Handelsregister Eindhoven nr. 39420
Nederlandse Philips Bedrijven B.V.

april 1991
Wijzigingen voorbehouden

Programma elektronica-onderdelen 1991

Marktgroep Philips Components Nederland

Herdruk april 1991
wijzigingen voorbehouden

Algemeen
General

Geïntegreerde schakelingen
Integrated circuits

Halfgeleiders
Discrete semiconductors

Electronenbuizen
Electron tubes

Condensatoren
Capacitors

Weerstanden
Resistors

Diversen
Miscellaneous

- Variable mains transformers
- Quartz crystal devices
- Loudspeakers
- Ferroxcube materials

SMD-ontwerpregels
Substrate design guidelines

IC
S
E
C
R
M
S

PHILIPS

PHILIPS

Voorkeurprogramma

Het "Voorkeurprogramma" is een courant programma elektronica-componenten. Het is ook een breed programma. Deze catalogus is daar het bewijs van. Het bevat een brede selectie uit het totaalprogramma electronika-componenten van Philips Components Nederland. Het voorkeurprogramma omvat alle gangbare typen en selekties en is afgestemd op de praktijk. Dit betekent dat u er uw produktie op kunt afstemmen. Richt u daarom op deze voorkeurselectie.

Uw contact met Philips Components Nederland

Indien u informatie nodig heeft over:

- prijzen
- leveringstijden
- technische produktinformatie
- monsterleveringen
- dokumentatie

dan kunt u kontakt opnemen met uw vaste kontaktpersoon van onze marktgroep Philips Components Nederland.

Natuurlijk kunt u ook terecht bij onze distributeurs.
Voor de adressen van de distributeurs zie overzicht achter in deze catalogus.

Voor resterende vragen kunt u terecht bij onze Distributie-coördinatiegroep, tel. 040 - 781187.

Distributie

Rechtstreekse leveringen uit het voorkeurprogramma door Marktgroep Philips Components Nederland zijn gebonden aan minimum bestelaantallen en eenheidsverpakkingen.

Uw distributeur heeft in principe het voorraadprogramma voor u klaar liggen. Het voorraadprogramma is een direct leverbare selectie uit het voorkeurprogramma. Naast de normale minimumbestelaantallen en eenheidsverpakkingen kan uw distributeur ook afwijkende aantallen uit het voorraad programma leveren.
Voorraadcomponenten zijn in deze catalogus met een (*) aangegeven (voor Integrated Circuits zie "Alphanumeric index"). U kunt ze rechtstreeks bestellen of eventueel afhalen bij de distributeur.

Voor de adressen van de distributeurs zie achterin deze catalogus.

Onderdelenprogramma

Philips Components Nederland BV levert een breed programma elektronica-onderdelen en componenten dat uitgebreid beschreven staat in onze data-handboeken.
Een programma dat nog elke dag in ontwikkeling is. Steeds weer nieuwe typen, geringere afmetingen, betere specificaties.
Hoewel we ons best doen om u op tijd van dienst te zijn, spreekt het vanzelf dat niet alle typen steeds direkt leverbaar zijn. Het volgende overzicht maakt u wegwijs in alle verschillende leveringsmogelijkheden.

Voorraadprogramma

Een selectie uit het voorkeurprogramma. In deze catalogus aangegeven met een sterretje (*) en in principe verkrijgbaar bij onze distributeurs.

Voorkeurprogramma

Omvat alle componenten in deze catalogus. Bestellingen van deze produkten zijn gebonden aan minimum besteleenheden.

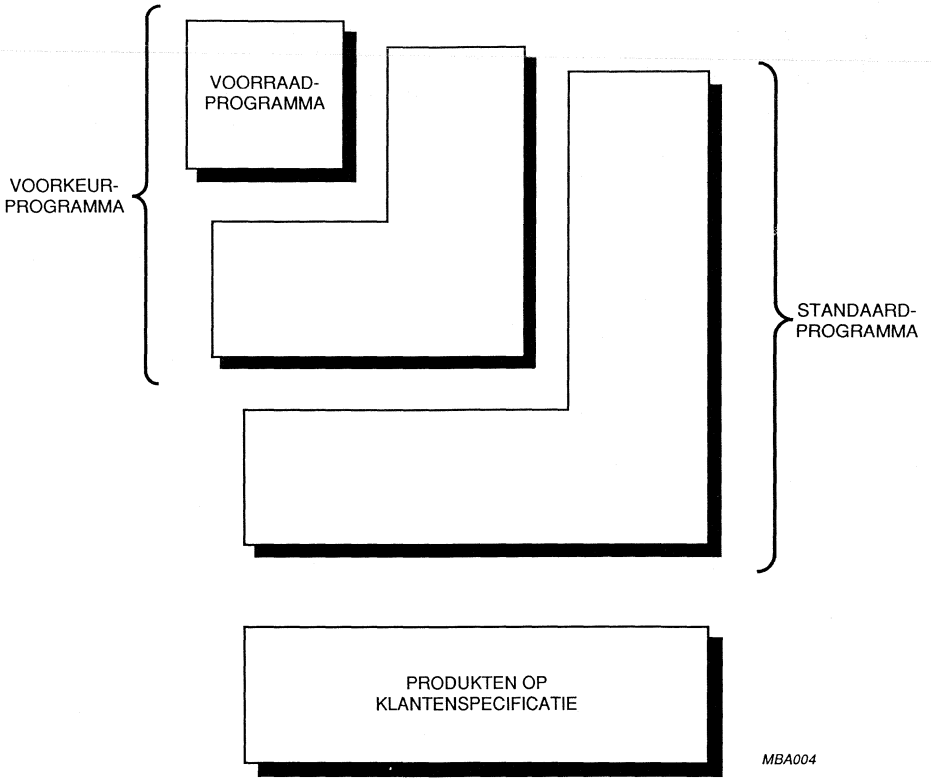
Produkten op order

Omvat alle overige in de handboeken gepubliceerde produkten. Op bestelling leverbaar.

Produkten op klantenspecificatie

Leveringstijd afhankelijk van het soort componenten en de gewenste specificaties.

Programma schema



Handboeken

Regelmatig verschijnen nieuwe en herziene uitgaven in de reeks handboeken.
Om u volledig op de hoogte te brengen van de stand van zaken op dit moment is achterin deze catalogus een overzicht opgenomen van de complete reeks. Elk door u gewenst deel kunt u ook betrekken van onze distributeurs. Zij hebben alle exemplaren voor u in voorraad. Abonnementen op complete series worden uitgevoerd door Philips Nederland B.V., Marktgroep Philips Components Nederland, afdeling Documentatie, Gebouw VB, Postbus 90050, 5600 PB Eindhoven, telefoon 040-782754,
telexnr. 51238, telefax 040-788399.

Overige informatie

TRANSFER–ORDERS

Indien dit een vlotte levering bevordert zullen wij uw order, uiteraard na uw voorafgaande goedkeuring, ter afhandeling doorsturen naar een onzer industriele distributeurs.
Hetzelfde geldt voor orders voor hoeveelheden die lager zijn dan het minimum bestelaantal.

BESTELLEN

Bestellingen gedaan bij de marktgroep Philips Components Nederland zijn gebonden aan een minimum besteleenheid of een veelvoud daarvan.
Op al onze aanbiedingen en leveringen zijn onze Algemene Verkoopvoorwaarden van toepassing, tenzij in offertes, orderbevestigingen of overeenkomsten anders is vermeld.
Deze verkoopvoorwaarden zijn gedeponeerd ter griffie van de Arrondissementsrechtbank te 's–Hertogenbosch en bij de Kamer van Koophandel en Fabrieken te Eindhoven; zij worden op aanvraag toegezonden.
Handelsregister Eindhoven no. 39420 Philips Nederland B.V.

ORDERKOSTEN

Voor orders lager dan f 500,– wordt een bedrag van f 20,– in rekening gebracht.

RETOURPROCEDURE

In geval van rechtstreekse leveringen gedaan door onze marktgroep Philips Components Nederland kunt u artikelen alleen terugzenden na ontvangst van begeleidingsdocumenten. Deze zullen u desgevraagd via uw contactpersoon bij Philips Components Nederland worden toegezonden na opgave van het factuurnummer en de datum.

STRATEGISCHE PRODUKTEN

Een aantal door Philips gefabriceerde producten wordt gerekend tot de strategische producten.
Op deze goederen is regelgeving ten aanzien van (re–)export van toepassing.
Indien tot (re–)export wordt overgegaan kan het nodig zijn dat hieraan voorafgaand door de desbetreffende overheid een exportvergunning verleend moet worden. Voor (re–)export gelieve u kontakt op te nemen met onze juridische afdeling (040–783381).
Bij wederverkoop binnen Nederland zullen deze voorwaarden blijven gelden.

Algemene verkoopvoorwaarden

ALGEMENE LEVERINGSVOORWAARDEN

1. Alle aanbiedingen van Philips Nederland B.V. (verder te noemen Philips) zijn vrijblijvend, tenzij in de schriftelijke aanbieding een geldigheidsduur is vermeld. Orders, overeenkomsten en afspraken zijn voor Philips eerst bindend, indien en voorzover zij door haar schriftelijk zijn bevestigd. Leveringstijden zijn vrijblijvend, tenzij anders is overeengekomen.

2. Indien in prijscouranten, aanbiedingen of orderbevestigingen niet anders is vermeld, zijn de door Philips opgegeven prijzen exclusief omzetbelasting of andere heffingen, welke in verband met de uitvoering van de overeenkomst zijn verschuldigd. Deze zijn geldend voor levering franco huis, met dien verstande dat orderkosten in rekening zullen worden gebracht voor orders beneden een nader vastgesteld bedrag volgens de ten tijde van de uitvoering van de order daartoe bij Philips geldende regeling.

3. Betalingen dienen zonder enige korting of compensatie te geschieden uiterlijk dertig dagen na factuurdatum, tenzij Philips anders bedingt. Indien de betalingen niet tijdig zijn ontvangen, wordt de afnemer geacht van rechtswege in verzuim te zijn en heeft Philips, onvermindert haar overige rechten, het recht aan de afnemer alle terzake van de incasso en de bewaring van haar rechten gemaakte kosten, waaropnder begrepen haar kosten van advocaten, in rekening te brengen.

4. Tot aan de algehele voldoening van de door afnemer aan Philips verschuldigde betalingen behoudt Philips de eigendom van alle door haar geleverde goederen, zulks tot zekerheid voor de betaling van al het hem toekomende niets uitgezonderd; de afnemer zal mitsdien de hem geleverde goederen zolang geen algehele betaling van het Philips toekomende heeft plaatsgevonden, niet mogen vervreemden, belenen, verpanden of onder hypothecair verband brengen, noch verhuren of uitlenen. De afnemer zal Philips terstond in staat stellen de geleverde goederen zonder dat een nadere ingebrekestelling of rechterlijke tussenkomst is vereist, terug te nemen.

5. De goederen zijn en reizen voor risico van Philips totdat zij in de feitelijke macht van de afnemer of een door deze ingeschakelde derde zijn overgegaan. Transportschade of manco's dienen door de afnemer onmiddellijk bij aankomst aan de vervoerder gemeld te worden met inachtneming van de daarvoor geldende aanwijzingen van Philips of van de vervoerder. Indien de afnemer zich hieraan niet houdt komt het risico van transportschade en van vermissing voor rekening van de afnemer.

6. Reclames over eventueel verkeerde uitvoering van bestellingen of over ondeugdelijke levering moet binnen acht dagen na ontvangst van de goederen worden ingediend.

7. Philips garandeert dat de door haar geleverde goederen van deugdelijk materiaal en met goed vakmanschap zijn vervaardigd. Mochten zich niettemin gebreken voordoen in de door Philips geleverde goederen als gevolg van fabricage- of materiaalfouten, dan zal Philips deze gebreken herstellen of doen herstellen of de voor herstel benodigde onderdelen beschikbaar stellen of het betrokken goed in zijn geheel vervangen al naar gelang en overeenkomstig de voor het betrokken artikel bij Philips geldende of bij ontstentenis daarvan usantiële garantievoorwaarden: voorzover uit de genoemde voorwaarden niet anders voortvloeit geldt de garantie gedurende drie maanden na aflevering. Tot enigerlei verdere verplichting, zoals schadevergoeding of ontbinding van de overeenkomst zal Philips nimmer gehouden zijn. Goederen of onderdelen daarvan, die ingevolge garantie of ingevolge een reparatieopdracht worden vervangen, worden daardoor het eigendom van Philips. Philips kan als voorwaarde voor de nakoming van haar garantieverplichtingen verlangen dat het voor garantie in aanmerking komende artikel franco aan haar of aan een door haar op te geven adres wordt toegezonden of dat een opdracht tot regelmatig onderhoud wordt gegeven. Bovengenoemde garantie geldt ook voor fouten in computerprogramma's, tenzij uitdrukkelijk anders schriftelijk is overeengekomen.

8. Philips-goederen mogen – behalve voor eigen gebruik – niet direct of indirect worden uitgevoerd naar landen die geen deel uitmaken van de Europese Economische Gemeenschap.

Algemene verkoopvoorwaarden (vervolg)

ALGEMENE LEVERINGSVOORWAARDEN (vervolg)

9. Philips garandeert dat de door haar geleverde goederen als zodanig geen inbreuk maken op de Nederlandse octrooirechten van derden. Indien niettemin door Philips moet worden erkend of door de Nederlandse rechter in een rechtsgeding tegen Philips in een niet of niet meer voor beroep vatbare beslissing wordt vastgelegd dat een door Philips geleverd goed wel inbreuk maakt op een Nederlands octrooirecht van een derde, zal Philips te harer keuze na overleg met de afnemer het betrokken goed vervangen door een goed dat geen inbreuk maakt op het betrokken octrooi of een licentierecht onder het betrokken Nederlandse octrooi verwerven dan wel het betrokken goed terugnemen tegen terugbetaling van de daarvoor betaalde prijs, verminderd met de normaal te achten afschrijvingen, zonder tot verdere schadevergoeding gehouden te zijn.

10. In geval een order uitgevoerd moet worden naar ontwerpen, tekeningen of andere aanwijzingen door of namens afnemer verstrekt, garandeert de afnemer dat daardoor geen industriële of andere rechten van derden worden aangetast.

11. Indien Philips een advies verstrekt, is zij aansprakelijk voor schade die het rechtstreekse gevolg is van een eventuele tekortkoming van dat advies, indien en voorzover de tekortkoming onder de gegeven omstandigheden en bij normale vakkennis en oplettendheid vermeden had behoren te worden en wel tot ten hoogste het bedrag van de afzonderlijk voor het adviesd bedongen vergoeding. In andere gevallen en voor andere schade als gevolg van door haar gegeven adviezen is Philips niet aansprakelijk.

12. Voorzover zulks elders in deze voorwaarden niet uitdrukkelijk anders is geregeld aanvaardt Philips aansprakelijkheid voor persoonlijk letsel en voor materiële schade aan installaties en eigendommen van afnemer en van derden tot ten hoogste f 1.000.000,– in totaal per gebeurtenis, voorzover het letsel of de schade is ontstaan tijdens de uitvoering van ingevolge de order te verrichten werkzaamheden of van onderhouds- of reparatiewerkzaamheden en het gevolg is van schuld van personen van wie Philips zich bij de uitvoering van die werkzaamheden bedient.

13. Voor enige directe of indirecte schade waarvoor Philips in deze voorwaarden de aansprakelijkheid niet uitdrukkelijk heeft aanvaard, zal Philips niet aansprakelijk zijn. Afnemer vrijwaart Philips te dezer zake tegen alle aanspraken van derden.

14. Alle afbeeldingen, tekeningen, gegevens betreffende gewichten, afmetingen, kleuren enz. opgenomen in prijscouranten en ciculaires gelden slechts bij benadering. Alle door Philips verstrekte aanbiedingen, tekeningen, schema's, ontwerpen, materiaallijsten enz. en door haar ter beschikking gestelde computerprogramma's blijven haar eigendom. Zij mogen zonder haar toestemming noch geheel noch gedeeltelijk worden gecopieerd anders dan voor intern gebruik bij de afnemer en zij mogen niet aan enige derde worden getoond, ter hand gesteld of op andere wijze worden bekend gemaakt, noch door de afnemer worden gebruikt of ter beschikking worden gesteld anders dan voor het doel, waarvoor zij door Philips verstrekt zijn.

15. Tenzij anders overeengekomen is, behoudt Philips zich het recht voor zonder voorafgaande kennisgeving verkoopprijzen, rabatten en verkoopvoorwaarden te veranderen en zijn op de dag van levering geldende prijzen, rabatten en verkoopvoorwaarden van kracht. De afnemer heeft het recht om in geval van verandering in prijzen, rabatten en overige verkoopvoorwaarden – behalve indien deze te zijnen voordele strekken – reeds gegeven orders voor zover nog niet afgeleverd, te annuleren binnen acht dagen na bekendmaking van deze veranderingen. Indien door enige overheidsmaatregel kostprijsverhogende belastingen, heffingen of invoerrechten worden ingevoerd of gewijzigd zal Philips het recht hebben deze wijzigingen door te berekenen, ook indien overeengekomen is dat de prijs vast zal zijn, zonder dat dit kan leiden tot annulering van gegeven orders door de afnemer.

16. Bij overmacht en bij andere omstandigheden van zodanige aard, dat naar redelijkheid en billijkheid nakoming van de overeenkomst van Philips niet kan worden gevergd, zal de uitvoering van de overeenkomst worden opgeschort dan wel, indien een dergelijke opschorting zes maanden heeft geduurd, de overeenkomst bij aangetekend schrijven kunnen worden beëindigd. Bij gedeeltelijke nakoming door Philips zal de afnemer een evenredig gedeelte van de totale prijs verschuldigd zijn.

Algemene verkoopvoorwaarden (vervolg)

ALGEMENE LEVERINGSVOORWAARDEN (vervolg)

17. Mocht de afnemer een van zijn verplichtingen jegens Philips niet nakomen, hetzij surseance van betaling aanvragen, hetzij geraken in staat van faillissement, dan heeft Philips het recht zonder dat nadere ingebrekestelling of rechterlijke tussenkomst vereist is alle met de betrokken afnemer gesloten overeenkomsten ontbonden te verklaren, onverminderd andere haar wettelijk toekomende rechten.

18. Afwijkingen van deze Algemene Leveringsvoorwaarden en/of van voorwaarden in prijscouranten, catalogi, circulaires e.d. van Philips zijn uitsluitend van kracht, indien deze door Philips schriftelijk zijn bevestigd. Eventuele inkoopvoorwaarden van afnemer gelden slechts in zoverre deze in overeenstemming zijn met deze Algemene Leveringsvoorwaarden.

19. Deze voorwaarden en de overeenkomsten waarop zij van toepassing zijn worden beheerst door Nederlands recht.

januari 1990

Integrated circuits

IC

INTEGRATED CIRCUITS

Data Handbook System

In the alphanumeric index (which appears in the second part of this section) reference is made to those IC data sheets or Data Handbooks in which comprehensive information is included.
These Handbooks are part of The Philips Data Handbook System which is a comprehensive source of information on electronic components, subassemblies and materials.
For this catalogue section the following Integrated Circuit Handbooks are of interest.

code	handbook title
Integrated circuits (purple series)	
IC01A	Radio, audio and associated systems - Bipolar, MOS (1990) CA 3089 - TDA 1510A
IC01B	Radio, audio and associated systems - Bipolar, MOS (1990) TDA 1512 - UA 758
IC02A	Video and associated systems - Bipolar, MOS type MAB8031AH - TDA 1521 (1989)
IC02B	Video and associated systems - Bipolar, MOS type TDA 1524A - TEA2000 (1989)
IC03	IC's for telephony - Bipolar, MOS (1989)
IC04	HE4000B Logic Family CMOS (1990)
IC05	Advanced low power schottky (1989)
IC06N	PC54/74HC/HCU/HCT Logic families HCMOS (1989)
IC07	Advanced CMOS logic ACL (1990)
IC07S	Supplement Advanced CMOS logic (1991)
IC08	10K and 100K logic families ECL (1991)
IC09N	TTL logic series (1986)
IC10	Memories MOS, TTL, ECL (1990)
IC11	Linear products (1989)
IC12A	I²C-bus compatible IC's deel 1 (1989)
IC12B	I²C-bus compatible IC's deel 2 (1989)
IC13	Semi-custom programmable logic divices (PLD) (1990)
IC14	Microcontrollers MOS (1991)
IC15	Fast TTL logic series (1990)
IC15 Suppl.	Fast TTL supplement (1991)
IC16	CMOS integrated circuits for clocks and watches (1989)
IC17	IC's for telecom, radiopagers, mobile telephones, ISDN (1989)
IC18	Microprocessors and peripherals (1986)
IC19	Data communication products (1988)
IC20	8051-Based 8-bit microcontrollers (1991)
IC23	Advanced BICMOS interface logic (1991)

INTEGRATED CIRCUITS

Contents

GENERAL PURPOSE

LOGIC IC5
CMOS HE4000B family specifications IC5
CMOS HE4000B family survey IC10
HCMOS PC74 family specifications IC15
HCMOS PC74 family survey IC23
ACL 74 family specifications IC29
ACL 74 family survey IC35
TTL family characteristics comparison IC41
TTL 74 series survey IC42
ECL 10 000 family specifications IC54
ECL 10 000 family survey IC56
ECL 100 000 family specifications IC60
ECL 100 000 family survey IC62
DIGITAL SIGNAL PROCESSORS IC65
MEMORIES IC66
EPROM IC66
EEPROM IC66
PROM IC67
RAM IC68
MICROCONTROLLERS IC69
CMOS 8-bit IC69
NMOS 8-bit IC74
Peripheral ICs IC76
MICROPROCESSORS IC78
Microprocessors IC78
Peripheral ICs IC78
AMPLIFIERS IC80
OPERATIONAL AMPLIFIERS (OP AMPS) IC81
COMPARATORS IC83
DATA CONVERSION (ADCs, DACs) IC84
DRIVERS IC85
RECEIVERS IC86
INTERFACES IC87
MOTOR CONTROL IC88
POSITION MEASUREMENT IC89
POWER SUPPLY ICs IC90
SAMPLE-AND-HOLD IC91
TIMERS IC92
DIGITAL CLOCKS IC93

APPLICATION-ORIENTED

DATA COMMUNICATIONS IC94
RADIO COMMUNICATIONS IC96
RADIO/AUDIO IC97
Amplifiers IC97
ARI system IC98
Audio ICs IC98
Clock/calendar IC98
Data conversion (ADCs, DACs) IC98
Display drivers IC99
Digital audio IC99
Frequency synthesizers IC100
I²C bus ICs IC100
Interference suppressors IC104
Memories IC104
Microcontrollers IC104
Motor controllers IC108
Personal radio/audio IC108
Radio receivers IC108
Remote controllers IC109
Remote I/O expanders IC109
Sound generator IC109

Stereo decoders IC110
Tuning ICs IC110
TELECOMMUNICATIONS IC111
Amplifiers IC111
Clock/calendar IC111
Data conversion (ADCs, DACs) IC111
Call progress decoder IC111
Listening-in IC111
Dialler ICs IC111
Display drivers IC112
I²C bus ICs IC112
Memories IC114
Microcontrollers IC115
Mobile telephones IC116
Power supply ICs IC118
Remote I/O expanders IC118

Speech-transmission IC118
Tone ringers IC119
Cordless telephones IC119
ISDN IC119
Radio pagers IC120

Contents

APPLICATION–ORIENTED (cont.)

VIDEO IC121
Amplifiers IC121
Camera ICs IC121
Clock/calendar IC121
Colour decoders IC121
Data conversion (ADCs, DACs) IC122
Digital processing IC123
Display drivers IC123
East–west correction IC124
I^2C bus ICs IC124
Memories IC128
Microcontrollers IC128
Power supply ICs IC132
Remote I/O expanders IC133
Remote controllers IC133
Small signal combination IC133
Sound ICs IC134
Sync processors IC135
Text systems IC136
Tuning circuits IC137
Video/audio switch IC137
Video games IC137
Vision IF ICs IC137

ASICS (Application Specific ICs) IC138

PLD IC138
PHD – programmable high–speed decoders IC138
PAL–type programmable array logic IC139
PLA – programmable logic arrays IC140
PLS – programmable logic sequencers IC141
PML – programmable macro logic IC142
PLD selection flow diagram IC144
CMOS SYSTEMGATE IC146
CMOS SYSTEMGATE II IC146
CMOS SEA OF GATES IC147
CMOS SYSTEMCELL II IC149

ALPHANUMERIC INDEX IC150
Explanation IC150
Package information IC151
Alphanumeric index IC153

CMOS HE4000B FAMILY SPECIFICATIONS

The LOCMOS HE4000B range is a fully buffered digital integrated circuit family which meets the Jedec–B specification. The members of this family are plug–in replacements for the well–known CMOS 4000 and 14500 ranges.

The HE family has the same advantages as conventional CMOS circuits, plus the additional LOCMOS advantages.

Advantages of CMOS

- low power dissipation – typically 10 nW per gate (static)
- wide operating supply voltage range
- wide operating temperature ranges:
  −40 to +85 °C for standard temperature range (HEF)
  −55 to +125 °C for extended temperature range (HEC)
- high DC fan–out
- inputs and outputs are protected against electrostatic voltages

IC

In addition to these, the **LOCMOS HE4000B** range has:

- buffered outputs on **all** circuits
- higher speed
- higher packing density – essential for MSI/LSI
- excellent noise immunity

Recommended supply voltage range 3 to 15 V.

LOCMOS means Local Oxidation Complementary MOS

Inputs and outputs are protected against electrostatic effects in a wide variety of device–handling situations. However, to be totally safe, handling precautions should be taken into account.

Type number designation

Type numbers have a suffix which signifies the type of package and burn–in option.

HE*4000**** complete type number which can be split up as follows:

HE* 4000 ** * * *

B	= burn–in
P	= plastic DIL
T	= plastic mini–pack (SO)
D	= ceramic (cerdip) DIL
U	= uncased chip
B	= buffered
UB	= unbuffered
V	= limited operating voltage
F	= T_{amb}: −40 to +85 °C
C	= T_{amb}: −55 to +125 °C

CMOS HE4000B FAMILY SPECIFICATIONS (cont.)

The HE family is designed with standardized output drive characteristics which, combined with relative intensitivity to output capacitance loading, simplify system design.

Family ratings

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Supply voltage range	V_{DD} −0,5 to +18 V
Voltage on any input	V_I −0,5 to (V_{DD} +0,5) V
DC current into any input or output	±I max. 10 mA
Power dissipation per package:	
HEF (plastic and ceramic DIL)	
T_{amb} = −40 to +70 °C	P_{tot} max. 500 mW
T_{amb} = +70 to +85 °C	derate linearly by 8 mW/K
HEF (plastic SO mini-pack)	
T_{amb} = −40 to +70 °C	P_{tot} max. 400 mW
T_{amb} = +70 to +85 °C	derate linearly by 6 mW/K
HEC (ceramic DIL)	
T_{amb} = −55 to +70 °C	P_{tot} max. 500 mW
T_{amb} = +70 to +125 °C	derate linearly by 8 mW/K
Power dissipation per output	P max. 100 mW
Operating ambient temperature range	T_{amb} −40 to +85 °C
Storage temperature range	T_{stg} −65 to +150 °C
Operating ambient temperature range	
HEF	T_{amb} −55 to +85 °C
HEC	T_{amb} −55 to +125 °C

DC family characteristics for HEF at V_{SS} = 0 V

parameter	symbol	T_{amb} = −40 °C		T_{amb} = +25 °C		T_{amb} = +85 °C		V_{DD}	conditions
		min.	max.	min.	max.	min.	max.	V	
Quiescent device current for gates	I_{DD} (μA)	–	1.0	–	1.0	–	7.5	5	all valid input combinations; V_I = V_{SS} or V_{DD}; I_O = 0
		–	2.0	–	2.0	–	15.0	10	
		–	4.0	–	4.0	–	30.0	15	
Quiescent device current for buffers and flip-flops	I_{DD} (μA)	–	4.0	–	4.0	–	30	5	all valid input combinations; V_I = V_{SS} or V_{DD}; I_O = 0
		–	8.0	–	8.0	–	60	10	
		–	16.0	–	16.0	–	120	15	
Quiescent device current for MSI	I_{DD} (μA)	–	20	–	20	–	150	5	all valid input combinations; V_I = V_{SS} or V_{DD}; I_O = 0
		–	40	–	40	–	300	10	
		–	80	–	80	–	600	15	

DC family characteristicsfor HEF at V_{SS} = 0 (cont.)

parameter	symbol	T_{amb} = −40 °C min.	T_{amb} = −40 °C max.	T_{amb} = +25 °C min.	T_{amb} = +25 °C max.	T_{amb} = +85 °C min.	T_{amb} = +85 °C max.	V_{DD} V	conditions
Quiescent device current for LSI	I_{DD} (μA)	–	50	–	50	–	375	5	all valid input combinations; $V_I = V_{SS}$ or V_{DD}; $I_O = 0$
		–	100	–	100	–	750	10	
		–	200	–	200	–	1500	15	
Output voltage LOW $\|I_O\| < 1$ μA	V_{OL} (V)	–	0.05	–	0.05	–	0.05	5	$V_I = V_{SS}$ or V_{DD}
		–	0.05	–	0.05	–	0.05	10	$V_I = V_{SS}$ or V_{DD}
		–	0.05	–	0.05	–	0.05	15	$V_I = V_{SS}$ or V_{DD}
Output voltage HIGH $\|I_O\| < 1$ μA	V_{OH} (V)	4.95	–	4.95	–	4.95	–	5	$V_I = V_{SS}$ or V_{DD}
		9.95	–	9.95	–	9.95	–	10	$V_I = V_{SS}$ or V_{DD}
		14.95	–	14.95	–	14.95	–	15	$V_I = V_{SS}$ or V_{DD}
Input voltage LOW $\|I_O\| < 1$ μA (buffered stages only)	V_{IL} (V)	–	1.5	–	1.5	–	1.5	5	V_O = 0.5 or 4.5 V
		–	3.0	–	3.0	–	3.0	10	V_O = 1.0 or 9.0 V
		–	4.0	–	4.0	–	4.0	15	V_O = 1.5 or 13.5 V
Input voltage HIGH $\|I_O\| < 1$ μA (buffered stages only)	V_{IH} (V)	3.5	–	3.5	–	3.5	–	5	V_O = 0.5 or 4.5 V
		7.0	–	7.0	–	7.0	–	10	V_O = 1.0 or 9.0 V
		11.0	–	11.0	–	11.0	–	15	V_O = 1.5 or 13.5 V
Input voltage LOW $\|I_O\| < 1$ μA (unbuffered stages only)	V_{IL} (V)	–	1.0	–	1.0	–	1.0	5	V_O = 0.5 or 4.5 V
		–	2.0	–	2.0	–	2.0	10	V_O = 1.0 or 9.0 V
		–	2.5	–	2.5	–	2.5	15	V_O = 1.5 or 13.5 V
Input voltage HIGH $\|I_O\| < 1$ μA (unbuffered stages only)	V_{IH} (V)	4.0	–	4.0	–	4.0	–	5	V_O = 0.5 or 4.5 V
		8.0	–	8.0	–	8.0	–	10	V_O = 1.0 or 9.0 V
		12.5	–	12.5	–	12.5	–	15	V_O = 1.5 or 13.5 V
Output (sink) current LOW	I_{OL} (mA)	0.52	–	0.44	–	0.36	–	5	V_O=0.4; V_I=0/5 V
		1.3	–	1.1	–	0.9	–	10	V_O=0.5; V_I=0/10 V
		3.6	–	3.0	–	2.4	–	15	V_O=1.5; V_I=0/15 V
Output (source) current HIGH	$-I_{OH}$ (mA)	0.52	–	0.44	–	0.36	–	5	V_O=4.6; V_I=0/5 V
		1.3	–	1.1	–	0.9	–	10	V_O=9.5; V_I=0/10 V
		3.6	–	3.0	–	2.4	–	15	V_O=13.5; V_I=0/15 V
Output (source) current (HIGH)	$-I_{OH}$ (mA)	1.7	–	1.4	–	1.1	–	5	V_O=2.5; V_I=0/5 V
Input leakage current	$\pm I_{IN}$(μA)	–	0.3	–	0.3	–	1.0	15	V_I = 0 or 15 V
3–state output leakage current HIGH	I_{OZH} (μA)	–	1.6	–	1.6	–	12.0	15	output returned to V_{DD}
3–state output leakage current LOW	$-I_{OZL}$ (μA)	–	1.6	–	1.6	–	12.0	15	output returned to V_{SS}
Input capacitance per unit load	C_I (pF)	–	–	–	7.5	–	–	–	digital inputs

IC

DC family characteristics for HEC at V_{SS} = 0 V

parameter	symbol	T_{amb} = −55 °C min.	T_{amb} = −55 °C max.	T_{amb} = +25 °C min.	T_{amb} = +25 °C max.	T_{amb} = +125 °C min.	T_{amb} = +125 °C max.	V_{DD} V	conditions
Quiescent device current for gates	I_{DD} (μA)	–	0.25	–	0.25	–	7.5	5	all valid input combinations; $V_I = V_{SS}$ or V_{DD}; $I_O = 0$
		–	0.5	–	0.5	–	15.0	10	
		–	1.0	–	1.0	–	30.0	15	
Quiescent device current for buffers and flip–flops	I_{DD} (μA)	–	1.0	–	1.0	–	30	5	all valid input combinations; $V_I = V_{SS}$ or V_{DD}; $i_O = 0$
		–	2.0	–	2.0	–	60	10	
		–	4.0	–	4.0	–	120	15	
Quiescent device current for MSI	I_{DD} (μA)	–	5.0	–	5.0	–	150	5	all valid input combinations; $V_I = V_{SS}$ or V_{DD}; $I_O = 0$
		–	10.0	–	10.0	–	300	10	
		–	20.0	–	20.0	–	600	15	
Quiescent device current for LSI	I_{DD} (μA)	–	15	–	15	–	375	5	all valid input combinations; $V_I = V_{SS}$ or V_{DD}; $I_O = 0$
		–	25	–	25	–	750	10	
		–	50	–	50	–	1500	15	
Output voltage LOW $\lvert I_O \rvert < 1$ μA	V_{OL} (V)	–	0.05	–	0.05	–	0.05	5	$V_I = V_{SS}$ or V_{DD}
		–	0.05	–	0.05	–	0.05	10	$V_I = V_{SS}$ or V_{DD}
		–	0.05	–	0.05	–	0.05	15	$V_I = V_{SS}$ or V_{DD}
Output voltage HIGH $\lvert I_O \rvert < 1$ μA	V_{OH} (V)	4.95	–	4.95	–	4.95	–	5	$V_I = V_{SS}$ or V_{DD}
		9.95	–	9.95	–	9.95	–	10	$V_I = V_{SS}$ or V_{DD}
		14.95	–	14.95	–	14.95	–	15	$V_I = V_{SS}$ or V_{DD}
Input voltage LOW $\lvert I_O \rvert < 1$ μA (buffered stages only)	V_{IL} (V)	–	1.5	–	1.5	–	1.5	5	V_O = 0.5 or 4.5 V
		–	3.0	–	3.0	–	3.0	10	V_O = 1.0 or 9.0 V
		–	4.0	–	4.0	–	4.0	15	V_O = 1.5 or 13.5 V
Input voltage HIGH $\lvert I_O \rvert < 1$ μA (buffered stages only)	V_{IH} (V)	3.5	–	3.5	–	3.5	–	5	V_O = 0.5 or 4.5 V
		7.0	–	7.0	–	7.0	–	10	V_O = 1.0 or 9.0 V
		11.0	–	11.0	–	11.0	–	15	V_O = 1.5 or 13.5 V

DC family characteristicsfor HEC at V_{SS} = 0 (cont.)

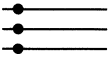
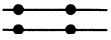
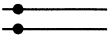
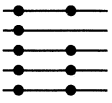
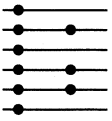
parameter	symbol	T_{amb} = −55 °C min.	T_{amb} = −55 °C max.	T_{amb} = +25 °C min.	T_{amb} = +25 °C max.	T_{amb} = +125 °C min.	T_{amb} = +125 °C max.	V_{DD} V	conditions
Input voltage LOW $\|I_O\| < 1$ µA (unbuffered stages only)	V_{IL} (V)	– – –	1.0 2.0 2.5	– – –	1.0 2.0 2.5	– – –	1.0 2.0 2.5	5 10 15	V_O = 0.5 or 4.5 V V_O = 1.0 or 9.0 V V_O = 1.5 or 13.5 V
Input voltage HIGH $\|I_O\| < 1$ µA (unbuffered stages only)	V_{IH} (V)	4.0 8.0 12.5	– – –	4.0 8.0 12.5	– – –	4.0 8.0 12.5	– – –	5 10 15	V_O = 0.5 or 4.5 V V_O = 1.0 or 9.0 V V_O = 1.5 or 13.5 V
Output (sink) current LOW	I_{OL} (mA)	0.64 1.6 4.2	– – –	0.5 1.3 3.4	– – –	0.36 0.9 2.4	– – –	5 10 15	V_O = 0.4; V_I=0/5 V V_O = 0.5; V_I=0/10 V V_O = 1.5; V_I=0/15 V
Output (source) current HIGH	$-I_{OH}$ (mA)	0.64 1.6 4.2	– – –	0.5 1.3 3.4	– – –	0.36 0.9 2.4	– – –	5 10 15	V_O = 4.6; V_I=0/5 V V_O = 9.5; V_I=0/10 V V_O = 13.5; V_I=0/15 V
Output (source) current (HIGH)	$-I_{OH}$ (mA)	1.7	–	1.4	–	1.1	–	5	V_O = 2.5; V_I=0/5 V
Input leakage current	$\pm I_{IN}$(µA)	–	0.3	–	0.3	–	1.0	15	V_I = 0 or 15 V
3–state output leakage current HIGH	I_{OZH} (µA)	–	1.6	–	1.6	–	12.0	15	output returned to V_{DD}
3–state output leakage current LOW	$-I_{OZL}$ (µA)	–	1.6	–	1.6	–	12.0	15	output returned to V_{SS}
Input capacitance per unit load	C_I (pF)	–	–	–	7.5	–	–	–	digital inputs

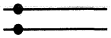
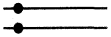
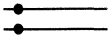
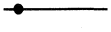
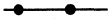
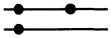
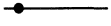
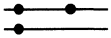
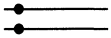
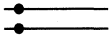
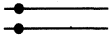
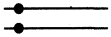
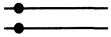
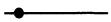
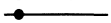
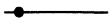
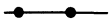
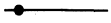
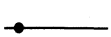
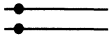
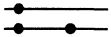
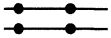
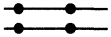
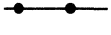
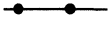
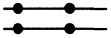
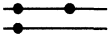
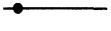
CMOS HE4000B FAMILY SURVEY

Type numbers have a suffix which signifies the type of package and burn–in option:
P = plastic DIL; D = ceramic (cerdip) DiL; T = plastic SO mini–pack;
U = uncased chip; 2nd B = burn–in

HE4000B FAMILY		HEF	HEC
ARITHMETIC ICs			
4008B	4–bit binary full adder	●	
4531B	13–input parity checker/generator	●	
BUFFERS			
4007UB	dual complementary pair and inverter	●	●
4041B	quadruple true/complement buffer	●	
4049B	hex inverting buffers	●	●
4050B	hex non–inverting buffers	●	●
4502B	strobed hex inverter/buffer	●	
40097B	3–state hex non–inverting buffer	●	●
40098B	3–state hex inverting buffer	●	●
40240B	octal inverting buffers with 3–state outputs	●	
40244B	octal buffers with 3–state outputs	●	
BUS ICs			
40245B	octal bus transceiver with 3–state outputs	●	
COMPARATORS			
4585B	4–bit magnitude comparator	●	●
COUNTERS			
4017B	5–stage Johnson counter	●	●
4018B	presettable divide–by–n counter	●	
4020B	14–stage binary counter	●	●
4022B	4–stage divide–by–8 Johnson counter	●	
4024B	7–stage binary counter	●	●
4029B	synchronous up/down counter, binary/decade counter	●	
4040B	12–stage binary counter	●	●
4059B	programmable divide–by–n counter	●	
4060B	14–stage ripple–carry binary counter/divider and oscillator	●	
4510B	BCD up/down counter	●	●
4516B	binary up/down counter	●	
4518B	dual BCD counter	●	
4520B	dual binary counter	●	●
4521B	24–stage frequency divider	●	
4522B	programmable 4–bit BCD down counter	●	
4526B	programmable 4–bit binary down counter	●	
4534B	real time 5–decade counter	●	
4737B	quadruple static decade counter	●	
4737V	quadruple static decade counter	●	
4751V	universal divider	●	●
40160B	4–bit synchronous decade counter; asynchronous reset	●	

HE4000B FAMILY		HEF	HEC
COUNTERS (cont.)			
40161B	4–bit synchronous binary counter; asynchronous reset	●	
40162B	4–bit synchronous decade counter; synchronous reset	●	
40163B	4–bit synchronous binary counter; synchronous reset	●	
40192B	4–bit up/down decade counter	●	
40193B	4–bit up/down binary counter	●	
DECODERS			
4028B	1–of–10 decoder	●	
4511B	BCD to 7–segment latch/decoder/driver	●	●
4514B	1–of–16 decoder/demultiplexer with input latches	●	
4515B	1–of–16 decoder/demultiplexer with input latches	●	
4543B	BCD to 7–segment latch/decoder/driver	●	
4555B	dual 1–of–4 decoder/demultiplexer	●	
4556B	dual 1–of–4 decoder/demultiplexer	●	●
DEMULTIPLEXERS			
4051B	8–channel analogue multiplexer/demultiplexer	●	●
4052B	dual 4–channel analogue multiplexer/demultiplexer	●	
4053B	triple 2–channel analogue multiplexer/demultiplexer	●	
4067B	16–channel analogue multiplexer/demultiplexer	●	
4514B	1–of–16 decoder/demultiplexer with input latches	●	
4515B	1–of–16 decoder/demultiplexer with input latches	●	
4555B	dual 1–of–4 decoder/demultiplexer	●	
4556B	dual 1–of–4 decoder/demultiplexer	●	●
DRIVERS			
4511B	BCD to 7–segment latch/decoder/driver	●	●
4543B	BCD to 7–segment latch/decoder/driver	●	
ENCODERS			
4532B	8–input priority encoder	●	
FLIP–FLOPS			
D–type			
4013B	dual D–type flip–flop	●	●
40174B	hex D–type flip–flop	●	●
40175B	quadruple D–type flip–flop	●	●
40374B	octal D–type flip–flop with 3–state outputs	●	
JK			
4027B	dual JK flip–flop	●	●

HE4000B FAMILY		HEF HEC
GATES		
AND		
4073B	triple 3–input AND gate	
4081B	quadruple 2–input AND gate	
AND		
4082B	dual 4–input AND gate	
4085B	dual 2–wide 2–input AND–OR–invert gate	
4086B	4–wide 2–input AND–OR–invert gate	
Complex		
4030B	quadruple EXCLUSIVE–OR gate	
4070B	quadruple EXCLUSIVE–OR gate	
4077B	quadruple EXCLUSIVE–NOR gate	
4085B	dual 2–wide 2–input AND–OR–invert gate	
4086B	4–wide 2–input AND–OR–invert gate	
EXCLUSIVE–OR		
4030B	quadruple EXCLUSIVE–OR gate	
4070B	quadruple EXCLUSIVE–OR gate	
EXCLUSIVE–NOR		
4077B	quadruple EXCLUSIVE–NOR gate	
Inverter		
4085B	dual 2–wide 2–input AND–OR–invert gate	
4086B	4–wide 2–input AND–OR–invert gate	
NAND		
4011B	quadruple 2–input NAND gate	
4011UB	quadruple 2–input NAND gate; unbuffered	
4012B	dual 4–input NAND gate	
4023B	triple 3–input NAND gate	
4068B	8–input NAND gate	
NOR		
4000B	dual 3–input NOR gate and inverter	
4001B	quadruple 2–input NOR gate	
4001UB	quadruple 2–input NOR gate; unbuffered	
4002B	dual 4–input NOR gate	
4025B	triple 3–input NOR gate	
4078B	8–input NOR gate	

HE4000B FAMILY		HEF HEC
GATES (cont.)		
OR		
4071B	quadruple 2–input OR gate	
4072B	dual 4–input OR gate	
4075B	triple 3–input OR gate	
4085B	dual 2–wide 2–input AND–OR–invert gate	
4086B	4–wide 2–input AND–OR–invert gate	
INVERTERS		
4007UB	dual complementary pair and inverter	
4069UB	hex inverter	
4502B	strobed hex inverter/buffer	
LATCHES		
4042B	quadruple D–latch	
4043B	quadruple R/S latch with 3–state outputs	
4044B	quadruple R/S latch with 3–state outputs	
4508B	dual 4–bit latch	
4511B	BCD to 7–segment latch/decoder/driver	
4543B	BCD to 7–segment latch/decoder/driver	
4724B	8–bit addressable latch	
40373B	octal transparent latch with 3–state output	
MEMORIES		
4505B	64–bit, 1–bit per word static read/write RAM	
4720B	256–bit, 1–bit per word RAM	
4720V	256–bit, 1–bit per word RAM	
MULTIPLEXERS		
4019B	quadruple 2–input multiplexer	
4051B	8–channel analogue multiplexer/demultiplexer	
4052B	dual 4–channel analogue multiplexer/demultiplexer	
4053B	triple 2–channel analogue multiplexer/demultiplexer	
4067B	16–channel analogue multiplexer/demultiplexer	
4512B	8–input multiplexer with 3–state output	
4519B	quadruple 2–input multiplexer	
4539B	dual 4–input multiplexer	
MULTIVIBRATORS		
Astable		
4047B	monostable/astable multivibrator	
Monostable		
4047B	monostable/astable multivibrator	
4528B	dual monostable multivibrator	
4538B	dual precision monostable multivibrator	

IC

HE4000B FAMILY		HEF	HEC
REGISTERS			
4006B	18–stage static shift register	●	
4014B	8–bit static shift register	●	●
4015B	dual 4–bit static shift register	●	●
4021B	8–bit static shift register	●	
4031B	64–stage static shift register	●	
4035B	4–bit universal shift register	●	●
4076B	quadruple D–type register with 3–state outputs	●	
4094B	8–stage shift–and–store bus register	●	●
4517B	dual 64–bit static shift register	●	
4557B	1–to–64 bit variable length shift register	●	●
4731B	quadruple 64–bit static shift register	●	
4731V	quadruple 64–bit static shift register	●	
40194B	4–bit bidirectional universal shift register	●	●
40195B	4–bit universal shift register	●	●
SCHMITT TRIGGERS			
4093B	quadruple 2–input NAND Schmitt trigger	●	●
40106B	hex inverting Schmitt trigger	●	
SPECIAL FUNCTIONS			
4046B	phase–locked loop	●	
4104B	quadruple low–to–high voltage translator with 3–state outputs	●	
4527B	BCD rate multiplier	●	
4738V	IEC/IEEE bus interface	●	
4750V	frequency synthesizer	●	●
4752V	AC motor control circuit	●	
4754V	18–element bar graph LCD driver	●	
4755V	transceiver for serial data communication	●	
SWITCHES			
4016B	quadruple bilateral switches	●	●
4066B	quadruple bilateral switches	●	●
TIMING CIRCUITS			
4541B	programmable timer	●	●
4753B	universal timer module	●	

HCMOS PC74 FAMILY SPECIFICATIONS

General

These specifications cover the electrical ratings and characteristics that are common to the entire HCMOS PC74 family, unless otherwise specified in the data sheet of an individual device.

Introduction

The HCMOS family of logic ICs is manufactured using a self–aligning 3 µm polycrystalline silicon–gate CMOS process combined with local oxidation of silicon (LOCOS). HCMOS ICs have the low power consumption, high immunity to input noise and wide operating temperature range of earlier silicon–gate CMOS circuits together with the high–speed and drive capability of bipolar, low–power Schottky TTL (LSTTL). They are also immune to latch–up and all types are available in DIL packages and in space–saving SO packages.

Many HCMOS circuits are pin–compatible with existing 54/74 LSTTL and HE4000B CMOS logic ICs. HCT types are ideal replacements for LSTTL. HCT types can also interface between TTL and CMOS ICs.

Three types of HCMOS ICs are available:

74HC CMOS input switching levels 30%V_{CC} and 70%V_{CC} (typical switching threshold 50%V_{CC}), supply voltage 2 V to 6 V

74HCT TTL input switching levels 0,8 V and 2 V (typical switching threshold 28%V_{CC}), supply voltage 5 V ±10%

74HCU CMOS input switching levels 20%V_{CC} and 80%V_{CC} (typical switching threshold 50%V_{CC}), supply voltage 2 V to 6 V; unbuffered to allow operation in the linear mode

The HCMOS family also includes several complex circuits for switching or multiplexing analog signals. These circuits have low crosstalk and feedthrough, and a very large frequency bandwidth. There are also two FIFOs and two PLLs in the HCMOS range, of which one (HC/HCT297) is a fully digital type.

Handling MOS devices

Inputs and outputs are protected against electrostatic effects in a wide variety of device–handling situations. However, to be totally safe, it is desirable to take handling precautions into account.

HCMOS features

- Very low power dissipation
- The switching levels of 74HC types are 30% and 70% of V_{CC}
- DC noise margin of 74HC types three times that of TTL ICs
- Logic output levels 0,1 V and V_{CC} – 0,1 V
- All types, except 74HCU are fully buffered
- Typical gate propogation delay of 8 ns
- Can operate up to 60 MHz (typical)
- Fanout capability of 10 LSTTL loads (4 mA); this is increased to 15 LSTTL loads (6 mA) for types with bus–driver outputs
- Wide supply voltage range
- Latch–up free
- Inputs protected against electrostatic discharge
- Functions and pinning identical to most popular LSTTL and CMOS HE4000B families
- Analog switching types operating up to 10 V
- Symmetrical output sourcing and sinking currents and equal output rise and fall times
- All types available in plastic SO packages for surface mounting and plastic DIL packages
- Choice of operating temperature range: –40 to +85 °C or –40 to +125 °C
- Approved to JEDEC standard No. 7A
- Alternate source is RCA

Type number designation

Basic family:

PC74*** ***** * complete type number; standard and extended temperature ranges

PC74*** ***** *

- * package code:
  - P = plastic DIL;
  - T = plastic mini-pack (SO)
- ***** device number (up to 5 digits)
- *** HC = CMOS input switching levels; supply voltage range 2 to 6 V; fully buffered
  - HCT = TTL input switching levels; supply voltage range 5 V ± 10%; fully buffered
  - HCU = CMOS input switching levels; supply voltage range 2 to 6 V; unbuffered (single-stage devices)

Family ratings

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Voltages are referenced to GND (ground = 0 V)

parameter	conditions	symbol	min.	max.	unit
DC supply voltage		V_{CC}	−0.5	+7	V
DC input diode current	for $V_I < -0.5$ V or $V_I > V_{CC}+0.5$ V	$\pm I_{IK}$	–	20	mA
DC output diode current	for $V_O < -0.5$ V or $V_O > V_{CC}+0.5$ V	$\pm I_{OK}$	–	20	mA
DC output source or sink current	for -0.5 V $< V_O <$ $V_{CC}+0.5$ V				
	standard outputs	$\pm I_O$	–	25	mA
	bus driver outputs	$\pm I_O$	–	35	mA
DC V_{CC} or GND current	standard outputs	$\pm I_{CC}$; $\pm I_{GND}$	–	50	mA
	bus driver outputs	$\pm I_{CC}$; $\pm I_{GND}$	–	70	mA
Storage temperature range		T_{stg}	−65	+150	°C
Power dissipation per package	for temperature range; −40 to +125 °C; PC74HC/HCT/HCU				
plastic DIL	above +70 °C derate linearly by 12 mW/K	P_{tot}	–	750	mW
plastic mini-pack (SO)	above +70 °C derate linearly by 8 mW/K	P_{tot}	–	500	mW

Recommended operating conditions

Voltages are referenced to GND (ground = 0 V)

parameter	symbol	min.	typ.	max.	unit	conditions
DC supply voltage range						
PC74HC/HCU	V_{CC}	2.0	5.0	6.0	V	
PC74HCT	V_{CC}	4.5	5.0	5.5	V	
DC input voltage range	V_I	0	–	V_{CC}	V	
DC output voltage range	V_O	0	–	V_{CC}	V	
Operating ambient temperature range						
PC74HC/HCT/HCU	T_{amb}	−40	–	+85	°C	standard
PC74HC/HCT/HCU	T_{amb}	−40	–	+125	°C	extended
Input rise and fall times		–	–	1000	ns	V_{CC} = 2.0 V
except for Schmitt trigger inputs	t_r; t_f	–	6.0	500	ns	V_{CC} = 4.5 V
		–	–	400	ns	V_{CC} = 6.0 V

DC family characteristics, PC74HC

Voltages are referenced to GND (ground = 0 V)

	V_{CC}		T_{amb} (°C)								conditions	
			+25			−40 to +85		−40 to +125				
parameter	V	symbol	min.	typ.	max.	min.	max.	min.	max.	unit	V_I	other
HIGH level input voltage	2.0	V_{IH}	1.5	1.2	–	1.5	–	1.5	–	V		
	4.5		3.15	2.4	–	3.15	–	3.15	–	V		
	6.0		4.2	3.2	–	4.2	–	4.2	–	V		
LOW level input voltage	2.0	V_{IL}	–	0.8	0.5	–	0.5	–	0.5	V		
	4.5		–	2.1	1.35	–	1.35	–	1.35	V		
	6.0		–	2.8	1.8	–	1.8	–	1.8	V		
HIGH level output voltage all outputs	2.0	V_{OH}	1.9	2.0	–	1.9	–	1.9	–	V	V_{IH}	$-I_O$ = 20 µA
	4.5		4.4	4.5	–	4.4	–	4.4	–	V	or	$-I_O$ = 20 µA
	6.0		5.9	6.0	–	5.9	–	5.9	–	V	V_{IL}	$-I_O$ = 20 µA
HIGH level output voltage standard	4.5	V_{OH}	3.98	4.32	–	3.84	–	3.7	–	V	V_{IH}	$-I_O$ = 4.0 mA
	6.0		5.48	5.81	–	5.34	–	5.2	–	V	or	$-I_O$ = 5.2 mA
											V_{IL}	
HIGH level output voltage bus driver	4.5	V_{OH}	3.98	4.32	–	3.84	–	3.7	–	V	V_{IH}	$-I_O$ = 6.0 mA
	6.0		5.48	5.81	–	5.34	–	5.2	–	V	or	$-I_O$ = 7.8 mA
											V_{IL}	
LOW level output voltage all outputs	2.0	V_{OL}	–	0	0.1	–	0.1	–	0.1	V	V_{IH}	I_O = 20 µA
	4.5		–	0	0.1	–	0.1	–	0.1	V	or	I_O = 20 µA
	6.0		–	0	0.1	–	0.1	–	0.1	V	V_{IL}	I_O = 20 µA
LOW level output voltage standard	4.5	V_{OL}	–	0.15	0.26	–	0.33	–	0.4	V	V_{IH}	I_O = 4.0 mA
	6.0		–	0.16	0.26	–	0.33	–	0.4	V	or	I_O = 5.2 mA
											V_{IL}	
LOW level output voltage bus driver	4.5	V_{OL}	–	0.15	0.26	–	0.33	–	0.4	V	V_{IH}	I_O = 6.0 mA
	6.0		–	0.16	0.26	–	0.33	–	0.4	V	or	I_O = 7.8 mA
											V_{IL}	
Input leakage current	6.0	$\pm I_I$	–	–	0.1	–	1.0	–	1.0	µA	V_{CC} or GND	
3–state OFF–state current	6.0	$\pm I_{OZ}$	–	–	0.5	–	5.0	–	10.0	µA	V_{IH} or V_{IL}	V_O = V_{CC} or GND
Quiescent supply current												
SSI	6.0	I_{CC}	–	–	2.0	–	20.0	–	40.0	µA	V_{CC}	I_O = 0
flip–flops	6.0	I_{CC}	–	–	4.0	–	40.0	–	80.0	µA	or	I_O = 0
MSI	6.0	I_{CC}	–	–	8.0	–	80.0	–	160.0	µA	GND	I_O = 0
LSI	6.0	I_{CC}	–	–	50.0	–	500.0	–	1000.0	µA	GND	I_O = 0

IC

DC family characteristics, PC74HCU

Voltages are referenced to GND (ground = 0 V)

			T_{amb} (°C)									
			+25			−40 to +85		−40 to +125			conditions	
parameter	V_{CC} V	symbol	min.	typ.	max.	min.	max.	min.	max.	unit	V_I	other
HIGH level input voltage	2.0	V_{IH}	1.7	1.4	–	1.7	–	1.7	–	V		
	4.5		3.6	2.6	–	3.6	–	3.6	–	V		
	6.0		4.8	3.4	–	4.8	–	4.8	–	V		
LOW level input voltage	2.0	V_{IL}	–	0.6	0.3	–	0.3	–	0.3	V		
	4.5		–	1.9	0.9	–	0.9	–	0.9	V		
	6.0		–	2.6	1.2	–	1.2	–	1.2	V		
HIGH level output voltage	2.0	V_{OH}	1.8	2.0	–	1.8	–	1.8	–	V	V_{IH} or V_{IL}	$-I_O$ = 20 µA
	4.5		4.0	4.5	–	4.0	–	4.0	–	V		$-I_O$ = 20 µA
	6.0		5.5	6.0	–	5.5	–	5.5	–	V		$-I_O$ = 20 µA
HIGH level output voltage	4.5	V_{OH}	3.98	4.32	–	3.84	–	3.7	–	V	V_{CC} or GND	$-I_O$ = 4.0 mA
	6.0		5.48	5.81	–	5.34	–	5.2	–	V		$-I_O$ = 5.2 mA
LOW level output voltage	2.0	V_{OL}	–	0	0.2	–	0.2	–	0.2	V	V_{IH} or V_{IL}	I_O = 20 µA
	4.5		–	0	0.5	–	0.5	–	0.5	V		I_O = 20 µA
	6.0		–	0	0.5	–	0.5	–	0.5	V		I_O = 20 µA
LOW level output voltage	4.5	V_{OL}	–	0.15	0.26	–	0.33	–	0.4	V	V_{CC} or GND	I_O = 4.0 mA
	6.0		–	0.16	0.26	–	0.33	–	0.4	V		I_O = 5.2 mA
Input leakage current	6.0	$\pm I_I$	–	–	0.1	–	1.0	–	1.0	µA	V_{CC} or GND	
Quiescent supply current **SSI**	6.0	I_{CC}	–	–	2.0	–	20.0	–	40.0	µA	V_{CC} or GND	I_O = 0

DC family characteristics, PC74HCT

Voltages are referenced to GND (ground = 0 V)

parameter	V_{CC} V	sym-bol	T_{amb} (°C) +25 min.	+25 typ.	+25 max.	−40 to +85 min.	−40 to +85 max.	−40 to +125 min.	−40 to +125 max.	unit	conditions V_I	conditions other
HIGH level input voltage	4.5–5.5	V_{IH}	2.0	1.6	–	2.0	–	2.0	–	V		
LOW level input voltage	4.5–5.5	V_{IL}	–	1.2	0.8	–	0.8	–	0.8	V		
HIGH level output voltage all outputs	4.5	V_{OH}	4.4	4.5	–	4.4	–	4.4	–	V	V_{IH} or V_{IL}	$-I_O$ = 20 µA
HIGH level output voltage standard	4.5	V_{OH}	3.98	4.32	–	3.84	–	3.7	–	V	V_{IH} or V_{IL}	$-I_O$ = 4.0 mA
HIGH level output voltage bus driver	4.5	V_{OH}	3.98	4.32	–	3.84	–	3.7	–	V	V_{IH} or V_{IL}	$-I_O$ = 6.0 mA
LOW level output voltage all outputs	4.5	V_{OL}	–	0	0.1	–	0.1	–	0.1	V	V_{IH} or V_{IL}	I_O = 20 µA
LOW level output voltage standard	4.5	V_{OL}	–	0.15	0.26	–	0.33	–	0.4	V	V_{IH} or V_{IL}	I_O = 4.0 mA
LOW level output voltage bus driver	4.5	V_{OL}	–	0.16	0.26	–	0.33	–	0.4	V	V_{IH} or V_{IL}	I_O = 6.0 mA
Input leakage current	5.5	$\pm I_I$	–	–	0.1	–	1.0	–	1.0	µA	V_{CC} or GND	
3-state OFF-state current	5.5	$\pm I_{OZ}$	–	–	0.5	–	5.0	–	10.0	µA	V_{IH} or V_{IL}	V_O = V_{CC} or GND; per input pin; other inputs at V_{CC} or GND; I_o = 0
Quiescent supply current												
SSI	5.5	I_{CC}	–	–	2.0	–	20.0	–	40.0	µA	V_{CC}	I_O = 0
flip-flops	5.5	I_{CC}	–	–	4.0	–	40.0	–	80.0	µA	or	I_O = 0
MSI	5.5	I_{CC}	–	–	8.0	–	80.0	–	160.0	µA	GND	I_O = 0
LSI	5.5	I_{CC}	–	–	50.0	–	500.0	–	1000.0	µA	GND	I_O = 0
A.Q.S.C. (see note)	4.5–5.5	ΔI_{CC}	–	100	360	–	450	–	490	µA	V_{CC} −2,1 V	other inputs at V_{CC} or GND I_O = 0

Note: Additional quiescent supply current (A.Q.S.C.) per input pin for unit load coefficient is 1.*

* The additional quiescent supply current per input is determined by the ΔI_{CC} unit load, which has to be multiplied by the unit load coefficient as given in the individual data sheets. For dual supply systems the theoretical worst-case (V_I = 2.4; V_{CC} = 5.5 V) specification is: ΔI_{CC} = 0.65 mA (typical) and 1.8 mA (maximum) across temperature.

AC family characteristics

GND = 0 V; C_L = 50 pF; $t_r = t_f$ = 6 ns

PC74HC

	V_{CC}		T_{amb} (°C)							
			+25			−40 to +85		−40 to +125		
parameter	V	symbol	min.	typ.	max.	min.	max.	min.	max.	unit
Output transition time standard outputs	2.0	t_{THL}/ t_{TLH}	–	19	75	–	95	–	110	ns
	4.5		–	7	15	–	19	–	22	ns
	6.0		–	6	13	–	16	–	19	ns
Output transition time bus driver outputs	2.0	t_{THL}/ t_{TLH}	–	14	60	–	75	–	90	ns
	4.5		–	5	12	–	15	–	18	ns
	6.0		–	4	10	–	13	–	15	ns

PC74HCU

	V_{CC}		T_{amb} (°C)							
			+25			−40 to +85		−40 to +125		
parameter	V	symbol	min.	typ.	max.	min.	max.	min.	max.	unit
Output transition time	2.0	t_{THL}/ t_{TLH}	–	19	75	–	95	–	110	ns
	4.5		–	7	15	–	19	–	22	ns
	6.0		–	6	13	–	16	–	19	ns

PC74HCT

	V_{CC}		T_{amb} (°C)							
			+25			−40 to +85		−40 to +125		
parameter	V	symbol	min.	typ.	max.	min.	max.	min.	max.	unit
Output transition time standard outputs	4.5	t_{THL}/ t_{TLH}	–	7	15	–	19	–	22	ns
Output transition time bus driver outputs	4.5	t_{THL}/ t_{TLH}	–	5	12	–	15	–	18	ns

HCMOS PC74 FAMILY SURVEY

Type numbers have a suffix which signifies the type of package:
P = plastic DIL; T = plastic SO mini-pack

PC74 FAMILY		HC	HCT
ARITHMETIC ICs			
181	4-bit arithmetic logic unit	●	●
182	look-ahead carry generator	●	●
280	9-bit odd/even parity generator/checker	●	●
283	4-bit binary full adder with fast carry	●	●
583	4-bit full adder with fast carry	●	●
7080	16-bit even/odd parity generator/checker	●	●
BUFFERS			
125	quad buffer/line driver; 3-state; output enable active LOW	●	●
126	quad buffer/line driver; 3-state; output enable active HIGH	●	●
240	octal buffer/line driver; 3-state; inverting	●	●
241	octal buffer/line driver; 3-state; output enable active low or HIGH	●	●
244	octal buffer/line driver; 3-state; output enable active LOW	●	●
365	hex buffer/line driver; 3-state	●	●
366	hex buffer/line driver; 3-state; inverting	●	●
367	hex buffer/line driver; 3-state	●	●
368	hex buffer/line driver; 3-state; inverting	●	●
540	octal buffer/line driver; 3-state; inverting	●	●
541	octal buffer/line driver; 3-state	●	●
7540	octal Schmitt trigger buffer/line driver; 3-state; inverting	●	●
7541	octal Schmitt trigger buffer/line driver; 3-state	●	●
9014	nine-wide Schmitt trigger buffer/line driver; inverting	●	●
9015	nine-wide Schmitt trigger buffer/line driver	●	●
9114	nine-wide Schmitt trigger buffer; open drain output; inverting	●	●
9115	nine-wide Schmitt trigger buffer; open drain output	●	●
BUS ICs			
242	quad bus transceiver; 3-state; inverting	●	●
243	quad bus transceiver; 3-state	●	●
245	octal bus transceiver; 3-state	●	●
640	octal bus transceiver; 3-state; inverting	●	●
643	octal bus transceiver; 3-state; true/inverting	●	●
646	octal bus transceiver/register; 3-state	●	●
648	octal bus transceiver/register; 3-state; inverting	●	●
COMPARATORS			
85	4-bit magnitude comparator	●	●
688	8-bit magnitude comparator	●	●

PC74 FAMILY		HC	HCT
COUNTERS			
93	4–bit binary ripple counter	●	●
160	presettable synchronous BCD decade counter; asynchronous reset	●	●
161	presettable synchronous 4–bit binary counter; asynchronous reset	●	●
162	presettable synchronous BCD decade counter; synchronous reset	●	●
163	presettable synchronous 4–bit binary counter; synchronous reset	●	●
190	presettable synchronous BCD decade up/down counter	●	●
191	presettable synchronous 4–bit binary up/down counter	●	●
192	presettable synchronous BCD decade up/down counter	●	●
193	presettable synchronous 4–bit binary up/down counter	●	●
390	dual decade ripple counter	●	●
393	dual 4–bit binary ripple counter	●	●
4017	Johnson decade counter with 10 decoded outputs	●	●
4020	14–stage binary ripple counter	●	●
4024	7–stage binary ripple counter	●	●
4040	12–stage binary ripple counter	●	●
4059	programmable divide–by–n counter	●	●
4060	14–stage binary ripple counter with oscillator	●	●
4510	BCD up/down counter	●	●
4516	binary up/down counter	●	●
4518	dual synchronous BCD counter	●	●
4520	dual synchronous 4–bit binary counter	●	●
40102	8–bit synchronous BCD down counter	●	●
40103	8–bit synchronous binary down counter	●	●
DECODERS			
42	BCD to decimal decoder (1–of–10)	●	●
137	3–to–8 line decoder/demultiplexer with address latches	●	●
138	3–to–8 line decoder/demultiplexer; inverting	●	●
139	dual 2–to–4 line decoder/demultiplexer	●	●
154	4–to–16 line decoder/demultiplexer	●	●
237	3–to–8 line decoder/demultiplexer with address latches	●	●
238	3–to–8 line decoder/demultiplexer	●	●
4511	BCD to 7–segment latch/decoder/driver	●	●
4514	4–to–16 line decoder/demultiplexer with input latches	●	●
4515	4–to–16 line decoder/demultiplexer with input latches	●	●
4543	BCD–to–7 segment latch/decoder/driver for LCDs	●	●
DEMULTIPLEXERS			
4051	8–channel analog multiplexer/demultiplexer	●	●
4052	dual 4–channel analog multiplexer/demultiplexer	●	●
4053	triple 2–channel analog multiplexer/demultiplexer	●	●
4067	16–channel analog multiplexer/demultiplexer	●	●

PC74 FAMILY		HC	HCT
DEMULTIPLEXERS (cont.)			
4351	8–channel analog multiplexer/demultiplexer with latch	●	●
4352	dual 4–channel analog multiplexer/demultiplexer with latch	●	●
4353	triple 2–channel analog multiplexer/demultiplexer with latch	●	●
4514	4–to–16 line decoder/demultiplexer with input latches	●	●
4515	4–to–16 line decoder/demultiplexer with input latches	●	●
DRIVERS			
4511	BCD to 7–segment latch/decoder/driver	●	●
4543	BCD–to–7 segment latch/decoder/driver for LCDs	●	●
ENCODERS			
147	10–to–4 line priority encoder	●	●
FLIP–FLOPS			
D–type			
74	dual D–type flip–flop with set and reset; positive edge–trigger	●	●
173	quad D–type flip–flop; positive–edge trigger; 3–state	●	●
174	hex D–type flip–flop with reset; positive–edge trigger	●	●
175	quad D–type flip–flop with reset; positive edge–trigger	●	●
273	octal D–type flip–flop with reset; positive edge–trigger	●	●
373	octal D–type transparent latch; 3–state	●	●
374	octal D–type flip–flop; positive–edge trigger; 3–state	●	●
377	octal D–type flip–flop with data enable; positive–edge trigger	●	●
533	octal D–type transparent latch; 3–state; inverting	●	●
534	octal D–type flip–flop; positive–edge trigger; 3–state; inverting	●	●
563	octal D–type transparent latch; 3–state; inverting; bus–oriented pin–out	●	●
564	octal D–type flip–flop; positive–edge trigger; 3–state; inverting; bus–oriented pin–out	●	●
573	octal D–type transparent latch; 3–state; bus–oriented pin–out	●	●
574	octal D–type flip–flop; positive–edge trigger; 3–state; bus–oriented pin–out	●	●

PC74 FAMILY		HC	HCT
FLIP–FLOPS (cont.)			
JK			
73	dual JK flip–flop with reset; negative–edge trigger; supply on centre pins	●	●
107	dual JK flip–flop with reset; negative–edge trigger	●	●
109	dual JK flip–flop with set and reset; positive edge–trigger	●	●
112	dual JK flip–flop with set and reset; negative edge–trigger	●	●
GATES			
AND			
08	quad 2–input AND gate	●	●
11	triple 3–input AND gate	●	●
21	dual 4–input AND gate	●	●
58	dual AND–OR gate	●	
EXCLUSIVE–OR			
86	quad 2–input EXCLUSIVE–OR gate	●	●
EXCLUSIVE–NOR			
7266	quad 2–input EXCLUSIVE–NOR gate	●	
NAND			
00	quad 2–input NAND gate	●	●
03	quad 2–input NAND gate; open drain	●	●
10	triple 3–input NAND gate	●	●
20	dual 4–input NAND gate	●	●
30	8–input NAND gate	●	●
NOR			
02	quad 2–input NOR gate	●	●
27	triple 3–input NOR gate	●	●
4002	dual 4–input NOR gate	●	●
OR			
32	quad 2–input OR gate	●	●
58	dual AND–OR gate	●	
4075	triple 3–input OR gate	●	●
INVERTERS			
04	hex inverter	●	●
U04	hex inverter (unbuffered)	●	

PC74 FAMILY		HC	HCT
LATCHES			
75	quad bistable transparent latch	●	●
259	8–bit addressable latch	●	●
354	8–input multiplexer/register with transparent latches; 3–state	●	●
LEVEL SHIFTERS			
4049	hex inverting HIGH–to–LOW level shifter	●	
4050	hex HIGH–to–LOW level shifter	●	
MULTIPLEXERS			
151	8–input multiplexer	●	●
153	dual 4–input multiplexer	●	●
157	quad 2–input multiplexer	●	●
158	quad 2–input multiplexer; inverting	●	●
251	8–input multiplexer; 3–state	●	●
253	dual 4–input multiplexer; 3–state	●	●
257	quad 2–input multiplexer; 3–state	●	●
258	quad 2–input multiplexer; 3–state; inverting	●	●
354	8–input multiplexer/register with transparent latches; 3–state	●	●
356	8–input multiplexer/register; 3–state	●	●
4051	8–channel analog multiplexer/demultiplexer	●	●
4052	dual 4–channel analog multiplexer/demultiplexer	●	●
4053	triple 2–channel analog multiplexer/demultiplexer	●	●
4067	16–channel analog multiplexer/demultiplexer	●	●
4351	8–channel analog multiplexer/demultiplexer with latch	●	●
4352	dual 4–channel analog multiplexer/demultiplexer with latch	●	●
4353	triple 2–channel analog multiplexer/demultiplexer with latch	●	●
MULTIVIBRATORS			
One–shot			
123	dual retriggerable monostable multivibrator with reset	●	●
221	dual non–retriggerable monostable multivibrator with reset	●	●
423	dual retriggerable monostable multivibrator with reset	●	●
4538	dual retriggerable precision monostable multivibrator	●	●
5555	programmable delay timer with oscillator	●	●
REGISTERS			
164	8–bit serial–in/parallel–out shift register	●	●
165	8–bit parallel–in/serial–out shift register	●	●
166	8–bit parallel–in/serial–out shift register; with reset	●	●
194	4–bit bidirectional universal shift register	●	●

PC74 FAMILY		HC	HCT
REGISTERS (cont.)			
195	4–bit parallel access shift register	●	●
299	8–bit universal shift register; 3–state	●	●
354	8–input multiplexer/register with transparent latches; 3–state	●	●
356	8–input multiplexer/register; 3–state	●	●
597	8–bit shift register with input latches	●	●
670	4 x 4 register file; 3–state	●	●
4015	dual 4–bit serial–in/parallel–out shift register	●	●
4094	8–stage shift–and–store bus register	●	●
7030	9–bit x 64 word FIFO register; 3–state	●	●
7597	8–bit shift register with input latches	●	●
40104	4–bit bidirectional universal shift register; 3–state	●	●
40105	4–bit x 16 word FIFO register	●	●
SCHMITT TRIGGERS			
14	hex inverting Schmitt trigger	●	●
132	quad 2–input NAND Schmitt trigger	●	●
7540	octal Schmitt trigger buffer/line driver; 3–state; inverting	●	●
7541	octal Schmitt trigger buffer/line driver; 3–state	●	●
9014	nine–wide Schmitt trigger buffer/line driver; inverting	●	●
9015	nine–wide Schmitt trigger buffer/line driver	●	●
9114	nine–wide Schmitt trigger buffer; open drain output; inverting	●	●
9115	nine–wide Schmitt trigger buffer; open drain output	●	●
SPECIAL FUNCTIONS			
297	digital phase–locked–loop filter	●	●
4046A	phase–locked loop with VCO	●	●
7046A	PLL with lock detector	●	●
SWITCHES			
4016	quad bilateral switches (uncompensated switches)	●	●
4066	quad bilateral switches	●	●
4316	quad bilateral switches; separate analog ground	●	●
TRANCEIVERS			
242	quad bus transceiver; 3–state; inverting	●	●
243	quad bus transceiver; 3–state	●	●
245	octal bus transceiver; 3–state	●	●
640	octal bus transceiver; 3–state; inverting	●	●
643	octal bus transceiver; 3–state; true/inverting	●	●
646	octal bus transceiver/register; 3–state	●	●
648	octal bus transceiver/register; 3–state; inverting	●	●

ACL 74 FAMILY SPECIFICATIONS

General

These family specifications cover the common electrical ratings and characteristics of the entire ACL 74 family, unless otherwise specified in the individual device data sheet.

Introduction

The 74AC/ACT11XXX 1 µm CMOS logic family combines the low power advantages of CMOS family with the high speed and drive capability of FAST TTL.
The basic family of devices, designated as 74AC11XXX, will operate at CMOS input logic levels for high noise immunity, negligible quiescent supply and input current. It operates from a power supply of 3 to 5.5 V.
A subset of the family, designated as 74ACT11XXX, with the same features and functions as the "AC–types", will operate at standard TTL power supply voltage (5 V ±10%) and logic input levels (0,8 to 2,0 V).

Handling MOS devices

Inputs and outputs are protected against electrostatic effects in a wide variety of device–handling situations. However, to be totally safe, it is desirable to take handling precautions into account.

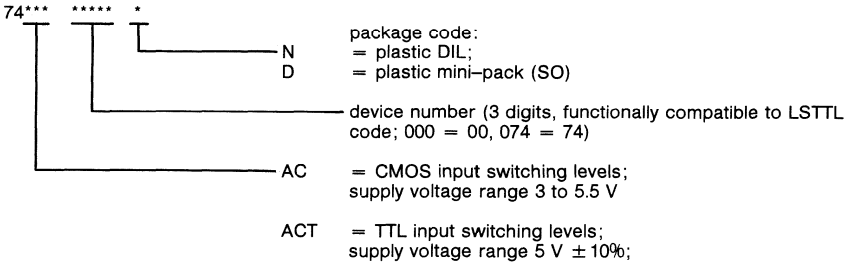
Features

- Comprehensive type range from simple gates to shift registers and counters
- All types available in 74AC versions (CMOS input levels) and ACT versions (TTL input levels)
- All types available in small outline (SO) and plastic dual in–line (PLDIL) packages
- Completely latch–up free
- Highly immune to electrostatic discharge
- Low power dissipation
- 24 mA sink/source current
- Input current only 1 µA in the HIGH or LOW state. The fan–out to other CMOS ICs) is therefore limited only by load capacitance and not by DC load considerations
- More than three times the noise immunity of TTL
- Input switching threshold level varies by only ±60 mV over the entire temperature range (±300 mV is specified for advanced TTL families)
- Wide supply voltage range:
  3 to 5.5 V for 74AC devices (internal logic states are maintained down to 2 V)
  5 V ±10% for 74ACT devices
- On–chip propagation delay for a single gate is 0.5 ns; with a 5 V supply and 50 pF load, average propagation delay for a device is 5 ns (HIGH–to–LOW or LOW–to–HIGH)
- Outputs have edge–control circuits that reduce switching noise
- Output buffers are standardized to allow symmetrical output current sourcing and sinking for equal output rise and fall times
- Centre supply pins and flow–through architecture minimize ground and supply rail glitches during simultaneous switching of outputs, and simplify board layout
- All inputs that control more than one output have a new (patented) dynamic hysteresis that reduces susceptibility to slow input edges
- Wide operating temperature range: −40 to +85 °C
- Alternate source is TI

Type number designation

Basic family:

74* ***** *** complete type number; standard commercial temperature range



Family ratings

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Voltages are referenced to GND (ground = 0 V)

parameter	conditions	symbol	min.	max.	unit
DC supply voltage		V_{CC}	−0.5	+7	V
DC input diode current	$V_I < 0$ or $V_I > V_{CC}$	$\pm I_{IK}$	–	20	mA
DC input voltage		V_I	−0.5	V_{CC} +0.5	V
DC output diode current	$V_O < 0$ or $V_O > V_{CC}$	$\pm I_{OK}$	–	50	mA
DC output voltage		V_O	−0.5	V_{CC} +0.5	V
DC output source or sink current	$-0.5\ V < V_O < V_{CC} + 0.5\ V$	$\pm I_O$	–	50	mA
Storage temperature range		T_{stg}	−65	+150	°C
Power dissipation per package					
plastic DIL	above +70 °C derate linearly by 8 mW/K	P_{tot}	–	500	mW
plastic mini-pack (SO)	above +70 °C derate linearly by 6 mW/K	P_{tot}	–	400	mW

IC

Recommended operating conditions

Voltages are referenced to GND (ground = 0 V)

parameter	symbol	min.	typ.	max.	unit	conditions
DC supply voltage range						
74AC	V_{CC}	3.0	5.0	5.5	V	
74ACT	V_{CC}	4.5	5.0	5.5	V	
HIGH level input voltage						
74AC	V_{IH}	2.1	–	–	V	V_{CC} = 3 V
		3.15	–	–	V	V_{CC} = 4.5 V
		3.85	–	–	V	V_{CC} = 5.5 V
74ACT	V_{IH}	2.0	–	–	V	V_{CC} = 4.5 V
		2.0	–	–	V	V_{CC} = 5.5 V
LOW level input voltage						
74AC	V_{IL}	–	–	0.9	V	V_{CC} = 3.0 V
		–	–	1.35	V	V_{CC} = 4.5 V
		–	–	1.65	V	V_{CC} = 5.5 V
74ACT	V_{IL}	–	–	0.8	V	V_{CC} = 4.5 V
		–	–	0.8	V	V_{CC} = 5.5 V
DC input voltage range	V_I	0	–	V_{CC}	V	
DC output voltage range	V_O	0	–	V_{CC}	V	
Operating ambient temperature range	T_{amb}	−40	–	+85	°C	standard

DC family characteristics, 74AC

Voltages are referenced to GND (ground = 0 V)

	V_{CC}		T_{amb} (°C)						conditions	
			+25			−40 to +85				
parameter	V	symbol	min.	typ.	max.	min.	max.	unit	V_I	other
HIGH level output voltage	3.0	V_{OH}	2.9	–	–	2.9	–	V	V_{IH}	$-I_O$ = 50 μA
	4.5		4.4	–	–	4.4	–	V	or	$-I_O$ = 50 μA
	5.5		5.4	–	–	5.4	–	V	V_{IL}	$-I_O$ = 50 μA
	3.0	V_{OH}	2.58	–	–	2.48	–	V	V_{IH}	$-I_O$ = 4 mA
	4.5		3.94	–	–	3.80	–	V	or	$-I_O$ = 24 mA
	5.5		4.94	–	–	4.80	–	V	V_{IL}	$-I_O$ = 24 mA
HIGH level output drive	5.5	V_{OH}	–	–	–	3.85	–	V		$-I_O$ = 75 mA see note
LOW level output voltage	3.0	V_{OL}	–	–	0.1	–	0.1	V	V_{IH}	I_O = 50 μA
	4.5		–	–	0.1	–	0.1	V	or	I_O = 50 μA
	5.5		–	–	0.1	–	0.1	V	V_{IL}	I_O = 50 μA
	3.0	V_{OL}	–	–	0.36	–	0.44	V	V_{IH}	I_O = 12 mA
	4.5		–	–	0.36	–	0.44	V	or	I_O = 24 mA
	5.5		–	–	0.36	–	0.44	V	V_{IL}	I_O = 24 mA
LOW level output drive	5.5	V_{OH}	–	–	–	–	1.65	V		I_O = 75 mA see note
Input leakage current	5.5	$\pm I_I$	–	–	0.1	–	1.0	μA	V_{CC} or GND	
3-state OFF-state current	5.5	$\pm I_{OZ}$	–	–	0.5	–	5.0	μA	V_{IH} or V_{IL}	V_O = V_{CC} or GND
Quiescent supply current										
SSI	5.5	I_{CC}	–	–	4.0	–	40	μA	V_{CC} or GND	I_O = 0
MSI	5.5	I_{CC}	–	–	8.0	–	80	μA		I_O = 0

Note: Not more than one output should be tested at a time and the duration of the test should not exceed 10 ms. This parameter has been introduced the meet the requirements of incident wave switching of 50 Ω loads.

DC family characteristics, 74ACT

Voltages are referenced to GND (ground = 0 V)

parameter	V_{CC} V	sym-bol	T_{amb} (°C) +25 min.	+25 typ.	+25 max.	−40 to +85 min.	−40 to +85 max.	unit	conditions V_I	conditions other
HIGH level output voltage	4.5	V_{OH}	4.4 3.94	–	–	4.4 3.8	–	V V	V_{IH} or V_{IL}	$-I_O$ = 50 µA $-I_O$ = 24 µA
HIGH level output drive	5.5	V_{OH}	–	–	–	3.85	–	V	V_{IH} or V_{IL}	$-I_O$ = 75 mA see note 1
LOW level output voltage	4.5	V_{OL}	– –	– –	0.1 0.36	–	0.1 0.44	V V	V_{IH} or V_{IL}	I_O = 50 µA I_O = 24 µA
LOW level output drive	5.5	V_{OL}	–	–	–	–	1.65	V	V_{IH} or V_{IL}	I_O = 75 mA see note 1
3-state OFF-state current	5.5	$\pm I_{OZ}$	–	–	0.5	–	5.0	µA	V_{IH} or V_{IL}	$V_O = V_{CC}$ or GND
Quiescent supply current										
SSI	5.5	I_{CC}	–	–	4.0	–	40	µA	V_{CC} or GND	I_O = 0
MSI	5.5	I_{CC}	–	–	8.0	–	80	µA		I_O = 0
A.Q.S.C. (see note 2)	5.5	ΔI_{CC}	–	0.9	1.0	–	1.0	µA	V_{CC} or GND	I_O = 0 one input at 3.4 V

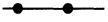
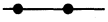
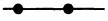
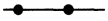
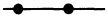
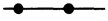
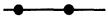
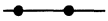
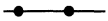
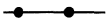
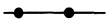
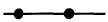
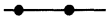
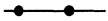
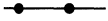
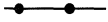
Note 1: Not more than one output should be tested at a time and the duration of the test should not exceed 10 ms. This parameter has been introduced the meet the requirements of incident wave switching of 50 Ω loads.

Note 2: Additional quiescent supply current (A.Q.S.C.) per input pin for unit load coefficient is 1.

ACL 74 FAMILY SURVEY

74AC/ACT FAMILY		AC	ACT
ARITHMETIC ICS			
11181	4–bit arithmetic unit	●	●
11280	9–bit odd/even parity generator/checker	●	●
11286	9–bit odd/even parity generator/checker with bus driver I/O port	●	●
11520	8–bit identity comparator with input pull–up	●	●
11521	8–bit identity comparator	●	●
BUFFERS/LINE DRIVERS			
11240	octal buffer/line driver; 3–state; inverting	●	●
11241	octal buffer/line driver; 3–state	●	●
11244	octal buffer/line driver; 3–state	●	●
11655	octal buffer/line driver with 9–bit parity generator/checker; 3–state; inverting	●	●
11656	octal buffer/line driver with 9–bit parity generator/checker; 3–state	●	●
COMPARATORS			
11677	16–bit address comparator with enable	●	●
11678	16–bit address comparator with output latch	●	●
COUNTERS			
11160	synchronous presettable, synchronous BCD decade counter; asynchronous reset	●	●
11162	synchronous presettable, synchronous BCD decade counter; synchronous reset	●	●
11190	asynchronous presettable, synchronous BCD decade up/down counter with single clock	●	●
11191	asynchronous presettable, synchronous 4–bit binary up/down counter with single clock	●	●
11192	asynchronous presettable, synchronous BCD decade up/down counter with dual clock	●	●
11193	asynchronous presettable, synchronous 4–bit binary up/down counter with dual clock	●	●
DECODERS/DEMULTIPLEXERS			
11138	3–to–8 line decoder/demultiplexer; active–LOW	●	●
11139	dual 2–to–4 line decoder/demultiplexer; active–LOW	●	●
11238	3–to–8 line decoder/demultiplexer	●	●
11239	dual 2–to–4 line decoder/demultiplexer; active–HIGH	●	●
DRIVERS			
11240	octal buffer/line driver; 3–state; inverting	●	●
11241	octal buffer/line driver; 3–state	●	●
11244	octal buffer/line driver; 3–state	●	●

74AC/ACT FAMILY		AC	ACT
FLIP-FLOPS			
D-type			
11074	dual D-type flip-flop with set and reset; positive-edge trigger	●	●
11174	hex D-type flip-flop with reset; positive-edge trigger	●	●
11175	quad D-type flip-flop with reset; positive-edge trigger	●	●
11373	octal D-type transparent latch; 3-state	●	●
11374	octal D-type flip-flop; positive-edge trigger; 3-state	●	●
11378	hex D-type flip-flop with enable; positive-edge trigger	●	●
11379	quad D-type flip-flop with data enable	●	●
11533	octal D-type transparent latch; 3-state; inverting	●	●
11534	octal D-type flip-flop; positive-edge trigger; 3-state; inverting	●	●
JK			
11109	dual JK flip-flop with set and reset; positive-edge trigger	●	●
11112	dual JK flip-flop with set and reset; negative-edge trigger	●	●

74AC/ACT FAMILY		AC	ACT
GATES			
AND			
11008	quad 2–input AND gate		
11011	triple 3–input AND gate		
11021	dual 4–input AND gate		
11051	dual 2–wide 2–input, 2–wide 3–input AND–OR–invert gate		
11064	4–2–3–2–input AND–OR–invert gate		
Complex			
11051	dual 2–wide 2–input, 2–wide 3–input AND–OR–invert gate		
11064	4–2–3–2–input AND–OR–invert gate		
EXCLUSIVE–OR			
11086	quad 2–input EXCLUSIVE–OR gate		
EXCLUSIVE–NOR			
11810	quad 2–input EXCLUSIVE–NOR gate		
Inverter			
11051	dual 2–wide 2–input, 2–wide 3–input AND–OR–invert gate		
11064	4–2–3–2–input AND–OR–invert gate		
NAND			
11000	quad 2–input NAND gate		
11010	triple 3–input NAND gate		
11013	dual 4–input NAND Schmitt trigger		
11020	dual 4–input NAND gate		
11030	8–input NAND gate		
11132	quad 2–input NAND Schmitt trigger		
NOR			
11002	quad 2–input NOR gate		
11027	triple 3–input NOR gate		
OR			
11032	quad 2–input OR gate		
11064	4–2–3–2–input AND–OR–invert gate		
INVERTERS			
11004	hex inverter		
11014	hex inverter Schmitt trigger		
11034	hex non–inverter		

74AC/ACT FAMILY		AC	ACT
LATCHES			
11373	octal D–type transparent latch; 3–state	●	●
11533	octal D–type transparent latch; 3–state; inverting	●	●
MULTIPLEXERS			
11151	8–input multiplexer	●	●
11153	dual 4–input multiplexer	●	●
11157	quad 2–input multiplexer	●	●
11158	quad 2–input multiplexer; inverting	●	●
11251	8–input multiplexer; 3–state	●	●
11253	dual 4–input multiplexer; 3–state	●	●
11257	quad 2–input multiplexer; 3–state	●	●
11258	quad 2–input multiplexer; 3–state; inverting	●	●
11352	dual 4–input multiplexer; inverting	●	●
11353	dual 4–input multiplexer; 3–state; inverting	●	●
REGISTERS			
11194	4–bit bidirectional universal shift register	●	●
11898	10–bit serial–in parallel–out shift register	●	●
11979	8–bit multiplexed I/O read–back register	●	●
11980	16–word by 8–bit multiplexed I/O read–back register	●	●
11981	16–word by 8–bit multiplexed I/O read–back register with address latch	●	●
11987	8–word by 9–bit multiplexed I/O read–back register	●	●
11988	8–word by 9–bit multiplexed I/O read–back register with address latch	●	●

74AC/ACT FAMILY		AC	ACT
SCHMITT TRIGGERS			
11013	dual 4–input NAND Schmitt trigger	●	●
11014	hex inverter Schmitt trigger	●	●
11132	quad 2–input NAND Schmitt trigger	●	●
TRANCEIVERS			
11245	octal transceiver with direction pin; 3–state	●	●
11470	octal transceiver/register with dual enable; 3–state	●	●
11471	octal transceiver/register with dual enable; 3–state; inverting	●	●
11472	9–wide latched transceiver with dual enable; 3–state	●	●
11473	9–wide latched transceiver with dual enable; 3–state; inverting	●	●
11474	9–wide latched transceiver/register with dual enable; 3–state	●	●
11475	9–wide latched transceiver/register with dual enable; 3–state; inverting	●	●
11543	octal latched transceiver with dual enable; 3–state	●	●
11544	octal latched transceiver with dual enable; 3–state; inverting	●	●
11620	octal transceiver with dual enable; 3–state; inverting	●	●
11640	octal transceiver with direction pin; 3–state; inverting	●	●
11643	octal transceiver; 3–state; true/inverting	●	●
11657	octal transceiver with 8–bit parity checker/ generator	●	●

ABT 74 FAMILY SPECIFICATIONS

General

These family specifications cover the common electrical ratings and characteristics of the entire 74ABT family, unless otherwise specified in the individual device data sheet.

Introduction

The 74ABT Advanced BiCMos family combines the low power dissipation and low noise of BiCMos with the high speed and high output drive of our bipolar modules.

The basic family of divices designated as 74ABTXXX will operate at BiCMos input logic levels for high noise immunity, negligible quiescent supply and input current. It is operated from a power supply of 4.5 to 5.5V.

Handling MOS devices

Inputs and outputs are protected against electrostatic effects in a wide variety of device-handling situations. However, to be totally safe, it is desirable to take handling precautions into account.

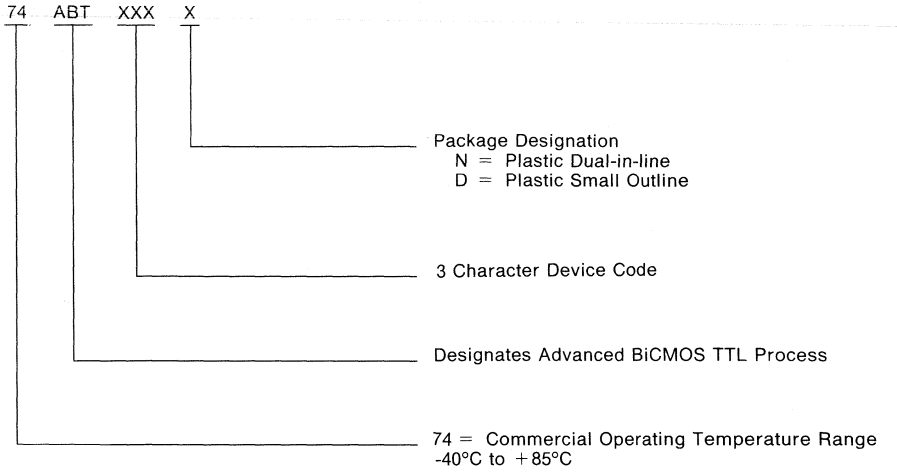
Features

- Dedicated to optimize interface performance
- Speed of FAST TTL (Prop. delay 2,5 nsec)
- 64/32 mA sink/source current
- Very low groundbounce
- Static power dissipation of CMOS Logic
- Pin-to-pin compatible with all Logic standard interface functions, with corner supply pinning
- Propagation delay hardly varies over temperature
- Standard temperature range -40°C to +85°C
- ESD protected to over 2000 V
- Latch-up protection exceeds 500 mA
- All types available in DIL and SO packages

Philips Components

Ordering Information

ABT Products



IC

TEMPERATURE RANGE	DEVICE NUMBER	PACKAGE STYLE
T_{amb} = -40°C to +85°C	74ATBXXX	D = Plastic Small Outline N = Plastic Dual-in-line

RECOMMENDED OPERATING CONDITIONS

symbol	parameter	limits		unit
		min	max	
V_{CC}	DC supply voltage	4.5	5.5	V
V_I	Input voltage	0	V_{CC}	V
V_{IH}	High-level input voltage	2.0		V
V_{IL}	Input voltage		0.8	V
I_{OH}	High level output current		-32	mA
I_{OL}	Low level output current		64	mA
$\Delta t/\Delta v$	Input transition rise or fall rate	0	5	ns/V
T_{amb}	Operating free-air temperature range	-40	+85	°C

ABSOLUTE MAXIMUM RATINGS[1]

symbol	parameter	conditions	rating	unit
V_{CC}	DC supply voltage		-0.5 to +7.0	V
I_{IK}	DC input diode current	$V_I > 0$	-18	mA
V_I	DC input voltage[2]		-1.2 to +7.0	V
I_{OK}	DC output diode current	$V_O < 0$	-50	mA
V_o	DC output voltage[2]	output in Off or High state	-0.5 to +5.5	V
I_O	DC output current	output in Low state	128	mA
T_{stg}	Storage temperature range		-65 to 150	°C

Notes: 1. Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may effect device reliability.
2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

Philips Components BICMOS Products

Family Specifications

DC ELECTRICAL CHARACTERISTICS

symbol	parameter	test conditions	limits					unit
			T_{amb} = +25°C			T_{amb} = -40°C to +85°C		
			Min	Typ	Max	Min	Max	
V_{IK}	Input clamp voltage	V_{CC} = 4.5V; I_{IK} = -18mA			-1.2		-1.2	V
V_{OH}	High-level output voltage	V_{CC} = 4.5V; I_{OH} = -3mA; V_I = V_{IL} or V_{IH}	2.5			2.5		V
		V_{CC} = 5.0V; I_{OH} = -3mA; V_I = V_{IL} or V_{IH}	3.0			3.0		
		V_{CC} = 4.5V; I_{OH} = -32mA; V_I = V_{IL} or V_{IH}	2.0	2.4		2.0		
V_{OL}	Low-level output voltage	V_{CC} = 4.5V; I_{OL} = 64mA; V_I = V_{IL} or V_{IH}		0.42	0.55		0.55	V
I_I	Input leakage current	V_{CC} = 5.5V; V_I = GND or 5.5V		±0.01	±1.0		±1.0	μA
I_{OZH}	3-State output High current	V_{CC} = 5.5V; V_O = 2.7V; V_I = V_{IL} or V_{IH}		5.0	50		50	μA
I_{OZL}	3-State output Low current	V_{CC} = 5.5V; V_O = 0.5V; V_I = V_{IL} or V_{IH}		-5.0	-50		-50	μA
I_O	Short-circuit output current[1]	V_{CC} = 5.5V; V_O = 2.5V	-50	-100	-180	-50	-180	mA
I_{CCH}	Quiescent supply current	V_{CC} = 5.5V; Outputs High; V_I = GND or V_{CC}		0.5	50		50	μA
I_{CCL}		V_{CC} = 5.5V; Outputs Low; V_I = GND or V_{CC}		24	30		30	μA
I_{CCZ}		V_{CC} = 5.5V; Outputs 3-State; V_I = GND or V_{CC}		0.5	50		50	μA
ΔI_{CC}	Additional Supply current per input pin[2]	Outputs enabled, one input at 3.4V, other inputs at V_{CC} or GND; V_{CC} = 5.5V		0.5	1.5		1.5	μA
		Outputs 3-State, one data input at 3.4V, other inputs at V_{CC} or GND; V_{CC} = 5.5V		0.5	50		50	μA
		Outputs 3-State, one enable input at 3.4V, other inputs at V_{CC} or GND; V_{CC} = 5.5V		0.5	1.5		1.5	mA

Notes: 1. Not more than one output should be tested at a time, and the duration of the test should not exceed one second
2. This is the increase in supply current for each input at 3.4V.

Functional Index

74ABTXXX FAMILY

TYPE NO.		DESCRIPTION
Buffers/Line Drivers		
74ABT125		Quad buffer (3-State)
74ABT126		Quad buffer (3-State)
74ABT240		Octal inverting buffer (3-State)
74ABT241	*	Octal buffer/line driver (3-state)
74ABT244	*	Octal buffer/line driver (3-State)
74ABT540		Octal buffer, inverting (3-State)
74ABT541	*	Octal buffer/liner driver (3-State)
74ABT827		10-bit buffer/line driver, non inverting (3-State)
Flip-Flops		
74ABT273	*	Octal D-type flip-flop
74ABT374	*	Octal D-type flip-flop; positive-edge trigger (3-State)
74ABT377	*	Octal D-type flip-flop with enable
74ABT534	*	Octal D-type flip-flop, inverting (3-State)
74ABT574	*	Octal D flip-flop (3-State)
74ABT821		10-bit D type flip-flop, positive-edge trigger (3-State)
74ABT823		9-bit D-type flip-flop; with reset and enable (3-State)
Transceivers		
74ABT245	*	Octal transceiver with direction pin (3-State)
74ABT620		Octal transceiver with dual enable, inverting (3-State)
74ABT623	*	Octal transceiver with dual enable, non-inverting (3-State)
74ABT640		Octal transceiver with direction pin, inverting (3-State)
74ABT657	*	Octal transceiver with 8-bit parity generator/checker (3-State)
74ABT833		8-bit transceiver with 9-bit parity checker/generator and error flip-flop
74ABT834		8-bit inverting transceiver with 9-bit parity checker/generator and error flip-flop
74ABT853		8-bit transceiver with 9-bit parity checker/generator and error flag latch
74ABT854		8-bit inverting transceiver with 9-bit parity checker/generator and error flag latch
74ABT861		10-wide transceiver (3-State)
74ABT863		9-bit bus transceiver (3-State)
Registered Transceivers		
74ABT543	*	Octal latched transceiver with dual enable (3-State)
74ABT544		Octal latched transceiver with dual enable, inverting (3-State)
74ABT646	*	Octal bus transceiver/register (3-State)
74ABT648	*	Octal bus transceiver/register, inverting (3-State)
74ABT651	*	Transceiver/register, inverting (3-State)
74ABT652	*	Transceiver/register, non-inverting (3-State)
74ABT2952	*	Octal registered transceiver (3-State)
74ABT2953	*	Octal registered transceiver, inverting (3-State)

Release Status

* indicates released per q1. Remaining types will be in production by the end of '91.

Philips Components–Signetics BiCMOS Products

Functional Index

type no.	description
Latches	
74ABT373	Octal D-type transparent latch (3-State)
74ABT573	Octal D-type transparent latch (3-State)
74ABT841	10-bit bus interface latch (3-State)
74ABT843	9-bit bus interface latch with set and reset (3-State)
74ABT845	8-bit bus interface latch with set and reset (3-State)
Devices with parity	
74ABT657	Octal transceiver with 8-bit parity generator/checker (3-State)
74ABT833	8-bit transceiver with 9-bit parity checker/generator and error flip-flop
74ABT834	8-bit inverting transceiver with 9-bit parity checker/generator and error flip-flop
74ABT853	8-bit transceiver with 9-bit parity checker/generator and error flag latch
74ABT854	8-bit inverting transceiver with 9-bit parity checker/generator and error flag latch

↑ For more information on this device, please contact Philips Components Netherlands.

TTL FAMILY CHARACTERISTICS COMPARISON

	SSI gates propagation delay	flip–flops toggle rate	MSI ALU 4–bit add time
STANDARD TTL (STD: basic type number 74XX) 7400 Series SSI and MSI 8200 Series MSI 9300 and 9600 Series MSI Standard "gold doped" TTL is the industry's longest selling digital logic family still in high volume production. New system designs generally favor the Low Power Schottky TTL equivalent functions.	10 ns at 10 mW	25 MHz	27 ns
LOW POWER SCHOTTKY TTL (LS) 74LS00 Series SSI and MSI Low power Schottky provides the same speed as standard TTL at 1/5 the power. The power savings and LSI potential are encouraging the use of 74LS in most new system designs.	10 ns at 2 mW	30 MHz	21 ns
SCHOTTKY TTL (S) 74S00 Series SSI, MSI and 82S00 Series MSI Schottky TTL uses a diode clamp design to ensure the highest speed possible at TTL logic levels.	3 ns at 30 mW	90 MHz	11 ns
FAST TTL (F) 74F00 Series SSI and LSI FAST Series offers higher speeds than Schottky TTL and uses only 25% of the power.	3 ns at 4 mW	100 MHz	9 ns
ADVANCED LOW POWER SCHOTTKY (ALS) 74ALS00 Series SSI and MSI replaces LS with a 50% power saving and greater than twice the speed.	5 ns at 1 mW	60 MHz	12 ns
HC/HCT CMOS For information see previous chapter HCMOS PC74.			
AC/ACT CMOS For information see previous chapter ACL 74 FAMILY.			

TTL 74 SERIES SURVEY

N74 SERIES		STD	LS	S	F	ALS
ARITHMETIC ICs						
83	4–bit BCD adder				●	
83A	4–bit binary full adder (fast carry)		●			
181	4–bit arithmetic logic unit		●		●	
182	look–ahead carry generator				●	
280	9–bit odd/even parity generator/checker			●		
280A	9–bit odd/even parity generator/checker				●	
280B	9–bit odd/even parity generator/checker				●	
283	4–bit full adder with fast carry		●		●	
381	4–bit arithmetic logic unit				●	
382	4–bit arithmetic logic unit				●	
385	quad serial adder/substractor				●	
582	4–bit BCD arithmetic logic unit				●	
583	4–bit BCD adder				●	
881	arithmetic logic unit/function generator				●	
882	32–bit look–ahead carry generator				●	
BUFFERS						
06	hex inverter buffer/driver (open collector)	●			●	
07	hex buffer/line driver (open collector)	●			●	
16	hex inverter buffer/driver (open collector)	●				
17	hex buffer/driver (open collector)	●				
125	quad buffer (3–state)	●			●	
125A	quad buffer (3–state)		●			
126	quad buffer (3–state)	●			●	
126A	quad buffer (3–state)		●			
240	octal inverter buffer (3–state)		●	●	●	
240A	octal inverter buffer (3–state)					●
240A–1	octal inverter buffer (3–state)					●
241	octal buffer (3–state)		●	●	●	
241A	octal buffer (3–state)					●
241A–1	octal buffer (3–state)					●
244	octal buffer (3–state)		●	●	●	
244A	octal buffer (3–state)					●
244A–1	octal buffer (3–state)					●
365	hex buffer/driver (3–state)				●	
365A	hex buffer/driver (3–state)	●	●			
366	hex inverter buffer (3–state)				●	
366A	hex inverter buffer (3–state)	●	●			
367	hex buffer/driver (3–state)				●	
367A	hex buffer/driver (3–state)	●	●			
368	hex inverter buffer (3–state)				●	
368A	hex inverter buffer (3–state)	●	●			
455	octal buffer with parity generator checker				●	
456	octal buffer with parity generator checker				●	
540	octal buffer/line driver (3–state)		●		●	
541	octal non–inverting buffer/line driver (3–state)		●		●	
655A	octal inverting buffer with parity generator checker				●	
656A	octal buffer with parity generator checker				●	
756	octal inverter buffer (open collector)				●	
757	octal buffer (open collector)				●	

N74 SERIES		STD	LS	S	F	ALS
BUFFERS (cont.)						
760	octal buffer (open collector)				●	
827	10–bit buffer/line driver, non–inverting (3–state)				●	
828	10–bit buffer/line driver, inverting (3–state)				●	
1240	octal buffer; inverting (3–state); light load				●	
1241	octal buffer; non–inverting; (3–state); light load				●	
1244	octal buffer (3–state)				●	
BUS ICs						
242	quad bus inverting transceiver (3–state)		●		●	
243	quad transceiver (3–state)		●		●	
245	octal bus transceiver (3–state)		●		●	
245A	octal bus transceiver (3–state)					●
245A–1	octal bus transceiver (3–state)					●
545	octal bus transceiver (3–state)				●	
620	octal bus transceiver; inverting (3–state)		●		●	
620A	octal bus transceiver; inverting (3–state)					●
620A–1	octal bus transceiver; inverting (3–state)					●
621	octal bus transceiver; non–inverting (open collector)		●		●	
622	octal bus transceiver; inverting (open collector)		●		●	
623	octal bus transceiver; non–inverting (3–state)		●		●	
623A	octal bus transceiver; non–inverting (3–state)					●
623A–1	octal bus transceiver; non–inverting (3–state)					●
640	octal bus transceiver, inverting (3–state)		●		●	
640–1	octal bus transceiver; inverting (3–state)		●			
641	octal bus transceiver; non–inverting (open collector)		●		●	
641–1	octal bus transceiver; non–inverting (open collector)		●			
642	octal bus transceiver; inverting (open collector)		●		●	
642–1	octal bus transceiver; inverting (open collector)		●			
645	octal bus transceiver (3–state)		●			
645–1	octal bus transceiver (3–state)		●			
646	octal bus transceiver and register; non–inverting (3–state)				●	
646A	octal bus transceiver and register; non–inverting (3–state)				●	
647	octal bus transceiver and register; non–inverting (open collector)				●	
648	octal bus transceiver and register; inverting (3–state)				●	
648A	octal bus transceiver and register; inverting (3–state)				●	
649	octal bus transceiver and register; inverting (open collector)				●	
657	octal bus transceiver with parity generator checker (3–state)				●	
657A	octal bus transceiver with parity generator checker (3–state)				●	
776	octal bidirectional latched bus transceiver (open collector)				●	
777	triple bidirectional latched bus transceiver (3–state) (open collector)				●	

N74 SERIES		STD	LS	S	F	ALS
BUS ICs (cont.)						
808	hex 2–input AND driver				●	
821	10–bit bus interface register, non–inverting (3–state)				●	
822	10–bit bus interface register, inverting (3–state)				●	
823	9–bit bus interface register, non–inverting (3–state)				●	
824	9–bit bus interface register, inverting (3–state)				●	
825	9–bit bus interface register, non–inverting (3–state)				●	
826	9–bit bus interface register, inverting (3–state)				●	
838	microprogram sequence controller				●	
841	10–bit bus interface latch, non–inverting (3–state)				●	
842	10–bit bus interface latch, inverting (3–state)				●	
843	9–bit bus interface latch, non–inverting (3–state)				●	
844	9–bit bus interface latch, inverting (3–state)				●	
845	8–bit bus interface latch, non–inverting (3–state)				●	
846	8–bit bus interface latch, inverting (3–state)				●	
861	10–bit bus transceiver, non–inverting				●	
862	10–bit bus transceiver, inverting				●	
863	9–bit bus transceiver, non–inverting (3–state)				●	
864	9–bit bus transceiver, inverting (3–state)				●	
1245	octal bus transceiver (3–state); light load				●	
3893	quad FutureBus backplane transceiver (3–state, open collector)				●	
COMPARATORS						
85	4–bit magnitude comparator	●	●	●	●	
521	8–bit identify comparator				●	
524	8–bit register comparator (open collector)				●	
COUNTERS						
90	4–bit decade ripple counter	●	●			
92	divide–by–twelve counter	●	●			
93	4–bit binary ripple counter	●	●			
160	synchronous BCD decade counter	●				
160A	synchronous BCD decade counter		●		●	
161A	synchronous 4–bit binary counter		●		●	
161B	synchronous 4–bit binary counter					●
162A	synchronous BCD decade counter		●		●	
163A	synchronous 4–bit binary counter		●		●	
163B	synchronous 4–bit binary counter					●

N74 SERIES		STD	LS	S	F	ALS
COUNTERS (cont.)						
168	synchronous BCD decade up/down counter			●	●	
169	synchronous 4–bit binary up/down counter				●	
169A	synchronous 4–bit binary up/down counter		●			
190	presettable BCD/decade up/down counter				●	
191	presettable 4–bit binary up/down counter		●		●	●
192	presettable BCD/decade up/down counter	●	●		●	
193	presettable 4–bit binary up/down counter	●	●		●	●
269	8–bit binary counter				●	
290	4–bit decade ripple counter		●			
293	4–bit binary ripple counter		●			
390	dual decade ripple counter		●			
393	dual 4–bit binary ripple counter		●		●	
490	dual BCD decade ripple counter		●			
568	BCD decade up/down synchronous counter (3–state)				●	
569	4–bit binary up/down synchronous counter (3–state)				●	
579	8–bit binary up/down counter, common I/O (3–state)				●	
779	8–bit bidirectional binary counter (3–state)				●	
1779	8–bit bidirectional binary counter (3–state)				●	
DECODERS						
42	BCD–to–decimal decoder (1–of–10)		●			
45	BCD–to–decimal decoder/driver (open collector)	●				
138	3–line to 8–line decoder/demultiplexer		●	●	●	●
139	dual 2–line to 4–line decoder/demultiplexer		●	●	●	●
145	BCD–to–decimal decoder/driver (open collector)	●				
154	4–line to 16–line decoder/demultiplexer	●	●		●	
155	dual 2–line to 4–line decoder/demultiplexer		●			
156	dual 2–line to 4–line decoder/demultiplexer (open collector)		●			
445	BCD–to–decimal decoder/driver (open collector)		●			
537	1–of–10 decoder (3–state)				●	
538	1–of–8 decoder (3–state)				●	
539	dual 1–of–4 decoder (3–state)				●	
547	octal decoder/demultiplexer				●	
548	octal decoder/demultiplexer				●	
DEMULTIPLEXERS						
138	3–line to 8–line decoder/demultiplexer				●	●
139	dual 2–line to 4–line decoder/demultiplexer				●	●
154	4–line to 16–line decoder/demultiplexer				●	
547	octal decoder/demultiplexer				●	
548	octal decoder/demultiplexer				●	

N74 SERIES		STD	LS	S	F	ALS
DRIVERS						
804	hex 2–input NAND driver				●	
805	hex 2–input NOR driver				●	
808	hex 2–input AND driver				●	
832	hex 2–input OR driver				●	
1804	hex 2–input NAND driver				●	
1805	hex 2–input NOR driver				●	
1808	hex 2–input AND driver				●	
1832	hex 2–input OR driver				●	
3037	quad 2–input NAND, 30 Ohm transmission line driver				●	
3038	quad 2–input NAND, 30 Ohm transmission line driver; open collector				●	
3040	dual 4–input NAND, 30 Ohm transmission line driver				●	
5300	LED driver				●	
30240	octal inverting 30 Ohm transmission line driver; open collector				●	
30244	octal 30 Ohm transmission–line/backplane driver				●	
30245	octal transceiver/30 Ohm transmission line driver; open collector				●	
30640	octal transceiver, 30 Ohm transmission driver; inverting; open collector				●	
ENCODERS						
148	8–line to 3–line priority encoder				●	
FLIP–FLOPS						
D–type						
74	dual D–type edge–triggered flip–flop	●		●	●	
74A	dual D–type edge–triggered flip–flop		●			●
173	quad D–type flip–flop (3–state)		●		●	
174	hex D–type flip–flop with reset	●	●	●	●	●
175	quad D–type edge–triggered flip–flop with reset	●	●	●	●	●
273	octal D–type flip–flop with reset		●	●	●	●
374	octal D–type flip–flop (3–state)		●	●	●	●
377	octal D–type flip–flop with clock enable		●		●	●
378	hex D–type flip–flop with clock enable		●		●	
379	quad D flip–flop with enable				●	
534	octal D–type flip–flop (3–state)			●	●	
564	octal D flip–flop (3–state) broadside pinout				●	
564A	octal D–type flip–flop, inverting (3–state)					●
574	octal D flip–flop (3–state) broadside pinout				●	
574A	octal D–type flip–flop (3–state); same as 'ALS374 with broadside pin–out					●
5074	synchronizing dual D–type flip–flop with metastable immune characteristics				●	
50728	cascaded synchronizing dual D–type flip–flop with metastable immune characteristics				●	
50729	synchronizing dual D–type flip–flop with edge–triggered set and reset and metastable immune characteristics				●	

N74 SERIES		STD	LS	S	F	ALS
FLIP–FLOPS (cont.)						
JK						
73	dual JK master–slave flip–flop		●			
76	dual JK master–slave flip–flop		●			
107	dual JK master–slave flip–flop		●			
109	dual JK positive–edge triggered flip–flop		●		●	
109A	dual JK positive–edge triggered flip–flop					●
112	dual JK negative–edge triggered flip–flop		●	●	●	
112A	dual JK negative–edge triggered flip–flop					●
113	dual JK positive–edge triggered flip–flop		●		●	
114	dual JK negative–edge triggered flip–flop				●	
50109	dual synchronizing JK flip–flop; positive–edged–triggered with metastable immune characteristics				●	
GATES						
AND						
08	quad 2–input AND gate	●	●	●	●	●
09	quad 2–input AND gate (open collector)		●			
11	triple 3–input AND gate		●	●	●	
11A	triple 3–input AND gate					●
21	dual 4–input AND gate		●			
51	dual 2–wide 2–input AND–OR–invert gate	●	●	●	●	
54	4–wide 2 and 3–input AND–OR–invert gate		●			
64	4–2–3–2–input AND–OR–invert gate			●	●	
Complex						
51	dual 2–wide 2–input AND–OR–invert gate	●	●	●	●	
54	4–wide 2 and 3–input AND–OR–invert gate		●			
64	4–2–3–2–input AND–OR–invert gate			●	●	
EXCLUSIVE–OR						
86	quad 2–input EXCLUSIVE–OR gate	●	●	●	●	●
136	quad EXCLUSIVE–OR gate (open collector)		●			
EXCLUSIVE–NOR						
266	quad 2–input EXCLUSIVE–NOR gate (open collector)		●			
Inverter						
51	dual 2–wide 2–input AND–OR–invert gate	●	●	●	●	
54	4–wide 2 and 3–input AND–OR–invert gate		●			
64	4–2–3–2–input AND–OR–invert gate			●	●	

N74 SERIES		STD	LS	S	F	ALS
GATES (cont.)						
NAND						
00	quad 2–input NAND gate	●	●	●	●	
00A	quad 2–input NAND gate					●
01	quad 2–input NAND gate (open collector)		●			
03	quad 2–input NAND gate (open collector)	●		●		
10	triple 3–input NAND gate	●	●	●	●	
10A	triple 3–input NAND gate					●
20	dual 4–input NAND gate	●	●	●	●	
20A	dual 4–input NAND gate					●
26	quad 2–input NAND gate (open collector)	●	●			
30	8–input NAND gate		●		●	
30A	8–input NAND gate					●
37	quad 2–input NAND buffer	●	●	●	●	
38	quad 2–input NAND buffer (open collector)	●	●	●	●	
38A	quad 2–input NAND buffer (open collector)					●
39	quad 2–input NAND buffer (open collector)	●				
40	dual 4–input NAND buffer	●		●	●	
133	13–input NAND gate			●	●	
134	12–input NAND gate (3–state)			●		
140	dual 4–input NAND line driver (50 Ohm)			●		
NOR						
02	quad 2–input NOR gate	●	●	●	●	●
25	dual 4–input NOR gate with strobe	●				
27	triple 3–input NOR gate				●	●
33	quad 2–input NOR buffer (open collector)	●	●			
260	dual 5–input NOR gate		●	●	●	
OR						
32	quad 2–input OR gate	●	●	●	●	●
51	dual 2–wide 2–input AND–OR–invert gate	●	●	●	●	
54	4–wide 2 and 3–input AND–OR–invert gate		●			
64	4–2–3–2–input AND–OR–invert gate			●	●	
INVERTERS						
04	hex inverter	●	●	●	●	
04B	hex inverter					●
05	hex inverter (open collector)	●	●	●		
LATCHES						
256	dual 4–bit addressable latch		●		●	
259	8–bit addressable latch		●		●	
279	quadruple S–R latch	●				
373	octal transparent latch (3–state)		●	●	●	●

IC

N74 SERIES		STD	LS	S	F	ALS
LATCHES (cont.)						
412	multi–mode buffered latch; non–inverting (3–state)				●	
432	multi–mode buffered latch; inverting (3–state)				●	
533	inverting octal D–type latch (3–state)				●	
563	octal D latch (3–state) broadside pinout				●	
563A	octal transparent latch, inverting (3–state)					●
573	octal transparent latch (3–state) broadside pinout				●	
573B	octal transparent latch (3–state); same as 'ALS373 with broadside pin–out					●
841	10–bit bus interface latch, non–inverting (3–state)				●	
842	10–bit bus interface latch, inverting (3–state)				●	
843	9–bit bus interface latch, non–inverting (3–state)				●	
844	9–bit bus interface latch, inverting (3–state)				●	
845	8–bit bus interface latch, non–inverting (3–state)				●	
846	8–bit bus interface latch, inverting (3–state)				●	
1604	dual octal latch				●	
MEMORIES						
189	64–bit bipolar RAM (16x4)			●		
189A	64–bit TTL bipolar RAM (16x4); inverting (3–state)				●	
219A	64–bit TTL bipolar RAM (16x4); non–inverting (3–state)				●	
301	256–bit TTL bipolar RAM (256x1)		●	●		
410	register stack; 16x4 RAM; 3–state output register				●	
MULTIPLEXERS						
150	16–line to 1–line multiplexer	●				
151	8–line to 1–line multiplexer		●	●	●	●
151A	8–line to 1–line multiplexer				●	
153	dual 4–line to 1–line multiplexer		●	●	●	●
157	quad 2–input data selector/multiplexer; non–inverting	●	●	●	●	●
157A	quad 2–input data selector/multiplexer; non–inverting				●	
158	quad 2–input data selector/multiplexer; inverting	●	●	●	●	●
158A	quad 2–input data selector/multiplexer; inverting				●	
251	8–line to 1–line multiplexer (3–state)			●	●	●
251A	8–line to 1–line multiplexer (3–state)		●		●	
253	dual 4–line to 1–line multiplexer (3–state)		●	●	●	●
257	quad 2–line to 1–line data selector/multiplexer (3–state)			●	●	●
257A	quad 2–line to 1–line data selector/multiplexer (3–state)		●		●	
258	quad 2–line to 1–line data selector/multiplexer (3–state)			●	●	●

N74 SERIES		STD	LS	S	F	ALS
MULTIPLEXERS (cont.)						
258A	quad 2–line to 1–line data selector/multiplexer (3–state)		●		●	
352	dual 4–input multiplexer		●		●	
353	dual 4–input multiplexer (3–state)		●		●	
711	quintuple 2–input multiplexer (3–state)				●	
711–1	quintuple 2–input multiplexer with 30 Ohm series termination resistors (3–state)				●	
712	quintuple 3–input multiplexer				●	
712–1	quintuple 3–input multiplexer with 30 Ohm series termination resistors				●	
723	quad 3–input multiplexer (3–state)				●	
723–1	quad 3–input multiplexer with 30 Ohm series termination resistors (3–state)				●	
725	quad 4–input multiplexer				●	
725–1	quad 4–input multiplexer with 30 Ohm series termination resistors				●	
732	quad data multiplexer; inverting (3–state)				●	
733	quad data multiplexer; non–inverting (3–state)				●	
MULTIVIBRATORS						
Monostable						
121	monostable multivibrator	●				
123	dual retriggerable monostable multivibrator	●				
REGISTERS						
91A	8–bit shift register	●				
96	5–bit shift register		●			
164	8–bit serial–in/parallel–out shift register	●	●		●	●
166	8–bit serial/parallel–in/serial–out shift register	●			●	
194	4–bit bidirectional universal shift register	●		●	●	
195	4–bit parallel access shift register			●	●	
195A	4–bit parallel access shift register		●			
198	8–bit bidirectional universal shift register				●	
199	8–bit parallel–access shift register	●			●	
222	16x4 synchronous FIFO with 'ready' enables (3–state)				●	
224	16x4 synchronous FIFO (3–state)				●	
225	16x5 asynchronous FIFO (3–state)			●	●	
298	quad 2–port register		●		●	
299	octal shift/storage register (3–state)				●	
322	octal shift/storage register (3–state)				●	
323	octal shift/storage register (3–state)				●	
350	4–bit shifter (3–state)				●	

IC

N74 SERIES		STD	LS	S	F	ALS
REGISTERS (cont.)						
395	4–bit cascadable shift register (3–state)				●	
395A	4–bit cascadable shift register (3–state)		●		●	
398	quad 2–port register true				●	
399	quad 2–port register true				●	
410	register stack; 16x4 RAM; 3–state output register				●	
595	8–bit shift register with output latches (3–state)				●	
597	8–bit shift register with input latches				●	
598	8–bit shift register with input latches (3–state)				●	
604	dual 8–bit register (3–state)				●	
605	dual 8–bit register (open collector)				●	
646	octal bus transceiver and register; non–inverting (3–state)				●	●
646–1	octal transceiver/register; non–inverting (3–state)					●
646A	octal bus transceiver and register; non–inverting (3–state)				●	
647	octal bus transceiver and register; non–inverting (open collector)				●	
648	octal bus transceiver and register; inverting (3–state)				●	●
648–1	octal transceiver/register; inverting (3–state)					●
648A	octal bus transceiver and register; inverting (3–state)				●	
649	octal bus transceiver and register; inverting (open collector)				●	
651	octal transceiver/register; inverting (3–state)				●	●
651–1	octal transceiver/register; inverting (3–state)					●
651A	octal transceiver/register; inverting (3–state)				●	
652	octal transceiver/register; non–inverting (3–state)				●	●
652–1	octal transceiver/register; non–inverting (3–state)					●
652A	octal transceiver/register; non–inverting (3–state)				●	
653	octal transceiver/register, inverting (open collector) (3–state)				●	
654	octal transceiver/register, non–inverting (open collector) (3–state)				●	
670	4x4 register file (3–state)		●		●	
674	16–bit serial/parallel–in,serial out shift register (3–state)				●	
676	16–bit serial/parallel–in, serial out shift register (3–state)				●	
755	octal mailbox register with 'ready' flag (3–state)				●	
821	10–bit bus interface register, non–inverting (3–state)				●	
822	10–bit bus interface register, inverting (3–state)				●	
823	9–bit bus interface register, non–inverting (3–state)				●	
824	9–bit bus interface register, inverting (3–state)				●	

N74 SERIES		STD	LS	S	F	ALS
REGISTERS (cont.)						
825	9–bit bus interface register, non–inverting (3–state)				●	
826	9–bit bus interface register, inverting (3–state)				●	
835	8–bit shift register; 2:1 MUX–in; latched 'B' inputs; serial–out				●	
SCHMITT TRIGGERS						
13	dual 4–input NAND Schmitt trigger		●		●	
14	hex inverter Schmitt trigger	●	●		●	
132	quad 2–input NAND Schmitt trigger		●		●	
SELECTORS						
157	quad 2–input data selector/multiplexer; non–inverting	●	●	●	●	●
157A	quad 2–input data selector/multiplexer; non–inverting				●	
158	quad 2–input data selector/multiplexer; inverting	●	●	●	●	●
158A	quad 2–input data selector/multiplexer; inverting				●	
257	quad 2–line to 1–line data selector/multiplexer (3–state)			●	●	●
257A	quad 2–line to 1–line data selector/multiplexer (3–state)		●		●	
258	quad 2–line to 1–line data selector/multiplexer (3–state)			●	●	●
258A	quad 2–line to 1–line data selector/multiplexer (3–state)		●		●	
SPECIAL FUNCTIONS						
384	8–bit serial/parallel two's complement multiplier				●	
764	dual port RAM controller		●		●	
764–1	DRAM dual–ported controller				●	
764A	DRAM dual ported controller				●	
765	dual port RAM controller without latch		●		●	
765–1	DRAM dual–ported controller without latch				●	
765A	DRAM dual ported controller without latch				●	
786	4–input asynchronous bus arbiter				●	
838	microprogram sequence controller				●	
1761	DRAM and interrupt vector controller				●	
1762	1 M–bit memory address controller				●	
1763	1 M–bit intelligent DRAM controller				●	
1764	1 M–bit DRAM dual–ported controller with latch				●	
1764–1	1 M–bit DRAM dual–ported controller with latch				●	
1765	1 M–bit DRAM dual–ported controller without latch				●	
1765–1	1 M–bit DRAM dual–ported controller without latch				●	
1801	bit stream manager (encoder/decoder)		●			
1802	bit stream manager (serializer/de–serializer)		●			
4763	4 Mbit intelligent DRAM controller				●	

N74 SERIES		STD	LS	S	F	ALS
TRANCEIVERS						
242	quad bus inverting transceiver (3–state)		●		●	
243	quad transceiver (3–state)		●		●	
245	octal bus transceiver (3–state)		●		●	
543	octal registered transceiver; non–inverting (3–state)				●	●
543–1	octal registered transceiver; non–inverting (3–state)					●
544	octal registered transceiver; inverting (3–state)				●	●
544–1	octal registered transceiver; inverting (3–state)					●
545	octal bus transceiver (3–state)				●	
550	octal registered transceiver (AMD2950)				●	
551	octal registered transceiver (AMD2951)				●	
552	octal registered transceiver with status flags				●	
588	octal bidirectional transceiver with IEEE–488 termination resistors (3–state inputs and outputs)				●	
620	octal bus transceiver; inverting (3–state)		●		●	
620A	octal bus transceiver; inverting (3–state)					●
620A–1	octal bus transceiver; inverting (3–state)					●
621	octal bus transceiver; non–inverting (open collector)		●		●	
622	octal bus transceiver; inverting (open collector)		●		●	
623	octal bus transceiver; non–inverting (3–state)		●		●	
623A	octal bus transceiver; non–inverting (3–state)					●
623A–1	octal bus transceiver; non–inverting (3–state)					●
640	octal bus transceiver, inverting (3–state)		●		●	
640–1	octal bus transceiver; inverting (3–state)		●			
641	octal bus transceiver; non–inverting (open collector)		●		●	
641–1	octal bus transceiver; non–inverting (open collector)		●			
642	octal bus transceiver; inverting (open collector)		●		●	
642–1	octal bus transceiver; inverting (open collector)		●			
645	octal bus transceiver (3–state)		●			
645–1	octal bus transceiver (3–state)		●			
645A	octal transceiver (3–state)					●
645A–1	octal transceiver (3–state)					●
646	octal bus transceiver and register; non–inverting (3–state)				●	●
646–1	octal transceiver/register; non–inverting (3–state)					●
646A	octal bus transceiver and register; non–inverting (3–state)				●	
647	octal bus transceiver and register; non–inverting (open collector)				●	
648	octal bus transceiver and register; inverting (3–state)				●	●
648–1	octal transceiver/register; inverting (3–state)					●
648A	octal bus transceiver and register; inverting (3–state)				●	
649	octal bus transceiver and register; inverting (open collector)				●	
651	octal transceiver/register; inverting (3–state)				●	●

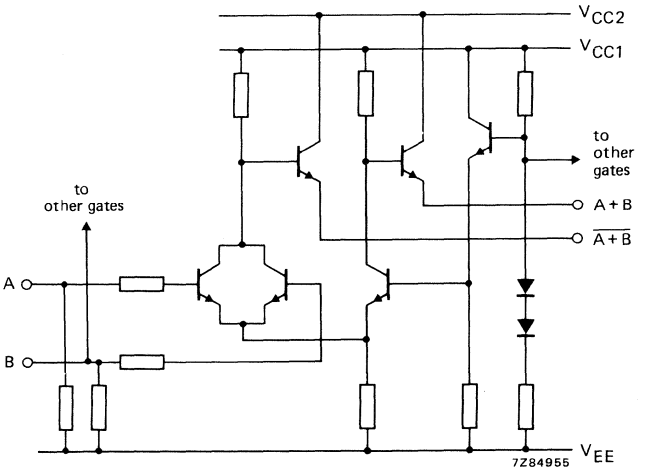
N74 SERIES		STD	LS	S	F	ALS
TRANCEIVERS (cont.)						
651–1	octal transceiver/register; inverting (3–state)					●
651A	octal transceiver/register; inverting (3–state)				●	
652	octal transceiver/register; non–inverting (3–state)				●	●
652–1	octal transceiver/register; non–inverting (3–state)					●
652A	octal transceiver/register; non–inverting (3–state)				●	
653	octal transceiver/register, inverting (open collector) (3–state)				●	
654	octal transceiver/register, non–inverting (open collector) (3–state)				●	
657	octal bus transceiver with parity generator checker (3–state)				●	
657A	octal bus transceiver with parity generator checker (3–state)				●	
776	octal bidirectional latched bus transceiver (open collector)				●	
777	triple bidirectional latched bus transceiver (3–state) (open collector)				●	
807	octal shift/count registered transceiver with adder and parity (3–state)				●	
861	10–bit bus transceiver, non–inverting				●	
862	10–bit bus transceiver, inverting				●	
863	9–bit bus transceiver, non–inverting (3–state)				●	
864	9–bit bus transceiver, inverting (3–state)				●	
899	dual 9–bit latch transceiver with 8–bit parity generator/checker (3–state)				●	
1242	quad transceiver; inverting (3–state); light load				●	
1243	quad transceiver (3–state); light load				●	
1245	octal bus transceiver (3–state); light load				●	
1894	9–bit transceiver with latched 8–bit parity error (open collector)				●	
1895	9–bit transceiver with latched 8–bit parity error (3–state)				●	
1896	9–bit transceiver with registered 8–bit parity error (open collector)				●	
1897	9–bit transceiver with registered 8–bit parity error (3–state)				●	
2952	8–bit transceiver; non–inverting (3–state)				●	
2953	8–bit transceiver; inverting (3–state)				●	
3893	quad FutureBus backplane transceiver (3–state, open collector)				●	
8960	octal latched bidirectional FutureBus transceiver; inverting (open collector)				●	
8961	octal latched bidirectional FutureBus transceiver; non–inverting (open collector)				●	
30245	octal transceiver/30 Ohm transmission line driver; open collector				●	
30640	octal transceiver, 30 Ohm transmission driver; inverting; open collector				●	

IC

ECL 10 000 FAMILY SPECIFICATIONS

The 10K family of ECL silicon monolithic integrated circuits is designed for high speed central processors and digital communication systems.
With 2 ns typical propagation delay and only 25 mW power dissipation per gate, this family offers an excellent speed–power product and therefore is recommended for large high–speed system design.

Basic gate circuit



Family ratings

Limiting values in accordance with the Absolute Maximum System (IEC134)

Supply voltage (DC)	V_{EE}	max. −8.0	V
Input voltage range	V_I	0 to V_{EE}	
Output current	I_O	max. 50	mA
Storage temperature range	T_{stg}	−55 to +150	°C

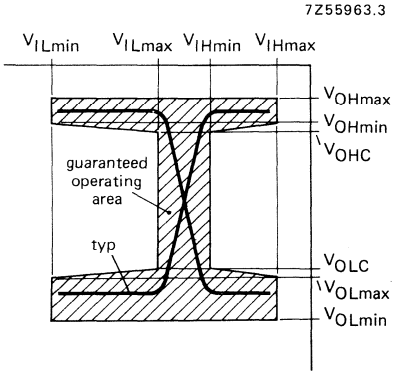
DC family characteristics

V_{CC} = ground; V_{EE} = −5.2 V; R_L = 50 Ohm to −2 V

Each 10K circuit has been designed to meet the DC specifications shown in the test table below, after thermal equilibrium has been established.
The circuit is in a test socket or mounted on a printed-circuit board and transverse air flow > 2.5 m/s is maintained.
Test values are given in the table and defined in the figure.

Test table

T_{amb}	−30	+25	+85 °C	unit
V_{IHA}	−890	−810	−700	mV
V_{IHB}	−1205	−1105	−1035	mV
V_{ILA}	−1500	−1475	−1440	mV
V_{ILB}	−1890	−1850	−1825	mV



parameter	symbol	T_{amb} −30 °C	T_{amb} +25 °C	T_{amb} +75 °C	unit
Output voltage HIGH	V_{OHA} V_{OHB}	−890 −1060	−810 −960	−700 −890	mV mV
Output voltage LOW	V_{OLA} V_{OLB}	−1675 −1890	−1650 −1850	−1615 −1825	mV mV
Output threshold voltage HIGH	V_{OHC}	−1080	−980	−910	mV
Output threshold voltage LOW	V_{OLC}	−1655	−1630	−1595	mV

ECL 10 000 FAMILY SURVEY

Type numbers have a suffix which signifies the type of package:
N = plastic DIL; F = ceramic (cerdip) DIL

AMPLIFIERS

10216	triple differential amplifier

ARITHMETIC ICs

10160	12–bit parity checker/generator

BUS ICs

10192	quadruple current–mode bus driver

COUNTERS

10136	universal hexadecimal counter
10137	universal decade counter

FLIP–FLOPS

D–type

10131	dual D–type master–slave flip–flop
10176	hex D–type master–slave flip–flop
10231	high speed dual D–type master–slave flip–flop

JK

10135	dual JK master–slave flip–flop

GATES

AND

10104	quadruple 2–input, 3 AND and 1 AND/NAND gate

Complex

10119	4–wide 4–3–3–3–input OR–AND gate

EXCLUSIVE–OR

10107	triple 2–input EXCLUSIVE–OR/EXCLUSIVE–NOR gate
10113	quadruple EXCLUSIVE–OR gate (with enable)

EXCLUSIVE–NOR

10107	triple 2–input EXCLUSIVE–OR/EXCLUSIVE–NOR gate

NAND

10104	quadruple 2–input, 3 AND and 1 AND/NAND gate

NOR

10100	quadruple 3–input NOR gate (1 input common)
10101	quadruple 2–input OR/NOR gate (1 input common)
10102	quadruple 2–input, 3 NOR and 1 OR/NOR gate
10103	quadruple 2–input, 3 OR and 1 OR/NOR gate
10105	triple 2–3–2 input OR/NOR gate
10109	dual 4–5 input OR/NOR gate

OR

10101	quadruple 2–input OR/NOR gate (1 input common)
10102	quadruple 2–input, 3 NOR and 1 OR/NOR gate
10103	quadruple 2–input, 3 OR and 1 OR/NOR gate
10105	triple 2–3–2 input OR/NOR gate
10109	dual 4–5 input OR/NOR gate

LATCHES

10133	quadruple latch with D–type inputs and enable outputs
10134	dual 2–input multiplexer with clocked D–type latches
10175	quintuple D–type latch with common reset and two wired–OR common clock inputs

MULTIPLEXERS

10134	dual 2–input multiplexer with clocked D–type latches
10158	quadruple 2–to–1 multiplexer (non–inverting)
10164	8–input multiplexer with enable input
10173	quadruple 2–input multiplexer with latched outputs
10174	dual 4–to–1 multiplexer (with enable)

REGISTERS

10141	4–bit universal shift register

TRANSLATORS

10124	quadruple TTL to ECL translator
10125	quadruple ECL to TTL translator

MEMORIES

PROM

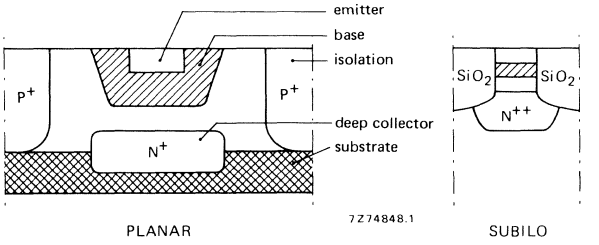
10P256	256–bit ECL bipolar PROM
10149	1024–bit ECL bipolar PROM (256x4)
10149A	1024–bit ECL bipolar PROM (256x4)
10149B	1024–bit ECL bipolar PROM (256x4)

Receivers

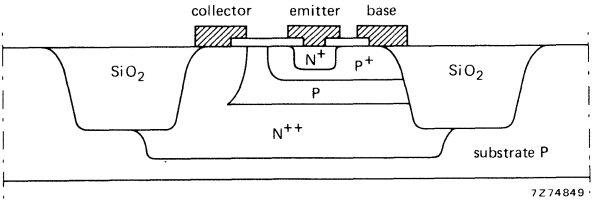
10114	triple line receiver (output OR/NOR)
10115	quadruple line receiver (output OR)
10116	triple line receiver (output OR/NOR)

ECL 100 000 FAMILY SPECIFICATIONS

To satisfy the needs of new generations of computer and telecommunication systems in standard and LSI circuit design, a new technological process has been developed using oxide lateral isolation. The process is called SUBILO and permits the manufacture of integrated circuits with ultra-high speeds and high integration density.
Instead of conventional planar junction isolation technology, SUBILO uses a process that results in a considerable reduction in transistor area and an increased integration density.
By using an increase in silicon oxide instead of isolation diffusion 'p', and removing the part between the emitter and isolation oxide, SUBILO technology results in a further reduction of transistor area. At the same time, the collector-base capacitance decreases, which is an important improvement in the dynamic performance of the transistor.



Junction-isolated PLANAR technique used for ECL 10 000.



The SUBILO process uses silicon oxide between devices instead of the p^+ regions used in the planar process.

Planar process in comparison with SUBILO technology

	planar	SUBILO	unit
Transistor area	3000	500	μm^2
Transition frequency	1.5	4.5	GHz
Application	ECL 10 000	ECL 100 000	

Family ratings

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Supply voltage (DC):	V_{EE} max. -7 V
Input voltage range:	$V_I = 0$ to V_{EE} if $V_{EE} > -6$ V; 0 to -6 V $> V_{EE} > -7$ V
Output current:	I_O max. 55 mA
Storage temperature range:	T_{stg} -55 to $+150$ °C

DC family characteristics

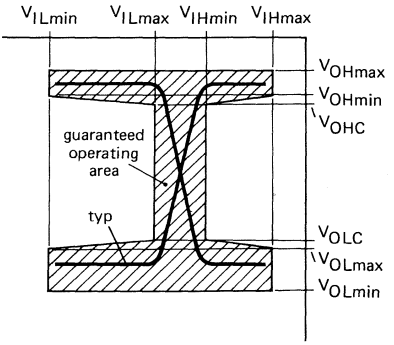
V_{CC} = ground; V_{EE} = −4.5 V; T_{amb} = 0 to +85 °C; R_L = 50 Ohm to −2 V.

Each 100K circuit has been designed to meet the DC specifications shown in the test table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed–circuit and transverse air flow > 2.5 m/s is maintained.
Test values are given in the table and defined in the figure.

Test table

parameter	symbol	value	unit
Input voltage HIGH	V_{IHA} V_{IHB}	−880 −1165	mV mV
Input voltage LOW	V_{ILA} V_{ILB}	−1475 −1810	mV mV
Output voltage HIGH	V_{OHA} V_{OHB}	−880 −1025	mV mV
Output voltage LOW	V_{OLA} V_{OLB}	−1620 −1810	mV mV
Output threshold voltage HIGH LOW	 V_{OHC} V_{OLC}	 −1035 −1610	 mV mV

7Z55963.3



ECL 100 000 FAMILY SURVEY

ARITHMETIC ICs

100160	dual 9–bit parity generator/8–bit comparator
100179	high speed carry look ahead generator
100180	fast 6–bit adder
100181	4–bit ALU binary/decimal

BUFFERS

100122	9–bit buffer gate

COMPARATORS

100166	9–bit comparator

DECODERS

100170	universal demultiplexer/decoder

DEMULTIPLEXERS

100170	universal demultiplexer/decoder

DRIVERS

100112	quadruple double fan–out OR/NOR gate
100113	quadruple fan–out OR/NOR gate
100123	hex bus driver
100126	9–bit buffer gate

ENCODERS

100165	universal priority encoder

FLIP–FLOPS

D–type

100131	triple D master–slave flip–flop
100150	hex D latch flip–flop
100151	hex D master–slave flip–flop
100231	triple D master–slave flip–flop (high speed version of 100131)

GATES

Complex

100117	triple 1–2–2 input OR/AND–OR/NAND gate
100118	2–4–4–4–5 input OR/AND–OR/NAND gate

EXCLUSIVE–OR

100107	quintuple EXCLUSIVE OR/NOR gate with compare

EXCLUSIVE–NOR

100107	quintuple EXCLUSIVE OR/NOR gate with compare

GATES (cont.)

NOR

100101	triple 5–input OR/NOR gate
100102	quintuple 2–input OR/NOR gate with common enable

OR

100101	triple 5–input OR/NOR gate
100102	quintuple 2–input OR/NOR gate with common enable

LATCHES

100155	quadruple 2–way multiplexer latch
100175	5–bit 100K to 10K interface with latch

MULTIPLEXERS

100155	quadruple 2–way multiplexer latch
100163	dual 8–bit multiplexer
100164	16–input multiplexer
100171	triple bit 4–way multiplexer

REGISTERS

100136	multipurpose counting register
100141	8–bit universal shift register

SPECIAL FUNCTIONS

100158	8–bit shift matrix

TRANSLATORS

100175	5–bit 100K to 10K interface with latch
100255	5–bit ECL/TTL interface

MEMORIES

PROM

100P256	256–bit ECL bipolar PROM
100149	1024–bit ECL bipolar PROM (256x4)
100149A	1024–bit ECL bipolar PROM (256x4)
100149B	1024–bit ECL bipolar PROM (256x4)

RECEIVERS

100114	quintuple differential line receiver

BUFFERS

N8T95	high–speed hex buffer (3–state)
N8T96	high–speed hex inverter (3–state)
N8T97	high speed hex buffer (3–state)
N8T98	high–speed hex inverter (3–state)

BUS ICs

N8T09	quad 3–state bus driver
N8T26A	quad inverting bus transceiver (3–state)
N8T34	quad bus transceiver (3–state)
N8T37	hex bus receiver/Schmitt trigger
N8T38	quad bus transceiver (open collector)
N8T128	quad bus driver/receiver (non–inverting)

DRIVERS

N8T13	dual low impedance line driver
N8T23	dual IBM 360/370 line driver

FLIP–FLOPS

D–type

N8TS808	octal D–type flip–flop (3–state)

LATCHES

N8TS805	octal transparent latch (3–state)
N8TS807	octal transparent latch (3–state)

MULTIVIBRATORS

Monostable

9602	dual monostable multivibrator

One–shot

N8T20	bidirectional one shot multivibrator

RECEIVERS

N8T24	triple IBM 360/370 line receiver

REGISTERS

8274	10–bit parallel–in/serial–out shift register

SPECIAL FUNCTIONS

N8T31	transparent I/O port; 8–bit bidirectional
N8T32	addressable I/O port; 8–bit bidirectional, synchronous
N8T36	addressable I/O port; 8–bit bidirectional, asynchronous
23 101	high level 16–to–8 connection matrix
231 101	high level 16–to–8 connection matrix

GENERAL PURPOSE

TIMING ICs

N8T20	bidirectional one shot multivibrator

TRANCEIVERS

N8T26A	quad inverting bus transceiver (3–state)
N8T34	quad bus transceiver (3–state)
N8T38	quad bus transceiver (open collector)
N8X41	auto–directional bus transceiver

EPROM

27C64A–IND	64K CMOS EPROM (8Kx8); industrial temperature range –40 to +85 °C
27C64A–OTP	64K CMOS EPROM (8Kx8); one time programmable
27C64A–UV	64K CMOS EPROM (8Kx8); erasable
27C210–OTP	1 M–bit CMOS EPROM (64Kx16); one time programmable
27C210–UV	1 M–bit CMOS EPROM (64Kx16); erasable
27C256–IND	256K CMOS EPROM (32Kx8); industrial temperature range –40 to +85 °C
27C256–OTP	256K CMOS EPROM (32Kx8); one time programmable
27C256–UV	256K CMOS EPROM (32Kx8); erasable
27C512–OTP	512K CMOS EPROM (32Kx8); one time programmable
27C512–UV	512K CMOS EPROM (32Kx8); erasable
27HC641–OTP	64K CMOS EPROM (8Kx8); one time programmable
27HC641–UV	64K CMOS EPROM (8Kx8); erasable

EEPROM

PCA8582B	256x8–bit static CMOS EEPROM with I^2C–bus interface; for automotive applications
PCF8581	128x8–bit EEPROM with I^2C–bus interface; supply voltage 4.5 to 5.5 V
PCF8581C	128x8–bit EEPROM with I^2C–bus interface; supply voltage 2.5 to 6 V
PCF8582A	256x8–bit static CMOS EEPROM; I^2C bus
PCF8582C	256x8–bit static CMOS EEPROM; I^2C–bus; for automotive applications; supply voltage 2.5 to 6 V

PROM

82HS195	16,384–bit TTL bipolar PROM (4096x4)
82HS195A	16,384–bit TTL bipolar PROM (4096x4)
82HS195B	16,384–bit TTL bipolar PROM (4096x4)
82HS321	32,768–bit TTL bipolar PROM (4096x8)
82HS321A	32,768–bit TTL bipolar PROM (4096x8)
82HS321B	32,768–bit TTL bipolar PROM (4096x8)
82HS641	65,536–bit TTL bipolar PROM (8192x8)
82HS641A	65,536–bit TTL bipolar PROM (8192x8)
82HS641B	65,536–bit TTL bipolar PROM (8192x8)
82LHS191	16,384–bit TTL bipolar PROM (2048x8)
82LHS321	32,768–bit TTL bipolar PROM (4096x8)
82LS135	2048–bit TTL bipolar PROM (256x8)
82S23	256–bit TTL bipolar PROM (32x8)
82S23A	256–bit TTL bipolar PROM (32x8)
82S115	4096–bit TTL bipolar PROM (512x8)
82S123	256–bit TTL bipolar PROM (32x8)
82S123A	256–bit TTL bipolar PROM (32x8)
82S126	1024–bit TTL bipolar PROM (256x4)
82S126A	1024–bit TTL bipolar PROM (256x4)
82S129	1024–bit TTL bipolar PROM (256x4)
82S129A	1024–bit TTL bipolar PROM (256x4)
82S130	2048–bit TTL bipolar PROM (512x4)
82S130A	2048–bit TTL bipolar PROM (512x4)
82S131	2048–bit TTL bipolar PROM (512x4)
82S131A	2048–bit TTL bipolar PROM (512x4)
82S135	2048–bit TTL bipolar PROM (256x8)
82S137	4096–bit TTL bipolar PROM (1024x4)
82S137A	4096–bit TTL bipolar PROM (1024x4)
82S137B	4096–bit TTL bipolar PROM (1024x4)
82S141	4096–bit TTL bipolar PROM (512x8)
82S141A	4096–bit TTL bipolar PROM (512x8)
82S147	4096–bit TTL bipolar PROM (512x8)
82S147A	4096–bit TTL bipolar PROM (512x8)
82S147B	4096–bit TTL bipolar PROM (512x8)
82S181	8192–bit TTL bipolar PROM (1024x8)
82S181A	8192–bit TTL bipolar PROM (1024x8)
82S181C	8192–bit TTL bipolar PROM (1024x8)
82S183	8192–bit TTL bipolar PROM (1024x8)
82S185	8192–bit TTL bipolar PROM (2048x4)
82S185A	8192–bit TTL bipolar PROM (2048x4)
82S185B	8192–bit TTL bipolar PROM (2048x8)
82S191	16,384–bit TTL bipolar PROM (2048x8)
82S191A	16,384–bit TTL bipolar PROM (2048x8)
82S191C	16,384–bit TTL bipolar PROM (2048x8)
82US23	256–bit TTL bipolar PROM (32x8)
82US123	256–bit TTL bipolar PROM (32x8)

RAM

FCB61C65L–70	8Kx8–bit high–speed CMOS low–power static RAM; access time 70 ns
FCF61C65LL–85	8Kx8–bit medium speed CMOS very low power static RAM; access time 85 nsec; extended temperature range
FCB61C65LL–70	8Kx8–bit high–speed CMOS very low power static RAM; access time 70 nsec
N8X350	2048–bit TTL bipolar RAM (256x8)
PCD5101	256x4–bit static RAM
PCD5114	1024x4–bit static RAM
PCF8570	256x8–bit static RAM; I^2C bus
PCF8570C	256x8–bit static RAM; I^2C bus; different slave address
PCF8571	128x8–bit static RAM; I^2C bus
PCF8583	clock calendar with 256x8–bit static RAM; I^2C bus
82LS16	256–bit TTL bipolar RAM (256x1)
82S09	576–bit TTL bipolar RAM (64x9)
82S09A	576–bit TTL bipolar RAM (64x9)
82S16	256–bit TTL bipolar RAM (256x1)
82S19	576–bit TTL bipolar RAM (64x9)
82S25	64–bit TTL bipolar RAM (16x4)
82S212	2304–bit TTL bipolar RAM (256x9)
82S212A	2304–bit TTL bipolar RAM (256x9)
3101A	64–bit bipolar RAM (16x4)

CMOS 8–BIT

PCA80C31BH–2	microcontroller: 128x8 RAM; 0.5 to 12 MHz; 0 to 70 °C
PCA80C31BH–3	microcontroller; 128x8 RAM; 1.2 to 12 MHz; –40 to +125 °C
PCA80C39	microcontroller; 128x8 RAM; 1.0 to 15 MHz; –40 to +110 °C
PCA80C49	microcontroller; 128x8 RAM; 2Kx8 ROM; 1.0 to 15 MHz; –40 to +110 °C
PCA80C51BH–3	microcontroller; 128x8 RAM; 4Kx8 ROM; 1.2 to 12 MHz; –40 to +125 °C
PCA80C528	microcontroller: 80C51 CPU plus 512x8 RAM; watch–dog timer; 16–bit timer/counter; I²C–bus; ROM code protection; 1.2 to 16 MHz; –40 to +110 °C
PCA80C552	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 12 MHz; –40 to +125 °C
PCA80C562	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 8–bit ADC; 1.2 to 12 MHz; –40 to +125 °C
PCA80C652	microcontroller; 256x8 RAM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +125 °C

CMOS 8–BIT (cont.)

PCA80C662	microcontroller: 80C51 CPU plus 256x8 RAM; two 16–bit timer/counters; four 8–bit I/O ports; full duplex UART; I²C–bus; –40 to +110 °C
PCA83C528	microcontroller: 80C51 CPU plus 512x8 RAM; 32x8 ROM; watch–dog timer; 16–bit timer/counter; I²C–bus; ROM code protection; 1.2 to 16 MHz; –40 to +110 °C
PCA83C552	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; –40 to +125 °C
PCA83C562	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 8–bit ADC; 1.2 to 12 MHz; –40 to +125 °C
PCA83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +125 °C
PCA83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 16 MHz; –40 to +125 °C
PCA83C662	microcontroller: 80C51 CPU plus 256x8 RAM; 8Kx8 ROM; two 16–bit timer/counters; four 8–bit I/O ports; full duplex UART; I²C–bus; –40 to +110 °C
PCB80C31BH–2	microcontroller: 128x8 RAM; 0.5 to 12 MHz; 0 to 70 °C
PCB80C31BH–3	microcontroller; 128x8 RAM; 1.2 to 16 MHz; 0 to +70 °C
PCB80C39	microcontroller; 128x8 RAM; 1.0 to 15 MHz; 0 to +70 °C
PCB80C49	microcontroller; 128x8 RAM; 2Kx8 ROM; 1.0 to 15 MHz; 0 to +70 °C
PCB80C51BH–2	microcontroller: 128x8 RAM; 4Kx8 ROM; 0.5 to 12 MHz; 0 to +70 °C
PCB80C51BH–3	microcontroller; 128x8 RAM; 4Kx8 ROM; 1.2 to 16 MHz; 0 to +70 °C
PCB80C528	microcontroller: 80C51 CPU plus 512x8 RAM; watch dog timer; 16–bit timer/counter; I²C–bus; ROM–code protection; 1.2 to 16 MHz; 0 to +70 °C
PCB80C552	microcontroller; 256x8 RAM; 16–bit capture/ compare timer/counter; watch–dog timer; two pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; 0 to +70 °C
PCB80C562	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 8–bit ADC; 1.2 to 16 MHz; 0 to +70 °C
PCB80C582	microcontroller: 256x8 RAM; 256x8 EEPROM; 16–bit capture/compare timer/counter; watch–dog timer; two PWM signals; 8–bit input to 10–bit ADC; I²C–bus; 1.2 to 16 MHz; 0 to +70 °C
PCB80C592	microcontroller with CAN serial link interface; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; two PWM signals; 8–bit input to 10–bit ADC; I²C–bus; 1.2 to 16 MHz; 0 to +70°C
PCB80C652	microcontroller; 256x8 RAM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; 0 to +70 °C

CMOS 8–BIT (cont.)

PCB80C662	microcontroller: 80C51 CPU plus 256x8 RAM; two 16–bit timer/counters; four 8–bit I/O ports; full duplex UART; I²C–bus; 0 to +70 °C
PCB80C851	microcontroller; 128x8 RAM; 256x8 EEPROM; 1.2 to 12 MHz; 0 to +70 °C
PCB83C528	microcontroller: 80C51 CPU plus 512x8 RAM; 32x8 ROM; watch–dog–timer; 16–bit timer/counter; I²C–bus; ROM–code protection; 1.2 to 16 MHz 0 to +70 °C
PCB83C552	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; two pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHZ; 0 to +70 °C
PCB83C562	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 8–bit ADC; 1.2 to 16 MHz; 0 to +70 °C
PCB83C582	microcontroller: 256x8 RAM; 8Kx8 ROM; 256x8 EEPROM; 16–bit capture/compare timer/counter; watch–dog timer; two PWM signals; 8–bit input to 10–bit ADC; I²C–bus; 1.2 to 16 MHz; 0 to +70 °C
PCB83C592	microcontroller with CAN serial link interface; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/ counter; watch–dog timer; two PWM signals; 8–bit to 10–bit ADC; I²C–bus; 1.2 to 16 MHz; 0 to +70°C
PCB83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; 0 to +70 °C
PCB83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 16 MHz; 0 to +70 °C
PCB83C662	microcontroller: 80C51 CPU plus 256x8 RAM; 8Kx8 ROM; two 16–bit timer/counters; four 8–bit I/O ports; full–duplex UART; I²C–bus; 0 to +70 °C
PCB83C851	microcontroller; 128x8 RAM; 4Kx8 ROM; 256x8 EEPROM; 1.2 to 12 MHz; 0 to +70 °C
PCB90C100	16/32–bit microcontroller: derivate of 68070 high–end control (HEC) family with UART and I²C–bus; 512 bytes RAM; 0 to +70 °C
PCB93C100	16/32–bit microcontroller: derivate of 68070 high–end control (HEC) family with UART and I²C–bus; 512 bytes RAM; 34K bytes ROM; 0 to +70 °C
PCB93C110	16/32–bit microcontroller: derivate of 68070 high–end control (HEC) family with UART and I²C–bus; 512 bytes RAM; 34K bytes ROM; 256 bytes EEPROM; 0 to +70 °C
PCD3315C	microcontroller for telephone sets; 160x8 RAM; 1.5Kx8 ROM; 20 I/O lines; I²C bus
PCD3343	microcontroller for telephone sets; 224x8 RAM; 3Kx8 ROM; 20 I/O lines; I²C bus
PCD3348	microcontroller for telephone sets; 256x8 RAM; 8Kx8 ROM; 20 I/O lines; I²C bus
PCF80C31BH–3	microcontroller; 128x8 RAM; 1.2 to 12 MHz; –40 to + 85 °C
PCF80C39	microcontroller; 128x8 RAM; 1.0 to 15 MHz; –40 to +85 °C

CMOS 8–BIT (cont.)

PCF80C49	microcontroller; 128x8 RAM; 2Kx8 ROM; 1.0 to 15 MHz; –40 to +85 °C
PCF80C51BH–3	microcontroller; 128x8 RAM; 4Kx8 ROM; 1.2 to 12 MHz; –40 to +85 °C
PCF80C528	microcontroller: 80C51 CPU plus 512x8 RAM; watch–dog timer; 16–bit timer/counter; I²C–bus; ROM–code protection; 1.2 to 16 MHz; –40 to +85 °C
PCF80C552	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF80C562	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 8–bit ADC; 1.2 to 12 MHz; –40 to +85 °C
PCF80C652	microcontroller; 256x8 RAM; serial I/O; UART: I²C bus; 1.2 to 12 MHz; –40 to +85 °C
PCF80C662	microcontroller: 80C51 CPU plus 256x8 RAM; two 16–bit timer/counters; four 8–bit I/O ports; full duplex UART; I²C–bus; –40 to +85 °C
PCF80C851	microcontroller; 128x8 RAM; 256x8 EEPROM; 1.2 to 12 MHz; –40 to +85 °C
PCF83C528	microcontroller: 80C51 plus 512x8 RAM; 32x8 ROM; watch–dog timer; 16–bit timer/counter; I²C–bus; ROM–code protection; 1.2 to 16 MHz; –40 to +85 °C
PCF83C552	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF83C562	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 8–bit ADC; 1.2 to 12 MHz; –40 to +85 °C
PCF83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +85 °C
PCF83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF83C662	microcontroller: 80C51 CPU plus 256x8 RAM; 8Kx8 ROM; two 16–bit timer/counters; four 8–bit I/O ports; full duplex UART; I²C–bus; –40 to +85 °C
PCF83C851	microcontroller; 128x8 RAM; 4Kx8 ROM; 256x8 EEPROM; 1.2 to 12 MHz; –40 to +85 °C
PCF84C12	low cost microcontroller; 64x8 RAM; 1Kx8 ROM; –40 to +85 °C
PCF84C21	microcontroller; 64x8 RAM; 2Kx8 ROM; plus 8–bit LED driver; I²C bus; –40 to +85 °C
PCF84C22	low cost microcontroller; 64x8 RAM; 2Kx8 ROM; –40 to +85 °C
PCF84C41	microcontroller; 128x8 RAM; 4Kx8 ROM; plus 8–bit LED driver; I²C bus; –40 to +85 °C
PCF84C42	low cost microcontroller; 64x8 RAM; 4K8 ROM; –40 to +85 °C
PCF84C81	microcontroller; 256x8 RAM; 8Kx8 ROM; plus 8–bit LED driver; I²C bus; –40 to +85 °C

CMOS 8–BIT (cont.)

PCF84C85	microcontroller; 256x8 RAM; 8Kx8 ROM; 32 I/O; plus 8–bit LED driver; I²C bus; –40 to +85 °C
PCF84C121	microcontroller; 256x8 RAM; 1Kx8 ROM; 8x8 EEPROM
PCF84C230	microcontroller; 64x8 RAM; 2Kx8 ROM; with LCD driver; –40 to +85 °C
PCF84C270	microcontroller with keyboard scanner; 128x8 RAM; 2Kx8 ROM; for capacitive matrix–type keyboards
PCF84C271	microcontroller with keyboard scanner; 128x8 RAM; 2Kx8 ROM; for mechanical matrix–type keyboards
PCF84C430	microcontroller with LCD driver; 128x8 RAM; 4Kx8 ROM; I²C bus
PCF84C470	microcontroller with keyboard scanner; 128x8 RAM; 4Kx8 ROM; for capacitive matrix–type keyboards
PCF84C633A	microcontroller with LCD drivers: 256x8 RAM; 6Kx8 ROM; derivative port; timer/capture; timer/counter
PCF84C853A	microcontroller with derivative ports: 256x8 RAM; 8Kx8 ROM; timer/capture; timer/counter
PCF90C100	16/32–bit microcontroller; derivate of 68070 high–end control (HEC) family with UART and I²C–bus; 512 bytes RAM; –40 to +85 °C
PCF93C100	16/32–bit microcontroller; derivate of 68070 high–end control (HEC) family with UART and I²C–bus; 512 bytes RAM; 34K bytes ROM; –40 to +85 °C
PCF93C110	16/32–bit microcontroller; derivate of 68070 high–end control (HEC) family with UART and I²C–bus; 512 bytes RAM; 34K bytes ROM; 256 bytes EEPROM; –40 to +85 °C
SC80C451	I/O expanded microcontroller; 128x8 RAM; 0.5 to 16 MHz; –40 to +85 °C
SC83C451	I/O expanded microcontroller; 128x8 RAM; 4Kx8 ROM; 0.5 to 16 MHz; –40 to +85 °C
SC83C751–1	microcontroller; 64x8 RAM; 2Kx8 ROM; 16–bit timer/counter; 2x8–bit I/O; I²C bus; 3.5 to 12 MHz; 0 to +70 °C
SC83C751–2	microcontroller; 64x8 RAM; 2Kx8 ROM; 16–bit timer/counter; 2x8–bit I/O; I²C bus; 3.5 to 12 MHz; –40 to +85°C
SC83C751–3	microcontroller; 64x8 RAM; 2Kx8 ROM; 16–bit timer/counter; 2x8–bit I/O; I²C bus; 0.5 to 12 MHz; 0 to +70 °C
SC83C751–4	microcontroller; 64x8 RAM; 2Kx8 ROM; 16–bit timer/counter; 2x8–bit I/O; I²C bus; 3.5 to 16 MHz; 0 to +70 °C
SC83C751–5	microcontroller; 64x8 RAM; 2Kx8 ROM; 16–bit timer/counter; 2x8–bit I/O; I²C bus; 3.5 to 16 MHz; –40 to +85 °C
SC83C752	microcontroller: 64x8 RAM; 2Kx8 ROM; 16–bit auto reload counter/timer + fixed rate timer; 5–channel 8–bit ADC; 8–bit PWM output/timer; I²C–bus interface
SC87C51	microcontroller; 128x8 RAM; 4Kx8 EPROM; 0.5 to 12 MHz

CMOS 8–BIT (cont.)

SC87C451	I/O expanded microcontroller; 128x8 RAM; 4Kx8 EPROM; 0.5 to 16 MHz
SC87C552–1	8–bit microcontroller; 256x8 RAM; 8Kx8 EPROM; 80C51B CPU; two 16–bit timer/counters; capture/compare timer/counter; ADC; I²C–bus; full–duplex UART, high speed outputs; PWM
SC87C652	microcontroller: 256x8 RAM; 8Kx8 OTP EPROM; serial I/O; UART; I²C–bus; 1.2 to 12 MHz
SC87C750	microcontroller: 64x8 RAM; 2Kx8 OTP EPROM; 16–bit auto–reload counter/timer; 12 mA output port; power–down mode return by Reset/Interrupt
SC87C751	microcontroller; 64x8 RAM; 2Kx8 EPROM; 16–bit timer/counter; 2x8–bit I/O; I²C bus; 0.5 to 16 MHz
SC87C752	microcontroller: 64x8 RAM; 2Kx8 OTP EPROM; 16–bit auto–reload counter/timer + fixed rate timer; 5–channel 8–bit ADC; 8–bit PWM output/timer; I²C–bus interface

NMOS 8–BIT

MAB8031AH–2	microcontroller; 128x8 RAM; 3.5 to 15 MHz; 0 to +70 °C
MAB8032AH–2	microcontroller: 256x8 RAM; 3.5 to 15 MHz 0 to +70 °C
MAB8035HL	microcontroller; 64x8 RAM; 1.0 to 11 MHz; 0 to +70 °C
MAB8039HL	microcontroller; 128x8 RAM; 1.0 to 11 MHz; 0 to +70 °C
MAB8040HL	microcontroller; 256x8 RAM; 1.0 to 11 MHz; 0 to +70 °C
MAB8048H	microcontroller; 64x8 RAM; 1Kx8 ROM; 1.0 to 11 MHz; 0 to +70 °C
MAB8049H	microcontroller; 128x8 RAM; 2Kx8 ROM; 1.0 to 11 MHz; 0 to +70 °C
MAB8050H	microcontroller; 256x8 RAM; 4Kx8 ROM; 1.0 to 11 MHz; 0 to +70 °C
MAB8051AH–2	microcontroller; 128x8 RAM; 4Kx8 ROM; 3.5 to 12 MHz; 0 to +70 °C
MAB8052AH–2	microcontroller: 256x8 RAM; 8Kx8 ROM; 3.5 to 12 MHz; 0 to +70 °C
MAB8401	microcontroller; 128x8 RAM; bond–out version for MAB84XX family plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8411	microcontroller; 64x8 RAM; 1Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8421	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8422	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 15 I/O lines; I²C bus; 1.0 to 6 MHz; 0 to +70 °C

NMOS 8–BIT (cont.)

MAB8441	microcontroller; 128x8 RAM; 4Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8461	microcontroller; 128x8 RAM; 6Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAF80A31AH–2	microcontroller; 128x8 RAM; 3.5 to 12 MHz; –40 to +110 °C
MAF80A32AH–2	microcontroller: 256x8 RAM: 3.5 to 12 MHz; –40 to +110 °C
MAF80A35HL	microcontroller; 64x8 RAM; 1.0 to 10 MHz; –40 to +110 °C
MAF80A39HL	microcontroller; 128x8 RAM; 1.0 to 10 MHz; –40 to +110 °C
MAF80A40HL	microcontroller; 256x8 RAM; 1.0 to 10 MHz; –40 to +110 °C
MAF80A48H	microcontroller; 64x8 RAM; 1Kx8 ROM; 1.0 to 10 MHz; –40 to +110 °C
MAF80A49H	microcontroller; 128x8 RAM; 2Kx8 ROM; 1.0 to 10 MHz; –40 to +110 °C
MAF80A50H	microcontroller; 256x8 RAM; 4Kx8 ROM; 1.0 to 10 MHz; –40 to +110 °C
MAF80A51AH–2	microcontroller; 128x8 RAM; 4Kx8 ROM; 3.5 to 12 MHz; –40 to +110 °C
MAF80A52AH–2	microcontroller: 256x8 RAM; 8Kx8 ROM; 3.5 to 12 MHz; –40 to +110 °C
MAF84A11	microcontroller; 64x8 RAM; 1Kx8 ROM; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A21	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A22	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 15 I/O lines; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A41	microcontroller; 128x8 RAM; 4Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A61	microcontroller; 128x8 RAM; 6Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF8031AH–2	microcontroller; 128x8 RAM; 3.5 to 12 MHz; –40 to +85 °C
MAF8032AH–2	microcontroller: 256x8 RAM; 3.5 to 12 MHz; –40 to +85 °C
MAF8035HL	microcontroller; 64x8 RAM; 1.0 to 11 MHz; –40 to +85 °C
MAF8039HL	microcontroller; 128x8 RAM; 1.0 to 11 MHz; –40 to +85 °C
MAF8040HL	microcontroller; 256x8 RAM; 1.0 to 11 MHz; –40 to +85 °C
MAF8048H	microcontroller; 64x8 RAM; 1Kx8 ROM; 1.0 to 11 MHz; –40 to +85 °C

IC

NMOS 8–BIT (cont.)

MAF8049H	microcontroller; 128x8 RAM; 2Kx8 ROM; 1.0 to 11 MHz; –40 to +85 °C
MAF8050H	microcontroller; 256x8 RAM; 4Kx8 ROM; 1.0 to 11 MHz; –40 to +85 °C
MAF8051AH–2	microcontroller; 128x8 RAM; 4Kx8 ROM; 3.5 to 12 MHz; –40 to +85 °C
MAF8052AH–2	microcontroller: 256x8 RAM; 8Kx8 ROM; 3.5 to 12 MHz; –40 to +85 °C
MAF8411	microcontroller; 64x8 RAM; 1Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8421	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8422	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 15 I/O lines; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8441	microcontroller; 128x8 RAM; 4Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8461	microcontroller; 128x8 RAM; 6Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; –40 to +85 °C

PERIPHERAL ICs

NE587	LED decoder/driver
NE5018	8–bit microprocessor–compatible DAC
NE5019	8–bit microprocessor–compatible DAC
NE5020	10–bit microprocessor–compatible DAC
PCA82C200	Philips stand–alone CAN Controller (controller area network serial link) (PSCC) for automotive and other applications
PCA8582B	256x8–bit static CMOS EEPROM with I²C–bus interface; for automotive applications
PCF1252–0	power–fail detector and reset generator; trip voltage = 4.75 V
PCF1252–1	power–fail detector and reset generator; trip voltage = 4.55 V
PCF1252–2	power–fail detector and reset generator; trip voltage = 4.25 V
PCF1252–3	power–fail detector and reset generator; trip voltage = 4.05 V
PCF1252–4	power–fail detector and reset generator; trip voltage = 3.75 V
PCF1252–5	power–fail detector and reset generator; trip voltage = 3.55 V

PERIPHERAL ICs (cont.)

PCF1252–6	power–fail detector and reset generator; trip voltage = 3.25 V
PCF1252–7	power–fail detector and reset generator; trip voltage = 3.05 V
PCF1252–8	power–fail detector and reset generator; trip voltage = 2.75 V
PCF1252–9	power–fail detector and reset generator; trip voltage = 2.55 V
PCF2100	LCD duplex driver; 40 segments
PCF2110	LCD duplex driver; 60 segments and 2 LEDs
PCF2111	LCD duplex driver; 64 segments
PCF2112	LCD driver; 32 segments
PCF2201	LCD flat panel row/column driver
PCF8566	universal LCD driver for low multiplex rates (1:1 to 1:4); max. 96 elements; I²C bus
PCF8567C	LCD direct mode driver with I²C–bus interface
PCF8570	256x8–bit static RAM; I²C bus
PCF8571	128x8–bit static RAM; I²C bus
PCF8573	clock calendar; I²C bus
PCF8574	remote 8–bit I/O expander; I²C bus
PCF8574A	remote 8–bit I/O expander; I²C bus; different slave address
PCF8576	universal LCD driver for low multiplex rates 1:1 to 1:4); max. 160 segments; I²C bus
PCF8577	LCD direct driver (32 segments) or duplex driver (64 segments); I²C bus
PCF8577A	LCD direct driver (32 segments) or duplex driver (64 segments); I²C bus; different slave address
PCF8578	LCD row/column driver for dot matrix graphic displays; 40 outputs, of which 24 are programmable; I²C bus
PCF8579	LCD column driver for dot matrix graphic displays; 40 column outputs; I²C bus
PCF8581	128x8–bit EEPROM with I²C–bus interface; supply voltage 4.5 to 5.5 V
PCF8581C	128x8–bit EEPROM with I²C–bus interface; supply voltage 2.5 to 6 V
PCF8582A	256x8–bit EEPROM; static CMOS; I²C bus
PCF8582C	256x8–bit static CMOS EEPROM; I²C–bus; for automotive applications; supply voltage 2.5 to 6 V
PCF8583	clock calendar with 256x8–bit static RAM; I²C bus
PCF8591	8–bit ADC/DAC; I²C bus
SAA1099	stereo sound generator for sound effects and music synthesis (µC–controlled)
SAA5351	EUROM 50 Hz, CRT controller (CEPT standard)
SAA5361	EUROM 60 Hz, CRT controller
SE5018	8–bit microprocessor–compatible DAC
S8X360	memory address director
TDA1721	8–bit multiplying DAC
TEA2000	PAL/NTSC colour encoder
241 141	high speed FIFO RAM controller

MICROPROCESSORS

SCC68070	microprocessor; 16/32–bit MPU; 68000 CPU; MMU; DMA; timer; UART; I^2C bus
SCN68000	microprocessor; 16/32–bit MPU; 16–bit external/ 32–bit internal MPU; 17 general purpose 32–bit registers; 16 MB linear address space

PERIPHERAL ICs

NE587	LED decoder/driver
NE5018	8–bit microprocessor–compatible DAC
NE5019	8–bit microprocessor–compatible DAC
NE5020	10–bit microprocessor–compatible DAC
PCB2310	IST bus interface
PCF1252–0	power–fail detector and reset generator; trip voltage = 4.75 V
PCF1252–1	power–fail detector and reset generator; trip voltage = 4.55 V
PCF1252–2	power–fail detector and reset generator; trip voltage = 4.25 V
PCF1252–3	power–fail detector and reset generator; trip voltage = 4.05 V
PCF1252–4	power–fail detector and reset generator; trip voltage = 3.75 V
PCF1252–5	power–fail detector and reset generator; trip voltage = 3.55 V
PCF1252–6	power–fail detector and reset generator; trip voltage = 3.25 V
PCF1252–7	power–fail detector and reset generator; trip voltage = 3.05 V
PCF1252–8	power–fail detector and reset generator; trip voltage = 2.75 V
PCF1252–9	power–fail detector and reset generator; trip voltage = 2.55 V
SAA1045	line driver/detector for digital data bus (D^2B) (built–in filter)
SCB2675	colour/monochrome attributes controller (CMAC)
SCB2675T	turbo colour/monochrome attributes controller (Turbo–CMAC)
SCB68154	interrupt generator (VME bus)
SCB68155	interrupt handler (VME bus)
SCB68172	VME bus controller (BUSCON) interface circuit; master–slave configurations, processor or DMA interface
SCB68430	direct memory access interface (DMAI)
SCC2691	universal asynchronous receiver/transmitter (UART)

PERIPHERAL ICs (cont.)

SCC2692	dual asynchronous receiver/transmitter (DUART)
SCC2698	octal universal asynchronous receiver/transmitter (Octal UART)
SCC63484	advanced CRT controller (ACRTC)
SCC66470B	video and system controller (VSC); 68000–bus–compatible
SCC68173	VMS bus controller (VMSCON)
SCC68692	dual asynchronous receiver/transmitter (DUART)
SCN2641	asynchronous communications interface (ACI)
SCN2651	programmable communications interface (PCI)
SCN2661	enhanced programmable communications interface (EPCI)
SCN2672	programmable video timing controller (PVTC)
SCN2674	advanced video display controller (AVDC)
SCN2681	dual asynchronous receiver/transmitter (DUART)
SCN26542	dual multi–protocol serial controller (DMSC)
SCN26562	dual universal serial communications controller (DUSCC); dual channel; asynchronous; multi–protocol operation; DMA interface; two counter/timers; baud rate generator; synchronous bus interface
SCN68542	dual multi–protocol serial controller (DMSC)
SCN68562	dual universal serial communications controller (DUSCC); dual channel asynchronous; multi–protocol operation; DMA interface; two timer/counters; baud rate generator; interfaces to the 68000 MPU
SCN68681	dual asynchronous receiver/transmitter (DUART); dual channel; quad buffered receiver; double buffered transmitter; independent baud rate selection; the SCN68681 is for non–multiplexed bus processors like SCN68000; the SCN2681 is for multiplexed bus processors like Intel/Zilog etc.
SE5018	8–bit microprocessor–compatible DAC

AMPLIFIERS

NE592	video amplifier
NE5204	wide band high frequency amplifier
NE5205	wide band high frequency amplifier
NE5210	transimpedance amplifier; 280 MHz bandwidth
NE5211	transimpedance amplifier; 180 MHz bandwidth
NE5212	transimpedance amplifier; 140 MHz bandwidth
NE5214	fibre–optic post–amplifier with link status indicator
NE5217	fibre–optic post–amplifier with link status indicator
NE5592	video amplifier
SA5204	wide band high frequency amplifier
SA5205	wide band high frequency amplifier
SA5211	transimpedance amplifier; 180 MHz bandwidth
SA5212	transimpedance amplifier; 140 MHz bandwidth
SA5214	fibre–optic post–amplifier with link status indicator
SA5217	fibre–optic post–amplifier with link status indicator
SE5205	wide band high frequency amplifier
SE5212	transimpedance amplifier; 140 MHz bandwidth
μA733	differential video amplifier
μA733C	differential video amplifier

OP AMPS

AU2902	quad low–power operational amplifier
AU2904	dual low–power operational amplifier
LM124	quad low power operational amplifier
LM158	dual low power operational amplifier
LM224	quad low power operational amplifier
LM258	dual low power operational amplifier
LM324	quad low power operational amplifier
LM324A	quad low power operational amplifier
LM358	dual low power operational amplifier
LM358A	dual low power operational amplifier
LM2902	quad low power operational amplifier
LM2904	dual low power operational amplifier
MC1458	dual general purpose operational amplifier
MC1558	dual general purpose operational amplifier
MC3303	quad low power operational amplifier
MC3503	quad low power operational amplifier
NE531	high slew rate operational amplifier
NE532	dual low power operational amplifier
NE4558	dual general purpose operational amplifier
NE5230	low voltage operational amplifier
NE5512	dual high performance operational amplifier
NE5514	quad high performance operational amplifier
NE5517	dual operational transconductance amplifier
NE5517A	dual operational transconductance amplifier
NE5532	internally compensated dual low noise operational amplifier
NE5532A	internally compensated dual low noise operational amplifier
NE5533	dual low noise operational amplifier
NE5533A	dual low noise operational amplifier
NE5534	single low noise operational amplifier
NE5534A	single low noise operational amplifier
NE5539	ultra high frequency operational amplifier
SA532	dual low power operational amplifier
SA534	quad low power operational amplifier
SA592	video amplifier
SA741C	general purpose operational amplifier
SA747C	dual operational amplifier
SA1458	dual general purpose operational amplifier
SA4558	dual general purpose operational amplifier
SA5230	low voltage operational amplifier
SA5512	dual high performance operational amplifier
SA5534	single low noise operational amplifier
SA5534A	single low noise operational amplifier
SE531	high slew rate operational amplifier
SE532	dual low power operational amplifier
SE592	video amplifier
SE4558	dual general purpose operational amplifier
SE5512	dual high performance operational amplifier
SE5514	quad high performance operational amplifier
SE5532	internally compensated dual low noise operational amplifier

OP AMPS (cont.)

SE5532A	internally compensated dual low noise operational amplifier
SE5534	single low noise operational amplifier
SE5534A	single low noise operational amplifier
SE5539	ultra high frequency operational amplifier
TCA520B	low–power/low–voltage operational amplifier
TCA520D	low–power/low–voltage operational amplifier
μA741	general purpose operational amplifier
μA741C	general purpose operational amplifier
μA747	dual operational amplifier
μA747C	dual operational amplifier

COMPARATORS

AU2901	quad voltage comparator
AU2903	dual low–power voltage comparator
LM111	voltage comparator
LM119	dual voltage comparator
LM139	quad voltage comparator
LM139A	quad voltage comparator
LM193	low power dual voltage comparator
LM193A	low power dual voltage comparator
LM211	voltage comparator
LM219	dual voltage comparator
LM239	quad voltage comparator
LM239A	quad voltage comparator
LM293	low power dual voltage comparator
LM293A	low power dual voltage comparator
LM311	voltage comparator
LM319	dual voltage comparator
LM339	quad voltage comparator
LM339A	quad voltage comparator
LM393	low power dual voltage comparator
LM393A	low power dual voltage comparator
LM2901	quad voltage comparator
LM2903	low power dual voltage comparator
MC3302	quad voltage comparator
NE521	high speed dual differential comparator/ sense amplifier
NE522	high speed dual differential comparator/ sense amplifier
NE527	voltage comparator
NE529	voltage comparator
NE5105	precision high–speed comparator with latch
NE5105A	precision high–speed comparator with latch
SA5105	precision high–speed comparator with latch
SA5105A	precision high–speed comparator with latch
SE521	high speed dual differential comparator/ sense amplifier
SE522	high–speed dual differential comparator/sense amplifier
SE527	voltage comparator
SE529	voltage comparator
SE5105	precision high–speed comparator with latch
SE5105A	precision high–speed comparator with latch

ADCs, DACs

ADC0803–1	8–bit CMOS ADC
ADC0804–1	8–bit CMOS ADC
ADC0805–1	8–bit CMOS ADC
ADC0820	8–bit, high speed, CMOS ADC with track/hold; microprocessor compatible
AM6012	12–bit multiplying DAC
DAC08	8–bit high–speed multiplying DAC
MC1408–7	8–bit multiplying DAC
MC1408–8	8–bit multiplying DAC
MC1508–8	8–bit multiplying DAC
MC3410	10–bit high speed multiplying DAC
MC3410C	10–bit high speed multiplying DAC
MC3510	10–bit high–speed multiplying DAC
NE5018	8–bit microprocessor–compatible DAC
NE5019	8–bit microprocessor–compatible DAC
NE5020	10–bit microprocessor–compatible DAC
NE5410	10–bit high speed multiplying DAC
PCF8591	8–bit ADC/DAC; I^2C bus
PNA7509	7–bit ADC; 22 MHz; 3–state output
PNA7518	8–bit multiplying DAC; 30 MHz
SE5018	8–bit microprocessor–compatible DAC
SE5019	8–bit microprocessor–compatible DAC
SE5030	10–bit high–speed microprocessor–compatible DAC
SE5410	10–bit high–speed multiplying DAC
TDA1432	8–bit DAC (CMOS)
TDA1534	14–bit ADC
TDA1541A	dual 16–bit DAC
TDA1543	dual 16–bit economy DAC (I^2S bus format)
TDA1543A	dual 16–bit economy DAC (Japanese format)
TDA8702	8–bit high–performance, high–speed video DAC; 30 MHz (max.); TTL–compatible
TDA8703	8–bit high–performance, high–speed ADC; 40 MHz (max.); TTL–compatible; internal voltage reference regulator
TDA8712	8–bit high–performance, high–speed video DAC; 30 MHz (max.); TTL compatible; –55 to +125 °C
TDA8713	8–bit high–performance, high–speed ADC; 40 MHz (max.); TTL compatible
TDA8715	8–bit high–performance, high–speed ADC; 50 MHz (max.); ECL compatible; 0 to +70 °C
TDE8715	8–bit high–performance, high–speed ADC; 50 MHz (max.); ECL compatible; extended temperature

DRIVERS

MC1488	quad line driver
NE587	LED decoder/driver
NE590	addressable peripheral drivers
NE591	addressable peripheral drivers
NE594	vacuum fluorescent display driver
NE5090	addressable relay driver
NE5170	octal line driver
SAA1064	4–digit LED driver; I^2C bus
SA594	vacuum fluorescent display driver
SA5090	addressable relay driver
TEA1017	13–bit series–parallel converter and display driver

RECEIVERS

MC1489	quad line receiver
MC1489A	quad line receiver
NE5180	octal differential line receiver with input noise filter
NE5181	octal differential line receiver

INTERFACES

NE587	LED decoder/driver
NE590	addressable peripheral drivers
NE591	addressable peripheral drivers
NE5090	addressable relay driver
PCA82C200	Philips stand–alone CAN Controller (controller area network serial link) (PSCC) for automotive and other applications
PCF8567C	LCD direct mode driver with I^2C–bus interface
PCF8574	remote 8–bit I/O expander; I^2C bus
PCF8574A	remote 8–bit I/O expander; I^2C bus; different slave address
SAA1029	universal industrial logic and interface circuit
SA5090	addressable relay driver
TEA1017	13–bit series–parallel converter and display driver

MOTOR CONTROL

MEF3050	3–phase PWM for DC or AC motor control, used in conjunction with PCF1500
NE5044	programmable seven–channel RC encoder
NE5570	brushless DC motor controller
SA5570	brushless DC motor controller
SE5570	brushless DC motor controller
TDA5040	DC motor drive circuit with magnetic–field detector
TDA5045	DC motor drive circuit with magnetic–field detector
TDA5140	brushless DC motor drive circuit

POSITION MEASUREMENT

NE5521	linear variable differential transformer (LVDT) signal conditioner
SA5521	linear variable differential transformer (LVDT) signal conditioner
SE5521	linear variable differential transformer (LVDT) signal conditioner

POWER SUPPLY ICs

NE5560	SMPS controller
NE5561	SMPS controller
NE5562	SMPS controller
NE5568	SMPS controller
SA723C	precision voltage regulator
SE5560	SMPS controller
SE5561	SMPS controller
SE5562	SMPS controller
SG2524C	SMPS controller
SG3524	SMPS controller
SG3524C	SMPS controller
TDA1023	proportional–control triac triggering circuit
TDA1060	SMPS controller
TDA1060A	SMPS controller
TDA1060B	SMPS controller
TDA1060T	SMPS controller
TDA3645	SMPS driver
TEA1041	battery low–level indicator
TEA1088	control circuit for NiCd charge systems
μA723	precision voltage regulator
μA723C	precision voltage regulator
UC1842	current–mode pulse width modulation controller
UC2842	current–mode pulse width modulation controller
UC3842	current–mode pulse width modulation controller

SAMPLE–AND–HOLD

LF198	sample–and–hold amplifier
LF298	sample–and–hold amplifier
LF398	sample–and–hold amplifier
NE5537	low leakage sample–and–hold amplifier
SE5537	low leakage sample–and–hold amplifier
TDA1535	high–speed sample–and–hold amplifier

TIMERS

ICM7555	general purpose CMOS timer
NE555	timer
NE556	dual timer
NE556–1	dual timer
NE558	quad timer
SA555	timer
SA556	dual timer
SA556–1	dual timer
SA558	quad timer
SE555	timer
SE555C	timer
SE556	dual timer
SE556–1	dual timer
SE556–1C	dual timer
SE556C	dual timer
SE558	quad timer
PC74HC5555	CMOS Timer

DIGITAL CLOCKS

NE587	LED decoder/driver
NE594	vacuum fluorescent display driver
PCF1171C	4.19 MHz digital LCD car clock; 4–digits
PCF1172C	4.19 MHz digital LCD car clock; 3–1/2 digits
PCF1174C	4.19 MHz 4–digit static–LCD car clock; EEPROM
PCF1175C	4.19 MHz 4–digit duplex–LCD car clock; EEPROM
PCF1178C	4.19 MHz 4–digit static–LCD car clock; EEPROM; mirrored version of PCF1175; different colon and set frequency
SAA1064	4–digit LED driver; I^2C bus
SA594	vacuum fluorescent display driver

DATA COMMUNICATIONS

AM26LS30	dual differential RS–422 party line/quad single–ended RS–423 line driver
AM26LS31	quad high–speed differential line driver
AM26LS32	quad high–speed differential line receiver
AM26LS33	quad high–speed differential line receiver
MC1488	quad line driver
MC1489	quad line receiver
MC1489A	quad line receiver
NE564	phase locked loop; 5 V supply; up to 50 MHz; TTL compatible in/out
NE568	phase–locked loop; up to 150 MHz
NE592	video amplifier
NE602A	double–balanced mixer and oscillator
NE604A	low power narrow band FM IF system
NE614A	low power FM IF system
NE615	high performance low power mixer FM IF system
NE5050	power line modem
NE5080	high–speed FSK modem transmitter
NE5081	high–speed FSK modem receiver
NE5170	octal line driver
NE5180	octal differential line receiver with input noise filter
NE5181	octal differential line receiver
NE5204	wide band high frequency amplifier
NE5205	wide band high frequency amplifier
NE5210	transimpedance amplifier; 280 MHz bandwidth
NE5211	transimpedance amplifier; 180 MHz bandwidth
NE5212	transimpedance amplifier; 140 MHz bandwidth
NE5214	fibre–optic post–amplifier with link status indicator
NE5217	fibre–optic post–amplifier with link status indicator
NE5539	ultra high frequency operational amplifier
N8X60	FIFO RAM controller (4K RAM)
N74F86	quad 2–input EXCLUSIVE–OR gate
N74F764	DRAM dual–ported controller
N74F764–1	DRAM dual–ported controller
N74F764A	DRAM dual ported controller
N74F765	DRAM dual–ported controller without latch
N74F765–1	DRAM dual–ported controller without latch
N74F765A	DRAM dual ported controller without latch
N74F1763	1 M–bit intelligent DRAM controller
N74F1764	1 M–bit DRAM dual–ported controller with latch
N74F1764–1	1 M–bit DRAM dual–ported controller with latch
N74F1765	1 M–bit DRAM dual–ported controller without latch
N74F1765–1	1 M–bit DRAM dual–ported controller without latch
PCA82C200	Philips stand–alone CAN Controller (controller area network serial link) (PSCC) for automotive and other applications
PCB2310	IST bus interface
PCF1254	infrared remote control transmitter; EEPROM–generated individual code for remote control; identification or security systems; low power
PC74HCT4046A	phase–locked loop with VCO
PC74HCT7030	9–bit x 64 word FIFO register; 3–state
PC74HCT40105	4–bit x 16 word FIFO register

DATA COMMUNICATIONS (cont.)

PC74HC4046A	phase–locked loop with VCO
PC74HC7030	9–bit x 64 word FIFO register; 3–state
PC74HC40105	4–bit x 16 word FIFO register
SAA1045	line driver/detector for digital data bus (D^2B) (built–in filter)
SAA1235	universal digital data bus (D^2B) transceiver
SA592	video amplifier
SA602A	double–balanced mixer and oscillator
SA604A	high performance low power FM IF system
SA614A	low power FM IF system
SA615	high performance low power mixer FM IF system
SA5204	wide band high frequency amplifier
SA5205	wide band high frequency amplifier
SA5211	transimpedance amplifier; 180 MHz bandwidth
SA5212	transimpedance amplifier; 140 MHz bandwidth
SA5214	fibre–optic post–amplifier with link status indicator
SA5217	fibre–optic post–amplifier with link status indicator
SCC2691	universal asynchronous receiver/transmitter (UART)
SCC2692	dual asynchronous receiver/transmitter (DUART)
SCC2698	octal universal asynchronous receiver/transmitter (Octal UART)
SCC68692	dual asynchronous receiver/transmitter (DUART)
SCN2641	asynchronous communications interface (ACI)
SCN2661	enhanced programmable communications interface (EPCI)
SCN2681	dual asynchronous receiver/transmitter (DUART)
SCN68562	dual universal serial communications controller (DUSCC); dual channel asynchronous; multi–protocol operation; DMA interface; two timer/counters; baud rate generator; interfaces to the 68000 MPU
SCN68681	dual asynchronous receiver/transmitter (DUART); dual channel; quad buffered receiver; double buffered transmitter; independent baud rate selection; the SCN68681 is for non–multiplexed bus processors like SCN68000; the SCN2681 is for multiplexed bus processors like Intel/Zilog etc.
SC83C451	I/O expanded microcontroller; 128x8 RAM; 4Kx8 ROM; 0.5 to 16 MHz; –40 to +85 °C
SE564	phase–locked loop; 5 V supply; up to 50 MHz; TTL compatible in/out
SE592	video amplifier
SE5205	wide band high frequency amplifier
SE5212	transimpedance amplifier; 140 MHz bandwidth
SE5539	ultra high frequency operational amplifier
TEA5500	coded locking circuit for security systems
TEA5501	coded locking circuit for security systems (one–shot output; 6.5K codes)
9401	CRC generator/checker

RADIO COMMUNICATIONS

MC1496	balanced modulator/demodulator
MC1596	balanced modulator/demodulator
MC3361	low power FM IF system
NE564	phase locked loop; 5 V supply; up to 50 MHz; TTL compatible inputs and outputs
NE566	function generator (programmable VCO with square and triangular wave outputs)
NE567	tone/frequency decoder PLL
NE568	phase–locked loop; up to 150 MHz
NE570	compandor
NE571	compandor
NE572	programmable analog compandor
NE575	low voltage dual expander/single compandor or automatic level controller
NE602A	double–balanced mixer and oscillator
NE604A	high–performance low–power FM IF system
NE605	low–power FM IF system
NE612	double balanced mixer and oscillator
NE614A	low–power FM IF system
NE615	high–performance low–power mixer FM IF system
NE5750	audio processor system for RF communication
NE5751	audio processor system with I^2C control for RF communication
PCF2322	wideband speech encoder/decoder (CMOS)
SA571	compandor
SA572	programmable analog compandor
SA602A	double–balanced mixer and oscillator
SA604A	high performance low power FM IF system
SA605	low–power FM IF system
SA614A	low power FM IF system
SA615	high performance low power mixer FM IF system
SA5750	audio processor system for RF communication
SA5751	audio processor system with I^2C–bus for RF communication
SCC66470B	video and system controller (VSC); 68000–bus–compatible
SC83C451	I/O expanded microcontroller; 128x8 RAM; 4Kx8 ROM; 0.5 to 16 MHz; –40 to +85 °C
SE564	phase–locked loop; 5 V supply; up to 50 MHz; TTL compatible in/out
SE566	function generator (programmable VCO with square and triangular wave outputs)
SE567	tone/frequency decoder PLL
TDB1080	IF limiting amplifier, FM detector and audio amplifier
UMA1000	data processor for cellular radio (DPROC); I^2C bus
UMA1010	low–power universal frequency synthesizer for radio communications; 400 to 1150 MHz; I^2C bus
UMA1012	low power universal frequency synthesizer for radio communications; I^2C bus; up to 550 MHz

AMPLIFIERS

TDA1010A	6 W audio power amplifier for in–car applications/10 W audio power amplifier for mains–fed applications
TDA1011	2 to 6 W audio power amplifier with preamplifier
TDA1013B	4 W audio power amplifier with DC volume control
TDA1015	1 to 4 W audio power amplifier with preamplifier
TDA1015T	0.5 W audio power amplifier with preamplifier
TDA1016	2 W recording/playback audio power amplifier with preamplifier, automatic level control, short circuit and thermal protection
TDA1020	12 W audio power amplifier with preamplifier for car radios
TDA1510A	24 W BTL or 2x12 W stereo car radio power amplifier
TDA1512A	12 to 20 W hi–fi audio power amplifier
TDA1514A	40 W hi–fi power amplifier for digital audio (e.g. Compact Disc)
TDA1515B	24 W BTL or 2x12 W stereo car radio power amplifier
TDA1516Q	22 W BTL or 2x11 W stereo car radio power amplifier; closed loop voltage gain 26 dB
TDA1517	2x6 W stereo car radio audio power amplifier (20 dB gain)
TDA1518Q	22 W BTL or 2x11 W stereo car radio power amplifier; closed loop voltage gain 46 dB
TDA1519	2x6 W stereo car radio audio power amplifier (40 dB gain)
TDA1519A	22 W BTL or 2x11 W stereo car radio power amplifier
TDA1519B	12 W BTL or 2x6 W stereo car radio power amplifier
TDA1520B	20 W hi–fi audio power amplifier; complete SOAR protection
TDA1521	2x12 W hi–fi stereo audio power amplifier
TDA1521A	2x6 W hi–fi stereo audio power amplifier
TDA1521Q	2x12 W hi–fi stereo audio power amplifier
TDA1522	stereo playback amplifier/equalizer with mute switch
TDA1552	2x22 W BTL stereo audio power amplifier for car radio applications
TDA1553	2x22 W BTL stereo audio power amplifier with loudspeaker protection for car radio applications
TDA1554	4x11 W single–ended, or 2x22 W BTL audio power amplifier for car radio applications
TDA1555	4x11 W single–ended, or 2x22 W BTL audio power amplifier with distortion detector for car radio applications
TDA2611A	5 W audio power amplifier
TDA2613	6 W hi–fi audio power amplifier
TDA7050	150 mW BTL or 2x75 mW stereo audio power amplifier; low voltage
TDA7052	1 W BTL mono audio amplifier for portable applications

IC

AMPLIFIERS (cont.)

TDA7053	2x1 W BTL stereo audio power amplifier for portable applications
TDA7056	3 W BTL mono audio amplifier for portable and TV applications

ARI SYSTEM

TDA1579	traffic warning decoder circuit (AM carriers); ARI system
TDA1589	traffic control message and warning tone circuit; ARI system

AUDIO ICs

Bus–controlled

PCF5022	CMOS analogue interface circuit (digital section) for audio systems; I^2S bus
PCF5023	CMOS analogue interface circuit (analog section) for audio systems; I^2S bus
TDA8420	hi–fi stereo audio processor; I^2C bus
TDA8421	hi–fi stereo audio processor; I^2C bus
TDA8425	hi–fi stereo audio processor; I^2C bus
TEA6300	car radio preamplifier and source selector with sound and fader controls; I^2C bus
TEA6310	sound fader control circuit; I^2C bus

DC–controlled

TDA1029	signal–sources switch (4 x two channels)
TDA1074A	dual tandem electronic potentiometer circuit
TDA1524A	stereo tone/volume control circuit
TDA1525	stereo tone/volume control circuit
TDA1526	stereo tone/volume control circuit
TDA1600	multi–function oscillator switch for audio cassette recorders
TDA3810	spatial, stereo and pseudo–stereo sound circuit
TDD1601	equalizer for audio cassette recorders

CLOCK/CALENDAR CIRCUITS

PCF8573	clock calendar; I^2C bus
PCF8583	clock calendar with 256x8–bit static RAM; I^2C bus

DATA CONVERSION

ADCs, DACs

MC3510	10–bit high–speed multiplying DAC
PCF8591	8–bit ADC/DAC; I^2C bus
PNA7509	7–bit ADC; 22 MHz; 3–state output
PNA7518	8–bit multiplying DAC; 30 MHz
SAA7323GP	stereo DAC for Compact Disc digital audio
SE5410	10–bit high–speed multiplying DAC
TDA1534	14–bit ADC
TDA1541A	dual 16–bit DAC
TDA1543	dual 16–bit economy DAC (I^2S bus format)

DATA CONVERSION (cont.)

ADCs, DACs (cont.)

TDA1543A	dual 16–bit economy DAC (Japanese format)
TDA8444	octuple 6–bit DAC; I^2C bus

DISPLAY DRIVERS

PCF1303	18–element bar graph LCD driver (with analogue input)
PCF2100	LCD duplex driver; 40 segments
PCF2110	LCD duplex driver; 60 segments and 2 LEDs
PCF2111	LCD duplex driver; 64 segments
PCF2112	LCD driver; 32 segments
PCF2201	LCD flat panel row/column driver
PCF8566	universal LCD driver for low multiplex rates (1:1 to 1:4); max. 96 elements; I^2C bus
PCF8567C	LCD direct mode driver with I^2C–bus interface
PCF8576	universal LCD driver for low multiplex rates 1:1 to 1:4); max. 160 segments; I^2C bus

DIGITAL AUDIO
Compact disc

SAA7210	decoder for second generation compact disc
SAA7220	digital filter and interpolator for second generation compact disc
SAA7310	decoder for third generation compact disc
TDA1514A	40 W hi–fi power amplifier for digital audio
TDA1541A	dual high–performance 16–bit DAC (selection type available!)
SAA7322	sterio DAC for third generation compact disc
SAA7323	high–end stereo DAC for third generation compact disc
SAA7350	Bitstream DAC

DISPLAY DRIVERS (cont.)

PCF8577	LCD direct driver (32 segments) or duplex driver (64 segments); I²C bus
PCF8577A	LCD direct driver (32 segments) or duplex driver (64 segments); I²C bus; different slave address
PCF8578	LCD row/column driver for dot matrix graphic displays; 40 outputs, of which 24 are programmable; I²C bus
PCF8579	LCD column driver for dot matrix graphic displays; 40 column outputs; I²C bus
SAA1060	LED display/interface circuit
SAA1064	4–digit LED driver; I²C bus

FREQUENCY SYNTHESIZERS

HEF4750V	frequency synthesizer
SAA1057	radio tuning PLL frequency synthesizer (SYMO II)
TDD1742	low power frequency synthesizer (LOPSY)
TSA6057	radio tuning PLL frequency synthesizer; I²C bus
UMA1010	low–power universal frequency synthesizer for radio communications; 400 to 1150 MHz; I²C bus
UMA1012	low power universal frequency synthesizer for radio communications; I²C bus; up to 550 MHz

I²C–BUS ICs

MAB8401	microcontroller; 128x8 RAM; bond–out version for MAB84XX family plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8411	microcontroller; 64x8 RAM; 1Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8421	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8422	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 15 I/O lines; I²C bus; 1.0 to 6 MHz; 0 to +70 °C

I²C–BUS ICs (cont.)

MAB8441	microcontroller; 128x8 RAM; 4Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8461	microcontroller; 128x8 RAM; 6Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAF84A11	microcontroller; 64x8 RAM; 1Kx8 ROM; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A21	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A22	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 15 I/O lines; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A41	microcontroller; 128x8 RAM; 4Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A61	microcontroller; 128x8 RAM; 6Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF8411	microcontroller; 64x8 RAM; 1Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8421	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8422	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 15 I/O lines; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8441	microcontroller; 128x8 RAM; 4Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8461	microcontroller; 128x8 RAM; 6Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
PCA80C528	microcontroller: 80C51 CPU plus 512x8 RAM; watch–dog timer; 16–bit timer/counter; I²C–bus; ROM code protection; 1.2 to 16 MHz; –40 to +110 °C
PCA80C552	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 12 MHz; –40 to +125 °C
PCA80C652	microcontroller; 256x8 RAM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +125 °C
PCA83C528	microcontroller: 80C51 CPU plus 512x8 RAM; 32x8 ROM; watch–dog timer; 16–bit timer/counter; I²C–bus; ROM code protection; 1.2 to 16 MHz; –40 to +110 °C

IC

I²C BUS ICs (cont.)

PCA83C552	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; –40 to +125 °C
PCA83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +125 °C
PCA83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 16 MHz; –40 to +125 °C
PCA8582B	256x8–bit static CMOS EEPROM with I²C–bus interface; for automotive applications
PCB80C528	microcontroller: 80C51 CPU plus 512x8 RAM; watch dog timer; 16–bit timer/counter; I²C–bus; ROM–code protection; 1.2 to 16 MHz; 0 to +70 °C
PCB80C552	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; two pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; 0 to +70 °C
PCB80C582	microcontroller: 256x8 RAM; 256x8 EEPROM; 16–bit capture/compare timer/counter; watch–dog timer; two PWM signals; 8–bit input to 10–bit ADC; I²C–bus; 1.2 to 16 MHz; 0 to +70 °C
PCB80C652	microcontroller; 256x8 RAM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; 0 to +70 °C
PCB83C528	microcontroller: 80C51 CPU plus 512x8 RAM; 32x8 ROM; watch–dog–timer; 16–bit timer/counter; I²C–bus; ROM–code protection; 1.2 to 16 MHz 0 to +70 °C
PCB83C552	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; two pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHZ; 0 to +70 °C
PCB83C582	microcontroller: 256x8 RAM; 8Kx8 ROM; 256x8 EEPROM; 16–bit capture/compare timer/counter; watch–dog timer; two PWM signals; 8–bit input to 10–bit ADC; I²C–bus; 1.2 to 16 MHz; 0 to +70 °C
PCB83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; 0 to +70 °C
PCB83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 16 MHz; 0 to +70 °C
PCF80C528	microcontroller: 80C51 CPU plus 512x8 RAM; watch–dog timer; 16–bit timer/counter; I²C–bus; ROM–code protection; 1.2 to 16 MHz; –40 to +85 °C
PCF80C552	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF80C652	microcontroller; 256x8 RAM; serial I/O; UART: I²C bus; 1.2 to 12 MHz; –40 to +85 °C
PCF83C528	microcontroller: 80C51 plus 512x8 RAM; 32x8 ROM; watch–dog timer; 16–bit timer/counter; I²C–bus; ROM–code protection; 1.2 to 16 MHz; –40 to +85 °C

I²C BUS ICs (cont.)

PCF83C552	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; –40 to +85 /o
PCF83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +85 °C
PCF83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF86C410	microcontroller: 128x8 RAM; 4Kx8 ROM; 32 I/O; I²C–bus; 1.5 to 6 V operation; low power; –40 to +85 /o
PCF86C610	microcontroller: 256x8 RAM; 8Kx8 ROM; 32 I/O; I²C–bus; 1.5 to 6 V operation; low power; –40 to +85 /o
PCF8566	universal LCD driver for low multiplex rates (1:1 to 1:4); max. 96 elements; I²C bus
PCF8567C	LCD direct mode driver with I²C–bus interface
PCF8570	256x8–bit static RAM; I²C bus
PCF8571	128x8–bit static RAM; I²C bus
PCF8573	clock calendar; I²C bus
PCF8574	remote 8–bit I/O expander; I²C bus
PCF8574A	remote 8–bit I/O expander; I²C bus; different slave address
PCF8576	universal LCD driver for low multiplex rates 1:1 to 1:4); max. 160 segments; I²C bus
PCF8577	LCD direct driver (32 segments) or duplex driver (64 segments); I²C bus
PCF8577A	LCD direct driver (32 segments) or duplex driver (64 segments); I²C bus; different slave address
PCF8578	LCD row/column driver for dot matrix graphic displays; 40 outputs, of which 24 are programmable; I²C bus
PCF8579	LCD column driver for dot matrix graphic displays; 40 column outputs; I²C bus
PCF8581	128x8–bit EEPROM with I²C–bus interface; supply voltage 4.5 to 5.5 V
PCF8581C	128x8–bit EEPROM with I²C–bus interface; supply voltage 2.5 to 6 V
PCF8582A	256x8–bit static CMOS EEPROM; I²C bus
PCF8582C	256x8–bit static CMOS EEPROM; I²C–bus; for automotive applications; supply voltage 2.5 to 6 V
PCF8583	clock calendar with 256x8–bit static RAM; I/2 bus
PCF8591	8–bit ADC/DAC; I²C bus
SAA1064	4–digit LED driver; I²C bus
SAA1300	tuner switching circuit; I²C bus
SAA3028	high performance transcoder (RC–5) for infrared remote control; I²C bus
TDA8417	TV and video recorder stereo/dual sound processor with integrated filters and I²C–bus control
TDA8420	hi–fi stereo audio processor; I²C bus
TDA8421	hi–fi stereo audio processor; I²C bus
TDA8425	hi–fi stereo audio processor; I²C bus
TDA8426	hi–fi stereo audio processor; I²C–bus
TEA6100	FM/IF system and microcomputer–based tuning interface; I²C bus
TEA6300	car radio preamplifier and source selector with sound and fader controls; I²C bus
TEA6310	sound fader control circuit; I²C bus
TSA6057	radio tuning PLL frequency synthesizer; I²C bus

INTERFERENCE SUPPRESSORS

TDA1001B	interference and noise suppression circuit for FM receivers

MEMORIES

FCF61C65LL–85	as LL–70, but 85 nsec plus extended temperature
FCB61C65L–70	8Kx8–bit high–speed CMOS low–power static RAM; access time 70 ns
FCB61C65LL–70	8Kx8–bit high–speed CMOS very low power static RAM; access time 70 ns
PCA8582B	256x8–bit static CMOS EEPROM with I²C–bus interface; for automotive applications
PCF8570	256x8–bit static RAM; I²C bus
PCF8571	128x8–bit static RAM; I²C bus
PCF8581	128x8–bit EEPROM with I²C–bus interface; supply voltage 4.5 to 5.5 V
PCF8581C	128x8–bit EEPROM with I²C–bus interface; supply voltage 2.5 to 6 V
PCF8582A	256x8–bit static CMOS EEPROM; I²C bus
PCF8582C	256x8–bit static CMOS EEPROM; I²C–bus; for automotive applications; supply voltage 2.5 to 6 V

MICROCONTROLLERS

CMOS 8–bit

PCA80C31BH–2	microcontroller; 128x8 RAM; 0.5 to 12 MHz; 0 to 70 /o
PCA80C31BH–3	microcontroller; 128x8 RAM; 1.2 to 12 MHz; –40 to +125 °C
PCA80C39	microcontroller; 128x8 RAM; 1.0 to 15 MHz; –40 to +110 °C
PCA80C49	microcontroller; 128x8 RAM; 2Kx8 ROM; 1.0 to 15 MHz; –40 to +110 °C
PCA80C51BH–3	microcontroller; 128x8 RAM; 4Kx8 ROM; 1.2 to 12 MHz; –40 to +125 °C
PCA80C528	microcontroller: 80C51 CPU plus 512x8 RAM; watch–dog timer; 16–bit timer/counter; I²C–bus; ROM code protection; 1.2 to 16 MHz; –40 to +110 °C
PCA80C552	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 12 MHz; –40 to +125 °C
PCA80C562	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 8–bit ADC; 1.2 to 12 MHz; –40 to +125 °C
PCA80C652	microcontroller; 256x8 RAM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +125 °C
PCA83C528	microcontroller: 80C51 CPU plus 512x8 RAM; 32x8 ROM; watch–dog timer; 16–bit timer/counter; I²C–bus; ROM code protection; 1.2 to 16 MHz; –40 to +110 °C

MICROCONTROLLERS (cont.)

CMOS 8–bit (cont.)

PCA83C552	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; –40 to +125 °C
PCA83C562	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 8–bit ADC; 1.2 to 12 MHz; –40 to +125 °C
PCA83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +125 °C
PCA83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 16 MHz; –40 to +125 °C
PCB80C31BH–2	microcontroller: 128x8 RAM; 0.5 to 12 MHz; 0 to 70 °C
PCB80C31BH–3	microcontroller; 128x8 RAM; 1.2 to 16 MHz; 0 to +70 °C
PCB80C39	microcontroller; 128x8 RAM; 1.0 to 15 MHz; 0 to +70 °C
PCB80C49	microcontroller; 128x8 RAM; 2Kx8 ROM; 1.0 to 15 MHz; 0 to +70 °C
PCB80C51BH–2	microcontroller: 128x8 RAM; 4Kx8 ROM; 0.5 to 12 MHz; 0 to +70 °C
PCB80C51BH–3	microcontroller; 128x8 RAM; 4Kx8 ROM; 1.2 to 16 MHz; 0 to +70 °C
PCB80C528	microcontroller: 80C51 CPU plus 512x8 RAM; watch dog timer; 16–bit timer/counter; I²C–bus; ROM–code protection; 1.2 to 16 MHz; 0 to +70 °C
PCB80C552	microcontroller; 256x8 RAM; 16–bit capture/ compare timer/counter; watch–dog timer; two pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; 0 to +70 °C
PCB80C562	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 8–bit ADC; 1.2 to 16 MHz; 0 to +70 °C
PCB80C582	microcontroller: 256x8 RAM; 256x8 EEPROM; 16–bit capture/compare timer/counter; watch–dog timer; two PWM signals; 8–bit input to 10–bit ADC; I²C–bus; 1.2 to 16 MHz; 0 to +70 °C
PCB80C652	microcontroller; 256x8 RAM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; 0 to +70 °C
PCB83C528	microcontroller: 80C51 CPU plus 512x8 RAM; 32x8 ROM; watch–dog–timer; 16–bit timer/counter; I²C–bus; ROM–code protection; 1.2 to 16 MHz 0 to +70 °C
PCB83C552	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; two pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHZ; 0 to +70 °C
PCB83C562	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 8–bit ADC; 1.2 to 16 MHz; 0 to +70 °C

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MICROCONTROLLERS (cont.)

CMOS 8–bit (cont.)

PCB83C582	microcontroller: 256x8 RAM; 8Kx8 ROM; 256x8 EEPROM; 16–bit capture/compare timer/counter; watch–dog timer; two PWM signals; 8–bit input to 10–bit ADC; I²C–bus; 1.2 to 16 MHz; 0 to +70 °C
PCB83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; 0 to +70 °C
PCB83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 16 MHz; 0 to +70 °C
PCF80C31BH–3	microcontroller; 128x8 RAM; 1.2 to 12 MHz; –40 to + 85 °C
PCF80C39	microcontroller; 128x8 RAM; 1.0 to 15 MHz; –40 to +85 °C
PCF80C49	microcontroller; 128x8 RAM; 2Kx8 ROM; 1.0 to 15 MHz; –40 to +85 °C
PCF80C51BH–3	microcontroller; 128x8 RAM; 4Kx8 ROM; 1.2 to 12 MHz; –40 to +85 °C
PCF80C528	microcontroller: 80C51 CPU plus 512x8 RAM; watch–dog timer; 16–bit timer/counter; I²C–bus; ROM–code protection; 1.2 to 16 MHz; –40 to +85 °C
PCF80C552	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF80C652	microcontroller; 256x8 RAM; serial I/O; UART: I²C bus; 1.2 to 12 MHz; –40 to +85 °C
PCF83C528	microcontroller: 80C51 plus 512x8 RAM; 32x8 ROM; watch–dog timer; 16–bit timer/counter; I²C–bus; ROM–code protection; 1.2 to 16 MHz; –40 to +85 °C
PCF83C552	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +85 °C
PCF83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF84C12	low cost microcontroller; 64x8 RAM; 1Kx8 ROM; –40 to +85 °C
PCF84C21	microcontroller; 64x8 RAM; 2Kx8 ROM; plus 8–bit LED driver; I²C bus; –40 to +85 °C
PCF84C41	microcontroller; 128x8 RAM; 4Kx8 ROM; plus 8–bit LED driver; I²C bus; –40 to +85 °C
PCF84C81	microcontroller; 256x8 RAM; 8Kx8 ROM; plus 8–bit LED driver; I²C bus; –40 to +85 °C
PCF84C85	microcontroller; 256x8 RAM; 8Kx8 ROM; 32 I/O; plus 8–bit LED driver; I²C bus; –40 to +85 °C
PCF86C410	microcontroller: 128x8 RAM; 4Kx8 ROM; 32 I/O; I²C–bus; 1.5 to 6 V operation; low power; –40 to +85 °C
PCF86C610	microcontroller: 256x8 RAM; 8Kx8 ROM; 32 I/O; I²C–bus; 1.5 to 6 V operation; low power; –40 to +85 °C

MICROCONTROLLERS (cont.)

NMOS 8–bit

MAB8401	microcontroller; 128x8 RAM; bond–out version for MAB84XX family plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8411	microcontroller; 64x8 RAM; 1Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8421	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8422	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 15 I/O lines; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8441	microcontroller; 128x8 RAM; 4Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8461	microcontroller; 128x8 RAM; 6Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAF84A11	microcontroller; 64x8 RAM; 1Kx8 ROM; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A21	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A22	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 15 I/O lines; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A41	microcontroller; 128x8 RAM; 4Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A61	microcontroller; 128x8 RAM; 6Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF8411	microcontroller; 64x8 RAM; 1Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8421	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8422	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 15 I/O lines; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8441	microcontroller; 128x8 RAM; 4Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8461	microcontroller; 128x8 RAM; 6Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; –40 to +85 °C

MOTOR CONTROLLERS

TDA1059B	motor speed regulator with thermal shut–down; multiplication coefficient = 9; drop–out voltage = 1.8 V
TDA5040	DC motor drive circuit with magnetic–field detector
TDA5045	DC motor drive circuit with magnetic–field detector
TDA5140	brushless DC motor drive circuit
TDA7072	single power driver for CD servo systems
TDA7073	dual power driver for CD servo systems

PERSONAL RADIO/AUDIO

TDA7000	FM radio circuit; mono (in plastic DIL–18)
TDA7010	FM radio circuit; mono (in SO–16 plastic mini–pack)
TDA7021	FM radio circuit; stereo/mono; for low voltage micro tuning system (MTS)
TDA7030	low voltage micro tuning system (MTS)
TDA7040	PLL stereo decoder; low voltage
TDA7050	150 mW BTL or 2x75 mW stereo audio power amplifier; low voltage
TDA7052	1 W BTL mono audio amplifier for portable applications
TDA7053	2x1 W BTL stereo audio power amplifier for portable applications
TEA0670	Dolby B & C processor with preamplifier and electronic switch; low voltage
TEA5551	single–chip AM radio circuit, plus dual AF amplifier, for pocket receivers with headphones

RADIO RECEIVERS

AM

TDA1072A	AM receiver circuit for hi–fi and car radios
TDA1572	AM receiver circuit for stereo hi–fi and car radios
TEA6200	AM upconversion radio receiver; 10.7 MHz IF

AM/FM

TEA5570	AM/FM radio receiver circuit
TEA5591	AM/FM radio receiver circuit
TEA5591A	AM/FM radio receiver circuit
TEA5592	AM/FM radio reciever circuit

FM

NE605	low–power FM IF system
NE614A	low–power FM IF system
NE615	high–performance low–power mixer FM IF system
SAA7579	radio data system decoder
SA605	low–power FM IF system
TDA1574	integrated FM tuner for radio receivers
TDA1576	FM/IF amplifier and detector
TDA1596	FM/IF amplifier and detector
TDA7000	FM radio circuit; mono (in plastic DIL–18)

RADIO RECEIVERS (cont.)

FM (cont.)

TDA7010	FM radio circuit; mono (in SO–16 plastic mini–pack)
TDA7021	FM radio circuit; stereo/mono; for low voltage micro tuning system (MTS)
TDB1080	IF limiting amplifier, FM detector and audio amplifier
TEA6100	FM/IF system and microcomputer–based tuning interface; I²C bus

REMOTE CONTROLLERS

PCF1254	infrared remote control transmitter; EEPROM–generated individual code for remote control; identification or security systems; low power
SAA3004	high performance transmitter (455 kHz) for infrared remote control; up to 448 commands
SAA3006	high performance transmitter (RC–5) for infrared remote control; up to 2048 commands
SAA3007	high performance transmitter (455 kHz) for infrared remote control; up to 1280 commands; low voltage
SAA3008	high performance transmitter (38 kHz) for infrared remote control; low voltage
SAA3009	infrared remote control decoder; decodes 64 commands (RECS80/RC–5); up to 32 subaddresses; high current output capability for direct LED drive
SAA3010	high–performance transmitter (RC–5) for infrared remote control; low voltage
SAA3028	high performance transcoder (RC–5) for infrared remote control; I²C bus
SAA3049	infrared remote control decoder, low current version of SAA3009
SAF1032	receiver/decoder for infrared remote control
SAF1039	transmitter for infrared remote control
TDA3047	high performance receiver for infrared remote control; positive output voltage
TDA3048	high performance receiver for infrared remote control; negative output voltage
TEA5500	coded locking circuit for security systems
TEA5501	coded locking circuit for security systems (one–shot output; 6.5K codes)

REMOTE I/O EXPANDERS

PCF8567C	LCD direct mode driver with I²C–bus interface
PCF8574	remote 8–bit I/O expander; I²C bus
PCF8574A	remote 8–bit I/O expander; I²C bus; different slave address

SOUND GENERATOR

SAA1099	stereo sound generator for sound effects and music synthesis (μC–controlled)

STEREO DECODERS

SAA7500	digital satellite radio broadcasting tuner decoder (SAT–2)
TDA1578A	time multiplex PLL stereo decoder for hi–fi and car radios
TDA1598	time multiplex PLL stereo decoder for hi–fi and car radios
TDA7040	PLL stereo decoder; low voltage
TEA5580	PLL stereo decoder for medium–fi and car radios
TEA5581	PLL stereo decoder with source selector switch for medium–fi and car radios
TSA6057	radio tuning PLL frequency synthesizer; I^2C bus

TUNING ICs

HEF4750V	frequency synthesizer
HEF4751V	universal divider
SAA1057	radio tuning PLL frequency synthesizer (SYMO II)
SAA1300	tuner switching circuit; I^2C bus
TDA1574	integrated FM tuner for radio receivers
TDA7030	low voltage micro tuning system (MTS)
TDD1742	low power frequency synthesizer (LOPSY)

AMPLIFIERS

NE5230	low voltage operational amplifier
SA5230	low voltage operational amplifier
TDA7050	150 mW BTL or 2x75 mW stereo audio power amplifier; low voltage
TDA7052	1 W BTL mono audio amplifier for portable applications

CLOCK/CALENDAR

PCF8573	clock calendar; I^2C bus
PCF8583	clock calendar with 256x8–bit static RAM; I^2C bus

DATA CONVERSION

ADCs, DACs

PCF8591	8–bit ADC/DAC; I^2C bus

CALL PROGRESS DECODER

NE5900	call progress decoder

LISTENING–IN

TEA1085	listening–in circuit for line–powered telephone sets; larson level limiter

DIALLER ICs

DTMF

PCD3311	DTMF generator with parallel data inputs; I^2C bus
PCD3311A	DTMF/32–single tone generator with parallel data inputs; I^2C bus
PCD3312	DTMF generator; I^2C bus
PCF4420	dialler with redial, compatible with 3x4 keypad
PCF4421	dialler with redial plus access pause, flash and disconnect functions

Pulse

PCD3320C	dialler with redial; several mute signals; no access pause; mark/space ratio 3:2
PCD3321C	dialler with redial; manual and two automatic access pauses; mark/space ratio 3:2 and 2:1
PCD3322C	variant of PCD3320C
PCD3323	dialler for sophisticated PABX applications
PCD3324C	variant of PCD3321C; one automatic access pause
PCD3325C	dialler with manual access pause control
PCD3326C	variant of PCD3321C with selectable access pause
PCD3327C	variant of PCD3325C for ceramic resonator; automatic reset of access pause

DIALLER ICs (cont.)

Pulse/DTMF

PCD3310	pulse and DTMF dialler with redial; pulse dialling mark/space ratio 2:1; PABX register; notepad; flash; access pause by cursor method
PCD3310A	variant of PCD3310 with mark/space ratio 3:2
PCD3310C	variant of PCD3310; dialling mode indicator output
PCD4410	pulse and DTMF dialler with redial; 3x4 keypad; flash; mark/space ratio 2:1; tone burst 70/140 ms; data memory
PCD4413	variant of PCD4410 without redial; mark/space ratio 3:2; tone burst 70/70 ms
PCD4413A	PCD4413 with flash time of 255 ms
PCD4415	PCD4410 for 3x4 or 3x5 keypad; tone burst 70/70 ms
PCD4415A	PCD4415 with mark/space ratio 3:2

Repertory

PCD3315/502	10–number repertory dialler with redial and DTMF generator for PCD3312; 4x5 keypad; 10 Hz
PCD3315/503	PCD3315/502 plus 10 name keys
PCD3315/512	PCD3315/503 plus 16 and 20 Hz options
PCD3315/513	PCD3315/503 plus Norwegian and Swedish key options
PCD3341	advanced 10–100 number repertory pulse/DTMF dialler; LCD control; I²C bus
PCD3344/004	up to 20 number repertory pulse/DTMF dialler with redial (max. 30 digits); music on hold; LCD control; specification options
PCD3344/006	up to 20 number repertory pulse/DTMF dialler (floating RAM); music on hold; on–hook dialling and listening–in control; specification options

DISPLAY DRIVERS

PCF2111	LCD duplex driver; 64 segments
PCF2201	LCD flat panel row/column driver
PCF8566	universal LCD driver for low multiplex rates (1:1 to 1:4); max. 96 elements; I²C bus
PCF8567C	LCD direct mode driver with I²C–bus interface
PCF8576	universal LCD driver for low multiplex rates 1:1 to 1:4); max. 160 segments; I²C bus
PCF8577	LCD direct driver (32 segments) or duplex driver (64 segments); I²C bus
PCF8577A	LCD direct driver (32 segments) or duplex driver (64 segments); I²C bus; different slave address
PCF8578	LCD row/column driver for dot matrix graphic displays; 40 outputs, of which 24 are programmable; I²C bus
PCF8579	LCD column driver for dot matrix graphic displays; 40 column outputs; I²C bus

I²C BUS ICs

NE5751	audio processor system with I²C control for RF communication
PCA80C552	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 12 MHz; –40 to + 125 °C

I²C BUS ICs (cont.)

PCA80C652	microcontroller; 256x8 RAM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +125 °C
PCA83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +125 °C
PCA83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 16 MHz; –40 to +125 °C
PCA8582B	256x8–bit static CMOS EEPROM with I²C–bus interface; for automotive applications
PCB80C552	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; two pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; 0 to +70 °C
PCB80C652	microcontroller; 256x8 RAM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; 0 to +70 °C
PCB83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; 0 to +70 °C
PCB83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 16 MHz; 0 to +70 °C
PCD3311	DTMF generator with parallel data inputs; I²C bus
PCD3311A	DTMF/32–single tone generator with parallel data inputs; I²C bus
PCD3312	DTMF generator; I²C bus
PCD3315C	microcontroller for telephone sets; 160x8 RAM; 1.5Kx8 ROM; 20 I/O lines; I²C bus
PCD3341	advanced 10–100 number repertory pulse/DTMF dialler; LCD control; I²C bus
PCD3343	microcontroller for telephone sets; 224x8 RAM; 3Kx8 ROM; 20 I/O lines; I²C bus
PCD3344	microcontroller with on–chip DTMF generator; 224x8 RAM; 2Kx8 ROM; 20 I/O lines; I²C bus
PCD3346	microcontroller for telephone sets; 128x8 RAM; 4Kx8 ROM; 256x8 EEPROM; 20 I/O lines; I²C bus
PCD3347	microcontroller with on–chip DTMF generator; 64x8 RAM; 1.5Kx8 ROM; 13 I/O lines; I²C bus
PCD3348	microcontroller for telephone sets; 256x8 RAM; 8Kx8 ROM; 20 I/O lines; I²C bus
PCD3349	microcontroller with on–chip DTMF generator; 224x8 RAM; 4Kx8 ROM; 20 I/O lines; I²C bus
PCF80C552	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF80C652	microcontroller; 256x8 RAM; serial I/O; UART: I²C bus; 1.2 to 12 MHz; –40 to +85 °C
PCF83C552	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +85 °C
PCF83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF86C410	microcontroller: 128x8 RAM; 4Kx8 ROM; 32 I/O; I²C–bus; 1.5 to 6 V operation; low power; –40 to +85 °C

IC

I²C BUS ICs (cont.)

PCF8566	universal LCD driver for low multiplex rates (1:1 to 1:4); max. 96 elements; I²C bus
PCF8567C	LCD direct mode driver with I²C–bus interface
PCF8570	256x8–bit static RAM; I²C bus
PCF8571	128x8–bit static RAM; I²C bus
PCF8573	clock calendar; I²C bus
PCF8574	remote 8–bit I/O expander; I²C bus
PCF8574A	remote 8–bit I/O expander; I²C bus; different slave address
PCF8576	universal LCD driver for low multiplex rates 1:1 to 1:4); max. 160 segments; I²C bus
PCF8577	LCD direct driver (32 segments) or duplex driver (64 segments); I²C bus
PCF8577A	LCD direct driver (32 segments) or duplex driver (64 segments); I²C bus; different slave address
PCF8581	128x8–bit EEPROM with I²C–bus interface; supply voltage 4.5 to 5.5 V
PCF8581C	128x8–bit EEPROM with I²C–bus interface; supply voltage 2.5 to 6 V
PCF8582A	256x8–bit static CMOS EEPROM; I²C bus
PCF8582C	256x8–bit static CMOS EEPROM; I²C–bus; for automotive applications; supply voltage 2.5 to 6 V
PCF8591	8–bit ADC/DAC; I²C bus
SA5751	audio processor system with I²C–bus for RF communication
SCC68070	microprocessor; 16/32–bit MPU; 68000 CPU; MMU; DMA; timer; UART; I²C bus
UMA1000	data processor for cellular radio (DPROC); I²C bus
UMA1010	low–power universal frequency synthesizer for radio communications; 400 to 1150 MHz; I²C bus
UMA1012	low power universal frequency synthesizer for radio communications; I²C bus; up to 550 MHz

MEMORIES

FCB61C65L–70	8Kx8–bit high–speed CMOS low–power static RAM; access time 70 ns

MEMORIES (cont.)

FCB61C65LL–70	8Kx8–bit high–speed, very–low–power CMOS static RAM; access time 70 ns
FCF61C65LL–85	8Kx8–bit high–speed, very–low–power CMOS static RAM; extended temperature range; access time 85 ns
PCF8570	256x8–bit static RAM; I²C bus
PCF8571	128x8–bit static RAM; I²C bus
PCF8581	128x8–bit EEPROM with I²C–bus interface; supply voltage 4.5 to 5.5V
PCF8581C	128x8–bit EEPROM with I²C–bus interface; supply voltage 2.5 to 6 V
PCF8582A	256x8–bit static CMOS EEPROM; I²C bus
PCF8582C	256x8–bit static CMOS EEPROM; I²C–bus; for automotive applications; supply voltage 2.5 to 6 V

MICROCONTROLLERS

PCA80C552	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 12 MHz; –40 to +125 °C
PCA80C652	microcontroller; 256x8 RAM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +125 °C
PCA83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +125 °C
PCA83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 16 MHz; –40 to +125 °C
PCB80C552	microcontroller; 256x8 RAM; 16–bit capture/ compare timer/counter; watch–dog timer; two pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; 0 to +70 °C
PCB80C652	microcontroller; 256x8 RAM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; 0 to +70 °C
PCB80C851	microcontroller; 128x8 RAM; 256x8 EEPROM; 1.2 to 12 MHz; 0 to +70 °C
PCB83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 16 MHz; 0 to +70 °C
PCB83C851	microcontroller; 128x8 RAM; 4Kx8 ROM; 256x8 EEPROM; 1.2 to 12 MHz; 0 to +70 °C
PCD3300B	28/28–pin piggyback version for PCD33XX family without DTMF
PCD3315C	microcontroller for telephone sets; 160x8 RAM; 1.5Kx8 ROM; 20 I/O lines; I²C bus
PCD3343	microcontroller for telephone sets; 224x8 RAM; 3Kx8 ROM; 20 I/O lines; I²C bus
PCD3344	microcontroller with on–chip DTMF generator; 224x8 RAM; 2Kx8 ROM; 20 I/O lines; I²C bus
PCD3344B	28/28–pin piggyback version for PCD33XX family with DTMF
PCD3346	microcontroller for telephone sets; 128x8 RAM; 4Kx8 ROM; 256x8 EEPROM; 20 I/O lines; I²C bus
PCD3347	microcontroller with on–chip DTMF generator; 64x8 RAM; 1.5Kx8 ROM; 13 I/O lines; I²C bus
PCD3348	microcontroller for telephone sets; 256x8 RAM; 8Kx8 ROM; 20 I/O lines; I²C bus
PCD3349	microcontroller with on–chip DTMF generator; 224x8 RAM; 4Kx8 ROM; 20 I/O lines; I²C bus

MICROCONTROLLERS (cont.)

PCF80C552	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I^2C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF80C652	microcontroller; 256x8 RAM; serial I/O; UART: I^2C bus; 1.2 to 12 MHz; –40 to +85 °C
PCF83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I^2C bus; 1.2 to 12 MHz; –40 to +85 °C
PCF83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I^2C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF86C410	microcontroller: 128x8 RAM; 4Kx8 ROM; 32 I/O; I^2C–bus; 1.5 to 6 V operation; low power; –40 to +85 °C
PCF86C610	microcontroller: 256x8 RAM; 8Kx8 ROM; 32 I/O; I^2C–bus; 1.5 to 6 V operation; low power; –40 to +85 °C

MOBILE TELEPHONES

MC3361	low power FM IF system
NE567	tone/frequency decoder PLL
NE570	compandor
NE571	compandor
NE572	programmable analog compandor
NE575	low voltage dual expander/single compandor or automatic level controller
NE602A	double–balanced mixer and oscillator
NE604A	high–performance low–power FM IF system
NE605	low–power FM IF system
NE612	double balanced mixer and oscillator
NE614A	low–power FM IF system
NE615	high–performance low–power mixer FM IF system
NE5750	audio processor system for RF communication
NE5751	audio processor system with I^2C control for RF communication
PCB80C552	microcontroller; 256x8 RAM; 16–bit capture/ compare timer/counter; watch–dog timer; two pulse–width modulated signals; 8–bit input to 10–bit ADC; I^2C bus; 1.2 to 16 MHz; 0 to +70 °C
PCB80C652	microcontroller; 256x8 RAM; serial I/O; UART; I^2C bus; 1.2 to 12 MHz; 0 to +70 °C
PCB80C851	microcontroller; 128x8 RAM; 256x8 EEPROM; 1.2 to 12 MHz; 0 to +70 °C
PCB83C552	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; two pulse–width modulated signals; 8–bit input to 10–bit ADC; I^2C bus; 1.2 to 16 MHZ; 0 to +70 °C
PCB83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I^2C bus; 1.2 to 12 MHz; 0 to +70 °C
PCB83C851	microcontroller; 128x8 RAM; 4Kx8 ROM; 256x8 EEPROM; 1.2 to 12 MHz; 0 to +70 °C
PCD3311A	DTMF/32–single tone generator with parallel data inputs; I^2C bus

MOBILE TELEPHONES (cont.)

PCD3312	DTMF generator; I²C bus
PCD3315/502	10–number repertory dialler with redial and DTMF generator for PCD3312; 4x5 keypad; 10 Hz
PCF80C552	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF80C562	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 8–bit ADC; 1.2 to 12 MHz; –40 to +85 °C
PCF80C652	microcontroller; 256x8 RAM; serial I/O; UART: I²C bus; 1.2 to 12 MHz; –40 to +85 °C
PCF80C851	microcontroller; 128x8 RAM; 256x8 EEPROM; 1.2 to 12 MHz; –40 to +85 °C
PCF83C552	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF83C562	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 8–bit ADC; 1.2 to 12 MHz; –40 to +85 °C
PCF83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +85 °C
PCF83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +85 °C
PCF83C851	microcontroller; 128x8 RAM; 4Kx8 ROM; 256x8 EEPROM; 1.2 to 12 MHz; –40 to +85 °C
PCF8591	8–bit ADC/DAC; I²C bus
SA571	compandor
SA572	programmable analog compandor
SA602A	double–balanced mixer and oscillator
SA604A	high performance low power FM IF system
SA605	low–power FM IF system
SA614A	low power FM IF system
SA615	high performance low power mixer FM IF system
SA5750	audio processor system for RF communication
SA5751	audio processor system with I²C–bus for RF communication
SE567	tone/frequency decoder PLL
TDA7050	150 mW BTL or 2x75 mW stereo audio power amplifier; low voltage
TDA7052	1 W BTL mono audio amplifier for portable applications
TDD1742	low power frequency synthesizer (LOPSY)
UMA1000	data processor for cellular radio (DPROC); I²C bus
UMA1010	low–power universal frequency synthesizer for radio communications; 400 to 1150 MHz; I²C bus
UMA1012	low power universal frequency synthesizer for radio communications; I²C bus; up to 550 MHz

POWER SUPPLY ICs

PCF1252–0	power–fail detector and reset generator; trip voltage = 4.75 V
PCF1252–1	power–fail detector and reset generator; trip voltage = 4.55 V
PCF1252–2	power–fail detector and reset generator; trip voltage = 4.25 V
PCF1252–3	power–fail detector and reset generator; trip voltage = 4.05 V
PCF1252–4	power–fail detector and reset generator; trip voltage = 3.75 V
PCF1252–5	power–fail detector and reset generator; trip voltage = 3.55 V
PCF1252–6	power–fail detector and reset generator; trip voltage = 3.25 V
PCF1252–7	power–fail detector and reset generator; trip voltage = 3.05 V
PCF1252–8	power–fail detector and reset generator; trip voltage = 2.75 V
PCF1252–9	power–fail detector and reset generator; trip voltage = 2.55 V
TEA1041	battery low–level indicator
TEA1081	supply circuit with power–down for telephone set peripherals
TEA1088	control circuit for NiCd charge systems

REMOTE I/O EXPANDERS

PCF8567C	LCD direct mode driver with I^2C–bus interface
PCF8574	remote 8–bit I/O expander; I^2C bus
PCF8574A	remote 8–bit I/O expander; I^2C bus; different slave address

SPEECH–TRANSMISSION

TEA1042	telephone transmission circuit for handsfree loudspeaking
TEA1060	speech/transmission circuit with dialler interface; low impedance input for dynamic and magnetic microphones
TEA1061	speech/transmission circuit with dialler interface; high impedance input for electret and piezoelectric microphones
TEA1064	speech/transmission circuit with dialler interface and transmit level dynamic limiting
TEA1066	speech/transmission circuit with dialler interface
TEA1067	low voltage speech/transmission circuit with dialler interface; input suitable for all microphone types
TEA1068	speech/transmission circuit with dialler interface; input suitable for all microphone types

TONE RINGERS

PCD3360	programmable multi–tone ringer
UBA1094	3–tone ringer circuit for telephones

CORDLESS TELEPHONES

MC3361	low power FM IF system
NE567	tone/frequency decoder PLL
NE575	low voltage dual expander/single compandor or automatic level controller
NE5750	audio processor system for RF communication
NE5751	audio processor system with I²C control for RF communication
PCD3315/534	microcontroller for cordless remote unit
PCD3344	microcontroller with on–chip DTMF generator; 224x8 RAM; 2Kx8 ROM; 20 I/O lines; I²C bus
PCF86C410	microcontroller: 128x8 RAM; 4Kx8 ROM; 32 I/O; I²C–bus; 1.5 to 6 V operation; low power; –40 to +85 °C
PCF86C610	microcontroller: 256x8 RAM; 8Kx8 ROM; 32 I/O; I²C–bus; 1.5 to 6 V operation; low power; –40 to +85 °C
PC74HC4046A	phase–locked loop with VCO
SA5750	audio processor system for RF communication
SA5751	audio processor system with I²C–bus for RF communication

ISDN

PCB80C851	microcontroller; 128x8 RAM; 256x8 EEPROM; 1.2 to 12 MHz; 0 to +70 °C
PCB83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; 0 to +70 °C
PCB83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; 0 to +70 °C
PCB83C851	microcontroller; 128x8 RAM; 4Kx8 ROM; 256x8 EEPROM; 1.2 to 12 MHz; 0 to +70 °C
PCB2310	IST bus interface

SCC68070	microprocessor; 16/32–bit MPU; 68000 CPU; MMU; DMA; timer; UART; I^2C bus

RADIO PAGERS

PCA5000	decoder for POCSAG paging systems
TDA7052	1 W BTL mono audio amplifier for portable applications
UAA2033	VHF digital paging receiver; low power
UAA2050	UHF digital paging receiver; low–power

AMPLIFIERS

NE592	video amplifier
NE5539	ultra high frequency operational amplifier
NE5592	video amplifier
SA592	video amplifier
SE592	video amplifier
SE5539	ultra high frequency operational amplifier
TDA6100Q	8 MHz video output amplifier
TDA6110	16 MHz video output amplifier
μA733	differential video amplifier
μA733C	differential video amplifier

CAMERA ICs

SAA1043	universal sync generator
SAA1044	subcarrier coupler circuit
SAA1101	universal sync generator
SAD1019	multi–norm pulse pattern generator

CLOCK/CALENDAR

PCF8573	clock calendar; I^2C bus
PCF8583	clock calendar with 256x8–bit static RAM; I^2C bus

COLOUR DECODERS

SAA9051	digital multistandard TV decoder (S–DMSD) with separate chrominance and luminance inputs; I^2C bus
TDA3501	video control combination
TDA3505	video control combination with automatic cut–off control; –(B–Y) and –(R–Y) input
TDA3506	video control combination with automatic cut–off control; + (B–Y) and + (R–Y) input
TDA3507	video control combination with automatic cut–off control; –(B–Y) and –(R–Y) input
TDA3510	PAL decoder
TDA3561A	PAL decoder
TDA3565	PAL decoder
TDA3566	PAL/NTSC decoder
TDA3592A	SECAM/PAL transcoder
TDA4510	PAL decoder
TDA4555	multistandard decoder for –(R–Y) and –(B–Y) signals
TDA4556	multistandard decoder for + (R–Y) and + (B–Y) signals
TDA4557	multistandard colour decoder
TDA4560	colour transient improvement circuit
TDA4565	colour transient improvement circuit; output signal delayed 180 us less than that of TDA4560

COLOUR DECODERS (cont.)

TDA4566	colour transient improvement circuit; switchable delay time
TDA4568	luminance signal delay circuit for colour TV receivers
TDA4580	video control combination with automatic cut–off control
TDA8390	single–chip PAL decoder and RGB matrix
TDA8442	I^2C bus interface for colour decoders
TDA8443A	two channel switch for YUV or RGB signals; RGB/YUV matrix; I^2C bus or DC control; 3–state outputs; seven slave addresses
TDA8451	P^2CCD delay line and matrix for colour decoders
TDA8452	P^2CCD filter combination for colour decoders
TDA8453	P^2CCD filter combination for CVBS and S–VHS
TDA8461	PAL/NTSC decoder; I^2C bus
TDA9080	video control combination circuit with automatic cut–off control

DATA CONVERSION

ADCs, DACs

PCF8591	8–bit ADC/DAC; I^2C bus
PNA7509	7–bit ADC; 22 MHz; 3–state output
PNA7518	8–bit multiplying DAC; 30 MHz
SAA9079	7–bit ADC for digital TV; low level
SAD1009	universal DAC (UDAC)
TDA1534	14–bit ADC
TDA1541A	dual 16–bit DAC
TDA1543	dual 16–bit economy DAC (I^2S bus format)
TDA1543A	dual 16–bit economy DAC (Japanese format)
TDA8444	octuple 6–bit DAC; I^2C bus
TDA8702	8–bit high–performance, high–speed video DAC; 30 MHz (max.); TTL–compatible
TDA8703	8–bit high–performance, high–speed ADC; 40 MHz (max.); TTL–compatible; internal voltage reference regulator
TDA8706	6–bit video ADC with three analogue inputs, clamps and 3:1 multiplexer; for picture–in–picture; TTL compatible
TDA8708	8–bit video ADC; 30 MHz (max.); 1–out–of–3 input selector, clamp and automatic gain control
TDA8712	8–bit high–performance, high–speed video DAC; 30 MHz (max.); TTL compatible; –55 to +125 °C
TDA8713	8–bit high–performance, high–speed ADC; 40 MHz (max.); TTL compatible
TDA8715	8–bit high–performance, high–speed ADC; 50 MHz (max.); ECL compatible; 0 to +70 °C
TDE8715	8–bit high–performance, high–speed ADC; 50 MHz (max.); ECL compatible; extended temperature

DIGITAL PROCESSING

SAA9041A	digital video teletext (DVTB) processor for Philips digital TV system (525 and 625–line systems); I²C bus (West European language version)
SAA9050	digital multistandard TV decoder; I²C bus
SAA9051	digital multistandard TV decoder (S–DMSD) with separate chrominance and luminance inputs; I²C bus
SAA9057	clock signal generator circuit (CGC) for digital TV systems
SAA9058	sample rate converter
SAA9060	video processor with DACs for luminance and colour difference signals (VDA)
SAA9062	digital deflection controller (DDC) option 1 with on–chip ROM/RAM; ROM preprogrammed for 45AX picture tubes; RAM programmable for other picture tubes; 50/60 Hz vertical frequency; 16 kHz line frequency; I²C bus
SAA9063	digital deflection controller (DDC) option 2 with on–chip ROM/RAM; ROM preprogrammed for 45AX picture tubes; RAM programmable for other picture tubes; 50/60 Hz vertical frequency; 31 kHz line frequency; I²C bus
SAA9064	digital deflection controller (DDC) option 3 with on–chip ROM/RAM; ROM preprogrammed for 45AX picture tubes; RAM programmable for other picture tubes; 100/120 Hz vertical frequency; 31 kHz line frequency; I²C bus
SAA9068	picture–in–picture controller (PIPCO); I²C bus
SAA9069	digital vertical filter (DVF)
SAA9079	7–bit ADC for digital TV; low level

DISPLAY DRIVERS

PCF1303	18–element bar graph LCD driver (with analog input)
PCF2100	LCD duplex driver; 40 segments
PCF2110	LCD duplex driver; 60 segments and 2 LEDs
PCF2111	LCD duplex driver; 64 segments
PCF2112	LCD driver; 32 segments
PCF2201	LCD flat panel row/column driver
PCF8566	universal LCD driver for low multiplex rates (1:1 to 1:4); max. 96 elements; I²C bus
PCF8567C	LCD direct mode driver with I²C–bus interface
PCF8576	universal LCD driver for low multiplex rates 1:1 to 1:4); max. 160 segments; I²C bus
PCF8577	LCD direct driver (32 segments) or duplex driver (64 segments); I²C bus
PCF8577A	LCD direct driver (32 segments) or duplex driver (64 segments); I²C bus; different slave address
PCF8578	LCD row/column driver for dot matrix graphic displays; 40 outputs, of which 24 are programmable; I²C bus
PCF8579	LCD column driver for dot matrix graphic displays; 40 column outputs; I²C bus
SAA1060	LED display/interface circuit
SAA1064	4–digit LED driver; I²C bus

EAST–WEST CORRECTION

TDA1082	east–west correction driver circuit
TDA8432	vertical deflection processor for computer–controlled TV receivers
TDA8433	vertical deflection processor for computer–controlled TV receivers; I²C bus; BIMOS successor to TDA8432

I²C BUS ICs

MAB8401	microcontroller; 128x8 RAM; bond–out version for MAB84XX family plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8411	microcontroller; 64x8 RAM; 1Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8421	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8422	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 15 I/O lines; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8441	microcontroller; 128x8 RAM; 4Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8461	microcontroller; 128x8 RAM; 6Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAF84A11	microcontroller; 64x8 RAM; 1Kx8 ROM; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A21	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A22	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 15 I/O lines; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A41	microcontroller; 128x8 RAM; 4Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A61	microcontroller; 128x8 RAM; 6Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF8411	microcontroller; 64x8 RAM; 1Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8421	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8422	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 15 I/O lines; I²C bus; 1.0 to 6 MHz; –40 to +85 °C

I²C BUS ICs (cont.)

MAF8441	microcontroller; 128x8 RAM; 4Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8461	microcontroller; 128x8 RAM; 6Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
PCA80C552	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 12 MHz; –40 to +125 °C
PCA80C652	microcontroller; 256x8 RAM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +125 °C
PCA83C552	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; –40 to +125 °C
PCA83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +125 °C
PCA83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 16 MHz; –40 to +125 °C
PCA8582B	256x8–bit static CMOS EEPROM with I²C–bus interface; for automotive applications
PCB80C552	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; two pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; 0 to +70 °C
PCB80C582	microcontroller: 256x8 RAM; 256x8 EEPROM; 16–bit capture/compare timer/counter; watch–dog timer; two PWM signals; 8–bit input to 10–bit ADC; I²C–bus; 1.2 to 16 MHz; 0 to +70 °C
PCB80C652	microcontroller; 256x8 RAM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; 0 to +70 °C
PCB83C552	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; two pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHZ; 0 to +70 °C
PCB83C582	microcontroller: 256x8 RAM; 8Kx8 ROM; 256x8 EEPROM; 16–bit capture/compare timer/counter; watch–dog timer; two PWM signals; 8–bit input to 10–bit ADC; I²C–bus; 1.2 to 16 MHz; 0 to +70 °C
PCB83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 16 MHz; 0 to +70 °C
PCF80C552	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF80C652	microcontroller; 256x8 RAM; serial I/O; UART: I²C bus; 1.2 to 12 MHz; –40 to +85 °C

I²C BUS ICs (cont.)

PCF83C552	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; –40 to +85 /o
PCF83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +85 °C
PCF83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF84C21	microcontroller; 64x8 RAM; 2Kx8 ROM; plus 8–bit LED driver; I²C bus; –40 to +85 °C
PCF84C41	microcontroller; 128x8 RAM; 4Kx8 ROM; plus 8–bit LED driver; I²C bus; –40 to +85 °C
PCF84C81	microcontroller; 256x8 RAM; 8Kx8 ROM; plus 8–bit LED driver; I²C bus; –40 to +85 °C
PCF84C85	microcontroller; 256x8 RAM; 8Kx8 ROM; 32 I/O; plus 8–bit LED driver; I²C bus; –40 to +85 °C
PCF8566	universal LCD driver for low multiplex rates (1:1 to 1:4); max. 96 elements; I²C bus
PCF8567C	LCD direct mode driver with I²C–bus interface
PCF8570	256x8–bit static RAM; I²C bus
PCF8571	128x8–bit static RAM; I²C bus
PCF8573	clock calendar; I²C bus
PCF8574	remote 8–bit I/O expander; I²C bus
PCF8576	universal LCD driver for low multiplex rates 1:1 to 1:4); max. 160 segments; I²C bus
PCF8577	LCD direct driver (32 segments) or duplex driver (64 segments); I²C bus
PCF8578	LCD row/column driver for dot matrix graphic displays; 40 outputs, of which 24 are programmable; I²C bus
PCF8579	LCD column driver for dot matrix graphic displays; 40 column outputs; I²C bus
PCF8581	128x8–bit EEPROM with I²C–bus interface; supply voltage 4.5 to 5.5 V
PCF8581C	128x8–bit EEPROM with I²C–bus interface; supply voltage 2.5 to 6 V
PCF8582A	256x8–bit static CMOS EEPROM; I²C bus
PCF8582C	256x8–bit static CMOS EEPROM; I²C–bus; for automotive applications; supply voltage 2.5 to 6 V
PCF8583	clock calendar with 256x8–bit static RAM; I²C bus
PCF8591	8–bit ADC/DAC; I²C bus
SAA1064	4–digit LED driver; I²C bus
SAA1300	tuner switching circuit; I²C bus
SAA3028	high performance transcoder (RC–5) for infrared remote control; I²C bus
SAA5243E	enhanced computer–controlled teletext circuit (ECCT); 625–line system; I²C bus (West European language version)
SAA5243H	enhanced computer–controlled teletext circuit (ECCT); 625–line system; I²C bus (East European language version)
SAA5243K	enhanced computer–controlled teletext circuit (ECCT); 625–line system; I²C bus (Arabic and English version)
SAA5243L	enhanced computer–controlled teletext circuit (ECCT); 625–line system; I²C bus (Arabic and Hebrew version)

I²C BUS ICs (cont.)

SAA5244A	single–chip teletext device (IVT0) with memory for 1 page display; 625–line; I²C–bus; 5–language version
SAA5245A	525–lin system enhanced computer–controlled teletext circuit (USECCT); I²C bus (West European language version)
SAA5246E	single–chip CMOS teletext processor (IVT) for 6–line system; I²C bus (West European language version)
SAA9041A	digital video teletext (DVTB) processor for Philips digital TV system (525 and 625–line systems); I²C bus (West European language Version)
SAA9050	digital multistandard TV decoder; I²C bus
SAA9051	digital multistandard TV decoder (S–DMSD) with separate chrominance and luminance inputs; I²C bus
SAA9062	digital deflection controller (DDC) option 1 with on–chip ROM/RAM; ROM preprogrammed for 45AX picture tubes; RAM programmable for other picture tubes; 50/60 Hz vertical frequency; 16 kHz line frequency; I²C bus
SAA9063	digital deflection controller (DDC) option 2 with on–chip ROM/RAM; ROM preprogrammed for 45AX picture tubes; RAM programmable for other picture tubes; 50/60 Hz vertical frequency; 31 kHz line frequency; I²C bus
SAA9064	digital deflection controller (DDC) option 3 with on–chip ROM/RAM; ROM preprogrammed for 45AX picture tubes; RAM programmable for other picture tubes; 100/120 Hz vertical frequency; 31 kHz line frequency; I²C bus
SAA9068	picture–in–picture controller (PIPCO); I²C bus
SAB3035	computer interface for tuning and control (CITAC); 8 DACs; I²C bus
SAB3036	computer interface for tuning and control (CITAC); without DACs; I²C bus
SAB3037	computer interface for tuning and control (CITAC); 4 DACs; I²C bus
SAF1135	dataline decoder
TDA8370	synchronization processor for TV; I²C bus
TDA8405	TV and video recorder stereo/dual sound processor; I²C bus
TDA8415	TV and video recorder stereo/dual sound processor with integrated filters and I²C–bus control; function and software–compatible with TDA8405
TDA8416	TV and video recorder stereo/dual sound processor with integrated filters and I²C–bus control with 2 slave addresses
TDA8417	TV and video recorder stereo/dual sound processor with integrated filters and I²C–bus control
TDA8420	hi–fi stereo audio processor; I²C bus
TDA8421	hi–fi stereo audio processor; I²C bus
TDA8425	hi–fi stereo audio processor; I²C bus
TDA8426	hi–fi stereo audio processor; I²C–bus

I²C BUS ICs (cont.)

TDA8433	vertical deflection processor for computer–controlled TV receivers; I²C bus; BIMOS successor to TDA8432
TDA8440	video/audio switch for CTV receivers; I²C bus
TDA8442	I²C bus interface for colour decoders
TDA8443A	two channel switch for YUV or RGB signals; RGB/YUV matrix; I²C bus or DC control; 3–state outputs; seven slave addresses
TDA8444	octuple 6–bit DAC; I²C bus
TDA8461	PAL/NTSC decoder; I²C bus
TSA5510	1.3 GHz PLL frequency synthesizer; I²C bus

MEMORIES

FCF61C65LL–85	8Kx8–bit medium speed CMOS very low power static RAM; access time 85 nsec; extended temperature range
FCB61C65L–70	8Kx8–bit high–speed CMOS low–power static RAM; access time 70 ns
FCB61C65LL–70	8Kx8–bit high–speed CMOS very low power static RAM; access time 70 nsec;
PCA8582B	256x8–bit static CMOS EEPROM with I²C–bus interface; for automotive applications
PCF8570	256x8–bit static RAM; I²C bus
PCF8571	128x8–bit static RAM; I²C bus
PCF8581	128x8–bit EEPROM with I²C–bus interface; supply voltage 4.5 to 5.5 V
PCF8581C	128x8–bit EEPROM with I²C–bus interface; supply voltage 2.5 to 6 V
PCF8582A	256x8–bit static CMOS EEPROM; I²C bus
PCF8582C	256x8–bit static CMOS EEPROM; I²C–bus; for automotive applications; supply voltage 2.5 to 6 V
PCF8583	clock calendar with 256x8–bit static RAM; I²C bus

MICROCONTROLLERS

CMOS 8–bit

PCA80C31BH–2	microcontroller: 128x8 RAM; 0.5 to 12 MHz; 0 to 70 °C
PCA80C31BH–3	microcontroller; 128x8 RAM; 1.2 to 12 MHz; –40 to +125 °C
PCA80C51BH–3	microcontroller; 128x8 RAM; 4Kx8 ROM; 1.2 to 12 MHz; –40 to +125 °C
PCA80C552	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 12 MHz; –40 to +125 °C

MICROCONTROLLERS (cont.)

CMOS 8–bit (cont.)

PCA80C652	microcontroller; 256x8 RAM; serial I/O; UART; I^2C bus; 1.2 to 12 MHz; –40 to +125 °C
PCA83C552	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I^2C bus; 1.2 to 16 MHz; –40 to +125 °C
PCA83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I^2C bus; 1.2 to 12 MHz; –40 to +125 °C
PCA83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I^2C bus; 1.2 to 16 MHz; –40 to +125 °C
PCB80C31BH–2	microcontroller: 128x8 RAM; 0.5 to 12 MHz; 0 to 70 °C
PCB80C31BH–3	microcontroller; 128x8 RAM; 1.2 to 16 MHz; 0 to +70 °C
PCB80C39	microcontroller; 128x8 RAM; 1.0 to 15 MHz; 0 to +70 °C
PCB80C49	microcontroller; 128x8 RAM; 2Kx8 ROM; 1.0 to 15 MHz; 0 to +70 °C
PCB80C51BH–2	microcontroller: 128x8 RAM; 4Kx8 ROM; 0.5 to 12 MHz; 0 to +70 °C
PCB80C51BH–3	microcontroller; 128x8 RAM; 4Kx8 ROM; 1.2 to 16 MHz; 0 to +70 °C
PCB80C552	microcontroller; 256x8 RAM; 16–bit capture/ compare timer/counter; watch–dog timer; two pulse–width modulated signals; 8–bit input to 10–bit ADC; I^2C bus; 1.2 to 16 MHz; 0 to +70 °C
PCB80C582	microcontroller: 256x8 RAM; 256x8 EEPROM; 16–bit capture/compare timer/counter; watch–dog timer; two PWM signals; 8–bit input to 10–bit ADC; I^2C–bus; 1.2 to 16 MHz; 0 to +70 °C
PCB80C652	microcontroller; 256x8 RAM; serial I/O; UART; I^2C bus; 1.2 to 12 MHz; 0 to +70 °C
PCB83C552	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; two pulse–width modulated signals; 8–bit input to 10–bit ADC; I^2C bus; 1.2 to 16 MHZ; 0 to +70 °C
PCB83C582	microcontroller: 256x8 RAM; 8Kx8 ROM; 256x8 EEPROM; 16–bit capture/compare timer/counter; watch–dog timer; two PWM signals; 8–bit input to 10–bit ADC; I^2C–bus; 1.2 to 16 MHz; 0 to +70 °C
PCB83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I^2C bus; 1.2 to 12 MHz; 0 to +70 °C
PCB83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I^2C bus; 1.2 to 16 MHz; 0 to +70 °C
PCF80C31BH–3	microcontroller; 128x8 RAM; 1.2 to 12 MHz; –40 to + 85 °C
PCF80C39	microcontroller; 128x8 RAM; 1.0 to 15 MHz; –40 to +85 °C
PCF80C49	microcontroller; 128x8 RAM; 2Kx8 ROM; 1.0 to 15 MHz; –40 to +85 °C

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MICROCONTROLLERS (cont.)

CMOS 8–bit (cont.)

PCF80C51BH–3	microcontroller; 128x8 RAM; 4Kx8 ROM; 1.2 to 12 MHz; –40 to +85 °C
PCF80C552	microcontroller; 256x8 RAM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF80C652	microcontroller; 256x8 RAM; serial I/O; UART: I²C bus; 1.2 to 12 MHz; –40 to +85 °C
PCF83C552	microcontroller; 256x8 RAM; 8Kx8 ROM; 16–bit capture/compare timer/counter; watch–dog timer; 2 pulse–width modulated signals; 8–bit input to 10–bit ADC; I²C bus; 1.2 to 16 MHz; –40 to +85 °C
PCF83C652	microcontroller; 256x8 RAM; 8Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 12 MHz; –40 to +85 °C
PCF83C654	microcontroller; 256x8 RAM; 16Kx8 ROM; serial I/O; UART; I²C bus; 1.2 to 16 MHz; –40 to +85 °C

NMOS 8–bit

MAB8031AH–2	microcontroller; 128x8 RAM; 3.5 to 15 MHz; 0 to +70 °C
MAB8032AH–2	microcontroller: 256x8 RAM; 3.5 to 15 MHz 0 to +70 °C
MAB8035HL	microcontroller; 64x8 RAM; 1.0 to 11 MHz; 0 to +70 °C
MAB8039HL	microcontroller; 128x8 RAM; 1.0 to 11 MHz; 0 to +70 °C
MAB8040HL	microcontroller; 256x8 RAM; 1.0 to 11 MHz; 0 to +70 °C
MAB8048H	microcontroller; 64x8 RAM; 1Kx8 ROM; 1.0 to 11 MHz; 0 to +70 °C
MAB8049H	microcontroller; 128x8 RAM; 2Kx8 ROM; 1.0 to 11 MHz; 0 to +70 °C
MAB8050H	microcontroller; 256x8 RAM; 4Kx8 ROM; 1.0 to 11 MHz; 0 to +70 °C
MAB8051AH–2	microcontroller; 128x8 RAM; 4Kx8 ROM; 3.5 to 12 MHz; 0 to +70 °C
MAB8052AH–2	microcontroller: 256x8 RAM; 8Kx8 ROM; 3.5 to 12 MHz; 0 to +70 °C
MAB8401	microcontroller; 128x8 RAM; bond–out version for MAB84XX family plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8411	microcontroller; 64x8 RAM; 1Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8421	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8422	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 15 I/O lines; I²C bus; 1.0 to 6 MHz; 0 to +70 °C

MICROCONTROLLERS (cont.)

NMOS 8–bit (cont.)

MAB8441	microcontroller; 128x8 RAM; 4Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8442	microcontroller; 128x8 RAM; 4Kx8 ROM plus 8–bit LED driver; 15 I/O lines; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAB8461	microcontroller; 128x8 RAM; 6Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; 0 to +70 °C
MAF80A31AH–2	microcontroller; 128x8 RAM; 3.5 to 12 MHz; –40 to +110 °C
MAF80A32AH–2	microcontroller: 256x8 RAM: 3.5 to 12 MHz; –40 to +110 °C
MAF80A35HL	microcontroller; 64x8 RAM; 1.0 to 10 MHz; –40 to +110 °C
MAF80A39HL	microcontroller; 128x8 RAM; 1.0 to 10 MHz; –40 to +110 °C
MAF80A40HL	microcontroller; 256x8 RAM; 1.0 to 10 MHz; –40 to +110 °C
MAF80A48H	microcontroller; 64x8 RAM; 1Kx8 ROM; 1.0 to 10 MHz; –40 to +110 °C
MAF80A49H	microcontroller; 128x8 RAM; 2Kx8 ROM; 1.0 to 10 MHz; –40 to +110 °C
MAF80A50H	microcontroller; 256x8 RAM; 4Kx8 ROM; 1.0 to 10 MHz; –40 to +110 °C
MAF80A51AH–2	microcontroller; 128x8 RAM; 4Kx8 ROM; 3.5 to 12 MHz; –40 to +110 °C
MAF80A52AH–2	microcontroller: 256x8 RAM; 8Kx8 ROM; 3.5 to 12 MHz; –40 to +110 °C
MAF84A11	microcontroller; 64x8 RAM; 1Kx8 ROM; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A21	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A22	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 15 I/O lines; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A41	microcontroller; 128x8 RAM; 4Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A42	microcontroller; 128x8 RAM; 4Kx8 ROM plus 8–bit LED driver; 15 I/O lines; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF84A61	microcontroller; 128x8 RAM; 6Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 5.0 MHz; –40 to +110 °C
MAF8031AH–2	microcontroller; 128x8 RAM; 3.5 to 12 MHz; –40 to +85 °C
MAF8032AH–2	microcontroller: 256x8 RAM; 3.5 to 12 MHz; –40 to +85 °C
MAF8035HL	microcontroller; 64x8 RAM; 1.0 to 11 MHz; –40 to +85 °C

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MICROCONTROLLERS (cont.)

NMOS 8–bit (cont.)

MAF8039HL	microcontroller; 128x8 RAM; 1.0 to 11 MHz; –40 to +85 °C
MAF8040HL	microcontroller; 256x8 RAM; 1.0 to 11 MHz; –40 to +85 °C
MAF8048H	microcontroller; 64x8 RAM; 1Kx8 ROM; 1.0 to 11 MHz; –40 to +85 °C
MAF8049H	microcontroller; 128x8 RAM; 2Kx8 ROM; 1.0 to 11 MHz; –40 to +85 °C
MAF8050H	microcontroller; 256x8 RAM; 4Kx8 ROM; 1.0 to 11 MHz; –40 to +85 °C
MAF8051AH–2	microcontroller; 128x8 RAM; 4Kx8 ROM; 3.5 to 12 MHz; –40 to +85 °C
MAF8052AH–2	microcontroller: 256x8 RAM; 8Kx8 ROM; 3.5 to 12 MHz; –40 to +85 °C
MAF8411	microcontroller; 64x8 RAM; 1Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8421	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8422	microcontroller; 64x8 RAM; 2Kx8 ROM plus 8–bit LED driver; 15 I/O lines; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8441	microcontroller; 128x8 RAM; 4Kx8 ROM plus 8–bit LED driver; 20 I/O lines; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8442	microcontroller; 128x8 RAM; 4Kx8 ROM plus 8–bit LED driver; 15 I/O lines; I²C bus; 1.0 to 6 MHz; –40 to +85 °C
MAF8461	microcontroller; 128x8 RAM; 6Kx8 ROM plus 8–bit LED driver; I²C bus; 1.0 to 6 MHz; –40 to +85 °C

POWER SUPPLY ICs

SMPS controllers

TDA8380	SMPS controller
TEA1039	SMPS controller

PPS controllers

TDA2582	control circuit for PPS

REMOTE I/O EXPANDERS

PCF8567C	LCD direct mode driver with I²C–bus interface
PCF8574	remote 8–bit I/O expander; I²C bus
PCF8574A	remote 8–bit I/O expander; I²C bus; different slave address

REMOTE CONTROLLERS

SAA3004	high performance transmitter (455 kHz) for infrared remote control; up to 448 commands
SAA3006	high performance transmitter (RC–5) for infrared remote control; up to 2048 commands
SAA3008	high performance transmitter (38 kHz) for infrared remote control; low voltage
SAA3028	high performance transcoder (RC–5) for infrared remote control; I²C bus
SAF1032	receiver/decoder for infrared remote control
SAF1039	transmitter for infrared remote control
TDA3047	high performance receiver for infrared remote control; positive output voltage
TDA3048	high performance receiver for infrared remote control; negative output voltage
TEA5500	coded locking circuit for security systems
TEA5501	coded locking circuit for security systems (one–shot output; 6.5K codes)

SMALL SIGNAL COMBINATIONS

Black–white TV

TDA4500	small signal combination for B/W TV
TDA4503	small signal combination for B/W TV (improved TDA4500)

SMALL SIGNAL COMBINATIONS (cont.)

Colour TV

TDA4501	small signal combination with sound circuit for colour TV
TDA4502A	small signal combination with video switch for colour TV
TDA4504	small signal combination for multistandard colour TV (positive and negative modulation)
TDA4505	small signal combination IC for colour TV
TDA8305	small signal combination for colour TV (improved TDA4505)

SOUND ICs

SAA7272	NICAM decoder (UK)
SAA7273	NICAM decoder extension
SAA7280	NICAM decoder (TDSD)
TBA120U	sound IF amplifier/demodulator for TV
TDA1013B	4 W audio power amplifier with DC volume control
TDA1015	1 to 4 W audio power amplifier with preamplifier
TDA1015T	0.5 W audio power amplifier with preamplifier
TDA1029	signal–sources switch (4 x two channels)
TDA1512A	12 to 20 W hi–fi audio power amplifier
TDA1514A	40 W hi–fi power amplifier for digital audio (e.g. Compact Disc)
TDA1520B	20 W hi–fi audio power amplifier; complete SOAR protection
TDA1521	2x12 W hi–fi stereo audio power amplifier
TDA1521A	2x6 W hi–fi stereo audio power amplifier
TDA1521Q	2x12 W hi–fi stereo audio power amplifier
TDA1524A	stereo tone/volume control circuit
TDA1525	stereo tone/volume control circuit
TDA1526	stereo tone/volume control circuit
TDA1543	dual 16–bit economy DAC (I^2S bus format)
TDA2543	AM sound IF circuit for French standard
TDA2545A	quasi–split–sound circuit
TDA2546A	quasi–split–sound circuit with 5,5 MHz demodulation
TDA2555	dual FM demodulator for TV sound; 8–stage limiter
TDA2556	quasi–split–sound circuit with dual FM sound demodulators
TDA2557	dual FM demodulator for TV sound; 5–stage limiter
TDA2611A	5 W audio power amplifier
TDA2613	6 W hi–fi audio power amplifier
TDA2795	TV stereo/dual sound identification decoder
TDA3800G	stereo/dual TV sound processor (dynamic selection)
TDA3800GS	stereo/dual TV sound processor (static selection)
TDA3803A	stereo/dual TV sound decoder
TDA3806	multiplex PLL stereo decoder
TDA3808	second audio programme (SAP) signal processor
TDA3810	spatial, stereo and pseudo–stereo sound circuit
TDA3825	single FM TV sound demodulator system with external AF input and mute
TDA3826	single FM TV sound demodulator system with mute and 6 dB AF amplifier
TDA3830	BTSC–stereo/SAP/DBX decoder

SOUND ICs (cont.)

TDA3845	quasi–split–sound circuit and AM demodulator
TDA7052	1 W BTL mono audio amplifier for portable applications
TDA7053	2x1 W BTL stereo audio power amplifier for portable applications
TDA7056	3 W BTL mono audio amplifier for portable and TV applications
TDA8405	TV and video recorder stereo/dual sound processor; I²C bus
TDA8415	TV and video recorder stereo/dual sound processor with integrated filters and I²C–bus control; function and software–compatible with TDA8405
TDA8416	TV and video recorder stereo/dual sound processor with integrated filters and I²C–bus control with 2 slave addresses
TDA8417	TV and video recorder stereo/dual sound processor with integrated filters and I²C–bus control
TDA8420	hi–fi stereo audio processor; I²C bus
TDA8421	hi–fi stereo audio processor; I²C bus
TDA8425	hi–fi stereo audio processor; I²C bus
TDA8426	hi–fi stereo audio processor; I²C–bus
TEA5582	low–cost stereo decoder for TV (BTSC sound system)

SYNC PROCESSORS

Horizontal

TBA920S	horizontal combination
TDA2593	horizontal combination
TDA2594	horizontal combination with transmitter identification
TDA2595	horizontal combination with transmitter identification and protection circuits

Vertical

TDA2653A	vertical deflection circuit; PIL–S4; 30AX systems and monitors
TDA2655B	vertical deflection circuit; colour and monochrome (90°)
TDA2658	vertical deflection circuit (90°)
TDA3653B	vertical deflection and guard circuit (90°)
TDA3653CQ	vertical deflection and guard circuit (90°)
TDA3654	vertical deflection and guard circuit (110°)
TDA3654Q	vertical deflection and guard circuit (110°)
TDA4800	vertical deflection circut for monitors
TDA8350	DC–coupled vertical deflection amplifier and demodulator
TDA8432	vertical deflection processor for computer–controlled TV receivers
TDA8433	vertical deflection processor for computer–controlled TV receivers; I²C bus; BIMOS successor to TDA8432

SYNC PROCESSORS (cont.)

Horizontal/vertical

SAA9062	digital deflection controller (DDC) option 1 with on–chip ROM/RAM; ROM preprogrammed for 45AX picture tubes; RAM programmable for other picture tubes; 50/60 Hz vertical frequency; 16 kHz line frequency; I²C bus
SAA9063	digital deflection controller (DDC) option 2 with on–chip ROM/RAM; ROM preprogrammed for 45AX picture tubes; RAM programmable for other picture tubes; 50/60 Hz vertical frequency; 31 kHz line frequency; I²C bus
SAA9064	digital deflection controller (DDC) option 3 with on–chip ROM/RAM; ROM preprogrammed for 45AX picture tubes; RAM programmable for other picture tubes; 100/120 Hz vertical frequency; 31 kHz line frequency; I²C bus
TDA2577A	horizontal/vertical synchronization circuit
TDA2578A	horizontal/vertical synchronization circuit
TDA2579A	horizontal/vertical synchronization circuit
TDA8370	synchronization processor for TV; I²C bus
TDA8372A	horizontal/vertical synchronization circuit with SMPS comparator

TEXT SYSTEMS

SAA5231	teletext video processor (successor of SAA5030)
SAA5235	dataline slicer for video cassette recorders
SAA5243E	enhanced computer–controlled teletext circuit (ECCT); 625–line system; I²C bus (West European language version)
SAA5243H	enhanced computer–controlled teletext circuit (ECCT); 625–line system; I²C bus (East European language version)
SAA5243K	enhanced computer–controlled teletext circuit (ECCT); 625–line system; I²C bus (Arabic and English version)
SAA5243L	enhanced computer–controlled teletext circuit (ECCT); 625–line system; I²C bus (Arabic and Hebrew version)
SAA5244A	single–chip teletext device (IVT0) with memory for 1 page display; 625–line; I²C–bus; 5–language version
SAA5245A	525–lin system enhanced computer–controlled teletext circuit (USECCT); I²C bus (West European language version)
SAA5246E	single–chip CMOS teletext processor (IVT) for 6–line system; I²C bus (West European language version
SAA5250	interface for data acquisition and control
SAA5351	EUROM 50 Hz, CRT controller (CEPT standard)
SAA5355	FTFROM, CRT controller (525–line)
SAA5361	EUROM 60 Hz, CRT controller
SAA5370	EUROM application system interface (EASI)

TEXT SYSTEMS (cont.)

SAA9041A	digital video teletext (DVTB) processor for Philips digital TV system (525 and 625–line systems); I²C bus (West European language version)
SAA9068	picture–in–picture controller (PIPCO); I²C bus
SAA9069	digital vertical filter (DVF)

TUNING CIRCUITS

SAA1300	tuner switching circuit; I²C bus
SAB3035	computer interface for tuning and control (CITAC); 8 DACs; I²C bus
SAB3036	computer interface for tuning and control (CITAC); without DACs; I²C bus
SAB3037	computer interface for tuning and control (CITAC); 4 DACs; I²C bus
SAB6456	sensitive 1 GHz divide–by–64/divide–by–256 switchable prescaler
SAB8726	2.6 GHz divide–by–2 prescaler
TDA5030A	mixer/oscillator for VHF tuner
TDA5330	VHF, UHF and hyperband mixer/oscillator for TV and VCR 3–band tuners
TDA5331	VHF, UHF and hyperband mixer/oscillator for TV and VCR 3–band tuners (TDA5330 with mirrored pinning)
TDA5332	double mixer/oscillator for TV and VCR tuners
TDA5333	double mixer/oscillator for TV and VCR tuners (TDA5332 with mirrored pinning)
TSA5510	1.3 GHz PLL frequency synthesizer; I²C bus

VIDEO/AUDIO SWITCHES

TDA8440	video/audio switch for CTV receivers; I²C bus
TDA8443A	two channel switch for YUV or RGB signals; RGB/YUV matrix; I²C bus or DC control; 3–state outputs; seven slave addresses
TDA9045	video processor and input selector

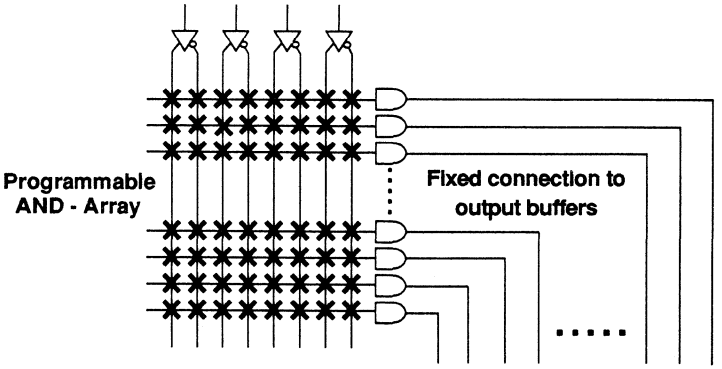
VIDEO GAMES

SAA1099	stereo sound generator for sound effects and music synthesis (uC–controlled)
TDA6800	video modulator circuit

VISION IF ICs

TDA2549	IF amplifier and demodulator for multistandard TV receivers
TDA8340	TV IF amplifier and demodulator
TDA8340Q	TV IF amplifier and demodulator
TDA8341	TV IF amplifier and demodulator
TDA8341Q	TV IF amplifier and demodulator
TDA8349A	multistandard IF amplifier and demodulator

PHD – programmable high–speed decoders



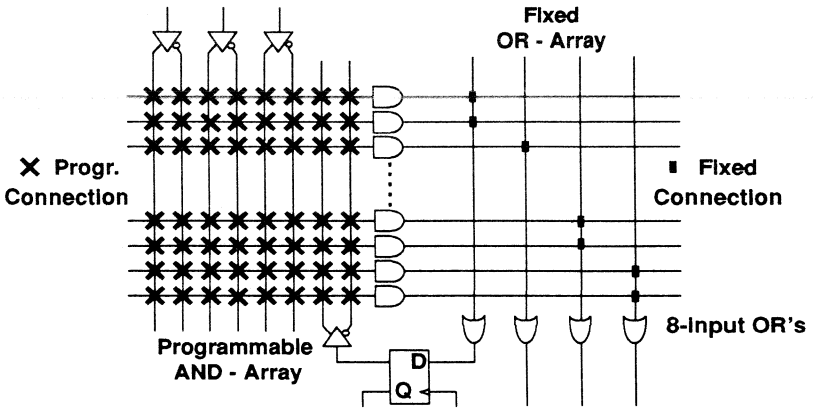
Basic PHD architecture

PHD summary

basic type number	architecture	non–registered inputs	non–registered outputs	registered outputs	max. prop. delay (ns)	max. oper. freq. (MHz)	max. supply current (mA)	technology	copy prot.
PHD16N8–5	16 x 16 X 8	10 to 16	8 to 2		5		180	BIP TiW	CP

CP = programmable copy protection

PAL–type programmable array logic



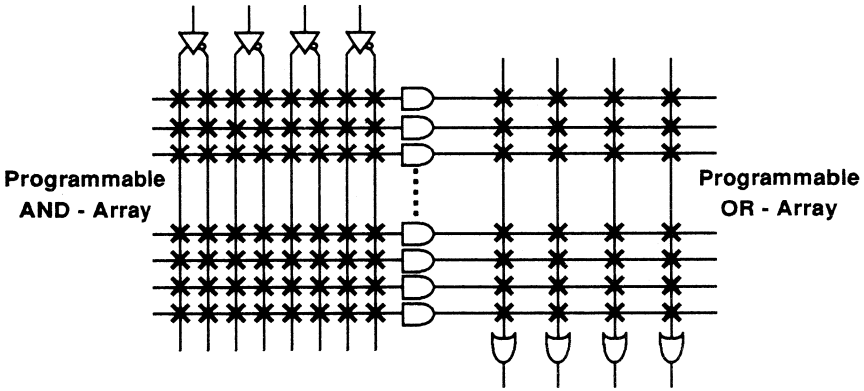
Basic PAL architecture

PAL–type summary

basic type number	architecture	non–registered inputs	non–registered outputs	registered outputs	max. prop. delay (ns)	max. oper. freq. (MHz)	max. supply current (mA)	tech–nology	copy prot.
PLUS16L8D	16 x 64 x 8	10 to 16	8 to 2		10		180	BIP TiW	CP
PLUS16L8–7	16 x 64 x 8	10 to 16	8 to 2		7.5		180	BIP TiW	CP
PLUS20L8D	20 x 64 x 8	14 to 20	8 to 2		10		210	BIP TiW	CP
PLUS20L8–7	20 x 64 x 8	14 to 20	8 to 2		7.5		210	BIP TiW	CP
PLUS16R4D	16 x 64 x 8	8 to 12	4 to 0	4	10	60	180	BIP TiW	CP
PLUS16R4–7	16 x 64 x 8	8 to 12	4 to 0	4	7.5	74	180	BIP TiW	CP
PLUS16R6D	16 x 64 x 8	8 to 10	2 to 0	6	10	60	180	BIP TiW	CP
PLUS16R6–7	16 x 64 x 8	8 to 10	2 to 0	6	7.5	74	180	BIP TiW	CP
PLUS16R8D	16 x 64 x 8	8	0	8		60	180	BIP TiW	CP
PLUS16R8–7	16 x 64 x 8	8	0	8		74	180	BIP TiW	CP
PLUS20R4D	20 x 64 x 8	12 to 16	4 to 0	4	10	60	210	BIP TiW	CP
PLUS20R4–7	20 x 64 x 8	12 to 16	4 to 0	4	7.5	74	210	BIP TiW	CP
PLUS20R6D	20 x 64 x 8	12 to 14	2 to 0	6	10	60	210	BIP TiW	CP
PLUS20R6–7	20 x 64 x 8	12 to 16	4 to 0	6	7.5	74	210	BIP TiW	CP
PLUS20R8D	20 x 64 x 8	12	0	8		60	210	BIP TiW	CP
PLUS20R8–7	20 x 64 x 8	12	0	8	7.5	74	210	BIP TiW	CP
PLC18V8Z35	18 x 74 x 8	10 to 18	8 to 0	8	35	21	*	CMOS	CP
PLC18V8ZI	18 x 74 x 8	10 to 18	8 to 0	8	40	18	*	CMOS	CP
100H20EV8–6	20 x 80 x 8	14 to 20	8 to 0	8	6	166	230	ECL 100K	CP
100H20EV8–4	20 x 80 x 8	14 to 20	8 to 0	8	4.5	222	230	ECL 100K	CP
10H20EV8–6	20 x 80 x 8	14 to 20	8 to 0	8	6	166	230	ECL 10K	CP
10H20EV8–4	20 x 80 x 8	14 to 20	8 to 0	8	4.5	222	230	ECL 10K	CP

PAL is a trademark of AMD/MMI
CP = programmable copy protection
* 1.5mA/MHz: 100 µA zero power standby

PLA – programmable logic arrays



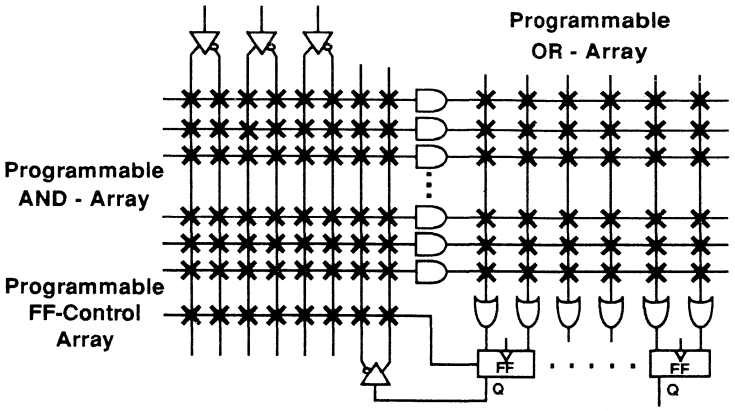
Basic PLA architecture

PLA summary

basic type number	architecture	non–registered inputs	non–registered outputs	registered outputs	max. prop. delay (ns)	max. oper. freq. (MHz)	max. supply current (mA)	tech–nology	copy prot.
PLS153	18 x 42 x 10	8 to 18	10 to 0		40		155	BIP NiCr	
PLS153A	18 x 42 x 10	8 to 18	10 to 0		30		155	BIP NiCr	
PLUS153B	18 x 42 x 10	8 to 18	10 to 0		15		200	BIP TiW	CP
PLUS153D	18 x 42 x 10	8 to 18	10 to 0		12		200	BIP TiW	CP
PLS173	22 x 42 x 10	12 to 22	10 to 0		30		170	BIP NiCr	
PLUS173B	22 x 42 x 10	12 to 22	10 to 0		15		200	BIP TiW	CP
PLUS173D	22 x 42 x 10	12 to 22	10 to 0		12		200	BIP TiW	CP
PLS100	16 x 48 x 8	16	8		50		170	BIP NiCr	
PLS101	16 x 48 x 8	16	8		50		170	BIP NiCr	CP

CP = programmable copy protection

PLS – progammable logic sequencers



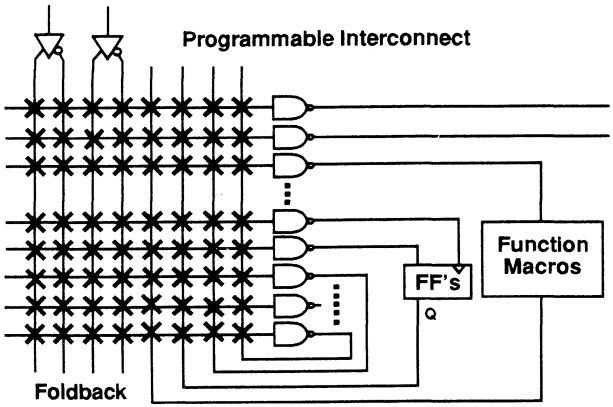
Basic PLS architecture

PLS summary

basic type number	architecture	non–reg. inputs	non–reg. outputs	registered outputs (≠ flip–flops)	max. prop. delay (ns)	max. oper. freq. (MHz)	max. supply current (mA)	tech–nology	copy prot.
PLS155	16 x 45 x 12	4 to 12	8 to 0	4	50	14	190	BIP NiCr	
PLS157	16 x 45 x 12	4 to 10	6 to 0	6	50	14	190	BIP NiCr	
PLS159A	16 x 45 x 12	4 to 8	4 to 0	8	35	18	190	BIP NiCr	
PLS179	20 x 45 x 12	8 to 12	4 to 0	8	35	18	210	BIP NiCr	
PLS167	22 x 48 x 6	14	0	6 (12)		14	180	BIP NiCr	
PLS167A	22 x 48 x 6	14	0	6 (12)		20	180	BIP NiCr	
PLS168	22 x 48 x 8	12	0	8 (14)		14	180	BIP NiCr	
PLS168A	22 x 48 x 8	12	0	8 (14)		20	180	BIP NiCr	
PLS105	22 x 48 x 8	16	0	8 (14)		14	180	BIP NiCr	
PLS105A	22 x 48 x 8	16	0	8 (14)		20	180	BIP NiCr	
PLUS105–40	22 x 48 x 8	16	0	8 (14)		40	200	BIP TiW	CP
PLUS405–37	24 x 64 x 8	16	0	8 (16)		37	225	BIP TiW	CP
PLUS405–45	24 x 64 x 8	16	0	8 (16)		45	225	BIP TiW	CP
PLUS405–55	24 x 64 x 8	16	0	8 (16)		55	225	BIP TiW	CP
PLC415–16	25 x 68 x 8	17	0	8 (16)		16	**	CMOS	CP
PLC415–28	25 x 68 x 8	17	0	8 (16)		28	**	CMOS	CP
PLC42VA12	42 x 105 x 12	10 to 22	12 to 2	10	35	25	90*	CMOS	CP

CP = programmable copy protection
* I_{DD} at 15 MHz
** I_{DD} at 15 MHz: 80 mA supply current; 100 µA zero power standby

PML – programmable macro logic



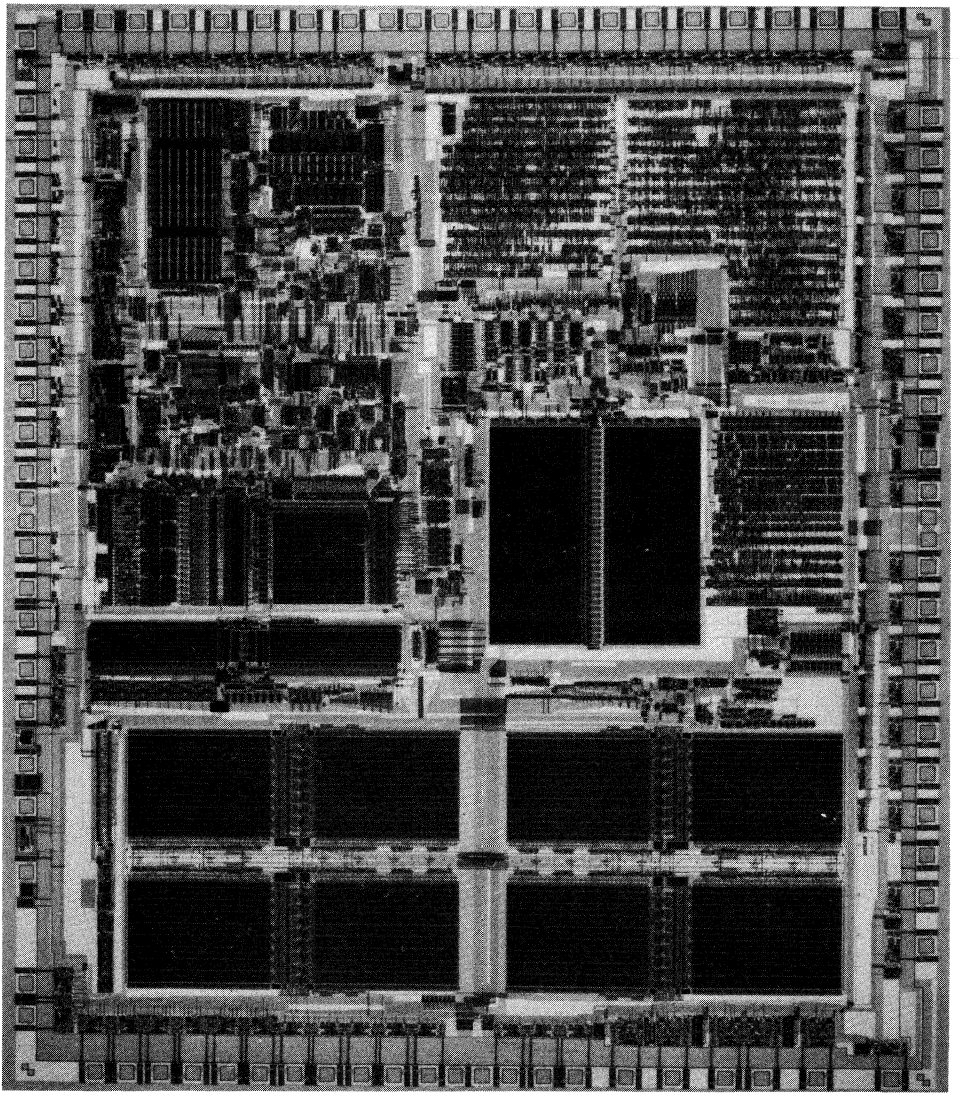
Basic PML architecture

PML summary

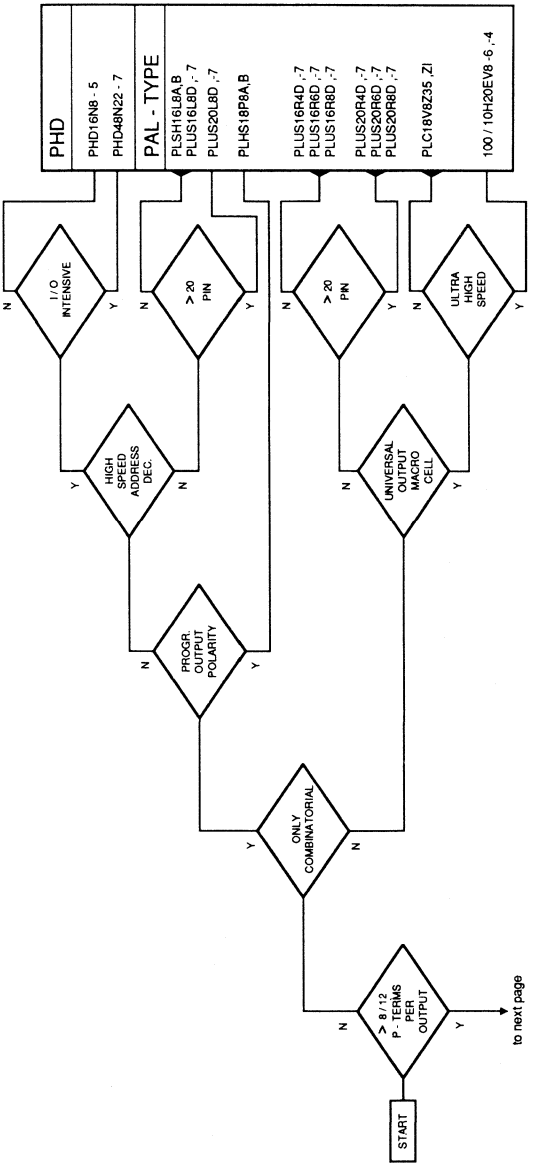
basic type number	architecture	non–reg. inputs	non–reg. outputs	registered outputs (≠ flip–flops)	max. prop. delay (ns)*	max. oper. freq. (MHz)	max. supply current (mA)	tech–nology	copy prot.
PLHS501	104 x 116 x 24	24 to 32	24 to 16		6.5		295	BIP AIM	CP
PML2552	185 x 199 x 24	29 to 53	48 to 24	16 (52)	12	33	**	CMOS	CP
PML2552A	185 x 199 x 24	29 to 53	48 to 24	16 (52)	15	50	**	CMOS	CP

CP = programmable copy protection
* Propagation delay of internal NAND function, max. clock frequency
** 100 mA supply current; 100 µA zero power standby

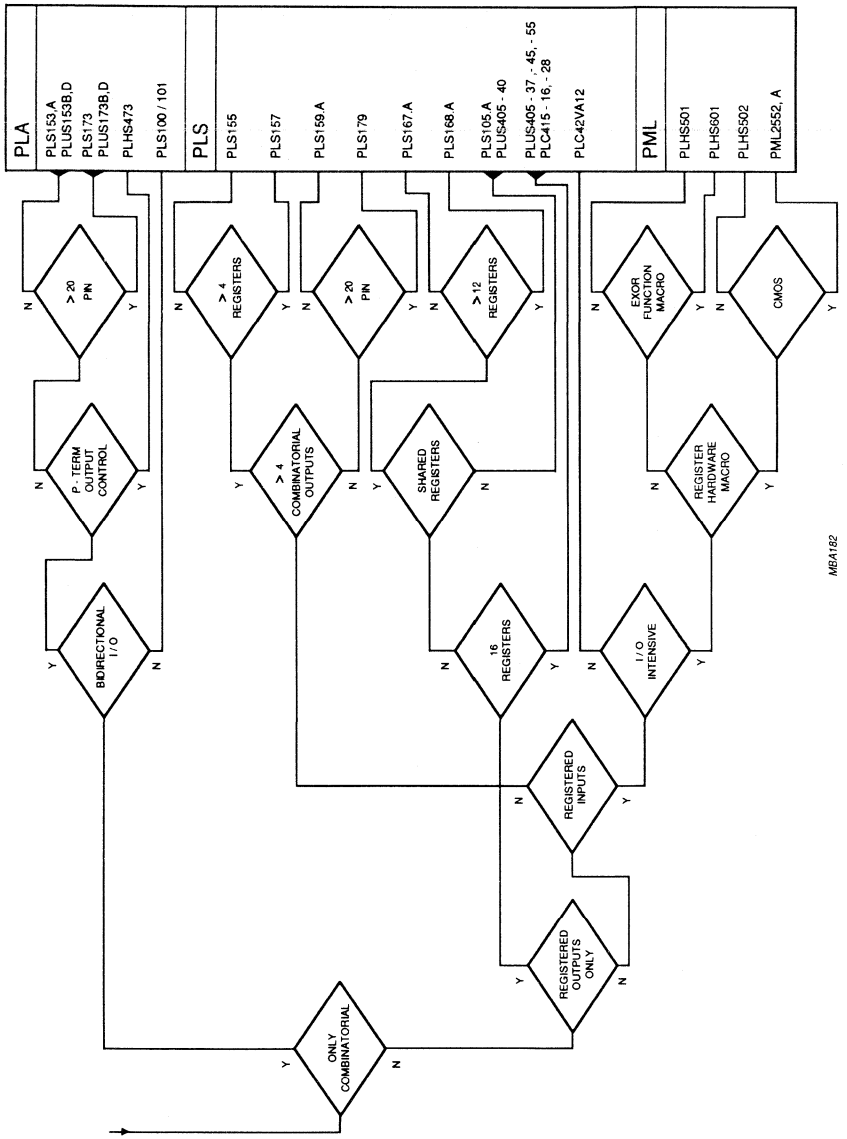
PHILIPS



PLD–selection flow diagram



PLD–selection flow diagram (cont.)



IC

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INTEGRATED CIRCUITS

Alphanumeric Index

In the alphanumeric index six columns are given (see next page). The first column shows the full (extended) IC type numbers in alpha–numeric sequence. The second, third and fourth columns give package information; the fifth column is a reference to the catalogue page number where the functional placing, the basic type number and brief description of the IC are given. The sixth column refers to the relevant Handbook (IC.., see list below) in which the IC data is published. Where the data is available only on loose data sheet or if handbook data has been superseded by a loose data sheet, this column shows 'DS'; a hyphen (–) indicates that **NO** data are available at date of printing this publication.

code	handbook title
IC01	Radio, audio and associated systems Bipolar, MOS
IC02a/b	Video and associated systems Bipolar, MOS
IC03	ICs for Telecom Bipolar, MOS Subscriber sets, Cordless telephones
IC04	HE4000B logic family CMOS
IC05	Advanced Low–power Schottky (ALS) logic series CMOS
IC06	High–speed CMOS; PC74HC/HCT/HCU Logic family
IC07	Advanced CMOS logic (ACL)
IC08	ECL 10K and 100K logic families
IC09N	TTL logic series
IC10	Memories MOS, TTL, ECL
IC11	Linear products
IC12	I^2C–bus compatible ICs
IC13	Semi–custom Programmable Logic Devices (PLD)
IC14	Microcontrollers NMOS, CMOS
IC15	FAST TTL logic series
IC16	CMOS integrated circuits for clocks and watches
IC17	ICs for Telecom Bipolar, MOS Radio pagers, Mobile telephones, ISDN
IC18	Microprocessors and peripherals
IC19	Data communication products
IC23	ABT advanced BICMOS interface logic

PACKAGE INFORMATION

The alphanumeric index provides package information in three columns: package code; number of pins, and pin position (an indication of the pin configuration). Brief descriptions of the packages are given in the following table, some packages may have internal heat spreaders.

package code	description	pin position
SOT18/13	3–lead cylindrical; metal (TO18)	CYL
SOT18/17	4–lead cylindrical; metal (TO72)	CYL
SOT20	4–lead single in–line; plastic	SIL
SOT27	14–lead dual in–line; plastic	DIL
SOT32	3 lead single in–line (TO126)	SIL
SOT38;A;D;WE.2;Z		
	16–lead dual in–line; plastic	DIL
SOT38BE;WBE	16–lead dual in–line; plastic (opposite bent leads)	DIL
SOT58	16–lead quadruple in–line; plastic	QIL
SOT73	14–lead dual in–line; ceramic (CERDIP)	DIL
SOT74;B	16–lead dual in–line; ceramic (CERDIP)	DIL
SOT87B	28–lead dual in–line; metal ceramic (CERDIL)	DIL
SOT94	24–lead dual in–line; ceramic (CERDIP)	DIL
SOT96A;C	8–lead mini–pack; plastic (SO8)	SO8
SOT97A	8–lead dual in–line; plastic	DIL
SOT101A;B	24–lead dual in–line; plastic	DIL
SOT102;H;K;M	18–lead dual in–line; plastic	DIL
SOT102G;GE	18–lead dual in–line; plastic; shortened leads	DIL
SOT108A	14–lead mini–pack; plastic (SO14)	SO14
SOT109A	16–lead mini–pack; plastic (SO16)	SO16
SOT110;B	9–lead single in–line; plastic	SIL
SOT116	22–lead dual in–line; plastic	DIL
SOT117	28–lead dual in–line; plastic	DIL
SOT129	40–lead dual in–line; plastic	DIL
SOT131;A;B	9–lead single in–line; plastic power	SIL
SOT133;B	18–lead dual in–line; ceramic (CERDIP)	DIL
SOT135A	28–lead dual in–line; ceramic (CERDIP)	DIL
SOT136A	28–lead mini–pack; plastic (SO28)	SO28
SOT137;A	24–lead mini–pack; plastic (SO24)	SO24
SOT141B;C;CEA	13–lead SIL–bent–to–DIL; plastic power	SBD
SOT142	9–lead single in–line; plastic	SIL
SOT144	8–lead micro–flat–pack; plastic	MFP
SOT146;A;E;EE7	20–lead dual in–line; plastic	DIL
SOT150	12–lead dual in–line; plastic with metal cooling fin	DIL
SOT157	9–lead SIL–bent–to–DIL; plastic power	SBD
SOT158A	40–lead mini–pack; plastic (VSO40)	VSO40
SOT158B	40–lead mini–pack; plastic (opposite bent leads) (VSO40)	VS040
SOT162;A	16–lead mini–pack; plastic (SO16L)	SO16L
SOT163;A	20–lead mini–pack; plastic (SO20)	SO20
SOT176	8–lead mini–pack; plastic (SO–8L)	SO8L
SOT187	44–lead plastic leaded chip carrier; 'pedestal' version	PLCC
SOT187AA	44–lead plastic leaded chip carrier; 'pocket' version	PLCC
SOT188	68–lead plastic leaded chip carrier; 'pedestal' version	PLCC
SOT188AA	68–lead plastic leaded chip carrier; 'pocket' version	PLCC
SOT189	84–lead plastic leaded chip carrier; 'pedestal' version	PLCC
SOT189AA	84–lead plastic leaded chip carrier; 'pocket' version	PLCC
SOT190	56–lead mini–pack; plastic (VSO56)	VSO56
SOT196A	48–lead quad flat–pack; plastic	QFP
SOT201	32–lead dual in–line; plastic	DIL
SOT205A	44–lead quad flat–pack; plastic	QFP

package code	description	pin position
SOT208	64–lead quad flat–pack; plastic	QFP
SOT213	28–lead mini–pack; plastic (SO28, extra large)	SO28XLG
SOT215A	40–on–40 dual in–line piggy–back; metal ceramic (CERDIL)	PB
SOT219	80–lead quad flat–pack; plastic	QFP
SOT220	120–lead quad flat–pack; plastic	QFP
SOT221	32–lead mini–pack; plastic	SOXL32
SOT224	22–lead skinny dual in–line; plastic	DIL
SOT234	24–lead shrink dual in–line; plastic	DIL
SOT239	24–lead mini–pack; plastic (J–bent leads)	SOJ24
SOT243	17–lead SIL–bent–to–DIL; plastic power	SBD
SOT267A	64–lead tape–automated–bonding module	TAB64
FO75	64–pin grid array package without heatsink	PGA
FO99	64–pin grid array package with heatsink	PGA
FO108	144–pin grid array package without heatsink	PGA
FO128	144–pin grid array package with heatsink	PGA
A	plastic leaded chip carrier	PLCC
EC	metal can	TO46/7
D	plastic mini–pack (SO)	SOxx
FA	dual in–line; ceramic (CERDIP) with quartz window	CERDIL
F;FE	dual in–line; ceramic (CERDIP)	CERDIL
H	metal can	HEADER
I	dual in–line; metal ceramic (hermetic) (CERDIL)	CERDIL
L	ceramic leadless chip carrier	CLCC
N	dual in–line; plastic	PLDIL
NM	24–lead slim plastic dual in–line	DIL
Y	ceramic flat–pack	HLCC/W
–	chip–on–film frame carrier	FFC
–	tape–automatic bonding	TAB
–	28–lead "Piggy–back" with 28–lead EPROM on top	PB
Other abbreviations:		
PADS	connecting surfaces on uncased ICs	
PC–board	printed circuit board	
UW	unsawn wafer	

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
ADC0803–1CD	D	20	SO20	84	IC11
ADC0803–1LCN	N	20	PLDIL	84	IC11
ADC0804–1CD	D	20	SO20	84	IC11
ADC0804–1CN	N	20	PLDIL	84	IC11
ADC0804–1LCD	D	20	SO20	84	IC11
ADC0804–1LCN	N	20	PLDIL	84	IC11
ADC0805–1LCN	N	20	PLDIL	84	IC11
ADC0820CNED	DL	20	SO20	84	IC11
ADC0820CNEN	NL	20	PLDIL	84	IC11
AM26LS30CD	D	16	SO16	94	IC11
AM26LS30CN	N	16	PLDIL	94	IC11
AM26LS30ID	D	16	SO16	94	IC11
AM26LS30IN	N	16	PLDIL	94	IC11
AM26LS30MN	N	16	PLDIL	94	IC11
AM26LS31CD	D	16	SO16	94	IC19 IC11
AM26LS31CN	N	16	PLDIL	94	IC19 IC11
AM26LS31ID	D	16	SO16	94	IC19 IC11
AM26LS31IN	N	16	PLDIL	94	IC19 IC11
AM26LS31MN	N	16	PLDIL	94	IC19 IC11
AM26LS32CD	D	16	SO16	94	IC11
AM26LS32CN	N	16	PLDIL	94	IC11
AM26LS32ID	D	16	SO16	94	IC11
AM26LS32IN	N	16	PLDIL	94	IC11
AM26LS32MN	N	16	PLDIL	94	IC11
AM26LS33CD	D	16	SO16	94	IC11
AM26LS33CN	N	16	PLDIL	94	IC11
AM26LS33ID	D	16	SO16	94	IC11
AM26LS33IN	N	16	PLDIL	94	IC11
AM26LS33MN	N	16	PLDIL	94	IC11
AM6012D	DL	20	SO20	84	IC11
AM6012F	FL	20	CERDIP	84	IC11
AU2901D	D	14	SO14	83	IC11
AU2901N	N	14	PLDIL	83	IC11
AU2902D	D	14	SO14	81	IC11
AU2902N	N	14	PLDIL	81	IC11
AU2903D	D	8	SO8	83	IC11
AU2903N	N	8	PLDIL	83	IC11
AU2904D	D	8	SO8	81	IC11
AU2904N	N	8	PLDIL	81	IC11
DAC08AF	F	16	CERDIP	84	IC11
DAC08CF	F	16	CERDIP	84	IC11
DAC08CN	N	16	PLDIL	84	IC11
DAC08ED	D	16	SO16	84	IC11
DAC08EF	F	16	CERDIP	84	IC11
DAC08EN	N	16	PLDIL	84	IC11
DAC08F	F	16	CERDIP	84	IC11
DAC08HF	F	16	CERDIP	84	IC11
DAC08HN	N	16	PLDIL	84	IC11

INTEGRATED CIRCUITS

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
FCF61C65LL–85T	SOT213	28	SOXL28	68;104;114;128	IC10
FCB61C65L–70P★	SOT117	28	DIL	68;104;114;128	IC10
FCB61C65L–70T	SOT213	28	SOXL28	68;104;114;128	IC10
FCB61C65LL–70P	SOT117	28	DIL	68;104;115;128	IC10
FCB61C65LL–70T	SOT213	28	SOXL28	68;104;115;128	IC10
HEF4000BD	SOT73	14	DIL	12	IC04
HEF4000BP★	SOT27	14	DIL	12	IC04
HEF4000BT	SOT108A	14	SO14	12	IC04
HEF4001BD★	SOT73	14	DIL	12	IC04
HEF4001BP★	SOT27	14	DIL	12	IC04
HEF4001BT★	SOT108A	14	SO14	12	IC04
HEF4001UBD	SOT73	14	DIL	12	IC04
HEF4001UBP	SOT27	14	DIL	12	IC04
HEF4001UBT	SOT108A	14	SO14	12	IC04
HEF4002BD	SOT73	14	DIL	12	IC04
HEF4002BP★	SOT27	14	DIL	12	IC04
HEF4002BT	SOT108A	14	SO14	12	IC04
HEF4006BD	SOT73	14	DIL	14	IC04
HEF4006BP★	SOT27	14	DIL	14	IC04
HEF4006BT	SOT108A	14	SO14	17	IC04
HEF4007UBD	SOT73	14	DIL	10;13	IC04
HEF4007UBP	SOT27	14	DIL	10;13	IC04
HEF4007UBT	SOT108A	14	SO14	10;13	IC04
HEF4008BD	SOT74	16	DIL	10	IC04
HEF4008BP★	SOT38Z	16	DIL	10	IC04
HEF4008BT	SOT109A	16	SO16	10	IC04
HEF40097BD	SOT74	16	DIL	10	IC04
HEF40097BP★	SOT38Z	16	DIL	10	IC04
HEF40097BT★	SOT109A	16	SO16	10	IC04
HEF40098BD	SOT74	16	DIL	10	IC04
HEF40098BP★	SOT38Z	16	DIL	10	IC04
HEF40098BT★	SOT109A	16	SO16	10	IC04
HEF40106BD★	SOT73	14	DIL	14	IC04
HEF40106BP★	SOT27	14	DIL	14	IC04
HEF40106BT★	SOT108A	14	SO14	14	IC04
HEF4011BD	SOT73	14	DIL	12	IC04
HEF4011BP★	SOT27	14	DIL	12	IC04
HEF4011BT★	SOT108A	14	SO14	12	IC04
HEF4011UBD	SOT73	14	DIL	12	IC04
HEF4011UBP★	SOT27	14	DIL	12	IC04
HEF4011UBT	SOT108A	14	SO14	12	IC04
HEF4012BD	SOT73	14	DIL	12	IC04
HEF4012BP★	SOT27	14	DIL	12	IC04
HEF4012BT	SOT108A	14	SO14	12	IC04
HEF4013BD★	SOT73	14	DIL	11	IC04
HEF4013BP★	SOT27	14	DIL	11	IC04
HEF4013BT★	SOT108A	14	SO14	11	IC04
HEF4014BD	SOT74	16	DIL	14	IC04
HEF4014BP	SOT38Z	16	DIL	14	IC04
HEF4014BT	SOT109A	16	SO16	14	IC04
HEF4015BD★	SOT74	16	DIL	14	IC04

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
HEF4015BP★	SOT38Z	16	DIL	14	IC04
HEF4015BT★	SOT109A	16	SO16	14	IC04
HEF4016BD	SOT73	14	DIL	14	IC04
HEF4016BP★	SOT27	14	DIL	14	IC04
HEF4016BT	SOT108A	14	SO14	14	IC04
HEF40160BD	SOT74	16	DIL	10	IC04
HEF40160BP★	SOT38Z	16	DIL	10	IC04
HEF40160BT	SOT109A	16	SO16	10	IC04
HEF40161BD	SOT74	16	DIL	11	IC04
HEF40161BP	SOT38Z	16	DIL	11	IC04
HEF40161BT	SOT109A	16	SO16	11	IC04
HEF40162BD	SOT74	16	DIL	11	IC04
HEF40162BP	SOT38Z	16	DIL	11	IC04
HEF40162BT	SOT109A	16	SO16	11	IC04
HEF40163BD	SOT74	16	DIL	11	IC04
HEF40163BP	SOT38Z	16	DIL	11	IC04
HEF40163BT	SOT109A	16	SO16	11	IC04
HEF4017BD	SOT74	16	DIL	10	IC04
HEF4017BP★	SOT38Z	16	DIL	10	IC04
HEF4017BT★	SOT109A	16	SO16	10	IC04
HEF40174BD	SOT74	16	DIL	11	IC04
HEF40174BP★	SOT38Z	16	DIL	11	IC04
HEF40174BT	SOT109A	16	SO16	11	IC04
HEF40175BD	SOT74	16	DIL	11	IC04
HEF40175BP★	SOT38Z	16	DIL	11	IC04
HEF40175BT	SOT109A	16	SO16	11	IC04
HEF4018BD	SOT74	16	DIL	10	IC04
HEF4018BP★	SOT38Z	16	DIL	10	IC04
HEF4018BT	SOT109A	16	SO16	10	IC04
HEF4019BD	SOT74	16	DIL	13	IC04
HEF4019BP★	SOT38Z	16	DIL	13	IC04
HEF4019BT	SOT109A	16	SO16	13	IC04
HEF40192BD	SOT74	16	DIL	11	IC04
HEF40192BP★	SOT38Z	16	DIL	11	IC04
HEF40192BT	SOT109A	16	SO16	11	IC04
HEF40193BD	SOT74	16	DIL	11	IC04
HEF40193BP★	SOT38Z	16	DIL	11	IC04
HEF40193BT★	SOT109A	16	SO16	11	IC04
HEF40194BD	SOT74	16	DIL	14	IC04
HEF40194BP★	SOT38Z	16	DIL	14	IC04
HEF40194BT	SOT109A	16	SO16	14	IC04
HEF40195BD	SOT74	16	DIL	14	IC04
HEF40195BP★	SOT38Z	16	DIL	14	IC04
HEF40195BT★	SOT109A	16	SO16	14	IC04
HEF4020BD	SOT74	16	DIL	10	IC04
HEF4020BP★	SOT38Z	16	DIL	10	IC04
HEF4020BT	SOT109A	16	SO16	10	IC04
HEF4021BD	SOT74	16	DIL	14	IC04
HEF4021BP★	SOT38Z	16	DIL	14	IC04
HEF4021BT★	SOT109A	16	SO16	14	IC04
HEF4022BD	SOT74	16	DIL	10	IC04
HEF4022BP	SOT38Z	16	DIL	10	IC04
HEF4022BT	SOT109A	16	SO16	10	IC04
HEF4023BD	SOT73	14	DIL	12	IC04
HEF4023BP★	SOT27	14	DIL	12	IC04
HEF4023BT	SOT108A	14	SO14	12	IC04
HEF4024BD	SOT73	14	DIL	10	IC04

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
HEF4024BP★	SOT27	14	DIL	10	IC04
HEF4024BT★	SOT108A	14	SO14	10	IC04
HEF40240BP★	SOT146	20	DIL	10	IC04
HEF40240BT★	SOT163A	20	SO20	10	IC04
HEF40244BP★	SOT146	20	DIL	10	IC04
HEF40244BT★	SOT163A	20	SO20	10	IC04
HEF40245BP★	SOT146	20	DIL	10	IC04
HEF40245BT	SOT163A	20	SO20	10	IC04
HEF4025BD	SOT73	14	DIL	12	IC04
HEF4025BP★	SOT27	14	DIL	12	IC04
HEF4025BT	SOT108A	14	SO14	12	IC04
HEF4027BD	SOT74	16	DIL	11	IC04
HEF4027BP★	SOT38Z	16	DIL	11	IC04
HEF4027BT★	SOT109A	16	SO16	11	IC04
HEF4028BD	SOT74	16	DIL	11	IC04
HEF4028BP★	SOT38Z	16	DIL	11	IC04
HEF4028BT★	SOT109A	16	SO16	11	IC04
HEF4029BD	SOT74	16	DIL	10	IC04
HEF4029BP★	SOT38Z	16	DIL	10	IC04
HEF4029BT	SOT109A	16	SO16	10	IC04
HEF4030BD★	SOT73	14	DIL	12	IC04
HEF4030BP★	SOT27	14	DIL	12	IC04
HEF4030BT	SOT108A	14	SO14	12	IC04
HEF4031BD	SOT74	16	DIL	14	IC04
HEF4031BP	SOT38Z	16	DIL	14	IC04
HEF4031BT	SOT109A	16	SO16	14	IC04
HEF4035BD	SOT74	16	DIL	14	IC04
HEF4035BP★	SOT38Z	16	DIL	14	IC04
HEF4035BT	SOT109A	16	SO16	14	IC04
HEF40373BP★	SOT146	20	DIL	13	IC04
HEF40373BT	SOT163A	20	SO20	13	IC04
HEF40374BP★	SOT146	20	DIL	11	IC04
HEF40374BT	SOT163A	20	SO20	11	IC04
HEF4040BD★	SOT74	16	DIL	10	IC04
HEF4040BP★	SOT38Z	16	DIL	10	IC04
HEF4040BT★	SOT109A	16	SO16	10	IC04
HEF4041BD★	SOT73	14	DIL	10	IC04
HEF4041BP★	SOT27	14	DIL	10	IC04
HEF4041BT	SOT108A	14	SO14	10	IC04
HEF4042BD	SOT74	16	DIL	13	IC04
HEF4042BP★	SOT38Z	16	DIL	13	IC04
HEF4042BT	SOT109A	16	SO16	13	IC04
HEF4043BD★	SOT74	16	DIL	13	IC04
HEF4043BP★	SOT38Z	16	DIL	13	IC04
HEF4043BT	SOT109A	16	SO16	13	IC04
HEF4044BD	SOT74	16	DIL	13	IC04
HEF4044BP★	SOT38Z	16	DIL	13	IC04
HEF4044BT	SOT109A	16	SO16	13	IC04
HEF4046BD★	SOT74	16	DIL	14	IC04
HEF4046BP★	SOT38Z	16	DIL	14	IC04
HEF4046BT	SOT109A	16	SO16	14	IC04
HEF4047BD	SOT73	14	DIL	13	IC04
HEF4047BP★	SOT27	14	DIL	13	IC04
HEF4047BT	SOT108A	14	SO14	13	IC04
HEF4049BD★	SOT74	16	DIL	10	IC04
HEF4049BP★	SOT38Z	16	DIL	10	IC04
HEF4049BT★	SOT109A	16	SO16	10	IC04

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
HEF4050BD★	SOT74	16	DIL	10	IC04
HEF4050BP★	SOT38Z	16	DIL	10	IC04
HEF4050BT★	SOT109A	16	SO16	10	IC04
HEF4051BD	SOT74	16	DIL	11;13	IC04
HEF4051BP★	SOT38Z	16	DIL	11;13	IC04
HEF4051BT★	SOT109A	16	SO16	11;13	IC04
HEF4052BD	SOT74	16	DIL	11;13	IC04
HEF4052BP★	SOT38Z	16	DIL	11;13	IC04
HEF4052BT	SOT109A	16	SO16	11;13	IC04
HEF4053BD	SOT74	16	DIL	11;13	IC04
HEF4053BP★	SOT38Z	16	DIL	11;13	IC04
HEF4053BT★	SOT109A	16	SO16	11;13	IC04
HEF4059BD	SOT94	24	DIL	10	IC04
HEF4059BP★	SOT101A	24	DIL	10	IC04
HEF4059BT	SOT137A	24	SO24	10	IC04
HEF4060BD★	SOT74	16	DIL	10	IC04
HEF4060BP★	SOT38Z	16	DIL	10	IC04
HEF4060BT★	SOT109A	16	SO16	10	IC04
HEF4066BD	SOT73	14	DIL	14	IC04
HEF4066BP★	SOT27	14	DIL	14	IC04
HEF4066BT★	SOT108A	14	SO14	14	IC04
HEF4067BD	SOT94	24	DIL	11;13	IC04
HEF4067BP★	SOT101A	24	DIL	11;13	IC04
HEF4067BT★	SOT137A	24	SO24	11;13	IC04
HEF4068BD★	SOT73	14	DIL	12	IC04
HEF4068BP★	SOT27	14	DIL	12	IC04
HEF4068BT	SOT108A	14	SO14	12	IC04
HEF4069UBD	SOT73	14	DIL	13	IC04
HEF4069UBP★	SOT27	14	DIL	13	IC04
HEF4069UBT★	SOT108A	14	SO14	13	IC04
HEF4070BD	SOT73	14	DIL	12	IC04
HEF4070BP★	SOT27	14	DIL	12	IC04
HEF4070BT	SOT108A	14	SO14	12	IC04
HEF4071BD	SOT73	14	DIL	13	IC04
HEF4071BP★	SOT27	14	DIL	13	IC04
HEF4071BT★	SOT108A	14	SO14	13	IC04
HEF4072BD★	SOT73	14	DIL	13	IC04
HEF4072BP★	SOT27	14	DIL	13	IC04
HEF4072BT★	SOT108A	14	SO14	13	IC04
HEF4073BD	SOT73	14	DIL	12	IC04
HEF4073BP★	SOT27	14	DIL	12	IC04
HEF4073BT★	SOT108A	14	SO14	12	IC04
HEF4075BD★	SOT73	14	DIL	13	IC04
HEF4075BP★	SOT27	14	DIL	13	IC04
HEF4075BT	SOT108A	14	SO14	13	IC04
HEF4076BD	SOT74	16	DIL	14	IC04
HEF4076BP★	SOT38Z	16	DIL	14	IC04
HEF4076BT	SOT109A	16	SO16	14	IC04
HEF4077BD	SOT73	14	DIL	12	IC04
HEF4077BP★	SOT27	14	DIL	12	IC04
HEF4077BT	SOT108A	14	SO14	12	IC04
HEF4078BD	SOT73	14	DIL	12	IC04
HEF4078BP	SOT27	14	DIL	12	IC04
HEF4078BT	SOT108A	14	SO14	12	IC04
HEF4081BD★	SOT73	14	DIL	12	IC04
HEF4081BP★	SOT27	14	DIL	12	IC04
HEF4081BT★	SOT108A	14	SO14	12	IC04

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
HEF4082BD★	SOT73	14	DIL	12	IC04
HEF4082BP★	SOT27	14	DIL	12	IC04
HEF4082BT	SOT108A	14	SO14	12	IC04
HEF4085BD	SOT73	14	DIL	12;13	IC04
HEF4085BP	SOT27	14	DIL	12;13	IC04
HEF4085BT	SOT108A	14	SO14	12;13	IC04
HEF4086BD★	SOT73	14	DIL	12;13	IC04
HEF4086BP★	SOT27	14	DIL	12;13	IC04
HEF4086BT	SOT108A	14	SO14	12;13	IC04
HEF4093BD★	SOT73	14	DIL	14	IC04
HEF4093BP★	SOT27	14	DIL	14	IC04
HEF4093BT★	SOT108A	14	SO14	14	IC04
HEF4094BD	SOT74	16	DIL	14	IC04
HEF4094BP★	SOT38Z	16	DIL	14	IC04
HEF4094BT★	SOT109A	16	SO16	14	IC04
HEF4104BD	SOT74	16	DIL	14	IC04
HEF4104BP★	SOT38Z	16	DIL	14	IC04
HEF4104BT★	SOT109A	16	SO16	14	IC04
HEF4502BD	SOT74	16	DIL	10;13	IC04
HEF4502BP★	SOT38Z	16	DIL	10;13	IC04
HEF4502BT★	SOT109A	16	SO16	10;13	IC04
HEF4505BD	SOT73	14	DIL	13	IC04
HEF4505BP	SOT27	14	DIL	13	IC04
HEF4508BD	SOT94	24	DIL	13	IC04
HEF4508BP★	SOT101A	24	DIL	13	IC04
HEF4508BT★	SOT137A	24	SO24	13	IC04
HEF4510BD	SOT74	16	DIL	10	IC04
HEF4510BP★	SOT38Z	16	DIL	10	IC04
HEF4510BT	SOT109A	16	SO16	10	IC04
HEF4511BD	SOT74	16	DIL	11;13	IC04
HEF4511BP★	SOT38Z	16	DIL	11;13	IC04
HEF4511BT★	SOT109A	16	SO16	11;13	IC04
HEF4512BD	SOT74	16	DIL	13	IC04
HEF4512BP★	SOT38Z	16	DIL	13	IC04
HEF4512BT	SOT109A	16	SO16	13	IC04
HEF4514BD	SOT94	24	DIL	11	IC04
HEF4514BP★	SOT101A	24	DIL	11	IC04
HEF4514BT★	SOT137A	24	SO24	11	IC04
HEF4515BD	SOT94	24	DIL	11	IC04
HEF4515BP★	SOT101A	24	DIL	11	IC04
HEF4515BT	SOT137A	24	SO24	11	IC04
HEF4516BD	SOT74	16	DIL	10	IC04
HEF4516BP★	SOT38Z	16	DIL	10	IC04
HEF4516BT★	SOT109A	16	SO16	10	IC04
HEF4517BD	SOT74	16	DIL	14	IC04
HEF4517BP★	SOT38Z	16	DIL	14	IC04
HEF4517BT	SOT162A	16	SO16L	14	IC04
HEF4518BD	SOT74	16	DIL	10	IC04
HEF4518BP★	SOT38Z	16	DIL	10	IC04
HEF4518BT★	SOT109A	16	SO16	10	IC04
HEF4519BD	SOT74	16	DIL	13	IC04
HEF4519BP★	SOT38Z	16	DIL	13	IC04
HEF4519BT★	SOT109A	16	SO16	13	IC04
HEF4520BD★	SOT74	16	DIL	10	IC04
HEF4520BP★	SOT38Z	16	DIL	10	IC04
HEF4520BT	SOT109A	16	SO16	10	IC04
HEF4521BD	SOT74	16	DIL	10	IC04

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
HEF4521BP★	SOT38Z	16	DIL	10	IC04
HEF4521BT	SOT109A	16	SO16	10	IC04
HEF4522BD	SOT74	16	DIL	10	IC04
HEF4522BP★	SOT38Z	16	DIL	10	IC04
HEF4522BT★	SOT109A	16	SO16	10	IC04
HEF4526BD	SOT74	16	DIL	10	IC04
HEF4526BP★	SOT38Z	16	DIL	10	IC04
HEF4526BT	SOT109A	16	SO16	10	IC04
HEF4527BD	SOT74	16	DIL	14	IC04
HEF4527BP★	SOT38Z	16	DIL	14	IC04
HEF4527BT★	SOT109A	16	SO16	14	IC04
HEF4528BD	SOT74	16	DIL	13	IC04
HEF4528BP★	SOT38Z	16	DIL	13	IC04
HEF4528BT★	SOT109A	16	SO16	13	IC04
HEF4531BD	SOT74	16	DIL	10	IC04
HEF4531BP	SOT38Z	16	DIL	10	IC04
HEF4531BT	SOT109A	16	SO16	10	IC04
HEF4532BD	SOT74	16	DIL	11	IC04
HEF4532BP★	SOT38Z	16	DIL	11	IC04
HEF4532BT	SOT109A	16	SO16	11	IC04
HEF4534BD	SOT94	24	DIL	10	IC04
HEF4534BP★	SOT101A	24	DIL	10	IC04
HEF4534BT	SOT137A	24	SO24	10	IC04
HEF4538BD	SOT74	16	DIL	13	IC04
HEF4538BP★	SOT38Z	16	DIL	13	IC04
HEF4538BT★	SOT109A	16	SO16	13	IC04
HEF4539BD	SOT74	16	DIL	13	IC04
HEF4539BP	SOT38Z	16	DIL	13	IC04
HEF4539BT	SOT109A	16	SO16	13	IC04
HEF4541BD★	SOT73	14	DIL	13;14	IC04
HEF4541BP★	SOT27	14	DIL	13;14	IC04
HEF4541BT★	SOT108A	14	SO14	13;14	IC04
HEF4543BD	SOT74	16	DIL	11;13	IC04
HEF4543BP★	SOT38Z	16	DIL	11;13	IC04
HEF4543BT★	SOT109A	16	SO16	11;13	IC04
HEF4555BD	SOT74	16	DIL	11	IC04
HEF4555BP★	SOT38Z	16	DIL	11	IC04
HEF4555BT	SOT109A	16	SO16	11	IC04
HEF4556BD	SOT74	16	DIL	11	IC04
HEF4556BP★	SOT38Z	16	DIL	11	IC04
HEF4556BT★	SOT109A	16	SO16	11	IC04
HEF4557BD	SOT74	16	DIL	14	IC04
HEF4557BP★	SOT38Z	16	DIL	14	IC04
HEF4557BT★	SOT109A	16	SO16	14	IC04
HEF4585BD	SOT74	16	DIL	10	IC04
HEF4585BP★	SOT38Z	16	DIL	10	IC04
HEF4585BT★	SOT109A	16	SO16	10	IC04
HEF4720BD★	SOT74	16	DIL	13	IC04
HEF4720BP★	SOT38Z	16	SO16	13	IC04
HEF4720BT	SOT162A	16	SO16L	13	IC04
HEF4720V				13	
HEF4724BD	SOT74	16	DIL	13	IC04
HEF4724BP★	SOT38Z	16	DIL	13	IC04
HEF4724BT★	SOT109A	16	SO16	13	IC04
HEF4731BD	SOT73	14	DIL	14	IC04
HEF4731BP★	SOT27	14	DIL	14	IC04
HEF4731V				14	

INTEGRATED CIRCUITS

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
HEF4737BD	SOT133	18	DIL	10	IC04
HEF4737BP★	SOT102	18	DIL	10	IC04
HEF4738VP★	SOT129	40	DIL	14	IC04
HEF4750VD★	SOT135A	28	DIL	14;100;110	IC04 IC01
HEF4751VD	SOT135A	28	DIL	10;110	IC04 IC01
HEF4751VP	SOT117	28	DIL	10;110	IC04 IC01
HEF4751VT	SOT136A	28	SO28	10;110	IC04
HEF4752VD	SOT135A	28	DIL	14	IC04
HEF4752VP★	SOT117	28	DIL	14	IC04
HEF4753BD	SOT133	18	DIL	14	IC04
HEF4753BP★	SOT102	18	DIL	14	IC04
HEF4754VD	SOT135A	28	DIL	14	IC04
HEF4754VP	SOT117	28	DIL	14	IC04
HEF4754VT	SOT136A	28	SO28	14	IC04
HEF4755VD	SOT135A	28	DIL	14	IC04
HEF4755VP	SOT117	28	DIL	14	IC04
HEF4755VT	SOT136A	28	SO28	14	IC04
ICM7555CD	D	8	SO8	92	IC11
ICM7555CN	N	8	PLDIL	92	IC11
ICM7555ID	D	8	SO8	92	IC11
ICM7555IN	N	8	PLDIL	92	IC11
ICM7555MFE	FE	8	CERDIP	92	IC11
ICM7555MN	N	8	PLDIL	92	IC11
LF198				91	
LM298				91	
LF398D	D	14	SO14	91	IC11
LF398FE	FE	8	CERDIP	91	IC11
LF398N	NE	8	PLDIL	91	IC11
LM111FE	FE	8	CERDIP	83	IC11
LM119F	FH	14	CERDIP	83	IC11
LM124F	FH	14	CERDIP	81	IC11
LM124N	NH	14	PLDIL	81	IC11
LM139AF	FH	14	CERDIP	83	IC11
LM139F	FH	14	CERDIP	83	IC11
LM193AFE	FE	8	CERDIP	83	IC11
LM193FE	FE	8	CERDIP	83	IC11
LM211D	DE	8	SO8	83	IC11
LM211FE	FE	8	CERDIP	83	IC11
LM211N	NE	8	PLDIL	83	IC11
LM219F	FH	14	CERDIP	83	IC11
LM224F	FH	14	CERDIP	81	IC11
LM224N	NH	14	PLDIL	81	IC11
LM239AN	N	14	PLDIL	83	IC11
LM239D	D	14	SO14	83	IC11
LM239F	F	14	CERDIP	83	IC11
LM239N	N	14	PLDIL	83	IC11
LM258D	D	8	SO8	81	IC11
LM258N	NE	8	PLDIL	81	IC11
LM2901D	DH	14	SO14	83	IC11
LM2901N	NH	14	PLDIL	83	IC11
LM2902D	DH	14	SO14	81	IC11
LM2902N	NH	14	PLDIL	81	IC11
LM2903D	DE	8	SO8	83	IC11
LM2903N	NE	8	PLDIL	83	IC11

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
LM2904D	DE	8	SO8	81	IC11
LM2904N	NE	8	PLDIL	81	IC11
LM293AFE	FE	8	CERDIP	83	IC11
LM293AN	NE	8	PLDIL	83	IC11
LM293D	D	8	SO8	83	IC11
LM293FE	FE	8	CERDIP	83	IC11
LM293N	NE	8	PLDIL	83	IC11
LM311D	DE	8	SO8	83	IC11
LM311FE	FE	8	CERDIP	83	IC11
LM311N	NE	8	PLDIL	83	IC11
LM319D	DH	14	SO14	83	IC11
LM319F	FH	14	CERDIP	83	IC11
LM319N★	NH	14	PLDIL	83	IC11
LM324AD	DH	14	SO14	81	IC11
LM324AN	N	14	PLDIL	81	IC11
LM324D★	DH	14	SO14	81	IC11
LM324F	FH	14	CERDIP	81	IC11
LM324N★	NH	14	PLDIL	81	IC11
LM339AF	F	14	CERDIP	83	IC11
LM339AN★	NH	14	PLDIL	83	IC11
LM339D	DH	14	SO14	83	IC11
LM339F	FH	14	CERDIP	83	IC11
LM339N	NH	14	PLDIL	83	IC11
LM358AD	D	8	SO8	81	IC11
LM358AN	N	8	PLDIL	81	IC11
LM358D	DE	8	SO8	81	IC11
LM358N★	NE	8	PLDIL	81	IC11
LM393AFE	FE	8	CERDIP	83	IC11
LM393AN	NE	8	PLDIL	83	IC11
LM393D	DE	8	SO8	83	IC11
LM393FE	FE	8	CERDIP	83	IC11
LM393N★	NE	8	PLDIL	83	IC11
MAB8031AH–2P★	SOT129	40	DIL	74;130	IC14
MAB8031AH–2WP	SOT187AA	44	PLCC	74;130	IC14
MAB8032AH–2P★	SOT129	40	DIL	74;130	IC14
MAB8032AH–2WP	SOT187AA	44	PLCC	74;130	IC14
MAB8035HLP	SOT129	40	DIL	74;130	IC14
MAB8035HLWP	SOT187AA	44	PLCC	74;130	IC14
MAB8039HLP	SOT129	40	DIL	74;130	IC14
MAB8039HLWP	SOT187AA	44	PLCC	74;130	IC14
MAB8040HLP	SOT129	40	DIL	74;130	IC14
MAB8040HLWP	SOT187AA	44	PLCC	74;130	IC14
MAB8048HP	SOT129	40	DIL	74;130	IC14
MAB8048HWP	SOT187AA	44	PLCC	74;130	IC14
MAB8049HP	SOT129	40	DIL	74;130	IC14
MAB8049HWP	SOT187AA	44	PLCC	74;130	IC14
MAB8050HP	SOT129	40	DIL	74;130	IC14
MAB8050HWP	SOT187AA	44	PLCC	74;130	IC14
MAB8051AH–2P	SOT129	40	DIL	74;130	IC14
MAB8051AH–2WP	SOT187AA	44	PLCC	74;130	IC14
MAB8052AH–2P	SOT129	40	DIL	74;130	IC14
MAB8052AH–2WP	SOT187AA	44	PLCC	74;130	IC14
MAB8401B	–	28	PB	74;100;107;124;130	IC12 IC14
MAB8401WP	SOT188AA	68	PLCC	74;100;107;124;130	IC12 IC14
MAB8411P	SOT117	28	DIL	74;100;107;130	IC12

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
					IC14
MAB8411T	SOT136A	28	SO28	74;100;107;124; 130	IC12 IC14
MAB8421P	SOT117	28	DIL	74;100;107;130;	IC12 IC14
MAB8421T	SOT136A	28	SO28	74;100;107;124; 130	IC12 IC14
MAB8422P	SOT146	20	DIL	74;100;107;124; 130	IC12 IC14
MAB8441P	SOT117	28	DIL	75;101;107;124; 131	IC12 IC14
MAB8441T	SOT136A	28	SO28	75;101;107;124; 131	IC12 IC14
MAB8442				131	
MAB8461T	SOT136A	28	SO28	75;101;107;124; 131	IC12 IC14
MAF80A31AH–2P	SOT129	40	DIL	75;131	IC14
MAF80A31AH–2WP	SOT187AA	44	PLCC	75;131	IC14
MAF80A32AH–2P	SOT129	40	DIL	75;131	IC14
MAF80A32AH–2WP	SOT187AA	44	PLCC	75;131	IC14
MAF80A35HLP	SOT129	40	DIL	75;131	IC14
MAF80A39HLP	SOT129	40	DIL	75;131	IC14
MAF80A40HLP	SOT129	40	DIL	75;131	IC14
MAF80A48HP	SOT129	40	DIL	75;131	IC14
MAF80A49HP	SOT129	40	DIL	75;131	IC14
MAF80A50HP	SOT129	40	DIL	75;131	IC14
MAF80A51AH–2P	SOT129	40	DIL	75;131	IC14
MAF80A51AH–2WP	SOT187AA	44	PLCC	75;131	IC14
MAF80A52AH–2P	SOT129	40	DIL	75;131	IC14
MAF80A52AH–2WP	SOT187AA	44	PLCC	75;131	IC14
MAF8031AH–2P	SOT129	40	DIL	75;131	IC14
MAF8031AH–2WP	SOT187AA	44	PLCC	75;131	IC14
MAF8032AH–2P	SOT129	40	DIL	75;131	IC14
MAF8032AH–2WP	SOT187AA	44	PLCC	75;131	IC14
MAF8035HLP	SOT129	40	DIL	75;131	IC14
MAF8039HLP	SOT129	40	DIL	75;132	IC14
MAF8040HLP	SOT129	40	DIL	75;132	IC14
MAF8048HP	SOT129	40	DIL	75;132	IC14
MAF8049HP	SOT129	40	DIL	76;132	IC14
MAF8050HP	SOT129	40	DIL	76;132	IC14
MAF8051AH–2P	SOT129	40	DIL	76;132	IC14
MAF8051AH–2WP	SOT187AA	44	PLCC	76;132	IC14
MAF8052AH–2P	SOT129	40	DIL	76;132	IC14
MAF8052AH–2WP	SOT187AA	44	PLCC	76;132	IC14
MAF84A11P	SOT117	28	DIL	75;101;107;124	IC12 IC14
MAF84A21P	SOT117	28	DIL	75;101;107;124	IC12 IC14
MAF84A22P	SOT146	20	DIL	75;101;107;124	IC12 IC14
MAF84A41P	SOT117	28	DIL	75;101;107;124	IC12 IC14
MAF84A42				131;132	
MAF84A61P	SOT117	28	DIL	75;101;107;124	IC12 IC14
MAF8411P	SOT117	28	DIL	76;101;107;124	IC12 IC14

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
MAF8421P	SOT117	28	DIL	76;101;107;124	IC12 IC14
MAF8422P	SOT146	20	DIL	76;101;107;124	IC12 IC14
MAF8441P	SOT117	28	DIL	76;101;107;125	IC12 IC14
MAF8461P	SOT117	28	DIL	76;101;107;125	IC12 IC14
MC1408–7F	F	16	CERDIP	84	IC11
MC1408–7N	NJ	16	PLDIL	84	IC11
MC1408–8D	DJ	16	SO16	84	IC11
MC1458D	DE	8	SO8	81	IC11
MC1458N	NE	8	PLDIL	81	IC11
MC1488D	DH	14	SO14	85;94	IC11 IC19
MC1488F	FH	14	CERDIP	85;94	IC11 IC19
MC1488N★	NH	14	PLDIL	85;94	IC11 IC19
MC1489AD	DH	14	SO14	86;94	IC11 IC19
MC1489AF	FH	14	CERDIP	86;94	IC11 IC19
MC1489AN	NH	14	PLDIL	86;94	IC11 IC19
MC1489D	DH	14	SO14	86;94	IC11 IC19
MC1489F	FH	14	CERDIP	86;94	IC11 IC19
MC1489N	NH	14	PLDIL	86;94	IC11 IC19
MC1496F	F	14	CERDIP	96	IC11
MC1496N	NH	14	PLDIL	96	IC11
MC1508–8F	FJ	16	CERDIP	84	IC11
MC1558N	NE	8	PLDIL	81	IC11
MC1596F	FH	14	CERDIP	96	IC11
MC1596N	NH	14	PLDIL	96	IC11
MC3302D	DH	14	SO14	83	IC11
MC3302F	F	14	CERDIP	83	IC11
MC3302N	NH	14	PLDIL	83	IC11
MC3303D	D	14	SO14	81	IC11
MC3303F	F	14	CERDIP	81	IC11
MC3303N	NH	14	PLDIL	81	IC11
MC3361D	DJ	16	SO16L	96;116;119	IC03 IC11
MC3361N	NJ	16	PLDIL	96;116;119	IC03 IC11
MC3410CF	FJ	16	CERDIP	84	IC11 IC01
MC3410F	FJ	16	CERDIP	84	IC11 IC01
MC3503F	FH	14	CERDIP	81	IC11
MC3510				98	
MEF3050	SOT129	40	DIL	89	–
NE4558D	DE	8	SO8	81	IC11
NE4558FE	FE	8	CERDIP	81	IC11
NE4558N	NE	8	PLDIL	81	IC11

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
NE5018D	DN	24	SO24L	76;78;84	IC11
NE5018F	FM	22	CERDIP	76;78;84	IC11
NE5018N★	NM	22	PLDIL	76;78;84	IC11
NE5019F	FM	22	CERDIP	76;78;84	IC11
NE5019N	NM	22	PLDIL	76;78;84	IC11
NE5020F	F	24	CERDIP	76;78;84	IC11
NE5020N	NN	24	PLDIL	76;78;84	IC11
NE5044D	DJ	16	SO16	88	IC11
NE5044N	NJ	16	PLDIL	88	IC11
NE5050D	DL	20	SO20L	94	IC11
					IC19
NE5050N★	N	20	PLDIL	94	IC11
					IC19
NE5080N	NJ	16	PLDIL	94	IC11
					IC19
NE5081N	NL	20	PLDIL	94	IC11
					IC19
NE5090D	DJ	16	SO16L	85;87	IC11
NE5090F	FJ	16	CERDIP	85;87	IC11
NE5090N	NJ	16	PLDIL	85;87	IC11
NE5105					
NE5105A					
NE5170A	AQ	28	PLCC	85;94	IC11
					IC19
NE5170D	D	24	SO24	85;94	IC11
					IC19
NE5170N	N	28	PLDIL	85;94	IC11
					IC19
NE5180A	AQ	28	PLCC	88;94	IC11
					IC19
NE5180N	N	28	PLDIL	86;94	IC11
					IC19
NE5181A	AQ	28	PLCC	86;94	IC11
					IC19
NE5181N	N	28	PLDIL	86;94	IC11
					IC19
NE5204D	DE	8	SO8	80;94	IC11
					IC19
					IC02
NE5204N	NE	8	PLDIL	80;94	IC11
					IC19
					IC02
NE5205D	DE	8	SO8	80;94	IC11
					IC19
					IC02
NE5205EC	EC	4	T046/7	80;94	IC11
					IC19
					IC02
NE5205FE	FE	8	CERDIP	80;94	IC11
					IC19
					IC02
NE5205N	NE	8	PLDIL	80;94	IC11
					IC19
					IC02
NE521D	DH	14	SO14	83	IC11
NE521F	FH	14	CERDIP	83	IC11
NE521N	NH	14	PLDIL	83	IC11

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
NE5210D	D	14	SO14	80;94	IC11
NE5211D	D	14	SO14	80;94	IC11
NE5212D	DE	8	SO8	80;94	IC11
					IC19
NE5212N	NE	8	PLDIL	80;94	IC11
					IC19
NE5214D	D	20	SO20	80;83;94	IC11
NE5217D	D	20	SO20	80;83;94	IC11
NE522D	DH	14	SO14	83	IC11
NE522F	FH	14	CERDIP	83	IC11
NE522N★	NH	14	PLDIL	83	IC11
NE5230D	DE	8	SO8	81;111	IC11
					IC03
					IC17
NE5230FE	FE	8	CERDIP	81	IC11
					IC03
					IC17
NE5230N	NE	8	PLDIL	81	IC11
					IC03
					IC17
NE527D	DH	14	SO14	83	IC11
NE527F	FH	14	CERDIP	83	IC11
NE527H	HF	10	HEADER	83	IC11
NE527N	NH	14	PLDIL	83	IC11
NE529D	DH	14	SO14	83	IC11
NE529F	FH	14	CERDIP	83	IC11
NE529H	HF	10	HEADER	83	IC11
NE529N	NH	14	PLDIL	83	IC11
NE531N	NE	8	PLDIL	81	IC11
NE532D	DE	8	SO8	81	IC11
NE532FE	FE	8	CERDIP	81	IC11
NE532N★	NE	8	PLDIL	81	IC11
NE5410F	FJ	16	CERDIP	84	IC11
					IC01
NE5512D	DE	8	SO8	81	IC11
NE5512N	NE	8	PLDIL	81	IC11
NE5514D	DJ	16	SO16L	81	IC11
NE5514N	NH	14	PLDIL	81	IC11
NE5517AN	NJ	16	PLDIL	81	IC11
NE5517D	DJ	16	SO16L	81	IC11
NE5517N★	NJ	16	PLDIL	81	IC11
NE5521D	DJ	16	SO16L	89	IC11
NE5521F	FK	18	CERDIP	89	IC11
NE5521N	NK	18	PLDIL	89	IC11
NE5532AFE	FE	8	CERDIP	81	IC11
					IC01
NE5532AN★	NE	8	PLDIL	81	IC11
					IC01
NE5532D	D	16	SO16L	81	IC11
					IC01
NE5532FE	FE	8	CERDIP	81	IC11
					IC01
NE5532N★	NE	8	PLDIL	81	IC11
					IC01
NE5533AN★	NH	14	PLDIL	81	IC11
					IC01
NE5533N	NH	14	PLDIL	81	IC11

IC

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
NE5534AD	DE	8	SO8	81	IC01 IC11 IC01
NE5534AFE	FE	8	CERDIP	81	IC11 IC01
NE5534AN★	NE	8	PLDIL	81	IC11 IC01
NE5534D	DE	8	SO8	81	IC11 IC01
NE5534FE	FE	8	CERDIP	81	IC11 IC01
NE5534N★	NE	8	PLDIL	81	IC11 IC01
NE5537D	DH	14	SO14	91	IC11
NE5537N	NE	8	PLDIL	91	IC11
NE5539D	DH	14	SO14	81;94;121	IC11 IC19 IC02
NE5539F	FH	14	CERDIP	81;94;121	IC11 IC19 IC02
NE5539N★	NH	14	PLDIL	81;94;121	IC11 IC19 IC02
NE555D	DE	8	SO8	92	IC11
NE555FE	FE	8	CERDIP	92	IC11
NE555N	NE	8	PLDIL	92	IC11
NE556–1F	F	14	CERDIP	92	IC11
NE556–1N	NH	14	PLDIL	92	IC11
NE556D	DH	14	SO14	94	IC11
NE556F	FH	14	CERDIP	94	IC11
NE556N	NH	14	PLDIL	94	IC11
NE5560D	DJ	16	SO16L	90	IC11
NE5560F	FJ	16	CERDIP	90	IC11
NE5560N	NJ	16	PLDIL	90	IC11
NE5561D	DE	8	SO8	90	IC11
NE5561FE	FE	8	CERDIP	90	IC11
NE5561N	NE	8	PLDIL	90	IC11
NE5562D	DL	20	SO20	90	IC11
NE5562F	FL	20	CERDIP	90	IC11
NE5562N	NL	20	PLDIL	90	IC11
NE5568D	DE	8	SO8	90	IC11
NE5568N★	NE	8	PLDIL	90	IC11
NE5570D	DN	24	SO24L	88	IC11
NE5570N	NN	24	PLDIL	88	IC11
NE558D	DJ	16	SO16L	92	IC11
NE558N	NJ	16	PLDIL	92	IC11
NE5592D	DH	14	SO14	80;121	IC11 IC02
NE5592N	NH	14	PLDIL	80;121	IC11 IC02
NE564D	DJ	16	SO16	94	IC11 IC19
NE564F	FJ	16	CERDIP	94	IC19
NE564N	NJ	16	PLDIL	94	IC11 IC19
NE566D	DE	8	SO8	96	IC11

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
NE566F	FH	14	CERDIP	96	IC11
NE566N★	NE	8	PLDIL	96	IC11
NE567D	DE	8	SO8	96;116;119	IC11 IC03
NE567F	FH	14	CERDIP	96;116;119	IC11 IC03
NE567N★	NE	8	PLDIL	96;116;119	IC11 IC03
NE568D	D	20	SO20	94;96	IC11 IC19
NE568N	N	20	PLDIL	94;96	IC11 IC19
NE570F	FJ	16	CERDIP	96;116	IC11 IC17 IC01
NE570N★	NJ	16	PLDIL	96;116	IC11 IC17 IC01
NE571D	DJ	16	SO16L	96;116	IC11 IC17 IC01
NE571F	FJ	16	CERDIP	96;116	IC11 IC17 IC01
NE571N★	NJ	16	PLDIL	96;116	IC11 IC17 IC01
NE572D	DJ	16	SO16L	96;116	IC11 IC01
NE572N	NJ	16	PLDIL	96;116	IC11 IC01
NE575D	D	20	SO20	96;116;119	IC11 IC03 IC17 IC01
NE575N	N	20	PLDIL	96;116;119	IC11 IC03 IC17 IC01
NE5750D	D	24	SO24	96;116;119	DS
NE5750N	N	24	PLDIL	96;116;119	DS
NE5751D	D	28	SO28	96;112;116;119	DS
NE5751N	N	24	PLDIL	96;112;116;119	DS
NE587D	DL	20	SO20L	76;78;85;87;93	IC11
NE587N	NK	18	PLDIL	76;78;85;87;93	IC11
NE590F	FJ	16	CERDIP	85;87	IC11
NE590N★	NJ	16	PLDIL	85;87	IC11
NE5900D	DJ	16	SO16L	111	IC11 IC03
NE5900N★	NJ	16	PLDIL		IC11 IC03
NE591N★	NK	18	PLDIL	85;87	IC11
NE592D14	DH	14	SO14	80;94;121	IC19
NE592D8	DE	8	SO8	80;94;121	IC19
NE592F14	FH	14	CERDIP	80;94;121	IC19
NE592N14	NH	14	PLDIL	80;94;121	IC11

IC

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
					IC19
					IC02
NE592N8	NE	8	PLDIL	80;94;121	IC11
					IC19
					IC02
NE594D	DL	20	SO20L	85;93	IC11
NE594N	NK	18	PLDIL	85;93	IC11
NE602AD	DE	8	SO8	94;96;116	IC11
					IC17
					IC19
					IC01
NE602AN★	NE	8	PLDIL	94;96;116	IC11
					IC17
					IC19
NE604AD	D	16	SO16	94;96;116	IC11
					IC01
NE604AN★	N	16	PLDIL	94;96;116	IC11
					IC01
NE605D	D	20	SO20	96;108;116	IC11
					IC17
					IC01
NE605N	N	20	DIL	96;108;116	IC11
					IC17
					IC01
NE612D	DE	8	SO8	96;116	IC11
					IC03
					IC17
					IC01
NE612N	NE	8	PLDIL	96;116	IC11
					IC03
					IC17
					IC01
NE614AD	D	16	SO16	96;108;116	IC01
NE614AN	N	16	PLDIL	94;96;108;116	IC01
NE615D	D	20	SO20	94;96;108;116	IC11
NE615N	N	20	PLDIL	94;96;108;116	IC11
N3101AD	D	16	SO16	68	IC10
N3101AN	NJ	16	PLDIL	68	IC10
N74ALS00AD	DH	14	SO14	47	IC05
N74ALS00AN	NH	14	PLDIL	47	IC05
N74ALS02D	DH	14	SO14	47	IC05
N74ALS02N	NH	14	PLDIL	47	IC05
N74ALS04BD	DH	14	SO14	47	IC05
N74ALS04BN	NH	14	PLDIL	47	IC05
N74ALS08D	DH	14	SO14	46	IC05
N74ALS08N	NH	14	PLDIL	46	IC05
N74ALS10AD	DH	14	SO14	47	IC05
N74ALS10AN	NH	14	PLDIL	47	IC05
N74ALS109AD	DJ	16	SO16	46	IC05
N74ALS109AN	NJ	16	PLDIL	46	IC05
N74ALS11AD	DH	14	SO14	46	IC05
N74ALS11AN	NH	14	PLDIL	46	IC05
N74ALS112AD	DJ	16	SO16	46	IC05
N74ALS112AN	NJ	16	PLDIL	46	IC05

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74ALS138D	DJ	16	SO16	44	IC05
N74ALS138N	NJ	16	PLDIL	44	IC05
N74ALS139D	DJ	16	SO16	44	IC05
N74ALS139N	NJ	16	PLDIL	44	IC05
N74ALS151D	DJ	16	SO16	48	IC05
N74ALS151N	NJ	16	PLDIL	48	IC05
N74ALS153D	DJ	16	SO16	48	IC05
N74ALS153N	NJ	16	PLDIL	48	IC05
N74ALS157D	DJ	16	SO16	48;51	IC05
N74ALS157N	NJ	16	PLDIL	48;51	IC05
N74ALS158D	DJ	16	SO16	48;51	IC05
N74ALS158N	NJ	16	PLDIL	48;51	IC05
N74ALS161BD	DJ	16	SO16	43	IC05
N74ALS161BN	NJ	16	PLDIL	43	IC05
N74ALS163BD	DJ	16	SO16	43	IC05
N74ALS163BN	NJ	16	PLDIL	43	IC05
N74ALS164D	DH	14	SO14	49	IC05
N74ALS164N	NH	14	PLDIL	49	IC05
N74ALS174D	DJ	16	SO16	45	IC05
N74ALS174N	NJ	16	PLDIL	45	IC05
N74ALS175D	DJ	16	SO16	45	IC05
N74ALS175N	NJ	16	PLDIL	45	IC05
N74ALS191D	DJ	16	SO16	44	IC05
N74ALS191N	NJ	16	PLDIL	44	IC05
N74ALS193D	DJ	16	SO16	44	IC05
N74ALS193N	NJ	16	PLDIL	44	IC05
N74ALS20AD	DH	14	SO14	47	IC05
N74ALS20AN	NH	14	PLDIL	47	IC05
N74ALS240A-1D	DL	20	SO20	41	IC05
N74ALS240A-1N	NL	20	PLDIL	41	IC05
N74ALS240AD	DL	20	SO20	41	IC05
N74ALS240AN	NL	20	PLDIL	41	IC05
N74ALS241A-1D	DL	20	SO20	41	IC05
N74ALS241A-1N	NL	20	PLDIL	41	IC05
N74ALS241AD	DL	20	SO20	41	IC05
N74ALS241AN	NL	20	PLDIL	41	IC05
N74ALS244A-1D	DL	20	SO20	41	IC05
N74ALS244A-1N	NL	20	PLDIL	41	IC05
N74ALS244AD	DL	20	SO20	41	IC05
N74ALS244AN	NL	20	PLDIL	41	IC05
N74ALS245A-1D	DL	20	SO20	42	IC05
N74ALS245A-1N	NL	20	PLDIL	42	IC05
N74ALS245AD	DL	20	SO20	42	IC05
N74ALS245AN	NL	20	PLDIL	42	IC05
N74ALS251D	DJ	16	SO16	48	IC05
N74ALS251N	NJ	16	PLDIL	48	IC05
N74ALS253D	DJ	16	SO16	48	IC05
N74ALS253N	NJ	16	PLDIL	48	IC05
N74ALS257D	DJ	16	SO16	48;51	IC05
N74ALS257N	NJ	16	PLDIL	48;51	IC05
N74ALS258D	DJ	16	SO16	48;51	IC05
N74ALS258N	NJ	16	PLDIL	48;51	IC05
N74ALS27D	DH	14	SO14	47	IC05
N74ALS27N	NH	14	PLDIL	47	IC05
N74ALS273D	DL	20	SO20	45	IC05
N74ALS273N	NL	20	PLDIL	45	IC05
N74ALS30AD	DH	14	SO14	47	IC05

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74ALS30AN	NH	14	PLDIL	47	IC05
N74ALS32D	DH	14	SO14	47	IC05
N74ALS32N	NH	14	PLDIL	47	IC05
N74ALS373D	DL	20	SO20	47	IC05
N74ALS373N	NL	20	PLDIL	47	IC05
N74ALS374D	DL	20	SO20	45	IC05
N74ALS374N	NL	20	PLDIL	45	IC05
N74ALS377D	DL	20	SO20	45	IC05
N74ALS377N	NL	20	PLDIL	45	IC05
N74ALS38AD	DH	14	SO14	47	IC05
N74ALS38AN	NH	14	PLDIL	47	IC05
N74ALS543–1D	D	24	SO24	52	IC05
N74ALS543–1N	NN	24	SDIL	52	IC05
N74ALS543D	D	24	SO24	52	IC05
N74ALS543N	NN	24	SDIL	52	IC05
N74ALS544–1D	D	24	SO24	52	IC05
N74ALS544–1N	NN	24	SDIL	52	IC05
N74ALS544D	D	24	SO24	52	IC05
N74ALS544N	NN	24	SDIL	52	IC05
N74ALS563AD	DL	20	SO20	48	IC05
N74ALS563AN	NL	20	PLDIL	48	IC05
N74ALS564AD	DL	20	SO20	45	IC05
N74ALS564AN	NL	20	PLDIL	45	IC05
N74ALS573BD	DL	20	SO20	48	IC05
N74ALS573BN	NL	20	PLDIL	48	IC05
N74ALS574AD	DL	20	SO20	45	IC05
N74ALS574AN	NL	20	PLDIL	45	IC05
N74ALS620A–1D	DL	20	SO20	42;52	IC05
N74ALS620A–1N	NL	20	PLDIL	42;52	IC05
N74ALS620AD	DL	20	SO20	42;52	IC05
N74ALS620AN	NL	20	PLDIL	42;52	IC05
N74ALS623A–1D	DL	20	SO20	42;52	IC05
N74ALS623A–1N	NL	20	PLDIL	42;52	IC05
N74ALS623AD	DL	20	SO20	42;52	IC05
N74ALS623AN	NL	20	PLDIL	42;52	IC05
N74ALS645A–1D	DL	20	SO20L	52	IC05
N74ALS645A–1N	NL	20	PLDIL	52	IC05
N74ALS645AD	DL	20	SO20L	52	IC05
N74ALS645AN	NL	20	PLDIL	52	IC05
N74ALS646–1D	DL	24	SO24L	50;52	IC05
N74ALS646–1N	NL	24	PLDIL	50;52	IC05
N74ALS646D	DL	24	SO24L	50;52	IC05
N74ALS646N	NL	24	PLDIL	50;52	IC05
N74ALS648–1D	DL	24	SO24L	50;52	IC05
N74ALS648–1N	NL	24	PLDIL	50;52	IC05
N74ALS648D	DL	24	SO24L	50;52	IC05
N74ALS648N	NL	24	PLDIL	50;52	IC05
N74ALS651–1D	DL	24	SO24L	50;53	IC05
N74ALS651–1N	NL	24	PLDIL	50;53	IC05
N74ALS651D	DL	24	SO24L	50;52	IC05
N74ALS651N	NL	24	PLDIL	50;52	IC05
N74ALS652–1D	DL	24	SO24L	50;53	IC05
N74ALS652–1N	NL	24	PLDIL	50;53	IC05
N74ALS652D	DL	24	SO24L	50;53	IC05
N74ALS652N	NL	24	PLDIL	50;53	IC05
N74ALS74AD	DH	14	SO14	45	IC05
N74ALS74AN	NH	14	PLDIL	45	IC05

INTEGRATED CIRCUITS

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74ALS86D	DH	14	SO14	46	IC05
N74ALS86N	NH	14	PLDIL	46	IC05
N74F00D★	DH	14	SO14	47	IC15
N74F00N★	NH	14	PLDIL	47	IC15
N74F02D	DH	14	SO14	47	IC15
N74F02N	NH	14	PLDIL	47	IC15
N74F04D★	DH	14	SO14	47	IC15
N74F04N★	NH	14	PLDIL	47	IC15
N74F06D	DH	14	SO14	41	IC15
N74F06N	NH	14	PLDIL	41	IC15
N74F07D	DH	14	SO14	41	IC15
N74F07N	NH	14	PLDIL	41	IC15
N74F08D★	DH	14	SO14	46	IC15
N74F08N★	NH	14	PLDIL	46	IC15
N74F10D★	DH	14	SO14	47	IC15
N74F10N★	NH	14	PLDIL	47	IC15
N74F109D	DJ	16	SO16	46	IC15
N74F109N	NJ	16	PLDIL	46	IC15
N74F11D★	DH	14	SO14	46	IC15
N74F11N★	NH	14	PLDIL	46	IC15
N74F112D	DJ	16	SO16	46	IC15
N74F112N	NJ	16	PLDIL	46	IC15
N74F113D	DH	14	SO14	46	IC15
N74F113N★	NH	14	PLDIL	46	IC15
N74F114D	DH	14	SO14	46	IC15
N74F114N★	NH	14	PLDIL	46	IC15
N74F1240D	DL	20	SO20	42	IC15
N74F1240N	NL	20	PLDIL	42	IC15
N74F1241D	DL	20	SO20	42	IC15
N74F1241N★	NL	20	PLDIL	42	IC15
N74F1242D	DH	14	SO14	53	IC15
N74F1242N★	NH	14	PLDIL	53	IC15
N74F1243D	DH	14	SO14	53	IC15
N74F1243N★	NH	14	PLDIL	53	IC15
N74F1244D	DL	20	SO20	42	IC15
N74F1244N★	NL	20	PLDIL	42	IC15
N74F1245D	DL	20	SO20	43	IC15
N74F1245N★	NL	20	PLDIL	43	IC15
N74F125D	DH	14	SO14	41	IC15
N74F125N★	NH	14	PLDIL	41	IC15
N74F126D	DH	14	SO14	41	IC15
N74F126N★	NH	14	PLDIL	41	IC15
N74F13D	DH	14	SO14	51	IC15
N74F13N	NH	14	PLDIL	51	IC15
N74F132D	DH	14	SO14	51	IC15
N74F132N	NH	14	PLDIL	51	IC15
N74F133D	DJ	16	SO16	47	IC15
N74F133N★	NJ	16	PLDIL	47	IC15
N74F138D	DJ	16	SO16	44	IC15
N74F138N★	NJ	16	PLDIL	44	IC15
N74F139D	DJ	16	SO16	44	IC15
N74F139N★	NJ	16	PLDIL	44	IC15
N74F14D	DH	14	SO14	51	IC15
N74F14N★	NH	14	PLDIL	51	IC15
N74F148D	DJ	16	SO16	45	IC15
N74F148N★	NJ	16	PLDIL	45	IC15
N74F151AD	DJ	16	SO16	48	IC15

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74F151AN★	NJ	16	PLDIL	48	IC15
N74F151D	DJ	16	SO16	48	IC15
N74F151N★	NJ	16	PLDIL	48	IC15
N74F153D	DJ	16	SO16	48	IC15
N74F153N★	NJ	16	PLDIL	48	IC15
N74F154D	DN	24	SO24	44	IC15
N74F154N★	NN	24	PLDIL	44	IC15
N74F157AD	DJ	16	SO16	48;51	IC15
N74F157AN★	NJ	16	PLDIL	48;51	IC15
N74F157D★	DJ	16	SO16	48;51	IC15
N74F157N★	NJ	16	PLDIL	48;51	IC15
N74F158AD★	DJ	16	SO16	48;51	IC15
N74F158AN★	NJ	16	PLDIL	48;51	IC15
N74F158D	DJ	16	SO16	48;51	IC15
N74F158N★	NJ	16	PLDIL	48;51	IC15
N74F160AD	DJ	16	SO16	43	IC15
N74F160AN★	NJ	16	PLDIL	43	IC15
N74F1604D	D	28	SO28	48	IC15
N74F1604N	N	28	PLDIL	48	IC15
N74F161AD	DJ	16	SO16	43	IC15
N74F161AN★	NJ	16	PLDIL	43	IC15
N74F162AD	DJ	16	SO16	43	IC15
N74F162AN★	NJ	16	PLDIL	43	IC15
N74F163AD	DJ	16	SO16	43	IC15
N74F163AN★	NJ	16	PLDIL	43	IC15
N74F164D	DH	14	SO14	49	IC15
N74F164N★	NH	14	PLDIL	49	IC15
N74F166D	DJ	16	SO16	49	IC15
N74F166N★	NJ	16	PLDIL	49	IC15
N74F168D	DJ	16	SO16	44	IC15
N74F168N★	NJ	16	PLDIL	44	IC15
N74F169D	DJ	16	SO16	44	IC15
N74F169N★	NJ	16	PLDIL	44	IC15
N74F173D	DJ	16	SO16	45	IC15
N74F173N★	NJ	16	PLDIL	45	IC15
N74F174D	DJ	16	SO16	45	IC15
N74F174N★	NJ	16	PLDIL	45	IC15
N74F175D	DJ	16	SO16	45	IC15
N74F175N★	NJ	16	PLDIL	45	IC15
N74F1761A	A	44	PLCC	51	IC15
N74F1761N	N	48	PLDIL	51	IC15
N74F1762A	A	44	PLCC	51	IC15
N74F1762N	N	40	PLDIL	51	IC15
N74F1763A	A	44	PLCC	51;94	IC15 IC19
N74F1763N	N	48	PLDIL	51;94	IC15 IC19
N74F1764–1A	A	44	PLCC	51;94	IC15 IC19
N74F1764–1N	N	48	PLDIL	51;94	IC15 IC19
N74F1764A	A	44	PLCC	51;94	IC15 IC19
N74F1764N★	NY	48	PLDIL	51;94	IC15 IC19
N74F1765–1A	A	44	PLCC	51;94	IC15 IC19

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74F1765–1N	N	48	PLDIL	51;94	IC15 IC19
N74F1765A	A	44	PLCC	51;94	IC15 IC19
N74F1765N	NY	48	PLDIL	51;94	IC15 IC19
N74F1779D	D	16	SO16	44	IC15
N74F1779N	N	16	PLDIL	44	IC15
N74F1804D	D	20	SO20	45	IC15
N74F1804N	N	20	PLDIL	45	IC15
N74F1805D	D	20	SO20	45	IC15
N74F1805N	N	20	PLDIL	45	IC15
N74F1808D	D	20	SO20	45	IC15
N74F1808N	N	20	PLDIL	45	IC15
N74F181D	DN	24	SO24	41	IC15
N74F181N★	NN	24	PLDIL	41	IC15
N74F182D	DJ	16	SO16	41	IC15
N74F182N★	NJ	16	PLDIL	41	IC15
N74F1832D	D	20	SO20	45	IC15
N74F1832N	N	20	PLDIL	45	IC15
N74F189AD	D	16	SO16	48	IC15 IC10
N74F189AN	N	16	PLDIL	48	IC15 IC10
N74F1894D	D	28	SO28	53	IC15
N74F1894N	N	28	PLDIL	53	IC15
N74F1895D	D	28	SO28	53	IC15
N74F1895N	N	28	PLDIL	53	IC15
N74F1896D	D	28	SO28	53	IC15
N74F1896N	N	28	PLDIL	53	IC15
N74F1897D	D	28	SO28	53	IC15
N74F1897N	N	28	PLDIL	53	IC15
N74F190D	DJ	16	SO16	44	IC15
N74F190N★	NJ	16	PLDIL	44	IC15
N74F191D	DJ	16	SO16	44	IC15
N74F191N★	NJ	16	PLDIL	44	IC15
N74F192D	DJ	16	SO16	44	IC15
N74F192N★	NJ	16	PLDIL	44	IC15
N74F193D	DJ	16	SO16	44	IC15
N74F193N★	NJ	16	PLDIL	44	IC15
N74F194D	DJ	16	SO16	49	IC15
N74F194N	NJ	16	PLDIL	49	IC15
N74F195D	DJ	16	SO16	49	IC15
N74F195N★	NJ	16	PLDIL	49	IC15
N74F198D	D	24	SO24	49	IC15
N74F198N★	NN	24	PLDIL	49	IC15
N74F199D	D	24	SO24	49	IC15
N74F199N★	NN	24	PLDIL	49	IC15
N74F20D	DH	14	SO14	47	IC15
N74F20N	NH	14	PLDIL	47	IC15
N74F219AD	D	16	SO16	48	IC10 IC15
N74F219AN	N	16	PLDIL	48	IC10 IC15
N74F222D	D	20	SO20	49	IC15
N74F222N	N	20	PLDIL	49	IC15
N74F224D	D	16	SO16	49	IC15

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74F224N	N	16	PLDIL	49	IC15
N74F225D	D	20	SO20	49	IC15
N74F225N	NL	20	PLDIL	49	IC15
N74F240D	DL	20	SO20	41	IC15
N74F240N★	NL	20	PLDIL	41	IC15
N74F241D	DL	20	SO20	41	IC15
N74F241N	NL	20	PLDIL	41	IC15
N74F242D	DH	14	SO14	42;52	IC15
N74F242N	NH	14	PLDIL	42;52	IC15
N74F243D	DH	14	SO14	42;52	IC15
N74F243N	NH	14	PLDIL	42;52	IC15
N74F244D★	DL	20	SO20	41	IC15
N74F244N★	NL	20	PLDIL	41	IC15
N74F245D★	DL	20	SO20	42;52	IC15
N74F245N★	NL	20	PLDIL	42;52	IC15
N74F251AD	DJ	16	SO16	48	IC15
N74F251AN★	NJ	16	PLDIL	48	IC15
N74F251D	DJ	16	SO16	48	IC15
N74F251N★	NJ	16	PLDIL	48	IC15
N74F253D	DJ	16	SO16	48	IC15
N74F253N★	NJ	16	PLDIL	48	IC15
N74F256D	DJ	16	SO16	47	IC15
N74F256N	NJ	16	PLDIL	47	IC15
N74F257AD	DJ	16	SO16	48;51	IC15
N74F257AN★	NJ	16	PLDIL	48;51	IC15
N74F257D	DJ	16	SO16	48;51	IC15
N74F257N★	NJ	16	PLDIL	48;51	IC15
N74F258AD	DJ	16	SO16	49;51	IC15
N74F258AN★	NJ	16	PLDIL	49;51	IC15
N74F258D	DJ	16	SO16	48;51	IC15
N74F258N	NJ	16	PLDIL	48;51	IC15
N74F259D	DJ	16	SO16	47	IC15
N74F259N	NJ	16	PLDIL	47	IC15
N74F260D	DH	14	SO14	47	IC15
N74F260N★	NH	14	PLDIL	47	IC15
N74F269D	DN	24	SO24	44	IC15
N74F269N★	NN	24	PLDIL	44	IC15
N74F27D	DH	14	SO14	47	IC15
N74F27N	NH	14	PLDIL	47	IC15
N74F273D	DL	20	SO20	45	IC15
N74F273N	NL	20	PLDIL	45	IC15
N74F280AD	DH	14	SO14	41	IC15
N74F280AN★	NH	14	PLDIL	41	IC15
N74F280BD	DH	14	SO14	41	IC15
N74F280BN	NH	14	PLDIL	41	IC15
N74F283D	DJ	16	SO16	41	IC15
N74F283N★	NJ	16	PLDIL	41	IC15
N74F2952D	D	24	SO24	53	IC15
N74F2952N	NN	24	PLDIL	53	IC15
N74F2953D	D	24	SO24	53	IC15
N74F2953N★	NN	24	PLDIL	53	IC15
N74F298D	DJ	16	SO16	49	IC15
N74F298N★	NJ	16	PLDIL	49	IC15
N74F299D	DL	20	SO20	49	IC15
N74F299N★	NL	20	PLDIL	49	IC15
N74F30D	DH	14	SO14	47	IC15
N74F30N	NH	14	PLDIL	47	IC15

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74F30240N★	NN	24	PLDIL	45	IC15
N74F30244N★	NN	24	PLDIL	45	IC15
N74F30245N	N	24	PLDIL	45;53	IC15
N74F3037D	D	16	SO16	45	IC15
N74F3037N★	NJ	16	PLDIL	45	IC15
N74F3038D	D	16	SO16	45	IC15
N74F3038N★	NJ	16	PLDIL	45	IC15
N74F3040D	D	16	SO16	45	IC15
N74F3040N★	NJ	16	PLDIL	45	IC15
N74F30640N★	NN	24	PLDIL	45;53	IC15
N74F32D★	DH	14	SO14	47	IC15
N74F32N★	NH	14	PLDIL	47	IC15
N74F322D	D	20	SO20	49	IC15
N74F322N★	NL	20	PLDIL	49	IC15
N74F323D	D	20	SO20	49	IC15
N74F323N★	NL	20	PLDIL	49	IC15
N74F350D	DJ	16	SO16	49	IC15
N74F350N★	NJ	16	PLDIL	49	IC15
N74F352D	DJ	16	SO16	49	IC15
N74F352N	NJ	16	PLDIL	49	IC15
N74F353D	DJ	16	SO16	49	IC15
N74F353N	NJ	16	PLDIL	49	IC15
N74F365D	DJ	16	SO16	41	IC15
N74F365N★	NJ	16	PLDIL	41	IC15
N74F366D	DJ	16	SO16	41	IC15
N74F366N★	NJ	16	PLDIL	41	IC15
N74F367D	DJ	16	SO16	41	IC15
N74F367N★	NJ	16	PLDIL	41	IC15
N74F368D	DJ	16	SO16	41	IC15
N74F368N★	NJ	16	PLDIL	41	IC15
N74F37D	DH	14	SO14	47	IC15
N74F37N★	NH	14	PLDIL	47	IC15
N74F373D★	DL	20	SO20	47	IC15
N74F373N★	NL	20	PLDIL	47	IC15
N74F374D	DL	20	SO20	45	IC15
N74F374N★	NL	20	PLDIL	45	IC15
N74F377D	DL	20	SO20	45	IC15
N74F377N★	NL	20	PLDIL	45	IC15
N74F378D	DJ	16	SO16	45	IC15
N74F378N★	NJ	16	PLDIL	45	IC15
N74F379D	DJ	16	SO16	45	IC15
N74F379N★	NJ	16	PLDIL	45	IC15
N74F38D	DH	14	SO14	47	IC15
N74F38N★	NH	14	PLDIL	47	IC15
N74F381D	DL	20	SO20	41	IC15
N74F381N★	NL	20	PLDIL	41	IC15
N74F382D	DL	20	SO20	41	IC15
N74F382N★	NL	20	PLDIL	41	IC15
N74F384N	NL	20	PLDIL	51	IC15
N74F385D	DL	20	SO20	41	IC15
N74F385N★	NL	20	PLDIL	41	IC15
N74F3893A	A	20	PLCC	43;53	IC15
N74F393D	D	14	SO14	44	IC15
N74F393N★	NH	14	PLDIL	44	IC15
N74F395AN	NJ	16	PLDIL	50	IC15
N74F395D	DJ	16	SO16	50	IC15
N74F395N★	NJ	16	PLDIL	50	IC15

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74F398D	DL	20	SO20	50	IC15
N74F398N★	NL	20	PLDIL	50	IC15
N74F399D	DJ	16	SO16	50	IC15
N74F399N★	NJ	16	PLDIL	50	IC15
N74F40D	DH	14	SO14	47	IC15
N74F40N	NH	14	PLDIL	47	IC15
N74F410N	N	18	PLDIL	48;50	IC10 IC15
N74F412D	DN	24	SO24	48	IC15
N74F412N★	NN	24	PLDIL	48	IC15
N74F432D	DN	24	SO24	48	IC15
N74F432N★	NN	24	PLDIL	48	IC15
N74F455D	DN	24	SO24	41	IC15
N74F455N★	NN	24	PLDIL	41	IC15
N74F456D	DN	24	SO24	41	IC15
N74F456N★	NN	24	PLDIL	41	IC15
N74F4763A	A	68	PLCC	51	IC15
N74F4763N	N	64	PLDIL	51	IC15
N74F50109D	D	16	SO16	46	IC15
N74F50109N	N	16	PLDIL	46	IC15
N74F50728D	D	14	SO14	45	IC15
N74F50728N	N	14	PLDIL	45	IC15
N74F50729D	D	14	SO14	45	IC15
N74F50729N	N	14	PLDIL	45	IC15
N74F5074D	D	14	SO14	45	IC15
N74F5074N	N	14	PLDIL	45	IC15
N74F51D	DH	14	SO14	46;47	IC15
N74F51N	NH	14	PLDIL	46;47	IC15
N74F521D	DL	20	SO20	43	IC15
N74F521N★	NL	20	PLDIL	43	IC15
N74F524D	DL	20	SO20	43	IC15
N74F524N★	NL	20	PLDIL	43	IC15
N74F5300D	D	8	SO8	45	IC15
N74F533D	DL	20	SO20	48	IC15
N74F533N	NL	20	PLDIL	48	IC15
N74F534D	DL	20	SO20	45	IC15
N74F534N	NL	20	PLDIL	45	IC15
N74F537D	DL	20	SO20	44	IC15
N74F537N★	NL	20	PLDIL	44	IC15
N74F538D	DL	20	SO20	44	IC15
N74F538N★	NL	20	PLDIL	44	IC15
N74F539D	DL	20	SO20	44	IC15
N74F539N★	NL	20	PLDIL	44	IC15
N74F540D	DL	20	SO20	41	IC15
N74F540N★	NL	20	PLDIL	41	IC15
N74F541D	DL	20	SO20	41	IC15
N74F541N★	NL	20	PLDIL	41	IC15
N74F543D	DN	24	SO24	52	IC15
N74F543N★	NN	24	PLDIL	52	IC15
N74F544D	DN	24	SO24	52	IC15
N74F544N★	NN	24	PLDIL	52	IC15
N74F545D	DL	20	SO20	42;52	IC15
N74F545N★	NL	20	PLDIL	42;52	IC15
N74F547D	DL	20	SO20	44	IC15
N74F547N★	NL	20	PLDIL	44	IC15
N74F548D	DL	20	SO20	44	IC15
N74F548N★	NL	20	PLDIL	44	IC15

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74F550N	NQ	28	PLDIL	52	IC15
N74F551N	NQ	28	PLDIL	52	IC15
N74F552D	D	28	SO28	52	IC15
N74F552N	NQ	28	PLDIL	52	IC15
N74F563D	D	20	SO20	48	IC15
N74F563N★	NL	20	PLDIL	48	IC15
N74F564D	D	20	SO20	45	IC15
N74F564N★	NL	20	PLDIL	45	IC15
N74F568D	D	20	SO20	44	IC15
N74F568N★	NL	20	PLDIL	44	IC15
N74F569D	D	20	SO20	44	IC15
N74F569N★	NL	20	PLDIL	44	IC15
N74F573D	D	20	SO20	48	IC15
N74F573N★	NL	20	PLDIL	48	IC15
N74F574D★	D	20	SO20	45	IC15
N74F574N★	NL	20	PLDIL	45	IC15
N74F579D	DL	20	SO20	44	IC15
N74F579N★	NL	20	PLDIL	44	IC15
N74F582D	DN	24	SO24	41	IC15
N74F582N★	NN	24	PLDIL	41	IC15
N74F583D	DJ	16	SO16	41	IC15
N74F583N★	NJ	16	PLDIL	41	IC15
N74F588D	D	20	SO20	52	IC15
N74F588N★	NL	20	PLDIL	52	IC15
N74F595D	D	16	SO16	50	IC15
N74F595N	NJ	16	PLDIL	50	IC15
N74F597D	D	16	SO16	50	IC15
N74F597N	NJ	16	PLDIL	50	IC15
N74F598D	D	20	SO20	50	IC15
N74F598N	NJ	20	PLDIL	50	IC15
N74F604D	DQ	28	SO28	50	IC15
N74F604N★	NQ	28	PLDIL	50	IC15
N74F605D	DQ	28	SO28	50	IC15
N74F605N★	NQ	28	PLDIL	50	IC15
N74F620D	DL	20	SO20	42;52	IC15
N74F620N★	NL	20	PLDIL	42;52	IC15
N74F621D	DL	20	SO20	42;52	IC15
N74F621N★	NL	20	PLDIL	42;52	IC15
N74F622D	DL	20	SO20	42;52	IC15
N74F622N★	NL	20	PLDIL	42;52	IC15
N74F623D	DL	20	SO20	42;52	IC15
N74F623N	NL	20	PLDIL	42;52	IC15
N74F64D	DH	14	SO14	46;47	IC15
N74F64N	NH	14	PLDIL	46;47	IC15
N74F640D	DL	20	SO20	42;52	IC15
N74F640N★	NL	20	PLDIL	42;52	IC15
N74F641D	DL	20	SO20	42;52	IC15
N74F641N★	NL	20	PLDIL	42;52	IC15
N74F642D	DL	20	SO20	42;52	IC15
N74F642N★	NL	20	PLDIL	42;52	IC15
N74F646AD	DN	24	SO24	42;50;52	IC15
N74F646AN	NN	24	PLDIL	42;50;52	IC15
N74F646D	DN	24	SO24	42;50;52	IC15
N74F646N★	NN	24	PLDIL	42;50;52	IC15
N74F647D	DN	24	SO24	42;50;52	IC15
N74F647N★	NN	24	PLDIL	42;50;52	IC15
N74F648AD	DN	24	SO24	42;50;52	IC15

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74F648AN	NN	24	PLDIL	42;50;52	IC15
N74F648D	DN	24	SO24	42;50;52	IC15
N74F648N	NN	24	PLDIL	42;50;52	IC15
N74F649D	DN	24	SO24	42;50;52	IC15
N74F649N★	NN	24	PLDIL	42;50;52	IC15
N74F651AD	DN	24	SO24	50;53	IC15
N74F651AN	NN	24	PLDIL	50;53	IC15
N74F651D	DN	24	SO24	50;52	IC15
N74F651N★	NN	24	PLDIL	50;52	IC15
N74F652AD	DN	24	SO24	50;53	IC15
N74F652AN	NN	24	PLDIL	50;53	IC15
N74F652D	DN	24	SO24	50;53	IC15
N74F652N	NN	24	PLDIL	50;53	IC15
N74F653F★	FN	24	CERDIP	50;53	IC15
N74F654F★	FN	24	CERDIP	50;53	IC15
N74F655AD	DN	24	SO24	41	IC15
N74F655AN★	NN	24	PLDIL	41	IC15
N74F656AD	DN	24	SO24	41	IC15
N74F656AN★	NN	24	PLDIL	41	IC15
N74F657AD	DN	24	SO24	42	IC15
N74F657AN	NN	24	PLDIL	42	IC15
N74F657D	DN	24	SO24	42	IC15
N74F657N★	NN	24	PLDIL	42	IC15
N74F670D	D	16	SO16	50	IC15
N74F670N★	NJ	16	PLDIL	50	IC15
N74F674D	D	24	SO24	50	IC15
N74F674N★	NN	24	PLDIL	50	IC15
N74F676D	DN	24	SO24	50	IC15
N74F676N★	NN	24	PLDIL	50	IC15
N74F711–1D	D	20	SO20	49	IC15
N74F711–1N	N	20	PLDIL	49	IC15
N74F711D	D	20	SO20	49	IC15
N74F711N	NL	20	PLDIL	49	IC15
N74F712–1D	D	24	SO24	49	IC15
N74F712–1N	N	24	PLDIL	49	IC15
N74F712D	D	24	SO24	49	IC15
N74F712N	NN	24	PLDIL	49	IC15
N74F723–1D	D	24	SO24	49	IC15
N74F723–1N	N	24	PLDIL	49	IC15
N74F723D	D	24	SO24	49	IC15
N74F723N	NN	24	PLDIL	49	IC15
N74F725–1D	D	24	SO24	49	IC15
N74F725–1N	N	24	PLDIL	49	IC15
N74F725D	D	24	SO24	49	IC15
N74F725N	NN	24	PLDIL	49	IC15
N74F732D	D	20	SO20	49	IC15
N74F732N	NL	20	PLDIL	49	IC15
N74F733D	D	20	SO20	49	IC15
N74F733N★	NL	20	PLDIL	49	IC15
N74F74D★	DH	14	SO14	45	IC15
N74F74N★	NH	14	PLDIL	45	IC15
N74F755D	D	24	SO24	50	IC15
N74F755N	N	24	PLDIL	50	IC15
N74F756D	D	20	SO20	41	IC15
N74F756N	N	20	PLDIL	41	IC15
N74F757D	D	20	SO20	41	IC15
N74F757N	N	20	PLDIL	41	IC15

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74F760D	D	20	SO20	42	IC15
N74F760N	N	20	PLDIL	42	IC15
N74F764–1A	AW	44	PLCC	51;94	IC15 IC19
N74F764–1N★	NW	40	PLDIL	51;94	IC15 IC19
N74F764A	AW	44	PLCC	51;94	IC15 IC19
N74F764AA	AW	44	PLCC	51;94	IC15 IC19
N74F764AN	N	40	PLDIL	51;94	IC15 IC19
N74F764N★	NW	40	PLDIL	51;94	IC15 IC19
N74F765–1A	AW	44	PLCC	51;94	IC15 IC19
N74F765–1N★	NW	40	PLDIL	51;94	IC15 IC19
N74F765A	AW	44	PLCC	51;94	IC15 IC19
N74F765AA	AW	44	PLCC	51;94	IC15 IC19
N74F765AN	N	40	PLDIL	51;94	IC15 IC19
N74F765N	NW	40	PLDIL	51;94	IC15 IC19
N74F776A	A	28	PLCC	42;53	IC15
N74F776N	N	28	PLDIL	42;53	IC15
N74F777A	A	20	PLCC	42;53	IC15
N74F777F	F	20	CLCC	42;53	IC15
N74F779D	DJ	16	SO16	44	IC15
N74F779N★	NJ	16	PLDIL	44	IC15
N74F786D	D	16	SO16	51	IC15 IC19
N74F786N	N	16	PLDIL	51	IC15 IC19
N74F804D	D	20	SO20	45	IC15
N74F804N	NL	20	PLDIL	45	IC15
N74F805D	D	20	SO20	45	IC15
N74F805N	NL	20	PLDIL	45	IC15
N74F807A	A	28	PLCC	53	IC15
N74F807D	D	28	SO28	53	IC15
N74F807N	N	28	PLDIL	53	IC15
N74F808D	D	20	SO20	43;45	IC15
N74F808N	NL	20	PLDIL	43;45	IC15
N74F821D	D	24	SO24	43;50	IC15
N74F821N★	NN	24	PLDIL	43;50	IC15
N74F822D	D	24	SO24	43;50	IC15
N74F822N	NN	24	PLDIL	43;50	IC15
N74F823D	D	24	SO24	43;50	IC15
N74F823N	NN	24	PLDIL	43;50	IC15
N74F824D	D	24	SO24	43;50	IC15
N74F824N	NN	24	PLDIL	43;50	IC15
N74F825D	D	24	SO24	43;51	IC15
N74F825N	NN	24	PLDIL	43;51	IC15
N74F826D	D	24	SO24	43;51	IC15
N74F826N	NN	24	PLDIL	43;51	IC15

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74F827D	DN	24	SO24	42	IC15
N74F827N	NN	24	PLDIL	42	IC15
N74F828D	DN	24	SO24	42	IC15
N74F828N	NN	24	PLDIL	42	IC15
N74F83D	DJ	16	SO16	41	IC15
N74F83N★	NJ	16	PLDIL	41	IC15
N74F832D	D	20	SO20	45	IC15
N74F832N	NL	20	PLDIL	45	IC15
N74F835D	D	24	SO24	51	IC15
N74F835N	N	24	PLDIL	51	IC15
N74F838D	D	20	SO20	43;51	IC15
N74F838N	N	20	PLDIL	43;51	IC15
N74F841D	DN	24	SO24	43;48	IC15
N74F841N	NN	24	PLDIL	43;48	IC15
N74F842D	DN	24	SO24	43;48	IC15
N74F842N★	NN	24	PLDIL	43;48	IC15
N74F843D	D	24	SO24	43;48	IC15
N74F843N★	NN	24	PLDIL	43;48	IC15
N74F844D	DN	24	SO24	43;48	IC15
N74F844N★	NN	24	PLDIL	43;48	IC15
N74F845N	NN	24	PLDIL	43;48	IC15
N74F846D	DN	24	SO24	43;48	IC15
N74F846N★	NN	24	PLDIL	43;48	IC15
N74F85D★	DJ	16	SO16	43	IC15
N74F85N★	NJ	16	PLDIL	43	IC15
N74F86D★	DH	14	SO14	46	IC15
N74F86N★	NH	14	PLDIL	46	IC15
N74F861D	DN	24	SO24	43;53;94	IC15
N74F861N★	NN	24	PLDIL	43;53;94	IC15
N74F862D	DN	24	SO24	43;53	IC15
N74F862N★	NN	24	PLDIL	43;53	IC15
N74F863D	DN	24	SO24	43;53	IC15
N74F863N★	NN	24	PLDIL	43;53	IC15
N74F864D	DN	24	SO24	43;53	IC15
N74F864N★	NN	24	PLDIL	43;53	IC15
N74F881D	DN	24	SO24	41	IC15
N74F881N★	NN	24	PLDIL	41	IC15
N74F882D	DN	24	SO24	41	IC15
N74F882N★	NN	24	PLDIL	41	IC15
N74F8960A	A	28	PLCC	53	IC15
N74F8960N	N	28	PLDIL	53	IC15
N74F8961A	A	28	PLCC	53	IC15
N74F8961N	N	28	PLDIL	53	IC15
N74F899A	A	28	PLCC	53	IC15
N74F899N	N	28	PLDIL	53	IC15
N74LS00D	DH	14	SO14	47	IC09
N74LS00N★	NH	14	PLDIL	47	IC09
N74LS01D	DH	14	SO14	47	IC09
N74LS01N★	NH	14	PLDIL	47	IC09
N74LS02D	DH	14	SO14	47	IC09
N74LS02N★	NH	14	PLDIL	47	IC09
N74LS04D	DH	14	SO14	47	IC09
N74LS04N★	NH	14	PLDIL	47	IC09
N74LS05D	DH	14	SO14	47	IC09
N74LS05N★	NH	14	PLDIL	47	IC09
N74LS08D	DH	14	SO14	46	IC09
N74LS08N★	NH	14	PLDIL	46	IC09

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74LS09D	DH	14	SO14	46	IC09
N74LS09N	NH	14	PLDIL	46	IC09
N74LS10D	DH	14	SO14	47	IC09
N74LS10N★	NH	14	PLDIL	47	IC09
N74LS107D	DH	14	SO14	46	IC09
N74LS107N	NH	14	PLDIL	46	IC09
N74LS109AD	DJ	16	SO16	46	IC09
N74LS109AN	NJ	16	PLDIL	46	IC09
N74LS11D	DH	14	SO14	46	IC09
N74LS11N	NH	14	PLDIL	46	IC09
N74LS112D	DJ	16	SO16	46	IC09
N74LS112N	NJ	16	PLDIL	46	IC09
N74LS125AD	DH	14	SO14	41	IC09
N74LS125AN★	NH	14	PLDIL	41	IC09
N74LS126AD	DH	14	SO14	41	IC09
N74LS126AN	NH	14	PLDIL	41	IC09
N74LS13D	DH	14	SO14	51	IC09
N74LS13N★	NH	14	PLDIL	51	IC09
N74LS132D	DH	14	SO14	51	IC09
N74LS132N★	NH	14	PLDIL	51	IC09
N74LS138D	DJ	16	SO16	44	IC09
N74LS138N★	NJ	16	PLDIL	44	IC09
N74LS139D	DJ	16	SO16	44	IC09
N74LS139N	NJ	16	PLDIL	44	IC09
N74LS14D	DH	14	SO14	51	IC09
N74LS14N★	NH	14	PLDIL	51	IC09
N74LS151D	DJ	16	SO16	48	IC09
N74LS151N	NJ	16	PLDIL	48	IC09
N74LS153D	DJ	16	SO16	48	IC09
N74LS153N★	NJ	16	PLDIL	48	IC09
N74LS154D	DN	24	SO24	44	IC09
N74LS154N★	NN	24	PLDIL	44	IC09
N74LS155D	DJ	16	SO16	44	IC09
N74LS155N	NJ	16	PLDIL	44	IC09
N74LS156D	DJ	16	SO16	44	IC09
N74LS156N★	NJ	16	PLDIL	44	IC09
N74LS157D	DJ	16	SO16	48;51	IC09
N74LS157N★	NJ	16	PLDIL	48;51	IC09
N74LS158D	DJ	16	SO16	48;51	IC09
N74LS158N★	NJ	16	PLDIL	48;51	IC09
N74LS160AN	NJ	16	PLDIL	43	IC09
N74LS161AD	DJ	16	SO16	43	IC09
N74LS161AN★	NJ	16	PLDIL	43	IC09
N74LS162AN	NJ	16	PLDIL	43	IC09
N74LS163AD	DJ	16	SO16	43	IC09
N74LS163AN★	NJ	16	PLDIL	43	IC09
N74LS164D	DH	14	SO14	49	IC09
N74LS164N★	NH	14	PLDIL	49	IC09
N74LS169AD	DJ	16	SO16	44	IC09
N74LS169AN	NJ	16	PLDIL	44	IC09
N74LS173D	DJ	16	SO16	45	IC09
N74LS173N	NJ	16	PLDIL	45	IC09
N74LS174D	DJ	16	SO16	45	IC09
N74LS174N	NJ	16	PLDIL	45	IC09
N74LS175D	DJ	16	SO16	45	IC09
N74LS175N★	NJ	16	PLDIL	45	IC09
N74LS1801F	FN	24	CERDIP	51	IC09

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74LS1802F	–		–	51	IC09
N74LS181					
N74LS191D	DJ	16	SO16	44	IC09
N74LS191N	NJ	16	PLDIL	44	IC09
N74LS192N	NJ	16	PLDIL	44	IC09
N74LS193D	DJ	16	SO16	44	IC09
N74LS193N	NJ	16	PLDIL	44	IC09
N74LS195AD	DJ	16	SO16	49	IC09
N74LS195AN	NJ	16	PLDIL	49	IC09
N74LS20D	DH	14	SO14	47	IC09
N74LS20N★	NH	14	PLDIL	47	IC09
N74LS21D	DH	14	SO14	46	IC09
N74LS21N★	NH	14	PLDIL	46	IC09
N74LS240D	DL	20	SO20	41	IC09
N74LS240N★	NL	20	PLDIL	41	IC09
N74LS241D	DL	20	SO20	41	IC09
N74LS241N★	NL	20	PLDIL	42	IC09
N74LS242N	NH	14	PLDIL	42;52	IC09
N74LS243N★	NH	14	PLDIL	42;52	IC09
N74LS244D	DL	20	SO20	41	IC09
N74LS244N★	NL	20	PLDIL	41	IC09
N74LS245D	DL	20	SO20	42;52	IC09
N74LS245N★	NL	20	PLDIL	42;52	IC09
N74LS251AD	DJ	16	SO16	48	IC09
N74LS251AN	NJ	16	PLDIL	48	IC09
N74LS253D	DJ	16	SO16	48	IC09
N74LS253N	NJ	16	PLDIL	48	IC09
N74LS256D	DJ	16	SO16	47	IC09
N74LS256N	NJ	16	PLDIL	47	IC09
N74LS257AD	DJ	16	SO16	48;51	IC09
N74LS257AN★	NJ	16	PLDIL	48;51	IC09
N74LS258AD	DJ	16	SO16	49;51	IC09
N74LS258AN	NJ	16	PLDIL	49;51	IC09
N74LS259D	DJ	16	SO16	47	IC09
N74LS259N	NJ	16	PLDIL	47	IC09
N74LS26D	DH	14	SO14	47	IC09
N74LS26N★	NH	14	PLDIL	47	IC09
N74LS260D	DH	14	SO14	47	IC09
N74LS260N★	NH	14	PLDIL	47	IC09
N74LS266D	DH	14	SO14	46	IC09
N74LS266N	NH	14	PLDIL	46	IC09
N74LS273D	DL	20	SO20	45	IC09
N74LS273N★	NL	20	PLDIL	45	IC09
N74LS283D	DJ	16	SO16	41	IC09
N74LS283N	NJ	16	PLDIL	41	IC09
N74LS290D	DH	14	SO14	44	IC09
N74LS290N	NH	14	PLDIL	44	IC09
N74LS293D	DH	14	SO14	44	IC09
N74LS293N	NH	14	PLDIL	44	IC09

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74LS298N	NJ	16	PLDIL	49	IC09
N74LS30D	DH	14	SO14	47	IC09
N74LS30N★	NH	14	PLDIL	47	IC09
N74LS301D	D	16	SO16	48	IC09 IC10
N74LS301N	NJ	16	PLDIL	48	IC09 IC10
N74LS32D	DH	14	SO14	47	IC09
N74LS32N★	NH	14	PLDIL	47	IC09
N74LS33N	NH	14	PLDIL	47	IC09
N74LS352N	NJ	16	PLDIL	49	IC09
N74LS353D	DJ	16	SO16	49	IC09
N74LS353N	NJ	16	PLDIL	49	IC09
N74LS365AD	DJ	16	SO16	41	IC09
N74LS365AN	NJ	16	PLDIL	41	IC09
N74LS366AN	NJ	16	PLDIL	41	IC09
N74LS367AD	DJ	16	SO16	41	IC09
N74LS367AN	NJ	16	PLDIL	41	IC09
N74LS368AD	DJ	16	SO16	41	IC09
N74LS368AN	NJ	16	PLDIL	41	IC09
N74LS37N★	NH	14	PLDIL	47	IC09
N74LS373D	DL	20	SO20	47	IC09
N74LS373N★	NL	20	PLDIL	47	IC09
N74LS374D	DL	20	SO20	45	IC09
N74LS374N★	NL	20	PLDIL	45	IC09
N74LS377D	DL	20	SO20	45	IC09
N74LS377N	NL	20	PLDIL	45	IC09
N74LS378N	NJ	16	PLDIL	45	IC09
N74LS38D	DH	14	SO14	47	IC09
N74LS38N★	NH	14	PLDIL	47	IC09
N74LS390D	DJ	16	SO16	44	IC09
N74LS390N★	NJ	16	PLDIL	44	IC09
N74LS393D	DH	14	SO14	44	IC09
N74LS393N★	NH	14	PLDIL	44	IC09
N74LS395AN	NJ	16	PLDIL	50	IC09
N74LS42D	DJ	16	SO16	44	IC09
N74LS42N	NJ	16	PLDIL	44	IC09 IC19
N74LS490N	NJ	16	PLDIL	44	IC09
N74LS51D	DH	14	SO14	46;47	IC09
N74LS51N	NH	14	PLDIL	46;47	IC09
N74LS54D	DH	14	SO14	46;47	IC09
N74LS54N	NH	14	PLDIL	46;47	IC09
N74LS540D	DL	20	SO20	41	IC09
N74LS540N★	NL	20	PLDIL	41	IC09
N74LS541D	DL	20	SO20	41	IC09
N74LS541N★	NL	20	PLDIL	41	IC09
N74LS620N	NL	20	PLDIL	42;52	IC09
N74LS621N	NL	20	PLDIL	42;52	IC09
N74LS622N	NL	20	PLDIL	42;52	IC09
N74LS623N	NL	20	PLDIL	42;52	IC09
N74LS640-1N	NL	20	PLDIL	42;52	IC09

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74LS640D	DL	20	SO20	42;52	IC09
N74LS640N	NL	20	PLDIL	42;52	IC09
N74LS641–1N	NL	20	PLDIL	42;52	IC09
N74LS641N	NL	20	PLDIL	42;52	IC09
N74LS642–1N	NL	20	PLDIL	42;52	IC09
N74LS642N	NL	20	PLDIL	42;52	IC09
N74LS645–1D	DL	20	SO20	42;52	IC09
N74LS645–1N	NL	20	PLDIL	42;52	IC09
N74LS645D	DL	20	SO20	42;52	IC09
N74LS645N	NL	20	PLDIL	42;52	IC09
N74LS670D	DJ	16	SO20	50	IC09
N74LS670N	NJ	16	PLDIL	50	IC09
N74LS73D	DH	14	SO14	46	IC09
N74LS73N	NH	14	PLDIL	46	IC09
N74LS74AD	DH	14	SO14	45	IC09
N74LS74AN★	NH	14	PLDIL	45	IC09
N74LS76N	NJ	16	PLDIL	46	IC09
N74LS764N	NW	40	PLDIL	51	IC09
N74LS765N	NW	40	PLDIL	51	IC09
N74LS83AD	DJ	16	SO16	41	IC09
N74LS83AN	NJ	16	PLDIL	41	IC09
N74LS85D	DJ	16	SO16	43	IC09
N74LS85N★	NJ	16	PLDIL	43	IC09
N74LS86D	DH	14	SO14	46	IC09
N74LS86N★	NH	14	PLDIL	46	IC09
N74LS90N★	NH	14	PLDIL	43	IC09
N74LS92D	DH	14	SO14	43	IC09
N74LS92N	NH	14	PLDIL	43	IC09
N74LS93D	DH	14	SO14	43	IC09
N74LS93N★	NH	14	PLDIL	43	IC09
N74LS96N	NJ	16	PLDIL	49	IC09
N74S00D	DH	14	SO14	47	IC09
N74S00N★	NH	14	PLDIL	47	IC09
N74S02D	DH	14	SO14	47	IC09
N74S02N★	NH	14	PLDIL	47	IC09
N74S03D	DH	14	SO14	47	IC09
N74S03N	NH	14	PLDIL	47	IC09
N74S04D	DH	14	SO14	47	IC09
N74S04N★	NH	14	PLDIL	47	IC09
N74S05D	DH	14	SO14	47	IC09
N74S05N★	NH	14	PLDIL	47	IC09
N74S08D	DH	14	SO14	46	IC09
N74S08N★	NH	14	PLDIL	46	IC09
N74S10D	DH	14	SO14	47	IC09
N74S10N★	NH	14	PLDIL	47	IC09
N74S11D	DH	14	SO14	46	IC09
N74S11N	NH	14	PLDIL	46	IC09
N74S112D	DJ	16	SO16	46	IC09
N74S112N	NJ	16	PLDIL	46	IC09
N74S133D	DJ	16	SO16	47	IC09
N74S133N	NJ	16	PLDIL	47	IC09
N74S134D	DJ	16	SO16	47	IC09
N74S134N	NJ	16	PLDIL	47	IC09
N74S138D	DJ	16	SO16	44	IC09

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74S138N★	NJ	16	PLDIL	44	IC09
N74S139D	DJ	16	SO16	44	IC09
N74S139N	NJ	16	PLDIL	44	IC09
N74S140N★	NH	14	PLDIL	47	IC09
N74S151D	DJ	16	SO16	48	IC09
N74S151N★	NJ	16	PLDIL	48	IC09
N74S153D	DJ	16	SO16	48	IC09
N74S153N★	NJ	16	PLDIL	48	IC09
N74S157D	DJ	16	SO16	48;51	IC09
N74S157N★	NJ	16	PLDIL	48;51	IC09
N74S158D	DJ	16	SO16	48;51	IC09
N74S158N	NJ	16	PLDIL	48;51	IC09
N74S168N	NJ	16	PLDIL	44	IC09
N74S174D	DJ	16	SO16	45	IC09
N74S174N	NJ	16	PLDIL	45	IC09
N74S175D	DJ	16	SO16	45	IC09
N74S175N★	NJ	16	PLDIL	45	IC09
N74S189D	DJ	16	SO16	48	IC09 IC10
N74S189F	FJ	16	CERDIP	48	IC09
N74S189N	NJ	16	PLDIL	48	IC09 IC10
N74S194D	DJ	16	SO16	49	IC09
N74S194N	NJ	16	PLDIL	49	IC09
N74S195N	NJ	16	PLDIL	49	IC09
N74S20D	DH	14	SO14	47	IC09
N74S20N	NH	14	PLDIL	47	IC09
N74S225N	NL	20	PLDIL	49	IC09
N74S240D	DL	20	SO20	41	IC09
N74S240N	NL	20	PLDIL	41	IC09
N74S241N	NL	20	PLDIL	41	IC09
N74S244N	NL	20	PLDIL	41	IC09
N74S251N	NJ	16	PLDIL	48	IC09
N74S253D	DJ	16	SO16	48	IC09
N74S253N	NJ	16	PLDIL	48	IC09
N74S257D	DJ	16	SO16	48;51	IC09
N74S257N	NJ	16	PLDIL	48;51	IC09
N74S258N★	NJ	16	PLDIL	48;51	IC09
N74S260D	DH	14	SO14	47	IC09
N74S260N	NH	14	PLDIL	47	IC09
N74S273D	DL	20	SO20	45	IC09
N74S273N★	NL	20	PLDIL	45	IC09
N74S280N★	NH	14	PLDIL	41	IC09
N74S301D	D	16	SO16	48	IC10
N74S301N	NJ	16	PLDIL	48	IC09 IC10
N74S32D	DH	14	SO14	47	IC09
N74S32N★	NH	14	PLDIL	47	IC09
N74S37D	DH	14	SO14	47	IC09
N74S37N	NH	14	PLDIL	47	IC09
N74S373D	DL	20	SO20	47	IC09
N74S373N	NL	20	PLDIL	47	IC09
N74S374D	DL	20	SO20	45	IC09
N74S374N★	NL	20	PLDIL	45	IC09
N74S38D	DH	14	SO14	47	IC09
N74S38N★	NH	14	PLDIL	47	IC09

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74S40N	NH	14	PLDIL	47	IC09
N74S51D	DH	14	SO14	46;47	IC09
N74S51N	NH	14	PLDIL	46;47	IC09
N74S534N	NL	20	PLDIL	45	IC09
N74S64D	NH	14	PLDIL	46;47	IC09
N74S64N	NH	14	PLDIL	46;47	IC09
N74S74D	DH	14	SO14	45	IC09
N74S74N★	NH	14	PLDIL	45	IC09
N74S85D	DJ	16	SO16	43	IC09
N74S85N	NJ	16	PLDIL	43	IC09
N74S86D	DH	14	SO14	46	IC09
N74S86N★	NH	14	PLDIL	46	IC09
N7400N★	NH	14	PLDIL	47	IC09
N7402N	NH	14	PLDIL	47	IC09
N7403N	NH	14	PLDIL	47	IC09
N7404N★	NH	14	PLDIL	47	IC09
N7405N★	NH	14	PLDIL	47	IC09
N7406D	DH	14	SO14	41	IC09
N7406N★	NH	14	PLDIL	41	IC09
N7407D	DH	14	SO14	41	IC09
N7407N★	NH	14	PLDIL	41	IC09
N7408N	NH	14	PLDIL	46	IC09
N7410N	NH	14	PLDIL	48	IC09
N74121D	DH	14	SO14	49	IC09
N74121N★	NH	14	PLDIL	49	IC09
N74123D	DJ	16	SO14	49	IC09
N74123N★	NJ	16	PLDIL	49	IC09
N74125N	NH	14	PLDIL	41	IC09
N74126N	NH	14	PLDIL	41	IC09
N7414D	DH	14	SO14	51	IC09
N7414N	NH	14	PLDIL	51	IC09
N74145D	DJ	16	SO16	44	IC09
N74145N	NJ	16	PLDIL	44	IC09
N74148N	NJ	16	PLDIL	45	IC09
N74150N	NN	24	PLDIL	48	IC09
N74154N★	NN	24	PLDIL	44	IC09
N74157N	NJ	16	PLDIL	48;51	IC09
N74158N	NJ	16	PLDIL	48;51	IC09
N7416N	NH	14	PLDIL	41	IC09
N74164N	NH	14	PLDIL	49	IC09
N74166D	DJ	16	SO16	49	IC09
N74166N	NJ	16	PLDIL	49	IC09
N7417D	DH	14	SO16	41	IC09
N7417N★	NH	14	PLDIL	41	IC09
N74174N	NJ	16	PLDIL	45	IC09
N74175N	NJ	16	PLDIL	45	IC09
N74192N	NJ	16	PLDIL	44	IC09
N74193N	NJ	16	PLDIL	44	IC09
N74194N	NJ	16	PLDIL	49	IC09
N74199N	NN	24	PLDIL	49	IC09
N7420N	NH	14	PLDIL	47	IC09
N7425N	NH	14	PLDIL	47	IC09
N7426N	NH	14	PLDIL	47	IC09
N7432N	NH	14	PLDIL	47	IC09
N7433N	NH	14	PLDIL	47	IC09
N74365AN	NJ	16	PLDIL	41	IC09
N74366AN	NJ	16	PLDIL	41	IC09

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N74367AN	NJ	16	PLDIL	41	IC09
N74368AN	NJ	16	PLDIL	41	IC09
N7437N★	NH	14	PLDIL	47	IC09
N7438D	DH	14	SO14	47	IC09
N7438N	NH	14	PLDIL	47	IC09
N7439N	NH	14	PLDIL	47	IC09
N7440N	NH	14	PLDIL	47	IC09
N7445N	NJ	16	PLDIL	44	IC09
N7451N	NH	14	PLDIL	46;47	IC09
N7474N	NH	14	PLDIL	45	IC09
N7485N	NJ	16	PLDIL	43	IC09
N7486N	NH	14	PLDIL	46	IC09
N7490N★	NH	14	PLDIL	43	IC09
N7491AN	N	14	PLDIL	49	IC09
N7492N	NH	14	PLDIL	43	IC09
N7493N	NH	14	PLDIL	43	IC09
N8TS805					
N8TS807					
N8TS808					
N8T09N	NH	14	PLDIL	64	IC09
N8T128N	NJ	16	PLDIL	64	IC09
N8T13N	NJ	16	PLDIL	64	IC09
N8T20N	NJ	16	PLDIL	65	IC09
N8T23N	NJ	16	PLDIL	65	IC09
N8T24N	NJ	16	PLDIL	65	IC09
N8T26AN★	NJ	16	PLDIL	64;65	IC09
N8T34N	NJ	16	PLDIL	64;65	–
N8T37N	NJ	16	PLDIL	64	IC09
N8T38N	NJ	16	PLDIL	64;65	IC09
N8T95N	NJ	16	PLDIL	63;64	IC09
N8T96N	NJ	16	PLDIL	63;64	IC09
N8T97D	DJ	16	SO16	63;64	IC09
N8T97N	NJ	16	PLDIL	63;64	IC09
N8T98N★	NJ	16	PLDIL	63;64	IC09
N8X350					
N8X41					
N8X60					94
N82HS195A	A	20	PLCC	67	IC10
N82HS195AA	A	20	PLCC	67	IC10
N82HS195AF	FL	20	CERDIP	67	–
N82HS195AN	NL	20	PLDIL	67	IC10
N82HS195BA	A	20	PLCC	67	IC10

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N82HS195BN	NL	20	PLDIL	67	IC10
N82HS195N	NL	20	PLDIL	67	IC10
N82HS321A	A	28	PLCC	67	IC10
N82HS321AF	FN	24	CERDIP	67	IC10
N82HS321AN★	NN	24	PLDIL	67	IC10
N82HS321BA	A	28	PLCC	67	IC10
N82HS321BF	NN	24	PLDIL	67	IC10
N82HS321BN	NN	24	PLDIL	67	IC10
N82HS321F	FN	24	CERDIP	67	IC10
N82HS321N★	NN	24	PLDIL	67	IC10
N82HS641AF	FN	24	CERDIP	67	IC10
N82HS641AN	NW	24	PLDIL	67	IC10
N82HS641BF	FN	24	CERDIP	67	IC10
N82HS641BN	NW	24	PLDIL	67	IC10
N82HS641F	FN	24	CERDIP	67	IC10
N82HS641N	NW	24	PLDIL	67	IC10
N82LHS191A	A	28	PLCC	67	IC10
N82LHS191N	N	24	PLDIL	67	IC10
N82LHS191N3	N	24	PLDIL	67	IC10
N82LHS321A	A	28	PLCC	67	IC10
N82LHS321N	N	24	PLDIL	67	IC10
N82LHS321N3	N	24	PLDIL	67	IC10
N82LS135A	A	20	PLCC	67	IC10
N82LS135D	D	20	SO20	67	IC10
N82LS135N	NL	20	PLDIL	67	IC10
N82LS16D	D	16	SO16	68	IC10
N82LS16F	FJ	16	CERDIP	68	–
N82LS16N	NJ	16	PLDIL	68	IC10
N82S09A	A	28	PLCC	68	IC10
N82S09AA	A	28	PLCC	68	IC10
N82S09AF	FQ	28	CERDIP	68	–
N82S09AN	N	28	PLDIL	68	IC10
N82S09F	FQ	28	CERDIP	68	–
N82S09N	NQ	28	PLDIL	68	IC10
N82S115F	FN	24	CERDIP	67	–
N82S115I	IN	24	CERDIL	67	–
N82S115N	NN	24	PLDIL	67	IC10
N82S123A	A	20	PLCC	67	IC10
N82S123AA	A	20	PLCC	67	IC10
N82S123AD	DJ	16	SO16	67	IC10
N82S123AF	FJ	16	CERDIP	67	–
N82S123AN★	NJ	16	PLDIL	67	IC10
N82S123D	DJ	16	SO16	67	–
N82S123F★	FJ	16	CERDIP	67	–
N82S123N★	NJ	16	PLDIL	67	IC10
N82S126A	A	20	PLCC	67	IC10
N82S126AA	A	20	PLCC	67	IC10
N82S126AD	DJ	16	SO16	67	IC10
N82S126AF	FJ	16	CERDIP	67	–
N82S126AN	NJ	16	PLDIL	67	IC10
N82S126F	FJ	16	CERDIP	67	–
N82S126N★	NJ	16	PLDIL	67	IC10
N82S129A	A	20	PLCC	67	IC10
N82S129AA	A	20	PLCC	67	IC10
N82S129AD	DJ	16	SO16	67	IC10
N82S129AF	FJ	16	CERDIP	67	–
N82S129AN	NJ	16	PLDIL	67	IC10

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N82S129F	FJ	16	CERDIP	67	–
N82S129N★	NJ	16	PLDIL	67	IC10
N82S130A	A	20	PLCC	67	IC10
N82S130AA	A	20	PLCC	67	IC10
N82S130AD	DJ	16	SO16	67	IC10
N82S130AN	NJ	16	PLDIL	67	IC10
N82S130F	FJ	16	CERDIP	67	–
N82S130N★	NJ	16	PLDIL	67	IC10
N82S131A	A	20	PLCC	67	IC10
N82S131AA	A	20	PLCC	67	IC10
N82S131AD	DJ	16	SO16	67	IC10
N82S131AF	FJ	16	CERDIP	67	–
N82S131AN	NJ	16	PLDIL	67	IC10
N82S131F	FJ	16	CERDIP	67	–
N82S131N★	NJ	16	PLDIL	67	IC10
N82S135A	A	20	PLCC	67	IC10
N82S135D	D	20	SO20	67	IC10
N82S135N★	NL	20	PLDIL	67	IC10
N82S137A	A	20	PLCC	67	IC10
N82S137AA	A	20	PLCC	67	IC10
N82S137AF	FK	18	CERDIP	67	–
N82S137AN	NK	18	PLDIL	67	IC10
N82S137BA	A	20	PLCC	67	IC10
N82S137BN	NK	18	PLDIL	67	IC10
N82S137CA	A	20	PLCC	67	–
N82S137CN	N	18	PLDIL	67	–
N82S137F	FK	18	CERDIP	67	–
N82S137N★	NK	18	PLDIL	67	IC10
N82S141AA	A	28	PLCC	67	IC10
N82S141AN	N	24	PLDIL	67	IC10
N82S141AN3	N	24	PLDIL	67	IC10
N82S141F	FN	24	CERDIP	67	–
N82S141N★	NN	24	PLDIL	67	IC10
N82S141N3	N	24	PLDIL	67	IC10
N82S147A	A	20	PLCC	67	IC10
N82S147AA	A	20	PLCC	67	IC10
N82S147AF	FL	20	CERDIP	67	–
N82S147AN	NL	20	PLDIL	67	IC10
N82S147BA	A	20	PLCC	67	IC10
N82S147BN	N	20	PLDIL	67	IC10
N82S147F	FL	20	CERDIP	67	–
N82S147N★	NL	20	PLDIL	67	IC10
N82S16D	D	16	SO16	68	IC10
N82S16F	FJ	16	CERDIP	68	–
N82S16N	NJ	16	PLDIL	68	IC10
N82S181A	A	28	PLCC	67	IC10
N82S181AA	AQ	28	PLCC	67	IC10
N82S181AF	FN	24	CERDIP	67	–
N82S181AN	NN	24	PLDIL	67	IC10
N82S181CA	A	28	PLCC	67	IC10
N82S181CF	FN	24	CERDIP	67	–
N82S181CF3	FN	24	CERDIP	67	–
N82S181CN	NN	24	PLDIL	67	IC10
N82S181CN3	NN	24	PLDIL	67	IC10
N82S181F	FN	24	CERDIP	67	–
N82S181N★	NN	24	PLDIL	67	IC10
N82S183A	A	28	PLCC	67	IC10

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
N82S183F	FN	24	CERDIP	67	–
N82S183N★	NN	24	PLDIL	67	IC10
N82S185AF	FK	18	CERDIP	67	–
N82S185AN	NK	18	PLDIL	67	IC10
N82S185BN	N	18	PLDIL	67	IC10
N82S185CN	N	18	PLDIL	67	–
N82S185F	FK	18	CERDIP	67	–
N82S185N★	NK	18	PLDIL	67	IC10
N82S19A	A	28	PLCC	68	IC10
N82S19F	FQ	28	CERDIP	68	–
N82S19N	NQ	28	PLDIL	68	IC10
N82S191A	A	28	PLCC	67	IC10
N82S191AA	A	28	PLCC	67	IC10
N82S191AF	FN	24	CERDIP	67	–
N82S191AN	NN	24	PLDIL	67	IC10
N82S191CA	A	28	PLCC	67	IC10
N82S191CF	FN	24	CERDIP	67	–
N82S191CF3	FN	24	CERDIP	67	–
N82S191CN	NN	24	PLDIL	67	IC10
N82S191CN3★	NN	24	PLDIL	67	IC10
N82S191F	FN	24	CERDIP	67	–
N82S191N★	NN	24	PLDIL	67	IC10
N82S212A	A	28	PLCC	68	IC10
N82S212AA	A	28	PLCC	68	IC10
N82S212AF	FM	22	CERDIP	68	–
N82S212AN	NM	22	PLDIL	68	IC10
N82S212F	FM	22	CERDIP	68	–
N82S212N	NM	22	PLDIL	68	IC10
N82S23A	A	20	PLCC	67	IC10
N82S23AA	A	20	PLCC	67	IC10
N82S23AD	DJ	16	SO16	67	IC10
N82S23AN	NJ	16	PLDIL	67	IC10
N82S23F	FJ	16	CERDIP	67	–
N82S23N★	NJ	16	PLDIL	67	IC10
N82US123A	A	20	PLCC	67	IC10
N82US123D	D	16	SO16L	67	IC10
N82US123N	N	16	PLDIL	67	IC10
N82US23A	A	20	PLCC	67	IC10
N82US23D	D	16	SO16L	67	IC10
N82US23N	N	16	PLDIL	67	IC10
N8274N	NJ	16	PLDIL	64	IC10
N9401N	NH	14	PLDIL	71;98	IC09 IC19
N9403N	NN	24	PLDIL	71	IC09
N9602N	NJ	16	PLDIL	66	–
PCA5000T	SOT136A	28	SO28	120	IC17
PCA80C31BH-2P	SOT129	40	DIL	69;104;128	IC14
PCA80C31BH-2WP	SOT187AA	44	PLCC	69;104;128	IC14
PCA80C31BH-3H	SOT203	44	QFP	69;104;128	–

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PCA80C31BH-3P	SOT129	40	DIL	69;104;128	IC14
PCA80C31BH-3WP	SOT187AA	44	PLCC	69;104;128	IC14
PCA80C39P	SOT129	40	DIL	69;104	DS
PCA80C39WP	SOT187AA	44	PLCC	69;104	DS
PCA80C49P	SOT129	40	DIL	69;104	DS
PCA80C49WP	SOT187AA	44	PLCC	69;104	DS
PCA80C51BH-3P	SOT129	40	DIL	69;104;128	IC14
PCA80C51BH-3WP	SOT187AA	44	PLCC	69;104;128	IC14
PCA80C528P	SOT129	40	DIL	69;101;104;128	–
PCA80C552WP	SOT188AA	68	PLCC	69;101;104;112; 125;128	IC14
PCA80C562WP	SOT188AA	68	PLCC	69;104	IC14
PCA80C652P	SOT129	40	DIL	69;101;104;113; 115;125	IC14 IC12
PCA80C652WP	SOT187AA	44	PLCC	69;104;113;115	IC14 IC12
PCA80C662H	SOT203	44	QFP	70	IC14
PCA80C662P	SOT129	40	DIL	70	IC14
PCA80C662WP	SOT187AA	44	PLCC	70	IC14
PCA82C200P	SOT117	28	DIL	76;87;94	–
PCA83C528P	SOT129	40	DIL	70;101;104	–
PCA83C552WP	SOT188AA	68	PLCC	70;102;125	IC14
PCA83C562WP	SOT188AA	68	PLCC	70	IC14
PCA83C652P	SOT129	40	DIL	70;102;115;125	IC14 IC12
PCA83C652WP	SOT187AA	44	PLCC	70;102;115	IC14 IC12
PCA83C654P	SOT129	40	DIL	70;102;113;115; 125	IC14
PCA83C654WP	SOT187AA	44	PLCC	70;102;113;115; 125	IC14
PCA83C662H	SOT203	44	QFP	70	IC14
PCA83C662P	SOT129	40	DIL	70	IC14
PCA83C662WP	SOT187AA	44	PLCC	70	IC14
PCA8582BP	SOT97	8	DIL	66;76;102;104; 125;128	IC10
PCA8582BT	SOT162A	16	SO16L	66;76;102;125	IC10
PCB2310WP	SOT187	44	PLCC	78;94;119	DS
PCB80C31BH-2P	SOT129	40	DIL	70;105;129	–
PCB80C31BH-2WP	SOT187AA	44	PLCC	70;105;129	–
PCB80C31BH-3H	SOT203	44	QFP	70;105;129	–
PCB80C31BH-3P★	SOT129	40	DIL	70;105;129	IC14
PCB80C31BH-3WP★	SOT187AA	44	PLCC	70;105;129	IC14
PCB80C39P	SOT129	40	DIL	70;105;129	DS
PCB80C39WP	SOT187AA	44	PLCC	70;105;129	DS
PCB80C49P	SOT129	40	DIL	70;105;129	DS
PCB80C49WP	SOT187AA	44	PLCC	70;105;129	DS
PCB80C51BH-2P	SOT129	40	DIL	70;105;129	–
PCB80C51BH-2WP	SOT187AA	44	PLCC	70;105;129	–

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PCB80C51BH-3H	SOT203	44	QFP	70;105;129	–
PCB80C51BH-3P	SOT129	40	DIL	70;105;129	IC14
PCB80C51BH-3WP	SOT187AA	44	PLCC	70;105;129	IC14
PCB80C528P	SOT129	40	DIL	70;102	–
PCB80C552H	SOT219	80	QFP	70;102;125	–
PCB80C552WP★	SOT188AA	68	PLCC	70;102;105	IC14 IC12
PCB80C562WP	SOT188AA	68	PLCC	70;102;105	IC14
PCB80C582WP	SOT188AA	68	PLCC	70;102;125	–
PCB80C592WP	SOT188AA	68	PLCC	70	–
PCB80C652H	SOT205	44	QFP	70;102;115;125	–
PCB80C652P★	SOT129	40	DIL	70;102;125	IC14 IC12
PCB80C652WP★	SOT187AA	44	PLCC	70;102;125	IC14 IC12
PCB80C662H	SOT203	44	QFP	71	IC14
PCB80C662P★	SOT129	40	DIL	71	IC14
PCB80C662WP★	SOT187AA	44	PLCC	71	IC14
PCB80C851H	SOT205	44	QFP	71;115;116;119	–
PCB80C851P★	SOT129	40	DIL	71;115;116;119	IC14
PCB80C851WP★	SOT187AA	44	PLCC	71;115;116;119	IC14
PCB83C528P	SOT129	40	DIL	71;102	–
PCB83C552H	SOT219	80	QFP	71;102;115;116	–
PCB83C552WP	SOT188AA	68	PLCC	71;102;115;116 125	IC14 IC12
PCB83C562WP	SOT188AA	68	PLCC	71;105	IC14
PCB83C582WP	SOT188AA	68	PLCC	71;102;106;125	–
PCB83C592WP	SOT188AA	68	PLCC	71	–
PCB83C652H	SOT205	44	QFP	71;102;106;119; 129	–
PCB83C652P	SOT129	40	DIL	71;106;119;129	IC14 IC12
PCB83C652WP	SOT187AA	44	PLCC	71;106;119;129	IC14 IC12
PCB83C654H	SOT205A	44	QFP	71;102;106;115; 119;125	IC14 IC12
PCB83C654P	SOT129	40	DIL	71;102;106;119; 125	IC14 IC12
PCB83C654WP	SOT187AA	44	PLCC	71;102;106;119; 125	IC14 IC12
PCB83C662H	SOT203	44	QFP	71	IC14
PCB83C662P	SOT129	40	DIL	71	IC14
PCB83C662WP	SOT187AA	44	PLCC	71	IC14
PCB83C851P	SOT129	40	DIL	71;115;116	IC14
PCB83C851WP	SOT187AA	44	PLCC	71;115;116	IC14
PCB90C100H	SOT219	80	QFP	71	–
PCB90C100WP	SOT189	84	PLCC	71	–
PCB93C100H	SOT219	80	QFP	71	–

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PCB93C100WP	SOT189	84	PLCC	71	–
PCB93C110H	SOT219	80	QFP	71	–
PCB93C110WP	SOT189	84	PLCC	71	DS
PCD3300B		28	PB	115	–
PCD3310AP	SOT146	20	DIL	112	IC03
PCD3310AT	SOT136A	28	SO28	112	IC03 IC17
PCD3310CP	SOT146	20	DIL	112	IC03
PCD3310CT	SOT136A	28	SO28	112	IC03
PCD3310P	SOT146	20	DIL	112	IC03
PCD3310T	SOT136A	28	SO	112	IC03
PCD3311AT	SOT162A	16	SO16L	111;113	IC03 IC17 IC12
PCD3311P★	SOT27	14	DIL	111;113	IC03 IC12 IC17
PCD3311T	SOT162A	16	SO16L	111;113	IC03 IC12 IC17
PCD3312P★	SOT97	8	DIL	111;113;117	IC03 IC12 IC17
PCD3312T★	SOT176	8	SO8L	111;113	IC03 IC12 IC17
PCD3315/502P	SOT117	28	DIL	112	–
PCD3315/502T	SOT136A	28	SO28	112;117	–
PCD3315/503P	SOT117	28	DIL	112	IC03
PCD3315/503T	SOT136A	28	SO28	112	IC03
PCD3315/512P	SOT117	28	DIL	112	–
PCD3315/512T	SOT136A	28	SO28	112	–
PCD3315/513P	SOT117	28	DIL	112	–
PCD3315/513T	SOT136A	28	SO28	112	–
PCD3315/534P	SOT117	28	DIL	119	–
PCD3315/534T	SOT136A	28	SO28	119	–
PCD3315CP	SOT117	28	DIL	113	IC03 IC12 IC14
PCD3315CT	SOT136A	28	SO28	113	IC03 IC12 IC14
PCD3320CD	SOT133B	18	CERDIP	111	DS
PCD3320CP	SOT102G	18	DIL	111	DS
PCD3321CD	SOT133B	18	CERDIP	111	DS
PCD3321CP	SOT102G	18	DIL	111	DS
PCD3321CT	SOT163A	20	SO20	111	DS
PCD3322CP	SOT102G	18	DIL	111	DS
PCD3322CT	SOT163A	20	SO20	111	DS
PCD3323D	SOT135A	28	DIL	111	IC03
PCD3323P	SOT117	28	DIL	111	IC03
PCD3323T	SOT136A	28	SO28	111	IC03
PCD3324CP	SOT102G	18	DIL	111	DS
PCD3325CP	SOT102G	18	DIL	111	DS
PCD3326CP	SOT102G	18	DIL	111	DS
PCD3327CP	SOT102G	18	DIL	111	DS
PCD3327CT	SOT163A	20	SO20	111	DS

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PCD3327CU		20	PADS	111	DS
PCD3341P	SOT117	28	DIL	112;113	IC03 IC12
PCD3341T	SOT136A	28	SO28	112;113	IC03 IC12
PCD3343D	SOT135A	28	DIL	71;113;115	IC03 IC12 IC14
PCD3343P	SOT117	28	DIL	71;113;115	IC03 IC12 IC14
PCD3343T	SOT136A	28	SO28	113;115	IC03 IC12 IC14
PCD3344/004P	SOT117	28	DIL	112	IC03
PCD3344/004T	SOT136A	28	SO28	112	IC03
PCD3344/006P	SOT117	28	DIL	112	IC03
PCD3344/006T	SOT136A	28	SO28	112	IC03
PCD3344B		28	PB	113;115	IC03
PCD3344P	SOT117	28	DIL	113;115	IC03
PCD3344T	SOT136A	28	SO28	113;115	IC03
PCD3346P	SOT117	28	DIL	113;115	–
PCD3346T	SOT136A	28	SO28	113;115	–
PCD3347P	SOT146	20	DIL	113;115	DS
PCD3347T	SOT163A	20	SO20	113;115	DS
PCD3348P	SOT117	28	DIL	71;113;115	–
PCD3348T	SOT136A	28	SO28	71;113;115	–
PCD3349P	SOT117	28	DIL	113;115	IC03 IC14
PCD3349T	SOT136A	28	SO28	113;115	IC03 IC14
PCD3360P	SOT38	16	DIL	119	IC03
PCD3360T	SOT162A	16	SO16L	119	IC03
PCD4410	SOT102	18	DIL	112	DS
PCD4413	SOT102	18	DIL	112	IC03
PCD4413A	SOT102	18	DIL	112	–
PCD4415AP	SOT102	18	DIL	112	–
PCD4415AT	SOT163A	20	SO20	112	–
PCD4415P	SOT102	18	DIL	112	IC03
PCD4415T	SOT163A	20	SO20	112	IC03
PCD5101P	SOT116	22	DIL	68	IC10
PCD5101T	SOT137A	24	SO24	68	IC10
PCD5114P	SOT102G	18	DIL	68	IC10
PCD5114T	SOT163A	20	SO20	68	IC10
PCF1171CT	SOT158B	40	VSO40	93	IC16
PCF1171CU	–	40	PADS	93	IC16
PCF1172CT	SOT158B	40	VSO40	93	IC16
PCF1172CU	–	40	PADS	93	IC16
PCF1174CT	SOT158B	40	VSO40	93	IC16
PCF1174CU	–	40	PADS	93	IC16
PCF1175CT	SOT136A	28	SO28	93	IC16
PCF1175CU	–	28	PADS	93	IC16
PCF1178CT	SOT136A	28	PADS	93	IC16
PCF1178CU	–	28	PADS	93	IC16
PCF1178CU/10	–	28	FFC	93	IC16
PCF1178CU/5	–	28	UW	93	IC16
PCF1252-0P	SOT97	8	DIL	76;78;118	–

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PCF1252–0T	SOT96A	8	SO8	76;78;118	–
PCF1252–1P	SOT97	8	DIL	76;78;118	–
PCF1252–1T	SOT96A	8	SO8	76;78;118	
PCF1252–2P	SOT97	8	DIL	76;78;118	–
PCF1252–2T	SOT96A	8	SO8	76;78;118	–
PCF1252–3P	SOT97	8	DIL	76;78;118	–
PCF1252–3T	SOT96A	8	SO8	76;78;118	–
PCF1252–4P	SOT97	8	DIL	76;78;118	–
PCF1252–4T	SOT96A	8	SO8	76;78;118	–
PCF1252–5P	SOT97	8	DIL	76;78;118	–
PCF1252–5T	SOT96A	8	SO8	76;78;118	–
PCF1252–6P	SOT97	8	DIL	77;78;118	–
PCF1252–6T	SOT96A	8	SO8	77;78;118	–
PCF1252–7P	SOT97	8	DIL	77;78;118	–
PCF1252–7T	SOT96A	8	SO8	77;78;118	–
PCF1252–8P	SOT97	8	DIL	77;78;118	–
PCF1252–8T	SOT96A	8	SO8	77;78;118	–
PCF1252–9P	SOT97	8	DIL	77;78;118	–
PCF1252–9T	SOT96A	8	SO8	77;78;118	–
PCF1254P	SOT97	8	DIL	94;109	DS
PCF1254T	SOT96A	8	SO8	94;109	DS
PCF1303T	SOT136A	28	SO28	99;123	IC01 IC02
PCF2100P	SOT117	28	DIL	77;99;123	IC01 IC02 IC03 IC17
PCF2100T	SOT136A	28	SO28	77;99;123	IC01 IC02 IC03 IC17
PCF2110P	SOT129	40	DIL	77;99;123	IC01 IC02 IC03 IC17
PCF2110T	SOT158A	40	VSO40	77;99;123	IC01 IC02 IC03 IC17
PCF2111P	SOT129	40	DIL	77;99;112;123	IC01 IC02 IC03 IC17
PCF2111T	SOT158A	40	VSO40	77;99;123	IC01

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PCF2112P	SOT129	40	DIL	77;99;123	IC02 IC03 IC17 IC01 IC02 IC03 IC17
PCF2112T	SOT158A	40	VSO40	77;99;123	IC01 IC02 IC03 IC17
PCF2201V	–	120	TAB	77;99;112;123	IC01 IC02
PCF2322WP	SOT188A	68	PLCC	96;119	DS
PCF4420P	SOT38	16	DIL	111	–
PCF4420T	SOT162A	16	SO16L	111	–
PCF4421P	SOT102	18	DIL	111	–
PCF4421T	SOT163A	20	SO20	111	–
PCF80C31BH–3P	SOT129	40	DIL	71;106;129	IC14
PCF80C31BH–3WP	SOT187AA	44	PLCC	71;106;129	IC14
PCF80C39P	SOT129	40	DIL	71;106;129	DS
PCF80C39WP	SOT187AA	44	PLCC	71;106;129	DS
PCF80C49P	SOT129	40	DIL	72;106;129	DS
PCF80C49WP	SOT187AA	44	PLCC	72;106;129	DS
PCF80C51BH–3P	SOT129	40	DIL	72;106;130	IC14
PCF80C51BH–3WP	SOT187AA	44	PLCC	72;106;130	IC14
PCF80C528P	SOT129	40	DIL	72;102;106	–
PCF80C552WP	SOT188AA	68	PLCC	72;102;106;113; 117;125;130	IC14
PCF80C562WP	SOT188AA	68	PLCC	72;117	IC14
PCF80C652H	–	44	QFP	72;102;106;113; 117;125;130	IC14 IC12
PCF80C652P	SOT129	40	DIL	72;102;106;113; 125;130	IC14 IC12
PCF80C652WP	SOT187AA	44	PLCC	72;102;106;113; 125;130	IC14 IC12
PCF80C662H	SOT203	44	QFP	72	IC14
PCF80C662P	SOT129	40	DIL	72	IC14
PCF80C662WP	SOT187AA	44	PLCC	72	IC14
PCF80C851P	SOT129	40	DIL	72;117	IC14
PCF80C851WP	SOT187AA	44	PLCC	72;117	IC14
PCF83C528P	SOT129	40	DIL	72;102;106	–
PCF83C552WP	SOT188AA	68	PLCC	72;103;113;117; 126	IC14
PCF83C562WP	SOT188AA	68	PLCC	72;117	IC14

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PCF83C652P	SOT129	40	DIL	72;103;113;117; 126	IC14 IC12
PCF83C652WP	SOT187AA	44	PLCC	72;103;113;117; 126	IC14 IC12
PCF83C654H	SOT205A	44	QFP	72;113;117;126	IC14
PCF83C654P	SOT129	40	DIL	72;113;117;126	IC14
PCF83C654WP	SOT187AA	44	PLCC	72;113;117;126	IC14
PCF83C662H	SOT203	44	QFP	72	IC14
PCF83C662P	SOT129	40	DIL	72	IC14
PCF83C662WP	SOT187AA	44	PLCC	72	IC14
PCF83C851H	SOT205	44	QFP	72;117	–
PCF83C851P	SOT129	40	DIL	72;117	IC14
PCF83C851WP	SOT187AA	44	PLCC	72;117	IC14
PCF84C12P	SOT146	20	DIL	72;106	IC14
PCF84C12T	SOT163A	20	SO20	72;106	IC14
PCF84C121P	SOT146	20	DIL	73;106	DS
PCF84C121T	SOT163A	20	SO20	73;106	DS
PCF84C21P	SOT117	28	DIL	72;106;126	IC14 IC12
PCF84C21T	SOT136A	28	SO28	72;106;126	IC14 IC12
PCF84C22P	SOT146	20	DIL	72	IC14
PCF84C22T	SOT163A	20	SO20	72	IC14
PCF84C230P	SOT129	40	DIL	73	DS
PCF84C230T	SOT158A	40	VSO40	73	DS
PCF84C270P	SOT129	40	DIL	73	DS
PCF84C271P	SOT129	40	DIL	73	DS
PCF84C41P	SOT117	28	DIL	72;106;126	IC14 IC12
PCF84C41T	SOT136A	28	SO28	72;106;126	IC14 IC12
PCF84C42P	SOT146	20	DIL	72	IC14
PCF84C42T	SOT163A	20	SO20	72	IC14
PCF84C430H	SOT208	64	QFP	73	IC14 IC12
PCF84C470P	SOT129	40	DIL	73	–
PCF84C633AT	SOT190	56	VSO56	73	DS
PCF84C81P	SOT117	28	DIL	72;106;126	IC14 IC12
PCF84C81T	SOT136A	28	SO28	72;106;126	IC14 IC12
PCF84C85P	SOT129	40	DIL	73;106;126	IC14 IC12
PCF84C85T	SOT158A	40	VSO40	73;106;126	IC14 IC12
PCF84C853AP	SOT129	40	DIL	73	DS
PCF84C853AT	SOT158A	40	VSO40	73	DS
PCF8566P★	SOT129	40	DIL	77;99;114;116	IC01 IC02 IC03 IC12 IC14 IC17
PCF8566T★	SOT158A	40	VSO40	77;99;103;112;	IC01

IC

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
				114;123;126	IC02 IC03 IC12 IC14 IC17
PCF8567CP	SOT129	40	DIL	77;99;103;109; 114;118;123;126; 133	DS
PCF8567CT	SOT158A	40	VSO40	77;99;103;109; 114;118;123;126; 133	DS
PCF8570CP	SOT97	8	DIL	68;103;104;114; 115;126;128	IC02 IC03 IC12 IC17 IC01 IC10
PCF8570CT	SOT176	8	SO8L	68;103;104;114; 115;126;128	IC02 IC03 IC12 IC17 IC01 IC10
PCF8570P★	SOT97	8	DIL	68;103;104;114; 115;126;128	IC02 IC03 IC12 IC17 IC01 IC10
PCF8570T★	SOT176	8	SO8L	68;77;103;104; 114;115;126;128	IC02 IC03 IC12 IC17 IC01 IC10
PCF8571P★	SOT97	8	DIL	68;77;103;104; 114;115;126;128	IC02 IC03 IC12 IC17 IC01 IC10
PCF8571T★	SOT176	8	SO8L	68;77;103;104; 114;115;126;128	IC02 IC03 IC12 IC17 IC01 IC10
PCF8573P★	SOT38	16	DIL	77;98;103;111; 126	IC01 IC02 IC03 IC12 IC17
PCF8573T★	SOT162	8	SO16L	77;98;103;111; 126	IC01 IC02 IC03 IC12 IC17

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PCF8574AP★	SOT38	16	DIL	77;87;103;109; 114;118;126;133	IC01 IC02 IC03 IC12 IC17
PCF8574AT★	SOT162A	16	SO16L	77;87;103;109; 114;118;126;133	IC01 IC02 IC03 IC12 IC17
PCF8574P★	SOT38	16	DIL	77;87;103;109; 114;118;126;133	IC01 IC02 IC03 IC12 IC17
PCF8574T★	SOT162A	16	SO16L	77;87;103;109; 114;118;126;133	IC01 IC02 IC03 IC12 IC17
PCF8576T	SOT190	56	VSO56	77;99;103;112; 123;126	IC02 IC03 IC12 IC17 IC01
PCF8576U	–	56	PADS	77;99;103;112; 114;123;126	IC02 IC03 IC12 IC17 IC01
PCF8576U/10	–	56	FFC	77;99;103;112; 114;123;126	IC02 IC03 IC12 IC17 IC01
PCF8577AP	SOT129	40	DIL	77;100;103;112; 114;123;126	IC01 IC02 IC03 IC12 IC17
PCF8577AT	SOT158A	40	VSO40	77;100;103;112; 114;123;126	IC01 IC02 IC03 IC12 IC17
PCF8577AU/10	–	–	FFC	77;100;103;112; 114;123;126	IC01 IC12 IC02
PCF8577AU/5	–	–	UW	77;100;103;112; 114;123;126	IC01 IC12 IC02
PCF8577P	SOT129	40	DIL	77;100;103;112; 114;123;126	IC01 IC02 IC03 IC12 IC17
PCF8577T	SOT158A	40	VSO40	77;100;103;112;	IC01

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
				114;123;126	IC02 IC03 IC12 IC17
PCF8577U/10	–	–	FFC	77;100;103;112; 114;123;126	IC01 IC12 IC02
PCF8577U/5	–	–	UW	77;100;103;112; 114;123;126	IC01 IC12 IC02
PCF8578T	SOT190	56	VSO56	77;100;103;112; 114;126	IC03 IC12 IC17 IC01 IC02
PCF8578U	–	56	PADS	77;100;103;112; 123;126	IC03 IC12 IC17 IC01 IC02
PCF8578V	SOT267A	64	TAB–64	77;100;103;112; 123;126	IC01 IC12 IC02
PCF8579T	SOT190	56	VSO56	77;100;103;112; 123;126	IC03 IC12 IC17 IC01 IC02
PCF8579U	–	56	PADS	77;123;126	IC03 IC12 IC17 IC01 IC02
PCF8579V	SOT257A	64	TAB–64	77;126	IC01 IC12 IC02
PCF8581CP	SOT97	8	DIL	66;77;103;104; 114;115;126;128	IC10
PCF8581CT	SOT176C	8	SO8L	66;77;103;104; 114;115;126;128	IC10
PCF8581P	SOT97	8	DIL	66;77;103;104; 115;115;126;128	IC10
PCF8581T	SOT176C	8	SO8L	66;77;103;104; 114;115;126;128	IC10
PCF8582AP★	SOT97	8	DIL	66;77;103;104; 114;115;126;128	IC03 IC17 IC01 IC02 IC10 IC12
PCF8582AT	SOT162A	16	SO16L	66;77;103;104; 114;115;126;128	IC03 IC17

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
					IC01 IC02 IC10 IC12
PCF8582CP	SOT97	8	DIL	66;77;103;104; 114;115;126;128	IC10
PCF8582CT	SOT162A	16	SO16L	66;77;103;104; 114;115;126;128	IC10
PCF8583P★	SOT97	8	DIL	68;77;98;103; 111;126;128	IC01 IC02 IC03 IC10 IC12 IC17
PCF8583T★	SOT176	8	SO8L	68;77;98;103; 111;126;128	IC01 IC02 IC03 IC10 IC12 IC17
PCF8591P★	SOT38	16	DIL	77;84;98;103; 111;122	IC01 IC02 IC03 IC12 IC17
PCF8591T★	SOT162A	16	SO16L	77;84;98;103; 111	IC01 IC02 IC03 IC12 IC17
PCF86C410P	SOT129	40	DIL	103;113;119	DS
PCF86C410T	SOT158A	40	VSO40	103;113;119	DS
PCF90C100H	SOT219	80	QFP	73	–
PCF90C100WP	SOT189	84	PLCC	73	–
PCF93C100H	SOT219	80	QFP	73	–
PCF93C100WP	SOT189	84	PLCC	73	–
PCF93C110H	SOT219	80	QFP	73	–
PCF93C110WP	SOT189	84	PLCC	73	DS
PC74HCT00P★	SOT27	14	DIL	26	IC06
PC74HCT00T★	SOT108A	14	SO14	26	IC06
PC74HCT02P★	SOT27	14	DIL	26	IC06
PC74HCT02T★	SOT108A	14	SO14	26	IC06
PC74HCT03P	SOT27	14	DIL	26	IC06
PC74HCT03T★	SOT108A	14	SO14	26	IC06
PC74HCT04P★	SOT27	14	DIL	26	IC06
PC74HCT04T★	SOT108A	14	SO14	26	IC06
PC74HCT08P★	SOT27	14	DIL	26	IC06
PC74HCT08T★	SOT108A	14	SO14	26	IC06
PC74HCT10P★	SOT27	14	DIL	26	IC06

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PC74HCT10T	SOT108A	14	SO14	26	IC06
PC74HCT107P★	SOT27	14	DIL	26	IC06
PC74HCT107T	SOT108A	14	SO14	26	IC06
PC74HCT109P★	SOT38Z	16	DIL	26	IC06
PC74HCT109T	SOT109A	16	SO16	26	IC06
PC74HCT11P★	SOT27	14	DIL	26	IC06
PC74HCT11T	SOT108A	14	SO14	26	IC06
PC74HCT112P	SOT38Z	16	DIL	26	IC06
PC74HCT112T	SOT109A	16	SO16	26	IC06
PC74HCT123P★	SOT38Z	16	DIL	27	IC06
PC74HCT123T★	SOT109A	16	SO16	27	IC06
PC74HCT125P★	SOT27	14	DIL	23	IC06
PC74HCT125T★	SOT108A	14	SO14	23	IC06
PC74HCT126P★	SOT27	14	DIL	23	IC06
PC74HCT126T★	SOT108A	14	SO14	23	IC06
PC74HCT132P★	SOT27	14	DIL	28	IC06
PC74HCT132T★	SOT108A	14	SO14	28	IC06
PC74HCT137P	SOT38Z	16	DIL	24	IC06
PC74HCT137T	SOT109A	16	SO16	24	IC06
PC74HCT138P★	SOT38Z	16	DIL	24	IC06
PC74HCT138T★	SOT109A	16	SO16	24	IC06
PC74HCT139P★	SOT38Z	16	DIL	24	IC06
PC74HCT139T★	SOT109A	16	SO16	24	IC06
PC74HCT14P★	SOT27	14	DIL	28	IC06
PC74HCT14T	SOT108A	14	SO14	28	IC06
PC74HCT147P	SOT38Z	16	DIL	25	IC06
PC74HCT147T	SOT109A	16	SO16	25	IC06
PC74HCT151P★	SOT38Z	16	DIL	27	IC06
PC74HCT151T★	SOT109A	16	SO16	27	IC06
PC74HCT153P★	SOT38Z	16	DIL	27	IC06
PC74HCT153T★	SOT109A	16	SO16	27	IC06
PC74HCT154P★	SOT101A	24	DIL	24	IC06
PC74HCT154T★	SOT137A	24	SO24	24	IC06
PC74HCT157P★	SOT38Z	16	DIL	27	IC06
PC74HCT157T	SOT109A	16	SO16	27	IC06
PC74HCT158P	SOT38Z	16	DIL	27	IC06
PC74HCT158T	SOT109A	16	SO16	27	IC06
PC74HCT160P	SOT38Z	16	DIL	24	IC06
PC74HCT160T	SOT109A	16	SO16	24	IC06
PC74HCT161P★	SOT38Z	16	DIL	24	IC06
PC74HCT161T	SOT109A	16	SO16	24	IC06
PC74HCT162P	SOT38Z	16	DIL	24	IC06
PC74HCT162T	SOT109A	16	SO16	24	IC06
PC74HCT163P★	SOT38Z	16	DIL	24	IC06
PC74HCT163T★	SOT109A	16	SO16	24	IC06
PC74HCT164P★	SOT27	14	DIL	27	IC06
PC74HCT164T★	SOT108A	14	SO14	27	IC06
PC74HCT165P★	SOT38Z	16	DIL	27	IC06
PC74HCT165T★	SOT109A	16	SO16	27	IC06
PC74HCT166P★	SOT38Z	16	DIL	27	IC06
PC74HCT166T	SOT109A	16	SO16	27	IC06
PC74HCT173P★	SOT38Z	16	DIL	25	IC06
PC74HCT173T★	SOT109A	16	SO16	25	IC06
PC74HCT174P★	SOT38Z	16	DIL	25	IC06
PC74HCT174T	SOT109A	16	SO16	25	IC06
PC74HCT175P★	SOT38Z	16	DIL	25	IC06
PC74HCT175T	SOT109A	16	SO16	25	IC06

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PC74HCT181P	SOT101A	24	DIL	23	IC06
PC74HCT181T	SOT137A	24	SO24	23	IC06
PC74HCT182P	SOT38Z	16	DIL	23	IC06
PC74HCT182T	SOT109A	16	SO16	23	IC06
PC74HCT190P★	SOT38Z	16	DIL	24	IC06
PC74HCT190T	SOT109A	16	SO16	24	IC06
PC74HCT191P★	SOT38Z	16	DIL	24	IC06
PC74HCT191T★	SOT109A	16	SO16	24	IC06
PC74HCT192P★	SOT38Z	16	DIL	24	IC06
PC74HCT192T	SOT109A	16	SO16	24	IC06
PC74HCT193P★	SOT38Z	16	DIL	24	IC06
PC74HCT193T★	SOT109A	16	SO16	24	IC06
PC74HCT194P★	SOT38Z	16	DIL	27	IC06
PC74HCT194T	SOT109A	16	SO16	27	IC06
PC74HCT195P	SOT38Z	16	DIL	28	IC06
PC74HCT195T	SOT109A	16	SO16	28	IC06
PC74HCT20P★	SOT27	14	DIL	26	IC06
PC74HCT20T	SOT108A	14	SO14	26	IC06
PC74HCT21P★	SOT27	14	DIL	26	IC06
PC74HCT21T	SOT108A	14	SO14	26	IC06
PC74HCT221P★	SOT38Z	16	DIL	27	DS
PC74HCT221T	SOT109A	16	SO16	27	DS
PC74HCT237P	SOT38Z	16	DIL	24	IC06
PC74HCT237T	SOT109A	16	SO16	24	IC06
PC74HCT238P★	SOT38Z	16	DIL	24	IC06
PC74HCT238T	SOT109A	16	SO16	24	IC06
PC74HCT240P★	SOT146	20	DIL	23	IC06
PC74HCT240T★	SOT163A	20	SO20	23	IC06
PC74HCT241P★	SOT146	20	DIL	23	IC06
PC74HCT241T	SOT163A	20	SO20	23	IC06
PC74HCT242P	SOT27	14	DIL	23;28	IC06
PC74HCT242T	SOT108A	14	SO14	23;28	IC06
PC74HCT243P★	SOT27	14	DIL	23;28	IC06
PC74HCT243T★	SOT108A	14	SO14	23;28	IC06
PC74HCT244P★	SOT146	20	DIL	23	IC06
PC74HCT244T★	SOT163A	20	SO20	23	IC06
PC74HCT245P★	SOT146	20	DIL	23;28	IC06
PC74HCT245T★	SOT163A	20	SO20	23;28	IC06
PC74HCT251P★	SOT38Z	16	DIL	27	IC06
PC74HCT251T	SOT109A	16	SO16	27	IC06
PC74HCT253P★	SOT38Z	16	DIL	27	IC06
PC74HCT253T	SOT109A	16	SO16	27	IC06
PC74HCT257P★	SOT38Z	16	DIL	27	IC06
PC74HCT257T★	SOT109A	16	SO16	27	IC06
PC74HCT258P★	SOT38Z	16	DIL	27	IC06
PC74HCT258T★	SOT109A	16	SO16	27	IC06
PC74HCT259P★	SOT38Z	16	DIL	27	IC06
PC74HCT259T	SOT109A	16	SO16	27	IC06
PC74HCT27P★	SOT27	14	DIL	26	IC06
PC74HCT27T	SOT108A	14	SO14	26	IC06
PC74HCT273P★	SOT146	20	DIL	25	IC06
PC74HCT273T	SOT163A	20	SO20	25	IC06
PC74HCT280P★	SOT27	14	DIL	23	IC06
PC74HCT280T	SOT108A	14	SO14	23	IC06
PC74HCT283P★	SOT38Z	16	DIL	23	IC06
PC74HCT283T	SOT109A	16	SO16	23	IC06
PC74HCT297P★	SOT38Z	16	DIL	28	IC06

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PC74HCT297T★	SOT109A	16	SO16	28	IC06
PC74HCT299P★	SOT146	20	DIL	28	IC06
PC74HCT299T	SOT163A	20	SO20	28	IC06
PC74HCT30P★	SOT27	14	DIL	26	IC06
PC74HCT30T	SOT108A	14	SO14	26	IC06
PC74HCT32P★	SOT27	14	DIL	26	IC06
PC74HCT32T	SOT108A	14	SO14	26	IC06
PC74HCT354P★	SOT146	20	DIL	27;28	IC06
PC74HCT354T	SOT163A	20	SO20	27;28	IC06
PC74HCT356P	SOT146	20	DIL	27;28	IC06
PC74HCT356T★	SOT163A	20	SO20	27;28	IC06
PC74HCT365P★	SOT38Z	16	DIL	23	IC06
PC74HCT365T★	SOT109A	16	SO16	23	IC06
PC74HCT366P	SOT38Z	16	DIL	23	IC06
PC74HCT366T	SOT109A	16	SO16	23	IC06
PC74HCT367P★	SOT38Z	16	DIL	23	IC06
PC74HCT367T★	SOT109A	16	SO16	23	IC06
PC74HCT368P★	SOT38Z	16	DIL	23	IC06
PC74HCT368T	SOT109A	16	SO16	23	IC06
PC74HCT373P★	SOT146	20	DIL	25	IC06
PC74HCT373T★	SOT163A	20	SO20	25	IC06
PC74HCT374P★	SOT146	20	DIL	25	IC06
PC74HCT374T★	SOT163A	20	SO20	25	IC06
PC74HCT377P★	SOT146	20	DIL	25	IC06
PC74HCT377T	SOT163A	20	SO20	25	IC06
PC74HCT390P★	SOT38Z	16	DIL	24	IC06
PC74HCT390T★	SOT109A	16	SO16	24	IC06
PC74HCT393P★	SOT38Z	16	DIL	24	IC06
PC74HCT393T	SOT109A	16	SO16	24	IC06
PC74HCT4002P★	SOT27	14	DIL	26	IC06
PC74HCT4002T	SOT108A	14	SO14	26	IC06
PC74HCT40102P	SOT38Z	16	DIL	24	IC06
PC74HCT40102T	SOT109A	16	SO16	24	IC06
PC74HCT40103P★	SOT38Z	16	DIL	24	IC06
PC74HCT40103T★	SOT109A	16	SO16	24	IC06
PC74HCT40104P★	SOT38Z	16	DIL	28	IC06
PC74HCT40104T	SOT109A	16	SO16	28	IC06
PC74HCT40105P★	SOT38Z	16	DIL	28;94	IC06
PC74HCT40105T★	SOT109A	16	SO16	28;94	IC06
PC74HCT4015P	SOT38Z	16	DIL	28	IC06
PC74HCT4015T	SOT109A	16	SO16	28	IC06
PC74HCT4016P★	SOT27	14	DIL	28	IC06
PC74HCT4016T	SOT108A	14	SO14	28	IC06
PC74HCT4017P★	SOT38Z	16	DIL	24	IC06
PC74HCT4017T★	SOT109A	16	SO16	24	IC06
PC74HCT4020P★	SOT38Z	16	DIL	24	IC06
PC74HCT4020T★	SOT109A	16	SO16	24	IC06
PC74HCT4024P★	SOT27	14	DIL	24	IC06
PC74HCT4024T	SOT108A	14	SO14	24	IC06
PC74HCT4040P★	SOT38Z	16	DIL	24	IC06
PC74HCT4040T★	SOT109A	16	SO16	24	IC06
PC74HCT4046AP★	SOT38Z	16	DIL	28;94;95	IC06
PC74HCT4046AT	SOT109A	16	SO16	28;94;95	IC06
PC74HCT4051P★	SOT38Z	16	DIL	24;27	IC06
PC74HCT4051T★	SOT109A	16	SO16	24;27	IC06
PC74HCT4052P★	SOT38Z	16	DIL	24;27	IC06
PC74HCT4052T★	SOT109A	16	SO16	24;27	IC06

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PC74HCT4053P★	SOT38Z	16	DIL	24;27	IC06
PC74HCT4053T★	SOT109A	16	SO16	24;27	IC06
PC74HCT4059P★	SOT101A	24	DIL	24	IC06
PC74HCT4059T	SOT137A	24	SO24	24	IC06
PC74HCT4060P★	SOT38Z	16	DIL	24	IC06
PC74HCT4060T	SOT109A	16	SO16	24	IC06
PC74HCT4066P★	SOT27	14	DIL	28	IC06
PC74HCT4066T★	SOT108A	14	SO14	28	IC06
PC74HCT4067P★	SOT101A	24	DIL	24;27	IC06
PC74HCT4067T★	SOT137A	24	SO24	24;27	IC06
PC74HCT4075P★	SOT27	14	DIL	26	IC06
PC74HCT4075T	SOT108A	14	SO14	26	IC06
PC74HCT4094P★	SOT38Z	16	DIL	28	IC06
PC74HCT4094T★	SOT109A	16	SO16	28	IC06
PC74HCT42P★	SOT38Z	16	DIL	24	IC06
PC74HCT42T	SOT109A	16	SO16	24	IC06
PC74HCT423P★	SOT38Z	16	DIL	27	IC06
PC74HCT423T★	SOT109A	16	SO16	27	IC06
PC74HCT4316P★	SOT38Z	16	DIL	28	IC06
PC74HCT4316T	SOT109A	16	SO16	28	IC06
PC74HCT4351P★	SOT102	18	DIL	25;27	IC06
PC74HCT4351T	SOT163A	20	SO20	25;27	IC06
PC74HCT4352P★	SOT102	18	DIL	25;27	IC06
PC74HCT4352T	SOT163A	20	SO20	25;27	IC06
PC74HCT4353P	SOT102	18	DIL	25;27	IC06
PC74HCT4353T	SOT163A	20	SO20	25;27	IC06
PC74HCT4510P	SOT38Z	16	DIL	24	IC06
PC74HCT4510T	SOT109A	16	SO16	24	IC06
PC74HCT4511P★	SOT38Z	16	DIL	24;25	IC06
PC74HCT4511T	SOT109A	16	SO16	24;25	IC06
PC74HCT4514P	SOT101A	24	DIL	24;25	IC06
PC74HCT4514T★	SOT137A	24	SO24	24;25	IC06
PC74HCT4515P★	SOT101A	24	DIL	24;25	IC06
PC74HCT4515T★	SOT137A	24	SO24	24;25	IC06
PC74HCT4516P	SOT38Z	16	DIL	24	IC06
PC74HCT4516T	SOT109A	16	SO16	24	IC06
PC74HCT4518P	SOT38Z	16	DIL	24	IC06
PC74HCT4518T	SOT109A	16	SO16	24	IC06
PC74HCT4520P★	SOT38Z	16	DIL	24	IC06
PC74HCT4520T	SOT109A	16	SO16	24	IC06
PC74HCT4538P★	SOT27	14	DIL	27	IC06
PC74HCT4538T	SOT108A	14	SO14	27	IC06
PC74HCT4543P★	SOT38Z	16	DIL	24;25	IC06
PC74HCT4543T	SOT109A	16	SO16	24;25	IC06
PC74HCT533P★	SOT146	20	DIL	25	IC06
PC74HCT533T	SOT163A	20	SO20	25	IC06
PC74HCT534P★	SOT146	20	DIL	25	IC06
PC74HCT534T	SOT163A	20	SO20	25	IC06
PC74HCT540P★	SOT146	20	DIL	23	IC06
PC74HCT540T	SOT163A	20	SO20	23	IC06
PC74HCT541P★	SOT146	20	DIL	23	IC06
PC74HCT541T★	SOT163A	20	SO20	23	IC06
PC74HCT5555P	SOT38Z	16	DIL	27	IC06
PC74HCT5555T	SOT109A	16	SO16	27	IC06
PC74HCT563P★	SOT146	20	DIL	25	IC06
PC74HCT563T	SOT163A	20	SO20	25	IC06
PC74HCT564P★	SOT146	20	DIL	25	IC06

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PC74HCT564T	SOT163A	20	SO20	25	IC06
PC74HCT573P★	SOT146	20	DIL	25	IC06
PC74HCT573T★	SOT163A	20	SO20	25	IC06
PC74HCT574P★	SOT146	20	DIL	25	IC06
PC74HCT574T★	SOT163A	20	SO20	25	IC06
PC74HCT583P	SOT38Z	16	DIL	23	IC06
PC74HCT583T	SOT109A	16	SO16	23	IC06
PC74HCT597P★	SOT38Z	16	DIL	28	IC06
PC74HCT597T★	SOT109A	16	SO16	28	IC06
PC74HCT640P★	SOT146	20	DIL	23;28	IC06
PC74HCT640T	SOT163A	20	SO20	23;28	IC06
PC74HCT643P★	SOT146	20	DIL	23;28	IC06
PC74HCT643T	SOT163A	20	SO20	23;28	IC06
PC74HCT646P★	SOT101A	24	DIL	23;28	IC06
PC74HCT646T★	SOT137A	24	SO24	23;28	IC06
PC74HCT648P★	SOT101A	24	DIL	23;28	IC06
PC74HCT648T	SOT137A	24	SO24	23;28	IC06
PC74HCT670P★	SOT38Z	16	DIL	28	IC06
PC74HCT670T	SOT109A	16	SO16	28	IC06
PC74HCT688P★	SOT146	20	DIL	23	IC06
PC74HCT688T★	SOT163A	20	SO20	23	IC06
PC74HCT7030P★	SOT117	28	DIL	28;94	IC06
PC74HCT7030T★	SOT136A	28	SO28	28;94	IC06
PC74HCT7046AP	SOT38Z	16	DIL	28	IC06
PC74HCT7046AT	SOT109A	16	SO16	28	IC06
PC74HCT7080P	SOT146	20	DIL	23	IC06
PC74HCT7080T★	SOT163A	20	SO20	23	IC06
PC74HCT73P★	SOT27	14	DIL	26	IC06
PC74HCT73T★	SOT108A	14	SO14	26	IC06
PC74HCT74P★	SOT27	14	DIL	25	IC06
PC74HCT74T★	SOT108A	14	SO14	25	IC06
PC74HCT75P★	SOT38Z	16	DIL	27	IC06
PC74HCT75T★	SOT109A	16	SO16	27	IC06
PC74HCT7540P★	SOT146	20	DIL	23;28	DS
PC74HCT7540T	SOT163A	20	SO20	23;28	DS
PC74HCT7541P	SOT146	20	DIL	23;28	DS
PC74HCT7541T	SOT163A	20	SO20	23;28	DS
PC74HCT7597P	SOT38Z	16	DIL	28	IC06
PC74HCT7597T	SOT109A	16	SO16	28	IC06
PC74HCT85P★	SOT38Z	16	DIL	23	IC06
PC74HCT85T	SOT109A	16	SO16	23	IC06
PC74HCT86P★	SOT27	14	DIL	26	IC06
PC74HCT86T	SOT108A	14	SO14	26	IC06
PC74HCT9014P	SOT146	20	DIL	23;28	DS
PC74HCT9014T	SOT163A	20	SO20	23;28	DS
PC74HCT9015P	SOT146	20	DIL	23;28	DS
PC74HCT9015T	SOT163A	20	SO20	23;28	DS
PC74HCT9114P	SOT146	20	DIL	23;28	DS
PC74HCT9114T	SOT163A	20	SO20	23;28	DS
PC74HCT9115P	SOT146	20	DIL	23;28	DS
PC74HCT9115T	SOT163A	20	SO20	23;28	DS
PC74HCT93P★	SOT27	14	DIL	24	IC06
PC74HCT93T	SOT108A	14	DIL	24	IC06
PC74HCU04P★	SOT27	14	DIL	26	IC06
PC74HCU04T★	SOT108A	14	SO14	26	IC06
PC74HC00P★	SOT27	14	DIL	26	IC06
PC74HC00T★	SOT108A	14	SO14	26	IC06

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PC74HC02P★	SOT27	14	DIL	26	IC06
PC74HC02T★	SOT108A	14	SO14	26	IC06
PC74HC03P★	SOT27	14	DIL	26	IC06
PC74HC03T	SOT108A	14	SO14	26	IC06
PC74HC04P★	SOT27	14	DIL	26	IC06
PC74HC04T★	SOT108A	14	SO14	26	IC06
PC74HC08P★	SOT27	14	DIL	26	IC06
PC74HC08T★	SOT108A	14	SO14	26	IC06
PC74HC10P★	SOT27	14	DIL	26	IC06
PC74HC10T★	SOT108A	14	SO14	26	IC06
PC74HC107P★	SOT27	14	DIL	26	IC06
PC74HC107T	SOT108A	14	SO14	26	IC06
PC74HC109P★	SOT38Z	16	DIL	26	IC06
PC74HC109T★	SOT109A	16	SO16	26	IC06
PC74HC11P	SOT27	14	DIL	26	IC06
PC74HC11T★	SOT108A	14	SO14	26	IC06
PC74HC112P★	SOT38Z	16	DIL	26	IC06
PC74HC112T	SOT109A	16	SO16	26	IC06
PC74HC123P★	SOT38Z	16	DIL	27	IC06
PC74HC123T	SOT109A	16	SO16	27	IC06
PC74HC125P★	SOT27	14	DIL	23	IC06
PC74HC125T★	SOT108A	14	SO14	23	IC06
PC74HC126P	SOT27	14	DIL	23	IC06
PC74HC126T	SOT108A	14	SO14	23	IC06
PC74HC132P★	SOT27	14	DIL	28	IC06
PC74HC132T	SOT108A	14	SO14	28	IC06
PC74HC137P	SOT38Z	16	DIL	24	IC06
PC74HC137T	SOT109A	16	SO16	24	IC06
PC74HC138P★	SOT38Z	16	DIL	24	IC06
PC74HC138T★	SOT109A	16	SO16	24	IC06
PC74HC139P★	SOT38Z	16	DIL	24	IC06
PC74HC139T	SOT109A	16	SO16	24	IC06
PC74HC14P★	SOT27	14	DIL	28	IC06
PC74HC14T★	SOT108A	14	SO14	28	IC06
PC74HC147P★	SOT38Z	16	DIL	25	IC06
PC74HC147T★	SOT109A	16	SO16	25	IC06
PC74HC151P	SOT38Z	16	DIL	27	IC06
PC74HC151T	SOT109A	16	SO16	27	IC06
PC74HC153P	SOT38Z	16	DIL	27	IC06
PC74HC153T	SOT109A	16	SO16	27	IC06
PC74HC154P	SOT101A	24	DIL	24	IC06
PC74HC154T	SOT137A	24	SO24	24	IC06
PC74HC157P	SOT38Z	16	DIL	27	IC06
PC74HC157T	SOT109A	16	SO16	27	IC06
PC74HC158P	SOT38Z	16	DIL	27	IC06
PC74HC158T	SOT109A	16	SO16	27	IC06
PC74HC160P	SOT38Z	16	DIL	24	IC06
PC74HC160T	SOT109A	16	SO16	24	IC06
PC74HC161P★	SOT38Z	16	DIL	24	IC06
PC74HC161T	SOT109A	16	SO16	24	IC06
PC74HC162P	SOT38Z	16	DIL	24	IC06
PC74HC162T	SOT109A	16	SO16	24	IC06
PC74HC163P★	SOT38Z	16	DIL	24	IC06
PC74HC163T	SOT109A	16	SO16	24	IC06
PC74HC164P★	SOT27	14	DIL	27	IC06
PC74HC164T★	SOT108A	14	SO14	27	IC06
PC74HC165P★	SOT38Z	16	DIL	27	IC06

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PC74HC165T★	SOT109A	16	SO16	27	IC06
PC74HC166P★	SOT38Z	16	DIL	27	IC06
PC74HC166T	SOT109A	16	SO16	27	IC06
PC74HC173P	SOT38Z	16	DIL	25	IC06
PC74HC173T	SOT109A	16	SO16	25	IC06
PC74HC174P★	SOT38Z	16	DIL	25	IC06
PC74HC174T	SOT109A	16	SO16	25	IC06
PC74HC175P★	SOT38Z	16	DIL	25	IC06
PC74HC175T	SOT109A	16	SO16	25	IC06
PC74HC181P	SOT101A	24	DIL	23	IC06
PC74HC181T	SOT137A	24	SO24	23	IC06
PC74HC182P	SOT38Z	16	DIL	23	IC06
PC74HC182T	SOT109A	16	SO16	23	IC06
PC74HC190P	SOT38Z	16	DIL	24	IC06
PC74HC190T	SOT109A	16	SO16	24	IC06
PC74HC191P	SOT38Z	16	DIL	24	IC06
PC74HC191T	SOT109A	16	SO16	24	IC06
PC74HC192P	SOT38Z	16	DIL	24	IC06
PC74HC192T	SOT109A	16	SO16	24	IC06
PC74HC193P★	SOT38Z	16	DIL	24	IC06
PC74HC193T	SOT109A	16	SO16	24	IC06
PC74HC194P	SOT38Z	16	DIL	27	IC06
PC74HC194T	SOT109A	16	SO16	27	IC06
PC74HC195P	SOT38Z	16	DIL	28	IC06
PC74HC195T	SOT109A	16	SO16	28	IC06
PC74HC20P★	SOT27	14	DIL	26	IC06
PC74HC20T★	SOT108A	14	SO14	26	IC06
PC74HC21P	SOT27	14	DIL	26	IC06
PC74HC21T	SOT108A	14	SO14	26	IC06
PC74HC221P★	SOT38Z	16	DIL	27	DS
PC74HC221T	SOT109A	16	SO16	27	DS
PC74HC237P	SOT38Z	16	DIL	24	IC06
PC74HC237T	SOT109A	16	SO16	24	IC06
PC74HC238P	SOT38Z	16	DIL	24	IC06
PC74HC238T★	SOT109A	16	SO16	24	IC06
PC74HC240P	SOT146	20	DIL	23	IC06
PC74HC240T	SOT163A	20	SO20	23	IC06
PC74HC241P★	SOT146	20	DIL	23	IC06
PC74HC241T	SOT163A	20	SO20	23	IC06
PC74HC242P	SOT27	14	DIL	23;28	IC06
PC74HC242T	SOT108A	14	SO14	23;28	IC06
PC74HC243P★	SOT27	14	DIL	23;28	IC06
PC74HC243T	SOT108A	14	SO14	23;28	IC06
PC74HC244P★	SOT146	20	DIL	23	IC06
PC74HC244T	SOT163A	20	SO20	23	IC06
PC74HC245P★	SOT146	20	DIL	23;28	IC06
PC74HC245T	SOT163A	20	SO20	23;28	IC06
PC74HC251P★	SOT38Z	16	DIL	27	IC06
PC74HC251T	SOT109A	16	SO16	27	IC06
PC74HC253P	SOT38Z	16	DIL	27	IC06
PC74HC253T	SOT109A	16	SO16	27	IC06
PC74HC257P★	SOT38Z	16	DIL	27	IC06
PC74HC257T	SOT109A	16	SO16	27	IC06
PC74HC258P	SOT38Z	16	DIL	27	IC06
PC74HC258T	SOT109A	16	SO16	27	IC06
PC74HC259P★	SOT38Z	16	DIL	27	IC06
PC74HC259T★	SOT109A	16	SO16	27	IC06

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PC74HC27P★	SOT27	14	DIL	26	IC06
PC74HC27T	SOT108A	14	SO14	26	IC06
PC74HC273P	SOT146	20	DIL	25	IC06
PC74HC273T	SOT163A	20	SO20	25	IC06
PC74HC280P★	SOT27	14	DIL	23	IC06
PC74HC280T	SOT108A	14	SO14	23	IC06
PC74HC283P★	SOT38Z	16	DIL	23	IC06
PC74HC283T	SOT109A	16	SO16	23	IC06
PC74HC297P★	SOT38Z	16	DIL	28	IC06
PC74HC297T	SOT109A	16	SO16	28	IC06
PC74HC299P★	SOT146	20	DIL	28	IC06
PC74HC299T	SOT163A	20	SO20	28	IC06
PC74HC30P★	SOT27	14	DIL	26	IC06
PC74HC30T★	SOT108A	14	SO14	26	IC06
PC74HC32P★	SOT27	14	DIL	26	IC06
PC74HC32T★	SOT108A	14	SO14	26	IC06
PC74HC354P	SOT146	20	DIL	27;28	IC06
PC74HC354T	SOT163A	20	SO20	27;28	IC06
PC74HC356P	SOT146	20	DIL	27;28	IC06
PC74HC356T	SOT163A	20	SO20	27;28	IC06
PC74HC365P	SOT38Z	16	DIL	23	IC06
PC74HC365T	SOT109A	16	SO16	23	IC06
PC74HC366P	SOT38Z	16	DIL	23	IC06
PC74HC366T	SOT109A	16	SO16	23	IC06
PC74HC367P★	SOT38Z	16	DIL	23	IC06
PC74HC367T	SOT109A	16	SO16	23	IC06
PC74HC368P★	SOT38Z	16	DIL	23	IC06
PC74HC368T★	SOT109A	16	SO16	23	IC06
PC74HC373P★	SOT146	20	DIL	25	IC06
PC74HC373T★	SOT163A	20	SO20	25	IC06
PC74HC374P★	SOT146	20	DIL	25	IC06
PC74HC374T	SOT163A	20	SO20	25	IC06
PC74HC377P★	SOT146	20	DIL	25	IC06
PC74HC377T	SOT163A	20	SO20	25	IC06
PC74HC390P★	SOT38Z	16	DIL	24	IC06
PC74HC390T	SOT109A	16	SO16	24	IC06
PC74HC393P	SOT38Z	16	DIL	24	IC06
PC74HC393T	SOT109A	16	SO16	24	IC06
PC74HC4002P	SOT27	14	DIL	26	IC06
PC74HC4002T	SOT108A	14	SO14	26	IC06
PC74HC40102P	SOT38Z	16	DIL	24	IC06
PC74HC40102T	SOT109A	16	SO16	24	IC06
PC74HC40103P★	SOT38Z	16	DIL	24	IC06
PC74HC40103T	SOT109A	16	SO16	24	IC06
PC74HC40104P	SOT38Z	16	DIL	28	IC06
PC74HC40104T	SOT109A	16	SO16	28	IC06
PC74HC40105P★	SOT38Z	16	DIL	28;95	IC06
PC74HC40105T	SOT109A	16	SO16	28;95	IC06
PC74HC4015P	SOT38Z	16	DIL	28	IC06
PC74HC4015T	SOT109A	16	SO16	28	IC06
PC74HC4016P	SOT27	14	DIL	28	IC06
PC74HC4016T	SOT108A	14	SO14	28	IC06
PC74HC4017P★	SOT38Z	16	DIL	24	IC06
PC74HC4017T	SOT109A	16	SO16	24	IC06
PC74HC4020P★	SOT38Z	16	DIL	24	IC06
PC74HC4020T	SOT109A	16	SO16	24	IC06
PC74HC4024P★	SOT27	14	DIL	24	IC06

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PC74HC4024T	SOT108A	14	SO14	24	IC06
PC74HC4040P★	SOT38Z	16	DIL	24	IC06
PC74HC4040T	SOT109A	16	SO16	24	IC06
PC74HC4046AP★	SOT38Z	16	DIL	28;119	IC06
PC74HC4046AT	SOT109A	16	SO16	28;119	IC06
PC74HC4049P	SOT38Z	16	DIL	27	IC06
PC74HC4049T	SOT109A	16	SO16	27	IC06
PC74HC4050P★	SOT38Z	16	DIL	27	IC06
PC74HC4050T	SOT109A	16	SO16	27	IC06
PC74HC4051P★	SOT38Z	16	DIL	24;27	IC06
PC74HC4051T	SOT109A	16	SO16	24;27	IC06
PC74HC4052P★	SOT38Z	16	DIL	24;27	IC06
PC74HC4052T★	SOT109A	16	SO16	24;27	IC06
PC74HC4053P★	SOT38Z	16	DIL	24;27	IC06
PC74HC4053T★	SOT109A	16	SO16	24;27	IC06
PC74HC4059P	SOT101A	24	DIL	24	IC06
PC74HC4059T	SOT137A	24	SO24	24	IC06
PC74HC4060P★	SOT38Z	16	DIL	24	IC06
PC74HC4060T	SOT109A	16	SO16	24	IC06
PC74HC4066P★	SOT27	14	DIL	28	IC06
PC74HC4066T★	SOT108A	14	SO14	28	IC06
PC74HC4067P★	SOT101A	24	DIL	24;27	IC06
PC74HC4067T	SOT137A	24	SO24	24;27	IC06
PC74HC4075P	SOT27	14	DIL	26	IC06
PC74HC4075T	SOT108A	14	SO14	26	IC06
PC74HC4094P★	SOT38Z	16	DIL	28	IC06
PC74HC4094T	SOT109A	16	SO16	28	IC06
PC74HC42P★	SOT38Z	16	DIL	24	IC06
PC74HC42T	SOT109A	16	SO16	24	IC06
PC74HC423P★	SOT38Z	16	DIL	27	IC06
PC74HC423T	SOT109A	16	SO16	27	IC06
PC74HC4316P	SOT38Z	16	DIL	28	IC06
PC74HC4316T	SOT109A	16	SO16	28	IC06
PC74HC4351P	SOT102	18	DIL	25;27	IC06
PC74HC4351T	SOT163A	20	SO20	25;27	IC06
PC74HC4352P	SOT102	18	DIL	25;27	IC06
PC74HC4352T	SOT163A	20	SO20	25;27	IC06
PC74HC4353P	SOT102	18	DIL	25;27	IC06
PC74HC4353T	SOT163A	20	SO20	25;27	IC06
PC74HC4510P	SOT38Z	16	DIL	24	IC06
PC74HC4510T	SOT109A	16	SO16	24	IC06
PC74HC4511P★	SOT38Z	16	DIL	24;25	IC06
PC74HC4511T	SOT109A	16	SO16	24;25	IC06
PC74HC4514P★	SOT101A	24	DIL	24;25	IC06
PC74HC4514T	SOT137A	24	SO24	24;25	IC06
PC74HC4515P★	SOT101A	24	DIL	24;25	IC06
PC74HC4515T	SOT137A	24	SO24	24;25	IC06
PC74HC4516P★	SOT38Z	16	DIL	24	IC06
PC74HC4516T	SOT109A	16	SO16	24	IC06
PC74HC4518P★	SOT38Z	16	DIL	24	IC06
PC74HC4518T★	SOT109A	16	SO16	24	IC06
PC74HC4520P★	SOT38Z	16	DIL	24	IC06
PC74HC4520T	SOT109A	16	SO16	24	IC06
PC74HC4538P★	SOT27	14	DIL	27	IC06
PC74HC4538T	SOT108A	14	SO14	27	IC06
PC74HC4543P	SOT38Z	16	DIL	24;25	IC06
PC74HC4543T	SOT109A	16	SO16	24;25	IC06

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PC74HC533P	SOT146	20	DIL	25	IC06
PC74HC533T	SOT163A	20	SO20	25	IC06
PC74HC534P	SOT146	20	DIL	25	IC06
PC74HC534T	SOT163A	20	SO20	25	IC06
PC74HC540P★	SOT146	20	DIL	23	IC06
PC74HC540T	SOT163A	20	SO20	23	IC06
PC74HC541P★	SOT146	20	DIL	23	IC06
PC74HC541T	SOT163A	20	SO20	23	IC06
PC74HC5555P	SOT38Z	16	DIL	27	IC06
PC74HC5555T	SOT109A	16	SO16	27	IC06
PC74HC563P★	SOT146	20	DIL	25	IC06
PC74HC563T	SOT163A	20	SO20	25	IC06
PC74HC564P	SOT146	20	DIL	25	IC06
PC74HC564T	SOT163A	20	SO20	25	IC06
PC74HC573P	SOT146	20	DIL	25	IC06
PC74HC573T★	SOT163A	20	SO20	25	IC06
PC74HC574P★	SOT146	20	DIL	25	IC06
PC74HC574T	SOT163A	20	SO20	25	IC06
PC74HC58P	SOT27	14	DIL	26	IC06
PC74HC58T	SOT108A	14	SO14	26	IC06
PC74HC583P	SOT38Z	16	DIL	23	IC06
PC74HC583T	SOT109A	16	SO16	23	IC06
PC74HC597P★	SOT38Z	16	DIL	28	IC06
PC74HC597T	SOT109A	16	SO16	28	IC06
PC74HC640P	SOT146	20	DIL	23;28	IC06
PC74HC640T	SOT163A	20	SO20	23;28	IC06
PC74HC643P	SOT146	20	DIL	23;28	IC06
PC74HC643T	SOT163A	20	SO20	23;28	IC06
PC74HC646P	SOT101A	24	DIL	23;28	IC06
PC74HC646T	SOT137A	24	SO24	23;28	IC06
PC74HC648P	SOT101A	24	DIL	23;28	IC06
PC74HC648T	SOT137A	24	SO24	23;28	IC06
PC74HC670P★	SOT38Z	16	DIL	28	IC06
PC74HC670T★	SOT109A	16	SO16	28	IC06
PC74HC688P	SOT146	20	DIL	23	IC06
PC74HC688T	SOT163A	20	SO20	23	IC06
PC74HC7030P	SOT117	28	DIL	28;95	IC06
PC74HC7030T	SOT136A	28	SO28	28;95	IC06
PC74HC7046AP	SOT38Z	16	DIL	28	IC06
PC74HC7046AT	SOT109A	16	SO16	28	IC06
PC74HC7080P	SOT146	20	DIL	23	IC06
PC74HC7080T	SOT163A	20	SO20	23	IC06
PC74HC7266P★	SOT27	14	DIL	26	IC06
PC74HC7266T	SOT108A	14	SO14	26	IC06
PC74HC73P	SOT27	14	DIL	26	IC06
PC74HC73T	SOT108A	14	SO14	26	IC06
PC74HC74P★	SOT27	14	DIL	25	IC06
PC74HC74T★	SOT108A	14	SO14	25	IC06
PC74HC75P	SOT38Z	16	DIL	27	IC06
PC74HC75T	SOT109A	16	SO16	27	IC06
PC74HC7540P	SOT146	20	DIL	23;28	DS
PC74HC7540T	SOT163A	20	SO20	23;28	DS
PC74HC7541P	SOT146	20	DIL	23;28	DS
PC74HC7541T	SOT163A	20	SO20	23;28	DS
PC74HC7597P★	SOT38Z	16	DIL	28	IC06
PC74HC7597T	SOT109A	16	SO16	28	IC06
PC74HC85P★	SOT38Z	16	DIL	23	IC06

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PC74HC85T	SOT109A	16	SO16	23	IC06
PC74HC86P★	SOT27	14	DIL	26	IC06
PC74HC86T	SOT108A	14	SO14	26	IC06
PC74HC9014P	SOT146	20	DIL	23;28	DS
PC74HC9014T	SOT163A	20	SO20	23;28	DS
PC74HC9015P	SOT146	20	DIL	23;28	DS
PC74HC9015T	SOT163A	20	SO20	23;28	DS
PC74HC9114P	SOT146	20	DIL	23;28	DS
PC74HC9114T	SOT163A	20	SO20	23;28	DS
PC74HC9115P	SOT146	20	DIL	23;28	DS
PC74HC9115T	SOT163A	20	SO20	23;28	DS
PC74HC93P	SOT27	14	DIL	24	IC06
PC74HC93T	SOT108A	14	DIL	24	IC06
PHD16N8–5A	A	20	PLCC	138	–
PHD16N8–5N	N	20	PLDIL	138	–
PLC18V8ZIA	A	20	PLCC	139	–
PLC18V8ZIFA	FA	20	CERDIP	139	–
PLC18V8ZIN	N	20	PLDIL	139	–
PLC18V8Z35A	A	20	PLCC	139	–
PLC18V8Z35FA★	FA	20	CERDIP	139	–
PLC18V8Z35N★	N	20	PLDIL	139	–
PLC415–16A	A	28	PLCC	141	–
PLC415–16FA	FA	28	CERDIP	141	–
PLC415–16N★	N	28	PLDIL	141	–
PLC415–28A	A	28	PLCC	141	–
PLC415–28FA	FA	28	CERDIP	141	–
PLC415–28N	N	28	PLDIL	141	–
PLC42VA12A	A	28	PLCC	141	–
PLC42VA12FA	FA	24	CERDIP	141	–
PLC42VA12N★	N	24	PLDIL	141	–
PLHS501A★	A	52	PLCC	142	IC13
PLS100A	AQ	28	PLCC	140	IC13
PLS100N★	NQ	28	PLDIL	140	IC13
PLS101A	AQ	28	PLCC	140	IC13
PLS101N	NQ	28	PLDIL	140	IC13
PLS105A	AQ	28	PLCC	141	IC13
PLS105AA	AQ	28	PLCC	141	IC13
PLS105AN	NQ	28	PLDIL	141	IC13
PLS105N★	NQ	28	PLDIL	141	IC13
PLS153AA	AL	20	PLCC	140	IC13
PLS153AN	NL	20	PLDIL	140	IC13
PLS153N★	NL	20	PLDIL	140	IC13
PLS155A	AL	20	PLCC	141	IC13
PLS155N★	NL	20	PLDIL	141	IC13
PLS157A	AL	20	PLCC	141	IC13

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PLS157N★	NL	20	PLDIL	141	IC13
PLS159AA	AL	20	PLCC	141	IC13
PLS159AN★	NL	20	PLDIL	141	IC13
PLS167A	AQ	28	PLCC	141	IC13
PLS167AA	AQ	28	PLCC	141	IC13
PLS167AN	NN	24	PLDIL	141	IC13
PLS167N★	NN	24	PLDIL	141	IC13
PLS168A	AQ	28	PLCC	141	IC13
PLS168AA	AQ	28	PLCC	141	IC13
PLS168AN	NN	24	PLDIL	141	IC13
PLS168N★	NN	24	PLDIL	141	IC13
PLS173A	AQ	28	PLCC	140	IC13
PLS173N★	NN	24	PLDIL	140	IC13
PLS179A	AQ	28	PLCC	141	IC13
PLS179N	NN	24	PLDIL	141	IC13
PLUS105–40A	A	28	PLCC	141	–
PLUS105–40N	N	28	PLDIL	141	–
PLUS153BA	A	20	PLCC	140	IC13
PLUS153BN	N	20	PLDIL	140	IC13
PLUS153DA	A	20	PLCC	140	IC13
PLUS153DN	N	20	PLDIL	140	IC13
PLUS16L8–7A	A	20	PLCC	139	DS
PLUS16L8–7N	N	20	PLDIL	139	DS
PLUS16L8DA	A	20	PLCC	139	DS
PLUS16L8DN	N	20	PLDIL	139	DS
PLUS16R4–7A	A	20	PLCC	139	DS
PLUS16R4–7N	N	20	PLDIL	139	DS
PLUS16R4DA	A	20	PLCC	139	DS
PLUS16R4DN★	N	20	PLDIL	139	DS
PLUS16R6–7A	A	20	PLCC	139	DS
PLUS16R6–7N	N	20	PLDIL	139	DS
PLUS16R6DA	A	20	PLCC	139	DS
PLUS16R6DN★	N	20	PLDIL	139	DS
PLUS16R8–7A	A	20	PLCC	139	DS
PLUS16R8–7N	N	20	PLDIL	139	DS
PLUS16R8DA	A	20	PLCC	139	DS
PLUS16R8DN★	N	20	PLDIL	139	DS
PLUS173BA	A	28	PLCC	140	IC13
PLUS173BN	N	24	PLDIL	140	IC13
PLUS173DA	A	28	PLCC	140	IC13
PLUS173DN	N	24	PLDIL	140	IC13
PLUS20L8–7A	A	28	PLCC	139	DS
PLUS20L8–7N	N	24	PLDIL	139	DS
PLUS20L8DA	A	28	PLCC	139	DS
PLUS20L8DN★	D	24	PLDIL	139	DS
PLUS20R4–7A	A	28	PLCC	139	DS
PLUS20R4–7N	N	24	PLDIL	139	DS
PLUS20R4DA	A	28	PLCC	139	DS
PLUS20R4DN★	N	24	PLDIL	139	DS
PLUS20R6–7A	A	28	PLCC	139	DS
PLUS20R6–7N	N	24	PLDIL	139	DS
PLUS20R6DA	A	28	PLCC	139	DS
PLUS20R6DN★	N	24	PLDIL	139	DS
PLUS20R8–7A	A	28	PLCC	139	DS
PLUS20R8–7N	N	24	PLDIL	139	DS
PLUS20R8DA	A	28	PLCC	139	DS
PLUS20R8DN★	N	24	PLDIL	139	DS

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PLUS405–37A	A	28	PLCC	141	DS
PLUS405–37N★	N	28	PLDIL	141	DS
PLUS405–45A	A	28	PLCC	141	DS
PLUS405–45N	N	28	PLDIL	141	DS
PLUS405–55A	A	28	PLCC	141	–
PLUS405–55N	N	28	PLDIL	141	–
PML2552A★	A	68	PLCC	142	–
PML2552AA	A	68	PLCC	142	–
PML2552AL	L	68	CLCC	142	–
PML2552L	L	68	CLCC	142	–
PNA7509P	SOT101A	24	DIL	84	IC01 IC02
PNA7509T	SOT137A	24	SO24	84;98;122	–
PNA7518P	SOT38D	16	DIL	84;98;122	IC01 IC02
PNA7518T	SOT162A	16	SO16L	84;98;122	–
SAA1029★	SOT38	16	DIL	87	IC11
SAA1043★	SOT117	28	DIL	121	IC02
SAA1044	SOT38	16	DIL	121	IC02
SAA1045P★	SOT97	8	DIL	78;95	DS
SAA1045T	SOT96A	8	SO8	78;95	DS
SAA1057★	SOT102H	18	DIL	100;110	IC01
SAA1060	SOT101A	24	DIL	100;123	IC02
SAA1064P★	SOT101B	24	DIL	85;93;100;103; 123;126	IC01 IC02 IC12
SAA1064T	SOT137A	24	SO24	85;93;100;103; 123;126	IC02
SAA1099★	SOT102M	18	DIL	77;109;137	IC01 IC02
SAA1101P	SOT117	28	DIL	121	–
SAA1235P	SOT117	28	DIL	95	–
SAA1235T	SOT136A	28	SO28	95	–
SAA1300	SOT142	9	SIL	103;110;126;137	IC01 IC02 IC12
SAA3004P	SOT146	20	DIL	109;133	IC01 IC02
SAA3004T	SOT163A	20	SO20	109;133	IC01 IC02
SAA3006P	SOT117	28	DIL	109;133	IC01 IC02
SAA3007P	SOT146	20	DIL	109;112	IC01
SAA3007T	SOT163A	20	SO20	109;12	IC01
SAA3008P	SOT146	20	DIL	109;133	IC01 IC02
SAA3008T	SOT163A	20	SO20	109	IC01 IC02
SAA3009P	SOT146	20	DIL	109	IC01 IC02
SAA3010P	SOT117	28	DIL	109	IC01
SAA3010T	SOT136A	28	SO28	109	IC01
SAA3028	SOT38Z	16	DIL	103;109;126;133	IC01 IC02 IC12
SAA3049P	SOT146	20	DIL	109	IC01

INTEGRATED CIRCUITS

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
					IC02
SAA3049T	SOT163A	20	SO20	109	IC01
					IC02
SAA5231★	SOT117	28	DIL	136	IC02
SAA5235				136	
SAA5243E★	SOT129	40	DIL	126;136	IC02
					IC12
SAA5243H	SOT129	40	DIL	126;136	IC02
					IC12
SAA5243K	SOT129	40	DIL	126;136	IC02
					IC12
SAA5243L	SOT129	40	DIL	126;136	IC02
					IC12
SAA5244A	SOT129	40	DIL	127;136	–
SAA5245A	SOT129	40	DIL	127;136	IC02
					IC12
SAA5246E	SOT240	48	DIL	127;136	–
SAA5250P	SOT129	40	DIL	136	IC02
SAA5250T	SOT158A	40	VSO40	136	IC02
SAA5351★	SOT129	40	DIL	77;136	IC02
SAA5355	SOT129	40	DIL	136	IC02
SAA5361	SOT129	40	DIL	77;136	IC02
SAA5370	SOT220	120	QFP	136	–
SAA7220				99	
SAA7272				134	
SAA7273				134	
SAA7280				134	
SAA7310				99	
SAA7323GP				98	
SAA7500WP	SOT188AA	68	PLCC	110	DS
SAA7579T	SOT162A	16	SO16L	108	–
SAA9041A	SOT129	40	DIL	123;127	IC02
					IC12
SAA9050	SOT129	40	DIL	123	IC02
					IC12
SAA9051	SOT188	68	PLCC	121;123	–
SAA9057	SOT146	20	DIL	123	DS
SAA9058	SOT146	20	DIL	123	IC02
SAA9060	SOT117	28	DIL	123	IC02
SAA9062	SOT129	40	DIL	123;136	–
SAA9063	SOT129	40	DIL	123;136	–
SAA9064	SOT129	40	DIL	123;136	–
SAA9068WP	SOT188	68	PLCC	123;137	IC12
					IC02
SAA9069T	SOT163A	20	SO20	123;137	IC02
SAA9079P	SOT101A	24	DIL	122;123	IC02
SAA9079T	SOT137A	24	SO24	122;123	IC02
SAB3035	SOT117	28	DIL	127;137	IC02
					IC12
SAB3036	SOT102H	18	DIL	127;137	IC02
					IC12
SAB3037	SOT101A	24	DIL	127;137	IC02
					IC12
SAB6456	SOT97	8	DIL	137	IC02
SAB6456T	SOT96A	8	DIL	137	IC02
SAB8726	SOT97	8	DIL	137	IC02
SAD1009P	SOT101A	24	DIL	122	IC02

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
SAD1009T	SOT137A	24	SO24	122	IC02
SAD1019P	SOT101B	24	DIL	121	IC02
SAD1019T	SOT137A	24	SO24	121	IC02
SAF1032P★	SOT102H	18	DIL	109;133	IC01 IC02
SAF1039P★	SOT38Z	16	DIL	109;133	IC01 IC02
SAF1135	SOT27	14	DIL	127	IC02 IC12
SA1458D	DE	8	SO8	81	IC11
SA1458N	NE	8	PLDIL	81	IC11
SA4558FE	FE	8	CERDIP	81	IC11
SA4558N	N	8	PLDIL	81	IC11
SA5090N	N	16	PLDIL	85;87	IC11
SA5105AD	D	8	SO8	83	IC11
SA5105AN	N	8	PLDIL	83	IC11
SA5105D	D	8	SO8	83	IC11
SA5105N	N	8	PLDIL	83	IC11
SA5204D	DE	8	SO8	80;95	IC11 IC19 IC02
SA5204N	NE	8	PLDIL	80;95	IC11 IC19 IC02
SA5205D	DE	8	SO8	80;95	IC19 IC02
SA5205FE	FE	8	CERDIP	80;95	IC19 IC02
SA5205N	NE	8	PLDIL	80;95	IC19 IC02
SA5211D	D	14	SO14	80;95	IC11
SA5212D	D	8	SO8	80;95	IC19
SA5212FE	FE	8	CERDIP	80;95	IC11 IC19
SA5212N	N	8	PLDIL	80;95	IC11 IC19
SA5214D	D	20	SO20	80;95	IC11
SA5217D	D	20	SO20	80	IC11
SA5230D	DE	8	SO8	81;111	IC11 IC03
SA5230FE	FE	8	CERDIP	81	IC11 IC03
SA5230N	NE	8	PLDIL	81	IC11 IC03
SA532D	DE	8	SO8	81	IC11
SA532FE	FE	8	CERDIP	81	IC11
SA532N	NE	8	PLDIL	81	IC11
SA534D	DH	14	SO14	81	IC11
SA534F	F	14	CERDIP	81	IC11
SA534N	NH	14	PLDIL	81	IC11
SA5512D	DE	8	SO8	81	IC11
SA5512N	N	8	PLDIL	81	IC11
SA5521D	DJ	16	SO16L	89	IC11
SA5521N	NK	18	PLDIL	89	IC11
SA5534AD	D	8	SO8	81	IC11 IC01
SA5534AN	N	8	PLDIL	81	IC11

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
					IC01
SA5534N	N	8	PLDIL	81	IC11
					IC01
SA555D	DE	8	SO8	92	IC11
SA555N	NE	8	PLDIL	92	IC11
SA556–1F	F	14	CERDIP	92	IC11
SA556–1N	N	14	PLDIL	92	IC11
SA556N	N	14	PLDIL	92	IC11
SA5570F	F	24	CERDIP	88	IC11
SA5570N	NN	24	PLDIL	88	IC11
SA558F	F	16	CERDIP	92	IC11
SA558N	N	16	PLDIL	92	IC11
SA571F	FJ	16	CERDIP	96;117	IC11
					IC17
					IC01
SA571N	NJ	16	PLDIL	96;117	IC11
					IC17
					IC01
SA572D	DJ	16	SO16L	96;117	IC11
					IC01
SA572F	F	16	CERDIP	96;117	IC11
					IC01
SA572N	NJ	16	PLDIL	96;117	IC11
					IC01
SA5750D	D	24	SO24	96;117;119	DS
SA5750N	N	24	PLDIL	96;117;119	DS
SA5751D	D	28	SO28	96;114;119	DS
SA5751N	N	24	PLDIL	96;114;119	DS
SA592D8	D	8	SO8	81;121	IC11
SA592HD8	D	8	SO8	81;95;121	IC11
SA592HN8	N	8	PLDIL	81;95;121	IC11
SA592N8	N	8	PLDIL	81;95;121	IC11
SA594F	F	18	CERDIP	85;93	IC11
SA594N	NK	18	PLDIL	85;93	IC11
SA602AD	DE	8	SO8	96;117	IC11
					IC17
					IC19
					IC01
SA602AFE	FE	8	CERDIP	95;96;117	IC11
					IC17
					IC19
				IC01	
SA602AN	NE	8	PLDIL	95;96;117	IC11
					IC17
					IC19
					IC01
SA604AD	D	16	SO16	95;96;117	IC11
					IC01
SA604AN	N	16	PLDIL	95;96;117	IC11
					IC01
SA605D	D	20	SO20	95;108;117	IC11
					IC17
					IC01
SA605F	F	20	CERDIP	96;108;117	IC11
					IC17
					IC01
SA605N	N	20	PLDIL	96;108;117	IC11

IC

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
					IC17 IC01
SA614AD	D	16	SO16	95;96;117	IC01
SA614AN	N	16	PLDIL	95;96;117	IC01
SA615D	D	20	SO20	95;96;117	IC11
SA615N	N	20	PLDIL	95;96;117	IC11
SA723CN	N	14	PLDIL	90	IC11
SA741CN	N	8	PLDIL	81	IC11
SA747CN	N	14	PLDIL	81	IC11
SCB2675BC5N40	NW	40	PLDIL	78	IC18
SCB2675CC5N40	NW	40	PLDIL	78	IC18
SCB2675TC4N40	NW	40	PLDIL	78	IC18
SCB2677BC5N40	NW	40	PLDIL	78	IC18
SCB68154CAA44	AX	44	PLCC	78	IC18
SCB68154C2I40	IW	40	CERDIL	78	IC18
SCB68154C2N40	NW	40	PLDIL	78	IC18
SCB68155CAA44	AX	44	PLCC	78	IC18
SCB68155CAI40	IW	40	CERDIL	78	IC18
SCB68155CAN40	NW	40	PLDIL	78	IC18
SCB68172C2A44	AX	44	PLCC	78	IC18
SCB68172C2F28	FQ	28	CERDIP	78	IC18
SCB68172C2N28	NQ	28	PLDIL	78	IC18
SCB68430CAA52	AA	52	PLCC	78	IC18
SCB68430CAI48	IY	48	CERDIL	78	IC18
SCB68430CAN48	NY	48	PLDIL	78	IC18
SCB68430CCA52	AA	52	PLCC	78	IC18
SCB68430CCI48	IY	48	CERDIL	78	IC18
SCB68430CCN48	NY	48	PLDIL	78	IC18
SCC2691AA1A28	A	28	PLCC	78;95	IC19
SCC2691AA1N24★	N	24	PLDIL	78;95	IC19
SCC2691AC1A28	AQ	28	PLCC	78;95	IC18 IC19
SCC2691AC1N24★	NN	24	PLDIL	78;95	IC18 IC19
SCC2691C1A28	AQ	28	PLCC	78;95	IC18
SCC2691C1N24	NN	24	PLDIL	78;95	IC18
SCC2692AA1A44	A	44	PLCC	79;95	DS
SCC2692AA1F28	F	28	CERDIP	79;95	DS
SCC2692AA1F40	F	40	CERDIP	79;95	DS
SCC2692AA1N28	N	28	PLDIL	79;95	DS
SCC2692AA1N40	N	40	PLDIL	79;95	DS
SCC2692AC1A44	A	44	PLCC	79;95	DS
SCC2692AC1F28	F	28	CERDIP	79;95	DS
SCC2692AC1F40	F	40	CERDIP	79;95	DS
SCC2692AC1N28	N	28	PLDIL	79;95	DS
SCC2692AC1N40	N	40	PLDIL	79;95	DS
SCC2698AC1A84	AC	84	PLCC	79;95	IC18 IC19
SCC2698AC1N64	NS	64	PLDIL	79;95	IC18 IC19
SCC63484CAA68	A	68	PLCC	79	DS
SCC63484CAN64	N	64	PLDIL	79	DS
SCC63484C4A64	AS	64	PLCC	79	–
SCC63484C4I64	IS	64	CERDIL	79	–
SCC63484C4N64	NS	64	PLDIL	79	–
SCC63484C6I64	IS	64	CERDIL	79	–
SCC63484C8A68	A	68	PLCC	79	DS

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
SCC63484C8I64	IS	64	CERDIL	79	–
SCC63484C8N64	NS	64	PLDIL	79	DS
SCC66470B	H	124	QFP	79;96	DS
SCC68070AAA84	SOT189	84	PLCC	78;114;120	DS IC12
SCC68070AAB	SOT220	120	QFP	78;114,120	DS IC12
SCC68070ABA84	SOT189	84	PLCC	78;114;120	DS IC12
SCC68070ABB	SOT220	120	QFP	78;114;120	DS IC12
SCC68070ACA84	SOT189	84	PLCC	78;114;120	DS IC12
SCC68070ACB	SOT220	120	QFP	78;114;120	DS IC12
SCC68070CAA84★	SOT189	84	PLCC	78;114;120	DS IC12
SCC68070CAB	SOT220	120	QFP	78;114;120	DS IC12
SCC68070CBA84★	SOT189	84	PLCC	78;114;120	DS IC12
SCC68070CBB	SOT220	120	QFP	78;114;120	DS IC12
SCC68070CCA84	SOT189	84	PLCC	78;114;120	DS IC12
SCC68070CCB	SOT220	120	QFP	78;114;120	DS IC12
SCC68173P	SOT117	28	DIL	79	IC18
SCC68173T	SOT136A	28	SO28	79	IC18
SCC68692A1A44	A	44	PLCC	79;95	DS
SCC68692A1F40	F	40	CERDIP	79;95	DS
SCC68692A1N40	N	40	PLDIL	79;95	DS
SCC68692C1A44★	A	44	PLCC	79;95	DS
SCC68692C1F40	F	40	CERDIP	79;95	DS
SCC68692C1N40	N	40	PLDIL	79;95	DS
SCN2641CC1A28	AQ	28	PLCC	79;95	IC18 IC19
SCN2641CC1N24	NN	24	PLDIL	79;95	IC18 IC19
SCN2651CC1N28★	NQ	28	PLDIL	79	IC18
SCN26542C2A52	A	52	PLCC	79	DS
SCN26542C2N40	N	40	PLDIL	79	DS
SCN26562C2A52	A	52	PLCC	79	DS
SCN26562C2N48	N	48	PLDIL	79	DS
SCN26562C4A52	A	52	PLCC	79	DS
SCN26562C4N48	N	48	PLDIL	79	DS
SCN2661AC1A28	AQ	28	PLCC	79;95	IC18 IC19
SCN2661AC1N24	NN	24	PLDIL	79;95	IC18
SCN2661AC1N28	NQ	28	PLDIL	79;95	IC18 IC19
SCN2661BC1A28	AQ	28	PLCC	79;95	IC18 IC19
SCN2661BC1N24	NN	24	PLDIL	79;95	IC18
SCN2661BC1N28★	NQ	28	PLDIL	79;95	IC18 IC19
SCN2661CC1A28	A	28	PLCC	79;95	IC19

INTEGRATED CIRCUITS

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
SCN2661CC1N24	NN	24	PLDIL	79;95	IC18
SCN2661CC1N28	NQ	28	PLDIL	79;95	IC18 IC19
SCN2672AC4N40	NW	40	PLDIL	79	IC18
SCN2672BC4A44	AX	44	PLCC	79	IC18
SCN2672BC4I40	IW	40	CERDIL	79	IC18
SCN2672BC4N40★	NW	40	PLDIL	79	IC18
SCN2672TC5A44	A	44	PLCC	79	DS
SCN2672TC5I40	I	40	CERDIL	79	DS
SCN2672TC5N40	N	40	PLDIL	79	DS
SCN2674BC4A44	A	44	PLCC	79	DS
SCN2674BC4I40	IW	40	CERDIL	79	DS
SCN2674BC4N40	NW	40	PLDIL	79	DS
SCN2674TC5A44	A	44	PLCC	79	DS
SCN2674TC5I40	I	40	CERDIL	79	DS
SCN2674TC5N40	N	40	PLDIL	79	DS
SCN2681AA1A44	A	44	PLCC	79;95	IC19 DS
SCN2681AA1I40	I	40	CERDIL	79;95	IC19 DS
SCN2681AA1N40	N	40	PLDIL	79;95	IC19 DS
SCN2681AC1A44	AX	44	PLCC	79;95	IC18 IC19 DS
SCN2681AC1I28	IQ	28	CERDIL	79;95	IC18 IC19 DS
SCN2681AC1I40	IW	40	CERDIL	79;95	IC18 IC19 DS
SCN2681AC1N24★	NN	24	PLDIL	79;95	IC18 IC19 DS
SCN2681AC1N28★	NQ	28	PLDIL	79;95	IC18 IC19 DS
SCN2681AC1N40	NW	40	PLDIL	79;95	IC18 IC19 DS
SCN68000CAA68★	AB	68	PLCC	78	IC18
SCN68000CAI64	IS	64	CERDIL	78	IC18
SCN68000C6I64	IS	64	CERDIL	78	IC18
SCN68000C6N64	NS	64	PLDIL	78	IC18
SCN68000C8A68	AB	68	PLCC	78	IC18
SCN68000C8N64★	NS	64	PLDIL	78	IC18
SCN68542C2A52	A	52	PLCC	79	DS
SCN68542C2N40	N	40	PLDIL	79	DS
SCN68562C4A52	AA	52	PLCC	79;95	IC18 IC19
SCN68562C4I48	IY	48	CERDIL	79;95	IC18 IC19
SCN68562C4N48★	NY	48	PLDIL	79;95	IC18 IC19
SCN68681A1A44	A	44	PLCC	79;95	IC19
SCN68681A1I40	I	40	CERDIL	79;95	IC19
SCN68681A1N40	N	40	PLDIL	79;95	IC19

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
SCN68681C1A44	AX	44	PLCC	79;95	IC18 IC19
SCN68681C1I40	IW	40	CERDIL	79;95	IC18 IC19
SCN68681C1N40★	NW	40	PLDIL	79;95	IC18 IC19
SC80C451ACA68	A	68	PLCC	73	IC14
SC80C451ACN64	N	64	PLDIL	73	IC14
SC80C451AGA68	A	68	PLCC	73	IC14
SC80C451AGN64	N	64	PLDIL	73	IC14
SC80C451CBA68	A	68	PLCC	73	IC14
SC80C451CBN64	N	64	PLDIL	73	IC14
SC80C451CCA68★	A	68	PLCC	73	IC14
SC80C451CCN64★	N	64	PLDIL	73	IC14
SC80C451CGA68	A	68	PLCC	73	IC14
SC80C451CGN64	N	64	PLDIL	73	IC14
SC83C451ACA68	A	68	PLCC	73;95;96	IC14
SC83C451ACN64	N	64	PLDIL	73;95;96	IC14
SC83C451AGA68	A	68	PLCC	73;95;96	IC14
SC83C451AGN64	N	64	PLDIL	73;95;96	IC14
SC83C451CBA68	A	68	PLCC	73;95;96	IC14
SC83C451CBN64	N	64	PLDIL	73;95;96	IC14
SC83C451CCA68	A	68	PLCC	73;95;96	IC14
SC83C451CCN64	N	64	PLDIL	73;95;96	IC14
SC83C451CGA68	A	68	PLCC	73;95;96	IC14
SC83C451CGN64	N	64	PLDIL	73;95;96	IC14
SC83C751-1A28	A	28	PLCC	73	DS
SC83C751-1N24	N	24	PLDIL	73	DS
SC83C751-2A28	A	28	PLCC	73	DS
SC83C751-2N24	N	24	PLDIL	73	DS
SC83C751-3A28	A	28	PLCC	73	DS
SC83C751-3N24	N	24	PLDIL	73	DS
SC83C751-4A28	A	28	PLCC	73	DS
SC83C751-4N24	N	24	PLDIL	73	DS
SC83C751-5A28	A	28	PLCC	73	DS
SC83C751-5N24	N	24	PLDIL	73	DS
SC83C752P	N	28	PLDIL	73	–
SC83C752WP	A	28	PLCC	73	–
SC87C451CBA68	A	68	PLCC	74	DS
SC87C451CBI64	I	64	CERDIL	74	DS
SC87C451CBL68	L	68	CLCC	74	DS
SC87C451CBN64	N	64	PLDIL	74	DS
SC87C451CCA68	A	68	PLCC	74	DS
SC87C451CCI64	I	64	CERDIL	74	DS
SC87C451CCL68	L	68	CLCC	74	DS
SC87C451CCN64	N	64	PLDIL	74	DS
SC87C451CGA68	A	68	PLCC	74	DS
SC87C451CGI64	I	64	CERDIL	74	DS
SC87C451CGL68	L	68	CLCC	74	DS
SC87C451CGN64	N	64	PLDIL	74	DS
SC87C51CBA44	A	44	PLCC	73	DS
SC87C51CBF40	F	40	CERDIP	73	DS
SC87C51CBL44	L	44	CLCC	73	DS
SC87C51CBN40	N	40	PLDIL	73	DS
SC87C51CCA44	A	44	PLCC	73	DS

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
SC87C51CCF40★	F	40	CERDIP	73	DS
SC87C51CCL44	L	44	CLCC	73	DS
SC87C51CCN40★	N	40	PLDIL	73	DS
SC87C51CGA44	A	44	PLCC	73	DS
SC87C51CGF40	F	40	CERDIP	73	DS
SC87C51CGL44	L	44	CLCC	73	DS
SC87C51CGN40	N	40	PLDIL	73	DS
SC87C552–1A68	A	68	PLCC	74	DS
SC87C552–1L68	L	68	CLCC	74	DS
SC87C652	A	40	PLDIL	74	–
SC87C750P	N	20	PLDIL	74	–
SC87C751–1A28	A	28	PLCC	74	DS
SC87C751–1F24★	F	24	CERDIP	74	DS
SC87C751–1N24★	N	24	PLDIL	74	DS
SC87C751–2A28	A	28	PLCC	74	DS
SC87C751–2N24	N	24	PLDIL	74	DS
SC87C751–3A28	A	28	PLCC	74	DS
SC87C751–3F24	F	24	CERDIP	74	DS
SC87C751–3N24	N	24	PLDIL	74	DS
SC87C751–4A28	A	28	PLCC	74	DS
SC87C751–4F24	F	24	CERDIP	74	DS
SC87C751–4N24	N	24	PLDIL	74	DS
SC87C751–5A28	A	28	PLCC	74	DS
SC87C751–5N24	N	24	PLDIL	74	DS
SC87C752P	N	28	PLDIL	74	–
SE4558FE	FE	8	CERDIP	81	IC11
SE4558N	N	8	PLDIL	81	IC11
SE5018F	FM	22	CERDIP	77;79;84	IC11
SE5018N	N	22	PLDIL	77;79;84	IC11
SE5019F	F	22	CERDIP	84	IC11
SE5030F	F	24	CERDIP	84	IC11
SE5105AN	N	8	PLDIL	83	IC11
SE5105N	N	8	PLDIL	83	IC11
SE5205FE	FE	8	CERDIP	80;95	IC11 IC19
SE5205N	N	8	PLDIL	80;95	IC11 IC19
SE521F	FH	14	CERDIP	83	IC11
SE5212FE	FE	8	CERDIP	80;95	IC11 IC19
SE5212N	N	8	PLDIL	80;95	IC11 IC19
SE522F	F	14	CERDIP	83	IC11
SE527F	FH	14	CERDIP	83	IC11
SE527H	HF	10	HEADER	83	IC11
SE529F	FH	14	CERDIP	83	IC11
SE529H	HF	10	HEADER	83	IC11
SE531FE	FE	8	CERDIP	81	IC11
SE531H	HE	8	HEADER	81	IC11
SE532FE	FE	8	CERDIP	81	IC11
SE532N	NE	8	PLDIL	81	IC11
SE5410F	F	16	CERDIP	84;98	IC11 IC01
SE5512FE	FE	8	CERDIP	81	IC11
SE5512N	NE	8	PLDIL	81	IC11
SE5514F	FH	14	CERDIP	81	IC11
SE5514N	NH	14	PLDIL	81	IC11

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
SE5521F	FK	18	CERDIP	89	IC11
SE5532AFE	FE	8	CERDIP	82	IC11 IC01
SE5532FE	FE	8	CERDIP	81	IC11 IC01
SE5534AFE	FE	8	CERDIP	82	IC11 IC01
SE5534AN	NE	8	PLDIL	82	IC11 IC01
SE5534FE	FE	8	CERDIP	82	IC11 IC01
SE5534N	NE	8	PLDIL	82	IC11 IC01
SE5537FE	FE	8	CERDIP	91	IC11
SE5539F	FH	14	CERDIP	95;121	IC11 IC19 IC02
SE5539N	NH	14	PLDIL	95;121	IC11 IC19 IC02
SE555CF	F	14	CERDIP	92	IC11
SE555CFE	FE	8	CERDIP	92	IC11
SE555CN	NE	8	PLDIL	92	IC11
SE555F	FH	14	CERDIP	92	IC11
SE555FE	FE	8	CERDIP	92	IC11
SE555N	NE	14	PLDIL	92	IC11
SE556-1CF	F	14	CERDIP	92	IC11
SE556-1CN	N	14	PLDIL	92	IC11
SE556-1F	F	14	CERDIP	92	IC11
SE556-1N	N	14	PLDIL	92	IC11
SE556CN	NH	14	PLDIL	92	IC11
SE556F	FH	14	CERDIP	92	IC11
SE556N	NH	14	PLDIL	92	IC11
SE5560F	FJ	16	CERDIP	90	IC11
SE5560N	NJ	16	PLDIL	90	IC11
SE5561FE	FE	8	CERDIP	90	IC11
SE5561N	NE	8	PLDIL	90	IC11
SE5562F	FL	20	CERDIP	90	IC11
SE5570F	FN	24	CERDIP	88	IC11
SE5570N	NN	24	PLDIL	88	IC11
SE558F	F	16	CERDIP	92	IC11
SE558N	NJ	16	PLDIL	92	IC11
SE564F	FJ	16	CERDIP	95;96	IC11
SE564N	N	16	PLDIL	95;96	IC11 IC19
SE566F	FE	14	CERDIP	96	IC11
SE566N	NE	8	PLDIL	96	IC11
SE567D	D	8	SO8	96;117	IC11 IC03
SE567F	FH	14	CERDIP	96;117	IC11 IC03
SE567FE	FE	8	CERDIP	96;117	IC11 IC03
SE567N	NE	8	PLDIL	96;117	IC11 IC03
SE592F14	FH	14	CERDIP	81;95;121	IC19 IC02

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
SE592F8	FE	8	CERDIP	81;95;121	IC19 IC02
SE592H	HF	10	HEADER	81;95;121	IC19 IC02
SG2524CD	D	16	SO16	90	IC11
SG2524CF	F	16	CERDIP	90	IC11
SG2524CN	NJ	16	PLDIL	90	IC11
SG3524CD	DJ	16	SO16L	90	IC11
SG3524CF	F	16	CERDIP	90	IC11
SG3524CN	NJ	16	PLDIL	90	IC11
SG3524D	DJ	16	SO16	90	IC11
SG3524F	FJ	16	CERDIP	90	IC11
SG3524N	NJ	16	PLDIL	90	IC11
S8X360I	I	40	CERDIP	77	IC14
TBA120U	SOT27	14	DIL	134	IC02
TBA920S	SOT38	16	DIL	135	IC02
TCA520B	SOT97	8	DIL	82	IC11
TCA520D	SOT96A	8	SO8	82	IC11
TDA1001B★	SOT38	16	DIL	104	IC01
TDA1001BT	SOT109A	16	SO16	104	IC01
TDA1010A	SOT110B	9	SIL	97	IC01
TDA1011	SOT110B	9	SIL	97	IC01
TDA1013B	SOT110B	9	SIL	97;134	IC01 IC02
TDA1015	SOT110B	9	SIL	97;134	IC01 IC02
TDA1015T	SOT96A	8	SO8	97;134	IC01 IC02
TDA1016	SOT38	16	DIL	97	IC01
TDA1020	SOT110B	9	SIL	97	IC01
TDA1023★	SOT38	16	DIL	90	IC11
TDA1023T	SOT109A	16	SO16	90	–
TDA1029	SOT38	16	DIL	981;134	IC01 IC02
TDA1059B	SOT32	3	SIL	108	IC01
TDA1060★	SOT38	16	DIL	90	IC11
TDA1060A	SOT38	16	DIL	90	IC11
TDA1060B	SOT74	16	CERDIP	90	IC11
TDA1060T	SOT109A	16	SO16	90	IC11
TDA1072A	SOT38	16	DIL	108	IC01
TDA1072AT	SOT109A	16	SO16	108	IC01
TDA1074A	SOT102H	18	DIL	98	IC01
TDA1082	SOT38	16	DIL	124	IC02
TDA1432P	SOT38Z	16	DIL	84	–
TDA1432T	SOT109A	16	SO16	84	–
TDA1510A★	SOT141C	13	SBD	97	IC01
TDA1512A	SOT131CE	9	SIL	97;134	IC01 IC02
TDA1512AQ	SOT157	9	SBD	97;134	IC01 IC02
TDA1514A★	SOT131A	9	SIL	97;99;134	IC01 IC02
TDA1515B	SOT141C	13	SBD	97	IC01
TDA1516Q★	SOT141C	13	SBD	97	IC01
TDA1517	SOT110B	9	SIL	97	IC01
TDA1518Q	SOT141C	13	SBD	97	IC01
TDA1519	SOT110B	9	SIL	97	IC01

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
TDA1519A	SOT131B	9	SIL	97	IC01
TDA1519AQ	SOT157	9	SBD	97	IC01
TDA1519B	SOT110B	9	SIL	97	IC01
TDA1520B	SOT131CE	9	SIL	97;134	IC02
					IC01
TDA1520BQ	SOT157CE	9	SBD	97;134	IC01
TDA1521	SOT131	9	SIL	97;134	IC01
					IC02
TDA1521A	SOT110B	9	SIL	97;134	IC01
					IC02
TDA1521AQ	SOT157	9	SBD	97;134	–
TDA1521Q	SOT157	9	SBD	97;134	IC01
					IC02
TDA1522	SOT142	9	SIL	97	IC01
TDA1524A★	SOT102	18	DIL	98;134	IC01
					IC02
TDA1525	SOT102	18	DIL	98;134	IC01
					IC02
TDA1526	SOT102	18	DIL	98;134	DS
TDA1534	SOT117	28	DIL	84;98;122	IC01
					IC02
TDA1535	SOT38WE2	16	DIL	91	IC01
TDA1541A	SOT117	28	DIL	84;98;99;122	IC02
					IC01
TDA1543				99;134	
TDA1543A				98;122;134	
TDA1552Q	SOT141R	13	SBD	97	DS
TDA1553Q	SOT141R	13	SBD	97	DS
TDA1554Q	SOT243	17	SBD	97	DS
TDA1555Q	SOT243	17	SBD	97	DS
TDA1572	SOT102H	18	DIL	108	IC01
TDA1572T	SOT163A	20	SO20	108	IC01
TDA1574	SOT102H	18	DIL	108;110	IC01
TDA1574T	SOT163A	20	SO20	108;110	IC01
TDA1576	SOT102H	18	DIL	108	IC01
					IC17
TDA1578A	SOT102H	18	DIL	110	IC01
TDA1579	SOT102H	18	DIL	98	IC01
TDA1579T	SOT163A	20	SO20	98	IC01
TDA1589	SOT102H	18	DIL	98	IC01
TDA1596	SOT102H	18	DIL	108	IC01
TDA1596T	SOT163A	20	SO20	108	IC01
TDA1598	SOT102H	18	DIL	110	IC01
TDA1600	SOT101B	24	DIL	98	IC01
TDA1721P	SOT38Z	16	DIL	77	–
TDA1721T	SOT109A	16	SO16	77	–
TDA2543	SOT102H	18	DIL	134	IC02
TDA2545A	SOT38	16	DIL	134	IC02
TDA2546A	SOT102H	18	DIL	134	IC02
TDA2549	SOT101A	24	DIL	137	IC02
TDA2555	SOT102H	18	DIL	134	IC02
TDA2556	SOT101B	24	DIL	134	IC02
TDA2557	SOT102H	18	DIL	134	IC02
TDA2577A	SOT102H	18	DIL	136	IC02
TDA2578A	SOT102H	18	DIL	136	IC02
TDA2579A	SOT102H	18	DIL	136	IC02
TDA2582	SOT38	16	DIL	132	IC02

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
TDA2582Q	SOT58	16	QIL	132	IC02
TDA2593★	SOT38	16	DIL	135	IC02
TDA2594	SOT102H	18	DIL	135	IC02
TDA2595★	SOT102H	18	DIL	135	IC02
TDA2611A★	SOT110B	9	SIL	97;134	IC01 IC02
TDA2613	SOT110B	9	SIL	97;134	IC01 IC02
TDA2653A★	SOT141R	13	SBD	135	IC02
TDA2655B	SOT150	12	DIL	135	IC02
TDA2658	SOT141R	13	SBD	135	IC02
TDA2795	SOT102H	18	DIL	134	IC02
TDA3047	SOT38	16	DIL	109;133	IC01 IC02
TDA3047T	SOT162A	16	SO16L	109;133	IC01 IC02
TDA3048	SOT38	16	DIL	109;133	IC01 IC02
TDA3048T	SOT162A	16	SO16L	109;133	IC01 IC02
TDA3501	SOT117	28	DIL	121	IC02
TDA3505	SOT117	28	DIL	121	IC02
TDA3506	SOT117	28	DIL	121	IC02
TDA3507	SOT117	28	DIL	121	IC02
TDA3510	SOT101A	24	DIL	121	IC02
TDA3561A	SOT117	28	DIL	121	IC02
TDA3565	SOT102H	18	DIL	121	IC02
TDA3566	SOT117	28	DIL	121	IC02
TDA3645	–		–	90	–
TDA3653B	SOT110B	9	SIL	135	IC02
TDA3653C	SOT131	9	SIL	135	IC02
TDA3654	SOT131	9	SIL	135	IC02
TDA3654Q	SOT157	9	SBD	135	IC02
TDA3800G	SOT117	28	DIL	134	IC02
TDA3800GS	SOT117	28	DIL	134	IC02
TDA3803A	SOT117	28	DIL	134	IC02
TDA3806	SOT102H	18	DIL	134	IC02
TDA3808	SOT38	16	DIL	134	IC02
TDA3810	SOT102H	18	DIL	98;134	IC01 IC02
TDA3825	SOT27	14	DIL	134	IC02
TDA3826	SOT27	14	DIL	134	IC02
TDA3830	SOT232	32	DIL	134	DS
TDA3845	SOT38	16	DIL	135	IC02
TDA4500	SOT117	28	DIL	133	IC02
TDA4501	SOT117	28	DIL	134	IC02
TDA4502A	SOT117	28	DIL	134	IC02
TDA4503	SOT117	28	DIL	133	IC02
TDA4504	SOT201	32	DIL	134	–
TDA4505	SOT117	28	DIL	134	IC02
TDA4555	SOT117	28	DIL	121	IC02
TDA4556	SOT117	28	DIL	121	IC02
TDA4557	SOT117	28	DIL	121	IC02
TDA4560	SOT102H	18	DIL	121	IC02
TDA4565	SOT102H	18	DIL	121	IC02
TDA4566	SOT102	18	DIL	122	IC02
TDA4568	SOT102	18	DIL	122	IC02

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
TDA4580	SOT117	28	DIL	122	IC02
TDA4800	SOT141R	13	SBD	135	–
TDA5030A	SOT102	18	DIL	137	IC02 IC11
TDA5030AT	SOT163A	20	SO20	137	IC02 IC11
TDA5040T	SOT96A	8	SO8	88;108	IC01
TDA5045T	SOT96A	8	SO8	88;108	–
TDA5140P	SOT102	18	DIL	88;108	DS
TDA5140T	SOT163A	20	SO20	88;108	DS
TDA5330T	SOT136A	28	SO28	137	IC02
TDA5331T	SOT136A	28	SO28	137	–
TDA5332T	SOT163A	20	SO20	137	IC02
TDA5333T	SOT163A	20	SO20	137	–
TDA6100Q	SOT111B	9	SBD	121	DS
TDA6110	SOT110B	9	SIL	121	–
TDA6800	SOT97	8	DIL	137	IC02
TDA6800T	SOT96A	8	SO8	137	IC02
TDA7000★	SOT102H	18	DIL	108	IC01
TDA7010T	SOT109A	16	SO16	108;109	IC01
TDA7021T	SOT109A	16	SO16	108;109	IC01
TDA7030T	SOT136A	28	SO28	108;110	IC01
TDA7040T★	SOT96A	8	SO8	108;110	IC01
TDA7050	SOT97	8	DIL	97;108;117	IC01 IC03 IC17
TDA7050T	SOT96A	8	SO8	97;108;117	IC01 IC03 IC17
TDA7052★	SOT97	8	DIL	97;108;117;120; 135	IC03 IC17 IC01
TDA7053	SOT38	16	DIL	98;108;135	IC01
TDA7056	SOT110	9	SIL	98;135	–
TDA7072				108	
TDA7073				108	
TDA8305	SOT117	28	DIL	134	–
TDA8340	SOT38	16	DIL	137	IC02
TDA8340Q	SOT58	16	QIL	137	IC02
TDA8341	SOT38	16	DIL	137	IC02
TDA8341Q	SOT58	16	QIL	137	IC02
TDA8349A	SOT146	20	DIL	137	–
TDA8350	SOT269	13	SBD	135	–
TDA8370	SOT117	28	DIL	127;136	IC02 IC12
TDA8372A	SOT101B	24	DIL	136	–
TDA8380	SOT38	16	DIL	132	IC02
TDA8390	SOT201	32	DIL	122	IC02
TDA8405	SOT117	28	DIL	127;135	IC02 IC12
TDA8415	SOT146	20	DIL	127;135	IC02
TDA8416	SOT146	20	DIL	127;135	DS
TDA8417	SOT146	20	DIL	103;127;135	DS
TDA8420	SOT117	28	DIL	98;103;127;135	IC01 IC02 IC12
TDA8421	SOT117	28	DIL	98;103;127;135	IC01

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
					IC02
					IC12
TDA8425	SOT146	20	DIL	98;103;127;135	IC01
					IC02
					IC12
TDA8426	SOT146	20	DIL	103;127;135	DS
TDA8432	SOT101BE	24	DIL	124;135	–
TDA8433	SOT101	24	DIL	124;135	–
TDA8440	SOT102H	18	DIL	128;137	IC02
					IC12
TDA8442	SOT38	16	DIL	122;128	IC02
					IC12
TDA8443A	SOT101B	24	DIL	122;128;137	IC02
					IC12
TDA8444	SOT38	16	DIL	99;122;128	IC01
					IC02
					IC12
TDA8451	SOT38	16	DIL	122	IC02
TDA8452	SOT38	16	DIL	122	IC02
TDA8453	SOT102	18	DIL	122	DS
TDA8461	SOT129	40	DIL	122;128	IC02
					IC12
TDA8702★	SOT38D	16	DIL	84;122	–
TDA8702D	SOT74	16	CERDIP	84;122	–
TDA8702T★	SOT162A	16	SO16L	84;122	–
TDA8703★	SOT101	24	DIL	84;122	–
TDA8703T★	SOT137A	24	SO24	84;122	–
TDA8706	SOT146	20	DIL	122	–
TDA8708★	SOT117	28	DIL	122	–
TDA8708T★	SOT136A	28	SO28	122	–
TDA8712	SOT38D	16	DIL	84;122	–
TDA8712T	SOT162A	16	SO16L	84;122	–
TDA8713	SOT101	24	DIL	84;122	–
TDA8713T	SOT137A	24	SO24	84;122	–
TDA8715	SOT102H	18	DIL	84;122	–
TDA8715T	SOT163A	20	SO20	84;122	–
TDA9045	SOT102H	18	DIL	137	IC02
TDA9080	SOT117	28	DIL	122	IC02
TDB1080	SOT38	16	DIL	96;109	IC11
					IC01
TDB1080T	SOT109A	16	SO16	96;109	IC01
TDD1601	SOT101B	24	DIL	98	IC01
TDD1742T	SOT136A	28	SO28	100;110;117	IC01
					IC17
TDE8715D	SOT133B	18	CERDIP	84	–
TEA1017★	SOT102	18	DIL	85;87	IC11
TEA1039★	SOT110B	9	SIL	132	IC02
					IC11
TEA1041T	SOT96A	8	SO8	90;118	–
TEA1042	SOT101A	24	DIL	118	–
TEA1060	SOT102	18	DIL	118	IC03
TEA1061	SOT102	18	DIL	118	IC03
TEA1064	SOT146	20	DIL	118	IC03
TEA1064T	SOT163A	20	SO20	118	IC03
TEA1066T	SOT163A	20	SO20	118	IC03
TEA1067	SOT102	18	DIL	118	IC03
TEA1067T	SOT163A	20	SO20	118	IC03

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
TEA1068	SOT102	18	DIL	118	IC03
TEA1068T	SOT163A	20	SO20	118	IC03
TEA1081	SOT97	8	DIL	118	IC03
TEA1081T	SOT96A	8	SO8	118	IC03
TEA1085	SOT117	28	PLDIL	111	–
TEA1088T	SOT162A	16	SO16L	90;118	–
TEA2000	SOT102H	18	DIL	77	IC02 IC14
TEA5500	SOT38	16	DIL	95;109;133	IC11
TEA5500T	SOT162A	16	SO16L	95;109;133	IC11
TEA5501	SOT27	14	DIL	95;109;133	DS
TEA5551T	SOT109A	16	SO16	108	IC01
TEA5570	SOT38	16	DIL	108	IC01
TEA5580	SOT38	16	DIL	110	IC01
TEA5581	SOT38	16	DIL	110	IC01
TEA5581T	SOT162A	16	SO16L	110	IC01
TEA5582	SOT146	20	DIL	135	–
TEA5591	SOT146	20	DIL	108	IC01
TEA5591A	SOT234	24	DIL	108	–
TEA5592	SOT234	24	DIL	108	–
TEA6100	SOT146	20	DIL	103;109	IC01 IC12
TEA6200	SOT146	20	DIL	108	IC01
TEA6300	SOT117	28	DIL	98;103	IC01 IC12
TEA6300T	SOT136A	28	SO28	98;103	IC01 IC12
TEA6310T	SOT136A	28	SO28	98;103	IC01 IC12
TSA5510	SOT102	18	DIL	128;137	IC02 IC12
TSA5510T	SOT109A	16	SO16	128	IC02 IC12
TSA6057	SOT38	16	DIL	110	IC01 IC12
TSA6057T	SOT162A	16	SO16L	100	IC01 IC12
UAA2033T	SOT136A	28	SO28	120	IC01 IC17
UAA2050T	SOT136A	28	SO28	120	DS
µA723CD	DH	14	SO14	90	IC11
µA723CF	FH	14	CERDIP	90	IC11
µA723CN	DH	14	PLDIL	90	IC11
µA723F	FH	14	CERDIP	90	IC11
µA723N	NH	14	PLDIL	90	IC11
µA733CF	FH	14	CERDIP	80;121	IC11 IC02
µA733CN	NH	14	PLDIL	80;121	IC11 IC02
µA733F	F	14	CERDIP	80;121	IC11 IC02
µA733N	NH	14	PLDIL	80;121	IC11 IC02
µA741CD	DE	8	SO8	82	IC11
µA741CF	F	8	CERDIP	82	IC11
µA741CN	NE	8	PLDIL	82	IC11
µA741F	F	8	CERDIP	82	IC11

INTEGRATED CIRCUITS

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
µA741N	NE	8	PLDIL	82	IC11
µA747CD	DH	14	SO14	82	IC11
µA747CF	FH	14	CERDIP	82	IC11
µA747CN	NH	14	PLDIL	82	IC11
µA747F	FH	14	CERDIP	82	IC11
µA747N	NH	14	PLDIL	82	IC11
UBA1094	SOT27	14	DIL	119	–
UC1842N	N	8	PLDIL	90	IC11
UC2842D	D	14	SO14	90	IC11
UC2842N	N	8	PLDIL	90	IC11
UC3842D	D	14	SO14	90	IC11
UC3842N	N	8	PLDIL	90	IC11
UMA1000T	SOT136A	28	SO28	96;114	IC17 IC12
UMA1010T	SOT136A	28	SO28	96;110;114	IC17 IC12
UMA1012T	SOT136A	28	SO28	96;100;114	–
10H20EV8–4A	A	28	PLCC	143	
10H20EV8–4FA	FA	24	CERDIP	143	
10H20EV8–6A	A	28	PLCC	143	
10H20EV8–6FA	FA	24	CERDIP	143	
100H20EV8–4A	A	28	PLCC	143	
100H20EV8–4FA	FA	24	CERDIP	143	
100H20EV8–6A	A	28	PLCC	143	
100H20EV8–6FA	FA	24	CERDIP	143	
10P256F	F	18	CERDIP	59	IC10
100P256F	F	18	CERDIP	63	IC10
100101F	FN	24	CERDIP	63	IC08
100101Y	YN	24	HLCC/W	63	IC08
100102F	FN	24	CERDIP	63	IC08
100102Y	YN	24	HLCC/W	63	IC08
100107F	FN	24	CERDIP	62	IC08
100107Y	YN	24	HLCC/W	62	IC08
100112F	FN	24	CERDIP	62	IC08
100112Y	YN	24	HLCC/W	62	IC08
100113F	FN	24	CERDIP	62	IC08
100113Y	YN	24	HLCC/W	62	IC08
100114F	FN	24	CERDIP	63	IC08
100114Y	YN	24	HLCC/W	63	IC08
100117F	FN	24	CERDIP	62	IC08
100117Y	YN	24	HLCC/W	62	IC08
100118F	FN	24	CERDIP	62	IC08
100118Y	YN	24	HLCC/W	62	IC08
100122F	FN	24	CERDIP	62	IC08
100122Y	YN	24	HLCC/W	62	IC08
100123F	FN	24	CERDIP	62	IC08
100123Y	YN	24	HLCC/W	62	IC08
100126F	FN	24	CERDIP	62	IC08
100126Y	YN	24	HLCC/W	62	IC08
100131F	FN	24	CERDIP	62	IC08
100131Y	YN	24	HLCC/W	62	IC08
100136F	FN	24	CERDIP	63	IC08
100136Y	YN	24	HLCC/W	63	IC08
100141F	FN	24	CERDIP	63	IC08
100141Y	YN	24	HLCC/W	63	IC08
100149AF	F	16	CERDIP	63	IC10

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
100149BF	F	16	CERDIP	63	IC10
100149F	FJ	16	CERDIP	63	IC10
100150F	FN	24	CERDIP	62	IC08
100150Y	YN	24	HLCC/W	62	IC08
100151F	FN	24	CERDIP	62	IC08
100151Y	YN	24	HLCC/W	62	IC08
100155F	FN	24	CERDIP	63	IC08
100155Y	YN	24	HLCC/W	63	IC08
100158F	FN	24	CERDIP	63	IC08
100158Y	YN	24	HLCC/W	63	IC08
100160F	FN	24	CERDIP	62	IC08
100160Y	YN	24	HLCC/W	62	IC08
100163F	FN	24	CERDIP	63	IC08
100163Y	YN	24	HLCC/W	63	IC08
100164F	FN	24	CERDIP	63	IC08
100164Y	YN	24	HLCC/W	63	IC08
100165F	FN	24	CERDIP	62	IC08
100165Y	YN	24	HLCC/W	62	IC08
100166F	FN	24	CERDIP	62	IC08
100166Y	YN	24	HLCC/W	62	IC08
100170F	FN	24	CERDIP	62	IC08
100170Y	YN	24	HLCC/W	62	IC08
100171F	FN	24	CERDIP	63	IC08
100171Y	YN	24	HLCC/W	63	IC08
100175F	FJ	16	CERDIP	63	IC08
100179F	FN	24	CERDIP	62	IC08
100179Y	YN	24	HLCC/W	62	IC08
100180F	FN	24	CERDIP	62	IC08
100180Y	YN	24	HLCC/W	62	IC08
100181F	FN	24	CERDIP	62	IC08
100181Y	YN	24	HLCC/W	62	IC08
100231F	FN	24	CERDIP	62	IC08
100231Y	YN	24	HLCC/W	62	IC08
100255D	D	16	CERDIP	63	IC08 DS
10100F	FJ	16	CERDIP	57	IC08
10100N	NJ	16	PLDIL	57	IC08
10101F	FJ	16	CERDIP	57	IC08
10101N	NJ	16	PLDIL	57	IC08
10102F	FJ	16	CERDIP	57	IC08
10102N	NJ	16	PLDIL	57	IC08
10103F	FJ	16	CERDIP	57	IC08
10103N	NJ	16	PLDIL	57	IC08
10104D	DJ	16	SO16	57	IC08
10104F	FJ	16	CERDIP	57	IC08
10104N	NJ	16	PLDIL	57	IC08
10105F	FJ	16	CERDIP	57	IC08
10105N	NJ	16	PLDIL	57	IC08
10107D	DJ	16	SO16	57	IC08
10107F	FJ	16	CERDIP	57	IC08
10107N	NJ	16	PLDIL	57	IC08
10109F	FJ	16	CERDIP	57	IC08
10109N	NJ	16	PLDIL	57	IC08

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
10113F	FJ	16	CERDIP	57	IC08
10113N	NJ	16	PLDIL	57	IC08
10114F	FJ	16	CERDIP	59	IC08
10114N	NJ	16	PLDIL	59	IC08
10115F	FJ	16	CERDIP	59	IC08
10115N	NJ	16	PLDIL	59	IC08
10116D	DJ	16	SO16	59	IC08
10116F	FJ	16	CERDIP	59	IC08
10116N	NJ	16	PLDIL	59	IC08
10119N	NJ	16	PLDIL	57	IC08
10124F	FJ	16	CERDIP	56	IC08
10124N	NJ	16	PLDIL	58	IC08
10125F	FJ	16	CERDIP	58	IC08
10125N	NJ	16	PLDIL	58	IC08
10130N	NJ	16	PLDIL	58	IC08
10131F	FJ	16	CERDIP	56	IC08
10131N	NJ	16	PLDIL	56	IC08
10133F	FJ	16	CERDIP	58	IC08
10133N	NJ	16	PLDIL	58	IC08
10134N	NJ	16	PLDIL	58	IC08
10135F	FJ	16	CERDIP	56	IC08
10135N	NJ	16	PLDIL	56	IC08
10136F	FJ	16	CERDIP	56	IC08
10136N	NJ	16	PLDIL	56	IC08
10137F	FJ	16	CERDIP	56	IC08
10137N	NJ	16	PLDIL	56	IC08
10141F	FJ	16	CERDIP	58	IC08
10141N	NJ	16	PLDIL	58	IC08
10149AF	F	16	CERDIP	59	IC10
10149BF	F	16	CERDIP	59	IC10
10149F	FJ	16	CERDIP	59	IC10
10158N	NJ	16	PLDIL	58	IC08
10160F	FJ	16	CERDIP	56	IC08
10160N	NJ	16	PLDIL	56	IC08
10164F	FJ	16	CERDIP	58	IC08
10164N	NJ	16	PLDIL	58	IC08
10173N	NJ	16	PLDIL	58	IC08
10174F	FJ	16	CERDIP	58	IC08
10174N	NJ	16	PLDIL	58	IC08
10175N	NJ	16	PLDIL	58	IC08

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
10176F	FJ	16	CERDIP	56	IC08
10176N	NJ	16	PLDIL	56	IC08
10181N	NN	24	PLDIL	56	IC08
10192F	FJ	16	CERDIP	56	IC08
10192N	NJ	16	PLDIL	56	IC08
10210F	FJ	16	CERDIP	56	IC08
10216F	FJ	16	CERDIP	56	IC08
10216N	NJ	16	PLDIL	56	IC08
10231F	FJ	16	CERDIP	56	IC08
10231N	NJ	16	PLDIL	56	IC08
23 101PB	FO75	64	PGA	64	DS
23 101PBH	FO99	64	PGA	64	DS
231 101PB	FO75	64	PGA	64	DS
231 101PBH	FO99	64	PGA	64	DS
241 141PBK	FO108	144	PGA	77	DS
241 141PBKH	FO128	144	PGA	77	DS
27C210–15A	A	44	PLCC	66	IC10
27C210–15FA	FA	40	CERDIP	66	IC10
27C210–15N	N	40	PLDIL	66	IC10
27C210–20A	A	44	PLCC	66	IC10
27C210–20FA	FA	40	CERDIP	66	IC10
27C210–20N	N	40	PLDIL	66	IC10
27C256–12A	A	32	PLCC	66	IC10
27C256–12FA	FA	28	CERDIP	66	IC10
27C256–12N	N	28	PLDIL	66	IC10
27C256–15A	A	32	PLCC	66	IC10
27C256–15FA★	FA	28	CERDIP	66	IC10
27C256–15N★	N	28	PLDIL	66	IC10
27C256–17A	A	32	PLCC	66	IC10
27C256–17FA★	FA	28	CERDIP	66	IC10
27C256–17N	N	28	PLDIL	66	IC10
27C256–20A	A	32	PLCC	66	IC10
27C256–20FA★	FA	28	CERDIP	66	IC10
27C256–20N	N	28	PLDIL	66	IC10
27C256I–15A	A	32	PLCC	66	IC10
27C256I–15FA	FA	28	CERDIP	66	IC10
27C256I–15N	N	28	PLDIL	66	IC10
27C256I–20A	A	32	PLCC	66	IC10
27C256I–20FA	FA	28	CERDIP	66	IC10
27C256I–20N	N	28	PLDIL	66	IC10
27C512–15A	A	32	PLCC	66	IC10
27C512–15FA★	FA	28	CERDIP	66	IC10
27C512–15N★	N	28	PLDIL	66	IC10
27C512–17A	A	32	PLCC	66	IC10
27C512–17FA	FA	28	CERDIP	66	IC10
27C512–17N	N	28	PLDIL	66	IC10
27C512–20A	A	32	PLCC	66	IC10
27C512–20FA★	FA	28	CERDIP	66	IC10
27C512–20N	N	28	PLDIL	66	IC10

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
27C64A–10A	A	32	PLCC	66	IC10
27C64A–10FA	FA	28	CERDIP	66	IC10
27C64A–10N	N	28	PLDIL	66	IC10
27C64A–12A	A	32	PLCC	66	IC10
27C64A–12FA	FA	28	CERDIP	66	IC10
27C64A–12N	N	28	PLDIL	66	IC10
27C64A–15A	A	32	PLCC	66	IC10
27C64A–15FA★	FA	28	CERDIP	66	IC10
27C64A–15N★	N	28	PLDIL	66	IC10
27C64A–20A	A	32	PLCC	66	IC10
27C64A–20FA★	FA	28	CERDIP	66	IC10
27C64A–20N	N	28	PLDIL	66	IC10
27C64AI–15A	A	32	PLCC	66	IC10
27C64AI–15FA	FQ	28	CERDIP	66	IC10
27C64AI–15N	N	28	PLDIL	66	IC10
27C64AI–20A	A	32	PLCC	66	IC10
27C64AI–20FA	FQ	28	CERDIP	66	IC10
27C64AI–20N	N	28	PLDIL	66	IC10
27HC641–45A	A	28	PLCC	66	IC10
27HC641–45FA	FA	24	CERDIP	66	IC10
27HC641–45N	N	24	PLDIL	66	IC10
27HC641–55A	A	28	PLCC	66	IC10
27HC641–55FA	FA	24	CERDIP	66	IC10
27HC641–55N	N	24	PLDIL	66	IC10
74ACT11000D	D	16	SO16	37	IC07
74ACT11000N★	N	16	PLDIL	37	IC07
74ACT11002D	D	16	SO16	37	IC07
74ACT11002N★	N	16	PLDIL	37	IC07
74ACT11004D	D	20	SO20	37	IC07
74ACT11004N★	N	20	PLDIL	37	IC07
74ACT11008D	D	16	SO16	37	IC07
74ACT11008N★	N	16	PLDIL	37	IC07
74ACT11010D	D	16	SO16	37	IC07
74ACT11010N★	N	16	PLDIL	37	IC07
74ACT11011D	D	16	SO16	37	IC07
74ACT11011N★	N	16	PLDIL	37	IC07
74ACT11013D	D	14	SO14	37;39	IC07
74ACT11013N	N	14	PLDIL	37;39	IC07
74ACT11014D	D	20	SO20	37;39	IC07
74ACT11014N	N	20	PLDIL	37;39	IC07
74ACT11020D	D	14	SO14	37	IC07
74ACT11020N★	N	14	PLDIL	37	IC07
74ACT11021D	D	14	SO14	37	IC07
74ACT11021N★	N	14	PLDIL	37	IC07
74ACT11027D	D	16	SO16	37	IC07
74ACT11027N★	N	16	PLDIL	37	IC07
74ACT11030D	D	14	SO14	37	IC07
74ACT11030N★	N	14	PLDIL	37	IC07
74ACT11032D	D	16	SO16	37	IC07
74ACT11032N★	N	16	PLDIL	37	IC07
74ACT11034D	D	20	SO20	37	IC07
74ACT11034N★	N	20	PLDIL	37	IC07
74ACT11051D	D	14	SO14	37	–
74ACT11051N	N	14	PLDIL	37	–
74ACT11064D	D	14	SO14	37	–
74ACT11064N	N	14	PLDIL	37	–
74ACT11074D	D	14	SO14	36	IC07

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
74ACT11074N★	N	14	PLDIL	36	IC07
74ACT11086D	D	16	SO16	37	IC07
74ACT11086N	N	16	PLDIL	37	IC07
74ACT11109D	D	16	SO16	36	IC07
74ACT11109N★	N	16	PLDIL	36	IC07
74ACT11112D	D	16	SO16	36	IC07
74ACT11112N	N	16	PLDIL	36	IC07
74ACT11132D	D	16	SO16	37;39	IC07
74ACT11132N	N	16	PLDIL	37;39	IC07
74ACT11138D	D	16	SO16	35	IC07
74ACT11138N★	N	16	PLDIL	35	IC07
74ACT11139D	D	16	SO16	35	–
74ACT11139N	N	16	PLDIL	35	–
74ACT11151D	D	16	SO16	38	IC07
74ACT11151N	N	16	PLDIL	38	IC07
74ACT11153D	D	16	SO16	38	–
74ACT11153N	N	16	PLDIL	38	–
74ACT11157N	N	20	PLDIL	38	–
74ACT11158D	D	20	SO20	38	IC07
74ACT11158N	N	20	PLDIL	38	IC07
74ACT11160D	D	20	SO20	35	IC07
74ACT11160N	N	20	PLDIL	35	IC07
74ACT11162D	D	20	SO20	35	IC07
74ACT11162N	N	20	PLDIL	35	IC07
74ACT11174D	D	20	SO20	36	–
74ACT11174N	N	20	PLDIL	36	–
74ACT11175D	D	20	SO20	36	IC07
74ACT11175N	N	20	PLDIL	36	IC07
74ACT11181D	D	28	SO28	35	–
74ACT11181N	N	28	PLDIL	35	–
74ACT11190D	D	20	SO20	35	IC07
74ACT11190N	N	20	PLDIL	35	IC07
74ACT11191D	D	20	SO20	35	IC07
74ACT11191N	N	20	PLDIL	35	IC07
74ACT11192D	D	20	SO20	35	–
74ACT11192N	N	20	PLDIL	35	–
74ACT11193D	D	20	SO20	35	–
74ACT11193N	N	20	PLDIL	35	–
74ACT11194D	D	20	SO20	38	IC07
74ACT11194N	N	20	PLDIL	38	IC07
74ACT11238D	D	16	SO16	35	IC07
74ACT11238N	N	16	PLDIL	35	IC07
74ACT11239D	D	16	SO16	35	–
74ACT11239N	N	16	PLDIL	35	–
74ACT11240D	D	24	SO24	35	IC07
74ACT11240N★	N	24	PLDIL	35	IC07
74ACT11241D	D	24	SO24	35	IC07
74ACT11241N★	N	24	PLDIL	35	IC07
74ACT11244D	D	24	SO24	35	IC07
74ACT11244N★	N	24	PLDIL	35	IC07
74ACT11245D	D	24	SO24	39	IC07
74ACT11245N★	N	24	PLDIL	39	IC07
74ACT11251D	D	16	SO16	38	IC07
74ACT11251N	N	16	PLDIL	38	IC07
74ACT11253D	D	16	SO16	38	IC07
74ACT11253N★	N	16	PLDIL	38	IC07
74ACT11257D	D	20	SO20	38	IC07

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
74ACT11257N	N	20	PLDIL	38	IC07
74ACT11258D	D	20	SO20	38	IC07
74ACT11258N	N	20	PLDIL	38	IC07
74ACT11280D	D	14	SO14	35	IC07
74ACT11280N★	N	14	PLDIL	35	IC07
74ACT11286D	D	14	SO14	35	IC07
74ACT11286N	N	14	PLDIL	35	IC07
74ACT11352D	D	16	SO16	38	–
74ACT11352N	N	16	PLDIL	38	–
74ACT11353D	D	16	SO16	38	IC07
74ACT11353N★	N	16	PLDIL	38	IC07
74ACT11373D	D	24	SO24	36	IC07
74ACT11373N★	N	24	PLDIL	36	IC07
74ACT11374D	D	24	SO24	36	IC07
74ACT11374N★	N	24	PLDIL	36	IC07
74ACT11378D	D	20	SO20	36	–
74ACT11378N	N	20	PLDIL	36	–
74ACT11379D	D	20	SO20	36	–
74ACT11379N	N	20	PLDIL	36	–
74ACT11470D	D	28	SO28	39	–
74ACT11470N	N	28	PLDIL	39	–
74ACT11471D	D	28	SO28	39	–
74ACT11471N	N	28	PLDIL	39	–
74ACT11472D	D	28	SO28	39	–
74ACT11472N	N	28	PLDIL	39	–
74ACT11473D	D	28	SO28	39	–
74ACT11473N	N	28	PLDIL	39	–
74ACT11474D	D	28	SO28	39	–
74ACT11474N	N	28	PLDIL	39	–
74ACT11475D	D	28	SO28	39	–
74ACT11475N	N	28	PLDIL	39	–
74ACT11520D	D	20	SO20	35	IC07
74ACT11520N★	N	20	PLDIL	35	IC07
74ACT11521D	D	20	SO20	35	IC07
74ACT11521N★	N	20	PLDIL	35	IC07
74ACT11533D	D	24	SO24	36;38	IC07
74ACT11533N★	N	24	PLDIL	36;38	IC07
74ACT11534D	D	24	SO24	36	IC07
74ACT11534N★	N	24	PLDIL	36	IC07
74ACT11543D	D	28	SO28	39	–
74ACT11543N	N	28	PLDIL	39	–
74ACT11544D	D	28	SO28	39	–
74ACT11544N	N	28	PLDIL	39	–
74ACT11620D	D	24	SO24	39	–
74ACT11620N	N	24	PLDIL	39	–
74ACT11640D	D	24	SO24	39	IC07
74ACT11640N	N	24	PLDIL	39	IC07
74ACT11643D	D	24	SO24	39	–
74ACT11643N	N	24	PLDIL	39	–
74ACT11655D	D	28	SO28	35	–
74ACT11655N	N	28	PLDIL	35	–
74ACT11656D	D	28	SO28	35	–
74ACT11656N	N	28	PLDIL	35	–
74ACT11657D	D	28	SO28	39	–
74ACT11657N	N	28	PLDIL	39	–
74ACT11677D	D	24	SO24	35	–
74ACT11677N	N	24	PLDIL	35	–

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
74ACT11678D	D	24	SO24	35	–
74ACT11678N	N	24	PLDIL	35	–
74ACT11810D	D	16	SO16	37	IC07
74ACT11810N	N	16	PLDIL	37	IC07
74ACT11898D	D	20	SO20	38	IC07
74ACT11898N	N	20	PLDIL	38	IC07
74ACT11979D	D	16	SO16	38	–
74ACT11979N	N	16	PLDIL	38	–
74ACT11980D	D	20	SO20	38	–
74ACT11980N	N	20	PLDIL	38	–
74ACT11981D	D	20	SO20	38	–
74ACT11981N	N	20	PLDIL	38	–
74ACT11987D	D	20	SO20	38	–
74ACT11987N	N	20	PLDIL	38	–
74ACT11988D	D	20	SO20	38	–
74ACT11988N	N	20	PLDIL	38	–
74AC11000D	D	16	SO16	37	IC07
74AC11000N★	N	16	PLDIL	37	IC07
74AC11002D	D	16	SO16	37	IC07
74AC11002N★	N	16	PLDIL	37	IC07
74AC11004D	D	20	SO20	37	IC07
74AC11004N★	N	20	PLDIL	37	IC07
74AC11008D	D	16	SO16	37	IC07
74AC11008N★	N	16	PLDIL	37	IC07
74AC11010D	D	16	SO16	37	IC07
74AC11010N★	N	16	PLDIL	37	IC07
74AC11011D	D	16	SO16	37	IC07
74AC11011N★	N	16	PLDIL	37	IC07
74AC11013D	D	14	SO14	37;39	IC07
74AC11013N	N	14	PLDIL	37;39	IC07
74AC11014D	D	20	SO20	37;39	IC07
74AC11014N	N	20	PLDIL	37;39	IC07
74AC11020D	D	14	SO14	37	IC07
74AC11020N★	N	14	PLDIL	37	IC07
74AC11021D	D	14	SO14	37	IC07
74AC11021N★	N	14	PLDIL	37	IC07
74AC11027D	D	16	SO16	37	IC07
74AC11027N★	N	16	PLDIL	37	IC07
74AC11030D	D	14	SO14	37	IC07
74AC11030N★	N	14	PLDIL	37	IC07
74AC11032D	D	16	SO16	37	IC07
74AC11032N★	N	16	PLDIL	37	IC07
74AC11034D	D	20	SO20	37	IC07
74AC11034N★	N	20	PLDIL	37	IC07
74AC11051D	D	14	SO14	37	–
74AC11051N	N	14	PLDIL	37	–
74AC11064D	D	14	SO14	37	–
74AC11064N	N	14	PLDIL	37	–
74AC11074D	D	14	SO14	36	IC07
74AC11074N★	N	14	PLDIL	36	IC07
74AC11086D	D	16	SO16	37	IC07
74AC11086N	N	16	PLDIL	37	IC07
74AC11109D	D	16	SO16	36	IC07
74AC11109N★	N	16	PLDIL	36	IC07
74AC11112D	D	16	SO16	36	IC07
74AC11112N	N	16	PLDIL	36	IC07
74AC11132D	D	16	SO16	37;39	IC07

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
74AC11132N	N	16	PLDIL	37;39	IC07
74AC11138D	D	16	SO16	35	IC07
74AC11138N	N	16	PLDIL	35	IC07
74AC11139D	D	16	SO16	35	–
74AC11139N	N	16	PLDIL	35	–
74AC11151D	D	16	SO16	38	IC07
74AC11151N	N	16	PLDIL	38	IC07
74AC11153D	D	16	SO16	38	–
74AC11153N	N	16	PLDIL	38	–
74AC11157D	D	20	SO20	38	–
74AC11157N	N	20	PLDIL	38	–
74AC11158D	D	20	SO20	38	IC07
74AC11158N	N	20	PLDIL	38	IC07
74AC11160D	D	20	SO20	35	IC07
74AC11160N★	N	20	PLDIL	35	IC07
74AC11162D	D	20	SO20	35	IC07
74AC11162N★	N	20	PLDIL	35	IC07
74AC11174D	D	20	SO20	36	–
74AC11174N	N	20	PLDIL	36	–
74AC11175D	D	20	SO20	36	IC07
74AC11175N	N	20	PLDIL	36	IC07
74AC11181D	D	28	SO28	35	–
74AC11181N	N	28	PLDIL	35	–
74AC11190D	D	20	SO20	35	IC07
74AC11190N	N	20	PLDIL	35	IC07
74AC11191D	D	20	SO20	35	IC07
74AC11191N	N	20	PLDIL	35	IC07
74AC11192D	D	20	SO20	35	–
74AC11192N	N	20	PLDIL	35	–
74AC11193D	D	20	SO20	35	–
74AC11193N	N	20	PLDIL	35	–
74AC11194D	D	20	SO20	38	IC07
74AC11194N	N	20	PLDIL	38	IC07
74AC11238D	D	16	SO16	35	IC07
74AC11238N★	N	16	PLDIL	35	IC07
74AC11239D	D	16	SO16	35	–
74AC11239N	N	16	PLDIL	35	–
74AC11240D	D	24	SO24	35	IC07
74AC11240N★	N	24	PLDIL	35	IC07
74AC11241D	D	24	SO24	35	IC07
74AC11241N	N	24	PLDIL	35	IC07
74AC11244D	D	24	SO24	35	IC07
74AC11244N★	N	24	PLDIL	35	IC07
74AC11245D	D	24	SO24	39	IC07
74AC11245N★	N	24	PLDIL	39	IC07
74AC11251D	D	16	SO16	38	IC07
74AC11251N	N	16	PLDIL	38	IC07
74AC11253D	D	16	SO16	38	IC07
74AC11253N★	N	16	PLDIL	38	IC07
74AC11257D	D	20	SO20	38	IC07
74AC11257N	N	20	PLDIL	38	IC07
74AC11258D	D	20	SO20	38	IC07
74AC11258N	N	20	PLDIL	38	IC07
74AC11280D	D	14	SO14	35	IC07
74AC11280N★	N	14	PLDIL	35	IC07
74AC11286D	D	14	SO14	35	IC07
74AC11286N	N	14	PLDIL	35	IC07

Alphanumeric index

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
74AC11352D	D	16	SO16	38	–
74AC11352N	N	16	PLDIL	38	–
74AC11353D	D	16	SO16	38	IC07
74AC11353N★	N	16	PLDIL	38	IC07
74AC11373D	D	24	SO24	36;38	IC07
74AC11373N★	N	24	PLDIL	36;38	IC07
74AC11374D	D	24	SO24	36	IC07
74AC11374N★	N	24	PLDIL	36	IC07
74AC11378D	D	20	SO20	36	–
74AC11378N	N	20	PLDIL	36	–
74AC11379D	D	20	SO20	36	–
74AC11379N	N	20	PLDIL	36	–
74AC11470D	D	28	SO28	39	–
74AC11470N	N	28	PLDIL	39	–
74AC11471D	D	28	SO28	39	–
74AC11471N	N	28	PLDIL	39	–
74AC11472D	D	28	SO28	39	–
74AC11472N	N	28	PLDIL	39	–
74AC11473D	D	28	SO28	39	–
74AC11473N	N	28	PLDIL	39	–
74AC11474D	D	28	SO28	39	–
74AC11474N	N	28	PLDIL	39	–
74AC11475D	D	28	SO28	39	–
74AC11475N	N	28	PLDIL	39	–
74AC11520D	D	20	SO20	35	IC07
74AC11520N★	N	20	PLDIL	35	IC07
74AC11521D	D	20	SO20	35	IC07
74AC11521N★	N	20	PLDIL	35	IC07
74AC11533D	D	24	SO24	36;38	IC07
74AC11533N★	N	24	PLDIL	36;38	IC07
74AC11534D	D	24	SO24	36	IC07
74AC11534N★	N	24	PLDIL	36	IC07
74AC11543D	D	28	SO28	39	–
74AC11543N	N	28	PLDIL	39	–
74AC11544D	D	28	SO28	39	–
74AC11544N	N	28	PLDIL	39	–
74AC11620D	D	24	SO24	39	–
74AC11620N	N	24	PLDIL	39	–
74AC11640D	D	24	SO24	39	IC07
74AC11640N	N	24	PLDIL	39	IC07
74AC11643D	D	24	SO24	39	–
74AC11643N	N	24	PLDIL	39	–
74AC11655D	D	28	SO28	35	–
74AC11655N	N	28	PLDIL	35	–
74AC11656D	D	28	SO28	35	–
74AC11656N	N	28	PLDIL	35	–
74AC11657D	D	28	SO28	39	–
74AC11657N	N	28	PLDIL	39	–
74AC11677D	D	24	SO24	35	–
74AC11677N	N	24	PLDIL	35	–
74AC11678D	D	24	SO24	35	–
74AC11678N	N	24	PLDIL	35	–
74AC11810D	D	16	SO16	37	IC07
74AC11810N	N	16	PLDIL	37	IC07
74AC11898D	D	20	SO20	38	IC07
74AC11898N	N	20	PLDIL	38	IC07
74AC11979D	D	16	SO16	38	–

extended type no.	package code	no. of pins	pin position	catalogue page no.	handbook
74AC11979N	N	16	PLDIL	38	–
74AC11980D	D	20	SO20	38	–
74AC11980N	N	20	PLDIL	38	–
74AC11981D	D	20	SO20	38	–
74AC11981N	N	20	PLDIL	38	–
74AC11987D	D	20	SO20	38	–
74AC11987N	N	20	PLDIL	38	–
74AC11988D	D	20	SO20	38	–
74AC11988N	N	20	PLDIL	38	–

Discrete semiconductors

S

DISCRETE SEMICONDUCTORS

Data Handbook System

On most pages, directly underneath the title, reference is made to a 'Data Handbook'.
That Handbook is part of the Philips Data Handbook System which is a comprehensive source of information on electronic components, subassemblies and materials.
For this catalogue section the following Handbooks are of interest:

book	title
Semiconductors (red series)	
S8A	Light, emitting diodes (1988) (wordt SC11)
S9	Power Mos transistors (1988) (wordt SC13)
SC01	Diodes - small-signal diodes, voltage regulator diodes, voltage reference diodes, tuner diodes, rectifier diodes (1989) (was S1)
SC02	Power diodes - rectifier diodes, regulator diodes, high-voltage rectifier diodes, accessoires (1990) (was S2A)
SC03	Thyristors, triacs (1991) (was S2B)
SC04	Small-signal transistors (1989) (was S3)
SC05	Low-frequency power transistors and modules (1989) (was S4A)
SC06	High-voltage and switching power transistors (1989) (was S4B)
SC07	Field-effect transistors (1989) (was S5)
SC08	R.F. power transistors (1989) (was S6A)
SC08B	R.F. power Mos transistors (1991)
SC09	R.F. power modules (1989) (was S6B)
SC10	Surface mounted semiconductors (1989) (was S7)
SC12	Optocouplers (1989) (was S8B)
SC14A	Wideband transistors and wideband hybrid IC modules (1989) (was S10)
SC15	Microwave semiconductors (1990) (was S11)
SC17	Semiconductor sensors(1991) (was S13)
SC18	Liquid crystal displays LCD01 (1991) (was S14)

DISCRETE SEMICONDUCTORS

Contents

Data Handbook System ..... S–ii

Contents ..... S–iii

Letter symbols ..... S–iv

Alphanumeric type number index ..... S–v

Diodes:
Small signal diodes S1
General purpose and high speed switching diodes S1
Schottky–Barrier switching diodes S3
Low–leakage diodes S3
Tuner diodes S4
Variable capacitance diodes S4
Band switching diodes S5
Voltage reference diodes S6
Stabistors S6
Voltage regulator diodes S7
Transient suppressor diodes S7

Rectifier diodes:
Schottky–Barrier S8
Ultra fast recovery types S9
Very fast recovery types S9
Fast gen. purpose and efficiency types S10
High–voltage typos S11

Triacs, thyristors, bi–directional devices S28

Breakover diodes S33

Small signal transistors:
Transistors for audio and general–purpose applications S35
Transistors for HF applications S38
Transistors for switching applications S40

Trigger devices S44

Alphanumeric list S45

LF power transistors and modules:
General purpose Darlingtons S53
LF general–purpose power transistors S55
High voltage transistors S58
PowerMOS S62
Alphanumeric list S67

Field–effect transistors S102

RF power transistors and modules S109
Alphanumeric list S117

Wideband transistors and modules S125

Hybrid integrated circuits S140

Surface–mounting devices S147
Alphanumeric list S155

Optoelectronic devices:
Laser diodes S164
Collimator pens S166
Laser diodes for fibre–optic communication S168

Pyroelectric infrared detectors S172
Optocouplers S178
Liquid crystal displays S185
Microwave transistors S212
Accessories S216
Sensor devices S217

Guide to packing quantities S220

CECC approved types S221

S

Letter symbols

C_d	Diode capacitance
C_{rb}	Feedback capacitance (common base)
C_{rd}	Feedback capacitance (common drain)
C_{re}	Feedback capacitance (common emitter)
C_{rs}	Feedback capacitance (common source)
CMRR	Common mode rejection ratio
D*	Detectivity
d_{im}	Intermodulation distortion
d_{cm}	Cross-modulation distortion
$E_{e\,tr}$	Irradiance to trigger a device
F	Noise figure
f	Frequency
f_{hfe}	Frequency at which h_{fe} is -3 dB
f_T	Transition frequency
$\Delta \frac{1}{g_{fs}}$	Difference in transfer impedance
$\Delta \frac{g_{os}}{g_{fs}}$	Difference in penetration factor
G_p	Power gain
GUM	Maximum unilateral power gain
h_{fe}	Small-signal current gain
h_{FE}	D.C. current gain
$\frac{\Delta I}{\Delta T}$	Equivalent differential current change with temperature
I_A	Anode current
dI_A/dT	Rate of rise of anode current
I_{ARM}	Repetitive peak anode current
I_B	D.C. (or average) base current
I_C	D.C. (or average) collector current
$I_{(CL)SM}$	Non-repetitive peak clamping current
I_{CM}	Peak value of I_C
I_D	Off-state current
I_{DSS}	Drain current (source short-circuited to gate)
I_{DSX}	Drain cut-off current (specified conditions)
I_e	Radiant intensity
I_F	Forward current (d.c. or average)
$I_{F(AV)}$	Total average forward current
I_{FM}	Peak forward current
I_{FRM}	Repetitive peak forward current
I_{FSM}	Non-repetitive peak forward current
I_{FWM}	Working peak forward current
I_{GSS}	Gate cut-off current (source short-circuited to drain)
I_{GT}	Gate-cathode current that will trigger all devices
I_H	Holding current
I_{ISM}	Non-repetitive peak input current
$I_{O(AV)}$	Average output current
I_{opt}	Output current at optimum operation
I_{ORM}	Repetitive peak output current
I_R	Reverse (cut-off) current
$I_{R(D)}$	Dark reverse current
I_{RRM}	Repetitive peak reverse current
I_{SDX}	Source cut-off current (specified conditions)
I_{SGO}	Source current (open drain)
I_T	On-state current
dI_T/dt	Rate of rise of on-state current
$I_{T(AV)}$	Average on-state current
I_{TRM}	Repetitive peak on-state current
$I_{T(RMS)}$	R.M.S. value of the on-state current
I_{TSM}	Non-repetitive peak on-state current
I_{TWM}	Working peak on-state current
I_v	Luminous intensity
I_Z	Working current (d.c. or average)
I_{ZM}	Peak working current
I_{ZRM}	Repetitive peak working current
I^2t	I squared t for fusing
N	Light sensitivity
P_D	Drive power
P.E.P.	Peak envelope power
P_L	Load power
P_o	Output power
P_{opt}	Optimum output power
PRRM	Repetitive peak reverse power dissipation
PRSM	Non-repetitive peak reverse power dissipation
P_S	Source power
P_{tot}	Total power dissipation
PZRM	Repetitive peak reverse power dissipation
PZSM	Non-repetitive peak reverse power dissipation
r_D	Diode series resistance
r_{diff}	Differential resistance
r_{do}	Initial dark resistance
r_{DSoff}	Drain-source resistance (off)
$r_{ds\,on}$	Drain-source resistance (on) at specified frequency
R_L	Load resistance
r_{lo}	Initial illumination resistance
SF, SZ	Temperature coefficient of the working voltage
T_{amb}	Ambient temperature
T_c	Colour temperature
t_d	Forward conduction delay
t_f	Fall time
T_h	Heatsink temperature
T_j	Junction temperature
T_{mb}	Mounting base temperature
t_{off}	Turn-off time
t_{on}	Turn-on time
t_q	Circuit commutated turn-off time
t_r	Rise time
t_{rr}	Reverse recovery time
t_{tot}	Total recovery time
V_{AK}	Anode-cathode voltage
V_B	Supply voltage
V_{CBO}	Collector-base voltage (open emitter)
V_{CEO}	Collector-emitter voltage (open base)
V_{CER}	Collector-emitter voltage with a specified resistance between emitter and base
V_{CERM}	Peak value of V_{CER}
V_{CES}	Collector-emitter voltage (emitter to base)
V_{CESM}	Peak value of V_{CES}
V_{CEsat}	Collector-emitter saturation voltage
$V_{(CL)R}$	Output clamping voltage
dV_{com}/dt	Rate of rise of commutating voltage that will not trigger any device
V_D	Continuous off-state voltage
dV_D/dt	Rate of rise of off-state voltage
V_{DB}	Drain-substrate voltage
V_{DRM}	Repetitive peak off-state voltage
V_{DS}	Drain-source voltage
V_{DWM}	Crest working off-state voltage
V_F	Continuous forward voltage
V_{GA}	Anode gate-anode voltage
V_{GK}	Cathode gate-cathode voltage
ΔV_{GS}	Gate-source voltage difference
$\frac{d\Delta V_{GS}}{dT}$	Thermal drift of gate-source voltage difference
V_{GT}	Gate-cathode voltage that will trigger all devices
V_I	Input stand-off voltage (transient suppressors)
V_{IRM}	Repetitive peak input voltage
$V_{I(RMS)}$	R.M.S. value of the input voltage
V_{IWM}	Crest working input voltage
V_n	Equivalent noise voltage
V_O	Output voltage
$V_{(opt)}$	Output voltage at optimum operation
$V_{(P)GS}$	Gate-source cut-off voltage
V_R	Continuous reverse voltage; stand-off voltage
V_{RRM}	Repetitive peak reverse voltage
V_{RWM}	Crest working reverse voltage
V_{SB}	Source-substrate voltage
V_Z	Working voltage
$\frac{\Delta V}{\Delta T}$	Equivalent differential voltage change with temperature
y_{fs}	Transfer admittance (common source)
η	Efficiency
α 50%	Beamwidth between half-intensity directions
λ_{peak}	Wavelength at peak spectral response or emission
ϕ_e	Radiant output power

DISCRETE SEMICONDUCTORS

Product code guide

Alphanumeric type number index

In this alphanumeric list we present all semiconductors mentioned in this catalogue. The second column is the code for the kind of product and the part of the Data Handbook System in which full information is given. The third column gives the page on which data can be found.

Key to product code:

FET Field–effect transistors
HIC Hybrid integrated circuits
I Infrared devices
LED Light–emitting diodes
LCD Liquid crystal displays
Mm Surface–mounting devices
Mw Microwave transistors
P Low–frequency power transistors and modules
PDT Photodiodes or transistors
Ph Photoconductive devices
PhC Photocouplers
PM Power MOS transistors
R Rectifier diodes
RFP R.F. power transistors and modules
BOD Breakover diodes
RT Tripler
S Sensor devices
Saw Surface accoustic wave filters
SD Small–signal diodes
Sm Small–signal transistors
Sp Low–frequency switching power transistors
St Rectifier stacks
T Tuner diodes
Th Thyristors
ThM Thyristor modules
Tri Triacs
Vrf voltage reference diodes
Vrg Voltage regulator diodes
WBT Wideband transistors and modules

S

type	handbook reference	prod. code	cat. page
BA220	SC01	SD	S1/6
BA221	SC01	SD	S1
BA223	SC01	T	S5
BA281	SC01	SD	S5
BA314	SC01	Vrg	S6
BA315	SC01	Vrg	S6
BA316	SC01	SD	S1
BA317	SC01	SD	S1
BA318	SC01	SD	S1
BA423	SC01	T	S5
BA481	SC01	T	S5
BA482	SC01	T	S5
BA483	SC01	T	S5
BA484	SC01	T	S5
BA682	SC01/10	T/Mm	S5
BAS11	SC01	SD	S2
BAS15	SC01	SD	S1
BAS16	SC01/10	SD/Mm	S2
BAS17*	SC01/10	Vrg/Mm	S6
BAS29	SC01/10	SD/Mm	S2
BAS31	SC01/10	SD/Mm	S2
BAS32	SC01/10	SD/Mm	S2
BAS32L	SC01/10	SD/Mm	S2
BAS35	SC01/10	SD/Mm	S2
BAS45	SC01	SD	S3

type	handbook reference	prod. code	cat. page
BAS45L	SC01/10	SD/Mm	S2
BAS56	SC01/10	SD/Mm	S1
BAS85	SC01/10	SD/Mm	S3
BAT17	SC01/10	SD/Mm	S3
BAT18	SC01/10	T/Mm	S5
BAT54	SC01/10	SD/Mm	S3
BAT54A	SC01/10	SD/Mm	S3
BAT54C	SC01/10	SD/Mm	S3
BAT54S	SC01/10	SD/Mm	S3
BAT74	SC01/10	SD/Mm	S3
BAT81	SC01	T	S3
BAT82	SC01	T	S3
BAT83	SC01	T	S3
BAT85	SC01	T	S3
BAT86	SC01	T	S3
BAV10	SC01	SD	S1
BAV18	SC01	SD	S1
BAV19	SC01	SD	S2
BAV20	SC01	SD	S2
BAV21	SC01	SD	S2
BAV23	SC01/10	SD/Mm	S2
BAV45	SC01	SD	S3
BAV74	SC01/10	SD/Mm	S1
BAV99	SC01/10	SD/Mm	S1
BAV100	SC01/10	SD/Mm	S1

* series

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
BAV101	SC01/10	SD/Mm	S2
BAV102	SC01/10	SD/Mm	S2
BAV103	SC01/10	SD/Mm	S2
BAV105	SC01/10	SD/Mm	S1
BAW56	SC01/10	SD/Mm	S1
BAW62	SC01	SD	S2
BAX12	SC01	SD	S2
BAX14	SC01	SD	S1/6
BAX18	SC01	SD	S2
BAY80	SC01	SD	S2
BB112	SC01	T	S4
BB119	SC01	T	S4
BB130	SC01	T	S4
BB204B	SC01	T	S4
BB204G	SC01	T	S4
BB212	SC01	T	S4
BB215	SC01/10	SD/Mm	S4
BB219	SC01/10	SD/Mm	S4
BB240	SC01/10	T/Mm	S4
BB241	SC01/10	T/Mm	S4
BB405B	SC01	T	S4
BB417	SC01	T	S4
BB804	SC01/10	T/Mm	S4
BB809	SC01	T	S4
BB909A	SC01	T	S4
BB909B	SC01	T	S4
BB910	SC01	T	S4
BB911	SC01	T	S4
BBY31	SC01/10	T/Mm	S4
BBY39	SC01/10	T/Mm	S4
BBY40	SC01/10	T/Mm	S4
BBY42	SC01/10	T/Mm	S4
BBY62	SC01/10	T/Mm	S4
BC107	SC04	Sm	S36
BC108	SC04	Sm	S36
BC109	SC04	Sm	S36
BC140	SC04	Sm	S36
BC141	SC04	Sm	S37
BC160	SC04	Sm	S37
BC161	SC04	Sm	S37
BC177	SC04	Sm	S37
BC178	SC04	Sm	S37
BC179	SC04	Sm	S37
BC264A	SC07	FET	S121
BC264B	SC07	FET	S121
BC264C	SC07	FET	S121
BC264D	SC07	FET	S121
BC327;A	SC04	Sm	S37
BC328	SC04	Sm	S37
BC337;A	SC04	Sm	S37
BC338	SC04	Sm	S37
BC368	SC04	Sm	S37
BC369	SC04	Sm	S37
BC375	SC04	Sm	S37
BC376	SC04	Sm	S37
BC516	SC04	Sm	S37
BC517	SC04	Sm	S37
BC546	SC04	Sm	S37
BC547	SC04	Sm	S37
BC548	SC04	Sm	S37
BC549	SC04	Sm	S37
BC550	SC04	Sm	S37
BC556	SC04	Sm	S37
BC557	SC04	Sm	S37
BC558	SC04	Sm	S37
BC559	SC04	Sm	S37
BC560	SC04	Sm	S37
BC635	SC04	Sm	S37
BC636	SC04	Sm	S37
BC637	SC04	Sm	S37
BC638	SC04	Sm	S37
BC639	SC04	Sm	S37
BC640	SC04	Sm	S37
BC807	SC10	Mm	S37
BC808	SC10	Mm	S37
BC817	SC10	Mm	S37
BC818	SC10	Mm	S37
BC846	SC10	Mm	S37
BC847	SC10	Mm	S37
BC848	SC10	Mm	S37
BC849	SC10	Mm	S37
BC850	SC10	Mm	S37
BC856	SC10	Mm	S37
BC857	SC10	Mm	S37
BC858	SC10	Mm	S37
BC859	SC10	Mm	S37
BC860	SC10	Mm	S37
BC868	SC10	Mm	S37
BC869	SC10	Mm	S38
BCF29	SC10	Mm	S35

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
BCF30	SC10	Mm	S35
BCF32	SC10	Mm	S35
BCF33	SC10	Mm	S35
BCF70	SC10	Mm	S35
BCF81	SC10	Mm	S35
BCV26	SC10	Mm	S35
BCV27	SC10	Mm	S35
BCV61	SC10	Mm	S35
BCV62	SC10	Mm	S35
BCV63	SC10	Mm	S35
BCV64	SC10	Mm	S35
BCV65	SC10	Mm	S35
BCV71	SC10	Mm	S35
BCV72	SC10	Mm	S35
BCW29	SC10	Mm	S35
BCW30	SC10	Mm	S35
BCW31	SC10	Mm	S35
BCW32	SC10	Mm	S35
BCW33	SC10	Mm	S35
BCW60*	SC10	Mm	S35
BCW61*	SC10	Mm	S35
BCW69	SC10	Mm	S35
BCW70	SC10	Mm	S35
BCW71	SC10	Mm	S35
BCW72	SC10	Mm	S35
BCW81	SC10	Mm	S35
BCW89	SC10	Mm	S36
BCX17	SC10	Mm	S36
BCX18	SC10	Mm	S36
BCX19	SC10	Mm	S36
BCX20	SC10	Mm	S36
BCX51	SC10	Mm	S36
BCX52	SC10	Mm	S36
BCX53	SC10	Mm	S36
BCX54	SC10	Mm	S36
BCX55	SC10	Mm	S36
BCX56	SC10	Mm	S36
BCX58	SC04	Sm	S36
BCX59	SC04	Sm	S36
BCX70*	SC10	Mm	S36
BCX71*	SC10	Mm	S36
BCX78	SC04	Sm	S36
BCX79	SC04	Sm	S36
BCY56	SC04	Sm	S36
BCY57	SC04	Sm	S36
BCY58*	SC04	Sm	S36
BCY59*	SC04	Sm	S36
BCY65	SC04	Sm	S36
BCY70	SC04	Sm	S36
BCY71	SC04	Sm	S36
BCY72	SC04	Sm	S36
BCY78*	SC04	Sm	S36
BCY79*	SC04	Sm	S36
BCY87	SC04	Sm	S36
BCY88	SC04	Sm	S36
BCY89	SC04	Sm	S36
BD131	SC05	P	S72
BD132	SC05	P	S72
BD135	SC05	P	S72
BD136	SC05	P	S72
BD137	SC05	P	S72
BD138	SC05	P	S72
BD139	SC05	P	S72
BD140	SC05	P	S72
BD201	SC05	P	S72
BD202	SC05	P	S72
BD203	SC05	P	S72
BD204	SC05	P	S72
BD226	SC05	P	S72
BD227	SC05	P	S72
BD228	SC05	P	S72
BD229	SC05	P	S72
BD230	SC05	P	S72
BD231	SC05	P	S72
BD233	SC05	P	S72
BD234	SC05	P	S72
BD235	SC05	P	S72
BD236	SC05	P	S72
BD237	SC05	P	S72
BD238	SC05	P	S72
BD239	SC05	P	S72
BD239A	SC05	P	S72
BD239B	SC05	P	S72
BD239C	SC05	P	S72
BD240	SC05	P	S72
BD240A	SC05	P	S72
BD240B	SC05	P	S72
BD240C	SC05	P	S72
BD241	SC05	P	S74
BD241A	SC05	P	S74

* series

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
BD241B	SC05	P	S74
BD241C	SC05	P	S74
BD242	SC05	P	S74
BD242A	SC05	P	S74
BD242B	SC05	P	S74
BD242C	SC05	P	S74
BD243	SC05	P	S74
BD243A	SC05	P	S74
BD243B	SC05	P	S74
BD243C	SC05	P	S74
BD244	SC05	P	S74
BD244A	SC05	P	S74
BD244B	SC05	P	S74
BD244C	SC05	P	S74
BD329	SC05	P	S74
BD330	SC05	P	S74
BD331;S	SC05	P	S74
BD332;S	SC05	P	S74
BD333;S	SC05	P	S74
BD334;S	SC05	P	S74
BD335;S	SC05	P	S74
BD336;S	SC05	P	S76
BD337;S	SC05	P	S76
BD338;S	SC05	P	S76
BD433	SC05	P	S76
BD434	SC05	P	S76
BD435	SC05	P	S76
BD436	SC05	P	S76
BD437	SC05	P	S76
BD438	SC05	P	S76
BD643;F	SC05	P	S76
BD644;F	SC05	P	S76
BD645;F	SC05	P	S76
BD646;F	SC05	P	S76
BD647;F	SC05	P	S76
BD648;F	SC05	P	S76
BD649;F	SC05	P	S76
BD650;F	SC05	P	S76
BD651;F	SC05	P	S76
BD652;F	SC05	P	S76
BD675	SC05	P	S78
BD676	SC05	P	S78
BD677	SC05	P	S78
BD678	SC05	P	S78
BD679	SC05	P	S78

type	handbook reference	prod. code	cat. page
BD680	SC05	P	S78
BD681	SC05	P	S78
BD682	SC05	P	S78
BD683	SC05	P	S78
BD684	SC05	P	S78
BD719	SC05	P	S78
BD720	SC05	P	S78
BD721	SC05	P	S78
BD722	SC05	P	S78
BD723	SC05	P	S78
BD724	SC05	P	S78
BD725	SC05	P	S78
BD726	SC05	P	S78
BD825	SC05	P	S78
BD826	SC05	P	S78
BD827	SC05	P	S78
BD828	SC05	P	S78
BD829	SC05	P	S78
BD830	SC05	P	S78
BD839	SC05	P	S78
BD840	SC05	P	S78
BD841	SC05	P	S78
BD842	SC05	P	S78
BD843	SC05	P	S78
BD844	SC05	P	S78
BD933;F	SC05	P	S80
BD934;F	SC05	P	S80
BD935;F	SC05	P	S80
BD936;F	SC05	P	S80
BD937;F	SC05	P	S80
BD938;F	SC05	P	S80
BD939;F	SC05	P	S80
BD940;F	SC05	P	S80
BD941;F	SC05	P	S80
BD942;F	SC05	P	S82
BD943;F	SC05	P	S82
BD944;F	SC05	P	S82
BD945;F	SC05	P	S82
BD946;F	SC05	P	S82
BD947;F	SC05	P	S82
BD948;F	SC05	P	S82
BD949;F	SC05	P	S82
BD950;F	SC05	P	S82
BD951;F	SC05	P	S82
BD952;F	SC05	P	S82

* series

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
BD953;F	SC05	P	S82
BD954;F	SC05	P	S82
BD955;F	SC05	P	S82
BD956;F	SC05	P	S82
BDT29;F	SC05	P	S84
BDT29A;F	SC05	P	S84
BDT29B;F	SC05	P	S84
BDT29C;F	SC05	P	S84
BDT30;F	SC05	P	S84
BDT30A;F	SC05	P	S84
BDT30B;F	SC05	P	S84
BDT30C;F	SC05	P	S84
BDT31;F	SC05	P	S84
BDT31A;F	SC05	P	S84
BDT31B;F	SC05	P	S84
BDT31C;F	SC05	P	S84
BDT32;F	SC05	P	S84
BDT32A;F	SC05	P	S84
BDT32B;F	SC05	P	S84
BDT32C;F	SC05	P	S84
BDT41;F	SC05	P	S84
BDT41A;F	SC05	P	S84
BDT41B;F	SC05	P	S84
BDT41C;F	SC05	P	S84
BDT42;F	SC05	P	S84
BDT42A;F	SC05	P	S84
BDT42B;F	SC05	P	S84
BDT42C;F	SC05	P	S84
BDT60;F	SC05	P	S86
BDT60A;F	SC05	P	S86
BDT60B;F	SC05	P	S86
BDT60C;F	SC05	P	S86
BDT61;F	SC05	P	S86
BDT61A;F	SC05	P	S86
BDT61B;F	SC05	P	S86
BDT61C;;F	SC05	P	S86
BDT62;F	SC05	P	S86
BDT62A;F	SC05	P	S86
BDT62B;F	SC05	P	S86
BDT62C;F	SC05	P	S86
BDT63;F	SC05	P	S86
BDT63A;F	SC05	P	S86
BDT63B;F	SC05	P	S86
BDT63C;F	SC05	P	S86
BDT64;F	SC05	P	S88
BDT64A;F	SC05	P	S88
BDT64B;F	SC05	P	S88
BDT64C;F	SC05	P	S88
BDT65;F	SC05	P	S88
BDT65A;F	SC05	P	S88
BDT65B;F	SC05	P	S88
BDT65C;F	SC05	P	S88
BDT81;F	SC05	P	S88
BDT82;F	SC05	P	S88
BDT83;F	SC05	P	S88
BDT84;F	SC05	P	S88
BDT85;F	SC05	P	S88
BDT86;F	SC05	P	S90
BDT87;F	SC05	P	S90
BDT88;F	SC05	P	S90
BDT91;F	SC05	P	S90
BDT92;F	SC05	P	S90
BDT93;F	SC05	P	S90
BDT94;F	SC05	P	S90
BDT95;F	SC05	P	S90
BDT96;F	SC05	P	S90
BDV64	SC05	P	S90
BDV64A	SC05	P	S90
BDV64B	SC05	P	S90
BDV64C	SC05	P	S90
BDV65	SC05	P	S90
BDV65A	SC05	P	S90
BDV65B	SC05	P	S90
BDV65C	SC05	P	S90
BDV66A	SC05	P	S92
BDV66B	SC05	P	S92
BDV66C	SC05	P	S92
BDV66D	SC05	P	S92
BDV67A	SC05	P	S92
BDV67B	SC05	P	S92
BDV67C	SC05	P	S92
BDV67D	SC05	P	S92
BDV91	SC05	P	S92
BDV92	SC05	P	S92
BDV93	SC05	P	S92
BDV94	SC05	P	S92
BDV95	SC05	P	S92
BDV96	SC05	P	S92
BDX35	SC05	P	S92
BDX36	SC05	P	S92

* series

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
BDX37	SC05	P	S92
BDX42	SC05	P	S92
BDX43	SC05	P	S92
BDX44	SC05	P	S92
BDX45	SC05	P	S92
BDX46	SC05	P	S92
BDX47	SC05	P	S92
BDX77;F	SC05	P	S92
BDX78;F	SC05	P	S92
BF198	SC04	Sm	S38
BF199	SC04	Sm	S38
BF240	SC04	Sm	S38
BF241	SC04	Sm	S38
BF245A	SC07	FET	S121
BF245B	SC07	FET	S121
BF245C	SC07	FET	S121
BF247A	SC07	FET	S121
BF247B	SC07	FET	S121
BF247C	SC07	FET	S121
BF256A	SC07	FET	S121
BF256B	SC07	FET	S121
BF256C	SC07	FET	S121
BF324	SC04	Sm	S38
BF370	SC04	Sm	S38
BF410A	SC07	FET	S121
BF410B	SC07	FET	S121
BF410C	SC07	FET	S121
BF410D	SC07	FET	S121
BF419	SC06	SP	S112
BF420	SC04	Sm	S38
BF421	SC04	Sm	S38
BF422	SC04	Sm	S38
BF423	SC04	Sm	S38
BF450	SC04	Sm	S38
BF451	SC04	Sm	S38
BF457	SC06	SP	S112
BF458	SC06	SP	S112
BF459	SC06	SP	S112
BF469	SC06	SP	S112
BF470	SC06	SP	S112
BF471	SC06	SP	S112
BF472	SC06	SP	S112
BF483	SC04	Sm	S38
BF485	SC04	Sm	S38
BF487	SC04	Sm	S38
BF494	SC04	Sm	S38
BF495	SC04	Sm	S38
BF496	SC04	Sm	S38
BF510	SC07/10	FET/Mm	S121
BF511	SC07/10	FET/Mm	S121
BF512	SC07/10	FET/Mm	S121
BF513	SC07/10	FET/Mm	S121
BF536	SC10	Mm	S38
BF550	SC10	Mm	S149
BF569	SC10	Mm	S149
BF570	SC10	Mm	S149
BF579	SC10	Mm	S149
BF583	SC06	SP	S112
BF585	SC06	SP	S112
BF587	SC06	SP	S112
BF620	SC10	Mm	S38
BF621	SC10	Mm	S38
BF622	SC10	Mm	S38
BF623	SC10	Mm	S38
BF660	SC10	Mm	S38
BF689K	SC14	WBT	S145
BF747	SC14	WBT/Mm	S145
BF763	SC14/10	WBT/Mm	S145
BF767	SC01	Mm	S38
BF819	SC06	SP	S112
BF820	SC10	Mm	S38
BF821	SC10	Mm	S38
BF822	SC10	Mm	S38
BF823	SC10	Mm	S38
BF824	SC10	Mm	S38
BF840	SC10	Mm	S38
BF841	SC10	Mm	S38
BF857	SC06	SP	S112
BF858	SC06	SP	S112
BF859	SC06	SP	S112
BF869	SC06	SP	S112
BF870	SC06	SP	S112
BF871	SC06	SP	S112
BF872	SC06	SP	S112
BF926	SC04	Sm	S38
BF936	SC04	Sm	S39
BF939	SC04	Sm	S39
BF960	SC07	FET	S123
BF964S	SC07	FET	S123
BF965	SC07	FET	S123

* series

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
BF966S	SC07	FET	S123
BF967	SC04	Sm	S39
BF970	SC04	Sm	S39
BF979	SC04	Sm	S39
BF980A	SC07	FET	S123
BF981	SC07	FET	S123
BF982	SC07	FET	S123
BF989	SC07/10	FET/Mm	S123
BF990A;AR	SC07/10	FET/Mm	S123
BF991	SC07/10	FET/Mm	S123
BF992;R	SC07/10	FET/Mm	S123
BF994S;SR	SC07/10	FET/Mm	S123
BF996S	SC07/10	FET/Mm	S123
BF997	SC07/10	FET/Mm	S123
BFG16A	SC14/10	WBT/Mm	S145
BFG17A	SC14	WBT	S145
BFG23	SC14	WBT	S145
BFG25AX	SC14/10	WBT/Mm	S145
BFG31	SC14/10	WBT/Mm	S145
BFG32	SC14	WBT	S145
BFG33	SC14	WBT	S145
BFG34	SC14	WBT	S145
BFG35	SC10	WBT/Mm	S145
BFG51	SC14	WBT	S145
BFG54	SC14	WBT	S145
BFG55	SC14/10	WBT/Mm	S145
BFG65	SC14	WBT	S145
BFG67	SC14/10	WBT/Mm	S145
BFG67X	SC14/10	WBT/Mm	S145
BFG90A	SC14	WBT	S145
BFG91A	SC14	WBT	S145
BFG92A	SC14	WBT	S145
BFG92X	SC14/10	WBT/Mm	S145
BFG93A	SC14/10	WBT/Mm	S145
BFG93X	SC14/10	WBT/Mm	S145
BFG94	SC14/10	WBT/Mm	S145
BFG96	SC14	WBT	S145
BFG97	SC14/10	WBT/Mm	S145
BFG134	SC14	WBT	S145
BFG135	SC14/10	WBT/Mm	S145
BFG195	SC14	WBT	S145
BFG197	SC14/10	WBT/Mm	S145
BFG197X	SC14/10	WBT/Mm	S145
BFG198	SC14/10	WBT/Mm	S147

type	handbook reference	prod. code	cat. page
BFP90A	SC14	WBT	S147
BFP91A	SC14	WBT	S147
BFP96	SC14	WBT	S147
BFQ10	SC07	FET	S127
BFQ11	SC07	FET	S127
BFQ12	SC07	FET	S127
BFQ13	SC07	FET	S127
BFQ14	SC07	FET	S127
BFQ15	SC07	FET	S127
BFQ16	SC07	FET	S127
BFQ17	SC14/10	WBT/Mm	S147
BFQ18A	SC14/10	WBT/Mm	S147
BFQ19	SC14/10	WBT/Mm	S147
BFQ22S	SC14	WBT	S147
BFQ23	SC14	WBT	S147
BFQ23C	SC14	WBT	S147
BFQ24	SC14	WBT	S147
BFQ32	SC14	WBT	S147
BFQ32C	SC14	WBT	S147
BFQ32M	SC14	WBT	S147
BFQ32S	SC14	WBT	S147
BFQ33C	SC14	WBT	S147
BFQ34	SC14	WBT	S135
BFQ34T	SC14	WBT	S135
BFQ42	SC14	WBT	S131
BFQ43	SC08	RFP	S136
BFQ43S	SC08	RFP	S136
BFQ51	SC14	WBT	S147
BFQ51C	SC14	WBT	S147
BFQ52	SC14	WBT	S147
BFQ53	SC14	WBT	S147
BFQ54	SC14	WBT	S147
BFQ54T	SC14	WBT	S147
BFQ63	SC14	WBT	S147
BFQ65	SC14	WBT	S147
BFQ66	SC14	WBT	S147
BFQ67	SC14/10	WBT/Mm	S147
BFQ68	SC14	WBT	S135
BFQ135	SC14	WBT	S136
BFQ136	SC14	WBT	S136
BFQ149	SC14/10	WBT/Mm	S149
BFQ161	SC14	WBT	S151
BFQ162	SC14	WBT	S151
BFQ163	SC14	WBT	S151
BFQ231;A	SC14	WBT	S151

S

* series

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
BFQ232;A	SC14	WBT	S151
BFQ233;A	SC14	WBT	S151
BFQ234	SC14	WBT	S151
BFQ235;A	SC14	WBT	S151
BFQ251;A	SC14	WBT	S151
BFQ252;A	SC14	WBT	S151
BFQ253;A	SC14	WBT	S151
BFQ254	SC14	WBT	S151
BFQ255;A	SC14	WBT	S151
BFQ262;A	SC14	WBT	S151
BFQ263;A	SC14	WBT	S151
BFQ265;A	SC14	WBT	S151
BFQ268	SC14	WBT	S151
BFQ270	SC14	WBT	S197
BFR29	SC07	FET	S125
BFR30	SC07/10	FET/Mm	S121
BFR31	SC07/10	FET/Mm	S121
BFR53	SC14/10	WBT/Mm	S149
BFR54	SC04	Sm	S38
BFR64	SC14	WBT	S149
BFR65	SC14	WBT	S149
BFR84	SC07	FET	S123
BFR90	SC14	WBT	S149
BFR90A	SC14	WBT	S149
BFR91	SC14	WBT	S149
BFR91A	SC14	WBT	S149
BFR92	SC14/10	WBT/Mm	S149
BFR92A	SC14/10	WBT/Mm	S149
BFR93	SC14/10	WBT/Mm	S149
BFR93A	SC14/10	WBT/Mm	S149
BFR94	SC14	WBT	S149
BFR95	SC14	WBT	S149
BFR96	SC14	WBT	S135
BFR96S	SC14	WBT	S135
BFR101A;B	SC07/10	FET/Mm	S121
BFR106	SC14	WBT	S149
BFR134	SC14	WBT	S149
BFS17	SC14/10	WBT/Mm	S149
BFS17A	SC14/10	WBT/Mm	S149
BFS18	SC10	Mm	S38
BFS19	SC10	Mm	S38
BFS20	SC10	Mm	S38
BFS21;;A	SC07	FET	S127
BFS22A	SC08	RFP	S131
BFS23A	SC08	RFP	S130
BFT24	SC14	WBT	S149
BFT25;A	SC14/10	WBT/Mm	S147
BFT44	SC04	Sm	S38
BFT45	SC04	Sm	S38
BFT46	SC07/10	FET/Mm	S121
BFT92	SC14/10	WBT/Mm	S149
BFT93	SC14/10	WBT/Mm	S149
BFW10	SC07	FET	S121
BFW11	SC07	FET	S121
BFW12	SC07	FET	S121
BFW13	SC07	FET	S121
BFW16A	SC14	WBT	S149
BFW17A	SC14	WBT	S149
BFW30	SC14	WBT	S149
BFW61	SC	WBT	S121
BFW92	SC14	WBT	S149
BFW92A	SC14	WBT	S149
BFW93	SC14	WBT	S149
BFX34	SC04	Sm	S38
BFX89	SC14	WBT	S149
BFY50	SC04	Sm	S38
BFY51	SC04	Sm	S38
BFY52	SC04	Sm	S38
BFY55	SC04	Sm	S38
BFY90	SC14	WBT	S19
BGD102	SC14	WBM	S19
BGD102E	SC14	WBM	S154
BGD104	SC14	WBM	S154
BGD104E	SC14	WBM	S154
BGD106	SC14	WBM	S154
BGD108	SC14	WBM	S154
BGD502	SC14	WBM	S156
BGD504	SC14	WBM	S156
BGD506	SC14	WBM	S156
BGD508	SC14	WBM	S156
BGX885	SC14	WBM	S156
BGY32	SC09	RFP	S132
BGY33	SC09	RFP	S132
BGY35	SC09	RFP	S132
BGY36	SC09	RFP	S132
BGY40A	SC09	RFP	S132
BGY40B	SC09	RFP	S132
BGY41A	SC09	RFP	S132
BGY41B	SC09	RFP	S132
BGY43	SC09	RFP	S132

* series

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
BGY45A	SC09	RFP	S132
BGY45B	SC09	RFP	S132
BGY45C	SC09	RFP	S132
BGY46A	SC09	RFP	S132
BGY46B	SC09	RFP	S132
BGY46D	SC09	RFP	S132
BGY47*	SC09	RFP	S132
BGY49A	SC09	RFP	S132
BGY49B	SC09	RFP	S132
BGY50	SC14	WBM	S152
BGY51	SC14	WBM	S152
BGY52	SC14	WBM	S152
BGY53	SC14	WBM	S152
BGY54	SC14	WBM	S152
BGY55	SC14	WBM	S152
BGY56	SC14	WBM	S152
BGY57	SC14	WBM	S152
BGY58	SC14	WBM	S152
BGY58A	SC14	WBM	S152
BGY59	SC14	WBM	S152
BGY60	SC14	WBM	S152
BGY61	SC14	WBM	S156
BGY65	SC14	WBM	S156
BGY67	SC14	WBM	S156
BGY67A	SC14	WBM	S156
BGY80	SC14	WBM	S154
BGY81	SC14	WBM	S154
BGY82	SC14	WBM	S154
BGY83	SC14	WBM	S154
BGY84	SC14	WBM	S154
BGY84A	SC14	WBM	S154
BGY84H	SC14	WBM	S154
BGY85	SC14	WBM	S154
BGY85A	SC14	WBM	S154
BGY85H	SC14	WBM	S154
BGY86	SC14	WBM	S154
BGY87	SC14	WBM	S154
BGY87B	SC14	WBM	S154
BGY88	SC14	WBM	S154
BGY89	SC14	WBM	S154
BGY90A	SC09	RFP	S132
BGY90B	SC09	RFP	S132
BGY91A	SC09	RFP	S132
BGY91B	SC09	RFP	S132
BGY95A	SC09	RFP	S132

type	handbook reference	prod. code	cat. page
BGY95B	SC09	RFP	S132
BGY96A	SC09	RFP	S132
BGY96B	SC09	RFP	S132
BGY110A	SC08	RFP	S132
BGY110B	SC08	RFP	S132
BGY110D	SC08	RFP	S132
BGY110E	SC08	RFP	S132
BGY110F	SC08	RFP	S132
BGY580	SC14	WBM	S154
BGY581	SC14	WBM	S154
BGY583	SC14	WBM	S154
BGY584	SC14	WBM	S154
BGY584A	SC14	WBM	S154
BGY585	SC14	WBM	S154
BGY585A	SC14	WBM	S154
BGY586	SC14	WBM	S154
BGY587	SC14	WBM	S154
BGY587B	SC14	WBM	S154
BGY588	SC14	WBM	S154
BLF145	SC08	RFP	S128
BLF147	SC08	RFP	S128
BLF177	SC08	RFP	S128
BLF221	SC08	RFP	S131
BLF225	SC08	RFP	S131
BLF241	SC08	RFP	S130
BLF242	SC08	RFP/FET	S130
BLF244	SC08	RFP/FET	S130
BLF245;B	SC08	RFP/FET	S130
BLF246	SC08	RFP	S128
BLF246A	SC08	RFP	S130
BLF278	SC08	RFP	S130
BLF368	SC08	RFP	S130
BLF378	SC08	RFP	S143
BLF521	SC08	RFP	S143
BLF522	SC08	RFP	S143
BLF543	SC08	RFP	S143
BLF544	SC08	RFP	S143
BLF544B	SC08	RFP	S143
BLF545	SC08	RFP	S143
BLF548	SC08	RFP	S143
BLT90/SL	SC08	RFP	S134
BLT91/SL	SC08	RFP	S134
BLT92/SL	SC08	RFP	S134
BLU15/12	SC08	RFP	S117
BLU20/12	SC08	RFP	S133

* series

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
BLU30/12	SC08	RFP	S133
BLU45/12	SC08	RFP	S133
BLU50	SC08	RFP	S133
BLU51	SC08	RFP	S133
BLU52	SC08	RFP	S133
BLU53	SC08	RFP	S133
BLU60/12	SC08	RFP	S133
BLU97	SC08	RFP	S133
BLU98	SC08	RFP	S134
BLU99	SC08	RFP	S133
BLV10	SC08	RFP	S129
BLV11	SC08	RFP	S128
BLV20	SC08	RFP	S129
BLV21	SC08	RFP	S128
BLV25	SC08	RFP	S134
BLV30	SC08	RFP	S135
BLV31	SC08	RFP	S135
BLV32F	SC08	RFP	S135
BLV33	SC08	RFP	S135
BLV33F	SC08	RFP	S135
BLV36	SC08	RFP	S135
BLV37	SC08	RFP	S135
BLV38	SC08	RFP	S135
BLV45/12	SC08	RFP	S131
BLV57	SC08	RFP	S135
BLV59	SC08	RFP	S135
BLV75/12	SC08	RFP	S131
BLV80/28	SC08	RFP	S137
BLV90/SL	SC08	RFP	S134
BLV91/SL	SC08	RFP	S134
BLV92	SC08	RFP	S134
BLV93	SC08	RFP	S134
BLV94	SC08	RFP	S134
BLV95	SC08	RFP	S134
BLV97	SC08	RFP	S134
BLV98	SC08	RFP	S134
BLV99	SC08	RFP	S134
BLW29	SC08	RFP	S131
BLW31	SC08	RFP	S131
BLW32	SC08	RFP	S135
BLW33	SC08	RFP	S135
BLW34	SC08	RFP	S135
BLW50F	SC08	RFP	S129
BLW60	SC08	RFP	S128
BLW60C	SC08	RFP	S128
BLW76	SC08	RFP	S128
BLW77	SC08	RFP	S128
BLW78	SC08	RFP	S128
BLW79	SC08	RFP	S138
BLW80	SC08	RFP	S138
BLW81	SC08	RFP	S138
BLW82	SC08	RFP	S138
BLW83	SC08	RFP	S128
BLW84	SC08	RFP	S130
BLW85	SC08	RFP	S128
BLW86	SC08	RFP	S128
BLW87	SC08	RFP	S128
BLW89	SC08	RFP	S139
BLW90	SC08	RFP	S139
BLW91	SC08	RFP	S139
BLW95	SC08	RFP	S128
BLW96	SC08	RFP	S128
BLW97	SC08	RFP	S129
BLW98	SC08	RFP	S129
BLW99	SC08	RFP	S128
BLX13	SC08	RFP	S128
BLX13C	SC08	RFP	S128
BLX14	SC08	RFP	S128
BLX15	SC08	RFP	S128
BLX39	SC08	RFP	S128
BLX65	SC08	RFP	S139
BLX65E	SC08	RFP	S139
BLX67	SC08	RFP	S139
BLX68	SC08	RFP	S140
BLX69A	SC08	RFP	S140
BLX91A	SC08	RFP	S140
BLX91CB	SC08	RFP	S140
BLX92A	SC08	RFP	S140
BLX93A	SC08	RFP	S140
BLX94A	SC08	RFP	S140
BLX94C	SC08	RFP	S140
BLX95	SC08	RFP	S140
BLX98	SC08	RFP	S140
BLY87C	SC08	RFP	S129
BLY88C	SC08	RFP	S128
BLY89A	SC08	RFP	S128
BLY89C	SC08	RFP	S128
BLY90	SC08	RFP	S141

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
BLY91C	SC08	RFP	S129
BLY92C	SC08	RFP	S128
BLY93A	SC08	RFP	S130
BLY93C	SC08	RFP	S130
BLY94	SC08	RFP	S130
BPF32/21	SC12	PhC	S174
BPF32/22	SC12	PhC	S174
BPF32/23	SC12	PhC	S174
BR100	SC03	Th	S34
BR210*	SC02	BOD	S33
BR211*	SC02	BOD	S33
BR213*	SC02	BOD	S33
BR216	SC02	BOD	S33
BR220*	SC02	BOD	S33
BRY39	SC02	Th/Sm	S34
BRY56	SC04	Sm	S44
BS107;A	SC07	FET	S126
BS170	SC07	FET	S126
BS250	SC07	FET	S126
BSD10	SC07	FET	S125
BSD12	SC07	FET	S125
BSD20	SC07/10	FET/Mm	S125
BSD22	SC07/10	FET/Mm	S125
BSD212	SC07	FET	S125
BSD213	SC07	FET	S125
BSD214	SC07	FET	S125
BSD215	SC07	FET	S125
BSJ111	SC07	FET	S124
BSJ112	SC07	FET	S124
BSJ113	SC07	FET	S124
BSJ174	SC07	FET	S122
BSJ175	SC07	FET	S122
BSJ176	SC07	FET	S122
BSJ177	SC07	FET	S122
BSN205;A	SC07	FET	S126
BSN254A	SC07	FET	S126
BSP204;A	SC07	FET	S126
BSR12	SC10	Mm	S39
BSR13	SC10	Mm	S39
BSR14	SC10	Mm	S39
BSR15	SC10	Mm	S39
BSR16	SC10	Mm	S39
BSR17	SC10	Mm	S39
BSR17A	SC10	Mm	S39
BSR18	SC10	Mm	S39
BSR18A	SC10	Mm	S39
BSR19	SC10	Mm	S39
BSR19A	SC10	Mm	S39
BSR20	SC10	Mm	S39
BSR20A	SC10	Mm	S39
BSR30	SC10	Mm	S39
BSR31	SC10	Mm	S39
BSR32	SC10	Mm	S39
BSR33	SC10	Mm	S39
BSR40	SC10	Mm	S39
BSR41	SC10	Mm	S39
BSR42	SC10	Mm	S39
BSR43	SC10	Mm	S39
BSR50	SC04	Sm	S39
BSR51	SC04	Sm	S39
BSR52	SC04	Sm	S39
BSR56	SC07/10	FET/Mm	S124
BSR57	SC07/10	FET/Mm	S124
BSR58	SC07/10	FET/Mm	S124
BSR60	SC04	Sm	S39
BSR61	SC04	Sm	S39
BSR62	SC04	Sm	S39
BSR111	SC07/10	FET/Mm	S124
BSR112	SC07/10	FET/Mm	S124
BSR113	SC07/10	FET/Mm	S124
BSR174	SC07/10	FET/Mm	S122
BSR175	SC07/10	FET/Mm	S122
BSR176	SC07/10	FET/Mm	S122
BSR177	SC07/10	FET/Mm	S122
BSS38	SC04	Sm	S39
BSS50	SC04	Sm	S39
BSS51	SC04	Sm	S39
BSS52	SC04	Sm	S39
BSS60	SC04	Sm	S39
BSS61	SC04	Sm	S39
BSS62	SC04	Sm	S39
BSS63	SC10	Mm	S39
BSS64	SC10	Mm	S39
BSS68	SC04	Sm	S39
BSS83	SC07/10	FET/Mm	S125
BSS87	SC07	FET	S126
BSS89	SC07	FET	S126
BSS91	SC07	FET	S126

* series

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
BSS92	SC07	FET	S126
BST15	SC10	Mm	S39
BST16	SC10	Mm	S39
BST39	SC10	Mm	S39
BST40	SC10	Mm	S39
BST50	SC10	Mm	S39
BST51	SC10	Mm	S39
BST52	SC10	Mm	S40
BST60	SC10	Mm	S40
BST61	SC10	Mm	S40
BST62	SC10	Mm	S40
BST70A	SC07	FET	S126
BST72A	SC07	FET	S126
BST74A	SC07	FET	S126
BST76A	SC07	FET	S126
BST78	SC07	FET	S126
BST80	SC07/10	FET/Mm	S126
BST82	SC07/10	FET/Mm	S126
BST84	SC07/10	FET/Mm	S126
BST86	SC07/10	FET/Mm	S126
BST95	SC07	FET	S126
BST97	SC07	FET	S126
BST100	SC07	FET	S126
BST110	SC07	FET	S126
BST120	SC07/10	FET/Mm	S126
BST122	SC07/10	FET/Mm	S126
BSV15*	SC04	Sm	S40
BSV16*	SC04	Sm	S40
BSV17	SC04	Sm	S40
BSV52	SC10	Mm	S40
BSV64	SC04	Sm	S40
BSV78	SC07	FET	S124
BSV79	SC07	FET	S124
BSV80	SC07	FET	S124
BSV81	SC07	FET	S125
BSW66A	SC04	Sm	S40
BSW67A	SC04	Sm	S40
BSW68A	SC04	Sm	S40
BSX19	SC04	Sm	S40
BSX20	SC04	Sm	S40
BSX45*	SC04	Sm	S40
BSX46*	SC04	Sm	S40
BSX47	SC04	Sm	S40
BSX59	SC04	Sm	S40
BSX60	SC04	Sm	S40
BSX61	SC04	Sm	S40
BT134*	SC03	Tri	S32
BT136*	SC03	Tri	S32
BT137*	SC03	Tri	S32
BT138*	SC03	Tri	S32
BT139*	SC03	Tri	S32
BT145*	SC03	Tri	S30
BT148*	SC03	Th	S29
BT149	SC03	Th	S29
BT150	SC03	Th	S29
BT151*	SC03	Th	S29
BT152*	SC03	Th	S30
BT169*	SC03	Th	S29
BTA140*	SC03	Th	S32
BTW38*	SC03	Th	S29
BTW40*	SC03	Th	S30
BTW42*	SC03	Th	S29
BTW43G*	SC03	Tri	S32
BTW43H*	SC03	Tri	S32
BTW45*	SC03	Th	S30
BTW58*	SC03	Th	S31
BTY79*	SC03	Th	S29
BTY91*	SC03	Th	S30
BU406	SC06	SP	S94
BU407	SC06	SP	S94
BU505;D	SC06	SP	S94
BU506	SC06	SP	S94
BU506D	SC06	SP	S94
BU506DF	SC06	SP	S94
BU506F	SC06	SP	S94
BU508A	SC06	SP	S94
BU508AF	SC06	SP	S94
BU508D	SC06	SP	S94
BU508DF	SC06	SP	S94
BU705	SC06	SP	S96
BU706	SC06	SP	S96
BU706D	SC06	SP	S96

* series

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
BU706DF	SC06	SP	S96
BU706F	SC06	SP	S96
BU724A	SC06	SP	S96
BU806;A	SC06	SP	S96
BU807	SC06	SP	S96
BU826;A	SC06	SP	S96
BUK426*	–	PM	S116
BUK427*	–	PM	S116
BUK436*	–	PM	S116
BUK437*	–	PM	S116
BUK443*	–	PM	S117
BUK444*	–	PM	S117
BUK445*	–	PM	S117
BUK446*	–	PM	S117
BUK452*	–	PM	S118
BUK453*	–	PM	S118
BUK454*	–	PM	S118
BUK455*	–	PM	S118
BUK456*	–	PM	S118
BUK457*	–	PM	S118
BUK543*	–	PM	S119
BUK545*	–	PM	S119
BUK552*	–	PM	S119
BUK553*	–	PM	S119
BUK554*	–	PM	S119
BUK555*	–	PM	S119
BUK627*	–	PM	S120
BUK637*	–	PM	S120
BUK655*	–	PM	S120
BUK657*	–	PM	S120
BUT11;A	SC06	SP	S98
BUT11F;AF	SC06	SP	S98
BUT12;A	SC06	SP	S98
BUT18;A	SC06	SP	S98
BUT18F;AF	SC06	SP	S98
BUV26;A*	SC06	SP	S98
BUV27;A*	SC06	SP	S98
BUV28;A	SC06	SP	S98
BUV28F;AF	SC06	SP	S98
BUV89	SC06	SP	S98
BUV90	SC06	SP	S98
BUV98(V);A	SC06	SP	S98
BUV298(V);A	SC06	SP	S98
BUW11;A	SC06	SP	S98
BUW11F;AF	SC06	SP	S98
BUW12;A	SC06	SP	S98
BUW12F;AF	SC06	SP	S98
BUW13;A	SC06	SP	S100
BUW13F;AF	SC06	SP	S100
BUW84	SC06	SP	S100
BUW85	SC06	SP	S100
BUX84;F	SC06	SP	S100
BUX85;F	SC06	SP	S100
BUX86	SC06	SP	S100
BUX87	SC06	SP	S100
BUX99	SC06	SP	S100
BY228	SC01	R	S26
BY229*	SC02	R	S22
BY249*	SC02	R	S25
BY328	SC01	SD	S26
BY329*	SC02	R	S22
BY359*	SC02	R	S22
BY438	SC01	R	S26
BY448	SC01	R	S26
BY458	SC01	R	S26
BY505	SC01	R	S27
BY509	SC01	R	S27
BY527	SC01	R	S23
BY584	SC01	R	S27
BY609	SC01	R	S27
BY610	SC01	R	S27
BY614	SC01	R	S27
BY619	SC01	R	S27
BY620	SC01	R	S27
BY627	SC01	R	S23
BY705	SC01	R	S27
BY706	SC01	R	S27
BY707	SC01	R	S27
BY708	SC01	R	S27
BY709	SC01	R	S27
BY710	SC01	R	S27
BY711	SC01	R	S27
BY712	SC01	R	S27
BY713	SC01	R	S27
BY714	SC01	R	S27
BY715	SC01	R	S27
BY716	SC01	R	S27
BY717	SC01	R	S27
BY718	SC01	R	S27
BY719	SC01	R	S27

* series

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
BY720	SC01	R	S27
BY721	SC01	R	S27
BY722	SC01	R	S27
BY723	SC01	R	S27
BY724	SC01	R	S
BYD11*	SC01	R	S23
BYD13*	SC01	R	S23
BYD14*	SC01	R	S23
BYD17*	SC01/10	R/Mm	S23
BYD31*	SC01	R	S20
BYD33*	SC01	R	S20
BYD34*	SC01	R	S20
BYD37*	SC01/10	R/Mm	S20
BYD73*	SC01	R	S14
BYD74*	SC01	R	S14
BYD77*	SC01/10	R/Mm	S14
BYM26*	SC01	R	S14
BYM36*	SC01	R	S15
BYM56*	SC01	R	S24
BYQ27*	SC02	R	S16
BYQ28*	SC02	R	S15
BYR28*	SC02	R	S16
BYR29*	SC02	R	S16
BYR30*	SC02	R	S17
BYR34*	SC02	R	S17
BYR79*	SC02	R	S17
BYT28*	SC02	R	S16
BYT79*	SC02	R	S17
BYT230PIV	SC01	R	S19
BYV10*	SC01	SD	S3
BYV24*	SC02	R	S22
BYV26*	SC01/2	R	S14
BYV27*	SC01/2	R	S14
BYV28*	SC01/2	R	S15
BYV29*	SC02	R	S16
BYV30*	SC02	R	S17
BYV31*	SC02	R	S18
BYV32*	SC02	R	S16
BYV34*	SC02	R	S17
BYV36*	SC02	R	S14
BYV42*	SC02	R	S18
BYV44*	SC02	R	S18
BYV54V*	SC02	R	S19

type	handbook reference	prod. code	cat. page
BYV72*	SC02	R	S18
BYV74*	SC02	R	S18
BYV79*	SC02	R	S17
BYV95*	SC01	R	S20
BYV96*	SC02	R	S20
BYV118*	SC02	R	S12
BYV120*	SC02	R	S12
BYV121*	SC02	R	S13
BYV133*	SC02	R	S12
BYV143*	SC02	R	S13
BYW29*	SC02	R	S16
BYW30*	SC02	R	S17
BYW31*	SC02	R	S18
BYW54	SC01	R	S23
BYW55	SC01	R	S23
BYW56	SC01	R	S23
BYW95*	SC01	R	S20
BYW96*	SC01	R	S20
BYX10G	SC01	R	S26
BYX25*	SC02	R	S24
BYX30*	SC02	R	S21
BYX38*	SC02	R	S25
BYX39*	SC02	R	S24
BYX42*	SC02	R	S25
BYX96*	SC02	R	S25
BYX46*	SC02	R	S21
BYX50*	SC02	R	S20
BYX90G	SC01	R	S27
BYX98*	SC02	R	S25
BYX99*	SC02	R	S25
BZD23*	SC01	Vrg	S7
BZD27*	SC01/10	Vrg/Mm	S7
BZT03*	SC01	Vrg	S7
BZV10	SC01	Vrf	S6
BZV11	SC01	Vrf	S6
BZV12	SC01	Vrf	S6
BZV13	SC01	Vrf	S6
BZV14	SC01	Vrf	S6
BZV37	SC01	Vrg	S7
BZV49*	SC01/10	Vrg/Mm	S7
BZV55*	SC10	Mm	S7
BZV60	SC01/10	Vrg/Mm	S7
BZV80	SC01	Vrf	S6
BZV81	SC01	Vrf	S6
BZV85*	SC01	Vrg	S7

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
BZV86	SC01	Vrg	S6
BZW03*	SC01	Vrg	S7
BZW14	SC01	Vrg	S7
BZX55*	SC01	Vrg	S7
BZX75	SC01	Vrg	S6
BZX79*	SC01	Vrg	S7
BZX84*	SC01/10	Vrg/Mm	S7
CNG35	SC12	PhC	S186
CNG36	SC12	PhC	S186
CNG82	SC12	PhC	S187
CNG83	SC12	PhC	S187
CNR36	SC12	PhC	S188
CNW82	SC12	PhC	S188
CNW83	SC12	PhC	S188
CNX21	SC12	PhC	S186
CNX35	SC12	PhC	S183
CNX35U	SC12	PhC	S182
CNX36	SC12	PhC	S183
CNX36U	SC12	PhC	S182
CNX38	SC12	PhC	S183
CNX38U	SC12	PhC	S182
CNX39	SC12	PhC	S183
CNX39U	SC12	PhC	S182
CNX48	SC12	PhC	S183
CNX48U	SC12	PhC	S182
CNX62A	SC12	PhC	S188
CNX72A	SC12	PhC	S188
CNX82A	SC12	PhC	S188
CNX83A	SC12	PhC	S188
CNY17–1	SC12	PhC	S185
CNY17–2	SC12	PhC	S185
CNY17–3	SC12	PhC	S185
CNY17–4	SC12	PhC	S185
CPF31/21	SC12	PhC	S174
CQF22/D31	SC12	PhC	S172
CQF22/21	SC12	PhC	S175
CQF22/22	SC12	PhC	S175
CQF22/23	SC12	PhC	S175
CQF23/D21	SC12	PhC	S172
CQF23/21	SC12	PhC	S175
CQF23/22	SC12	PhC	S175
CQF23/23	SC12	PhC	S175
CQF25A/D21	SC12	PhC	S172
CQF25A/21	SC12	PhC	S175
CQF25A/22	SC12	PhC	S175
CQF25A/23	SC12	PhC	S175
CQF26/27	SC12	PhC	S175
CQF26H/D27	SC12	PhC	S172
CQF27A/D21	SC12	PhC	S172
CQF27A/21	SC12	PhC	S175
CQF27A/22	SC12	PhC	S175
CQF27A/23	SC12	PhC	S175
CQF45	SC12	PhC	S174
CQF46	SC12	PhC	S174
CQF47	SC12	PhC	S174
CQF48	SC12	PhC	S174
CQF55	SC12	PhC	S172
CQF56	SC12	PhC	S172
CQF58	SC12	PhC	S172
CQF60	SC12	PhC	S172
CQF61	SC12	PhC	S172
CQF62	SC12	PhC	S172
CQF63	SC12	PhC	S172
CQF64	SC12	PhC	S172
CQF65	SC12	PhC	S172
CQL20	SC12	Ph	S168
CQL21	SC12	Ph	S168
CQL30	SC12	Ph	S170
CQL44A	SC12	Ph	S168
CQL54A	SC12	Ph	S170
CQL60A	SC12	Ph	S168
CQL61A	SC12	Ph	S168
CQL63A	SC12	Ph	S168
CQL70A	SC12	Ph	S170
CQL71A	SC12	Ph	S170
CQL73	SC12	Ph	S170
CQL75A	SC12	Ph	S170
ESM3045A(V)	SC06	SP	S100
ESM3045D(V)	SC06	SP	S100
ESM4045A(V)	SC06	SP	S100
ESM4045D(V)	SC06	SP	S100
ESM5045D(V)	SC06	SP	S100
ESM6045A(V)	SC06	SP	S100
ESM6045D(V)	SC06	SP	S100
H11A1	SC12	PhC	S184
H11A2	SC12	PhC	S184
H11A3	SC12	PhC	S184
H11A4	SC12	PhC	S184
H11A5	SC12	PhC	S184
H11B1	SC12	PhC	S185

* series

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
H11B2	SC12	PhC	S185
H11B3	SC12	PhC	S185
H11B255	SC12	PhC	S185
KGZ10	–	SEN	S223
KGZ20	–	SEN	S223
KGZ21	–	SEN	S223
KMZ10A*	–	SEN	S223
KMZ10B	–	SEN	S223
KMZ10C	–	SEN	S223
KP100A*	–	SEN	S223
KP101A	–	SEN	S223
KP130AE	–	SEN	S223
KPZ20G	–	SEN	S223
KPZ21G;GE	–	SEN	S223
KTY81–1*	–	SEN	S221
KTY81–2*	–	SEN	S221
KTY83–1*	–	SEN	S221
KTY84–1*	–	SEN	S222
KTY85–1*	–	SEN	S222
KTY86–2*	–	SEN	S222
KTY87–2*	–	SEN	S222
LAE4001R	SC15	M	S216
LAE4002S	SC15	M	S216
LBE2003S	SC15	M	S216
LBE2009S	SC15	M	S216
LCE2003S	SC15	M	S216
LCE2009S	SC15	M	S216
LHA142U–22	SC18	LCD	S191
LTA141*	SC18	LCD	S191
LTA331*	SC18	LCD	S191
LTA332*	SC18	LCD	S191
LTA341*	SC18	LCD	S191
LTA342*	SC18	LCD	S191
LTA343*	SC18	LCD	S191
LTD101R–11	SC18	LCD	S191
LTD132R–11	SC18	LCD	S191
LTD133F–21	SC18	LCD	S191
LTD201R–11	SC18	LCD	S191
LTD202*	SC18	LCD	S191
LTD203*	SC18	LCD	S191
LTD211*	SC18	LCD	S191
LTD221*	SC18	LCD	S191
LTD222*	SC18	LCD	S191
LTD224R–11	SC18	LCD	S191
LTD225R–11	SC18	LCD	S191
LTD226*	SC18	LCD	S191
LTD227*	SC18	LCD	S192
LTD228R–11	SC18	LCD	S192
LTD229*	SC18	LCD	S192
LTD231R–11	SC18	LCD	S192
LTD232R–11	SC18	LCD	S192
LTD233R–11	SC18	LCD	S192
LTD234R–11	SC18	LCD	S192
LTD235*	SC18	LCD	S192
LTD241*	SC18	LCD	S192
LTD242*	SC18	LCD	S192
LTD261*	SC18	LCD	S192
LTD262*	SC18	LCD	S192
LTD263*	SC18	LCD	S192
LTD264*	SC18	LCD	S192
LTD321R–12	SC18	LCD	S192
LTD351R–11	SC18	LCD	S192
LTE21009R	SC15	M	S212
LTE21015R	SC15	M	S212
LTE21025R	SC15	M	S212
LTE4002S	SC15	M	S212
LTE42005S	SC15	M	S212
LTE42008R	SC15	M	S212
LTE42012R	SC15	M	S212
LTM233R–10	SC18	LCD	S193
LTN111*	SC18	LCD	S193
LTN211*	SC18	LCD	S193
LTN221*	SC18	LCD	S193
LTN222*	SC18	LCD	S193
LTN242*	SC18	LCD	S193
LUE2003S	SC15	M	S216
LUE2009S	SC15	M	S216
LV1721E50R	SC15	M	S216
LV2024E45R	SC15	M	S216
LV2327E40R	SC15	M	S216
LV2931E50S	SC15	M	S216
LVE21050R	SC15	M	S216
LWE2015R	SC15	M	S216
LWE2025R	SC15	M	S216
LZ1418E100R	SC15	M	S216
MCA230	SC12	PhC	S185

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
MCA231	SC12	PhC	S185
MCA255	SC12	PhC	S185
MCT2	SC12	PhC	S184
MCT26	SC12	PhC	S184
MPS6513	SC04	Sm	S40
MPS6514	SC04	Sm	S40
MPS6515	SC04	Sm	S40
MPS6517	SC04	Sm	S40
MPS6518	SC04	Sm	S40
MPS6519	SC04	Sm	S40
MPS6520	SC04	Sm	S40
MPS6521	SC04	Sm	S40
MPS6522	SC04	Sm	S40
MPS6523	SC04	Sm	S40
MPSA05	SC04	Sm	S40
MPSA06	SC04	Sm	S40
MPSA13	SC04	Sm	S40
MPSA14	SC04	Sm	S40
MPSA42	SC04	Sm	S40
MPSA43	SC04	Sm	S40
MPSA55	SC04	Sm	S40
MPSA56	SC04	Sm	S40
MPSA63	SC04	Sm	S40
MPSA64	SC04	Sm	S40
MPSA92	SC04	Sm	S40
MPSA93	SC04	Sm	S40
MRB11175Y	SC15	M	S219
MRB11350Y	SC15	M	S219
MRB11900Y	SC15	M	S219
MX0912B250Y	SC15	M	S219
MX0912B350Y	SC15	M	S219
MZ0912B50Y	SC15	M	S219
MZ0912B100Y	SC15	M	S219
OF945*	SC12	Ph	S170
OM286;M	SC17	SEN	S163
OM287M	SC17	SEN	S163
OM320	SC14	WBM	S162
OM321	SC14	WBM	S162
OM322	SC14	WBM	S162
OM323	SC14	WBM	S162
OM335	SC14	WBM	S162
OM336	SC14	WBM	S162
OM337	SC14	WBM	S162
OM339	SC14	WBM	S162
OM345	SC14	WBM	S162
OM350	SC14	WBM	S162
OM360	SC14	WBM	S162
OM361	SC14	WBM	S162
OM370	SC14	WBM	S162
OM386B	SC17	SEN	S163
OM386M	SC17	SEN	S163
OM387B	SC17	SEN	S163
OM387M	SC17	SEN	S163
OM388B	SC17	SEN	S163
OM389B	SC17	SEN	S163
OM390	SC17	SEN	S163
OM925	SC17	WBM	S166
OM926	SC14	WBM	S166
OM961	SC05	P	S160
OM975	SC17	WBM	S166
OM991	SC05	P	S160
OM2045	SC14	WBM	S162
OM2050	SC14	WBM	S162
OM2060	SC14	WBM	S162
OM2063	SC14	WBM	S162
OM2070	SC14	WBM	S162
OM2860	SC14	WBM	S163
OM2870	SC14	WBM	S163
OM3016	SC14	WBM	S166
OM3026	SC14	WBM	S166
P2105	SC12	I	S179
PBYR635T	SC02	R	S12
PBYR640T	SC02	R	S12
PBYR645T	SC02	R	S12
PBYR735	SC02	R	S12
PBYR740	SC02	R	S12
PBYR745	SC02	R	S12
PBYR1035	SC02	R	S12
PBYR1040	SC02	R	S12
PBYR1045	SC02	R	S12
PBYR1535CT	SC02	R	S12
PBYR1540CT	SC02	R	S12
PBYR1545CT	SC02	R	S12
PBYR1635	SC02	R	S12

* series

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
PBYR1640	SC02	R	S12
PBYR1645	SC02	R	S12
PBYR2035	SC02	R	S12
PBYR2040	SC02	R	S12
PBYR2045	SC02	R	S12
PBYR2535	SC02	R	S13
PBYR2540	SC02	R	S13
PBYR2545	SC02	R	S13
PBYR3035	SC02	R	S13
PBYR3040	SC02	R	S13
PBYR3045	SC02	R	S13
PBYR12035TV	SC02	R	S13
PBYR12040TV	SC02	R	S13
PBYR12045TV	SC02	R	S13
PBYR16035TV	SC02	R	S13
PBYR16040TV	SC02	R	S13
PBYR16045TV	SC02	R	S13
PBYR30035CT	SC02	R	S13
PBYR30040CT	SC02	R	S13
PBYR30045CT	SC02	R	S13
PBYR40035CT	SC02	R	S13
PBYR40040CT	SC02	R	S13
PBYR40045CT	SC02	R	S13
PH2222;A	SC04	Sm	S40
PH2369	SC04	Sm	S40
PH2907	SC04	Sm	S41
PH2907A	SC04	Sm	S41
PH5415	SC04	Sm	S41
PH5416	SC04	Sm	S41
PH6659	SC07	FET	S126
PH6660	SC07	FET	S126
PH6661	SC07	FET	S126
PH13002	SC06	SP	S100
PH13003	SC06	SP	S100
PMBD914	SC01/10	SD/Mm	S2
PMBD2835	SC01/10	SD/Mm	S2
PMBD2836	SC01/10	SD/Mm	S2
PMBD2837	SC01/10	SD/Mm	S2
PMBD6050	SC01/10	SD/Mm	S2
PMBD6100	SC01/10	SD/Mm	S2
PMBD7000	SC01/10	SD/Mm	S2
PMBF170	SC07	FET	S126
PMBF4391	SC07/10	FET/Mm	S124
PMBF4392	SC07/10	FET/Mm	S124
PMBF4393	SC07/10	FET/Mm	S124
PMBFJ174	SC07/10	FET/Mm	S122
PMBFJ175	SC07/10	FET/Mm	S122
PMBFJ176	SC07/10	FET/Mm	S122
PMBFJ177	SC07/10	FET/Mm	S122
PMBT2222	SC10	Mm	S41
PMBT2222A	SC10	Mm	S41
PMBT2907	SC10	Mm	S41
PMBT2907A	SC10	Mm	S41
PMBT3903	SC10	Mm	S41
PMBT3904	SC10	Mm	S41
PMBT3906	SC10	Mm	S41
PMBT6428	SC10	Mm	S41
PMBT6429	SC10	Mm	S41
PMBTA05	SC10	Mm	S41
PMBTA06	SC10	Mm	S41
PMBTA13	SC10	Mm	S41
PMBTA14	SC10	Mm	S41
PMBTA42	SC10	Mm	S41
PMBTA43	SC10	Mm	S41
PMBTA55	SC10	Mm	S41
PMBTA56	SC10	Mm	S41
PMBTA63	SC10	Mm	S41
PMBTA64	SC10	Mm	S41
PMBTA92	SC10	Mm	S41
PMBTA93	SC10	Mm	S41
PMBZ522B to **PMBZ527B**	SC01/10	Vrf	S7
PMLL4148	SC01/10	SD/Mm	S1
PMLL4150	SC01/10	SD/Mm	S1
PMLL4151	SC01/10	SD/Mm	S1
PMLL4153	SC01/10	SD/Mm	S1
PMLL4446	SC01/10	SD/Mm	S1
PMLL4448	SC01/10	SD/Mm	S1
PMLL5225B to **PMLL5267B**	SC01/10	SD	S7
PN2222	SC04	Sm	S41
PN2222A	SC04	Sm	S41
PN2369	SC04	Sm	S41
PN2369A	SC04	Sm	S41
PN2907	SC04	Sm	S41
PN2907A	SC04	Sm	S41
PN3439	SC04	Sm	S41
PN3440	SC04	Sm	S41

* series

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
PN4391	SC07	FET	S124
PN4392	SC07	FET	S124
PN4393	SC07	FET	S124
PN5415	SC04	Sm	S42
PN5416	SC04	Sm	S42
PO40	SC12	PhC	S188
PO44	SC12	PhC	S188
PO44A	SC12	PhC	S188
PPC5001T	SC15	M	S217
PQC5001T	SC15	M	S217
PRU4001	SC01	R	S23
PRU4002	SC01	R	S23
PTB23001X	SC15	M	S217
PTB23003X	SC15	M	S217
PTB23005X	SC15	M	S217
PTB32001X	SC15	M	S217
PTB32003X	SC15	M	S217
PTB32005X	SC15	M	S217
PTB42001X	SC15	M	S217
PTB42002X	SC15	M	S217
PTB42003X	SC15	M	S217
PVB42004X	SC15	M	S217
PXB1650U	SC15	M	S217
PXT3904	SC10	Mm	S41
PXT3906	SC10	Mm	S41
PZ1418B15U	SC15	M	S217
PZ1418B30U	SC15	M	S217
PZ1721B12U	SC15	M	S217
PZ1721B25U	SC15	M	S217
PZ2024B10U	SC15	M	S217
PZ2024B20U	SC15	M	S217
PZ2327B15U	SC15	M	S217
PZB16035U	SC15	M	S217
RPY98*	SC12	I	S176
RPY99*	SC12	I	S176
RPY104	SC12	I	S176
RPY105*	SC12	I	S176
RPY106*	SC12	I	S176
RPY108	SC12	I	S176
RV2833B5X	SC15	M	S218
RV3135B5X	SC15	M	S218
RX1011B250Y	SC15	M	S219
RX1011B350Y	SC15	M	S219
RX1214B150W	SC15	M	S218
RX1214B300Y	SC15	M	S218
RX303B470W	SC15	M	S218
RZ1214B35Y	SC15	M	S218
RZ1214B65Y	SC15	M	S218
RZ1214B125Y	SC15	M	S218
RZ2137B48W	SC15	M	S218
RZ2731B16W	SC15	M	S218
RZ2731B32W	SC15	M	S218
RZ2731B60W	SC15	M	S218
RZ2731B90W	SC15	M	S218
RZ2833B60W	SC15	M	S218
RZ3135B14W	SC15	M	S218
RZ3135B28W	SC15	M	S218
RZ3135B42W	SC15	M	S218
RZ3135B50W	SC15	M	S218
RZB12050Y	SC15	M	S219
RZB12100Y	SC15	M	S219
SL5505S	SC12	PhC	S188
TIP29*	SC06	P	S102
TIP30*	SC06	P	S102
TIP31*	SC06	P	S102
TIP32*	SC06	P	S102
TIP33*	SC06	P	S102
TIP34*	SC05	P	S102
TIP47	SC06	P	S102
TIP48	SC06	P	S102
TIP49	SC06	P	S102
TIP50	SC06	P	S102
TIP110	SC05	P	S102
TIP111	SC05	P	S102
TIP112	SC05	P	S102
TIP115	SC05	P	S102
TIP116	SC05	P	S102
TIP117	SC05	P	S102
TIP120	SC05	P	S104
TIP121	SC05	P	S104

* series

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
TIP122	SC05	P	S104
TIP125	SC05	P	S104
TIP126	SC05	P	S104
TIP127	SC05	P	S104
TIP130	SC05	P	S104
TIP131	SC05	P	S104
TIP132	SC05	P	S104
TIP135	SC05	P	S104
TIP136	SC05	P	S104
TIP137	SC05	P	S104
TIP140	SC05	P	S104
TIP141	SC05	P	S104
TIP142	SC05	P	S104
TIP145	SC05	P	S104
TIP146	SC05	P	S104
TIP147	SC05	P	S104
TIP2955;T	SC05	P	S104
TIP3055;T	SC05	P	S104
1N821;A	SC01	Vrf	S6
1N823;A	SC01	Vrf	S6
1N825;A	SC01	Vrf	S6
1N827;A	SC01	Vrf	S6
1N829;	SC01	Vrf	S6
1N914	SC01	SD	S2
1N916	SC01	SD	S2
1N3879	SC02	R	S20
1N3880	SC02	R	S20
1N3881	SC02	R	S20
1N3882	SC02	R	S20
1N3883	SC02	R	S20
1N3889	SC02	R	S20
1N3890	SC02	R	S20
1N3891	SC02	R	S20
1N3892	SC02	R	S20
1N3893	SC02	R	S20
1N4007ID	SC01	R	S23
1N4148	SC01	SD	S2
1N4150	SC01	SD	S1
1N4151	SC01	SD	S1
1N4153	SC01	SD	S1
1N4446	SC01	SD	S2
1N4448	SC01	SD	S2
1N4531	SC01	SD	S2
1N4532	SC01	SD	S2
1N4933	SC01	R	S20
1N4934	SC01	R	S20
1N4935	SC01	R	S20
1N4936	SC01	R	S20
1N4937	SC01	R	S20
1N5059	SC01	R	S23
1N5060	SC01	R	S23
1N5061	SC01	R	S23
1N5062	SC01	R	S23
1N5225B– **1N5267B**	SC01	R	S7
2N918	SC14	WBT	S149
2N930	SC04	Sm	S42
2N1613	SC04	Sm	S41
2N1711	SC04	Sm	S41
2N1893	SC04	Sm	S41
2N2219	SC04	Sm	S41
2N2219A	SC04	Sm	S41
2N2222	SC04	Sm	S41
2N2222A	SC04	Sm	S41
2N2297	SC04	Sm	S41
2N2369	SC04	Sm	S41
2N2369A	SC04	Sm	S41
2N2483	SC04	Sm	S41
2N2484	SC04	Sm	S41
2N2904	SC04	Sm	S42
2N2904A	SC04	Sm	S42
2N2905	SC04	Sm	S42
2N2905A	SC04	Sm	S42
2N2906	SC04	Sm	S42
2N2906A	SC04	Sm	S42
2N2907	SC04	Sm	S42
2N2907A	SC04	Sm	S42
2N3019	SC04	Sm	S42
2N3020	SC04	Sm	S42
2N3053	SC04	Sm	S42
2N3375	SC08	RFP	S141
2N3440	SC04	Sm	S42
2N3553	SC08	RFP	S141
2N3632	SC08	RFP	S141
2N3822	SC07	FET	S121
2N3823	SC07	FET	S121
2N3866	SC08	RFP	S130
2N3903	SC04	Sm	S42
2N3904	SC04	Sm	S42
2N3905	SC04	Sm	S42

* series

Alphanumeric type number index

For key to product code see page S–v

type	handbook reference	prod. code	cat. page
2N3906	SC04	Sm	S42
2N3924	SC08	RFP	S141
2N3926	SC08	RFP	S141
2N3927	SC08	RFP	S141
2N3966	SC07	FET	S124
2N4030	SC04	Sm	S42
2N4031	SC04	Sm	S42
2N4032	SC04	Sm	S42
2N4033	SC04	Sm	S42
2N4091	SC07	FET	S124
2N4092	SC07	FET	S124
2N4093	SC07	FET	S124
2N4123	SC04	Sm	S42
2N4124	SC04	Sm	S42
2N4125	SC04	Sm	S42
2N4126	SC04	Sm	S42
2N4391	SC07	FET	S124
2N4392	SC07	FET	S124
2N4393	SC07	FET	S124
2N4400	SC04	Sm	S42
2N4401	SC04	Sm	S42
2N4402	SC04	Sm	S42
2N4403	SC04	Sm	S42
2N4427	SC08	RFP	S131
2N4856	SC07	FET	S124
2N4857	SC07	FET	S124
2N4858	SC07	FET	S124
2N4859	SC07	FET	S124
2N4860	SC07	FET	S124
2N4861	SC07	FET	S124
2N5064	SC03	Th	S29
2N5086	SC04	Sm	S42
2N5087	SC04	Sm	S42
2N5088	SC04	Sm	S42
2N5089	SC04	Sm	S42
2N5400	SC04	Sm	S42
2N5401	SC04	Sm	S42
2N5415	SC04	Sm	S42
2N5416	SC04	Sm	S42
2N5550	SC04	Sm	S42
2N5551	SC04	Sm	S42
2N6659	SC07	FET	S126
2N6660	SC07	FET	S126
2N6661	SC07	FET	S126
4N25;A	SC12	PhC	S184

type	handbook reference	prod. code	cat. page
4N26	SC12	PhC	S184
4N27	SC12	PhC	S184
4N28	SC12	PhC	S184
4N29	SC12	PhC	S185
4N30	SC12	PhC	S185
4N31	SC12	PhC	S185
4N32	SC12	PhC	S185
4N33	SC12	PhC	S185
4N35	SC12	PhC	S184
4N36	SC12	PhC	S184
4N37	SC12	PhC	S184
4N38	SC12	PhC	S184
4N38A	SC12	PhC	S184
56245	SC04/14	A	S220
56246	SC04/14	A	S220
56264a;b	SC02/03	A	S220
56295*	SC02/03	A	S220
56326	SC06	A	S220
56353	SC06	A	S220
56354	SC06	A	S220
56359b	SC02/05	A	S220
56359c	SC02/05	A	S220
56359d	SC02/05	A	S220
56360a	SC02/05	A	S220
56363	SC02/05	A	S220
56364	SC02/05	A	S220
56367	SC02/05	A	S220
56368a	SC02/05	A	S220
56368b	SC02/05	A	S220
56369	SC02/05	A	S220
56378	SC02/05	A	S220
56379	SC02/05	A	S220
56387a,b	SC06	A	S220
6N135	SC12	PhC	S188
6N136	SC12	PhC	S188

* series

SMALL SIGNAL DIODES

General purpose and high speed switching diodes

For detailed information on these and other types see Data Handbook SC01

- robust diodes in a hermetic encapsulation
- fast switching and low, stable leakage current
- CECC–approved types available
- titanium–silver crystal metallization for a reliable electrical connection between crystal and dumet studs
- thermally–matched crystal, studs and glass encapsulation for constant contact pressure over a wide temperature range.
- reliable: 10 FITs (Failures In Time Standard) i.e. a failure rate of 10 x 10^{-9}/h at T_j < 100 °C

type	case	V_R V	I_F mA	t_{rr} ns	C_d pF	at V_R V	and f MHz	V_F V	at I_F mA
BA316	DO35	10	100	4	2	0	1	1.1	100
BA220	DO35	10	200	4	2.5	0	1	0.95	100
BAX14	DO35	20	500	50	35	0	1	1	300
BA317	DO35	30	100	4	2	0	1	1.1	100
BA221	DO35	30	200	4	2.5	0	1	1.05	200
BAS15	DO34	50	100	4	2	0	1	1.1	100
BA318	DO35	50	100	4	2	0	1	1.1	100
PMLL4150	SOD80	50	300	6	2.5	0	1	1.0	200
PMLL4151	SOD80	50	200	2	2	0	1	1.0	50
PMLL4553	SOD80	50	200	2	2	0	1	0.88	20
1N4150★	DO35	50	300	6	2.5	0	1	1	200
1N4151	DO35	50	200	4	2	0	1	1	50
1N4153	DO35	50	200	4	2	0	1	0.88	20
BAV18	DO35	50	250	50	5	0	1	1.25	200
BAV74*	SOT23	50	250	4	2	0	1	1.0	100
BAV100	SOD80	50	250	50	1.5	0	1	1.25	200
BAV105	SOD80	60	300	6	2.5	0	1	1.0	200
BAS56*	SOT143	60	200	6	2.5	0	1	1.25	500
BAV10★	DO35	60	300	6	2.5	0	1	1.25	500
BAV99*★	SOT23	70	250	6	1.5	0	1	1.25	150
BAW56*★	SOT23	70	250	6	2	0	1	1.25	150
PMLL4148★	SOD80	75	200	4	4	0	1	1.0	10
PMLL4446	SOD80	75	200	4	4	0	1	1.0	10
PMLL4448★	SOD80	75	200	4	4	0	1	1.0	10

* double diode

N.B. All values are maximum ones unless stated otherwise

General purpose and high speed switching diodes

For detailed information on these and other types see Data Handbook SC01

type	case	V_R V	I_F mA	t_{rr} ns	C_d pF	at V_R V	and f MHz	V_F V	at I_F mA
1N914★	DO35	75	75	4	4	0	1	1.0	10
1N916	DO34	75	75	4	2	0	1	1.0	10
1N4148★	DO35	75	200	4	4	0	1	1.0	10
1N4446	DO35	75	200	4	4	0	1	1.0	20
1N4448★	DO35	75	200	4	4	0	1	1.0	100
1N4531	DO34	75	200	4	4	0	1	1.0	10
1N4532	DO34	75	200	2	2	0	1	1.0	20
BAW62★	DO35	75	200	4	2	0	1	1.0	100
BAS32	SOD80	75	200	4	2	0	1	1.0	100
BAS32L★	SOD80	75	200	4	2	0	1	1.0	100
BAS16★	SOT23	75	250	6	2	0	1	1.25	150
BAX18	DO35	75	500	6	35	0	1	1.0	300
BAX12★	DO35	90	400	–	35	0	1	1.25	400
BAS29	SOT23	90	250	50	35	0	1	1.25	400
BAS31*	SOT23	90	250	50	35	0	1	1.25	400
BAS35*	SOT23	90	250	50	35	0	1	1.25	400
BAS45L	SOD80	125	225	50	8	0	1	1.0	100
BAV19	DO35	100	250	–	5	0	1	1.25	200
BAV101	SOD80	100	250	50	5	0	1	1.25	200
BAY80	DO35	120	250	50	6	0	1	1.0	100
BAV102	SOD80	150	250	50	5	0	1	1.25	200
BAV20★	DO35	150	250	50	5	0	1	1.25	200
BAV23*	SOT143	200	200	50	5	0	1	1.25	200
BAV21★	DO35	200	250	50	5	0	1	1.25	200
BAV103	SOD80	200	250	50	5	0	1	1.25	200
BAS11★	DO35	300	350	1000	15	0	1	1.1	300
PMBD2835	SOT23	30	100	15	4	0	1	1.0	50
PMBD2836	SOT23	70	100	15	4	0	1	1.0	50
PMBD2837	SOT23	30	150	15	4	0	1	1.0	50
PMBD2838	SOT23	50	150	15	4	0	1	1.0	50
PMBD914	SOT23	70	200	15	4	0	1	1.0	10
PMBD6050	SOT23	70	100	15	2.5	0	1	1.1	100
PMBD6100	SOT23	70	200	15	2.5	0	1	1.1	100
PMBD7000	SOT23	100	200	15	1.5	0	1	1.1	100

* double diode

N.B. All values are maximum ones unless stated otherwise

SMALL SIGNAL DIODES (cont.)

General data

Schottky–Barrier switching and low–leakage diodes

For detailed information on these and other types see Data Handbook SC01

- Schottky–Barrier diodes in hermetically sealed encapsulation
- Axial leaded miniature DO–34 housing
- BAT85 features a low V_F
- The low V_F of BAT81–83 allows very fast switching

S

Schottky–barrier switching diodes

type	case	V_R V	I_F mA	t_{rr} ns	C_d pF	at V_R V	and f MHz	V_F V	at I_F mA
BAS85	SOD80	30	200	5	10	1	1	400	10
BAT17	SOT23	4	30	–	10	0	1	450	1
BYV10–20	DO41	20	1000	–	220	0	1	390	100
BYV10–30	DO41	30	1000	–	220	0	1	390	100
BYV10–40	DO41	40	1000	–	220	0	1	390	100
BAT54★	SOT23	30	200	5	1	1	1	320	1
BAT54A	SOT23	30	200	5	10	1	1	320	1
BAT54C	SOT23	30	200	5	10	1	1	320	1
BAT54S	SOT23	30	200	5	10	1	1	320	1
BAT74	SOT143	30	200	5	1	1	1	320	1
BAT81★	DO34	40	30	1	1.6	1	1	410	1
BAT82★	DO34	50	30	1	1.6	1	1	410	1
BAT83	DO34	60	30	1	1.6	1	1	410	1
BAT85★	DO34	30	200	5	10	1	1	320	1
BAT86	DO34	50	200	4	8	1	1	380	1

Low–leakage diodes

type	case	V_R V	I_R* pF	at V_R V	C_d pF	at V_R V	and f MHz
BAS45	DO34	125	1000	125	8	0	1
BAV45	TO18	20	5	5	1.3	0	1

* T_j = 25°C

N.B. All values are maximum ones unless stated otherwise.

Variable capacitance diodes

For detailed information on these and other types see Data Handbook SC01

- tuning–voltage/capacitance characteristics gives a minimum non–linear distortion
- low leakage current
- low easily–compensated temperature coefficient of capacitance
- low series resistance to prevent damping of tuned circuits
- matched sets available
- available on tape or in bulk

type	case	r_s max Ω	C_d min pF	C_d max pF	at V_R V	C_d ratio min	C_d ratio max	over tuning voltage range V_1 to V	over tuning voltage range V_2 V
BB417	DO34	1.2	2.2	2.4	15	2	5	4	15
BB119	DO35	1.5	15.3	19	10	1.3		4	10
BB204B*	TO92	0.4	37	42	3	2.5	2.8	3	30
BB204G*	TO92	0.4	34	39	3	2.5	2.8	3	30
BB804	SOT23	0.6	42	47.5	2	1.7		2	8
BB112	SOD69	1.5	17	29	8.5	18		1	8.5
BB130	SOD69	2	12	21	28	23		1	28
BB212*	TO92	2.5		22	8	22.5		0.5	8
BB809	DO34	0.8	4	5	28	8	10	1	28
BB909A	DO34	0.9	2.6	3	28	12	15	1	28
BB909B	DO34	0.9	2.8	3.2	28	12	15	1	28
BB910	DO34	1	2.4	2.7	28	14	–	0.5	28
BB911	DO34	2	2.5	3.0	28	21	–	0.5	28
BB405B★	DO34	0.75	1.8	2.2	28	7.6		1	28

Varicaps for surface mounting

type	case	r_s max Ω	C_d min pF	C_d max pF	at V_R V	C_d ratio min	C_d ratio max	over tuning voltage range V_1 to V	over tuning voltage range V_2 V
BB215	SOD80	0.75	1.8	2.2	28	7.6	–	1	28
BB219	SOD80	0.9	2.6	3.2	28	12	15	1	28
BB240	SOD80	1.0	2.4	2.7	28	14	–	0.5	28
BB241	SOD80	2.0	2.5	3.0	28	21	–	0.5	28
BBY31	SOT23	1.2	1.6	2.0	28	–	–	–	–
BBY39	SOT23	1.2	1.6	2.0	28	8	–	1	28
BBY40	SOT23	0.7	3.8	4.8	28	8	12	1	28
BBY42	SOT23	1.0	2.4	3.0	28	12	16	1	28
BBY62*	SOT143	1.2	1.6	2.0	28	–	–	–	–

* double diode

For detailed information on these and other types see Data Handbook SC01

S

Band switching diodes

type	case	V_R V	I_F mA	C_d pF	at V_R V	and f MHz	r_D Ω	at I_F mA	and f MHz
BA223	DO34	20	50	3.5	6	1	1.5	10	1
BA423	DO34	20	50	2.5	3	1	1.2	10	1
BA482	DO34	35	100	1.2	3	100	0.7	3	200
BA483	DO34	35	100	1	3	100	1.2	3	200
BA484	DO34	35	100	1.6	3	100	1.2	3	200
BA682	SOD80	35	100	1.25	3	1	0.7	3	200
BAT18	SOT23	35	100	1.0	20	1	0.7	5	200

UHF mixer Schottky–Barrier diodes

type	case	V_R V	I_F mA	C_d pF	at V_R V	and f MHz	V_F mV	at I_F mA
BA481	DO34	4	30	1.1	0.2	1	450	1

FM detection diode

type	case	V_R V	I_F mA	C_d pF	at V_R V	and f MHz	V_F min V	V_F max mV	at I_F µA
BA281	DO35	50	200	1.2	0	1	360	420	10

N.B. All values are maximum ones unless stated otherwise

Voltage reference diodes; stabistors

For detailed information on these and other types see Data Handbook SC01

- Full range of temperature compensated voltage reference diodes, stabistors and voltage regulator diodes.

Voltage reference diodes

type	case	V_{ref} nom. V	at I_Z mA	$\|S_Z\|$ %/K	r_{diff} Ω	at I_Z mA
BZV10	DO34	6.5	2	0.01	50	2
BZV11★	DO34	6.5	2	0.005	50	2
BZV12	DO34	6.5	2	0.002	50	2
BZV13	DO34	6.5	2	0.001	50	2
BZV14	DO34	6.5	2	0.0005	50	2
1N821	DO34	6.2	7.5	0.01	15	7.5
1N821A	DO34	6.2	7.5	0.01	10	7.5
1N823	DO34	6.2	7.5	0.005	15	7.5
1N823A	DO34	6.2	7.5	0.005	10	7.5
1N825	DO34	6.2	7.5	0.002	15	7.5
1N825A	DO34	6.2	7.5	0.002	10	7.5
1N827	DO34	6.2	7.5	0.001	15	7.5
1N827A	DO34	6.2	7.5	0.001	10	7.5
1N829	DO34	6.2	7.5	0.0005	15	7.5
1N829A	DO34	6.2	7.5	0.0005	10	7.5
BZV80	SOD80	6.2	7.5	0.01	15	7.5
BZV81	SOD80	6.2	7.5	0.0005	15	7.5

Stabistors

type	case	typical V_F (V) at: I_F = 1 mA	I_F = 5 mA	I_F = 10 mA	V_R V_{RRM} V	I_{FRM} mA	S_F at I_F = 1 mA mV/K	r_{diff} at I_F = 10 mA Ω
BAX14	DO35	0.55	0.62	0.65	40	2000	−2.2	6
BA220	DO35	0.58	0.66	0.70	10	400	−2.2	7
BA315	DO35	0.62	0.70	0.75	5	225	−2.1	7
BA314	DO35	0.72	0.77	0.79	4	250	−1.8	6
BAS17	SOT23	0.72	0.77	0.79	4	250	−1.8	–
BZV86	SOD27	–	2.0	–	10	250	−6.0	–
BZX75	DO7	1.75	–	1.99	5	250	−5.0	9

* at I_F = 5 mA

N.B. All values are maximum ones unless stated otherwise.

VOLTAGE REGULATOR DIODES

Voltage regulator/transient suppressor diodes

For detailed information see Data Handbooks SC01 and SC02

Voltage regulator diodes

P_{tot} W at	T_{tp} °C	type	working voltage E24 series V	tolerance	P_{RSM} at T_j = 25 °C t_p = 100 µs square W	case
0.4	50	**BZV37**	6.5	5%	40	DO34
0.5	50	**BZX55 series**	2.4 to 75	5%	40	DO35
0.5	50	**BZX79 series★**	2.4 to 75	5%	40	DO35
35	50	**BZX84 series★**	2.4 to 75	5%	–	SOT23
0.5	–	**BZV55 series**	2.4 to 75	5	–	SOD80
0.5	75	**PMLL5225B to PMLL5267B**	3.0 to 75	5%	–	SOD80
0.5	75	**1N5225B to 1N5267B**	3.0 to 75	5%	–	DO35
1	–	**BZV49 series**	2.4 to 75	5	40	SOT89
1.3	55	**BZV85 series★**	3.6 to 75	5%	60	DO41
2.5	105	**BZD27 series**	7V5 to 270	5%	300	SOD87
2.5	25	**BZD23 series**	7V5 to 270	5%	300	SOD81
3.25	25	**BZT03 series★**	7.5 to 500	5%	600	SOD57
6	25	**BZW03 series**	7.5 to 500	5%	1000	SOD64
0.5	50	**BZV60 series**	2.4 to 75	5	30	SOD68
0.3	25	**PMBZ5226B to PMBZ5257**	3.3 to 33	5	–	SOT23

Transient suppressor diodes

type	V_R (stand–off voltage) V	$V_{(CL)R}$ V at	I_{RSM} A	P_{RSM} W	case
BZD23 series	7.5 to 270	11.3 to 707	13.3 to 0.21	300	SOD81
BZD27 series	7.5 to 270	11.3 to 707	13.3 to 0.21	300	SOD87
BZW14	12	28	50	–	SOD64
BZT03 series★	6.2 to 430	11.3 to 707	26.5 to 0.43	300	SOD57
BZW03 series	6.2 to 430	11.3 to 707	44.2 to 0.71	500	SOD64

RECTIFIER DIODES

Selection guide

Schottky–Barrier

For detailed information on these and other types see Data Handbook SC01 and SC02

Schottky–Barrier

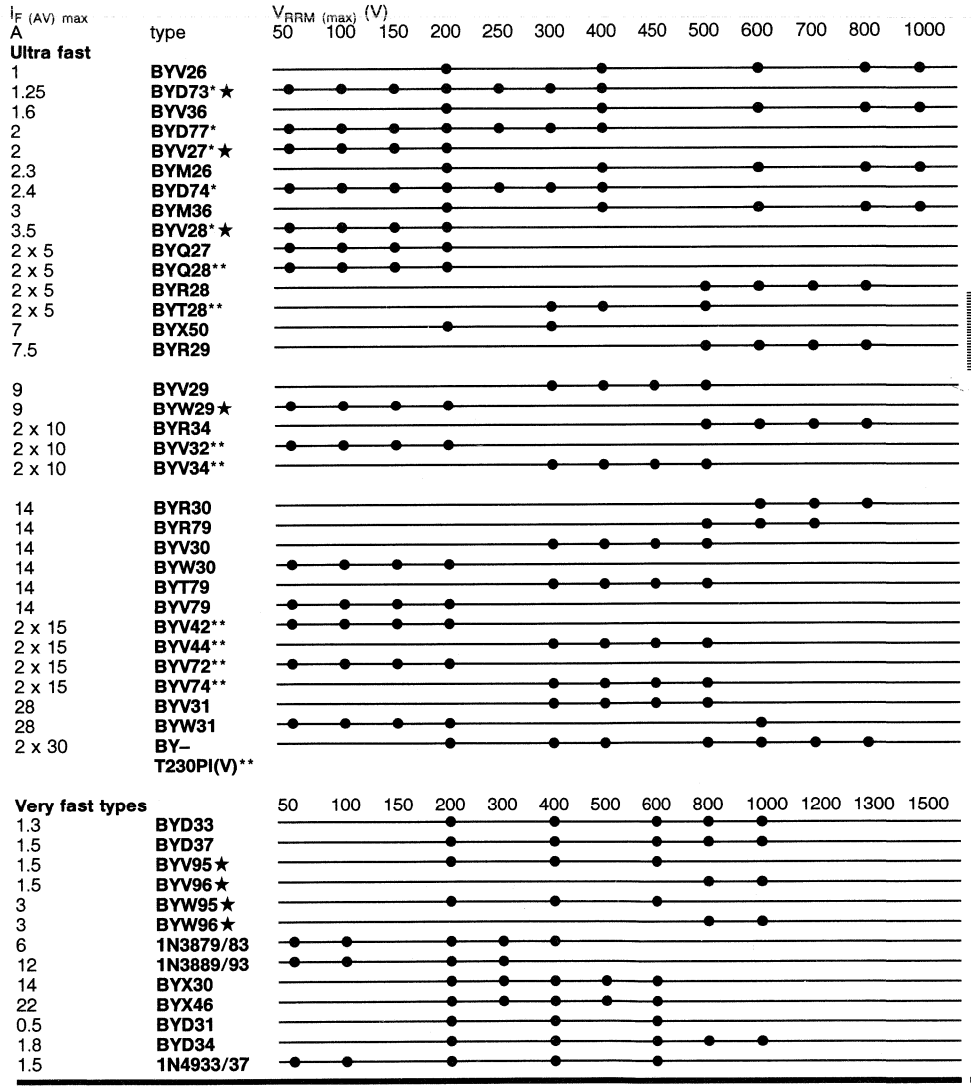
$I_{F\ (AV)\ max}$ A	$V_{RRM\ (max)}$ (V) 35	40	45
2 x 5	**PBYR635T**	**PBYR640T**	**PBYR645T**
7.5	**PBYR735**	**PBYR740**	**PBYR745**
10	**PBYR1035**	**PBYR1040**	**PBYR1045**
2 x 5	**BYV118–35**	**BYV118–40**	**BYV118–45**
2 x 7.5	**PBYR1535CT**	**PBYR1540CT**	**PBYR1545CT**
15	**BYV120–35**	**BYV120–40**	**BYV120–45**
16	**PBYR1635**	**PBYR1640**	**PBYR1645**
2 x 10	**BYV133–35**	**BYV133–40**	**BYV133–45**
2 x 10	**PBYR2035CT**	**PBYR2040CT**	**PBYR2045CT**
2 x 15	**BYV143–35**	**BYV143–40**	**BYV143–45**
2 x 15	**PBYR2535CT**	**PBYR2540CT**	**PBYR2545CT**
2 x 15	**PBYR3035PT**	**PBYR3040PT**	**PBYR3045PT**
30	**BYV121–35★**	**BYV121–40★**	**BYV121–45**
2 x 60	**PBYR12035TV**	**PBYR12040TV**	**PBYR12045TV**
2 x 80	**PBYR16035TV**	**PBYR16040TV**	**PBYR16045TV**
2 x 150	**PBYR30035CT**	**PBYR30040CT**	**PBYR30045CT**
2 x 200	**PBYR40035CT**	**PBYR40040CT**	**PBYR40045CT**

RECTIFIER DIODES (cont.)

Selection guide

Ultra fast and very fast recovery types

For detailed information on these and other types see Data Handbooks SC01 and SC02



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* epitaxial type
** monolithic dual rectifier diodes

RECTIFIER DIODES (cont.)

Selection guide

Fast general purpose and efficiency types

For detailed information on these and other types see Data Handbooks SC01 and SC02

Fast types

$I_{F\ (AV)\ max}$ A	type	$V_{RRM\ (max)}$ (V) 50 100 150 200 300 400 500 600 800 1000 1200 1300 1500
7	**BY229★**	
8	**BY329★**	
12	**BYV24**	

General purpose types

$I_{F\ (AV)\ max}$ A	type	$V_{RRM\ (max)}/V_{RWM\ (MAX)}$ (V) 50 100 150 200 300 400 500 600 800 1000 1200 1250 1400 1600
0.6	**BYD11***	
1	**1N4001ID**	
1	**1N4007ID**	
1.4	**BYD13*★**	
1.5	**BYD17***	
2	**BYD14***	
2	**BY527*★**	
2	**BY627***	
2	**BYW54*★**	
2	**BYW55*★**	
2	**BYW56*★**	
2	**1N5059***	
2	**1N5060*★**	
2	**1N5061*★**	
2	**1N5062*★**	
3.5	**BYM56***	
6	**BYX38**	
6.5	**BY249**	
9.5	**BYX39***	
10	**BYX98**	
12	**BYX42**	
15	**BYX99**	
20	**BYX25***	
30	**BYX96**	

Efficiency diodes

$I_{FW\ max}$ A	type	$V_{RRM\ (max)}$ (V) 50 1200 1400 1500 1600
4	**BY448**	
4	**BY458**	
5	**BY228★**	
5	**BY438**	
5	**BY328****	
–	**BYX10G**	

* controlled avalanche type

** for 32 kHz scanning systems

RECTIFIER DIODES (cont.)

Selection guide
High voltage types

For detailed information on these and other types see Data Handbooks SC01 and SC02

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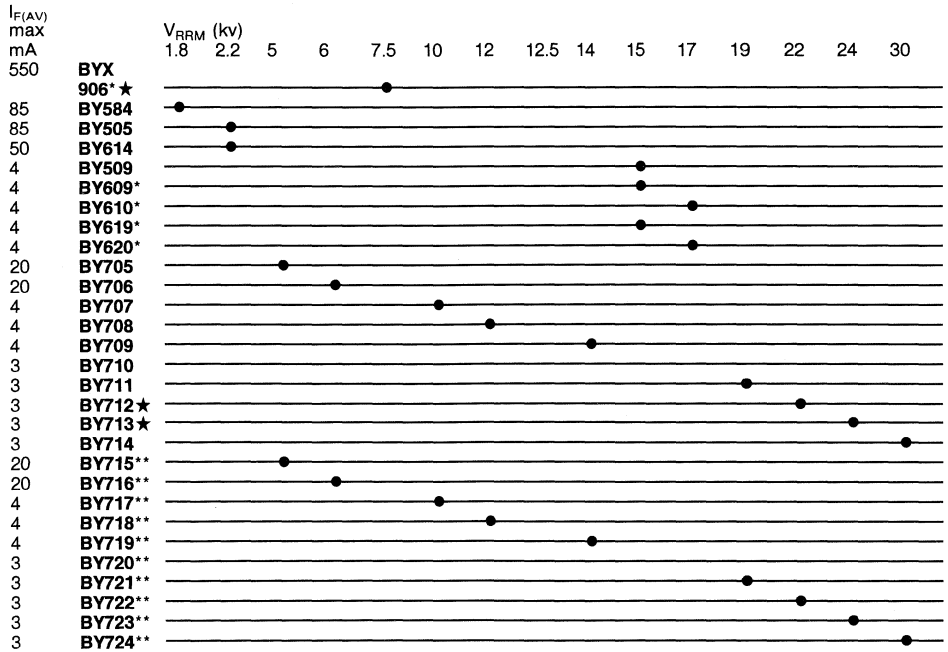
E.H.T. rectifiers
(see page S24)



* with avalanche characteristics
** meant for ⩾ 32 kHz TV scanning sytems

For detailed information on these and other types see Data Handbooks SC01 and SC02

type	case	ratings				characteristics	
		$I_{F(AV)}$ max A	V_{RRM} max V	I_{FSM} and I^2t $T_{j\,max}$; t = 10 ms A	A^2s	I_R at V_{RRM} T_j = 25 °C mA	$V_{F\,max}$ at I_F T_j = 125 °C
PBYR635CT **PBYR640CT** **PBYR645CT**	SOT82	2 x 5	35 40 45	80	32	0.1	0.63/5
PBYR735* **PBYR740*** **PBYR745***	TO220AC	7.5	35 40 45	135	93	0.1	0.57/7.5
PBYR1035* **PBYR1040*** **PBYR1045***	TO220AC	10	35 40 45	135	93	0.1	0.57/10
BYV118–35 **BYV118–40** **BYV118–45**	TO220AB	2 x 5	35 40 45	80	32	0.1	0.63/5
PBYR1535CT* **PBYR1540CT*** **PBYR1545CT***	TO220AB	2 x 7.5	35 40 45	135	93	0.1	0.57/7.5
BYV120–35 **BYV120–40** **BYV120–45**	DO4	15	35 40 45	300	250	0.1	0.63/15
PBYR1635* **PBYR1640*** **PBYR1645***	TO220AC	16	35 40 45	135	93	0.2	0.57/16
PBYR2035CT* **PBYR2040CT*** **PBYR2045CT***	TO220AB	2 x 10	35 40 45	135	93	0.1	0.57/10
BYV133–35 **BYV133–40** **BYV133–45**	TO220AB	2 x 10	35 40 45	100	50	0.1	0.63/7

* also available in SOT186 (full–pack)

For detailed information on these and other types see Data Handbooks SC01 and SC02

type	case	ratings				characteristics	
		$I_{F(AV)}$ max A	V_{RRM} max V	I_{FSM} and I^2t $T_{j\,max}$; t = 10 ms A	A^2s	I_R at V_{RRM} T_j = 25 °C mA	$V_{F\,max}$ at I_F T_j = 125 °C
PBYR2535CT* **PBYR2540CT*** **PBYR2545CT***	TO220AB	2 x 15	35 40 45	135	93	0.2	0.60/20
BYV143–35 **BYV143–40** **BYV143–45**	TO220AB	2 x 15	35 40 45	135	93	0.2	0.63/15
PBYR3035PT **PBYR3040PT** **PBYR3045PT**	SOT93	2 x 15	35 40 45	180	165	1.0	0.60/20
BYV121–35★ **BYV121–40★** **BYV121–45**	DO4	30	35 40 45	600	1800	0.1	0.60/30
PBYR12035TV **PBYR12040TV** **PBYR12045TV**	SOT227	2 x 60	35 40 45	600	1800	2.0	0.70/60
PBYR16035TV **PBYR16040TV** **PBYR16045TV**	SOT227	2 x 80	35 40 45	900	4000	2.0	0.71/80
PBYR30035CT **PBYR30040CT** **PBYR30045CT**	TO244	2 x 150	35 40 45	2000	20000	4.0	0.69/150
PBYR40035CT **PBYR40040CT** **PBYR40045CT**	TO244	2 x 200	35 40 45	2500	32500	4.0	0.66/200

* also available in SOT186 (full–pack)

RECTIFIER DIODES (cont.)

General data

Ultra fast (epitaxial) types

For detailed information on these and other types see Data Handbooks SC01 and SC02

type		case	ratings				characteristics		
			$I_{F(AV)}$ A	V_{RRM} V	I_{FRM} A	I_{FSM} $T_{j\,max}$; t = 10 ms A	t_{rr} max ns	$V_{F\,max}$ at I_F T_j = 25 °C V/A	I_{RRM} A
BYV26	**–A**	SOD57	1	200	10	30	30	2.5/1	
	–B			400			30		
	–C			600			30		
	–D			800			75		
	–E			1000			75		
BYD73	**–A***	SOD81	1.75	50	15	25	25	0.95/1	
	–B			100					
	–C			150					
	–D★			200					
	–E	SOD81	1.7	250	13	25	50	1.05/1	
	–F			300					
	–G			400					
BYV36	**–A**	SOD57	1.6	200	10	30	100	1.35/1	
	–B		1.6	400			100	1.35/1	
	–C		1.6	600			100	1.35/1	
	–D		1.5	800	9		150	1.45/1	
	–E		1.5	1000	9		150	1.45/1	
BYV27	**– 50*★**	SOD57	2	50	15	50	25	1.07/3	
	– 100★			100					
	– 150★			150					
	– 200★			200					
BYD77	**–A***	SOD87	2	50	15	25	25	0.95/1	
	–B		2	100					
	–C		2	150					
	–D		2	200					
	–E		1.85	250	13		50	1.05/1	
	–F		1.85	300					
	–G		1.85	400					
BYM26	**–A**	SOD64	2.3	200	8	45	30	2.65/2	
	–B		2.3	400					
	–C		2.3	600					
	–D		2.3	800			75		
	–E		2.3	1000			75		
BYD74	**–A***	SOD84	2.4	50	21	50	25	0.94/2	
	–B		2.4	100			25	0.94/2	
	–C		2.4	150			25	0.94/2	
	–D		2.4	200			25	0.94/2	
	–E		2.15	250			50	1.05/2	
	–F		2.15	300			50	1.05/2	
	–G		2.15	400			50	1.05/2	

* epitaxial type

data section continues next page

Ultra fast (epitaxial) types (cont.)

For detailed information on these and other types see Data Handbooks SC01 and SC02

type		case	ratings				characteristics		
			$I_{F(AV)}$ A	V_{RRM} V	I_{FRM} A	I_{FSM} $T_{j\,max}$; t = 10 ms A	t_{rr} max ns	$V_{F\,max}$ at I_F T_j = 25 °C V/A	I_{RRM} A
BYM36	**–A**	SOD64	3	200	13	65	100	1.6/3	
	–B		3	400					
	–C		3	600					
	–D		2.9	800	11		150	1.78/3	
	–E		2.9	1000	11		150	1.78/3	
BYV28	**– 50*★**	SOD64	3.5	50	25	90	30	1.1/5	
	– 100★			100					
	– 150★			150					
	– 200★			200					
BYQ28	**– 50**	TO–220AB(3)	2 x 5	50	80	50	20	1.25/10	1.2
double	**– 100**			100					
	– 150			150					
	– 200			200					

* epitaxial type

data section continues next page

For detailed information on these and other types see Data Handbook SC01 and SC02

type	case	ratings						characteristics		
		$I_{F(AV)}$ A	V_{RRM} V	V_{RWM} V	I_{FRM} A	I_{FSM} and I^2t $T_{j\,max}$; t = 10 ms A	A^2s	t_{rr} max ns	$V_{F\,max}$ at I_F T_j = 25 °C V/A	I_{RRM} A
BYT28 – 300	TO220AB	2 x 5	300	300	80	50	12.5	50	1.05/5	3.0
double – 400			400	300						
– 450			450							
– 500			500	400						
BYQ27 – 50	SOT82	2 x 5	50	50	80	50	12.5	20	1.25/10	1.2
double – 100			100	100						
– 150			150	150						
– 200			200	200						
BYR28 – 500	TO220AB	2 x 5	500	400	90	50	12.5	80	2.0/10	6
double – 600			600	500						
– 700			700	600						
– 800			800	700						
BYR29 – 500	TO220AC	8	500	400	130	60	18	75	1.3/10	6.0
– 600			600	500						
– 700			700							
– 800			800	600						
BYV29 – 300	TO220AC	9	300	200	100	80	50	50	1.05/5	–
– 400			400	300						
– 500			500	400						
BYW29 – 50★	TO220AC	8	50	50	240	80	32	25	0.8/8	4.0
– 100★			100	100						
– 150★			150	150						
– 200★			200	200						
BYV32 – 50	TO220AB	2 x 10	50	50	300	150	112	25	0.85/5	2.0
double – 100			100	100						
– 150			150	150						
– 200			200	200						

* unified stud available, add suffix **U** (e.g. **BYW30–50U**)

data section continues next page

SOT–220 and SOT–93 versions are also available in F–pack versions

For detailed information on these and other types see Data Handbook SC01 and SC02

type		case	ratings						characteristics		
			$I_{F(AV)}$ A	V_{RRM} V	V_{RWM} V	I_{FRM} A	I_{FSM} and I^2t $T_{j\,max}$; t = 10 ms A	A^2s	t_{rr} max ns	$V_{F\,max}$ at I_F T_j = 25 °C V/A	I_{RRM} A
BYV34	**– 300**	TO220AB	2 x 10	300	200	240	120	12	50	0.93/10	5.0
double	**– 400**			400	300						
	– 450			450							
	– 500			500	400						
BYR34	**– 500**	TO220AB	2 x 10	500	400	185	100	50	80	1.65/30	7.0
double	**– 600**			600	500						
	– 700			700	500						
	– 800			800	600						
BYV30	**– 300**	DO4	14	300	200	320	150	112	50	1.05/15	–
	– 400	unified		400	300						
	– 450	stud		450	400						
	– 500			500	400						
BYW30	**– 50**	DO4	14	50	50	420	200	200	30	0.8/15	4.0
	– 100	metric		100	100						
	– 150	stud*		150	150						
	– 200			200	200						
BYR30	**– 500**	DO4	14	500	400	320	150	112	100	1.3/15	8.0
	– 600	unified		600	500						
	– 700	stud		700	600						
BYR79	**– 500**	TO220AC	14	500	400	320	90	40	100	1.3/15	8.0
	– 600			600	500						
	– 700			700	500						
	– 800			800	600						
BYT79	**– 300**	TO220AC	14	300	200	320	150	112	50	1.05/15	5.2
	– 400			400	300						
	– 450			450	400						
	– 500			500	400						
BYV79	**– 50**	TO220AC	14	50	50	420	180	160	30	0.85/10	4.0
	– 100			100	100						
	– 150			150	150						
	– 200			200	200						

* unified stud available, add suffix **U** (e.g. **BYW30–50U**)

SOT–220 and SOT–93 versions are also available in F–pack versions

data section continues next page

Ultra fast (epitaxial) types (cont.)

For detailed information on these and other types see Data Handbook SC01 and SC02

type	case	ratings						characteristics		
		$I_{F\,(AV)}$ A	V_{RRM} V	V_{RWM} V	I_{FRM} A	I_{FSM} and I^2t $T_{j\,max}$; t = 10 ms A	A^2s	t_{rr} max ns	$V_{F\,max}$ at I_F T_j = 25 °C V/A	I_{RRM} A
BYV42 – 50	TO220AB(3)	2 x 15	50	50	400	200	–	35	0.85/10	2.4
double – 100			100	100						
– 150			150	150						
– 200			200	200						
BYV44 – 300	TO220AB	2 x 15	300	200	320	150	112	50	1.05/15	5.2
double – 400			400	300						
– 450			450							
– 500			500	400						
BYV72 – 50	SOT93	2 x 15	50	50	320	150	112	28	0.85/10	2.4
double – 100			100	100						
– 150			150	150						
– 200			200	200						
BYV74 – 300	SOT93	2 x 15	300	200	320	130	84	50	1.05/15	5.2
double – 400			400	300						
– 450			450							
– 500			500	400						
BYV31 – 300	DO4	28	300	200	550	300	450	50	1.05/30	4.0
– 400	metric		400	300						
– 450	stud*		450	400						
– 500			500	400						
BYW31 – 50	DO4	28	50	50	550	320	500	40	0.8/30	4.0
– 100	metric		100	100						
– 150	stud*		150	150						
– 200			200	200						

* unified stud available, add suffix **U** (e.g. **BYV31–50U**)

For detailed information on these and other types see Data Handbook SC01 and SC02

type	case	ratings						characteristics			
		$I_{F(AV)}$ A	V_{RRM} V	V_{RWM} V	I_{FRM} A	I_{FSM} and I^2t $T_{j\,max}$; t = 10 ms A	A^2s	t_{rr} max ns	V_F max at T_j = 25 °C V	I_F A	I_{RRM} A
BYT230PIV–200	SOT227B	30	200		800	500	610	50		30	
BYT230PIV–300	SOT227B	30	300		800	500	610	50		30	
BYT230PIV–400	SOT227B	30	400		800	500	610	50		30	
BYT230PIV–600	SOT227B	30	600		375	200	200	55		30	
BYT230PIV–700	SOT227B	30	700		375	200	200	55		30	
BYT230PIV–800	SOT227B	30	800		375	200	200	55	1.9	30	
BYT230PIV–1000	SOT227B	30	1000		375	200	200	70	1.9	30	
BYV54V–50	SOT227B	100	50		1000	1000	3200	60	0.8	50	
BYV54V–100	SOT227B	100	100		1000	1000	3200	60	0.8	50	
BYV54V–150	SOT227B	100	150		1000	1000	3200	60	0.8	50	
BYV54V–200	SOT227B	100	200		1000	1000	3200	60	0.8	50	

RECTIFIER DIODES (cont.)

General data

Very fast types

For detailed information on these and other types see Data Handbooks SC01 and SC02

type	case	ratings						characteristics		
		$I_{F(AV)}$ A	V_{RRM} V	V_{RWM} V	I_{FRM} A	I_{FSM} and I^2t T_j max; t = 10 ms A	A^2s	t_{rr} max ns	V_F max at T_j = 25 °C V	I_F A
BYD31–D*	SOD91	0.5	200			10		250	1.6	1
BYD31–G*	SOD91	0.5	400			10		250	1.6	1
BYD31–J*	SOD91	0.5	600			10		250	1.6	1
BYD33–D*	SOD81	1.3	200		7	20		250	1.3	1
BYD33–G*	SOD81	1.3	400		7	20		250	1.3	1
BYD33–J*	SOD81	1.3	600		7	20		250	1.3	1
BYD33–K*	SOD81	1.3	800		7	20		300	1.3	1
BYD33–M*	SOD81	1.3	1000		7	20		300	1.3	1
BYD34–D*	SOD84	1.8	200		17	45		250	1.4	3
BYD34–G*	SOD84	1.8	400		17	45		250	1.4	3
BYD34–J*	SOD84	1.8	600		17	45		250	1.4	3
BYD34–K*	SOD84	1.8	800		17	35		300	1.4	3
BYD34–M*	SOD84	1.8	1000		17	35		300	1.4	3
BYD37–D*	SOD87	1.5	200		12	20		250	1.3	1
BYD37–G*	SOD87	1.5	400		12	20		250	1.3	1
BYD37–J*	SOD87	1.5	600		12	20		250	1.3	1
BYD37–K*	SOD87	1.5	800		12	20		300	1.3	1
BYD37–M*	SOD87	1.5	1000		12	20		300	1.3	1
BYV95A*★	SOD57	1.5	200		10	35		250	1.6	3
BYV95B*★	SOD57	1.5	400		10	35		250	1.6	3
BYV95C*★	SOD57	1.5	600		10	35		250	1.6	3
BYV96–D*★	SOD57	1.5	800		10	35		300	1.6	3
BYV96–E*★	SOD57	1.5	1000		10	35		300	1.6	3
BYW95A★	SOD64	3	200		15	70		250	1.5	5
BYW95B★	SOD64	3	400		15	70		250	1.5	5
BYW95C★	SOD64	3	600		15	70		250	1.5	5
BYW96D★	SOD64	3	800		15	70		300	1.5	5
BYW96E★	SOD64	3	1000		15	70		300	1.5	5
BYX50–200	DO4	7	200	200	80	80	32	100	1.95	20
BYX50–300	DO4	7	300	300	80	80	32	100	1.95	20
1N3879	DO4	6	50	50	75	75	28	200	1.4	6
1N3880	DO4	6	100	100	75	75	28	200	1.4	6
1N3881	DO4	6	200	200	75	75	28	200	1.4	6
1N3882	DO4	6	300	300	75	75	28	200	1.4	6
1N3883	DO4	6	400	400	75	75	28	200	1.4	6
1N3889	DO4	12	50	50	140	140	100	200	1.4	12
1N3890	DO4	12	100	100	140	140	100	200	1.4	12
1N3891	DO4	12	200	200	140	140	100	200	1.4	12
1N3892	DO4	12	300	300	140	140	100	200	1.4	12
1N3893	DO4	12	400	400	140	140	100	200	1.4	12
1N4933	SOD84	1.5	50			30		200	1.1	1
1N4934	SOD84	1.5	100			30		200	1.1	1
1N4935	SOD84	1.5	200			30		200	1.1	1
1N4936	SOD84	1.5	400			30		200	1.1	1
1N4937	SOD84	1.5	600			30		200	1.1	1

* avalanche types

RECTIFIER DIODES (cont.)

Very fast types

For detailed information on these and other types see Data Handbooks SC01 and SC02

type	case	ratings						characteristics		
		$I_{F(AV)}$ A	V_{RRM} V	V_{RWM} V	I_{FRM} A	I_{FSM} and I^2t T_j max; t = 10 ms A	A^2s	t_{rr} max ns	V_F max T_j = 25 °C V	at I_F A
BYX30–200*	DO4	14		200	310	250	312	200	3.2	50
BYX30–200R*	DO4	14		200	310	250	312	200	3.2	50
BYX30–300*	DO4	14		300	310	250	312	200	3.2	50
BYX30–300R*	DO4	14		300	310	250	312	200	3.2	50
BYX30–400*	DO4	14		400	310	250	312	200	3.2	50
BYX30–400R*	DO4	14		400	310	250	312	200	3.2	50
BYX30–500*	DO4	14		500	310	250	312	200	3.2	50
BYX30–500R*	DO4	14		500	310	250	312	200	3.2	50
BYX30–600*	DO4	14		600	310	250	312	200	3.2	50
BYX30–600R*	DO4	14		600	310	250	312	200	3.2	50
BYX46–200*	DO4	22		200	400	300	450	200	2	50
BYX46–200R*	DO4	22		200	400	300	450	200	2	50
BYX46–300*	DO4	22		300	400	300	450	200	2	50
BYX46–300R*	DO4	22		300	400	300	450	200	2	50
BYX46–400*	DO4	22		400	400	300	450	200	2	50
BYX46–400R*	DO4	22		400	400	300	450	200	2	50
BYX46–500*	DO4	22		500	400	300	450	200	2	50
BYX46–500R*	DO4	22		500	400	300	450	200	2	50
BYX46–600*	DO4	22		600	400	300	450	200	2	50
BYX46–600R*	DO4	22		600	400	300	450	200	2	50

* with avalanche characteristics

RECTIFIER DIODES (cont.)

For detailed information on these and other types see Handbooks SC01 and SC02

type	case	ratings						characteristics		
		$I_{F(AV)}$ A	V_{RRM} V	V_{RWM} V	I_{FRM} A	I_{FSM} and I^2t T_j max; t = 10 ms A	A^2s	t_{rr} max ns	V_F max T_j = 25 °C V	at I_F A
BYV24–1000	DO4	12	1000	850	120	150	72	450	1.7	20
BYV24–1000R	DO4	12	1000	850	120	150	72	450	1.7	20
BYV24–800	DO4	12	800	650	120	150	72	450	1.7	20
BYV24–800R	DO4	12	800	650	120	150	72	450	1.7	20
BY229–200	TO220AC	7	200	150	135	60	18	150	1.85	20
BY229–200R	TO220AC	7	200	150	135	60	18	150	1.85	20
BY229–400★	TO220AC	7	400	300	135	60	18	150	1.85	20
BY229–400R	TO220AC	7	400	300	135	60	18	150	1.85	20
BY229–600★	TO220AC	7	600	500	135	60	18	150	1.85	20
BY229–600R	TO220AC	7	600	500	135	60	18	150	1.85	20
BY229–800★	TO220AC	7	800	600	135	60	18	150	1.85	20
BY229–800R	TO220AC	7	800	600	135	60	18	150	1.85	20
BY229F–200	SOT186	7	200	150	135	60	18	150	1.85	20
BY229F–400★	SOT186	7	400	300	135	60	18	150	1.85	20
BY229F–600	SOT186	7	600	500	135	60	18	150	1.85	20
BY229F–800	SOT186	7	800	600	135	60	18	150	1.85	20
BY329–800	TO220AC	8	800	600	80	80	32	150	1.85	20
BY329–1000★	TO220AC	8	1000	800	80	80	32	150	1.85	20
BY329–1200★	TO220AC	8	1200	1000	80	80	32	150	1.85	20

Controlled avalanche types (general purpose)

For detailed information on these and other types see Data Handbooks SC01 and SC02

type		case	ratings							
			$I_{F(AV)}$ A	V_{RRM} V	V_{RWM} V	I_{FRM} A	I_{FSM} $T_{j\,max}$; t = 10 ms A	P_{RRM} and P_{RSM} t = 20 µs kW		E_{RSM} mJ
BYD11	**–D**	SOD91	0.6		200		10			
	–G				400					
	–J				600					
	–K				800					
	–M				1000					
1N4001ID		SOD81	1		50	10	20			
1N4002ID					100					
1N4003ID					200					
1N4004ID					400					
1N4005ID					600					
1N4006ID					800					
1N4007ID					1000					
BYD13	**–D**	SOD81	1.4		200	5.5	20	–	–	7
	–G				400					
	–J				600					
	–K				800					
	–M				1000					
BYD17	**–D**	SOD87	1.5		200	5.5	20	–	–	7
	–G				400					
	–J				600					
	–K				800					
	–M				1000					
PRLL4001		SOD87	1.5		50	5.5	20			
PRLL4002					100					
BYD14	**–D**	SOD84	2	–	200	20	50	–	–	40
	–G				400					
	–J				600					
	–K				800					
	–M				1000					
BYW54★		SOD57	2		600	12	50	–	1	20
BYW55★					800					
BYW56★					1000					
BY527		SOD57	2	1250	800	12	50	–	–	20
BY627		SOD84	2	1250	800	20	50			40
1N5059		SOD57	2		200	12	50	–	1	20
1N5060★					400					
1N5061★					600					
1N5062★					800					

The 1N4..... series are not avalanche types

RECTIFIER DIODES (cont.)

Controlled avalanche types (general purpose)

For detailed information on these and other types see Data Handbooks SC01 and SC02

type	case	ratings							
		$I_{F(AV)}$ A	V_{RRM} V	V_{RWM} V	I_{FRM} A	I_{FSM} $T_{j\,max}$; t = 10 ms A	P_{RRM} and P_{RSM} t = 20 µs kW		E_{RSM} mJ
BYM56 –A	SOD64	3.5		200	20	80	–	1	20
–B				400					
–C				600					
–D				800					
–E				1000					
BYX39 – 600(R)	DO4	9.5		600	100	125	2*	4*	–
– 800(R)	unified			800					
–1000(R)	stud			1000					
–1200(R)				1200					
–1400(R)				1400					
BYX25 – 600(R)	DO4	20		600	440	360	3*	18*	–
– 800(R)	unified			800					
–1000(R)	stud			1000					
–1200(R)				1200					
–1400(R)				1400					

* t = 10 µs

(**R**) Reverse polarity types available, add suffix **R** to type number (e.g. **BYX39–600R**)

General purpose types

For detailed information on these and other types see Data Handbooks SC01 and SC02

type		case	ratings					characteristics
			$I_{F(AV)}$ A	V_{RRM} V	I_{FRM} A	I_{FSM} and I^2t $T_{j\,max}$; t = 10 ms A	A^2s	$V_{F\,max}$ at I_F T_j = 25 °C V/A
BYX38	**– 300(R)**	DO4	6	300	50	50	13	1.7/20
	– 600(R)	unified		600				
	–1200(R)	stud		1200				
BY249	**– 300(R)**	TO220AC	6.5	300	60	60	8	1.6/20
	– 600(R)			600				
BYX98	**– 300(R)**	DO4	10	300	75	75	28	1.7/20
	– 600(R)	unified		600				
	–1200(R)	stud		1200				
BYX42	**– 300(R)**	DO4	12	300	60	125	75	1.4/15
	– 600(R)	unified		600				
	–1200(R)	stud		1200				
BYX99	**– 300(R)**	DO4	15	300	180	180	162	1.55/50
	– 600(R)	unified		600				
	–1200(R)	stud		1200				
BYX96	**– 300(R)**	DO4	30	300	400	400	800	1.7/100
	– 600(R)	metric		600				
	–1200(R)	stud*		1200				
	–1600(R)			1600				

* For unified stud, add final letter **U** (e.g. **BYX96–300RU**)
TO220 and SOT93 versions are also available in F–pack versions
(**R**) Reverse polarity types available, add suffix **R** to type number (e.g. **BYX38–300R**)

Efficiency diodes

For detailed information on these and other types see Data Handbooks SC01 and SC02

Efficiency diodes

type	case	ratings			characteristics
		$I_{F(AV)}$* I_{FWM} A	V_{RRM} V	I_{FRM} A	t_{tot} max µs
BYX10G	SOD57	1.2*	1600	5	–
BY448	SOD57	4	1500	8	20
BY458	SOD57	4	1200	8	20
BY228★	SOD64	5	1500	10	20
BY438	SOD64	5	1200	10	20
BY328**	SOD64	5	1400	6	13

* plastic module with heatsink face
** for 32 kHz scanning systems

For detailed information on these and other types see Data Handbooks SC01 and SC02

S

E.H.T. rectifiers

type	case	V_{RW} (kV)	V_{RRM} (kV)	$I_{F(AV)}$ (mA)	t_{rr} typ (µs)
BYX90G*★	SOD83	6	7.5	550	< 0.35
BY584	SOD61	1.5	1.8	85	0.2
BY505	SOD61	2	2.2	85	0.2
BY614	SOD61	2	2.2	50	0.2
BY609*	SOD61	12	15	4	0.2
BY610*	SOD61	12	17	4	0.2
BY619*	SOD61	12	15	4	0.2
BY620*	SOD61	12	17	4	0.2
BY705	SOD61	4	5	20	0.2
BY706	SOD61	5	6	20	0.2
BY707	SOD61	9	10	4	0.2
BY708	SOD61	10	12	4	0.2
BY709	SOD61	12	14	4	0.2
BY710	SOD61	14	17	3	0.2
BY711	SOD61	16	19	3	0.2
BY712★	SOD61	18	22	3	0.2
BY713★	SOD61	20	24	3	0.2
BY714	SOD61	24	30	3	0.2
BY715	SOD61	4	5	20	0.1
BY716	SOD61	5	6	20	0.1
BY717	SOD61	9	10	4	0.1
BY718	SOD61	10	12	4	0.1
BY719	SOD61	12	14	4	0.1
BY720	SOD61	14	17	3	0.1
BY721	SOD61	16	19	3	0.1
BY722	SOD61	18	22	3	0.1
BY723	SOD61	20	24	3	0.1
BY724	SOD61	24	30	3	0.1

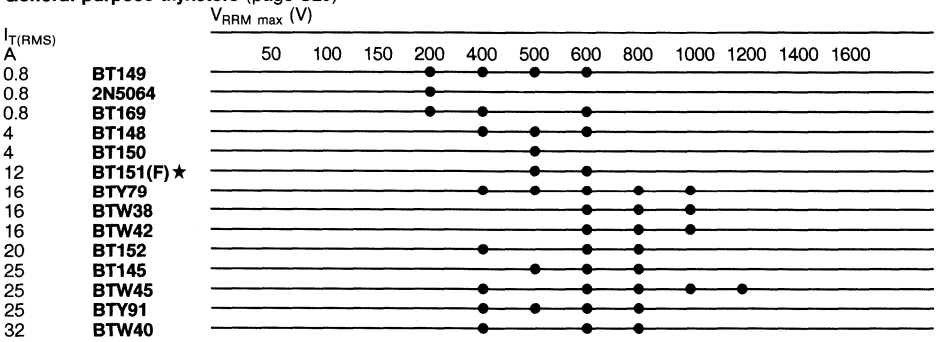
* avalanche types
1) with intergrated bleeder resistor
2) with focus potentiometer

THYRISTORS AND TRIACS — Selection guide

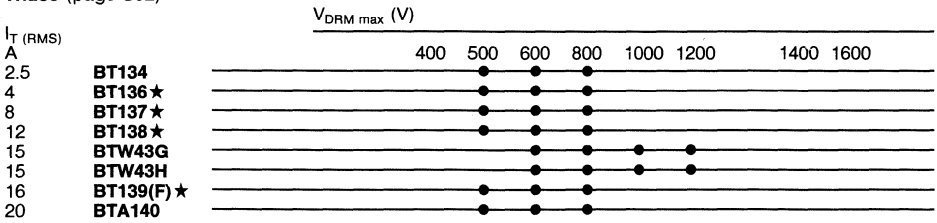
General purpose thyristors, triacs and bi-directional devices

For detailed information see Data Handbook SC02

General purpose thyristors (page S29)



Triacs (page S32)



Bi-directional devices (page S34)

Diac **BR100:** $V_{(BO)}$ = 28 to 36 V; I_{FRM} < 2 A. Thyristor tetrode **BRY39:** $V_{RRM\ max}$ = 70 V; $I_{T\ max}$ = 250 mA.

General purpose thyristors

For detailed information on these and other types see Data Handbook SC02

Voltage range 200 to 1200 V
Current range 0.8 to 32 A

S

type	case	ratings					characteristics		
		$I_{T(RMS)}$ A	$I_{T(AV)max}$ T_{mb} = 85 °C A	V_{RRM} max V	I_{TSM} max at T_j max t = 10 ms A	dI_T/dt max A/µs	dV_D/dt max at T_j max V/µs	V_{GT} min V_D = 6 V; T_j = 25 °C V	I_{GT} min at T_j max mA
2N5064	TO92*	0.8	0.5	200	10	–	25**	0.8	0.2
BTW38–1000R	TO64(2)	16	10	1000	150	50	200	1.5	50
BTW38–600R	TO64(2)	16	10	600	150	50	200	1.5	50
BTW38–800R	TO64(2)	16	10	800	150	50	200	1.5	50
BTW42–1000R	TO64(2)	16	10	1000	150	50	500	1.5	50
BTW42–600R	TO64(2)	16	10	600	150	50	500	1.5	50
BTW42–800R	TO64(2)	16	10	800	150	50	500	1.5	50
BTY79–1000R	TO64(1)	16	10	1000	150	50	200	1.5	30
BTY79–400R	TO64(1)	16	10	400	150	50	200	1.5	30
BTY79–500R	TO64(1)	16	10	500	150	50	200	1.5	30
BTY79–600R	TO64(1)	16	10	600	150	50	200	1.5	30
BTY79–800R	TO64(1)	16	10	800	150	50	200	1.5	30
BT148–400R	SOT82	4	2.5	400	25	50	5	1.5	0.2
BT148–500R	SOT82	4	2.5	500	25	50	5	1.5	0.2
BT148–600R	SOT82	4	2.5	600	25	50	5	1.5	0.2
BT149B	TO92	0.8	0.5	200	8	30	25**	0.8	0.2
BT149D	TO92	0.8	0.5	400	8	30	25**	0.8	0.2
BT149E	TO92	0.8	0.5	500	8	30	25**	0.8	0.2
BT149G	TO92	0.8	0.5	600	8	30	25**	0.8	0.2
BT150	TO220AB	4	2.5	500	25	50	5	1.5	200
BT151–500R★	TO220AB	12	7.5	500	100	50	200	1.5	15
BT151–650R★	TO220AB	12	7.5	650	100	50	200	1.5	15
BT151–800R	TO220AB	12	7.5	800	100	50	200	1.5	15
BT169B–200	TO92	0.8	0.5	200	8	30	25**	0.8	0.2
BT169D–400	TO92	0.8	0.5	400	8	30	25**	0.8	0.2
BT169E	TO92*	0.8	0.5	500	8	30	25**	0.8	0.2
BT169G	TO92*	0.8	0.5	600	8	30	25**	0.8	0.2

* U.S.A reverse pinning (a/K reversed)
** typ.

General purpose thyristors

For detailed information on these and other types see Data Handbook SC02

		ratings					characteristics		
type	case	$I_{T(RMS)}$ A	$I_{T(AV)max}$ T_{mb} = 85 °C A	V_{RRM} max V	I_{TSM} max at T_j max t = 10 ms A	dI_T/dt max A/µs	dV_D/dt max at T_j max V/µs	V_{GT} min V_D = 6 V; T_j = 25 °C V	I_{GT} min at T_j max mA
BTW40–400R	TO48(2)	32	20	400	400	100	100	1.5	75
BTW40–400RU	TO48(1)	32	20	400	400	100	100	1.5	75
BTW40–600R	TO48(2)	32	20	600	400	100	100	1.5	75
BTW40–600RU	TO48(1)	32	20	600	400	100	100	1.5	75
BTW40–800R	TO48(2)	32	20	800	400	100	100	1.5	75
BTW40–800RU	TO48(1)	32	20	800	400	100	100	1.5	75
BTW45–1000R	TO48(2)	25	16	1000	300	100	200	1.5	75
BTW45–1000RU	TO48(1)	25	16	1000	300	100	200	1.5	75
BTW45–1200R	TO48(2)	25	16	1200	300	100	200	1.5	75
BTW45–1200RU	TO48(1)	25	16	1200	300	100	200	1.5	75
BTW45–400R	TO48(2)	25	16	400	300	100	200	1.5	75
BTW45–400RU	TO48(1)	25	16	400	300	100	200	1.5	75
BTW45–600R	TO48(2)	25	16	600	300	100	200	1.5	75
BTW45–600RU	TO48(1)	25	16	600	300	100	200	1.5	75
BTW45–800R	TO48(2)	25	16	800	300	100	200	1.5	75
BTW45–800RU	TO48(1)	25	16	800	300	100	200	1.5	75
BTY91–400R	TO48(1)	25	14	400	200	20	200	3	40
BTY91–500R	TO48(1)	25	14	500	200	20	200	3	40
BTY91–600R	TO48(1)	25	14	600	200	20	200	3	40
BTY91–800R	TO48(1)	25	14	800	200	20	200	3	40
BT145–500R	TO220AB	25	16	500	300	200	200	1.5	35
BT145–600R	TO220AB	25	16	600	300	200	200	1.5	35
BT145–800R	TO220AB	25	16	800	300	200	200	1.5	35
BT152–400R	TO220AB	20	13	400	200	200	200	1.5	32
BT152–600R	TO220AB	20	13	600	200	200	200	1.5	32
BT152–800R	TO220AB	20	13	800	200	200	200	1.5	32

TO–220AB versions are also available in F–pack
Reverse polarity (anode to stud) **R**

NOTES

For detailed information on these and other types see Data Handbook SC02

Voltage range 500 to 1200 V
Current range 4 to 20 A

High quality triacs for motor control, furnace control, heating, light dimming, contactor drive, static switching, etc. They have a high surge capability and excellent high commutating characteristics.

type*	suffix = V_{DRM} max	case	ratings					characteristics				
								dV_D/dt max at $T_{j\,max}$				
			$I_{T(RMS)}$ A	I_{TRM} A	I_{TSM} and I^2t $T_{j\,max}$; 10 ms A	A^2s	dI_T/dt A/µs	normal commutating at: V/µs	V/µs	dI_T/dt A/ms	V_{GT} min V	I_{GT} min mA
BT134	**– 500R**	SOT82	2.5	25	25	4	10	100	10	2.5	1.5	35
	– 600R											
	– 800R											
BT136	**– 500**	TO220AB	4	25	25	–	10	100	10	1.8	1.5	35*
	– 600											
	– 800											
BT137	**– 500**	TO220AB	8	55	55	15	20	100	10	3.6	1.5	35*
	– 600											
	– 800											
BT138	**– 500**	TO220AB	12	90	90	40	30	100	10	5.4	1.5	35*
	– 600											
	– 800											
BT139	**– 500**	TO220AB	16	130	130	65	30	100	10	7.2	1.5	35*
	– 600											
	– 800											
BTW43G	**– 600**	TO64	15	50	120	72	50	200	10	5	2.5	100
	– 800											
	–1000											
	–1200											
BTW43H	**– 600**	TO64	15	50	120	72	50	200	10	12	2.5	100
	– 800											
	–1000											
	–1200											
BTA140	**– 500**	TO220AB	20	200	200	90	30	100	10	9.0	1.5	35
	– 600											
	– 800											

variants with different gate sensitivities are available as follows:

Suffix to type no.	$I_{GT\,min}$
G	50 mA
F	25 mA
E	10 mA
D	5 mA

TO–220AB versions are also available in F–pack

For detailed information on these and other types see Data Handbook SC02

type	case	V_{BO}nom V	$I_H$min mA	I_{TSM} 1) A	I_{TSM} 2) A	configuration
BR210–100	TO220AB	100	150	150	40	single bi–directional
BR210–120		120				
BR210–140		140				
BR210–160		160				
BR210–180		180				
BR210–200		200				
BR210–220		220				
BR210–240		240				
BR210–260		260				
BR210–280		280				
BR211–100	SOD80	100	150	–	40	single bi–directional
BR211–120		120				
BR211–140		140				
BR211–160		160				
BR211–180		180				
BR211–200		200				
BR211–220		220				
BR211–240		240				
BR211–260		260				
BR211–280		280				
BR216	TO220AB	78	150	150	40	dual asymmetrical
BR220–100	TO220AB	100	150	150	40	dual bi–directional
BR220–120		120				
BR220–140		140				
BR220–160		160				
BR220–180		180				
BR220–200		200				
BR220–220		220				
BR220–240		240				
BR220–260		260				
BR220–280		280				
BR213–100	TO220AB	100	150	150	40	triple bi–directional
BR213–120		120				
BR213–140		140				
BR213–160		160				
BR213–180		180				
BR213–200		200				
BR213–220		220				
BR213–240		240				
BR213–260		260				
BR213–280		280				

1) 80/20 µs impulse
2) 10/320 µs impulse

Bi–directional devices

For detailed information on these and other types see Data Handbook SC02

Bi–directional devices
status = P

type			
Diac BR100	breakover voltage repetitive peak current breakback voltage	$V_{(BO)}$ I_{FRM} V_O	28 to 36 V max 2 A min 5 V

type	case			
BRY39 thyristors tetrode	TO72(3)	$V_D = V_R$ I_{TSM} at T_j max $t = 10$ µs I_T dI_T/dt	max 70 V max 3 A max 250 mA max 20 A/µs	characteristics at $T_j = 25$ °C V_{GKT} > 0.5 V I_{GKT} > 1 µA $-V_{GAT}$ > 1 V $-I_{GAT}$ > 100 µA

For detailed information on these and other types see Data Handbook SC04

type	pol.	case	V_{CEO} V	I_C mA
BCF29	PNP	SOT23	32	100
BCF30	PNP	SOT23	32	100
BCF32	NPN	SOT23	32	100
BCF33	NPN	SOT23	32	100
BCF70	PNP	SOT23	45	100
BCF81	NPN	SOT23	45	100
BCV26	PNP	SOT23	30	300
BCV27	NPN	SOT23	30	300
BCV61	NPN	SOT143	30	100
BCV62	PNP	SOT143	30	100
BCV63	PNP	SOT143	30	100
BCV64	PNP	SOT143	30	100
BCV65	PNP	SOT143	30	100
BCV71	NPN	SOT23	60	100
BCV72	NPN	SOT23	60	100
BCW29	PNP	SOT23	32	100
BCW30	PNP	SOT23	32	100
BCW31	NPN	SOT23	32	100
BCW32	NPN	SOT23	32	100
BCW33	NPN	SOT23	32	100
BCW60A	NPN	SOT23	32	200
BCW60B	NPN	SOT23	32	200
BCW60C	NPN	SOT23	32	200
BCW60D	NPN	SOT23	32	200
BCW61A	PNP	SOT23	32	200
BCW61B	PNP	SOT23	32	200
BCW61C	PNP	SOT23	32	200
BCW61D	PNP	SOT23	32	200
BCW69	PNP	SOT23	45	100
BCW70	PNP	SOT23	45	100
BCW71	NPN	SOT23	45	100
BCW72	NPN	SOT23	45	100
BCW81	NPN	SOT23	45	100

SMALL SIGNAL TRANSISTORS

Type number survey
Alpha numeric list

For detailed information on these and other types see Data Handbook SC04

type	pol.	case	V_{CEO} V	I_C mA
BCW89	PNP	SOT23	60	100
BCX17	PNP	SOT23	45	500
BCX18	PNP	SOT23	25	500
BCX19	NPN	SOT23	45	500
BCX20	NPN	SOT23	25	500
BCX51	PNP	SOT89	45	1000
BCX52	PNP	SOT89	60	1000
BCX53	PNP	SOT89	80	1000
BCX54	NPN	SOT89	45	1000
BCX70G	NPN	SOT23	45	200
BCX70H	NPN	SOT23	45	200
BCX70J	NPN	SOT23	45	200
BCX70K	NPN	SOT23	45	200
BCX71G	PNP	SOT23	45	200
BCX71H	PNP	SOT23	45	200
BCX71J	PNP	SOT23	45	200
BCX71K	PNP	SOT23	45	200
BCX78	PNP	TO92	32	100
BCX79	PNP	TO92	45	100
BCY56	NPN	TO18	45	100
BCY57	NPN	TO18	20	100
BCY58/VII	NPN	TO18	32	200
BCY58/VIII	NPN	TO18	32	200
BCY58/IX	NPN	TO18	32	200
BCY58/X	NPN	TO18	32	200
BCY59/VII	NPN	TO18	45	200
BCY59/VIII	NPN	TO18	45	200
BCY59/IX	NPN	TO18	45	200
BCY59/X	NPN	TO18	45	200
BCY65/VII	NPN	TO18	60	200
BCY65/VIII	NPN	TO18	60	200
BCY65/IX	NPN	TO18	60	200
BCY70	PNP	TO18	40	200
BCY71	PNP	TO18	45	200
BCY72	PNP	TO18	25	200
BCY78/VII	PNP	TO18	32	200
BCY78/VIII	PNP	TO18	32	200
BCY78/IX★	PNP	TO18	32	200
BCY78/X	PNP	TO18	32	200
BCY79/VII	PNP	TO18	45	200
BCY79/VIII	PNP	TO18	45	200
BCY79/IX★	PNP	TO18	45	200
BCY87	NPN	TO71(1)	40	30
BCY88	NPN	TO71(1)	40	30
BCY89	NPN	TO71(1)	40	30
BC107★	NPN	TO18	45	100
BC108	NPN	TO18	20	100
BC109	NPN	TO18	20	100
BC140	NPN	TO39(1)	40	1000

SMALL SIGNAL TRANSISTORS

Type number survey
Alpha numeric list

For detailed information on these and other types see Data Handbook SC04

type	pol.	case	V_{CEO} V	I_C mA
BC141	NPN	TO39(1)	60	1000
BC160	PNP	TO39(1)	40	1000
BC161	PNP	TO39(1)	60	1000
BC177★	PNP	TO18	45	100
BC178	PNP	TO18	25	100
BC179	PNP	TO18	20	100
BC327★	PNP	TO92VAR	45	500
BC327A	PNP	TO92VAR	60	500
BC328★	PNP	TO92VAR	25	500
BC337★	NPN	TO92VAR	45	500
BC337A	NPN	TO92VAR	60	500
BC338★	NPN	TO92VAR	25	500
BC368	NPN	TO92VAR	20	1000
BC369	PNP	TO92VAR	20	1000
BC375	NPN	TO92VAR	20	1000
BC376	PNP	TO92VAR	20	1000
BC516	PNP	TO92VAR	30	400
BC517	NPN	TO92VAR	30	400
BC546★	NPN	TO92VAR	65	100
BC547★	NPN	TO92VAR	45	100
BC548★	NPN	TO92VAR	30	100
BC549★	NPN	TO92VAR	30	100
BC550★	NPN	TO92VAR	45	100
BC556★	PNP	TO92VAR	65	100
BC557★	PNP	TO92VAR	45	100
BC558★	PNP	TO92VAR	30	100
BC559★	PNP	TO92VAR	30	100
BC560★	PNP	TO92VAR	45	100
BC635★	NPN	TO92VAR	45	1000
BC636★	PNP	TO92VAR	45	1000
BC637★	NPN	TO92VAR	60	1000
BC638★	PNP	TO92VAR	60	1000
BC639★	NPN	TO92VAR	80	1000
BC640★	PNP	TO92VAR	80	1000
BC807	PNP	SOT23	45	500
BC808	PNP	SOT23	25	500
BC817	NPN	SOT23	45	500
BC818	NPN	SOT23	25	500
BC846★	NPN	SOT23	65	100
BC847★	NPN	SOT23	45	100
BC848★	NPN	SOT23	30	100
BC849★	NPN	SOT23	30	100
BC850★	NPN	SOT23	45	100
BC856★	PNP	SOT23	65	100
BC857★	PNP	SOT23	45	100
BC858★	PNP	SOT23	30	100
BC859★	PNP	SOT23	30	100
BC860★	PNP	SOT23	45	100
BC868	NPN	SOT89	20	1000

For detailed information on these and other types see Data Handbook SC04

type	pol.	case	V_{CEO} V	I_C mA
BC869	PNP	SOT89	20	1000
BFR54	NPN	TO92VAR	15	
BFS18	PNP	SOT23	20	30
BFS19	PNP	SOT23	20	30
BFS20	PNP	SOT23	20	25
BFT44	PNP	TO39(1)	300	500
BFT45	PNP	TO39(1)	250	500
BFX34	NPN	TO39(1)	60	2000
BFY50	NPN	TO39(1)	35	1000
BFY51	NPN	TO39(1)	30	1000
BFY52	NPN	TO39(1)	20	1000
BFY55	NPN	TO39(1)	35	1000
BF198★	NPN	TO92VAR	30	25
BF199	NPN	TO92VAR	25	25
BF240	NPN	TO92VAR	40	25
BF241	NPN	TO92VAR	40	25
BF324★	PNP	TO92VAR	30	25
BF370	NPN	TO92VAR	15	100
BF420	NPN	TO92VAR		50
BF421	PNP	TO92VAR		50
BF422	NPN	TO92VAR	250	50
BF423	PNP	TO92VAR	250	50
BF450	PNP	TO92VAR	40	25
BF451	PNP	TO92VAR	40	25
BF483	NPN	TO92VAR	250	50
BF485	NPN	TO92VAR	300	50
BF487	NPN	TO92VAR	350	50
BF494★	NPN	TO92VAR	20	30
BF495	NPN	TO92VAR	30	30
BF496	NPN	TO92VAR	20	20
BF536	PNP	SOT23	30	25
BF550	PNP	SOT23	40	25
BF569	PNP	SOT23	35	30
BF570	PNP	SOT23	15	100
BF579	PNP	SOT23	20	25
BF620	NPN	SOT89		50
BF621	PNP	SOT89		50
BF622	NPN	SOT89	250	50
BF623	PNP	SOT89	250	50
BF660	PNP	SOT23	30	25
BF767	PNP	SOT23	30	20
BF820	NPN	SOT23		50
BF821	PNP	SOT23		50
BF822	NPN	SOT23	250	50
BF823	PNP	SOT23	250	50
BF824	PNP	SOT23	30	25
BF840	PNP	SOT23	40	25
BF841	PNP	SOT23	40	25
BF926	PNP	TO92VAR	20	25

For detailed information on these and other types see Data Handbook SC04

type	pol.	case	V_{CEO} V	I_C mA
BF936	PNP	TO92VAR	20	25
BF939	PNP	TO92VAR	25	20
BF967	PNP	SOT37	30	20
BF970	PNP	SOT37	35	30
BF979	PNP	SOT37	20	
BSR12	PNP	SOT23	15	100
BSR13	NPN	SOT23	30	800
BSR14	NPN	SOT23	40	800
BSR15	PNP	SOT23	40	600
BSR16	PNP	SOT23	60	600
BSR17	NPN	SOT23	40	200
BSR17A	NPN	SOT23	40	200
BSR18	PNP	SOT23	40	200
BSR18A	PNP	SOT23	40	200
BSR19	NPN	SOT23	140	600
BSR19A	NPN	SOT23	160	600
BSR20	PNP	SOT23	120	600
BSR20A	PNP	SOT23	150	600
BSR30	PNP	SOT89	60	1000
BSR31	PNP	SOT89	60	1000
BSR32	PNP	SOT89	80	1000
BSR33	PNP	SOT89	80	1000
BSR40	NPN	SOT89	60	1000
BSR41	NPN	SOT89	60	1000
BSR42	NPN	SOT89	80	1000
BSR43	NPN	SOT89	80	1000
BSR50	NPN	TO92VAR		1000
BSR51	NPN	TO92VAR		1000
BSR52	NPN	TO92VAR		1000
BSR60	PNP	TO92VAR		1000
BSR61	PNP	TO92VAR		1000
BSR62	PNP	TO92VAR		1000
BSS38	NPN	TO92VAR	100	100
BSS50	NPN	TO39(1)		1000
BSS51	NPN	TO39(1)		1000
BSS52	NPN	TO39(1)		1000
BSS60	PNP	TO39(1)		1000
BSS61	PNP	TO39(1)		1000
BSS62	PNP	TO39(1)		1000
BSS63	PNP	SOT23	100	100
BSS64	NPN	SOT23	80	100
BSS68	PNP	TO92VAR	100	100
BST15	PNP	SOT89	200	1000
BST16	PNP	SOT89	300	1000
BST39	NPN	SOT89	350	1000
BST40	NPN	SOT89	250	1000
BST50	NPN	SOT89		500
BST51	NPN	SOT89		500

SMALL SIGNAL TRANSISTORS

Type number survey
Alpha numeric list

For detailed information on these and other types see Data Handbook SC04

type	pol.	case	V_{CEO} V	I_C mA
BST52	NPN	SOT89		500
BST60	PNP	SOT89		500
BST61	PNP	SOT89		500
BST62	PNP	SOT89		500
BSV15–10	PNP	TO39(1)	40	1000
BSV15–16	PNP	TO39(1)	40	1000
BSV16–10	PNP	TO39(1)	60	1000
BSV16–16	PNP	TO39(1)	60	1000
BSV17–10	PNP	TO39(1)	80	1000
BSV52	NPN	SOT23	12	100
BSV64	NPN	TO39(1)	60	2000
BSW66A★	NPN	TO39(1)	100	1000
BSW67A★	NPN	TO39(1)	120	1000
BSW68A★	NPN	TO39(1)	150	1000
BSX19	NPN	TO18	15	
BSX20	NPN	TO18	15	
BSX45–10	NPN	TO39(1)	40	1000
BSX45–16	NPN	TO39(1)	40	1000
BSX46–10	NPN	TO39(1)	60	1000
BSX46–16	NPN	TO39(1)	60	1000
BSX47–10	NPN	TO39(1)	80	1000
BSX59	NPN	TO39(1)	45	1000
BSX60	NPN	TO39(1)	30	1000
BSX61	NPN	TO39(1)	45	1000
MPSA05	NPN	TO92	60	500
MPSA06	NPN	TO92	80	500
MPSA13	NPN	TO92		500
MPSA14	NPN	TO92		500
MPSA42	NPN	TO92	300	500
MPSA43	NPN	TO92	200	500
MPSA55	PNP	TO92	60	500
MPSA56	PNP	TO92	80	500
MPSA63	PNP	TO92		500
MPSA64	PNP	TO92		500
MPSA92	PNP	TO92	300	500
MPSA93	PNP	TO92	200	500
MPS6513	NPN	TO92	30	100
MPS6514	NPN	TO92	25	100
MPS6515	NPN	TO92	25	100
MPS6517	PNP	TO92	40	100
MPS6518	PNP	TO92	40	100
MPS6519	PNP	TO92	25	100
MPS6520	NPN	TO92	25	100
MPS6521	NPN	TO92	25	100
MPS6522	PNP	TO92	25	100
MPS6523	PNP	TO92	25	100
PH2222	NPN	TO92VAR	30	800
PH2222A	NPN	TO92VAR	40	800
PH2369	NPN	TO92VAR	15	600

SMALL SIGNAL TRANSISTORS

Type number survey
Alpha numeric list

For detailed information on these and other types see Data Handbook SC04

type	pol.	case	V_{CEO} V	I_C mA
PH2907	PNP	TO92VAR	40	600
PH2907A	PNP	TO92VAR	60	600
PH5415	PNP	TO92VAR	200	1000
PH5416	PNP	TO92VAR	300	1000
PMBTA05	NPN	SOT23	60	500
PMBTA06	NPN	SOT23	80	500
PMBTA13	NPN	SOT23		300
PMBTA14	NPN	SOT23		300
PMBTA42	NPN	SOT23	300	500
PMBTA43	NPN	SOT23	200	500
PMBTA55	PNP	SOT23	60	500
PMBTA56	PNP	SOT23	80	500
PMBTA63	PNP	SOT23		500
PMBTA64	PNP	SOT23		500
PMBTA92	PNP	SOT23	300	500
PMBTA93	PNP	SOT23	200	500
PMBT2222	NPN	SOT23	30	600
PMBT2222A	NPN	SOT23	40	600
PMBT2907	PNP	SOT23	40	600
PMBT2907A	PNP	SOT23	60	600
PMBT3903	NPN	SOT23	40	200
PMBT3904	NPN	SOT23	40	200
PMBT3906	PNP	SOT23	40	200
PMBT6428	NPN	SOT23	50	200
PMBT6429	NPN	SOT23	45	200
PN2222	NPN	TO92	30	600
PN2222A	NPN	TO92	40	600
PN2369	NPN	TO92	15	600
PN2369A	NPN	TO92	15	600
PN2907	PNP	TO92	40	600
PN2907A	PNP	TO92	60	600
PN3439	NPN	TO92	350	1000
PN3440	NPN	TO92	250	1000
PN5415	PNP	TO92	200	1000
PN5416	PNP	TO92	300	1000
PXT3904	NPN	SOT89	40	200
PXT3906	PNP	SOT89	40	200
2N1613	NPN	TO39(1)		
2N1711	NPN	TO39(1)		
2N1893	NPN	TO39(1)	80	500
2N2219	NPN	TO39(1)	30	800
2N2219A	NPN	TO39(1)	40	800
2N2222	NPN	TO18	30	800
2N2222A	NPN	TO18	40	800
2N2297	NPN	TO39(1)	35	1000
2N2369	NPN	TO18	15	
2N2369A	NPN	TO18	15	200
2N2483	NPN	TO18	60	
2N2484	NPN	TO18	60	

SMALL SIGNAL TRANSISTORS

Type number survey
Alpha numeric list

For detailed information on these and other types see Data Handbook SC04

type	pol.	case	V_{CEO} V	I_C mA
2N2904	PNP	TO39(1)	40	600
2N2904A	PNP	TO39(1)	60	600
2N2905	PNP	TO39(1)	40	600
2N2905A★	PNP	TO39(1)	60	600
2N2906	PNP	TO18	40	600
2N2906A	PNP	TO18	60	600
2N2907	PNP	TO18	40	600
2N2907A★	PNP	TO18	60	600
2N3019	NPN	TO39(1)	80	1000
2N3020	NPN	TO39(1)	80	1000
2N3053	NPN	TO39(1)	40	700
2N3439	NPN	TO39(1)	350	1000
2N3440	NPN	TO39(1)	250	1000
2N3903	NPN	TO92	40	200
2N3904	NPN	TO92	40	200
2N3905	PNP	TO92	40	200
2N3906	PNP	TO92	40	200
2N4030	PNP	TO39(1)	60	1000
2N4031	PNP	TO39(1)	80	1000
2N4032	PNP	TO39(1)	60	1000
2N4033	PNP	TO39(1)	80	1000
2N4123	NPN	TO92	30	200
2N4124	NPN	TO92	25	200
2N4125	PNP	TO92	30	200
2N4126	PNP	TO92	25	200
2N4400	NPN	TO92	40	600
2N4401	NPN	TO92	40	600
2N4402	PNP	TO92	40	600
2N4403	PNP	TO92	40	600
2N5086	PNP	TO92	50	50
2N5087	PNP	TO92	50	50
2N5088	NPN	TO92	30	50
2N5089	NPN	TO92	25	50
2N5400	PNP	TO92	120	600
2N5401	PNP	TO92	150	600
2N5415	PNP	TO39(1)	200	1000
2N5416	PNP	TO39(1)	300	1000
2N5550	NPN	TO92	140	600
2N5551	NPN	TO92	160	600
2N930	NPN	TO18	45	30

SMALL SIGNAL TRANSISTORS

Selection guide

Transistors for audio and general-purpose applications

For detailed information on these and other types see Data Handbook SC04

Voltage range 20 to 80 V
Current range 500 to 1000 mA
D.C. current gain h_{FE} 40 to 800

			ratings				characteristics				
type	pol.	case	V_{CEO} V	I_C mA	P_{tot} mW	at T_{amb} °C	h_{FE} (h_{fe}) min	h_{FE} (h_{fe}) max	at I_C mA	f_T typ MHz	F typ dB
BC177★	PNP	TO18	45	100	300	25	75	260	2	150	
BC178	PNP	TO18	25	100	300	25	75	260	2	150	
BC179	PNP	TO18	20	100	300	25	180	500	2	150	
BC160	PNP	TO39(1)	40	1000	3700	45*	63	250	100		
BC161	PNP	TO39(1)	60	1000	3700	45*	63	250	100		
BC327★	PNP	TO92VAR	45	500	800	25	100	600	100	100	
BC327A	PNP	TO92VAR	60	500	800	25	100	400	100	100	
BC328★	PNP	TO92VAR	25	500	800	25	100	600	100	100	
BC369	PNP	TO92VAR	20	1000	800	25	85	375	500	60	
BC376	PNP	TO92VAR	20	1000	800	25	60	340	150	150	
BC516	PNP	TO92VAR	30	400	625	25	30000		20	220	
BC556	PNP	TO92VAR	65	100	500	25	75	475	2	200	2
BC557	PNP	TO92VAR	45	100	500	25	75	800	2	200	2
BC558	PNP	TO92VAR	30	100	500	25	75	800	2	200	2
BC559	PNP	TO92VAR	30	100	500	25	125	800	2	200	1
BC560	PNP	TO92VAR	45	100	500	25	125	800	2	200	1
BC107★	NPN	TO18	45	100	300	25	110	450	2	300	2
BC108	NPN	TO18	20	100	300	25	110	800	2	300	2
BC109	NPN	TO18	20	100	300	25	200	800	2	300	1.2
BC140	NPN	TO39(1)	40	1000	3700	45*	63	250	100		
BC141	NPN	TO39(1)	60	1000	3700	45*	63	250	100		
BC337★	NPN	TO92VAR	45	500	800	25	100	600	100	200	
BC337A	NPN	TO92VAR	60	500	800	25	100	400	100	200	
BC338★	NPN	TO92VAR	25	500	800	25	100	600	100	200	
BC368	NPN	TO92VAR	20	1000	800	25	85	375	500	60	
BC375	NPN	TO92VAR	20	1000	800	25	60	340	150	150	
BC517	NPN	TO92VAR	30	400	625	25	30000		20	220	
BC546★	NPN	TO92VAR	65	100	500	25	110	450	2	300	2
BC547★	NPN	TO92VAR	45	100	500	25	110	800	2	300	2
BC548★	NPN	TO92VAR	30	100	500	25	110	800	2	300	2
BC549★	NPN	TO92VAR	30	100	500	25	200	800	2	300	1.2
BC550★	NPN	TO92VAR	45	100	500	25	200	800	2	300	1
BC635★	NPN	TO92VAR	45	1000	1000	25	40	250	150	130	
BC637★	NPN	TO92VAR	60	1000	1000	25	40	250	150	130	
BC639★	NPN	TO92VAR	80	1000	1000	25	40	250	150	130	

* T_{case}

SMALL SIGNAL TRANSISTORS (cont.) Selection guide

Transistors for audio and general–purpose applications (cont.)

For detailed information on these and other types see Data Handbook SC04

type	pol.	case	ratings				characteristics				
			V_{CEO} V	I_C mA	P_{tot} mW	at T_{amb} °C	h_{FE} (h_{fe}) min	h_{FE} (h_{fe}) max	at I_C mA	f_T typ MHz	F typ dB
BCY56	NPN	TO18	45	100	300	25	100	450	2	85	1.5
BCY57	NPN	TO18	20	100	300	25	200	800	2	100	1.5
BCY58/IX	NPN	TO18	32	200	330	45*	250	460	2		2
BCY58/VII	NPN	TO18	32	200	330	45*	120	220	2		2
BCY58/VIII	NPN	TO18	32	200	330	45*	180	310	2		2
BCY58/X	NPN	TO18	32	200	330	45*	380	630	2		2
BCY59/IX	NPN	TO18	45	200	330	45*	250	460	2		2
BCY59/VII	NPN	TO18	45	200	330	45*	120	220	2		2
BCY59/VIII	NPN	TO18	45	200	330	45*	180	310	2		2
BCY59/X	NPN	TO18	45	200	330	45*	380	630	2		2
BCY70	PNP	TO18	40	200	350	25	100		10		2
BCY71	PNP	TO18	45	200	350	25	100	400	10		
BCY72	PNP	TO18	25	200	350	25	100		10		
BCY78/IX	PNP	TO18	32	200	345	45	250	460	2	180	
BCY78/VII	PNP	TO18	32	200	345	45	120	220	2	180	2
BCY78/VIII	PNP	TO18	32	200	345	45	180	310	2	180	
BCY78/X	PNP	TO18	32	200	345	45	380	630	2	180	2
BCY79/IX	PNP	TO18	45	200	345	45	250	460	2	180	
BCY79/VII	PNP	TO18	45	200	345	25	120	220	2	180	2
BCY79/VIII	PNP	TO18	45	200	345	25	180	310	2	180	
BCY87**	NPN	TO71(1)	40	30	150	25	100	450	0.05		
BCY88**	NPN	TO71(1)	40	30	150	25	100	450	0.05		
BCY89**	NPN	TO71(1)	40	30	150	25	100	450	0.05		
BC636★	PNP	TO92VAR	45	1000	1000	25	40	250	150	50	
BC638★	PNP	TO92VAR	60	1000	1000	25	40	250	150	50	
BC640★	PNP	TO92VAR	80	1000	1000	25	40	250	150	50	
MPSA05	NPN	TO92	60	500	625	25	50		10		
MPSA06	NPN	TO92	80	500	625	25	50		10		
MPSA13	NPN	TO92		500	625	25	5000		10		
MPSA14	NPN	TO92		500	625	25	10000		10		
MPSA42	NPN	TO92	300	500	625	25	40		30		
MPSA43	NPN	TO92	200	500	625	25	40		30		
MPSA55	PNP	TO92	60	500	625	25	50		100		
MPSA56	PNP	TO92	80	500	625	25	50		100		
MPSA63	PNP	TO92		500	625	25	5000		10		
MPSA64	PNP	TO92		500	625	25	10000		10		
MPSA92	PNP	TO92	300	500	625	25	25		30		
MPSA93	PNP	TO92	200	500	625	25	25		30		
MPS6513	NPN	TO92	30	100	625	25	60		100		
MPS6514	NPN	TO92	25	100	625	25	90		100		
MPS6515	NPN	TO92	25	100	625	25	150		100		
MPS6517	PNP	TO92	40	100	625	25	60		100		
MPS6518	PNP	TO92	40	100	625	25	90		100		
MPS6519	PNP	TO92	25	100	625	25	150		100		
MPS6520	NPN	TO92	25	100	625	25	200	400	2		
MPS6521	NPN	TO92	25	100	625	25	300	600	2		
MPS6522	PNP	TO92	25	100	625	25	200	400	2		
MPS6523	PNP	TO92	25	100	625	25	400	600	2		

* T_{case}

** Dual transistors for differential amplifiers

Transistors for audio and general–purpose applications (cont.)

For detailed information on these and other types see Data Handbook SC04

S

type	pol.	case	ratings				characteristics				
			V_{CEO} V	I_C mA	P_{tot} mW	at T_{amb} °C	h_{FE} (h_{fe}) min	h_{FE} (h_{fe}) max	at I_C mA	f_T typ MHz	F typ dB
2N2483	NPN	TO18	60		360	25	40	120	10*	80	
2N2484	NPN	TO18	60		360	25	100	500	10*	80	
2N3019	NPN	TO39(1)	80	1000	800	25	100	300	150		
2N4030	PNP	TO39(1)	60	1000	800	25	25		500		
2N4031	PNP	TO39(1)	80	1000	800	25	25		500		
2N4032	PNP	TO39(1)	60	1000	800	25	70		500		
2N4033	PNP	TO39(1)	80	1000	800	25	70		500		
2N4123	NPN	TO92	30	200	350	25	50	200	2		
2N4124	NPN	TO92	25	200	350	25	120	480	2		
2N4125	PNP	TO92	30	200	350	25	50	200	2		
2N4126	PNP	TO92	25	200	350	25	120	480	2		
2N4400	NPN	TO92	40	600	625	25	50	100	100		
2N4401	NPN	TO92	40	600	625	25	150	300	100		
2N4402	PNP	TO92	40	600	625	25	50	100	150		
2N4403	PNP	TO92	40	600	625	25	150	300	150		
2N5086	PNP	TO92	50	50	625	25	150		1		
2N5087	PNP	TO92	50	50	625	25	250		1		
2N5088	NPN	TO92	30	50	625	25	350		1		
2N5089	NPN	TO92	25	50	625	25	450		1		
2N5400	PNP	TO92	120	600	625	25	40	180	10		
2N5401	PNP	TO92	150	600	625	25	60	240	10		
2N5550	NPN	TO92	140	600	500	25	60	250	10		
2N5551	NPN	TO92	160	600	500	25	80	250	10		
2N930	NPN	TO18	45	30	300	25	150	600	10	80	

* µA

SMALL SIGNAL TRANSISTORS (cont.)

Selection guide

Transistors for h.f. applications

For detailed information on these and other types see Data Handbook SC04

			ratings				characteristics						
type	pol.	case	V_{CEO} V	I_C mA	P_{tot} mW	at T_{amb} °C	h_{FE} (h_{fe}) min	h_{FE} (h_{fe}) max	at I_C mA	C_{re} typ pF	f_T typ MHz	F typ dB	at f MHz
BF198★	NPN	TO92VAR	30	25	500	25				0.2	400	3	35
BF199	NPN	TO92VAR	25	25	500	25				0.34	550		
BF240	NPN	TO92VAR	40	25	250	45				0.34	380	1.5	0.002
BF241	NPN	TO92VAR	40	25	250	45				0.34	350	2	0.002
BF324★	PNP	TO92VAR	30	25	250	45				0.1	450	3	100
BF370	NPN	TO92VAR	15	100	500	25	40		10	1.6		3	100
BF420	NPN	TO92VAR		50	830	25	50		25				
BF421	PNP	TO92VAR		50	830	25	50		25				
BF422	NPN	TO92VAR	250	50	830	25	50		25				
BF423	PNP	TO92VAR	250	50	830	25	50		25				
BF450	PNP	TO92VAR	40	25	250	45				0.35	325	2	0.001
BF451	PNP	TO92VAR	40	25	250	45				0.35	325	2	0.001
BF483	NPN	TO92VAR	250	50	830	25	50		25				
BF485	NPN	TO92VAR	300	50	830	25	50		25				
BF487	NPN	TO92VAR	350	50	830	25	50		25				
BF494★	NPN	TO92VAR	20	30	300	75				0.85	260	4	100
BF495	NPN	TO92VAR	30	30	300	75				0.85	200	4	100
BF496	NPN	TO92VAR	20	20	300	75				0.8	550	2	100
BF926	PNP	TO92VAR	20	25	250	45				0.5	350	5	200
BF936	PNP	TO92VAR	20	25	250	45	25		1	0.9	350	5	200
BF939	PNP	TO92VAR	25	20	225	55				0.7	750	2.5	200
BF967	PNP	SOT37	30	20	160	55	15		3	0.45	900	4	800

SMALL SIGNAL TRANSISTORS (cont.)

Selection guide

Transistors for h.f. applications

For detailed information on these and other types see Data Handbook SC04

S

type	pol.	case	ratings				characteristics						
			V_{CEO} V	I_C mA	P_{tot} mW	at T_{amb} °C	h_{FE} (h_{fe}) min	h_{FE} (h_{fe}) max	at I_C mA	C_{re} typ pF	f_T typ MHz	F typ dB	at f MHz
BFR54	NPN	TO92VAR	15		500	25	40		10				
BF970	PNP	SOT37	35	30	160	55	25		3	0.475	900	4.7	800
BF979	PNP	SOT37	20		140	55	20		10	0.65	1350	4.5	800
MPSA42	NPN	TO92	300	500	625	25	40		30				
MPSA43	NPN	TO92	200	500	625	25	40		30				
MPSA92	PNP	TO92	300	500	625	25	25		30				
MPSA93	PNP	TO92	200	500	625	25	25		30				

Transistors for switching applications

For detailed information on these and other types see Data Handbook SC04

type	pol*	case	ratings				characteristics					remarks
			V_{CEO} V	I_C mA	P_{tot} mW	at T_{amb} °C	h_{FE} (h_{fe}) min–max	at I_C mA	f_T typ MHz	t_{off} max ns	at I_C mA	
BC516	P	TO92	30	400	625	25	> 30000	20	220			darlingtons
BC517	N	var										
BCX58	N	TO92	32	200	450	25			> 125			
BCX59		var	45									
BCX78	P	TO92	32	200	450	25			> 200			
BCX79		var	45									
BCY58	N	TO18	32	200	330	45	80–1000		280	800	10	
BCY59			45									
BCY65	N	TO18	60	200	330	45	200–330	2	⩾ 125	800	10	
BCY70	P	TO18	40	200	350	25	> 100	10	450	420	10	
BCY71			45							–	–	BCY71:low–noise
BCY72			25							420	10	
BCY78★	P	TO18	32	200	345	45	80–1000	10	180	800	10	amplyfing and
BCY79★			45									switching
BFT44	P	TO39	300	500	5000	50**	50–150	10	70	125	500	
BFT45			250									
BFX34	N	TO39	60	2000	5000	25**	40–150	2000	> 70	1200	5000	inverter and switching reg.
BFY50	N	TO39	35	1000	5000	50**	typ 112		140			
BFY51			30				typ 123	150	160	360	150	general purpose
BFY52			20				typ 142		185			
BFY55	N	TO39	35	1000	800	25	40–120	150	> 60			
BSR50	N	TO92	45***	1000	800	25	> 2000	500		1500	500	darlingtons
BSR51		var	60***									
BSR52			80***									
BSR60	P	TO92	45***	1000	800	25	> 2000	500		1500	500	darlingtons
BSR61		var	60***									
BSR62			80***									
BSS38	N	TO92 var	100	100	500	25	> 20	4	> 60	1000	15	driver for numerical ind. tube
BSS50	N	TO39	45***	1000	5000	25**	> 2000	500		1500	500	darlingtons
BSS51			60***									
BSS52			80***									

* polarity indication P = p–n–p, N = n–p–n

** T_{case}

*** V_{CER}

SMALL SIGNAL TRANSISTORS (cont.)

Selection guide

Transistors for switching applications (cont.)

For detailed information on these and other types see Data Handbook SC04

type	pol.	case	ratings				characteristics					
			V_{CEO} V	I_C mA	P_{tot} mW	at T_{amb} °C	h_{FE} (h_{fe}) min	h_{FE} (h_{fe}) max	at I_C mA	f_T typ MHz	t_{off} max ns	at I_C mA
BSS60	PNP	TO39(1)		1000	800	25	2000		500		1500	500
BSS61	PNP	TO39(1)		1000	800	25	2000		500		1500	500
BSS62	PNP	TO39(1)		1000	800	25	2000		500		1500	500
BSS68	PNP	TO92VAR	100	100	500	25	30		25			
BSV15–10	PNP	TO39(1)	40	1000	800	25	63	160	100			
BSV15–16	PNP	TO39(1)	40	1000	800	25	100	250	100			
BSV16–10	PNP	TO39(1)	60	1000	800	25	63	160	100			
BSV16–16	PNP	TO39(1)	60	1000	800	25	100	250	100			
BSV17–10	PNP	TO39(1)	80	1000	800	25	63	160	100			
BSV64	NPN	TO39(1)	60	2000	5000	50*	40		2000	100		
BSW66A★	NPN	TO39(1)	100	1000	800	25	30		500	130	900	500
BSW67A★	NPN	TO39(1)	120	1000	800	25	30		500	130	900	500
BSW68A★	NPN	TO39(1)	150	1000	800	25	30		500	130	900	500
BSX19	NPN	TO18	15		360	25	20	60	10	500		
BSX20	NPN	TO18	15		360	25	40	120	10	500		
BSX45–10	NPN	TO39(1)	40	1000	6250	25*	63	160	100	50		
BSX45–16	NPN	TO39(1)	40	1000	6250	25*	100	250	100	50		
BSX46–10	NPN	TO39(1)	60	1000	6250	25*	63	160	100	50		
BSX46–16	NPN	TO39(1)	60	1000	6250	25*	100	250	100	50		
BSX47–10	NPN	TO39(1)	80	1000	6250	25*	63	160	100	50		
BSX59	NPN	TO39(1)	45	1000	800	25	30	90	500		45	500
BSX60	NPN	TO39(1)	30	1000	800	25	30	90	500		58	500
BSX61	NPN	TO39(1)	45	1000	800	25	30	90	500		70	500
MPSA13	NPN	TO92		500	625	25	5000		10			
MPSA14	NPN	TO92		500	625	25	10000		10			
MPSA42	NPN	TO92	300	500	625	25	40		30			
MPSA43	NPN	TO92	200	500	625	25	40		30			
MPSA63	PNP	TO92		500	625	25	5000		10			
MPSA64	PNP	TO92		500	625	25	10000		10			
MPSA92	PNP	TO92	300	500	625	25	25		30			
MPSA93	PNP	TO92	200	500	625	25	25		30			

* T_{case}

Transistors for switching applications (cont.)

For detailed information see Data Handbook SC04

			ratings				characteristics					
type	pol.	case	V_{CEO} V	I_C mA	P_{tot} mW	at T_{amb} °C	h_{FE} min	h_{FE} max	at I_C mA	f_T typ MHz	t_{off} max ns	at I_C mA
PH2222	NPN	TO92VAR	30	800	625	25	75		10		285	150
PH2222A	NPN	TO92VAR	40	800	625	25	75		10		285	150
PH2369	NPN	TO92VAR	15	600	500	25	40	120	10		18	10
PH2907	PNP	TO92VAR	40	600	625	25	100	300	150		100	150
PH2907A	PNP	TO92VAR	60	600	625	25	100	300	150		100	150
PH5415	PNP	TO92VAR	200	1000	625	25	30	150	50			
PH5416	PNP	TO92VAR	300	1000	625	25	30	120	50			
PN2222	NPN	TO92	30	600	625	25	100	300	150		285	150
PN2222A	NPN	TO92	40	600	625	25	100	300	150		285	150
PN2369	NPN	TO92	15	600	625	25	40	120	10		18	10
PN2369A	NPN	TO92	15	600	625	25	40	120	10		18	10
PN2907	PNP	TO92	40	600	625	25	100	300	150		100	150
PN2907A	PNP	TO92	60	600	625	25	100	300	150		100	150
PN3439	NPN	TO92	350	1000	625	25	30		2			
PN3440	NPN	TO92	250	1000	625	25	40		20			
PN5415	PNP	TO92	200	1000	625	25	30	150	50			
PN5416	PNP	TO92	300	1000	625	25	30	120	50			
2N1613	NPN	TO39(1)			800	25	40	120	150		30	50
2N1711	NPN	TO39(1)			800	25	100	300	150			
2N1893	NPN	TO39(1)	80	500	800	25	40	120	150			
2N2219	NPN	TO39(1)	30	800	800	25	100	300	150		285	150
2N2219A	NPN	TO39(1)	40	800	800	25	100	300	150		285	150
2N2222	NPN	TO18	30	800	500	25	100	300	150		285	150
2N2222A	NPN	TO18	40	800	500	25	100	300	150		285	150
2N2297	NPN	TO39(1)	35	1000	800	25	40	120	150			
2N2369	NPN	TO18	15		360	25	40	120	10		18	10
2N2369A	NPN	TO18	15	200	360	25	40	120	10		18	10
2N2904	PNP	TO39(1)	40	600	600	25	40	120	150		100	150
2N2904A	PNP	TO39(1)	60	600	600	25	40	120	150		100	150
2N2905	PNP	TO39(1)	40	600	600	25	100	300	150		100	150
2N2905A★	PNP	TO39(1)	60	600	600	25	100	300	150		100	150

SMALL SIGNAL TRANSISTORS (cont.)

Selection guide

Transistors for switching applications (cont.)

For detailed information see Data Handbook SC04

S

type	pol.	case	ratings				characteristics					
			V_{CEO} V	I_C mA	P_{tot} mW	at T_{amb} °C	h_{FE} min	h_{FE} max	at I_C mA	f_T typ MHz	t_{off} max ns	at I_C mA
2N2906	PNP	TO18	40	600	400	25	40	120	150		100	150
2N2906A	PNP	TO18	60	600	400	25	40	120	150		100	150
2N2907	PNP	TO18	40	600	400	25	100	300	150		100	150
2N2907A★	PNP	TO18	60	600	400	25	100	300	150		100	150
2N3019	NPN	TO39(1)	80	1000	800	25	100	300	150			
2N3020	NPN	TO39(1)	80	1000	800	25	40	120	150			
2N3053	NPN	TO39(1)	40	700		50	250	150				
2N3439	NPN	TO39(1)	350	1000	1000	25	30		2			
2N3440	NPN	TO39(1)	250	1000	1000	25	40		20			
2N3903	NPN	TO92	40	200	350	25	50	150	10		225	10
2N3904	NPN	TO92	40	200	350	25	100	300	10		250	10
2N3905	PNP	TO92	40	200	350	25	50	150	10		260	10
2N3906	PNP	TO92	40	200	350	25	100	300	10		300	10
2N4030	PNP	TO39(1)	60	1000	800	25	25		500		400	500
2N4031	PNP	TO39(1)	80	1000	800	25	25		500		400	500
2N4032	PNP	TO39(1)	60	1000	800	25	70		500		400	500
2N4033	PNP	TO39(1)	80	1000	800	25	70		500		400	500
2N5400	PNP	TO92	120	600	625	25	40	180	10			
2N5401	PNP	TO92	150	600	625	25	60	240	10			
2N5415	PNP	TO39(1)	200	1000	1000	50	30	150	50			
2N5416	PNP	TO39(1)	300	1000	1000	50	30	120	50			
2N5550	NPN	TO92	140	600	500	25	60	250	10			
2N5551	NPN	TO92	160	600	500	25	80	250	10			

For detailed information on these and other types see Data Handbook SC04, SC05, SC06 and SC14

Programmable unijunction transistors

		ratings				characteristics			
type	case	V_{GA} V	I_E mA	I_{ARM} mA	dI_A/dT A/µs	I_p max µA	I_V min µA	T_r max ns	remarks
BRY39★	TO72	70	175	2.5	20	5	25	80	characteristics measured
BRY56	TO92 var						2		with R_G = 10 kΩ

Silicon controlled switches

		ratings					characteristics				
type	case	V_{CBO} V	I_E mA	I_{ERM} A	P_{tot} at mw	T_{amb} °C	V_{AK} max V	I_H max mA	t_{on} max µs	t_q max µs	remarks
BRY39		70							1,5	8	with R_G = 10 kΩ

Thyristor tetrode

		ratings				characteristics at T_j = 25°C					
type	case	I_T mA	I_{TRM} A	I_{TSM} A	dI_T/dt A/µs	V_{GKT} min V	I_{GKT} min µA	V_{GAT} min V	I_{GAT} min µA	t_q max µs	remarks
BRY39	TO72	250	2.5	3	20	0.5	1	–1	–100	3	V_{RRMmax} = 70V

Surface–mounting general purpose transistors

For detailed information on these and other types see Data Handbook SC10

P–N–P type	case*	ratings				characteristics				
		V_{CBO} V	V_{CEO} V	I_C mA	P_{tot} mW	h_{FE} min/max	at I_C/V_{CE} mA/V	V_{CEsat} max V	at I_C/I_B mA	f_T typ MHz
BC807	SOT–23	45	45	500	310	100/600	100/1	0.70	500/50	100
BC808	SOT–23	25	25	500	310					
BC856★	SOT–23	65	65	100	200	75/475	2/5	0.30	10/0.5	150
BC857★	SOT–23	45	45	100	200	75/475	2/5	0.30	10/0.5	150
BC858★	SOT–23	30	30	100	200	75/800	2/5	0.30	10/0.5	150
BC869	SOT–89	20	20	1000	1000	85/375	500/1	0.50	1000/100	60
BCV26	SOT–23	40	30	300	350	>20000	100/5	1.0	100/0.1	220
BCV62	SOT–143	30	30	100	200	100/800	2/5	0.65	100/5	150
BCV63	SOT–143	30	30	100	300	100/900	2/5	0.65	100/5	200
BCV64	SOT–143	30	30	100	300	100/900	2/5	0.30	100/0.5	200
BCV65	SOT–143	30	30	100	300	75/800	2/5	0.30	10/0.5	100
BCW29	SOT–23	32	32	100	350	120/260	2/5	0.30	10/0.5	150
BCW30	SOT–23	32	32	100	350	215/500	2/5	0.30	10/0.5	150
BCW61A	SOT–23	32	32	200	150	120/220	2/5	0.25	10/0.25	180
BCW61B	SOT–23					180/310				
BCW61C	SOT–23					250/460				
BCW61D	SOT–23					380/630				
BCW69	SOT–23	50	45	100	350	120/260	2/5	0.30	10/0.5	150
BCW70	SOT–23	50	45	100	350	120/500				
BCW89	SOT–23	80	60	100	350	120/260				
BCX17	SOT–23	50	45	500	425	100/600	100/1	0.62	500/50	100
BCX18	SOT–23	30	25	500	425					
BCX51	SOT–89	45	45	1000	1000	40/250	150/2	0.50	500/50	50
BCX52	SOT–89	60	60			40/160				
BCX53	SOT–89	100	80			40/160				
BCX71G	SOT–23	45	45	200	150	120/220	2/5	0.25	10/0.25	180
BCX71H	SOT–23	45	45	200	150	180/310	2/5	0.25	10/0.25	180
BCX71J	SOT–23					250/460				
BCX71K	SOT–23					380/630				
PMBTA55	SOT–23	60	60	500	300	50	10/1	0.25	100/10	50
PMBTA56	SOT–23	80	80	500	300	50	10/1	0.25	100/10	50
PMBTA63	SOT–23	30	30	500	300	5000	10/5	1.5	100/0.1	125
PMBTA64	SOT–23	30	30	500	300	10000	10/5	1.5	100/0.1	125

* Reverse–pinning types are available upon request for some SOT–23 encapsulated types

SURFACE–MOUNTING DEVICES (cont.) Selection guide

Surface–mounting general purpose transistors (cont.)

For detailed information on these and other types see Data Handbook SC10

N–P–N type	case*	ratings				characteristics				
		V_{CBO} V	V_{CEO} V	I_C mA	P_{tot} mW	h_{FE} min/max	at I_C/V_{CE} mA/V	V_{CEsat} max V	at I_C/I_B mA	f_T typ MHz
BC817	SOT–23	45	45	500	310	100/600	100/1	0.70	500/50	200
BC818	SOT–23	25	25	500	310					
BC846★	SOT–23	65	65	100	200	220/800	2/5	0.25	10/0.5	300
BC847★	SOT–23	45	45	100	200					
BC848★	SOT–23	30	30	100	200					
BC868	SOT–89	20	20	1000	1000	85/375	500/1	0.50	1000/100	60
BCV27	SOT–23	40	30	300	350	>20000	100/5	1.0	100/0.1	220
BCV61	SOT–143	30	30	100	200	100/800	2/5	0.60	100/5	300
BCV71	SOT–23	80	60	100	350	110/220	2/5	0.25	10/0.5	300
BCV72	SOT–23	80	60	100	350	200/450	2/5	0.25	10/0.5	300
BCW31	SOT–23	32	32	100	350	110/220	2/5	0.25	10/0.5	300
BCW32	SOT–23					200/450				
BCW33	SOT–23					420/800				
BCW60A	SOT–23	32	32	200	150	120/220	2/5	0.35	10/0.25	250
BCW60B	SOT–23	32	32	200	150	180/310	2/5	0.35	10/0.25	250
BCW60C	SOT–23					250/460				
BCW60D	SOT–23					380/630				
BCW71	SOT–23	50	45	100	350	110/220	2/5	0.25	10/0.5	300
BCW72	SOT–23					220/450				
BCW81	SOT–23	50	45	100	350	450/800	2/5	0.25	10/0.5	300
BCX19	SOT–23	50	45	500	425	100/600	100/1	0.62	500/50	200
BCX20	SOT–23	30	25							
BCX54	SOT–89	45	45	1000	1000	45/250	150/2	0.50	500/50	130
BCX55	SOT–89	60	60			40/160				
BCX56	SOT–89	100	80			40/160				
BCX70G	SOT–23	45	45	200	150	120/220	2/5	0.35	10/0.25	250
BCX70H	SOT–23					180/310				
BCX70J	SOT–23					250/460				
BCX70K	SOT–23	45	45	200	150	380/630	2/5	0.35	10/0.25	250
PMBT6428	SOT–23	60	50	200	350	250/600	–	0.2	10/0.5	300
PMBT6429	SOT–23	55	45	200	350	500/1250	–	0.2	10/0.5	300
PMBTA05	SOT–23	60	60	500	300	50	10/1	0.25	100/10	100
PMBTA06	SOT–23	80	80	500	300	50	10/1	0.25	100/10	100
PMBTA13	SOT–23	30	30	300	300	5000	10/5	1.5	100/0.1	125
PMBTA14	SOT–23	30	30	300	300	10000	10/5	1.5	100/0.1	125

* Reverse–pinning types are available upon request for some SOT–23 encapsulated types

SURFACE–MOUNTING DEVICES (cont.) Selection guide

Surface–mounting h.f. and wideband transistors

For detailed information on these and other types see Data Handbook SC10 and SC14

High frequency transistors

type	case*	ratings				characteristics					
		V_{CBO} V	V_{CEO} V	I_C mA	P_{tot} mW	h_{FE} min/max	at I_C/V_{CE} mA/V	F typ	at f MHz	f_T typ MHz	C_{re} typ pF
P–N–P											
BF550	SOT–23	40	40	25	200	50/–	1/10	2	0.1	325	0.5
BF569	SOT–23	40	35	30	200	25/–	3/10	4.5	800	900	0.33
BF579	SOT–23	20	20	25	150	20/–	10/10	4.5	800	1350	0.46
BF660	SOT–23	40	30	25	200	30/–	3/10	–	–	650	0.65
BF767	SOT–23	30	30	20	200	15/–	3/10	4	800	900	0.30
BF824	SOT–23	30	30	25	300	25/–	4/–	3	100	450	0.1
N–P–N											
BF570	SOT–23	40	15	100	300	>40	10/1	–	–	>490	1.6
BF840	SOT–23	40	40	25	300	70/220	1/10	1.5	0.2	300	0.27
BF841	SOT–23	40	40	25	300	40/125	1/10	2	0.2	300	0.27
BFS18	SOT–23	30	20	30	250	35/125	1/10	4	100	200	0.85
BFS19	SOT–23	30	20	30	250	65/225	1/10	4	100	260	0.85
BFS20	SOT–23	30	20	25	250	40/85	7/10	–	–	450	0.35

SURFACE–MOUNTING DEVICES (cont.) Selection guide

Surface–mounting h.f. and wideband transistors

For detailed information on these and other types see Data Handbook SC10 and SC14

Wideband transistors

type	case*/**	ratings				characteristics					
		V_{CBO} V	V_{CEO} V	I_C mA	P_{tot} mW	h_{FE} min/max	at I_C/V_{CE} mA/V	d_{im} typ at dB	f MHz	f_T typ GHz	C_{re} typ pF
P–N–P											
BFT92	SOT–23	20	15	25	200	20/–	14/10	60	493.25	5	0.7
BFT93	SOT–23	15	12	35	200	20/–	30/5	60	493.25	5	1.0
N–P–N											
BF747	SOT–23	30	20	50	150	40/250	2/10	–	–	1.2	0.7
BFG16A	SOT–223	40	25	150	1000	25/–	150/5	–	–	1.5	1.8
BFG25AX	SOT–143X	15	8	1	50	30/200	0.5/1	–	–	5	0.2
BFG31	SOT–223	20	15	100	1000	20/–	70/10	–	–	5	1.6
BFG55	SOT–223	25	18	150	1000	25/–	100/10	–	–	4	1.7
BFG67	SOT–143	20	10	50	300	60/100	15/5	2.5	2000	7.5	0.5
BFG67X	SOT–143X	20	10	50	300	60/100	15/5	2.5	2000	7.5	0.5
BFG92A	SOT–143		15	25	300			5.0			
BFG92AX	SOT–143X		15	25	300			5.0			
BFG93A	SOT–143		12	35	300			6.0			
BFG93AX	SOT–143X		12	35	300			6.0			
BFG94	SOT–223	15	12	80	1000	40/–	30/5	2.3	1000	6.0	0.6
BFG197	SOT–143		10	100	300			7.5			
BFG197X	SOT–143X		10	100	300			7.5			
BFQ17	SOT–89	40	25	150	1000	25/–	150/5		–	1.2	1.9
BFQ18A	SOT–89	25	15	150	1000	25/–	100/10	60	793.25	3.6	1.2
BFQ19	SOT–89	20	15	75	500	25/–	75/10		–	5.0	1.3
BFQ67	SOT–23	20	10	50	300	60/–	15/5			7.5	0.5
BFQ149	SOT–89	20	15	75	1000	20/–	75/10	3.75	500	4.5	1.7
BFR53	SOT–23	18	10	50	250	25/–	50/5	60	217.0	2.0	0.9
BFR92	SOT–23	20	15	25	200	25/–	14/10	60	493.25	5.0	0.7
BFR92A	SOT–23	20	15	25	200	40/–	14/10	60	793.25	5.0	0.35
BFR93	SOT–23	15	12	35	200	25/–	30/5	60	493.25	5.0	0.8
BFR93A	SOT–23	15	12	35	250	40/–	30/5	60	793.25	5.0	0.6
BFR106	SOT–23	20	15	100	350	25/–	20/8	3.5	–	4.5	1.7
BFS17	SOT–23	25	15	25	250	20/150	2/1	45	217	1.3	0.65
BFS17A	SOT–23	25	15	25	300	20/150	2/1	–	–	2.8	–
BFT25	SOT–23	8	5	2.5	50	20/–	1/1		–	2.3	0.45
BFT25A	SOT–23	15	8	1.0	50	30/200	0.5/1	–	–	5.0	0.20

* Reverse–pinning types are available upon request for some SOT–23 + SOT–143 encapsulated types

** SOT–143X: cross emitter pinning

SURFACE–MOUNTING DEVICES (cont.)

Selection guide

Surface–mounting switching transistors

For detailed information on these and other types see Data Handbook SC10

type	case*	ratings				characteristics					
		V_{CBO} V	V_{CEO} V	I_C mA	P_{tot} mW	h_{FE} min/max	at I_C/V_{CE} mA/V	V_{CEsat} max V	at I_C/I_B mA/mA	t(max) on/off ns	at I_C/I_B mA
P–N–P											
BSR12	SOT–23	15	15	100	250	30/120	50/1	0.45	100/10	20/30	30/3
BSR15	SOT–23	60	40	600	425	100/300	150/10	1.6	500/50	45/100	150/15
BSR16	SOT–23	60	60	600	425	100/300	150/10	1.6	500/50	45/100	150/15
BSR18	SOT–23	40	40	200	250	50/150	10/1	0.40	50/5	70/250	10/1
BSR18A	SOT–23	40	40	200	250	100/300	10/1	0.4	50/5	70/300	10/1
BSR20	SOT–23	130	120	–	–	40/180	10/5	0.25	50/5	–	–
BSR20A	SOT–23	100	150	–	–	50/240	10/5	0.2	50/5	–	–
BSR30	SOT–89	70	60	1000	1000	40/120	100/5	0.5	500/50	500/650	100/5
BSR31	SOT–89	70	60	1000	1000	100/300	100/5	0.5	500/50	500/650	100/5
BSR32	SOT–89	90	80	1000	1000	40/120	100/5	0.5	500/50	500/650	100/5
BSR33	SOT–89	90	80	1000	1000	100/300	100/5	0.5	500/50	500/650	100/5
BSS63	SOT–23	110	100	100	350	30/–	25/1	0.25	25/2.5	–	–
BST60	SOT–89	60	45	500	1000	1000/–	150/10	1.3	500/0.5	400/1500	500/0.5
BST61	SOT–89	80	60	500	1000	1000/–	150/10	1.3	500/0.5	400/1500	500/0.5
BST62	SOT–89	100	80	500	1000	1000/–	150/10	1.3	500/0.5	400/1500	500/0.5
PMBT2907	SOT–23	60	40	600	350	30/–	500/10	0.4	150/15	45/100	150/15
PMBT2907A	SOT–23	60	60	600	350	30/–	500/10	0.4	150/15	45/100	150/15
PMBT3906	SOT–23	40	40	200	300	100/300	0.25	10/1			
PXT3906	SOT–89	40	40	200	1000	100/300	10/1	0.25	10/1	35/35	10/1
N–P–N											
BSR13	SOT–23	60	30	800	425	100/300	150/10	1.6	500/50	35/285	150/–
BSR14	SOT–23	75	40	800	425	100/300	150/10	1.0	500/50	35/285	150/–
BSR17	SOT–23	60	40	200	350	50/150	10/1	0.3	50/5	70/225	10/1
BSR17A	SOT–23	60	40	200	350	100/300	10/1	0.3	50/5	70/250	10/1
BSR19	SOT–23	160	140	600	300	60/250	10/5	0.25	50/5	–	–
BSR19A	SOT–23	180	160	600	300	80/250	10/5	0.2	50/5	–	–
BSR40	SOT–89	70	60	1000	1000	40/120	100/5	0.5	500/50	250/1000	100/5
BSR41	SOT–89	70	60	1000	1000	100/300	100/5	0.5	500/50	250/1000	100/5
BSR42	SOT–89	90	80	1000	1000	40/120	100/5	0.5	500/50	250/1000	100/5
BSR43	SOT–89	90	80	1000	1000	100/300	100/5	0.5	500/50	250/1000	100/5
BSS64	SOT–23	120	80	100	350	20/80	10/1	0.2	50/15	/1000	15/1
BSV52	SOT–23	20	12	100	250	40/120	10/1	0.2	50/5	12/18	10/3
BST50	SOT–89	60	45	500	1000	1000/–	150/10	1.3	500/50	400/1500	500/0.5
BST51	SOT–89	80	60	500	1000	1000/–	150/10	1.3	500/50	400/1500	500/0.5
BST52	SOT–89	100	80	500	1000	1000/–	150/10	1.3	500/50	400/1500	500/0.5
PMBT2222	SOT–23	60	30	600	350	100/300	150/10	0.4	150/15	35/285	150/–
PMBT2222A	SOT–23	75	40	600	350	100/300	150/10	0.3	150/15	35/285	150/–
PMBT3903	SOT–23	60	40	200	300	20/150	0.3	50/5	70/225		
PMBT3904	SOT–23	60	40	200	300	40/300	0.3	50/5	70/250		
PXT3904	SOT–89	60	40	200	1000	100/300	10/1	0.2	10/1	35/35	10/1

* Reverse–pinning types are available upon request for some SOT–23 encapsulated types

SURFACE–MOUNTING DEVICES (cont.) Selection guide

Surface–mounting general low noise and h.v. transistors

For detailed information on these and other types see Data Handbook SC10

Low noise transistors (F < 4 dB at f = 1kHz; B = 200 Hz)

type	case	ratings				characteristics				
		V_{CBO} V	V_{CEO} V	I_C mA	P_{tot} mW	h_{FE} min/max at	I_C/V_{CE} mA/V	V_{CEsat} max at V	I_C/I_B mA	f_T typ MHz
P–N–P										
BC859★	SOT–23	30	30	100	200	125/800	2/5	0.3	10/0.5	150
BC860★	SOT–23	45	45	100	200	125/800	2/5	0.3	10/0.5	150
BCF29	SOT–23	32	32	100	350	120/260	2/5	0.3	10/0.5	150
BCF30	SOT–23	32	32	100	350	215/500	2/5	0.3	10/0.5	150
BCF70	SOT–23	50	45	100	350	215/500	2/5	0.3	10/0.5	150
N–P–N										
BC849★	SOT–23	30	30	100	200	450/800	2/5	0.25	10/0.5	300
BC850★	SOT–23	45	45	100	200					
BCF32	SOT–23	32	32	100	350	200/450	2/5	0.25	10/0.5	300
BCF33	SOT–23	32	32	100	350	420/800	2/5	0.25	10/0.5	300
BCF81	SOT–23	50	45	100	350	420/800	2/5	0.25	10/0.5	300

High voltage transistors

type	case	ratings				characteristics				
		V_{CBO} V	V_{CEO} V	I_C mA	P_{tot} mW	h_{FE} min/max at	I_C/V_{CE} mA/V	V_{CEsat} max at V	I_C/I_B mA	f_T min MHz
P–N–P										
BF621	SOT–89	300	–	20	1000	50/–	25/20	0.8	30/5	60
BF623	SOT–89	250	250	20	1000	50/–	25/20	0.8	30/5	60
BF821	SOT–23	300	–	50	310	50/–	25/20	0.8	30/5	60
BF823	SOT–23	250	250	50	310	50/–	25/20	0.8	30/5	60
BST15	SOT–89	200	200	1000	1000	30/150	50/10	2.5	50/5	15
BST16	SOT–89	350	300	1000	1000	30/120	50/10	2.0	50/5	15
PMBTA92	SOT–23	300	300	500	300	40/–	10/10	0.5	20/2	50
PMBTA93	SOT–23	200	200	500	300	40/–	10/10	0.5	20/2	50
N–P–N										
BF620	SOT–89	300	–	20	1000	50/–	25/20	0.6	30/5	60
BF622	SOT–89	250	250	20	1000	50/–	25/20	0.6	30/5	60
BF820	SOT–23	300	–	50	310	50/–	25/20	0.6	30/5	60
BF822	SOT–23	250	250	50	310	50/–	25/20	0.6	30/5	60
BST39	SOT–89	400	350	1000	1000	40/160	20/10	0.5	50/4	15
BST40	SOT–89	350	250	1000	1000	40/160	20/10	0.5	50/4	15
PMBTA42	SOT–23	300	300	500	310	40/–	30/10	0.5	20/2	50
PMBTA43	SOT–23	200	200	500	310	40/–	30/10	0.5	20/2	50

Surface–mounting FETs and trigger devices

For detailed information on these and other types see Data Handbook SC10

For FET configurations see general data pages, beginning S100

P–and N–channel field effect transistors

type	case	FET type (see notes)	ratings				characteristics					
			$\pm V_{DS}$ V	$-V_{GSO}$ V	I_D mA	P_{tot} mW	$-I_{GSS}$ max nA	I_{DSS} min/max mA	$-V_{(P)GS}$ max V	$\|Y_{fs}\|$ min mS	C_{RS} max pF	V_n max µV
BF510	SOT–23	(1)	20	–	10	250	10	0.7/3.0	0.8	2.5	0,4	–
BF511	SOT–23	(1)	20	–	10	250	10	2.5/7.0	1.5	4	0.4	–
BF512	SOT–23	(1)	20	–	10	250	10	6/12	2.2	6	0.4	–
BF513	SOT–23	(1)	20	–	10	250	10	10/18	3	7	0.4	–
BF989	SOT–143	(2)	20	–	20	200	50	2/20	2.7	9.5	0.025	–
BF990A	SOT–143	(2)	18	–	30	200	25	–	1.3	17	0.025	–
BF991	SOT–143	(2)	20	–	20	200	50	4/25	2.5	10	0.020	–
BF992	SOT–143	(2)	20	–	40	200	25	–	1.3	20	0.04	–
BF994S	SOT–143	(2)	20	–	–	300	50	4/20	2.5	15	–	–
BF996S	SOT–143	(2)	20	–	–	300	50	4/20	2.5	15	–	–
BF997	SOT–143	(2)	20	–	30	300	10	2/20	2.5	15	0.025	–
BFR30	SOT–23	(1)	25	25	10	250	0.2	4/10	5	1	1.5	0.5
BFR31	SOT–23	(1)						1/5	2.5	1.5	–	–
BFR101A	SOT–143	(1)	30	30	10	200	5	0.2/1.5	1.0	1.2	–	–
BFR101B	SOT–143	(1)	30	30	10	200	5	1/5	2.5	2.5	–	–
BFT46	SOT–23	(1)	25	25	10	250	0.2	0.2/1.5	1.0	1.0	1.5	0.5
BSD20	SOT–143	(4)	10	–	50	230	1.0	–	2.0	–	0.6	–
BSD22	SOT–143	(4)	20	–	50	230	1.0	–	2.0	–	0.6	–
BSR56	SOT–23	(3)	40	40	–	250	1	50/–	10	–	5	–
BSR57	SOT–23	(3)						20/100	6	–	–	–
BSR174	SOT–23	(7)	30	–	–	300	–	–	–	–	–	–
BSR175	SOT–23	(7)	30	–	–	300	–	–	–	–	–	–
BSR176	SOT–23	(7)	30	–	–	300	–	–	–	–	–	–
BSR177	SOT–23	(7)	30	–	–	300	–	–	–	–	–	–
BSR58	SOT–23	(3)						8/8000	4	–	–	–
BSS83	SOT–143	(4)	10	–	50	230	10	–	2.0	–	0.6	–
BST80	SOT–89	(5)	80	–	–	1000	100	500	3.5	–	–	–
BST82	SOT–23	(5)	80	–	–	250	100	175	3.5	–	–	–
BST84	SOT–89	(5)	200	–	–	1000	100	300	3.5	–	–	–
BST86	SOT–89	(5)	180	–	–	1000	100	300	2.7	–	–	–
BST120	SOT–89	(6)	60	–	–	1000	100	–	–	–	–	–
BST122	SOT–89	(6)	50	–	–	1000	100	–	–	–	–	–
PMBF4391	SOT–23	(3)	40	–	–	250	1	50	10	–	3.5	–
PMBF4392	SOT–23	(3)	40	–	–	250	1	25	5	–	3.5	–
PMBF4393	SOT–23	(3)	40	–	–	250	1	5	3	–	3.5	–

(1) n–channel junction FETs
(2) dual–gate n–channel MOS FETs
(3) n–channel junction FETs for switching
(4) n–channel MOS–FETs for switching
(5) n–channel vertical D–MOS FETs for switching
(6) p–channel vertical D–MOS FETs for switching
(7) p–channel junction FETS for switching

SURFACE-MOUNTING DEVICES (cont.) Selection guide

Trigger devices and surface-mounting diodes

For detailed information on these and other types see Data Handbook SC01 and SC10

- four encapsulations – SOT-23, SOT-89, SOT-143 and SOD-80, all suitable for wave and reflow soldering.
- unimetal bonding of SOT-23 switching diodes for long life
- avalanche diodes – BAS29, BAS31 and BAS 35
- SOD-80 is a hermetically sealed glass encapsulation
- performance and reliability of all types comparable to that of axial leaded DO-34 and DO-35 diodes (the same crystals are used)

Trigger devices

P-N-P-N type	case	V_{GA} max V	I_A max mA	I_P µA	I_V µA
BRY61	SOT-23	70	175	5/1	30/50
BRY62	SOT-143	70	175	–	–

Controlled avalanche rectifier diodes

			ratings							
type	st.	case	$I_{F(AV)}$ A	V_{RWM} V	I_{FRM} A	I_{FSM} $T_{j\,max}$; t = 10 ms A	P_{RRM} and P_{RSM} t = 20 µs kW	P_{RSM} kW	E_{RSM} mJ	nearest conventional
BYD17 **series**	P	SOD-87	1.5	200 to 800	5.5	20	–	–	7	BYD13

Very fast rectifier diodes

			ratings				characteristics		
type	st.	case	$I_{F(AV)}$ A	V_{RRM} V	I_{FRM} A	I_{FSM} $T_{j\,max}$; t = 10 ms A	t_{rr} max ns	$V_{F\,max}$ at I_F T_j = 25 °C V/A	nearest conventional
BYD37 series	P	SOD-87	1.5	200 to 1000	7	20	250	1.3/1	BYD33

Ultra fast rectifier diodes

			ratings				characteristics		
type	st.	case	$I_{F(AV)}$ A	V_{RRM} V	I_{FRM} A	I_{FSM} $T_{j\,max}$; t = 10 ms A	t_{rr} max ns	$V_{F\,max}$ at I_F T_j = 25 °C V/A	nearest conventional
BYD77 series	P	SOD-87	2	50 to 400	15 to 30	25	25 to 50	0.95/1 1.95/1	BYD73

N.B. All values are maximum ones unless stated otherwise.
For details on other SM diodes refer to pages S1–S7.

Surface–mounting devices: alphanumeric list

For detailed information on these and other types see Data Handbook SC10

type number	case SOT–23	SOT–89	SOT–143	SOD–80	marking type*	rev. type	device type	nearest conventional	comple–ment
BA682				●	red band		diode	BA482	
BA683				●	red & or.		diode	BA483	
BAS16	●				A6		diode	BAW62, 1N4148	
BAS17	●				A91		diode	BA314	
BAS19	●				A8		diode	BAV19	
BAS20	●				A81		diode	BAV20	
BAS21	●				A82		diode	BAV21	
BAS28			●		A61		diode	2 x 1N4148	
BAS29	●				L20		diode	BAX12	
BAS31	●				L21		diode	2 x BAX12	
BAS32				●	black band		diode	1N4148	
BAS35	●				L22		diode	2 x BAX12	
BAS56			●		L51		diode	2 x BAV10	
BAT17	●				A3		diode	BA480	
BAT18	●				A2		diode	BA482	
BAT54	●						diode	BAT85	
BAT74			●				diode	2 x BAT85	
BAV23			●		L30		diode	2 x BAV21	
BAV70	●				A4		diode	2 x BAW62, 1N4148	
BAV99	●				A7		diode	2 x BAW62, 1N4148	
BAV100				●	gr. & bl.		diode	BAV18	
BAV101				●	gr. & br.		diode	BAV19	
BAV102				●	gr. & red		diode	BAV20	
BAV103				●	gr. & or.		diode	BAV21	
BAW56	●				A1		diode	2 x BAW62, 1N4148	
BB215				●	white & gr.		diode	BB405B	
BB219				●	white		diode	BB909	
BBY31	●				S1		diode	BB405	
BBY40	●				S2		diode	BB809	
BBY42	●				–		diode	–	
BC807–16	●				5A	5AR	PNP	BC327–16	BC817–16
BC807–25	●				5B	5BR	PNP	BC327–25	BC817–25
BC807–40	●				5C	5CR	PNP	BC327–40	BC817–40
BC808–16	●				5E	5ER	PNP	BC328–16	BC818–16
BC808–25	●				5F	5FR	PNP	BC328–25	BC818–25
BC808–40	●				5G	5GR	PNP	BC328–40	BC818–40
BC817–16	●				6A	6AR	NPN	BC337–16	BC807–16
BC817–25	●				6B	6BR	NPN	BC337–25	BC807–25
BC817–40	●				6C	6CR	NPN	BC337–40	BC807–40
BC818–16	●				6E	6ER	NPN	BC328–16	BC808–16
BC818–25	●				6F	6FR	NPN	BC328–25	BC808–25
BC818–40	●				6G	6GR	NPN	BC328–40	BC808–40
BC846A	●				1A	1AR	NPN	BC546A	BC856A

* or. = orange; gr. = green; bl. = black; br. = brown.

Surface–mounting devices: alphanumeric list

For detailed information on these and other types see Data Handbook SC10

type number	case SOT–23	SOT–89	SOT–143	SOD–80	marking type	marking rev. type	device type	nearest conventional	complement
BC846B	●				1B	1BR	NPN	BC546B	BC856B
BC847A	●				1E	1ER	NPN	BC547A, BC107A	BC857A
BC847B	●				1F	1FR	NPN	BC547B, BC107B	BC857B
BC847C	●				1G	1GR	NPN	BC547C	BC857C
BC848A	●				1J	1JR	NPN	BC548A, BC108A	BC858A
BC848B	●				1K	1KR	NPN	BC548B, BC108B	BC858B
BC848C	●				1L	1LR	NPN	BC548C, BC108C	BC858C
BC849B	●				2B	2BR	NPN	BC549B, BC109B	BC859B
BC849C	●				2C	2CR	NPN	BC549C, BC109C	BC859C
BC850B	●				2F	2FR	NPN	BC550B, BCY59	BC860B
BC850C	●				2G	2GR	NPN	BC550C, BCY59	BC860C
BC856A	●				3A	3AR	PNP	BC556A	BC846A
BC856B	●				3B	3BR	PNP	BC556B	BC846B
BC857A	●				3E	3ER	PNP	BC557A, BC177A	BC847A
BC857B	●				3F	3FR	PNP	BC557B, BC177B	BC847B
BC857C	●				3G	3GR	PNP	BC557C	BC847C
BC858A	●				3J	3JR	PNP	BC558A, BC178A	BC848A
BC858B	●				3K	3KR	PNP	BC558B, BC178B	BC848B
BC858C	●				3L	3LR	PNP	BC558C	BC848C
BC859A	●				4A	4AR	PNP	BC559A, BC179A, BCY78	
BC859B	●				4B	4BR	PNP	BC559B, BCY79	BC849B
BC859C	●				4C	4CR	PNP	BC559C, BCY79	BC849C
BC860A	●				4E	4ER	PNP	BC560A, BCY79	
BC860B	●				4F	4FR	PNP	BC560B, BCY79	BC850B
BC860C	●				4G	4GR	PNP	BC560C, BCY79	BC850C
BC868		●			CAC		NPN	BC368, BD329	BC869
BC869		●			CEC		PNP	BC369, BD330	BC868
BCF29	●				C7	C77	PNP	BC559A, BCY78, BC179	
BCF30	●				C8	C9	PNP	BC559B, BCY78	BCF32
BCF32	●				D7	D77	NPN	BC549B, BCY58, BC109	BCF30
BCF33	●				D8	D81	NPN	BC549C, BCY58	
BCF70	●				H7	H71	PNP	BC560B, BCY79	
BCF81	●				K9	K91	NPN	BC550C	
BCV26	●				FD	–	PNP	–	BCV27
BCV27	●				FF	–	NPN	–	BCV26
BCV61		●			D91		NPN	–	BCV62
BCV62		●			C91		PNP	–	BCV61
BCV63			●		D95	–	NPN	–	–
BCV64			●		C95	–	PNP	–	–
BCV65			●		97	–	PNP/NPN	–	–
BCV71	●				K7	K71	NPN	BC546A	
BCV72	●				K8	K81	NPN	BC546B	
BCW29	●				C1	C4	PNP	BC178A, BC558A	BCW31
BCW30	●				C2	C5	PNP	BC178B, BC558B	BCW32
BCW31	●				D1	D4	NPN	BC108A, BC548A	BCW29

Surface-mounting devices: alphanumeric list

For detailed information on these and other types see Data Handbook SC10

type number	case SOT-23	SOT-89	SOT-143	SOD-80	marking type	rev. type	device type	nearest conventional	complement
BCW32	●				D2	D5	NPN	BC108B, BC548B	BCW30
BCW33	●				D3	D6	NPN	BC108C, BC548C	
BCW60A	●				AA		NPN	BC548A	BCW61A
BCW60B	●				AB		NPN	BC548B	BCW61B
BCW60C	●				AC		NPN	BC548B	BCW61C
BCW60D	●				AD		NPN	BC548C	BCW61D
BCW61A	●				BA		PNP	BC558A	BCW60A
BCW61B	●				BB		PNP	BC558B	BCW60B
BCW61C	●				BC		PNP	BC558B	BCW60C
BCW61D	●				BD		PNP	BC558C	BCW60D
BCW69	●				H1	H4	PNP	BC557A	BCW71
BCW70	●				H2	H5	PNP	BC557B	BCW72
BCW71	●				K1	K4	NPN	BC547A	BCW69
BCW72	●				K2	K5	NPN	BC547B	BCW70
BCW81	●				K3	K31	NPN	BC547C	
BCW89	●				H3	H31	PNP	BC556A	
BCX17	●				T1	T4	PNP	BC327	BCX19
BCX18	●				T2	T5	PNP	BC328	BCX20
BCX19	●				U1	U4	NPN	BC337	BCX17
BCX20	●				U2	U5	NPN	BC338	BCX18
BCX51		●			AA		PNP	BC636, BD136	BCX54
BCX52		●			AE		PNP	BC638, BD138	BCX55
BCX53		●			AH		PNP	BC640, BD140	BCX56
BCX54		●			BA		NPN	BC635, BD135	BCX51
BCX55		●			BE		NPN	BC637, BD137	BCX52
BCX56		●			BH		NPN	BC639, BD139	BCX53
BCX70G	●				AG		NPN	BC107A, BC547A	BCX71G
BCX70H	●				AH		NPN	BC107B, BC547B	BCX71H
BCX70J	●				AJ		NPN	BC107B, BC547B	BCX71J
BCX70K	●				AK		NPN	BC107C, BC547C	BCX71K
BCX71G	●				BG		PNP	BC177A, BC557A	BCX70G
BCX71H	●				BH		PNP	BC177B, BC557B	BCX70H
BCX71J	●				BJ		PNP	BC177B, BC557B	BCX70J
BCX71K	●				BK		PNP	BC557C	BCX70K
BF510	●				S6		FET	BF410A	
BF511	●				S7		FET	BF410B	
BF512	●				S8		FET	BF410C	
BF513	●				S9		FET	BF410D	

Surface–mounting devices: alphanumeric list

For detailed information on these and other types see Data Handbook SC10

type number	case SOT–23	SOT–89	SOT–143	SOT–223	marking type	marking rev. type	device type	nearest conventional	complement
BF550	●				G2	G5	PNP	BF450	
BF569	●				G6		PNP	BF970	
BF570	●				B26	–	NPN	BF370	
BF579	●				G7		PNP	BF979	
BF620		●			DC		NPN	BF420, BF471, BF871	BF621
BF621		●			DF		PNP	BF421, BF472, BF872	BF620
BF623		●			DB		PNP	BF423, BF470, BF870	
BF660	●				G8	G81	PNP	BF606A	
BF747	●				E15		NPN	BY90	
BF820	●				1V		NPN	BF420	BF821
BF821	●				1W		PNP	BF421	BF820
BF823	●				1Y		PNP	BF423	
BF824	●				F8		PNP	BF324	
BF840	●				F3		NPN	BF240	
BF841	●				F31		NPN	BF241	
BF989			●		M89		FET	BF960	
BF990A			●				FET	BF980A	
BF991			●		M91		FET	BF981	
BF992			●		M92		FET	BF982	
BF994			●		M94		FET	BF964	
BF994S			●		M93		FET	BF964S	
BF996			●		M96		FET	BF966	
BF996S			●		M95		FET	BF966S	
BF997			●		M83		FET	BF965	
BF998			●				FET	BF988	

Surface-mounting devices: alphanumeric list

For detailed information on these and other types see Data Handbook SC10

type number	case				marking		device type	nearest conventional	complement
	SOT-23	SOT-89	SOT-143	SOT-223	type	rev. type			
BFG16A				●	–		NPN	BFW16A	
BFG17A			●		E6		NPN	BFW92A	
BFG25X			●		V11		NPN	BFT24	
BFG31				●	–		PNP	BFQ32(S)	BFG97
BFG33			●		V6		NPN	BFQ33C	
BFG55				●	–		PNP	BFQ54T	BFG35
BFG67			●		V3		NPN	BFG65	
BFG67X			●		V21		NPN	BFG65	
BFG92A			●		P8		NPN	BFG90A	
BFG92AX			●		V14		NPN	BFG90A	
BFG93A			●		R8		NPN	BFG91A	
BFG93AX			●		V15		NPN	BFG91A	
BFG94				●	–		NPN	BFR91A	
BFG197			●		V5		NPN	BFG195	
BFG197X			●		V13		NPN	BFG195	
BFQ17		●			FA		NPN	BFW16A	
BFQ18A		●			FF		NPN	BFQ34	
BFQ19		●			FB		NPN	BFR96	BFQ149
BFQ67		●			V2		NPN	BFQ65	
BFQ149	●				FG		PNP	BFQ32	BFQ19
BFR30	●				M1		FET	BFW11, BF245B	
BFR31	●				M2		FET	BFW12, BF245A	
BFR53	●				N1	N4	NPN	BFW30, BFW93	
BFR92	●				P1	P4	NPN	BFR90	BFT92
BFR92A	●				P2	P5	NPN	BFR90A	BFT92
BFR93	●				R1	R4	NPN	BFR91	BFT93
BFR93A	●				R2	R5	NPN	BFR91A	BFT93
BFR101A			●		M97		FET	–	
BFR101B			●		M98		FET	–	
BFR106	●				R7		NPN	–	–
BFS17	●				E1	E4	NPN	BFY90, BFW92	
BFS17A	●				E2	E5	NPN	BFW92A	
BFS18	●				F1	F4	NPN	BF185, BF495	
BFS19	●				F2	F5	NPN	BF184, BF494	
BFT25A	●				V10		NPN	BFT24	

Surface–mounting devices: alphanumeric list

For detailed information on these and other types see Data Handbook SC10

type number	case SOT–23	SOT–89	SOT–143	SOD–80	marking type	marking rev. type	device type	nearest conventional	complement
BFS20	●				G1	G4	NPN	BF199	
BFT25	●				V1	V4	NPN	BFT24	
BFT46	●				M3		FET	BFW13, BF245	
BFT92	●				W1	W4	PNP	BFQ51; 52	BFR92
BFT93	●				X1	X4	PNP	BFQ23;24	BFR93
BRY61	●				A5		PNPN	BRY56	
BRY62	●				A51		PNPN	BRY56, BRY39	
BSD20			●		M31		FET	BSD10	
BSD22			●		M32		FET	BSD12	
BSR12	●				B5	B8	PNP	2N2894A	BSV52
BSR13	●				U7	U71	NPN	2N2222, PH2222	BSR15
BSR14	●				U8	U81	NPN	2N2222A, PH2222A	BSR16
BSR15	●				T7	T71	PNP	2N2907, PH2907	BSR13
BSR16	●				T8	T81	PNP	2N2907A, PH2907A	BSR14
BSR17	●				U9	U91	NPN	2N3903	BSR18
BSR17A	●				U92	U93	NPN	2N3904	BSR18A
BSR18	●				T9	T91	PNP	2N3905	BSR17
BSR18A	●				T92	T93	PNP	2N3906	BSR17A
BSR19	●				U35		NPN	2N5550	BSR20
BSR19A	●				U36		NPN	2N5551	BSR20A
BSR20	●				T35		PNP	2N5400	BSR19
BSR20A	●				T36		PNP	2N5401	BSR19A
BSR30		●			BR1		PNP	2N4030	BSR40
BSR31		●			BR2		PNP	2N4031	BSR41
BSR32		●			BR3		PNP	2N4032	BSR42
BSR33		●			BR4		PNP	2N4033	BSR43
BSR40		●			AR1		NPN	BSX46–6	BSR30
BSR41		●			AR2		NPN	BSX46–16	BSR31
BSR42		●			AR3		NPN	2N3020	BSR32
BSR43		●			AR4		NPN	2N3019	BSR33
BSR56	●				M4		FET	2N4856	
BSR57	●				M5		FET	2N4857	
BSR58	●				M6		FET	2N4858	
BSR174	●				LO	–	FET	BSJ174	–
BSR175	●				LP	–	FET	BSJ175	–
BSR176	●				LQ	–	FET	BSJ176	–
BSR177	●				LR	–	FET	BSJ177	–
BSS63	●				T3	T6	PNP	BSS68	BSS64
BSS64	●				U3	U6	NPN	BSS38	BSS63
BSS83			●		M74		FET	BSD213	

Surface–mounting devices: alphanumeric list

For detailed information on these and other types see Data Handbook SC10

type number	case SOT–23	SOT–89	SOT–143	SOD–80	SOD–87	marking type	device type	nearest conventional	comple–ment
BST15		●				BT1	PNP	2N5415	BST40
BST16		●				BT2	PNP	2N5416	BST39
BST50		●				AS1	NPN	BSR50, BSS50, BDX42	
BST51		●				AS2	NPN	BSR51, BSS51, BDX43	
BST52		●				AS3	NPN	BSR52, BSS52, BDX44	
BST60		●				BS1	PNP	BSR60, BSS60, BDX45	
BST61		●				BS2	PNP	BSR61, BSS61, BDX46	
BST62		●				BS3	PNP	BSR62, BSS62, BDX47	
BST80		●				KM	FET	BST70A	
BST82	●					OZ	FET	BST72A	
BST84		●				KN	FET	BST74A	
BST86		●				KQ	FET	BST76A	
BST120		●				LM	FET	BST100	
BST122		●				LN	FET	BST110, BS250	
BSV52	●					B2*	NPN	PH2369, BSX20	BSR12
BYD17					●		diode		
BYD77					●		diode		
BYD37					●		diode		
BZD27					●		diode		
BZV49		●				*	diode	BZV85	
BZV55				●			diode		
BZX84	●					*	diode	BZX79	
PMBF4391	●					M62	FET	2N4391, PH4391	
PMBF4392	●					M63	FET	2N4392, PH4392	
PMBF4393	●					M64	FET	2N4395, PH4395	
PMBT2222	●					P1B	NPN	2N2222	PMBT2907
PMBT2222A	●					P1P	NPN	2N2222A	..2907A
PMBT2907	●					P2B	PNP	2N2907	PMBT2222
PMBT2907A	●					P2F	PNP	2N2907A	..2222A
PMBT3903	●					P1Y	NPN	2N3903	PMBT3905
PMBT3904	●					P1A	NPN	2N3904	PMBT3905
PMBT3906	●					P2A	PNP	2N3906	PMBT3904
PMBT6428	●					P1K	NPN	2N6428	
PMBT6429	●					P1L	NPN	2N6429	
PMBTA05	●					P1H	NPN	MPSA05	PMBTA55
PMBTA06	●					P1G	NPN	MPSA06	PMBTA56
PMBTA13	●					P1M	NPN	MPSA13	PMBTA63
PMBTA14	●					P1N	NPN	MPSA14	PMBTA64
PMBTA42	●					P1D	NPN	MPSA42	PMBTA94

* Reverse type: B3

Surface–mounting devices: alphanumeric list

For detailed information on these and other types see Data Handbook SC10

type number	case					marking type	device type	nearest conventional	comple–ment
	SOT–23	SOT–89	SOT–143	SOD–80	SOD–87				
PMBTA43	●					P1E	NPN	MPSA43	PMBTA93
PMBTA55	●					P2G	NPN	MPSA55	PMBTA05
PMBTA56	●					P2H	NPN	MPSA56	PMBTA06
PMBTA63	●					P2U	PNP	MPSA63	PMBTA13
PMBTA64	●					P2V	PNP	MPSA64	PMBTA14
PMBTA92	●					P2D	PNP	MPSA92	PMBTA42
PMBTA93	●					P2E	PNP	MPSA93	PMBTA43
PMLL5225B to PMLL5267B				●			diode	1N5225B to 1N5267B	
PXT3904	●					P1A	NPN	2N3904	PXT3906
PXT3906	●					P2A	PNP	2N3906	PXT3904

Surface-mounting devices: alphanumeric list

For detailed information on these and other types see Data Handbook SC10

type case device type nearest conventional type	BZV49 SOT-89 diode BZV85 series	BZX84 SOT-23 diode BZX79 series
type number suffix	mark	mark
C2V4	2Y4	Z11
C2V7	2Y7	Z12
C3V0	3Y0	Z13
C3V3	3Y3	Z14
C3V6	3Y6	Z15
C3V9	3Y9	Z16
C4V3	4Y3	Z17
C4V7	4Y7	Z1
C5V1	5Y1	Z2
C5V6	5Y6	Z3
C6V2	6Y2	Z4
C6V8	6Y8	Z5
C7V5	7Y5	Z6
C8V2	8Y2	Z7
C9V1	9Y1	Z8
C10	10Y	Z9
C11	11Y	Y1
C12	12Y	Y2
C13	13Y	Y3
C15	15Y	Y4
C16	16Y	Y5
C18	18Y	Y6
C20	20Y	Y7
C22	22Y	Y8
C24	24Y	Y9
C27	27Y	Y10
C30	30Y	Y11
C33	33Y	Y12
C36	36Y	Y13
C39	39Y	Y14
C43	43Y	Y15
C47	47Y	Y16
C51	51Y	Y17
C56	56Y	Y18
C62	62Y	Y19
C68	68Y	Y20
C75	75Y	Y21

L.F. POWER TRANSISTORS (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbook SC05

Voltage range	20 to 800 V
Current range	0.05 to 30 A
D.C. current gain	6 to 1500

Note: The following alphanumeric list for L.F. power transistors is presented as two facing pages of related data. Please read across both pages for ratings and characteristics referring to each type number.

L.F. POWER TRANSISTORS (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbook SC05

type	pol	case	ratings					
			V_{CBO} V	V_{CESM} V	V_{CEO} V	I_C A	P_{tot} W	at T_{mb} °C
BD131	NPN	TO126	70		45	3	15	60
BD132	PNP	TO126	45		45	3	15	60
BD135★	NPN	TO126	45		45	1.5	8	70
BD136★	PNP	TO126	45		45	1.5	8	70
BD137★	NPN	TO126	60		60	1.5	8	70
BD138★	PNP	TO126	60		60	1.5	8	70
BD139★	NPN	TO126	100		80	1.5	8	70
BD140★	PNP	TO126	100		80	1.5	8	70
BD201★	NPN	TO220	60		45	8	60	25
BD201F	NPN	SOT186	60		45	8	28	25
BD202★	PNP	TO220	60		45	8	60	25
BD202F	PNP	SOT186	60		45	8	28	25
BD203★	NPN	TO220	60		60	8	60	25
BD203F	NPN	SOT186	60		60	8	28	25
BD204★	PNP	TO220	60		60	8	60	25
BD204F	PNP	SOT186	60		60	8	28	25
BD226	NPN	TO126	45		45	1.5	12.5	62
BD227	PNP	TO126	45		45	1.5	12.5	62
BD228	NPN	TO126	60		60	1.5	12.5	62
BD229	PNP	TO126	60		60	1.5	12.5	62
BD230	NPN	TO126	100		80	1.5	12.5	62
BD231	PNP	TO126	100		80	1.5	12.5	62
BD233	NPN	TO126	45		45	2	25	25
BD234	PNP	TO126	45		45	2	25	25
BD235★	NPN	TO126	60		60	2	25	25
BD236★	PNP	TO126	60		60	2	25	25
BD237★	NPN	TO126	100		80	2	25	25
BD238★	PNP	TO126	100		80	2	25	25
BD239	NPN	TO220AB	45		45	3	30	25
BD239A	NPN	TO220AB	60		60	3	30	25
BD239B	NPN	TO220AB	80		80	3	30	25
BD239C	NPN	TO220AB	100		100	3	30	25
BD240	PNP	TO220AB	45		45	3	30	25
BD240A	PNP	TO220AB	60		60	3	30	25
BD240B	PNP	TO220AB	80		80	3	30	25
BD240C	PNP	TO220AB	100		100	3	30	25

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbook SC05

characteristics								
h_{FE} min	h_{FE} max	at I_C A	f_{hfe} typ MHz	f_T typ MHz	V_{CEsat} max V	at I_C A	at I_B mA	type
40					0.7	2	200	**BD131**
40					0.7	2	200	**BD132**
40	250	0.15		250	0.5	0.5	5	**BD135**
40	250	0.15		75	0.5	0.5	5	**BD136**
40	250	0.15		250	0.5	0.5	5	**BD137**
40	250	0.15		75	0.5	0.5	5	**BD138**
40	250	0.15		250	0.5	0.5	5	**BD139**
40	250	0.15		75	0.5	0.5	5	**BD140**
30			0.025		1	3	300	**BD201**
30			0.025		1	3	300	**BD201F**
30			0.025		1	3	300	**BD202**
30			0.025		1	3	300	**BD202F**
30			0.025		1	3	300	**BD203**
30			0.025		1	3	300	**BD203F**
30			0.025		1	3	300	**BD204**
30			0.025		1	3	300	**BD204F**
40	250	0.15		125	0.8	1	100	**BD226**
40	250	0.15		50	0.8	1	100	**BD227**
40	250	0.15		125	0.8	1	100	**BD228**
40	250	0.15		50	0.8	1	100	**BD229**
40	250	0.15		125	0.8	1	100	**BD230**
40	250	0.15		50	0.8	1	100	**BD231**
40	250	0.15			0.6	1	100	**BD233**
40	250	0.15			0.6	1	100	**BD234**
40	250	0.15			0.6	1	100	**BD235**
40	250	0.15			0.6	1	100	**BD236**
40	250	0.15			0.6	1	100	**BD237**
40	250	0.15			0.6	1	100	**BD238**
15					0.6	1	200	**BD239**
15					0.6	1	200	**BD239A**
15					0.6	1	200	**BD239B**
15					0.6	1	200	**BD239C**
15					0.6	1	200	**BD240**
15					0.6	1	200	**BD240A**
15					0.6	1	200	**BD240B**
15					0.6	1	200	**BD240C**

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbook SC05

type	pol	case	ratings					
			V_{CBO} V	V_{CESM} V	V_{CEO} V	I_C A	P_{tot} W	at T_{mb} °C
BD241	NPN	TO220AB	45		45	5	40	25
BD241A	NPN	TO220AB	60		60	5	40	25
BD241B	NPN	TO220AB	80		80	5	40	25
BD241C	NPN	TO220AB	100		100	5	40	25
BD242	PNP	TO220AB	45		45	5	40	25
BD242A	PNP	TO220AB	60		60	5	40	25
BD242B	PNP	TO220AB	80		80	5	40	25
BD242C	PNP	TO220AB	100		100	5	40	25
BD243	NPN	TO220AB	45		45	8	65	25
BD243A	NPN	TO220AB	60		60	8	65	25
BD243B	NPN	TO220AB	80		80	8	65	25
BD243C	NPN	TO220AB	100		100	8	65	25
BD244	PNP	TO220AB	45		45	8	65	25
BD244A	PNP	TO220AB	60		60	8	65	25
BD244B	PNP	TO220AB	80		80	8	65	25
BD244C	PNP	TO220AB	100		100	8	65	25
BD329	NPN	TO126	32		20	3	15	45
BD330	PNP	TO126	32		20	3	15	45
BD331*	NPN	SOT82	60		60	6	60	25
BD332*	PNP	SOT82	60		60	6	60	25
BD333*	NPN	SOT82	80		80	6	60	25
BD334*	PNP	SOT82	80		80	6	60	25
BD335*	NPN	SOT82	100		100	6	60	25

* also available in SOT–194 (SMD version of SOT–82): add suffix **S** to type number

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbook SC05

characteristics								
h_{FE} min	h_{FE} max	at I_C A	f_{hfe} typ MHz	f_T typ MHz	V_{CEsat} max V	at I_C A	at I_B mA	type
25					1.2	3	600	**BD241**
25					1.2	3	600	**BD241A**
25					1.2	3	600	**BD241B**
25					1.2	3	600	**BD241C**
25					1.2	3	600	**BD242**
25					1.2	3	600	**BD242A**
25					1.2	3	600	**BD242B**
25					1.2	3	600	**BD242C**
15					1.5	6	1000	**BD243**
15					1.5	6	1000	**BD243A**
15					1.5	6	1000	**BD243B**
15					1.5	6	1000	**BD243C**
15					1.5	6	1000	**BD244**
15					1.5	6	1000	**BD244A**
15					1.5	6	1000	**BD244B**
15					1.5	6	1000	**BD244C**
85	375	0.5		130	0.5	2	200	**BD329**
85	375	0.5		100	0.5	2	200	**BD330**
750			0.06	7	2	3	12	**BD331**
750			0.06	7	2	3	12	**BD332**
750			0.06	7	2	3	12	**BD333**
750			0.06	7	2	3	12	**BD334**
750			0.06	7	2	3	12	**BD335**

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbook SC05

type	pol	case	ratings					
			V_{CBO} V	V_{CESM} V	V_{CEO} V	I_C A	P_{tot} W	at T_{mb} °C
BD336	PNP	SOT82	100		100	6	60	25
BD337	NPN	SOT82	120		120	6	60	25
BD338	PNP	SOT82	120		120	6	60	25
BD433★	NPN	TO126	22		22	4	36	25
BD434★	PNP	TO126	22		22	4	36	25
BD435	NPN	TO126	32		32	4	36	25
BD436	PNP	TO126	32		32	4	36	25
BD437	NPN	TO126	45		45	4	36	25
BD438	PNP	TO126	45		45	4	36	25
BD643	NPN	TO220AB	60		45	8	62.5	25
BD643F	NPN	SOT186	60		45	8	28	25
BD644	PNP	TO220AB	45		45	8	62.5	25
BD644F	PNP	SOT186	45		45	8	28	25
BD645★	NPN	TO220AB	80		60	8	62.5	25
BD645F	NPN	SOT186	80		60	8	28	25
BD646★	PNP	TO220AB	60		60	8	62.5	25
BD646F	PNP	SOT186	60		60	8	28	25
BD647★	NPN	TO220AB	100		80	8	62.5	25
BD647F	NPN	SOT186	100		80	8	28	25
BD648★	PNP	TO220AB	80		80	8	62.5	25
BD648F	PNP	SOT186	80		80	8	28	25
BD649★	NPN	TO220AB	120		100	8	62.5	25
BD649F	NPN	SOT186	120		100	8	28	25
BD650★	PNP	TO220AB	100		100	8	62.5	25
BD650F	PNP	SOT186	100		100	8	28	25
BD651	NPN	TO220AB	140		120	8	62.5	25
BD651F	NPN	SOT186	140		120	8	62.5	25
BD652	PNP	TO220AB	120		120	8	62.5	25
BD652F	PNP	SOT186	120		120	8	28	25

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbook SC05

characteristics								
h_{FE} min	h_{FE} max	at I_C A	f_{hfe} typ MHz	f_T typ MHz	V_{CEsat} max V	at I_C A	at I_B mA	type
750			0.06	7	2	3	12	**BD336**
750			0.06	7	2	3	12	**BD337**
750			0.06	7	2	3	12	**BD338**
85	475	0.5			0.5	2	200	**BD433**
85	475	0.5			0.5	2	200	**BD434**
85	475	0.5			0.5	2	200	**BD435**
85	475	0.5			0.5	2	200	**BD436**
85	375	0.5			0.7	3	300	**BD437**
85	375	0.5			0.7	3	300	**BD438**
750			0.05		2	3	12	**BD643**
750			0.05		2	3	12	**BD643F**
750			0.1		2	3	12	**BD644**
750			0.1		2	3	12	**BD644F**
750			0.05		2	3	12	**BD645**
750			0.05		2	3	12	**BD645F**
750			0.1		2	3	12	**BD646**
750			0.1		2	3	12	**BD646F**
750			0.05		2	3	12	**BD647**
750			0.05		2	3	12	**BD647F**
750			0.1		2	3	12	**BD648**
750			0.1		2	3	12	**BD648F**
750			0.05		2	3	12	**BD649**
750			0.05		2	3	12	**BD649F**
750			0.1		2	3	12	**BD650**
750			0.1		2	3	12	**BD650F**
750			0.05		2	3	12	**BD651**
750			0.05		2	3	12	**BD651F**
750			0.1		2	3	12	**BD652**
750			0.1		2	3	12	**BD652F**

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbook SC05

type	pol	case	ratings					
			V_{CBO} V	V_{CESM} V	V_{CEO} V	I_C A	P_{tot} W	at T_{mb} °C
BD675★	NPN	TO126	60		45	4	40	25
BD676★	PNP	TO126	45		45	4	40	25
BD677★	NPN	TO126	80		60	4	40	25
BD678★	PNP	TO126	60		60	4	40	25
BD679★	NPN	TO126	100		80	4	40	25
BD680★	PNP	TO126	80		80	4	40	25
BD681	NPN	TO126	120		100	4	40	25
BD682	PNP	TO126	100		100	4	40	25
BD683	NPN	TO126	140		120	4	40	25
BD684	PNP	TO126	120		120	4	40	25
BD719	NPN	TO126	60		60	7	36	25
BD720	PNP	TO126	60		60	7	36	25
BD721	NPN	TO126	80		80	7	36	25
BD722	PNP	TO126	80		80	7	36	25
BD723	NPN	TO126	100		100	7	36	25
BD724	PNP	TO126	100		100	7	36	25
BD725	NPN	TO126	120		120	7	36	25
BD726	PNP	TO126	120		120	7	36	25
BD825	NPN	TO202	45		45	1	8	50
BD826	PNP	TO202	45		45	1	8	50
BD827	NPN	TO202	60		60	1	8	50
BD828	PNP	TO202	60		60	1	8	50
BD829	NPN	TO202	100		80	1	8	50
BD830	PNP	TO202	100		80	1	8	50
BD839	NPN	TO202	45		45	1.5	10	25
BD840	PNP	TO202	45		45	1.5	10	25
BD841	NPN	TO202	60		60	1.5	10	25
BD842	PNP	TO202	60		60	1.5	10	25
BD843	NPN	TO202	100		80	1.5	10	25
BD844	PNP	TO202	100		80	1,5	10	25

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbook SC05

characteristics								
h_{FE} min	h_{FE} max	at I_C A	f_{hfe} typ MHz	f_T typ MHz	V_{CEsat} max V	at I_C A	at I_B mA	type
750				7	2.5	1.5	6	**BD675**
750				7	2.5	1.5	6	**BD676**
750				7	2.5	1.5	6	**BD677**
750				7	2.5	1.5	6	**BD678**
750				7	2.5	1.5	6	**BD679**
750				7	2.5	1.5	6	**BD680**
750				7	2.5	1.5	6	**BD681**
750				7	2.5	1.5	6	**BD682**
750				7	2.5	1.5	6	**BD683**
750				7	2.5	1.5	6	**BD684**
20				3	1	2.0	0.2	**BD719**
20				3	1	2.0	0.2	**BD720**
20				3	1	2.0	0.2	**BD721**
20				3	1	2.0	0.2	**BD722**
20				3	1	2.0	0.2	**BD723**
20				3	1	2.0	0.2	**BD724**
20				3	1	2.0	0.2	**BD725**
20				3	1	2.0	0.2	**BD726**
40	250	0.15		250	0.5	0.5	50	**BD825**
40	250	0.15		75	0.5	0.5	50	**BD826**
40	250	0.15		250	0.5	0.5	50	**BD827**
40	250	0.15		75	0.5	0.5	50	**BD828**
40	250	0.15		250	0.5	0.5	50	**BD829**
40	250	0.15		75	0.5	0.5	50	**BD830**
40	250	0.15		125	0.8	1.0	100	**BD839**
40	250	0.15		50	0.8	1.0	100	**BD840**
40	250	0.15		125	0.8	1.0	100	**BD841**
40	250	0.15		50	0.8	1.0	100	**BD842**
40	250	0.15		125	0.8	1.0	100	**BD843**
40	250	0.15		50	0.8	1.0	100	**BD844**

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05

type	pol	case	ratings					
			V_{CBO} V	V_{CESM} V	V_{CEO} V	I_C A	P_{tot} W	at T_{mb} °C
BD933	NPN	TO220AB	45		45	3	30	25
BD933F	NPN	SOT186	45		45	3	19	25
BD934	PNP	TO220AB	45		45	3	30	25
BD934F	PNP	SOT186	45		45	3	19	25
BD935	NPN	TO220AB	60		60	3	30	25
BD935F	NPN	SOT186	60		60	3	19	25
BD936	PNP	TO220AB	60		60	3	30	25
BD936F	PNP	SOT186	60		60	3	19	25
BD937	NPN	TO220AB	100		80	3	30	25
BD937F	NPN	SOT186	100		80	3	19	25
BD938	PNP	TO220AB	100		80	3	30	25
BD938F	PNP	SOT186	100		80	3	19	25
BD939	NPN	TO220AB	120		100	3	30	25
BD939F	NPN	SOT186	120		100	3	19	25
BD940	PNP	TO220AB	120		100	3	30	25
BD940F	PNP	SOT186	120		100	3	19	25
BD941	NPN	TO220AB	140		120	3	30	25
BD941F	NPN	SOT186	140		120	3	19	25

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05

characteristics								
h_{FE} min	h_{FE} max	at I_C A	f_{hfe} typ MHz	f_T typ MHz	V_{CEsat} max V	at I_C A	at I_B mA	type
40	250	0.15		3	0.6	1	100	**BD933**
40	250	0.15		3	0.6	1	100	**BD933F**
40	250	0.15		3	0.6	1	100	**BD934**
40	250	0.15		3	0.6	1	100	**BD934F**
40	250	0.15		3	0.6	1	100	**BD935**
40	250	0.15		3	0.6	1	100	**BD935F**
40	250	0.15		3	0.6	1	100	**BD936**
40	250	0.15		3	0.6	1	100	**BD936F**
40	250	0.15		3	0.6	1	100	**BD937**
40	250	0.15		3	0.6	1	100	**BD937F**
40	250	0.15		3	0.6	1	100	**BD938**
40	250	0.15		3	0.6	1	100	**BD938F**
40	250	0.15		3	0.6	1	100	**BD939**
40	250	0.15		3	0.6	1	100	**BD939F**
40	250	0.15		3	0.6	1	100	**BD940**
40	250	0.15		3	0.6	1	100	**BD940F**
40	250	0.15		3	0.6	1	100	**BD941**
40	250	0.15		3	0.6	1	100	**BD941F**

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05

type	pol	case	ratings					
			V_{CBO} V	V_{CESM} V	V_{CEO} V	I_C A	P_{tot} W	at T_{mb} °C
BD942	PNP	TO220AB	140		120	3	30	25
BD942F	PNP	SOT186	140		120	3	19	25
BD943	NPN	TO220AB	22		22	5	40	25
BD943F	NPN	SOT186	22		22	5	22	25
BD944	PNP	TO220AB	22		22	5	40	25
BD944F	PNP	SOT186	22		22	5	22	25
BD945	NPN	TO220AB	32		32	5	40	25
BD945F	NPN	SOT186	32		32	5	22	25
BD946	PNP	TO220AB	32		32	5	40	25
BD946F	PNP	SOT186	32		32	5	22	25
BD947	NPN	TO220AB	45		45	5	40	25
BD947F	NPN	SOT186	45		45	5	22	25
BD948	PNP	TO220AB	45		45	5	40	25
BD948F	PNP	SOT186	45		45	5	22	25
BD949	NPN	TO220AB	60		60	5	40	25
BD949F	NPN	SOT186	60		60	5	22	25
BD950	PNP	TO220AB	60		60	5	40	25
BD950F	PNP	SOT186	60		60	5	22	25
BD951	NPN	TO220AB	80		80	5	40	25
BD951F	NPN	SOT186	80		80	5	22	25
BD952	PNP	TO220AB	80		80	5	40	25
BD952F	PNP	SOT186	80		80	5	22	25
BD953	NPN	TO220AB	100		100	5	40	25
BD953F	NPN	SOT186	100		100	5	22	25
BD954	PNP	TO220AB	100		100	5	40	25
BD954F	PNP	SOT186	100		100	5	22	25
BD955	NPN	TO220AB	120		120	5	40	25
BD955F	NPN	SOT186	120		120	5	22	25
BD956	PNP	TO220AB	120		120	5	40	25
BD956F	PNP	SOT186	120		120	5	22	25

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05

characteristics								
h_{FE} min	h_{FE} max	at I_C A	f_{hfe} typ MHz	f_T typ MHz	V_{CEsat} max V	at I_C A	at I_B mA	type
40	250	0.15		3	0.6	1	100	**BD942**
40	250	0.15		3	0.6	1	100	**BD942F**
85	475	0.5		3	0.5	2	200	**BD943**
85	475	0.5		3	0.5	2	200	**BD943F**
85	475	0.5		3	0.5	2	200	**BD944**
85	475	0.5		3	0.5	2	200	**BD944F**
85	475	0.5		3	0.5	2	200	**BD945**
85	475	0.5		3	0.5	2	200	**BD945F**
85	475	0.5		3	0.5	2	200	**BD946**
85	475	0.5		3	0.5	2	200	**BD946F**
85	475	0.5		3	0.5	2	200	**BD947**
85	475	0.5		3	0.5	2	200	**BD947F**
85	475	0.5		3	0.5	2	200	**BD948**
85	475	0.5		3	0.5	2	200	**BD948F**
40				3	1	2	200	**BD949**
40				3	1	2	200	**BD949F**
40				3	1	2	200	**BD950**
40				3	1	2	200	**BD950F**
40				3	1	2	200	**BD951**
40				3	1	2	200	**BD951F**
40				3	1	2	200	**BD952**
40				3	1	2	200	**BD952F**
40				3	1	2	200	**BD953**
40				3	1	2	200	**BD953F**
40				3	1	2	200	**BD954**
40				3	1	2	200	**BD954F**
40				3	1	2	200	**BD955**
40				3	1	2	200	**BD955F**
40				3	1	2	200	**BD956**
40				3	1	2	200	**BD956F**

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05

type	pol	case	ratings					
			V_{CBO} V	V_{CESM} V	V_{CEO} V	I_C A	P_{tot} W	at T_{mb} °C
BDT29	NPN	TO220AB	40		40	1	30	25
BDT29A	NPN	TO220AB	60		60	1	30	25
BDT29AF	NPN	SOT186	60		60	1	19	25
BDT29B	NPN	TO220AB	80		80	1	30	25
BDT29BF	NPN	SOT186	80		80	1	19	25
BDT29C	NPN	TO220AB	100		100	1	30	25
BDT29CF	NPN	SOT186	100		100	1	19	25
BDT29F	NPN	SOT186	40		40	1	19	25
BDT30	PNP	TO220AB	40		40	1	30	25
BDT30A	PNP	TO220AB	60		60	1	30	25
BDT30AF	PNP	SOT186	60		60	1	19	25
BDT30B	PNP	TO220AB	80		80	1	30	25
BDT30BF	PNP	SOT186	80		80	1	19	25
BDT30C	PNP	TO220AB	100		100	1	30	25
BDT30CF	PNP	SOT186	100		100	1	19	25
BDT30F	PNP	SOT186	40		40	1	19	25
BDT31	NPN	TO220AB	40		40	3	40	25
BDT31A	NPN	TO220AB	60		60	3	40	25
BDT31AF	NPN	SOT186	60		60	3	19	25
BDT31B	NPN	TO220AB	80		80	3	40	25
BDT31BF	NPN	SOT186	80		80	3	19	25
BDT31C	NPN	TO220AB	100		100	3	40	25
BDT31CF	NPN	SOT186	100		100	3	19	25
BDT31F	NPN	SOT186	40		40	3	19	25
BDT32	PNP	TO220AB	40		40	3	40	25
BDT32A	PNP	TO220AB	60		60	3	40	25
BDT32AF	PNP	SOT186	60		60	3	19	25
BDT32B	PNP	TO220AB	80		80	3	40	25
BDT32BF	PNP	SOT186	80		80	3	19	25
BDT32C	PNP	TO220AB	100		100	3	40	25
BDT32CF	PNP	SOT186	100		100	3	19	25
BDT32F	PNP	SOT186	40		40	3	19	25
BDT41	NPN	TO220AB	40		40	6	65	25
BDT41A	NPN	TO220AB	60		60	6	65	25
BDT41AF	NPN	SOT186	60		60	6	28	25
BDT41B	NPN	TO220AB	80		80	6	65	25
BDT41BF	NPN	SOT186	80		80	6	28	25
BDT41C	NPN	TO220AB	100		100	6	65	25
BDT41CF	NPN	SOT186	100		100	6	28	25
BDT41F	NPN	SOT186	40		40	6	28	25
BDT42	PNP	TO220AB	40		40	6	65	25
BDT42A	PNP	TO220AB	60		60	6	65	25
BDT42AF	PNP	SOT186	60		60	6	28	25
BDT42B	PNP	TO220AB	80		80	6	65	25
BDT42BF	PNP	SOT186	80		80	6	28	25
BDT42C	PNP	TO220AB	100		100	6	65	25
BDT42CF	PNP	SOT186	100		100	6	28	25
BDT42F	PNP	SOT186	40		40	6	28	25

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05

characteristics								
h_{FE} min	h_{FE} max	at I_C A	f_{hfe} typ MHz	f_T typ MHz	V_{CEsat} max V	at I_C A	at I_B mA	type
15	75	1			0.7	1	125	**BDT29**
15	75	1			0.7	1	125	**BDT29A**
15	75	1			0.7	1	125	**BDT29AF**
15	75	1			0.7	1	125	**BDT29B**
15	75	1			0.7	1	125	**BDT29BF**
15	75	1			0.7	1	125	**BDT29C**
15	75	1			0.7	1	125	**BDT29CF**
15	75	1			0.7	1	125	**BDT29F**
15	75	1			0.7	1	125	**BDT30**
15	75	1			0.7	1	125	**BDT30A**
15	75	1			0.7	1	125	**BDT30AF**
15	75	1			0.7	1	125	**BDT30B**
15	75	1			0.7	1	125	**BDT30BF**
15	75	1			0.7	1	125	**BDT30C**
15	75	1			0.7	1	125	**BDT30CF**
15	75	1			0.7	1	125	**BDT30F**
10	50	3			1.2	3	375	**BDT31**
10	50	3			1.2	3	375	**BDT31A**
10	50	3			1.2	3	375	**BDT31AF**
10	50	3			1.2	3	375	**BDT31B**
10	50	3			1.2	3	375	**BDT31BF**
10	50	3			1.2	3	375	**BDT31C**
10	50	3			1.2	3	375	**BDT31CF**
10	50	3			1.2	3	375	**BDT31F**
10	50	3			1.2	3	375	**BDT32**
10	50	3			1.2	3	375	**BDT32A**
10	50	3			1.2	3	375	**BDT32AF**
10	50	3			1.2	3	375	**BDT32B**
10	50	3			1.2	3	375	**BDT32BF**
10	50	3			1.2	3	375	**BDT32C**
10	50	3			1.2	3	375	**BDT32CF**
10	50	3			1.2	3	375	**BDT32F**
15	75	3			1.5	6	600	**BDT41**
15	75	3			1.5	6	600	**BDT41A**
15	75	3			1.5	6	600	**BDT41AF**
15	75	3			1.5	6	600	**BDT41B**
15	75	3			1.5	6	600	**BDT41BF**
15	75	3			1.5	6	600	**BDT41C**
15	75	3			1.5	6	600	**BDT41CF**
15	75	3			1.5	6	600	**BDT41F**
15	75	3			1.5	6	600	**BDT42**
15	75	3			1.5	6	600	**BDT42A**
15	75	3			1.5	6	600	**BDT42AF**
15	75	3			1.5	6	600	**BDT42B**
15	75	3			1.5	6	600	**BDT42BF**
15	75	3			1.5	6	600	**BDT42C**
15	75	3			1.5	6	600	**BDT42CF**
15	75	3			1.5	6	600	**BDT42F**

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05

type	pol	case	ratings					
			V_{CBO} V	V_{CESM} V	V_{CEO} V	I_C A	P_{tot} W	at T_{mb} °C
BDT60	PNP	TO220AB	60		60	4	50	25
BDT60A	PNP	TO220AB	80		80	4	50	25
BDT60AF	PNP	SOT186	80		80	4	25	25
BDT60B	PNP	TO220AB	100		100	4	50	25
BDT60BF	PNP	SOT186	100		100	4	25	25
BDT60C	PNP	TO220AB	120		120	4	50	25
BDT60CF	PNP	SOT186	120		120	4	25	25
BDT60F	PNP	SOT186	60		60	4	25	25
BDT61	NPN	TO220AB	60		60	4	50	25
BDT61A	NPN	TO220AB	80		80	4	50	25
BDT61AF	NPN	SOT186	80		80	4	25	25
BDT61B	NPN	TO220AB	100		100	4	50	25
BDT61BF	NPN	SOT186	100		100	4	25	25
BDT61C	NPN	TO220AB	120		120	4	50	25
BDT61CF	NPN	SOT186	120		120	4	25	25
BDT61F	NPN	SOT186	60		60	4	25	25
BDT62	PNP	TO220AB	60		60	10	90	25
BDT62A	PNP	TO220AB	80		80	10	90	25
BDT62AF	PNP	SOT186	80		80	10	32	25
BDT62B	PNP	TO220AB	100		100	10	90	25
BDT62BF	PNP	SOT186	100		100	10	32	25
BDT62C	PNP	TO220AB	120		120	10	90	25
BDT62CF	PNP	SOT186	120		120	10	32	25
BDT62F	PNP	SOT186	60		60	10	32	25
BDT63	NPN	TO220AB	60		60	10	90	25
BDT63A	NPN	TO220AB	80		80	10	90	25
BDT63AF	NPN	SOT186	80		80	10	32	25
BDT63B	NPN	TO220AB	100		100	10	90	25
BDT63BF	NPN	SOT186	100		100	10	32	25
BDT63C	NPN	TO220AB	120		120	10	90	25
BDT63CF	NPN	SOT186	120		120	10	32	25
BDT63F	NPN	SOT186	60		60	10	32	25

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05

characteristics								
h_{FE} min	h_{FE} max	at I_C A	f_{hfe} typ MHz	f_T typ MHz	V_{CEsat} max V	at I_C A	at I_B mA	type
750					2.5	1.5	6	**BDT60**
750					2.5	1.5	6	**BDT60A**
750					2.5	1.5	6	**BDT60AF**
750					2.5	1.5	6	**BDT60B**
750					2.5	1.5	6	**BDT60BF**
750					2.5	1.5	6	**BDT60C**
750					2.5	1.5	6	**BDT60CF**
750					2.5	1.5	6	**BDT60F**
750			0.025		2.5	1.5	6	**BDT61**
750			0.025		2.5	1.5	6	**BDT61A**
750			0.025		2.5	1.5	6	**BDT61AF**
750			0.025		2.5	1.5	6	**BDT61B**
750			0.025		2.5	1.5	6	**BDT61BF**
750			0.025		2.5	1.5	6	**BDT61C**
750			0.025		2.5	1.5	6	**BDT61CF**
750			0.025		2.5	1.5	6	**BDT61F**
1000			0.1		2	3	12	**BDT62**
1000			0.1		2	3	12	**BDT62A**
1000			0.1		2	3	12	**BDT62AF**
1000			0.1		2	3	12	**BDT62B**
1000			0.1		2	3	12	**BDT62BF**
1000			0.1		2	3	12	**BDT62C**
1000			0.1		2	3	12	**BDT62CF**
1000			0.1		2	3	12	**BDT62F**
1000			0.05		2	3	12	**BDT63**
1000			0.05		2	3	12	**BDT63A**
1000			0.05		2	3	12	**BDT63AF**
1000			0.05		2	3	12	**BDT63B**
1000			0.05		2	3	12	**BDT63BF**
1000			0.05		2	3	12	**BDT63C**
1000			0.05		2	3	12	**BDT63CF**
1000			0.05		2	3	12	**BDT63F**

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05

type	pol	case	ratings					
			V_{CBO} V	V_{CESM} V	V_{CEO} V	I_C A	P_{tot} W	at T_{mb} °C
BDT64	PNP	TO220AB	60		60	12	125	25
BDT64A	PNP	TO220AB	80		80	12	125	25
BDT64AF	PNP	SOT186	80		80	12	36	25
BDT64B	PNP	TO220AB	100		100	12	125	25
BDT64BF	PNP	SOT186	100		100	12	36	25
BDT64C	PNP	TO220AB	120		120	12	125	25
BDT64CF	PNP	SOT186	120		120	12	36	25
BDT64F	PNP	SOT186	60		60	12	36	25
BDT65	NPN	TO220AB	60		60	12	125	25
BDT65A	NPN	TO220AB	80		80	12	125	25
BDT65AF	NPN	SOT186	80		80	12	36	25
BDT65B	NPN	TO220AB	100		100	12	125	25
BDT65BF	NPN	SOT186	100		100	12	36	25
BDT65C	NPN	TO220AB	120		120	12	125	25
BDT65CF	NPN	SOT186	120		120	12	36	25
BDT65F	NPN	SOT186	60		60	12	36	25
BDT81	NPN	TO220AB	60		60	15	125	25
BDT81F	NPN	SOT186	60		60	15	36	25
BDT82	PNP	TO220AB	60		60	15	125	25
BDT82F	PNP	SOT186	60		60	15	36	25
BDT83	NPN	TO220AB	80		80	15	125	25
BDT83F	NPN	SOT186	80		80	15	36	25
BDT84	PNP	TO220AB	80		80	15	125	25
BDT84F	PNP	SOT186	80		80	15	36	25
BDT85	NPN	TO220AB	100		100	15	125	25
BDT85AF	NPN	SOT186	100		100	15	36	25
BDT85F	NPN	SOT186	100		100	15	36	25

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05

S

characteristics								
h_{FE} min	h_{FE} max	at I_C A	f_{hfe} typ MHz	f_T typ MHz	V_{CEsat} max V	at I_C A	at I_B mA	type
1000					2	5	20	**BDT64**
1000					2	5	20	**BDT64A**
1000					2	5	20	**BDT64AF**
1000					2	5	20	**BDT64B**
1000					2	5	20	**BDT64BF**
1000					2	5	20	**BDT64C**
1000					2	5	20	**BDT64CF**
1000					2	5	20	**BDT64F**
1000					2	5	20	**BDT65**
1000					2	5	20	**BDT65A**
1000					2	5	20	**BDT65AF**
1000					2	5	20	**BDT65B**
1000					2	5	20	**BDT65BF**
1000					2	5	20	**BDT65C**
1000					2	5	20	**BDT65CF**
1000					2	5	20	**BDT65F**
50				10	1	5	500	**BDT81**
50				10	1	5	500	**BDT81F**
50				20	1	5	500	**BDT82**
50				10	1	5	500	**BDT82F**
50				10	1	5	500	**BDT83**
50				10	1	5	500	**BDT83F**
50				20	1	5	500	**BDT84**
50				10	1	5	500	**BDT84F**
50				10	1	5	500	**BDT85**
50				10	1	5	50	**BDT85AF**
50				10	1	5	500	**BDT85F**

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05

type	pol	case	ratings					
			V_{CBO} V	V_{CESM} V	V_{CEO} V	I_C A	P_{tot} W	at T_{mb} °C
BDT86	PNP	TO220AB	100		100	15	125	25
BDT86AF	PNP	SOT186	100		100	15	36	25
BDT86F	PNP	SOT186	100		100	15	36	25
BDT87	NPN	TO220AB	120		120	15	125	25
BDT87AF	NPN	SOT186	120		120	15	36	25
BDT87F	NPN	SOT186	120		120	15	36	25
BDT88	PNP	TO220AB	120		120	15	125	25
BDT88AF	PNP	SOT186	120		120	15	36	25
BDT88F	PNP	SOT186	120		120	15	36	25
BDT91	NPN	TO220AB	60		60	10	90	25
BDT91F	NPN	SOT186	60		60	10	32	25
BDT92	PNP	TO220AB	60		60	10	90	25
BDT92F	PNP	SOT186	60		60	10	32	25
BDT93	NPN	TO220AB	80		80	10	90	25
BDT93F	NPN	SOT186	80		80	10	32	25
BDT94	PNP	TO220AB	80		80	10	90	25
BDT94F	PNP	SOT186	80		80	10	32	25
BDT95	NPN	TO220AB	100		100	10	90	25
BDT95F	NPN	SOT186	100		100	10	32	25
BDT96	PNP	TO220AB	100		100	10	90	25
BDT96F	PNP	SOT186	100		100	10	32	25
BDV64	PNP	SOT93*	60		60	12	125	25
BDV64A	PNP	SOT93*	80		80	12	125	25
BDV64B	PNP	SOT93*	100		100	12	125	25
BDV64C	PNP	SOT93*	120		120	12	125	25
BDV65	NPN	SOT93*	60		60	12	125	25
BDV65A	NPN	SOT93*	80		80	12	125	25
BDV65B	NPN	SOT93*	100		100	12	125	25
BDV65C	NPN	SOT93*	120		120	12	125	25

* Also available in F-pack SOT-199: add suffix **F** to type number

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05

characteristics								
h_{FE} min	h_{FE} max	at I_C A	f_{hfe} typ MHz	f_T typ MHz	V_{CEsat} max V	at I_C A	at I_B mA	type
50				20	1	5	500	**BDT86**
50				10	1	5	50	**BDT86AF**
50				10	1	5	500	**BDT86F**
50				10	1	5	500	**BDT87**
50				10	1	5	50	**BDT87AF**
50				10	1	5	500	**BDT87F**
50				20	1	5	500	**BDT88**
50				10	1	5	50	**BDT88AF**
50				10	1	5	500	**BDT88F**
20	200	4		4	1	4	400	**BDT91**
20	200	4		4	1	4	400	**BDT91F**
20	200	4		4	1	4	400	**BDT92**
20	200	4		4	1	4	400	**BDT92F**
20	200	4		4	1	4	400	**BDT93**
20	200	4		4	1	4	400	**BDT93F**
20	200	4		4	1	4	400	**BDT94**
20	200	4		4	1	4	400	**BDT94F**
20	200	4		4	1	4	400	**BDT95**
20	200	4		4	1	4	400	**BDT95F**
20	200	4		4	1	4	400	**BDT96**
20	200	4		4	1	4	400	**BDT96F**
1000			0.1		2	5	20	**BDV64**
1000			0.1		2	5	20	**BDV64A**
1000			0.1		2	5	20	**BDV64B**
1000			0.1		2	5	20	**BDV64C**
1000			0.07		2	5	20	**BDV65**
1000			0.07		2	5	20	**BDV65A**
1000			0.07		2	5	20	**BDV65B**
1000			0.07		2	5	20	**BDV65C**

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05

type	pol	case	ratings					
			V_{CBO} V	V_{CESM} V	V_{CEO} V	I_C A	P_{tot} W	at T_{mb} °C
BDV66A	PNP	SOT93*	100		80	16	175	25
BDV66B	PNP	SOT93*	120		100	16	175	25
BDV66C	PNP	SOT93*	140		120	16	175	25
BDV66D	PNP	SOT93*	160		150	16	175	25
BDV67A	NPN	SOT93*	100		80	16	200	25
BDV67B	NPN	SOT93*	120		100	16	200	25
BDV67C	NPN	SOT93*	140		120	16	200	25
BDV67D	NPN	SOT93*	160		150	16	200	25
BDV91	NPN	SOT93	60		60	10	100	25
BDV92	PNP	SOT93	60		60	10	100	25
BDV93	NPN	SOT93	80		80	10	100	25
BDV94	PNP	SOT93	80		80	10	100	25
BDV95	NPN	SOT93	100		100	10	100	25
BDV96	PNP	SOT93	100		100	10	100	25
BDX35	NPN	TO126	100		60	5	15	75
BDX36	NPN	TO126	120		60	5	15	75
BDX37	NPN	TO126	120		80	5	15	75
BDX42	NPN	TO126	60			1	5	100
BDX43	NPN	TO126	80			1	5	100
BDX44	NPN	TO126	100			1	5	100
BDX45	PNP	TO126	60			1	5	100
BDX46	PNP	TO126	80			1	5	100
BDX47	PNP	TO126	100			1	5	100
BDX77★	NPN	TO220	100		80	8	60	25
BDX77F	NPN	SOT186	100		80	8	28	25
BDX78★	PNP	TO220	80		80	8	60	25
BDX78F	PNP	SOT186	80		80	8	28	25

* Also available in F–pack SOT–199: add suffix **F** to type number

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05

S

characteristics								
h_{FE} min	h_{FE} max	at I_C A	f_{hfe} typ MHz	f_T typ MHz	V_{CEsat} max V	at I_C A	at I_B mA	type
1000			0.06		2	10	40	**BDV66A**
1000			0.06		2	10	40	**BDV66B**
1000			0.06		2	10	40	**BDV66C**
1000			0.06		2	10	40	**BDV66D**
1000			0.06		2	10	40	**BDV67A**
1000			0.06		2	10	40	**BDV67B**
1000			0.06		2	10	40	**BDV67C**
1000			0.06		2	10	40	**BDV67D**
20					1	4	400	**BDV91**
20					1	4	400	**BDV92**
20					1	4	400	**BDV93**
20					1	4	400	**BDV94**
20					1	4	400	**BDV95**
20					1	4	400	**BDV96**
45	450	0.5		100	0.9	5	500	**BDX35**
45	450	0.5		100	0.7	5	500	**BDX36**
45	450	0.5		100	0.9	5	500	**BDX37**
2000					1.6	1	4	**BDX42**
2000					1.6	1	1	**BDX43**
2000					1.3	0.5	0.5	**BDX44**
2000					1.6	1	4	**BDX45**
2000					1.6	1	1	**BDX46**
2000					1.3	0.5	0.5	**BDX47**
30					1	3	300	**BDX77**
30					1	3	300	**BDX77F**
30					1	3	300	**BDX78**
30					1	3	300	**BDX78F**

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC06

type	pol	case	ratings					
			V_{CBO} V	V_{CESM} V	V_{CEO} V	I_C A	P_{tot} W	at T_{mb} °C
BU406	NPN	TO220		400	200	7	60	25
BU406F	NPN	SOT186		400	200	7	18	25
BU407	NPN	TO220		330	150	7	60	25
BU407F	NPN	SOT186		330	150	7	18	25
BU505	NPN	TO220**		1500	700	2.5	75	25
BU505D*	NPN	TO220**		1500	700	2.5	75	25
BU506	NPN	TO220		1500	700	5	100	25
BU506D*	NPN	TO220		1500	700	5	100	25
BU508	NPN	SOT93		1500	700	8	125	25
BU508A★	NPN	SOT93		1500	700	8	125	25
BU508AF	NPN	SOT199		1500	700	8	34	25
BU508D*	NPN	SOT93		1500	700	8	125	25
BU508DF*	NPN	SOT199		1500	700	8	34	25

* incl. efficiency diode

** also available in F-pack SOT-186: add suffix **F** to type number

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC06

characteristics								
h_{FE} min	h_{FE} max	at I_C A	t_f max $T_{mb} = 95$ °C µs	f_T typ MHz	V_{CEsat} max V	at I_C A	at I_B mA	type
50			0.75		1	5	500	**BU406**
			0.75		1	5	500	**BU406F**
50			0.75		1	5	500	**BU407**
			0.75		1	5	500	**BU407F**
2.2		2	0.7		5	2	900	**BU505**
2.2		2	0.7		5	2	900	**BU505D**
			0.7		5	3	1330	**BU506**
			0.7		5	3	1330	**BU506D**
			0.7		5	4.5	2000	**BU508**
			0.7	7	1	4.5	2000	**BU508A**
			0.7	7	1	4.5	2000	**BU508AF**
			0.7	7	1	4.5	2000	**BU508D**
			0.7		1	4.5	2000	**BU508DF**

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC06

type	pol	case	ratings					
			V_{CBO} V	V_{CESM} V	V_{CEO} V	I_C A	P_{tot} W	at T_{mb} °C
BU705	NPN	SOT93A		1500	700	2.5	75	25
BU705F	NPN	SOT199		1500	700	2.5	29	25
BU706	NPN	SOT93A		1500	700	5	100	25
BU706D*	NPN	SOT93A		1500	700	5	100	25
BU724	NPN	SOT82		650	375	2	1.5	25
BU724A	NPN	SOT82		850	400	2	1.5	25
BU806	NPN	TO220AB	400		200	8	60	25
BU806A	NPN	TO220AB	400		180	8	60	25
BU806AF	NPN	SOT186	400		180	8	28	25
BU806F	NPN	SOT186	400		200	8	28	25
BU807	NPN	TO220AB	330		150	8	60	25
BU807F	NPN	SOT186	330		150	8	28	25
BU826	NPN	SOT93		800	375	6	125	25
BU826A		SOT93		900	400	6	125	25

* incl. efficiency diode

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC06

characteristics								
h_{FE} min	h_{FE} max	at I_C A	t_f max T_{mb} = 95 °C µs	f_T typ MHz	V_{CEsat} max V	at I_C A	at I_B mA	type
2.2		2	0.7	7	5	2	900	**BU705**
2.2		2	0.7	7	5	2	900	**BU705F**
			0.7		5	3	1330	**BU706**
			0.7		5	3	1330	**BU706D**
			1.5		5	0.4	1	**BU724**
			1.5		3	0.3	1	**BU724A**
			0.2		1.5	5	50	**BU806**
			0.2		1.5	5	50	**BU806A**
			0.2		1.5	5	50	**BU806AF**
			0.2		1.5	5	50	**BU806F**
			0.2		1.5	5	50	**BU807**
			0.2	7	1.5	5	50	**BU807F**
			0.6		2	2.5	55	**BU826**
			0.6		2	2.5	55	**BU826A**

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC06

type	pol	case	ratings					
			V_{CBO} V	V_{CESM} V	V_{CEO} V	I_C A	P_{tot} W	at T_{mb} °C
BUT11★	NPN	TO220AB		850	400	5	100	25
BUT11A★	NPN	TO220AB		1000	450	5	100	25
BUT11AF	NPN	SOT186		1000	450	5	20	
BUT11F	NPN	SOT186		850	400	5	20	
BUT12	NPN	TO220		850	400	10	125	25
BUT12A	NPN	TO220		1000	450	10	125	25
BUT18	NPN	TO220		850	400	6	110	25
BUT18A	NPN	TO220		1000	450	6	125	25
BUT18AF	NPN	SOT186		850	400	6	110	25
BUT18F	NPN	SOT186		850	400	6	125	25
BUV26	NPN	TO220		180	90	14	65	25
BUV26A	NPN	TO220		200	100	14	65	25
BUV26AF	NPN	SOT186		200	100	14	65	25
BUV26F	NPN	SOT186		180	90	14	65	25
BUV27	NPN	TO220		240	120	12	65	25
BUV27A	NPN	TO220		300	150	12	65	25
BUV27AF	NPN	SOT186		300	150	12	65	25
BUV27F	NPN	SOT186		240	120	12	65	25
BUV28	NPN	TO220		400	200	10	65	25
BUV28A	NPN	TO220		450	225	10	65	25
BUV28AF	NPN	SOT186		450	225	10	65	25
BUV28F	NPN	SOT186		400	200	10	65	25
BUV89	NPN	SOT93		1200	800	8	125	25
BUV90	NPN	SOT93		650	400	12	125	25
BUV98V	NPN	SOT227B*		850	450	30	150	25
BUV98AV	NPN	SOT227B*		1000	450	30	150	25
BUV298V	NPN	SOT227B*		850	450	60	250	25
BUV298AV	NPN	SOT227B*		1000	450	60	250	25
BUW11	NPN	SOT93		850	400	5	100	25
BUW11A	NPN	SOT93		1000	450	5	100	25
BUW11AF	NPN	SOT199		1000	450	5	100	25
BUW11F	NPN	SOT199		850	400	5	100	25
BUW12★	NPN	SOT93		850	400	8	125	25
BUW12A	NPN	SOT93		1000	450	8	125	25
BUW12AF	NPN	SOT199		1000	450	8	125	25
BUW12F	NPN	SOT199		850	400	8	125	25

(1) the value of P_{tot} will differ for the F pack versions; refer to data handbook SC06

* also available in SOT–227A (Faston terminals) omit letter **V** from type number

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC06

characteristics								
h_{FE} min	h_{FE} max	at I_C A	t_f max T_{mb} = 95 °C µs	f_T typ MHz	V_{CEsat} max V	at I_C A	at I_B mA	type
30		1	0.8		1.5	3	600	**BUT11**
30		1	0.8		1.5	2.5	500	**BUT11A**
			0.8		1.5	2.5	500	**BUT11AF**
			0.8		1.5	3	600	**BUT11F**
			0.8		1.5	6	1200	**BUT12**
			0.8		1.5	5	1000	**BUT12A**
10		10	0.8		1.5	4	0.08	**BUT18**
10		10	0.8		1.5	4	0.08	**BUT18A**
10		10	0.8		1.5	4	0.08	**BUT18AF**
10		10	0.8		1.5	4	0.08	**BUT18F**
			0.04		1.5	12	1200	**BUV26**
			0.04		1	10	1000	**BUV26A**
			0.04		1	10	1000	**BUV26AF**
			0.04		1.5	12	1200	**BUV26F**
			0.04		1.5	12	1200	**BUV27**
			0.04		1	10	1000	**BUV27A**
			0.04		1	10	1000	**BUV27AF**
			0.04		1.5	12	1200	**BUV27F**
			0.04		1.5	6	600	**BUV28**
			0.04		1.5	4	400	**BUV28A**
			0.04		1.5	4	400	**BUV28AF**
			0.04		1.5	6	600	**BUV28F**
			0.5	7	1	4.5	2000	**BUV89**
			1	7	2	10	300	**BUV90**
			0.08		1.5	20	4000	**BUV98V**
			0.08		1.5	16	3200	**BUV98AV**
			0.4		1.2	40	8000	**BUV298V**
			0.4		1.2	32	6400	**BUV298AV**
			0.8		1.5	3	600	**BUW11**
			0.8		1.5	2.5	500	**BUW11A**
			0.8		1.5	2.5	500	**BUW11AF**
			0.8		1.5	3	600	**BUW11F**
			0.8		1.5	6	1200	**BUW12**
			0.8		1.5	5	1000	**BUW12A**
			0.8		1.5	5	1000	**BUW12AF**
			0.8		1.5	6	1200	**BUW12F**

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05 and SC06

type	pol	case	ratings					
			V_{CBO} V	V_{CESM} V	V_{CEO} V	I_C A	P_{tot} W	at T_{mb} °C
BUW13	NPN	SOT93		850	400	15	175	25
BUW13A★	NPN	SOT93		1000	450	15	175	25
BUW13AF	NPN	SOT199		1000	450	15	175	25
BUW13F	NPN	SOT199		850	400	15	175	25
BUW84	NPN	SOT82		800	400	2	50	45
BUW85	NPN	SOT82		1000	450	2	50	45
BUW84★	NPN	TO220		800	400	2	40	50
BUX84F	NPN	SOT186		800	400	2	18	25
BUX85	NPN	TO220		1000	450	2	40	50
BUX85F	NPN	SOT186		1000	450	2	18	25
BUX86★	NPN	TO126		800	400	0.5	20	60
BUX87	NPN	TO126		1000	450	0.5	20	60
BUX99	NPN	TO126		730	300	1.5	28	25
ESM3045AV	NPN	SOT227B*		1000	450	24	125	25
ESM3045DV	NPN	SOT227B*		600	450	24	125	25
ESM4045AV	NPN	SOT227B*		1000	450	42	150	25
ESM4045DV	NPN	SOT227B*		600	450	42	150	25
ESM5045DV	NPN	SOT227B*		600	450	60	175	25
ESM6045AV	NPN	SOT227B*		1000	450	84	250	25
ESM6045DV	NPN	SOT227B*		600	450	84	250	25
PH13002	NPN	TO126		600	300	1.5	28	25
PH13003	NPN	TO126		700	400	1.5	28	25

(1) the value of P_{tot} will differ for the F-pack versions; refer to Handbook SC06

* also available in SOT-227A (Faston terminals) omit letter **V** from typenumber

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05 and SC06

S

characteristics								
h_{FE} min	h_{FE} max	at I_C A	t_f max T_{mb} = 95 °C µs	f_T typ MHz	V_{CEsat} max V	at I_C A	at I_B mA	type
			0.8		1.5	10	2000	**BUW13**
			0.8		1.5	8	1600	**BUW13A**
			0.8		1.5	8	1800	**BUW13AF**
			0.8		1.5	10	2000	**BUW13F**
			1.4	20	0.8	0.3	30	**BUW84**
			1.4	20	0.8	0.3	30	**BUW85**
			1.4	20	1	1	200	**BUX84**
			1.4	20	1	1	200	**BUX84F**
			1.4	20	1	1	200	**BUX85**
			1.4	20	1	1	200	**BUX85F**
			1.3	20	3	0.2	20	**BUX86**
			1.3	20	3	0.2	20	**BUX87**
16		0.05	0.8		2	0.2	20	**BUX99**
			0.5		2	15	300	**ESM3045AV**
			0.5		2	15	300	**ESM3045DV**
			0.5		2	25	500	**ESM4045AV**
			0.5		2	25	500	**ESM4045DV**
			0.5		2	35	700	**ESM5045DV**
			0.5		2	50	1000	**ESM6045AV**
			0.5		2	50	1000	**ESM6045DV**
8	40	0.5	0.7	4	1	1	250	**PH13002**
8	40	0.5	0.7	4	1	1	250	**PH13003**

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05 and SC06

type	pol	case	ratings					
			V_{CBO} V	V_{CESM} V	V_{CEO} V	I_C A	P_{tot} W	at T_{mb} °C
TIP110	NPN	TO220AB	60		60	4	50	25
TIP111	NPN	TO220AB	80		80	4	50	25
TIP112	NPN	TO220AB	100		100	4	50	25
TIP115	PNP	TO220AB	60		60	4	50	25
TIP116	PNP	TO220AB	80		80	4	50	25
TIP117	PNP	TO220AB	100		100	4	50	25
TIP29	NPN	TO220AB	80		40	1	30	25
TIP29A	NPN	TO220AB	100		60	1	30	25
TIP29B	NPN	TO220AB	120		80	1	30	25
TIP29C	NPN	TO220AB	140		100	1	30	25
TIP29D	NPN	TO220AB	160		120	1	30	25
TIP30	PNP	TO220AB	80		40	1	30	25
TIP30A	PNP	TO220AB	100		60	1	30	25
TIP30B	PNP	TO220AB	120		80	1	30	25
TIP30C	PNP	TO220AB	140		100	1	30	25
TIP30D	PNP	TO220AB	160		120	1	30	25
TIP31	NPN	TO220AB	80		40	3	40	25
TIP31A	NPN	TO220AB	100		60	3	40	25
TIP31B	NPN	TO220AB	120		80	3	40	25
TIP31C	NPN	TO220AB	140		100	3	40	25
TIP31D	NPN	TO220AB	160		120	3	40	25
TIP32	PNP	TO220AB	80		40	3	40	25
TIP32A	PNP	TO220AB	100		60	3	40	25
TIP32B	PNP	TO220AB	120		80	3	40	25
TIP32C	PNP	TO220AB	140		100	3	40	25
TIP32D	PNP	TO220AB	160		120	3	40	25
TIP33	NPN	SOT93	80		40	10	80	25
TIP33A	NPN	SOT93	100		60	10	80	25
TIP33B	NPN	SOT93	120		80	10	80	25
TIP33C	NPN	SOT93	140		100	10	80	25
TIP34	PNP	SOT93	80		40	10	80	25
TIP34A	PNP	SOT93	100		60	10	80	25
TIP34B	PNP	SOT93	120		80	10	80	25
TIP34C	PNP	SOT93	140		100	10	80	25
TIP47	NPN	TO220AB	350		250	1	40	25
TIP48	NPN	TO220AB	400		300	1	40	25
TIP49	NPN	TO220AB	450		350	1	40	25
TIP50	NPN	TO220AB	500		400	1	40	25

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05 and SC06

characteristics								
h_{FE} min	h_{FE} max	at I_C A	t_f max T_{mb} = 95 °C µs	f_T typ MHz	V_{CEsat} max V	at I_C A	at I_B mA	type
500		2			2.5	2	8	**TIP110**
500		2			2.5	2	8	**TIP111**
500		2			2.5	2	8	**TIP112**
500		2			2.5	2	8	**TIP115**
500		2			2.5	2	8	**TIP116**
500		2			2.5	2	8	**TIP117**
15	75	1			0.7	1	125	**TIP29**
15	75	1			0.7	1	125	**TIP29A**
15	75	1			0.7	1	125	**TIP29B**
15	75	1			0.7	1	125	**TIP29C**
15	75	1			0.7	1	125	**TIP29D**
15	75	1			0.7	1	125	**TIP30**
15	75	1			0.7	1	125	**TIP30A**
15	75	1			0.7	1	125	**TIP30B**
15	75	1			0.7	1	125	**TIP30C**
15	75	1			0.7	1	125	**TIP30D**
10	50	3			1.2	3	375	**TIP31**
10	50	3			1.2	3	375	**TIP31A**
10	50	3			1.2	3	375	**TIP31B**
10	50	3			1.2	3	375	**TIP31C**
10	50	3			1.2	3	375	**TIP31D**
10	50	3			1.2	3	375	**TIP32**
10	50	3			1.2	3	375	**TIP32A**
10	50	3			1.2	3	375	**TIP32B**
10	50	3			1.2	3	375	**TIP32C**
10	50	3			1.2	3	375	**TIP32D**
20	100	3			1	3	300	**TIP33**
20	100	3			1	3	300	**TIP33A**
20	100	3			1	3	300	**TIP33B**
20	100	3			1	3	300	**TIP33C**
20	100	3			1	3	300	**TIP34**
20	100	3			1	3	300	**TIP34A**
20	100	3			1	3	300	**TIP34B**
20	100	3			1	3	300	**TIP34C**
30	150	0.3			1	1	200	**TIP47**
30	150	0.3			1	1	200	**TIP48**
30	150	0.3			1	1	200	**TIP49**
30	150	0.3			1	1	0.2	**TIP50**

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05 and SC06

type	pol	case	ratings					
			V_{CBO} V	V_{CESM} V	V_{CEO} V	I_C A	P_{tot} W	at T_{mb} °C
TIP120	NPN	TO220AB	60		60	5	65	25
TIP121	NPN	TO220AB	80		80	5	65	25
TIP122	NPN	TO220AB	100		100	5	65	25
TIP125	PNP	TO220AB	60		60	5	65	25
TIP126	PNP	TO220AB	80		80	5	65	25
TIP127	PNP	TO220AB	100		100	5	65	25
TIP130	NPN	TO220AB	60		60	8	70	25
TIP131	NPN	TO220AB	80		80	8	70	25
TIP132	NPN	TO220AB	100		100	8	70	25
TIP135	PNP	TO220AB	60		60	8	70	25
TIP136	PNP	TO220AB	80		80	8	70	25
TIP137	PNP	TO220AB	100		100	8	70	25
TIP140	NPN	SOT93	60		60	10	125	25
TIP141	NPN	SOT93	80		80	10	125	25
TIP142	NPN	SOT93	100		100	10	125	25
TIP145	PNP	SOT93	60		60	10	125	25
TIP146	PNP	SOT93	80		80	10	125	25
TIP147	PNP	SOT93	100		100	10	125	25
TIP2955	PNP	SOT93	100		60	15	100	25
TIP2955T	PNP	TO220AB	70		60	8	75	25
TIP3055	NPN	SOT93	100		60	15	100	25
TIP3055T	NPN	TO220AB	70		60	8	75	25

L.F. POWER TRANSISTORS AND MODULES (cont.)

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks SC05 and SC06

characteristics								
h_{FE} min	h_{FE} max	at I_C A	t_f max T_{mb} = 95 °C µs	f_T typ MHz	V_{CEsat} max V	at I_C A	at I_B mA	type
1000		3			2	3	12	**TIP120**
1000		3			2	3	12	**TIP121**
1000		3			2	3	12	**TIP122**
1000		3			2	3	12	**TIP125**
1000		3			2	3	12	**TIP126**
1000		3			2	3	12	**TIP127**
1000		4			2	4	16	**TIP130**
1000		4			2	4	16	**TIP131**
1000		4			2	4	16	**TIP132**
1000		4			2	4	16	**TIP135**
1000		4			2	4	16	**TIP136**
1000		4			2	4	16	**TIP137**
1000		5			2	5	10	**TIP140**
1000		5			2	5	10	**TIP141**
1000		5			2	5	10	**TIP142**
1000		5			2	5	10	**TIP145**
1000		5			2	5	10	**TIP146**
1000		5			2	5	10	**TIP147**
5		10			1.1	4	400	**TIP2955**
5		10			0.8	4	400	**TIP2955T**
5		10			1.1	4	400	**TIP3055**
5		10			0.8	4	400	**TIP3055T**

L.F. POWER TRANSISTORS AND MODULES

Selection guide

General-purpose Darlingtons

For detailed information on these and other types see Data Handbook SC05

Voltage range	45 to 200 V
Current range	1 to 25 A
D.C. current gain	500 to 1000

I_C A	V_{CEO} V	N–P–N type	P–N–P type	h_{FE}	case
1	45	**BDX42**	**BDX45**	2000	TO126
	60	**BDX43**	**BDX46**	2000	TO126
	80	**BDX44**	**BDX47**	2000	TO126
4	45	**BD675★**	**BD676★**	750	TO126
	60	**BD677★**	**BD678★**	750	TO126
	80	**BD679★**	**BD680★**	750	TO126
	100	**BD681**	**BD682**	750	TO126
	120	**BD683**	**BD684**	750	TO126
	60	**BDT61**	**BDT60**	750	TO220AB*
	80	**BDT61A**	**BDT60A**	750	TO220AB*
	100	**BDT61B**	**BDT60B**	750	TO220AB*
	120	**BDT61C**	**BDT60C**	750	TO220AB*
	60	**TIP110**	**TIP115**	500	TO220AB
	80	**TIP111**	**TIP116**	500	TO220AB
	100	**TIP112**	**TIP117**	500	TO220AB
5	60	**TIP120**	**TIP125**	1000	TO220AB
	80	**TIP121**	**TIP126**	1000	TO220AB
	100	**TIP122**	**TIP127**	1000	TO220AB
6	60	**BD331(S)**	**BD332(S)**	750	SOT82(SOT194)
	80	**BD333(S)**	**BD334(S)**	750	SOT82(SOT194)
	100	**BD335(S)**	**BD336(S)**	750	SOT82(SOT194)
	120	**BD337(S)**	**BD338(S)**	750	SOT82(SOT194)
8	45	**BD643**	**BD644**	750	TO220AB*
	60	**BD645★**	**BD646★**	750	TO220AB*
	80	**BD647★**	**BD648★**	750	TO220AB*
	100	**BD649★**	**BD650★**	750	TO220AB*
	120	**BD651**	**BD652**	750	TO220AB*
	200	**BU806**	–	–	TO220AB*
	180	**BU806A**	–	–	TO220AB*
	150	**BU807**	–	–	TO220AB*
	60	**TIP130**	**TIP135**	1000	TO220AB
	80	**TIP131**	**TIP136**	1000	TO220AB
	100	**TIP132**	**TIP137**	1000	TO220AB
10	60	**BDT63**	**BDT62**	1000	TO220AB*
	80	**BDT63A**	**BDT62A**	1000	TO220AB*
	100	**BDT63B**	**BDT62B**	1000	TO220AB*
	120	**BDT63C**	**BDT62C**	1000	TO220AB*
	60	**TIP140**	**TIP145**	1000	SOT93
	80	**TIP141**	**TIP146**	1000	SOT93
	100	**TIP142**	**TIP147**	1000	SOT93

* also available in F-pack SOT-186 or SOT-199: add suffix **F** to type number

L.F. POWER TRANSISTORS AND MODULES (cont.) Selection guide

General–purpose Darlingtons (cont.)

For detailed information on these and other types see Data Handbook SC05

I_C A	V_{CEO} V	N–P–N type	P–N–P type	h_{FE}	case
12	60	**BDT65**	**BDT64**	1000	TO220AB*
	80	**BDT65A**	**BDT64A**	1000	TO220AB*
	100	**BDT65B**	**BDT64B**	1000	TO220AB*
	120	**BDT65C**	**BDT64C**	1000	TO220AB*
	60	**BDV65**	**BDV64**	1000	SOT93*
	80	**BDV65A**	**BDV64A**	1000	SOT93*
	100	**BDV65B**	**BDV64B**	1000	SOT93*
	120	**BDV65C**	**BDV64C**	1000	SOT93*
16	80	**BDV67A**	**BDV66A**	1000	SOT93*
	100	**BDV67B**	**BDV66B**	1000	SOT93*
	120	**BDV67C**	**BDV66C**	1000	SOT93*
	150	**BDV67D**	**BDV66D**	1000	SOT93*

* also available in F–pack SOT–186 or SOT–199: add suffix **F** to type number

L.F. POWER TRANSISTORS AND MODULES (cont.) Selection guide

L.F. general–purpose power transistors

For detailed information on these and other types see Data Handbook SC05

Voltage range	20 to 150 V
Current range	1 to 15 A
D.C. current gain	15 to 475

S

I_C A	V_{CEO} V	N–P–N type	P–N–P type	h_{FE}	case
1	40	**BDT29**	**BDT30**	15	TO220AB*
	60	**BDT29A**	**BDT30A**	15	TO220AB*
	80	**BDT29B**	**BDT30B**	15	TO220AB*
	100	**BDT29C**	**BDT30C**	15	TO220AB*
	45	**BD825**	**BD826**	40	TO202
	60	**BD827**	**BD828**	40	TO202
	80	**BD829**	**BD830**	40	TO202
	40	**TIP29**	**TIP30**	15	TO220AB
	60	**TIP29A**	**TIP30A**	15	TO220AB
	80	**TIP29B**	**TIP30B**	15	TO220AB
	100	**TIP29C**	**TIP30C**	15	TO220AB
	120	**TIP29D**	**TIP30D**	15	TO220AB
1.5	45	**BD135★**	**BD136★**	40	TO126
	60	**BD137★**	**BD138★**	40	TO126
	80	**BD139★**	**BD140★**	40	TO126
	45	**BD226**	**BD227**	40	TO126
	60	**BD228**	**BD229**	40	TO126
	80	**BD230**	**BD231**	40	TO126
	45	**BD839**	**BD840**	40	TO202
	60	**BD841**	**BD842**	40	TO202
	80	**BD843**	**BD844**	40	TO202
2	45	**BD233**	**BD234**	40	TO126
	60	**BD235★**	**BD236★**	40	TO126
	80	**BD237★**	**BD238★**	40	TO126

* also available in F–pack SOT–186 or SOT–199: add suffix **F** to type number

L.F. general–purpose power transistors (cont.)

For detailed information on these and other types see Data Handbook SC05

I_C A	V_{CEO} V	N–P–N type	P–N–P type	h_{FE}	case
3	45	**BD131**	**BD132**	40	TO126
	45	**BD239**	**BD240**	15	TO220AB
	60	**BD239A**	**BD240A**	15	TO220AB
	80	**BD239B**	**BD240B**	15	TO220AB
	100	**BD239C**	**BD240C**	15	TO220AB
	20	**BD329**	**BD330**	85	TO126
	45	**BD933**	**BD934**	40	TO220AB*
	60	**BD935**	**BD936**	40	TO220AB*
	80	**BD937**	**BD938**	40	TO220AB*
	100	**BD939**	**BD940**	40	TO220AB*
	120	**BD941**	**BD942**	40	TO220AB*
	40	**BDT31**	**BDT32**	10	TO220AB*
	60	**BDT31A**	**BDT32A**	10	TO220AB*
	80	**BDT31B**	**BDT32B**	10	TO220AB*
	100	**BDT31C**	**BDT32C**	10	TO220AB*
	40	**TIP31**	**TIP32**	10	TO220AB
	60	**TIP31A**	**TIP32A**	10	TO220AB
	80	**TIP31B**	**TIP32B**	10	TO220AB
	100	**TIP31C**	**TIP32C**	10	TO220AB
	120	**TIP31D**	**TIP32D**	10	TO220AB
4	22	**BD433★**	**BD434★**	85	TO126
	32	**BD435**	**BD436**	85	TO126
	45	**BD437**	**BD438**	85	TO126
5	45	**BD241**	**BD242**	25	TO220AB
	60	**BD241A**	**BD242A**	25	TO220AB
	80	**BD241B**	**BD242B**	25	TO220AB
	100	**BD241C**	**BD242C**	25	TO220AB
	22	**BD943**	**BD944**	85	TO220AB*
	32	**BD945**	**BD946**	85	TO220AB*
	45	**BD947**	**BD948**	85	TO220AB*
	60	**BD949**	**BD950**	40	TO220AB*
	80	**BD951**	**BD952**	40	TO220AB*
	100	**BD953**	**BD954**	40	TO220AB*
	120	**BD955**	**BD956**	40	TO220AB*
	60	**BDX35**		45	TO126
	60**	**BDX36**		45	TO126
	80	**BDX37**		45	TO126
6	40	**BDT41**	**BDT42**	15	TO220AB*
	60	**BDT41A**	**BDT42A**	15	TO220AB*
	80	**BDT41B**	**BDT42B**	15	TO220AB*
	100	**BDT41C**	**BDT42C**	15	TO220AB*

* also available in F–pack SOT–186 or SOT–199: add suffix **F** to type number

** V_{CER}

L.F. POWER TRANSISTORS AND MODULES (cont.) Selection guide

L.F. general–purpose power transistors (cont.)

For detailed information on these and other types see Data Handbook SC05 and SC06

I_C A	V_{CEO} V	N–P–N type	P–N–P type	h_{FE}	case
7	60	**BD719**	**BD720**	20	TO126
	80	**BD721**	**BD722**	20	TO126
	100	**BD723**	**BD724**	20	TO126
	120	**BD725**	**BD726**	20	TO126
	150	**BU407**	–	50	TO220AB*
	200	**BU406**	–	50	TO220AB*
8	45	**BD201★**	**BD202★**	30	TO220AB*
	60	**BD203★**	**BD204★**	30	TO220AB*
	80	**BDX77★**	**BDX78★**	30	TO220AB*
	45	**BD243**	**BD244**	15	TO220AB
	60	**BD243A**	**BD244A**	15	TO220AB
	80	**BD243B**	**BD244B**	15	TO220AB
	100	**BD243C**	**BD244C**	15	TO220AB
10	60	**BDT91**	**BDT92**	20	TO220AB*
	80	**BDT93**	**BDT94**	20	TO220AB*
	100	**BDT95**	**BDT96**	20	TO220AB*
	60	**BDV91**	**BDV92**	20	SOT93
	80	**BDV93**	**BDV94**	20	SOT93
	100	**BDV95**	**BDV96**	20	SOT93
	40	**TIP33**	**TIP34**	20	SOT93
	60	**TIP33A**	**TIP34A**	20	SOT93
	80	**TIP33B**	**TIP34B**	20	SOT93
	100	**TIP33C**	**TIP34C**	20	SOT93
15	120	**BUV27**	–	–	TO220AB*
	150	**BUV27A**	–	–	TO220AB*
14	90	**BUV26**	–	–	TO220AB*
	100	**BUV26A**	–	–	TO220AB*
15	60	**BDT81**	**BDT82**	50	TO220AB*
	80	**BDT83**	**BDT84**	50	TO220AB*
	100	**BDT85**	**BDT86**	50	TO220AB*
	120	**BDT87**	**BDT88**	50	TO220AB*
	60	**TIP3055**	**TIP2955**	20	SOT93

* also available in F–pack SOT–186 or SOT–199: add suffix **F** to type number

L.F. POWER TRANSISTORS AND MODULES (cont.) Selection guide

High voltage transistors

For detailed information on these and other types see Data Handbook SC06

Voltage range 90 to 700 V
Current range 0.05 to 30 A

I_C A	V_{CEO} V	V_{CBO} V	type	pol	case	remarks
0.05	250	250	**BF469**	NPN	TO126	
	250	250	**BF470**	PNP	TO126	
	300	300	**BF471**	NPN	TO126	
	300	300	**BF472**	PNP	TO126	
	250	300	**BF583**	NPN	TO202	
	300	350	**BF585**	NPN	TO202	
	400	400	**BF587**	NPN	TO202	
	250	250	**BF869**	NPN	TO202	
	250	250	**BF870**	PNP	TO202	
	300	300	**BF871**	NPN	TO202	
	300	300	**BF872**	PNP	TO202	
0.1	250	300	**BF419**	NPN	TO126	
	160	160	**BF457**	NPN	TO126	
	250	250	**BF458**	NPN	TO126	
	300	300	**BF459**	NPN	TO126	
	250	300	**BF819**	NPN	TO202	
	160	160	**BF857**	NPN	TO202	
	250	250	**BF858**	NPN	TO202	
	300	300	**BF859**	NPN	TO202	
0.3	400	850***	**BU724A**	NPN	TO126	Darlington
0.5	400	800	**BUX86★**	NPN	TO126	
	450	1000	**BUX87**	NPN	TO126	
1	250	350	**TIP47**	NPN	TO220	
	300	400	**TIP48**	NPN	TO220	
	350	450***	**TIP49**	NPN	TO220	
	400	500***	**TIP50**	NPN	TO220	
1.5	300	730	**BUX99**	NPN	TO126	
	300	600	**PH13002**	NPN	TO126	
	400	700	**PH13003**	NPN	TO126	
2	400	800	**BUW84**	NPN	SOT82	
	450	1000	**BUW85**	NPN	SOT82	
	375	500	**BUX79**	NPN	SOT82	
	400	800	**BUX84★**	NPN	TO220*	
	450	1000	**BUX85**	NPN	TO220*	
2.5	700	1500	**BU505**	NPN	TO220*	
	700	1500	**BU505D****	NPN	TO220*	
	700	1500***	**BU705**	NPN	SOT93*	

* also available in F-pack SOT-186 or SOT-199: add suffix **F** to type number
** incl. efficiency diode. $V_F < 1.8$ V at $I_F = 2A$
*** V_{CESM}

L.F. POWER TRANSISTORS AND MODULES (cont.) Selection guide

High voltage transistors (cont.)

For detailed information on these and other types see Data Handbook SC06

S

I_C A	V_{CEO} V	V_{CESM} V	type	pol	case	remarks
5	400	850	**BUT11★**	NPN	TO220AB	
	450	1000	**BUT11A★**	NPN	TO220AB	
	450	1000	**BUT11AF**	NPN	SOT186	
	400	850	**BUT11F**	NPN	SOT186	
	400	850	**BUW11**	NPN	SOT93	
	450	1000	**BUW11A**	NPN	SOT93	
	450	1000	**BUW11AF**	NPN	SOT199	
	400	850	**BUW11F**	NPN	SOT199	
	700	1500	**BU506**	NPN	TO220	
	700	1500	**BU506D***	NPN	TO220	
	700	1500	**BU506F**	NPN	SOT186	
	700	1500	**BU506DF**	NPN	SOT186	
	700	1500	**BU706**	NPN	SOT93	
	700	1500	**BU706D***	NPN	SOT93	
	700	1500	**BU706F**	NPN	SOT199	
	700	1500	**BU706DF**	NPN	SOT199	
	550	1350	**BU903**	NPN	SOT93	
	550	1350	**BU903F**	NPN	SOT199	
6	400	850	**BUT18**	NPN	TO220	
	450	1000	**BUT18A**	NPN	TO220	
	400	850	**BUT18F**	NPN	SOT186	
	450	1000	**BUT18AF**	NPN	SOT186	
	375	800	**BU826**	NPN	SOT93	Darlington
	400	1000	**BU826A**	NPN	SOT93	Darlington

* incl. efficiency diode. $V_F < 1.8$ V at $I_F = 2$ A

L.F. POWER TRANSISTORS AND MODULES (cont.) Selection guide

High voltage transistors (cont.)

For detailed information on these and other types see Data Handbook SC06

I_C A	V_{CEO} V	V_{CESM} V	type	pol	case
8	400	850	**BUT12**	NPN	TO220AB
	450	1000	**BUT12A**	NPN	TO220AB
	800	1200	**BUV89**	NPN	SOT93
	400	850	**BUW12★**	NPN	SOT93
	450	1000	**BUW12A**	NPN	SOT93
	450	1000	**BUW12AF**	NPN	SOT199
	400	850	**BUW12F**	NPN	SOT199
	700	1500	**BU508A★**	NPN	SOT93A
	700	1500	**BU508AF**	NPN	SOT199
	700	1500	**BU508D***	NPN	SOT93A
	700	1500	**BU508DF**	NPN	SOT199
12	200	400	**BUV28**	NPN	TO220AB
	225	450	**BUV28A**	NPN	TO220AB
	225	450	**BUV28AF**	NPN	SOT186
	200	400	**BUV28F**	NPN	SOT186

* incl. efficiency diode. $V_F < 2.2$ V at $I_F = 4$ A

L.F. POWER TRANSISTORS AND MODULES (cont.) Selection guide

High voltage transistors (cont.)

For detailed information on these and other types see Data Handbook SC06

S

I_C A	V_{CEO} V	V_{CESM} V	type	pol	case	remarks
12	400	650	**BUV90**	NPN	SOT93*	Darlington
15	400	750	**BUP23B**	NPN	SOT93*	
	450	850	**BUP23C**	NPN	SOT93*	
	400	850	**BUW13**	NPN	SOT93	
	450	1000	**BUW13A★**	NPN	SOT93	
	450	1000	**BUW13AF**	NPN	SOT199	
	400	850	**BUW13F**	NPN	SOT199	
24	450	1000	**ESM3045AV**	NPN	SOT227B	Darlington
	450	600	**ESM3045DV**	NPN	SOT227B	Darlington
	450	850	**BUV98V**	NPN	SOT227B	
	450	1000	**BUV98AV**	NPN	SOT227B	
42	450	1000	**ESM4045AV**	NPN	SOT227B	Darlington
	450	600	**ESM4045DV**	NPN	SOT227B	Darlington
60	450	1000	**BUV298V**	NPN	SOT227B	
	450	600	**BUV298AV**	NPN	SOT227B	
	450	600	**ESM5045DV**	NPN	SOT227B	Darlington
84	450	1000	**ESM6045AV**	NPN	SOT227B	Darlington
	450	600	**ESM6045DV**	NPN	SOT227B	Darlington

* also available in F–pack SOT–199: add suffix **F** to type number

For detailed information on these types see POWERMOS product spec. 1989 book

MOSFET N-CHANNEL

technology	case	V_{DS} max V	$R_{DS(on)}$ at Ω	I_D A	type	I_D max A	P_D max W
MOSFET N	SOT199	50	0.028	29	**BUK426-50A**	30	45
MOSFET N	SOT199	50	0.030	29	**BUK426-50B**	30	45
MOSFET N	SOT199	100	0.057	15	**BUK426-100A**	20	45
MOSFET N	SOT199	100	0.065	15	**BUK426-100B**	19	45
MOSFET N	SOT199	200	0.16	10	**BUK426-200A**	11	45
MOSFET N	SOT199	200	0.20	10	**BUK426-200B**	10	45
MOSFET N	SOT199	800	3	1.5	**BUK426-800A**	2.4	45
MOSFET N	SOT199	800	4	1.5	**BUK426-800B**	2.1	45
MOSFET N	SOT199	1000	4	1.5	**BUK426-1000A**	2.1	45
MOSFET N	SOT199	1000	5	1.5	**BUK426-1000B**	1.9	45
MOSFET N	SOT199	400	0.4	6.5	**BUK427-400A**	6.9	45
MOSFET N	SOT199	400	0.5	6.5	**BUK427-400B**	6.2	45
MOSFET N	SOT199	500	0.6	6.5	**BUK427-500A**	5.6	45
MOSFET N	SOT199	500	0.8	6.5	**BUK427-500B**	4.8	45
MOSFET N	SOT199	600	1	6.5	**BUK427-600A**	4.3	45
MOSFET N	SOT199	600	1.2	6.5	**BUK427-600B**	3.9	45
MOSFET N	SOT93	50	0.028	29	**BUK436-50A**	50	125
MOSFET N	SOT93	50	0.033	29	**BUK436-50B**	46	125
MOSFET N	SOT93	100	0.057	15	**BUK436-100A**	33	125
MOSFET N	SOT93	100	0.065	15	**BUK436-100B**	31	125
MOSFET N	SOT93	200	0.16	10	**BUK436-200A**	19	125
MOSFET N	SOT93	200	0.20	10	**BUK436-200B**	17	125
MOSFET N	SOT93	800	3	1.5	**BUK436-800A**	4	125
MOSFET N	SOT93	800	4	1.5	**BUK436-800A**	3.5	125
MOSFET N	SOT93	1000	4	1.5	**BUK436-1000A**	3.5	125
MOSFET N	SOT93	1000	5	1.5	**BUK436-1000B**	3.1	125
MOSFET N	SOT93	400	0.4	6.5	**BUK437-400A**	14	180
MOSFET N	SOT93	400	0.5	6.5	**BUK437-400B**	12	180
MOSFET N	SOT93	500	0.6	6.5	**BUK437-500A**	11	180
MOSFET N	SOT93	500	0.8	6.5	**BUK437-500B**	10	180
MOSFET N	SOT93	600	0.8	6.5	**BUK437-600A**	10	180
MOSFET N	SOT93	600	1	6.5	**BUK437-600B**	9	180

For detailed information on these types see POWERMOS product spec. 1989 book

S

MOSFET N–CHANNEL (cont.)

technology	case	V_{DS} max V	$R_{DS(on)}$ at Ω	I_D A	type	I_D max A	P_D max W
MOSFET N	SOT186	50	0.08	9	**BUK443–50A**	13	25
MOSFET N	SOT186	50	0.10	9	**BUK443–50B**	9	25
MOSFET N	SOT186	100	0.16	5	**BUK443–100A**	9	25
MOSFET N	SOT186	100	0.20	5	**BUK443–100B**	8	25
MOSFET N	SOT186	200	0.40	3.5	**BUK444–200A**	5.3	25
MOSFET N	SOT186	200	0.50	3.5	**BUK444–200B**	4.7	25
MOSFET N	SOT186	400	1.50	1.5	**BUK444–400A**	2.7	25
MOSFET N	SOT186	400	1.80	1.5	**BUK444–400B**	2.4	25
MOSFET N	SOT186	500	2.30	1.2	**BUK444–500A**	2.1	25
MOSFET N	SOT186	500	2.80	1.2	**BUK444–500B**	1.9	25
MOSFET N	SOT186	600	4	1.2	**BUK444–600A**	1.6	25
MOSFET N	SOT186	600	4.5	1.2	**BUK444–600B**	1.5	25
MOSFET N	SOT186	800	6	1	**BUK444–800A**	1.4	30
MOSFET N	SOT186	800	8	1	**BUK444–800B**	1.2	30
MOSFET N	SOT186	50	0.038	20	**BUK445–50A**	21	30
MOSFET N	SOT186	50	0.045	20	**BUK445–50B**	20	30
MOSFET N	SOT186	100	0.080	13	**BUK445–100A**	14	30
MOSFET N	SOT186	100	0.10	13	**BUK445–100B**	12	30
MOSFET N	SOT186	200	0.23	7	**BUK445–200A**	7.6	30
MOSFET N	SOT186	200	0.28	7	**BUK445–200B**	7	30
MOSFET N	SOT186	400	0.80	2.5	**BUK445–400A**	4	30
MOSFET N	SOT186	400	1	2.5	**BUK445–400B**	3.8	30
MOSFET N	SOT186	500	1.3	2.5	**BUK445–500A**	3.1	30
MOSFET N	SOT186	500	1.5	2.5	**BUK445–500B**	2.9	30
MOSFET N	SOT186	600	1.6	2.5	**BUK445–600A**	2.8	30
MOSFET N	SOT186	600	2	2.5	**BUK445–600B**	2.5	30
MOSFET N	SOT186	800	3	1.5	**BUK446–800A**	2	30
MOSFET N	SOT186	800	4	1.5	**BUK446–800B**	1.7	30
MOSFET N	SOT186	1000	4	1.5	**BUK446–1000A**	1.7	30
MOSFET N	SOT186	1000	5	1.5	**BUK446–1000B**	1.5	30

Power MOS (cont.)

For detailed information on these types see POWERMOS product spec. 1989 book

MOSFET N–CHANNEL (cont.)

technology	case	V_{DS} max V	$R_{DS(on)}$ at Ω	I_D A	type	I_D max A	P_D max W
MOSFET N	TO220AB	50	0.13	8.5	**BUK452–50A**	15	60
MOSFET N	TO220AB	50	0.15	8.5	**BUK452–50B**	14	60
MOSFET N	TO220AB	60	0.13	8.5	**BUK452–60A**	15	60
MOSFET N	TO220AB	60	0.15	8.5	**BUK452–60B**	15	60
MOSFET N	TO220AB	100	0.25	5.5	**BUK452–100A**	11	60
MOSFET N	TO220AB	100	0.30	5.5	**BUK452–100B**	10	60
MOSFET N	TO220AB	50	0.08	10	**BUK453–50A★**	22	75
MOSFET N	TO220AB	50	0.10	10	**BUK453–50B★**	20	75
MOSFET N	TO220AB	100	0.16	5	**BUK453–100A**	14	75
MOSFET N	TO220AB	100	0.20	5	**BUK453–100B**	13	75
MOSFET N	TO220AB	200	0.40	3.5	**BUK454–200A**	9.2	90
MOSFET N	TO220AB	200	0.50	3.5	**BUK454–200B**	8.2	90
MOSFET N	TO220AB	400	1.50	1.5	**BUK454–400A**	4.6	75
MOSFET N	TO220AB	400	1.80	1.5	**BUK454–400B**	4.2	75
MOSFET N	TO220AB	500	2.30	1.5	**BUK454–500A**	3.7	75
MOSFET N	TO220AB	500	2.80	1.5	**BUK454–500B**	3.3	75
MOSFET N	TO220AB	600	4	1.2	**BUK454–600A**	2.8	75
MOSFET N	TO220AB	600	4.5	1.2	**BUK454–600B**	2.6	75
MOSFET N	TO220AB	800	6	1	**BUK454–800A**	2.6	100
MOSFET N	TO220AB	800	8	1	**BUK454–800B**	2.2	100
MOSFET N	TO220AB	50	0.038	20	**BUK455–50A**	41	125
MOSFET N	TO220AB	50	0.045	20	**BUK455–50B**	38	125
MOSFET N	TO220AB	100	0.08	13	**BUK455–100A★**	26	125
MOSFET N	TO220AB	100	0.10	13	**BUK455–100B★**	23	125
MOSFET N	TO220AB	200	0.23	7	**BUK455–200A**	14	125
MOSFET N	TO220AB	200	0.28	7	**BUK455–200B**	13	125
MOSFET N	TO220AB	400	0.8	2.5	**BUK455–400A**	7.3	100
MOSFET N	TO220AB	400	1	2.5	**BUK455–400B**	6.5	100
MOSFET N	TO220AB	500	1.3	2.5	**BUK455–500A**	5.7	100
MOSFET N	TO220AB	500	1.5	2.5	**BUK455–500B**	5.3	100
MOSFET N	TO220AB	600	2	2.5	**BUK455–600A**	4.5	100
MOSFET N	TO220AB	600	2.5	2.5	**BUK455–600B**	4	100
MOSFET N	TO220AB	50	0.028	29	**BUK456–50A**	52	150
MOSFET N	TO220AB	50	0.030	29	**BUK456–50B**	51	150
MOSFET N	TO220AB	100	0.057	15	**BUK456–100A★**	34	150
MOSFET N	TO220AB	100	0.065	15	**BUK456–100B★**	32	150
MOSFET N	TO220AB	200	0.16	10	**BUK456–200A★**	19	150
MOSFET N	TO220AB	200	0.20	10	**BUK456–200B★**	17	150
MOSFET N	TO220AB	800	3	1.5	**BUK456–800A★**	4	125
MOSFET N	TO220AB	800	4	1.5	**BUK456–800B★**	3.5	125
MOSFET N	TO220AB	1000	4	1.5	**BUK456–1000A★**	3.5	125
MOSFET N	TO220AB	1000	5	1.5	**BUK456–1000B★**	3.1	125
MOSFET N	TO220AB	400	0.4	6.5	**BUK457–400A**	13	150
MOSFET N	TO220AB	400	0.5	6.5	**BUK457–400B**	11	150
MOSFET N	TO220AB	500	0.6	6.5	**BUK457–500A**	10	150
MOSFET N	TO220AB	500	0.8	6.5	**BUK457–500B**	9	150
MOSFET N	TO220AB	600	0.8	6.5	**BUK457–600A**	9	150
MOSFET N	TO220AB	600	1	6.5	**BUK457–600B**	8	150

For detailed information on these types see POWERMOS product spec. 1989 book

S

L^2FET

technology	case	V_{DS} max V	$R_{DS(on)}$ at Ω	I_D A	type	I_D max A	P_D max W
L^2FET	SOT186	50	0.085	10	**BUK543-50A**	13	25
L^2FET	SOT186	50	0.10	10	**BUK543-50B**	12	25
L^2FET	SOT186	100	0.18	5	**BUK543-100A**	8.3	25
L^2FET	SOT186	100	0.22	5	**BUK543-100B**	7.5	25
L^2FET	SOT186	50	0.042	20	**BUK545-50A**	20	30
L^2FET	SOT186	50	0.055	20	**BUK545-50B**	18	30
L^2FET	SOT186	100	0.085	13	**BUK545-100A**	13	30
L^2FET	SOT186	100	0.11	13	**BUK545-100B**	12	30
L^2FET	SOT186	200	0.23	7	**BUK545-200A**	7.6	30
L^2FET	SOT186	200	0.28	7	**BUK545-200A**	7	30
L^2FET	TO220AB	50	0.15	8.5	**BUK552-50A**	14	60
L^2FET	TO220AB	50	0.18	8.5	**BUK552-50B**	13	60
L^2FET	TO220AB	60	0.15	8.5	**BUK552-60A**	14	60
L^2FET	TO220AB	60	0.18	8.5	**BUK552-60B**	13	60
L^2FET	TO220AB	100	0.28	5.5	**BUK552-100A**	10	60
L^2FET	TO220AB	100	0.35	5.5	**BUK552-100B**	8.5	60
L^2FET	TO220AB	50	0.085	10	**BUK553-50A**	21	75
L^2FET	TO220AB	50	0.10	10	**BUK553-50B**	20	75
L^2FET	TO220AB	100	0.18	6.5	**BUK553-100A**	13	75
L^2FET	TO220AB	100	0.22	6.5	**BUK553-100A**	12	75
L^2FET	TO220AB	200	0.40	3.5	**BUK554-200A**	9.2	90
L^2FET	TO220AB	200	0.50	3.5	**BUK554-200B**	8.2	90
L^2FET	TO220AB	50	0.042	20	**BUK555-50A**	39	125
L^2FET	TO220AB	50	0.055	20	**BUK555-50B**	35	125
L^2FET	TO220AB	100	0.085	13	**BUK555-100A**	25	125
L^2FET	TO220AB	100	0.11	13	**BUK555-100B**	22	125
L^2FET	TO220AB	200	0.23	7	**BUK555-200A**	14	125
L^2FET	TO220AB	200	0.28	7	**BUK555-200B**	13	125

Power MOS (cont.)

For detailed information on these types see POWERMOS product spec. 1989 book

FREDFETS

technology	case	V_{DS} max V	$R_{DS(on)}$ at Ω	I_D A	type	I_D max A	P_D max W
FREDFET	SOT199	500	0.65	6.5	**BUK627–500A**	5.6	45
FREDFET	SOT199	500	0.80	6.5	**BUK627–500B**	4.8	45
FREDFET	SOT199	600	1	6.5	**BUK627–600A**	4.3	45
FREDFET	SOT199	600	1.20	6.5	**BUK627–600B**	3.9	45
FREDFET	SOT93	500	0.65	6.5	**BUK637–500A**	11	180
FREDFET	SOT93	500	0.80	6.5	**BUK637–500B**	10	180
FREDFET	TO220AB	500	1.3	2.5	**BUK655–500A**	5.7	100
FREDFET	TO220AB	500	1.5	2.5	**BUK655–500B**	5.3	100
FREDFET	TO220AB	500	0.65	6.5	**BUK657–500A**	10	150
FREDFET	TO220AB	500	0.80	6.5	**BUK657–500B**	9	150
FREDFET	TO220AB	600	1	6.5	**BUK657–600A**	8	150
FREDFET	TO220AB	600	1.2	6.5	**BUK657–600B**	7.1	150

FIELD–EFFECT TRANSISTORS

General data

N–channel junction FETs for amplifiers

For detailed information on these and other types see Data Handbook SC07

Voltage range 20 to 50 V

	ratings			characteristics							
type	$\pm V_{DS}$ V	P_{tot} mW	at T_{amb} °C	$-I_{GSS}$ max nA	I_{DSS} min mA	I_{DSS} max mA	$-V_{(P)GS}$ max V	$\lvert Y_{fs}\rvert$ min f = 1 kHz mA V	C_{rs} typ pF	F typ dB	case
BC264A	30	300	25	10	2	4.5		2.5	1.2	0.5	TO–92VAR
BC264B	30	300	25	10	3.5	6.5		3	1.2	0.5	TO–92VAR
BC264C	30	300	25	10	5	8		3.5	1.2	0.5	TO–92VAR
BC264D	30	300	25	10	7	12		4	1.2	0.5	TO–92VAR
BFR101A**	30	200	60	5	0.2	1.5	1	1.2			SOT–143
BFR101B**	30	200	60	5	1	5	2.5	2.5			SOT–143
BFR30**	25	250	65	0.2	4	10	5	1			SOT–23
BFR31**	25	250	65	0.2	1	5	2.5	1.5			SOT–23
BFT46**	25	250	65	0.2	0.2	1.5	1.2	1			SOT–23
BFW10★	30	300	25	0.1	8	20	8	3.5	0.6	2.5*	TO–72(1)
BFW11★	30	300	25	0.1	4	10	6	3	0.6	2.5*	TO–72(1)
BFW12	30	150	110	0.1	1	5	2.5	2			TO–72(1)
BFW13	30	150	110	0.1	0.2	1.5	1.2	1			TO–72(1)
BFW61	25	300	25	1	2	20	8	2			TO–72(1)
BF245A★	30	300	75	5	2	6.5	8	3	1.1	1.5	TO–92VAR
BF245B★	30	300	75	5	6	15	8	3	1.1	1.5	TO–92VAR
BF245C★	30	300	75	5	12	25	8	3	1.1	1.5	TO–92VAR
BF247A	25	250	75	5	30	80	14.5	8	3.5		TO–92VAR
BF247B	25	250	75	5	60	140	14.5	8	3.5		TO–92VAR
BF247C	25	250	75	5	110	250	14.5	8	3.5		TO–92VAR
BF256A	30	300	75	5	3	7		4.5	0.7	7.5	TO–92VAR
BF256B	30	300	75	5	6	13		4.5	0.7	7.5	TO–92VAR
BF256C	30	300	75	5	11	18		4.5	0.7	7.5	TO–92VAR
BF410A	20***	300	75	10	0.7	3		2.5	0.3	1.5	TO–92VAR
BF410B	20***	300	75	10	2.5	7		4	0.3	1.5	TO–92VAR
BF410C	20***	300	75	10	6	12		6	0.3	1.5	TO–92VAR
BF410D	20***	300	75	10	10	18		7	0.3	1.5	TO–92VAR
BF510**	20	250	65	10	0.7	3		2.5	0.3	1.5	SOT–23
BF511**	20	250	65	10	2.5	7		4	0.3	1.5	SOT–23
BF512**	20	250	65	10	6	12		6	0.3	1.5	SOT–23
BF513**	20	250	65	10	10	18		7	0.3	1.5	SOT–23
2N3822	50	300	25	0.1	2	10	6	3		5*	TO–72(1)
2N3823	30	300	25	0.5	4	20	8	3.5		2.5*	TO–72(1)

* maximum value

** surface mounting devices; see page S153

*** asymmetrical

FIELD–EFFECT TRANSISTORS

General data

P–channel junction FETs for switching

For detailed information on these and other types see Data Handbook SC07

Voltage range 30 V

	ratings			characteristics								
type	$\pm V_{DS}$ V	P_{tot} at mW	T_{amb} °C	I_{GSS} max nA	$-I_{DSS}$ min mA	$-I_{DSS}$ max mA	$V_{GS(off)}$ max V	R_{DSon} max Ω	C_{rs} typ pF	t_{on} ns	t_{off} ns	case
BSJ174	30	400	25	1	20	135	10	85	4	7	15	TO–92
BSJ175	30	400	25	1	7	70	6	125	4	15	30	TO–92
BSJ176	30	400	25	1	2	35	4	250	4	35	35	TO–92
BSJ177	30	400	25	1	1.5	20	2.25	300	4	45	45	TO–92
BSR174*	30	300	50	1	20	135	10	85	4	7	15	SOT–23
BSR175*	30	300	50	1	7	70	6	125	4	15	30	SOT–23
BSR176*	30	300	50	1	2	35	4	250	4	35	35	SOT–23
BSR177*	30	300	50	1	1.5	20	2.25	300	4	45	45	SOT–23
PMBFJ174*	30	400	25	1	20	135	10	85	–	–	–	SOT–23
PMBFJ175*	30	400	25	1	7	70	6	125	–	–	–	SOT–23
PMBFJ176*	30	400	25	1	2	35	4	250	–	–	–	SOT–23
PMBFJ177*	30	400	25	1	1.5	20	2.25	300	–	–	–	SOT–23

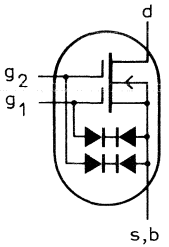
* surface mounting devices; see page S153

FIELD–EFFECT TRANSISTORS (cont.)

General data

Dual–gate n–channel MOS FETs

For detailed information on these and other types see Data Handbook SC07



S

type*	ratings			characteristics							case
	V_{DS} V	P_{tot} at mW	T_{amb} °C	I_{DSS} mA	$-V_{(P)GS}$ $-V_{(P)G1-S}$ V	C_{ig1-s} f = 1 MHz pF (typ)	$\lvert y_{fs}\rvert$ f = 1 kHz min mS	F max dB	at freq. MHz	
BF960	20	225	75	2–20	<3.5	1.8	9.5	2.8***	800	SOT–103
BF964S	20	225	75	4–20	<2.5	2.5	15	1.0***	200	SOT–103
BF965*	20	225	75	2–20	<2.5	2.5	15	1.0***	200	SOT–103
BF966S	20	225	75	4–20	<2.5	2.3	15	1.8***	800	SOT–103
BF980A	18	225	75	–	<1.3	2.6	17	2.8***	800	SOT–103
BF981*	20	225	75	4–25	<2.5	2.1	10	2.0	200	SOT–103
BF982*★	20	225	75	–	<1.3	4.0	20	1.2***	200	SOT–103
BF989**	20	200	60	2–20	<2.7	1.8	9.5	2.8***	800	SOT–143
BF990A**	18	200	60	–	<1.3	3.0	17	2.8***	800	SOT–143
BF990AR**	18	200	60	–	<1.3	3.0	18	2.8***	800	SOT–143R
BF991**	20	200	60	4–25	<2.5	2.1	10	2.0	200	SOT–143
BF992**	20	200	60	–	<1.3	4.0	20	1.2***	200	SOT–143
BF992R**	20	200	60	–	<1.3	4.0	20	1.2***	200	SOT–143R
BF994S**	20	300	25	4–20	<2.5	–	15	1.0***	200	SOT–143
BF994SR**	20	300	25	4–20	<2.5	–	15	1.0***	200	SOT–143R
BF996S**	20	300	25	4–20	<2.5	–	15	1.8***	800	SOT–143
BF996SR**	20	300	25	4–20	<2.5	–	15	1.8***	800	SOT–143R
BF997	20	200	60	2–20	<2.5	2.5	15	1.0***	200	SOT–143
BFR84	20	300	25	20–55	1.5–3.8	5.5	12	3.0	200	TO–72

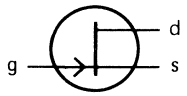
* all types protected against excessive input voltage surges
** surface mounting devices; see page S153
*** typical

FIELD–EFFECT TRANSISTORS (cont.)

General data

N–channel junction FETs for switching

For detailed information on these and other types see Data Handbook SC07



Status = P

type	ratings			characteristics							case
	$\pm V_{DS}$ V	P_{tot} mW	at T_{amb} °C	$-I_{GSS}$ (I_{SGO}) max pA	I_{DSS} min mA	$-V_{(P)GS}$ max V	R_{DSon} max Ω	C_{rs} max pF	t_{on} max ns	t_{off} max ns	
BSJ111	40	400	50	1000	20	10	30	–	–	–	TO–92
BSJ112	40	400	50	1000	5	5	50	–	–	–	TO–92
BSJ112	40	400	50	1000	2	3	50	–	–	–	TO–92
BSR56*	40	250	65	1000	50	10	25	5	9	25	SOT–23
BSR57*	40	250	65	1000	20	6	40	5	10	50	SOT–23
BSR58*	40	250	65	1000	8	4	60	5	20	100	SOT–23
BSR111*	40	300	25	1000	20	10	30	–	–	–	SOT–23
BSR112*	40	300	25	1000	5	5	50	–	–	–	SOT–23
BSR113*	40	300	25	1000	2	3	100	–	–	–	SOT–23
BSV78	40	350	25	250	50	11	25	5	10	10	TO–18
BSV79★	40	350	25	250	20	7	40	5	18	16	TO–18
BSV80★	40	350	25	250	10	5	60	5	30	32	TO–18
PMBF4391*	40	250	65	1000	50	10	30	3.5	15	20	SOT–23
PMBF4392*	40	250	65	1000	25	5	60	3.5	15	35	SOT–23
PMBF4393*	40	250	65	1000	5	3	100	3.5	15	50	SOT–23
PN4391	40	250	65	1000	50	10	30	5	15	20	TO–92
PN4392	40	250	65	1000	25	5	60	5	15	35	TO–92
PN4393	40	250	65	1000	5	3	100	5	15	50	TO–92
2N3966	30	300	25	100	2	6	220	1.5	120	100	TO–72(1)
2N4091	40	1800	25		30	10	30	5	25	40	TO–18
2N4092	40	1800	25		15	7	50	5	35	60	TO–18
2N4093	40	1800	25		8	5	80	5	60	80	TO–18
2N4391	40	1800	25	100	50	10	30	3.5	15	20	TO–18
2N4392	40	1800	25	100	25	5	60	3.5	15	35	TO–18
2N4393	40	1800	25	100	5	3	100	3.5	15	50	TO–18
2N4856	40	360	25	250	50	10	25	8	9	25	TO–18
2N4857	40	360	25	250	20	6	40	8	10	50	TO–18
2N4858	40	360	25	250	8	4	60	8	20	100	TO–18
2N4859	30	360	25	250	50	10	25	8	9	25	TO–18
2N4860	30	360	25	250	20	6	40	8	10	50	TO–18
2N4861	30	360	25	250	8	4	60	8	20	100	TO–18

* surface mounting devices; see page S153

N–channel MOS FETs for switching

For detailed information on these and other types see Data Handbook SC07

Voltage range 10 to 20 V

S

N–channel MOS FETs for switching
Status = P

type	ratings			characteristics							mode	case
	V_{DS} V	P_{tot} mW	at T_{amb} °C	$\pm I_{GSS}$ max nA	I_{DSX} I_{SDX} max nA	$r_{ds\ on}$ I_D = 1 mA max Ω	$-V_{(P)GS}$ max V	t_{on} typ ns	t_{off} typ ns	C_{rss} typ pF		
BFR29	15	200	25	0.01			4			<0.7	DEPL	TO–72
BSD10(2)	10	275	25		1	30	2	1	5	0.6	DEPL	TO–72(1)
BSD12(2)	20	275	25		1	30	2	1	5	0.6	DEPL	TO–72(1)
BSD20(2)**	10	230	25		1	30	2	1	5	0.6	DEPL	SOT–143
BSD212	10	275	25		1	45		1	5	0.6	ENH	TO–72(1)
BSD213(2)	10	275	25		1	45		1	5	0.6	ENH	TO–72(1)
BSD214	20	275	25		1	45		1	5	0.6	ENH	TO–72(1)
BSD215(2)	20	275	25		1	45		1	5	0.6	ENH	TO–72(1)
BSD22(2)**	20	230	25		1	30	2	1	5	0.6	DEPL	SOT–143
BSS83(2)	10	230	25		1	45*		1	5	0.6	ENH	SOT–143
BSV81★	30	200	25	0.01	1	100				0.5	DEPL	TO–72

* I_D = 0.1 mA
** surface mounting devices; see page S153
(2) protection

P– and N–channel D–MOS FETs for switching

For detailed information on these and other types see Data Handbook SC07

Voltage range 50 to 450 V

N–channel vertical D–MOS FETs for switching

	ratings				characteristics						
type	V_{DS} V	I_D mA	P_{tot} mW	at T_{amb} °C	$V_{GS(th)}$ min V	$V_{GS(th)}$ max V	C_{is} typ pF	R_{DSon} max Ω	t_{on} max ns	t_{off} max ns	case
BS107	200	120	250	75	0.8	2.8	70	28	10	25	TO–92VAR
BS107A	200	120			0.8	2.8		28	10	15	TO–92VAR
BS170	60	500	830	25	0.8	3.0	25	5	10	10	TO–92VAR
BSN205	200	300	1000	25	0.8	2.8	45	6	10	20	TO–92VAR
BSN205A	200	300	1000	25	0.8	2.8	45	6	10	20	TO–92VAR
BSN254	250	300	1000	25	0.8	2.0	65	6	5	10	TO–92VAR
BSN254A	240	300	1000	25	0.8	2.0	65	6	5	10	TO–92VAR
BSS87	200	300	1000	25	0.8	2.8	110	6	80	145	SOT–89
BSS89	200	300	1000	25	0.8	2.8	110	6	80	145	TO–92VAR
BSS91	200	300	1000	25	0.8	2.8	110	6	80	145	TO–18
BST70A	80	500	1000	25	1.5	3.5	60	4	10	15	TO–92VAR
BST72A	80	300	850	25	1.5	3.5	15	10	10	10	TO–92VAR
BST74A	200	250	1000	25	0.8	2.8	70	12	10	25	TO–92VAR
BST76A	180	300	1000	25	0.7	2.4	65	10	10	15	TO–92VAR
BST78	450	750	15000		2.0	4.0	75	14	10	100	TO–126
BST80**	80	500	1000	25	1.5	3.5	60	4	10	15	SOT–89
BST82**	80	175	300	25	1.5	3.5	15	10	10	10	SOT–23
BST84**	200	250	1000	25	0.8	2.8	70	12	10	25	SOT–89
BST86**	180	300	1000	25	0.7	2.4	65	10	10	15	SOT–89
BST95	200	2000	10000		1.0	3.0	120	2	10	25	TO–39
BST97	180	300	1500		0.7	2.7	50	10	10	15	TO–18
PH6659	35	750	1000	25	0.8	2.0	50	5	10	10	TO–92VAR
PH6660	60	500	1000	25	0.8	2.0	50	5	10	10	TO–92VAR
PH6661	90	500	1000	25	0.8	2.0	50	5.3	10	10	TO–92VAR
PMBF170	60	500	300	25	0.8	3.0	25	5	4	4	SOT–23
2N6659	35	1400	6250	25*	0.8	2.0	50	5	10	10	TO–39(3)
2N6660	60	1100	6250	25*	0.8	2.0	50	5	10	10	TO–39(3)
2N6661	90	900	6250	25*	0.8	2.0	50	5.3	10	10	TO–39(3)

P–channel vertical D–MOS FETs for switching

	ratings				characteristics					
type	$-V_{DS}$ V	$-I_D$ mA	P_{tot} mW	at T_{amb} °C	$V_{GS(th)}$ min V	$V_{GS(th)}$ max V	R_{DSon} max Ω	t_{on} max ns	t_{off} max ns	case
BS250	45	250	830	25	1	3.5	14	4	10	TO–92VAR
BST100	60	300	1000	25	1.5	3.5	6	4	20	TO–92VAR
BST110	50	250	830	25	1.5	3.5	10	4	10	TO–92VAR
BST120**	60	300	1000	25	1.5	3.5	6	4	20	SOT–89
BST122**	50	250	1000	25	1.5	3.5	10	4	10	SOT–89
BSS92	200	150	1000	25	0.8	2.8	20	20	50	TO–92VAR
BSP204	200	150	1000	25	0.8	2.8	10	20	50	TO–92VAR
BSP204A	200	150	1000	25	0.8	2.8	10	20	50	TO–92VAR

* at T_{case}

** surface mounting devices; see page S146

status = P for all types

FIELD–EFFECT TRANSISTORS General data

Dual N–channel junction FETs for differential amplifiers

For detailed information on these and other types see Data Handbook SC07

S

Note: BFQ..types: dual transistors in TO–71(1)
BFS..types: matched pairs in SOT–52

Status = P

	ratings			characteristics							
	individual transistor		total device	individual transistor			total device				
type	$\pm V_{DS}$ V	P_{tot} (T_{amb}) mW (°C)	P_{tot} (T_{amb}) mW (°C)	$-I_{GSS}$ max nA	I_{DSS} mA	$-V_{(P)GS}$ max V	$\lvert\Delta V_{GS}\rvert$ max mV	$\lvert\frac{d\Delta V_{GS}}{dT}\rvert$ max µV/K	$\lvert\Delta\frac{1}{g_{fs}}\rvert$ max Ω	$\lvert\Delta\frac{g_{os}}{g_{fs}}\rvert$ max µV/V	CMRR min dB
BFQ10	30					3.5	5	5	6	18	95
BFQ11	30					3.5	10	5	6	30	90
BFQ12	30					3.5	10	10	12	30	90
BFQ13	30					3.5	10	20	12	30	90
BFQ14	30					3.5	15	20	12	30	90
BFQ15	30					3.5	20	40	20	30	90
BFQ16	30					3.5	50	50	30	100	80
BFS21	30	300 (25)	30 (100)	0.5	> 1	6	20	75	15	1000	60
BFS21A							10	40	7.5	500	66

For detailed information on these and other types see Data Handbook SC08

Main r.f. power application areas with applicable transistors and modules, grouped according to voltage and (within each voltage group) arranged in order of increasing power.

Status = C

application	P_L (P.E.P) W	V_{CE} V	Gp dB	type	case
s.s.b. class-AB; f = 28 MHz					
d_3; d_5 < −30 dB	10	13.5	18	**BLY88C**	SOT-120
	10	13.5	18	**BLV11**	SOT-123
	15	13.5	18	**BLY89C★**	SOT-120
	15	13.5	18	**BLW87**	SOT-123
	30	12.5	18	**BLW60**	SOT-56
	30	12.5	18	**BLW60C★**	SOT-120
	30	12.5	18	**BLW85**	SOT-123
	80	12.5	12.5	**BLW99**	SOT-121
	10	28	20	**BLY92C**	SOT-120
	10	28	20	**BLV21**	SOT-123
	25	28	18	**BLX13★**	SOT-56
	25	28	18	**BLX13C**	SOT-120
	25	28	18	**BLW83**	SOT-123
	30	28	20	**BLF145**	SOT-123
	40	28	17	**BLX39**	SOT-120
	45	28	17	**BLW86**	SOT-123
	50	28	13	**BLX14**	SOT-55
	80	28	20	**BLF246**	SOT-121
	80	28	13	**BLW76★**	SOT-121
	100	28	19	**BLW78**	SOT-121
	130	28	12	**BLW77**	SOT-121
	150	28	17	**BLF147**	SOT-121
	175	28	11.5	**BLW97**	SOT-121
	50	50	18	**BLW50F**	SOT-123
	150	50	20	**BLF177**	SOT-121
	150	50	14	**BLX15**	SOT-55
	160	50	14	**BLW95**	SOT-121
	200	50	13.5	**BLW96**	SOT-121

R.F. POWER TRANSISTORS AND MODULES (cont.) Selection guide

R.F. power transistors (cont.)

For detailed information on these and other types see Data Handbook SC08

S

Status = C

application	P_L (P.E.P) W	V_{CE} V	Gp dB	type	case
s.s.b. class-A;					
f = 28 MHz;	1	12	18	**BLY87C**	SOT-120
d_3; d_5 < −40 dB	1	12	10.5	**BLV10**	SOT-123
	2	12	18	**BLY88C**	SOT-120
	2	12	7.5	**BLV11**	SOT-123
	6	12	18	**BLY89C★**	SOT-120
	6	12	18	**BLW87**	SOT-123
	1.3	26	20	**BLY91C**	SOT-120
	1.3	26		**BLV20**	SOT-123
	2.5	26	20	**BLY92C**	SOT-120
	2.5	26		**BLV21**	SOT-123
	8	26	18	**BLX13★**	SOT-56
	8	26	20	**BLX13C**	SOT-120
	10	26	20	**BLW83**	SOT-123
	15	26	18	**BLX39**	SOT-120
	17	26	20	**BLW86**	SOT-123
	30	26	18	**BLW78**	SOT-121
	16	45	19.5	**BLW50F**	SOT-123
	50	40	19	**BLW96**	SOT-121

R.F. POWER TRANSISTORS AND MODULES (cont.) Selection guide

R.F. power transistors/MOST

For detailed information on these and other types see Data Handbook SC08, SC09

Status = C

application	P_L W	V_{CE} V	f MHz	Gp dB	type	case
v.h.f. 28 – 50 V stations; class–B operation	1	28	175	15	**2N3866★**	TO–39/1
	3	28	175	14	**BLF241**	SOT–5/11
	4	28	175	16	**BFS23A**	TO–39/1
	5	28	175	16	**BLF242**	SOT–123
	8	28	175	12	**BLY91C**	SOT–120
	8	28	175	12	**BLV20**	SOT–123
	15	28	175	13	**BLF244**	SOT–123
	15	28	175	10	**BLY92C**	SOT–120
	15	28	175	10	**BLV21**	SOT–123
	25	28	175	9	**BLY93A★**	SOT–56
	25	28	175	9	**BLY93C**	SOT–120
	25	28	175	9	**BLW84**	SOT–123
	30	28	175	10	**BLF245**	SOT–123
	30	28	175	10	**BLF245B**	SOT–161
	45	28	175	7.5	**BLX39**	SOT–120
	45	28	175	7.5	**BLW86**	SOT–123
	50	28	175	7	**BLY94★**	SOT–55
	60	28	175	14	**BLF246A**	SOT–161
	80	28	108	16	**BLF246**	SOT–121
	80	28	175	6.5	**BLV80/26**	SOT–121
	80	28	108	8	**BLW76★**	SOT–121
	100	28	150	6	**BLW78**	SOT–121
	130	28	87.5	7.5	**BLW77**	SOT–121
	150	50	108	7.5	**BLX15**	SOT–55
	150	50	108	19	**BLF177**	SOT–121
	160	50	108	7	**BLW95**	SOT–121
	200	50	108	6.5	**BLW96**	SOT–121
	300	50	108	20	**BLF278**	SOT–262
	300	28	175	15	**BLF368**	SOT–262

R.F. POWER TRANSISTORS AND MODULES (cont.) Selection guide

R.F. power transistors/MOST (cont.)

For detailed information on these and other types see Data Handbook SC08, SC09

Status = C

application	P_L W	V_{CE} V	f MHz	Gp dB	type	case
v.h.f. mobile transmitters; class-B operation 12 – 13.5 V	1	12	175	10	**2N4427★**	TO-39/1
	2	12.5	175	10	**BLF221**	TO-39/3
	2	12.5	175	11	**BFQ42**	TO-39/1
	4	13.5	175	8	**BFS22A**	TO-39/1
	4	12.5	175	12	**BFQ43**	TO-39/3
	8	13.5	175	12	**BLY87C**	SOT-120
	8	13.5	175	9	**BLV10**	SOT-123
	15	13.5	175	10	**BLW29**	SOT-120
	15	13.5	175	7.5	**BLY88C**	SOT-120
	15	13.5	175	7.5	**BLV11**	SOT-123
	25	13.5	175	6	**BLY89A★**	SOT-56
	25	13.5	175	6	**BLY89C★**	SOT-120
	25	13.5	175	6	**BLW87**	SOT-123
	28	13.5	175	9	**BLW31**	SOT-120
	30	12.5	175	9	**BLF225**	SOT-123
	45	12.5	175	6.5	**BLV45/12**	SOT-119
	45	12.5	175	5	**BLW60**	SOT-56
	45	12.5	175	5	**BLW60C★**	SOT-120
	45	12.5	175	4.5	**BLW85**	SOT-123
	50	12.5	175	5	**BLY90**	SOT-55
	75	12.5	175	6.5	**BLV75/12**	SOT-119

R.F. POWER TRANSISTORS AND MODULES (cont.) Selection guide

R.F. power modules

For detailed information on these and other types see Data Handbook SC09

Status = C

application	P_L W	V_B V	f MHz	Gp dB	type	case
v.h.f. modules for mobile transmitters	13	12.5	148–174	19.4	**BGY43**	SOT–132B
	18	12.5	68–88	22.6	**BGY32**	SOT–132B
	18	12.5	80–108	22.6	**BGY33**	SOT–132B
	18	12.5	132–156	20.8	**BGY35**	SOT–132B
	18	12.5	148–174	20.8	**BGY36**	SOT–132B
	18	12.5	175–210	20.8	**BGY45C**	SOT–183
	29	12.5	68–88	23.0	**BGY45A**	SOT–183
	28	12.5	148–174	20.0	**BGY45B**	SOT–183
u.h.f. modules for mobile transmitters	1.4	9.6	400–440	15.0	**BGY46A**	SOT–181
	1.4	9.6	430–470	15.5	**BGY46B**	
	1.4	9.6	370–400	15.5	**BGY46D**	
	2	7.5	400–470	16.0	**BGY47A**	SOT–181
	3.2	9.6	400–470	18.0	**BGY47A**	SOT–181
	7.5	12.5	400–440	18.8	**BGY40A**	SOT–132C
	7.5	12.5	400–470	18.8	**BGY40B**	SOT–132C
	13	12.5	400–440	19.4	**BGY41A**	SOT–132C
	13	12.5	440–470	19.4	**BGY41B**	SOT–132C
	20.0	12.5	400–440	21.2	**BGY49A**	SOT–132
	20.0	12.5	440–470	21.2	**BGY49B**	SOT–132
s.h.f modules for portable and mobile transmitters	2.5	7.5	824–849	21	**BGY95A**	SOT–200
	2.5	7.5	890–915	21	**BGY95B**	SOT–200
	2.5	9.6	824–849	21	**BGY96A**	SOT–200
	2.5	9.6	890–915	21	**BGY96B**	SOT–200
	6.0	12.5	806–890	15.7	**BGY90A**	SOT–179
	6.0	12.5	870–950	15.7	**BGY90B**	SOT–179
	1.2	6.0	824–849	30.8	**BGY110A**	SOT–246
	1.2	6.0	872–905	30.8	**BGY110B**	SOT–246
	1.7	7.2	824–849	32.3	**BGY110D**	SOT–246
	1.7	7.2	872–905	32.3	**BGY110E**	SOT–246
	1.7	7.2	890–915	32.3	**BGY110F**	SOT–246
	6.0	12.5	806–890	23.0	**BGY91A**	SOT–233
	6.0	12.5	870–950	23.0	**BGY91B**	SOT–233

R.F. POWER TRANSISTORS AND MODULES (cont.) Selection guide

R.F. power transistors (cont.)

For detailed information on these and other types see Data Handbook SC08

Status = C

application	P_L W	V_{CE} V	V_B V	f MHz	Gp dB	type	case
air communication class–B transmitters (225–400 MHz)	30	28	–	400	10	**BLU50**	SOT–161
	45	28	–	400	9	**BLU51**	SOT–161
	60	28	–	400	8	**BLU52**	SOT–161
	100	28	–	400	6	**BLU53**	SOT–161
u.h.f. base stations class–B operation	1	28	–	470	7	**2N3866★**	TO–39/1
	1	28	–	470	11	**BLX91A**	SOT–48/1
	2	28	–	470	12	**BLW89**	SOT–122
	2.5	28	–	470	11	**BLX92A**	SOT–48/1
	4	28	–	470	11	**BLW90**	SOT–122
	7	28	–	470	8.5	**BLX93A**	SOT–48/1
	10	28	–	470	9	**BLW91**	SOT–122
	25	28	–	470	6	**BLX94A**	SOT–48
	25	28	–	470	6.5	**BLX94C**	SOT–122
	40	28	–	470	4.5	**BLX95**	SOT–56
u.h.f. mobile transmitters class–B operation	2	–	12.5	470	6	**BLX65**	TO–39/1
	2	–	12.5	470	9	**BLX65E**	TO–39/3
	2	–	12.5	470	9	**BLW79**	SOT–122
	2.5	–	12.5	470	8.5	**BLX67**	SOT–48/1
	4	–	12.5	470	8	**BLW80**	SOT–122
	5	–	12.5	470	10.5	**BLU99**	SOT–122
	7	–	12.5	470	11	**BLU97**	SOT–122
	7	–	12.5	470	5	**BLX68**	SOT–48/1
	10	–	12.5	470	6	**BLW81**	SOT–122
	20	12.5	12.5	470	7.8	**BLU20/12**	SOT–119
	20	–	13.5	470	4	**BLX69A**	SOT–48/2
	30	–	12.5	470	7.4	**BLU30/12**	SOT–119
	45	–	12.5	470	5.8	**BLU45/12**	SOT–119
	60	–	12.5	470	5.5	**BLU60/12**	SOT–119

R.F. POWER TRANSISTORS AND MODULES (cont.) Selection guide

R.F. power transistors (cont.)

For detailed information on these and other types see Data Handbook SC08

Status = C

application	P_L W	V_{CE} V	f MHz	Gp dB	type	case
900 MHz base stations	2	24	900	8	**BLV99**	SOT–172
class–B operation	14	24	900	8.5	**BLV98**	SOT–171
	30	24	900	7	**BLV97**	SOT–171
900 MHz mobile	0.5	12.5	900	9.5	**BLU98**	SOT–103
transmitters	0.75	7.5	900	8.5	**BLT90/SL**	SOT–172D
class–B operation	1	12.5	900	7.5	**BLV90;SL**	SOT–172;D
	1.5	7.5	900	6	**BLT91/SL**	SOT–172D
	2	12.5	900	6.5	**BLV91;SL**	SOT–172;D
	3	7.5	900		**BLT92/SL**	SOT–122D
	4	12.5	900	5.5	**BLU99**	SOT–122
	4	12.5	900	7.5	**BLV92**	SOT–171
	8	12.5	900	6.5	**BLV93**	SOT–171
	12.5	12.5	900	6	**BLV94**	SOT–171
	25	12.5	900	5.5	**BLV95**	SOT–171
f.m. broadcast	1	28	87.5–108	18	**2N3866★**	TO–39/3
transmitters	4	28	87.5–108	20	**BLW90**	SOT–122
class–B operation	15	28	87.5–108	15	**BLV21**	SOT–123
	45	28	87.5–108	11	**BLX39**	SOT–120
	45	28	87.5–108	11	**BLW86**	SOT–123
	100	28	87.5–108	8	**BLW78**	SOT–121
	175	28	87.5–108	10.5	**BLV25**	SOT–119

R.F. POWER TRANSISTORS AND MODULES (cont.) Selection guide

R.F. power transistors (cont.)

For detailed information on these and other types see Data Handbook SC08

S

TV transposer types for application in band III, IV and V.
Status = C

application	$P_o$sync W	V_{CE} V	f MHz	Gp dB	d_{im} dB	type	case
TV transposer circuits; band III; class-A operation	1.5	25	225	20	−60	**BLV30**	SOT-122
	5	25	225	16.5	−58	**BLV31**	SOT-122
	10	25	225	16	−55	**BLV32F**	SOT-160
	16	25	225	13.5	−55	**BLV33F**	SOT-119
	19	25	225	9	−55	**BLV33**	SOT-147
TV transmitter circuits; band III; class-AB operation	85*	28	225	10.5	–	**BLV33F**	SOT-119
	90*	28	225	6.5	–	**BLV33**	SOT-147
	120*	28	225	10	–	**BLV36**	SOT-161
	225	35	225		−8.5	**BLV38**	SOT-179
TV transposer circuits; band IV-V; class-A operation			860			**BFR96S**** ★	SOT-37
						BFQ34** ★	SOT-122
	0.5	25	860	11	−60	**BLW32**	SOT-122
	0.7		860		−60	**BFQ68****	SOT-122
	1.0	25	860	10	−60	**BLW33**	SOT-122
	1.8	25	860	9	−60	**BLW34**	SOT-122
	3.5	25	860	6.5	−60	**BLW98**	SOT-122
	6	25	860	8	−60	**BLV57**	SOT-161
TV transmitter circuits; band IV-V; class-AB operation	30*	25	860	7.0	–	**BLV59**	SOT-171
F.M. transmitter B.C. class B	250	28	108		−11	**BLV37**	SOT-179

* at 1 dB power gain compression.
** see also pages S124, S125 and Data Handbook 'Wideband transistors and hybrids (S10)'

R.F. POWER TRANSISTORS AND MODULES (cont.)

Alphanumeric list

For detailed information on these and other types see Data Handbook SC08, SC09

Status = C

type	case	mode of operation	V_{CE} V	frequency MHz	output power W	power gain dB
BFQ34★	SOT–122					
BFQ42	TO–39/1	c.w.; class–B	13.5	175	2	> 11
			12.5	175	2	typ 10.5
BFQ43;S	TO–39/3	c.w.; class–B	13.5	175	4	> 12
			12.5	175	4	typ 12
BFQ68	SOT–122					
BFQ135	SOT–172					
BFQ136	SOT–122					
BFQ270	SOT–172					
BFR96S★	SOT–37					
BFS22A	TO–39/1	c.w.; class–B	13.5	175	4	> 8
			12.5	175	4	typ 8
BFS23A	TO–39/1	c.w.; class–B	28	175	4	> 10
BGY...	see Modules page S120					
BLF...	see RF power MOST S...					
BLT90/SL	SOT–172D	c.w.; class–B	7.5	900	0.75	> 8.5
BLT91/SL	SOT–172D	c.w.; class–B	7.5	900	1.5	> 6
BLT92/SL	SOT–122D	c.w.; class–B	7.5	900	3	
BLU15/12	SOT–122	c.w.; class–B	12.5	470	15	> 7.8
BLU20/12	SOT–119	c.w.; class–B	12.5	470	20	> 7.8
BLU30/12	SOT–119	c.w.; class–B	12.5	470	30	> 7.4
BLU45/12	SOT–119	c.w.; class–B	12.5	470	45	> 5.8
BLU60/12	SOT–119	c.w.; class–B	12.5	470	60	> 5.5
BLU97	SOT–122	c.w.; class–B	12.5	470	7	> 8.5
BLU98	SOT–103	c.w.; class–B	12.5	900	0.5	> 8.0
BLU99	SOT–122	c.w.; class–B	12.5	470	5	> 10.5
			12.5	900	4	typ 7.0
BLV10	SOT–123	c.w.; class–B	13.5	175	8	> 9
			12.5	175	8	typ 10.5
		s.s.b.; class–A	12	28	1 (note 3)	18
BLV11	SOT–123	c.w.;class–B	13.5	175	15	> 8.0
			12.5	175	15	typ 7.5
		s.s.b.; class–A	12	28	2 (note 3)	18
		s.s.b.; class–AB	13.5	28	10 (note 4)	18
BLV20	SOT–123	c.w.; class–B	28	175	8	> 12
		s.s.b.; class–A	26	28	1.3 (note 3)	20
BLV21	SOT–123	c.w.; class–B	28	175	15	> 10
		s.s.b.; class–A	26	28	2.3 (note 3)	20
BLV25	SOT–119	c.w.; class–B narrow band	28	108	175	> 10

Notes
1. $P_{o\ sync}$ at $d_{im} < -60$ dB
2. $P_{o\ sync}$ at $d_{im} < -55$ dB
3. P.E.P. at $d_3 < -40$ dB
4. P.E.P. at d_3 typ. -30 dB
5. P.E.P.

R.F. POWER TRANSISTORS AND MODULES (cont.)

Alphanumeric list

For detailed information on these and other types see Data Handbook SC08, SC09

Status = C

type	case	mode of operation	V_{CE} V	frequency MHz	output power W		power gain dB	
BLV30	SOT–122	lin. ampl., class–A	25	225	1.5	(note 1)	>	18
			25	225	1.7	(note 1)	typ	20
BLV31	SOT–122	lin. ampl., class–A	25	225	5	(note 1)	>	15
			25	225	7	(note 1)	typ	16.5
BLV32F	SOT–160	lin. ampl., class–A	25	225	10	(note 2)	>	16
			25	225	12.5	(note 2)	typ	17.2
BLV33	SOT–147	lin. ampl., class–A	25	225	19	(note 2)	>	9
			25	225	26	(note 2)	typ	9.7
		lin. ampl., class–AB	28	225	90	(note 2)	typ	6.5
BLV33F	SOT–119	lin. ampl., class–A	25	225	16	(note 2)	>	13.5
			25	225	22	(note 2)	typ	14.8
		lin. ampl., class–AB	28	225	85	(note 2)	typ	10.5
BLV36	SOT–161	lin. ampl., class–AB	28	225	115		>	10
			28	225	115		typ	13.0
BLV37	SOT–179	F.M. b.c. transmitter class–B	28	108	250		>	11
BLV38	SOT–179	TV transmitter band III class–AB	35	225	225		>	8.5
BLV45/12	SOT–119	c.w.; class–B	12.5	175	45		>	6.5
BLV57	SOT–161	lin. ampl., class–A	25	860	6	(note 1)	>	8.0
			25	860	12 typ	(note 2)	typ	9
		c.w.; class–AB	25	860	38		typ	6.5
BLV59	SOT–161	lin. ampl., class–AB	25	860	30	(note 5)		7
BLV75/12	SOT–119	c.w.; class–B	12.5	175	75		>	6.5
BLV80/28	SOT–121	c.w.; class–B	28	175	80		>	6.5
BLV90	SOT–172	c.w.; class–B	12.5	900	1		>	7.5
BLV90/SL	SOT–172D	c.w.; class–B	12.5	900	1		>	7.5
BLV91	SOT–172	c.w.; class–B	12.5	900	2		>	6.5
BLV91/SL	SOT–172D	c.w.; class–B	12.5	900	2		>	6.5
BLV92	SOT–171	c.w.; class–B	12.5	900	4		>	7.5
BLV93	SOT–171	c.w.; class–B	12.5	900	8		>	6.5
BLV94	SOT–171	c.w.; class–B	12.5	900	12.5		>	6.0
BLV95	SOT–171	c.w.; class–B	12.5	900	22.5		>	5.5
BLV97	SOT–171	c.w.; class–B	24	900	30		>	7.0
BLV98	SOT–171	c.w.; class–B	24	900	14		>	8.5
BLV99	SOT–172	c.w.; class–B	24	900	2		>	8

Notes

1. $P_{o\ sync}$ at $d_{im} < -60$ dB
2. $P_{o\ sync}$ at $d_{im} < -55$ dB
3. P.E.P. at $d_3 < -40$ dB
4. P.E.P. at d_3 typ. -30 dB
5. at 1 dB compression

R.F. POWER TRANSISTORS AND MODULES (cont.)

Alphanumeric list

For detailed information on these and other types see Data Handbook SC08, SC09

Status = C type	case	mode of operation	V_{CE} V	frequency MHz	output power W		power gain dB	
BLW29	SOT-120	c.w.; class-B	13.5	175	15		>	10
			12.5				typ	10.5
BLW31	SOT-120	c.w.; class-B	13.5	175	28		>	9
			12.5	175	28		typ	9.5
BLW32	SOT-122	lin. ampl., class-A	25	860	0.5	(note 1)	>	11
			25	860	0.63	(note 1)	typ	12.2
BLW33	SOT-122	lin. ampl., class-A	25	860	1.0	(note 1)	>	10
			25	860	1.15	(note 1)	typ	10.5
BLW34	SOT-122	lin. ampl., class-A	25	860	1.8	(note 1)	>	9
			25	860	2.15	(note 1)	typ	10.2
BLW50F	SOT-123	s.s.b.; class-A	45	1.6–28	0–16	(note 3)	>	19.5
		s.s.b.; class-AB	50	1.6–28	10–65	(note 4)	typ	18
BLW60	SOT-56	c.w.; class-B	12.5	175	45		>	5.0
		s.s.b.; class-AB	12.5	1.6–28	3–30	(note 4)	typ	19.5
BLW60C	SOT-120	c.w.; class-B	12.5	175	45		>	5
		s.s.b.; class-AB	12.5	1.6–28	3–30	(note 4)	typ	19.5
BLW76★	SOT-121	s.s.b.; class-AB	28	1.6–28	8–80	(note 4)	>	13
		c.w.;class-B	28	108	80		typ	7.9
BLW77	SOT-121	s.s.b.; class-AB	28	1.6–28	15–130	(note 4)	>	12
		c.w.; class-B	28	87.5	130		typ	7.5
BLW78	SOT-121	c.w.; class-B	28	150	100		>	6
		s.s.b.; class-A	26	28	35	(note 3)	typ	19.5
		s.s.b.; class-AB	28	28	100	(note 4)	typ	19.0
BLW79	SOT-122	c.w.; class-B	12.5	470	2		>	9.0
			12.5	175	2		typ	13.5
BLW80	SOT-122	c.w.; class-B	12.5	470	4		>	8.0
			12.5	175	4		typ	15
BLW81	SOT-122	c.w.; class-B	12.5	470	10		>	6.0
			12.5	175	10		typ	13.5
BLW82	SOT-119	c.w.; class-B	12.5	470	30		>	5
			13.5	470	30		typ	5
BLW83	SOT-123	s.s.b.; class-A	26	1.6–28	0–10	(note 3)	>	20
		s.s.b.; class-AB	28	1.6–28	3–30	(note 4)	typ	21
BLW84	SOT-123	c.w.; class-B	28	175	25		>	9
BLW85	SOT-123	c.w.; class-AB	12.5	175	45		>	4.5
		s.s.b.; class-AB	12.5	1.6–28	3–30	(note 4)	typ	19.5
BLW86	SOT-123	c.w.; class-B	28	175	45		>	7.5
		s.s.b.; class-AB	28	1.6–28	5–47	(note 4)	typ	19
		s.s.b.; class-A	26	1.6–28	17	(note 3)	typ	22
		class-B	28	87.5–108	45		>	11

Notes

1. $P_{o\ sync}$ at $d_{im} < -60$ dB.
2. $P_{o\ sync}$ at $d_{im} < -55$ dB.
3. P.E.P. at $d_3 < -40$ dB.
4. P.E.P. at d_3 typ. -30 dB.

R.F. POWER TRANSISTORS AND MODULES (cont.)

Alphanumeric list

For detailed information on these and other types see Data Handbook SC08, SC09

Status = C

type	case	mode of operation	V_{CE} V	frequency MHz	output power W		power gain dB	
BLW87	SOT–123	c.w.; class–B	13.5	175	25		>	6
BLW89	SOT–122	c.w.; class–B	28	470	2		>	12
BLW90	SOT–122	c.w.; class–B	28	470	4		>	11
BLW91	SOT–122	c.w.; class–B	28	470	10		>	9
BLW95	SOT–121	s.s.b.; class–AB	50	1.6–28	20–160	(note 4)	>	14
BLW96	SOT–121	s.s.b.; class–AB	50	1.6–28	25–200	(note 4)	>	13.5
		c.w.; class–B	50	108	200		typ	6.5
		s.s.b.; class–A	40	28	50	(note 3)	typ	19
BLW97	SOT–121	s.s.b.; class–AB	28	1.6–28	175	(note 4)	>	11.5
BLW98	SOT–122	lin. ampl., class–A	25	860	3.5	(note 1)	>	6.5
			25	860	4.4	(note 1)	typ	7.0
BLW99	SOT–121	s.s.b.; class–AB	12.5	1.6–28	80	(note 4)	>	12.5
BLX13	SOT–56	s.s.b; class–A	26	28	0–8	(note 3)	>	18
		s.s.b.; class–AB	28	28	25	(note 4)	>	18
		c.w.; class–B	28	70	25		typ	17
BLX13C	SOT–120	s.s.b.; class–A	26	1.6–28	0.8	(note 3)	>	20
		s.s.b.; class–AB	28	1.6–28	3–25	(note 4)	typ	21
BLX14	SOT–55	s.s.b.; class–A	28	1.6–28	25	(note 3)	>	13
		s.s.b.; class–AB	28	1.6–28	7.5–50	(note 4)	>	13
		c.w.; class–B	28	70	50		>	7.5
		c.w.; class–B	28	30	50		typ	16
BLX15★	SOT–55	s.s.b.; class–AB	50	1.6–28	20–150	(note 4)	>	14
		s.s.b.; class–A	40	1.6–28	30	(note 3)	>	14
		c.w.; class–B	50	70	150		>	10
		c.w.; class–B	50	108	150		typ	7.4
BLX39	SOT–120	c.w.; class–B	28	175	45		>	7.5
		s.s.b.; class–AB	28	1.6–28	5–42.5	(note 4)	typ	19
		s.s.b.; class–A	26	1.6–28	15	(note 3)	typ	20
BLX65	TO–39/1	c.w.; class–B	13.8	470	2		typ	7
			12.5	470	2		>	6
			12.5	175	2		typ	12
BLX65E	TO–39/3	c.w.; class–B	12.5	175	2		typ	16
			12.5	470	2		>	9
BLX67	SOT–48/1	c.w.; class–B	13.8	470	1.5		typ	10
			13.8	470	3.0		typ	9.3
			12.5	470	2.5		>	8.5
			12.5	175	3.0		typ	20

Notes

1. $P_{o\ sync}$ at $d_{im} < -60$ dB
2. $P_{o\ sync}$ at $d_{im} < -55$ dB
3. P.E.P. at $d_3 < -40$ dB
4. P.E.P. at d_3 typ. -30 dB

R.F. POWER TRANSISTORS AND MODULES (cont.)

Alphanumeric list

For detailed information on these and other types see Data Handbook SC08, SC09

Status = C

type	case	mode of operation	V_{CE} V	frequency MHz	output power W	power gain dB
BLX68	SOT–48/1	c.w.; class–B	13.8	470	7	> 5.4
			13.8	470	7.8	typ 5.9
			12.5	470	7.0	> 5.0
			12.5	175	7.2	typ 12.6
BLX69A	SOT–48/2	c.w.; class–B	13.5	470	20	> 4
			12.5	470	17	> 4
			12.5	175	17	typ 11
BLX91A	SOT–48/1	c.w.; class–B	24	470	0.85	typ 12.3
			28	470	1.0	> 11
			28	470	1.45	typ 12.6
			28	1000	1.4	typ 5.4
BLX91CB	SOT–48/3	video cathode driver	28	'V_{CESM} max. 65 V; C_c typ. 3 pF'		
BLX92A	SOT–48/1	c.w.; class–B	24	470	2.4	typ 10.8
			28	470	2.5	> 11
			28	470	3.0	typ 11.7
			28	1000	2.5	typ 5.5
BLX93A	SOT–48/1	c.w.; class–B	24	470	7.0	typ 8.5
			28	470	7.0	> 8.5
			28	470	8.0	typ 9.0
			28	1000	5.0	typ 5.2
BLX94A	SOT–48/2	c.w.; class–B	28	470	25	> 6
BLX94C	SOT–122	c.w.; class–B	28	470	25	> 6.5
BLX95	SOT–56	c.w.; class–B	28	470	40	< 4.5
			28	175	40	typ 11
BLX98	SOT–48/2	class–A	25	860	3.5 (note 1)	> 5.0
			25	860	4.0 (note 1)	typ 5.5

Notes
1. $P_{o\ sync}$ at $d_{im} < -60$ dB
2. $P_{o\ sync}$ at $d_{im} < -55$ dB
3. P.E.P. at $d_3 < -40$ dB
4. P.E.P. at d_3 typ. -30 dB

R.F. POWER TRANSISTORS AND MODULES (cont.)

Alphanumeric list

For detailed information on these and other types see Data Handbook SC08, SC09

Status = C

type	case	mode of operation	V_{CE} V	frequency MHz	output power W	power gain dB
BLY87A★	SOT–48/2	c.w.; class–B	13.5 12.5	175 175	8 8	> 9 typ 9
BLY87C	SOT–120	c.w.; class–B	13.5 12.5	175 175	8 8	> 12 typ 11.5
BLY88A★	SOT–48/2	c.w.; class–B	13.5 12.5	175 175	15 15	> 7.5 typ 7.5
BLY88C	SOT–120	c.w.; class–B	13.5 12.5	175 175	15 15	> 8.0 typ 7.5
BLY89A★	SOT–56	c.w.; class–B	13.5	175	25	> 6
BLY89C★	SOT–120	c.w.; class–B	13.5	175	25	> 6
BLY90	SOT–55	c.w.; class–B	12.5	175	50	> 5.0
BLY91A	SOT–48/2	c.w.; class–B	28	175	8	> 12
BLY91C	SOT–120	c.w.; class–B	28	175	8	> 12
BLY92A	SOT–48/2	c.w.; class–B	28	175	15	> 10
BLY92C	SOT–120	c.w.; class–B	28	175	15	> 10
BLY93A★	SOT–56	c.w.; class–B	28	175	25	> 9
BLY93C	SOT–120	c.w.; class–B	28	175	25	> 9
BLY94★	SOT–55	c.w.; class–B	28	175	50	> 7
2N3375	TO–60	c.w.; class–B	28 28	100 400	7.5 > 3	> 8.8 > 4.8
2N3553★	TO–39(1)	c.w.; class–B class–B	28 28	175 87.5–108	2.5 1	> 10 > 18
2N3632	TO–60	c.w.; class–B	28	175	> 13.5	> 5.9
2N3866★	TO–39/1	c.w.; class–B	28	400	1	> 10
2N3924★	TO–39/1	c.w.; class–B	13.5	175	4	> 6
2N3926	TO–60	c.w.; class–B	13.5	175	7	> 5.4
2N3927	TO–60	c.w.; class–B	13.5	175	12	> 4.8
2N4427★	TO–39/1	c.w.; class–B	12	175	1	> 10

R.F. POWER TRANSISTORS AND MODULES (cont.)

Alphanumeric list

For detailed information on these and other types see Data Handbook SC08, SC09

Status = C

module type	case	mode of operation	$V_{S1.S2}$ V	frequency MHz	output power W	power gain dB
BGY32	SOT-132	c.w.	12.5	68–88	> 18	22.6
BGY33★	SOT-132	c.w.	12.5	80–108	> 18	22.6
BGY35	SOT-132	c.w.	12.5	132–156	> 18	20.6
BGY36★	SOT-132	c.w.	12.5	148–174	> 18	20.8
BGY40A	SOT-132	c.w.	12.5	400–440	> 7.5	18.8
BGY40B	SOT-132	c.w.	12.5	440–470	> 7.5	18.8
BGY41A	SOT-132	c.w.	12.5	400–440	> 13	19.4
BGY41B	SOT-132	c.w.	12.5	440–470	> 13	19.4
BGY43	SOT-132	c.w.	12.5	148–174	> 13	19.4
BGY45A	SOT-183	c.w.	12.5	68–88	> 29	20.0
BGY45B	SOT-183	c.w.	12.5	148–174	> 28	19.7
BGY45C	SOT-183	c.w.	12.5	170–210	> 18	23.5
BGY46A	SOT-181	c.w.	9.6	400–440	> 1.4	15.0
BGY46B	SOT-181	c.w.	9.6	430–470	> 1.4	15.0
BGY46D	SOT-181	c.w.	9.6	370–430	> 1.4	15.0
BGY47A	SOT-181	c.w.	7.5	400–470	> 2.0	18.0
BGY47A	SOT-181	c.w.	9.6	400–470	> 3.2	18.0
BGY49A	SOT-132	c.w.	12.5	400–440	> 20.0	21.2
BGY49B	SOT-132	c.w.	12.5	440–470	> 20.0	21.2
BGY90A	SOT-179	c.w.	12.5	806–890	> 6.0	17.5
BGY90B	SOT-179	c.w.	12.5	870–950	> 6.0	17.5
BGY91A	SOT-233	c.w.	12.5	806–890	> 6.0	23.0
BGY91B	SOT-233	c.w.	12.5	870–850	> 6.0	23.0
BGY95A	SOT-200	c.w.	7.5	825–845	> 2.2	20.4
BGY95B	SOT-200	c.w.	7.5	890–915	> 2.2	20.4
BGY96A	SOT-200	c.w.	9.6	825–845	> 2.5	21.0
BGY96B	SOT-200	c.w.	9.6	890–915	> 2.5	21.0
BGY110A	SOT-246	c.w.	6.0	824–849	> 1.2	30.8
BGY110B	SOT-246	c.w.	6.0	872–905	> 1.2	30.8
BGY110D	SOT-246	c.w.	7.2	824–849	> 1.7	32.3
BGY110E	SOT-246	c.w.	7.2	872–905	> 1.7	32.3
BGY110F	SOT-246	c.w.	7.2	890–915	> 1.7	32.3

R.F. POWER TRANSISTORS AND MODULES (cont.)

Alphanumeric list

For detailed information on these and other types see Data Handbook SC08, SC09

Status = C

type	case	mode of operation	V_D V	frequency MHz	output power W		power gain dB	
BLF145	SOT–123	s.s.b.; class–AB	28	28	30	(note 1)		20
		s.s.b.; class–A	28	28	8	(note 2)	>	24
BLF147	SOT–121	s.s.b.; class–AB	28	28	150	(note 3)	>	17
BLF175	SOT–123	s.s.b.; class–AB	50	28	30	(note 1)		23
		s.s.b.; class–A	50	28	8	(note 2)	>	24
BLF177	SOT–121	s.s.b.; class–AB	50	28	150	(note 3)	>	20
		c.w.; class–B	50	108	150			19
BLF221	TO–39/3	c.w.; class–B	12.5	175	2		>	10
BLF225	SOT–123	c.w.; class–B	12.5	175	30		>	9
BLF241	SOT–5/11	c.w.; class–AB	12.5	175	2		>	10
		c.w.; class–B	28	175	3		typ	14
BLF242	SOT–123	c.w.; class–B	28	175	5		>	13
		c.w.; class–B	28	400	5			13
BLF244	SOT–123	c.w.; class–B	28	175	15		>	13
		c.w.; class–B	28	400	15			11
		s.s.b.; class–AB	28	28	4	(note 2)		24
BLF245	SOT–123	c.w.; class–B	28	175	30		>	13
		c.w.; class–B	28	400	30			10
BLF245B	NO–354	c.w.; class–B	28	175	30		typ	10
BLF246	SOT–121	s.s.b.; class–AB	28	28	80	(note 3)		20
		c.w.; class–B	28	108	80		>	16
BLF246B	SOT–161	c.w.; class–B	28	175	60		>	14
BLF278	SOT–262	c.w.; class–B	50	108	300		>	20
BLF346	SOT–119	linear amp., class–A	28	225	typ 30	(note 4)	typ	16
BLF348	SOT–262	linear amp., class–A	28	225	typ 70	(note 4)	typ	13
BLF368	SOT–262	c.w.; class–AB	32	225	300		>	12
			28	175	300		typ	15
BLF378	SOT–262	c.w.; class–AB	50	225	250		>	14
BLF521	SOT–172D	c.w.; class–B	12.5	500	2		>	10
BLF522	SOT–171	c.w.; class–B	12.5	500	5		>	10
BLF543	SOT–171	c.w.; class–B	28	500	10		>	10
		c.w.; class–B	28	960	10		typ	8
BLF544	SOT–171	c.w.; class–B	28	500	20		>	11
		c.w.; class–B	28	960	20		typ	7
BLF544B	SOT–268	c.w.; class–B	28	500	20		>	12
BLF545	SOT–268	c.w.; class–B	28	500	40		>	11
BLF546	SOT–268	c.w.; class–B	28	500	80		>	10
BLF548	SOT–262	c.w.; class–B	28	500	150		>	10

Notes
1. P.E.P. at d_3 −35 dB
2. P.E.P. at d_3 < −40 dB
3. P.E.P. at d_3 < −30 dB
4. three tone method (vision carrier −8 dB, sound carrier −7 dB, sideband signal −16 dB), 0 dB corresponds to peak sync level at d_3 < −52 dB.

For detailed information on these and other types see Data Handbook SC14

The table gives the preferred npn transistors and their complements for wideband applications.
The sequence is the linear output voltage capability. The values for V_o, ITO and PL1 are typical.

f_T = 5 GHz

envelope	I_C (mA) / V_{CE} (V)									
			14 / 10	30 / 8	70 / 10	80 / 10	90 / 10	120 / 15	240 / 15	600 / 18
	V_o (mV)		150	425	700	700	750	1200	1600	2500
	ITO (dBm)		27	36	40	–	43	45	47	52
	PL1 (dBm)		8	17	21	–	24	26	28	33
SOT–37	*		BFR90A	BFR91A	BFR96S		BFQ34T			
	**		BFQ51	BFQ23	BFQ32S		BFQ54T			
SOT–23	*		BFR92A	BFR93A	BFR106					
	**		BFT92	BFT93						
SOT–89	*				BFQ19	BFQ18A				
	**				BFQ149					
SOT–122	*							BFQ34	BFQ68	BFQ136
	**							BFQ54		
SOT–103	*		BFG90A	BFG91A	BFG96		BFG34			
	**		BFG51	BFG23	BFG32		BFG54			
SOT–143	*		BFG92A	BFG93A						
SOT–173	*		BFP90A	BFP91A	BFP96					
	**		BFQ51C	BFQ23C	BFQ32C					
SOT–223	*			BFG94	BFG97		BFG35			
	*				BFG31		BFG55			
TO–72	*		BFQ53	BFQ22S	BFQ63					
	**		BFQ52	BFQ24	BFQ32M					

f_T = 7.5 GHz

envelope	I_C (mA) / V_{CE} (V)						
			15 / 8	50 / 8	100 / 10	120 / 18	180 / 18
SOT–37	*		BFQ65		BFR134		
SOT–23	*		BFQ67				
SOT–103	*		BFG65	BFG195	BFG134		
SOT–143	*		BFG67	BFG197			
SOT–172	*					BFQ135	BFQ270
SOT–173	*		BFQ66				
SOT–223	*			BFG198	BFG135		

* polarity = NPN
** polarity = PNP

Wideband transistors (cont.)

For detailed information on these and other types see Data Handbook SC14

type number	n–p–n or p–n–p	envelope	ratings V_{CEO} V	ratings I_C mA	ratings P_{tot} mW	characteristics f_T GHz	characteristics F at dB	characteristics f MHz
BF689K	n	TO–92	15	25	360	1.8	3.0	200
BF747	n	SOT–23	20	50	150	1.2	–	–
BF763	n	TO–92	15	25	500	1.8	5.0	800
BFG16A	n	SOT–223	25	150	1000	1.5	–	–
BFG17A	n	SOT–143	15	25	300	2.8	2.5	800
BFG23	p	SOT–103	12	35	180	5.0	3.7	800
BFG25AX	n	SOT–143X	8	1	50	5.0	2.5	1000
BFG31	p	SOT–223	15	100	1000	5.0	–	500
BFG32	p	SOT–103	15	75	700	4.5	4.3	800
BFG33	n	SOT–143	7	20	140	12	3	2000
BFG34	n	SOT–103	18	150	1000	3.7	2.3	800
BFG35	n	SOT–223	18	150	1000	4.0	2.3	800
BFG51	p	SOT–103	15	25	180	5.0	3.4	800
BFG54	p	SOT–103	18	150	1000	4.5	–	–
BFG55	p	SOT–223	18	150	1000	4.0	–	500
BFG65	n	SOT–103	10	50	300	7.5	3.0	2000
BFG67	n	SOT–143	10	50	300	7.5	3.0	2000
BFG67X	n	SOT–143X	10	50	300	7.5	3.0	2000
BFG90A	n	SOT–103	15	25	180	5.0	2.4	800
BFG91A	n	SOT–103	12	35	300	6.0	2.3	800
BFG92A	n	SOT–143	15	25	300	5.0	1.8	800
BFG92X	n	SOT–143X	15	25	300	5.0	2.4	800
BFG93A	n	SOT–143	12	35	300	6.0	1.6	800
BFG93X	n	SOT–143X	12	35	300	6.0	1.6	800
BFG94	n	SOT–223	12	80	1000	6.0	2.3	800
BFG96	n	SOT–103	15	150	700	5.0	3.7	800
BFG97	n	SOT–223	15	150	700	5.0	3.7	800
BFG134	n	SOT–103	18	150	1000	7.5	–	–
BFG135	n	SOT–103	10	150	1000	7.5	–	–
BFG195	n	SOT–103	10	100	500	7.5	1.9	800
BFG197	n	SOT–143	10	100	300	7.5	1.9	800
BFG197X	n	SOT–143X	10	100	300	7.5	1.9	800

all values are typical unless otherwise stated

Wideband transistors (cont.)

For detailed information on these and other types see Data Handbook SC14

G_{UM} at dB	f MHz	V_O* mV	PL1** dBm	ITO** dBm	I_C mA	V_{CE} V	type
16	200	–	–	–	–	–	**BF689K**
20	100	–	–	–	–	–	**BF747**
–	–	–	–	–	–	–	**BF763**
10	500	–	–	–	–	–	**BFG16A**
15.5	800	150	7	26	14	10	**BFG17A**
14.5	800	400	16	35	30	8	**BFG23**
12.5	1000	–	–	–	–	–	**BFG25AX**
12	800	600	–	–	70	10	**BFG31**
13.5	800	500	18	37	70	10	**BFG32**
13	2000	–	–	–	–	–	**BFG33**
14.5	800	750	22	41	90	10	**BFG34**
–	–	–	–	–	–	–	**BFG35**
16.5	800	150	7	26	14	10	**BFG51**
–	–	–	–	–	–	–	**BFG54**
11	800	750	–	–	100	10	**BFG55**
10.5	2000	–	–	–	–	–	**BFG65**
10	2000	–	–	–	–	–	**BFG67**
10	2000	–	–	–	–	–	**BFG67X**
19	800	150	8	27	14	10	**BFG90A**
17.5	800	425	17	36	30	8	**BFG91A**
9.5	2000	–	–	–	–	–	**BFG92A**
9.5	2000	–	–	–	–	–	**BFG92AX**
9	2000	–	–	–	–	–	**BFG93A**
9	2000	–	–	–	–	–	**BFG93AX**
14	800	425	–	–	30	8	**BFG94**
15	800	700	21	40	70	10	**BFG96**
–	–	–	–	–	–	–	**BFG97**
8	2000	–	–	–	100	10	**BFG134**
8	2000	–	–	–	100	10	**BFG135**
11	2000	–	–	–	–	–	**BFG195**
11	2000	–	–	–	–	–	**BFG197**
11	2000	–	–	–	–	–	**BFG197X**

all values are typical unless otherwise stated

* typical reference at d_{im} = –6 dB

** typical reference values

Wideband transistors (cont.)

For detailed information on these and other types see Data Handbook SC14

type number	n–p–n or p–n–p	envelope	ratings V_{CEO} V	ratings I_C mA	ratings P_{tot} mW	characteristics f_T GHz	characteristics F at dB	characteristics f MHz
BFG198	n	SOT–223	10	100	300	7.5	4.0	2000
BFP90A	n	SOT–173	15	30	250	5.0	2.4	800
BFP91A	n	SOT–173	12	50	350	6.0	2.3	800
BFP96	n	SOT–173	15	100	500	5.0	2.5	800
BFQ17	n	SOT–89	25	150	1000	1.2	–	–
BFQ18A	n	SOT–89	15	150	1000	3.6	–	–
BFQ19	n	SOT–89	15	75	500	5.0	–	–
BFQ22S	n	TO–72	12	35	150	5.0	1.9	500
BFQ23	p	SOT–37	12	35	180	5.0	2.4	500
BFQ23C	p	SOT–173	12	50	350	5.0	3.7	800
BFQ24	p	TO–72	12	35	150	5.0	2.4	500
BFQ32	p	SOT–37	15	75	500	4.2	3.8	500
BFQ32C	p	SOT–173	15	100	500	4.5	4.2	800
BFQ32M	p	TO–72	15	75	250	4.5	2.3	500
BFQ32S	p	SOT–37	15	100	700	4.5	4.3	800
BFQ33C	n	SOT–173	7	20	140	12.0	3.0	2000
BFQ34★	n	SOT–122	18	150	2250	3.9	8.0	500
BFQ34T	n	SOT–37	18	150	1000	3.7	–	–
BFQ51	p	SOT–37	15	25	180	5.0	2.4	800
BFQ51C	p	SOT–173	15	30	250	5.0	2.5	800
BFQ52	p	TO–72	15	25	150	5.0	2.7	500
BFQ53	n	TO–72	15	25	150	5.0	2.4	500
BFQ54	n	SOT–122	18	150	2250	4.5	–	–
BFQ54T	n	SOT–37	18	150	1000	4.5	–	–
BFQ63	n	TO–72	15	75	250	4.5	2.3	500
BFQ65	n	SOT–37	10	50	300	7.5	3.0	2000
BFQ66	n	SOT–173	10	50	350	7.5	3.0	2000
BFQ67	n	SOT–23	10	50	180	7.5	3.0	2000
BFQ270	n	SOT–172	18	180	3000	7.5	–	–
BFT25A	n	SOT–143X	8	1	50	5.0	2.5	1000

all values are typical unless otherwise stated

Wideband transistors (cont.)

For detailed information on these and other types see Data Handbook SC14

G_{UM} at dB	f MHz	V_O* mV	PL1** dBm	ITO** dBm	I_C mA	V_{CE} V	type
9	2000	–	–	–	50	8	**BFG198**
19.5	800	150	8	27	14	10	**BFP90A**
18.5	800	425	17	36	30	8	**BFP91A**
15	800	700	21	40	70	10	**BFP96**
6.5	800	–	–	–	–	–	**BFQ17**
–	–	700	21	40	80	10	**BFQ18A**
7.5	800	500	18	37	50	10	**BFQ19**
16	500	300	14	33	30	5	**BFQ22S**
16.5	500	300	14	33	30	5	**BFQ23**
15	800	400	16	35	30	8	**BFQ23C**
15	500	300	14	33	30	5	**BFQ24**
14	500	500	18	37	50	10	**BFQ32**
13	800	500	19	38	70	10	**BFQ32C**
11	500	–	–	–	–	–	**BFQ32M**
10	800	600	20	39	70	10	**BFQ32S**
13.3	2000	–	–	–	–	–	**BFQ33C**
16.3	500	1200	26	45	120	15	**BFQ34**
19.5	300	1000	24	43	100	10	**BFQ34T**
18	500	150	7	26	14	10	**BFQ51**
16.5	800	150	8	27	14	10	**BFQ51C**
17	500	150	7	26	14	10	**BFQ52**
18	500	150	7	26	14	10	**BFQ53**
16	500	900	–	–	–	–	**BFQ54**
18	300	200	–	–	–	–	**BFQ54T**
11.5	500	500	18	37	50	10	**BFQ63**
8	2000	–	–	–	–	–	**BFQ65**
11.5	2000	–	–	–	–	–	**BFQ66**
8	2000	–	–	–	–	–	**BFQ67**
8	2000	1600	–	–	–	–	**BFQ270**
12.5	1000	–	–	–	–	–	**BFT25A**

all values are typical unless otherwise stated

* typical reference at $d_{im} = -6$ dB

** typical reference values

Wideband transistors (cont.)

For detailed information on these and other types see Data Handbook SC14

type number	n–p–n or p–n–p	envelope	ratings V_{CEO} V	ratings I_C mA	ratings P_{tot} mW	characteristics f_T GHz	characteristics F at dB	characteristics f MHz
BFQ68	n	SOT–122	18	300	4500	4,0	–	–
BFQ135	n	SOT–172	18	150	2250	7,5	–	–
BFQ136	n	SOT–122	18	600	9000	4,0	–	–
BFQ149	p	SOT–89	15	75	1000	4.5	3.8	500
BFR53	n	SOT–23	10	50	250	2,0	5,0	500
BFR64	n	SOT–48	25	200	3500	1,0	6,0	200
BFR65	n	SOT–48	25	400	5000	> 1.0	–	–
BFR90	n	SOT–37	15	25	180	5.0	2.4	500
BFR90A	n	SOT–37	15	25	180	5.0	2.4	800
BFR91★	n	SOT–37	12	35	180	5.0	1.9	500
BFR91A	n	SOT–37	12	35	300	6.0	2.3	800
BFR92	n	SOT–23	15	25	200	5.0	2.4	500
BFR92A	n	SOT–23	15	25	200	5.0	2.4	800
BFR93	n	SOT–23	12	35	200	5.0	1.9	500
BFR93A	n	SOT–23	12	35	250	5.0	2.3	800
BFR94	n	SOT–48	25	150	3500	3.5	5.0	500
BFR95	n	TO–39	25	150	1500	3.5	9.0	200
BFR96★	n	SOT–37	15	75	500	5.0	3.3	500
BFR96S★	n	SOT–37	15	100	700	5.0	4.0	800
BFR106	n	SOT–23	15	100	350	4.0	3.6	800
BFR134	n	SOT–37	18	150	1000	7.5	–	–
BFS17	n	SOT–23	15	25	250	1.3	4.5	500
BFS17A	n	SOT–23	15	25	300	2.8	2.5	800
BFT24	n	SOT–37	5	2.5	30	2.3	3.8	500
BFT25	n	SOT–23	5	6.5	50	2.3	3.8	500
BFT92	p	SOT–23	15	25	200	5.0	2.7	500
BFT93	p	SOT–23	12	35	200	5.0	2.4	500
BFW16A★	n	TO–39	25	150	1500	1.2	< 6.0	200
BFW17A	n	TO–39	25	150	1500	1.1	–	–
BFW30	n	TO–72	10	50	250	1.6	< 5.0	500
BFW92	n	SOT–37	15	25	190	1.6	4.0	500
BFW92A	n	SOT–37	15	25	200	2.8	2.5	800
BFW93	n	SOT–37	10	50	190	1.7	< 5.0	500
BFX89	n	TO–72	15	25	200	1.2	3.3	200
BFY90	n	TO–72	15	25	200	1.4	2.5	200
2N918	n	TO–72	15	50	200	< 0.9	< 6.0	60

all values are typical unless otherwise stated

* typical reference at d_{im} = –6 dB

** typical reference values

WIDEBAND TRANSISTORS AND MODULES Type number survey

Wideband transistors (cont.)

For detailed information on these and other types see Data Handbook SC14

G_{UM} at dB	f MHz	V_O* mV	PL1** dBm	ITO** dBm	I_C mA	V_{CE} V	type
13	800	1600	28	47	240	15	**BFQ68**
8	2000	1200	–	–	–	–	**BFQ135**
12.5	800	2500	33	52	500	15	**BFQ136**
12	500	–	–	–	50	10	**BFQ149**
10.5	800	100	5	24	30	5	**BFR53**
–	–	–	–	–	–	–	**BFR64**
–	–	–	–	–	–	–	**BFR65**
19.5	500	150	7	26	14	10	**BFR90**
15	800	150	8	27	14	10	**BFR90A**
18	500	300	14	33	30	5	**BFR91**
14	800	425	17	36	30	8	**BFR91A**
18	500	150	7	26	14	10	**BFR92**
15	800	150	8	27	14	10	**BFR92A**
16.5	500	300	14	33	30	5	**BFR93**
14	800	425	16	35	30	8	**BFR93A**
13.5	500	700	21	40	90	20	**BFR94**
–	–	1000	24	43	80	18	**BFR95**
15.2	500	500	18	37	50	10	**BFR96**
11.5	800	700	21	40	70	10	**BFR96S**
11.5	800	250	–	–	30	6	**BFR106**
8	2000	–	–	–	–	–	**BFR134**
–	–	–	–	–	–	–	**BFS17**
13.5	800	150	7	26	14	10	**BFS17A**
17	500	–	–	–	–	–	**BFT24**
18	500	–	–	–	–	–	**BFT25**
18	500	150	7	26	14	10	**BFT92**
16.5	500	300	14	33	30	5	**BFT93**
–	–	–	–	–	–	–	**BFW16A**
–	–	–	–	–	–	–	**BFW17A**
–	–	100	5	24	30	6	**BFW30**
–	–	–	–	–	–	–	**BFW92**
13	800	150	7	26	14	10	**BFW92A**
10.5	800	100	5	24	30	5	**BFW93**
–	–	–	–	–	–	–	**BFX89**
–	–	–	–	–	–	–	**BFX90**
36	200	–	–	–	–	–	**2N918**

all values are typical unless otherwise stated

* typical reference at d_{im} = –6 dB

** typical reference values

Wideband transistors (cont.)

For detailed information on these and other types see Data Handbook SC14

Wideband transistors for medium and high resolution CRT monitors

type	npn pnp	envelope	BV_{CBO} (V) >	BV_{CEO} (V) >	I_C (mA) <	H_{FE} >	C_{CB} (pF)	T_j (°C)	$f_{T\,min}$ (MHz)
BFQ161	n	SOT–54	20	10	500	25	4.2	175	1000
BFQ162	n	SOT–32	20	10	500	25	4.2	175	1000
BFQ163	n	SOT–5	20	10	500	25	4.5	200	1000
BFQ231	n	SOT–54	100	65	300	20	1.6	150	1000
BFQ231A	n	SOT–54	115	95	300	20	1.6	150	1000
BFQ232	n	SOT–32	100	65	300	20	2.0	175	1000
BFQ232A	n	SOT–32	115	95	300	20	2.0	175	800
BFQ233	n	SOT–5	100	65	300	20	2.0	200	1000
BFQ233A	n	SOT–5	115	95	300	20	2.0	200	800
BFQ234	n	SOT–172	100	65	300	20	2.0	200	1000
BFQ235	n	SOT–128	100	65	300	20	2.0	175	1000
BFQ235A	n	SOT–128	115	95	300	20	2.0	175	800
BFQ251	p	SOT–54	100	65	300	20	1.9	150	1000
BFQ251A	p	SOT–54	115	95	300	20	1.9	150	800
BFQ252	p	SOT–32	100	65	300	20	2.5	175	1000
BFQ252A	p	SOT–32	115	95	300	20	2.5	175	800
BFQ253	p	SOT–5	100	65	300	20	2.5	200	1000
BFQ253A	p	SOT–5	115	95	300	20	2.5	200	800
BFQ254	p	SOT–172	100	65	300	20	2.5	200	1000
BFQ255	p	SOT–128	100	65	300	20	2.5	175	1000
BFQ255A	p	SOT–128	115	95	300	20	2.5	175	800
BFQ262	n	SOT–32	100	65	400	15	2.0	175	1000
BFQ262A	n	SOT–32	115	95	400	15	2.0	175	800
BFQ263	n	SOT–5	100	65	400	15	2.0	200	1000
BFQ263A	n	SOT–5	115	95	400	15	2.0	200	800
BFQ265	n	SOT–128	100	65	400	15	2.0	175	1000
BFQ265A	n	SOT–128	115	95	400	15	2.0	175	800
BFQ268	n	SOT–172	100	65	400	15	2.0	200	1000

Wideband modules for CATV

For detailed information on these and other types see Data Handbook SC14

type	power gain dB at 50 MHz	slope (cable equivalent) dB*	max flatness dB*	min return loss (input/output) dB*	min output–voltage dBmV
40 to 300 (330) MHz frequency range					
					dBmV[5]
BGY50	12.5 ±0.4	0.2–0.8	±0.2	20	61
BGY51	12.5 ±0.4	0.2–0.8	±0.2	20	63,5
BGY52	16.4 ±0.4	0–1	±0.1	20	61
BGY53	16.4 ±0.4	0–1	±0.1	20	63,5
BGY54	17.0 ±0.4	0–1	±0.1	20	61
BGY55	17.0 ±0.4	0–1	±0.1	20	63,5
BGY56	22.0 ±0.6	0–1	±0.2	20	61,5
BGY57	22.0 ±0.6	0–1	±0.2	20	64
BGY58	33.0 ±1.0	0.5–1.5	±0.3	20	64
BGY58A[8]	34.0 ±1.0	0.5–1.5	±0.3	20	64
BGY59	38.5 ±1.0	0–1.5	±0.3	18	64
BGY60[7]	33.5 ±1.0	0.5–1.5	±0.3	18	64

For note see next page.

General remarks

Source & load impedance of all devices = 75 Ω

Characteristics of all devices specified at T_{mb} = 30 °C

For further information please consult the relevant data sheet.

For detailed information on these and other types see Data Handbook SC14

2nd order beat		composite triple beat	cross-modulation	max noise figure	total d.c. current consumption		
dB	dB	dB	dB	dB*	mA[6]		type
40 to 300 (330) MHz frequency range (cont.)							
max	–	32 chs[4]	32 chs[4]		typ	max	
−71[2]	–	−65	−60	7.0	160	180	**BGY50**
−73[2]	–	−67	−65	8.0	200	220	**BGY51**
−71[2]	–	−65	−60	6.0	160	180	**BGY52**
−73[2]	–	−67	−65	7.0	200	220	**BGY53**
−71[2]	–	−65	−60	6.0	160	180	**BGY54**
−73[2]	–	−67	−65	7.0	200	220	**BGY55**
−64[1]	–	−64	−59	6.0	160	180	**BGY56**
−66[1]	–	−66	−62	7.0	200	220	**BGY57**
−68[1]	–	−67	−65	6.0	320	340	**BGY58**
−70[2]	–	−67	−65	6.0	320	340	**BGY58A[8]**
−68[1]	–	–	–	6.0	320	340	**BGY59**
−66[1]	–	−67	−65	6.0	320	340	**BGY60[7]**

Notes:

* over operating frequency range

1) V_o = 50 dBmV, f_p = 66 MHz, V_o = dBmV, f_q = 144 MHz; measured at $f_{(p+q)}$ = 210 MHZ
2) V_o = 50 dBmV: ch 2; V_o = 50 dBmV: ch 13; measured in ch R
3) V_o = 50 dBmV: ch G; V_o = 50 dBmV: ch N; measured in ch H14
4) V_o = 46 dBmV measured in ch W
5) intermodulation distortion = −60 dB (DIN 45004, para. 6.3: 3 tone) $V_p = V_o$; f_p = 287,25 MHz; $V_q = V_o - 6dB$; f_q = 294.25 MHz; $V_r = v_o - 6dB$; f_r = 296.25 MHz; measured at $f_{(p+q-r)}$ = 285.25 MHz
6) measured at 24 V d.c. supply
7) interstage amplifier module
8) BGY58A has operating frequency range from 40–330 MHz

Wideband modules for CATV (cont.)

For detailed information on these and other types see Data Handbook SC14

type	status	power gain dB	slope (cable equivalent) dB[1)]	max flatness dB[1)]	min return loss (input/output) dB	min output–voltage dBmV	
40 to 450 MHz frequency range (high dynamic range)							
		at 50 MHz			dB[13)]	dBmV[10)]	
BGY80	C	12.5 ±0.4	0.2–1.5	±0.2	18	61.5	
BGY81	C	12.5 ±0.4	0.2–1.5	±0.2	18	64	
BGY82	C	14.5 ±0.5	0.2–1.5	±0.2	18	61.5	
BGY83	C	14.5 ±0.5	0.2–1.5	±0.2	18	64	
BGY84	C	17.0 ±0.4	0.3–1.5	±0.2	18	60	
BGY84A	C	18.4 ±0.4	0.3–1.5	±0.2	18	60	
BGY84H	C	14.5–16.3	4.7–5.5	±0.2	18	61.5	
BGY85	C	17.0 ±0.4	0.3–1.5	±0.2	18	62.5	
BGY85A	C	18.4 ±0.4	0.3–1.5	±0.2	18	62.5	
BGY85H	C	14.5–16.3	4.7–5.5	±0.2	18	62.5	
BGY86	C	22.0 ±0.5	0.2–1.5	±0.2	18	60.0	
BGY87	C	22.0 ±0.5	0.2–1.5	±0.2	18	62.5	
BGY87B	C	27.0 ±0.8	0.5–2.5	±0.4	18	64	
BGY88	P	34.5 ±1.0	0.5–2.5	±0.3	18	62	
BGY89	C	38.O ±1.0	0–2.5	±0.4	18	64	
Power doublers – 40 to 450 MHz frequency range							
		at 50 MHz			dB	dBmV[10)]	
BGD102	C	18.5 ±0.5	0.5–2.5	±0.3	18	–	
BGD104	C	20.0 ±0.5	0.5–2.5	±0.3	18	–	
BGD106	C	22.0 ±0.5	0–2.0	±0.3	18	67	
BGD108	C	36.0 ±1.0	0.5–2.0	±0.4	18	66	
BGD102E	C	18.5 ±0.5	0.5–2.0	±0.3	18[13)]	65	
BGD104E	C	20.0 ±0.5	0.5–2.0	±0.3	18[13)]	64.5	
40 to 550 MHz frequency range							
		at 50 MHz			dB	dBmV[10]	
BGY580	C	12.5 ±0.4	0.5–2.0	±0.2	18[13)]	59	
BGY581	C	12.5 ±0.4	0.5–2.0	±0.3	18[13)]	61.5	
BGY582	P	14.0 ±0.5	0.2–1.5	±0.2	18	59.0	
BGY583	P	14.0 ±0.5	0.2–1.5	±0.2	18	61.5	
BGY584	C	17.2 ±0.5	0.5–2.0	±0.2	18[13)]	59.0	
BGY584A	C	18.2 ±0.5	0.5–2.0	±0.2	18[13)]	59.0	
BGY585	P	17.2 ±0.5	0.5–2.0	±0.2	18[13)]	61.5	
BGY585A	C	18.2 ±0.5	0.5–2.0	±0.2	18[13)]	61.5	
BGY586	C	22.0 ±0.5	0.5–2.0	±0.2	18[13)]	58.5	
BGY587	C	22.0 ±0.5	0.5–2.0	±0.2	18[13)]	61.0	
BGY587B	C	27.0 ±0.8	0.5–2.5	±0.4	18	61.5	
BGY588	C	34.5 ±1.0	0.5–2.5	±0.3	16	61.0	

For notes see page S132
CECC approved types available

WIDEBAND TRANSISTORS AND MODULES (cont.) General data

Wideband modules for CATV (cont.)

For detailed information on these and other types see Data Handbook SC14

2nd order beat		max composite triple beat	max cross-modulation	max noise figure	total d.c. current consumption[4]		max r.f. input voltage	
dB	dB	dB	dB	dB[1]	mA	mA	dBmV	type
40 to 450 MHz frequency range (high dynamic range) cont.								
typ[2]	max[3]	60 chs[5]	60 chs[6]		typ	max		
–	−72	−58	−59	8.0	180	200	65	**BGY80**
–	−74	−61	−62	9.0	220	240	65	**BGY81**
–	−72	−55	−56	7.0	180	200	60	**BGY82**
–	−72	−59	−59	8.0	220	240	60	**BGY83**
−80	−70	−55	−57	6.5	180	200	65	**BGY84**
−80	−72	−55	−58	6.5	180	200	65	**BGY84A**
–	−72	−59	−59	7.0	220	240	–	**BGY84H**
−80	−70	−58	−60	7.0	220	240	65	**BGY85**
−80	−72	−59	−61	7.0	220	240	65	**BGY85A**
	−72	−59	−61	7.0	220	240	–	**BGY85H**
	−68	−56	−55	6.0	180	200	60	**BGY86**
	−72	−60	−59	7.0	220	240	60	**BGY87**
–	−70	−60	−60	6.0	320	340	–	**BGY87B**
−80	−70	−58	−59	6.0	320	340	55	**BGY88**
–	−70	−58	−58	5.5	320	340	–	**BGY89**
Power doublers – 40 to 450 MHz frequency range, cont.								
	max[3]	60 chs[5]	60 chs [6]		typ	max		
–	−73	−65	−67	7.0	415	435	65	**BGD102**
–	−73	−64	−66	7.0	415	435	65	**BGD104**
–	−72	−64	−61	6.5	415	435	–	**BGD106**
–	−73	−65	−65	7.0	600	625	–	**BGD108**
–	−73	−65	−67	7.0	415	435	65	**BGD102E**
–	−73	−64	−66	7.0	415	435	65	**BGD104E**
40 to 550 MHz frequncy range, cont.								
	max[14]	77 chs[15]	77 chs[16]		typ	max		
–	−70	−56	−59	8.0	180	200	–	**BGY580**
–	−72	−59	−62	9.0	220	240	–	**BGY581**
–	−70	−55	−58	7.5	180	200	60	**BGY582**
–	−72	−59	−61	8.5	220	240	60	**BGY583**
	−68	−56	−59	7.0	180	200	60	**BGY584**
–	−70	−56	−59	7.0	180	200	60	**BGY584A**
–	−70	−59	−62	8.0	220	240	60	**BGY585**
–	−72	−59	−62	8.0	210	240	60	**BGY585A**
–	−62	−53	−55	6.5	180	200	60	**BGY586**
–	−66	−57	−59	7.0	220	240	60	**BGY587**
–	−68	−57	−62	6.5	320	340	–	**BGY587B**
–	−68	−57	−59	6.5	320	340	–	**BGY588**

For notes see page S132
CECC approved types available

Wideband modules for CATV (cont.)

For detailed information on these and other types see Data Handbook SC14

type	status	power gain dB	slope (cable equivalent) dB[1]	max flatness dB[1]	min return loss (input/output) dB	min output-voltage dBmV	
Power doubler – 40 to 550 MHz frequency range							
		at 50 MHz			dB		
BGD502	P	18.5 ±0.5	0.2–2.2	±0.3	18[13]	64.0	
BGD504	C	20.0 ±0.5	0.2–2.0	±0.3	18	63.5	
BGD506	C	22.0 ±0.5	0–2.0	±0.3	18	63.0	
BGD508	C	36.0 ±0.5	0–2.0	±0.3	18	63.0	
40 to 860 MHz frequency range.							
		at 50 MHz			dB		
BGX885	–	17.0 ±0.5	0.2–1.2	±0.3	20	61.0	
Reverse amplifiers – 5 to 200 MHz frequency range							
		at 10 MHz			dB[1]	dBmV[11]	dBmV[12]
BGY61	C	13.0 ±0.5	−0.2 – +0.5	±0.2	20	67	64
BGY65	C	18.5 ±0.5	−0.2 – +0.5	±0.2	20	67	64
BGY67	C	22.0 ±0.5	−0.2 – +0.5	±0.2	20	67	64
BGY67A	C	24.0 ±0.5	−0.2 – +0.5	±0.2	20	67	64

For notes see page S132

Wideband modules for CATV (cont.)

For detailed information on these and other types see Data Handbook SC14

2nd order beat		max composite triple beat	max cross-modulation	max noise figure	total d.c. current consumption[4]		max r.f. input voltage	
dB	dB	dB	dB	dB[1]	mA	mA	dBmV	type
Power doubler – 40 to 550 MHz frequency range, cont.								
	max[14]	77 chs[15]	77 chs[16]		typ	max		
–	−73	−65	−68	8.0	415	435	60	**BGD502**
–	−70	−64	−67	8.0	415	435	60	**BGD504**
–	−68	−63	−63	7.0	415	435	60	**BGD506**
–	−70	−63	−65	7.5	600	625	55	**BGD508**
40 to 860 MHz frequency range.								
	max[14]	77 chs[15]	77 chs[16]		typ	max		
–	−53	–	–	8.0	220	240	60	**BGX885**
Reverse amplifiers – 5 to 200 MHz frequency range, cont.								
	max[8]	22 chs[7]	22 chs[9]		typ	max		
–	−72	−68	−61	7.0	200	230	67	**BGY61**
–	−72	−68	−61	5.5	200	230	65	**BGY65**
–	−67	−67	−60	5.5	200	230	63	**BGY67**
–	−67	−67	−59	5.5	200	230	63	**BGY67A**

For notes see page S132.

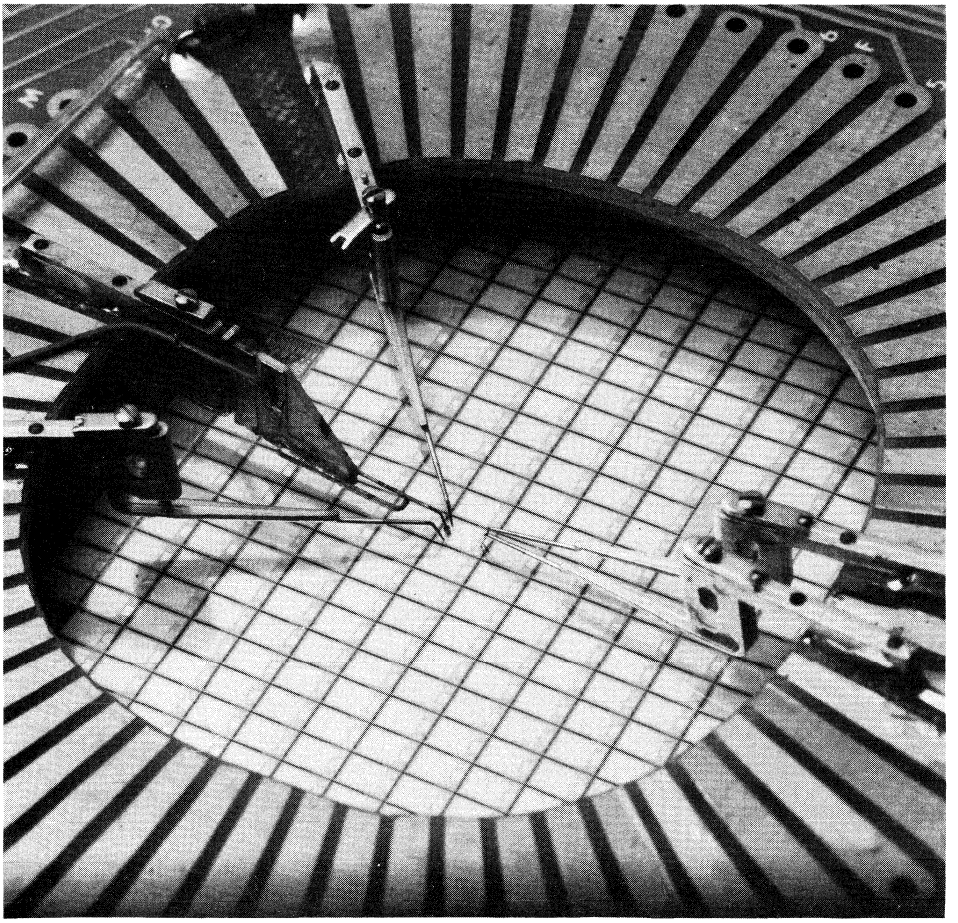
Wideband modules for CATV (cont.)

For detailed information on these and other types see Data Handbook SC14

General remarks
Source & load impedance of all devices = 75 Ω
Characteristics of power doubler specified at T_{mb} = 35 °C
Characteristics of other devices specified at T_{mb} = 30 °C
For further information please consult the relevant data sheet.

Notes:
1) over operating frequency range
2) V_o = 50 dBmV: ch 2; V_o = 50 dBmV: ch 13; measured in ch R
3) V_o = 46 dBmV; ch 2; V_o = 46 dBmV: ch H5; measured in ch H14
4) measured at 24 V d.c. supply
5) V_o = 46 dBmV measured in ch H22
6) V_o = 46 dBmV measured in channel 2
7) V_o = 50 dBmV measured in ch 7
8) V_o = 50 dBmV at 90 MHz; V_o = 50 dBmV at 100 MHz; measured at 190 MHz
9) V_o = 50 dBmV measured in channel 2
10) intermodulation –60dB; (DIN 45004, para. 6.3: 3 tone); $V_p = V_o$; f_p = 440.25 MHz; $V_q = V_o - 6dB$; f_q = 447,25 MHz; $V_r = V_o - 6dB$; f_r = 449.25 MHz; measured at f_{p+q-r} = 438.25 MHZ
11) as [10] but with f_p = 35,25 MHz; f_q = 42.25 MHz; f_r = 44.25; $f_{(p+q-r)}$ = 33.25 MHz
12) as [10] but with f_p = 187,25 MHz; f_q = 194.25 MHz; f_r = 196.25 MHz; $f_{p+q-r)}$ = 185.25 MHz
13) min. 20dB from 40–80 MHz; min. 19dB from 80–160 MHz; min. 18dB from 160–450 MHZ; (550 MHz)
14) V_o = 44 dBmV, ch 2; V_o = 44 dBmV, ch 18; measured in ch 27
15) measured in channel 27 with V_o = 44 dBmV
16) measured in channel 2 with V_o = 44 dBmV

PHILIPS

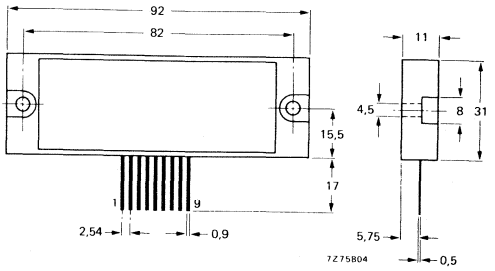


HYBRID INTEGRATED CIRCUITS

General data

L.F. power modules

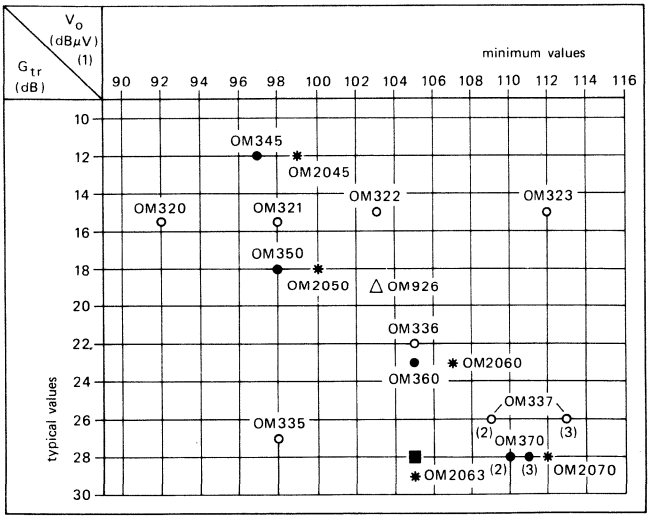
For detailed information on these and other types see Data Handbook SC05



type	P_o at $d_{tot} < 0{,}2\%$ $R_L = 4\ \Omega$	$R_L = 8\ \Omega$	d_{tot} at $D_o = 1$ W; f = 1 kHz
OM961	> 60 W at ±31 V	> 60 W at ±35 V	typ. 0.02%
OM991	> 120 W at ±45 V	> 120 W at ± 50 V	typ. 0.02%

Wideband amplifier modules: 40 – 860 MHz

For detailed information on these and other types see Data Handbook SC14



7Z83427.1

● 12 V types
○ 24 V types

S

Wideband modules

For detailed information on these and other types see Data Handbook S10

Frequency range	40 to 860 MHz
Source and load (characteristic) imp.	75 Ω
Operating ambient temperature	−20 to +70 °C
Operating mounting-base temperature: (OM323; A and OM337; A)	−30 to +100 °C
Pinning (except OM322)	suitable for 0.1-inch grid
Finish	resin coated

Conversion table for 75 Ω impedance

dBμV	mV	dBm
92	39.8	−16.75
98	79.4	−10.75
103	141.3	−5.75
105	177.8	−3.75
112	398.1	+3.25
113	446.7	+4.25

Typical characteristics at V_B = 24 V ±10%

type	gain $\|sf\|^2$ dB	V_o(rms)* dBμV	supply current mA	noise figure dB	max VSWR typical values input	max VSWR typical values output	dimensions L mm	dimensions H mm
OM320	15.5	92	23	5.5	2.2	2.5	30	12
OM321	15.5	98	33	6	2.5	2	30	12
OM322	15	103	60	7	1.7	1.7	–	–
OM323; A**	15	113	100	9	1.9	2.3	30	18
OM335	27	98	35	5.5	1.9	3.2	30	18
OM336	22	105	65	7	1.4	1.6	30	19
OM337; A**	26	112	115	9.8	2.3	1.8	30	18
OM339	28	105	67	6	1.5	1.5	30	19

Improved design techniques for h.f. performance resulted in reduced dimensions of the 12 V range.

Typical characteristics at V_B = 12 V ±10%

OM345	12	99	11.5	5.5	2.0	1.4	14	8
OM350	18	100	18	6	1.5	1.9	19	9
OM360	23	105	55	7	1.3	1.5	27	9
OM361	28	105	50	6	1.5	1.7	27	9
OM370	28	112	105	7	2.3	1.9	27	22
OM2045	12	99	11.5	3.6	2.0	1.4	14	8
OM2050	18	100	18	5.2	1.5	1.9	19	9
OM2060	23	105	55	5.4	1.3	1.5	27	9
OM2061	28	105	50	4.4	1.5	1.7	27	9
OM2070	28	112	105	4.8	2.3	1.9	27	22

* Min. output voltage at −60 dB intermodulation distortion (DIN 45004, par. 6.3: 3-tone, f = 470 MHz).

** The OM323A and OM337A need an external collector coil and output capacitor, the OM323 and OM337 have these built-in.

Inductive proximity detectors

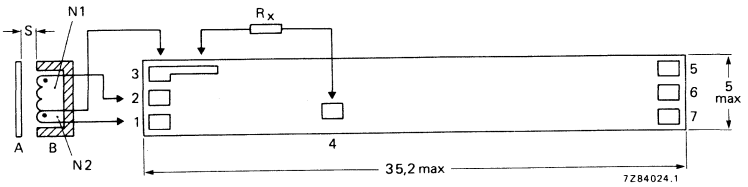
For detailed information on these and other types see Data Handbook SC17

stud type	OM type	LXW mm (max)	V_S V	I_O mA	false polarity protection	short cir/ load protec.	RX DISCR.	LED INTR.	CON.
M5	**2860 2870**	21.5x3	4.7 – 30	250	supply with spikes protection	transient protection	X	–	–
M8	**286**	32.5x5	4.5 – 30 **	50 – 250	supply	–	X	–	–
	286M 287M	22.6x5*	4.5 – 30	50 – 250	supply	–	X	–	–
	386B 387B	43.6x5	4.5 – 30	250	supply/load	yes	X	X	X
	386M 387M	22.5x5*	10 – 30	250	supply/load	yes	X	X	X
M12	**388B 389B**	25.6x5	10 – 30	250	supply/load	yes	X	X	X
	390	14.2x14.2	10 – 30	250	supply/load	yes	X	X	X

Inductive proximity detectors

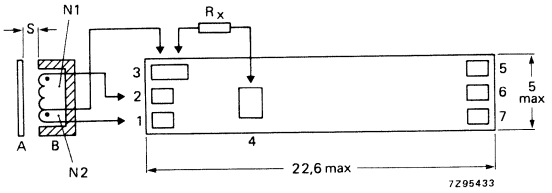
For detailed information on these and other types see Data Handbook SC17

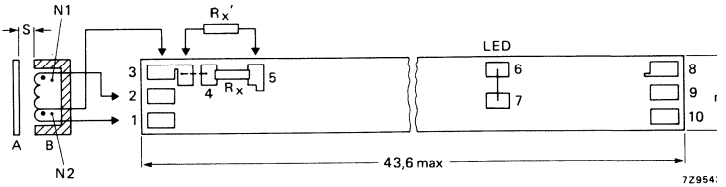
OM286/OM287



OM286M/OM287M

A = metal actuator
B = open potcore or potcore half with coil

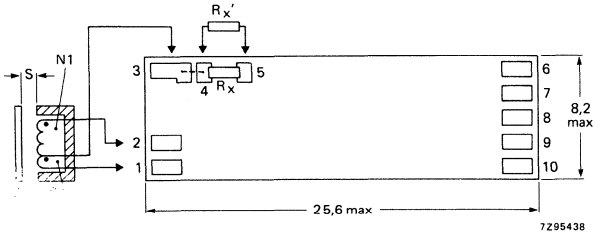




A = metal actuator
B = open potcore or potcore half with coil

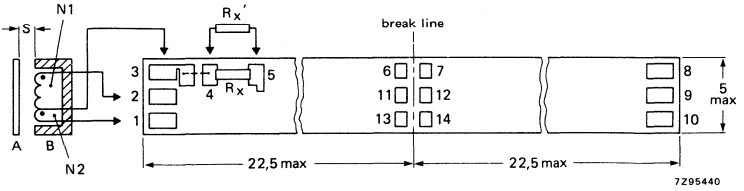
Mechanical outline and connections. Note that the supply polarities to points 8 and 10 are given for the OM386; for OM387 the polarities are point 8: $-V_B$ and point 10: $+V_B$.
S is the switching distance. The maximum height of the circuits including the substrate thickness is 1.7 mm.

For detailed information on these and other types see Data Handbook SC17



A = metal actuator
B = open potcore or
potcore half with coil

Mechanical outline and connections. Note that the supply polarities to points 5 and 7 are given for the OM286; for OM287 the polarities are point 5: $-V_B$ and point 7: $+V_B$.
S is the switching distance. The maximum height of the circuits including the substrate thickness is 1.7 mm.



Mechanical outline and connections. The supply polarities to points 8 and 10 are given for the OM386; for OM387 the polarities are point 8: $-V_B$ and point 10: $+V_B$. S is the switching distance.
The thickness of assembled hybrid (two parts glued together back to back) is max. 3.8 mm.

For detailed information on these and other types see Data Handbook SC17

New types

OM296: WBA for IF–satellite receiver
detailed information available on request
V_B = 15 V max
V_{out} = 101 dB/μV min
Gain = 18 dB typ
Bandwidth = 10 – 2000 MHz

Video amplifiers for high resolution displays
Detailed information available on request

type	V_B V	V_{in} V	V_{out} V	Bandwidth MHz
OM925	12	0 – 2.5	12 – 62	0 – 80/100
OM975	12	0 – 2.5	12 – 62[1)] 15 – 90[2)]	0 – 200/300

Drivers for video amplifiers

type	driver for	V_B V	V_{in} V	V_{out} V	Gain
OM3016	OM925	12	0.7	2	0 – 4X
OM3026	OM975	12	0.7	3.5	0 – 4.5X

1) if applied voltage = 70 V
2) if applied voltage = 90 V

Customized product capabilities

- Impartial advice for customers to choose between:
  pcb – Hybrid ICs – gate arrays or fully monolithic ICs
- Basic factory load guaranteed by standard catalogue hybrid modules
- Wide range of in–house surface mounted components and naked crystals
- Wide variety of application know–how
- Various factories with local or international approvals
  (e.g. CNET, CECC, AQUAP)
- Regular innovation of new technologies:
  High density with naked crystals
  Naked crystals in conformal coating
  Metallized via–holes
  Polyimide technology
  Full double–sided modules

For detailed information on these and other types see Data Handbook S8b

Currently available technologies:

- **Metallo–Organic Vapour Phase Epitaxy** (MOVPE); gain and index guided semiconductor lasers
- **Liquid Phase Epitaxy** (LPE) low cost index guided lasers with BTRS

type	techn.	wave–length λ nm	optical power P_o mW	threshold current I_{th} mA	operating current I_{op} mA	operating voltage V_{op} V
CQL20	LPE	790	3	30	40	1.8
CQL21	LPE	790	3	30	40	1.8
CQL60A*	MOVPE	820	5	70	90	2.2
CQL63A*	MOVPE	820	5	70	90	2.2
CQL61A*	MOVPE	820	20	90	115	2.2
CQL44A	MOVPE	825	35	45	105	2.1

All values typical at T = 25 °C

* Typical peak wavelengths of 850 and 875 nm are available

For detailed information on these and other types see Data Handbook S8b

Table continued from previous page

radiation angles		emission point accuracy					
parallel to junc. $\Theta_{\parallel}$ deg	perpen. to junc. $\Theta_{\perp}$ deg	angles $\Delta\theta_{\parallel}\Delta\theta_{\perp}$ deg	positio–nal hor/vert µm	differential efficiency mW/mA	polarity laser pin	type	techn.
11	35	2/3	50/30	0.35	positive	**CQL20**	LPE
11	35	2/3	50/30	0.35	positive	**CQL21**	LPE
32	36	2/3	50/30	0.40	negative	**CQL60A***	MOVPE
32	36	2/3	50/30	0.40	negative	**CQL63A***	MOVPE
21	27	2/3	50/30	0.70	negative	**CQL61A***	MOVPE
9	27	2/3	50/30	0.7	negative	**CQL44A**	MOVPE

All values typical at T = 25 °C

* Typical peak wavelengths of 850 and 875 nm are available

Collimator Pens

For detailed information on these and other types see Data Handbook S8b

The Philips range of collimated laser sources offers a host of unique features:
- a collimated laser beam with an optical power up to 20 mW
- a small (17 mm), rugged, low cost alternative to glass–tube lasers
- the high reliability of semiconductor lasers – life expectancy > 1 000 000 hours
- low power consumption 200–500 mW for MOVPE lasers, 100 mW for BTRS lasers

Collimated laser applications include:
- barcode scanners*
- target markers/range finders
- non–contact measurements
- Digital Optical Recording
- laser printers

* customized versions optional

type	techn.	wave–length λ nm	optical power P_o mW	threshold current I_{th} mA	operating current I_{op} mA	operating voltage V_{op} V	beam collimat. |col| deg	deviation optic./mech axes max. mrad
CQL30	LPE	790	2	30	45	1.8	0.6x0.3	5
CQL73	LPE	790	1	30	45	1.8	0.6	5
CQL70A*	MOVPE	820	2	70	90	2.2	0.3	5
CQL75A*	MOVPE	820	2	70	90	2.2	0.3	5
OF945***	MOVPE	820	20	70	150	4.0	0.35	10
CQL71A	MOVPE	820	10	90	115	2.2	0.30	5
CQL54A	MOVPE	820	20	50	140	2.1	0.6x0.3	5

All values typical at T = 25°C, unless otherwise stated
* Typical peak wavelengths of 850 and 870 nm are available
** continuous wave
*** pulsed

For detailed information on these and other types see Data Handbook S8b

Table continued from previous page

polarity laser pin	dimensions		weight		
	diameter Ø	length l			
	mm	mm	g	type	tech.
positive	11	27	13	**CQL30**	MOVPE
positive	8	17	4	**CQL73**	MOVPE
negative	11	27	13	**CQL70A***	MOVPE
negative	8	17	4	**CQL75A***	MOVPE
negative	11	27	13	**OF945*****	MOVPE
negative	11	27	13	**CQL71A**	MOVPE
negative	11	27	13	**CQL54A**	MOVPE

All values typical at T = 25°C, unless otherwise stated

* Typical peak wavelengths of 850 and 870 nm are available

** continuous wave

*** pulsed

Laser diodes for fibre–optic communication

For detailed information on these and other types see Data Handbook S8b

Features:
- choice of wavelengths suitable to all three fibre–optic communication windows
- DCPBH structure for high reliability, good quality and low optical feedback sensitivity
- coaxial encapsulation for high coupling efficiency
- DIL–14 TE–cooled housing coupled to SM or MM fibre
- low inductance DIL–14 packagedesigned for operation up to 4 Gbits/s
- connectable laser receptacle produced in accordance with FC, SMA or DIN standards
- manufactured under tight process control and with high–stress burn–in

type	struct–ure	wave–length λ_p nm	optical power P_o mW	operating current I_{op} mA	operating voltage V_{op} V	differential efficiency mW/mA	encapsulation	fibre specification
CQF55	DCPBH	1300	2	50	1.5	0.1	2	MM
CQF56	DCPBH	1300	1.5	50	1.5	0.05	2	SM
CQF58	DCPBH	1550	1.75	60	1.5	0.01	2	SM
CQF59	DCPBH	1300	0.2	40	1.5	0.15	3	SM
CQF60	DCPBH	1300	1	50	1.5	0.15	3	SM
CQF61	DCPBH/DFB	1550	0.75	50	1.5	0.03	3	SM
CQF62	DCPBH/DFB	1300	1.5	50	1.5	0.03	3	SM
CQF63	DCPBH	1300	3.0	50	1.5	0.2	4	non
CQF64	DCPBH	1300	0.2	50	1.5	0.01	5	SM
CQF65	DCPBH	1300	0.2	50	1.5	0.01	6	SM

type	beam guidance	laser diameter Ø mm	wavelength λ_p nm	optical power P_o mW	operating current I_{op} mA	operting voltage V_{op} V
CQF22/D31	index	9	790	2	50	1.8
CQF23/D21	index	5.6	790	2	50	1.8
CQF25A/D21	gain	5.6	820	2	100	2.0
CQF26H/D27	index	5.6	1300	0.2	50	1.5
CQF27A/D21	gain	9	820	2	100	2.0

Encapsulations: 1) DIL14, TE cooled, 11 mm height
2) DIL14, non–cooled, low profile, 5.3 mm height
3) DIL14, TE cooled, low inductance, high speed
4) TO242, flat window, 5.6 mm diameter
5) mini–coax 5.6 mm
6) DIL14, non–cooled, 8.2 mm height

For detailed information on these and other types see Data Handbook S8b

Table continued from previous page

differential efficiency	encapsulation			
mW/mA	receptacle mounting **	connectors standard	optional	type
0.2	4-hole flange	FC	SMA/DIN/ST	**CQF22/D31**
0.2	2-hole flange	FC	SMA/DIN/ST	**CQF23/D21**
0.2	2-hole flange	FC	SMA/DIN/ST	**CQF25A/D21**
0.01	2-hole flange	FC/SM	FC/PC	**CQF26H/D27**
0.2	2-hole flange	FC	SMA/DIN/ST	**CQF27A/D21**

** optional mountings: bulkhead; 4-hole flange; PC-board block

Laser diodes for fibre–optic communication (cont.)

For detailed information on these and other types see Data Handbook S8b

Features:
- ICC (Internal Current Confinement) structure for 1.3 µm LED based on InGaAsP compounds
- high reliability
- Precision TO–46 microlens and TO–46 flat window encapsulation
- matching emitter/receiver components

type	wave–length λ nm	coupled optical power P_{out} at µW	I_f mA	bandwidth MHz	recommended fibre diameter µm	encapsulation
CQF45	1300	15	100	150	50/125	TO–46 microlens
CQF46	1300	25	100	50	50/125	TO–46 microlens
CQF47	1550	10	100	150	50/125	TO–46 flat window
CQF48	1550	20	100	50	50/125	TO–46 flat window

PIN–receiver receptacles for fibre optic communication

type	sensitivity A/W	wavelength nm	reverse dark current nA	reverse voltage V	cutoff freq. f_3dB MHz	adaptor/ mounting*
BPF32/21	0.6	850	0.1	30	150	FC–2 hole flange
BPF32/22	0.6	850	0.1	30	150	SMA–2 hole flange
BPF32/23	0.6	850	0.1	30	150	ST–2 hole flange
CPF31/21	0.7	1300	2	15	1000	FC–PC–2 hole flange

* Other mounting options available

Laser diodes for fibre–optic communication (cont.)

For detailed information on these and other types see Data Handbook S8b

Receptacles

type	laser type	diam. Ø mm	wavelength λp nm	operating current I_{op} mA	operating voltage V_{op} V	optical* power P_o mW	rise/fall time t_z/t_f psec	adaptor type/ mounting***
CQF22/21	index	10	790	45	1.8	2	⩽500	FC–2 hole flange
CQF22/22	index	10	790	45	1.8	2	⩽500	SMA–2 hole flange
CQF22/23	index	10	790	45	1.8	2	⩽500	ST–2 hole flange
CQF23/21	index	8	790	45	1.8	2	⩽500	FC–2 hole flange
CQF23/22	index	8	790	45	1.8	2	⩽500	SMA–2 hole flange
CQF23/23	index	8	790	45	1.8	2	⩽500	ST–2 hole flange
CQF25A/21**	gain	8	820	90	2.2	2	⩽500	FC–2 hole flange
CQF25A/22**	gain	8	820	90	2.2	2	⩽500	SMA–2 hole flange
CQF25A/23**	gain	8	820	90	2.2	2	⩽500	ST–2 hole flange
CQF26/27	index	8	1300	40	1.5	0.2	<200	FC–PC–2 hole flange
CQF27A/21**	gain	10	820	90	2.2	2	⩽500	FC–2 hole flange
CQF27A/22**	gain	10	820	90	2.2	2	⩽500	SMA–2 hole flange
CQF27A/23**	gain	10	820	90	2.2	2	⩽500	ST–2 hole flange

* adaption of optical power levels possible
** optimal λp = 850 and 875 nm
*** other adaptor and mcunting options available

OPTOELECTRONIC DEVICES (cont.) Selection guide

Pyroelectric infrared detectors

For detailed information on these and other types see Data Handbook S8b

RPY98 series	–	–	–	–	–	B	●	–	●
RPY105 series	–	–	–	–	–	B	●	–	●
RPY106 series	–	–	–	–	–	B	●	–	
RPY99 series	–	–	–	–	–	–	B	●	B
RPY108	–	–	–	–	–	–	B	●	B
RPY104 series	–	–	–	–	–	–	B	★★	B

Key: ● = optimal
★ = capable
B = limited possibilty
– = not recommended

Pyroelectric infrared detectors

For detailed information on these and other types see Data Handbook S8b

single	DLATGS	+ +	TO39 3 lead	RPY98 series
single	DLATGS	+ +	TO39 3 lead	RPY105 series
single	DLATGS	+ +	TO39 3 lead	RPY106 series
single	DLATGS	+ +		RPY99 series
single	DLATGS	+ +		RPY108 series
single	DLATGS	+ +		RPY104 series

Key: + + = various

NOTES

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NOTES

NOTES

For detailed information on these and other types see Data Handbook SC12
Standard types, UL recognised and VDE approved

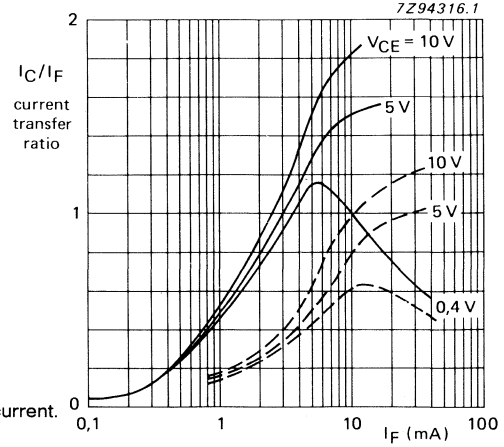


Fig.1 Typical current transfer ratio versus forward current.
Piece with a high I_C/I_F (CTR).
Piece with a low I_C/I_F (CTR).

type	case	C.T.R. I_F = 10 mA V_{CE} = 0.4 V min	C.T.R. I_F = 10 mA V_{CE} = 0.4 V max	$V_{(BR)CEO}$ min V	V_{IORM} peak kV (AC)	t_{on} typ I_C = 2 mA V_{CC} = 5 V R_L = 100 Ω µs	t_{off} typ I_C = 2 mA V_{CC} = 5 V R_L = 100 Ω µs	status
CNX39U	SOT–90B	0.6	1	30	4.4	5.5	4	P
CNX35U	SOT–90B	0.4	1.6	30	4.4	3	3	P
CNX36U	SOT–90B	0.8	2	30	4.4	8	6	P

* I_C = 4 mA

High voltage transistor output

type	case	C.T.R. I_F = 10 mA V_{CE} = 0.4 V min	C.T.R. I_F = 10 mA V_{CE} = 0.4 V max	$V_{(BR)CEO}$ min V	V_{IORM} peak kV (AC)	t_{on} typ I_C = 4 mA V_{CC} = 5 V R_L = 100 Ω µs	t_{off} typ I_C = 4 mA V_{CC} = 5 V R_L = 100 Ω µs	status
CNX38U★	SOT–90B	0.7	2.1	80	4.4	5	5	P

Darlington transistor output

type	case	C.T.R. I_F = 1 mA V_{CE} = 1 V min	$V_{(BR)CEO}$ min V	V_{IORM} peak kV (AC)	t_{on} typ I_F = 10 mA V_{CC} = 5 V R_L = 100 Ω µs	t_{off} typ I_F = 10 mA V_{CC} = 5 V R_L = 100 Ω µs	status
CNX48U	SOT–90B	5	30	4.4	5	30	P

For detailed information on these and other types see Data Handbook SC12

Standard types

Transistor output

type	case	C.T.R. I_F = 10 mA V_{CE} = 0.4 V min	C.T.R. I_F = 10 mA V_{CE} = 0.4 V max	$V_{(BR)CEO}$ min V	V_{IORM} peak kV (AC)	t_{on} typ I_C = 2 mA V_{CC} = 5 V R_L = 100 Ω µs	t_{off} typ I_C = 2 mA V_{CC} = 5 V R_L = 100 Ω µs	status
CNX35★	SOT–90B	0.4	1.6	30	4.4	3	3	P
CNX39	SOT–90B	0.6	1	30	4.4	5.5	4	P
CNX36★	SOT–90B	0.8	2	30	4.4	8	6	P

* I_C = 4 mA

High–voltage transistor output

type	case	C.T.R. I_F = 10 mA V_{CE} = 0.4 V min	C.T.R. I_F = 10 mA V_{CE} = 0.4 V max	$V_{(BR)CEO}$ min V	V_{IORM} peak kV (AC)	t_{on} typ I_C = 2 mA V_{CC} = 5 V R_L = 100 Ω µs	t_{off} typ I_C = 2 mA V_{CC} = 5 V R_L = 100 Ω µs	status
CNX38	SOT–90B	0.7	2.1	80	4.4	5	5	P

Darlington transistor output

type	case	C.T.R. I_F = 10 mA V_{CE} = 10 V min	$V_{(BR)CEO}$ min V	V_{IORM} peak kV (AC)	t_{on} typ I_C = 2 mA V_{CC} = 10 V R_L = 100 Ω µs	t_{off} typ I_C = 2 mA V_{CC} = 10 V R_L = 100 Ω µs	status
CNX48★	SOT–90B	6	30	4.4	5	30	P

* t_r, t_f

** I_F = 20 mA, R_{be} = 100 kΩ, R_L = 2kΩ

For detailed information on these and other types see Data Handbook SC12
Standard types, UL recognized or pending, VDE approved

Transistor output

type	case	C.T.R. I_F = 10 mA V_{CE} = 10 V min	$V_{(BR)CEO}$ min V	V_{IORM} peak kV (AC)	t_{on} typ I_C = 2 mA V_{CC} = 10 V R_L = 100 Ω µs	t_{off} typ I_C = 2 mA V_{CC} = 10 V R_L = 100 Ω µs	status
4N25A	SOT-90B	0.2	30	2.8	3*	3*	P
4N26	SOT-90B	0.2	30	2.8	3*	3*	P
4N27	SOT-90B	0.1	30	2.8	3*	3*	P
4N28	SOT-90B	0.1	30	2.8	3*	3*	P
4N25	SOT-90B	0.2	30	2.8	3*	3*	P
4N35	SOT-90B	1.0	30	4.4	7	5	P
4N36	SOT-90B	1.0	30	2.8	7	5	P
4N37	SOT-90B	1.0	30	2.8	7	5	P
H11A1	SOT-90B	0.5	30	2.8	3*	3*	P
H11A2	SOT-90B	0.2	30	2.8	3*	3*	P
H11A3	SOT-90B	0.2	30	2.8	3*	3*	P
H11A4	SOT-90B	0.1	30	2.8	3*	3*	P
H11A5	SOT-90B	0.3	30	2.8	3*	3*	P
MCT2	SOT-90B	0.2	30	4.4	5**	10**	P
MCT26	SOT-90B	0.06	30	4.4	3*	3*	P

High-voltage transistor output

type	case	C.T.R. I_F = 10 mA V_{CE} = 10 V min	$V_{(BR)CEO}$ min V	V_{IORM} peak kV (AC)	t_{on} typ I_C = 2 mA V_{CC} = 10 V R_L = 100 Ω µs	t_{off} typ I_C = 2 mA V_{CC} = 10 V R_L = 100 Ω µs	status
4N38	SOT-90B	0.2	80	2.82	5	5	P
4N38A	SOT-90B	0.2	80	2.82	5	5	P

* t_r/t_f
** I_F = 20 mA, R_{be} = 100 kΩ, R_L = 2kΩ

For detailed information on these and other types see Data Handbook SC12
Standard types, UL recognized, VDE approved

High-voltage transistor output

type	case	C.T.R. I_F = 10 mA V_{CE} = 5 V min	C.T.R. I_F = 10 mA V_{CE} = 5 V max	$V_{(BR)CEO}$ min V	V_{IORM} peak kV (AC)	t_{on} typ I_C = 2 mA V_{CC} = 10 V R_L = 100 Ω µs	t_{off} typ I_C = 2 mA V_{CC} = 5 V R_L = 100 Ω µs	status
CNY17-1	SOT-90B	0.4	0.8	70	4.4	5	5	P
CNY17-3	SOT-90B	1	2	70	4.4	5	5	P
CNY17-2	SOT-90B	0.63	1.25	70	4.4	5	5	P
CNY17-4	SOT-90B	1.6	3.2	70	4.4	5	5	P

Darlington transistor output

type	case	C.T.R. I_F = 10 mA V_{CE} = 5 V min	C.T.R. I_F = 10 mA V_{CE} = 5 V max	$V_{(BR)CEO}$ min V	V_{IORM} peak kV (AC)	t_{on} typ I_C = 2 mA V_{CC} = 10 V R_L = 100 Ω µs	t_{off} typ I_C = 2 mA V_{CC} = 5 V R_L = 100 Ω µs	status
H11B1	SOT-90B	5*	–	25	2.8	125[1]	100[1]	P
H11B2	SOT-90B	2*	–	25	2.8	125[1]	100[1]	P
H11B3	SOT-90B	1*	–	25	2.8	125[1]	100[1]	P
H11B255	SOT-90B	1	–	55	2.8	125[1]	100[1]	P
MCA230	SOT-90B	1	–	30	4.4	5[2]	100[2]	P
MCA231	SOT-90B	2	–	30	4.4	5[2]	100[2]	P
MCA255	SOT-90B	1	–	55	4.4	5[2]	100[2]	P
4N29	SOT-90B	1**	–	30	4.4	0.7[3]	25[3]	P
4N30	SOT-90B	1**	–	30	4.4	0.7[3]	25[3]	P
4N31	SOT-90B	0.5**	–	30	4.4	0.7[3]	25[3]	P
4N32	SOT-90B	5**	–	30	4.4	0.7[3]	25[3]	P
4N33	SOT-90B	5**	–	30	4.4	0.7[3]	25[3]	P

* I_F = 1 mA
** V_{CE} = 10 V

1) I_C = 10 mA
2) I_F = 10 mA
3) I_C = 50 mA, R_L = 180 Ω

For detailed information on these and other types see Data Handbook SC12
Types for mains applications, UL recognized, VDE approved

Types with input/output pin distance 15.24 mm

type	case	C.T.R. I_F = 10 mA V_{CE} = 0.4 V min	$V_{(BR)CEO}$ min V	V_{IORM} kV (AC) peak	t_{on} I_C = 2 mA V_{CC} = 5 V R_L = 100 Ω µs	t_{off} I_C = 2 mA V_{CC} = 5 V R_L = 100 Ω µs	status	
CNX21★	SOT-211	0.2	30	10	3	3	P	

Low current types with GaAlAs IR-LED

type	case	C.T.R. I_F = 10 mA V_{CE} = 4 V min	C.T.R. I_F = 10 mA V_{CE} = 4 V max	$V_{(BR)CEO}$ min V	V_{IORM} peak kV (AC)	t_{on} typ I_C = 2 mA V_{CC} = 5 V R_L = 100 Ω µs	t_{off} typ I_C = 2 mA V_{CC} = 5 V R_L = 100 Ω µs	status
CNG35	SOT-90B	0.4	1.6	30	4.4	3	3	P
CNG36	SOT-90B	0.8		30	4.4	8	6	P

For detailed information on these and other types see Data Handbook SC12
GaAlAs types for mains applications, UL recognized, VDE approved

Optocouplers for mains applications

type	case	C.T.R. I_F = 10 mA V_{CE} = 4 V min	C.T.R. I_F = 10 mA V_{CE} = 4 V max	$V_{(BR)CEO}$ min V	V_{IORM} peak kV (AC)	t_{on} typ I_C = 2 mA V_{CC} = 5 V R_L = 100 Ω µs	t_{off} typ I_C = 2 mA V_{CC} = 5 V R_L = 100 Ω µs	status
CNG82	SOT-212	0.4	1.6	50	5.3	3	3	P
CNG83	SOT-212	0.4		50	5.3	3	3	P

For detailed information on these and other types see Data Handbook SC12
For telephony applications approved by British Telecom

GaAlAs type, British Telecom

type	case	C.T.R. I_F = 10 mA V_{CE} = 0.5 V min	C.T.R. I_F = 10 mA V_{CE} = 0.5 V max	$V_{(BR)CEO}$ min V	V_{IORM} peak kV (AC)	t_{on} typ I_C = 2 mA V_{CC} = 10 V R_L = 100 Ω µs	t_{off} typ I_C = 2 mA V_{CC} = 10 V R_L = 100 Ω µs	status
PO40/44A	SOT-90B	0.6	1.5	30	3.5	7	7	P

High speed type, diode/transistor output

type	case	C.T.R. I_F = 10 mA V_{CE} = 4.5 V min	C.T.R. I_F = 10 mA V_{CE} = 4.5 V max	$V_{(BR)CEO}$ min V	V_{IORM} peak kV (AC)	t_{on} typ I_F = 10 mA V_{CC} = 5 V R_L = 2.5 kΩ µs	t_{off} typ I_F = 10 mA V_{CC} = 5 V R_L = 2.5 kΩ µs	status
CNR36	SOT-97F	0.2		18	3.5	0.8	0.8	P
6N135	SOT-97F	0.07		15	3.5	1.5	1.5	P
6N136	SOT-97F	0.19		15	3.5	0.8	0.8	P
SL5505S	SOT-97F	0.2	0.4	22	3.5	0.8	0.8	P

Optocouplers for mains applications

type	case	C.T.R. I_F = 10 mA V_{CE} = 0.4 V min	C.T.R. I_F = 10 mA V_{CE} = 0.4 V max	$V_{(BR)CEO}$ min V	V_{IORM} peak kV (AC)	t_{on} typ I_C = 2 mA V_{CC} = 5 V R_L = 100 Ω µs	t_{off} typ I_C = 2 mA V_{CC} = 5 V R_L = 100 Ω µs	status
CNX62A	SOT-230	0.4		50	5.3	3	3	P
CNX72A	SOT-229	0.4	1.6	30	5.3*	26[1]	2.5[1]	P
CNX82A	SOT-231	0.4		50	5.3	3	3	P
CNX83A	SOT-231	0.4		50	5.3	3	3	P
CNW82	SOT-228	0.4		50	8.3	3	3	P
CNW83	SOT-228	0.4		50	8.3	3	3	P

1) t_{on}/t_{off} = max values. R_{BE} = 56 kΩ. R_L = 1 kΩ.
2) t_{on}/t_{off} measured at I_F.
3) I_F = 16 mA.
* for VDE 4.4 kV

CNX82A/83A and CNW82/83 have 10.16 mm pin spacing
CNX82A and CNW82 have no base connection

LCDs features and product options

For detailed information on these types see Data Handbook SC18

FEATURES of LCDs
- very low power consumption
- low operating voltage
- easy to drive/CMOS compatible
- excellent legibility under most ambient light conditions
- expected life time > 100 000 hours

AVAILABLE PRODUCT VARIATIONS
- reflective, transflective or transmissive versions
- positive or negative image
- various electro–optical specifications
- commercial or extended temperature ranges
- connection with fixed pins or for elastomer connector (elastomer connectors not supplied)

STANDARD PRODUCTS
A range of standard products are available. For more information refer to Data Handbook.

Standard LCD cells
A range of standard LCD cells are available for multiple applications e.g. clocks, counters, point of sales equipment etc.

Standard LCD modules
A range of standard LCD modules are available for multiple applications. An LCD module combines an LCD cell with driver circuitry in a compact unit. Our LCD modules are classified as:

segment types (mainly for application in telephony equipment)
character types, displaying 1 or more lines of 5 x 7 characters (used in a variety of applications e.g. typewriters, point of sales equipment etc).
flat panels (also known as dot matrix types) intended for full graphic applications e.g. PCs, measuring equipment etc.

LCDs custom design facilities

For detailed information on these types see Data Handbook SC18

CUSTOM DESIGN FACILITIES
We offer a complete custom design service for LCD cells in which the following can be customer specified:

- dimensions
- display pattern
- electro–optical characteristics
- connection method

Our custom design facility has been divided into two categories: semi–standard products and custom products each category has different priorities on design flexibility versus development cost.

Semi–standard products are a custom designed display pattern incorporated with a variety of standard options. These options include a range of standard glass sizes and a selection of electro–optical characteristics. Semi–standard products are characterized by simple product definition, fast development time and low development cost.

For more information please refer to the Data Handbook which has a section dedicated to semi–standard products, or to the nearest Philips Components sales organization (see back cover for details).

Custom products offer more flexibility in dimensions and electro–optical characteristics and are best suited to when semi–standard products do not meet with user requirements.

For more information please refer to the Data Handbook which has a section dedicated to custom products, or to the nearest Philips Components sales organization (see back cover for details).

LIQUID CRYSTAL DISPLAYS (cont.)

Type number survey
Standard LCD cells

For detailed information on these types see Data Handbook SC18

type no.	illumination mode	quality grade*	dimensions (mm) excluding pins		drive method**	connection method	family characteristics
			width	height			
LTA141R–12	reflective	comm.	50.8	80.0	DD	with pins	TR0
LTA141F–12	transflective	comm.	50.8	80.0	DD	with pins	TF0
LTA141R–22	reflective	ext.	50.8	80.0	DD	with pins	TR2
LTA141F–22	transflective	ext.	50.8	80.0	DD	with pins	TF2
LHA142U–22	transmissive	ext.	51.0	80.0	DD	with pins	TR2
LTA331R–11	reflective	comm.	69	23	MUX 1:16	for elastomer	–
LTA331F–11	transflective	comm.	69	23	MUX 1:16	for elastomer	–
LTA332R–11	reflective	comm.	69	25	MUX 1:16	for elastomer	–
LTA332F–11	transflective	comm.	69	25	MUX 1:16	for elastomer	–
LTA341R–11	reflective	comm.	94	35	MUX 1:16	for elastomer	–
LTA341F–11	transflective	comm.	94	35	MUX 1:16	for elastomer	–
LTA342R–11	reflective	comm.	94	35	MUX 1:16	for elastomer	–
LTA342F–11	transflective	comm.	94	35	MUX 1:16	for elastomer	–
LTA343R–11	reflective	comm.	160	27	MUX 1:16	for elastomer	–
LTA343F–11	transflective	comm.	160	27	MUX 1:16	for elastomer	–
LTD101R–11	reflective	comm.	50.8	22.9	DD	for elastomer	TR0
LTD132R–11★	reflective	comm.	46.8	54.8	MUX 1:2	for elastomer	TR1
LTD133F–21	transflective	comm.	38.6	20.8	MUX 1:2	for elastomer	TR3
LTD201R–11	reflective	comm.	23.9	14.0	DD	for elastomer	TR0
LTD202R–12	reflective	comm.	27.9	30.4	DD	with pins	TR0
LTD202R–22	reflective	ext.	27.9	30.4	DD	with pins	TR2
LTD202F–22	transflective	ext.	27.9	30.4	DD	with pins	TF2
LTD203R–11★	reflective	comm.	38.0	20.3	DD	for elastomer	TR0
LTD203R–21	reflective	ext.	38.0	20.3	DD	for elastomer	TR2
LTD203F–21	transflective	ext.	38.0	20.3	DD	for elastomer	TF2
LTD211R–11	reflective	comm.	38.0	20.3	MUX 1:2	for elastomer	TR1
LTD211F–11	translective	comm.	38.0	20.3	MUX 1:2	for elastomer	TF1
LTD211R–21	reflective	ext.	38.0	20.3	MUX 1:2	for elastomer	TR2
LTD211F–21	translective	ext.	38.0	20.3	MUX 1:2	for elastomer	TF2
LTD221R–11	reflective	comm.	50.8	30.4	DD	for elastomer	TR0
LTD221R–12★	reflective	comm.	50.8	30.4	DD	with pins	TR0
LTD221F–12	transflective	comm.	50.8	30.4	DD	with pins	TR2
LTD221R–22	reflective	ext.	50.8	30.4	DD	with pins	TF0
LTD221F–22	transflective	ext.	50.8	30.4	DD	with pins	TF2
LTD222R–11★	reflective	comm.	50.8	30.4	DD	for elastomer	TR0
LTD222R–12★	reflective	comm.	50.8	30.4	DD	with pins	TR0
LTD222F–12	transflective	comm.	50.8	30.4	DD	with pins	TF0
LTD222R–21	reflective	comm.	50.8	30.4	DD	for elastomer	TR2
LTD222F–21	transflective	comm.	50.8	30.4	DD	for elastomer	TF2
LTD222R–22	reflective	ext.	50.8	30.4	DD	with pins	TR2
LTD222F–22	transflective	ext.	50.8	30.4	DD	with pins	TF2
LTD224R–11	reflective	comm.	50.8	30.4	DD	for elastomer	TR0
LTD225R–11	reflective	comm.	50.8	30.4	DD	for elastomer	TR0
LTD226R–11	reflective	comm.	50.8	30.4	DD	for elastomer	TR0
LTD226R–12★	reflective	comm.	50.8	30.4	DD	with pins	TR0
LTD226F–12	transflective	comm.	50.8	30.4	DD	with pins	TF0
LTD226R–21	reflective	ext.	50.8	30.4	DD	for elastomer	TR2
LTD226F–21	transflective	ext.	50.8	30.4	DD	for elastomer	TF2
LTD226R–22	reflective	ext.	50.8	30.4	DD	with pins	TR2
LTD226F–22★	transflective	ext.	50.8	30.4	DD	with pins	TF2

* comm. = commercial quality grade
ext. = extended quality grade
** DD = direct drive.

note:
all types are positive image mode except LHA142U–22 which has a negative image

LIQUID CRYSTAL DISPLAYS (cont.)

Type number survey

Standard LCD cells (cont.)

For detailed information on these types see Data Handbook SC18

type no.	illumination mode	quality grade*	dimensions (mm) excluding pins		drive method**	connection method	family characteristics
			width	height			
LTD227R–12	reflective	comm.	50.8	30.4	DD	with pins	TR0
LTD227R–22	reflective	ext.	50.8	30.4	DD	with pins	TR2
LTD227F–22	transflective	ext.	50.8	30.4	DD	with pins	TF2
LTD228R–12★	reflective	comm.	50.8	30.4	DD	with pins	TR0
LTD229R–12★	reflective	comm.	50.8	30.4	DD	with pins	TR0
LTD229R–22	reflective	ext.	50.8	30.4	DD	with pins	TR2
LTD229F–22	transflective	ext.	50.8	30.4	DD	with pins	TF2
LTD231R–11	reflective	comm.	50.8	30.4	MUX 1:3	for elastomer	TR1
LTD232R–11	reflective	comm.	50.8	30.4	MUX 1:3	for elastomer	TR1
LTD233R–11	reflective	comm.	69.8	20.3	MUX 1:2	for elastomer	TR1
LTD234R–11	reflective	comm.	69.8	20.3	MUX 1:4	for elastomer	TR2
LTD235R–12	reflective	comm.	50.8	30.4	MUX 1:3	with pins	TR1
LTD241R–12★	reflective	comm.	69.8	38.0	DD	with pins	TR0
LTD241R–22	reflective	ext.	69.8	38.0	DD	with pins	TR2
LTD241F–22	transflective	ext.	69.8	38.0	DD	with pins	TF2
LTD242R–12	reflective	comm.	69.8	38.0	DD	with pins	TR0
LTD242R–22	reflective	ext.	69.8	38.0	DD	with pins	TR2
LTD242F–22	transflective	ext.	69.8	38.0	DD	with pins	TF2
LTD261R–12	reflective	comm.	76.2	101.6	DD	with pins	TR0
LTD261R–22	reflective	ext.	76.2	101.6	DD	with pins	TR2
LTD261F–22	transflective	ext.	76.2	101.6	DD	with pins	TF2
LTD262R–12★	reflective	comm.	93.8	30.8	DD	with pins	TR0
LTD262R–22	reflective	ext.	93.8	30.8	DD	with pins	TR2
LTD262F–22	transflective	ext.	93.8	30.8	DD	with pins	TF2
LTD263R–12	reflective	comm.	93.8	38.0	DD	with pins	TR0
LTD263R–22	reflective	ext.	93.8	38.0	DD	with pins	TR2
LTD264R–22	reflective	ext.	114.0	46.0	DD	with pins	TR2
LTD264F–22	transflective	ext.	114.0	46.0	DD	with pins	TF2
LTD321R–12	reflective	comm.	69.8	30.4	DD	with pins	TR0
LTD351R–11	reflective	comm.	26.0	114.0	MUX 1:2	for elastomer	TR1

* comm. = commercial quality grade
ext. = extended quality grade

** DD = direct drive.

LIQUID CRYSTAL DISPLAYS (cont.)

Type number survey
Standard LCD modules

For detailed information on these types see Data Handbook SC18

type no.	description	illumination mode	dimensions (mm) excluding pins		drive method
			width	height	
Segment types					
LTM233R–10★	16–digit module	reflective	92.5	25.0	MUX 1:2
Character types					
LTN111R–10★	16 character 5 x 7 dot 1–line module	reflective	80.0	36.0	MUX 1:16
LTN111R–50	16 character 5 x 7 dot 1–line module	reflective	80.0	36.0	MUX 1:16
LTN111F–10	16 character 5 x 7 dot 1–line module	transflective	80.0	36.0	MUX 1:16
LTN111F–50	16 character 5 x 7 dot 1–line module	transflective	80.0	36.0	MUX 1:16
LTN211R–10★	16 character 5 x 7 dot 2–line module	reflective	84.0	44.0	MUX 1:16
LTN211R–50	16 character 5 x 7 dot 2–line module	reflective	84.0	44.0	MUX 1:16
LTN211F–10	16 character 5 x 7 dot 2–line module	transflective	84.0	44.0	MUX 1:16
LTN211F–50	16 character 5 x 7 dot 2–line module	transflective	84.0	44.0	MUX 1:16
LTN221R–10★	20 character 5 x 7 dot 2–line module	reflective	116	37.0	MUX 1:16
LTN221F–10	20 character 5 x 7 dot 2–line module	transflective	116	37.0	MUX 1:16
LTN222R–10★	24 character 5 x 7 dot 2–line module	reflective	116	37.0	MUX 1:16
LTN222F–10	24 character 5 x 7 dot 2–line module	transflective	116	37.0	MUX 1:16
LTN242R–10★	40 character 5 x 7 dot 2–line module	reflective	182.0	33.5	MUX 1:16
LTN242F–10	40 character 5 x 7 dot 2–line module	transflective	182.0	33.5	MUX 1:16

For detailed information on these types see Data Handbook SC18

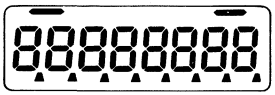
LTD201

7Z22297

LTD203

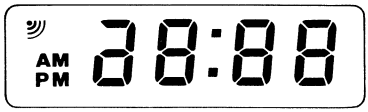
7Z22299

LTD211



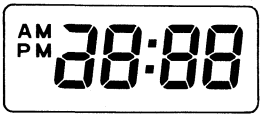
7Z22300

LTD101



7Z22295

LTD133

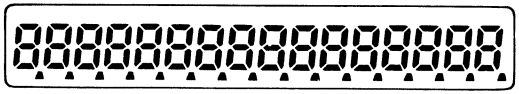


7Z22271

LTD202

7Z22298

LTD233



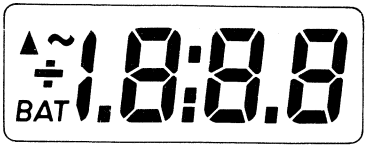
7Z22311

LTD234

7Z22312

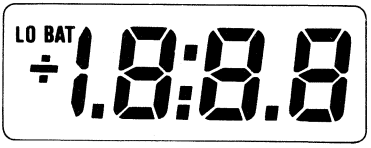
For detailed information on these types see Data Handbook SC18

LTD221



7Z22301

LTD222



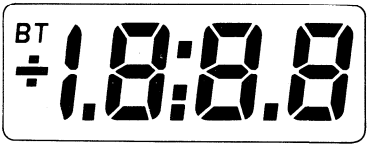
7Z22302

S

LTD224

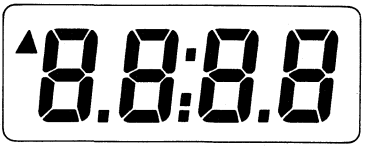
7Z22303

LTD225



7Z22304

LTD226



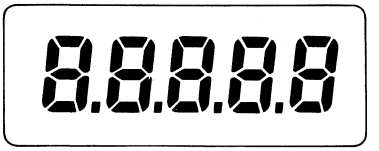
7Z22305

LTD227

7Z22306

For detailed information on these types see Data Handbook SC18

LTD228

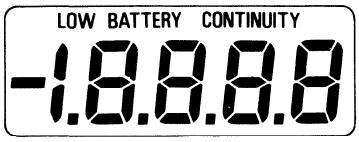


7Z22307

LTD231

7Z22309

LTD232

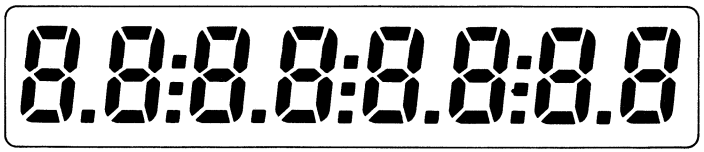


7Z22310

LTD229

7Z22308

LTD262



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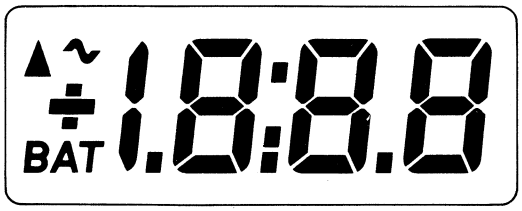
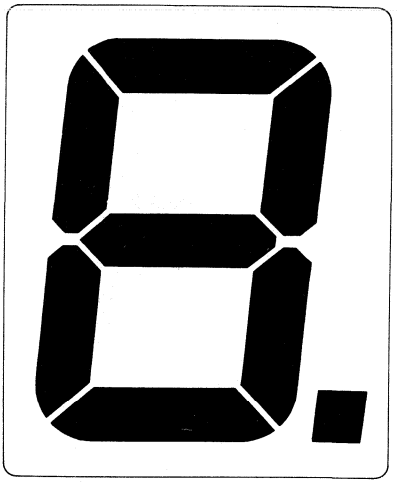


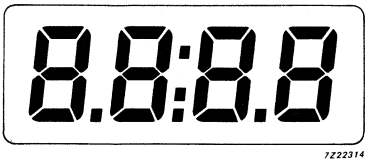
7Z22313

For detailed information on these types see Data Handbook SC18

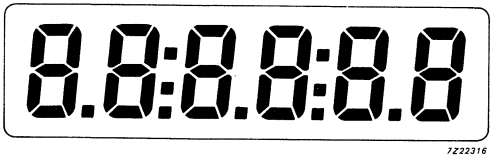
LTD261



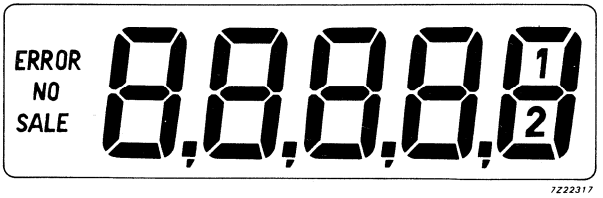
LTD242



LTD263

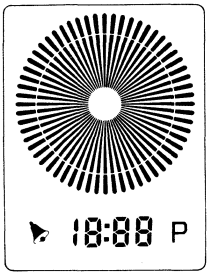


LTD264



For detailed information on these types see Data Handbook SC18

LTD132



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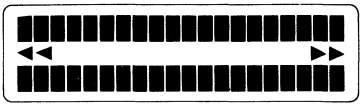
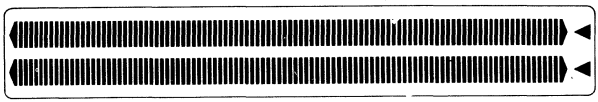
LTD321



7Z22318

LTD351



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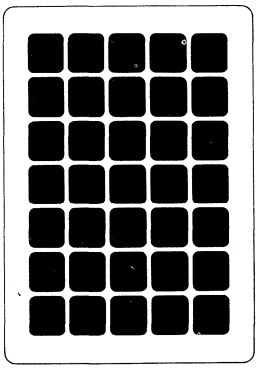
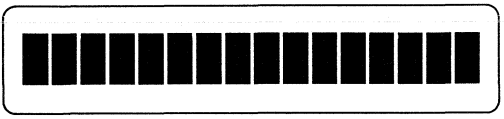
LTA141



7Z22323

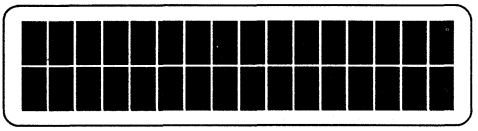
For detailed information on these types see Data Handbook SC18

LTA331



MBA141

LTA332



MBA148

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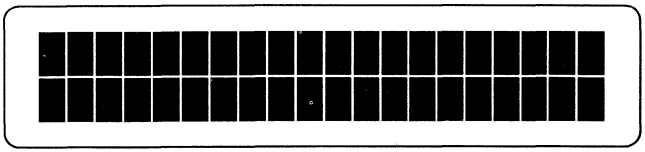

MBA135

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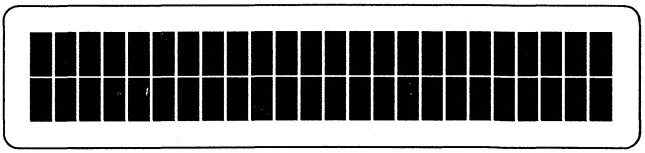
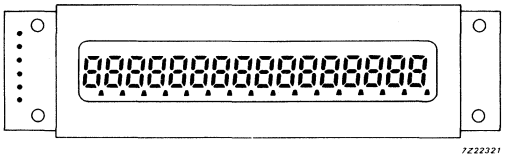


MBA136 - 1

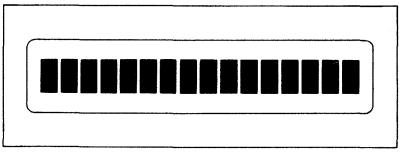
For detailed information on these types see Data Handbook SC18

LTM233



7Z22321

LTN111



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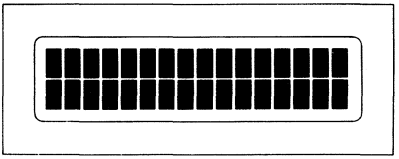
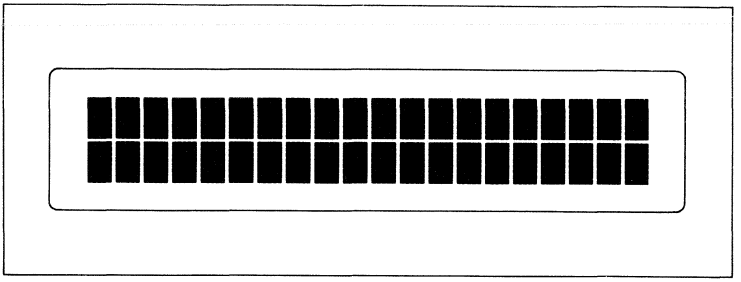
LTN211



7Z22324

For detailed information on these types see Data Handbook SC18

LTN221



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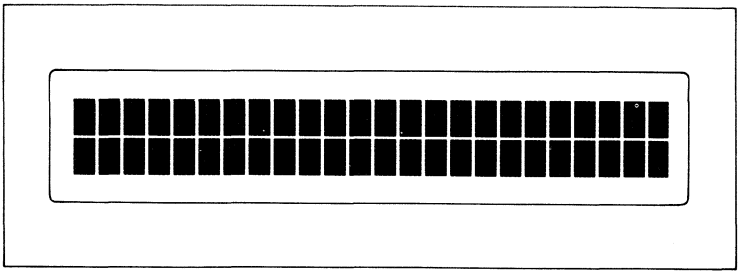
LTN222



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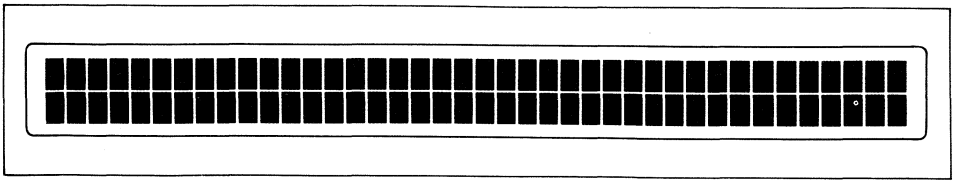
LTN242



7Z22273

For detailed information on family characteristics see Data Handbook SC18

TR0
Optical description
Illumination mode: reflective
Image mode: positive
Front surface: glossy

Reliability grade: commercial

Electro–optical characteristics for constant drive voltage

parameter	symbol		drive method	unit	note
			DD*		
operating voltage	V_{op}	min typ max	3.5 5.0 6.5	V V V	(1)
operating ambient temperature	T_{amb}	min max	−10 +60	°C °C	
turn on time at T_{amb} = 25°C at T_{amb} = 0°C	 t_{on} t_{on}		 25 100	 ms ms	 (2)
turn off time at T_{amb} = 25°C at T_{amb} = 0°C	 t_{off} t_{off}	 120	 40 ms	 ms	 (2)
specific current consumption	I_S		24	nA/mm^2	
frame frequency	f_{dr}	min max	30 200	Hz Hz	(1)
viewing angles for $C_R > 3$ $\rho = \rho_{pref}$ $\rho = \rho_{pref} + 180°$ $\rho = \rho_{pref} + 270°$	 α α α		 60 30 35	 ° ° °	 (3)

* DD = direct drive
1) For definition see Fig.33, SC18
2) For definition see Fig.34, SC18
3) For definition see Fig.35, SC18

For detailed information on family characteristics see Data Handbook SC18

TF0
Optical description

Illumination mode:	transflective
Image mode:	positive
Front surface:	glossy

Reliability grade: commercial

Electro-optical characteristics for constant drive voltage

parameter	symbol		drive method	unit	note
			DD*		
operating voltage	V_{op}	min	3.5	V	(1)
		typ	5.0	V	
		max	6.5	V	
operating ambient temperature	T_{amb}	min	−10	°C	
		max	+60	°C	
turn on time					
at T_{amb} = 25°C	t_{on}		25	ms	(2)
at T_{amb} = 0°C	t_{on}		100	ms	
turn off time					
at T_{amb} = 25°C	t_{off}		40	ms	(2)
at T_{amb} = 0°C	t_{off}	120	ms		
specific current consumption	I_S		24	nA/mm²	
frame frequency	f_{dr}	min	30	Hz	(1)
		max	200	Hz	
viewing angles for $C_R > 3$					
$\rho = \rho_{pref}$	α		55	°	(3)
$\rho = \rho_{pref} + 180°$	α		35	°	
$\rho = \rho_{pref} + 270°$	α		40	°	

* DD = direct drive
1) For definition see Fig.33, SC18
2) For definition see Fig.34, SC18
3) For definition see Fig.35, SC18

Family characteristics

For detailed information on family characteristics see Data Handbook SC18

TR1
Optical description
Illumination mode: reflective
Image mode: positive
Front surface: glossy

Reliability grade: commercial

Electro–optical characteristics for constant drive voltage

parameter	symbol		drive method				unit	note
			DD*	1:2	1:3	1:4		
operating voltage	V_{op}	min	2.5	–	–	–	V	(1)
		typ	4.5	2.6	2.8	3.1	V	
		max	6.0	–	–	–	V	
operating ambient temperature	T_{amb}	min	−10	−10	−10	−10	°C	
		max	+60	+55	+55	+40	°C	
turn on time								
at T_{amb} = 25°C	t_{on}		35	160	240	190	ms	(2)
at T_{amb} = 0°C	t_{on}		170	970	1480	1270	ms	
turn off time								
at T_{amb} = 25°C	t_{off}		65	50	40	40	ms	(2)
at T_{amb} = 0°C	t_{off}	260	170	130	130	ms		
specific current consumption	I_S		36	29	34	45	nA/mm²	
frame frequency	f_{dr}	min	30	30	30	30	Hz	(1)
		max	200	100	100	100	Hz	
viewing angles for $C_R > 3$								
$\rho = \rho_{pref}$	α		55	35	35	35	°	(3)
$\rho = \rho_{pref} + 180°$	α		45	20	5	0	°	
$\rho = \rho_{pref} + 270°$ or 90°	α		35	35	20	20	°	

* DD = direct drive
1) For definition see Fig.33, SC18
2) For definition see Fig.34, SC18
3) For definition see Fig.35, SC18

For detailed information on family characteristics see Data Handbook SC18

TR1

Electro–optical characteristics for temperature compensated drive voltage

parameter	symbol		drive method				unit	note
			1:2	1:3	1:4			
operating voltage	$V_{op\ typ}$		2.9	3.1	3.1	V	(1)	
temperature coefficient of V_{op}	TC		−12	−13	−14	mV/°C		
ambient operating temperature	T_{amb}	min max	−10 +60	−10 +60	−10 +60	°C °C		
turn on time at T_{amb} = 25°C at T_{amb} = 0°C	 t_{on} t_{on}		 90 430	 145 550	 190 810	 ms ms	 (2)	
turn off time at T_{amb} = 25°C at T_{amb} = 0°C	 t_{off} t_{off}		 55 290	 50 280	 40 250	 ms ms	 (2)	
frame frequency	f_{dr}	min max	30 100	30 100	30 100	Hz Hz	(1)	

* DD = direct drive

1) For definition see Fig.33, SC18
2) For definition see Fig.34, SC18
   Viewing angles as constant drive voltage

Family characteristics

For detailed information on family characteristics see Data Handbook SC18

TF1
Optical description
Illumination mode: transflective
Image mode: positive
Front surface: glossy

Reliability grade: commercial

Electro–optical characteristics for constant drive voltage

parameter	symbol		drive method				unit	note
			DD*	1:2	1:3	1:4		
operating voltage	V_{op}	min	2.5	–	–	–	V	(1)
		typ	4.5	2.6	2.8	3.1	V	
		max	6.0	–	–	–	V	
operating ambient temperature	T_{amb}	min	−10	−10	−10	−10	°C	
		max	+60	+55	+55	+40	°C	
turn on time								
at T_{amb} = 25°C	t_{on}		35	160	240	190	ms	(2)
at T_{amb} = 0°C	t_{on}		170	970	1480	1270	ms	
turn off time								
at T_{amb} = 25°C	t_{off}		65	50	40	40	ms	(2)
at T_{amb} = 0°C	t_{off}	260	170	130	130	ms		
specific current consumption	I_S		36	29	34	45	nA/mm²	
frame frequency	f_{dr}	min	30	30	30	30	Hz	(1)
		max	200	100	100	100	Hz	
viewing angles for $C_R > 3$								
$\rho = \rho_{pref}$	α		45	40	–	–	°	(3)
$\rho = \rho_{pref} + 180°$	α		25	15	–	–	°	
$\rho = \rho_{pref} + 270°$ or 90°	α		35	40	–	–	°	
$\rho = \rho_{pref}$	α_{opt}		–	–	20	20	°	
$\rho = \rho_{pref}$	α_2–α_1		–	–	40	40	°	

* DD = direct drive
1) For definition see Fig.33, SC18
2) For definition see Fig.34, SC18
3) For definition see Fig.35, SC18

For detailed information on family characteristics see Data Handbook SC18

TF1

Electro–optical characteristics for temperature compensated drive voltage

parameter	symbol		drive method			unit	note
			1:2	1:3	1:4		
operating voltage	$V_{op\ typ}$		2.9	3.1	3.1	V	(1)
temperature coefficient of V_{op}	TC		−12	−13	−14	mV/°C	
ambient operating temperature	T_{amb}	min max	−10 +60	−10 +60	−10 +60	°C °C	
turn on time at T_{amb} = 25°C at T_{amb} = 0°C	 t_{on} t_{on}		 90 430	 145 550	 190 810	 ms ms	 (2)
turn off time at T_{amb} = 25°C at T_{amb} = 0°C	 t_{off} t_{off}		 55 290	 50 280	 40 250	 ms ms	 (2)
frame frequency	f_{dr}	min max	30 100	30 100	30 100	Hz Hz	(1)

* DD = direct drive

1) For definition see Fig.33, SC18

2) For definition see Fig.34, SC18
Viewing angles as constant drive voltage

For detailed information on family characteristics see Data Handbook SC18

TR2
Optical description
Illumination mode: reflective
Image mode: positive
Front surface: glossy

Reliability grade: extended

Electro–optical characteristics for constant drive voltage

parameter	symbol		drive method				unit	note
			DD*	1:2	1:3	1:4		
operating voltage	V_{op}	min	3.5	–	–	–	V	(1)
		typ	5.0	3.7	4.0	4.3	V	
		max	6.5	–	–	–	V	
operating ambient temperature	T_{amb}	min	–25	–25	–25	–20	°C	
		max	+80	+70	+65	+50	°C	
turn on time								
at T_{amb} = 25°C	t_{on}		25	75	125	115	ms	(2)
at T_{amb} = 0°C	t_{on}		100	320	495	535	ms	
turn off time								
at T_{amb} = 25°C	t_{off}		40	30	25	30	ms	(2)
at T_{amb} = 0°C	t_{off}	120	100	75	75	ms		
specific current consumption	I_S		24	24	28	36	nA/mm^2	
frame frequency	f_{dr}	min	30	30	30	30	Hz	(1)
		max	200	100	100	100	Hz	
viewing angles for $C_R > 3$								
$\rho = \rho_{pref}$	α		50	35	35	35	°	(3)
$\rho = \rho_{pref} + 180°$	α		40	25	25	25	°	
$\rho = \rho_{pref} + 270°$ or 90°	α		30	35	30	20	°	

* DD = direct drive
1) For definition see Fig.33, SC18
2) For definition see Fig.34, SC18
3) For definition see Fig.35, SC18

For detailed information on family characteristics see Data Handbook SC18

TR2

Electro–optical characteristics for temperature compensated drive voltage

parameter	symbol		drive method			unit	note
			1:2	1:3	1:4		
operating voltage	$V_{op\ typ}$		4.1	4.3	4.3	V	(1)
temperature coefficient of V_{op}	TC		−12	−14	−15	mV/°C	
ambient operating temperature	T_{amb}	min max	−25 +80	−25 +80	−25 +80	°C °C	
turn on time at T_{amb} = 25°C at T_{amb} = 0°C	 t_{on} t_{on}		 45 205	 95 365	 115 465	 ms ms	 (2)
turn off time at T_{amb} = 25°C at T_{amb} = 0°C	 t_{off} t_{off}		 35 100	 30 85	 30 70	 ms ms	 (2)
frame frequency	f_{dr}	min max	30 100	30 100	30 100	Hz Hz	(1)

* DD = direct drive

1) For definition see Fig.33, SC18
2) For definition see Fig.34, SC18
   Viewing angles as constant drive voltage

Family characteristics

For detailed information on family characteristics see Data Handbook SC18

TF2
Optical description
Illumination mode: transflective
Image mode: positive
Front surface: glossy

Reliability grade: extended
Electro–optical characteristics for constant drive voltage

parameter	symbol		drive method				unit	note
			DD*	1:2	1:3	1:4		
operating voltage	V_{op}	min	3.5	–	–	–	V	(1)
		typ	5.0	3.7	4.0	4.3	V	
		max	6.5	–	–	–	V	
operating ambient temperature	T_{amb}	min	–25	–25	–25	–20	°C	
		max	+80	+70	+65	+50	°C	
turn on time								
at T_{amb} = 25°C	t_{on}		25	75	125	115	ms	(2)
at T_{amb} = 0°C	t_{on}		100	320	495	535	ms	
turn off time								
at T_{amb} = 25°C	t_{off}		40	30	25	30	ms	(2)
at T_{amb} = 0°C	t_{off}	120	100	75	75	ms		
specific current consumption	I_S		24	24	28	36	nA/mm²	
frame frequency	f_{dr}	min	30	30	30	30	Hz	(1)
		max	200	100	100	100	Hz	
viewing angles for $C_R > 3$								
$\rho = \rho_{pref}$	α		50	50	45	45	°	(3)
$\rho = \rho_{pref} + 180°$	α		15	10	5	5	°	
$\rho = \rho_{pref} + 270°$ or 90°	α		35	35	35	30	°	

* DD = direct drive
1) For definition see Fig.33, SC18
2) For definition see Fig.34, SC18
3) For definition see Fig.35, SC18

For detailed information on family characteristics see Data Handbook SC18

TR2

Electro–optical characteristics for temperature compensated drive voltage

parameter	symbol		drive method			unit	note
			1:2	1:3	1:4		
operating voltage	$V_{op\ typ}$		4.1	4.3	4.3	V	(1)
temperature coefficient of V_{op}	TC		−12	−14	−15	mV/°C	
ambient operating temperature	T_{amb}	min max	−25 +80	−25 +80	−25 +80	°C °C	
turn on time at T_{amb} = 25°C at T_{amb} = 0°C	 t_{on} t_{on}		 45 205	 95 365	 115 465	 ms ms	 (2)
turn off time at T_{amb} = 25°C at T_{amb} = 0°C	 t_{off} t_{off}		 35 100	 30 85	 30 70	 ms ms	 (2)
frame frequency	f_{dr}	min max	30 100	30 100	30 100	Hz Hz	(1)

* DD = direct drive

1) For definition see Fig.33, SC18

2) For definition see Fig.34, SC18
Viewing angles as constant drive voltage

Family characteristics

For detailed information on family characteristics see Data Handbook SC18

TR3
Optical description
Illumination mode: reflective
Image mode: positive
Front surface: glossy

Reliability grade: extended
Electro–optical characteristics for constant drive voltage

parameter	symbol		drive method 1:2	unit	note
operating voltage	V_{op}	min typ max	– 5.0 –	V V V	(1)
operating ambient temperature	T_{amb}	min max	–25 +80	°C °C	
turn on time at T_{amb} = 25°C at T_{amb} = 0°C	 t_{on} t_{on}		 85 290	 ms ms	 (2)
turn off time at T_{amb} = 25°C at T_{amb} = 0°C	 t_{off} t_{off}	 75	 25 ms	 ms	 (2)
specific current consumption	I_S		24	nA/mm²	
frame frequency	f_{dr}	min max	30 100	Hz Hz	(1)
viewing angles for $C_R > 3$ $\rho = \rho_{pref}$ $\rho = \rho_{pref} + 180°$ $\rho = \rho_{pref} + 270°$ or 90°	 α α α		 35 20 35	 ° ° °	 (3)

1) For definition see Fig.33, SC18
2) For definition see Fig.34, SC18
3) For definition see Fig.35, SC18

For detailed information on family characteristics see Data Handbook SC18

TF3
Optical description
Illumination mode: transflective
Image mode: positive
Front surface: glossy

Reliability grade: extended
Electro–optical characteristics for constant drive voltage

parameter	symbol		drive method	unit	note
			1:2		
operating voltage	V_{op}	min typ max	– 5.0 –	V V V	(1)
operating ambient temperature	T_{amb}	min max	–25 +80	°C °C	
turn on time at T_{amb} = 25°C at T_{amb} = 0°C	 t_{on} t_{on}		 85 290	 ms ms	 (2)
turn off time at T_{amb} = 25°C at T_{amb} = 0°C	 t_{off} t_{off}	 75	 25 ms	 ms	 (2)
specific current consumption	I_S		24	nA/mm²	
frame frequency	f_{dr}	min max	30 100	Hz Hz	(1)
viewing angles for $C_R > 3$ $\rho = \rho_{pref}$ $\rho = \rho_{pref} + 180°$ $\rho = \rho_{pref} + 270°$ or 90°	 α α α		 35 15 35	 ° ° °	 (3)

1) For definition see Fig.33, SC18
2) For definition see Fig.34, SC18
3) For definition see Fig.35, SC18

For detailed information on these types see Data Handbook SC18

type no.	description	illumination mode	character size mm	dot size mm	supply voltage V
Segment types					
LTM233R–10★	16–digit module	reflective	32 x 6.0		+3
Character types					
LTN111R–10★	16 character 5 x 7 dot 1–line module	reflective	3.07 x 5.73	0.55 x 0.75	+5
LTN111F–10	16 character 5 x 7 dot 1–line module	transflective	3.07 x 5.73	0.55 x 0.75	+5
LTN111R–50	16 character 5 x 7 dot 1–line module	reflective	3.07 x 5.73	0.55 x 0.75	+5
LTN111F–50	16 character 5 x 7 dot 1–line module	transflective	3.07 x 5.73	0.55 x 0.75	+5
LTN211R–10★	16 character 5 x 7 dot 2–line module	reflective	2.96 x 4.86	0.56 x 0.66	+5
LTN211F–10	16 character 5 x 7 dot 2–line module	transflective	2.96 x 4.86	0.56 x 0.66	+5
LTN211R–50	16 character 5 x 7 dot 2–line module	reflective	2.96 x 4.86	0.56 x 0.66	+5
LTN211F–50	16 character 5 x 7 dot 2–line module	transflective	2.96 x 4.86	0.56 x 0.66	+5
LTN221R–10★	20 character 5 x 7 dot 2–line module	reflective	3.2 x 5.55	0.6 x 0.65	+5
LTN221F–10	20 character 5 x 7 dot 2–line module	transflective	3.2 x 5.55	0.6 x 0.65	+5
LTN222R–10★	24 character 5 x 7 dot 2–line module	reflective	2.7 x 5.55	0.5 x 0.65	+5
LTN222F–10	24 character 5 x 7 dot 2–line module	transflective	2.7 x 5.55	0.5 x 0.65	+5
LTN242R–10★	40 character 5 x 7 dot 2–line module	reflective	3.2 x 4.85	0.6 x 0.65	+5
LTN242F–10	40 character 5 x 7 dot 2–line module	transflective	3.2 x 4.85	0.6 x 0.65	+5

For detailed information on these types see Data Handbook SC18

S

LCD drivers

type no.	description
PCF2100	C bus control, 40–segments
PCF2110	C bus control, 60–segments, 2 LEDs
PCF2111	C bus control, 64–segments
PCF2112	C bus control, 32–segments
PCF8566	I^2C bus control, universal multiplex drive, 1:2 to 1:4 MUX ratios (24 segs)
PCF8576	I^2C bus control, universal multiplex drive, 1:2 to 1:4 MUX ratios (40 segs)
PCF8577	I^2C bus control, direct drive (32 segs) duplex drive (64 segs)
PCF2201	Flat panel ROW/COLUMN driver
PCF8578	Flat panel ROW/COLUMN driver
PCF8579	Flat panel COLUMN driver
PCF1303T	18–segment bargraph display LCD driver, with analog input
HEF4754V	18–segment bargraph display LCD driver
PC74HC4543	BCD to 7–segment latch/decoder/driver
PC74HCT4543	for LCD
HEF4543B	BCD to 7–segment latch/decoder/driver for LED and LCD

Class A bipolar medium power transistors

For detailed information on these types see data handbook SC15

status = C

Class-A medium power

type	f GHz	V_{CE} V	I_C mA	P_{L1}* mW	G_{po}** dB
LBE2003S	2	18	30	250	11
LCE2003S	2	18	30	250	11
LUE2003S	2	18	30	250	11
LBE2009S	2	18	110	900	9.8
LCE2009S	2	18	110	900	9.8
LUE2009S	2	18	110	900	9.8
LTE21009R	2.1	16	150	1000	8.5
LTE21015R	2.1	16	250	1600	8.1
LTE21025R	2.1	16	400	2800	7.8
LVE21050R	2.1	16	1100	5500	8
LWE2015R	2.3	16	250	1600	8.1
LWE2025R	2.3	16	400	2800	7.8
LAE4001R	4	15	25	110	9.5
LAE4002S	4	18	30	160	8
LTE42005S	4.2	18	110	550	7.2
LTE42008R	4.2	16	250	940	7.5
LTE42012R	4.2	16	400	1250	7

Status = C

Class-A high power (wideband)

type	f GHz	V_{CE} V	I_C A	P_{L1}* W	G_{po}** dB
LZ1418E100R	1.4 to 1.8	16	2	11	11
LV1721E50R	1.7 to 2.1	16	1.1	5.5	8
LV2024E45R	2.0 to 2.4	16	1.1	5	7
LV2327E40R	2.3 to 2.7	16	1	5	8
LV2931E50S	2.9 to 3.1	18	1	5	6.5

* Load power for 1 dB compressed power gain
** Low-level power gain associated with P_{L1}

Class C bipolar power transistors

For detailed information on these types see data handbook SC15

Status = C

Class-C medium power

type	f GHz	V_{CC} V	P_L W	G_p dB	η_C %
PTB23001X	2	24	1.8	9	50
PTB23003X	2	24	4.0	10	50
PTB23005X	2	24	7.0	11	50
PTB32001X	3	24	1.8	9.5	45
PTB32003X	3	24	3.0	9.5	40
PTB32005X	3	24	5.5	9.5	40
PTB42001X	4.2	24	1.0	6	33
PTB42002X	4.2	24	2.0	6	35
PTB42003X	4.2	24	3.0	6	33
PVB42004X	1	24	13	11	60
	2	24	10	10	48
	3	24	7.5	8.8	30
	4	24	4	6	25

Class-C high power

type	f GHz	V_{CC} V	P_L W	G_p dB	η_C %
PZ1418B15U	1.4 to 1.8	28	15	7.8	45
PZ1418B30U	1.4 to 1.8	28	35	8.4	45
PZB16035U	1.6	28	38	9.8	50
PXB16050U	1.6	28	50	9.5	52
PZ1721B12U	1.7 to 2.1	28	16	8	45
PZ1721B25U	1.7 to 2.1	28	30	7.8	41
PZ2024B10U	2.0 to 2.4	28	12	6.8	45
PZ2024B20U	2.0 to 2.4	28	26	7	42
PZ2327B15U	2.3 to 2.7	28	16	8	45

Status = C

Oscillator power transistors

type	f GHz	V_{EE} V	I_C mA	P_L mW	case
PPC5001T	5	−20	200	450	FO-102
PQC5001T	5	−20	200	450	FO-85

Bipolar transistors: pulsed power types

For detailed information on these types see data handbook SC15

Radar pulsed power transistors

Status = C

L–band

type	f GHz	V_{CC} V	t_p at µs	δ %	P_L W	G_p dB	η_C %
RZ1214B35Y	1.2 to 1.4	42	50	10	40	7.8	40
	1.2 to 1.4	50	300	10	40	7	35
RZ1214B65Y	1.2 to 1.4	42	50	10	80	7	38
	1.2 to 1.4	50	300	10	80	7	30
RZ1214B125Y	1.2 to 1.4	42	50	10	150	7	38
	1.2 to 1.4	50	300	10	150	7	30
RX1214B150W	1.2 to 1.4	40	1000	10	150	7	42
	1.2 to 1.4	50	150	5	240	9	45
RX1214B300Y	1.2 to 1.4	50	300	5	300	7.5	35
	1.2 to 1.4	50	150	5	320	8	38

S–band

RV2833B5X	2.8 to 3.3*	24	100	10	5.6	5.7	47
RV3135B5X	3.1 to 3.5	24	100	10	5.6	5.7	47
RZ2731B16W	2.7 to 3.1	40	100	10	16	6.3	38
RZ3135B14W	3.1 to 3.5	40	100	10	14	5.7	34
RZ2731B32W	2.7 to 3.1	40	100	10	32	6.3	38
RZ3135B28W	3.1 to 3.5	40	100	10	28	5.7	34
RZ2137B48W	2.7 to 3.1	40	100	10	48	6.3	38
RZ3135B42W	3.1 to 3.5	40	100	10	42	5.7	34
RZ2731B60W	2.7 to 3.1	40	100	10	70	6.3	65
RZ2833B60W	2.8 to 3.3	40	100	10	60	6	37
RZ3135B50W	3.1 to 3.5	40	100	10	55	5.6	35
RZ2731B90W	2.7 to 3.1	40	100	10	100	6.5	40
RX3034B70W	3.0 to 3.4	40	100	10	80	6	35

* may also be used for 2.7 to 3.1 GHz

Bipolar transistors: pulsed power types

For detailed information on these types see data handbook SC15

Avionics pulsed power transistors

type	f GHz	V_{CC} V	t_p at µs	δ %	P_L W	G_p dB	η_C %
MRB11175Y	1.09	50	10	1	200	8.5	40
MRB11350Y	1.09	50	10	1	400	8	35
MRB11900Y	1.09	50	10	1	850	7.5	35
RZB12050Y	1.09	50	100	10	50	10	45
	1.09	50	300	10	100	10	40
RZB12100Y	1.09	50	100	10	100	10	45
	1.09	50	300	10	100	10	40
RX1011B250Y	1.03 to 1.09	50	300	10	250	7.5	40
RX1011B350Y	1.03 to 1.09	50	300	10	350	7.5	40
MZ0912B50Y	0,96 to 1.215	50	10	10	60	7.8	44
MZ0912B100Y	0,96 to 1.215	50	10	10	115	7.6	44
MX0912B250Y	0,96 to 1.215	50	10	10	275	7.4	47
MX0912B350Y	0,96 to 1.215	50	10	10	375	7.3	47

ACCESSORIES

Type number survey
Accessories

For detailed information on these types see Data Handbooks SC02 and SC05.

	type	description	case application
Accessories	**56245**	Distance disc of insulating material	TO–5; TO–39
	56246	Distance disc of insulating material	TO–18; TO–72
	56264a	Mica washer	DO–5; TO–48
	56264b	Insulating bush	TO–48; DO–5 TO–48
	56295a	mica washer	DO–4; TO–64
	56295b	PTFE ring	
	56295c	insulating bush	
	56326	Metal washer	TO–126 (SOT–32)
	56353	Clip	TO–126; SOT–82
	56354	Mica insulator	TO–126; SOT–82
	56359b	Mica insulator	TO–220
	56359c	Insulating bush	TO–220
	56359d	Rectangular insulating bush	TO–220
	56360a	Rectangular washer	TO–220
	56363	Clip (direct mounting)	TO–220
	56364	Clip; to be used in conjunction with 56367 or 56369	TO–220
	56367	Alumina insulators, to be used in conjunction with 56364	TO–220
	56368a	Mica insulator	SOT–93
	56368b	Insulating bush	SOT–93
	56369	Mica insulator, to be used with 56364	TO–220
	56378	Mica insulator	SOT–93
	56379	Clip	SOT–93
	56387a	Mica insulator (up to 300 V)	TO–126
	56387b	Insulating bush (up to 300 V)	TO–126

More detailed information on these types can be supplied on request

KTY81–1 series

type number	resistance T_{amb} = 25°C Ω	measuring temperature range °C	temperature coefficient at 25 °C %/K	operating current mA
KTY81–110★	990–1010	–55 to +150	0.79	1
KTY81–120★	980–1020	–55 to +150	0.79	1
KTY81–121	980–1000	–55 to +150	0.79	1
KTY81–122	1000–1020	–55 to +150	0.79	1
KTY81–150★	950–1050	–55 to +150	0.79	1
KTY81–151	950–1000	–55 to +150	0.79	1
KTY81–152	1000–1050	–55 to +150	0.79	1

KTY81–2 series

type number	resistance T_{amb} = 25°C Ω	measuring temperature range °C	temperature coefficient at 25 °C %/K	operating current mA
KTY81–210★	1980–2020	–55 to +150	0.79	1
KTY81–220★	1960–2040	–55 to +150	0.79	1
KTY81–221	1960–2000	–55 to +150	0.79	1
KTY81–222	2000–2040	–55 to +150	0.79	1
KTY81–250★	1900–2100	–55 to +150	0.79	1
KTY81–251	1900–2000	–55 to +150	0.79	1
KTY81–252	2000–2100	–55 to +150	0.79	1

KTY83–1 series

type number	resistance T_{amb} = 25°C Ω	measuring temperature range °C	temperature coefficient at 25 °C %/K	operating current mA
KTY83–110★	990–1010	–55 to +175	0.76	1
KTY83–120★	980–1020	–55 to +175	0.76	1
KTY83–121	980–1000	–55 to +175	0.76	1
KTY83–122	1000–1020	–55 to +175	0.76	1
KTY83–150★	950–1050	–55 to +175	0.76	1
KTY83–151	950–1000	–55 to +175	0.76	1
KTY83–152	1000–1050	–55 to +175	0.76	1

More detailed information on these types can be supplied on request

KTY84–1 series

type number	resistance T_{amb} = 100°C Ω	measuring temperature range °C	temperature coefficient at 25 °C %/K	operating current mA
KTY84–130	970–1030	0 to +300	0.61	2
KTY84–150★	950–1050	0 to +300	0.61	2
KTY84–151	950–1000	0 to +300	0.61	2
KTY84–152	1000–1050	0 to +300	0.61	2

KTY85–1 series

type number	resistance T_{amb} = 25°C Ω	measuring temperature range °C	temperature coefficient at 25 °C %/K	operating current mA
KTY85–110★	990–1010	–40 to +125	0.76	1
KTY85–120★	980–1020	–40 to +125	0.76	1
KTY85–121	980–1000	–40 to +125	0.76	1
KTY85–122	1000–1020	–40 to +125	0.76	1
KTY85–150★	950–1050	–40 to +125	0.76	1
KTY85–151	950–1000	–40 to +125	0.76	1
KTY85–152	1000–1050	–40 to +125	0.76	1

KTY86–2 series

type number	resistance T_{amb} = 25°C Ω	measuring temperature range °C	temperature coefficient at 25 °C %/K	operating current mA
KTY86–205	1890–1910	–40 to +150	0.76	0.1

KTY87–2 series

type number	resistance T_{amb} = 25°C Ω	measuring temperature range °C	temperature coefficient at 25 °C %/K	operating current mA
KTY87–205	1890–1910*	–40 to +125	0.75	0.1

* nominal resistance at T_{amb} = 100 °C = 3327–3361 Ω

Monolithic membrane pressure sensors / Magnetic field sensors

More detailed information on these types can be supplied on request

Monolithic membrane pressure sensors

type	characteristics				
	pressure range	application mode	operating voltage (V)	sensitivity at T_{amb} = 25°C	internal temp. compensation
KP100A	0 to 2 bar	absolute	7.5	60 mV/bar	yes
KP100A1	0 to 2 bar	absolute	5	40 mV/bar	yes
KP101A	0 to 1.2 bar	absolute	7.5	40 mV/bar	yes
KP130AE	0.2 to 2 bar	absolute	5	2.25 V/bar	yes
KPZ20G	−1 to +2 bar	relative	7.5	79 mV/bar	no
KPZ21G	−1 to +10 bar	relative	7.5	26 mV/bar	no
KPZ21GE	−1 to +10 bar	relative	6.1	500 mV/bar	yes

Magnetic field sensors

type	magnetic field range	sensitivity mVm/kA	recommended aux. field kA/m	supply voltage V
KMZ10A	0 to ±0.5 kA/m	70	0.5	5
KMZ10A1*	0 to ±0.5 kA/m	85	0.5	5
KMZ10B	0 to ±2.0 kA/m	20	3	5
KMZ10C	0 to ±7.5 kA/m	7.5	3	5

Oxygen sensors

type	measuring range (O_2 pressure)	accuracy (in range 10–225 mbar)		max. gas temp.
		stab. mode	TC=0 mode	
	mbar	mbar	mbar	°C
KGZ10	2–1000	+/−2	+/−5	300
KGZ20	2–1000	+/−2	n.a.	400
KGZ21	2–1000	+/−2	n.a.	400

* direction of magnetic sensitivity is rotated by 90°

SEMICONDUCTORS

Guide to packing quantities

SPQ = smallest packing quantity
PQ = packing quantity

case	packing description	SPQ	PQ
DO–4	box	25	250
DO–5	box	10	100
DO–7	tape	7000	7000
DO–30	box	1	8
DO–34	reel	10000	10000
DO–35	reel	5000	5000
DO–41	reel	5000	5000
FO38	tray/box	25	75
FO41	box	1	75
FO45	box	1	75
FO46	box	25	75
FO53	box	1	110
FO57	box	1	110
FO58	box	25	75
FO67	box	1	110
FO83	box	1	110
FO85	box	10	400
FO91	box	1	110
FO92	box	1	110
FO93	box	1	110
FO96	box	1	110
FO102	box	10	400
NO–243	bulk (box)	50	50
SOD–18	box	450	450
SOD–53	bulk (bags)	1000	6000
SOD–57	reel	5000	5000
SOD–61	reel	5000	5000
SOD–63	bulk (bags)	1000	2000
SOD–64	reel	4000	4000
SOD–67	bulk	1000	2000
SOD–70	box	500	4000
SOD–74	bulk (bags)	1000	2000
SOD–75	bulk (bags)	1000	2000
SOD–76	bulk (bags)	1000	2000
SOD–77	bulk (bags)	1000	2000
SOD–78	bulk (bags)	1000	2000
SOD–79	bulk (bags)	1000	6000
SOD–80	blister tape	2500	2500
SOD–81	reel	5000	5000
SOD–82	bags	100	1000
SOD–83	reel	5000	5000
SOD–85	bulk (bags)	1000	2000
SOT–5	bulk (bags)	50	1000
SOT–18	bulk (bags)	1000	5000
SOT–23	bulk (phials)	500	25000
	tape (reel)/box	3000	6000
SOT–32	bulk (bags)	50	1500
	rail	50	1000

case	packing description	SPQ	PQ
SOT–37	bulk (bags)	500	8000
SOT–42	bulk (bags)	500	5000
SOT–48	tray/box	25	75
SOT–54	bulk (bags)	500	4000
	tape (reel)	2000	10000
	tape (ammo pack)	2000	10000
SOT–70	bags	100	2000
SOT–71	bags	100	2000
SOT–82	bulk (bags)	50	1000
	rail	50	1000
SOT–89	bulk (phials)	1000	10000
	tape (reel)	1000	1000
SOT–90	rail	75	1000
SOT–91	box	50	200
SOT–93	rail	25	500
SOT–100	box	10	400
SOT–103	bulk (bags)	500	5000
SOT–104	bulk (bags)	500	4000
SOT–112	box	200	200
SOT–115	bulk (tray)	1	50
SOT–122	tray/box	25	75
SOT–128	rail	50	1000
SOT–143	bulk (phials)	500	25000
	tape (reel)	3000	6000
SOT–148	box	20	120
SOT–173	bulk (box)	50	50
SOT–174	rail	75	1000
SOT–186	rail	50	1000
SOT–199	rail	25	500
TO–3	box	50	250
TO–18	bulk (bags) transistors	1000	5000
TO–39	bulk (bags)	50	1000
TO–46	bulk (bags)	100	100
TO–48	box	10	100
TO–64	box	25	250
TO–65	box	5	50
TO–72	bulk (bags)	500	4000
TO–92	bulk (bags)	2000	2000
	tape (reel)	2000	10000
	tape (ammo pack)	2000	10000
TO–94	box	–	–
TO–126	bulk (bags)	50	1500
	rail	50	1000
TO–202	rail	50	1000
TO–220	rail	50	1000
TO–238	box	5	50
TO–240	box	1	10

CECC APPROVED TYPES

Discrete semiconductors, CECC types

Products approved to the CECC (Cenelec Electronic Components Committee) harmonized system for electronic components of assessed quality

type	CECC detail specification
BA314	CECC 50 001–026
BAT85	CECC 50 001–059
BAV18	CECC 50 001–022
BAV19	CECC 50 001–022
BAV20	CECC 50 001–022
BAV21	CECC 50 001–022
BAW62	CECC 50 001–021
BAX16	CECC 50 001–022
BAX17	CECC 50 001–022
BC107	CECC 50 002–076
BC108	CECC 50 002–077
BC109	CECC 50 002–078
BC140	CECC 50 002–004
BC141	CECC 50 002–005
BC160	CECC 50 002–015
BC161	CECC 50 002–016
BCY70	CECC 50 002–079
BCY71	CECC 50 002–080
BCY72	CECC 50 002–081
BFR90A	CECC 50 002–086
BFR91A	CECC 50 002–125
BFR96	CECC 50 002–126
BFX29	CECC 50 002–071
BFX30	CECC 50 004–083
BFX34	CECC 50 004–025
BFX37	CECC 50 002–185
BFX84	CECC 50 004–100
BFX85	CECC 50 004–100
BFX86	CECC 50 004–100
BFX87	CECC 50 002–071
BFX88	CECC 50 002–071
BFY50	CECC 50 002–089
BFY51	CECC 50 002–089
BFY52	CECC 50 002–089
BGD502	CECC 63 101–009
BGY84H	CECC 63 101–007
BGY85H	CECC 63 101–007
BGY88	CECC 63 101–008
BSS50	CECC 50 004–073
BSS51	CECC 50 004–073
BSS52	CECC 50 004–073
BSS60	CECC 50 004–074
BSS61	CECC 50 004–074
BSS62	CECC 50 004–074
BSV15	CECC 50 002–131
BSV16	CECC 50 002–131
BSV17	CECC 50 002–131
BSV64	CECC 50 004–008
BSV78	CECC 50 012–011
BSV79	CECC 50 012–011
BSV80	CECC 50 012–011
BSW66A	CECC 50 004–040
BSW67A	CECC 50 004–040

type	CECC detail specification
BSW68A	CECC 50 004–040
BSX45	CECC 50 002–174
BSX46	CECC 50 002–174
BSX47	CECC 50 002–174
BSX62	CECC 50 004–025
BSX63	CECC 50 004–025
BSX64	CECC 50 004–025
BT151–500R	CECC 50 011–003
BT151–650R	CECC 50 011–003
BT152–400	CECC 50 011–011
BT152–600	CECC 50 011–011
BT152–800	CECC 50 011–011
BT155–600	CECC 50 011–009
BT155–800	CECC 50 011–009
BTW38–600	CECC 50 011–006
BTW38–800	CECC 50 011–006
BTW38–1000	CECC 50 011–006
BTW38–1200	CECC 50 011–006
BTW42–600	CECC 50 011–006
BTW42–800	CECC 50 011–006
BTW42–1000	CECC 50 011–006
BTW42–1200	CECC 50 011–006
BTW45–200R	CECC 50 011–002
BTW45–400R	CECC 50 011–002
BTW45–600R	CECC 50 011–002
BTW45–800R	CECC 50 011–002
BTW45–1000R	CECC 50 011–002
BTW45–1200R	CECC 50 011–002
BTY79–100	CECC 50 011–006
BTY79–200	CECC 50 011–006
BTY79–300	CECC 50 011–006
BTY79–400	CECC 50 011–006
BTY79–500	CECC 50 011–006
BTY79–600	CECC 50 011–006
BTY79–800	CECC 50 011–006
BTY79–1000	CECC 50 011–006
BY229–200	CECC 50 009–021
BY229–400	CECC 50 009–021
BY229–600	CECC 50 009–021
BY229–800	CECC 50 009–021
BY229–1000	CECC 50 009–021
BYV20–30	CECC 50 009–033
BYV20–35	CECC 50 009–033
BYV20–40	CECC 50 009–033
BYV20–45	CECC 50 009–033
BYV21–30	CECC 50 009–018
BYV21–35	CECC 50 009–018
BYV21–40	CECC 50 009–018
BYV21–45	CECC 50 009–018
BYV22–30	CECC 50 009–034
BYV22–35	CECC 50 009–034

CECC APPROVED TYPES

Discrete semiconductors, CECC types

Products approved to the CECC (Cenelec Electronic Components Committee) harmonized system for electronic components of assessed quality

type	CECC detail specification
BYV22–40	CECC 50 009–034
BYV22–45	CECC 50 009–034
BYV23–30	CECC 50 009–036
BYV23–35	CECC 50 009–036
BYV23–40	CECC 50 009–036
BYV23–45	CECC 50 009–036
BYV32–50(R)	CECC 50 009–026
BYV32–100(R)	CECC 50 009–026
BYV32–150(R)	CECC 50 009–026
BYV32–200(R)	CECC 50 009–026
BYW29–50	CECC 50 009–014
BYW29–100	CECC 50 009–014
BYW29–150	CECC 50 009–014
BYW29–200	CECC 50 009–014
BYW30–50	CECC 50 009–001
BYW30–100	CECC 50 009–001
BYW30–150	CECC 50 009–001
BYW30–200	CECC 50 009–001
BYW31–50	CECC 50 009–002
BYW31–100	CECC 50 009–002
BYW31–150	CECC 50 009–002
BYW31–200	CECC 50 009–002
BYW54	CECC 50 008–015
BYW55	CECC 50 008–015
BYW56	CECC 50 008–015
BYW92–50	CECC 50 009–003
BYW92–100	CECC 50 009–003
BYW92–150	CECC 50 009–003
BYW93–50	CECC 50 009–028
BYW93–100	CECC 50 009–028
BYW93–150	CECC 50 009–028
BYW93–200	CECC 50 009–028
BYX25–600(R)	CECC 50 009–022
BYX25–800(R)	CECC 50 009–022
BYX25–1000(R)	CECC 50 009–022
BYX25–1200(R)	CECC 50 009–022
BYX25–1400(R)	CECC 50 009–022
BYX38–300(R)	CECC 50 009–019
BYX38–600(R)	CECC 50 009–019
BYX38–900(R)	CECC 50 009–019
BYX38–1200(R)	CECC 50 009–019
BYX42–300(R)	CECC 50 009–020
BYX42–600(R)	CECC 50 009–020
BYX42–900(R)	CECC 50 009–020
BYX42–1200(R)	CECC 50 009–020
BYX49–300(R)	CECC 50 009–011
BYX49–600(R)	CECC 50 009–011
BYX49–1200(R)	CECC 50 009–011
BYX52–300(R)	CECC 50 009–024
BYX52–600(R)	CECC 50 009–024
BYX52–1200(R)	CECC 50 009–024
BYX56–600(R)	CECC 50 009–023
BYX56–800(R)	CECC 50 009–023

type	CECC detail specification
BYX56–1000(R)	CECC 50 009–023
BYX56–1200(R)	CECC 50 009–023
BYX56–1400(R)	CECC 50 009–023
BYX98–300(R)	CECC 50 009–004
BYX98–600(R)	CECC 50 009–004
BYX98–900(R)	CECC 50 009–004
BYX98–1200(R)	CECC 50 009–004
BYX99–300(R)	CECC 50 009–005
BYX99–600(R)	CECC 50 009–005
BYX99–900(R)	CECC 50 009–005
BYX99–1200(R)	CECC 50 009–005
BZT03 C9V1–C270	CECC 50 005–017
BZV85 series	CECC 50 005–010
BZW03 series	CECC 50 005–019
BZX55 C2V4–C75	CECC 50 005–005
BZX79 C2V4–C75	CECC 50 005–005
BZY88 C2V4–C75	CECC 50 005–005
1N914	CECC 50 001–021
1N916	CECC 50 001–021
1N3879(R)	CECC 50 009–006
1N3880(R)	CECC 50 009–006
1N3881(R)	CECC 50 009–006
1N3882(R)	CECC 50 009–006
1N3883(R)	CECC 50 009–006
1N3890(R)	CECC 50 009–007
1N3891(R)	CECC 50 009–007
1N3892(R)	CECC 50 009–007
1N3899	CECC 50 009–035
1N3900	CECC 50 009–035
1N3901	CECC 50 009–035
1N3902	CECC 50 009–035
1N3903	CECC 50 009–035
1N3909	CECC 50 009–035
1N3910	CECC 50 009–035
1N3911	CECC 50 009–035
1N3912	CECC 50 009–035
1N3913	CECC 50 009–035
1N4148	CECC 50 001–021
1N4149	CECC 50 001–021
1N4446	CECC 50 001–021
1N4447	CECC 50 001–021
1N4448	CECC 50 001–021
1N4449	CECC 50 001–021
1N5059	CECC 50 008–015
1N5060	CECC 50 008–015
1N5061	CECC 50 008–015
1N5062	CECC 50 008–015
2N1613	CECC 50 002–104
2N1711	CECC 50 002–104
2N1893	CECC 50 002–104
2N2218(A)	CECC 50 004–029
2N2219(A)	CECC 50 004–029
2N2222(A)	CECC 50 004–030

CECC APPROVED TYPES

Discrete semiconductors, CECC types

Products approved to the CECC (Cenelec Electronic Components Committee) harmonized system for electronic components of assessed quality

type	CECC detail specification
2N2904(A)	CECC 50 002–102
2N2905(A)	CECC 50 002–102
2N2906(A)	CECC 50 002–103
2N2907(A)	CECC 50 002–103
2N3019	CECC 50 002–175
2N3020	CECC 50 002–175
CV7099	CECC 50 005–005
CV7100	CECC 50 005–005
CV7101	CECC 50 005–005
CV7102	CECC 50 005–005
CV7103	CECC 50 005–005
CV7104	CECC 50 005–005
CV7105	CECC 50 005–005
CV7106	CECC 50 005–005
CV7138	CECC 50 005–005
CV7139	CECC 50 005–005
CV7140	CECC 50 005–005
CV7141	CECC 50 005–005
CV7142	CECC 50 005–005
CV7143	CECC 50 005–005
CV7144	CECC 50 005–005
CV7145	CECC 50 005–005
CV7146	CECC 50 005–005
CV7311	CECC 50 009–019
CV7312	CECC 50 009–019
CV7313	CECC 50 009–019
CV7314	CECC 50 009–019
CV7315	CECC 50 009–019
CV7316	CECC 50 009–019
CV7317	CECC 50 009–019
CV7318	CECC 50 009–019
CV7319	CECC 50 009–019
CV7320	CECC 50 009–019
CV7367	CECC 50 001–021
CV7368	CECC 50 001–021
CV7379	CECC 50 009–020
CV7380	CECC 50 009–020
CV7381	CECC 50 009–020
CV7382	CECC 50 009–020
CV7384	CECC 50 009–020
CV7385	CECC 50 009–020
CV7386	CECC 50 009–020
CV7387	CECC 50 009–020
CV7669	CECC 50 002–132
CV7670	CECC 50 002–132
CV7671	CECC 50 002–132
CV7672	CECC 50 002–132
CV7673	CECC 50 002–133
CV7674	CECC 50 002–133
CV7375	CECC 50 002–133
CV7376	CECC 50 002–133

type	CECC detail specification
CV7722	CECC 50 002–177
CV7723	CECC 50 002–177
CV7724	CECC 50 002–177
CV7725	CECC 50 004–096
CV7726	CECC 50 004–096
CV7727	CECC 50 004–096
CV7756	CECC 50 001–021
CV7757	CECC 50 001–021
CV7768	CECC 50 004–094
CV7770	CECC 50 004–094
CV7875	CECC 50 001–038
CV8308	CECC 50 001–020
CV8308–ID	CECC 50 001–020
CV8617	CECC 50 001–021
CV8790	CECC 50 001–022
CV8805	CECC 50 001–020
CV8805–ID	CECC 50 001–020
CV9507	CECC 50 004–050
CV9637	CECC 50 001–021
CV9638	CECC 50 001–037
CV9790	CECC 50 002–168
CV10253	CECC 50 004–095
CV10254	CECC 50 002–176
CV10440	CECC 50 004–087
CV10806	CECC 50 002–165
CV10807	CECC 50 004–085
CV10814	CECC 50 002–141
CV12253	CECC 50 004–095
CVA7026	CECC 50 008–015
CVA7027	CECC 50 008–015
CVA7028	CECC 50 008–015
CVA7029	CECC 50 008–015
CVA7030	CECC 50 008–015
CVA7476	CECC 50 008–015
PO15	CECC 50 004–084
PO17	CECC 50 004–085
PO33	CECC 50 001–026

Electron tubes

On most pages, directly underneath the title, reference is made to a 'Data Handbook'.
That Handbook is part of Philips Data Handbook System which is a comprehensive source of information on electronic components, subassemblies and materials.
For this catalogue section the following Handbooks are of interest:

code	title
Professional components (blue series)	
PC01	High-power klystrons (1990) (was T3)
PC04	Photo multipliers (1990) (was T9)
PC05	Plumbicon camera tubes and accessoires (1989) (was T10)
PC06	Circulators and isolators (1989) (was T11)
PC07	Vidicon and newvicon camera tubes deflection units (1989) (was T12)
PC08	Image intensifiers (1989) (was T13)
PC09	Dry reed switches (1990) (was T15)
PC12	Electron multipliers (1991)
T5	Cathode-ray tubes (1988) (wordt PC02)
T6	Geiger-muller tubes (1986) (wordt PC03)
Display components and electronic parts and assemblies (yellow series)	
DC01	Colour display components (1991) (was T8)
DC02	Monochrome tubes and deflection units (1991) (was T16)

ELECTRON TUBES

Contents

Data Handbook System E2

Contents E3

Camera tubes:
Plumbicon® tubes E4
Vidicon and Newvicon® tubes E6

Geiger Müller tubes E9

Photomultipliers: survey of types E11

Channel electron multipliers E14

CAMERA TUBES

General data

Plumbicon® tubes

For detailed information on these and other types see Data Handbook PC05

Photoconductive layer: lead oxide
ACT Anti comet tail
BL Bias light
D Diode
ED Electrostatic deflection
EF Electrostatic focus
ER With extended red response
ER(F) With extended red exponse and IR reflecting filter on anti-halation glass disc
HR High resolution
HSD High stability diode
IG Industrial grade
LOC Low output capacitance
SR Standard resolution

Plumbicon® tubes 1,25 inch (30 mm)

type	max length mm	photo-conductive layer
XQ1022	204	SR/X-RAY
XQ1410	216	HR/BL
XQ1410L	216	HR/BL
XQ1410R	216	HR/BL
XQ1410G	216	HR/BL
XQ1410B	216	HR/BL
XQ1413R	216	ER/BL
XQ1415R	216	ER(F)/BL
XQ1415L	216	ER(F)/BL
XQ1520	216	HR/ACT/BL
XQ1520L	216	HR/ACT/BL
XQ1520R	216	HR/ACT/BL
XQ1520G	216	HR/ACT/BL
XQ1520B	216	HR/ACT/BL
XQ1523R	216	ER/ACT/BL
XQ1525R	216	ER(F)/ACT/BL
XQ1525L	216	ER(F)/ACT/BL
XQ3440	216	HR/D/LOC/BL
XQ3440L	216	HR/D/LOC/BL
XQ3440R	216	HR/D/LOC/BL
XQ3440G	216	HR/D/LOC/BL
XQ3440B	216	HR/D/LOC/BL
XQ3443R	216	ER/D/LOC/BL
XQ3445R	216	ER(F)/D/LOC/BL

Plumbicon® tubes 1 inch (25 mm)

'rear loading' type	'front loading' type	max length mm	photo-conductive layer
	XQ1070	167	SR
	XQ1070L	167	SR
	XQ1070R	167	SR
	XQ1070G	167	SR
	XQ1070B	167	SR
XQ1070/02	**XQ1070/03**	170	SR/BL
XQ1070/02L	**XQ1070/03L**	170	SR/BL
XQ1070/02R	**XQ1070/03R**	170	SR/BL
XQ1070/02G	**XQ1070/03G**	170	SR/BL
XQ1070/02B	**XQ1070/03B**	170	SR/BL
	XQ1072	162	SR/X-RAY
	XQ1073R	167	ER/SR
XQ1073/02R	**XQ1073/03R**	170	ER/SR/BL
	XQ1075R	167	ER/SR
XQ1075/02R	**XQ1075/03R**	170	ER/SR/BL
XQ1500	**XQ1510**	167	HR/ACT/BL
XQ1500L	**XQ1510L**	167	HR/ACT/BL
XQ1500R	**XQ1510R**	167	HR/ACT/BL
XQ1500G	**XQ1510G**	167	HR/ACT/BL
XQ1500B	**XQ1510B**	167	HR/ACT/BL
XQ1503R	**XQ1513R**	167	ER/ACT/BL
XQ1505R	**XQ1515R**	167	ER(F)/ACT/BL
XQ2172/02	**XQ2172/03**	170	X-RAY
	XQ2172/03X	165	X-RAY
XQ3070*		170	HR/LOC/D/BL
XQ3070L*		170	HR/LOC/D/BL
XQ3070R*		170	HR/LOC/D/BL
XQ3070G*		170	HR/LOC/D/BL
XQ3070B*		170	HR/LOC/D/BL
XQ3073R*		170	ER/LOC/D/BL
XQ30735*		170	ER(F)/LOC/D/BL

* These tubes are only available in rear loading versions (02/, 05/, 12 and /15).

CAMERA TUBES (cont.)

Plumbicon® tubes (cont.)

For detailed information on these and other types see Data Handbook PC05

Photoconductive layers: lead oxide

ACT	Anti comet tail
BL	Bias light
D	Diode
ED	Electrostatic deflection
EF	Electrostatic focus
ER	With extended red response
ER(F)	With extended red exponse and IR reflecting filter on anti–halation glass disc
HR	High resolution
HSD	High stability diode
IG	Industrial grade
LOC	Low output capacitance
SR	Standard resolution

Plumbicon® tubes 2/3 inch (18 mm)

type	max length mm	photo–conductive layer
XQ1427	109	SR/
XQ1427R	109	ER/SR
XQ1427G	109	SR
XQ1427B	109	SR
XQ1428	109	SR/IG
XQ1428R	109	ER/SR/IG
XQ1428G	109	SR/IG
XQ1428B	109	SR/IG
XQ3427	108	HR/D/LOC
XQ3427R	108	ER/HR/D/LOC
XQ3427G	108	HR/D/LOC
XQ3427B	108	HR/D/LOC
XQ3457	88	HR/D/LOC/ED
XQ3457R	88	ER/HR/D/LOC/ED
XQ3457G	88	HR/D/LOC/ED
XQ3457B	88	HR/D/LOC/ED
XQ3467	112	SR/EF
XQ3467R	112	ER/SR/EF
XQ3467G	112	SR/EF
XQ3467B	112	SR/EF
XQ3477	88	HR/LOC/ED/EF
XQ3477R	88	ER/LOC/ED/EF
XQ3477G	88	HR/LOC/ED/EF
XQ3477B	88	HR/LOC/ED/EF
XQ3487	95	HR/D/LOC/ED
XQ3487R	95	ER/D/LOC/ED
XQ3487G	95	HR/D/LOC/ED
XQ3487B	95	HR/D/LOC/ED
XQ4187	95	HR/HSD/LOC/EF
XQ4187R	95	ER/HR/HSD/LOC/EF
XQ4187G	95	HR/HSD/LOC/EF
XQ4187B	95	HR/HSD/LOC/EF

Plumbicon® tubes 1/2 inch (14 mm)

type	max length mm	photo–conductive layer
XQ4087R	77	ER/HR/HSD/LOC/EF
XQ4087G	77	HR/HSD/LOC/EF
XQ4087B	77	HR/HSD/LOC/EF

CAMERA TUBES (cont.)

General data

Vidicon and Newvicon® tubes

For detailed information on these and other types see Data Handbook PC07

Photoconductive layers:
A Standard layer (Vidicon)
B Layer with peak response at approx. 475 nm (Vidicon)
Nw Cadmium and zinc telluride layer (Newvicon)
Nw(IR) Newvicon with enhanced sensitivity in near IR region
I Integral mesh electrode
S Seperate mesh electrode
M Magnetic focusing
E Electro–static focusing

Vidicon and Newvicon® tubes 1 inch (25 mm)

type	max length mm	mesh electrode	photoconductive layer	focusing
XQ1031	133	I	A	M
XQ1032	133	I	A	M
XQ1240	163	S	A	M
XQ1241	163	S	A	M
XQ1280	163	S	B	M
XQ1285	163	S	B	M
XQ1440	163	S	Nw	M
XQ1442	163	S	Nw	M
XQ1443	163	S	Nw(IR)	M
XQ1444	163	S	Nw*	M
XQ1445	133	S	Nw	M

Vidicon and Newvicon® tubes 2/3 inch (18 mm)

XQ1270	108	I	A	M
XQ1271	108	S	A	M
XQ1272	108	S	A	E
XQ1274	108	S	Nw	M
XQ1275	108	S	Nw(IR)	E
XQ1276	108	S	Nw(IR)	M
XQ1277	108	S	Nw	E
XQ1278	108	S	Nw	E
XQ1380	108	S	Nw*	M
XQ1381	108	S	Nw*	E
XQ1590	108	S	A	E

Vidicon and Newvicon® tubes 1/2 inch (11 mm)

XQ1600	85	S	A	E
XQ1601	85	S	Nw	E
XQ1602	85	S	Nw*	E

Tube with radiation resistant faceplate

NOTES

NOTES

GEIGER–MÜLLER TUBES

Selection guide
Geiger–Müller tubes

For detailed information on these and other types see Data Handbook PC03

Cylinder tubes

type	sensitive for: α	β	γ	counting rate at 10^{-2} mGy/h** count/s	sensitive length mm	plateau: threshold V	plateau: length V	plateau: slope %/V	dead time µs	background shielded count/min	dose rate range mGy/h
ZP1200		●	●	28	40	400	200	0.04	90	10	10^{-3} – 10^{2}
ZP1201*		●	●	20	40	400	200	0.04	110	10	10^{-3} – 40
ZP1202+		●	●	20	40	400	200	0.04	110	10	10^{-3} – 40
ZP1210		●	●	110	140	400	100	0.15	200	70	3 x 10^{-4} – 10
ZP1220		●	●	180	240	400	100	0.15	210	90	2 x 10^{-4} – 3
ZP1221/01*		●	●	180	240	400	100	0.15	210	11	2 x 10^{-4} – 3
ZP1221/02+		●	●	180	240	400	100	0.15	210	11	2 x 10^{-4} – 3
ZP1300	●	●	●	380***	7	500	100	0.30	11	1	10^{-1} – 2 x 10^{4}
ZP1301*		●	●	340***	7	500	100	0.30	13	1	10^{-1} – 2 x 10^{4}
ZP1302*		●	●	340***	7	500	100	0.30	13	120	10^{-1} – 2 x 10^{4}
ZP1304+		●	●	340***	8	500	100	0.30	13	1	10^{-1} – 2 x 10^{4}
ZP1310	●	●	●	1600***	16	500	150	0.15	15	2	2x10^{-2} – 4x10^{3}
ZP1313*		●	●	1600***	16	500	150	0.15	15	2	10^{-2} – 3 x 10^{3}
ZP1314+		●	●	1600***	16	500	150	0.15	15	2	10^{-2} – 3 x 10^{3}
ZP1320	●	●	●	9	28	500	150	0.08	45	12	3x10^{-3} – 2x10^{2}
ZP1321*		●	●	9	28	500	150	0.08	55	12	3 x 10^{-3} – 10^{2}
ZP1324+		●	●	9	27	500	150	0.08	55	15	3 x 10^{-3} – 10^{2}
ZP1330	●	●	●	65	75	450	350	0.02	70	30	6 x 10^{-4} – 10
ZP1340	●	●	●	200***	9	500	150	0.30	11	1	10^{-} – 2 x 10^{6}

Cosmic ray guard tube

ZP1700	●	–	–	800	400	0.03	1000	70	3 x 10^{-4} – 3 x 10^{-1}

Window tubes

type	sensitive for: α	β	γ	counting rate at 10^{-2} mGy/h** count/s	window ø/type mm	plateau: threshold V	plateau: length V	plateau: slope %/V	dead time µs	background shielded count/min	dose rate range mGy/h
ZP1400		●	●	25	9c	400	200	0.04	90	10	10^{-3} – 10^{2}
ZP1401	●	●	●	25	9a	400	200	0.04	90	10	10^{-3} – 10^{2}
ZP1410	●	●	●	32	19.8a	450	250	0.02	175	15	10^{-3} – 10
ZP1430	●	●	●	44	27.8a	450	250	0.04	230	25	6 x 10^{-4} – 6
ZP1431		●	●	44	27.8c	450	250	0.04	230	25	6 x 10^{-4} – 6
ZP1441	●	●	●	16	19.8a	500	200	0.09	65	5	3 x 10^{-3} – 10^{2}
ZP1442		●	●	16	19.8c	500	200	0.09	65	8	3 x 10^{-3} – 10^{2}
ZP1451	●	●	●	29	27.8a	500	250	0.07	60	9	10^{-3} – 20
ZP1452		●	●	29	27.8c	500	250	0.07	60	18	10^{-3} – 20
ZP1470		●	●	38	24.1b	550	150	0.15	70	25	10^{-3} – 20
ZP1480		●	●	24	17d	400	100	0.20	120	30	10^{-3} – 20
ZP1481		●	●	24	17d	400	100	0.20	120	30	10^{-3} – 20
ZP1490	●	●	●	16	28a	450	250	0.06	65	15	10^{-3} – 20

* With compensating filter
** 1R = 8.69 mGy
*** Counting rate at 10 mGy/h
\+ Ambient dose compensated

Window thickness mg/cm²:
a:1.5 to 2.0; b:1.5 to 2.5; c:2.0 to 3.0
d:2.5 to 3.0; e:2.5 to 3.5; f:2.0 to 2.5

GEIGER–MÜLLER TUBES

Selection guide

Geiger–Müller tubes (cont.)

For detailed information on these and other types see Data Handbook PC03

X–ray sensitive tubes

ZP1600 **ZP1610**	6.0–20 keV 2.5–40 keV	660 –	19.8e 7x18f	1600 operating voltage 1550 V	400	0.07	110	25	–

High temperature tubes

type	sensitive for: α β γ	counting rate at 10^{-2} mGy/h* count/s	sensitive length mm	plateau: threshold V	plateau: length V	plateau: slope %/V	dead time µs	background shielded count/min	dose rate range mGy/h
ZP1800	●	190	419	700	150	0.08	75	25	2×10^{-4} – 4
ZP1810	●	13	51	650	250	0.08	75	25	3×10^{-3} – 40
ZP1820	●	110	203	450	250	0.06	100	65	3×10^{-4} – 4
ZP1830	●	170	313	450	250	0.06	100	100	2×10^{-4} – 2
ZP1840	●	8	32	850	200	0.08	50	15	4×10^{-3} – 10^{2}
ZP1850	● ●	36	89	875	200	0.10	100	50	1×10^{-3} – 20
ZP1860	● ●	80	220	875	200	0.10	100	75	4×10^{-4} – 4

* 1R = 8.69 mGy

Photomultipliers: survey of types

For detailed information on these and other types see Data Handbook PC04

General photometry and scintillation counting tubes

Nominal diameter mm (1)	Sensitivity photocathode	number of stages (2)	base gl pl see notes:	type (5)	comments
19	blue	6 10	(3) (3)	+ **XP1922** **XP1911**	
	UV	10	(3)	**XP1918**	
	red	9	(3)	**XP1117**	
38	blue	10 10 10 10	(3)/(4) (3)/(4) (3)/(4) (3)/(4)	**XP2012(B)** **XP2072(B)** + **XP2052(B)** **XP2062(B)**	high PHR high gain short tube
	UV	10	(4)	**XP2018B**	
	green extd	10	(3)/(4)	+ **XP2081(B)**	
	red	8 10	(4) (4)	**XP2023B** + **XP2013B**	
	extd red	10	(4)	**XP2017B**	
	infra-red	10	(4)	**XP2015B**	
51	blue	10 vb 10 12	(3)/(4) (3)/(4) (3)/(4)	**XP2202(B)** **XP2102(B)** **XP2212(B)**	high PHR, medium gain
	green extd	10	(3)/(4)	+ **XP2201(B)**	
	high temp.	10	(3)	**XP2205**	
	red	10	(4)	**XP2203B**	
76	blue	vb 10	(3)/(4)	**XP2412(B)**	high PHR, medium gain
127	blue	vb 10	(4)	**XP2050**	

Photomultipliers: survey of types

For detailed information on these and other types see Data Handbook PC04

Fast tubes

Nominal diameter mm (1)	Sensitivity photocathode	number of stages (2)	base gl pl see notes:	type (5)	comments
29	blue	8 10 11	(3) (3) (3)	**XP2962** **XP2972** **XP2982**	
	UV	10	(3)	**+XP2978**	
	red	8	(3)	**XP2963**	
51	blue	6 8 12	(4) (4) (4)	**XP2242B** **+XP2282B** **XP2262B**	
	red	6 12	(4) (4)	**+XP2243B** **XP2233B**	
	extd. red	12	(4)	**+XP4227B**	
	blue*	12 12	(4) (4)	**XP2020** **+XP4222B**	high cathode sensitivity
	UV*	12 12	(4) (4)	**XP2020/Q** **+XP4228B**	high cathode sensitivity
	UV to red*	12	(4)	**XP2254B**	
	extd. red*	12	(4)	**+XP4227B**	
76	blue	8 12	(4) (4)	**XP3462B** **XP2312B**	
	green extd.	8	(4)	**+XP3461B**	
127	blue	14	(4)	**XP2041**	
	UV	14	(4)	**XP2041/Q**	

* Very fast types

Photomultipliers: survey of types

For detailed information on these and other types see Data Handbook PC04

High pulse height resolution, medium gain tubes

nominal diameter mm (1)	sensitivity photocathode	number of stages (2)	base see notes:	type (5)	comments
38	blue	10	(3)/(4)	**XP2072(B)**	
	H	8	(4)	**+XP3062B**	
51	blue	vb 10	(3)/(4)	**XP2102(B)**	
		8	(4)	**XP3102B**	
60	blue	vb 10	(4)	**XP2432B**	
H		vb 10	(4)	**+XP2452B**	
		8	(4)	**+XP3432B**	
H		8	(4)	**XP3422B**	
H		8		**+XP3421B**	Top resolution
76	blue	vb 10	(3)/(4)	**XP2412(B)**	
H		vb 10	(4)	**+XP2442B**	

Multianode tubes	XP4702 XP4722

(1) for hexagonal (H), dimension is given between flats
(2) vb = venetian blind multiplier, all other cases = linear focused multiplier
(3) glass base version
(4) plastic base version
(5) + indicates newly listed type

Channel electron multipliers

For detailed information on these and other types see Data Handbook PC04

Single channel electron multipliers

PULSED type	input configuration	dimensions nom. (mm)	resistance typ Ω	gain[2] at 2.5 kV	starting voltage typ. kV	operating voltage max. kV
X710BL[1]	tubular	Ø 2.2	3×10^8	1.5×10^8	1.6	4.0
X713BL[1]	rectangular	3.5 x 15.5	3×10^8	1.5×10^8	1.6	4.0
X714BL[1]	rectangular	3.5 x 15.5	3×10^8	1.5×10^8	1.6	4.0
X719BL[1]	conical	Ø 10	3×10^8	1.5×10^8	1.6	4.0
X810BL[1]	tubular	ø 1.25	7×10^8	1×10^8	1.6	3.5
X812BL[1]	rectangular	2 x 8	7×10^8	1×10^8	1.6	3.5
X814BL[1]	rectangular	2 x 8	7×10^8	1×10^8	1.6	3.5
X818BL[1]	conical	Ø 5	7×10^8	1×10^8	1.6	3.5
X910BL[1]	tubular	Ø 2.2	6×10^8	1×10^8	1.6	4.0
X913BL[1]	rectangular	3.5 x 15.5	6×10^8	1×10^8	1.6	4.0
X914BL[1]	rectangular	3.5 x 15.5	6×10^8	1×10^8	1.6	4.0
X919BL[1]	conical	Ø 10	6×10^8	1×10^8	1.6	4.0
X959BL[1]	conical	Ø 15	6×10^8	1×10^8	1.6	4.0
X951BL[1]	conical	Ø 20	6×10^8	1.5×10^8	1.6	4.0

ANALOGUE type	input configuration	dimensions nominal (mm)	resistance typ Ω	gain[2]	max. average output curr. µA	operating voltage max. kV	
X636AL[4][5][6]	elliptical	12.5 x 11.5	1.5×10^8	5×10^7	7	3	
X645AL[5]	conical	Ø 15	1.0×10^8	1×10^6	10	3	
X646AL[4][5]	elliptical	12.5 x 11.5	1.0×10^8	1×10^6	10	3	
X650 series*							

1. Open ended versions available: change BL to AL when ordering
2. Equivalent threshold of 2×10^7 electrons for 300 and 400 series, 2×10^6 for all other types
3. Measured at 3 kV
4. Different cone angles and sizes available
5. A guard ring collector and connecting strips can be supplied; change AL to CL when ordering
6. May be operated in pulse or analogue mode

* various mounted types available

Channel electron multipliers (cont.)

For detailed information on these and other types see Data Handbook PC04

type	useful dimensions mm	plate thickness mm	channel diameter µm	channel angle degrees	resistance MΩ	gain at 1 kV min.	max. operating voltage kV
G12–20x50	18.8 x 48.8	0.5 ±0.1	12.5	13	80 to 300	10^3	2
G12–25SE	Ø 19	0.5 ±0.02	12.5	13	200 to 750	10^3	2
G12–25SE/A	Ø 19	0.5 ±0.02	12.5	13	200 to 750	10^3	2
G12–36	Ø 32.5	0.5 ±0.02	12.5	13	80 to 300	10^3	2
G12–36/A	Ø 32.5	0.5 ±0.02	12.5	13	80 to 300	10^3	2
G12–36DT/0	Ø 32.5	1.0 ±0.02	12.5	0	160 to 600	10^4	3
G12–36DT/13	Ø 32.5	1.0 ±0.02	12.5	13	160 to 600	10^4	3
G12–46	Ø 42	0.5 ±0.02	12.5	13	30 to 100	10^3	1.5
G12–46/A	Ø 42	0.5 ±0.02	12.5	13	30 to 100	10^3	1.5
G12–46DT/0	Ø 42	1.0 ±0.02	12.5	0	60 to 250	10^4	3
G12–46DT/13	Ø 42	1.0 ±0.02	12.5	13	60 to 250	10^4	3
G12–70	Ø 67	0.5 ±0.02	25	13	20	10^3	1.5
G25–20x50	18 x 48.8	1.0 ±0.1	25	13	35	10^3	2
G25–25	Ø 26.5	1.0 ±0.1	25	13	30 to 150	10^3	2
G25–25/A	Ø 26.5	1.0 ±0.1	25	13	30 to 150	10^3	2
G25–50	Ø 51.8	1.0 ±0.1	25	13	7 to 40	10^3	2
G25–70	Ø 68	1.0 ±0.1	25	13	5	10^3	2

All values above are quoted per plate.
Type designations: A = supplied in matched resistance pairs for cascade operation;
SE = solid edge plate; DT = double thickness.
On special request, plates can be offerred in almost any dimension within the limits 120 mm x 160 mm, in various thicknesses with 12.5 µm and 25 µm channel diameter.

Capacitors C

On most pages, directly underneath the title, reference is made to a 'Data Handbook'.
That Handbook is part of the Philips Data Handbook System which is a comprehensive source of information on electronic components, subassemblies and materials.
For this catalogue section the following Handbooks are of interest:

code	title
Passive components (green series)	
C9	Piezoelectric quartz devices (1986) (wordt PA07)
C15	Ceramic capacitors (1987) (wordt PA06)
PA01	Electrolytic capacitors solid and non-solid (1989) (was C14)
PA04	Variable capacitors (1989) (was C7)
PA05	Film capacitors (1990) (was C22)

CAPACITORS

Contents

Data Handbook System C2

Contents C3

Selection guides for:
Non–solid aluminium electrolytic:
Axial C4
Radial C6
Large radial C7
Solid aluminium electrolytic:
Radial/axial C8
Surface mounted aluminium electrolytic:
Non–solid/solid C9

Electrolytic capacitors; solid and non–solid:
2222 021 ..... C10
2222 030/031 ..... C12
2222 035 ..... C15
2222 050/052 ..... C17
2222 058/059 ..... C19
2222 085 ..... C20
2222 097 ..... C21
2222 134 ..... C22
2222 154/155 ..... C23

Solid aluminium capacitors:
2222 123 ..... C24
2222 127 ..... C25
2222 128 ..... C26

Packing information:
Electrolytic capacitors,
solid/non–solid C27
Solid aluminium capacitors C29

Film capacitors selection guide
MKT C30
KT/MKC C32
KSKP C33
KP/MMKP, MKP and MKT–P C34

Interference suppression capacitors:
2222 330 (MKT–P) C35

Metallized film capacitors:
2222 344 (MKT) C36
2222 366 (MKT) C39
2222 368 (MKT) C41
2222 370 (MKT) C43
2222 371 (MKT) C44
2222 372 (MKT) C46
2222 373 (MKT) C47

Polypropylene film/foil capacitors:
2222 460–464 (KP) C49

A.C. and pulse metallized
polypropylene film capacitors:
2222 376 (KP/MMKP) C51
2222 378 (MKP) C52

Miniature ceramic capacitors:
2222 629 (K14000) C54
2222 630 (K2000) C55
2222 680/683 (P100) C56
2222 680/683 (NPO) C57
2222 680/683 (N150) C58
2222 680/683 (N750) C59
2222 680/683 (N1500) C60

Ceramic multilayer capacitors
(surface mounted) C61

Film dielectric trimmers:
2222/2238 808 1 (7.5 mm) C64
2222 808 3 (10 mm) C65

C

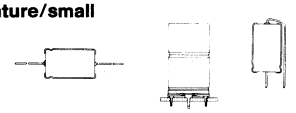
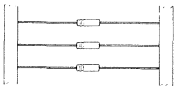
NON–SOLID ALUMINIUM ELECTROLYTIC CAP.

Selection guide

Axial

For detailed information on these and other types see Data Handbook PA01

Axial non–solid aluminium electrolytic capacitors

type	series number 2222 ...	application	nom. cap. µF	rated voltage U_R(V)	endurance test* h/T_{max}	DC leakage current**
Miniature/small 	021	high CV	0.22 to 15000	6.3 to 100	1000/85 to 2000/85	0.006CU +4 µA
Miniature/small 	030 031 032 033	standard CV	0.33 to 15000	6.3 to 100	1000/85 to 5000/85	0.05CU or 5 µA
	041 042 043	high voltage	1 to 220	160 to 385	2000/85 to 5000/85	0.05CU or 5 µA
Miniature/small 	065	low leakage current	0.33 to 68	6.3 to 25	2000/85	0.002CU or 0.7 µA
Ultra miniature 	117	small dimensions	0.1 to 0.22	6.3 to 63	1500/85	0.02CU +3 µA
Miniature	138	moulded	0.22 to 220	6.3 to 100	1000/105	0.02CU +3 µA

* EndurEnce test: life time (hours) at maximum operating temperature (°C).

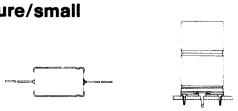
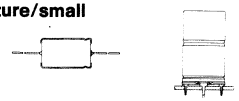
** DC leakage current: maximum DC leakage current 1 minute after application of U_R at T_{amb} = 20 °C; C = capacitance; U = rated voltage; A = current.

NON–SOLID ALUMINIUM ELECTROLYTIC CAP.

Selection guide
Axial

For detailed information on these and other types see Data Handbook PA01

Axial non–solid aluminium electrolytic capacitors (cont.)

type	series number 2222 ...	application	nom. cap. µF	rated voltage U_R(V)	endurance test* h/T_{max}	DC leakage current**
Small 	108	CECC; long–life	2.2 to 2200	6.3 to 100	5000/85 to 1000/105	0.006CU +4 µA
Miniature/small 	118	long–life high temperature	1 to 15000	6.3 to 200	2000/125 to 500/150	0.006CU +20 µA or 20 µA
Miniature/small 	119	CECC; long–life; high temperature	1 to 4700	10 to 63	2000/125 to 500/150	0.006CU +4 µA or 20 µA
Miniature/small 	132 133	CECC; long–life DIN 41257	1 to 4700	10 to 350	6000/85 to 8000/85	0.01CU +3 µA or 20 µA

* EndurEnce test: life time (hours) at maximum operating temperature (°C).

** DC leakage current: maximum DC leakage current 1 minute after application of U_R at T_{amb} = 20 °C; C = capacitance; U = rated voltage; A = current.

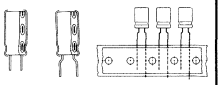
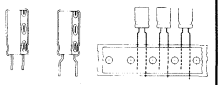
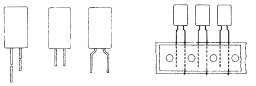
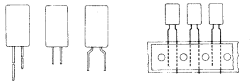
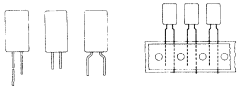
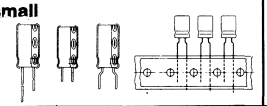
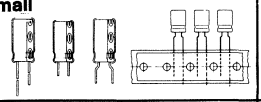
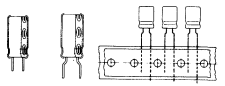
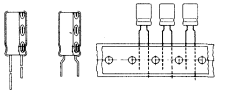
NON–SOLID ALUMINIUM ELECTROLYTIC CAP.

Selection guide

Radial

For detailed information on these and other types see Data Handbook PA01

Radial non–solid aluminium electrolytic capacitors

type	series number 2222 ...	application	nom. cap. µF	rated voltage U_R(V)	endurance test* h/T_{max}	DC leakage current**
Miniature/small 	035	standard CV	0.1 to 4700	6.3 to 100	1000/85	0.02CU +3 µA
Miniature/small 	037	high CV	0.1 to 10000	6.3 to 100	1000/85 to 2000/85	0.01CU +3 µA
Miniature 	036	long–life	0.15 to 470	6.3 to 63	2000/85	0.006CU +3 µA
Miniature 	013	low–leakage current	0.15 to 220	10 to 50	2000/85	0.002CU or 0.7 µA 0.002CU or 1 µA
Miniature 	116	long–life; high temperature	0.47 to 470	6.3 to 50	1500/105	0.006CU +3 µA
Miniature/small 	135	low impedance	22 to 10000	6.3 to 100	1000/105 to 2000/105	0.03CU
Miniature/small 	044	high voltage	1 to 68	160 to 385	2000/85	0.03 µA +10 µA
Miniature 	097	small dimensions H = 7 mm	0.1 to 220	6.3 to 63	1000/85	0.01 µA or 3 µA
Miniature 	134	small dimensions H = 5 mm	0.1 to 100	6.3 to 50	1000/85	0.01 µA or 3 µA

* Endurance test: life time (hours) at maximum operating temperature (°C).

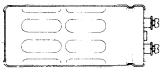
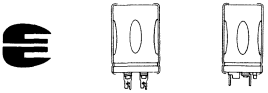
** DC leakage current: maximum DC leakage current 1 minute after application of U_R at T_{amb} = 20 °C; C = capacitance; U = rated voltage; A = current.

NON–SOLID ALUMINIUM ELECTROLYTIC CAP.

Selection guide
Large radial

For detailed information on these and other types see Data Handbook PA01

Large radial non–solid aluminium electrolytic capacitors

type	series number 2222 ...	application	nom. cap. µF	rated voltage U_R(V)	endurance test* h/T_{max}	DC leakage current**
Large 	114 115	screw terminals long life	150 to 220000	10 to 385	8000/85	0.006CU +4 µA
Large	154 155	screw terminals	220 to 470000	10 to 385	2000/85	0.006CU + 4µA
Large 	050 052	CECC; high ripple handling	47 to 68000	10 to 385	2880/85	0.006CU +4 µA
Large 	051 053	standard CV	68 to 150000	10 to 385	2000/85 to 5000/85	0.006CU +4 µA
Large 	054 055	snap–in; standard CV	47 to 33000	10 to 385	5000/85	0.006CU +4 µA
Large under development 	056 057	snap–in; high CV	47 to 68000	10 to 400	2000/85 to 5000/85	–
Large under development 	058 059	snap–in; high temperature	33 to 47000	10 to 400	5000/105	–

* Endurance test: life time (hours) at maximum operating temperature (°C).

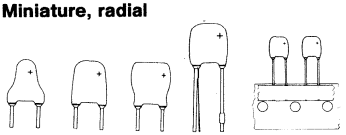
** DC leakage current: maximum DC leakage current 1 minute after application of U_R at T_{amb} = 20 °C; C = capacitance; U = rated voltage; A = current.

SOLID ALUMINIUM ELECTROLYTIC CAP.

Selection guide
Radial/axial

For detailed information on these and other types see Data Handbook PA01

Solid aluminium electrolytic capacitors

type	series number 2222 ...	application	nom. cap. µF	rated voltage U_R(V)	endurance test* h/T_{max}	DC leakage current**
Miniature, radial 	122	CECC; epoxy–dipped	0.1 to 68	6.3 to 40	8000/85 to 5000/125	0.01CU or 0.04 µA
Miniature, radial 	128	epoxy–dipped	0.1 to 68	6.3 to 40	2000/125	0.01CU or 0.04 µA
Small, axial 	123	CECC	2.2 to 2200	4 to 40	8000/125	0.1CU

* Endurance test: life time (hours) at maximum operating temperature (°C).

** DC leakage current: maximum DC leakage current 1 minute after application of U_R at T_{amb} = 20 °C; C = capacitance; U = rated voltage; A = current.

SURFACE MOUNTED ALUMINIUM ELECTR. CAP. Selection guide

Non–solid/solid

For detailed information on these and other types see Data Handbook PA01

Surface mounted capacitors

type	series number 2222 ...	application	nom. cap. µF	rated voltage U_R(V)	endurance test* h/T_{max}	DC leakage current**
Miniature, non–solid 	085	general	0.1 to 22	6.3 to 63	1000/85	0.02CU +3 µA
Miniature, solid 	127	general industrial	0.1 to 68	4 to 25	2000/125	0.01CU +0.04 µA
Miniature, non–solid	139	general industrial moulded	0.22 to 220	6.3 to 100	1000/125	0.02CU +3 µA
Miniature, tantalum	099	general industrial moulded	0.1 to 68	4 to 35	1000/125	0.01CU +0.5 mA

* Endurance test: life time (hours) at maximum operating temperature (°C).

** DC leakage current: maximum DC leakage current 1 minute after application of U_R at T_{amb} = 20 °C; C = capacitance; U = rated voltage; A = current.

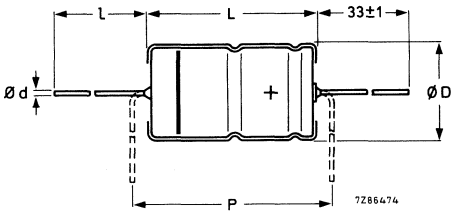
ELECTROLYTIC CAPACITORS; SOLID AND NON-SOLID

2222 021

For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29

Nominal capacitance range (E3-series)	0.22 to 15000 µF
Lower tolerance on nominal capacitance	−20%
Upper tolerance on nominal capacitance	+20%
Rated voltage range, U_R	10 to 63 V
Minimum category temperature	−55 °C
Maximum category temperature	+85 °C
Endurance test at 85 °C	
case sizes 2 to 7	2000 h
case sies 00 to 05	5000 h
Shelf life at 0 V, 85 °C	500 h
Basic specification	IEC 384-4
Climatic category	55/085/56

case size	nominal dimensions (mm)	P mm
2	Ø 4.5 x 10	15
3	Ø 6 x 10	15
5a	Ø 8 x 11	15
4	Ø 6.5 x 18	25
5	Ø 8 x 18	25
6	Ø 10 x 18	25
7	Ø 10 x 25	30
00	Ø 10 x 30	35
01	Ø 12.5 x 30	35
02	Ø 15 x 30	35
03	Ø 18 x 30	35
04	Ø 18 x 40	45
05	Ø 21 x 40	45



style 1

U_R V	C_{nom} µF	case size	cat. number style 1 (case sizes 2 to 7 on reel)
10	100	2	**2222 021 24101**
	220	3	**2222 021 24221**
	330	5a	**2222 021 24331**
	470	4	**2222 021 24471**
	1000	6	**2222 021 24102**
	1500	00	**2222 021 14152**
	2200	01	**2222 021 14222**
	6800	03	**2222 021 14682**
	10000	04	**2222 021 14103**
16	150	3	**2222 021 25151**
	220	5a	**2222 021 25221**
	470	5	**2222 021 25471**
	1000	00	**2222 021 15102★**
	1500	01	**2222 021 15152**
	2200	01	**2222 021 15222★**
	4700	03	**2222 021 15472★**
	10000	05	**2222 021 15103★**

For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29

U_R V	C_{nom} µF	case size	cat. number style 1 (case sizes 2 to 7 on reel)
25	47	2	**2222 021 26479**
	100	3	**2222 021 26101**
	220	4	**2222 021 26221**
	470	6	**2222 021 26471**
	1000	01	**2222 021 16102★**
	2200	02	**2222 021 16222★**
	4700	04	**2222 021 16472★**
	6800	05	**2222 021 16682★**
40	22	2	**2222 021 27229**
	47	3	**2222 021 27479**
	100	4	**2222 021 27101**
	220	6	**2222 021 27221**
	470	00	**2222 021 17471★**
	1000	01	**2222 021 17102★**
	2200	03	**2222 021 17222★**
	4700	05	**2222 021 17472★**
63	0.22	2	**2222 021 28227**
	0.47	2	**2222 021 28477**
	1	2	**2222 021 28108**
	2.2	2	**2222 021 28228**
	4.7	2	**2222 021 28478**
	10	2	**2222 021 28109**
	22	3	**2222 021 28229**
	47	4	**2222 021 28479**
	100	5	**2222 021 28101**
	220	00	**2222 021 18221★**
	470	01	**2222 021 18471★**
	1000	03	**2222 021 18102★**
	2200	05	**2222 021 18222★**

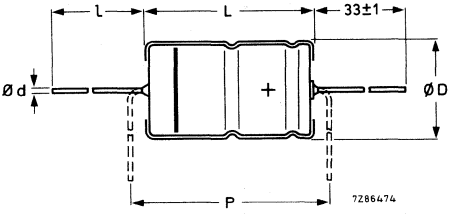
ELECTROLYTIC CAPACITORS; SOLID AND NON-SOLID Gen. data

2222 030/031

For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29

Nominal capacitance range (E6-series)	0.33 to 10000 µF
Lower tolerance on nominal capacitance	−10%
Upper tolerance on nominal capacitance	+50%
Rated voltage range, U_R	6.3 to 100 V
Minimum category temperature	−40, −55 °C
Maximum category temperature	+85 °C
Endurance test at 85 °C	
case sizes 2 to 7	2000, 5000 h
case size 1	1000 h
Shelf life at 0 V, 85 °C	500 h
Basic specification	IEC 384-4
Climatic category	40/085/56, 55/085/56

case size	nominal dimensions (mm)	P mm
2	Ø 4.5 x 10	15
3	Ø 6 x 10	15
5a	Ø 8 x 11	15
4	Ø 6.5 x 18	25
5	Ø 8 x 18	25
6	Ø 10 x 18	25
7	Ø 10 x 25	30



style 1

U_R V	C_{nom} µF	case size	cat. number style 1 ammo pack
10	22	2	**2222 030 34229**
	47	2	**2222 030 34479★**
	100	3	**2222 030 34101★**
	220	5a	**2222 030 34221★**
	330	5	**2222 031 34331**
	470	6	**2222 031 34471**

For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29

U_R V	C_{nom} µF	case size	cat. number style 1 ammo pack
16	15	2	**2222 030 35159**
	33	2	**2222 030 35339★**
	68	3	**2222 030 35689★**
	150	5a	**2222 030 35151★**
	220	5	**2222 031 35221★**
	330	6	**2222 031 35331★**
	470	7	**2222 031 35471★**
25	10	2	**2222 030 36109★**
	22	2	**2222 030 36229★**
	47	3	**2222 030 36479★**
	100	5a	**2222 030 36101★**
	220	6	**2222 031 36221★**
40	6.8	2	**2222 030 37688**
	10	2	**2222 030 37109★**
	15	2	**2222 030 37159★**
	22	3	**2222 030 37229★**
	33	3	**2222 030 37339★**
	47	5a	**2222 030 37479★**
	100	5	**2222 031 37101★**
	150	6	**2222 031 37151★**
	220	7	**2222 031 37221★**

ELECTROLYTIC CAPACITORS; SOLID AND NON-SOLID Gen. data

2222 030/031 (cont.)

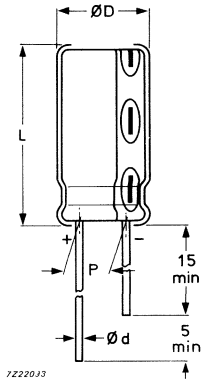
For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29

U_R V	C_{nom} µF	case size	cat. number style 1 ammo pack
63	0.33	2	**2222 030 38337**
	0.47	2	**2222 030 38477★**
	0.68	2	**2222 030 38687**
	1	2	**2222 030 38108★**
	1.5	2	**2222 030 38158★**
	2.2	2	**2222 030 38228★**
	3.3	2	**2222 030 38338★**
	4.7	2	**2222 030 38478★**
	6.8	2	**2222 030 38688★**
	10	3	**2222 030 38109★**
	15	3	**2222 030 38159**
	22	5a	**2222 030 38229★**
	47	5	**2222 031 38479**
	68	6	**2222 031 38689**
	100	7	**2222 031 38101★**
100	2.2	2	**2222 030 39228★**
	4.7	3	**2222 030 39478★**
	10	5a	**2222 030 39109★**
	22	5	**2222 031 39229**
	33	6	**2222 031 39339**
	47	7	**2222 031 39479**

For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29)

Nominal capacitance range (E3-series)	0.1 to 2200 µF
Lower tolerance on nominal capacitance	−20%
Upper tolerance on nominal capacitance	+20%
Rated voltage range, U_R	10 to 63 V
Minimum category temperature	−40 °C
Maximum category temperature	+85 °C
Endurance test at 85 °C	1000 h
Shelf life at 0 V, 85 °C	500 h
Basic specification	IEC 384-4
Climatic category	40/085/56

case size	nominal dimensions (mm)	P mm
11	Ø 5 x 11	2
12	Ø 6.3 x 11	2.5
13	Ø 8 x 12	3.5
14	Ø 10 x 12	5
15	Ø 10 x 16	5
16	Ø 10 x 20	5
17	Ø 12.5 x 20	5
18	Ø 12.5 x 25	5
19	Ø 16 x 25	7.5
20	Ø 16 x 31	7.5



style 1

U_R V	C_{nom} µF	case size	cat. number style 1 in box
10	47	11	**2222 035 54479**
	100	12	**2222 035 54101**
	220	13	**2222 035 54221**
	470	15	**2222 035 54471**
	1000	17	**2222 035 54102**
16	220	14	**2222 035 55221**
	470	16	**2222 035 55471**
	1000	18	**2222 035 55102**
	2200	19	**2222 035 55222★**

For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29

U_R V	C_{nom} µF	case size	cat. number style 1 in box
25	47	12	**2222 035 56479★**
	100	13	**2222 035 56101★**
	220	15	**2222 035 56221★**
	470	17	**2222 035 56471★**
	1000	19	**2222 035 56102★**
	2200	20	**2222 035 56222**
35	22	11	**2222 035 90003★**
	100	14	**2222 035 90059**
	1000	19	**2222 035 90006**
40	22	12	**2222 035 57229★**
	220	16	**2222 035 57221★**
	470	18	**2222 035 57471★**
63	0.47	11	**2222 035 58477★**
	1	11	**2222 035 58108★**
	2.2	11	**2222 035 58228★**
	4.7	11	**2222 035 58478★**
	10	12	**2222 035 58109★**
	22	13	**2222 035 58229★**
	47	14	**2222 035 58479★**
	100	16	**2222 035 58101★**
	220	18	**2222 035 58221★**
	470	19	**2222 035 58471★**

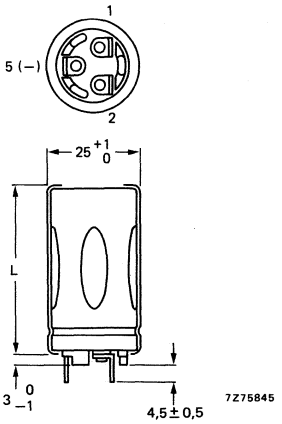
ELECTROLYTIC CAPACITORS; SOLID AND NON-SOLID Gen. data

2222 050/052

For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29

Nominal capacitance range (E6-series)	47 to 47000 µF
Lower tolerance on nominal capacitance	−10%
Upper tolerance on nominal capacitance	+30%
Rated voltage range, U_R	10 to 385 V
Minimum category temperature	−40 °C
Maximum category temperature	+85 °C
Endurance test at 85 °C	5000 h
Shelf life at 0 V, 85 °C	500 h
Basic specification	IEC 384-4
Climatic category	40/085/56

case size	nominal dimensions (mm)
1	Ø 25 x 35
2	Ø 25 x 45
3	Ø 30 x 45
4	Ø 35 x 45
5	Ø 35 x 55
6	Ø 40 x 45
7	Ø 40 x 55
8	Ø 40 x 75
9	Ø 40 x 105



C

U_R V	C_{nom} µF	case size	cat. number printed-wiring pins
16	3300	1	**2222 050 55332**
	4700	2	**2222 050 55472**
	6800	3	**2222 050 55682**
	10000	4	**2222 050 55103**
	15000	5	**2222 050 55153**
	22000	7	**2222 050 55223★**
	47000	9	**2222 050 55473★**
25	2200	1	**2222 050 56222**
	3300	2	**2222 050 56332**
	4700	3	**2222 050 56472**
	6800	4	**2222 050 56682**
	10000	5	**2222 050 56103**

ELECTROLYTIC CAPACITORS; SOLID AND NON–SOLID Gen. data

2222 050/052 (cont.)

For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29

U_R V	C_{nom} µF	case size	cat. number printed–wiring pins
40	1500	1	**2222 050 57152**
	2200	2	**2222 050 57222★**
	3300	3	**2222 050 57332**
	4700	4	**2222 050 57472★**
	10000	7	**2222 050 57103★**
63	1000	1	**2222 050 58102★**
	1500	2	**2222 050 58152**
	2200	3	**2222 050 58222**
	3300	4	**2222 050 58332**
	4700	5	**2222 050 58472**
	6800	7	**2222 050 58682**
	10000	8	**2222 050 58103**
100	470	1	**2222 050 59471★**
	1000	3	**2222 050 59102**
	1500	4	**2222 050 59152**
	2200	5	**2222 050 59222**
250	100	1	**2222 052 53101★**
	220	3	**2222 052 53221★**
	330	4	**2222 052 53331**
	470	5	**2222 052 53471★**
	680	7	**2222 052 53681**
	1000	8	**2222 052 53102★**
385	47	1	**2222 052 58479**
	100	3	**2222 052 58101★**
	150	4	**2222 052 58151**
	220	5	**2222 052 58221**
	470	8	**2222 052 58471★**

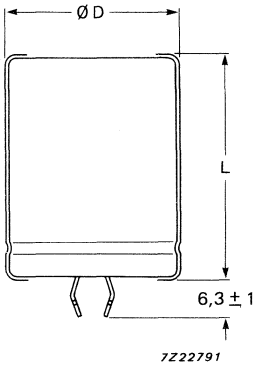
ELECTROLYTIC CAPACITORS; SOLID AND NON-SOLID Gen. data

2222 058/059

For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29

Nominal capacitance range (E6-series)	33 to 47000 µF
Lower tolerance on nominal capacitance	−20%
Upper tolerance on nominal capacitance	20%
Rated voltage range, U_R (R5-series)	10 to 385 V
Minimum category temperature	−55 °C
Maximum category temperature	+105 °C
Endurance test	2000 h
Shelf life at 0 V	500 h
Basic specification	IEC384-4
Climatic category	55/105/56

case size	nominal dimensions (mm)
2230	Ø 22 x 30
2530	Ø 25 x 30
3030	Ø 30 x 30
2240	Ø 22 x 40
2540	Ø 25 x 40
3040	Ø 30 x 40
3540	Ø 35 x 40
3050	Ø 30 x 50



C

U_R V	C_{nom} µF	case size	catalogue number
10	4700	2225	**2222 058 54472**
	10000	2530	**2222 058 54103**
	22000	3040	**2222 058 54223**
	47000	3550	**2222 058 54473**
16	4700	2230	**2222 058 55472★**
	10000	2540	**2222 058 45103★**
	22000	3050	**2222 058 45223**
25	2200	2225	**2222 058 56222**
	4700	2240	**2222 058 46472★**
	10000	2550	**2222 058 46103★**
	22000	3550	**2222 058 56223**
40	2200	2230	**2222 058 57222★**
	4700	2540	**2222 058 47472**
	10000	3050	**2222 058 47103**
25	2200	2225	**2222 058 56222**
	4700	2240	**2222 058 46472★**
	10000	2550	**2222 058 46103★**
	22000	3550	**2222 058 56223**
63	1000	2230	**2222 058 58102★**
	2200	2540	**2222 058 48222★**
	4700	3050	**2222 058 48472★**
100	470	2230	**2222 058 59471**
	1000	2540	**2222 058 49102**
	2200	3050	**2222 058 49222**
250	100	2230	**2222 059 53101**
	220	2540	**2222 059 43221**
	470	3050	**2222 059 43471★**
385	47	2230	**2222 059 58479**
	100	2540	**2222 059 48101**
	220	3050	**2222 059 48221**

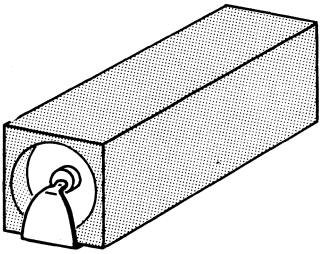
ELECTROLYTIC CAPACITORS; SOLID AND NON-SOLID Gen. data

2222 085 (surface mounting)

For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29

Nominal capacitance range (E3–series)	0.1 to 22 µF
Lower tolerance on nominal capacitance	−10%
Upper tolerance on nominal capacitance	+50%
Rated voltage range, U_R (R5–series)	6.3 to 63 V
Minimum category temperature	−40 °C
Maximum category temperature	+85 °C
Endurance test at 85 °C	1000 h
Shelf life at 0 V, 85 °C	500 h
Basic specification	IEC 384–4
Climatic category	40/085/56

case size	nominal dimensions (mm) length x width x height
1a	8.8 x 3.7 x 3.9
1	11.9 x 3.7 x 3.9



U_R V	C_{nom} µF	case size	cat. number capacitors in rail
6.3	10	1a	**2222 085 33109**
	22	1	**2222 085 33229**
16	4.7	1a	**2222 085 35478**
	10	1	**2222 085 35109**
40	2.2	1a	**2222 085 37228**
	4.7	1	**2222 085 37478**
63	0.1	1a	**2222 085 38107**
	0.22	1a	**2222 085 38227**
	0.47	1a	**2222 085 38477**
	1	1a	**2222 085 38108**
	2.2	1	**2222 085 38228**

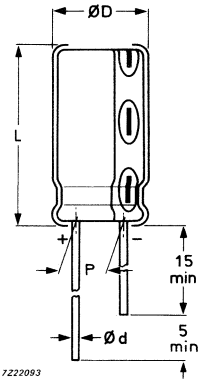
ELECTROLYTIC CAPACITORS; SOLID AND NON-SOLID Gen. data

2222 097

For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29

Nominal capacitance range (E3-series)	0.1 to 220 µF
Lower tolerance on nominal capacitance	−20%
Upper tolerance on nominal capacitance	+20%
Rated voltage range, U_R	6.3 to 63 V
Minimum category temperature	−40 °C
Maximum category temperature	+85 °C
Endurance test at 85 °C	1000 h
Shelf life at 0 V, 85 °C	500 h
Basic specification	IEC 384-4
Climatic category	40/085/56

case size	nominal dimensions (mm)	P ±0.5 (mm)
71	Ø 4 x 7	1.5
72	Ø 5 x 7	2
73	Ø 6.3 x 7	2.5
74	Ø 7 x 7	2.5



U_R V	C_{nom} µF	case size	cat. number 2222 097 followed by
6.3	22	71	**53229**
	47	72	**53479**
	220	74	**53221**
10	15	71	**54159**
	33	72	**54339**
	68	73	**54689**
	100	73	**54101**
16	6.8	71	**55688**
	10	71	**55109**
	15	72	**55159**
	22	72	**55229**
	47	73	**55479★**
	100	74	**55101★**
25	33	73	**56339**
	47	74	**56479**
35	4.7	71	**50478**
	6.8	72	**50688**
	10	72	**50109**
	15	73	**50159**
	22	73	**50229★**
	33	74	**50339**

U_R V	C_{nom} µF	case size	cat. number 2222 097 followed by
50	3.3	71	**51338**
	4.7	72	**51478**
	6.8	73	**51688**
	10	73	**51109★**
	22	74	**51229**
63	0.10	71	**58107★**
	0.15	71	**58157**
	0.22	71	**58227★**
	0.33	71	**58337**
	0.47	71	**58477★**
	0.68	71	**58687**
	1	71	**58108★**
	1.5	71	**58158**
	2.2	71	**58228★**
	3.3	72	**58338**
	4.7	73	**58478★**
	10	74	**58109**

C

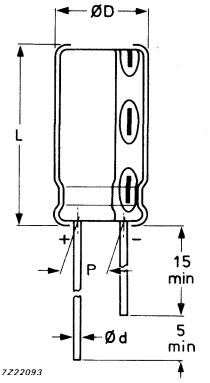
ELECTROLYTIC CAPACITORS; SOLID AND NON-SOLID Gen. data

2222 134

For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29

Nominal capacitance range (E6-series)	0.1 to 100 µF
Lower tolerance on nominal capacitance	−20%
Upper tolerance on nominal capacitance	+20%
Rated voltage range, U_R	6.3 to 50 V
Minimum category temperature	−40 °C
Maximum category temperature	+85 °C
Endurance test at 85 °C	1000 h
Shelf life at 0 V, 85 °C	500 h
Basic specification	IEC 384-4
Climatic category	40/085/56

case size	nominal dimensions (mm)	P mm
51	Ø 3 x 5	1 ±0.3
52	Ø 3.5 x 5	1 ±0.3
53	Ø 4 x 5	1.5 ±0.5
54	Ø 5 x 5	2 ±0.5
55	Ø 6.3 x 5	2.5 ±0.5



U_R V	C_{nom} µF	case size	cat. number 2222 134 followed by
6.3	10	51	**53109**
	15	52	**53159**
	22	53	**53229**
	47	54	**53479**
	100	55	**53101**
10	6.8	51	**54688**
	15	53	**54159**
	33	54	**54339**
	68	55	**54689**
16	4.7	51	**55478**
	6.8	52	**55688**
	10	52	**55109**
	15	54	**55159**
	22	54	**55229★**
	47	55	**55479★**
25	3.3	51	**56338**
	4.7	52	**56478**
	6.8	53	**56688**
	10	54	**56109**
	33	55	**56339**

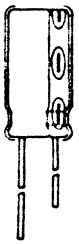
U_R V	C_{nom} µF	case size	cat. number 2222 134 followed by
35	2.2	51	**50228**
	3.3	52	**50338**
	4.7	53	**50478★**
	6.8	54	**50688**
	10	54	**50109★**
	15	55	**50159**
	33	55	**50339**
50	0.1	51	**51107★**
	0.15	51	**51157**
	0.22	51	**51227★**
	0.33	51	**51337**
	0.47	51	**51477★**
	0.68	51	**51687**
	1	51	**51108★**
	1.5	51	**51158**
	2.2	52	**51228★**
	3.3	53	**51338**
	4.7	54	**51478**
	6.8	55	**51688**
	10	55	**51109**

ELECTROLYTIC CAPACITORS; SOLID AND NON-SOLID Gen. data
2222 037

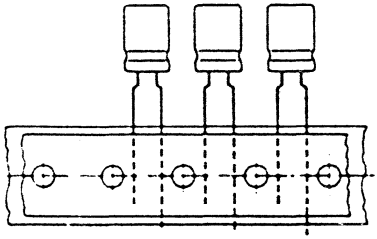
For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29

Nominal capacitance range (E6-series)	0.1 to 10000 μF
Lower tolerance on nominal capacitance	−20%
Upper tolerance on nominal capacitance	+20%
Rated voltage range, U_R (R5–series)	6.3 to 63 V
Minimum category temperature	−40 °C
Maximum category temperature	85 °C
Endurance test at 85 °C	2000 h
Shelf life at 0 V, 85 °C	500 h
Basic specification	IEC384–4
Climatic category	40/085/56

case size	nominal dimensions (mm)
11	∅ 5 x 11
12	∅ 6.3 x 11
13	∅ 8 x 12
14	∅ 10 x 12
15	∅ 10 x 16
16	∅ 10 x 20
17	∅ 12.5 x 20
18	∅ 12.5 x 25
19	∅ 16 x 25
20	∅ 16 x 31



style 1



style 4

U_R V	C_{nom} μF	case size	cat. number style 1 in box
6.3	220	12	**2222 037 53221★**
	470	13	**2222 037 53471★**
	2200	17	**2222 037 53222★**
	10000	20	**2222 037 53103★**
10	100	11	**2222 037 54101**
	1000	15	**2222 037 54102**
	4700	19	**2222 037 54472**
16	100	12	**2222 037 55101**
	220	13	**2222 037 55221**
	470	14	**2222 037 55471**
	1000	16	**2222 037 55102**
	2200	18	**2222 037 55222**
	4700	20	**2222 037 55472**

ELECTROLYTIC CAPACITORS; SOLID AND NON-SOLID Gen. data
2222 037 (cont.)

For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29

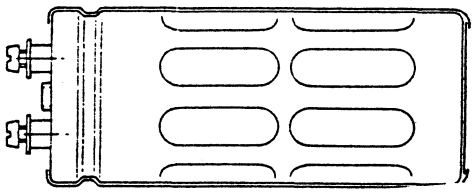
U_R V	C_{nom} μF	case size	cat. number styles 1 in box
25	47	11	**2222 037 56479★**
	1000	17	**2222 037 56102★**
	2200	19	
35	220	14	**2222 037 50221★**
	470	16	**2222 037 50471★**
	1000	18	**2222 037 50102★**
	2200	20	**2222 037 50222★**
40	22	11	**2222 037 57229★**
	47	12	**2222 037 57479★**
	100	13	**2222 037 57101★**
50	220	15	**2222 037 51221★**
	470	17	**2222 037 51471★**
	1000	19	**2222 037 51102★**
63	0.1	11	**2222 037 58107★**
	0.22	11	**2222 037 58227★**
	0.47	11	**2222 037 58477★**
	1	11	**2222 037 58108★**
	2.2	11	**2222 037 58228★**
	4.7	11	**2222 037 58478★**
	10	11	**2222 037 58109★**
	22	12	**2222 037 58229★**
	47	13	**2222 037 58479★**
	100	14	**2222 037 58101★**
	220	16	**2222 037 58221★**
	470	18	**2222 037 58471★**
	1000	20	**2222 037 58102★**

ELECTROLYTIC CAPACITORS; SOLID AND NON-SOLID Gen. data
2222 154/155

For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29

Nominal capacitance range (E6-series)	220 to 470000 μF
Lower tolerance on nominal capacitance	−20%
Upper tolerance on nominal capacitance	20%
Rated voltage range, U_R (R5–series)	10 to 385 V
Minimum category temperature	−40 °C
Maximum category temperature	+85 °C
Endurance test	2000 h
Shelf life at 0 V	500 h
Basic specification	IEC384–4
Climatic category	40/085/56

case size	nominal dimensions (mm)
10	∅ 35 x 60
11	∅ 35 x 80
12a	∅ 35 x 105
14	∅ 50 x 80
15a	∅ 50 x 105
16a	∅ 65 x 105
17	∅ 75 x 105



U_R V	C_{nom} μF	case size	catalogue number
16	33000	10	**2222 154 15333★**
	47000	11	**2222 154 15473★**
40	22000	11	**2222 154 17223★**
	47000	14	**2222 154 17473★**
63	10000	11	**2222 154 18103★**
	22000	14	**2222 154 18223★**
	47000	16a	**2222 154 18473★**
100	4700	11	**2222 154 19472★**
	10000	14	**2222 154 19103★**
	22000	16a	**2222 154 19223★**
160	1000	10	**2222 155 11102★**
	2200	12a	**2222 155 11222★**
	4700	15a	**2222 155 11472★**
	10000	16a	**2222 155 11103★**
250	1000	12a	**2222 155 13102★**
	2200	15a	**2222 155 13222★**
	4700	16a	**2222 155 13472★**
385	220	10	**2222 155 18221★**
	470	11	**2222 155 18471★**
	1000	14	**2222 155 18102★**
	2200	16a	**2222 155 18222★**

SOLID ALUMINIUM CAPACITORS (cont.)

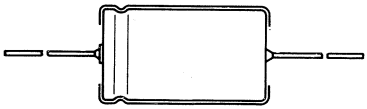
General data

2222 123

For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29

Nominal capacitance range (E3–series)	2.2 to 1500 µF
Lower tolerance on nominal capacitance	−20%
Upper tolerance on nominal capacitance	+20%
Rated voltage range, U_R	6.3 to 40 V
Minimum category temperature	−55 °C
Maximum category temperature	+125 °C
Usable temperature range	−80 to +200 °C
Endurance test at 155 °C	5000 h
Endurance test at 125 °C	8000 h
Basic specification	IEC 384–4
Climatic category	55/125/56

case size	nominal dimensions (mm)
1	Ø 6.5 x 15
2a	Ø 7.5 x 20
4	Ø 9 x 23
5	Ø 10 x 31.5
6	Ø 12.5 x 31.5



U_R V	C_{nom} µF	case size	cat. number
6.3	47	1	**2222 123 13479**
	150	2a	**2222 123 13151**
	330	4	**2222 123 13331**
	1000	6	**2222 123 13102**
10	33	1	**2222 123 14339**
	47	1	**2222 123 14479★**
	68	2a	**2222 123 14689**
	100	2a	**2222 123 14101★**
	220	4	**2222 123 14221**
	470	5	**2222 123 14471★**
16	10	1	**2222 123 15109**
	15	1	**2222 123 15159**
	22	1	**2222 123 15229**
	33	2a	**2222 123 15339**
	68	2a	**2222 123 15689**
	100	4	**2222 123 15101**
25	10	1	**2222 123 16109★**
	22	2a	**2222 123 16229**
	68	4	**2222 123 16689**
	100	4	**2222 123 16101★**
40	2.2	1	**2222 123 17228**
	4.7	1	**2222 123 17478**
	6.8	1	**2222 123 17688**
	10	2a	**2222 123 17109**
	15	2a	**2222 123 17159**
	22	4	**2222 123 17229**
	33	4	**2222 123 17339**
	47	5	**2222 123 17479**
	68	5	**2222 123 17689**
	100	6	**2222 123 17101**

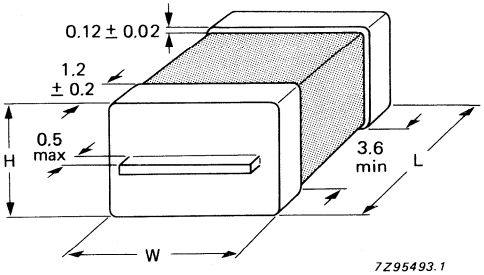
SOLID ALUMINIUM CAPACITORS

General data
2222 127

For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29

Nominal capacitance range (E3–series)	1 to 68 µF
Upper tolerance on nominal capacitance	−20%
Lower tolerance on nominal capacitance	+20%
Rated voltage range, U_R (R5–series)	63 to 25 V
Minimum category temperature	−55 °C
Maximum category temperature	+125 °C
Usable temperature range	−55 to +175 °C
Endurance test at 125 °C	2000 h
Resistance to soldering heat	260 °C, 10 s; immersion in solder permitted
Basic specification	IEC 384–4
Performance grade	GP
Climatic category	55/125/56
at norm	IEC 68

case size	nominal dimensions (mm)
20	6.5 x 4.4 x 2.9
30	6.5 x 5.5 x 3.4
40	6.5 x 5.5 x 4
50	6.5 x 7.5 x 4
60	6.5 x 7.5 x 5



U_R V	C_{nom} µF	case size	cat. number in box	
6.3	47	60	**2222 127 13479**	
10	4.7	30	**2222 127 14478**	
	10	40	**2222 127 14109**	
	22	60	**2222 127 14229**	
16	2.2	40	**2222 127 15228**	
	4.7	50	**2222 127 15478**	
25	1	50	**2222 127 16108**	

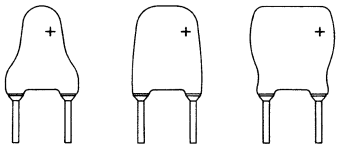
Ook leverbaar in blistertape.

SOLID ALUMINIUM CAPACITORS (cont.)

For detailed information on these and other types see Data Handbook PA01
For packing information see page C27/C28/C29

Nominal capacitance range (E3–series)	1 to 68 µF
Upper tolerance on nominal capacitance	−20%
Lower tolerance on nominal capacitance	+20%
Rated voltage range, U_R (R5–series)	6.3 to 40 V
Minimum category temperature	−55 °C
Maximum category temperature	+125 °C
Endurance test at 125 °C	2000 h
Endurance test at 85 °C	5000 h (typical)
Basic specification	IEC 384–4
Performance grade	GP
Climatic category	55/125/56
at norm	IEC 68

case size	nominal dimensions (mm)
10	9 x 7 x 3
20	9 x 7 x 3.5
30	9 x 7 x 4
40	9 x 7 x 5
50	9 x 8 x 5
60	9 x 8 x 6



style 1

U_R V*	C_{nom} µF	case size	cat. number style 1
6.3	10	20	**2222 128 53109**
	22	30	**2222 128 53229**
	47	50	**2222 128 53479★**
	68	60	**2222 128 53689★**
10	4.7	20	**2222 128 54478**
	10	30	**2222 128 54109**
	22	40	**2222 128 54229★**
	33	50	**2222 128 54339★**
16	2.2	20	**2222 128 55228**
	4.7	30	**2222 128 55478**
	10	40	**2222 128 55109★**
	15	50	**2222 128 55159★**
25	1	20	**2222 128 56108★**
	2.2	30	**2222 128 56228★**
	3.3	40	**2222 128 56338★**
	4.7	50	**2222 128 56478★**
	6.8	60	**2222 128 56688★**
40**	0.1	10	**2222 128 57107**
	0.22	20	**2222 128 57227**
	0.47	40	**2222 128 57477**
	1	50	**2222 128 57108★**

* up to T_{amb} = 125 °C
** up to T_{amb} = 85 °C; >85 and <125 °C U_R = 25 V

ELECTROLYTIC CAPACITORS; SOLID AND NON-SOLID

Packing information

For detailed information see Data Handbook PA01

Types 2222 035, 2222 097, 2222 134

case size	number of capacitors style 1 per box
11	1000
12	1000
13	1000
14	1000
15	500
16	500
17	200
18	200
19	200
20	200
51	3000
52	3000
53	2000
54	2000
55	2000
71	2000
72	1000
73	1000
74	1000

Types 2222 050, 2222 052, 2222 058, 2222 059
Packed in boxes of 100 pcs.

Type 2222 085

Packed in rails (100 pcs per rail, 1000 pcs. per inner box, 5000 pcs. per outer box), and in 16 mm (case size 1a) or 24 mm (case size 1) blister tape of 2000 pcs. on reel.

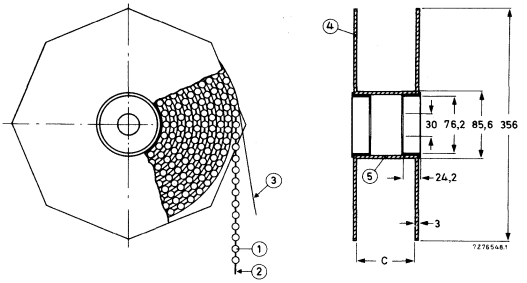
Type 2222 154/155

case size	number of capacitors per box
10, 11, 12a, 14, 15a	25
16a, 17	10

ELECTROLYTIC CAPACITORS; SOLID AND NON-SOLID

Packing information (cont.)

For detailed information see Data Handbook PA01



Style 1 capacitors on bandoliers on reel; dimension C is 83.5 mm for case sizes 1, 2, 3 and 5a, and 88.5 mm for case sizes 4, 5, 6 and 7; the overall width of the reel is 94.5 mm and 99.5 mm respectively.

1 = capacitor
2 = bandolier
3 = paper
4 = flange
5 = cylinder

Types 2222 021, 2222 030, 2222 031

	number of capacitors		
case size	style 1 on bandoliers per reel	style 1 on bandoliers per box	style 1 per box
1	4000	1000	–
2	3000	1000	–
3	1000	1000	–
5a	500	500	–
4	1000	1000	–
5	500	500	–
6	500	500	–
7	500	500	–
00	500	–	200
01	400	–	200
02	–	–	200
03	–	–	200
04	–	–	100
05	–	–	100

SOLID ALUMINIUM CAPACITORS

Packing information

For detailed information see Data Handbook PA01

Type 2222 128

case size	number of capacitors style 1 per box
1,2,20,30	1000
3,4,40,50,60	1000

Type 2222 123
Number of capacitors (on bandoliers) per box is 100.

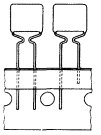
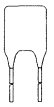
Type 2222 127
Number of capacitors per box is 200.

FILM CAPACITORS

Selection guide
MKT

For detailed information on these and other types see Data Handbook PA05

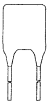
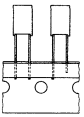
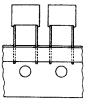
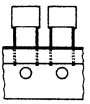
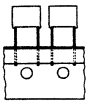
Metallized polyethylene-teraphthalate film capacitors (MKT)

type	series number 2222 ...	application	nom. cap. µF	rated voltage U_R(V)	pitch mm	tangent of the loss angle at 1,10,100 kHz ⩽ (..) x 10^{-4}
Epoxy lacquered 	365	general purpose; on tape	0.01 to 1.0 0.0033 to 1.0	63 to 100 63 to 400	5.08 5.08*	75;150; 300
Epoxy lacquered 	366	general purpose	0.01 to 1.0 0.0033 to 1.0	63 to 100 63 to 400	5.08 7.62	75;150; 300
Epoxy lacquered 	367	general purpose	0.01 to 1.0 0.0033 to 1.0	63 to 100 63 to 400	5.08 7.62	75;150; 300

* Original pitch 7.62 reduced to 5.08 mm.

For detailed information on these and other types see Data Handbook PA05

Metallized polyethylene–teraphthalate film capacitors (MKT)

type	series number 2222 ...	application	nom. cap. µF	rated voltage U_R(V)	pitch mm	tangent of the loss angle at 1,10,100 kHz $\leq$ (..) x 10^{-4}
Epoxy lacquered 	368	general purpose	0.001 to 6.8	63 to 630	10.16; 15.24; 22.86; 27.94	75;150; 300
Epoxy lacquered 	369	general purpose	0.001 to	63 to	10.16	75;150; 300
Potted   	370	CECC; general purpose	0.0039 to 1.0	63 to 100	5.08	75;130; 300
Potted   	371	CECC; general purpose	0.0039 to 1.0	63 to 400	7.62	75;130; 300
Potted  	372	general purpose	0.0047 to 0.47	100 to 400	10	75;130; 300
Potted  	373	general purpose	0.047 to 15	100 to 400	15; 22.5; 27.5	75;130; 300

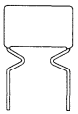
C

FILM CAPACITORS

Selection guide
KT and MKC

For detailed information on these and other types see Data Handbook PA05

Polyethylene–terephthalate film/foil capacitors (KT)

type	series number 2222 ...	application	nom. cap. µF	rated voltage U_R(V)	pitch mm	tangent of the loss angle at 1,10,100 kHz $\leq$ (..) x 10^{-4}
Phenolic lacquered 	347	high current; high steep pulses	0.001 to 1.0	100 to 630	10.16; 15.24; 22.86; 27.94	60;110

Metallized polycarbonate film capacitors (MKC)

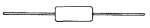
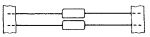
Potted 	344	general purpose	0.010 to 6.8	100 to 630	10;15; 22.5; 27.5	30;75; 130

FILM CAPACITORS

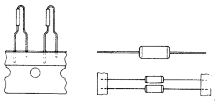
Selection guide
KS and KP

For detailed information on these and other types see Data Handbook PA05

Polystyrene film/foil capacitors (KS)

type	series number 2222 ...	application	nom. cap. pF	rated voltage U_R(V)	pitch mm	tangent of the loss angle at 1,100 kHz $\leq$ (..) x 10^{-4}
Sleeved 	424 425 426 427	close tolerance; reliable; low losses	47 to 39000	63 to 630	–	5;25
	428 429 430 431		47 to 39000	63 to 630	–	5;25
Potted 	443	close tolerance; reliable low losses	100 to 3400	63	2.54; 5.08; 7.62	5;60
Wrapped end-filled 	444 445 446 447	close tolerance; reliable; low losses	6200 to 162000	63 to 630	–	5;25

Polypropylene film/foil capacitors (KP)

Epoxy lacquered 	460 461 462 463 464	close tolerance; reliable; low losses	47 to 62000	63 to 630	–	5;40

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FILM CAPACITORS

Selection guide
KP/MMKP, MKP and MKT–P

For detailed information on these and other types see Data Handbook PA05

AC and pulse metallized polypropylene film capacitors (KP/MMKP and MKP)

type	series number 2222 ...	application	nom. cap. µF	rated voltage U_R(V)	pitch mm	tangent of the loss angle at 10,100 kHz $< (..) \times 10^{-4}$
Potted (KP/MMKP) 	376	high current; steep pulses	0.001 to 0.27	630 to 2000	15; 22.5; 27.5	–;20
Potted (MKP) 	378	high stability; high current; steep pulses	0.0033 to 3.3	250 to 2000	22.5; 27.5	20;90

Interference suppression capacitors (MKT–P)

type	series number 2222 ...	application	nom. cap. µF	rated voltage U_R(V) AC	pitch mm	tangent of the loss angle at 1,10 kHz $< (..) \times 10^{-4}$
Potted 	330 4.... 330 5....	interference suppression	0.01 to 1.0	250	15; 22.5; 27.5	75;130

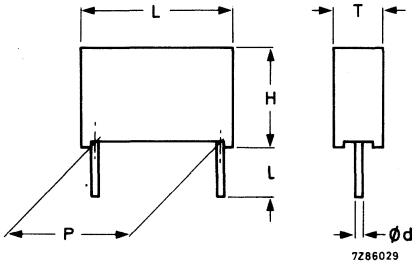
INTERFERENCE SUPPRESSION CAPACITORS

General data

2222 330 (MKT–P)

For detailed information on these and other types see Data Handbook PA05

Rated capacitance range (E–6 series)	0.01 to 1 µF
Upper tolerance on rated capacitance	±20%
Lower tolerance on rated capacitance	±20%
Rated voltage $U_{R.(a.c.)}$, 50/60 Hz	250 V
Minimum category temperature	−40 °C
Maximum category temperature	+85 °C
Climatic category	40/085/21
Related specification	IEC 384–14
Class	2
Dielectric	PETP–P
Approvals	VDE 565–1, SEMKO, IMQ (CEI 40–7), UL 1283



250 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	P mm	d mm	l = 5 mm cat.number
0.01	5	11	17.5	15	0.8	**2222 330 40103★**
0.015	5	11	17.5	15	0.8	**2222 330 40153**
0.022	5	11	17.5	15	0.8	**2222 330 40223★**
0.033	5	11	17.5	15	0.8	**2222 330 40333**
0.047	6	11.5	17.5	15	0.8	**2222 330 40473★**
0.068	7	13	17.5	15	0.8	**2222 330 40683**
0.1	8.5	14.5	17.5	15	0.8	**2222 330 40104★**
0.15	7	16	26	22.5	0.8	**2222 330 40154**
0.22	8.5	17.5	26	22.5	0.8	**2222 330 40224★**
0.33	10	18.5	26	22.5	0.8	**2222 330 40334**
0.47	13	22.5	31	27.5	0.8	**2222 330 40474★**
0.68	15	25	31	27.5	0.8	**2222 330 40684**
1	18	28	31	27.5	0.8	**2222 330 40105★**

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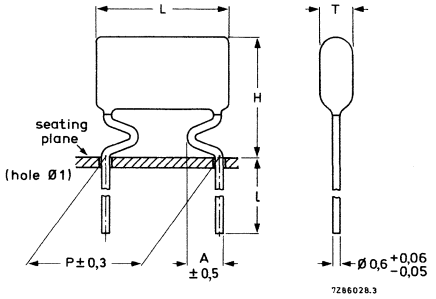
METALLIZED FILM CAPACITORS (cont.)

General data

2222 366 (MKT)

For detailed information on these and other types see Data Handbook PA05

Rated capacitance (E–12 series)	0.0047 to 1 µF
Upper tolerance on rated capacitance	±10%
Lower tolerance on rated capacitance	±10%
Rated voltage U_R (d.c.)	63 V, 100 V, 250 V, 400 V
Rated voltage U_R (a.c.), 50/60 Hz	40 V, 63 V, 160 V, 220 V
Minimum category temperature	−40 °C
Maximum category temperature	+100 °C
Climatic category	40/100/56
at norm	IEC 68
Related specification	IEC 384–2
Dielectric	PETP



63 V–range; pitch (P) = 7.62 mm

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	A mm	l = 4 mm cat. number
0.15	4	12	10	2	**2222 366 15154★**
0.22	4	12	10	2	**2222 366 15224★**
0.33	5	13.5	10.5	2	**2222 366 15334★**
0.47	5.5	14	10.5	2	**2222 366 15474★**
0.68	5.5	14.5	10.5	2	**2222 366 15684**
1	5.5	14.5	10.5	2	**2222 366 15105**

For detailed information on these and other types see Data Handbook PA05

100 V–range; pitch (P) = 7.62 mm

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	A mm	l = 4 mm cat. number
0.047	4	12	10	2	**2222 366 25473★**
0.068	4	11	10	2	**2222 366 25683★**
0.1	4	13	10	2	**2222 366 25104★**
0.15	5	13	10.5	2	**2222 366 25154**
0.22	5.5	13.5	10.5	2	**2222 366 25224**
0.33	6	15	10.5	2	**2222 366 25334**
0.47	6	15	10.5	2	**2222 366 25474**

250 V–range; pitch (P) = 7.62 mm

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	A mm	l = 4 mm cat. number
0.022	4	13	10	2	**2222 366 45223★**
0.033	4	13	10	2	**2222 366 45333★**
0.047	4	13	10	2	**2222 366 45473**

400 V–range; pitch (P) = 7.62 mm

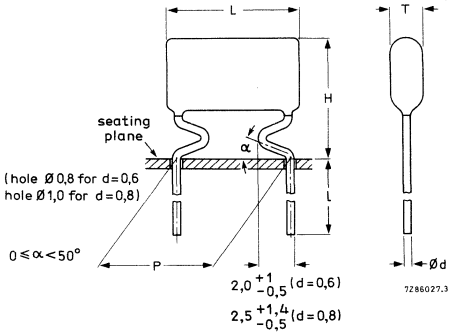
rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	A mm	l = 4 mm cat. number
0.0047	4	12	10	2	**2222 366 55472★**
0.0068	4	13	10	2	**2222 366 55682★**
0.01	4	13	10	2	**2222 366 55103★**
0.015	4	13	10	2	**2222 366 55153★**

METALLIZED FILM CAPACITORS (cont.)

General data
2222 368 (MKT)

For detailed information on these and other types see Data Handbook PA05

Rated capacitance (E–12 series)	0.001 to 6.8 µF
Upper tolerance on rated capacitance	±10%
Lower tolerance on rated capacitance	±10%
Rated voltage U_R (d.c.)	100 V, 250 V, 400 V
Rated voltage U_R (a.c.), 50/60 Hz	63 V, 160 V, 220 V
Minimum category temperature	−40 °C
Maximum category temperature	+100 °C
Climatic category	40/100/56
at norm	IEC 68
Related specification	IEC 384–2
Performance grade	grade 1 (LL)
Dielectric	PETP



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100 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	P mm	d mm	l = 5 mm cat. number
0.068	4	12	12.5	10.16	0.6	**2222 368 25683**
0.10	4	12	12.5	10.16	0.6	**2222 368 25104★**
0.15	4	12	12.5	10.16	0.6	**2222 368 25154★**
0.22	5	13	12.5	10.16	0.6	**2222 368 25224★**
0.33	5	14	17.5	15.14	0.8	**2222 368 25334★**
0.47	5.5	14.5	17.5	15.14	0.8	**2222 368 25474★**
0.68	6.0	15.0	17.5	15.14	0.8	**2222 368 25684★**
1.0	7.5	16.5	17.5	15.14	0.8	**2222 368 25105★**
1.5	6.0	18.0	26	22.86	0.8	**2222 368 25155★**
2.2	6.5	18.5	26	22.86	0.8	**2222 368 25225★**
3.3	8.5	20.5	26	22.86	0.8	**2222 368 25335★**
4.7	9.5	21.5	30	22.86	0.8	**2222 368 25475**
6.8	11.5	23.5	30	22.86	0.8	**2222 368 25685**

For detailed information on these and other types see Data Handbook PA05

250 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	P mm	d mm	l = 4 mm cat. number
0.033	4	12	12.5	10.16	0.6	**2222 368 45333★**
0.047	4	12	12.5	10.16	0.6	**2222 368 45473★**
0.068	4.5	12.5	12.5	10.16	0.6	**2222 368 45683★**
0.1	5	13	12.5	10.16	0.6	**2222 368 45104**
0.15	5	14	17.5	15.24	0.8	**2222 368 45154**
0.22	6	15	17.5	15.24	0.8	**2222 368 45224**
0.33	7	16	17.5	15.24	0.8	**2222 368 45334**
0.47	5.5	17.5	26	22.86	0.8	**2222 368 45474**
0.68	6.5	18.5	26	22.86	0.8	**2222 368 45684**
1	7.5	19.5	30	27.94	0.8	**2222 368 45105**
1.5	8.5	20.5	30	27.94	0.8	**2222 368 45155**
2.2	10.5	22.5	30	27.94	0.8	**2222 368 45225**

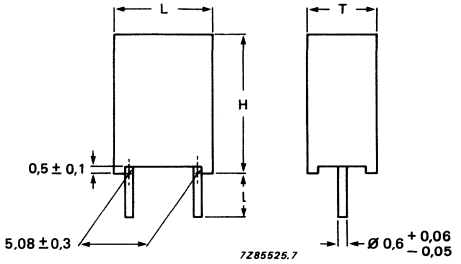
400 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	P mm	d mm	l = 4 mm cat. number
0.0010	4	12	12.5	10.16	0.6	**2222 368 55102★**
0.0015	4	12	12.5	10.16	0.6	**2222 368 55152★**
0.0022	4	12	12.5	10.16	0.6	**2222 368 55222★**
0.0033	4	12	12.5	10.16	0.6	**2222 368 55332★**
0.0047	4	12	12.5	10.16	0.6	**2222 368 55472★**
0.0068	4	12	12.5	10.16	0.6	**2222 368 55682**
0.010	4	12	12.5	10.16	0.6	**2222 368 55103★**
0.015	4	12	12.5	10.16	0.6	**2222 368 55153★**
0.022	4	12	12.5	10.16	0.6	**2222 368 55223★**
0.033	4.5	12.5	12.5	10.16	0.6	**2222 368 55333**
0.047	5	14	17.5	15.24	0.8	**2222 368 55473**
0.068	5	14	17.5	15.24	0.8	**2222 368 55683**
0.1	6	15	17.5	15.24	0.8	**2222 368 55104**
0.15	7	16	17.5	15.24	0.8	**2222 368 55154**
0.22	5.5	17.5	26	22.86	0.8	**2222 368 55224**
0.33	6.5	18.5	26	22.86	0.8	**2222 368 55334**
0.47	8	20	26	22.86	0.8	**2222 368 55474**
0.68	8.5	20.5	30	27.94	0.8	**2222 368 55684**
1	11	23	30	27.94	0.8	**2222 368 55105**

METALLIZED FILM CAPACITORS (cont.)

For details on these and other types see Data Handbook PA05

Rated capacitance (E–12 series)	0,001 to 1 μF
Upper tolerance on rated capacitance	$\pm$ 10%
Lower tolerance on rated capacitance	$\pm$ 10%
Rated voltage U_R (d.c.)	63 V, 100 V, 250 V, 400 V
Rated voltage U_R (a.c.), 50/60 Hz	40 V, 63 V, 160 V, 220 V
Minimum category temperature	$-$ 55 °C
Maximum category temperature	+ 100 °C
Climatic category (CECC 30400)	55/100/56
at norm	IEC 68
Related specification	IEC 384–2
performance grade	grade 1 (LL)
Dielectric	PETP



63 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	l = 4 mm cat. number
0.068	2.5	6.5	7.2	**2222 370 11683★**
0.1	2.5	6.5	7.2	**2222 370 11104★**
0.15	3.5	8	7.2	**2222 370 11154★**
0.22	3.5	8	7.2	**2222 370 11224★**
0.33	4.5	9	7.2	**2222 370 11334★**
0.47	5	10	7.2	**2222 370 11474★**
0.68	6	11	7.2	**2222 370 11684★**
1	6	11	7.2	**2222 370 11105★**

100 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	l = 4 mm cat. number
0.0047	2.5	6.5	7.2	**2222 370 21472★**
0.0068	2.5	6.5	7.2	**2222 370 21682★**
0.01	2.5	6.5	7.2	**2222 370 21103★**
0.015	2.5	6.5	7.2	**2222 370 21153★**
0.022	2.5	6.5	7.2	**2222 370 21223★**
0.033	2.5	6.5	7.2	**2222 370 21333★**
0.047	4.5	6.5	7.2	**2222 370 21473★**
0.068	3.5	8	7.2	**2222 370 21683★**
0.1	3.5	8	7.2	**2222 370 21104★**

METALLIZED FILM CAPACITORS (cont.)

General data

2222 370 (MKT)

For details on these and other types see Data Handbook PA05

250 V–range

rated cap. μF	T_{max} mm	H_{max} mm	L_{max} mm	l = 4 mm cat. number
0,0047	2,5	6,5	7,2	**2222 370 41472★**
0,0068	2,5	6,5	7,2	**2222 370 41682★**
0,01	2,5	6,5	7,2	**2222 370 41103★**
0,015	3,5	8	7,2	**2222 370 41153★**
0,022	3,5	8	7,2	**2222 370 41223★**
0,033	3,5	8	7,2	**2222 370 41333★**
0,047	4,5	9	7,2	**2222 370 41473★**
0,068	6	11	7,2	**2222 370 41683★**
0,1				**2222 370 41104★**

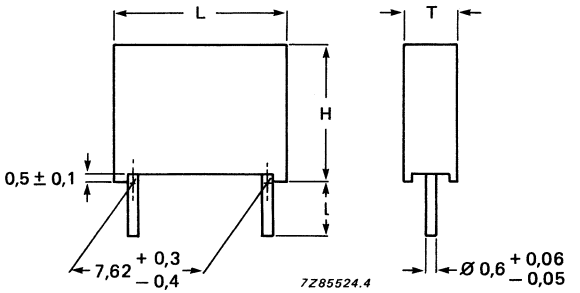
400 V–range

rated cap. μF	T_{max} mm	H_{max} mm	L_{max} mm	l = 4 mm cat. number
0,001	2,5	6,5	7,2	**2222 370 51102★**
0,0015	2,5	6,5	7,2	**2222 370 51152★**
0,0022	2,5	6,5	7,2	**2222 370 51222★**

NOTES

For detailed information on these and other types see Data Handbook PA05

Rated capacitance (E–12 series)	0.0047 to 1 µF
Upper tolerance on rated capacitance	± 10%
Lower tolerance on rated capacitance	± 10%
Rated voltage U_R (d.c.)	63 V, 100 V, 250 V, 400 V
Rated voltage U_R (a.c.), 50/60 Hz	40 V, 63 V, 160 V, 220 V
Minimum category temperature	− 55 °C
Maximum category temperature	+ 100 °C
Climatic category (CECC 30400)	55/100/56
at norm	IEC 68
Related specification	IEC 384–2
performance grade	grade 1 (LL)
Dielectric	PETP



63 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	l = 4 mm cat. number
0.068	2.5	6.5	10	**2222 371 11683**
0.1	2.5	6.5	10	**2222 371 11104**
0.15	3	8	10	**2222 371 11154**
0.22	3	8	10	**2222 371 11224**
0.33	4	9	10	**2222 371 11334**
0.47	4	9	10	**2222 371 11474★**
0.68	5	10.5	10	**2222 371 11684★**
1	6	11.5	10	**2222 371 11105★**

For detailed information on these and other types see Data Handbook PA05

100 V-range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	l = 4 mm cat. number
0.022	2.5	6.5	10	**2222 371 21223**
0.033	2.5	6.5	10	**2222 371 21333**
0.047	2.5	6.5	10	**2222 371 21473★**
0.068	3	8	10	**2222 371 21683**
0.1	3	8	10	**2222 371 21104★**
0.15	4	9	10	**2222 371 21154★**
0.22	4	9	10	**2222 371 21224★**
0.33	5	10.5	10	**2222 371 21334★**
0.47	6	11.5	10	**2222 371 21474★**

250 V-range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	l = 4 mm cat. number
0.01	2.5	6.5	10	**2222 371 41103★**
0.015	2.5	6.5	10	**2222 371 41153**
0.022	3	8	10	**2222 371 41223★**
0.033	3	8	10	**2222 371 41333**
0.047	3	8	10	**2222 371 41473★**
0.068	5	10.5	10	**2222 371 41683**
0.1	6	11.5	10	**2222 371 41104★**

400 V-range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	l = 4 mm cat. number
0.0047	2.5	6	10	**2222 371 51472★**
0.0068	2.5	6	10	**2222 371 51682**
0.01	3	8	10	**2222 371 51103**

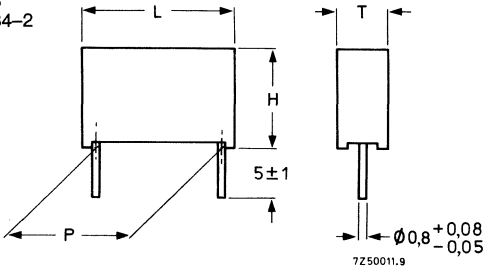
METALLIZED FILM CAPACITORS (cont.)

General data

2222 372 (MKT)

For detailed information on these and other types see Data Handbook PA05

Rated capacitance (E–12 series)	0.0047 to 0.47 µF
Upper tolerance on rated capacitance	+20%
Lower tolerance on rated capacitance	−20%
Rated voltage U_R (d.c.)	100 V, 250 V, 400 V
Rated voltage U_R (a.c.), 50/60 Hz	63 V, 160 V, 220 V
Minimum category temperature	−55 °C
Maximum category temperature	+100 °C
Climatic category (CECC 30400)	55/100/56
at norm	IEC68
Related specification	IEC384–2
performance grade	LL
Dielectric	PETP



100 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	cat. number packed in boxes	
0.1	4	9	12.5	**2222 372 21104★**	
0.15	4	9	12.5	**2222 372 21154★**	
0.22	4	9	12.5	**2222 372 21224★**	
0.33	4	10	12.5	**2222 372 21334★**	
0.47	5	11	12.5	**2222 372 21474★**	

250 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	cat. number packed in boxes	
0.047	4	9	12.5	**2222 372 41473★**	
0.068	4	9	12.5	**2222 372 41683★**	
0.1	4	10	12.5	**2222 372 41104★**	
0.15	5	11	12.5	**2222 372 41154★**	

400 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	cat. number packed in boxes	
0.0047	4	9	12.5	**2222 372 51472**	
0.0068	4	9	12.5	**2222 372 51682**	
0.01	4	9	12.5	**2222 372 51103★**	
0.015	4	9	12.5	**2222 372 51153★**	
0.022	4	9	12.5	**2222 372 51223★**	
0.033	4	10	12.5	**2222 372 51333★**	
0.047	5	11	12.5	**2222 372 51473★**	

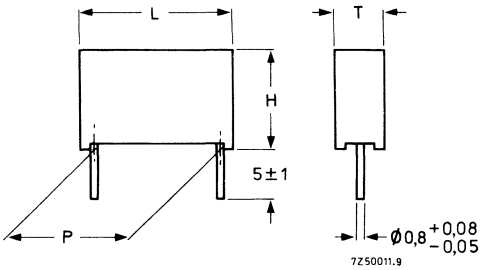
METALLIZED FILM CAPACITORS (cont.)

General data

2222 373 (MKT)

For detailed information on these and other types see Data Handbook PA05

Rated capacitance (E–12 series)	0.047 to 15 µF
Upper tolerance on rated capacitance	+10%
Lower tolerance on rated capacitance	−10%
Rated voltage U_R (d.c.)	100 V, 250 V, 400 V
Rated voltage U_R (a.c.), 50/60 Hz	63 V, 160 V, 220 V
Minimum category temperature	−55 °C
Maximum category temperature	+100 °C
Climatic category (CECC 30400)	55/100/56
at norm	IEC68
Related specification	IEC384–2
performance grade	LL
Dielectric	PETP



100 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	cat. number packed in boxes	
0.33	5	11	17.5	**2222 373 21334★**	
0.47	5	11	17.5	**2222 373 21474★**	
0.68	5	11	17.5	**2222 373 21684★**	
1	6	12	17.5	**2222 373 21105★**	
1.5	7	13.5	17.5	**2222 373 21155★**	
2.2	8.5	15	17.5	**2222 373 21225★**	
3.3	8.5	18	26	**2222 373 21335★**	
4.7	10	19.5	26	**2222 373 21475★**	
6.8	11	21	31	**2222 373 21685★**	
10	13	23	31	**2222 373 21106★**	
15	18	28	31	**2222 373 21156★**	

For detailed information on these and other types see Data Handbook PA05

250 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	cat. number packed in boxes	
0.15	5	11	17.5	**2222 373 41154**	
0.22	5	11	17.5	**2222 373 41224**	
0.33	6	12	17.5	**2222 373 41334**	
0.47	6	12	17.5	**2222 373 41474**	
0.68	7	13.5	17.5	**2222 373 41684**	
1	8.5	15	17.5	**2222 373 41105★**	
1.5	8.5	18	26	**2222 373 41155★**	
2.2	10	19.5	26	**2222 373 41225★**	
3.3	13	23	31	**2222 373 41335★**	
4.7	15	25	31	**2222 373 41475★**	

400 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	cat. number packed in boxes	
0.047	5	11	17.5	**2222 373 51473**	
0.068	5	11	17.5	**2222 373 51683**	
0.1	5	11	17.5	**2222 373 51104★**	
0.15	6	12	17.5	**2222 373 51154★**	
0.22	7	13.5	17.5	**2222 373 51224★**	
0.33	8.5	15	17.5	**2222 373 51334★**	
0.47	8.5	18	26	**2222 373 51474★**	
0.68	10	19.5	26	**2222 373 51684★**	
1	11	21	31	**2222 373 51105★**	
1.5	15	25	31	**2222 373 51155★**	

POLYPROPYLENE FILM/FOIL CAPACITORS

General data

2222 460–464 (KP)

For detailed information on these and other types see Data Handbook PA05

Rated capacitance (E–24 series and E–48 series)	47 to 62000 pF
Lower tolerance on rated capacitance	−2%
Upper tolerance on rated capacitance	+2%
Rated voltage U_R (d.c.)	63 V, 160 V, 250 V, 400 V, 630 V
Rated voltage U_R (a.c.), 50/60 Hz	40 V, 63 V, 125 V, 160 V, 200 V, 400 V
Minimum category temperature	−40 °C
Maximum category temperature	+100 °C
Climatic category	40/100/56
at norm	IEC 68
Related specification	IEC 384–13
Dielectric	PP

63 V–range

rated cap. pF	D_{max} mm	L_{max} mm	l_{min} mm	cat. number in box
6800	5	11	30	**2222 460 36802**
10000	5.5	15	28	**2222 460 31003**
15000	5.5	15	28	**2222 460 31503**
22000	5.5	15	28	**2222 460 32203**
33000	6.5	15	28	**2222 460 33303**
47000	7.5	15	28	**2222 460 34703**
62000	8	15	28	**2222 460 36203**

160 V–range

rated cap. pF	D_{max} mm	L_{max} mm	l_{min} mm	cat. number in box
4700	5	11	30	**2222 461 34702**
6800	5.5	15	28	**2222 461 36802**
10000	5.5	15	28	**2222 461 31003**
15000	5.5	15	28	**2222 461 31503**
22000	6.5	15	28	**2222 461 32203**
33000	7.5	15	28	**2222 461 33303**

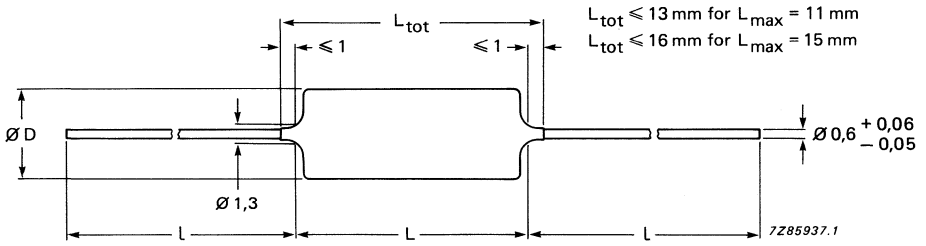
250 V–range

rated cap. pF	D_{max} mm	L_{max} mm	l_{min} mm	cat. number in box
1500	5	11	30	**2222 462 31502**
2200	5	11	30	**2222 462 32202**
3300	5	11	30	**2222 462 33302**
4700	5.5	15	28	**2222 462 44702**
6800	5.5	15	28	**2222 462 46802**
10000	6	15	28	**2222 462 41003**
15000	7	15	28	**2222 462 41503**
22000	8	15	28	**2222 462 42203**

POLYPROPYLENE FILM/FOIL CAPACITORS (cont.) General data

2222 460–464 (KP) cont.

For detailed information on these and other types see Data Handbook PA05



400 V–range

rated cap. pF	D_{max} mm	L_{max} mm	l_{min} mm	cat. number in box
150	5	11	30	**2222 463 31501**
220	5	11	30	**2222 463 32201**
330	5	11	30	**2222 463 33301**
470	5	11	30	**2222 463 34701**
680	5	11	30	**2222 463 36801**
1000	5	11	30	**2222 463 31001**

630 V–range

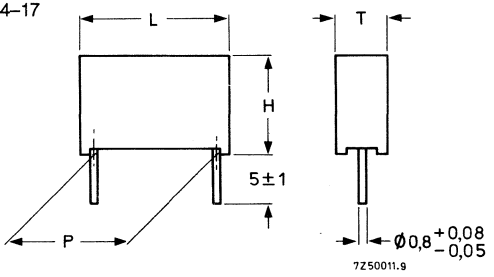
rated cap. pF	D_{max} mm	L_{max} mm	l_{min} mm	cat. number in box
47	5	11	30	**2222 464 34709**
68	5	11	30	**2222 464 36809**
100	5	11	30	**2222 464 31009**

A.C. & pulse metallized polypropylene film capacitors General data

2222 376 (KP/MMKP)

For detailed information on these and other types see Data Handbook PA05

Rated capacitance (E–12 series)	1 to 270 nF
Lower tolerance on rated capacitance	−5%
Upper tolerance on rated capacitance	+5%
Rated voltage U_R (d.c.)	630 V, 1000 V, 1600 V, 2000 V
Rated voltage U_R (a.c.), 50/60 Hz	300 V, 400 V, 500 V, 600 V
Minimum category temperature	−55 °C
Maximum category temperature	+85 °C
Climatic category	55/100/56
Related specification	IEC 384–17
Dielectric	PP



630 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	P* mm	cat. number
0.15	13	22.5	31	27.5	**2222 376 62154**
0.22	18	28	31	27.5	**2222 376 62224**

1000 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	P* mm	cat. number
0.033	8.5	17.5	26	22.5	**2222 376 72333**
0.047	11	20	31	27.5	**2222 376 72473**
0.068	11	20	31	27.5	**2222 376 72683**
0.1	13	22.5	31	27.5	**2222 376 72104**
0.15	18	28	31	27.5	**2222 376 72154**

2000 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	P* mm	cat. number
0.001	5	11	17.5	15	**2222 376 92102**
0.0015	6	12	17.5	15	**2222 376 92152**
0.0022	8.5	14.5	17.5	15	**2222 376 92222**
0.0033	6.5	15.5	26	22.5	**2222 376 92332**
0.0047	6.5	15.5	26	22.5	**2222 376 92472**
0.0068	7.5	16.5	26	22.5	**2222 376 92682**
0.01	9.5	19	26	22.5	**2222 376 92103**
0.015	11	20	31	27.5	**2222 376 92153**
0.022	13	22.5	31	27.5	**2222 376 92223**
0.033	18	28	31	27.5	**2222 376 92333**

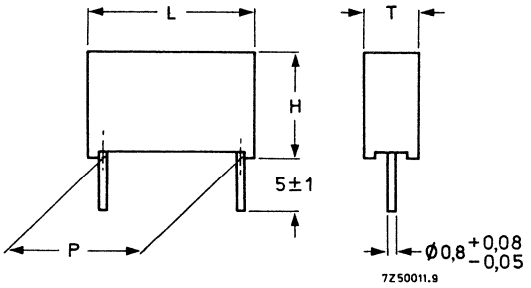
* ± 0.3

A.C. & pulse metallized polypropylene film capacitors General data

2222 378 (MKP)

For detailed information on these and other types see Data Handbook PA05

Rated capacitance (E–12 series)	0.0033 to 3.3 µF
Lower tolerance on rated capacitance	−5%
Upper tolerance on rated capacitance	+5%
Rated voltage U_R (d.c.)	250 V, 400 V, 630 V, 1000 V, 1600 V, 2000 V
Rated voltage U_R (a.c.), 50/60 Hz	160 V, 200 V, 300 V, 400 V, 500 V, 600 V
Minimum category temperature	−55 °C
Maximum category temperature	+85 °C
Climatic category	55/100/56
Related specification	IEC 384–17
Dielectric	PP
Performance grade	grade 1 (LL)



250 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	P* mm	cat. number
2.2	15	25	31	27.5	**2222 378 42225**
3.3	18	28	31	27.5	**2222 378 42335**

400 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	P** mm	cat. number
1	13	23	31	27.5	**2222 378 52105**
1.5	18	28	31	27.5	**2222 378 52155**

+TABLE < 54B >

630 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	P* mm	cat. number
0.15	8.5	18	26	22.5	**2222 378 62154**
0.22	11	21	31	27.5	**2222 378 62224**
0.33	13	21	31	27.5	**2222 378 62334**
0.47	15	25	31	27.5	**2222 378 62474**
0.68	18	28	31	27.5	**2222 378 62684**

* ±0.3

A.C. & pulse metallized polypropylene film capacitors General data
2222 378 (MKP) cont.

For detailed information on these and other types see Data Handbook PA05

1600 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	P* mm	cat. number
0.015	8.5	18	26	22.5	**2222 378 82153**
0.022	10	19.5	26	22.5	**2222 378 82223**
0.033	11	21	31	27.5	**2222 378 82333**
0.047	13	23	31	27.5	**2222 378 82473**
0.068	15	25	31	27.5	**2222 378 82683**
0.1	18	28	31	27.5	**2222 378 82104**

2000 V–range

rated cap. µF	T_{max} mm	H_{max} mm	L_{max} mm	P* mm	cat. number
0.0033	6	15.5	26	22.5	**2222 378 92332**
0.0047	7	16.5	26	22.5	**2222 378 92472**
0.0068	8.5	18	26	22.5	**2222 378 92682**
0.01	10	19.5	26	22.5	**2222 378 92103**
0.015	11	21	31	27.5	**2222 378 92153**

* ±0.3

MINIATURE CERAMIC CAPACITORS

General data

2222 629 (K14000)

For detailed information on these and other types see Data Handbook PA06
Bulk packaging: boxes of 1000 (sizes I, IIA, IIB, III) or 500 capacitors (sizes IV, V)

Capacitance range	1000 to 47000 pF
Lower tolerance	−20%
Upper tolerance	+80%
Rated d.c. voltage	63 V
Sectional specification	IEC 384–9
Class	2
Climatic category	10/055/21
at norm	IEC 68
Colour code	green

size	W_{max} mm	H_{max} (mm)		L (mm)	
		fig. 1	fig. 2	short leads	long leads
I	3.6	6.3	5.0	4 ± 0.5	⩾ 13
IIB	4.5	7.3	6.0	4 ± 0.5	⩾ 13
IV	6.2	9.0	7.7	4 ± 0.5	⩾ 13
V	6.2	11.2	9.9	4 ± 0.5	⩾ 13

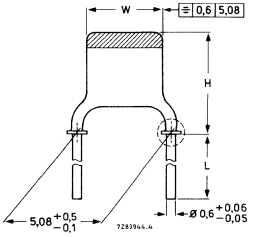


Fig. 1

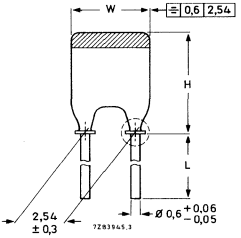


Fig. 2

cap. pF	size	cat.no. lead spacing 0.1" long leads,Fig.2 bulk	cat.no. lead spacing 0.2" short leads,Fig.1 bulk
1000	I	**2222 629 08102★**	**2222 629 19102★**
2200	I	**2222 629 08222★**	**2222 629 19222★**
4700	I	**2222 629 08472★**	**2222 629 19472★**
10000	IIB	**2222 629 08103★**	**2222 629 19103★**
22000	IV	**2222 629 08223★**	**2222 629 19223★**
47000	V	**2222 629 08473★**	**2222 629 19473★**

MINIATURE CERAMIC CAPACITORS (cont.)

General data

2222 630 (K2000)

For detailed information on these and other types see Data Handbook PA06
Bulk packaging: boxes of 1000 (sizes I, IIA, IIB, III) or 500 capacitors (sizes IV, V)

Capacitance range	180 to 6800 pF
Lower tolerance	−10%
Upper tolerance	+10%
Rated d.c. voltage	100 V
Sectional specification	IEC 384-9/2C2
Class	2
Climatic category	55/085/21
at norm	IEC 68
Colour code	yellow

size	W_{max} mm	H_{max} (mm)		L (mm)	
		fig. 1	fig. 2	short leads	long leads
I	3.6	6.3	5.0	4 ± 0.5	⩾ 13
IIA	3.9	6.7	5.3	4 ± 0.5	⩾ 13
IIB	4.5	7.3	6.0	4 ± 0.5	⩾ 13
III	5.1	7.9	6.6	4 ± 0.5	⩾ 13
IV	6.2	9.0	7.7	4 ± 0.5	⩾ 13
V	6.2	11.2	9.9	4 ± 0.5	⩾ 13

For Figs 1 and 2 see page C56.

C

cap. pF	size	cat.no. lead spacing 0.1" long leads,Fig.2 bulk	cat.no. lead spacing 0.2" short leads,Fig.1 bulk
180	I	**2222 630 08181★**	**2222 630 19181★**
220	I	**2222 630 08221★**	**2222 630 19221★**
270	I	**2222 630 08271★**	**2222 630 19271★**
330	I	**2222 630 08331★**	**2222 630 19331★**
390	I	**2222 630 08391★**	**2222 630 19391★**
470	I	**2222 630 08471★**	**2222 630 19471★**
560	I	**2222 630 08561★**	**2222 630 19561★**
680	I	**2222 630 08681★**	**2222 630 19681★**
820	I	**2222 630 08821★**	**2222 630 19821★**
1000	IIA	**2222 630 08102★**	**2222 630 19102★**
1200	IIA	**2222 630 08122★**	**2222 630 19122★**
1500	IIB	**2222 630 08152★**	**2222 630 19152★**
1800	IIB	**2222 630 08182★**	**2222 630 19182★**
2200	III	**2222 630 08222★**	**2222 630 19222★**
2700	III	**2222 630 08272★**	**2222 630 19272★**
3300	IV	**2222 630 08332★**	**2222 630 19332★**
3900	IV	**2222 630 08392★**	**2222 630 19392★**
4700	IV	**2222 630 08472★**	**2222 630 19472★**
5600	V	**2222 630 08562★**	**2222 630 19562★**
6800	V	**2222 630 08682★**	**2222 630 19682★**

MINIATURE CERAMIC CAPACITORS (cont.)

General data

2222 680/683 (P100)

For detailed information on these and other types see Data Handbook PA06
Bulk packaging: boxes of 1000 (sizes I, IIA, IIB, III) or 500 capacitors (sizes IV, V)

Capacitance range	0.56 to 1.5 pF
Lower tolerance	−0.25 pF
Upper tolerance	+0.25 pF
Rated d.c. voltage	100 V
Temperature coefficient	100 x 10^{-6}/K
Sectional specification	IEC 384–8/1B
Class	1
Climatic category	55/085/21
at norm	IEC 68
Colour code	red–violet

size	W_{max} mm	H_{max} (mm)		L (mm)	
		fig. 1	fig. 2	short leads	long leads
I	3.6	6.3	5.0	4 ± 0.5	> 13

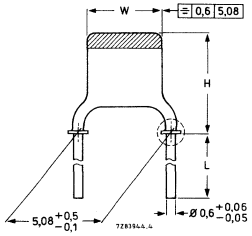


Fig. 1

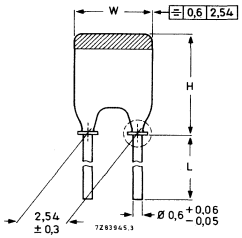


Fig. 2

cap. pF	tole-rance ± pF	size	cat.no. lead spacing 0.1" long leads,Fig.2 bulk	cat.no. lead spacing 0.2" short leads,Fig.1 bulk
0.56	0.25	I	**2222 680 03567**	**2222 683 03567**
0.68	0.25	I	**2222 680 03687**	**2222 683 03687**
0.82	0.25	I	**2222 680 03827**	**2222 683 03827**
1	0.25	I	**2222 680 03108★**	**2222 683 03108★**
1.2	0.25	I	**2222 680 03128★**	**2222 683 03128★**
1.5	0.25	I	**2222 680 03158★**	**2222 683 03158★**

MINIATURE CERAMIC CAPACITORS (cont.)

General data

2222 680/683 (NPO)

For details on these and other types see Data Handbook PA06
Bulk packaging: boxes of 1000 (sizes I, IIA, IIB, III) or 500 capacitors (sizes IV, V)

Capacitance range	1.8 to 220 pF	Sectional specification	IEC 384–8, class 1B
Tolerance	± 2% or ± 0.25 pF	Climatic category, IEC 68	55/085/21
Rated d.c. voltage	100 V	Colour code	black
Temperature coefficient	NPO (0 x 10^{-6}/K)		

size	W_{max} mm	H_{max} (mm)		L (mm)	
		fig. 1	fig. 2	short leads	long leads
I	3.6	6.3	5.0	4 ± 0.5	> 13
IIA	3.9	6.7	5.3	4 ± 0.5	> 13
IIB	4.5	7.3	6.0	4 ± 0.5	> 13
III	5.1	7.9	6.6	4 ± 0.5	> 13
IV	6.2	9	7.7	4 ± 0.5	> 13
V	6.2	11.2	9.9	4 ± 0.5	> 13

For drawing see next page.

cap. pF	tole-rance ± pF/%	size	cat.no. lead spacing 0.1" long leads, Fig.2 bulk	cat.no. lead spacing 0.2" short leads, Fig.1 bulk
1.8	0.25	I	**2222 680 09188★**	**2222 683 09188★**
2.2	0.25	I	**2222 680 09228★**	**2222 683 09228★**
2.7	0.25	I	**2222 680 09278★**	**2222 683 09278★**
3.3	0.25	I	**2222 680 09338★**	**2222 683 09338★**
4.7	0.25	I	**2222 680 09478★**	**2222 683 09478★**
5.6	0.25	I	**2222 680 09568★**	**2222 683 09568★**
6.8	0.25	I	**2222 680 09688★**	**2222 683 09688★**
8.2	0.25	I	**2222 680 09828★**	**2222 683 09828★**
10	2%	I	**2222 680 10109★**	**2222 683 10109★**
12	2%	I	**2222 680 10129★**	**2222 683 10129★**
15	2%	I	**2222 680 10159★**	**2222 683 10159★**
18	2%	I	**2222 680 10189★**	**2222 683 10189★**
22	2%	I	**2222 680 10229★**	**2222 683 10229★**
27	2%	I	**2222 680 10279★**	**2222 683 10279★**
33	2%	I	**2222 680 10339★**	**2222 683 10339★**
39	2%	IIA	**2222 680 10399★**	**2222 683 10399★**
47	2%	IIA	**2222 680 10479★**	**2222 683 10479★**
56	2%	IIB	**2222 680 10569★**	**2222 683 10569★**
68	2%	IIB	**2222 680 10689★**	**2222 683 10689★**
82	2%	IIB	**2222 680 10829★**	**2222 683 10829★**
100	2%	III	**2222 680 10101★**	**2222 683 10101★**
120	2%	III	**2222 680 10121★**	**2222 683 10121★**
150	2%	IV	**2222 680 10151**	**2222 683 10151**
180	2%	IV	**2222 680 10181**	**2222 683 10181**
220	2%	V	**2222 680 10221**	**2222 683 10221**

MINIATURE CERAMIC CAPACITORS (cont.)

General data

2222 680/683 (N150)

For detailed information on these and other types see Data Handbook PA06
Bulk packaging: boxes of 1000 (sizes I, IIA, IIB, III) or 500 capacitors (sizes IV, V)

Capacitance range	3.9 to 150 pF	Sectional specification	IEC 384–8, class 1B
Tolerance	± 2% or ± 0.25 pF	Climatic category, IEC 68	55/085/21
Rated d.c. voltage	100 V	Colour code	orange
Temperature coefficient	N150 (–150 x 10^{-6}/K)		

size	W_{max} mm	H_{max} (mm) fig. 1	H_{max} (mm) fig. 2	L (mm) short leads	L (mm) long leads
I	3.6	6.3	5.0	4 ± 0.5	⩾ 13
IIA	3.9	6.7	5.3	4 ± 0.5	⩾ 13
IIB	4.5	7.3	6.0	4 ± 0.5	⩾ 13
III	5.1	7.9	6.6	4 ± 0.5	⩾ 13
IV	6.2	9.0	7.7	4 ± 0.5	⩾ 13

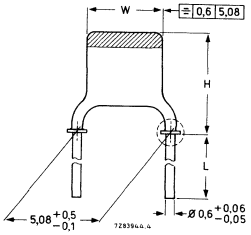


Fig. 1

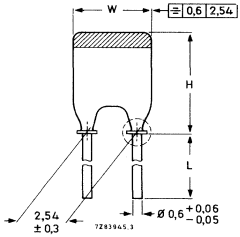


Fig. 2

cap. pF	tolerance ± pF/%	size	cat.no. lead spacing 0.1" long leads, Fig.2 bulk	cat.no. lead spacing 0.2" short leads, Fig.1 bulk
3.9	0.25	I	**2222 680 33398**	**2222 683 33398**
4.7	0.25	I	**2222 680 33478**	**2222 683 33478**
5.6	0.25	I	**2222 680 33568**	**2222 683 33568**
6.8	0.25	I	**2222 680 33688**	**2222 683 33688**
8.2	0.25	I	**2222 680 33828**	**2222 683 33828**
10	2%	I	**2222 680 34109**	**2222 683 34109**
12	2%	I	**2222 680 34129**	**2222 683 34129**
15	2%	I	**2222 680 34159**	**2222 683 34159**
18	2%	I	**2222 680 34189**	**2222 683 34189**
22	2%	I	**2222 680 34229**	**2222 683 34229**
27	2%	I	**2222 680 34279**	**2222 683 34279**
33	2%	I	**2222 680 34339**	**2222 683 34339**
39	2%	IIA	**2222 680 34399**	**2222 683 34399**
47	2%	IIA	**2222 680 34479**	**2222 683 34479**
56	2%	IIB	**2222 680 34569**	**2222 683 34569**
68	2%	IIB	**2222 680 34689**	**2222 683 34689**
82	2%	III	**2222 680 34829**	**2222 683 34829**
100	2%	III	**2222 680 34101**	**2222 683 34101**
120	2%	IV	**2222 680 34121**	**2222 683 34121**
150	2%	IV	**2222 680 34151**	**2222 683 34151**

MINIATURE CERAMIC CAPACITORS (cont.)

General data

2222 680/683 (N750)

For details on these and other types see Data Handbook PA06
Bulk packaging: boxes of 1000 (sizes I, IIA, IIB, III) or 500 capacitors (sizes IV, V)

Capacitance range	3.9 to 330 pF
Tolerance	± 2% or ± 0,25 pF
Rated d.c. voltage	100 V
Temperature coefficient	N750 (-750×10^{-6}/K)
Sectional specification	IEC 384-8, class 1B
Climatic category, IEC 68	55/085/21
Colour code	violet

size	W_{max} mm	H_{max} (mm)		L (mm)	
		fig. 1	fig. 2	long leads	short leads
I	3.6	6.3	5.0	4 ± 0.5	⩾ 13
IIA	3.9	6.7	5.3	4 ± 0.5	⩾ 13
IIB	4.5	7.3	6.0	4 ± 0.5	⩾ 13
III	5.1	7.9	6.6	4 ± 0.5	⩾ 13
IV	6.2	9.0	7.7	4 ± 0.5	⩾ 13
V	6.2	11.2	9.9	4 ± 0.5	⩾ 13

For drawing see next page.

cap. pF	tole-rance ± pF/%	size	cat. number lead spacing 0.1" long leads, Fig. 2, bulk packing	cat. number lead spacing 0.2" short leads, Fig. 1, bulk packing
3.9	0.25	I	**2222 680 57398**	**2222 683 57398**
4.7	0.25	I	**2222 680 57478**	**2222 683 57478**
5.6	0.25	I	**2222 680 57568**	**2222 683 57568**
6.8	0.25	I	**2222 680 57688**	**2222 683 57688**
8.2	0.25	I	**2222 680 57828**	**2222 683 57828**
10	2%	I	**2222 680 58109**	**2222 683 58109**
12	2%	I	**2222 680 58129**	**2222 683 58129**
15	2%	I	**2222 680 58159**	**2222 683 58159**
18	2%	I	**2222 680 58189**	**2222 683 58189**
22	2%	I	**2222 680 58229**	**2222 683 58229**
27	2%	I	**2222 680 58279**	**2222 683 58279**
33	2%	I	**2222 680 58339**	**2222 683 58339**
39	2%	I	**2222 680 58399**	**2222 683 58399**
47	2%	I	**2222 680 58479**	**2222 683 58479**
56	2%	IIA	**2222 680 58569**	**2222 683 58589**
68	2%	IIA	**2222 680 58689**	**2222 683 58689**
82	2%	IIB	**2222 680 58829**	**2222 683 58829**
100	2%	IIB	**2222 680 58101**	**2222 683 58101**
120	2%	III	**2222 680 58121★**	**2222 683 58121★**
150	2%	III	**2222 680 58151★**	**2222 683 58151★**
180	2%	IV	**2222 680 58181★**	**2222 683 58181★**
220	2%	IV	**2222 680 58221★**	**2222 683 58221★**
270	2%	V	**2222 680 58271★**	**2222 683 58271★**
330	2%	V	**2222 680 58331★**	**2222 683 58331★**

MINIATURE CERAMIC CAPACITORS (cont.)

General data

2222 680/683 (N1500)

For detailed information on these and other types see Data Handbook PA06
Bulk packaging: boxes of 1000 (sizes I, IIA, IIB, III) or 500 capacitors (sizes IV, V)

Capacitance range	390 to 560 pF
Tolerance	± 2%
Rated d.c. voltage	100 V
Temperature coefficient	N1500 (-1500×10^{-6}/K)
Sectional specification	IEC 384-8, class 1B
Climatic category, IEC 68	55/085/21
Colour code	orange/orange

size	W_{max} mm	H_{max} (mm)		L (mm)	
		fig. 1	fig. 2	short leads	long leads
IV	6.2	9.0	7.7	4 ± 0.5	⩾ 13
V	6.2	11.2	8.9	4 ± 0.5	⩾ 13

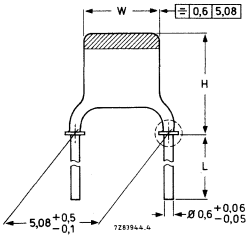


Fig. 1

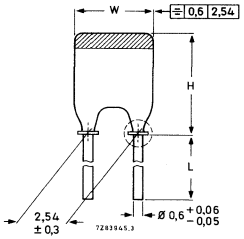


Fig. 2

cap. pF	tolerance ± %	size	cat.no. lead spacing 0.1" long leads, Fig.2 bulk	cat.no. lead spacing 0.2" short leads, Fig.1 bulk
390	2%	IV	**2222 680 70391★**	**2222 683 70391★**
470	2%	V	**2222 680 70471★**	**2222 683 70471★**
560	2%	V	**2222 680 70561★**	**2222 683 70561★**

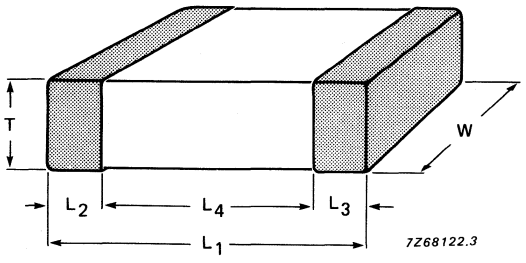
CERAMIC MULTILAYER CAPACITORS

General data

Surface mounting ceramic multilayer capacitors

For detailed information see Data Handbook PA06

Capacitance range:	
class 1, NPO dielectric	0.47 to 10000 pF (E12–series)*
N220 dielectric	4.7 to 820 pF (E12–series)*
N750 dielectric	6.8 to 1200 pF (E12–series)*
class 2, X7R dielectric	180 pF to 1 µF (E12–series)
Y5V dielectric	2200 to 100000 pF (E6–series)**
Terminations	metalized AgPd (65/35) or NiSn
Rated voltage U_R (d.c.)	50 V (EIA), 63 V (IEC)
Tolerance on capacitance:	
NPO, N220, N750 dielectrics	± 10%, ± 5%; below 10 pF: ± 0.5 pF; below 5.0 pF: ± 0.25 pF[1)]
X7R dielectric	± 20%, ± 10%
Z5U (Y5V) dielectric	−20 to +80%, ± 20%
Sectional specification	IEC 384–10, 40 (secretariat) 544
Climatic category (IEC 68):	
NPO, N220, N750 dielectrics	55/125/56
X7R dielectric	55/125/56
Y5V dielectric	25/085/56
Resistance to soldering heat	260 °C, 10 s
Packing	8 mm tape (blister) on reel: 4000 or 10000 12 mm tape (blister) on reel: 2000 or 5000



Dimensions in mm

size	status	L	W	T min.	T max.	A min.	A max.	C min.
0805	P	2.0 ± 0.10	1.25 ± 0.10	0.51	1.30	0.25	0.75	0.4
1206	P	3.2 ± 0.15	1.6 ± 0.15	0.51	1.60	0.25	0.75	1.4
1210	C	3.4 ± 0.2	2.5 ± 0.2	0.51	1.90	0.3	0.75	1.4
1808	C	4.5 ± 0.2	2.0 ± 0.2	0.51	1.90	0.3	0.75	2.2
1812	C	4.5 ± 0.2	3.2 ± 0.2	0.51	1.90	0.3	0.75	2.2
2220	C	5.7 ± 0.2	5.0 ± 0.2	0.51	1.90	0.3	0.75	2.9

* Other values, below 10 pF, on request.
** Values up to 1 µF under development.
1) Smaller tolerances: ±2% for C ≥ 10 pF, ±0.25% for C = 5 to 10 pF

CERAMIC MULTILAYER CAPACITORS (cont.) Selection chart

Surface mounting ceramic multilayer capacitors

For detailed information see Data Handbook PA06

NPO Dielectric

Tolerance ± 5%

On tape: 4000 pieces

capa-citance pF	cat. number size 0805	cat. number size 1206
0.47	2222 861 12477★	2222 863 12477★
0.56	2222 861 12567★	2222 863 12567★
0.68	2222 861 12687★	2222 863 12687★
0.82	2222 861 12827★	2222 863 12827★
1	2222 861 12108★	2222 863 12108★
1.2	2222 861 12128★	2222 863 12128★
1.5	2222 861 12158★	2222 863 12158★
1.8	2222 861 12188★	2222 863 12188★
2.2	2222 861 12228★	2222 863 12228★
2.7	2222 861 12278★	2222 863 12278★
3.3	2222 861 12338★	2222 863 12338★
3.9	2222 861 12398★	2222 863 12398★
4.7	2222 861 12478★	2222 863 12478★
5.6	2222 861 12568★	2222 863 12568★
6.8	2222 861 12688★	2222 683 12688★
8.2	2222 861 12828★	2222 863 12828★
10	2222 861 12109★	2222 863 12109★
12	2222 861 12129★	2222 863 12129★
15	2222 861 12159★	2222 863 12159★
18	2222 861 12189★	2222 863 12189★
22	2222 861 12229★	2222 863 12229★
27	2222 861 12279★	2222 863 12279★
33	2222 861 12339★	2222 863 12339★
39	2222 861 12399★	2222 863 12399★
47	2222 861 12479★	2222 863 12479★

capa-citance pF	cat. number size 0805	cat. number size 1206
68	2222 861 12689★	2222 863 12689★
82	2222 861 12829★	2222 863 12829★
100	2222 861 12101★	2222 863 12101★
120	2222 861 12121★	2222 863 12121★
150	2222 861 12151★	2222 863 12151★
180	2222 861 12181★	2222 863 12181★
220	2222 861 12221★	2222 863 12221★
270	2222 861 12271★	2222 863 12271★
330	2222 861 12331★	2222 863 12331★
390	2222 861 12391★	2222 863 12391★
470	2222 861 12471★	2222 863 12471★
560	2222 861 12561★	2222 863 12561★
680	2222 861 12681★	2222 863 12681★
820	2222 861 12821★	2222 863 12821
1000	2222 861 12102★	2222 863 12102
1200		2222 863 12122
1500		2222 863 12152
1800		2222 863 12182

CERAMIC MULTILAYER CAPACITORS (cont.) Selection chart

Surface mounting ceramic multilayer capacitors

For detailed information see Data Handbook PA06

X7R Dielectric
Tolerance ± 10%

On tape: 4000 peices

capacitance pF	cat. number size 0805	cat. number size 1206
180	**2222 590 16604★**	
220	**2222 590 16605★**	
270	**2222 590 16606★**	
330	**2222 590 16607★**	
390	**2222 590 16608★**	
470	**2222 590 16609★**	
560	**2222 590 16611★**	
680	**2222 590 16612★**	**2222 591 16612★**
820	**2222 590 16613★**	**2222 591 16613**
1000	**2222 590 16614★**	**2222 591 16614★**
1200	**2222 590 16615★**	**2222 591 16615**
1500	**2222 590 16616★**	**2222 591 16616★**
1800	**2222 590 16617★**	**2222 591 16617**
2200	**2222 590 16618★**	**2222 591 16618★**
2700	**2222 590 16619★**	**2222 591 16619**
3300	**2222 590 16621★**	**2222 591 16621★**
3900	**2222 590 16622★**	**2222 591 16622**
4700	**2222 590 16623★**	**2222 591 16623★**
5600	**2222 590 16624★**	**2222 591 16624**
6800	**2222 590 16625★**	**2222 591 16625★**
8200	**2222 590 16626★**	**2222 591 16626**
10000	**2222 590 16627★**	**2222 591 16627★**
12000	**2222 590 16628★**	**2222 591 16628**
15000	**2222 590 16629★**	**2222 591 16629★**
18000	**2222 590 16631★**	**2222 591 16631**
22000		**2222 591 16632★**
27000		**2222 591 16633**
33000		**2222 591 16634★**
39000		**2222 591 16635**
47000		**2222 591 16636★**
56000		**2222 591 16637**
68000		**2222 591 16638★**
82000		**2222 591 16639**
100000		**2222 591 16641★**

FILM DIELECTRIC TRIMMERS

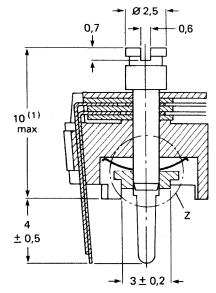
General data

2222 808 1 and 2238 808 1 (7.5 mm)

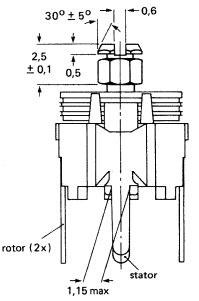
For detailed information on these and other types see Data Handbook PA06

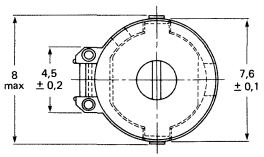
Capacitance range	5.5 to 50 pF
Diameter	7.5 mm
Rated voltage	250 V
Basic specification	IEC 418–1 and 4
Climatic category, IEC 68	40/070/21 and 40/085/21

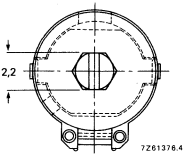
ROUND HEAD

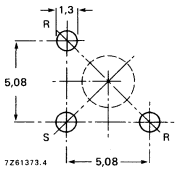


HEXAGONAL HEAD









(1) 11 max. for C_{max} = 40 pF and 50 pF

Hole pattern; R = rotor
S = stator

C_{max} pF	C_{min} pF	temperature coefficient 10^{-6}/K	max. permissible temperature °C	colour code	cat. number
10	1.4	–450	70	yellow	**2222 808 11109★**
15	1.6	–200	70	blue	**2222 808 11159**
22	1.8	–250	70	green	**2222 808 11229★**
27	1.8	–250	85	red	**2222 808 11279**
33	2	–250	70	brown	**2222 808 11339**
40	2	–100	85	violet	**2222 808 11409**
50	3	–100	85	black	**2222 808 11509**
10	1.2	–400	85	grey	**2222 808 11558★**

FILM DIELECTRIC TRIMMERS (cont.)

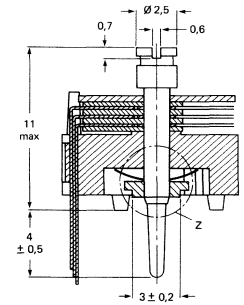
General data

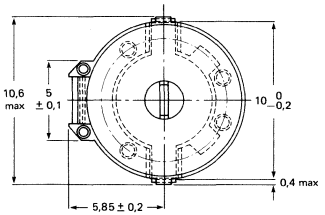
2222 808 3 (10 mm)

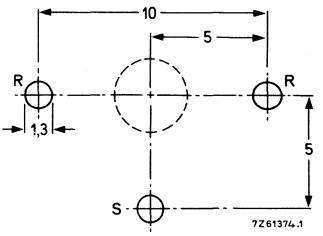
For detailed information on these and other types see Data Handbook PA06

Capacitance range	40 to 105 pF
Diameter	10 mm
Rated voltage	250 V
Basic specification	IEC 481–1/–4
Climatic category	40/070/21, 40/085/21
at norm	IEC 68

ROUND HEAD







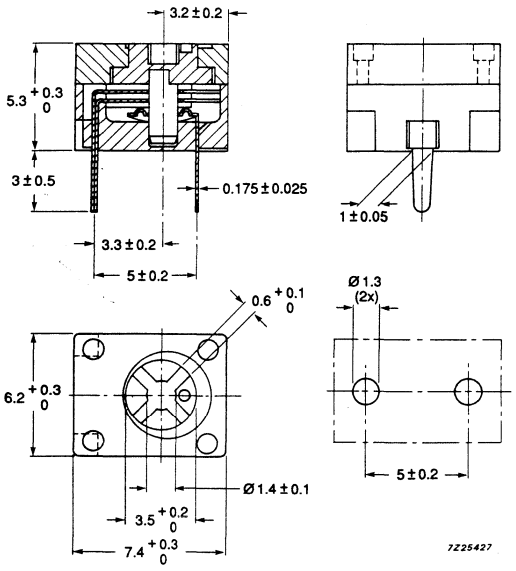
Hole pattern; R = rotor
S = stator

C_{max} pF	C_{min} pF	temperature coefficient 10^{-6}/K	max. permissible temperature °C	colour code	cat. number
40	5.5	–150	70	grey	**2222 808 32409★**
65	5.5	–200	70	yellow	**2222 808 32659★**
80	6	–100	85	red	**2222 808 32809**
100	77	–100	85	violet	**2222 808 32101**

For detailed information on these and other types see Data Handbook PA06

Capacitance range	10 to 40 pF
Rated voltage	100 V
Basic specification	IEC418–114
Climatic category, IEC 68	40/85/21

C_{max} pF	C_{min} pF	temperature coefficient 10^{-6}/K		colour code	cat. number
10	1.5	−300		yellow	**2222 810 00109★**
20	3	−200		green	**2222 810 00209★**
30	4	−250		red	**2222 810 00309★**
40	5	−250		violet	**2222 810 00409★**



FILM DIELECTRIC TRIMMERS (cont.)

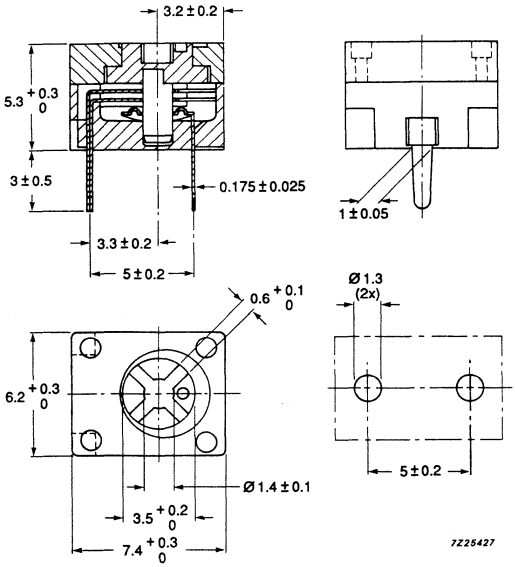
General data

2222 811

For detailed information on these and other types see Data Handbook PA06

Capacitance range	5 to 20 pF
Rated voltage	300 V
Basic specification	IEC418–114
Climatic category, (IEC 68)	40/125/21

C_{max} pF	C_{min} pF	coefficient 10^{-6}/K		colour code	cat. number
5	1.5	−250		grey	**2222 811 00508★**
10	2	−250		yellow	**2222 811 00109★**
15	2.5	−250		blue	**2222 811 00159★**
20	4	−250		green	**2222 811 00209★**



C

NOTES

Resistors

RESISTORS

Data Handbook System

On most pages, directly underneath the title, reference is made to a 'Data Handbook'.
That Handbook is part of the Philips Data Handbook System which is a comprehensive source of information on electronic components, subassemblies and materials.
For this catalogue section the following Handbooks are of interest:

code	title
PA02	Varistors, thermistors and sensors (1989) (was C11)
PA03	Potentiometers, encoders and switches (1989) (was C12)
PA08	Fixed resistors (1990) (was C13)

RESISTORS

Contents

Data Handbook System R2

Contents R3

Fixed resistors:
Taping specification R4
Standard film resistors SFR16T R5
Standard film resistors SFR25 ..... R7
Metal film resistors MRS25 ..... R9
Metal film precision resistors MPR24 ..... R14
High voltage/high ohmic resistors VR25 R16
High voltage/high ohmic resistors VR37 R17
High voltage/high ohmic resistors VR68 R18
Power metal film resistors PR01 ..... R19
Power metal film resistors PR02 ..... R20
Power metal film resistors PR03 ..... R21
Cemented wirewound resistors
AC03, AC05, AC10 ..... R22
Chip resistors RC–01 ..... R24
Chip resistors RC–02H R26
RC–01, RC–02H standard packaging R28

Carbon potentiometers, PP12 series R29

Varistors
Epoxy series: 2322 592 to 595 ..... R30

LDR light dependent resistors:
2322 600 9.... ..... R33

NTC thermistors:
Miniature Products R34
Extended accuracy range R35

Special accuracy range R36

Standard low–R values R37
Two point accuracy range R38
Assembly range R40

PTC thermistors, overload protection:
2322 66. 1...3 ..... R41

Humidity sensor:
2322 691 90001 ..... R42

R

Taping specification

As an example, details of standard packaging of SFR resistors are given here.
Complete details of packaging of all resistor ranges are given in Data Handbook PA08.

Standard packaging:
SFR16T, SFR25, MRS25, MRS16T, PR01, PR02, PR03, AC03, AC05, AC10, VR25, VR37, VR68.

Resistors having axial leads are supplied on tape. These tapes, or bandoliers, are either reeled or concertinaed in a cardboard box ('ammopack').

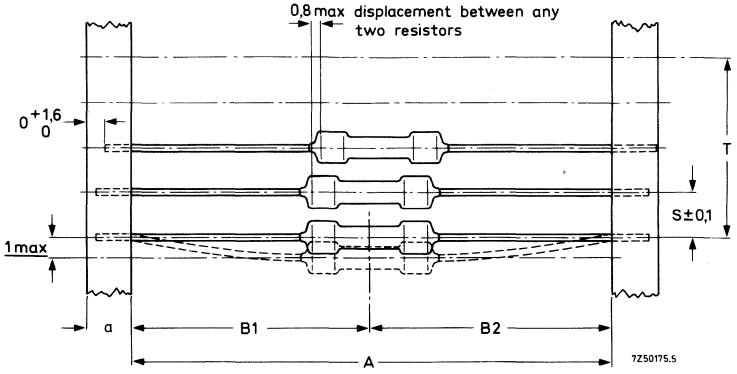


Fig. 1 Tape drawing (dimensions in mm) S = spacing; T = maximum deviation of spacing: 1 mm per 10 spacings or 0,5 mm per 5 spacings.

a = tape width
A = tape distance
B1 – B2 = centricity

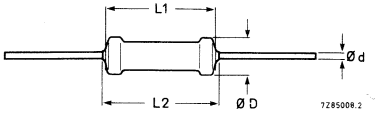
Standard film resistors (metal film): SFR16T

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 1000 pieces, on tape, in box

Resistance range (E24–series)	1 Ω to 3 MΩ
Lower tolerance on resistance	−5%
Upper tolerance on resistance	+5%
Temperature coefficient range	±100 to ±250 x 10^{-6}/K
Nominal dissipation at T_{amb} = 70 °C	0.5 W
Maximum noise range	0.1 to 1.5 μV/V
Limiting voltage, r.m.s	200 V

D_{max} mm	$L1_{max}$ mm	$L2_{max}$ mm	d −0.04 mm	a ± 0,5 mm	A ± 1,5 mm	$B_1 - B_2$ ± max mm	S mm	T
1,9	3,7	3,7	0,5	6	52,5	0,5	5	1 mm per 10 spacings

See page R4 for tape drawing with dimensions



Status = P

R_N	catalogue number
1 Ω	**2322 180 73108★**
1.2 Ω	**2322 180 73128★**
1.5 Ω	**2322 180 73158★**
1.8 Ω	**2322 180 73188★**
2.2 Ω	**2322 180 73228★**
2.7 Ω	**2322 180 73278★**
3.3 Ω	**2322 180 73338★**
3.9 Ω	**2322 180 73398★**
4.7 Ω	**2322 180 73478★**
5.6 Ω	**2322 180 73568★**
6.8 Ω	**2322 180 73688★**
8.2 Ω	**2322 180 73828★**
10 Ω	**2322 180 73109★**
12 Ω	**2322 180 73129★**
15 Ω	**2322 180 73159★**
18 Ω	**2322 180 73189★**
22 Ω	**2322 180 73229★**
27 Ω	**2322 180 73279★**
33 Ω	**2322 180 73339★**
39 Ω	**2322 180 73399★**
47 Ω	**2322 180 73479★**
56 Ω	**2322 180 73569★**
68 Ω	**2322 180 73689★**

Standard film resistors (metal film) cont.: SFR16T

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 1000 pieces, on tape, in box

R_N	catalogue number
82 Ω	**2322 180 73829★**
100 Ω	**2322 180 73101★**
120 Ω	**2322 180 73121★**
150 Ω	**2322 180 73151★**
180 Ω	**2322 180 73181★**
220 Ω	**2322 180 73221★**
270 Ω	**2322 180 73271★**
330 Ω	**2322 180 73331★**
390 Ω	**2322 180 73391★**
470 Ω	**2322 180 73471★**
560 Ω	**2322 180 73561★**
680 Ω	**2322 180 73681★**
820 Ω	**2322 180 73821★**
1 kΩ	**2322 180 73102★**
1.2 kΩ	**2322 180 73122★**
1.5 kΩ	**2322 180 73152★**
1.8 kΩ	**2322 180 73182★**
2.2 kΩ	**2322 180 73222★**
2.7 kΩ	**2322 180 73272★**
3.3 kΩ	**2322 180 73332★**
3.9 kΩ	**2322 180 73392★**
4.7 kΩ	**2322 180 73472★**
5.6 kΩ	**2322 180 73562★**
6.8 kΩ	**2322 180 73682★**
8.2 kΩ	**2322 180 73822★**

R_N	catalogue number
10 kΩ	**2322 180 73103★**
12 kΩ	**2322 180 73123★**
15 kΩ	**2322 180 73153★**
18 kΩ	**2322 180 73183★**
22 kΩ	**2322 180 73223★**
27 kΩ	**2322 180 73273★**
33 kΩ	**2322 180 73333★**
39 kΩ	**2322 180 73393★**
47 kΩ	**2322 180 73473★**
56 kΩ	**2322 180 73563★**
68 kΩ	**2322 180 73683★**
82 kΩ	**2322 180 73823★**
100 kΩ	**2322 180 73104★**
120 kΩ	**2322 180 73124★**
150 kΩ	**2322 180 73154★**
180 kΩ	**2322 180 73184★**
220 kΩ	**2322 180 73224★**
270 kΩ	**2322 180 73274★**
330 kΩ	**2322 180 73334★**
390 kΩ	**2322 180 73394★**
470 kΩ	**2322 180 73474★**
560 kΩ	**2322 180 73564★**
680 kΩ	**2322 180 73684★**
820 kΩ	**2322 180 73824★**
1 MΩ	**2322 180 73105★**

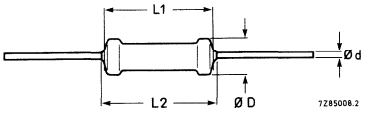
Standard film resistors (metal film) cont.: SFR25

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 5000 pieces, on tape, in box

Resistance range	1 Ω to 10 MΩ, tol. ± 5%, E24-series
Temperature coefficient	
R ⩽ 1 MΩ	± 100 x 10^{-6}/K
R > 1 MΩ	± 250 x 10^{-6}/K
Nom. dissipation at T_{amb} = 70 °C	0.4 W
Noise	
R ⩽ 1 MΩ	max. 0.1 μV/V
R > 1 MΩ	max. 1.5 μV/V
Limiting voltage, r.m.s.	250 V

D_{max} mm	$L1_{max}$ mm	$L2_{max}$ mm	d mm	a ± 0.5 mm	A ± 1.5 mm	B_1–B_2 ± max mm	S mm	T
2.5	6.5	7.0	0.6	6	52.5	1.2	5	1 mm per 10 spacings

See page R4 for tape drawing with dimensions



Status = P

R_N	catalogue number	R_N	catalogue number	R_N	catalogue number
0 Ω	**2322 181 90018★**	5.6 Ω	**2322 181 43568★**	39 Ω	**2322 181 43399★**
		6.2 Ω	**2322 181 43628★**	43 Ω	**2322 181 43439★**
1 Ω	**2322 181 43108★**	6.8 Ω	**2322 181 43688★**	47 Ω	**2322 181 43479★**
1.1 Ω	**2322 181 43118★**	7.5 Ω	**2322 181 43758★**	51 Ω	**2322 181 43519★**
1.2 Ω	**2322 181 43128★**	8.2 Ω	**2322 181 43828★**	56 Ω	**2322 181 43569★**
1.3 Ω	**2322 181 43138★**	9.1 Ω	**2322 181 43918★**	62 Ω	**2322 181 43629★**
1.5 Ω	**2322 181 43158★**	10 Ω	**2322 181 43109★**	68 Ω	**2322 181 43689★**
1.6 Ω	**2322 181 43168★**	11 Ω	**2322 181 43119★**	75 Ω	**2322 181 43759★**
1.8 Ω	**2322 181 43188★**	12 Ω	**2322 181 43129★**	82 Ω	**2322 181 43829★**
2 Ω	**2322 181 43208★**	13 Ω	**2322 181 43139★**	91 Ω	**2322 181 43919★**
2.2 Ω	**2322 181 43228★**	15 Ω	**2322 181 43159★**	100 Ω	**2322 181 43101★**
2.4 Ω	**2322 181 43248★**	16 Ω	**2322 181 43169★**	110 Ω	**2322 181 43111★**
2.7 Ω	**2322 181 43278★**	18 Ω	**2322 181 43189★**	120 Ω	**2322 181 43121★**
3 Ω	**2322 181 43308★**	20 Ω	**2322 181 43209★**	130 Ω	**2322 181 43131★**
3.3 Ω	**2322 181 43338★**	22 Ω	**2322 181 43229★**	150 Ω	**2322 181 43151★**
3.6 Ω	**2322 181 43368★**	24 Ω	**2322 181 43249★**	160 Ω	**2322 181 43161★**
3.9 Ω	**2322 181 43398★**	27 Ω	**2322 181 43279★**	180 Ω	**2322 181 43181★**
4.3 Ω	**2322 181 43438★**	30 Ω	**2322 181 43309★**	200 Ω	**2322 181 43201★**
4.7 Ω	**2322 181 43478★**	33 Ω	**2322 181 43339★**	220 Ω	**2322 181 43221★**
5.1 Ω	**2322 181 43518★**	36 Ω	**2322 181 43369★**	240 Ω	**2322 181 43241★**

Standard Film resistors (metal film) cont.: SFR25

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 5000 pieces, on tape, in box

R_N	catalogue number	R_N	catalogue number	R_N	catalogue number
270 Ω	2322 181 43271★	20 kΩ	2322 181 43203★	2.2 MΩ	2322 181 43225★
300 Ω	2322 181 43301★	22 kΩ	2322 181 43223★	2.7 MΩ	2322 181 43275★
330 Ω	2322 181 43331★	24 kΩ	2322 181 43243★	3.3 MΩ	2322 181 43335★
360 Ω	2322 181 43361★	27 kΩ	2322 181 43273★	3.9 MΩ	2322 181 43395★
390 Ω	2322 181 43391★	30 kΩ	2322 181 43303★	4.7 MΩ	2322 181 43475★
430 Ω	2322 181 43431★	33 kΩ	2322 181 43333★	5.6 MΩ	2322 181 43565★
470 Ω	2322 181 43471★	36 kΩ	2322 181 43363★	6.8 MΩ	2322 181 43685★
510 Ω	2322 181 43511★	39 kΩ	2322 181 43393★	8.2 MΩ	2322 181 43825★
560 Ω	2322 181 43561★	43 kΩ	2322 181 43433★	10 MΩ	2322 181 43106★
620 Ω	2322 181 43621★	47 kΩ	2322 181 43473★		
680 Ω	2322 181 43681★	51 kΩ	2322 181 43513★		
750 Ω	2322 181 43751★	56 kΩ	2322 181 43563★		
820 Ω	2322 181 43821★	62 kΩ	2322 181 43623★		
910 Ω	2322 181 43911★	68 kΩ	2322 181 43683★		
1 kΩ	2322 181 43102★	75 kΩ	2322 181 43753★		
1.1 kΩ	2322 181 43112★	82 kΩ	2322 181 43823★		
1.2 kΩ	2322 181 43122★	91 kΩ	2322 181 43913★		
1.3 kΩ	2322 181 43132★	100 kΩ	2322 181 43104★		
1.5 kΩ	2322 181 43152★	110 kΩ	2322 181 43114★		
1.6 kΩ	2322 181 43162★	120 kΩ	2322 181 43124★		
1.8 kΩ	2322 181 43182★	130 kΩ	2322 181 43134★		
2 kΩ	2322 181 43202★	150 kΩ	2322 181 43154★		
2.2 kΩ	2322 181 43222★	160 kΩ	2322 181 43164★		
2.4 kΩ	2322 181 43242★	180 kΩ	2322 181 43184★		
2.7 kΩ	2322 181 43272★	200 kΩ	2322 181 43204★		
3 kΩ	2322 181 43302★	220 kΩ	2322 181 43224★		
3.3 kΩ	2322 181 43332★	240 kΩ	2322 181 43244★		
3.6 kΩ	2322 181 43362★	270 kΩ	2322 181 43274★		
3.9 kΩ	2322 181 43392★	300 kΩ	2322 181 43304★		
4.3 kΩ	2322 181 43432★	330 kΩ	2322 181 43334★		
4.7 kΩ	2322 181 43472★	360 kΩ	2322 181 43364★		
5.1 kΩ	2322 181 43512★	390 kΩ	2322 181 43394★		
5.6 kΩ	2322 181 43562★	430 kΩ	2322 181 43434★		
6.2 kΩ	2322 181 43622★	470 kΩ	2322 181 43474★		
6.8 kΩ	2322 181 43682★	510 kΩ	2322 181 43514★		
7.5 kΩ	2322 181 43752★	560 kΩ	2322 181 43564★		
8.2 kΩ	2322 181 43822★	620 kΩ	2322 181 43624★		
9.1 kΩ	2322 181 43912★	680 kΩ	2322 181 43684★		
10 kΩ	2322 181 43103★	750 kΩ	2322 181 43754★		
11 kΩ	2322 181 43113★	820 kΩ	2322 181 43824★		
12 kΩ	2322 181 43123★	910 kΩ	2322 181 43914★		
13 kΩ	2322 181 43133★	1 MΩ	2322 181 43105★		
15 kΩ	2322 181 43153★	1.2 MΩ	2322 181 43125★		
16 kΩ	2322 181 43163★	1.5 MΩ	2322 181 43155★		
18 kΩ	2322 181 43183★	1.8 MΩ	2322 181 43185★		

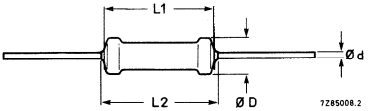
Metal film resistors: MRS25

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 5000 pieces, on tape, in box

Resistance range	1 Ω to 10 MΩ, tol. ± 1%, E96-series
Temperature coefficient	
R < 4,99 Ω	± 100 x 10^{-6}/K
R ⩾ 4,99 Ω	± 50 x 10^{-6}/K
Nom. dissipation at T_{amb} = 70 °C	0.6 W
Noise	max. 0.1 μV/V
Limiting voltage, r.m.s.	350 V

D_{max} mm	$L1_{max}$ mm	$L2_{max}$ mm	d mm	a ± 0.5 mm	A ± 1.5 mm	$B_1 - B_2$ ± max mm	S mm	T
2.5	6.5	7.0	0.6	6	52.5	1.2	5	1 mm per 10 spacings

See page R4 for tape drawing with dimensions



Status = P

R_N	Catalogue number	R_N	Catalogue number	R_N	Catalogue number
1.00 Ω	**2322 156 21008★**	1.62 Ω	**2322 156 21628★**	2.61 Ω	**2322 156 22618★**
1.02 Ω	**2322 156 21028★**	1.65 Ω	**2322 156 21658★**	2.67 Ω	**2322 156 22678★**
1.05 Ω	**2322 156 21058★**	1.69 Ω	**2322 156 21698★**	2.74 Ω	**2322 156 22748★**
1.07 Ω	**2322 156 21078★**	1.74 Ω	**2322 156 21748★**	2.80 Ω	**2322 156 22808★**
1.10 Ω	**2322 156 21108★**	1.78 Ω	**2322 156 21788★**	2.87 Ω	**2322 156 22878★**
1.13 Ω	**2322 156 21138★**	1.82 Ω	**2322 156 21828★**	2.94 Ω	**2322 156 22948★**
1.15 Ω	**2322 156 21158★**	1.87 Ω	**2322 156 21878★**	3.01 Ω	**2322 156 23018★**
1.18 Ω	**2322 156 21188★**	1.91 Ω	**2322 156 21918★**	3.09 Ω	**2322 156 23098★**
1.21 Ω	**2322 156 21218★**	1.96 Ω	**2322 156 21968★**	3.16 Ω	**2322 156 23168★**
1.24 Ω	**2322 156 21248★**	2.00 Ω	**2322 156 22008★**	3.24 Ω	**2322 156 23248★**
1.27 Ω	**2322 156 21278★**	2.05 Ω	**2322 156 22058★**	3.32 Ω	**2322 156 23328★**
1.30 Ω	**2322 156 21308★**	2.10 Ω	**2322 156 22108★**	3.40 Ω	**2322 156 23408★**
1.33 Ω	**2322 156 21338★**	2.15 Ω	**2322 156 22158★**	3.48 Ω	**2322 156 23488★**
1.37 Ω	**2322 156 21378★**	2.21 Ω	**2322 156 22218★**	3.57 Ω	**2322 156 23578★**
1.40 Ω	**2322 156 21408★**	2.26 Ω	**2322 156 22268★**	3.65 Ω	**2322 156 23658★**
1.43 Ω	**2322 156 21438★**	2.32 Ω	**2322 156 22328★**	3.74 Ω	**2322 156 23748★**
1.47 Ω	**2322 156 21478★**	2.37 Ω	**2322 156 22378★**	3.83 Ω	**2322 156 23838★**
1.50 Ω	**2322 156 21508★**	2.43 Ω	**2322 156 22438★**	3.92 Ω	**2322 156 23928★**
1.54 Ω	**2322 156 21548★**	2.49 Ω	**2322 156 22498★**	4.02 Ω	**2322 156 24028★**
1.58 Ω	**2322 156 21588★**	2.55 Ω	**2322 156 22558★**	4.12 Ω	**2322 156 24128★**

Metal film resistors (cont.): MRS25

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 5000 pieces, on tape, in box

R_N	catalogue number	R_N	catalogue number	R_N	catalogue number
4.22 Ω	**2322 156 24228★**	12.4 Ω	**2322 156 21249★**	36.5 Ω	**2322 156 23659★**
4.32 Ω	**2322 156 24328★**	12.7 Ω	**2322 156 21279★**	37.4 Ω	**2322 156 23749★**
4.42 Ω	**2322 156 24428★**	13.0 Ω	**2322 156 21309★**	38.3 Ω	**2322 156 23839★**
4.53 Ω	**2322 156 24538★**	13.3 Ω	**2322 156 21339★**	39.2 Ω	**2322 156 23929★**
4.64 Ω	**2322 156 24648★**	13.7 Ω	**2322 156 21379★**	40.2 Ω	**2322 156 24029★**
4.75 Ω	**2322 156 24758★**	14.0 Ω	**2322 156 21409★**	41.2 Ω	**2322 156 24129★**
4.87 Ω	**2322 156 24878★**	14.3 Ω	**2322 156 21439★**	42.2 Ω	**2322 156 24229★**
4.99 Ω	**2322 156 24998★**	14.7 Ω	**2322 156 21479★**	43.2 Ω	**2322 156 24329★**
5.11 Ω	**2322 156 25118★**	15.0 Ω	**2322 156 21509★**	44.2 Ω	**2322 156 24429★**
5.23 Ω	**2322 156 25238★**	15.4 Ω	**2322 156 21549★**	45.3 Ω	**2322 156 24539★**
5.36 Ω	**2322 156 25368★**	15.8 Ω	**2322 156 21589★**	46.4 Ω	**2322 156 24649★**
5.49 Ω	**2322 156 25498★**	16.2 Ω	**2322 156 21629★**	47.5 Ω	**2322 156 24759★**
5.62 Ω	**2322 156 25628★**	16.5 Ω	**2322 156 21659★**	48.7 Ω	**2322 156 24879★**
5.76 Ω	**2322 156 25768★**	16.9 Ω	**2322 156 21699★**	49.9 Ω	**2322 156 24999★**
5.90 Ω	**2322 156 25908★**	17.4 Ω	**2322 156 21749★**	51.1 Ω	**2322 156 25119★**
6.04 Ω	**2322 156 26048★**	17.8 Ω	**2322 156 21789★**	52.3 Ω	**2322 156 25239★**
6.19 Ω	**2322 156 26198★**	18.2 Ω	**2322 156 21829★**	53.6 Ω	**2322 156 25369★**
6.34 Ω	**2322 156 26348★**	18.7 Ω	**2322 156 21879★**	54.9 Ω	**2322 156 25499★**
6.49 Ω	**2322 156 26498★**	19.1 Ω	**2322 156 21919★**	56.2 Ω	**2322 156 25629★**
6.65 Ω	**2322 156 26658★**	19.6 Ω	**2322 156 21969★**	57.6 Ω	**2322 156 25769★**
6.81 Ω	**2322 156 26818★**	20.0 Ω	**2322 156 22009★**	59.0 Ω	**2322 156 25909★**
6.98 Ω	**2322 156 26988★**	20.5 Ω	**2322 156 22059★**	60.4 Ω	**2322 156 26049★**
7.15 Ω	**2322 156 27158★**	21.0 Ω	**2322 156 22109★**	61.9 Ω	**2322 156 26199★**
7.32 Ω	**2322 156 27328★**	21.5 Ω	**2322 156 22159★**	63.4 Ω	**2322 156 26349★**
7.50 Ω	**2322 156 27508★**	22.1 Ω	**2322 156 22219★**	64.9 Ω	**2322 156 26499★**
7.68 Ω	**2322 156 27688★**	22.6 Ω	**2322 156 22269★**	66.5 Ω	**2322 156 26659★**
7.87 Ω	**2322 156 27878★**	23.2 Ω	**2322 156 22329★**	68.1 Ω	**2322 156 26819★**
8.06 Ω	**2322 156 28068★**	23.7 Ω	**2322 156 22379★**	69.8 Ω	**2322 156 26989★**
8.25 Ω	**2322 156 28258★**	24.3 Ω	**2322 156 22439★**	71.5 Ω	**2322 156 27159★**
8.45 Ω	**2322 156 28458★**	24.9 Ω	**2322 156 22499★**	73.2 Ω	**2322 156 27329★**
8.66 Ω	**2322 156 28668★**	25.5 Ω	**2322 156 22559★**	75.0 Ω	**2322 156 27509★**
8.87 Ω	**2322 156 28878★**	26.1 Ω	**2322 156 22619★**	76.8 Ω	**2322 156 27689★**
9.09 Ω	**2322 156 29098★**	26.7 Ω	**2322 156 22679★**	78.7 Ω	**2322 156 27879★**
9.31 Ω	**2322 156 29318★**	27.4 Ω	**2322 156 22749★**	80.6 Ω	**2322 156 28069★**
9.53 Ω	**2322 156 29538★**	28.0 Ω	**2322 156 22809★**	82.5 Ω	**2322 156 28259★**
9.76 Ω	**2322 156 29768★**	28.7 Ω	**2322 156 22879★**	84.5 Ω	**2322 156 28459★**
10.0 Ω	**2322 156 21009★**	29.4 Ω	**2322 156 22949★**	86.6 Ω	**2322 156 28669★**
10.2 Ω	**2322 156 21029★**	30.1 Ω	**2322 156 23019★**	88.7 Ω	**2322 156 28879★**
10.5 Ω	**2322 156 21059★**	30.9 Ω	**2322 156 23099★**	90.9 Ω	**2322 156 29099★**
10.7 Ω	**2322 156 21079★**	31.6 Ω	**2322 156 23169★**	93.1 Ω	**2322 156 29319★**
11.0 Ω	**2322 156 21109★**	32.4 Ω	**2322 156 23249★**	95.3 Ω	**2322 156 29539★**
11.3 Ω	**2322 156 21139★**	33.2 Ω	**2322 156 23329★**	97.6 Ω	**2322 156 29769★**
11.5 Ω	**2322 156 21159★**	34.0 Ω	**2322 156 23409★**	100 Ω	**2322 156 21001★**
11.8 Ω	**2322 156 21189★**	34.8 Ω	**2322 156 23489★**	102 Ω	**2322 156 21021★**
12.1 Ω	**2322 156 21219★**	35.7 Ω	**2322 156 23579★**	105 Ω	**2322 156 21051★**

Metal film resistors (cont.): MRS25

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 5000 pieces, on tape, in box

R_N	catalogue number	R_N	catalogue number	R_N	catalogue number
107 Ω	**2322 156 21071★**	316 Ω	**2322 156 23161★**	931 Ω	**2322 156 29311★**
110 Ω	**2322 156 21101★**	324 Ω	**2322 156 23241★**	953 Ω	**2322 156 29531★**
113 Ω	**2322 156 21131★**	332 Ω	**2322 156 23321★**	976 Ω	**2322 156 29761★**
115 Ω	**2322 156 21151★**	340 Ω	**2322 156 23401★**	1.00 kΩ	**2322 156 21002★**
118 Ω	**2322 156 21181★**	348 Ω	**2322 156 23481★**	1.02 kΩ	**2322 156 21022★**
121 Ω	**2322 156 21211★**	357 Ω	**2322 156 23571★**	1.05 kΩ	**2322 156 21052★**
124 Ω	**2322 156 21241★**	365 Ω	**2322 156 23651★**	1.07 kΩ	**2322 156 21072★**
127 Ω	**2322 156 21271★**	374 Ω	**2322 156 23741★**	1.10 kΩ	**2322 156 21102★**
130 Ω	**2322 156 21301★**	383 Ω	**2322 156 23831★**	1.13 KΩ	**2322 156 21132★**
133 Ω	**2322 156 21331★**	392 Ω	**2322 156 23921★**	1.15 kΩ	**2322 156 21152★**
137 Ω	**2322 156 21371★**	402 Ω	**2322 156 24021★**	1.18 kΩ	**2322 156 21182★**
140 Ω	**2322 156 21401★**	412 Ω	**2322 156 24121★**	1.21 kΩ	**2322 156 21212★**
143 Ω	**2322 156 21431★**	422 Ω	**2322 156 24221★**	1.24 kΩ	**2322 156 21242★**
147 Ω	**2322 156 21471★**	432 Ω	**2322 156 24321★**	1.27 kΩ	**2322 156 21272★**
150 Ω	**2322 156 21501★**	442 Ω	**2322 156 24421★**	1.30 kΩ	**2322 156 21302★**
154 Ω	**2322 156 21541★**	453 Ω	**2322 156 24531★**	1.33 kΩ	**2322 156 21332★**
158 Ω	**2322 156 21581★**	464 Ω	**2322 156 24641★**	1.37 kΩ	**2322 156 21372★**
162 Ω	**2322 156 21621★**	475 Ω	**2322 156 24751★**	1.40 kΩ	**2322 156 21402★**
165 Ω	**2322 156 21651★**	487 Ω	**2322 156 24871★**	1.43 kΩ	**2322 156 21432★**
169 Ω	**2322 156 21691★**	499 Ω	**2322 156 24991★**	1.47 kΩ	**2322 156 21472★**
174 Ω	**2322 156 21741★**	511 Ω	**2322 156 25111★**	1.50 kΩ	**2322 156 21502★**
178 Ω	**2322 156 21781★**	523 Ω	**2322 156 25231★**	1.54 kΩ	**2322 156 21542★**
182 Ω	**2322 156 21821★**	536 Ω	**2322 156 25361★**	1.58 kΩ	**2322 156 21582★**
187 Ω	**2322 156 21871★**	549 Ω	**2322 156 25491★**	1.62 kΩ	**2322 156 21622★**
191 Ω	**2322 156 21911★**	562 Ω	**2322 156 25621★**	1.65 kΩ	**2322 156 21652★**
196 Ω	**2322 156 21961★**	576 Ω	**2322 156 25761★**	1.69 kΩ	**2322 156 21692★**
200 Ω	**2322 156 22001★**	590 Ω	**2322 156 25901★**	1.74 kΩ	**2322 156 21742★**
205 Ω	**2322 156 22051★**	604 Ω	**2322 156 26041★**	1.78 kΩ	**2322 156 21782★**
210 Ω	**2322 156 22101★**	619 Ω	**2322 156 26191★**	1.82 kΩ	**2322 156 21822★**
215 Ω	**2322 156 22151★**	634 Ω	**2322 156 26341★**	1.87 kΩ	**2322 156 21872★**
221 Ω	**2322 156 22211★**	649 Ω	**2322 156 26491★**	1.91 kΩ	**2322 156 21912★**
226 Ω	**2322 156 22261★**	665 Ω	**2322 156 26651★**	1.96 kΩ	**2322 156 21962★**
232 Ω	**2322 156 22321★**	681 Ω	**2322 156 26811★**	2.00 kΩ	**2322 156 22002★**
237 Ω	**2322 156 22371★**	698 Ω	**2322 156 26981★**	2.05 kΩ	**2322 156 22052★**
243 Ω	**2322 156 22431★**	715 Ω	**2322 156 27151★**	2.10 kΩ	**2322 156 22102★**
249 Ω	**2322 156 22491★**	732 Ω	**2322 156 27321★**	2.15 kΩ	**2322 156 22152★**
255 Ω	**2322 156 22551★**	750 Ω	**2322 156 27501★**	2.21 kΩ	**2322 156 22212★**
261 Ω	**2322 156 22611★**	768 Ω	**2322 156 27681★**	2.26 kΩ	**2322 156 22262★**
267 Ω	**2322 156 22671★**	787 Ω	**2322 156 27871★**	2.32 kΩ	**2322 156 22322★**
274 Ω	**2322 156 22741★**	806 Ω	**2322 156 28061★**	2.37 kΩ	**2322 156 22372★**
280 Ω	**2322 156 22801★**	825 Ω	**2322 156 28251★**	2.43 kΩ	**2322 156 22432★**
287 Ω	**2322 156 22871★**	845 Ω	**2322 156 28451★**	2.49 kΩ	**2322 156 22492★**
294 Ω	**2322 156 22941★**	866 Ω	**2322 156 28661★**	2.55 kΩ	**2322 156 22552★**
301 Ω	**2322 156 23011★**	887 Ω	**2322 156 28871★**	2.61 kΩ	**2322 156 22612★**
309 Ω	**2322 156 23091★**	909 Ω	**2322 156 29091★**	2.67 kΩ	**2322 156 22672★**

Metal film resistors (cont.): MRS25

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 5000 pieces, on tape, in box

R_N	catalogue number	R_N	catalogue number	R_N	catalogue number
2.74 kΩ	**2322 156 22742★**	8.06 kΩ	**2322 156 28062★**	23.7 kΩ	**2322 156 22373★**
2.80 kΩ	**2322 156 22802★**	8.25 kΩ	**2322 156 28252★**	24.3 kΩ	**2322 156 22433★**
2.87 kΩ	**2322 156 22872★**	8.45 kΩ	**2322 156 28452★**	24.9 kΩ	**2322 156 22493★**
2.94 kΩ	**2322 156 22942★**	8.66 kΩ	**2322 156 28662★**	25.5 kΩ	**2322 156 22553★**
3.01 kΩ	**2322 156 23012★**	8.87 kΩ	**2322 156 28872★**	26.1 kΩ	**2322 156 22613★**
3.09 kΩ	**2322 156 23092★**	9.09 kΩ	**2322 156 29092★**	26.7 kΩ	**2322 156 22673★**
3.16 kΩ	**2322 156 23162★**	9.31 kΩ	**2322 156 29312★**	27.4 kΩ	**2322 156 22743★**
3.24 kΩ	**2322 156 23242★**	9.53 kΩ	**2322 156 29532★**	28.0 kΩ	**2322 156 22803★**
3.32 kΩ	**2322 156 23322★**	9.76 kΩ	**2322 156 29762★**	28.7 kΩ	**2322 156 22873★**
3.40 kΩ	**2322 156 23402★**	10.0 kΩ	**2322 156 21003★**	29.4 kΩ	**2322 156 22943★**
3.48 kΩ	**2322 156 23482★**	10.2 kΩ	**2322 156 21023★**	30.1 kΩ	**2322 156 23013★**
3.57 kΩ	**2322 156 23572★**	10.5 kΩ	**2322 156 21053★**	30.9 kΩ	**2322 156 23093★**
3.65 kΩ	**2322 156 23652★**	10.7 kΩ	**2322 156 21073★**	31.6 kΩ	**2322 156 23163★**
3.74 kΩ	**2322 156 23742★**	11.0 kΩ	**2322 156 21103★**	32.4 kΩ	**2322 156 23243★**
3.83 kΩ	**2322 156 23832★**	11.3 kΩ	**2322 156 21133★**	33.2 kΩ	**2322 156 23323★**
3.92 kΩ	**2322 156 23922★**	11.5 kΩ	**2322 156 21153★**	34.0 kΩ	**2322 156 23403★**
4.02 kΩ	**2322 156 24022★**	11.8 kΩ	**2322 156 21183★**	34.8 kΩ	**2322 156 23483★**
4.12 kΩ	**2322 156 24122★**	12.1 kΩ	**2322 156 21213★**	35.7 kΩ	**2322 156 23573★**
4.22 kΩ	**2322 156 24222★**	12.4 kΩ	**2322 156 21243★**	36.5 kΩ	**2322 156 23653★**
4.32 kΩ	**2322 156 24322★**	12.7 kΩ	**2322 156 21273★**	37.4 kΩ	**2322 156 23743★**
4.42 kΩ	**2322 156 24422★**	13.0 kΩ	**2322 156 21303★**	38.3 kΩ	**2322 156 23833★**
4.53 kΩ	**2322 156 24532★**	13.3 kΩ	**2322 156 21333★**	39.2 kΩ	**2322 156 23923★**
4.64 kΩ	**2322 156 24642★**	13.7 kΩ	**2322 156 21373★**	40.2 kΩ	**2322 156 24023★**
4.75 kΩ	**2322 156 24752★**	14.0 kΩ	**2322 156 21403★**	41.2 kΩ	**2322 156 24123★**
4.87 kΩ	**2322 156 24872★**	14.3 kΩ	**2322 156 21433★**	42.2 kΩ	**2322 156 24223★**
4.99 kΩ	**2322 156 24992★**	14.7 kΩ	**2322 156 21473★**	43.2 kΩ	**2322 156 24323★**
5.11 kΩ	**2322 156 25112★**	15.0 kΩ	**2322 156 21503★**	44.2 kΩ	**2322 156 24423★**
5.23 kΩ	**2322 156 25232★**	15.4 kΩ	**2322 156 21543★**	45.3 kΩ	**2322 156 24533★**
5.36 kΩ	**2322 156 25362★**	15.8 kΩ	**2322 156 21583★**	46.4 kΩ	**2322 156 24643★**
5.49 kΩ	**2322 156 25492★**	16.2 kΩ	**2322 156 21623★**	47.5 kΩ	**2322 156 24753★**
5.62 kΩ	**2322 156 25622★**	16.5 kΩ	**2322 156 21653★**	48.7 kΩ	**2322 156 24873★**
5.76 kΩ	**2322 156 25762★**	16.9 kΩ	**2322 156 21693★**	49.9 kΩ	**2322 156 24993★**
5.90 kΩ	**2322 156 25902★**	17.4 kΩ	**2322 156 21743★**	51.1 kΩ	**2322 156 25113★**
6.04 kΩ	**2322 156 26042★**	17.8 kΩ	**2322 156 21783★**	52.3 kΩ	**2322 156 25233★**
6.19 kΩ	**2322 156 26192★**	18.2 kΩ	**2322 156 21823★**	53.6 kΩ	**2322 156 25363★**
6.34 kΩ	**2322 156 26342★**	18.7 kΩ	**2322 156 21873★**	54.9 kΩ	**2322 156 25493★**
6.49 kΩ	**2322 156 26492★**	19.1 kΩ	**2322 156 21913★**	56.2 kΩ	**2322 156 25623★**
6.65 kΩ	**2322 156 26652★**	19.6 kΩ	**2322 156 21963★**	57.6 kΩ	**2322 156 25763★**
6.81 kΩ	**2322 156 26812★**	20.0 kΩ	**2322 156 22003★**	59.0 kΩ	**2322 156 25903★**
6.98 kΩ	**2322 156 26982★**	20.5 kΩ	**2322 156 22053★**	60.4 kΩ	**2322 156 26043★**
7.15 kΩ	**2322 156 27152★**	21.0 kΩ	**2322 156 22103★**	61.9 kΩ	**2322 156 26193★**
7.32 kΩ	**2322 156 27322★**	21.5 kΩ	**2322 156 22153★**	63.4 kΩ	**2322 156 26343★**
7.50 kΩ	**2322 156 27502★**	22.1 kΩ	**2322 156 22213★**	64.9 kΩ	**2322 156 26493★**
7.68 kΩ	**2322 156 27682★**	22.6 kΩ	**2322 156 22263★**	66.5 kΩ	**2322 156 26653★**
7.87 kΩ	**2322 156 27872★**	23.2 kΩ	**2322 156 22323★**	68.1 kΩ	**2322 156 26813★**

Metal film resistors (cont.): MRS25

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 5000 pieces, on tape, in box

R_N	catalogue number
69.8 kΩ	2322 156 26983★
71.5 kΩ	2322 156 27153★
73.2 kΩ	2322 156 27323★
75.0 kΩ	2322 156 27503★
76.8 kΩ	2322 156 27683★
78.7 kΩ	2322 156 27873★
80.6 kΩ	2322 156 28063★
82.5 kΩ	2322 156 28253★
84.5 kΩ	2322 156 28453★
86.6 kΩ	2322 156 28663★
88.7 kΩ	2322 156 28873★
90.9 kΩ	2322 156 29093★
93.1 kΩ	2322 156 29313★
95.3 kΩ	2322 156 29533★
97.6 kΩ	2322 156 29763★
100 kΩ	2322 156 21004★
102 kΩ	2322 156 21024★
105 kΩ	2322 156 21054★
107 kΩ	2322 156 21074★
110 kΩ	2322 156 21104★
113 kΩ	2322 156 21134★
115 kΩ	2322 156 21154★
118 kΩ	2322 156 21184★
121 kΩ	2322 156 21214★
124 kΩ	2322 156 21244★
127 kΩ	2322 156 21274★
130 kΩ	2322 156 21304★
133 kΩ	2322 156 21334★
137 kΩ	2322 156 21374★
140 kΩ	2322 156 21404★
143 kΩ	2322 156 21434★
147 kΩ	2322 156 21474★
150 kΩ	2322 156 21504★
154 kΩ	2322 156 21544★
158 kΩ	2322 156 21584★
162 kΩ	2322 156 21624★
165 kΩ	2322 156 21654★
169 kΩ	2322 156 21694★
174 kΩ	2322 156 21744★
178 kΩ	2322 156 21784★
182 kΩ	2322 156 21824★
187 kΩ	2322 156 21874★
191 kΩ	2322 156 21914★
196 kΩ	2322 156 21964★
200 kΩ	2322 156 22004★

R_N	catalogue number
205 kΩ	2322 156 22054★
210 kΩ	2322 156 22104★
215 kΩ	2322 156 22154★
221 kΩ	2322 156 22214★
226 kΩ	2322 156 22264★
232 kΩ	2322 156 22324★
237 kΩ	2322 156 22374★
243 kΩ	2322 156 22434★
249 kΩ	2322 156 22494★
255 kΩ	2322 156 22554★
261 kΩ	2322 156 22614★
267 kΩ	2322 156 22674★
274 kΩ	2322 156 22744★
280 kΩ	2322 156 22804★
287 kΩ	2322 156 22874★
294 kΩ	2322 156 22944★
301 kΩ	2322 156 23014★
309 kΩ	2322 156 23094★
316 kΩ	2322 156 23164★
324 kΩ	2322 156 23244★
332 kΩ	2322 156 23324★
340 kΩ	2322 156 23404★
348 kΩ	2322 156 23484★
357 kΩ	2322 156 23574★
365 kΩ	2322 156 23654★
374 kΩ	2322 156 23744★
383 kΩ	2322 156 23834★
392 kΩ	2322 156 23924★
402 kΩ	2322 156 24024★
412 kΩ	2322 156 24124★
422 kΩ	2322 156 24224★
432 kΩ	2322 156 24324★
442 kΩ	2322 156 24424★
453 kΩ	2322 156 24534★
464 kΩ	2322 156 24644★
475 kΩ	2322 156 24754★
487 kΩ	2322 156 24874★
499 kΩ	2322 156 24994★
511 KΩ	2322 156 25114★
523 kΩ	2322 156 25234★
536 kΩ	2322 156 25364★
549 kΩ	2322 156 25494★
562 kΩ	2322 156 25624★
576 kΩ	2322 156 25764★
590 kΩ	2322 156 25904★

R_N	catalogue number
604 kΩ	2322 156 26044★
619 kΩ	2322 156 26194★
634 kΩ	2322 156 26344★
649 kΩ	2322 156 26494★
665 kΩ	2322 156 26654★
681 kΩ	2322 156 26814★
698 kΩ	2322 156 26984★
715 kΩ	2322 156 27154★
732 kΩ	2322 156 27324★
750 kΩ	2322 156 27504★
768 kΩ	2322 156 27684★
787 kΩ	2322 156 27874★
806 kΩ	2322 156 28064★
825 kΩ	2322 156 28254★
845 kΩ	2322 156 28454★
866 kΩ	2322 156 28664★
887 kΩ	2322 156 28874★
909 kΩ	2322 156 29094★
931 kΩ	2322 156 29314★
953 kΩ	2322 156 29534★
976 kΩ	2322 156 29764★
1.00 MΩ	2322 156 21005★

Metal film precision resistors: MPR24

For detailed information on these and other types see Data Handbook PA08

Temperature coefficient	±25; 15; 10; 5 x 10^{-6}/K	±25; 15; 10; 5 x 10^{-6}/K
Tolerance	±0.5; 0.25; 0.1%	±0.05; 0.02; 0.01%
Climatic category	55/155/56	25/125/56
Failure rate level	R	S
Max. dissipation at T_{amb} = 70 °C	0.25 W	0.125 W
Resistance range	4.99 Ω to 1 MΩ	TC: 25 and 15
	4.99 Ω to 100 kΩ	TC: 10 and 5
	24 Ω to 100 kΩ	tol.: 0.05; 0.02; 0.01%
Stability after:		
load	ΔR/R max. 0.05% + 0.01 Ω	
climatic test	ΔR/R max. 0.05% + 0.01 Ω	
soldering test	ΔR/R max. 0.01% + 0.01 Ω	
short overload	ΔR/R max. 0.01% + 0.01 Ω	

Available from stock:

MPR24, 0.1%, TC = 25

All resistance values from 4.99 Ω to 1 MΩ: E96–series.

Metal film precision resistors (cont.): MPR24

For detailed information on these and other types see Data Handbook PA08

Tol. ± (%)	TC 10^{-6} /K	packing	colour code
0.5	25	100	**2322 141 00xxx**
0.5	15	100	**2322 141 01xxx**
0.5	10	100	**2322 141 02xxx**
0.5	5	100	**2322 141 03xxx**
0.5	25	500	**2322 143 00xxx**
0.5	15	500	**2322 143 01xxx**
0.5	10	500	**2322 143 02xxx**
0.5	5	500	**2322 143 03xxx**
0.5	25	1000	**2322 141 10xxx**
0.5	15	1000	**2322 141 11xxx**
0.5	10	1000	**2322 141 12xxx**
0.5	5	1000	**2322 141 13xxx**
0.5	25	5000	**2322 143 10xxx**
0.5	15	5000	**2322 143 11xxx**
0.5	10	5000	**2322 143 12xxx**
0.5	5	5000	**2322 143 13xxx**
0.25	25	100	**2322 141 20xxx**
0.25	15	100	**2322 141 21xxx**
0.25	10	100	**2322 141 22xxx**
0.25	5	100	**2322 141 23xxx**
0.25	25	500	**2322 143 20xxx**
0.25	15	500	**2322 143 21xxx**
0.25	10	500	**2322 143 22xxx**
0.25	5	500	**2322 143 23xxx**
0.25	25	1000	**2322 141 30xxx**
0.25	15	1000	**2322 141 31xxx**
0.25	10	1000	**2322 141 32xxx**
0.25	5	1000	**2322 141 33xxx**
0.25	25	5000	**2322 143 30xxx**
0.25	15	5000	**2322 143 31xxx**
0.25	10	5000	**2322 143 32xxx**
0.25	5	5000	**2322 143 33xxx**

Tol. ± (%)	TC 10^{-6} /K	packing	colour code	marking code
0.1	25	100	**2322 141 40xxx**	–
0.1	15	100	**2322 141 41xxx**	–
0.1	10	100	**2322 141 42xxx**	–
0.1	5	100	**2322 141 43xxx**	–
0.1	25	500	**2322 143 40xxx**	–
0.1	15	500	**2322 143 41xxx**	–
0.1	10	500	**2322 143 42xxx**	–
0.1	5	500	**2322 143 43xxx**	–
0.1	25	1000	**2322 141 50xxx**	–
0.1	15	1000	**2322 141 51xxx**	–
0.1	10	1000	**2322 141 52xxx**	–
0.1	5	1000	**2322 141 53xxx**	–
0.1	25	5000	**2322 143 50xxx**	–
0.1	15	5000	**2322 143 51xxx**	–
0.1	10	5000	**2322 143 52xxx**	–
0.1	5	5000	**2322 143 53xxx**	–
0.05	25	20	–	**2322 141 60xxx**
0.05	15	20	–	**2322 141 61xxx**
0.05	10	20	–	**2322 141 62xxx**
0.05	5	20	–	**2322 141 63xxx**
0.02	25	20	–	**2322 141 70xxx**
0.02	15	20	–	**2322 141 71xxx**
0.02	10	20	–	**2322 141 72xxx**
0.02	5	20	–	**2322 141 73xxx**
0.01	25	20	–	**2322 141 80xxx**
0.01	15	20	–	**2322 141 81xxx**
0.01	10	20	–	**2322 141 82xxx**
0.01	5	20	–	**2322 141 83xxx**

xxx in the catalogue number are fixed by the supplier.

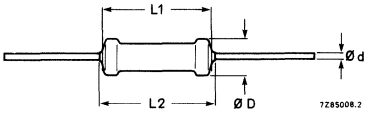
High voltage/high ohmic resistors: VR25

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 1000 pieces, on tape, in box

Resistance range	100 kΩ to 10 MΩ, tol. ± 5%, E24–series 12 MΩ to 22 MΩ, tol. ± 10%, E12–series
Temperature coefficient	± 200 x 10^{-6}/K
Max. dissipation at T_{amb} = 70 °C	0.25 W
Noise	max. 0.5 μV/V
Limiting voltage, r.m.s.	1600 V (d.c.) or 1150 V (r.m.s.)

D_{max} mm	$L1_{max}$ mm	$L2_{max}$ mm	d mm	a ± 0.5 mm	A ± 1.5 mm	$B_1 - B_2$ ± max mm	S mm	T
2.5	6.5	7.5	0.6	6	52.5	1.2	5	1 mm per 10 spacings

See page R4 for tape drawing with dimensions



Status = P

R_N	catalogue number
1 MΩ	**2322 241 13105**
1.5 MΩ	**2322 241 13155**
2.2 MΩ	**2322 241 13225**
3.3 MΩ	**2322 241 13335**
4.7 MΩ	**2322 241 13475**
6.8 MΩ	**2322 241 13685**
10 MΩ	**2322 241 13106★**
12 MΩ	**2322 241 12126★**
15 MΩ	**2322 241 12156★**
18 MΩ	**2322 241 12186★**
22 MΩ	**2322 241 12226★**

FIXED RESISTORS

General data

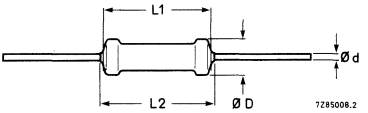
High voltage/high ohmic resistors (cont.): VR37

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 1000 pieces, on tape, in box

Resistance range (E24–series)	100 kΩ to 33 MΩ
Lower tolerance on resistance	−5%
Upper tolerance on resistance	+5%
Temperature coefficient	±200 x 10^{-6}/K
Max. dissipation at T_{amb} = 70 °C	< 0.5 W
Noise	< 2.5 μV/V
Limiting voltage, r.m.s	2500 V

D_{max} mm	$L1_{max}$ mm	$L2_{max}$ mm	d mm	a ± 0.5 mm	A ± 1.5 mm	$B_1 - B_2$ ± max mm	S mm	T
3.7	9.0	10	0.7	6	52.4	1.2	5	1 mm per 10 spacings

See page R4 for tape drawing with dimensions



Status = P

R_N	catalogue number
100 kΩ	**2322 242 13104**
150 kΩ	**2322 242 13154**
220 kΩ	**2322 242 13224**
330 kΩ	**2322 242 13334**
470 kΩ	**2322 242 13474**
680 kΩ	**2322 242 13684**
1 MΩ	**2322 242 13105**
1.5 MΩ	**2322 242 13155**
2.2 MΩ	**2322 242 13225**
3.3 MΩ	**2322 242 13335**
4.7 MΩ	**2322 242 13475**
6.8 MΩ	**2322 242 13685**
10 MΩ	**2322 242 13106**
12 MΩ	**2322 242 13126★**
15 MΩ	**2322 242 13156★**
18 MΩ	**2322 242 13186★**
22 MΩ	**2322 242 13226★**
27 MΩ	**2322 242 13276★**
33 MΩ	**2322 242 13336★**

FIXED RESISTORS

General data

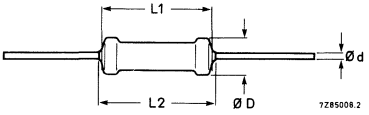
High voltage/high ohmic resistors (cont.): VR68

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 500 pieces, on tape, in box

Resistance range (E24–series)	100 kΩ to 68 MΩ
Lower tolerance on resistance	−5%
Upper tolerance on resistance	+5%
Temperature coefficient	±200 x 10^{-6}/K
Max. dissipation at T_{amb} = 70 °C	< 1 W
Noise	< 2.5 µV/V
Limiting voltage, r.m.s	7000 V

D_{max} mm	$L1_{max}$ mm	$L2_{max}$ mm	d mm	a ± 0.5 mm	A ± 1.5 mm	$B_1 - B_2$ ± max mm	S mm	T
6.8	16.5	19	0.8	5	66.7	1.2	10	1 mm per 10 spacings

See page R4 for tape drawing with dimensions



Status = P

R_N	catalogue number
100 kΩ	**2322 244 13104**
150 kΩ	**2322 244 13154**
220 kΩ	**2322 244 13224**
330 kΩ	**2322 244 13334**
470 kΩ	**2322 244 13474**
680 kΩ	**2322 244 13684**
1.0 MΩ	**2322 244 13105★**
1.2 MΩ	**2322 244 13125★**
1.5 MΩ	**2322 244 13255★**
1.8 MΩ	**2322 244 13185★**
2.2 MΩ	**2322 244 13225★**
2.7 MΩ	**2322 244 13275★**
3.3 MΩ	**2322 244 13335★**
3.9 MΩ	**2322 244 13395★**
4.7 MΩ	**2322 244 13475★**
5.6 MΩ	**2322 244 13565★**
6.8 MΩ	**2322 244 13685★**
8.2 MΩ	**2322 244 13825★**
10 MΩ	**2322 244 13106★**
12 MΩ	**2322 244 13126★**
15 MΩ	**2322 244 13156★**
18 MΩ	**2322 244 13186★**
22 MΩ	**2322 244 13226★**
27 MΩ	**2322 244 13276★**
33 MΩ	**2322 244 13336★**
39 MΩ	**2322 244 13396★**
47 MΩ	**2322 244 13476★**
56 MΩ	**2322 244 13566★**
68 MΩ	**2322 244 13686★**

FIXED RESISTORS

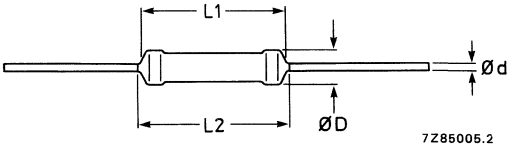
Power metal film resistors: PR01

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 1000 pieces, on tape, in box

Resistance range (E24–series)	1 Ω to 1 MΩ
Lower tolerance on resistance	−5%
Upper tolerance on resistance	+5%
Max. body temperature (hot spot)	205 °C
Nom. dissipation at T_{amb} = 70 °C	1 W
Limiting voltage, r.m.s	350 V

D_{max} mm	$L1_{max}$ mm	$L2_{max}$ mm	d mm	a ± 0.5 mm	A ± 1.5 mm	$B_1 - B_2$ ± max mm	S mm	T
2.5	6.5	8	0.6	6	73.5	1.2	5	1 mm per 10 spacings

See page R4 for tape drawing with dimensions



Status = P

R_N	catalogue number	R_N	catalogue number	R_N	catalogue number
1 Ω	**2322 193 13108★**	120 Ω	**2322 193 13121★**	15 kΩ	**2322 193 13153★**
1.2 Ω	**2322 193 13128★**	150 Ω	**2322 193 13151★**	18 kΩ	**2322 193 13183★**
1.5 Ω	**2322 193 13158★**	180 Ω	**2322 193 13181★**	22 kΩ	**2322 193 13223★**
1.8 Ω	**2322 193 13188★**	220 Ω	**2322 193 13221★**	27 kΩ	**2322 193 13273★**
2.2 Ω	**2322 193 13228★**	270 Ω	**2322 193 13271★**	33 kΩ	**2322 193 13333★**
2.7 Ω	**2322 193 13278★**	330 Ω	**2322 193 13331★**	39 kΩ	**2322 193 13393★**
3.3 Ω	**2322 193 13338★**	390 Ω	**2322 193 13391★**	47 kΩ	**2322 193 13473★**
3.9 Ω	**2322 193 13398★**	470 Ω	**2322 193 13471★**	56 kΩ	**2322 193 13563★**
4.7 Ω	**2322 193 13478★**	560 Ω	**2322 193 13561★**	68 kΩ	**2322 193 13683★**
5.6 Ω	**2322 193 13568★**	680 Ω	**2322 193 13681★**	82 kΩ	**2322 193 13823★**
6.8 Ω	**2322 193 13688★**	820 Ω	**2322 193 13821★**	100 kΩ	**2322 193 13104★**
8.2 Ω	**2322 193 13828★**	1 kΩ	**2322 193 13102★**	120 kΩ	**2322 193 13124★**
10 Ω	**2322 193 13109★**	1.2 kΩ	**2322 193 13122★**	150 kΩ	**2322 193 13154★**
12 Ω	**2322 193 13129★**	1.5 kΩ	**2322 193 13152★**	180 kΩ	**2322 193 13184★**
15 Ω	**2322 193 13159★**	1.8 kΩ	**2322 193 13182★**	220 kΩ	**2322 193 13224★**
18 Ω	**2322 193 13189★**	2.2 kΩ	**2322 193 13222★**	270 kΩ	**2322 193 13274★**
22 Ω	**2322 193 13229★**	2.7 kΩ	**2322 193 13272★**	330 kΩ	**2322 193 13334★**
27 Ω	**2322 193 13279★**	3.3 kΩ	**2322 193 13332★**	390 kΩ	**2322 193 13394★**
33 Ω	**2322 193 13339★**	3.9 kΩ	**2322 193 13392★**	470 kΩ	**2322 193 13474★**
39 Ω	**2322 193 13399★**	4.7 kΩ	**2322 193 13472★**	560 kΩ	**2322 193 13564★**
47 Ω	**2322 193 13479★**	5.6 kΩ	**2322 193 13562★**	680 kΩ	**2322 193 13684★**
56 Ω	**2322 193 13569★**	6.8 kΩ	**2322 193 13682★**	820 kΩ	**2322 193 13824★**
68 Ω	**2322 193 13689★**	8.2 kΩ	**2322 193 13822★**	1 MΩ	**2322 193 13105★**
82 Ω	**2322 193 13829★**	10 kΩ	**2322 193 13103★**		
100 Ω	**2322 193 13101★**	12 kΩ	**2322 193 13123★**		

FIXED RESISTORS

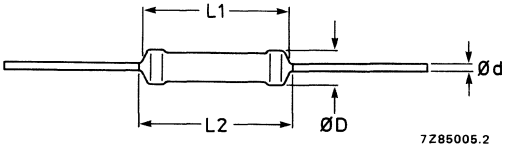
Power metal film resistors: PR02

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 1000 pieces, on tape, in box

Resistance range (E24–series)	1 Ω to 1 MΩ
Lower tolerance on resistance	−5%
Upper tolerance on resistance	+5%
Max. body temperature (hot spot)	220 °C
Nom. dissipation at T_{amb} = 70 °C	2 W
Limiting voltage, r.m.s	500 V

D_{max} mm	$L1_{max}$ mm	$L2_{max}$ mm	d mm	a ± 0.5 mm	A ± 1.5 mm	$B_1 - B_2$ ± max mm	S mm	T
3.9	10	11	0.8	6	73	1.2	5	1 mm per 10 spacings

See page R4 for tape drawing with dimensions



Status = P

R_N	catalogue number	R_N	catalogue number	R_N	catalogue number
1 Ω	**2322 194 13108★**	120 Ω	**2322 194 13121★**	15 kΩ	**2322 194 13153★**
1.2 Ω	**2322 194 13128★**	150 Ω	**2322 194 13151★**	18 kΩ	**2322 194 13183★**
1.5 Ω	**2322 194 13158★**	180 Ω	**2322 194 13181★**	22 kΩ	**2322 194 13223★**
1.8 Ω	**2322 194 13188★**	220 Ω	**2322 194 13221★**	27 kΩ	**2322 194 13273★**
2.2 Ω	**2322 194 13228★**	270 Ω	**2322 194 13271★**	33 kΩ	**2322 194 13333★**
2.7 Ω	**2322 194 13278★**	330 Ω	**2322 194 13331★**	39 kΩ	**2322 194 13393★**
3.3 Ω	**2322 194 13338★**	390 Ω	**2322 194 13391★**	47 kΩ	**2322 194 13473★**
3.9 Ω	**2322 194 13398★**	470 Ω	**2322 194 13471★**	56 kΩ	**2322 194 13563★**
4.7 Ω	**2322 194 13478★**	560 Ω	**2322 194 13561★**	68 kΩ	**2322 194 13683★**
5.6 Ω	**2322 194 13568★**	680 Ω	**2322 194 13681★**	82 kΩ	**2322 194 13823★**
6.8 Ω	**2322 194 13688★**	820 Ω	**2322 194 13821★**	100 kΩ	**2322 194 13104★**
8.2 Ω	**2322 194 13828★**	1 kΩ	**2322 194 13102★**	120 kΩ	**2322 194 13124★**
10 Ω	**2322 194 13109★**	1.2 kΩ	**2322 194 13122★**	150 kΩ	**2322 194 13154★**
12 Ω	**2322 194 13129★**	1.5 kΩ	**2322 194 13152★**	180 kΩ	**2322 194 13184★**
15 Ω	**2322 194 13159★**	1.8 kΩ	**2322 194 13182★**	220 kΩ	**2322 194 13224★**
18 Ω	**2322 194 13189★**	2.2 kΩ	**2322 194 13222★**	270 kΩ	**2322 194 13274★**
22 Ω	**2322 194 13229★**	2.7 kΩ	**2322 194 13272★**	330 kΩ	**2322 194 13334★**
27 Ω	**2322 194 13279★**	3.3 kΩ	**2322 194 13332★**	390 kΩ	**2322 194 13394★**
33 Ω	**2322 194 13339★**	3.9 kΩ	**2322 194 13392★**	470 kΩ	**2322 194 13474★**
39 Ω	**2322 194 13399★**	4.7 kΩ	**2322 194 13472★**	560 kΩ	**2322 194 13564★**
47 Ω	**2322 194 13479★**	5.6 kΩ	**2322 194 13562★**	680 kΩ	**2322 194 13684★**
56 Ω	**2322 194 13569★**	6.8 kΩ	**2322 194 13682★**	820 kΩ	**2322 194 13824★**
68 Ω	**2322 194 13689★**	8.2 kΩ	**2322 194 13822★**	1 MΩ	**2322 194 13105★**
82 Ω	**2322 194 13829★**	10 kΩ	**2322 194 13103★**		
100 Ω	**2322 194 13101★**	12 kΩ	**2322 194 13123★**		

FIXED RESISTORS

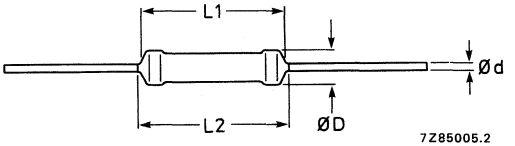
Power metal film resistors: PR03

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 500 pieces, on tape, in box

Resistance range (E12-series)	1 Ω to 1 MΩ
Lower tolerance on resistance	−5%
Lower tolerance on resistance	+5%
Max. body temperature (hot spot)	250 °C
Nom. dissipation at T_{amb} = 70 °C	3 W
Limiting voltage, r.m.s	750 V

D_{max} mm	$L1_{max}$ mm	$L2_{max}$ mm	d mm	a ± 0.5 mm	A ± 1.5 mm	$B_1 - B_2$ ± max mm	S mm	T
5.2	16.7	17.9	0.8	6	80	1.2	10	1 mm per 10 spacings

See page R4 for tape drawing with dimensions



Status = P

R_N	catalogue number	R_N	catalogue number	R_N	catalogue number
1 Ω	**2322 195 13108★**	120 Ω	**2322 195 13121★**	15 kΩ	**2322 195 13153★**
1.2 Ω	**2322 195 13128★**	150 Ω	**2322 195 13151★**	18 kΩ	**2322 195 13183★**
1.5 Ω	**2322 195 13158★**	180 Ω	**2322 195 13181★**	22 kΩ	**2322 195 13223★**
1.8 Ω	**2322 195 13188★**	220 Ω	**2322 195 13221★**	27 kΩ	**2322 195 13273★**
2.2 Ω	**2322 195 13228★**	270 Ω	**2322 195 13271★**	33 kΩ	**2322 195 13333★**
2.7 Ω	**2322 195 13278★**	330 Ω	**2322 195 13331★**	39 kΩ	**2322 195 13393★**
3.3 Ω	**2322 195 13338★**	390 Ω	**2322 195 13391★**	47 kΩ	**2322 195 13473★**
3.9 Ω	**2322 195 13398★**	470 Ω	**2322 195 13471★**	56 kΩ	**2322 195 13563★**
4.7 Ω	**2322 195 13478★**	560 Ω	**2322 195 13561★**	68 kΩ	**2322 195 13683★**
5.6 Ω	**2322 195 13568★**	680 Ω	**2322 195 13681★**	82 kΩ	**2322 195 13823★**
6.8 Ω	**2322 195 13688★**	820 Ω	**2322 195 13821★**	100 kΩ	**2322 195 13104★**
8.2 Ω	**2322 195 13828★**	1 kΩ	**2322 195 13102★**	120 kΩ	**2322 195 13124★**
10 Ω	**2322 195 13109★**	1.2 kΩ	**2322 195 13122★**	150 kΩ	**2322 195 13154★**
12 Ω	**2322 195 13129★**	1.5 kΩ	**2322 195 13152★**	180 kΩ	**2322 195 13184★**
15 Ω	**2322 195 13159★**	1.8 kΩ	**2322 195 13182★**	220 kΩ	**2322 195 13224★**
18 Ω	**2322 195 13189★**	2.2 kΩ	**2322 195 13222★**	270 kΩ	**2322 195 13274★**
22 Ω	**2322 195 13229★**	2.7 kΩ	**2322 195 13272★**	330 kΩ	**2322 195 13334★**
27 Ω	**2322 195 13279★**	3.3 kΩ	**2322 195 13332★**	390 kΩ	**2322 195 13394★**
33 Ω	**2322 195 13339★**	3.9 kΩ	**2322 195 13392★**	470 kΩ	**2322 195 13474★**
39 Ω	**2322 195 13399★**	4.7 kΩ	**2322 195 13472★**	560 kΩ	**2322 195 13564★**
47 Ω	**2322 195 13479★**	5.6 kΩ	**2322 195 13562★**	680 kΩ	**2322 195 13684★**
56 Ω	**2322 195 13569★**	6.8 kΩ	**2322 195 13682★**	820 kΩ	**2322 195 13824★**
68 Ω	**2322 195 13689★**	8.2 kΩ	**2322 195 13822★**	1 MΩ	**2322 195 13105★**
82 Ω	**2322 195 13829★**	10 kΩ	**2322 195 13103★**		
100 Ω	**2322 195 13101★**	12 kΩ	**2322 195 13123★**		

FIXED RESISTORS

General data

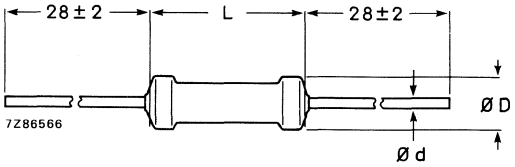
Cemented wirewound resistors: AC03, AC05, AC10

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 500 pieces, on tape, in box for AC03; AC05
Standard packaging: 100 pieces bulk for AC10

Resistance range	0.1 Ω to 8.2 Ω, tol. ± 10%, E12-series 10 Ω to 15 kΩ, tol. ± 5%, E12-series
Max. body temperature	350 °C
Nom. dissipation at T_{amb} = 40 °C	
AC03	3 W
AC05	5 W
AC10	10 W

type	D_{max} mm	L_{max} mm	d mm	a ± 0.5 mm	A ± 4.0 mm	$B_1 - B_2$ ± max mm	S mm	T
AC03	5.5	13	0.8	5	66	1.2	10	1mm per 10 spacings
AC05	7.5	17	0.8	5 or 6	66	1.2	10	
AC10	8	44	0.8					

See page R4 for tape drawing with dimensions



Status = P

R_N	tolerance %	AC03 cat. number	AC05 cat. number	AC10 cat. number
0.1 Ω	10	**2322 329 33107★***	**2322 329 35107★**	–
0.15 Ω	10	**2322 329 33157★**	**2322 329 35157★**	–
0.22 Ω	10	**2322 329 33227★**	**2322 329 35227★**	–
0.33 Ω	10	**2322 329 33337★**	**2322 329 35337★**	–
0.47 Ω	10	**2322 329 33477★**	**2322 329 35477★**	–
0.68 Ω	10	**2322 329 33687★**	**2322 329 35687★**	**2322 329 40687★**
1 Ω	10	**2322 329 33108★**	**2322 329 35108★**	**2322 329 40108★**
1.5 Ω	10	**2322 329 33158★**	**2322 329 35158★**	**2322 329 40158★**
2.2 Ω	10	**2322 329 33228★**	**2322 329 35228★**	**2322 329 40228★**
3.3 Ω	10	**2322 329 33338★**	**2322 329 35338★**	**2322 329 40338★**
4.7 Ω	10	**2322 329 33478★**	**2322 329 35478★**	**2322 329 40478★**
6.8 Ω	10	**2322 329 33688★**	**2322 329 35688★**	**2322 329 40688★**
10 Ω	5	**2322 329 03109★**	**2322 329 05109★**	**2322 329 10109★**
12 Ω	5		**2322 329 05129★**	**2322 329 10129★**
15 Ω	5	**2322 329 03159★**	**2322 329 05159★**	**2322 329 10159★**
18 Ω	5		**2322 329 05189★**	**2322 329 10189★**
22 Ω	5	**2322 329 03229★**	**2322 329 05229★**	**2322 329 10229★**
27 Ω	5		**2322 329 05279★**	**2322 329 10279★**
33 Ω	5	**2322 329 03339★**	**2322 329 05339★**	**2322 329 10339★**
39 Ω	5		**2322 329 05399★**	**2322 329 10399★**

Cemented wirewound resistors (cont.): AC03, AC05, AC10

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 500 pieces, on tape, in box for AC03; AC05
Standard packaging: 100 pieces bulk for AC10

Status = P

R_N	tolerance %	AC03 cat. number	AC05 cat. number	AC10 cat. number
47 Ω	5	**2322 329 03479★**	**2322 329 05479★**	**2322 329 10479★**
56 Ω	5		**2322 329 05569★**	**2322 329 10569★**
68 Ω	5	**2322 329 03689★**	**2322 329 05689★**	**2322 329 10689★**
82 Ω	5		**2322 329 05829★**	**2322 329 10829★**
100 Ω	5	**2322 329 03101★**	**2322 329 05101★**	**2322 329 10101★**
120 Ω	5		**2322 329 05121★**	**2322 329 10121★**
150 Ω	5	**2322 329 03151★**	**2322 329 05151★**	**2322 329 10151★**
180 Ω	5		**2322 329 05181★**	**2322 329 10181★**
220 Ω	5	**2322 329 03221★**	**2322 329 05221★**	**2322 329 10221★**
270 Ω	5		**2322 329 05271★**	**2322 329 10271★**
330 Ω	5	**2322 329 03331★**	**2322 329 05331★**	**2322 329 10331★**
390 Ω	5		**2322 329 05391★**	**2322 329 10391★**
470 Ω	5	**2322 329 03471★**	**2322 329 05471★**	**2322 329 10471★**
560 Ω	5		**2322 329 05561★**	**2322 329 10561★**
680 Ω	5	**2322 329 03681★**	**2322 329 05681★**	**2322 329 10681★**
820 Ω	5		**2322 329 05821★**	**2322 329 10821★**
1 kΩ	5		**2322 329 05102★**	**2322 329 10102★**
1.2 kΩ	5		**2322 329 05122★**	**2322 329 10122★**
1.5 kΩ	5		**2322 329 05152★**	**2322 329 10152★**
1.8 kΩ	5		**2322 329 05182★**	**2322 329 10182★**
2.2 kΩ	5		**2322 329 05222★**	**2322 329 10222★**
2.7 kΩ	5		**2322 329 05272★**	**2322 329 10272★**
3.3 kΩ	5		**2322 329 05332★**	**2322 329 10332★**
3.9 kΩ	5		**2322 329 05392★**	**2322 329 10392★**
4.7 kΩ	5		**2322 329 05472★**	**2322 329 10472★**
5.6 kΩ	5		**2322 329 05562★**	**2322 329 10562★**
6.8 kΩ	5			**2322 329 10682★**
8.2 kΩ	5			**2322 329 10822★**
10 kΩ	5			**2322 329 10103★**
12 kΩ	5			**2322 329 10123★**
15 kΩ	5			**2322 329 10153**

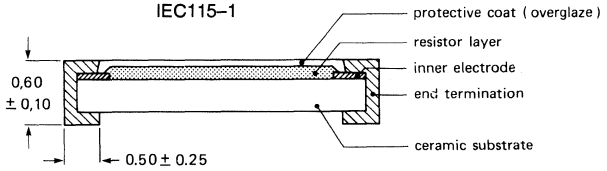
FIXED RESISTORS

General data

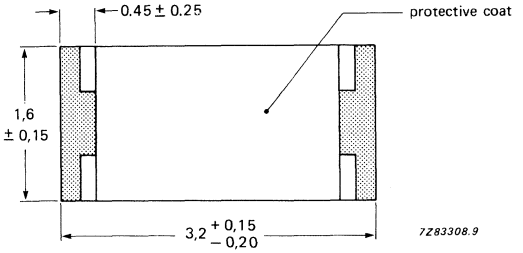
Chip resistors: RC–01

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 4000, in paper tape, on reel
See page R28 for additional packing information

Resistance range (E24–series)	1 to 10 MΩ (and 0 Ω jumper)
Lower tolerance on resistance	−5%
Upper tolerance on resistance	+5%
Temperature coefficient	200 10–6/K
Abs. max. dissipation at T_{amb} = 70 °C	0.25 W
Limiting voltage, r.m.s	200 V
Climatic category	55/155/56
at norm	IEC68
Basic specification	IEC115–1



Medio 1991 wordt de 4k reel verpakking vervangen door 5k reel verpakking.
bestelnr. wijzigt van: 2322 711 20... in 2322 711 60...



Status = P

R_N Ω	catalogue number	R_N Ω	catalogue number	R_N Ω	catalogue number
1	**2322 711 20108★**	4.3	**2322 711 20438★**	18	**2322 711 20189★**
1.1	**2322 711 20118★**	4.7	**2322 711 20478★**	20	**2322 711 20209★**
1.2	**2322 711 20128★**	5.1	**2322 711 20518★**	22	**2322 711 20229★**
1.3	**2322 711 20138★**	5.6	**2322 711 20568★**	24	**2322 711 20249★**
1.5	**2322 711 20158★**	6.2	**2322 711 20628★**	27	**2322 711 20279★**
1.6	**2322 711 20168★**	6.8	**2322 711 20688★**	30	**2322 711 20309★**
1.8	**2322 711 20188★**	7.5	**2322 711 20758★**	33	**2322 711 20339★**
2	**2322 711 20208★**	8.2	**2322 711 20828★**	36	**2322 711 20369★**
2.2	**2322 711 20228★**	9.1	**2322 711 20918★**	39	**2322 711 20399★**
2.4	**2322 711 20248★**	10	**2322 711 20109★**	43	**2322 711 20439★**
2.7	**2322 711 20278★**	11	**2322 711 20119★**	47	**2322 711 20479★**
3	**2322 711 20308★**	12	**2322 711 20129★**	51	**2322 711 20519★**
3.3	**2322 711 20338★**	13	**2322 711 20139★**	56	**2322 711 20569★**
3.6	**2322 711 20368★**	15	**2322 711 20159★**	62	**2322 711 20629★**
3.9	**2322 711 20398★**	16	**2322 711 20169★**	68	**2322 711 20689★**

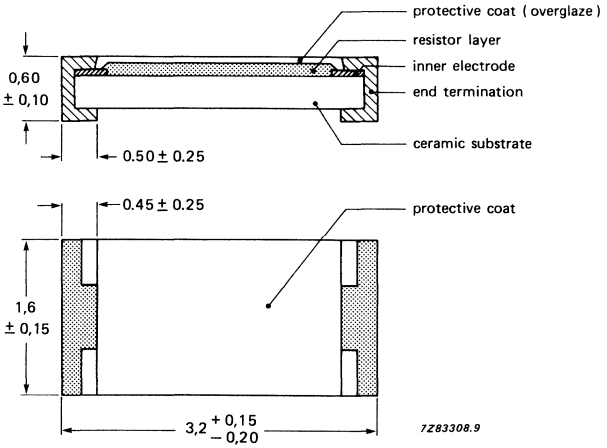
For detailed information on these and other types see Data Handbook PA08
Standard packaging: 4000, in paper tape, on reel
See page R28 for additional packing information

R_N	catalogue number	R_N	catalogue number	R_N	catalogue number
75 Ω	**2322 711 20759★**	5.6 kΩ	**2322 711 20562★**	430 kΩ	**2322 711 20434★**
82 Ω	**2322 711 20829★**	6.2 kΩ	**2322 711 20622★**	470 kΩ	**2322 711 20474★**
91 Ω	**2322 711 20919★**	6.8 kΩ	**2322 711 20682★**	510 kΩ	**2322 711 20514★**
100 Ω	**2322 711 20101★**	7.5 kΩ	**2322 711 20752★**	560 kΩ	**2322 711 20564★**
110 Ω	**2322 711 20111★**	8.2 kΩ	**2322 711 20822★**	620 kΩ	**2322 711 20624★**
120 Ω	**2322 711 20121★**	9.1 kΩ	**2322 711 20912★**	680 kΩ	**2322 711 20684★**
130 Ω	**2322 711 20131★**	10 kΩ	**2322 711 20103★**	750 kΩ	**2322 711 20754★**
150 Ω	**2322 711 20151★**	11 kΩ	**2322 711 20113★**	820 kΩ	**2322 711 20824★**
160 Ω	**2322 711 20161★**	12 kΩ	**2322 711 20123★**	910 kΩ	**2322 711 20914★**
180 Ω	**2322 711 20181★**	13 kΩ	**2322 711 20133★**	1 MΩ	**2322 711 20105★**
200 Ω	**2322 711 20201★**	15 kΩ	**2322 711 20153★**	1.1 MΩ	**2322 711 20115★**
220 Ω	**2322 711 20221★**	16 kΩ	**2322 711 20163★**	1.2 MΩ	**2322 711 20125★**
240 Ω	**2322 711 20241★**	18 kΩ	**2322 711 20183★**	1.3 MΩ	**2322 711 20135★**
270 Ω	**2322 711 20271★**	20 kΩ	**2322 711 20203★**	1.5 MΩ	**2322 711 20155★**
300 Ω	**2322 711 20301★**	22 kΩ	**2322 711 20223★**	1.6 MΩ	**2322 711 20165★**
330 Ω	**2322 711 20331★**	24 kΩ	**2322 711 20243★**	1.8 MΩ	**2322 711 20185★**
360 Ω	**2322 711 20361★**	27 kΩ	**2322 711 20273★**	2 MΩ	**2322 711 20205★**
390 Ω	**2322 711 20391★**	30 kΩ	**2322 711 20303★**	2.2 MΩ	**2322 711 20225★**
430 Ω	**2322 711 20431★**	33 kΩ	**2322 711 20333★**	2.4 MΩ	**2322 711 20245★**
470 Ω	**2322 711 20471★**	36 kΩ	**2322 711 20363★**	2.7 MΩ	**2322 711 20275★**
510 Ω	**2322 711 20511★**	39 kΩ	**2322 711 20393★**	3 MΩ	**2322 711 20305★**
560 Ω	**2322 711 20561★**	43 kΩ	**2322 711 20433★**	3.3 MΩ	**2322 711 20335★**
620 Ω	**2322 711 20621★**	47 kΩ	**2322 711 20473★**	3.6 MΩ	**2322 711 20365★**
680 Ω	**2322 711 20681★**	51 kΩ	**2322 711 20513★**	3.9 MΩ	**2322 711 20395★**
750 Ω	**2322 711 20751★**	56 kΩ	**2322 711 20563★**	4.3 MΩ	**2322 711 20435★**
820 Ω	**2322 711 20821★**	62 kΩ	**2322 711 20623★**	4.7 MΩ	**2322 711 20475★**
910 Ω	**2322 711 20911★**	68 kΩ	**2322 711 20683★**	5.1 MΩ	**2322 711 20515★**
1 kΩ	**2322 711 20102★**	75 kΩ	**2322 711 20753★**	5.6 MΩ	**2322 711 20565★**
1.1 kΩ	**2322 711 20112★**	82 kΩ	**2322 711 20823★**	6.2 MΩ	**2322 711 20625★**
1.2 kΩ	**2322 711 20122★**	91 kΩ	**2322 711 20913★**	6.8 MΩ	**2322 711 20685★**
1.3 kΩ	**2322 711 20132★**	100 kΩ	**2322 711 20104★**	7.5 MΩ	**2322 711 20755★**
1.5 kΩ	**2322 711 20152★**	110 kΩ	**2322 711 20114★**	8.2 MΩ	**2322 711 20825★**
1.6 kΩ	**2322 711 20162★**	120 kΩ	**2322 711 20124★**	9.1 MΩ	**2322 711 20915★**
1.8 kΩ	**2322 711 20182★**	130 kΩ	**2322 711 20134★**	10 MΩ	**2322 711 20106★**
2 kΩ	**2322 711 20202★**	150 kΩ	**2322 711 20154★**	0(jump)	**2322 711 90001★**
2.2 kΩ	**2322 711 20222★**	160 kΩ	**2322 711 20164★**		
2.4 kΩ	**2322 711 20242★**	180 kΩ	**2322 711 20184★**		
2.7 kΩ	**2322 711 20272★**	200 kΩ	**2322 711 20204★**		
3 kΩ	**2322 711 20302★**	220 kΩ	**2322 711 20224★**		
3.3 kΩ	**2322 711 20332★**	240 kΩ	**2322 711 20244★**		
3.6 kΩ	**2322 711 20362★**	270 kΩ	**2322 711 20274★**		
3.9 kΩ	**2322 711 20392★**	300 kΩ	**2322 711 20304★**		
4.3 kΩ	**2322 711 20432★**	330 kΩ	**2322 711 20334★**		
4.7 kΩ	**2322 711 20472★**	360 kΩ	**2322 711 20364★**		
5.1 kΩ	**2322 711 20512★**	390 kΩ	**2322 711 20394★**		

Chip resistors: RC–02H

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 4000, in paper tape, on reel
See page R28 for additional packing information

Resistance range (E96–series)	100 Ω to 1 MΩ
Lower tolerance on resistance	− 1%
Upper tolerance on resistance	+ 1%
Temperature coefficient range	± 100 x 10^{-6}/K
Abs. max. dissipation at T_{amb} = 70 °C	0.125 W
Maximum permissible voltage	200 V
Climatic category	55/125/56
at norm	IEC68
Basic specification	IEC115–1



Status = P

R_N	catalogue number	R_N	catalogue number	R_N	catalogue number
100 Ω	**2322 724 51001★**	430 Ω	**2322 724 54301★**	1.8 kΩ	**2322 724 51802★**
110 Ω	**2322 724 51101★**	470 Ω	**2322 724 54701★**	2 kΩ	**2322 724 52002★**
120 Ω	**2322 724 51201★**	510 Ω	**2322 724 55101★**	2.2 kΩ	**2322 724 52202★**
130 Ω	**2322 724 51301★**	560 Ω	**2322 724 55601★**	2.4 kΩ	**2322 724 52402★**
150 Ω	**2322 724 51501★**	620 Ω	**2322 724 56201★**	2.7 kΩ	**2322 724 52702★**
160 Ω	**2322 724 51601★**	680 Ω	**2322 724 56801★**	3 kΩ	**2322 724 53002★**
180 Ω	**2322 724 51801★**	750 Ω	**2322 724 57501★**	3.3 kΩ	**2322 724 53302★**
200 Ω	**2322 724 52001★**	820 Ω	**2322 724 58201★**	3.6 kΩ	**2322 724 53602★**
220 Ω	**2322 724 52201★**	910 Ω	**2322 724 59101★**	3.9 kΩ	**2322 724 53902★**
240 Ω	**2322 724 52401★**	1 Ω	**2322 724 51002★**	4.3 kΩ	**2322 724 54302★**
270 Ω	**2322 724 52701★**	1.1 kΩ	**2322 724 51102★**	4.7 kΩ	**2322 724 54702★**
300 Ω	**2322 724 53001★**	1.2 kΩ	**2322 724 51202★**	5.1 kΩ	**2322 724 55102★**
330 Ω	**2322 724 53301★**	1.3 kΩ	**2322 724 51302★**	5.6 kΩ	**2322 724 55602★**
360 Ω	**2322 724 53601★**	1.5 kΩ	**2322 724 51502★**	6.2 kΩ	**2322 724 56202★**
390 Ω	**2322 724 53901★**	1.6 kΩ	**2322 724 51602★**	6.8 kΩ	**2322 724 56802★**

Chip resistors: RC–02H (cont.)

For detailed information on these and other types see Data Handbook PA08
Standard packaging: 4000, in paper tape, on reel
See page R28 for additional packing information

Medio 1991 wordt de 4k reel verpakking vervangen door 5k reel verpakking.
Typenr. wijzigt van: 2322 724 5... in 2322 724 6...

R_N	catalogue number	R_N	catalogue number	R_N	catalogue number
7.5 kΩ	**2322 724 57502★**	51 kΩ	**2322 724 55103★**	360 kΩ	**2322 724 53604★**
8.2 kΩ	**2322 724 58202★**	56 kΩ	**2322 724 55603★**	390 kΩ	**2322 724 53904★**
9.1 kΩ	**2322 724 59102★**	62 kΩ	**2322 724 56203★**	430 kΩ	**2322 724 54304★**
10 kΩ	**2322 724 51003★**	68 kΩ	**2322 724 56803★**	510 kΩ	**2322 724 55104★**
11 kΩ	**2322 724 51103★**	75 kΩ	**2322 724 57503★**	560 kΩ	**2322 724 55604★**
12 kΩ	**2322 724 51203★**	82 kΩ	**2322 724 58203★**	620 kΩ	**2322 724 56204★**
13 kΩ	**2322 724 51303★**	91 kΩ	**2322 724 59103★**	680 kΩ	**2322 724 56804★**
15 kΩ	**2322 724 51503★**	100 kΩ	**2322 724 51004★**	750 kΩ	**2322 724 57504★**
16 kΩ	**2322 724 51603★**	110 kΩ	**2322 724 51104★**	820 kΩ	**2322 724 58204★**
18 kΩ	**2322 724 51803★**	120 kΩ	**2322 724 51204★**	910 kΩ	**2322 724 59104★**
20 kΩ	**2322 724 52003★**	130 kΩ	**2322 724 51304★**	1 MΩ	**2322 724 51005★**
22 kΩ	**2322 724 52203★**	150 kΩ	**2322 724 51504★**		
24 kΩ	**2322 724 52403★**	160 kΩ	**2322 724 51604★**		
27 kΩ	**2322 724 52703★**	180 kΩ	**2322 724 51804★**		
30 kΩ	**2322 724 53003★**	200 kΩ	**2322 724 52004★**		
33 kΩ	**2322 724 53303★**	220 kΩ	**2322 724 52204★**		
36 kΩ	**2322 724 53603★**	240 kΩ	**2322 724 52004★**		
39 kΩ	**2322 724 53903★**	270 kΩ	**2322 724 52004★**		
43 kΩ	**2322 724 54303★**	300 kΩ	**2322 724 53004★**		
47 kΩ	**2322 724 54703★**	330 kΩ	**2322 724 53304★**		

FIXED RESISTORS

General data

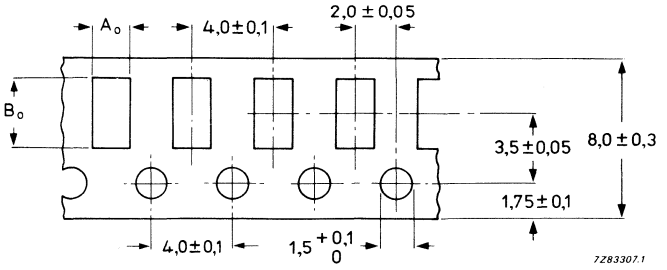
RC–01 and RC–02H standard packaging

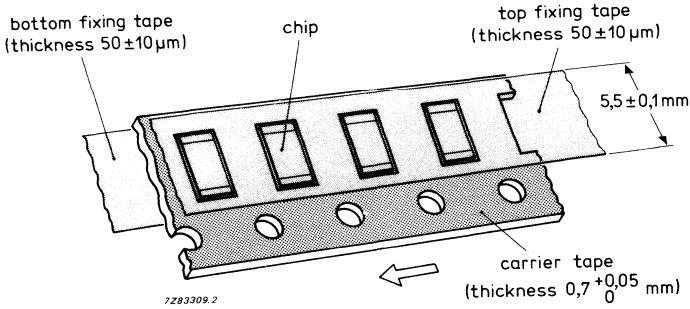
For complete details of RC–01 and RC–02H: packaging see Data Handbook PA08

Standard packaging for RC–01 and RC–02H paper tape on reel.

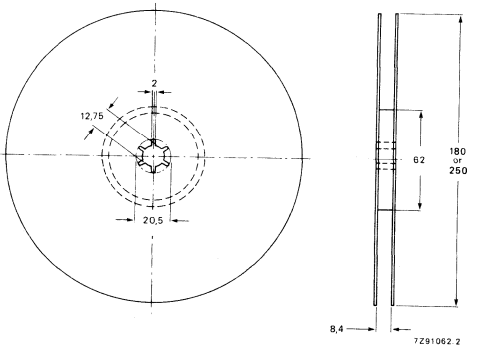
Paper tape

A_o = 1,85 + 0,20
B_o = 3,45 + 0,20





Reel



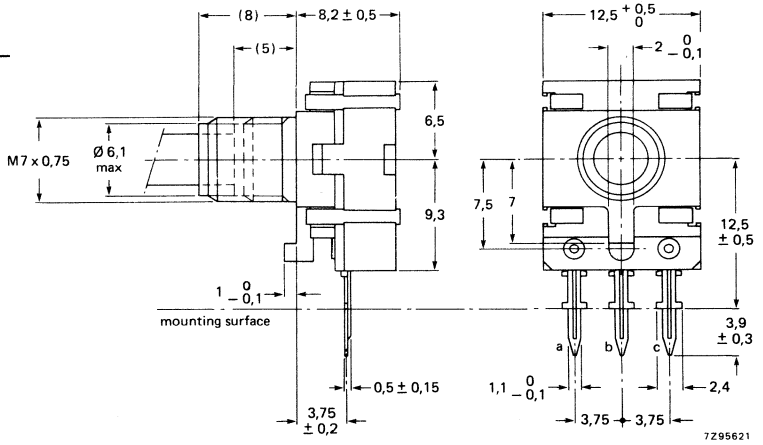
depth of compartments: 0.7 mm

CARBON PRESET POTENTIOMETERS, single

For detailed information on these and other types see Data Handbook PA03
Standard packaging: 1000 pieces

Resistance range (E3–series) linear law	470 Ω to 4.7 MΩ
Max. dissipation at T_{amb} = 40 °C linear law	< 0.2 W
Climatic category	25/070/10
at norm	IEC–68
Spindle material	METAL, PLASTIC

L (mm)	d (mm)
20	4
30	6



nominal resistance R_N	catalogue number flat metal spindle ø 4 x 20 (M7) linear law	catalogue number round plastic spindle ø 4 x 20 (M7) linear law	catalogue number round metal spindle ø 6 x 30 (M7) linear law
470 Ω	**2322 506 08103**	**2322 506 09103**	**2322 506 25103**
1 kΩ	**2322 506 08104**	**2322 506 09104**	**2322 506 25104**
2.2 kΩ	**2322 506 08105**	**2322 506 09105**	**2322 506 25105**
4.7 kΩ	**2322 506 08106**	**2322 506 09106**	**2322 506 25106**
10 kΩ	**2322 506 08107**	**2322 506 09107**	**2322 506 25107**
22 kΩ	**2322 506 08108**	**2322 506 09108**	**2322 506 25108**
47 kΩ	**2322 506 08109**	**2322 506 09109**	**2322 506 25109**
100 kΩ	**2322 506 08111**	**2322 506 09111**	**2322 506 25111**
220 kΩ	**2322 506 08112**	**2322 506 09112**	**2322 506 25112**
470 kΩ	**2322 506 08113**	**2322 506 09113**	**2322 506 25113**
1 MΩ	**2322 506 08114**	**2322 506 09114**	**2322 506 25114**
2.2 MΩ	**2322 506 08115**	**2322 506 09115**	**2322 506 25115**
4.7 MΩ	**2322 506 08116**	**2322 506 09116**	**2322 506 25116**

VARISTORS (VDRs)

General data

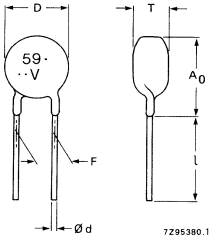
Epoxy series 2322 592 to 595

For detailed information on these and other types see Data Handbook PA02
Standard packaging: 250 pieces, in box

Max. a.c. voltage (r.m.s.)	30 to 550 V
Max. d.c. voltage	38 to 745 V
Max. non–repetitive transient current (8/20 μs)	100 to 4500 A
Climatic category	40/125/56

Table1 Dimensions in mm

series	D max	T max	A_0 max	l min	d ±10%	F
2322 592	7	6	9	20	0.6	5.00 $^{+0.8}_{-0.2}$
2322 593	9	6	11	19	0.6	5.00 $^{+0,8}_{-0.2}$
2322 594	13.5	7	15.5	17	0.8	7.62 ± 1
2322 595	17	7	19	16	0.8	7.62 ± 1



Epoxy series 2322 592 to 595 (cont.)

For detailed information on these and other types see Data Handbook PA02

catalogue number	maximum continuous voltage		voltage at 1 mA		max. voltage at current (8 x 20 µs)		max. energy 10 x 1000 µs	max. non rep. surge current 8 x 20 µs	typical capacitance at 1 kHz
	V r.m.s.	V d.c.	V min	V max	V	A	J	A	pF
2322 592 53006	30	38	42	52	96	1	1.1	100	560
2322 593 53006					93	2.5	2.3	250	1300
2322 594 53006					93	5	5.66	500	2200
2322 595 53006					90	10	10.4	1000	4800
2322 592 51316	130	170	185	225	310	5	4.7	400	130
2322 593 51316					340	10	11.4	1200	320
2322 594 51316					340	25	20	2500	580
2322 595 51316					380	50	38	4500	1050

Epoxy series 2322 592 to 595 (cont.)

For detailed information on these and other types see Data Handbook PA02

catalogue number	maximum continuous voltage		voltage at 1 mA		max. voltage at current (8 x 20 µs)		max. energy 10 x 1000 µs	max. non rep. surge current 8 x 20 µs	typical capacitance at 1 kHz
	V r.m.s.	V d.c.	V min	V max	V	A	J	A	pF
2322 592 52316	230	300	324	396	560	5	8	400	70
2322 593 52316					600	10	20	1200	170
2322 594 52316					600	25	35	2500	320
2322 595 52316					600	50	70	4500	540
2322 592 52516★	250	320	351	429	600	5	8,6	400	60
2322 593 52516★					650	10	21	1200	160
2322 594 52516★					650	25	40	2500	300
2322 595 52516★					650	50	72	4500	480
2322 592 52716	275	350	387	473	695	5	9,8	400	55
2322 593 52716					710	10	23	1200	140
2322 594 52716					710	25	45	2500	270
2322 595 52716					710	50	75	4500	440
2322 592 53016	300	385	423	517	750	5	10	400	50
2322 593 53016					800	10	25	1200	130
2322 594 53016					800	25	50	2500	240
2322 595 53016					800	50	90	4500	400
2322 592 53816	385	505	558	682	1000	5	14	400	40
2322 593 53816					1025	10	28	1200	95
2322 594 53816					1025	25	45	2500	180
2322 595 53816					1025	50	85	4500	280
2322 592 54216★	420	560	612	748	1100	5	16	400	35
2322 593 54216★					1120	10	30	1200	85
2322 594 54216★					1120	25	46	2500	165
2322 595 54216★					1120	50	90	4500	250
2322 592 54616	460	615	675	825	1200	5	20	400	30
2322 593 54616					1250	10	32	1200	75
2322 594 54616					1250	25	50	2500	150
2322 595 54616					1250	50	100	4500	225

NOTES

NTC THERMISTORS

For details of these and other types see Data Handbook PA02
Standard packaging: 10 pieces, in box

Resistance at +25 °C	1 kΩ to 1 MΩ
$B_{25/85}$	2075 to 4100 K
Max. dissipation	< 100 mW
Dissipation factor	0.8 mW/K, 1.2 mW/K
Thermal time constant	7.5 to 10 s
Lower tolerance	−5%*, −10%
Upper tolerance	+5%*, +10%
Min. temperature	−55 °C
Max. temperature	+200 °C or +300 °

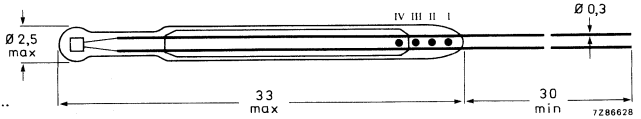


Fig. 1 2322 626 1....

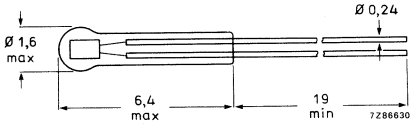


Fig. 2 2322 626 2....

status = P

cat. number	R_{25} kΩ	tolerance* %	thermal time constant s	T max °C	$B_{25/85}$ K	temperature coefficient at 25 °C %/K	Fig. no.
2322 626 12102	1	±10	10	200	2075	−2,3	1
2322 626 12222	2,2	±10	10	200	2285	−2,6	1
2322 626 12472	4,7	±10	10	200	2485	−2,8	1
2322 626 12103	10	±10	10	200	2750	−4,2	1
2322 626 12223	22	±10	10	200	3560	−4,0	1
2322 626 12473	47	±10	10	200	3750	−4,2	1
2322 626 12104	100	±10	10	300	3900	−4,4	1
2322 626 12224	220	±10	10	300	3860	−4,3	1
2322 626 12474	470	±10	10	300	3950	−4,5	1
2322 626 12105	1000	±10	10	300	4100	−4,6	1
2322 626 22102	1	±10	7,5	200	2075	−2,3	2
2322 626 22222	2,2	±10	7,5	200	2285	−2,6	2
2322 626 22472	4,7	±10	7,5	200	2485	−2,8	2
2322 626 22103	10	±10	7,5	200	3750	−4,2	2
2322 626 22223	22	±10	7,5	200	3560	−4,0	2
2322 626 22473	47	±10	7,5	200	3750	−4,2	2
2322 626 22104	100	±10	7,5	300	3900	−4,4	2
2322 626 22224	220	±10	7,5	300	3860	−4,3	2
2322 626 22474	470	±10	7,5	300	3950	−4,5	2
2322 626 22105	1000	±10	7,5	300	4100	−4,6	2

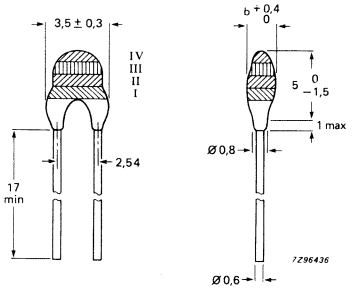
* To specify products with ±5% tolerance change 9th digit of catalogue number from **2** to **3** (e.g. 2322 626 12102 becomes **2322 626 13102** for ±5% tolerance)

Extended accuracy range

For detailed information on these and other types see Data Handbook PA02
Standard packaging: 500 pieces, in box

Resistance at +25 °C	2.7 kΩ to 470 kΩ
Tolerance	±5%, ±10%
$B_{25/85}$ tolerance	0.75% to 3%
Max. dissipation	250 mW
Dissipation factor	7 mW/K
Thermal time constant	11 s approx.
Temperature range	−40 to +125°C short period to +150°C*

* For types indicated with * in table



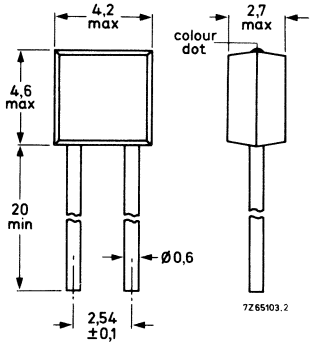
R_{25} kΩ	$B_{25/85}$ K	$B_{25/85}$ tolerance %	catalogue number R_{25} ±5%
2.7*	3977	0.75	**2322 640 63272★**
3.3*	3977	0.75	**2322 640 63332**
4.7*	3977	0.75	**2322 640 63472★**
6.8*	3977	0.75	**2322 640 63682**
10*	3977	0.75	**2322 640 63103★**
15	3740	3.00	**2322 640 63153**
22	3740	3.00	**2322 640 63223★**
33*	4100	2.00	**2322 640 63333**
47*	4100	2.00	**2322 640 63473★**
68*	4190	2.00	**2322 640 63683**
100*	4190	2.00	**2322 640 63104★**
150	4370	3.00	**2322 640 63154**
220	4370	3.00	**2322 640 63224★**
330	4570	3.00	**2322 640 63334**
470	4570	3.00	**2322 640 63474★**

NTC THERMISTORS (cont.)

Special accuracy range

For detailed information on these and other types see Data Handbook PA02
Standard packaging: 500 pieces, in box

Resistance	12 to 16.7 kΩ
$B_{25/85}$	3740 to 4300 K
Max. dissipation	250 mW
Dissipation factor	7 mW/K
Thermal time constant	
2322 640 9000.	19 s approx.
2322 640 90015	17 s approx.
Temperature range	
2322 640 90004	−10 to +125°C
2322 640 90005	−25 to +200°C
2322 640 90015	−40 to +125°C



status = P

cat. number	R_{25} kΩ	tolerance R_{25} °C	R_{100} Ω	tolerance R_{100} °C	$B_{25/85}$ K
2322 640 90004	12	±1.7	950	±1.8	3740

cat. number	R_{10} kΩ	tolerance R_{10} °C	R_{25} kΩ	tolerance R_{25} °C	$B_{25/85}$ K
2322 640 90015	15	±1.5	2.7	±1.5	4000

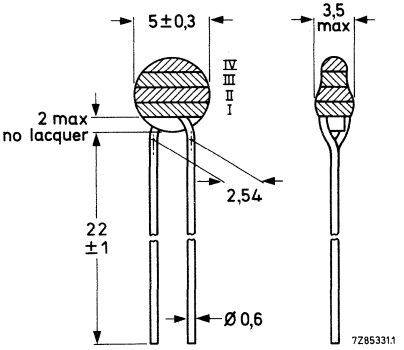
NTC THERMISTORS (cont.)

General data

Standard low R–values

For detailed information on these and other types see Data Handbook PA02

Resistance range at +25 °C (E6–series)	3.3 Ω to 1.5 kΩ
Tolerance	±5% and ±10%
$B_{25/85}$	2675 to 3975 K
Max. dissipation	0.5 W
Dissipation factor	8.5 mW/K
Thermal time constant	17 s approx.
Temperature range	−25 to +125 °C



status = P

suffix of cat. number 2322 642 6.*	R_{25} kΩ	$B_{25/85}$ K	temperature coefficient %/K
.338	3.3	2675	−3.0
.478	4.7	2750	−3.1
.688	6.8	2800	−3.2
.109	10	2875	−3.2
.159	15	2950	−3.3
.229	22	3025	−3.4
.339	33	3100	−3.5
.479	47	3150	−3.5
.689	68	3225	−3.6
.101	100	3300	−3.7
.151	150	3375	−3.8
.221	220	3475	−3.9
.331	330	3575	−4.0
.471	470	3650	−4.1
.681	680	3725	−4.2
.102	1000	3825	−4.3
.152	1500	3975	−4.5

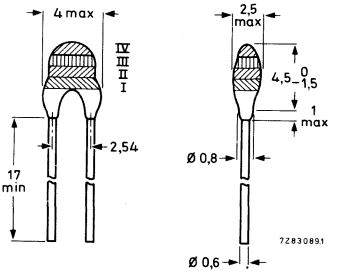
* ±5% tolerance 9th digit = 3, ±10% tolerance 9th digit = 2.

NTC THERMISTORS (cont.)

Two points accuracy range

For detailed information on these and other types see Data Handbook PA02

Resistance	4.7 kΩ to 164.2 kΩ
$B_{25/85}$	3977 to 4190 K
Max. dissipation	250 mW
Dissipation factor	
2322 640 10...	7 mW/K approx.
2322 640 90...	7.5 mW/K approx.
Thermal time constant	
640 10...	11 s approx.
640/645 9001.	8 s approx.
640 90031	11 s approx.
Temperature range	
640 10...	−40 to +125°C
640 90012	−55 to +125°C
640/645 900..	−40 t0 +125°C



status = P

cat. number	R_{25} kΩ	tolerance R_{25} °C	R_{85} Ω	tolerance R_{85} °C	$B_{25/85}$ K		
2322 640 10472	4.7	0.5	502.9	0.5	3977		
2322 640 10103	10	0.5	1070	0.5	3977		
2322 640 10473	47	0.5	4694	0.5	4100		
2322 640 10104	100	0.5	9498	0.5	4120		

cat. number	R_{30} kΩ	tolerance R_{30} °C	R_{20} kΩ	tolerance R_{20} °C	R_{10} kΩ	tolerance R_{10} °C	$B_{25/85}$ K
2322 640 90012	50	±1.5	20	±1.5	15	±1.5	3977

cat. number	R_0 kΩ	tolerance R_0 °C	R_{25} Ω	tolerance R_{25} °C	$B_{25/85}$ K		
2322 640 90031	9	±0.4	2.756	±0.9	3977		

cat. number	R_{40} kΩ	tolerance R_{40} °C	R_{25} kΩ	tolerance R_{25} °C	R_{50} kΩ	tolerance R_{50} °C	$B_{25/85}$ K
2322 645 90015	164.2	±0.75	5	±0.7	1.803	±0.9	3977

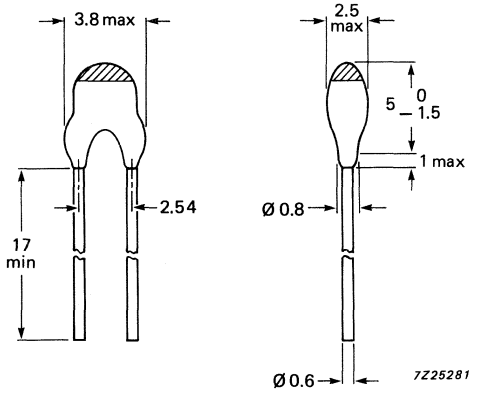
cat. number	R_{10} kΩ	tolerance R_{10} °C	R_{25} Ω	tolerance R_{25} °C	$B_{25/85}$ K		
2322 640 90014	15	±1.5	2.7	±1.5	3977		

NTC THERMISTORS (cont.)

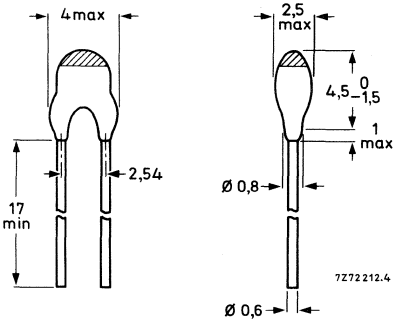
Two points accuracy range (cont.)

For detailed information on these and other types see Data Handbook PA02

Resistance	5 kΩ to 32.51 kΩ
$B_{25/85}$	3977 K
Max. dissipation	250 mW
Dissipation factor	7.5 mW/K
Thermal time constant	11 s approx.
Temperature range	−40 to +125°C



2322 640 90012 only.



2322 640 90014 only.

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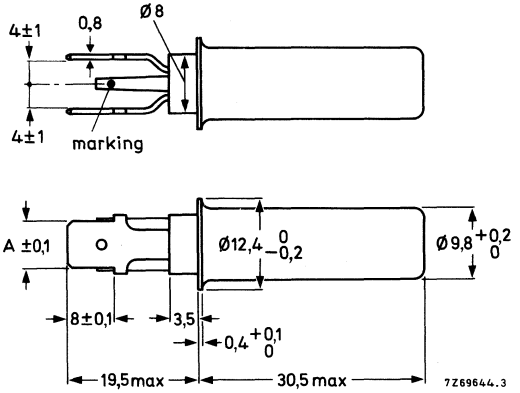
status = P

cat. number	R_0 kΩ	tolerance R_0 °C	R_{25} kΩ	tolerance R_{25} °C	R_{75} kΩ	tolerance R_{75} °C	$B_{25/85}$ K
2322 645 90001	32.51	±0.5	10	±0.5	14.81	±1.2	3977

NTC THERMISTORS (cont.)

Assembly range

For detailed information on these and other types see Data Handbook PA02



Steelcap range

	2322 640 90024 2322 640 90025	2322 640 90034
R_{25}	12 kΩ ±5.5%	12 kΩ ±7%
R_{35}	–	1.475 kΩ ±5%
R_{100}	950 Ω ±3.5%	–
Operating temperature range at 0 power continuously	−25 to +110°C	−25 to +110°C
for 24 hours max.	130°C	130°C

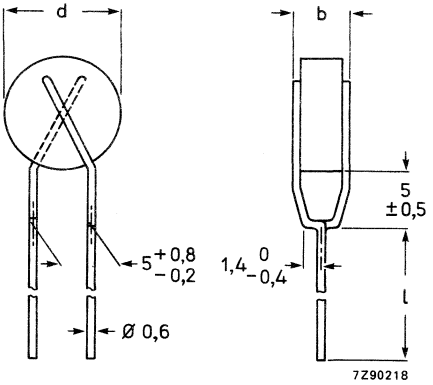
PTC THERMISTORS (overload protection)

General data

2322 66. 1...3

For detailed information on these and other types see Data Handbook PA02

Resistance at 25 °C	3.5 to 1900 Ω
Switch temperature	approx. 120 °C
Maximum d.c. voltage	265 V
Trip current at 10 °C	24 to 940 mA
Operating temperature range at V_{max}	0 to +55 °C



status = P

catalogue number	I_{nt} at 55 °C mA	I_t at 10 °C mA	R_{25} approx. Ω	I_{max} at 0 °C mA	$I_{res\ max}$ at 10 °C mA	R_s ±5% Ω	dissip. factor approx. mW/K	heat cap. approx. J/K	d mm	b max mm	l ±3 mm
2322 660 11293	12	24	1900	110	5	1100	6	0,12	4,5	5	20
2322 660 11593	15	30	1200	135	5	1100	6	0,12	4,5	5	20
2322 660 11893	18	36	850	165	5	1000	6	0,12	4,5	5	20
2322 660 12293	22	44	560	200	6	910	6	0,12	4,5	5	20
2322 660 12793	27	54	380	250	6	820	6	0,12	4,5	5	20
2322 661 13393	33	66	280	290	7	750	7	0,22	6,5	5	20
2322 661 13993	39	78	200	350	7	620	7	0,22	6,5	5	20
2322 661 14793	47	94	140	420	7	560	7	0,22	6,5	5	20
2322 661 15693	56	112	100	500	8	470	7	0,22	6,5	5	20
2322 661 16893	68	136	72	600	8	390	8	0,33	8,0	5	20
2322 661 18293	82	164	50	730	9	330	8	0,33	8,0	5	20
2322 661 11013	100	200	33	900	9	270	8	0,33	8,0	5	20
2322 662 11213	120	240	26	1100	12	220	8.5	0,48	10,0	5	20
2322 662 11513	150	300	20	1300	12	200	9.5	0,68	12,0	5	20
2322 662 11813	180	360	14	1700	14	150	9.5	0,68	12,0	5	20
2322 663 12213	220	440	10	2100	16	120	10	0,85	13,0	5	20
2322 663 12713	270	540	8	2500	19	100	12	1,30	16,0	5	20
2322 664 13313	330	660	7	3000	25	82	16	2,40	20,0	6	16
2322 664 13913	390	780	5	3600	25	68	16	2,40	20,0	6	16
2322 664 14713	470	940	3.5	4300	25	56	16	2,40	20,0	6	16

N.B. 2322 660/661/662 available on tape.
All series available without leads.

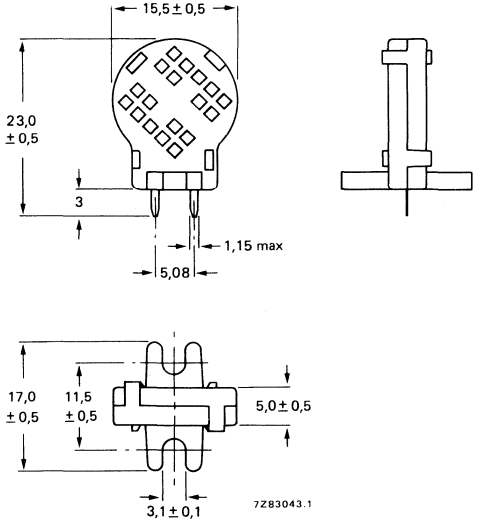
HUMIDITY SENSOR

General data

2322 691 90001

For detailed information on these and other types see Data Handbook PA02
Standard packaging: 100 pieces

Humidity range	10 to 90% R.H.
Capacitance at +25 °C, 43% R.H. and 100 kHz	122 pF ±15%
Sensitivity between 33 and 43% R.H.	0,4 ±0,05 pF/% R.H.
Frequency range	1 kHz to 1 MHz
Maximum a.c. or d.c. voltage	15 V
Storage humidity range	0 to 100% R.H.
Ambient temperature range	0 to +85 °C



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catalogue number

2322 691 90001★

Miscellaneous

M

- Regeltransformatoren
- Quartz crystal devices
- Luidsprekers
- Ferroxcube materialen

On most pages, directly underneath the title, reference is made to a 'Data Handbook'.
That Handbook is part of the Philips Data Handbook System which is a comprehensive source of information on electronic components, subassemblies and materials.
For this catalogue section the following Handbooks are of interest:

code	title
Display components and electronic parts and assemblies (yellow series)	
DC01	Colour display components (1991) (was T8)
DC02	Monochrome tubes and deflection units (1991) (was T16)
DC03	Television tuners, coaxial aerial input assemblies (1990) (was C2)
DC04	Loudspeakers (1990) (was C3)
DC05	Flyback-mains Transformers General-Purpose FXC assy (1989) (was C20)
Materials (greenish-blue series)	
C16	Permanent magnet materials (1986) (wordt MA02)
C19	Piezoelectric ceramics (1986) (wordt MA03)
MA01	Soft ferrites (1991) (was C4 - C5)

MATERIALS AND OTHER PRODUCTS

Contents

Data Handbook System M2

Contents M3

Dry reed switches M4

Quartz crystal devices M6

Loudspeakers .....
- Dome/cone tweeter M8
- Ribbon tweeter, dome/cone squawker M9
- Round woofers M10
- Speech reproduction M11
- Full range round M12

Soft ferrites .....
- Selection guide M16

Permanent magnet materials .....
- Shapes and applications M33
- General M34

Piezoelectric ceramics M36

M

DRY REED SWITCHES

General data

Dry reed switches

For detailed information on these and other types see Data Handbook PC09

A dry reed switch is an assembly containing ferromagnetic contact blades, hermetically sealed in a glass envelope filled with an inert gas and operated by a magnetic field, externally generated by a coil or magnet. The following data is for Form–A dry reed switches only.

Features
- low resistance when closed and almost infinite resistance when open (complete galvanic seperation)
- reliable switch
- environmentally non–sensitive
- magnetic sensitive
- low operating power required

Application areas
- reed relays
- keyboards
- keyswitches
- automotive systems
- level detection
- proximity switches
- security systems
- pace–makers
- games

Product survey	(all types are single–pole, single–throw with normally–open contacts. They all meet the requirements of IEC 255–9).
RI–23 series:	a general–purpose micro reed switch series for low and intermediate loads, designed to fit into a relay bobbin with a 0.1" internal diameter.
RI–25 series:	this micro reed switch series provides a high power capability (up to 25 W on the operate–AT range) in a compact package. Ideal for use in high load relays, this series also has an excellent switching performance at low voltages and currents.
RI–27 series:	very small 'pico' reed switches, ideal for use in DIP, SIP and SMDrelays. The hybrid contact layer, which ensures high reliability and long life, makes the RI–27 series suitable for other switching applications.
RI–29 series:	similar in size to the RI–27 series, the RI–29 series is specifically designed to switch higher currents, while still providing excellent switching performance at low voltages and currents.
RI–45:	reed switch for switching inductive loads driven by mains voltages up to 250 V. Breakdown voltage >750 V.
RI–46 series:	high–power reed switches capable of switching up to 40 W loads with breakdown voltages >1 kV DC, depending on the operate–AT value. Ideal for telephone applications and for driving solid state switches, as well as many high current applications that require a low contact resistance.

DRY REED SWITCHES

General data
Dry reed switches

For detailed information on these and other types see Data Handbook PC09

type series	RI–23	RI–25			RI–27	RI–29		RI–45	RI–46	
operate values (AT)[1]	8–70	8–16	14–32	28–70	10–34	16–25	20–34	27–59	15–28	24–70
release values (AT)[1]	4–32	4–14	7.5–22	12–32	4–19.5	5–18	7–19.5	8–21	5–16	8–22.5
contact resistance (MΩ) max	100	100	100	100	115	115	115	90	90	90
typ	70	70	70	70	90	90	90	60	60	60
insulation resist. (Ω) min	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}
switched power (W) max	10	10	15	25	10	15	20	40	30	40
switched voltage (V) DC max	200	200	200	200	200	200	200		200	200
(V) AC max	140	140	140	140	140	140	140	250	250	250
switched current (mA) max	500	750	1000	1000	500	1000	1000	1000	1000	1000
bounce time (μs) typ	150	50	150	150	50	50	50	150	150	150
wire diameter (mm) Ø2 max	0.60	0.60	0.60	0.60	0.50	0.50	0.50	0.65	0.65	0.65
glass diameter (mm) Ø1 max	2.54	2.54	2.54	2.54	1.8	1.8	1.8	2.8	2.8	2.8
glass length (mm)L max	15.0	15.0	15.0	15.0	13.5	13.5	13.5	21.5	21.5	21.5
total length (mm)T ±0.5	46	46	46	46	46	46	46	54.8	54.8	54.8

1) Measured using a coil consisting of 5000 turns of 42 SWG solid enamelled copper wire wounding on a 8.75 mm former having a winding length of 25.4 mm.

Quartz crystal devices

For detailed information on these and other types see Data Handbook PA01

Philips have strong technological and industrial capabilities in the field of quartz crystal devices.
Three types of devices are generally available:
1) Standard crystals for frequency stabilization in the frequency range 3 MHz to 20 MHz.
2) Special crystals for industrial applications from 1 MHz up to 125 MHz.
3) Crystal oscillators.

Some types in the categories 2 and 3 are listed below.

mode of vibration	frequency range MHz	type	holder envelope	connections	basic catalogue number
fundamental	1 to 1.8	HC–6/U	solder sealed	pins	**4322 152**
	1.8 to 25	HC–27/U	all–glass	pins	**4322 154**
		HC–27 ext	all–glass	pins	**4322 154**
		HC–33/U	solder sealed	pins	**4322 149**
		RW–36	resistance welded	pins	**4322 149**
	3 to 10	RW–10	resistance welded	flying leads	**4322 148**
					4322 148
	3 to 20	RW–43	resistance welded	flying leads	**4322 143**
	4.5 to 25	HC–26/U	all–glass	flying leads	**4322 155**
		HC–29/U	all–glass	pins	**4322 155**
		RW–43	resistance welded	flying leads	**4322 156**
		RW–42	resistance welded	pins	**4322 156**
	8–20	RW–80	resistance welded	flying leads	**9922 5210**
third overtone	10 to 75	HC–27/U	all–glass	pins	**4322 159**
		RW–36	resistance welded	pins	**4322 162**
		HC–33/U	solder sealed	pins	**4322 162**
	17 to 75	RW–43	resistance welded	flying leads	**4322 161**
		RW–42	resistance welded	pins	**4322 161**
		RW–80	resistance welded	flying leads	**9922 5213**
	20 to 75	HC–26/U	all–glass	flying leads	**4322 160**
		HC–29/U	all–glass	pins	**4322 160**
fifth overtone	50 to 125	HC–27/U	all–glass	pins	**4322 165**
		HC–26/U	all–glass	flying leads	**4322 166**
		HC–29/U	all–glass	pins	**4322 166**
		RW–43	resistance welded	flying leads	**4322 167**
		RW–42	resistance welded	pins	**4322 167**
		RW–36	resistance welded	pins	**4322 168**
		HC–33/U	solder sealed	pins	**4322 168**
		RW–80	resistance welded	flying leads	**9922 5218**

Special types

fundamental	1 MHz	HC–6/U	solder sealed	pins	**4322 152 01241**
	21,48 MHz	RW–80	resistance welded	flying leads	**4322 145 00011**
third overtone	10 MHz high precision	HC–27/U	all–glass	pins	**4322 159 00001**

For detailed information on these and other types see Data Handbook PA01

Quartz crystal controlled oscillators

frequency range MHz	temperature range °C	supply voltage ..V ±..	frequency tolerance ±..x 10^{-6}	adjustment facility	basic catalogue number
4.5 to 15	0 to +50	12 10%	1.0		**4322 190 2....**
	−10 to +60	12 10%	1.5	none	**4322 190 1....**
(TCXO)	−20 to +70	12 10%	2.0		**4322 190 0....**
4.5 to 15	0 to +50	12 10%	1.0	external	**4322 191 2....**
	−10 to +60	12 10%	1.5	variable	**4322 191 1....**
(TCXO)	−20 to +70	12 10%	2.0	capacitor	**4322 191 0....**
4.5 to 12	0 to +50	12 10%	1.0	external	**4322 192 2....**
	−10 to +60	12 10%	1.5	variable	**4322 192 1....**
(TCXO)	−20 to +70	12 10%	2.0	resistor	**4322 192 0....**
20 to 50	0 to +50	12 2%	1.0	external	**4322 195 0....**
	−20 to +70	12 2%	2.0	variable	**4322 195 1....**
(TCXO)	0 to +50	12 10%	2.0	capacitor	**4322 195 2....**
	−20 to +70	12 10%	3.0		**4322 195 3....**
4.5 to 15	−40 to +85	5 5%	0.5	external variable resistor	**4322 198 .....**
(DTCXO)					
1.0 to 20 (CIO)	0 to +70	5 10%	100	none	**4322 199 .....**
8 to 15 (VCXO)	−5 to +60	5 5%	20	control voltage	**9922 515 6....**

Quartz crystals for temperature measurement

frequency range	**4 to 20 MHz**	**1 to 25 MHz**	basic catalogue number
temperature range	−100 to +150 °C	−100 to +300 °C	4322 146 .....
temperature coefficient	−40 to +80 x 10^{-6}/K	−50 to +85 x 10^{-6}/K	
linearity	< ± 2.5%	< ±1.5%	
adjusting tolerance	< ± 150 x 10^{-6}	< ± 50 x 10^{-6}	
thermal time constant	typ. 10 s	3 to 30 s	
holder envelope	RW 43	RW43, RW80, HC-26/U HC-27/U, TO-39	

For detailed information on these and other types see Data Handbook DC04

The loudspeakers are divided into groups as shown in the survey below. All loudspeakers are equipped with ceramic magnets unless otherwise indicated in the column 'core diameter'.

Dome tweeter loudspeakers

magnet/ core diam.	Extended type number	imp. Ω	res. freq. Hz	power handling capacity	dimensions			cat. number
					flange width mm	flange length mm	mounting depth mm	
72/25	**AD 0163/T8**	8	1300	4		94	24	**2422 257 33422★**
	AD 11600/T8	8	1300	4	96	96	30	**2422 257 43522★**

★ Voorraad type.

Ribbon tweeter, dome/cone squawker

For detailed information of these and other types see Data Handbook DC04

Ribbon tweeter loudspeakers

magnet/ core diam.	Extended type number	imp. Ω	res. freq. Hz	power handling capacity	dimensions			cat. number
					flange width mm	flange length mm	mounting depth mm	
–/–	**AD 21600/RT8**	8		10	118	134	30	**2422 257 52022★**

★ Voorraad type.

For detailed information on these and other types see Data Handbook DC04

Round woofer loudspeakers

frame size inches	magnet/ core diameter	Extended type number	imp. Ω	res. freq. Hz	power handling capacity	dimensions: flange width mm	dimensions: flange length mm	dimensions: mounting depth mm	cat. number
8	–/34	**AD9710/M8**	8	50	20	217	–	94	**2422 257 48121★**
8	90/25	**AD 80652/W4**	4	39	50		204	83	**2422 257 48531★**
		AD 80652/W8	8	39	50		204	83	**2422 257 48532★**

★ Voorraad type.

For detailed information on these and other types see Data Handbook DC04

Loudspeakers for speech reproduction

frame size inches	magnet/ core diameter	Extended type number	imp. Ω	res. freq. Hz	power handling capacity	dimensions: flange width mm	dimensions: flange length mm	dimensions: mounting depth mm	cat. number
2 1/2	28/10*	**AD 2071/Z4** **AD 2071/Z8**	4 8		1 1		64 64		**2403 257 23121★** **2403 257 23122★**

* = square magnet
★ Voorraad type.

LOUDSPEAKERS (cont.)

General data

Full range round

For detailed information on these and other types see Data Handbook DC04

Full range round loudspeakers

frame size inches	core diam.	Extended type number	imp. Ω	res. freq. Hz	power handling capacity	dimensions			cat. number
						flange width mm	flange length mm	mounting depth mm	
3	28/10*	**AD 3371/Y8**	8	250	2	81	81	23	**2403 257 23522★**
4	28/10*	**AD 4472/X8**	8	170	3	105	105	30.2	**2403 257 24826★**

* = square magnet
★ Voorraad type.

For detailed information on these and other types see Data Handbook DC04

Full range round loudspeakers

frame size inches	core diam.	Extended type number	imp. Ω	res. freq. Hz	power handling capacity	dimensions			cat. number
						flange width mm	flange length mm	mounting depth mm	
5	53/18	**AD 50800/M4**	4	140	6		120	46	**2422 257 25125★**
		AD 50800/M8	8	140	6		120	46	**2422 257 25126**

★ Voorraad type.

Full range round (cont.)

For detailed information on these and other types see Data Handbook DC04

Full range round loudspeakers

frame size inches	core diam.	Extended type number	imp. Ω	res. freq. Hz	power handling capacity	dimensions			cat. number
						flange width mm	flange length mm	mounting depth mm	
5.25	60/18	**AD 51410/M4K**	4	90	15		130	51	**2404 257 45331**
4	60/18	**AD4400/M4K**	4	110	15	102	102	47.6	**2422 257 44121**

LOUDSPEAKERS (cont.)

General data
Full range round (cont.)

For detailed information on these and other types see Data Handbook DC04

Full range round loudspeakers

frame size inches	core diam.	Extended type number	imp. Ω	res. freq. Hz	power handling capacity	dimensions: flange width mm	dimensions: flange length mm	dimensions: mounting depth mm	cat. number
8	53/18	**AD 80800/M4**	4	85	15		204.6	68.6	**2422 257 38725★**
		AD 80800/M8	8	85	15		204.6	68.6	**2422 257 38726★**
12	121/35	**AD 12202/M8**	8	45	100		312	137	**2422 257 51222★**

★ Voorraad type.

For detailed information see Data Handbook C4/C5

Section	Catalogue page number
Material grades	M17
RM–cores	M18
RM/i–cores	M20
P–cores	M24
E – cores	M27
EF – cores	M27
ETD – cores	M29
EC – cores	M31
Ring cores	M32

For detailed information on these and other types see Data Handbook MA01

Our soft ferrites (Ferroxcube) are available in a range of core shapes suitable for many different applications. The following table is a survey of their main properties.

Main characteristics of the different Ferroxcube grades.

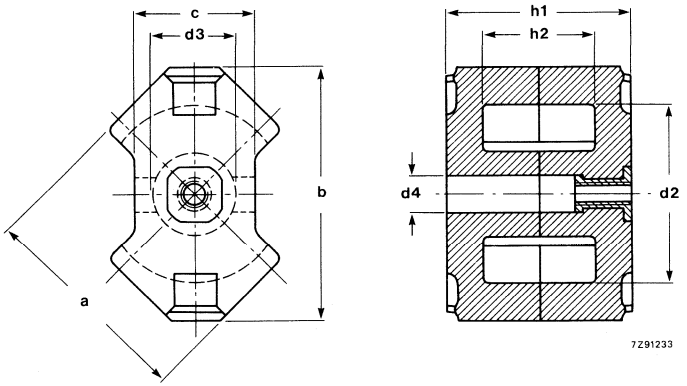
grade	μi ±20 %	flux density B at 3000 A/m 25 °C mT	curie temp. °C	resist-ivity Ωm	ferrite type	main application area	available core shapes
4D1	50	≠ 240	⩾400	10^3	NiZn	HF–tuning	beads,rods,tubes
4C6	100	380	350	10^3	NiZn	telecom filters	P,RM
4C65	125	380	350	10^3	NiZn	HF–tuning suppression	ring cores
4B1	250	350	250	10^5	NiZn	HF–tuning suppression	beads
6B1	250	350	250	10^3	LiZn	HF–tuning suppresion	rods,tubes
2A2	350	250	135	10^6	MgZn	deflection coils	yoke rings
4A11	600	350	125	10^5	NiZn	suppression	ring cores
4S2	600	350	125	10^5	NiZn	supression	beads
3D3	750	400	200	2	MnZn	telecom filters	P,RM
3B1	900	400	150	0.2	MnZn	suppression	rods,tubes,beads
3C2	900	400	150	0.1	MnZn	deflection coils	yoke rings
3H1	2300	400	130	1	MnZn	telecom filters	P,RM
3H3	2000	450	160	2	MnZn	telecom filters	P,RM
3C8	2000	500	200	1	MnZn	LF–power	E,EF,ETD,EC,U,I
3C85	2000	500	200	1	MnZn	MF–power	E,EF,ETD,EC,rods,rings,P,RM
3F3	2000	500	200	2	MnZn	HF–power	E,EF,ETD,P,RM rings
3B8	2300	500	200	1	MnZn	MF–power	P,RM
3S1	4000	400	125	0.3	MnZn	suppression	beads
3C11	4300	400	125	0.3	MnZn	supression	rings,EF
3E4	4700	400	125	0.3	MnZn	pulse transformers	RM
3E25	6000	400	125	0.1	MnZn	suppression	rings
3E5	10000	350	120	0.01	MnZn	pulse transformers	RM

RM–cores

For detailed information on these and other types see Data Handbook MA01

RM–cores (**Rectangular Module**) have been developed for use in analog, high density telecommunications. They are standardised to IEC–205.
available types:

- core sets without air gap and nut
- gapped sets of cores within a range of AL–values, with or without moulded in nuts
- inductance adjusters
- coilformers and clips



type	dimensions (mm)								Ve mm³	Ae mm³	le mm
	a	b	c	d2	d3	d4	h1	h2			
RM4	9.8	11	4.6	8	3.9	2.04	10.4	7	230	11.0	21.3
RM5	12.3	14.6	6.8	10.2	4.9	2.04	10.4	6.3	450	21.2	21.4
RM6R	14.7	17.9	6.3	12.6	6.3	3	12.4	8	810	32.0	25.6
RM6S	14.7	17.9	8.2	12.4	6.2	3	12.4	8	840	31.0	27.3
RM8	19.7	23.2	11	17	8.4	4.4	16.4	10.8	1850	52.0	35.5
RM10	24.7	28.5	13.5	21.2	10.9	5.4	18.7	12.4	3470	83.2	41.7

Ungapped core sets (without nut)

	4C6	3D3	3H3	3H1
RM4	**4322 022 5779**	**4322 022 5739**	**4322 022 5750**	**4322 022 5720**
RM5	**4322 022 5984**	**4322 022 5940**	**4322 022 5970**	**4322 022 5920**
RM65	**4322 022 4778**	**4322 022 4740**	**4322 022 4750**	**4322 022 4721**
RM6R	**4322 022 5566**	**4322 022 5540**	**4322 022 5562**	**4322 022 5520**
RM8	**4322 022 5181**	**4322 022 5140**	**4322 022 5170**	**4322 022 5120**
RM10				**4322 022 5020**

For gapped core sets and recommended adjusters see handbook MA01

Accessories for RM–cores

For detailed information on these and other types see Data Handbook MA01

RM–coilformers are well adapted to automatic winding and are made of a phenolic thermosetting resin (UI 94–Vo).
The clips deliver adequate clamping force for high stability. Round back clips may also be used, however, their clamping force is lower.

Coil formers – 1 section

RM core type	cat. number 4 pins	cat. number 6 pins	cat. number 12 pins
RM4	–	**4322 021 32210**	–
RM5	**4322 021 3445**	**4322 021 3447**	–
RM6R	**4322 021 3451**	**4322 021 3454**	–
RM6S	**4322 021 345**	**4322 021 3458**	–
RM8	–	–	**4322 021 3468**
RM10	–	–	**4322 021 3476**
RM14	–	–	**4322 021 33530**

Coil formers – 2 sections

RM core type	cat. number 6 pins	cat. number 8 pins	cat. number 12 pins
RM6R	**4322 021 3456**	–	–
RM6S	**4322 021 3460**	–	–
RM8	–	**4322 021 3470**	–
RM10	–	–	**4322 021 3481**

Clips

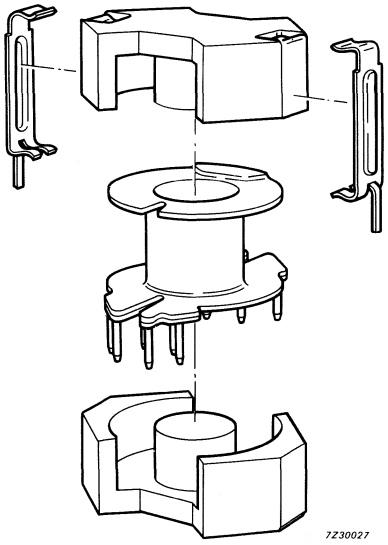
RM core type	catalogue number	RM/i core type	catalogue number
RM4	**4322 021 31900**	RM4/i	**4322 021 34920**
RM5	**4322 021 31900**	RM5/i	**4322 021 34920**
RM6S/R	**4322 021 31780**	RM6S/R/i	**4322 021 34300**
RM8	**4322 021 31840**	RM8/i	**4322 021 34310**
RM10	**4322 021 34320**	RM10/i	**4322 021 34320**
		RM12/i	**4322 021 34910**
		RM14/i	**4322 021 34920**

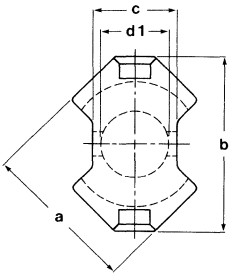
RM/i–cores

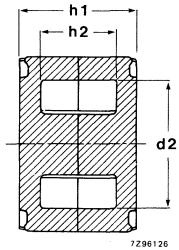
For detailed information on these and other types see Data Handbook MA01

RM/i–cores have no central hole and are very suitable for use in small power transformers, general purpose transformers and chokes. The dimensions are according to IEC–205.

Types available are:
- ungapped core sets
- gapped core sets within a standard range of AL–values
- coilformers and clips







core type	dimensions (mm)							magnetic dimensions		
	a	b	c	d1	d2	h1	h2	V_e (mm^3)	A_e (mm^2)	l_e (mm)
RM4/i	9.9	11.1	4.6	3.9	8	10.4	7	322	14.4	23.3
RM5/i	12.4	14.7	6.8	4.9	10.2	10.4	6.3	574	24.8	23.2
RM6–S/i	14.8	18	8.2	6.3	12.4	12.4	8	1090	37	29.2
RM8/i	20.0	23.4	11.1	8.4	16.9	16.4	10.8	2440	63	38.4
RM10/i	24.8	28.6	13.6	11	21.1	18.6	12.3	4310	96.6	44.6
RM12/i	29.9	37.6	16.5	12.9	24.8	24.5	16.6	8340	146	56.6
RM14/i	35	42.5	19	15.1	28.9	30.1	20.6	13900	198	70

For detailed information on these and other types see Data Handbook MA01

Ungapped core sets without nut (4322 ...)

core type	3B8	3C85	3F3	3E1	3E4	3E5
RM4/i	–	–	**022 5710**	**022 5770**	**022 5791**	**022 5775**
RM5/i	**022 5946**	**025 0400**	**025 0410**	**022 5990**	**022 5991**	**022 5992**
RM6–S/i	**022 4785**	**025 0500**	**025 0511**	**022 4780**	**022 4793**	**022 4787**
RM7/i	**025 0060**	**025 0040**	**025 0080**	**025 0099**	**025 0090**	**025 0095**
RM8/i	**022 5146**	**025 0120**	**025 0160**	**022 5186**	**022 5187**	**022 5188**
RM10/i	**022 5040**	**022 5060**	**025 0260**	**022 5090**	**022 5093**	**022 5094**
RM12/i	**025 0640**	**025 0600**	**025 0620**	**025 0670**	**025 0660**	–
RM14/i	**025 0380**	**025 0300**	**025 0360**	–	–	–

Accessories for RM/i-cores

For detailed information on these and other types see Data Handbook MA01

Two types of coilformers are available:
- phenolic coilformers, also used for the RM-range (UI 94-Vo)
- dual-in-line coilformers for power transformers, material: polyterephtalate (UI 94-Vo)

Two types of clips may be used:
- straight-backed types for high clamping forces
- rounded-backed types for easier assembly and lower clamping forces

Coil formers – 1 section

RM core type	cat. number 4 pins	cat. number 6 pins	cat. number 12 pins
RM4	–	**4322 021 32210**	–
RM5	**4322 021 3445**	**4322 021 3447**	–
RM6R	**4322 021 3451**	**4322 021 3454**	–
RM6S	**4322 021 345**	**4322 021 3458**	–
RM8	–	–	**4322 021 3468**
RM10	–	–	**4322 021 3476**
RM14	–	–	**4322 021 33530**

Coil formers – 2 sections

RM core type	cat. number 6 pins	cat. number 8 pins	cat. number 12 pins
RM6R	**4322 021 3456**	–	–
RM6S	**4322 021 3460**	–	–
RM8	–	**4322 021 3470**	–
RM10	–	–	**4322 021 3481**

Accessories for RM/i–cores (cont.)

For detailed information on these and other types see Data Handbook MA01

Coil formers for power applications (DIL)

RM core type	number of pins	catalogue number
RM6–S/i	8	**4322 021 34040**
RM8/i	12	**4322 021 34050**
RM10/i	12	**4322 021 34060**
RM12/i	12	**4322 021 34110**
RM14/i	12	**4322 021 34070**

Clips

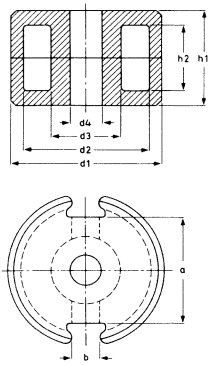
RM core type	catalogue number	RM/i core type	catalogue number
RM4	**4322 021 31900**	RM4/i	**4322 021 34290**
RM5	**4322 021 31900**	RM5/i	**4322 021 34290**
RM6S/R	**4322 021 31780**	RM6S/R/i	**4322 021 34300**
RM8	**4322 021 31840**	RM8/i	**4322 021 34310**
RM10	**4322 021 34320**	RM10/i	**4322 021 34320**
		RM12/i	**4322 021 34910**
		RM14/i	**4322 021 34920**

For detailed information on these and other types see Data Handbook MA01

P–cores are not comparable with RM–cores when dense component packing and efficient winding are required. However, they are ideal when maximum magnetic shielding is required.

Types available are:
- core sets without airgap and nut
- gapped core sets within a standard (IEC) range of A_L–values, with or without moulded–in nut
- inductance adjusters
- core assembly hardware

The dimensions of potcores P11/7 to P42/42 are in accordance with the specifications:
IEC 133 (International)
C93–324 (France)
DIN 41294 (Germany)
BS 4061 (U.K.)

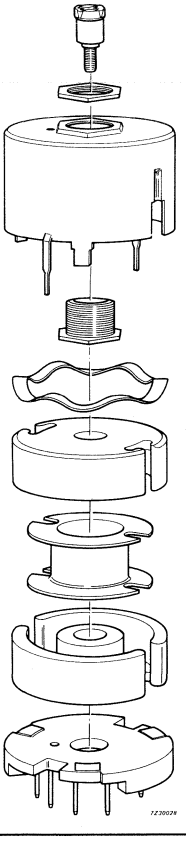


size	dimensions (mm)								core factor and effective dimensions			
	d1	d2	d3	d4	h1	h2	a	b	C_1 mm^{-1}	V_e mm^3	l_e mm	A_e mm^2
P5.8/3.3	5.8	4.5	2.5	0.95	3.3	3.2	–	1.4	1.68	37.0	7.9	4.7
P7.4/4.2	7.4	5.8	3	1.4	4.2	2.8	5.7	1.6	1.43	70.0	10.0	7.0
P9/5	9.3	7.5	3.9	2.04	5.4	3.6	6.5	2	1.24	126	12.5	10.1
P11/7	11.1	9	4.7	2.04	6.5	4.4	6.8	2.2	0.956	251	15.5	16.2
P14/8	14	11.6	6	3	8.4	5.6	9.5	3.3	0.789	495	19.8	25.1
P18/11	17.9	14.9	7.6	3	10.6	7.2	13.4	3.8	0.597	1120	25.8	43.3
P22/13	21.5	17.9	9.4	4.4	13.4	9.2	15	3.8	0.497	2000	31.5	63.4
P26/16	25.5	21.2	11.5	5.4	16	11	18	3.8	0.400	3530	37.6	93.9
P30/19	30	25	13.5	5.4	18.9	13	20.5	4.3	0.330	6190	45.2	137
P36/22	35.5	29.9	16	5.4	21.9	14.6	26.2	4.9	0.264	10700	53.2	202
P42/29	42.4	35.6	17.7	5.4	29.4	20.3	32	5.1	0.259	18200	68.6	265

Ungapped core sets without nut (4322 022 .....)

core type	4C6	3D3	3H3	3H1	3B8	3C85	3F3	3E1	3E4
P9/5	**4179**	**4140**	–	**4120**	–	–	–	–	–
P11/7	**0179**	**0139**	**0150**	**0120**	**0188**	**0196**	**0169**	**0166**	**0164**
P14/8	**0380**	**0340**	**0360**	**0321**	**0397**	**0366**	**0392**	**3790**	**0377**
P18/11	**0580**	**0540**	**0550**	**0521**	**0577**	**0578**	**0566**	**0547**	**0579**
P22/13	**0779**	**0740**	**0759**	**0720**	**0797**	**0777**	**0764**	**0772**	**0773**
P26/16	**0980**	**0949**	**0951**	**0972**	**0985**	**0973**	**0950**	**0967**	**0965**
P30/19	–	–	–	**0112**	**1182**	**1160**	**1148**	**1191**	**1190**
P36/22	–	–	–	**0132**	**1378**	**1360**	**1350**	**1396**	**1397**
P42/29	–	–	–	**0152**	–	**1590**	**1580**	–	–

For detailed information on these and other types see Data Handbook MA01



Coil formers

potcore type	cat. number 1 section
P11/7	**4322 021 30240**
P14/8	**4322 021 30250**
P18/11	**4322 021 30270**
P22/13	**4322 021 30300**
P26/16	**4322 021 30330**
P30/19	**4322 021 30360**
P36/22	**4322 021 30390**
P42/29	**4322 021 30420**

Accessories for P–cores (cont.)

For detailed information on these and other types see Data Handbook MA01

Mounting parts catalogue number 4322 021 .....

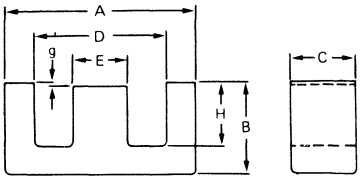
	P11/7	P14/8	P18/11	P22/13	P26/16	P30/19	P36/22	P42/29
Brass container	**30510**	**30520**	**30530**	**30540**	**30550**	**30560**	**30570**	**30580**
Tag plate	**30180**	**30440**	**30450**	**30460**	**30470**	**30480**	**30490**	**30500**
Spring	**30620**	**30630**	**30640**	**30650**	**30660**	**30670**	**30680**	**30690**

SOFT FERRITES

General data
E– EF–cores

For detailed information on these and other types see Data Handbook MA01

E–cores are standardized to DIN 41295. They are used in a multitude of applications as power transformers or chokes. EF–cores have been dimensionally optimized for the use of ferrite, where E–cores have the same dimensions as metal lamination cores. We offer an extensive range in 3C8, 3C85, 3F3 and 3C11. For gapped cores see handbook MA01.



type	dimensions (mm)						magnetic parameters for a set of cores		
	A max	B max	C max	D min	E min	H min	Ve mm^3	Ae mm^2	le mm
E20/10/5	20.7	10.2	5.3	12.8	4.8	6.3	1340	31.2	42.8
E25/13/7	25.8	12.8	7.5	17.5	7.2	8.7	3160	55	57.5
E30/15/7	30.8	15.2	7.3	19.5	6.7	9.7	4000	59.7	66.9
E42/21/15	43.0	21.2	15.2	29.5	11.7	14.8	17600	182	97
E42/21/20	43.0	21.2	20.0	29.5	11.7	14.8	23100	236	98
E55/28/21	56.2	27.8	21.0	37.5	16.7	18.5	43700	354	123
E65/33/27	66.5	32.8	27.4	44.2	19.3	22.2	78200	532	147
EF12.6	13.1	6.5	3.7	8.9	3.4	4.5	384	13	29.6
EF16	17.3	8.2	4.7	11.3	4.4	5.7	754	20.1	29.6
EF20	20.4	10.2	5.9	14.1	5.5	7.0	1500	33.5	44.9
EF25	25.8	12.8	7.5	17.5	7.0	8.7	3020	52.5	57.5
EF32	32.9	16.4	9.5	22.7	8.9	11.2	6180	83	74

type	material grade			
	3C8	3C85	3F3	3C11
E20/10/5	**4312 020 24070**	**4312 020 4539**	**4312 020 4552**	**4312 020 35970**
E30/15/7	**4312 020 34550**	**4312 020 4543**	**4312 020 4553**	**4312 020 35080**
E42/21/15	**4312 020 34110**	**4312 020 3564**	**4312 020 4550**	**4312 020 35980**
E42/21/20	**4312 020 34120**	**4312 020 3565**	**4312 020 4551**	
E55/28/21	**4312 020 34100**	**4312 020 3591**	**4312 020 4590**	
E65/33/27	**4312 020 34380**	**4312 020 4612**	**4312 020 4594**	
EF12.6	**4312 020 34470**	**4312 020 4510**	**4312 020 4556**	
EF16	**4312 020 35550**	**4312 020 4519**	**4312 020 4560**	
EF20	**4312 020 35040**	**4312 020 4525**	**4312 020 4554**	**4312 020 35560**
EF25	**4312 020 34020**	**4312 020 4529**	**4312 020 4555**	**4312 020 35620**
EF32	**4312 020 35400**	**4312 020 4533**	**4312 020 4572**	**4312 020 34930**

Accessories for E–cores

For detailed information on these and other types see Data Handbook MA01

Coil formers and mounting parts for E–cores

E–core type	catalogue number coil formers			catalogue number mounting parts	
		with pins			
	without pins	horizontal mounting	vertical mounting	clasp	spring
E20/10/5	**4312 021 28430**	**4322 021 20240**	**4322 021 20290**	**4322 021 20160**	**4322 021 20220**
E25/13/7	–	**4312 021 28750**	**4312 021 28540**	**4312 021 26120**	**4312 021 26190**
E30/15/7	**4312 021 28550**	**4322 021 20250**	–	**4322 021 20170**	**4322 021 20230**
E42/–21/15	**4312 021 28620**	**4322 021 31830**	–	**4322 021 31910**	**4322 021 31920**
E55/–28/21	**4312 021 28710**	–	–	**4312 021 26090***	**4312 021 26130***
E65/–32/27	**4312 021 28720**	–	–	**4312 021 26110***	**4312 021 26140***

fixing bush	**4322 021 30720**
nut	**4322 021 30710**

* Clasp and spring will be delivered as a set.

SOFT FERRITES

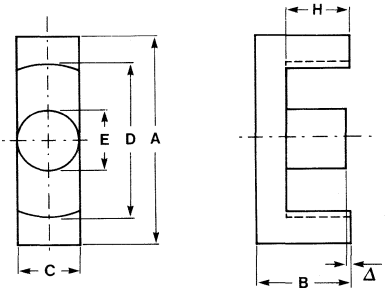
General data
ETD–cores

For detailed information on these and other types see Data Handbook MA01

The ETD–series of high frequency power cores in Ferroxcube 3C8, 3C85 and 3F3 ferrite has been optimized to meet the current requirements of switched–mode power supplies.

Features

- Round centre pole for minimum conductor length.
- Maximum throughput power in the frequency range 20 to 500 kHz.
- Minimum core weight due to constant cross–sectional area proper choice of transition frequency.
- Winding breadth sufficient for full IEC mains isolation in specified configurations.
- Sufficient winding height for minimum loss windings.



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type	dimensions (mm)						magnetic dimensions		
	A max	B max	C max	D min	E min	H min	Ve	Ae	le
ETD29/16/10	30.6	16	9.8	22	9.8	11.3	5470	76	72
ETD34/17/11	35	17.5	11.1	25.6	11.1	11.8	7640	97.1	78.6
ETD39/20/13	40	20	12.8	29.3	12.8	14.2	11500	125	92.2
ETD44/22/15	45	22.5	15.2	32.5	15.2	16.1	17800	173	103
ETD49/25/16	49.8	24.9	16.7	36.1	16.7	17.7	24000	211	114

Range of ungapped core halves

type	material grade		
	3C80	3C85	3F3
ETD29/16/10		**4312 020 37500**	**4312 020 3800**
ETD34/17/11	**4312 020 37000**	**4312 020 37200**	**4312 020 3801**
ETD39/20/13	**4312 020 37050**	**4312 020 37250**	**4312 020 3802**
ETD44/22/15	**4312 020 37100**	**4312 020 37300**	**4312 020 3803**
ETD49/25/16	**4312 020 37150**	**4312 020 37350**	**4312 020 3804**

Ungapped core sets are also available (see handbook MA01).

Accessories for ETD–cores

For detailed information on these and other types see Data Handbook MA01

Coil formers and clips

The PBTP coil former is suitable for single spindle or automatic machine winding. It is terminated after winding, to integral pins. The two cores are assembled to the coil former in one operation, as shown in figure below.

Two stainless steel clips retain the cores in the coil former assembly, maintaining adequate pressure at the mating pole faces.

The complete assembly is suitable for mounting on a printed–wiring board.

Coilformer material PBTP (UL94 – Vo, yellow card, number E45 329–M).
Clip material: stainless steel

type	coilformer		clip	earth clip
	no. of pins	cat. number	cat. number	cat. number
ETD29/16/10		**4322 021 34380**	**4322 021 34370**	
ETD34/17/11	14	**4322 021 33850**	**4322 021 33890**	**4322 021 33940**
ETD39/20/13	16	**4322 021 33860**	**4322 021 33900**	**4322 021 33950**
ETD44/22/15	18	**4322 021 33870**	**4322 021 33910**	**4322 021 33960**
ETD49/25/16	20	**4322 021 33880**	**4322 021 33920**	**4322 021 33970**

Double (coaxial) coilformers for ETD34, fulfilling mains insulation requirements in flame retarding phenolformaldehyde (UL94 – Vo, yellow card number E63312–M).
Coilformer half for primary winding: 4322 021 34230
Coilformer half for secondary winding: 4322 021 34240

EC–cores and accessories

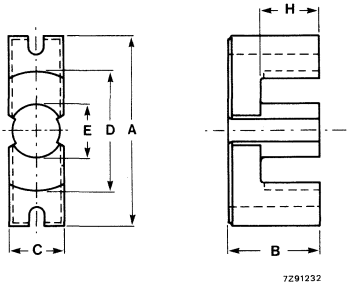
For detailed information on these and other types see Data Handbook MA01

EC–cores have a round centre pole to make strip winding easy, and ensuring a high copper factor and low leakage inductance; they meet the IEC65 standards for creepage distance (2 x 4 mm) and clearance between terminal pins and core.

	dimensions (mm)						magnetic parameters		
type	A max	B max	C max	D min	E min	H min	Ve mm^3	Ae mm^2	le mm
EC35/17/10	35.3	17.45	9.8	22.2	9.8	11.9	6530	84.3	77.4
EC41/19/12	41.6	19.65	11.9	26.3	11.9	13.5	10800	121	89.3
EC52/24/14	53.5	24.35	13.75	32.1	13.75	15.5	18800	180	105
EC70/34/17	71.7	34.65	16.8	43.3	16.8	22.3	40100	279	144

Range of ungapped core halves

	material grade
type	3C8
EC35/17/10	**4322 020 52500**
EC41/19/12	**4322 020 52510**
EC52/19/14	**4322 020 52520**
EC70/34/17	**4322 020 52530**



Accessories

	coil former			mounting parts (set)
type	coil former cat.no. **4322 021**	no. of tags	mounting horizontal or vertical	cat. no. of set **4312 021**
EC35/17/10	**33410**	11	H	**26010**
	33310	13	H	
EC41/19/12	**33010**	–	–	**26020** without
	33320	9	H	mounting stud
	33350	9	V	**26030** with
	33480	12	H	mounting stud
EC52/24/14	**33020**	–	–	**26040** without
	33330	11	H	mounting stud
	33360	11	V	**26050** with
	33500	14	H	mounting stud
EC70/34/17	**33030**	–	–	**26060** without
	33340	15	H	mounting stud
	33370	15	V	**26070** with mounting stud

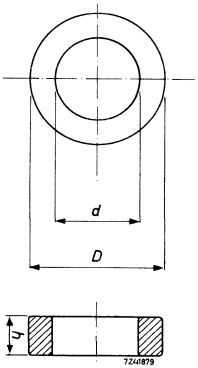
Coilformer of flame retarding PBTP (UL94 – Vo, yellow card number E45 329–M).

SOFT FERRITES

General data
Ring cores

For detailed information on these and other types see Data Handbook MA01

Ring cores are widely used for pulse and broad band transformers. In the field of RFI–suppression an important application is as a current compensated choke.
When used as a power transformer the main advantages are the long winding length and the very weak stray field (3C85 and 3F3).
The special grade 3R1 ia a rectangular loop ferrite suitable for magnetic amplifiers and spike suppression.
Our extensive range of sizes includes types proposed in IEC 525 plus many other current sizes.
The ring cores are isolated with a coat of nylon 11 (0.1 – 0.3 mm) to give good HV – isolation between core and winding (1.5 – 2 kV).



Range of ring cores (4330 030 .....)

size of non–coated ring D x d x h	material grade and colour code						
	violet 4C65	pink 4A11	red 3C85	blue 3F3	white 3C11	orange 3E25	black 3R1
2.5 x 1.5 x 1.0*	**34680**	**34350**		**37880**		**37060**	
4 x 2.2 x 1.1	**34690**	**34360**		**37890**		**37350**	
4 x 2.2 x 1.6*	**34700**	**34370**		**34780**		**37070**	
6 x 4 x 2	**97160***	**34380**		**37900**		**37080**	
6.3 x 3.8 x 2.5*	**34790**	**34870**		**34970**			
9 x 6 x 3	**97170***	**34390**		**37910**		**37090**	**37680**
10 x 6 x 4*	**34800**	**34880**		**34980**	**34500**	**34580**	
12.5 x 7.5 x 5*		**34400**	**37790**	**37920**	**34920**	**37100**	
14 x 9 x 5	**97180***	**34410**	**37450**	**37930**	**37460**	**37110**	**37690**
14 x 9 x 9		**34420**	**37800**	**37940**		**37120**	
16 x 9.6 x 6.3*		**34430**	**37810**	**37950**	**37180**	**37130**	
19 x 10.6 x 10			**34910**		**37470**	**37340**	
19 x 10.6 x 15			**37480**		**37490**	**37140**	
20 x 10 x 7*	**34820**		**34470**		**34510**	**34590**	
23 x 14 x 7	**97190***	**34440**	**37500**	**34990**	**37510**	**37160**	**37700**
25 x 15 x 10*			**34480**	**35000**	**34520**	**34600**	
26 x 14.5 x 10			**37830**		**37520**	**37170**	
26 x 14.5 x 20			**37840**		**37530**	**37540**	
29 x 19 x 7.5			**37850**		**37580**		
31.5 x 19 x 12.5*			**34490**	**35010**	**34530**	**34610**	
36 x 23 x 10	**34710**		**37860**		**37550**		
36 x 23 x15*	**97200***	**34450**	**37870**	**35020**	**37560**	**34220**	**34310**

* 4322 020

Shapes and applications

For detailed information see Data Handbook MA02

Rare earth magnets and Ferroxdure are among the most advanced permanent magnet materials available today. Magnets are made from these materials in a vast range of shapes and sizes, and the cost/weight/performance factor is excellent. Properly used, the strength of these magnets will remain practically unchanged throughout an indefinite lifetime. They are used mostly to transduce energy from one form to another, or to exert a force. This catalogue contains only a small selection of what is already being done: much more is possible.

Energy transduction

- **Electrical/mechanical**: in motors, meters, loudspeakers, beam deflectors, mass spectrometers
- **Mechanical/electrical**: in generators, alternators, dynamos, microphones, pick–ups
- **Mechanical/heat**: in hysteresis/torque and eddy–current instruments

Force exertion

- **On a magnetic material**: in attraction, repulsion, holding, lifting
- **On a moving electrical charge**: in magnetrons, klystrons, image intensifiers

Materials and shapes

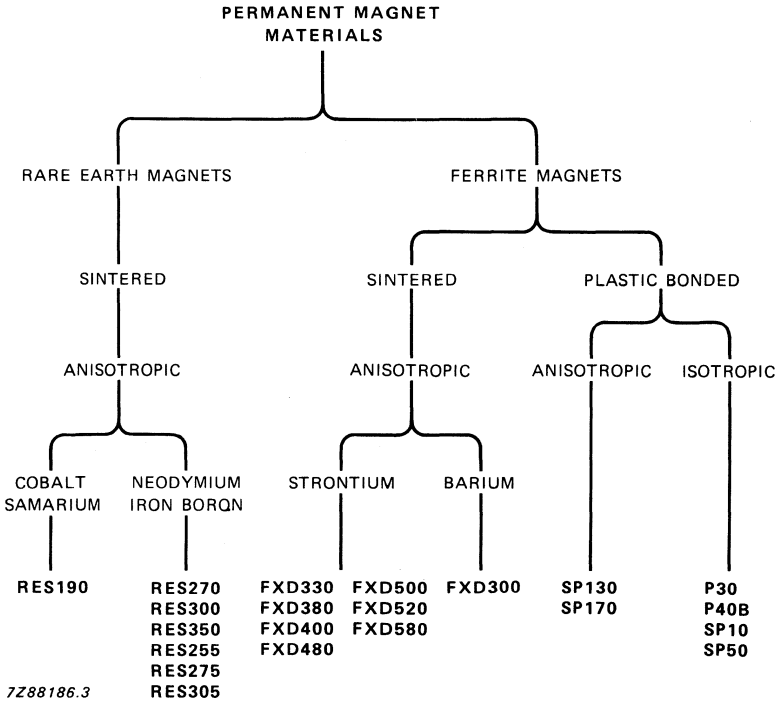
- **Anisotropic ceramic Ferroxdure**
  (see Data Handbook MA02 for type list)
  segments: in motors, magnetos
  rings: in loudspeakers, motors, magnetos
  disc and blocks: in metal seperators, chucks, clamping rings

- **Anisotropic plastic–bonded Ferroxdure**
  (see Data Handbook MA02 for type list)
  wide range of shapes

- **Isotropic plastic–bonded Ferroxdure**
  (see Data Handbook MA02 for type list)
  wide range of shapes: where flexible products and/or complex magnetizing patterns are required

- **Anisotropic sintered rare earth magnets**
  (see Data Handbook MA02 for type list)
  blocks, slugs, segments: in applications requiring highest magnetic energies

For detailed information see Data Handbook MA02



For detailed information see Data Handbook C16

Ferroxdure (sintered)
Anisotropic

material designation	remanence B_r (mT) typ – min	coercivity H_cB (kA/m) typ – min	polarization coercivity H_cJ (kA/m) typ – min	maximum BH product $(BH)_{max}$ (kJ/m³) typ – min	$B_r \times H_cJ$ (kJ/m³) typ – min
FXD330	370 – 360	245 – 230	255 – 240	25.5 – 24.1	94 – 86
FXD380	390 – 380	265 – 250	275 – 260	28.2 – 26.9	107 – 99
FXD480	380 – 370	280 – 270	320 – 305	26.8 – 25.5	122 – 113
FXD580	385 – 375	285 – 280	360 – 350	29.8 – 28.3	139 – 131
FXD300	400 – 390	160 – 145	165 – 150	29.5 – 28.0	66 – 59
FXD400	410 – 400	265 – 250	275 – 260	31.3 – 29.8	113 – 104
FXD500*	405 – 400	295 – 285	320 – 310	30.5 – 29.8	130 – 124
FXD520	425 – 420	250 – 240	260 – 250	33.6 – 32.8	111 – 105

Ferroxdure (plastic bonded)
Isotropic

material designation	remanence B_r (mT) typ – min	coercivity H_cB (kA/m) typ – min	polarization coercivity H_cJ (kA/m) typ – min	maximum BH product $(BH)_{max}$ (kJ/m³) typ – min	$B_r \times H_cJ$ (kJ/m³) typ – min
FXD SP10	80 – 75	58 – 54	190 –	0.9 – 0.8	
FXD P30	125 – 115	88 – 84	190 –	2.8 – 2.4	
FXD P40B	145 – 135	96 – 88	190 –	3.6 – 3.2	
FXD SP50	155 – 150	104 – 100	190 –	4.4 – 4	

Anisotropic

material designation	remanence B_r (mT) typ – min	coercivity H_cB (kA/m) typ – min	polarization coercivity H_cJ (kA/m) typ – min	maximum BH product $(BH)_{max}$ (kJ/m³) typ – min	$B_r \times H_cJ$ (kJ/m³) typ – min
FXD SP130	240 – 230	175 – 167	240 –	11 – 10	
FXD SP170	270 – 260	190 – 185	220 –	–	

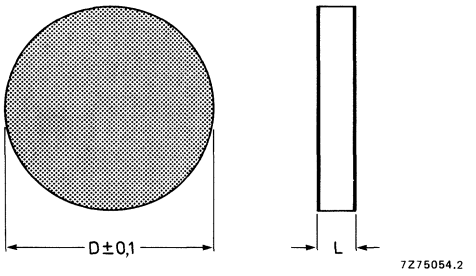
Rare earth (sintered)
Anisotropic

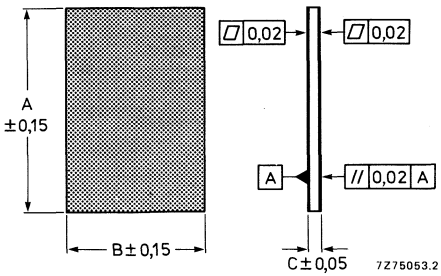
material designation	remanence B_r (mT) typ – min	coercivity H_cB (kA/m) typ – min	polarization coercivity H_cJ (kA/m) typ – min	maximum BH product $(BH)_{max}$ (kJ/m³) typ – min	$B_r \times H_cJ$ (kJ/m³) typ – min
RES 190	890 – 870	670 – 620	– 1100	154 – 144	
RES 270	1100 – 1050	700 – 650	1000 – 750	215 –	
RES 300	1150 – 1100	750 – 700	1000 – 750	240 –	
RES 350	1200 – 1150	800 – 750	1000 – 750	280 –	
RES 255	1050 – 1000	750 – 700	1500 – 1200	200 –	
RES 275	1100 – 1050	800 – 750	1500 – 1200	215 –	
RES 305	1150 – 1100	850 – 800	1500 – 1200	240 –	

PIEZOELECTRIC CERAMICS

General data
PXE

For detailed information on these and other types see Data Handbook MA03





Discs, grade PXE 5

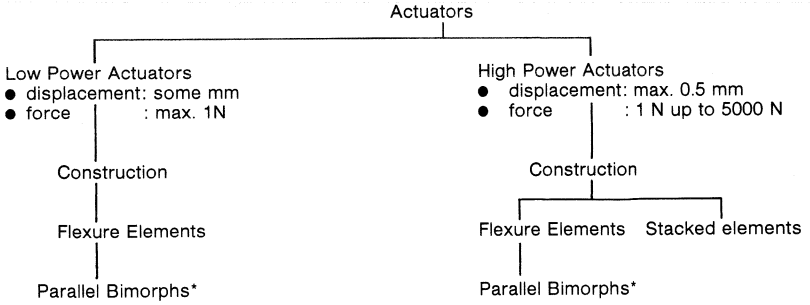
D mm	L mm	catalogue number
5.0	0.3	**4322 020 17500**
5.0	0.5	**4322 020 17510**
5.0	1,0	**4322 020 17520**
5.0	2,0	**4322 020 17530**
10.0	0.2	**4322 020 17540**
10.0	0.5	**4322 020 17550**
10.0	1.0	**4322 020 17560**
10.0	2.0	**4322 020 17570**
10.0	3.0	**4322 020 17580**
10.0	5.0	**4322 020 17590**
16.0	0.2	**4322 020 17600**
16.0	0.5	**4322 020 17610**
16.0	1.0	**4322 020 17620**
16.0	2.0	**4322 020 17630**
16.0	3.0	**4322 020 17640**
20.0	0.2	**4322 020 17650**
20.0	0.5	**4322 020 17660**
20.0	1.0	**4322 020 17670**
20.0	2.0	**4322 020 17680**
25.0	0.2	**4322 020 17690**
25.0	0.5	**4322 020 17700**
25.0	1.0	**4322 020 17710**
25.0	2.0	**4322 020 17720**

Plates, grade PXE 5

A mm	B mm	C mm	catalogue number
4	4	0.3	**4322 020 13500**
8	4	0.3	**4322 020 13520**
12	4	0.3	**4322 020 13540**
6	6	0.3	**4322 020 13550**
12	6	0.3	**4322 020 13580**
8	8	0.3	**4322 020 13590**
10	10	0.3	**4322 020 13620**
12	12	0.3	**4322 020 13640**
12	6	0.5	**4322 020 13650**
12	6	1.0	**4322 020 13660**

For detailed information on these and other types see Data Handbook MA03

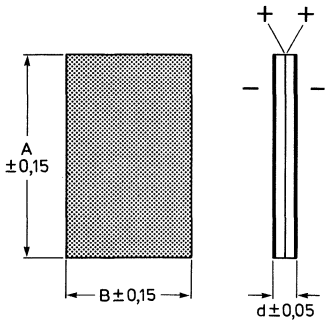
Actuators
Operating in the 31 or 33 mode below the resonant frequency, actuators transfer electrical energy into "large" displacements in comparison with the displacements of simple PXE transducers.



M

* series bimorph only as sensor

For detailed information on these and other types see Data Handbook MA03



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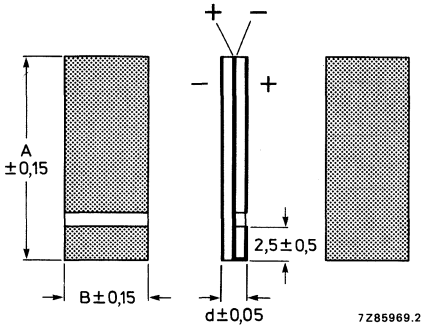

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Series Bimorph plates
Material: PXE 5

A mm	B mm	d mm	catalogue number
4	4	0.6	**4322 020 04570**
6	4	0.6	**4322 020 04580**
8	4	0.6	**4322 020 04590**
10	4	0.6	**4322 020 04600**
12	4	0.6	**4322 020 04610**
6	6	0.6	**4322 020 04620**
8	6	0.6	**4322 020 04630**
10	6	0.6	**4322 020 04640**
12	6	0.6	**4322 020 04650**
8	8	0.6	**4322 020 04660**
10	8	0.6	**4322 020 04670**
12	8	0.6	**4322 020 04680**
10	10	0.6	**4322 020 04690**
12	10	0.6	**4322 020 04700**
12	12	0.6	**4322 020 04710**
12.7	1.6	0.6	**4322 020 08250**
15.5	1.6	0.6	**4322 020 08240**
70	1.6	0.6	**4322 020 08230**

Parallel Bimorph plates
Material PXE5

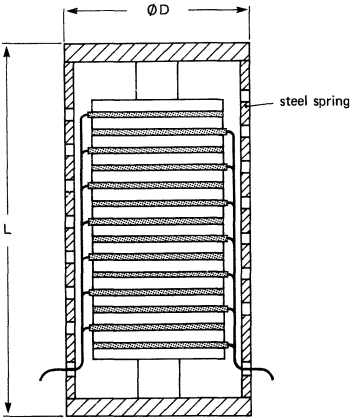
A mm	B mm	d mm	catalogue number
15	6	0.6	**4322 020 14530**
20	6	0.6	**4322 020 14540**
25	6	0.6	**4322 020 14550**
30	6	0.6	**4322 020 14560**
35	6	0.6	**4322 020 14570**
15	12	0.6	**4322 020 14580**
20	12	0.6	**4322 020 14590**
25	12	0.6	**4322 020 14600**
30	12	0.6	**4322 020 14610**
35	12	0.6	**4322 020 14620**

For detailed information on these and other types see Data Handbook MA03

High–power actuators

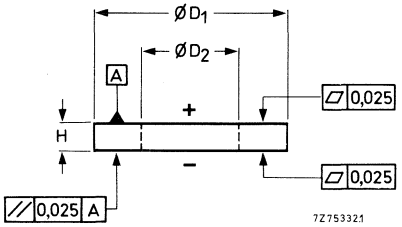
The high–power actuators produces in the 33 mode displacements far greater than those possible with simple PXE transducers operating in the 31 or 33 modes. It comprises a pile of PXE discs, held in compression with a force of about 1000 N by a cylindrical steel spring and interleaved with copper foil electrodes. The high compressive forces give the structure exceptional rigidity by eliminating all free play between the discs.

A voltage between the electrodes causes the discs to expand, stretching the cylindrical spring and producing an overall extension of the actuator. The actuator has a response time of around 200 µs.



catalogue number	**4322 020 19050**	**4322 020 19060**	**4322 020 19070**	
Dimensions D x L	16 x 50	22 x 75	32 x 100	mm
Stroke 0 to 500 V	≃ 20	≃ 30	≃ 50	µm
Stroke 0 to 800 V	≃ 35	≃ 50	≃ 80	µm
Capacitance at 25 °C	≃ 100	≃ 250	≃ 800	nF
Stiffness	≃ 30	≃ 50	≃ 80	N/µm
Max. applied force	2000	3000	5000	N

For detailed information on these and other types see Data Handbook MA03



Rings for ultrasonic applications

Material: PXE 41

D_1 mm	D_2 mm	H mm	nom. capacitance pF	catalogue number
10	5	2	320	**4322 020 06060**
20	6	5	650	**4322 020 06170**

Material: PXE 41

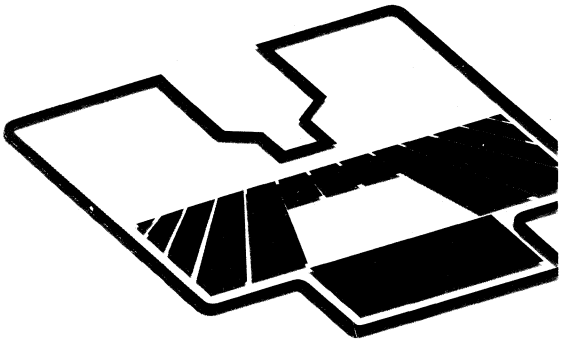
D_1 mm	D_2 mm	H mm	nom. capacitance pF	catalogue number
20 ±0.5	6 ±0.3	5 ±0.1	650	**4322 020 06130**
38.1 ±0.6	12.7 ±0.35	4 ±0.1	2800	**4322 020 06090**
38.1 ±0.6	12,7 ±0.35	6,35 ±0.1	1800	**4322 020 06040**
50 ±1	20 ±0.5	6 ±0.1	3000	**4322 020 06050**

Material: PXE 43

D_1 mm	D_2 mm	H mm	nom. capacitance pF	catalogue number
20 ±0.5	6 ±0.3	5 ±0.1	500	**4322 020 06290**
25 ±0.6	10 ±0.3	5 ±0.1	725	**4322 020 06280**
38.1 ±0.6	12.7 ± 0.35	6,35 ±0.1	1400	**4322 020 06270**
50 ±1	20 ±0.5	5 ±0.1	2900	**4322 020 06150**
50 ±1	20 ±0.5	6 ±0.1	2400	**4322 020 06140**

SUBSTRATE DESIGN GUIDELINES

Preface



An SMD sits on, and is not inserted through, the printed circuit board. With no wires through holes to ensure accurate alignment of device and footprint, tougher guidelines must be followed when designing PCBs for SMDs. Guidelines that incorporate the variables affecting SMD placement, soldering and processing. We draw on our extensive experience in using SMDs to present guidelines that enable you to define device footprints, and to lay out boards that optimize the benefits of SMD Technology.

NOTES

SUBSTRATE DESIGN GUIDELINES

Contents

FOOTPRINT DEFINITION		6 - 7
	Pattern coordinates	6
	Clearances and overlaps	7
FOOTPRINTS AND SOLDER PROCESSES		8 - 11
	FOOTPRINTS FOR WAVE SOLDERING	8 - 9
	The 'shadow effect'	8
	Solder bridging	8 - 9
	Adhesive application	9
	FOOTPRINTS FOR REFLOW SOLDERING	10 - 11
	Solder paste	10
	Swimming and tombstoning	11
SMD FOOTPRINT DIMENSIONS		12 - 15
BOARD LAYOUT CONSIDERATIONS		16 - 19
	Component orientation	16
	Component pitch	16
	Statistical analysis	17
	Solder-land/via-hole relationship	17
	Solder-land/test-point relationship	18
	Solder-land/component-lead relationship	18
	Placement machine considerations	18
	Hardware-programmable placement machines	19
IN CONCLUSION		19

FOOTPRINT DEFINITION

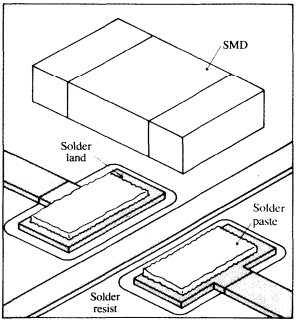


Fig. 1
A typical SMD footprint comprising solder land, solder resist and solder paste.

The first step in SMD circuit board design is defining a set of footprints for all devices. An SMD footprint, as shown in Fig.1, comprises:

- ☐ a pattern for the (metallized) solder lands;
- ☐ a pattern for the solder resist coating;
- ☐ a pattern for the solder paste (reflow).

These patterns are influenced by five main interactive factors, namely:

1 - component dimensions plus tolerances (determined by the component manufacturer);
2 - placement tolerances (determined by the ability of the machine to accurately place the SMDs);
3 - solder land position plus tolerances with respect to a reference point on the board;
4 - solder resist position with respect to the same reference point as 3 (optional for reflow soldering);
5 - solder paste position with respect to the solder land (for reflow soldering).

Pattern coordinates

The set of patterns defining each footprint can be represented as a set of nominal coordinates and dimensions. The actual coordinates will be distributed around the nominal values owing to positional and processing tolerances (points 3, 4 and 5 above).

The coordinates, therefore, are stochastic; the actual values form a probability distribution, with a mean value (nominal) and a standard deviation. The coordinates of the SMD are also stochastic due to dimensional tolerances, and machine placement tolerances (points 1 and 2 above).

Footprint definitions (cont.)

Clearances and overlaps

The relative positions of solder land, solder resist, solder paste and SMD are not arbitrary. A number of additional requirements may be formulated concerning clearances and overlaps. They include:

- ☐ limitations of pattern manufacture - for example, the minimum spacing between solder lands or tracks;
- ☐ requirements concerning the soldering process - for example, the land must be free of solder resist;
- ☐ requirements concerning quality of the soldered joint - for example, the solder land must be large enough to allow an appropriate meniscus.

Mathematical elaboration of these requirements, and substitution of actual values for all parameters, leads to a set of inequalities that must be solved simultaneously to derive the footprint's dimensions. Manual calculation, using simple worst-case parameters, is considered impractical; a better approach is to use a statistical analysis.

This approach may deliver more than one solution, so the optimal solution must be determined by finding a solution that:

- ☐ minimizes the area occupied by the footprint, allowing maximum component density;
- ☐ maximizes the number of tracks between solder lands within the footprints.

A computer program based on these criteria can be developed. The program should also include the facility to indicate which requirements have been violated if a solution is found to be impossible. For example, if placement machine tolerances dictate that the space between solder land and through-track must be greater than the value assigned to this parameter, the program output must indicate this and which input parameters need to be changed to arrive at a viable solution.

Such a footprint program, however, need not be included in a CAD system database. Once a library of footprints has been defined, the program will only be used when new footprints are required (if new devices, new soldering techniques or different board manufacturing process are introduced, for example).

FOOTPRINTS AND SOLDER PROCESSES

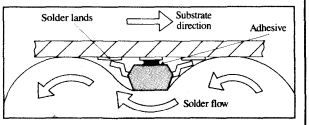


Fig. 2 (a)
The shadow effect - surface tension of the molten solder prevents wetting of the downstream solder land.

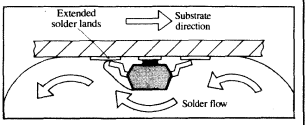


Fig. 2 (b)
Extending the solder land to overcome the shadow effect.

All the points discussed above are general, and are important for all SMD footprints. There are, however, specific requirements relating to the soldering process that influence the footprint design. Requirements for a board to be soldered by the wave method differ from those for a reflow-soldered board. Some reflow soldering techniques also have certain special requirements. These are now discussed.

FOOTPRINTS FOR WAVE SOLDERING

For successful wave soldering, several requirements in addition to those above must be met. These include:

- ☐ measures to prevent the 'shadow effect';
- ☐ measures to prevent solder bridges;
- ☐ provision for an adhesive 'dot'.

The 'shadow effect'

Unlike wave soldering of conventional printed boards, where there are no component bodies to restrict the wave's freedom to make contact with the whole surface, wave soldering of SMD-loaded boards is affected by the presence of SMDs on the solder-facing side.

Solder is forced over and around the component body as shown in Fig.2 (a), and the surface tension of the molten solder may prevent it reaching the downstream solder land. The result: a dry joint, in the 'shadow' of the component body, is therefore known as the shadow effect.

The higher the component body, the greater the possibility of shadowing. To overcome this problem, the solder land can be enlarged as shown in Fig.2 (b). The extended metallization makes contact with the molten solder, allowing it to flow back and form a meniscus around the joint.

The shadow effect is more prevalent in single-wave soldering. The dual-wave process has gone a long way towards alleviating this problem, as the first (turbulent) wave has sufficient upward pressure to force solder onto all solder lands, and the second (laminar) wave 'washes' the board to form smooth solder fillets.

Solder bridging

Solder bridges (unwanted solder connections between adjacent components or adjacent leads of an IC) are a potential problem with SMD-populated boards owing to the small device size and close spacing. They have a tendency to form on the downstream leads of ICs, particularly the VSO (very small outline) package with its lead pitch of only 0,762 mm.

The use of 'solder thieves' (small areas of metallization in addition to, or attached to, the downstream pair of solder lands of the IC's footprint) reduces the likelihood of solder bridging on these leads. Figure 3 shows an example of solder thieves on the VSO footprint.

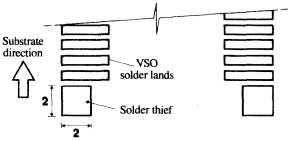


Fig. 3
Solder thieves for the VSO-40 footprint (dimensions in mm).

Solder bridging may also occur if the solder lands extend too far beyond the end of the IC package leads. Solder then collects on the exposed metallization, often short-circuiting adjacent leads. The protrusion of the solder lands must therefore be kept to a minimum, with only enough exposed metallization to allow an appropriate solder meniscus, and to accommodate placement tolerances.

Component/footprint misalignment can also cause solder bridging. As shown in Fig.4, a slight misalignment of narrow-pitch leaded devices greatly reduces the space between adjacent leads and solder lands.

A number of factors can cause misalignment of device and footprint prior to soldering: an incorrectly set-up or programmed placement machine; too much solder paste; or a convex meniscus of solder on the solder land (due to an excessively thick solder coating on the bare board). However, these are process or preparation faults, not related to the footprint design.

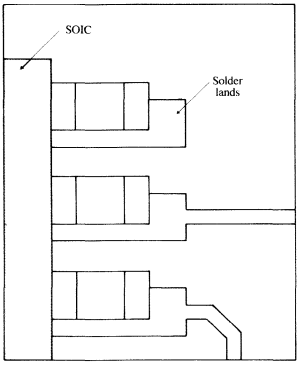


Fig. 4
Misalignment of an SO-package reduces clearance between leads and solder lands, increasing the risk of solder bridging.

Adhesive application

An adhesive is required to maintain SMD orientation during wave soldering. The amount of adhesive is critical as there must be sufficient to form a good bond, but not too much to foul the solder land and prevent the solder joint forming.

Two factors determine the height of the adhesive dot. Shown in Fig.5, they are: the solder-land metallization thickness (A); and the SMD metallization thickness (B). As the solder-land metallization thickness can vary from about 35 μm for a print-and-etch board, to 135 μm for a plated through-hole board, and the SMD metallization thickness may vary by several tens of microns (according to device type), the dot height (C) is by no means a constant.

By routing a track under the device, as shown in Fig.6, the solder-land metallization thickness (A) is eliminated from the adhesive dot height criteria. The high component density of SMD-loaded boards will usually require the routing of such a track between solder lands, and where it does not, a short dummy track should be introduced.

The wave-solder footprints must therefore be modified to include this dummy track (which can also be used as a through track) to support the adhesive dot (see Fig.7).

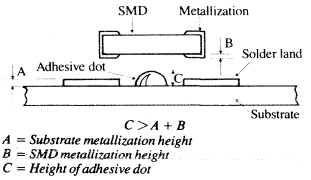


Fig. 5
Adhesive dot height criteria.

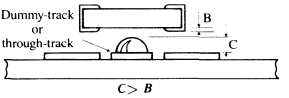


Fig. 6
Through track or dummy track modifies dot height criteria.

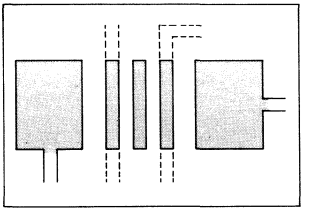


Fig. 7
Typical footprint with dummy track. Note that several tracks can be included - this gives a wider base for the adhesive dot, and each can be used as a through track if necessary.

FOOTPRINTS FOR REFLOW SOLDERING

The special footprint considerations for successful reflow soldering include:

- ☐ demands on solder-land area for solder paste;
- ☐ measures to prevent 'swimming' and 'tombstoning'.

Solder paste

The solder paste can be applied by pressure syringe dispensing, or by screen printing. For industrial purposes, screen printing is the favoured technique, as it is much faster than syringe dispensing.

A stainless steel mesh coated with emulsion except for the solder-land pattern is placed over the board. A squeegee forces solder paste through the uncoated areas of the mesh and onto the solder lands to produce dots of solder paste of a given density determined by the emulsion thickness and mesh type (guage and spacing of the wires within the mesh).

There is an optimum amount of solder paste for each joint. For example, the solder paste requirements for the 1206-size surface mounted resistor or capacitor is around 1,5 mg per end, and for the SO IC between 0,5 and 0,75 mg per lead.

The solder land must therefore be large enough to accommodate the required amount of solder (the solder paste pattern is usually the same size as the solder land). The paste density and the required amount of solder thus determine the minimum area of the solder land according to the expression:

$$\text{Min. solder-land area } (mm^2) = \frac{\text{Solder paste requirement (mg)}}{\text{Solder paste density } (mg/mm^2)}$$

Footprint and solder processes (cont.)

Swimming and tombstoning

A phenomenon sometimes observed on reflow soldered boards is 'swimming' (or 'floating'). This occurs when the solder paste reflows, and the forces exerted by the surface tension of the molten solder cause the SMD to shift on its footprint.

Swimming results in the device self-centering on the footprint as the forces of surface tension reach equilibrium. Although this removes minor positional errors, it is not a dependable feature and devices must always be positioned as accurately as possible.

However, the solder always reflows at slightly different rates at each end of the device, and the swimming effect can pull the SMD away from the solder land, or in extreme cases, stand it up on end (particularly with small chip resistors and capacitors). This is known as 'tombstoning'.

Tombstoning and swimming are related to the size and shape of the component metallization, and to the size of the footprint. The protrusion of the solder lands should be equal at both ends of the SMD, and should not be greater than the height of the SMD's metallization. Similarly, the solder lands should not be wider than the SMD metallization.

This maintains an equilibrium of the forces of surface tension at both ends, and helps prevent these forces up-ending the device, or pulling it off-centre.

SMD FOOTPRINT DIMENSIONS

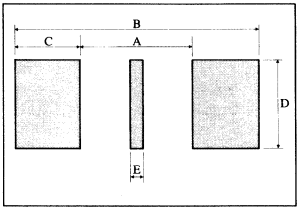
Figures 8 to 16 show footprints (in mm) for most SMD packages. All dimensions given are based on the criteria discussed in these guidelines, and from our experience with both development and production circuit boards. They are reproduced for guidance only.

In some cases (particularly the SM IC packages), it was found that one footprint size was suitable for both reflow- and wave-soldered boards. However, research is continually going on, and full data will be published when they become available.

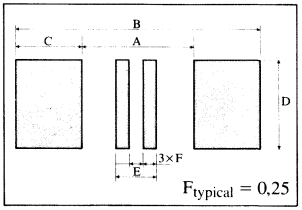
Although the ideal would be to locate a component exactly in its correct position on the solder lands, in practice some tolerance is allowed. This tolerance is usually expressed as the positioning accuracy, that is deviation of a component termination or lead from its nominal position on the solder lands. Factors that influence positioning accuracy include footprint tolerances (discussed under Footprint Definition), as well as component orientation and pitch (discussed below).

For small components with metallized terminations, the overall tolerance in positioning the terminations is taken to be ±0,4 mm. For ICs, the positioning accuracy depends on the package type and on the position and location of the leads, and can be represented as allowable limits in the x and y directions. Positioning accuracies for ICs are given in Table 1 for reflow soldering, and in Table 2 for wave soldering.

	Code	A	B	C	D	E_{max}
reflow	C0805	0,8	3,4	1,3	1,4	*
	R/C1206	1,8	4,0	1,1	1,7	0,75
	C1210[1]	1,8	4,6	1,4	2,6	–
	C1808[1]	2,8	6,2	1,7	2,1	–
	C1812[1]	2,8	6,2	1,7	3,3	–
	C2220[1]	4,0	7,4	1,7	5,1	–
wave	C0805	1,2	3,6	1,2	1,2	0,4**
	R/C1206	2,0	4,8	1,4	1,4	0,75



(a) Single track (wave soldering of C0805).



(b) Double tracks (wave soldering of R/C1206).

Fig. 8
Footprints for surface mounted resistors and ceramic multilayer capacitors.

SOT-23	A	B	C	D	E	F	G
reflow	1,2	2,6	0,7	0,9	1,1	2,9	*
wave	0,8	3,4	1,3	1,3	1,2	3,8	0,4

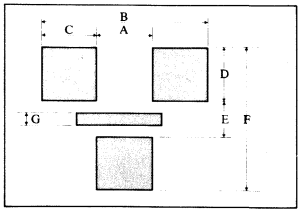
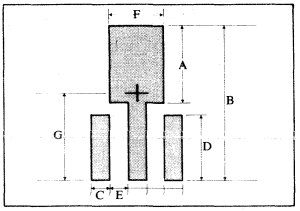


Fig. 9
Footprints for SOT-23 transistors.

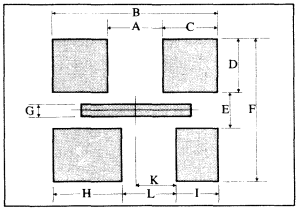
[1] only on ceramic substrates
* no track
** dummy track only

SMD footprint dimensions (cont.)



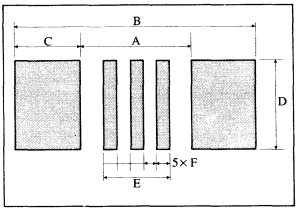
SOT-89	A	B	C	D	E	F	G
reflow	2,8	4,6	0,75	1,2	0,75	2,0	2,3
wave	3,2	5,2	0,75	1,5	0,75	2,0	2,6

Fig. 10
Footprints for SOT-89 transistors.



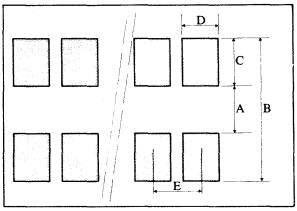
SOT-143	A	B	C	D	E	F	G	H	I	K	L
reflow	1,2	2,6	0,7	0,9	1,1	2,9	*	1,1	0,7	0,6	0,8
wave	0,8	3,4	1,3	1,3	1,2	3,8	0,4	1,6	1,2	0,5	0,6

Fig. 11
Footprints for SOT-143 transistors.



SOD-80	A	B	C	D	E	$F_{typical}$
reflow	2,4	5,2	1,4	1,4	1,5*	0,3
wave	2,5	4,9	1,2	2,0	1,5	0,3

Fig. 12
Footprints for SOD-80 diodes.



	A	B	C	D	E
SO small					
reflow	4,0	7,0	1,5	0,6	1,27
wave	4,0	6,6	1,3	0,6	1,27
SO-8 large					
reflow	8,0	13,0	2,5	0,6	1,27
wave	8,0	13,0	2,5	0,6	1,27
SO-28 large					
reflow	7,8	11,4	1,8	0,6	1,27
wave	7,8	11,4	1,8	0,6	1,27

Fig. 13
Footprints for SO ICs.

* no track or dummy track

SMD footprint dimensions (cont.)

VSO-40	A	B	C	D	E	F
reflow	8,0	13,4	2,7	0,5	0,762	–
wave	8,0	13,4	2,7	0,35	0,762	2,0*

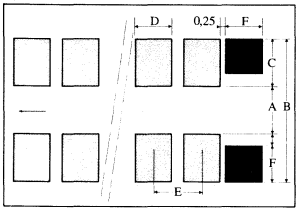


Fig. 14
Footprints for VSO ICs.

	A	B	C	D	E
PLCC-44					
reflow	14,1	18,7	2,3	0,6	1,27
wave	14,2	17,3	1,55	0,6	1,27
PLCC-68					
reflow	21,8	26,4	2,3	0,6	1,27
wave	21,8	24,9	1,55	0,6	1,27
PLCC-84					
reflow	26,9	31,5	2,3	0,6	1,27
wave	26,9	30,0	1,55	0,6	1,27

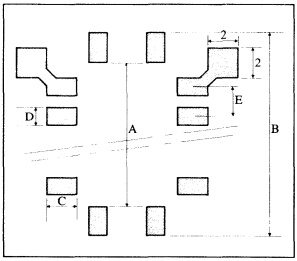


Fig. 15
Footprints for PLCCs.

QFP-48	A	B	C	D	E
reflow	10,5	15,7	2,6	0,5	0,75
wave	10,5	15,4	2,45	0,35	0,75

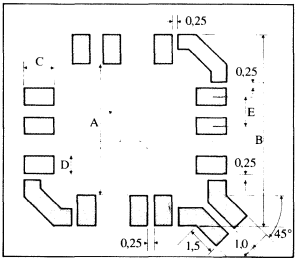


Fig. 16 (a)
Footprints for QFP-48.

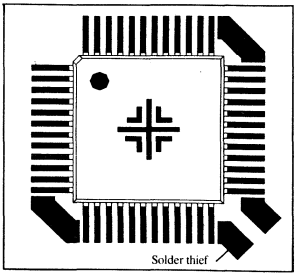


Fig. 16 (b)
Solder-land pattern and location of solder thieves for QFP-48.

* solder thieves for wave soldering only

Table 1 Positioning accuracy (mm) of leads for reflow soldering of ICs

Package type	No tracks		One track*	
	x	y	x	y
SO small	0,30	0,30	0,20	0,30
SO-8 large	0,30	0,40	0,20	0,40
SO-28 large	0,30	0,40	0,20	0,40
VSO-40	0,15	0,40	–	–
PLCC-44	0,30	0,30	0,20	0,20
PLCC-68	0,30	0,30	0,20	0,20
PLCC-84	0,30	0,30	0,20	0,20
QFP-48	0,15	0,15	–	–

Table 2 Positioning accuracy (mm) of leads for wave soldering of ICs

Package type	No tracks		One track*	
	x	y	x	y
SO small	0,25	0,25	0,20	0,25
SO-8 large	0,25	0,40	0,20	0,40
SO-28 large	0,20	0,40	0,20	0,40
VSO-40	0,10	0,30	–	–
PLCC-44	0,30	0,30	0,20	0,20
PLCC-68	0,30	0,30	0,20	0,20
PLCC-84	0,30	0,30	0,20	0,20
QFP-48	0,10	0,10	–	–

* one 0,20 mm track covered with solder resist, between solder lands.

BOARD LAYOUT CONSIDERATIONS

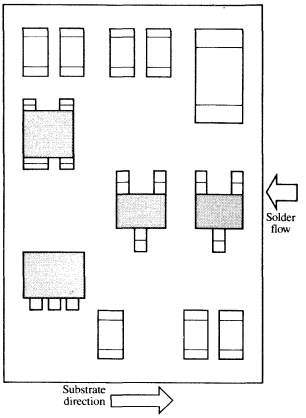


Fig. 17
Recommended component orientation for wave soldered substrates.

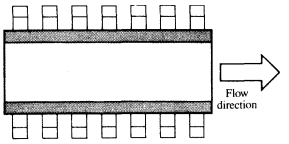


Fig. 18
Parallel orientation for SO and VSO packages.

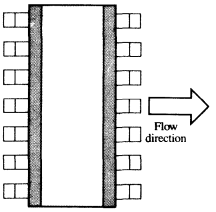


Fig. 19
Transverse (or perpendicular) orientation for SO packages only.

A number of special requirements can be outlined for laying out SMD-populated printed boards. The majority of these arise out of the nature of SMD assembly, and the soldering processes used, and bear little resemblance to guidelines for laying out conventional through-hole boards.

Component orientation

Component orientation is important for consistent soldered joint quality when wave soldering. The example layout given in Fig.17 shows the correct orientation for chip resistors and capacitors, and for small surface mounted discrete semiconductors. This gives good joint formation, and the shadow effect is virtually eliminated. Terminations of the devices receive equal amounts of solder.

The orientation of SO (small outline) and VSO ICs is critical to prevent both the shadow effect and solder bridging. Solder penetration is optimized when the IC travels over the solder wave lengthwise (as shown in Fig.18).

It is possible, if board space limitations dictate, to mount SO ICs sideways (central axis at a right angle to the direction of travel over the wave) as shown in Fig.19. This is, however, not recommended and for VSO packages is totally unacceptable.

These layout restrictions do not apply if the board is to be reflow soldered, as device orientation has no influence on the soldered joint, and the shadow effect is not present. Solder bridging, however, may still occur but for different reasons (for more details, see below and another publication in this series entitled SOLDERED JOINT CRITERIA).

Component pitch

The minimum pitch is governed by the maximum width (or length) of the SMD, and the minimum gap between adjacent components, according to the expression:

min. pitch = max. SMD width or length + min. permissible gap.

When defining the maximum width (or length) of an SMD, it's not only the component dimensions (plus tolerances) that must be considered, but also the rotational accuracy of the placement machine.

Figure 20 shows how the maximum dimensions of a chip resistor are increased when the component is rotated with respect to the footprint by angle ϕ (most manufacturers quote a typical rotational accuracy of around 3°, so for clarity, the rotation is exaggerated in this illustration).

The minimum permissible gap between adjacent SMDs is based on the space required to avoid solder bridges during wave soldering. Figure 21 shows how the minimum permissible gap, plus the SMD width, are combined to derive the basic expression for calculating the minimum pitch.

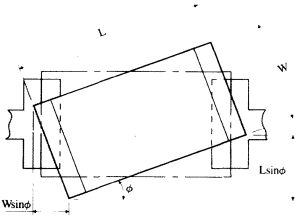


Fig. 20
Effective increase in device width when rotated with respect to the footprint.

Statistical analysis

As for footprint definition, the minimum SMD pitch is best determined by statistical analysis, and not simply by a worst-case calculation. Factors that need to be taken into account in these calculations include:

- placement positioning tolerance
- placement rotational accuracy
- solder-land pattern accuracy
- SMD metallization/solder land overlap
- minimum permissible gap (G_{min})

- Component dimensions:
  0805 – 2,0 × 1,25 mm
  (tolerance ±0,15 mm)
  1206 – 3,2 × 1,6 mm
  (tolerance ±0,15 mm).

As a guide, the minimum pitches for 1206- and 0805-size SMDs in three configurations are given in Table 3.

As these figures are statistically derived, there is some flexibility in the data. For example, it's possible to place size 1206 SMDs on a 2,5 mm pitch, but the probability of placement occurring with G_{min} smaller than 0,5 mm will increase, thus increasing the likelihood of solder bridging. Each application must be assessed on merit, with regard to acceptable levels of rework and so on.

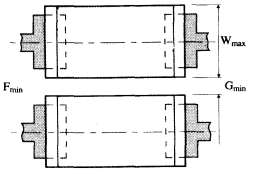


Fig. 21
Criteria for determining the minimum pitch of SMDs.

Solder-land/via-hole relationship

Double-sided and multilayer boards use plated-through via-holes to connect the conductor layers of the circuit board. Conventional assemblies can use the component through-holes as vias; with all-SMD assemblies this isn't possible, vias are needed in addition to the SMD footprints.

Via-holes in SMD-assemblies, particularly those on boards to be reflow soldered, must be sited away from the solder lands to prevent a solder-well forming. If too close, the via hole may draw the molten solder away from the joint by capillary action, resulting in insufficient wetting of the joint.

If layout restrictions on a very high-density board dictate that via-holes must be close to solder lands, then migration of the solder into the hole must be prevented by a suitable barrier, such as a narrow track, or a strip of non-wettable material (solder resist) on bare copper.

Table 3 Recommended pitch (F_{min}) for 1206 and 0805 SMDs

Combination	SMD 'A'	SMD 'B' 1206	SMD 'B' 0805
	1206	3,0	2,8
	0805	2,8	2,6
	1206	5,8	5,3
	0805	5,3	4,8
	1206	4,1	3,7
	0805	3,6	3,0

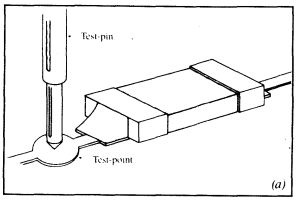


Fig. 22
Recommended test point siting close to an SMD.

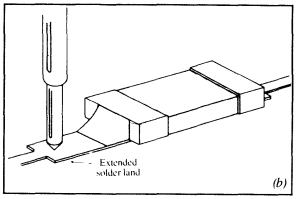


Fig. 23
Alternative test point siting, though not recommended.

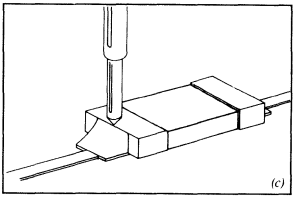


Fig. 24
Unacceptable test point siting.

Solder-land/test-point relationship

High-component density, relatively few via holes, and SMDs on both sides of the board present problems for siting test points on SMD assemblies. Through-hole boards generally have all test nodes accessible from one side; SMD boards, on the other hand, often need test points on both sides and require double-sided test fixtures.

These test points must be sited away from the footprint, as shown in Fig.22, and on a regular grid spacing to facilitate the use of a standard or semi-custom test fixture (of the 'bed-of-nails' type). The configuration shown in Fig.23 is an alternative option, though not recommended, as the molten solder may be drawn away from the SMD resulting in swimming or insufficient wetting.

Figure 24 shows an unacceptable test point siting, as the pressure applied by the test pin can make an open-circuit joint appear good, and the test pin can damage the SMD.

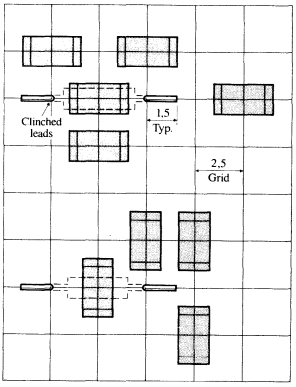


Fig. 25
Location of 1206-size SMDs on the bottom of a mixed-print board (dimensions in mm).

Solder-land/component-lead relationship

A special consideration for mixed-print boards in the position of component leads with respect to SMDs. Figure 25 shows typical configurations for 1206-size SMDs mounted on the bottom of a substrate with through-hole components on the top. Minimum distances between the clinched lead-ends and the SMDs and board conductors (tracks or solder lands) are 1 mm and 0,5 mm respectively.

Placement machine considerations

Board design and manufacture of SMD-assemblies lends itself to computer-aided design (CAD) techniques, as has been shown in both the footprint definition and the component pitch determination. The majority of SMD-placement systems are software-programmable.

A course-grid layout system, analogous to drawing the layout on graph paper, may be used for board layout on CAD systems with low resolution (older systems, intended primarily for through-hole boards), or for manual layout. However, this restricts layout density.

A fine-grid layout requires a higher resolution CAD system, but leads to a more flexible design, and achieves the high-density necessary to optimize the benefits of SMD assembly.

Hardware-programmable placement machines

Most high-capacity simultaneous placement systems are hardware-programmable, that is, they use a template (known as a 'program plate') to guide the pick-and-place heads to the correct location over the board. With this system, a series of 'lanes' are created (owing to adjacent pick-and-place heads), within which each head can place only one device per operation.

These lanes are typically 10 to 12 mm wide, as shown in Fig. 26. A board designed to be manufactured on one of these machines must consider this limitation, and the device distribution must be optimized to allow for it.

For example, the layout shown in the figure has 10 SMDs in one lane, and would therefore require 10 passes beneath the placement station to assemble. As there are no more than three SMDs in any other lane, this situation should be avoided for optimum efficiency.

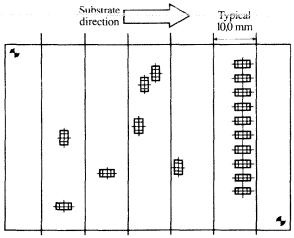


Fig. 26
Board 'lanes' from use of a simultaneous placement machine.

IN CONCLUSION

In demonstrating the basic guidelines for designing SMD-populated boards, it's evident that the adoption of CAD is the best solution. For example, once footprints for all devices have been defined, they can be stored in the library in the CAD system's database. Similarly, layout rules and limitations with respect to the various board configurations, soldering processes and manufacturing techniques can be included in the system's software. (For more details, see COMPUTER-AIDED DESIGN FOR SMD BOARDS). Nevertheless, manual layout is still possible, and will remain with us for some time, for small, simple boards.

NOTES

DATA HANDBOOK SYSTEM

Introduction

Our Data Handbook System comprises more than 60 books with specifications on electronic components, subassemblies and materials. It is made up of six series of handbooks:

INTEGRATED CIRCUITS
DISCRETE SEMICONDUCTORS
DISPLAY COMPONENTS
PASSIVE COMPONENTS
PROFESSIONAL COMPONENTS
MATERIALS

The data handbooks contain all pertinent data available at the time of publication, and each is revised and reissued periodically.
When ratings or specifications differ from those published in the preceding edition they are indicated with arrows in the page margin. Where application information is given it is advisory and does not form part of the product specification.
Information on current Data Handbooks and on how to obtain a subscription for future issues is available from any of the Organizations listed on the back cover.
Product specialists are at your service and enquiries will be answered promptly.

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IC01B	**Radio,audio and associated systems** Bipolar, MOS (1990) TDA 1512 - UA 758
IC02A	**Video and associated systems** Bipolar, MOS type MAB8031AH - TDA1521 (1989)
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IC03	**IC's for telephony** Bipolar, MOS (1989)
IC04	**HE4000B Logic family CMOS (1990)**
IC05	**Advanced low power schottky (1989)**
IC06N	**PC54/74HC/HCU/HCT Logic families HCMOS (1988)**
IC07	**Advanced CMOS logic ACL (1990)**
IC07S	**Supplement Advanced CMOS logic (1991)**
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IC15	**Suppl. Fast TTL supplement (1991)**
IC16	**CMOS integrated circuits for clocks and watches (1989)**
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SEMICONDUCTORS (RED SERIES)

S8A	Light emitting diodes (1988) (wordt SC11)
S9	Power MOS transistors (1988) (wordt SC13)
SC01	Diodes - small-signal diodes, voltage regulator diodes, voltage reference diodes, tuner diodes, rectifier diodes (1989) (was S1)
SC02	Power diodes - rectifier diodes, regulator diodes, high-voltage rectifier diodes, accessoires (1990) (was S2A)
SC03	Thyristors, triacs (1991) (was S2B)
SC04	Small-signal transistors (1989) (was S3)
SC05	Low-frequency power transistors and modules (1989) (was S4A)
SC06	High-voltage and switching power transistors (1989) (was S4B)
SC07	Field-effect transistors (1989) (was S5)
SC08	R.F. power transistors (1989) (was S6A)
SC08B	R.F. power MOS transistors (1991)
SC09	R.F. power modules (1989) (was S6B)
SC10	Surface mounted semiconductors (1989) (was S7)
SC12	Optocouplers (1989) (was S8B)
SC14	Wideband transistors and wideband hybrid IC modules (1989) (was S10)
SC15	Microwave semiconductors (1990) (was S11)
SC17	Semiconductor sensors (1991) (was S13)
SC18	Liquid crystal displays LCD01 (1991) (was S14)

PHILIPS

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DC05 Flyback-mains Transformers General-Purpose FXC assy (1989) (was C20)

PASSIVE COMPONENTS (GREEN SERIES)

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C15	Ceramic capacitors (1987) (wordt PA06)
PA01	Electrolytic capacitors solid and non-solid (1989) (was C14)
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PC06	Circulators and isolators (1989) (was T11)
PC07	Vidicon and newvicon camera tubes deflection units (1989) (was T12)
PC08	Image intensifiers (1989) (was T13)
PC09	Dry reed switches (1990) (was T15)
PC12	Electron multipliers (1991)
T5	Cathode-ray tubes (1989) (wordt PC02)
T6	Geiger-muller tubes (1986) (wordt PC03)

MATERIALS (GREENISH-BLUE SERIES)

C16	Permanent magnet materials (1986) (wordt MA02)
C19	Piezoelectric ceramics (1986) (wordt MA03)
MA01	Soft ferrites (1991) (was C4 - C5)

NOTES