



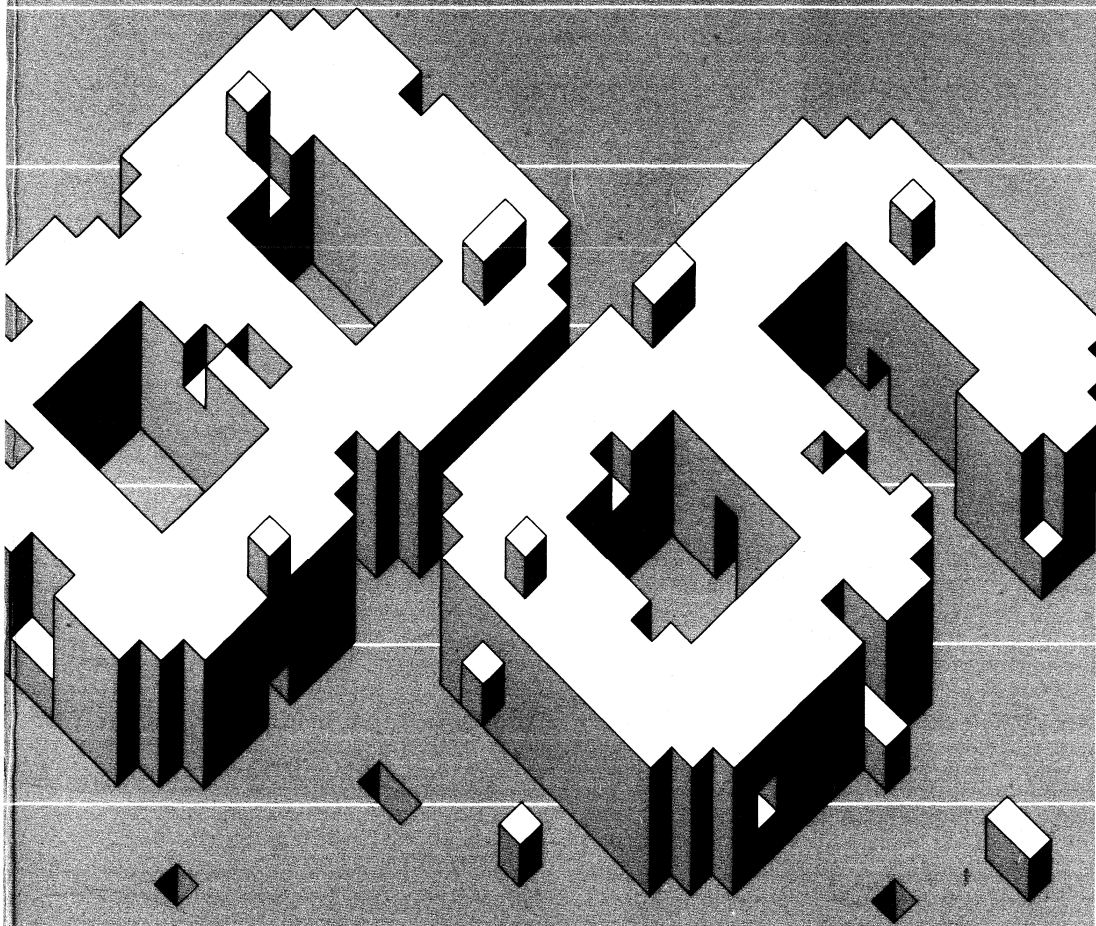
Electronic
components
and materials

PHILIPS

PREFERRED TYPE RANGE CATALOGUE

1986

Integrated circuits - Semiconductors - Electron tubes - Passive components
Materials and other products



PREFERRED TYPE RANGE CATALOGUE 1986

Integrated circuits **IC**

Semiconductors **S**

Electron tubes **E**

Capacitors **C**

Resistors **R**

Materials and other products **M**



PHILIPS - ELECTRONIC COMPONENTS AND MATERIALS (ELCOMA) DIVISION

PREFERRED TYPE RANGE CATALOGUE 1986

The preferred type range

Although Philips' Electronic Components and Materials (ELCOMA) Division manufactures over 100 000 different products, only about a third of them regularly appears on the majority of customer orders. This part of our total range is named the preferred type range. In this catalogue, type numbers, catalogue numbers, selection guides and brief technical data for the preferred type range are presented.

CECC approved products

Where information is available, products approved to the CECC (Cenelec Electronic Components Committee - harmonized system for electronic components of assessed quality) are listed at the end of each product section.

Status code

Within the preferred type range, status of products is indicated by code P (Preferred) or C (Common). Generally, these components can be supplied quickly.

Packing quantities

With many products there is an indication of the packing quantities; these units, or multiples of them, should be used when ordering.

The Philips Data Handbook System

For complete specifications of the components listed in this catalogue, please refer to the relevant volumes of the Philips Data Handbook System, which are indicated in the heading of each section in this catalogue.

The Philips Data Handbook System comprises over seventy volumes, divided into four series distinguished by colour as follows:

IC series	Integrated circuits	purple
S series	Discrete semiconductors	red
T series	Electron tubes	blue
C series	Passive components and materials	green

The contents of these series are listed in the section entitled Data Handbook System at the end of this catalogue.

If you cannot find the information you need in this catalogue or the appropriate data handbook, please consult your nearest Philips - Elcoma sales organization or industrial distributor (for addresses, see the back cover of this catalogue).

How to use this catalogue

The 'Integrated circuits' and 'Semiconductors' sections of this catalogue are also published separately under the titles 'Integrated circuits catalogue 1986' and 'Semiconductors preferred type range catalogue 1986' respectively.

The pages of this catalogue have, therefore, been numbered per section, as shown on the index pages. To enable you to find the beginning of each section, thumbmarks have been provided. There is a contents page at the beginning of each section, and all these contents pages have been combined into a general index at the beginning of the book (so the same contents list appears twice); we hope this facilitates the perusal of this catalogue.

Please note that all dimensions given in tables and drawings are in mm, unless stated otherwise.



INTEGRATED CIRCUITS

STANDARD FUNCTIONS

LOGIC FAMILIES	IC5
CMOS HE4000B family specifications	IC5
CMOS HE4000B family survey	IC8
HCMOS PC74 family specifications	IC12
HCMOS PC74 family survey	IC20
TTL family characteristics comparison	IC24
TTL 74 series survey	IC25
TTL 8200, 9300 and 9600 series	IC32
TTL 8T00 series survey	IC33
ECL 10 000 family specifications	IC34
ECL 10 000 family survey	IC36
ECL 100 000 family specifications	IC38
ECL 100 000 family survey	IC40

MEMORIES	IC41
Bipolar TTL RAM	IC41
Bipolar TTL PROM	IC42
Bipolar ECL RAM	IC44
Bipolar ECL PROM	IC44
Bipolar ECL CAM	IC44
NMOS ROM	IC44
CMOS EPROM	IC44
CMOS EEPROM	IC44
CMOS RAM	IC44

ANALOGUE	IC45
Peripheral interfaces	IC45
Comparators	IC45
D/A and A/D converters	IC45
Operational amplifiers	IC46
Video amplifiers	IC46
Sample and hold circuits	IC46
Timers	IC46
Motor control and sensor circuits	IC46
Phase locked loops	IC47
Transistor arrays	IC47
Compondors	IC47
SMPS controllers	IC47
Communication circuits	IC47

DIGITAL	IC48
LCD drivers; CMOS	IC48
Display drivers; bipolar	IC48
Clock timers; CMOS	IC48
A/D and D/A converters; NMOS	IC48
Miscellaneous; bipolar ECL	IC48
AD/DA converter CMOS	IC48
Remote I/O expander	IC48
Memories	IC48

DEDICATED FUNCTIONS

RADIO/AUDIO	IC49
AM channels, FM channels	IC49
AM/FM combined channels	IC49
Stereo decoders	IC49
Interference suppressors	IC49
Tuning circuits	IC49
ARI system	IC49
Bus controlled audio circuits	IC50
D.C. controlled audio circuits	IC50
Audio power amplifiers	IC50
Recorder (cassette) amplifiers/ control circuits	IC50
Motor speed control circuits	IC50
Display drivers	IC51
Personal radio/audio	IC51
Compact disc digital audio system circuits	IC51
Speech synthesizers	IC51
Miscellaneous	IC52
Dolby circuits	IC52

VIDEO	IC53
Vision i.f. circuits:	IC53
economical circuits	IC53
high-performance circuits	IC53
Colour decoding circuits	IC53
Vertical deflection circuits	IC54
Sync processors; horizontal; vertical	IC54
Digital video processing	IC54
Sound circuits	IC55
Video recorder circuits	IC55
Video camera circuits	IC55
Video amplifiers	IC56
Miscellaneous	IC56

DIGITAL SYSTEMS FOR RADIO/AUDIO AND VIDEO	IC57
Remote control systems: for general purpose applications	IC57
for sophisticated radio and video systems	IC57
Video tuning system (VTS): control systems	IC57
tuning systems	IC57
display systems	IC57
additional optional circuits	IC57
Text decoder systems: teletext decoder ICs	IC58
videotext	IC58
Field memory converters	IC58
Radio tuning systems (RTS): digital tv	IC59
tuning, display and control ICs	IC59
Frequency measurement and display system	IC59
Microcontrollers	IC60



Dedicated functions (cont.)

VIDEO GAMES IC61

TELEPHONY IC62

Bipolar ICs for telephone subscriber sets:

DTMF diallers with line interface IC62

speech/transmission circuits IC62

DTMF/speech transmission combination IC62

CMOS ICs for telephone subscriber sets:

DTMF dialler with redial IC63

pulse diallers with redial IC63

pulse repertory dialler/telephone-set controller IC63

µC peripherals (DTMF/MODEM, RAM, LCD, clock) IC63

multi-tone ringer IC63

CLOCKS AND WATCHES IC64

Analog watches IC64

Analog clocks IC64

Car clocks IC64

GENERAL INDUSTRIAL

Modulators IC65

I.F./A.F. circuits IC65

Control circuits for SMPS IC65

Motor drive circuits IC65

Transistor arrays IC65

Speech synthesizers IC66

Miscellaneous IC66

DOMESTIC APPLIANCES

..... IC67

DATA COMMUNICATIONS

..... IC67

VIDEO DISPLAY (CRT)

..... IC67

MICROPROCESSORS

BIPOLAR IC68

8-bit microprocessor family:

prototyping aids IC68

software IC68

bipolar LSI support products IC68

MICROPROCESSORS (cont.)

MOS IC69

8-bit microprocessor family IC69

16-bit microprocessor family (SC68000 series):

microprocessor unit (MPU) IC69

direct memory access IC69

data communication IC69

disk control IC69

memory access control IC69

interface IC69

MICROCONTROLLERS

MOS IC70

Single chip 8-bit microcontrollers:

NMOS IC70

CMOS IC71

PCB80C51 CMOS derivatives IC71

Peripheral circuits IC71

SEMI-CUSTOM CIRCUITS

IFL IC72

IFL series 20 IC72

IFL series 24 IC72

IFL series 28 IC72

IFL software support IC73

GATE ARRAYS

CMOS: IC74

standard speed IC74

high speed IC75

ISL IC76

ECL (ACE); 10K or 100K compatible IC77

The ACE cell array family IC77

Package coding IC77

CELL LIBRARIES

..... IC78

CMOS IC78

ISL IC78

MISCELLANEOUS

SPEECH SYNTHESIZERS IC79

ALPHANUMERIC INDEX

..... IC81



SEMICONDUCTORS

Data Handbook System S-ii

Contents S-iii

Letter symbols S-iv

Alphanumeric type number index S-v

Diodes:

Small signal diodes S1

Tuner diodes S3

Voltage reference diodes S5

Voltage regulator diodes S6

Transient suppressor diodes S6

Surface-mounting diodes S7

Rectifier diodes S10

Triacs, thyristors, bi-directional devices S25

Transistors listed by voltage S32

Small signal transistors:

L.F. general purpose transistors S39

Dual transistors for differential amplifiers S42

H.F. and switching transistors S44

L.F. power transistors and modules S56

Field-effect transistors S96

R.F. power transistors and modules S102

Wideband transistors S116

Surface-mounting devices S122

Optoelectronic devices:

Fibre optic emitters-receivers S137

Infrared receivers S138

Infrared emitters S139

Light-emitting diodes S140

Pyroelectric infrared detectors S146

Liquid crystal displays S147

Optocouplers S150

Microwave transistors S152

Accessories and heatsinks S158

Semiconductor sensor devices S160

Guide to packing quantities S162

Case outlines and dimensions S163

CECC approved types S181

ELECTRON TUBES

Data Handbook System E2

Contents E3

Display tubes:

Colour TV picture tubes E4

Flat, square colour TV picture tube assemblies E5

Black and white TV picture tubes E6

Black and white TV: deflection units E7

Colour data graphic display tube assemblies E8

Monochrome data graphic display tubes E9

Flat, square monochrome data graphic display tubes E10

Screen phosphors and deflection units E11

Industrial cathode ray tubes:

Instrument CRTs E12

CRTs for special applications E13

Survey of screen phosphors E14

Transmitting tubes:

R.F. heating E15

Telecommunication E17

Camera tubes:

Plumbicon tubes E20

Vidicon and Newvicon® tubes E22

Frame transfer sensors E23

Geiger Müller tubes E24

Image intensifiers E25

Photomultipliers: survey of types E26

Channel electron multipliers E28

Replacement types for electron tubes:

alphanumeric selection guide E29

CECC approved types E46



CAPACITORS

Data Handbook System C2

Contents C3

Aluminium electrolytic capacitors:

2222 013 C4

2222 021 C5

2222 030/031/032/033/041/042/043 C7

2222 035 C11

2222 036 C13

2222 037 C14

2222 050/052 C16

2222 051/053 C18

2222 085 (surface mounting) C19

2222 108 C20

2222 114/115 C21

2222 116 C22

2222 118 C23

Packing information C25

Solid aluminium capacitors:

2222 122 C27

2222 123 C29

2222 125 C30

Packing information C31

Interference suppression capacitors:

2222 330 (MKT-P) C32

Metallized film capacitors:

2222 341 (MKT and MKC) C35

2222 344 (MKT and MKC) C37

2222 365 (MKT) C40

2222 366 (MKT) C42

2222 367 (MKT) C44

2222 368 (MKT) C46

2222 369 (MKT) C48

2222 370 (MKT) C50

2222 371 (MKT) C51

Polypropylene film/foil capacitors:

2222 357 5 (KP) C53

2222 455-457 (KP) C54

2222 460-462 (KP) C55

Polysterene film/foil capacitors:

2222 424-431 (KS) C56

A.C. and pulse metallized polypropylene film capacitors:

2222 357 (KP/MKP) C57

2222 376 (KP/MMKP) C58

Miniature ceramic capacitors:

2222 629 (K14000) C59

2222 630 (K2000) C60

2222 680/683/679/689 (P100) C61

2222 680/683/679/689 (NP0) C62

2222 680/683/679/689 (N150) C63

2222 680/683/679/689 (N750) C64

2222 680/683/679/689 (N1500) C65

Packing information C66

Ceramic multilayer capacitors (surface mounting) C67

Film dielectric trimmers:

2222/2238 808 2 (5 mm) C71

2222/2238 808 1 (7,5 mm) C72

2222 808 3 (10 mm) C73

2222 809 050 (125 °C) C74

2222 809 070 (125 °C) C75

2222 809 080 (125 °C) C76

2222 809 090 (125 °C) C77

CECC approved types C78

RESISTORS

Data Handbook System R2

Contents R3

Fixed resistors:

Packaging information R4

Carbon film resistors CR25 R5

Standard film resistors SFR16T R7

Standard film resistors SFR25 R9

Metal film resistors MRS25 R11

Power metal film resistors PR37 R16

Power metal film resistors PR52 R17

Cemented wirewound resistors AC04, AC05, AC07, R18

Chip resistors RC-01 R19

Carbon potentiometers:

Carbon potentiometers, single R22

Carbon potentiometers, tandem R23

Carbon potentiometers, snap-in spindle R24

Carbon preset potentiometers:

CPT10 R25

ECP10 R26

MTP10 R27

EMP10 R28

Varistors Epoxy series: 2322 592 to 595 R29

RESISTORS (cont.)

LDR light dependent resistors:
 2322 600 9....

NTC thermistors:
 2322 626
 2322 633
 2322 633 2....
 2322 633 72224

2322 640 1....
 2322 640 19...
 2322 640 900..

NTC thermistors, disc:
 2322 642 6....
 2322 645

NTC thermistors, threaded:
 2322 642 7....

PTC thermistors, disc:
 2322 660 9100.
 2322 660 91001
 2322 660 93001
 2322 661 9100.

Dual PTC thermistors:
 2322 662 980..

PTC thermistors, overload protection:
 2322 66. 1...1
 2322 66. 1...3

PTC thermistors, for heating:
 2322 680 930..

Humidity sensor:
 2322 691 90001

CECC approved types

MATERIALS AND OTHER PRODUCTS

R32	Data Handbook System	M2
	Contents	M3
R33	Variable mains transformers	M4
R34		
R35	A.C. stabilizer module	M8
R36		
R37	Annular fixed transformers	M9
R38		
R39	Programmable logic controller PLC10	M10
	Programmable controller PC20	M12
R40		
R41	Hybrid integrated circuits	M16
	Dry reed switches	M23
R42	Piezoelectric quartz devices	M24
R43	Glass delay lines and comb. filters	M26
R44		
R45	Loudspeakers	M29
R46	Unidirectional synchronous motors	M33
R47	Reversible synchronous motors	M34
	Reversible hybrid synchronous motors	M34
R48	Stepping motors	M36
R49		
	Direct current motors	M39
R50	Gearboxes	M42
	Ferroxcube	M43
R51	Permanent magnet materials	M70
R52	Piezoelectric ceramics	M78
	CECC approved types	M8-

4 + + P-
 AGE-
 BEGI-
 N < S
 i >



Integrated circuits

In the alphanumeric index (which appears in the second part of this section) reference is made to IC data sheets or Data Handbooks in which they appear.

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 (purple series) are of interest.

book	title
------	-------

EXISTING SERIES

- | | |
|-----|--|
| IC4 | Digital integrated circuits - CMOS HE4000B family (superseded by IC04N/86) |
| IC6 | Professional analogue integrated circuits (superseded by IC11N/86) |
| IC7 | Signetics bipolar memories (superseded by IC10N/86) |

NEW SERIES

- | | |
|-------|---|
| IC01N | Radio, audio and associated systems - Bipolar, MOS (published 1985) |
| IC02N | Video and associated systems - Bipolar, MOS (published 1985) |
| IC03N | Telephony equipment - Bipolar, MOS (published 1985) |
| IC04N | HE4000B logic family - CMOS |
| IC05N | HE4000B logic family uncased integrated circuits - CMOS (published 1984) |
| IC06N | High-speed CMOS;PC74HC/HCT/HCU - logic family (published 1985) |
| IC07N | PC74HC/HCU/HCT uncased integrated circuits - HCMOS |
| IC08N | 10K and 100K logic family - ECL (published 1984) |
| IC09N | Logic series - TTL (published 1984) |
| IC10N | Memories - MOS, TTL, ECL |
| IC11N | Linear LSI (published 1985) |
| IC12N | Semi-custom gate arrays & cell libraries - ISL, ECL, CMOS |
| IC13N | Semi-custom - Integrated Fuse Logic (published 1985) |
| IC14N | Microprocessors, microcontrollers & peripherals - Bipolar, MOS (published 1985) |
| IC15N | Logic series - FAST TTL (published 1984) |
-



STANDARD FUNCTIONS

LOGIC FAMILIES	IC5
CMOS HE4000B family specifications	IC5
CMOS HE4000B family survey	IC8
HCMOS PC74 family specifications	IC12
HCMOS PC74 family survey	IC20
TTL family characteristics comparison	IC24
TTL 74 series survey	IC25
TTL 8200, 9300 and 9600 series	IC32
TTL 8T00 series survey	IC33
ECL 10 000 family specifications	IC34
ECL 10 000 family survey	IC36
ECL 100 000 family specifications	IC38
ECL 100 000 family survey	IC40

MEMORIES	IC41
Bipolar TTL RAM	IC41
Bipolar TTL PROM	IC42
Bipolar ECL RAM	IC44
Bipolar ECL PROM	IC44
Bipolar ECL CAM	IC44
NMOS ROM	IC44
CMOS EPROM	IC44
CMOS EEPROM	IC44
CMOS RAM	IC44

ANALOGUE	IC45
Peripheral interfaces	IC45
Comparators	IC45
D/A and A/D converters	IC45
Operational amplifiers	IC46
Video amplifiers	IC46
Sample and hold circuits	IC46
Timers	IC46
Motor control and sensor circuits	IC46
Phase locked loops	IC47
Transistor arrays	IC47
Compondors	IC47
SMPS controllers	IC47
Communication circuits	IC47

DIGITAL	IC48
LCD drivers; CMOS	IC48
Display drivers; bipolar	IC48
Clock timers; CMOS	IC48
A/D and D/A converters; NMOS	IC48
Miscellaneous; bipolar ECL	IC48
AD/DA converter CMOS	IC48
Remote I/O expander	IC48
Memories	IC48

DEDICATED FUNCTIONS

RADIO/AUDIO	IC49
AM channels	IC49
FM channels	IC49
AM/FM combined channels	IC49
Stereo decoders	IC49
Interference suppressors	IC49
Tuning circuits	IC49
ARI system	IC49
Bus controlled audio circuits	IC50
D.C. controlled audio circuits	IC50
Audio power amplifiers	IC50
Recorder (cassette) amplifiers/ control circuits	IC50
Motor speed control circuits	IC50
Display drivers	IC51
Personal radio/audio	IC51
Compact disc digital audio system circuits	IC51
Speech synthesizers	IC51
Miscellaneous	IC52
Dolby circuits	IC52

VIDEO	IC53
Vision i.f. circuits:	IC53
economical circuits	IC53
high-performance circuits	IC53
Colour decoding circuits	IC53
Vertical deflection circuits	IC54
Sync processors; horizontal; vertical	IC54
Digital video processing	IC54
Sound circuits	IC55
Video recorder circuits	IC55
Video camera circuits	IC55
Video amplifiers	IC56
Miscellaneous	IC56

DIGITAL SYSTEMS FOR RADIO/AUDIO AND VIDEO	IC57
Remote control systems: for general purpose applications	IC57
for sophisticated radio and video systems	IC57
Video tuning system (VTS): control systems	IC57
tuning systems	IC57
display systems	IC57
additional optional circuits	IC57
Text decoder systems: teletext decoder ICs	IC58
videotex	IC58
Field memory converters	IC58
Radio tuning systems (RTS): digital tv	IC59
tuning, display and control ICs	IC59
Frequency measurement and display system	IC59
Microcontrollers	IC60



Dedicated functions (cont.)

VIDEO GAMES IC61

TELEPHONY IC62

Bipolar ICs for telephone subscriber sets:

DTMF diallers with line interface IC62

speech/transmission circuits IC62

DTMF/speech transmission combination IC62

CMOS ICs for telephone subscriber sets:

DTMF dialler with redial IC63

pulse diallers with redial IC63

pulse repertory dialler/telephone-set controller IC63

µC peripherals (DTMF/MODEM, RAM, LCD, clock) IC63

multi-tone ringer IC63

CLOCKS AND WATCHES IC64

Analog watches IC64

Analog clocks IC64

Car clocks IC64

GENERAL INDUSTRIAL IC65

Modulators IC65

I.F./A.F. circuits IC65

Control circuits for SMPS IC65

Motor drive circuits IC65

Transistor arrays IC65

Speech synthesizers IC66

Miscellaneous IC66

DOMESTIC APPLIANCES IC67

DATA COMMUNICATIONS IC67

VIDEO DISPLAY (CRT) IC67

MICROPROCESSORS

BIPOLAR IC68

8-bit microprocessor family:

prototyping aids IC68

software IC68

bipolar LSI support products IC68

MICROPROCESSORS (cont.)

MOS IC69

8-bit microprocessor family IC69

16-bit microprocessor family (SC68000 series):

microprocessor unit (MPU) IC69

direct memory access IC69

data communication IC69

disk control IC69

memory access control IC69

interface IC69

MICROCONTROLLERS

MOS IC70

Single chip 8-bit microcontrollers:

NMOS IC70

CMOS IC71

PCB80C51 CMOS derivatives IC71

Peripheral circuits IC71

SEMI-CUSTOM CIRCUITS

IFL IC72

IFL series 20 IC72

IFL series 24 IC72

IFL series 28 IC72

IFL software support IC73

GATE ARRAYS IC74

CMOS:

standard speed IC74

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 the 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 d.c. fan-out
- inputs and outputs are protected against electrostatic voltages

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.

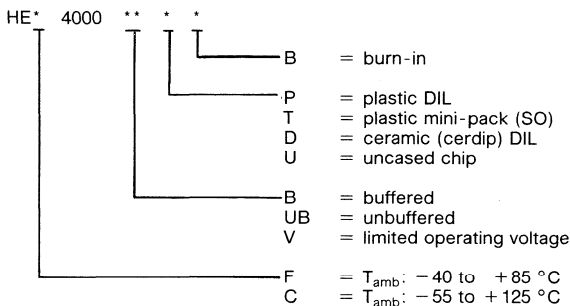
LOCMOS means Local Oxidation Complementary MOS

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

Type number designation

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

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



CMOS HE4000B FAMILY SPECIFICATIONS (cont.)

The HE family is designed with standardized output drive characteristics which, combined with relative insensitivity 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
D.C. current into any input or output	$\pm I$ max. 10 mA

D.C. family characteristics at $V_{SS} = 0$

parameter	symbol	$T_{amb} = -40\text{ }^{\circ}\text{C}$		$T_{amb} = +25\text{ }^{\circ}\text{C}$		$T_{amb} = +85\text{ }^{\circ}\text{C}$		V_{DD} V	conditions
		min.	max.	min.	max.	min.	max.		
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}
		-	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}
		-	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}
		-	40	-	40	-	300	10	
		-	80	-	80	-	600	15	
Quiescent device current for LSI	I_{DD} (μA)	-	50	-	50	-	375	5	all valid input combinations; $V_I = V_{SS}$ or V_{DD}
		-	100	-	100	-	750	10	
		-	200	-	200	-	1500	15	
Output voltage LOW $ I_O < 1\text{ }\mu\text{A}$	V_{OL} (V)	-	0,05	-	0,05	-	0,05	5	$V_I = V_{SS}$ or V_{DD}
		-	0,05	-	0,05	-	0,05	10	
		-	0,05	-	0,05	-	0,05	15	
Output voltage HIGH $ I_O < 1\text{ }\mu\text{A}$	V_{OH} (V)	4,95	-	4,95	-	4,95	-	5	$V_I = V_{SS}$ or V_{DD}
		9,95	-	9,95	-	9,95	-	10	
		14,95	-	14,95	-	14,95	-	15	
Input voltage LOW $ I_O < 1\text{ }\mu\text{A}$ (buffered stages only)	V_{IL} (V)	-	1,5	-	1,5	-	1,5	5	$V_O = 0,5$ or $4,5$ V $V_O = 1,0$ or $9,0$ V $V_O = 1,5$ or $13,5$ V
		-	3,0	-	3,0	-	3,0	10	
		-	4,0	-	4,0	-	4,0	15	
Input voltage HIGH $ I_O < 1\text{ }\mu\text{A}$ (buffered stages only)	V_{IH} (V)	3,5	-	3,5	-	3,5	-	5	$V_O = 0,5$ or $4,5$ V $V_O = 1,0$ or $9,0$ V $V_O = 1,5$ or $13,5$ V
		7,0	-	7,0	-	7,0	-	10	
		11,0	-	11,0	-	11,0	-	15	



Family ratings (cont.)

Power dissipation per package for plastic and ceramic (cerdip) DIL

for $T_{amb} = -40$ to $+60$ °C P_{tot} max. 400 mW
 for $T_{amb} = +60$ to $+85$ °C derate linearly with 8 mW/K to 200 mW

Power dissipation per package for plastic SO mini-pack

for $T_{amb} = -40$ to $+70$ °C P_{tot} max. 200 mW
 for $T_{amb} = +70$ to $+85$ °C derate linearly with 5 mW/K to 125 mW

Power dissipation per output P max. 100 mWOperating ambient temperature range $T_{amb} -40$ to $+85$ °CStorage temperature range $T_{stg} -65$ to $+150$ °C**D.C. family characteristics at $V_{SS} = 0$ (cont.)**

parameter	symbol	$T_{amb} = -40$ °C		$T_{amb} = +25$ °C		$T_{amb} = +85$ °C		V_{DD} V	conditions
		min.	max.	min.	max.	min.	max.		
Input voltage LOW $ I_O < 1 \mu A$ (unbuffered stages only)	V_{IL} (V)	-	1,0	-	1,0	-	1,0	5	$V_O = 0,5$ or $4,5$ V $V_O = 1,0$ or $9,0$ V $V_O = 1,5$ or $13,5$ V
		-	2,0	-	2,0	-	2,0	10	
		-	2,5	-	2,5	-	2,5	15	
Input voltage HIGH $ I_O < 1 \mu A$ (unbuffered stages only)	V_{IH} (V)	4,0	-	4,0	-	4,0	-	5	$V_O = 0,5$ or $4,5$ V $V_O = 1,0$ or $9,0$ V $V_O = 1,5$ or $13,5$ V
		8,0	-	8,0	-	8,0	-	10	
		12,5	-	12,5	-	12,5	-	15	
Output (sink) current LOW	I_{OL} (mA)	0,52	-	0,44	-	0,36	-	5	$V_O = 0,4$; $V_I = 0/5$ V $V_O = 0,5$; $V_I = 0/10$ V $V_O = 1,5$; $V_I = 0/15$ V
		1,3	-	1,1	-	0,9	-	10	
		3,6	-	3,0	-	2,4	-	15	
Output (source) current HIGH	$-I_{OH}$ (mA)	0,52	-	0,44	-	0,36	-	5	$V_O = 4,6$; $V_I = 0/5$ V $V_O = 9,5$; $V_I = 0/10$ V $V_O = 13,5$; $V_I = 0/15$ V
		1,3	-	1,1	-	0,9	-	10	
		3,6	-	3,0	-	2,4	-	15	
Output (source) current (HIGH)	$-I_{OH}$ (mA)	1,7	-	1,1	-	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

NAND gates

HEF4011B*	quadruple 2-input NAND gate
HEF4011UB	quadruple 2-input NAND gate; unbuffered
HEF4012B*	dual 4-input NAND gate
HEF4023B*	triple 3-input NAND gate
HEF4068B*	8-input NAND gate

AND gates

HEF4073B*	triple 3-input AND gate
HEF4081B*	quadruple 2-input AND gate
HEF4082B	dual 4-input AND gate

NOR gates

HEF4000B	dual 3-input NOR gate and inverter
HEF4001B*	quadruple 2-input NOR gate
HEF4001UB	quadruple 2-input NOR gate; unbuffered
HEF4002B*	dual 4-input NOR gate
HEF4025B*	triple 3-input NOR gate
HEF4078B	8-input NOR gate

OR gates

HEF4071B*	quadruple 2-input OR gate
HEF4072B	dual 4-input OR gate
HEF4075B	triple 3-input OR gate

Inverters and buffers

HEF4007UB*	dual complementary pair and inverter
HEF4041B	quadruple true/complement buffer
HEF4049B*	hex inverting buffers
HEF4050B*	hex non-inverting buffers
HEF4069UB*	hex inverter
HEF4502B	strobed hex inverter/buffer
HEF40097B*	3-state hex non-inverting buffer
HEF40098B*	3-state hex inverting buffer

Complex gates

HEF4030B*	quadruple EXCLUSIVE-OR gate
HEF4070B*	quadruple EXCLUSIVE-OR gate
HEF4077B	quadruple EXCLUSIVE-NOR gate
HEF4085B	dual 2-wide 2-input AND-OR-invert gate
HEF4086B	4-wide 2-input AND-OR-invert gate

* HEC type with burn-in option available in cerdip package



Flip-flops

HEF4013B*	dual D-type flip-flop
HEF4027B*	dual JK flip-flop
HEF4076B	quadruple D-type register with 3-state outputs
HEF40174B*	hex D-type flip-flop
HEF40175B*	quadruple D-type flip-flop

Counters

HEF4017B*	5-stage Johnson counter
HEF4018B	presettable divide-by-n counter
HEF4020B*	14-stage binary counter
HEF4022B	4-stage divide-by-8 Johnson counter
HEF4024B*	7-stage binary counter
HEF4029B	synchronous up/down counter, binary/decade counter
HEF4040B*	12-stage binary counter
HEF4059B	programmable divide-by-n counter
HEF4060B	14-stage ripple-carry binary counter/divider and oscillator
HEF4510B*	BCD up/down counter
HEF4516B	binary up/down counter
HEF4518B	dual BCD counter
HEF4520B*	dual binary counter
HEF4521B	24-stage frequency divider
HEF4522B	programmable 4-bit BCD down counter
HEF4526B	programmable 4-bit binary down counter
HEF4534B	real time 5-decade counter
HEF4737B;V	quadruple static decade counters
HEF4751V*	universal divider
HEF40160B	4-bit synchronous decade counter; asynchronous reset
HEF40161B	4-bit synchronous binary counter; asynchronous reset
HEF40162B	4-bit synchronous decade counter; synchronous reset
HEF40163B	4-bit synchronous binary counter; synchronous reset
HEF40192B	4-bit up/down decade counter
HEF40193B	4-bit up/down binary counter

Registers

HEF4006B	18-stage static shift register
HEF4014B*	8-bit static shift register
HEF4015B*	dual 4-bit static shift register
HEF4021B	8-bit static shift register
HEF4031B	64-stage static shift register
HEF4035B*	4-bit universal shift register
HEF4076B	quadruple D-type register with 3-state outputs
HEF4094B*	8-stage shift-and-store bus register
HEF4517B	dual 64-bit static shift register
HEF4557B*	1-to-64 bit variable length shift register
HEF4731B;V	quadruple 64-bit static shift register
HEF40194B*	4-bit bidirectional universal shift register
HEF40195B*	4-bit universal shift register

* HEC type with burn-in option available in cerdip package



Decoders and demultiplexers

HEF4028B	1-of-10 decoder
HEF4511B*	BCD to 7-segment latch/decoder/driver
HEF4514B	1-of-16 decoder/demultiplexer with input latches
HEF4515B	1-of-16 decoder/demultiplexer with input latches
HEF4543B	BCD to 7-segment latch/decoder/driver
HEF4555B	dual 1-of-4 decoder/demultiplexer
HEF4556B*	dual 1-of-4 decoder/demultiplexer

Digital multiplexers

HEF4019B*	quadruple 2-input multiplexer
HEF4512B*	8-input multiplexer with 3-state output
HEF4519B*	quadruple 2-input multiplexer
HEF4539B*	dual 4-input multiplexer

Analogue switches and multiplexers/demultiplexers

HEF4016B*	quadruple bilateral switches
HEF4051B*	8-channel analogue multiplexer/demultiplexer
HEF4052B	dual 4-channel analogue multiplexer/demultiplexer
HEF4053B	triple 2-channel analogue multiplexer/demultiplexer
HEF4066B*	quadruple bilateral switches
HEF4067B	16-channel analogue multiplexer/demultiplexer

Latches

HEF4042B*	quadruple D-latch
HEF4043B	quadruple R/S latch with 3-state outputs
HEF4044B	quadruple R/S latch with 3-state outputs
HEF4508B	dual 4-bit latch
HEF4724B	8-bit addressable latch

Multivibrators and timers

HEF4047B*	monostable/astable multivibrator
HEF4528B*	dual monostable multivibrator
HEF4538B	dual precision monostable multivibrator
HEF4541B*	programmable timer
HEF4753B	universal timer module

Arithmetic circuits

HEF4008B	4-bit binary full adder
HEF4531B	13-input parity checker/generator
HEF4532B	8-input priority encoder
HEF4585B*	4-bit magnitude comparator

* HEC type with burn-in option available in cerdip package



Schmitt triggers

HEF4093B* quadruple 2-input NAND Schmitt trigger
HEF40106B hex inverting Schmitt trigger

Memories

HEF4505B* 64-bit static read/write RAM
HEF4720B;V 256-bit, 1-bit per word RAM

Octal circuits

HEF40240B octal buffers with 3-state outputs
HEF40244B octal buffers with 3-state outputs
HEF40245B octal bus transceiver with 3-state outputs
HEF40373B octal transparent latch with 3-state outputs
HEF40374B octal D-type flip-flop with 3-state outputs

Special functions

HEF4046B phase-locked loop
HEF4104B quadruple low-to-high voltage translator with 3-state outputs
HEF4527B BCD rate multiplier
HEF4738V IEC/IEEE bus interface
HEF4750V* frequency synthesizer
HEF4752V a.c. motor control circuit
HEF4754V 18-element bar graph LCD driver
HEF4755V transceiver for serial data communication



* HEC type with burn-in option available in cerdip package



HCMOS PC74 FAMILY SPECIFICATIONS**General**

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

Introduction

The PC74 high-speed Si-gate CMOS logic family combine the low power advantages of the HE4000B family with the high speed and drive capability of the low power Schottky TTL (LSTTL). The family will have the same pin-out as the 74 series and provide the same circuit functions. In these families are included several HE4000B family circuits which do not have TTL counter parts and some special circuits.

The basic family of buffered devices, designated as PC74HCXXXXX, will operate at CMOS input logic levels for high noise immunity, negligible typical quiescent supply current and the input current is operated from a power supply of 2 to 6 V.

A subset of the family, designated as PC74HCT....., with the same features and functions as the "HC-types", will operate at standard TTL power supply voltage ($5\text{ V} \pm 10\%$) and logic levels (0,8 to 2,0 V) for use as pin-to-pin compatible CMOS replacements to reduce power consumption without loss of speed.

These types are also suitable for converted switching from TTL to CMOS.

Another subset, the PC74HCU....., are single-stage unbuffered CMOS compatible devices for application in RC or crystal controlled oscillators and other types of feed-back circuits which operate in the linear mode.

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

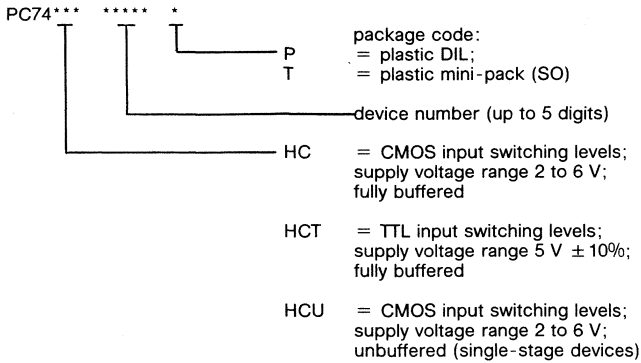
- Functions and pinning identical to the LSTTL and HE4000B family CMOS circuits
- Standard CMOS input switching levels for high-noise immunity (PC74HC)
- TTL input switching levels for PC74HCT devices
- Fan-out equal to 10 LSTTL loads (4 mA) for devices with standard outputs and 15 LSTTL loads (6 mA) for devices with bus driver outputs
- Balanced output characteristics for optimum speed and performance
- Typical quiescent power supply current: 10 nA (gates), 20 nA (flip-flops), 40 nA (MSI)
- Operating frequency (50 MHz) compatible with LSTTL
- Wide operating supply voltage:
2 to 6 V for PC74HC/HCU devices
 $5\text{ V} \pm 10\%$ for PC74HCT devices
- Wide operating temperature range:
standard: -40 to $+85\text{ }^{\circ}\text{C}$
extended: -40 to $+125\text{ }^{\circ}\text{C}$
- Available package:
plastic DIL and mini-pack (SO)
- Built-in protection against latch-up
- Highly immune to electrostatic discharge
- Alternate source is RCA



Type number designation

Basic family:

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



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.	typ.	max.	unit	
D.C. supply voltage		V_{CC}	-0,5	-	+7	V	
D.C. input diode current	for $V_I < -0,5$ V or $V_I > V_{CC} + 0,5$ V	$\pm I_{IK}$	-	-	20	mA	
D.C. output diode current	for $V_O < -0,5$ V or $V_O > V_{CC} + 0,5$ V	$\pm I_{OK}$	-	-	20	mA	
D.C. 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
D.C. 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 +85 °C PC74HC/HCT/HCU						
	plastic DIL	P_{tot}	-	-	500	mW	
	above +60 °C	P_{tot}^*	-	-	-	mW	
	plastic mini-pack (SO)	P_{tot}	-	-	400	mW	
Power dissipation per package	for temperature range; -40 to +125 °C; PC74HC/HCT/HCU						
	plastic DIL	P_{tot}	-	-	500	mW	
	above +70 °C	P_{tot}^*	-	-	-	mW	
	plastic minipack (SO)	P_{tot}	-	-	400	mW	
	above +70 °C	P_{tot}^{**}	-	-	-	mW	

* Derate linearly with 8 mW/K.

** Derate linearly with 6 mW/K.



Recommended operating conditions

Voltages are referenced to GND (ground = 0 V)

parameter	symbol	min.	typ.	max.	unit	conditions
D.C. supply voltage range PC74HC/HCU PC74HCT	V_{CC}	2,0	5,0	6,0	V	
	V_{CC}	4,5	5,0	5,5	V	
D.C. input voltage range	V_I	0	-	V_{CC}	V	
D.C. output voltage range	V_O	0	-	V_{CC}	V	
Operating ambient temperature range PC74HC/HCT/NCU PC74HC/HCT/HCU	T_{amb}	-40	-	+85	°C	standard
	T_{amb}	-40	-	+125	°C	extended
Input rise and fall times except for Schmitt trigger inputs	$t_r; t_f$	-	-	1000	ns	$V_{CC} = 2,0\text{ V}$
		-	6,0	500	ns	$V_{CC} = 4,5\text{ V}$
		-	-	400	ns	$V_{CC} = 6,0\text{ V}$



D.C. family characteristics, PC74HC

Voltages are referenced to GND (ground = 0 V)

parameter	V _{CC} V	symbol	T _{amb} (°C)						unit	conditions		
			+ 25			- 40 to + 85		- 40 to + 125		V _I	other	
			min.	typ.	max.	min.	max.	min.				max.
HIGH level input voltage	2,0	V _{IH}	1,5	1,3	-	1,5	-	1,5	-	V		
	4,5		3,15	2,4	-	3,15	-	3,15	-	V		
	6,0		4,2	3,1	-	4,2	-	4,2	-	V		
LOW level input voltage	2,0	V _{IL}	-	0,7	0,5	-	0,5	-	0,5	V		
	4,5		-	1,8	1,35	-	1,35	-	1,35	V		
	6,0		-	2,3	1,80	-	1,80	-	1,80	V		
HIGH level output voltage all outputs	2,0	V _{OH}	1,9	2,0	-	1,9	-	1,9	-	V	V _{IH} or V _{IL}	- I _o = 20 µA - I _o = 20 µA - I _o = 20 µA
	4,5		4,4	4,5	-	4,4	-	4,4	-	V		
	6,0		5,9	6,0	-	5,9	-	5,9	-	V		
HIGH level output voltage standard	4,5	V _{OH}	3,98	-	-	3,84	-	3,7	-	V	V _{IH} or V _{IL}	- I _o = 4,0 mA - I _o = 5,2 mA
	6,0		5,48	-	-	5,34	-	5,2	-	V		
HIGH level output voltage bus driver	4,5	V _{OH}	3,98	-	-	3,84	-	3,7	-	V	V _{IH} or V _{IL}	- I _o = 6,0 mA - I _o = 7,8 mA
	6,0		5,48	-	-	5,34	-	5,2	-	V		
LOW level output voltage all outputs	2,0	V _{OL}	-	0	0,1	-	0,1	-	0,1	V	V _{IH} or V _{IL}	I _o = 20 µA I _o = 20 µA I _o = 20 µA
	4,5		-	0	0,1	-	0,1	-	0,1	V		
	6,0		-	0	0,1	-	0,1	-	0,1	V		
LOW level output voltage standard	4,5	V _{OL}	-	-	0,26	-	0,33	-	0,4	V	V _{IH} or V _{IL}	I _o = 4,0 mA I _o = 5,2 mA
	6,0		-	-	0,26	-	0,33	-	0,4	V		
LOW level output voltage bus driver	4,5	V _{OL}	-	-	0,26	-	0,33	-	0,4	V	V _{IH} or V _{IL}	I _o = 6,0 mA I _o = 7,8 mA
	6,0		-	-	0,26	-	0,33	-	0,4	V		
Input leakage current	6,0	± I _I	-	-	0,1	-	1,0	-	1,0	µA	V _{CC} or GND	
3-state OFF-state current	6,0	± 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	V _{CC}	I _o = 0
MSI	6,0	I _{CC}	-	-	8,0	-	80,0	-	160,0	µA	GND	I _o = 0



D.C. family characteristics, PC74HCU

Voltages are referenced to GND (ground = 0 V)

parameter	V _{CC} V	symbol	T _{amb} (°C)						unit	conditions				
			+ 25			- 40 to + 85		- 40 to + 125		V _I	other			
			min.	typ.	max.	min.	max.	min.				max.		
HIGH level input voltage	2,0	V _{IH}	1,7	-	-	1,7	-	1,7	-	V				
	4,5		3,6	-	-	3,6	-	3,6	-	V				
	6,0		4,8	-	-	4,8	-	4,8	-	V				
LOW level input voltage	2,0	V _{IL}	-	-	0,3	-	0,3	-	0,3	V				
	4,5		-	-	0,9	-	0,9	-	0,9	V				
	6,0		-	-	1,2	-	1,2	-	1,2	V				
HIGH level output voltage	2,0	V _{OH}	1,8	-	-	1,8	-	1,8	-	V	V _{IH}	- I _o = 20 µA		
	4,5		4,0	-	-	4,0	-	4,0	-	V			or	- I _o = 20 µA
	6,0		5,5	-	-	5,5	-	5,5	-	V			V _{IL}	- I _o = 20 µA
HIGH level output voltage	4,5	V _{OH}	3,98	-	-	3,84	-	3,7	-	V	V _{CC}	- I _o = 4,0 mA		
	6,0		5,48	-	-	5,34	-	5,2	-	V			or GND	- I _o = 5,2 mA
LOW level output voltage	2,0	V _{OL}	-	-	0,2	-	0,2	-	0,2	V	V _{IH}	I _o = 20 µA		
	4,5		-	-	0,5	-	0,5	-	0,5	V			or	I _o = 20 µA
	6,0		-	-	0,5	-	0,5	-	0,5	V			V _{IL}	I _o = 20 µA
LOW level output voltage	4,5	V _{OL}	-	-	0,26	-	0,33	-	0,4	V	V _{CC}	I _o = 4,0 mA		
	6,0		-	-	0,26	-	0,33	-	0,4	V			or GND	I _o = 5,2 mA
Input leakage current	6,0	± I _I	-	-	0,1	-	1,0	-	1,0	µA	V _{CC}			
Quiescent supply current SSI	6,0	I _{CC}	-	-	2,0	-	20,0	-	40,0	µA	V _{CC}	I _o = 0		
											or GND			



D.C. family characteristics, PC74HCT

Voltages are referenced to GND (ground = 0 V)

parameter	V _{CC} V	sym- bol	T _{amb} (°C)						unit	conditions		
			+ 25			- 40 to + 85		- 40 to + 125		V _I	other	
			min.	typ.	max.	min.	max.	min.				max.
HIGH level input voltage	4,5-5,5	V _{IH}	2,0	-	-	2,0	-	2,0	-	V		
LOW level input voltage	4,5-5,5	V _{IL}	-	-	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	-	-	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	-	-	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}	-	-	0,26	-	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}	-	-	0,26	-	0,33	-	0,4	V	V _{IH} or V _{IL}	I _O = 6,0 mA
Input leakage current	5,5	± I _I	-	-	0,1	-	1,0	-	1,0	µA	V _{CC} or GND	
3-state OFF-state current	5,5	± 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 MSI	5,5	I _{CC}	-	-	4,0	-	40,0	-	80,0	µA	V _{CC} or GND	I _O = 0
MSI	5,5	I _{CC}	-	-	8,0	-	80,0	-	160,0	µA	GND	I _O = 0
A.Q.S.C. (see note)	4,5-5,5	I _{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.



A.C. family characteristics

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

PC74HC

parameter	V_{CC} V	symbol	T_{amb} (°C)						unit	
			+25			-40 to +85		-40 to +125		
			min.	typ.	max.	min.	max.	min.		max.
Output transition time standard outputs	2,0	$t_{THL}/$	-	-	75	-	95	-	110	ns
	4,5	t_{TLH}	-	-	15	-	19	-	22	ns
	6,0		-	-	13	-	16	-	19	ns
Output transition time bus driver outputs	2,0	t_{THL}	-	-	60	-	75	-	90	ns
	4,5	t_{TLH}	-	-	12	-	15	-	18	ns
	6,0		-	-	10	-	13	-	15	ns



PC74HCU

parameter	V_{CC} V	symbol	T_{amb} (°C)						unit	
			+25			-40 to +85		-40 to +125		
			min.	typ.	max.	min.	max.	min.		max.
Output transition time	2,0	t_{THL}	-	-	75	-	95	-	110	ns
	4,5	t_{TLH}	-	-	15	-	19	-	22	ns
	6,0		-	-	13	-	16	-	19	ns

PC74HCT

parameter	V_{CC} V	symbol	T_{amb} (°C)						unit	
			+25			-40 to +85		-40 to +125		
			min.	typ.	max.	min.	max.	min.		max.
Output transition time standard outputs	4,5	$t_{THL}/$ t_{TLH}	-	-	15	-	19	-	22	ns
Output transition time bus driver outputs	4,5	$t_{THL}/$ t_{TLH}	-	-	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

NAND/NOR gates

74HC/HCT00	quad 2-input NAND gate
74HC/HCT02	quad 2-input NOR gate
74HC/HCT03	quad 2-input NAND gate; open drain
74HC/HCT10	triple 3-input NAND gate
74HC/HCT20	dual 4-input NAND gate
74HC/HCT27	triple 3-input NOR gate
74HC/HCT30	8-input NAND gate
74HC7266	quad 2-input EXCLUSIVE-NOR gate
74HC/HCT4002	dual 4-input NOR gate

AND/OR/EXCLUSIVE-OR gates

74HC/HCT08	quad 2-input AND gate
74HC/HCT11	triple 3-input AND gate
74HC/HCT21	dual 4-input AND gate
74HC/HCT32	quad 2-input OR gate
74HC58	dual AND-OR gate
74HC/HCT86	quad 2-input EXCLUSIVE-OR gate
74HC/HCT4075	triple 3-input OR gate

Inverters/buffers/line drivers/level shifters

74HC/HCT04	hex inverter
74HCU04	hex inverter (unbuffered)
74HC/HCT125*	quad buffer/line driver; 3-state
74HC/HCT126*	quad buffer/line driver; 3-state
74HC/HCT240*	octal buffer/line driver; 3-state; inverting
74HC/HCT241*	octal buffer/line driver; 3-state
74HC/HCT244*	octal buffer/line driver; 3-state
74HC/HCT365*	hex buffer/line driver with common enable; 3-state
74HC/HCT366*	hex buffer/line driver with common enable; 3-state; inverting
74HC/HCT367*	hex buffer/line driver; 3-state
74HC/HCT368*	hex buffer/line driver; 3-state; inverting
74HC/HCT540*	octal buffer/line driver; 3-state; inverting
74HC/HCT541*	octal buffer/line driver; 3-state
74HC4049	hex inverting HIGH-to-LOW level shifter
74HC4050	hex HIGH-to-LOW level shifter

* Types with a bus driver output stage.



Flip-flops/latches/registers

74HC/HCT73	dual JK flip-flop with reset; negative-edge trigger
74HC/HCT74	dual D-type flip-flop with set and reset; positive edge-trigger
74HC/HCT75	quad bistable transparent latch
74HC/HCT107	dual JK flip-flop with reset; negative-edge trigger
74HC/HCT109	dual JK flip-flop with set and reset; positive edge-trigger
74HC/HCT112	dual JK flip-flop with set and reset; negative edge-trigger
74HC/HCT173*	quad D-type flip-flop; positive-edge trigger; 3-state
74HC/HCT174	hex D-type flip-flop with reset; positive-edge trigger
74HC/HCT175	quad D-type flip-flop with reset; positive edge-trigger
74HC/HCT259	8-bit addressable latch
74HC/HCT273	octal D-type flip-flop with reset; positive edge-trigger
74HC/HCT373*	octal D-type transparent latch; 3-state
74HC/HCT374*	octal D-type flip-flop; positive-edge trigger; 3-state
74HC/HCT377	octal D-type flip-flop with data enable; positive-edge trigger
74HC/HCT533*	octal D-type transparent latch; 3-state; inverting
74HC/HCT534*	octal D-type flip-flop; positive-edge trigger; 3-state; inverting
74HC/HCT563*	octal D-type transparent latch; 3-state; inverting
74HC/HCT564*	octal D-type flip-flop; positive-edge trigger; 3-state; inverting
74HC/HCT573*	octal D-type transparent latch; 3-state
74HC/HCT574*	octal D-type flip-flop; positive-edge trigger; 3-state

Shift registers

74HC/HCT164	8-bit serial-in/parallel-out shift register
74HC/HCT165	8-bit parallel-in/serial-out shift register
74HC/HCT166	8-bit parallel-in/serial-out shift register
74HC/HCT194	4-bit bidirectional universal shift register
74HC/HCT195	4-bit parallel access shift register
74HC/HCT299*	8-bit universal shift register; 3-state
74HC/HCT7597	8-bit shift register with input latches
74HC/HCT670*	4 x 4 register file; 3-state
74HC/HCT4015	dual 4-bit serial-in/parallel-out shift register
74HC/HCT4094	8-stage shift-and-store bus register
74HC/HCT7030	9-bit x 64 word FIFO register; 3-state
74HC/HCT40104*	4-bit bidirectional universal shift register; 3-state
74HC/HCT40105	4-bit x 16 word FIFO register



* Types with a bus driver output stage.

Arithmetic circuits

74HC/HCT85	4-bit magnitude comparator
74HC/HCT181	4-bit arithmetic logic unit
74HC/HCT182	look-ahead carry generator
74HC/HCT280	9-bit odd/even parity generator/checker
74HC/HCT283	4-bit full adder with fast carry
74HC/HCT583	4-bit full adder with fast carry
74HC/HCT688	8-bit magnitude comparator

Counters

74HC/HCT93	4-bit binary ripple counter
74HC/HCT160	presetable synchronous BCD decade counter; asynchronous reset
74HC/HCT161	presetable synchronous 4-bit binary counter; asynchronous reset
74HC/HCT162	presetable synchronous BCD decade counter; synchronous reset
74HC/HCT163	presetable synchronous 4-bit binary counter; synchronous reset
74HC/HCT190	presetable synchronous BCD decade up/down counter
74HC/HCT191	presetable synchronous 4-bit binary up/down counter
74HC/HCT192	presetable synchronous BCD decade up/down counter
74HC/HCT193	presetable synchronous 4-bit binary up/down counter
74HC/HCT390	dual decade ripple counter
74HC/HCT393	dual 4-bit binary ripple counter
74HC/HCT4017	Johnson decade counter with 10 decoded outputs
74HC/HCT4020	14-stage binary ripple counter
74HC/HCT4024	7-stage binary ripple counter
74HC/HCT4040	12-stage binary ripple counter
74HC/HCT4059	programmable divide-by-n counter
74HC/HCT4060	14-stage binary ripple counter with oscillator
74HC/HCT4510	BCD up/down counter
74HC/HCT4516	binary up/down counter
74HC/HCT4518	dual synchronous BCD counter
74HC/HCT4520	dual synchronous 4-bit binary counter
74HC/HCT40102	8-stage synchronous BCD down counter
74HC/HCT40103	8-bit synchronous binary down counter

Multiplexers

74HC/HCT151	8-input multiplexer
74HC/HCT153	dual 4-input multiplexer
74HC/HCT157	quad 2-input multiplexer
74HC/HCT158	quad 2-input multiplexer; inverting
74HC/HCT251	8-input multiplexer; 3-state
74HC/HCT253*	dual 4-input multiplexer; 3-state
74HC/HCT257*	quad 2-input multiplexer; 3-state
74HC/HCT258	quad 2-input multiplexer; 3-state
74HC/HCT354*	8-input multiplexer/register with transparent data latch; 3-state
74HC/HCT356*	8-input multiplexer/register; 3-state

* Types with a bus driver output stage.



Decoders/demultiplexers

74HC/HCT42	BCD to decimal decoder (1-of-10)
74HC/HCT137	3-to-8 line decoder/demultiplexer with address latches
74HC/HCT138	3-to-8 line decoder/demultiplexer; inverting
74HC/HCT139	dual 2-to-4 line decoder/demultiplexer
74HC/HCT147	10-to-4 line priority encoder
74HC/HCT154	4-to-16 line decoder/demultiplexer
74HC/HCT237	3-to-8 line decoder/demultiplexer with address latches
74HC/HCT238	3-to-8 line decoder/demultiplexer
74HC/HCT4511	BCD to 7-segment latch/decoder/driver
74HC/HCT4514	4-to-16 line decoder/demultiplexer with input latches
74HC/HCT4515	4-to-16 line decoder/demultiplexer with input latches
74HC/HCT4543	BCD-to-7 segment latch/decoder/driver for LCDs

Switches/multiplexers/demultiplexers

74HC/HCT4016	quad bilateral switches
74HC/HCT4051	8-channel analog multiplexer/demultiplexer
74HC/HCT4052	dual 4-channel analog multiplexer/demultiplexer
74HC/HCT4053	triple 2-channel analog multiplexer/demultiplexer
74HC/HCT4066	quad bilateral switches
74HC/HCT4067	16-channel analog multiplexer/demultiplexer
74HC/HCT4316	quad bilateral switches
74HC/HCT4351	8-channel analog multiplexer/demultiplexer with latch
74HC/HCT4352	dual 4-channel analog multiplexer/demultiplexer with latch
74HC/HCT4353	triple 2-channel analog multiplexer/demultiplexer with latch

Bus transceivers

74HC/HCT242*	quad bus transceiver; 3-state; inverting
74HC/HCT243*	quad bus transceiver; 3-state
74HC/HCT245*	octal bus transceiver; 3-state
74HC/HCT640*	octal bus transceiver; 3-state; inverting
74HC/HCT643*	octal bus transceiver; 3-state; true/inverting
74HC/HCT646*	octal bus transceiver/register; 3-state
74HC/HCT648*	octal bus transceiver/register; 3-state; inverting

Schmitt triggers

74HC/HCT14	hex inverting Schmitt trigger
74HC/HCT132	quad 2-input NAND Schmitt trigger

One-shot multivibrators

74HC/HCT123	dual retriggerable monostable multivibrator with reset
74HC/HCT221	dual non-retriggerable monostable multivibrator with reset
74HC/HCT423	dual retriggerable monostable multivibrator with reset
74HC/HCT4538	dual retriggerable precision monostable multivibrator

Miscellaneous

74HC/HCT297	digital phase-locked-loop filter
74HC/HCT4046A	phase-locked loop with VCO
74HC/HCT7046	PLL with lock detector

* Types with a bus driver output stage.



TTL FAMILY CHARACTERISTICS COMPARISON

	SSI gates propagation delay	flip-flops toggle rate	MSI ALU 4-bit add time
STANDARD TTL (STD) 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 insure the highest speed possible at TTL logic levels.	3 ns at 30 mW	90 MHz	11 ns
FAST TTL (F) 74F00 Series SSI and MSI New FAST Series offer higher speed than Schottky TTL.	3 ns at 4 mW	-	-



TTL 74 SERIES		STD	LS	S	F
Gates					
7400	quad 2-input NAND gate	●	●	●	●
7401	quad 2-input NAND gate (open collector)		●		
7402	quad 2-input NOR gate	●	●		●
7403	quad 2-input NAND gate (open collector)		●	●	
7408	quad 2-input AND gate	●	●	●	●
7409	quad 2-input AND gate (open collector)		●		
7410	triple 3-input NAND gate	●	●	●	●
7411	triple 3-input AND gate	●	●	●	●
7420	dual 4-input NAND gate	●	●	●	●
7421	dual 4-input AND gate	●	●		
7425	dual 4-input NOR gate with strobe	●			
7426	quad 2-input NAND gate (open collector)		●		
7427	triple 3-input NOR gate	●	●		●
7430	8-input NAND gate	●	●	●	●
7432	quad 2-input OR gate	●	●	●	●
7450	expandable dual 2-wide 2-input AND-OR-invert gate	●			
7451	dual 2-wide 2-input AND-OR-invert gate	●	●	●	●
7454	4-wide 2 and 3-input AND-OR-invert gate		●		
7464	4-2-3-2-input AND-OR-invert gate			●	●
7486	quad 2-input EXCLUSIVE-OR gate	●	●	●	●
74133	13-input NAND gate			●	
74134	12-input NAND gate (3-state)			●	
74135	quad EXCLUSIVE-OR/NOR gate			●	
74136	quad EXCLUSIVE-OR gate (open collector)		●		
74260	dual 5-input NOR gate		●	●	●
74266	quad 2-input EXCLUSIVE-NOR gate (open collector)		●		
Buffers, inverters					
7404	hex inverter	●	●	●	●
7405	hex inverter (open collector)		●	●	
7406	hex inverter buffer/driver (open collector)	●			
7407	hex buffer/driver (open collector)	●			
7416	hex inverter buffer/driver (open collector)	●			
7417	hex buffer/driver (open collector)	●			
7428	quad 2-input NOR buffer	●			
7433	quad 2-input NOR buffer (open collector)		●		
7437	quad 2-input NAND buffer	●	●	●	●
7438	quad 2-input NAND buffer (open collector)		●	●	●
7439	quad 2-input NAND buffer (open collector)		●	●	●
7440	dual 4-input NAND buffer	●	●	●	●
74827	10-bit buffer, non-inverting				○
74828	10-bit buffer, inverting				○
741240	octal buffer (3-state); light load				○
741241	octal buffer (3-state); light load				○
741244	octal buffer (3-state)				●
741245	octal bus transceiver (3-state); light load				○



○ = planned.

TTL 74 SERIES

STD LS S F

Bus drivers,
transceivers

Part Number	Function	STD	LS	S	F
74125	quad buffer (3-state)	●	●		●
74126	quad buffer (3-state)	●	●		●
74128	quad 2-input NOR buffer	●			
74240	octal inverter buffer (3-state)		●	●	●
74241	octal buffer (3-state)		●	●	
74242	quad bus inverting transceiver (3-state)		●	●	●
74243	quad transceiver (3-state)		●	●	●
74244	octal buffer (3-state)		●	●	●
74245	octal bus transceiver (3-state)		●		●
74365A	hex buffer/driver (3-state)	●	●		●
74366A	hex inverter buffer (3-state)	●	●		●
74367A	hex buffer/driver (3-state)	●	●		●
74368A	hex inverter buffer (3-state)	●	●		●
74540	octal buffer/line driver (3-state)		●		●
74541	octal non-inverting buffer/line driver (3-state)		●		●
74545	octal bus transceiver (3-state)				●
74550	octal registered transceiver (AMD2950)				○
74551	octal registered transceiver (AMD2951)				○
74552	octal registered transceiver with status flags				○
74588	GPIO compatible octal transceiver				●
74620	octal bus transceiver (3-state)		●		●
74621	octal bus transceiver (O.C.)		●		●
74622	octal bus transceiver (O.C.)		●		●
74623	octal bus transceiver (3-state)		●		●
74640	inverting octal bus transceiver (3-state)		●		●
74640-1	inverting octal bus transceiver (3-state)		●		●
74641	octal bus transceiver (open collector)		●		●
74641-1	octal bus transceiver (open collector)		●		●
74642	inverting octal bus transceiver (open collector)		●		●
74642-1	inverting octal bus transceiver (open collector)		●		●
74645	octal bus transceiver (3-state)		●		
74645-1	octal bus transceiver (3-state)		●		
74646	octal bus transceiver and register (3-state)				○
74647	octal bus transceiver and register (O.C.)				○
74648	octal bus transceiver and register (3-state)				○
74649	octal bus transceiver and register (O.C.)				○
74861	10-bit transceiver, non-inverting				○
74862	10-bit transceiver, inverting				○
74863	9-bit transceiver, non-inverting (3-state)				○
74864	9-bit transceiver, inverting (3-state)				○
741242	quad transceiver; inverting (3-state) light load				●
741243	quad transceiver (3-state); light load				●
743037	quad 2-input NAND, 30 Ohm transmission line driver				●
743038	quad 2-input NAND, 30 Ohm transmission line driver, (O.C.)				●
743040	dual 4-input NAND, 30 Ohm transmission line driver				●
7430240	octal inverting 30 Ohm transmission line driver				○
7430241	octal 30 Ohm transmission line driver				○
7430244	octal 30 Ohm transmission line driver				○

○ = planned.

Electronic
components
and materials

TTL 74 SERIES		STD	LS	S	F
Flip-flops					
7413	dual 4-input NAND Schmitt trigger	●	●		●
7414	hex inverter Schmitt trigger	●	●		●
7473	dual JK master-slave flip-flop	●	●		
7474	dual D-type edge-triggered flip-flop			●	●
7474A	dual D-type edge-triggered flip-flop		●		
7476	dual JK master-slave flip-flop	●	●		
74107	dual JK master-slave flip-flop	●	●		
74109	dual JK positive-edge triggered flip-flop	●	●		
74112	dual JK negative-edge triggered flip-flop		●	●	○
74113	dual JK positive-edge triggered flip-flop		●	●	○
74114	dual JK negative-edge triggered flip-flop				○
74121	monostable multivibrator	●			
74123	dual retriggerable monostable multivibrator	●			
74132	quad 2-input NAND Schmitt trigger	●	●		●
74173	quad D-type flip-flop (3-state)	●	●		
74174	hex D-type flip-flop with reset	●	●		●
74175	quad D-type edge-triggered flip-flop with reset	●	●	●	●
74221	dual monostable multivibrator	●			
74273	octal D-type flip-flop with reset		●		●
74364	octal D-type flip-flop (3-state)		●		
74374	octal D-type flip-flop (3-state)		●	●	●
74377	octal D-type flip-flop with clock enable		●		●
74378	hex D-type flip-flop with clock enable		●		●
74379	quad D flip-flop with enable				
74564	octal D flip-flop (3-state) broadside pinout				○
74574	octal D flip-flop (3-state) broadside pinout				○
Shift registers					
7494	4-bit shift register	●			
7495	4-bit shift register	●			
7495B	4-bit left-right shift register		●		
7496	5-bit shift register	●	●		
74164	8-bit serial-in/parallel-out shift register	●	●		○
74165	8-bit parallel-in/serial-out shift register				○
74166	8-bit parallel-in/serial-out shift register	●			
74170	4x4 register file (open collector)	●	●		
74172	16-bit multiple port register file (3-state)			●	
74194	4-bit bidirectional universal shift register	●	●	●	●
74194A	4-bit bidirectional universal shift register		●		
74195	4-bit parallel access shift register	●		●	●
74195A	4-bit parallel access shift register		●		
74198	8-bit bidirectional universal shift register				○
74199	8-bit parallel-access shift register	●			○
74225	FIFO			●	○
74295B	4-bit shift register (3-state)		●		
74299	octal shift/storage register (3-state)				○
74322	octal shift/storage register (3-state)				○
74323	octal shift/storage register (3-state)				○
74395A	4-bit cascadable shift register (3-state)		●		
74398	quad 2-port register true				●
74399	quad 2-port register true				●



○ = planned.



Electronic components and materials

TTL 74 SERIES

STD LS S F

Shift registers (cont.)

74595	8-bit shift register with output latch	
74597	8-bit shift register with input latch	
74598	8-bit shift register with input latch	
74670	4x4 register file (3-state)	
74673	16-bit serial-in, serial/parallel-out shift register (3-state)	
74674	16-bit serial/parallel-in, serial out shift register (3-state)	
74675	16-bit serial-in, serial/parallel-out shift register (3-state)	
74676	16-bit serial/parallel-in, serial out shift register (3-state)	

Other registers

74821	10-bit register, non-inverting	
74822	10-bit register, inverting	
74823	9-bit register, non-inverting	
74824	9-bit register, inverting	
74825	9-bit register, non-inverting	
74826	9-bit register, inverting	

Counters

7490	4-bit decade ripple counter	
7492	divide-by-twelve counter	
7493	4-bit binary ripple counter	
74160	synchronous BCD decade counter	
74160A	synchronous BCD decade counter	
74161	synchronous 4-bit binary counter	
74161A	synchronous 4-bit binary counter	
74162A	synchronous BCD decade counter	
74163	synchronous 4-bit binary counter	
74163A	synchronous 4-bit binary counter	
74168A	synchronous BCD decade up/down counter	
74169A	synchronous 4-bit binary up/down counter	
74190	presettable BCD/decade up/down counter	
74191	presettable 4-bit binary up/down counter	
74192	presettable BCD/decade up/down counter	
74193	presettable 4-bit binary up/down counter	
74197	presettable 4-bit binary ripple counter	
74269	8-bit binary counter	
74290	4-bit decade ripple counter	
74293	4-bit binary ripple counter	
74390	dual decade ripple counter	
74393	dual 4-bit binary ripple counter	
74490	dual BCD decade ripple counter	
74568A	BCD decade up/down synchronous counter (3-state)	
74569A	4-bit binary up/down synchronous counter (3-state)	
74579	8-bit up/down counter, common I/O (3-state)	
74779	8-bit up/down counter, common I/O (3-state)	

○ = planned.



Electronic components and materials

PHILIPS

TTL 74 SERIES		STD	LS	S	F
TTL 74 SERIES		STD	LS	S	F
Latches					
7475	quad bistable latch	●	●		
74116	dual 4-bit transparent latch with reset	●			
74256	dual 4-bit addressable latch		●		●
74259	8-bit addressable latch		●		●
74279	quadruple S-R latch	●			
74363	octal transparent latch (3-state)		●		
74373	octal transparent latch (3-state)		●	●	●
74375	quad transparent bistable latch		●		
74412	octal multimode buffered latch				○
74432	octal multimode buffered latch				○
74533	inverting octal D-type latch (3-state)				●
74534	octal D-type flip-flop (3-state)			●	●
74543	octal transparent bidirectional latch				○
74544	octal transparent bidirectional latch				○
74563	octal D latch (3-state) broadside pinout				○
74573	octal D latch (3-state) broadside pinout				○
74604	dual 8-bit latch (3-state)				●
74605	dual 8-bit latch (O.C.)				●
74841	10-bit latch, non-inverting				○
74842	10-bit latch, inverting				○
74843	9-bit latch, non-inverting				○
74844	9-bit latch, inverting				○
74845	8-bit latch, non-inverting				○
74846	8-bit latch, inverting				○
Decoders/drivers					
7445	BCD-to-decimal decoder/driver (open collector)	●			
74140	dual 4-input NAND line driver (50 Ohm)			●	
74145	BCD-to-decimal decoder/driver (open collector)	●			
74445	BCD-to-decimal decoder/driver (open collector)		●		



○ = planned.



Electronic components and materials

TTL 74 SERIES

STD LS S F

Decoders/(de)multiplexers

7442	BCD-to-decimal decoder (1-of-10)	
74138	3-line to 8-line decoder/demultiplexer	
74139	dual 2-line to 4-line decoder/demultiplexer	
74147	10-line to 4-line priority encoder	
74148	8-line to 3-line priority encoder	
74150	16-line to 1-line multiplexer	
74151	8-line to 1-line multiplexer	
74153	dual 4-line to 1-line multiplexer	
74154	4-line to 16-line decoder/demultiplexer	
74155	dual 2-line to 4-line decoder/demultiplexer	
74156	dual 2-line to 4-line decoder/demultiplexer (open collector)	
74157	quad 2-input data selector/multiplexer; non-inverting	
74158	quad 2-input data selector/multiplexer; inverting	
74251	8-line to 1-line multiplexer (3-state)	
74251A	8-line to 1-line multiplexer (3-state)	
74253	dual 4-line to 1-line multiplexer (3-state)	
74257	quad 2-line to 1-line data selector/multiplexer (3-state)	
74257A	quad 2-line to 1-line data selector/multiplexer (3-state)	
74258	quad 2-line to 1-line data selector/multiplexer (3-state)	
74258A	quad 2-line to 1-line data selector/multiplexer (3-state)	
74298	quad 2-port register	
74352	dual 4-input multiplexer	
74353	dual 4-input multiplexer (3-state)	
74384	8-bit serial/parallel two's complement multiplier	
74537	1-of-10 decoder (3-state)	
74538	1-of-8 decoder (3-state)	
74539	dual 1-of-4 decoder (3-state)	
74547	octal decoder/multiplexer	
74548	octal decoder/multiplexer	
74557	8x8 multiplier with latch (3-state)	
74558	8x8 multiplier (3-state)	

= planned.



Electronic components and materials

TTL 74 SERIES		STD	LS	S	F
Arithmetic circuits					
7483	4-bit binary full adder (ripple carry)	●			
7483A	4-bit binary full adder (fast carry)		●		
7485	4-bit magnitude comparator	●	●	●	●
74180	8-bit odd/even parity generator/checker	●			
74181	4-bit arithmetic logic unit	●	●	●	●
74182	look-ahead carry generator			●	○
74280	9-bit odd/even parity generator/checker			●	
74280A	9-bit odd/even parity generator/checker				●
74283	4-bit full adder with fast carry		●	○	○
74350	4-bit shifter (3-state)			●	●
74381	4-bit arithmetic logic unit				○
74382	4-bit arithmetic logic unit				○
74385	quad serial adder/subtractor				○
74455	octal buffer with parity generator checker				●
74456	octal buffer with parity generator checker				●
74521	8-bit identify comparator				●
74524	8-bit register comparator (O.C.)				○
74655A	octal inverting buffer with parity generator checker				●
74656A	octal buffer with parity generator checker (3-state)				●
74657	octal bus transceiver with parity generator checker				●
74881	arithmetic logic unit/function generator				○
74882	32-bit look-ahead carry generator				○
Memories					
74189	64-bit bipolar scratchpad memory (16x4)			●	○
74301	256-bit TTL RAM (256x1)		●	●	
Special functions					
74630	memory error detector/corrector (3-state)				○
74631	memory error detector/corrector (O.C.)				○
74764	dual port RAM controller	●		○	○
74765	dual port RAM controller without latch		○		○
74784	8-bit serial multiplier and adder subtractor				○
741801	bit stream manager EN/DEC		●		
741802	bit stream manager SER/DES		●		



○ = planned.

TTL 8200, 9300 AND 9600 SERIES**Arithmetic circuits**

82S82	4-bit arithmetic unit
82S83	4-bit BCD adder

Counters

9310	4-bit decade counter
9316	4-bit binary counter

Decoders/display drivers

82S50	binary-to-octal decoder
82S52	BCD-to-decimal decoder

Flip-flops

9602	dual monostable multivibrator
-------------	-------------------------------

Multiplexers

8234	2-input, 4-bit digital multiplexer
8266	2-input, 4-bit digital multiplexer
9309	dual 4-input multiplexer
9322	data selector/multiplexer

Parity functions

82S41	quad EXCLUSIVE-OR gate
8242	quad EXCLUSIVE-NOR gate
8262	8-bit parity generator and checker
82S62	8-bit parity generator and checker
9324	5-bit comparator

Registers/latches

8262	8-bit parity generator/checker
82S62	8-bit parity generator/checker
8271	4-bit shift register
8273	10-bit serial-in/parallel-out shift register
8274	10-bit parallel-in/serial-out shift register
8881	quad 2-input NAND O/C
8890	HEX inverter
8891	HEX inverter
9334	8-bit addressable latch
9386	quad exclusive - NOR



TTL 8T00 SERIES**Timing circuits**

8T20 bidirectional one shot

Line drivers/receivers/transceivers

8T09 quad 3-state bus driver
8T10 quad 3-state D-type bus latch
8T13 dual low impedance line driver
8T15 dual communications line driver
8T16 dual communications line receiver
8T23 dual IBM 360/370 line driver
8T24 triple IBM 360/370 line receiver
8T26A quad inverting bus transceiver (3-state)
8T28 quad non-inverting bus transceiver (3-state)
8T34 quad bus transceiver (3-state)
8T37 hex bus receiver/Schmitt trigger
8T38 quad bus transceiver (open collector)
8T95/97 high-speed hex buffer (3-state)
8T96/98 high-speed hex inverter (3-state)
8T125 octal transceiver (inverting)
8T126 quad bus driver/receiver (inverting)
8T127 quad bus driver/receiver (inverting)
8T128 quad bus driver/receiver (non-inverting)
8T129 quad bus driver/receiver (non-inverting)
8T245 octal transceiver
8T380 quad bus receiver with hysteresis/Schmitt trigger
8T3404 high-speed 6-bit latch

8TS805 octal transparent latch (3-state)
8TS806 octal D-type flip-flop (3-state)
8TS807 octal transparent latch (3-state)
8TS808 octal D-type flip-flop (3-state)
8TS809 octal transparent latch; inverting; 3-state

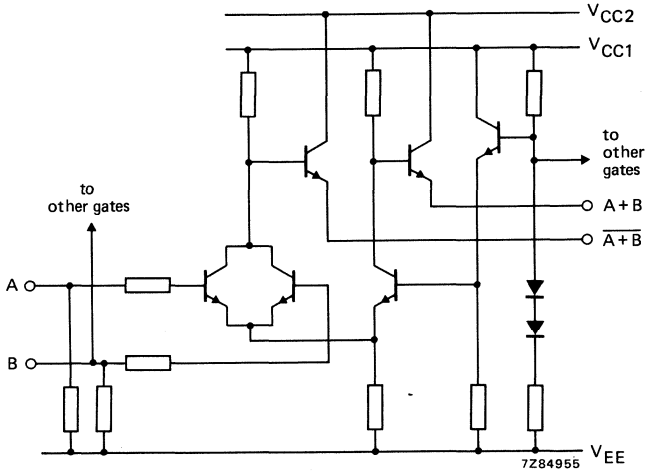


ECL 10 000 FAMILY SPECIFICATIONS

The 10K family of ECL silicon monolithic integrated circuits is designed for high speed central processors and digital communication systems.

With 2,0 ns typical propagation delay and only 25 mW power dissipation per gate, this family offers an excellent speed-power product and so is recommended for high speed large system design.

Basic gate circuit



Family ratings

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

Supply voltage (d.c.)	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



Electronic components and materials

D.C. family characteristics

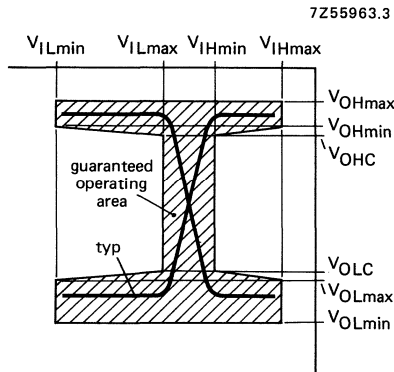
$V_{CC} = \text{ground}; V_{EE} = -5.2 \text{ V}; R_L = 50 \text{ Ohm to } -2 \text{ V}$

Each 10K circuit has been designed to meet the d.c. 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 $> 2.5 \text{ m/s}$ 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}			unit
		-30 °C	+25 °C	+75 °C	
Output voltage HIGH	V_{OHA}	-890	-810	-700	mV
	V_{OHB}	-1060	-960	-890	mV
Output voltage LOW	V_{OLA}	-1675	-1650	-1615	mV
	V_{OLB}	-1890	-1850	-1825	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

Gates

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
10104	quadruple 2-input, 3 AND and 1 AND/NAND gate
10105	triple 2-3-2 input OR/NOR gate
10106	triple 4-3-3 input NOR gate
10107	triple 2-input EXCLUSIVE-OR/EXCLUSIVE-NOR gate
10108	dual 3-input AND/NAND gate
10109	dual 4-5 input OR/NOR gate
10110	dual 3-input/3-output OR gate (line driver)
10111	dual 3-input/3-output NOR gate (line driver)
10113	quadruple EXCLUSIVE-OR gate (with enable)
10117	dual 2-wide 2-3-input OR-AND/OR-AND-INVERT gate
10118	dual 2-wide 3-input OR-AND gate
10119	4-wide 4-3-3-3-input OR-AND gate
10121	4-wide OR-AND/OR-AND-INVERT gate
10210	high speed dual 3-input/3-output OR gate
10211	high speed dual 3-input/3-output NOR gate
10216	triple differential amplifier

Interfaces

10114	triple line receiver (output OR/NOR)
10115	quadruple line receiver (output OR)
10116	triple line receiver (output OR/NOR)
10123	triple bus driver (4-3-3-input; output NOR)
10124	quadruple TTL to ECL translator
10125	quadruple ECL to TTL translator
10129	quadruple TTL/IBM bus receiver/latch
10188	hex buffer (non-inverting) with enable
10189	hex inverter with enable
10192	quadruple current-mode bus driver



Flip-flops

10130	dual D-type latch
10131	dual D-type master-slave flip-flop
10133	quadruple latch with D-type inputs and enable outputs
10135	dual JK master-slave flip-flop
10175	quint D-latch with common reset and two wired-OR common clock inputs
10176	hex D-type master-slave flip-flop
10231	high speed dual D-type master-slave flip-flop

Counters and registers

10136	universal hexadecimal counter
10137	universal decade counter
10141	4-bit universal shift register

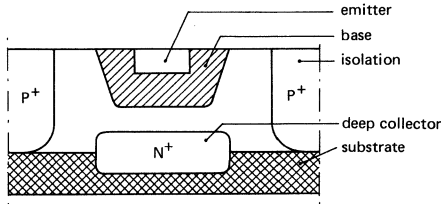
Complex functions

10132	dual 2-input multiplexer with clocked D-type latches and common reset
10134	dual 2-input multiplexer with clocked D-type latches
10149	1024-bit, 4-bits per word PROM (bip. memory)
10155	16-bit, 2-bits per word CAM (bip. memory)
10158	quadruple 2-to-1 multiplexer (non-inverting)
10159	quadruple 2-to-1 multiplexer (inverting)
10160	12-bit parity checker/generator
10161	3-bit decoder with two enable inputs (1 of 8 lines LOW)
10162	3-bit decoder with two enable inputs (1 of 8 lines HIGH)
10164	8-input multiplexer with enable input
10165	8-input priority encoder
10171	dual 2-bit decoder (1 of 4 lines LOW)
10172	dual 2-bit decoder (1 of 4 lines HIGH)
10173	quadruple 2-input multiplexer with latched outputs
10174	dual 4-to-1 multiplexer (with enable)
10179	look-ahead carry block
10180	dual 2-bit adder/subtractor
10181	4-bit arithmetic logic unit
10191	hex ECL-MST translator

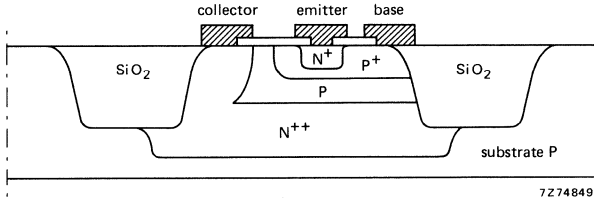


ECL 100 000 FAMILY SPECIFICATIONS

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 increase 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 (d.c.):	V_{EE} max. -7 V
Input voltage range:	$V_I = 0$ to V_{EE} if $V_{EE} > -6\text{ V}$; 0 to $-6\text{ V} > V_{EE} > -7\text{ V}$
Output current:	I_O max. 55 mA
Storage temperature range:	T_{stg} -55 to $+150\text{ }^\circ\text{C}$



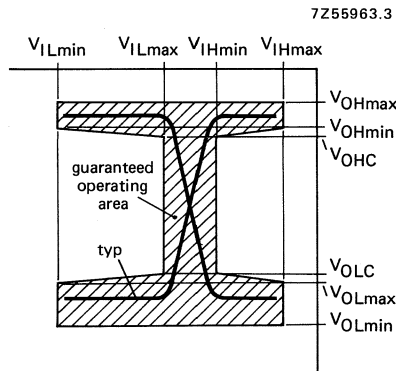
D.C. family characteristics

V_{CC} ground; $V_{EE} = -4,5\text{ V}$; $T_{amb} = 0\text{ to }+85\text{ }^\circ\text{C}$; $R_L = 50\text{ Ohm to }-2\text{ V}$.

Each 100K circuit has been designed to meet the d.c. 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 $> 2,5\text{ m/s}$ 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}	- 880	mV
	V_{IHB}	- 1165	mV
Input voltage LOW	V_{ILA}	- 1475	mV
	V_{ILB}	- 1810	mV
Output voltage HIGH	V_{OHA}	- 880	mV
	V_{OHB}	- 1025	mV
Output voltage LOW	V_{OLA}	- 1620	mV
	V_{OLB}	- 1810	mV
Output threshold voltage HIGH	V_{OHC}	- 1035	mV
	V_{OLC}	- 1610	mV



ECL 100 000 FAMILY SURVEY**Gates**

100101	triple 5-input OR/NOR gate
100102	quintuple 2-input OR/NOR gate with common enable
100107	quintuple EXCLUSIVE OR/NOR gate with compare
100112	quadruple double fan-out OR/NOR gate
100113	quadruple fan-out OR/NOR gate
100117	triple 1-2-2 input OR/AND-OR/NAND gate
100118	2-4-4-4-5 input OR/AND-OR/NAND gate

Drivers

100123	hex bus driver
---------------	----------------

Interfaces

100114	quintuple differential line receiver
100122	9-bit buffer gate
100126	9-bit buffer gate
100175	5-bit 100K to 10K interface with latch
100255	5-bit ECL/TTL interface

Flip-flops

100131	triple D master-slave flip-flop
100131A	high-speed triple D master-slave flip-flop
100150	hex D latch flip-flop
100151	hex D master-slave flip-flop

Matrix

100158	8-bit shift matrix
---------------	--------------------

Multiplexers

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

Counters and registers

100136	multipurpose counting register
100141	8-bit universal shift register
100145	16x4 register file

Complex functions

100160	dual 9-bit parity generator/8-bit comparator
100165	universal priority encoder
100166	9-bit comparator
100170	universal demultiplexer/decoder
100179	high speed carry look ahead generator
100180	fast 6-bit adder
100181	4-bit ALU binary/decimal



BIPOLAR TTL RAM

device	organization	output circuit ¹⁾	output logic ²⁾	access time (ns)	temperature range ³⁾	package	no. of pins	I _{CCmax} (mA)
3101A	16x4	OC	B	35	C	F,N	16	105
74S189	16x4	TS	B	35	C	F,N	16	110
82S16	256x1	TS	T	50	C	F,N	16	115
82S16				70	M	F		120
74S301	256x1	OC	B	50	C	F,N	16	115
82LS16	256x1	TS	T	40	C	F,N	16	70
74LS301	256x1	OC	B	40	C	F,N	16	70
82S09	64x9	OC	T	45	C	F,N	28	190
82S09A				35	C	F,N	28	190
82S19	64x9	OC	B	35	C	F,N	28	190
82S212	256x9	TS	B	45	C	F,N	24	185
82S212				70	M	F		200
82S212A				35	C	F,N		185
8X350	256x8	TS	B	N/A	C	F,N	22	185
8X350				N/A	M	F		200

Notes

- 1) Output circuit : OC = Open collector
 TS = 3-state
- 2) Output logic : T = Transparent - input data appears on output during Write
 B = Blanked - output is blanked during Write
- 3) Temperature range : C = Commercial (0 °C to +75 °C)
 M = Military (-55 °C to +125 °C)



BIPOLAR TTL PROM

device	organization	output circuit ¹⁾	access time (ns)	temperature range ²⁾	package	no. of pins	I _{CCmax} (mA)
82S23	32x8	OC	50	C	F,N	16	77
82S23A			25	C	F,N		100
82S123	32x8	TS	65	M	F	16	85
			82S123A	50	C		F,N
82S126	256x4	OC	25	C	F,N	16	85
			82S126A	65	M		F
82S129	256x4	TS	50	C	F,N	16	120
			82S129A	27	C		F,N
82S130	512x4	OC	70	M	F	16	125
	82S130A	OC	50	C	F,N		140
82S131	512x4	OC	33	C	F,N	16	140
	82S131A	OC	70	M	F		140
82S137	512x4	TS	50	C	F,N	16	140
	82S137A	TS	30	C	F,N		140
82LS135	512x4	TS	70	M	F	16	140
	82S135	TS	100	C	F,N		20
82S115	256x8	TS	45	C	F,N	20	155
	82S115	TS	60	C	F,N		24
82S137	512x8	TS	90	M	F	24	185
	82S137	TS	90	M	F		185
82HS137	1024x4	TS	60	C	F,N	18	140
	82HS137	TS	70	M	F		150
82S137A	1024x4	TS	45	C	F,N	18	140
	82S137B	TS	70	M	F		150
82S147	1024x4	TS	45	C	F,N	18	140
	82S147	TS	35	C	F,N		18
82S147A	512x8	TS	60	C	F,N	20	155
	82S147A	TS	45	C	F,N		20
82LS181	512x8	TS	45	C	F,N	20	155
	82LS181	TS	150	C	F,N		24
82S181	1024x8	TS	70	C	F,N	24	175
	82S181	TS	90	M	F,G		185
82S181A	1024x8	TS	50	C	F,N	24	175
	82S181A	TS	80	M	F,G		185
82S181B	1024x8	TS	45	C	F,N	24	175
	82S183	TS	60	C	F,N		24
82S185	1024x8	TS	100	C	I,N	18	120
	82S185	TS	115	M	I		130
82S185A	2048x4	TS	50	C	F,N	18	155
	82S185A	TS	80	M	F,G		160
82S185B	2048x4	TS	45	C	F,N	18	155
	82S185B	TS	45	C	N		24
82HS187	1024x8	TS	45	-	N	24	185
	82HS187	TS	45	-	N		24
82S191	1024x8	TS	80	C	F,N	24	175
	82S191	TS	100	M	F,G		185
82S191A	2048x8	TS	55	C	F,N	24	175
	82S191A	TS	80	C	F,G		185

- 1) Output circuit : OC = Open collector; TS = 3-state
 2) Temperature range : C = Commercial (0 °C to +75 °C)
 : M = Military (-55 °C to +125 °C)



Electronic components and materials

BIPOLAR TTL PROM (cont.)

device	organization	output circuit ¹⁾	access time (ns)	temperature range ²⁾	package	no. of pins	I _{CCmax} (mA)
82S191B	4096x4	TS	45	C	F,N	20	175
82S195			30	C	F,N		155
			50	M	F		165
82HS195	4096x4	TS	30	C	F,N		155
82HS195A	4096x4	TS	35	-	N	20	145
82HS195B	4096x4	TS	25	-	N	20	145
82S321	4096x8	TS	70	-	N	24	175
82HS321	4096x8	TS	35	C	F,N	24	175
82HS321A	4096x8	TS	35	-	N	24	175
82HS321B	4096x8	TS	30	-	N	24	175
82HS641	8192x8	TS	45	C	F,N	24	175
82HS641A	8192x8	TS	45	-	N	24	175
82HS641B	8192x8	TS	35	-	N	24	175



- 1) Output circuit : OC = Open collector; TS = 3-state
 2) Temperature range : C = Commercial (0 °C to +75 °C)
 : M = Military (-55 °C to +125 °C)



Electronic components and materials

BIPOLAR ECL RAM

10422; B; C 256x4-bit RAM
10470; A 4096x1-bit RAM
10474 A 1024x4-bit RAM

100422; B; C 256x4-bit RAM
100470; A 4096x1-bit RAM
100474 A 1024x4-bit RAM

Access time: A = 15 ns; B = 10 ns; C = 7 ns

BIPOLAR ECL PROM

10139 256-bit, 8-bits per word PROM
10149/100149 1024-bit, 4-bits per word PROM

BIPOLAR ECL CAM

10155 16-bit, 2-bits per word CAM
100142 4x4 CAM

NMOS ROM

2332 32 768-bit static ROM (4096x8)
 (2732 pin compatible)

2364 65 536-bit static ROM (8192x8)

2616 16 384-bit static ROM (2048x8)

2632 32 768-bit static ROM (4096x8)

(2532 pin compatible)

2664 65 536-bit static ROM (8192x8)

23128 131 072-bit static ROM (16 384x8)

23256A 262 144-bit static ROM (32 768x8)

23512A 524 288-bit static ROM (65536x8)

CMOS EPROM

27C64 65 536-bit CMOS EPROM (8192x8)

27C256 262 144-bit CMOS EPROM (32Kx8)

CMOS EEPROM

PCB8582 256x8-bit electrically eraseable PROM with I²C bus interface

All parts offer 200 ns, 250 ns and 300 ns access time.

CMOS RAM

PCD5101 256x4-bit static RAM

PCD5114 1024x4-bit static RAM

PCF8570 256x8-bit static RAM with I²C bus interface

SBB6116L-10 2048x8-bit static RAM; max. access time 100 ns

SBB6116L-12 2048x8-bit static RAM; max. access time 120 ns

SBB6164 8kx8-bit static RAM; access time 150 ns



PERIPHERAL INTERFACES

MC1488	quad line driver
MC1489/1489A	quad line receiver
NE587	LED decoder driver
NE589	LED decoder driver
NE590	addressable peripheral drivers
NE591	addressable peripheral drivers
NE/SA594	vacuum fluorescent display driver
NE5080	FSK modem transmitter
NE5081	FSK modem receiver
NE5090	addressable relay driver
NE5520	LVDT signal conditioner
NE5521	LVDT signal conditioner

COMPARATORS

LM111/211/311*	voltage comparator
LM119/219/319*	dual voltage comparator
LM139/239/339*	quad voltage comparator
LM193/293/393	dual voltage comparator
LM2901	quad voltage comparator
LM2903	low power dual voltage comparator
MC3302	quad voltage comparator
NE/SE521/522*	high speed dual differential comparator
NE/SE527*	high speed voltage comparator
NE/SE529*	high speed voltage comparator

D/A AND A/D CONVERTERS

AM6012	12-bit high speed multiply D/A converter
DAC-08 series	8-bit D/A converter
MC3410/3510	10-bit high speed multiplying D/A converter
NE/SE5410	10-bit high speed multiplying D/A converter
MC1408-7	8-bit D/A converter, 1 LSB accuracy
MC1408-8	8-bit D/A converter, 1/2 LSB accuracy
MC1508-8*	8-bit D/A converter, 1/2 LSB accuracy
NE/SE5018*	8-bit D/A converter subsystem, 1/2 LSB accuracy, V_{out}
NE/SE5019*	8-bit D/A converter subsystem, 1/4 LSB accuracy, V_{out}
NE/SE5118	8-bit D/A converter subsystem, 1/2 LSB accuracy, I_{out}
NE/SE5119	8-bit D/A converter subsystem, 1/4 LSB accuracy, I_{out}
NE5020	10-bit D/A converter subsystem, 1 LSB accuracy, I_{out}
ADC0801/2/3/4/5-1	8-bit CMOS A/D converter
NE5034	8-bit general purpose A/D converter
NE5036	8-bit A/D converter (serial output)
NE5037	6-bit A/D converter (parallel outputs)
PNA7509	7-bit, 22 MHz, $\pm 1/2$ LSB 3-state ADC (NMOS)
PNA7510	7-bit, 22 MHz, $\pm 1/2$ LSB 3-state + ref. voltage ADC (NMOS)
PNA7518	8-bit, 30 MHz, $\pm 1/2$ LSB D/A converter (NMOS)
TDA1432P;T	8-bit D/A converter (CMOS)
TDA1534A	monolithic 14-bit A/D converter
TDA1540D;P	14-bit D/A converter with 85 dB S/N ratio, 1/2 LSB accuracy
TDA5702	8-bit D/A converter (bipolar)
TDA5703	8-bit A/D converter (bipolar)
TDB1710	CDAC

* Available with military processing



Electronic
components
and materials



OPERATIONAL AMPLIFIERS

LM124/224/324*	general purpose single supply quad op amp
LM158/258/358*	dual low power op amp
MC1458/1558*	general purpose dual op amp
MC3303/3403/3503	quad low power op amp
NE/SE530	high slew rate op amp
NE/SE531	high slew rate op amp
NE/SE532*	dual low power op amp
NE/SE538	single high slew rate op amp
NE/SE4558	dual general purpose op amp
NE/SE5512	dual high performance op amp
NE/SE5514	quad high performance op amp
NE5517	dual transconductance amp
NE5517A	dual transconductance amp
NE/SE5532	internally compensated dual low noise op amp
NE/SE5532A	internally compensated dual low noise op amp
NE/5533	dual low noise op amp
NE/5533A	dual low noise op amp
NE/SE5534	single low noise op amp
NE/SE5534A	single low noise op amp
NE/SE5535	dual high slew rate op amp
NE5230	low voltage op amp
TCA520B; D	low-power/low-voltage op amp
NE5205	high frequency amplifier
μA741/741C*	general purpose op amp
μA747/747C*	dual op amp

VIDEO AMPLIFIERS

NE/SE5539	ultra high frequency op amp
NE/SE592	video amplifier
NE5592	video amplifier
μA733/733C	differential video amplifier

SAMPLE AND HOLD CIRCUITS

NE/SE5537	low leakage sample and hold amplifier
LF398	sample and hold circuit

TIMERS

NE/SE555*	timer
NE/SE556*	dual timer
NE/SE556-1	dual timer
NE/SE558	quad timer

MOTOR CONTROL AND SENSOR CIRCUITS

NE5044	programmable 7 channel RC encoder
NE5045	seven channel RC decoder
NE544	servo amplifier

* Available with military processing



PHASE LOCKED LOOPS

HEF4046B	phase-locked loop
NE/SE564*	phase locked loop; 5 V supply; up to 50 MHz; TTL compatible in/out
NE/SE565	phase locked loop; ± 6 to ± 12 V supply; TTL/DTL compatible output
NE/SE566	function generator
NE/SE567*	tone/frequency decoder PLL

TRANSISTOR ARRAYS

CA3081	seven-transistor common emitter
---------------	---------------------------------

COMPANDORS

NE570	compandor
NE/SA571	compandor
NE/SA572	programmable compandor

SMPS CONTROLLERS

NE/SE5560	SMPS controller
NE/SE5561	SMPS controller
NE/SE5562	SMPS controller
NE/SE5563	SMPS controller
NE5568	SMPS controller
SG3524	SMPS controller
SG/1526A/2526A/3526A	SMPS controller
μA723/CC/SA723C	precision voltage regulator

COMMUNICATION CIRCUITS

LM1870	stereo denodulator with blend
NE542	dual low noise of amp
NE/SA602	double balanced mixer & oscillator
NE612	double balanced mixer & oscillator
NE/SA604	low power narrow band FM. IF.
NE614	low power narrow band FM. IF.
μA758	FM stereo multiplex decoder phase locked loop
CA3089	FM. IF. system
MC1496/1596	balanced modulator/demodulator
ULN2003/4	high-voltage/high current Darlington transistor array

* Available with military processing



LCD DRIVERS; CMOS

PCF1303T	Bargrath LCD driver (18 segments); 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
PCF8576	universal LCD driver for low multiplex rates (1:1 to 1:4); I ² C bus interface
PCF8577	LCD direct driver (32 segments) or duplex driver (64 segments) with I ² C bus interface

DISPLAY DRIVERS; BIPOLAR

NE587/589	LED decoder/driver
NE/SE594	vacuum fluorescent display driver

CLOCK TIMERS; CMOS

PCF8573P	clock/calendar with serial I/O; I ² C bus interface
-----------------	--

A/D AND D/A CONVERTERS; NMOS

PNA7509	7-bit, 22 MHz, $\pm 1/2$ LSB 3-state output A/D converter
PNA7510	7-bit, 22 MHz, $\pm 1/2$ LSB 3-state + ref. voltage A/D converter
PNA7518	8-bit, 30 MHz, $\pm 1/2$ LBS D/A converter

MISCELLANEOUS; BIPOLAR ECL

23-101	16 lines to 8 lines high level connection matrix; 10K compatible
231-101	16 lines to 8 lines high level connection matrix; 100K compatible
241-141	high-speed FIFO RAM controller
SAB1164	sensitive 1 GHz divider-by-64
SAB1165	sensitive 1 GHz divider-by-64
SAB1256	sensitive 1 GHz divider-by-256
SAB3064	display driver
SAB6456	sensitive 1,3 GHz switchable divider-by-64/256
SAB6456T	sensitive 1,3 GHz switchable divider-by-64/256

AD/DA converter CMOS

PCF8591	8-bit AD/DA converter with I ² C bus interface
----------------	---

REMOTE I/O EXPANDER

PCF8574	remote I/O expander/LED driver
----------------	--------------------------------

MEMORIES

PCD5101	256x4-bit static CMOS RAM
PCD5114	1024x4-bit static CMOS RAM
PCF8570	256x8-bit static Ram with I ² C bus interface
PCF8571	128x8-bit static Ram with I ² C bus interface



AM CHANNELS

TDA1072 AM receiver circuit for hi-fi and carradio
TDA1072A AM receiver circuit for hi-fi and carradio
TEA5550 AM car radio receiver circuit
TEA5570 AM/FM radio receiver circuit

FM CHANNELS

TCA420A FM/IF combination

TDA1574 integrated FM tuner for radio receivers
TDA1576 FM/IF amplifier and detector
TDA1596 FM/IF amplifier and detector
TDA7000 FM radio circuit (in plastic DIL-18)
TDA7010T FM radio circuit (in SO-16 plastic mini-pack)
TDA7020;T low voltage FM stereo radio circuit (in SO-16 plastic mini-pack)
TDA7021;T low voltage FM stereo radio circuit (for MTOS)

TEA5560 FM/IF system
TEA5570 AM/FM radio receiver circuit
TEA6000 FM/IF system and microcomputer-based tuning interface

AM/FM COMBINED CHANNELS

TEA5570 AM/FM radio receiver circuit

STEREO DECODERS

TDA1005A;AT frequency multiplex PLL stereo decoder
TDA1578A time multiplex PLL stereo decoder for hi-fi and carradio
TDA1598 time multiplex PLL stereo decoder for hi-fi and carradio
TDA7040T low voltage stereo decoder (SO-8)

TEA5580 PLL stereo decoder

INTERFERENCE SUPPRESSORS

TDA1001B interference and noise suppression circuit for FM receivers
TDA1001BT interference and noise suppression circuit for FM receivers

TUNING CIRCUITS

HEF4750V frequency synthesizer
HEF4751V universal divider

SAA1057 radio tuning PLL frequency synthesizer
SAA1300 tuner switching circuit

TDD1742T low power synthesizer
TDA7030T low voltage micro-tuning and operating system (MTOS)

ARI SYSTEM

TDA1579 traffic warning decoder circuit (ARI-system)
TDA1589 traffic control messages and warning tone circuit



BUS CONTROLLED AUDIO CIRCUITS

TDA8420	stereofone/volume control circuit with head phone channel, spatial and pseudo-stereo sound
TEA6300	carradio preamplifier with source selector, sound and fader control

D.C. CONTROLLED AUDIO CIRCUITS

TCA730A	d.c. volume and balance stereo control circuit
TCA740A	d.c. treble and bass stereo control circuit
TDA1029	signal-sources switch (4 x two channels)
TDA1074A	dual tandem electronic potentiometer circuit
TDA1524A	stereo-tone/volume control circuit
TDA3810	spatial, stereo and pseudo-stereo sound circuit

AUDIO POWER AMPLIFIERS

TDA1010A	6 W audio power amplifier in car and 10 W audio power amplifier in mains-fed applications
TDA1011	2 to 6 W audio power amplifier
TDA1013A	4 W audio power amplifier with d.c. volume control
TDA1015	1 to 4 W audio power amplifier
TDA1015T	0,5 W audio power amplifier
TDA1020	12 W car radio power amplifier
TDA1510	24 W BTL or 2x12 W stereo car radio power amplifier
TDA1512	12 to 20 W hi-fi audio power amplifier
TDA1512Q	12 to 20 W hi-fi audio power amplifier
TDA1514	40 W hi-fi power amplifier for compact disc
TDA1515	24 W BTL or 2x12 W stereo car radio power amplifier
TDA1520;A;B	20 W hi-fi audio power amplifier
TDA1521	2x12 W audio power amplifier
TDA2611A	5 W audio power amplifier
TDA7050T	low voltage mono/stereo power amplifier; stereo: 75 mW; BTL: 150 mW

RECORDER (CASSETTE) AMPLIFIERS/CONTROL CIRCUITS

TDA1002A	recording and playback amplifier
TDA1012	recording/playback and 2 W audio power amplifier
TDA1016	recording/playback and 2 W audio power amplifier
TDA1508	auto-reverse car radio cassette deck steering circuit
TDA1522	stereo cassette head preamplifier and equalizer
TDA1600	oscillator switch and playback recorder amplifiers

MOTOR SPEED CONTROL CIRCUITS

HEF4752V	a.c.motor control circuit
TDA1059B	motor speed regulator with thermal shut-down
TDA1059C	motor speed regulator
TDA1506	motor regulator and function controller for car cassette systems
TDA1533	PLL motor speed control circuit for hi-fi applications
TDA1559	motor speed regulator



DISPLAY DRIVERS

SAA1060	LED display/interface circuit
SAA1062A	LCD display/interface circuit
SAA1062AT	LCD display/interface circuit
SAA1063	fluorescent display/interface circuit
PCF8574	remote I/O expander/LED driver
PCF8576	universal LCD driver for low multiplex rates (1:1 to 1:4); I ² S bus interface
PCF8577	LCD direct driver (32 segments) or duplex driver (64 segments) with I ² S bus interface
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

PERSONAL RADIO/AUDIO

TDA7000	FM radio circuit (in plastic DIL-18)
TDA7010T	FM radio circuit (in SO-16 plastic mini-pack)
TDA7020;T	low voltage FM stereo radio circuit
TDA7021;T	low voltage FM stereo radio circuit (MTOS)
TDA7030T	low voltage micro-tuning and operating system (MTOS)
TDA7040T	low voltage stereo decoder (SO-8)
TEA0670T	low voltage dolby B and C type noise reduction circuit

COMPACT DISC DIGITAL AUDIO SYSTEM CIRCUITS

SAA7210	CDZ decoder
SAA7220	CDZ digital filter
TDA1540D;P	14-bit DAC with 85 dB S/N ratio
TDA1541	stereo 16-bits DAC
TDA1542	low pass filter IC
TDA5708;T	photo diode signal processor
TDA5709;T	radial error signal processor

SPEECH SYNTHESIZERS

MEA8000	voice synthesizer
PCF8200	voice synthesizer
OM8000	standard Euro-card demo for MEA8000
OM8001	speech demonstration box
OM8002	dutch diphone board
OM8010	stand-alone speech editing system
OM8200	Euro-card demo for PCF8200
OM8201	speech demo box for PCF8200
OM8209	update package for OM8010
OM8210	speech editing system for PCF8200



MISCELLANEOUS

CA3089	FM/IF system
LM1870	stereo demodulator with blend
MC1496/1596	balanced modulator/demodulator
NE5044 NE5045	programmable 7-channel RC encoder 7-channel RC decoder
OM200/S2	integrated amplifier for use in hearing aids
TAA263 TAA320 TAA320A	low-level amplifier integrated MOST amplifier integrated MOST level sensor
TDA1540D;P	14-bit DAC with 85 dB S/N ratio

DOLBY CIRCUITS

NE645/646 *	Dolby noise reduction circuit
NE648/649 *	low voltage Dolby noise reduction circuit
NE650 *	Dolby B/C type noise reduction circuit
TEA0651 *	Dolby C processor
TEA0652 *	Dolby C processor
TEA0653T *	stereo Dolby B processor
TEA0654 *	Dolby C switch
TEA0665;T *	Dolby B and C type noise reduction circuit
TEA0666;T	Dolby B and C type noise reduction circuit
TEA0670T	low voltage Dolby B and C type noise reduction circuit

* Dolby is a registered trademark of Dolby Laboratories Licensing Corporation, San Francisco, California (U.S.A.)



VISION I.F. CIRCUITS

Economical circuits

TDA2540	i.f. amplifier and demodulator; n-p-n tuners
TDA2540Q	i.f. amplifier and demodulator; n-p-n tuners
TDA2541	i.f. amplifier and demodulator; p-n-p tuners
TDA2541Q	i.f. amplifier and demodulator; p-n-p tuners
TDA2542	i.f. amplifier and demodulator; for E and L standards; p-n-p tuners
TDA2542Q	i.f. amplifier and demodulator; for E and L standards; p-n-p tuners
TDA2544	i.f. amplifier and demodulator; MOS tuners
TDA2544Q	i.f. amplifier and demodulator; MOS tuners
TDA2548	i.f. amplifier and demodulator; p-n-p tuners
TDA2548Q	i.f. amplifier and demodulator; p-n-p tuners
TDA2549	i.f. amplifier and demodulator for multistandard TV receivers

High-performance circuits

TDA2549	i.f. amplifier and demodulator for multistandard TV receivers
TDA3540	i.f. amplifier and demodulator; n-p-n tuners
TDA3540Q	i.f. amplifier and demodulator; n-p-n tuners
TDA3541	i.f. amplifier and demodulator; p-n-p tuners
TDA3541Q	i.f. amplifier and demodulator; p-n-p tuners



COLOUR DECODING CIRCUITS

TBA540	reference combination
TCA640	chrominance amplifier for SECAM or PAL/SECAM decoders
TCA650	chrominance demodulator for SECAM or PAL/SECAM decoders
TCA660B	contrast, saturation and brightness control circuit for colour difference and luminance signals
TDA3501	video control combination
TDA3505	video control combination with automatic cut-off control
TDA3510	PAL decoder
TDA3560	PAL decoder
TDA3561A	PAL decoder
TDA3562A	PAL/NTSC decoder
TDA3563	NTSC decoder
TDA3564	NTSC decoder without R.G.B. inputs
TDA3565	PAL decoder
TDA3590	SECAM processor circuit
TDA3590A	SECAM processor circuit (improved TDA3590)
TDA3591	SECAM processor circuit
TDA3591A	SECAM processor circuit
TDA4510	PAL decoder
TDA4532	SECAM decoder
TDA4555	multi-standard decoder (colour difference output; negative going)
TDA4556	multi-standard decoder (colour difference output; positive going)
TDA4565	colour transient improvement circuit
TDA4570	NTSC decoder
TDA8442	bus interface for colour decoders
TDA9080	RGB processor (video control)

VERTICAL DEFLECTION CIRCUITS

TDA2653A	PIL-S4; 30AX; monitor; with +60 V and protection
TDA2654	monochrome, 110°; tiny-vision colour, 90°
TDA2655B	colour and monochrome, 90°; with +60 V and protection
TDA3650B	vertical deflection circuit
TDA3651	vertical deflection circuit
TDA3651A	vertical deflection circuit
TDA3651AQ	vertical deflection circuit
TDA3652	vertical deflection circuit
TDA3652Q	vertical deflection circuit
TDA3653	vertical deflection circuit with +60 V and protection
TDA3653A	vertical deflection circuit with +60 V and protection
TDA3654	vertical deflection circuit with +60 V and protection

SYNC PROCESSORS; HORIZONTAL; VERTICAL

TBA920S	horizontal combination
TDA2577A	synchronization circuit with vertical oscillator and driver stages
TDA2578A	synchronization circuit with vertical oscillator and driver stages
TDA2579	synchronization circuit (628 lines)
TDA2593	horizontal combination
TDA2594	horizontal combination with transmitter identification
TDA2595	horizontal combination with transmitter identification and protection circuits
TDA3571B	sync combination with transmitter identification and vertical 625 divider system
TDA3576B	sync combination with transmitter identification and vertical 625 divider system
TDA3586	horizontal and vertical sync. combination

DIGITAL VIDEO PROCESSING

SAA9001	317 K CCD memory
SAA9010	picture enhancement processor
SAA9020	field memory controller
SAA9030	background memory controller
SAA9035	video time multiplexer VMX
SAA9040	computer-controlled teletext extension
SAA9045	video time demultiplexer VDX



SOUND CIRCUITS

TBA120U	sound i.f. amplifier/demodulator for TV
TDA1013A	4 W audio power amplifier
TDA1029	signal sources switch (4 x two channels)
TDA1512	12 to 20 W hi-fi audio power amplifier
TDA1512Q	12 to 20 W hi-fi audio power amplifier
TDA1520A; AQ	20 W hi-fi audio power amplifier
TDA1520Q	20 W hi-fi audio power amplifier
TDA1524A	stereo-tone/volume control circuit
TDA2543	AM sound i.f. circuit for French standard
TDA2545A	quasi-split-sound circuit
TDA2546A	quasi-split-sound circuit with 5,5 MHz demodulation
TDA2555	dual FM demodulator with 8 stage limiter
TDA2557	dual FM demodulator with 5 stage limiter
TDA2611A	5 W audio power amplifier
TDA2791	TV sound combination; volume, treble, bass
TDA2795	TV stereo/dual sound identification decoder
TDA3800G; GS	stereo/dual TV sound processing circuit
TDA3806	multiplex PLL stereo decoder
TDA3810	spatial, stereo and pseudo-stereo sound circuit
TEA6300	carradio preamplifier with source selector, sound- and fader control



VIDEO RECORDER CIRCUITS

SAA5235	DATALINE slicer
SAD1009	UDAC universal digital to analog converter
TDA2501	PAL/NTSC encoder
TDA2504P;T	FM modem for 8 mm video
TDA2730	FM limiter/demodulator
TDA2740	amplifier and drop-out identification circuit
TDA3720	SECAM chrominance signal processor for V2000 system
TDA3724	SECAM identification circuit
TDA3730	frequency demodulator and drop-out compensator
TDA3740	video processor/frequency modulator
TDA3755	PAL/NTSC synchronization processor for VHS system
TDA3760	PAL chrominance signal processor for VHS system
TDA3765	NTSC chrominance signal processor for VHS system
TDA3766	PAL/NTSC chrominance signal processor for VHS system
TDA3771	video processor
TDA3780	frequency modulator
TDA3791	band selector and window detector
TDA5702	8-bit D/A converter (bipolar)
TDA5703	8-bit A/D converter (bipolar)

VIDEO CAMERA CIRCUITS

SAA1043	universal sync generator
SAA1044	subcarrier coupling circuit
TDA4301	vertical driver
TDA4302	pixel oscillator
TDA4303	white processor
TDA4304	d.c. controller
TDA4305	horizontal driver
TDA4306	master gain circuit



VIDEO AMPLIFIERS

NE/SE592 differential video amp.
μA733/733C differential video amp.

MISCELLANEOUS

TDA1082 east-west correction driver circuit
TDA2506;T SECAM encoder
TDA2507;T SECAM coder control
TDA2581 control circuit for SMPS
TDA2581Q control circuit for SMPS
TDA2582 control circuit for PPS
TDA2582Q control circuit for PPS
TDA4500 small signal combination IC for monochrome TV
TDA4501 monolithic integrated small signal combination for television receivers
TDA4503 small signal combination IC for monochrome TV
TDA4505 monostandard small signal combination IC for television receivers
TDA5030;A;AT mixer/oscillator for VHF tuner
TDA8440 PT COMMUTATOR switch
TDA8442 I²C bus interface
TDA8443 YUB RGB switch
TDA9045 start analog control

TEA1011 preamplifier and amplifier (for systems minitel and games)
TEA2000 NTSC/PAL colour encoder and video summer (64 different colours)



REMOTE CONTROL SYSTEMS**For general purpose applications**

SAA1082P	remote transmitter
SAF1032P	receiver/decoder for infrared operation
SAF1039P	remote transmitter for infrared operation

For sophisticated radio and video systems

SAA3004	remote control transmitter for infrared operation
SAA3006	low voltage infrared remote control transmitter (RC-5)
SAA3007	low voltage infrared remote control transmitter (455 KHz)
SAA3008	low voltage infrared remote control transmitter (38 KHz)
SAA3027	infrared remote control transmitter (RC-5)
SAA3028	infrared remote control transcoder (RC-5); I ² C bus compatible

VIDEO TUNING SYSTEM (VTS)**Control systems**

See page IC60 for microcontrollers used in this function

Tuning systems

SAB1164	sensitive 1 GHz divider-by-64
SAB1165	sensitive 1 GHz divider-by-64
SAB1256	sensitive 1 GHz divider-by-256
SAB3035	computer interface for tuning and control (CITAC); 8 DACs; I ² C bus compatible
SAB3036	computer interface for tuning and control (CITAC); without DACs; I ² C bus compatible
SAB3037	computer interface for tuning and control (CITAC); 4 DACs; I ² C bus compatible
SAB6456	1,3 GH divider switchable by 64/256
SAB6456T	1,3 GH divider switchable by 64/256

Display systems

SAA1060	LED display/interface circuit
----------------	-------------------------------

Additional optional circuits

PCF8573P	clock/calendar with serial I/O; I ² C bus interface
-----------------	--



TEXT DECODER SYSTEMS**Teletext decoder ICs**

SAA5020	teletext timing chain circuit (625 lines)
SAA5025D	teletext timing chain circuit for USA 525 line system (USTIC); 40 characters per row, 24 rows (8 TV-lines per row)
SAA5030	teletext video processor
SAA5040;B	teletext acquisition and control circuit
SAA5041;42	teletext acquisition and control circuit
SAA5045	gearing address logic array (GALA); 525 line system
SAA5050	teletext character generator (English)
SAA5051	teletext character generator (German)
SAA5052	teletext character generator (Swedish)
SAA5053	teletext character generator (Italian)
SAA5054	teletext character generator (Belgian)
SAA5055	teletext character generator (US ASCII)
SAA5056	teletext character generator (Hebrew)
SAA5057	teletext character generator (Cyrillic)
SAA5230	teletext video processor II
SAA5240A	computer controlled teletext circuit (CCT); 625-line system (English, German, Swedish)
SAA5240B	computer controlled teletext circuit (CCT); 625-line system (Italian, German, French)

Videotex

See page IC60 for microcontrollers used in this function

SAA5020	timing chain circuit (625 lines)
SAA5025D	teletext timing chain circuit for USA 525 line system (USTIC); 40 characters per row, 24 rows (8 TV-lines per row)
SAA5050	character generator (English)
SAA5051	character generator (German)
SAA5052	character generator (Swedish)
SAA5053	character generator (Italian)
SAA5054	character generator (Belgian)
SAA5055	character generator (US ASCII)
SAA5056	character generator (Hebrew)
SAA5057	character generator (Cyrillic)
SAA5070	microcontroller/microprocessor peripheral IC for viewdata (LUCY)
SAA5240A	computer controlled teletext circuit (CCT); 625-line system (English, German, Swedish)
SAA5240B	computer controlled teletext circuit (CCT); 625-line system (Italian, German, French)
SAA5350	Eurom, CRT controller (CEPT standard)

Field memory converters

SAA9001	CCD memory (320 K bits)
SAA9010	picture enhancement controller (PEP)
SAA9020	field memory controller (FMC)
SAA9030	background memory controller (BMC)
SAA9040	computer-controlled teletext extension (CCTE)



DEDICATED FUNCTIONS Text decoder / Radio tuning & frequency Digital systems - radio/audio/video

Digital TV

SAA9050	Digital Multi Standard Decoder (DMSD) NMOS for all standards, with I ² C capability
SAA9055	Digital Secam Color Decoder (DSD) CMOS with I ² C capability
SAA9057	Clock Generator Circuit (CGC) CMOS
SAA9058	Sample Rate Converter (SRC) NMOS
SAA90xx	A/D converter for digital TV NMOS like PNA7510

RADIO TUNING SYSTEM (RTS)

Tuning, display and control ICs

See page IC 60 for microcontrollers used in this function

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
PCF8576	universal LCD driver for low multiplex rates (1:1 to 1:4); I ² C bus interface
PCF8577	LCD direct driver (32 segments) or duplex driver (64 segments) with I ² C bus interface
SAA1056P	PLL frequency synthesizer
SAA1057	radio tuning PLL frequency synthesizer (SYMO II)
SAA1060	LED display/interface circuit
SAA1062A;AT	LCD display/interface circuit
SAA1097	analogue head switch
SAA1300	tuner switching unit
TDA730T	low voltage micro-tuning and operating system (for MTOS)
PCF8574	remote I/O expander/LED driver

FREQUENCY MEASUREMENT AND DISPLAY SYSTEM

SERIAL MEMORIES

PCF8570	256x8-bit static CMOS RAM with I ² C bus interface
PCF8571	128x8-bit static CMOS RAM with I ² C bus interface

AD/DA CONVERTER

PCF8591	8-bit AD/DA converter with I ² C bus interface
----------------	---



MICROCONTROLLERS MOS

NMOS single-chip 8-bit μ C

MAB8021	1Kx8 ROM, 64x8 RAM
MAB8031AH	128x8 RAM; ROM-less version of MAB8051AH
MAB8032AH	256x8 RAM; ROM-less version of MAB8052AH
MAB8035HL	64x8 RAM; ROM-less version of MAB8048H
MAB8039HL	128x8 RAM; ROM-less version of MAB8049H
MAB8040HL	256x8 RAM; ROM-less version of MAB8050H
MAB8041A	1Kx8 ROM, 64x8 RAM
MAB8048H	1Kx8 ROM, 64x8 RAM
MAB8049H	2Kx8 ROM, 128x8 RAM
MAB8050H	4Kx8 ROM, 256x8 RAM
MAB8051AH	4Kx8 ROM, 128x8 RAM
MAB8052AH	8Kx8 PROM, 256x8 bytes RAM
MAB8401WP	like MAB8400 but with 8-bit LED-driver
MAB8411	1K ROM/64 RAM bytes
MAB8421	2K ROM/64 RAM bytes plus 8-bit LED driver
MAB8422	2K ROM/64 RAM bytes
MAB8441	4K ROM/128 RAM bytes plus 8-bit LED driver
MAB8442	4K ROM/128 RAM bytes
MAB8461	6K ROM/128 RAM bytes plus 8-bit LED driver
MAF8021	1K ROM/64 RAM bytes
MAF8031AH	128K RAM; ROM-less version of MAB8051AH; extended temperature
MAF80A31AH	128K RAM; ROM-less version of MAB8051H; reduced frequency; extended temperature
MAF8035HL	64K RAM; ROM-less version of MAB8048H; extended temperature
MAF80A35HL	64K RAM; ROM-less version of MAB8048H; reduced frequency; extended temperature
MAF8039HL	128K RAM; ROM-less version of MAB8049H; extended temperature
MAF80A39HL	128K RAM; ROM-less version of MAB8049H; reduced frequency; extended temperature
MAF8040HL	256K RAM; ROM-less version of MAB8050H; extended temperature
MAF80A40HL	256K RAM; ROM-less version of MAB8050H; reduced frequency; extended temperature
MAF8048H	1Kx8 ROM, 64x8 RAM; extended temperature
MAF80A48H	1Kx8 ROM, 64x8 RAM; reduced frequency; extended temperature
MAF8049H	2Kx8 ROM, 128x8 RAM; extended temperature
MAF80A49H	2Kx8 ROM, 128x8 RAM; reduced frequency; extended temperature
MAF8050H	4Kx8 ROM, 256x8 RAM; extended temperature
MAF80A50H	4Kx8 ROM, 256x8 RAM; reduced frequency; extended temperature
MAF8051H	4Kx8 ROM, 128x8 RAM; extended temperature
MAF80A51H	4Kx8 ROM, 128x8 RAM; reduced frequency; extended temperature
MAF8411	1K ROM/64 RAM bytes
MAF80A11	1Kx8 ROM, 64x8 RAM; reduced frequency; extended temperature
MAF8421	2K ROM/64 RAM bytes plus 8-bit LED driver
MAF80A21	2Kx8 ROM, 64x8 RAM; reduced frequency; extended temperature
MAF8422	2K ROM/64 RAM bytes; extended temperature
MAF84A22	2K ROM/64 RAM bytes; reduced frequency; extended temperature
MAF8441	4K ROM/128 RAM bytes plus 8-bit LED driver
MAF84A41	4K ROM/128 RAM bytes; reduced frequency; extended temperature
MAF8442	4K ROM/128 RAM bytes; extended temperature
MAF84A42	4K ROM/128 RAM bytes; reduced frequency; extended temperature
MAF8461	6K ROM/128 RAM bytes plus 8-bit LED driver
MAF84A61	6K ROM/128 RAM bytes; reduced frequency; extended temperature



CMOS single-chip 8-bit μ C

PCB80C31	128K RAM; ROM-less version of PCB80C51
PCB80C39	128K RAM; ROM-less version of PCB80C49
PCB80C49	2Kx8 ROM, 128x8 RAM
PCB80C51	4Kx8 ROM, 128x8 RAM
PCB85C51	128K RAM; ROM-less version of PCB80C51; 28-pin EPROM on top
PCF80C39	128K RAM; ROM-less version of PCB80C49; extended temperature
PCF80C49	2K ROM/128 RAM bytes; extended temperature

Derivates of PCB80C51 CMOS

PCB80C351	128K RAM; ROM-less version of PCB83C351
PCB80C451	128K RAM; ROM-less version of PCB83C451
PCB80C552	256K RAM; ROM-less version of PCB83C552
PCB80C652	256K RAM; ROM-less version of PCB83C652
PCB83C351	4K ROM/128 RAM bytes; 1x16-bit capture timer/counter; I ² C (HW/SW) and D ² B 9-bit (HW) on chip
PCF83C451	4K ROM/128 RAM bytes; 2x8-bit quasi bidirectional ports; 4 data-signals connected to port 6
PCB83C552	8K ROM/256 RAM bytes; 1x16-bit capture/compare timer/counter; 1 watch-dog-timer and 2 pulse width modulated signals; 1x8-bit input connected to A/D converter
PCB83C652	8K ROM/256 RAM bytes; serial I/O UART and I ² C-HW



VIDEO GAMES

TDA2505	SECAM encoder
SCN2650A	8-bit Microprocessor
MEA8000	Voice Synthesizer
PCF8200	Voice Synthesizer
SAA1099	microprocessor controlled stereo sound generator sound effects
OM1099	demonstration board for SAA1099
TEA1011	preamplifier and amplifier for systems minitel and games
TEA2000	NTSC/PAL colour encoder and video summer (64 different colours)



BIPOLAR INTEGRATED CIRCUITS FOR TELEPHONE SUBSCRIBER SETS

DTMF diallers with line interface

TEA1075P DTMF generator for telephone dialling

Speech/transmission circuits

TEA1042 telephone transmission circuit for handsfree loudspeaking
TEA1060 versatile telephone transmission circuit with dialler interface;
for dynamic and magnetic microphones

TEA1061 versatile telephone transmission circuit with dialler interface;
for piezoelectric and electret microphones

TEA1066T telephone transmission circuit

TEA1067 see 1060/1061 for low voltage

TEA1068 versatile telephone transmission circuit with dialler interface
and for high and low omic microphones

TEA1080 supply circuit for telephone set peripherals

DTMF/speech transmission combination

TEA1046P DTMF/speech transmission IC for telephone applications



CMOS INTEGRATED CIRCUITS FOR TELEPHONE SUBSCRIBER SETS**DTMF dialler with redial**

PCD3310 DTMF/pulse dialler with redial

Pulse diallers with redial

PCD3320 interrupted current-loop dialling circuit
PCD3321 interrupted current-loop dialling circuit
PCD3322 interrupted current-loop dialling circuit
PCD3323 interrupted current-loop dialling circuit
PCD3325A interrupted current-loop dialling circuit
PCD3326 interrupted current-loop dialling circuit
PCD3327P interrupted current-loop dialling circuit

Pulse repertory dialler/telephone-set controller

PCD3315 pulse repertory dialler
PCD3341 pulse repertory dialler/telephone-set controller
PCD3343 microcontroller for telephone-set

Microcontroller peripherals (DTMF/MODEM, RAM, LCD, clock)

PCD3311 DTMF generator/modem generator with I²C bus interface
PCD3312 DTMF generator/modem generator with I²C bus interface
PCF1251 micropower voltage detector
PCF2111 LCD duplex driver; 64 segments
PCF8570 256x8-bit static RAM with I²C bus interface
PCF8571 128x8-bit static RAM with I²C bus interface
PCF8573 clock/calender with serial I/O; I²C bus interface
PCF8574 remote I/O expander/LED driver
PCF8576 universal LCD driver for low multiplex rates (1:1 to 1:4); I²C bus interface
PCF8577 LCD direct driver (32 segments) or duplex driver (64 segments) with I²C bus interface

Multi-tone ringer

PCD3360 programmable multi-tone ringer



ANALOG WATCHES

PCA1200 (family)	32 kHz watch circuit
PCA1260	32 kHz watch circuit with motor pulse control
PCA1400 (family)	32 kHz watch circuit; electrically trimmable

ANALOG CLOCKS

PCA1512	4 MHz d.c. alarm clock circuit; bipolar motor:	$T = 2 \text{ s}; t_p = 1 \text{ s}$
PCA1517	4 MHz a.c. alarm clock circuit; bipolar motor:	$T = 2 \text{ s}; t_p = 46,8 \text{ ms}$
PCA1564	32 kHz a.c. alarm clock circuit; bipolar motor:	$T = 2 \text{ s}; t_p = 46,8 \text{ ms}$
PCA1574	32 kHz a.c. alarm clock circuit; bipolar motor:	$T = 2 \text{ s}; t_p = 46,8 \text{ ms}$
PCA1580 (family)	32 kHz alarm clock; electrical trimmable	

CAR CLOCKS

PCF1171	4-digit LCD car clock circuit
PCF1172	3,5-digit LCD car clock circuit



MODULATORS

TCA240; D dual long-tailed pair/double-balanced modulator

I.F./A.F. CIRCUITS

TCA770A; D i.f. limiting amplifier, FM detector and a.f. preamplifier

CONTROL CIRCUITS FOR SWITCHED-MODE POWER SUPPLIES (SMPS)

NE/SE5560 SMPS control circuit
NE/SE5561 SMPS control circuit

SG3524 SMPS control circuit

TDA1060; A; B control circuits for SMPS

TEA1039 control circuit for SMPS

μA723/723C precision voltage regulator

MOTOR DRIVE CIRCUITS

SAA1027 stepping motor control circuit

SAK150BT servo-motor control circuit

TEA1012 stepping motor control circuit

TRANSISTOR ARRAYS

CA3081 seven-transistor array; common emitter
CA3082 seven-transistor array; common collector
CA3183 high voltage five-transistor array

TDA3083;D five-transistor array

ULN2003/4 high-voltage/high-current Darlington transistor array



SPEECH SYNTHESIZERS

MEA8000	voice synthesizer
PCF8200	voice synthesizer
OM8000	standard Euro-card demo for MEA8000
OM8001	speech demonstration box
OM8002	dutch diphone board
OM8010	stand-alone speech editing system
OM8200	Euro-card demo for PCF8200
OM8201	speech demo box for PCF8200
OM8209	update package for OM8010
OM8210	speech editing system for PCF8200

MISCELLANEOUS

MEB3000	PDV-bus interface circuit
NE542	dual low-noise preamp
NE544	servo amplifier
NE570/571/SA571	analog compandor
NE572	programmable analog compandor
PCF1251	micropower voltage detector
SAA1029	universal industrial logic and interface circuit
TDA1432P;T	8-bit D/A converter (CMOS)
TDA1540D; P	14-bit DAC with 85 dB S/N ratio
TDA1721	8-bit multiplying DAC
TDA5702	8-bit D/A converter (bipolar)
TDA5703	8-bit A/D converter (bipolar)
TEA1017	13-bit series-parallel converter and display driver
μA758	FM stereo multiplex decoder; PLL

DEDICATED FUNCTIONS

Domestic appliances/Data communications/Video display

DOMESTIC APPLIANCES

SAB3045	motor speed controller (e.g. washing machines)
TCA280Å	general-purpose triggering circuit
TDA1023	proportional-control triac triggering circuit
TDA1024	on-off triac triggering circuit

DATA COMMUNICATIONS

SCN2641	Asynchronous Communication Interface (ACI)
SCN2651	Programmable Communications Interface (PCI)
SCN2652	Multi-Protocol Communications Controller (MPCC)
SCN2653	Polynomial Generator Checker (PGC)
SCN2661	Enhanced Programmable Communications Interface (EPCI)
SCN2681	Dual Asynchronous Receiver/Transmitter (DUART)

VIDEO DISPLAY (CRT)

SAA5350	EUROM, CRT controller (CEPT standard)
SCB2673	Video Attributes Controller (VAC)
SCB2675	Color/Monochrome Attributes Controller (CMAC)
SCB2677	Video Attributes Controller (VAC)
SCN2670	Display Character and Graphics Generator (DCGG)
SCN2671	Programmable Keyboard & Comm Controller (PKCC)
SCN2672	Programmable Video Timing Controller (PVTC)
SCN2674	Advanced Video Display Controller (AVDC)



8-BIT MICROPROCESSOR FAMILY

8T31*	Transparent I/O Port;8-bit bidirectional
8T32*	Addressable I/O Port;8-bit bidirectional,synchronous
8T36*	Addressable I/O Port;8-bit bidirectional,asynchronous
8X300*	Microcontroller; 250 ns cycle time
8X305	Microcontroller; 200 ns cycle time
8X310	Interrupt controller
8X320	Bus Interface Array; 2-port RAM for 8/16-bit mailbox interface
8X330	Floppy Disk Formatter/Controller
8X350	Bipolar RAM; 256x8 high-speed memory with bus interface
8X353	Bipolar RAM; 32x8 high-speed memory with bus interface
8X355	LIFO RAM; 32x8 high-speed LIFO stack with bus interface
8X360	Memory Address Director
8X371	Transparent I/O Port;8-bit bidirectional
8X372	Addressable I/O Port;8-bit bidirectional,synchronous
8X374	Addressable I/O Port;8-bit bidirectional,synchronous with parity
8X376	Addressable I/O Port;8-bit bidirectional,asynchronous
8X382	Addressable I/O Port;4-in/4-out

Prototyping aids

8X300KT2SK	memory expansion for 8X305 prototyping kit
8X300KT1SK	8X305 prototyping and evaluation board
8X305ICEPACK	development system and emulator (available from SIGEN Corp. USA)

EZ-PRO	8X300/8X305 development system (available from American Automation - USA)
---------------	---

Software

8X300AS2SS	8X300/8X305 cross assembler for Intel Intellec system
8X300AS3SS	8X300/8X305 cross assembler; FORTRAN, ASCII, 1600 BPI
8X300AS4SS	8X300/8X305 cross assembler; FORTRAN, EBCDIC, 1600 BPI

Bipolar LSI support products

9401/8X01A	CRC generator/checker
9403	64-bit FIFO buffer memory (16x4)
8X60	FIFO CAM controller (4K RAM)

* Not recommended for new designs



8-BIT MICROPROCESSOR FAMILY**16-BIT MICROPROCESSOR FAMILY: SC68000 SERIES****Microprocessor unit (MPU)**

SCN68000	16/32-bit MPU; 16-bit external/32-bit internal MPU;
SCN68010	17 general purpose 32-bit registers; 16 MB linear address space
PCB68070	16/32-bit MPU; 16-bit external/32-bit internal MPU;
	17 general purpose 32-bit registers; 16 MB linear address space
	16-bit MPU, plus DMA, MMU and peripheral functions (CMOS)

Direct memory access

SCN68430	Direct Memory Access Interface (DMAI); single-channel DMA interface; cycle steal or burst data transfers; supports 32-bit transfers on VME bus
-----------------	--

Data communication

SCN68562	Dual Universal Serial Communications Controller (DUSCC); dual channel, asynchronous; byte control protocols, BISOFF DDCMP X.21; bit-oriented protocol HDLC, ADCCP, SDLC, X.25; DMA interface, counter timer
SCN68652	Multi-Protocol Communications Controller (MPCC);
SCN68653	synchronous communications controller; bit and byte protocols; CRC Polynomial Generator Checker (PGC); error correction, code generation/comparator circuit; comparator circuit; companion chip to MPCC or EPCI
SCN68661	Enhanced Programmable Communications Interface (EPCI); universal synchronous/asynchronous double buffered RxTx internal baud rate generator; three versions with different baud rates
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.

Disk control

SCB68459	Disk Phase Lock Loop (DPLL); companion device to SCN68454 (IMDC) used for interfacing to more than one IMDC
SCN68454	Intelligent Multiple Disk Controller (IMDC); simultaneously controls up to 4 hard or floppy drives in any combination SA1000 or ST506 interfaces

Memory access control

SCC68905	Basic Memory Access Controller (BMAC)
-----------------	---------------------------------------

Interface

SCB68172	VMS bus controller (BUSCON) interface circuit; master-slave configurations, processor or DMA interface
-----------------	--



MICROCONTROLLERS MOSNMOS single-chip 8-bit μ C

MAB8021	1Kx8 ROM, 64x8 RAM
MAB8031AH	ROM-less version of MAB8051AH
MAB8032AH	ROM-less version of MAB8052AH
MAB8035HL	ROM-less version of MAB8048H
MAB8039HL	ROM-less version of MAB8049H
MAB8040HL	ROM-less version of MAB8050H
MAB8041A	1Kx8 ROM, 64x8 RAM
MAB8048H	1Kx8 ROM, 64x8 RAM
MAB8049H	2Kx8 ROM, 128x8 RAM
MAB8050H	4Kx8 ROM, 256x8 RAM
MAB8051AH	4Kx8 ROM, 128x8 RAM
MAB8052AH	8Kx8 PROM, 256x8 bytes RAM
MAB8401WP	128x8 RAM; external program memory plus 8-bit LED-driver
MAB8411	1K ROM/64 RAM bytes
MAB8421	2K ROM/64 RAM bytes plus 8-bit LED driver
MAB8422	2K ROM/64 RAM bytes
MAB8441	4K ROM/128 RAM bytes plus 8-bit LED driver
MAB8442	4K ROM/128 RAM bytes
MAB8461	6K ROM/128 RAM bytes plus 8-bit LED driver
MAF8021	1K ROM/64 RAM bytes
MAF8031AH	ROM-less version of MAB8051AH; extended temperature
MAF80A31AH	ROM-less version of MAB8051H; reduced frequency; extended temperature
MAF8035HL	ROM-less version of MAB8048H; extended temperature
MAF80A35HL	ROM-less version of MAB8048H; reduced frequency; extended temperature
MAF8039HL	ROM-less version of MAB8049H; extended temperature
MAF80A39HL	ROM-less version of MAB8049H; reduced frequency; extended temperature
MAF8040HL	ROM-less version of MAB8050H; extended temperature
MAF80A40HL	ROM-less version of MAB8050H; reduced frequency; extended temperature
MAF8048H	1Kx8 ROM, 64x8 RAM; extended temperature
MAF80A48H	1Kx8 ROM, 64x8 RAM; reduced frequency; extended temperature
MAF8049H	2Kx8 ROM, 128x8 RAM; extended temperature
MAF80A49H	2Kx8 ROM, 128x8 RAM; reduced frequency; extended temperature
MAF8050H	4Kx8 ROM, 256x8 RAM; extended temperature
MAF80A50H	4Kx8 ROM, 256x8 RAM; reduced frequency; extended temperature
MAF8051H	4Kx8 ROM, 128x8 RAM; extended temperature
MAF80A51H	4Kx8 ROM, 128x8 RAM; reduced frequency; extended temperature
MAF8411	1K ROM/64 RAM bytes
MAF80A11	1Kx8 ROM, 64x8 RAM; reduced frequency; extended temperature
MAF8421	2K ROM/64 RAM bytes plus 8-bit LED driver
MAF80A21	2Kx8 ROM, 64x8 RAM; reduced frequency; extended temperature
MAF8422	2K ROM/64 RAM bytes; extended temperature
MAF84A22	2K ROM/64 RAM bytes; reduced frequency; extended temperature
MAF8441	4K ROM/128 RAM bytes plus 8-bit LED driver
MAF84A41	4K ROM/128 RAM bytes; reduced frequency; extended temperature
MAF8442	4K ROM/128 RAM bytes; extended temperature
MAF84A42	4K ROM/128 RAM bytes; reduced frequency; extended temperature
MAF8461	6K ROM/128 RAM bytes plus 8-bit LED driver
MAF84A61	6K ROM/128 RAM bytes; reduced frequency; extended temperature



CMOS single-chip 8-bit μ C

PCB80C31	ROM-less version of PCB80C51
PCB80C39	ROM-less version of PCB80C49
PCB80C49	2Kx8 ROM, 128x8 RAM
PCB80C51	4Kx8 ROM, 128x8 RAM
PCB85C51	ROM-less version of PCB80C51; 28-pin EPROM on top
PCF80C39	ROM-less version of PCB80C49; extended temperature
PCF80C49	2K ROM/128 RAM bytes; extended temperature

Derivates of PCB80C51 CMOS

PCB80C351	ROM-less version of PCB83C351
PCB80C451	ROM-less version of PCB83C451
PCB80C552	ROM-less version of PCB83C552
PCB80C652	ROM-less version of PCB83C652
PCB83C351	4K ROM/128 RAM bytes; 1x16-bit capture timer/counter; I^2C (HW/SW) and D ² B 9-bit (HW) on chip
PCF83C451	4K ROM/128 RAM bytes; 2x8-bit quasi bidirectional ports; 4 data-signals connected to port 6
PCB83C552	8K ROM/256 RAM bytes; 1x16-bit capture/compare timer/counter; 1 watch-dog-timer and 2 pulse width modulated signals; 1x8-bit input connected to A/D converter
PCB83C652	8K ROM/256 RAM bytes; serial I/O UART and I^2C -HW

PERIPHERAL CIRCUITS

PCF1251	micropower voltage converter
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
PCF8570	256x8-bit static CMOS RAM with I^2C bus interface
PCF8571	128x8-bit static CMOS RAM with I^2C bus interface
PCF8573P	clock/calendar with serial I/O; I^2C bus interface
PCF8574	remote 8-bit I/O for I^2C bus
PCF8576	universal LCD driver for low multiplex rates (1:1 to 1:4); I^2C bus interface
PCF8577	universal LCD driver for low multiplex rates (1:1 to 1:4) I^2C bus interface
PCF8591	8-bit AD/DA converter with I^2C bus interface



IFL SERIES 20

82S151	Field Programmable Gate Array (FPGA) (18x15x12)
82S153	Field Programmable Logic Array (FPLA) (18x42x10)
82S153A	Field Programmable Logic Array (FPLA) (18x42x10)
82S155	Field Programmable Logic Sequencer (FPLS) (16x45x12) 4-bit register
82S157	Field Programmable Logic Sequencer (FPLS) (16x45x12) 6-bit register
82S159	Field Programmable Logic Sequencer (FPLS) (16x45x12) 8-bit register

IFL SERIES 24

82S161	Field Programmable Logic Array (FPLA) (12x48x8)
82S162	Field Programmable Gate Array (FPGA) (16x5)
82S163	Field Programmable Gate Array (FPGA) (12x9)
82S167(A)	Field Programmable Logic Sequencer (FPLS) (14x48x6)
82S168	Field Programmable Logic Sequencer (FPLS) (12x48x8)
82S173	Field Programmable Logic Array (FPLA) (22x42x10)
82S179	Field Programmable Logic Sequencer (FLPS) (12x42x12)

IFL SERIES 28

82S100/101	Field Programmable Logic Array (FPLA) (16x48x8)
82S103	Field Programmable Gate Array (FPGA) (16x9x9)
82S105	Field Programmable Logic Sequencer (FPLS) (16x48x8)
82S105A	Field Programmable Logic Sequencer (FPLS) (16x48x8)



IFL SOFTWARE SUPPORT

AMAZE

Boolean equation entry and simulator packages for VAX-VMS, PDP-RSX11, IBMPC-MSDOS

cupl®

Boolean equation entry and simulator packages for VAX-VMS and UNIX, IBMPC/XT-MSDOS, CP/M-80 and CP/M-86 (available from Assisted Technology, Inc., 2381 Zanker Road, Suite 150, San Jose, California 95131, USA)



CMOS

Standard Speed

		PCF0330 PCC0330	PCF0450 PCC0450	PCF0700 PCC0700	PCF1100 PCC1100
Gate equivalents (2-input)		330	448	704	1116
Cell units		165	224	352	558
Rows of cell units		11	14	16	18
Cell units per row		15	16	22	31
Horizontal mask-programmable interconnection strips					
above top row of cell units	max.	5	5	5	6
between cell units	max.	10	9	10	13
below bottom row of cell units	max.	5	5	5	6
Bonding pads	max.	40	28	40	68
Input/output stages with choice of 3-state I/O drivers		38	26	38	66
buffers	max.	34	26	38	66
Schmitt-triggers	max.	38	14	22	66
	max.	38	12	16	66
	max.	34	8	10	66
Pin pull-up/pull-down resistors	max.	34	26	34	66
Chip size		13,6 mm ²	14,6 mm ²	21,9 mm ²	40,0 mm ²
Chip dimensions	x	3,52 mm	3,45 mm	4,44 mm	6,25 mm
	y	3,87 mm	4,24 mm	4,94 mm	6,40 mm
Gate delays					
at V _{DD} = 5 V	max.	16 ns	16 ns	16 ns	16 ns
	typ.	8 ns	8 ns	8 ns	8 ns
at V _{DD} = 10 V	max.	6,4 ns	6,4 ns	6,4 ns	6,4 ns
	typ.	3,2 ns	3,2 ns	3,2 ns	3,2 ns
at V _{DD} = 15 V	max.	4 ns	4 ns	4 ns	4 ns
	typ.	2 ns	2 ns	2 ns	2 ns
Maximum toggle frequency					
at V _{DD} = 5 V	min.	6 MHz	6 MHz	6 MHz	6 MHz
at V _{DD} = 10 V	min.	12 MHz	12 MHz	12 MHz	12 MHz
at V _{DD} = 15 V	min.	15 MHz	15 MHz	15 MHz	15 MHz



CMOS (cont.)

High speed

		PCF0336 PCF0336	PCF0456 PCC0456	PCF0706 PCC0706	PCF1106 PCC1106
Gate equivalent (2-input)		330	448	704	1116
Cell units		165	224	352	558
Rows of cell units		11	14	16	18
Cell units per row		15	16	22	31
Horizontal mask-programmable interconnection strips					
above top row of cell units	max.	5	5	5	6
between cell units	max.	10	9	10	13
below bottom row of cell units	max.	5	5	5	6
Bonding pads	max.	40	28	40	68
Input/output stages with choice of 3-state I/O drivers		38	26	38	66
buffers	max.	34	26	38	66
Schmitt-triggers	max.	34	14	22	66
	max.	38	12	16	66
	max.	34	8	10	66
Pin pull-up/pull-down resistors	max.	34	26	34	66
Chip size		13,8 mm ²	15,0 mm ²	22,3 mm ²	40,4 mm ²
Chip dimensions	x	3,55 mm	3,49 mm	4,48 mm	6,28 mm
	y	3,90 mm	4,30 mm	4,98 mm	6,43 mm
Gate delays					
at $V_{CC} = 2,0$ V	typ.	9 ns	9 ns	9 ns	9 ns
at $V_{DD} = 5,0$ V	typ.	2,6 ns	2,6 ns	2,6 ns	2,6 ns
at $V_{CC} = 6,0$ V	typ.	2,2 ns	2,2 ns	2,2 ns	2,2 ns
Maximum toggle frequency					
at $V_{CC} = 2,0$ V	typ.	10 MHz	10 MHz	10 MHz	10 MHz
at $V_{CC} = 5,0$ V	typ.	39 MHz	39 MHz	39 MHz	39 MHz
at $V_{CC} = 6,0$ V	typ.	47 MHz	47 MHz	47 MHz	47 MHz



ISL

8A1542	1472 gates; 42 I/Os
8A1664	1620 gates; 64 I/Os
8A1864	1740 gates; 72 I/Os
8A2176	2088 gates; 76 I/Os



ECL (ACE); 10K or 100K compatible

THE ACE CELL ARRAY FAMILY

	ACE 600	ACE 900	ACE 1400	ACE1320	ACE 2200	ACE 3000
Commercial name						
10 K	22XXX	23XXX	24XXX	25XXX	26XXX	27XXX
100 K	221XXX	231XXX	241XXX	251XXX	261XXX	271XXX
Equivalent gates						
typical	450	650	1050	700	1600	700
maximum	600	900	1400	1000	2200	1000
Major log cell sites	24	36	60	52	100	36
Minor log cell sites	10	22	12	14	16	16
Input cell sites	30	30	-	-	-	-
I/O cell sites	28	28	96	112	128	128
Number of pins						
GRID	64	64	144	144	144	144
FLAT PACK	68	68	84	84 or 148	84 or 148	148
Supply pins						
GRID	6	6	16	16	16	16
FLAT PACK	10	10	20	20 or 28	20 or 28	28
On-chip RAM (BIT)	-	-	-	320	-	1280



PACKAGE CODING

Type 1st digit		Sealing process 2nd digit		Pins 3rd digit		Heatsink 4th digit	
Symbol	Meaning	Symbol	Meaning	Symbol	Meaning	Symbol	Meaning
P	Pin Grid	B	Glued CAP	None	64	S	Short
Y	Flat Pack	C	Soldered CAP	R	68	H	Extrusions
				M	84	P	Vert. fins
				K	144		Hor. plates
				T	148		



CMOS

Compact Cell Logic

ISL

Composite Cell Logic

Full custom facilities available in MOS and Bipolar technologies.



SPEECH SYNTHESIZERS

MEA8000	voice synthesizer
PCF8200	voice synthesizer
OM8000	standard Euro-card demo for MEA8000
OM8001	speech demonstration box
OM8002	dutch diphone board
OM8010	stand-alone speech editing system
OM8200	Euro-card demo for PCF8200
OM8201	speech demo box for PCF8200
OM8209	update package for OM8010
OM8210	speech editing system for PCF8200



In the following index three columns are given.

The first column shows the IC type numbers in alpha-numerical sequence. The second column gives the package code, the third the number of pins and the fourth the pin position (see next page for explanation); the fifth column the reference page number in this catalogue and the sixth refers to the relevant Handbook (IC..., see list below). Where only loose datasheets exist, the column shows the symbol ●; a hyphen (-) indicates that **NO** data are available at date of printing this publication.

book	title
------	-------

EXISTING SERIES

- IC4 Digital integrated circuits - CMOS HE4000B family (superseded by IC04N/86)
- IC6 Professional analogue integrated circuits (superseded by IC11N/86)
- IC7 Signetics bipolar memories (superseded by IC10N/86)

NEW SERIES

- IC01N Radio, audio and associated systems - Bipolar, MOS (published 1985)
- IC02N Video and associated systems - Bipolar, MOS (published 1985)
- IC03N Telephony equipment - Bipolar, MOS (published 1985)
- IC04N HE4000B logic family - CMOS
- IC05N HE4000B logic family uncased integrated circuits - CMOS (published 1984)
- IC06N High-speed CMOS; PC74HC/HCU/HCT - logic families (published 1985)
- IC07N PC74HC/HCU/HCT uncased integrated circuits - HCMOS
- IC08N 10K and 100K logic families - ECL (published 1984)
- IC09N Logic series - TTL (published 1984)
- IC10N Memories - MOS, TTL, ECL
- IC11N Linear LSI (published 1985)
- IC12N Semi-custom gate arrays & cell libraries - ISL, ECL, CMOS
- IC13N Semi-custom - Integrated Fuse Logic (published 1985)
- IC14N Microprocessors, microcontrollers & peripherals - Bipolar, MOS (published 1985)
- IC15N Logic series - FAST TTL (published 1984)



EXPLANATION OF PACKAGE CODE/PIN POSITION COLUMNS

In the following list most of the packages used are mentioned.
It is the intention to give for all our devices the full package code e.g.:

SOT38BE.12; SOT102HE.01; SOT141BA.01; SOT165CA.03 etc.

A complete package code consists of:

basic number - SOT38
version letter(s) - BE
variant number - .12

package code	description	pin position
SOT14	10-lead cylindrical; metal (TO-74)	CYL
SOT18/13	3-lead cylindrical; metal (TO-18)	CYL
SOT18/17	4-lead cylindrical; metal (TO-72)	CYL
SOT20	4-lead single in-line; plastic (SOT-20)	SIL
SOT27K,M,P,T	14-lead dual in-line; plastic	DIL
SOT32	TO-126; 3 lead single in-line	SIL
SOT38	16-lead dual in-line; plastic	DIL
SOT38BE.2	16-lead dual in-line; plastic power	DIL
SOT38WE.2	16-lead dual in-line; plastic with internal heat spreader	DIL
SOT38Z	16-lead dual in-line; plastic	DIL
SOT58	16-lead quadruple in-line; plastic	QIL
SOT73A,B,C	14-lead dual in-line; ceramic (CERDIP)	DIL
SOT74A,B,C	16-lead dual in-line; ceramic (CERDIP)	DIL
SOT88B	40-lead dual in-line; metal ceramic (CERDIL)	DIL
SOT94	24-lead dual in-line; ceramic (CERDIP)	DIL
SOT95C	6-lead mini-pack; plastic (SO-6)	SO6
SOT96A	8-lead mini-pack; plastic (SO-8)	SO8
SOT96C	8-lead mini-pack; plastic (SO-8)	SO8
SOT97A	8-lead dual in-line; plastic	DIL
SOT101A	24-lead dual in-line; plastic	DIL
SOT101A,B	24-lead dual in-line; plastic (with internal heat spreader)	DIL
SOT102CA	18-lead dual in-line; plastic	DIL
SOT102CS,HE,KE	18-lead dual in-line; plastic	DIL
SOT102F,G,N,P	18-lead dual in-line; plastic	DIL
SOT108A	14-lead mini-pack; plastic (SO-14)	SO14
SOT109A	16-lead mini-pack; plastic (SO-16)	SO16
SOT110B	9-lead single in-line; plastic	SIL
SOT116	22-lead dual in-line; plastic	DIL
SOT117	28-lead dual in-line; plastic	DIL
SOT117	28-lead dual in-line; plastic (with internal heat spreader)	DIL
SOT117D	28-lead dual in-line; plastic	DIL



package code	description	pin position
SOT129	40-lead dual in-line; plastic	DIL
SOT131A,B	9-lead single in-line; plastic power	SIL
SOT133A,B	18-lead dual in-line; ceramic (CERDIP)	DIL
SOT134A	22-lead dual in-line; ceramic (CERDIP)	DIL
SOT135A	28-lead dual in-line; ceramic (CERDIP)	DIL
SOT136A	28-lead mini-pack; plastic (SO-28)	SO28
SOT137A	24-lead mini-pack; plastic (SO-24)	SO24
SOT138	24-lead flat-pack; ceramic (CERDIP)	FP;4x6
SOT141B	13-lead sil-bent-to-dil; plastic power	SBD
SOT141BA	13-lead sil-bent-to-dil; plastic power	SBD
SOT142	9-lead single in-line; plastic	SIL
SOT145	40-lead dual in-line; ceramic (CERDIP)	DIL
SOT146	20-lead dual in-line; plastic	DIL
SOT149	24-lead dual in-line; ceramic (CERDIP)	DIL
SOT150	12-lead dual in-line; plastic with metal cooling fin	DIL
SOT151A	8-lead dual in-line; ceramic (CERDIP)	DIL
SOT152B,C	20-lead dual in-line; ceramic (CERDIP)	DIL
SOT153B	8-lead dual in-line; metal ceramic (CERDIL)	DIL
SOT154B	20-lead dual in-line; metal ceramic (CERDIL)	DIL
SOT157A,B	9-lead sil-bent-to-dil; plastic power	SBD
SOT158A	40-lead mini-pack; plastic (VSO-40)	VSO40
SOT158B	40-lead mini-pack; plastic (opposite bent leads) (VSO-40)	VS04
SOT159A	44-lead mini-pack; plastic (VSO-44)	VSO44
SOT162A	16-lead mini-pack; plastic (SO-16L)	SO16L
SOT163A	20-lead mini-pack; plastic (SO-20)	SO20
SOT167	56-lead quadruple in-line; plastic	QIL
SOT169A	64-pin plug in package	GRID
SOT176	8-lead mini-pack; plastic (SO-8L)	SO8L
SOT187A	44-lead plastic leaded chip-carrier	PLCC
SOT188A	68-lead plastic leaded chip-carrier	PLCC
SOT189A	84-lead plastic leaded chip-carrier	PLCC
SOT190	56-lead mini-pack; plastic (VSO-56)	VSO56
SOT193	13-lead single in-line; plastic power	SIL
FO75	64-pin grid array package without heatspreader	GRID
FO99	64-pin grid array package with heatspreader	GRID
FO108	144-pin grid array package without heatspreader	GRID
FO128	144-pin grid array package with heatspreader	GRID
D	SIGNETICS plastic mini-pack (SO)	SOxx
F	SIGNETICS dual in-line; ceramic (CERDIP)	DIL
I	SIGNETICS dual in-line; metal ceramic (hermetic)(CERDIL)	DIL
N	SIGNETICS dual in-line; plastic	DIL
-	28-lead "Piggy-back" with 28-lead EPROM on top	PB



For the following package a package code has not yet been defined.

-	28-lead "Piggy-back" with 28-lead EPROM on top	PB
---	--	----

type no.	package code	no. of pins	pin position	catalogue page no.	handbook
ACE600	-	64	GRID	77	IC08N
-	-	68	FP	77	-
ACE900	-	64	GRID	77	IC08N
-	-	68	FP	77	-
ACE1320	-	144	GRID	77	IC08N
-	-	84	FP	77	-
-	-	148	FP	77	-
ACE1400	-	144	GRID	77	IC08N
-	-	84	FP	77	-
ACE2200	-	144	GRID	77	IC08N
-	-	84	FP	77	-
-	-	148	FP	77	-
ACE3000	-	144	GRID	77	-
-	-	148	FP	77	-
ADC0801;-1	F,N	20	DIL	45	IC11N
ADC0802;-1	F,N	20	DIL	45	IC11N
ADC0803;-1	F,N	20	DIL	45	IC11N
ADC0804;-1	F,N	20	DIL	45	IC11N
ADC0805;-1	F,N	20	DIL	45	IC11N
AM6012	-	-	-	45	-
CA3081	F,N	16	DIL	47;65	IC11N
CA3089	N	16	DIL	47	IC11N
DAC-08series	F,N	16	DIL	45	IC11N
HEC4001BDB	SOT73	14	DIL	8	IC04N
HEC4002BDB	SOT73	14	DIL	8	IC04N
HEC4007UBDB	SOT73	14	DIL	8	IC04N
HEC4011BDB	SOT73	14	DIL	8	IC04N
HEC4012BDB	SOT73	14	DIL	8	IC04N
HEC4013BDB	SOT73	14	DIL	9	IC04N
HEC4014BDB	SOT74	16	DIL	9	IC04N
HEC4015BDB	SOT74	16	DIL	9	IC04N
HEC4016BDB	SOT73	14	DIL	10	IC04N
HEC4017BDB	SOT74	16	DIL	9	IC04N
HEC4019BDB	SOT74	16	DIL	10	IC04N
HEC4020BDB	SOT74	16	DIL	9	IC04N
HEC4023BDB	SOT73	14	DIL	8	IC04N
HEC4024BDB	SOT73	14	DIL	9	IC04N
HEC4025BDB	SOT73	14	DIL	8	IC04N
HEC4027BDB	SOT74	16	DIL	9	IC04N
HEC4030BDB	SOT73	14	DIL	8	IC04N
HEC4035BDB	SOT74	16	DIL	9	IC04N
HEC4040BDB	SOT74	16	DIL	9	IC04N
HEC4042BDB	SOT74	16	DIL	10	IC04N
HEC4047BDB	SOT73	14	DIL	10	IC04N
HEC4049BDB	SOT74	16	DIL	8	IC04N
HEC4050BDB	SOT74	16	DIL	8	IC04N
HEC4051BDB	SOT74	16	DIL	10	IC04N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
HEC4066BDB	SOT73	14	DIL	10	IC04N
HEC4068BDB	SOT73	14	DIL	8	IC04N
HEC4069UBDB	SOT73	14	DIL	8	IC04N
HEC4070BDB	SOT73	14	DIL	8	IC04N
HEC4071BDB	SOT73	14	DIL	8	IC04N
HEC4073BDB	SOT73	14	DIL	8	IC04N
HEC4081BDB	SOT73	14	DIL	8	IC04N
HEC4093BDB	SOT73	14	DIL	11	IC04N
HEC4094BDB	SOT74	16	DIL	9	IC04N
HEC4505BDB	SOT73	14	DIL	11	IC04N
HEC4510BDB	SOT74	16	DIL	9	IC04N
HEC4511BDB	SOT74	16	DIL	10	IC04N
HEC4512BDB	SOT74	16	DIL	10	IC04N
HEC4519BDB	SOT74	16	DIL	10	IC04N
HEC4520BDB	SOT74	16	DIL	9	IC04N
HEC4528BDB	SOT74	16	DIL	10	IC04N
HEC4539BDB	SOT74	16	DIL	10	IC04N
HEC4541BDB	SOT73	14	DIL	10	IC04N
HEC4556BDB	SOT74	16	DIL	10	IC04N
HEC4557BDB	SOT74	16	DIL	9	IC04N
HEC4585BDB	SOT74	16	DIL	10	IC04N
HEC4750VD	SOT135A	28	DIL	11	IC04N
HEC4750VDB	SOT135A	28	DIL	11	IC04N
HEC4751VD	SOT135A	28	DIL	9	IC04N
HEC4751VDB	SOT135A	28	DIL	9	IC04N
HEC40097BDB	SOT74	16	DIL	8	IC04N
HEC40098BDB	SOT74	16	DIL	8	IC04N
HEC40174BDB	SOT74	16	DIL	9	IC04N
HEC40175BDB	SOT74	16	DIL	9	IC04N
HEC40194BDB	SOT74	16	DIL	9	IC04N
HEC40195BDB	SOT74	16	DIL	9	IC04N
HEF4000BD	SOT73	14	DIL	8	IC04N
HEF4000BP	SOT27	14	DIL	8	IC04N
HEF4000BT	SOT108A	14	SO14	8	IC04N
HEF4000BU	-	12	pads	8	IC05N
HEF4001BD	SOT73	14	DIL	8	IC04N
HEF4001BP	SOT27	14	DIL	8	IC04N
HEF4001BT	SOT108A	14	SO14	8	IC04N
HEF4001BU	-	14	pads	8	IC05N
HEF4001UBD	SOT73	14	DIL	8	IC04N
HEF4001UBP	SOT27	14	DIL	8	IC04N
HEF4001UBT	SOT108A	14	SO14	8	IC04N
HEF4001UBU	-	14	pads	8	IC05N
HEF4002BD	SOT73	14	DIL	8	IC04N
HEF4002BP	SOT27	14	DIL	8	IC04N
HEF4002BT	SOT108A	14	SO14	8	IC04N
HEF4002BU	-	12	pads	8	IC05N
HEF4006BD	SOT73	14	DIL	9	IC04N
HEF4006BP	SOT27	14	DIL	9	IC04N
HEF4006BT	SOT108A	14	SO14	9	IC04N
HEF4006BU	-	13	pads	9	IC05N
HEF4007UBD	SOT73	14	DIL	8	IC04N
HEF4007UBP	SOT27	14	DIL	8	IC04N
HEF4007UBT	SOT108A	14	SO14	8	IC04N
HEF4007UBU	-	14	pads	8	IC05N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
HEF4008BD	SOT74	16	DIL	10	IC04N
HEF4008BP	SOT38Z	16	DIL	10	IC04N
HEF4008BT	SOT109A	16	SO16	10	IC04N
HEF4008BU	-	16	pads	10	IC05N
HEF4011BD	SOT73	14	DIL	8	IC04N
HEF4011BP	SOT27	14	DIL	8	IC04N
HEF4011BT	SOT108A	14	SO14	8	IC04N
HEF4011BU	-	14	pads	8	IC05N
HEF4011UBD	SOT73	14	DIL	8	IC04N
HEF4011UBP	SOT27	14	DIL	8	IC04N
HEF4011UBT	SOT108A	14	SO14	8	IC04N
HEF4011UBU	-	14	pads	8	IC05N
HEF4012BD	SOT73	14	DIL	8	IC04N
HEF4012BP	SOT27	14	DIL	8	IC04N
HEF4012BT	SOT108A	14	SO14	8	IC04N
HEF4012BU	-	12	pads	8	IC05N
HEF4013BD	SOT73	14	DIL	9	IC04N
HEF4013BP	SOT27	14	DIL	9	IC04N
HEF4013BT	SOT108A	14	SO14	9	IC04N
HEF4013BU	-	14	pads	9	IC05N
HEF4014BD	SOT74	16	DIL	9	IC04N
HEF4014BP	SOT38Z	16	DIL	9	IC04N
HEF4014BT	SOT109A	16	SO16	9	IC04N
HEF4014BU	-	16	pads	9	IC05N
HEF4015BD	SOT74	16	DIL	9	IC04N
HEF4015BP	SOT38Z	16	DIL	9	IC04N
HEF4015BT	SOT109A	16	SO16	9	IC04N
HEF4015BU	-	16	pads	9	IC05N
HEF4016BD	SOT73	14	DIL	10	IC04N
HEF4016BP	SOT27	14	DIL	10	IC04N
HEF4016BT	SOT108A	14	SO14	10	IC04N
HEF4016BU	-	14	pads	10	IC05N
HEF4017BD	SOT74	16	DIL	9	IC04N
HEF4017BP	SOT38Z	16	DIL	9	IC04N
HEF4017BT	SOT109A	16	SO16	9	IC04N
HEF4017BU	-	16	pads	9	IC05N
HEF4018BD	SOT74	16	DIL	9	IC04N
HEF4018BP	SOT38Z	16	DIL	9	IC04N
HEF4018BT	SOT109A	16	SO16	9	IC04N
HEF4018BU	-	16	pads	9	IC05N
HEF4019BD	SOT74	16	DIL	10	IC04N
HEF4019BP	SOT38Z	16	DIL	10	IC04N
HEF4019BT	SOT109A	16	SO16	10	IC04N
HEF4019BU	-	16	pads	10	IC05N
HEF4020BD	SOT74	16	DIL	9	IC04N
HEF4020BP	SOT38Z	16	DIL	9	IC04N
HEF4020BT	SOT109A	16	SO16	9	IC04N
HEF4020BU	-	16	pads	9	IC05N
HEF4021BD	SOT74	16	DIL	9	IC04N
HEF4021BP	SOT38Z	16	DIL	9	IC04N
HEF4021BT	SOT109A	16	SO16	9	IC04N
HEF4021BU	-	16	pads	9	IC05N
HEF4022BD	SOT74	16	DIL	9	IC04N
HEF4022BP	SOT38Z	16	DIL	9	IC04N
HEF4022BT	SOT109A	16	SO16	9	IC04N
HEF4022BU	-	14	pads	9	IC05N
HEF4023BD	SOT73	14	DIL	8	IC04N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
HEF4023BP	SOT27	14	DIL	8	IC04N
HEF4023BT	SOT108A	14	SO14	8	IC04N
HEF4023BU	-	14	pads	8	IC05N
HEF4024BD	SOT73	14	DIL	9	IC04N
HEF4024BP	SOT27	14	DIL	9	IC04N
HEF4024BT	SOT108A	14	SO14	9	IC04N
HEF4024BU	-	11	pads	9	IC05N
HEF4025BD	SOT73	14	DIL	8	IC04N
HEF4025BP	SOT27	14	DIL	8	IC04N
HEF4025BT	SOT108A	14	SO14	8	IC04N
HEF4025BU	-	14	pads	8	IC05N
HEF4027BD	SOT74	16	DIL	9	IC04N
HEF4027BP	SOT38Z	16	DIL	9	IC04N
HEF4027BT	SOT109A	16	SO16	9	IC04N
HEF4027BU	-	16	pads	9	IC05N
HEF4028BD	SOT74	16	DIL	10	IC04N
HEF4028BP	SOT38Z	16	DIL	10	IC04N
HEF4028BT	SOT109A	16	SO16	10	IC04N
HEF4028BU	-	16	pads	10	IC05N
HEF4029BD	SOT74	16	DIL	9	IC04N
HEF4029BP	SOT38Z	16	DIL	9	IC04N
HEF4029BT	SOT109A	16	SO16	9	IC04N
HEF4029BU	-	16	pads	9	IC05N
HEF4030BD	SOT73	14	DIL	8	IC04N
HEF4030BP	SOT27	14	DIL	8	IC04N
HEF4030BT	SOT108A	14	SO14	8	IC04N
HEF4030BU	-	14	pads	8	IC05N
HEF4031BD	SOT74	16	DIL	9	IC04N
HEF4031BP	SOT38Z	16	DIL	9	IC04N
HEF4031BT	SOT109A	16	SO16	9	IC04N
HEF4031BU	-	9	pads	9	IC05N
HEF4035BD	SOT74	16	DIL	9	IC04N
HEF4035BP	SOT38Z	16	DIL	9	IC04N
HEF4035BT	SOT109A	16	SO16	9	IC04N
HEF4035BU	-	16	pads	9	IC05N
HEF4040BD	SOT74	16	DIL	9	IC04N
HEF4040BP	SOT38Z	16	DIL	9	IC04N
HEF4040BT	SOT109A	16	SO16	9	IC04N
HEF4040BU	-	16	pads	9	IC05N
HEF4041BD	SOT73	14	DIL	8	IC04N
HEF4041BP	SOT27	14	DIL	8	IC04N
HEF4041BT	SOT108A	14	SO14	8	IC04N
HEF4041BU	-	14	pads	8	IC05N
HEF4042BD	SOT74	16	DIL	10	IC04N
HEF4042BP	SOT38Z	16	DIL	10	IC04N
HEF4042BT	SOT109A	16	SO16	10	IC04N
HEF4042BU	-	16	pads	10	IC05N
HEF4043BD	SOT74	16	DIL	10	IC04N
HEF4043BP	SOT38Z	16	DIL	10	IC04N
HEF4043BT	SOT109A	16	SO16	10	IC04N
HEF4043BU	-	15	pads	10	IC05N
HEF4044BD	SOT74	16	DIL	10	IC04N
HEF4044BP	SOT38Z	16	DIL	10	IC04N
HEF4044BT	SOT109A	16	SO16	10	IC04N
HEF4044BU	-	15	pads	10	IC05N
HEF4046BD	SOT74	16	DIL	11;47	IC04N
HEF4046BP	SOT38Z	16	DIL	11;47	IC04N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
HEF4046BT	SOT109A	16	SO16	11;47	IC04N
HEF4046BU	-	16	pads	11;47	IC05N
HEF4047BD	SOT73	14	DIL	10	IC04N
HEF4047BP	SOT27	14	DIL	10	IC04N
HEF4047BT	SOT108A	14	SO14	10	IC04N
HEF4047BU	-	14	pads	10	IC05N
HEF4049BD	SOT74	16	DIL	8	IC04N
HEF4049BP	SOT38Z	16	DIL	8	IC04N
HEF4049BT	SOT109A	16	SO16	8	IC04N
HEF4049BU	-	14	pads	8	IC05N
HEF4050BD	SOT74	16	DIL	8	IC04N
HEF4050BP	SOT38Z	16	DIL	8	IC04N
HEF4050BT	SOT109A	16	SO16	8	IC04N
HEF4050BU	-	14	pads	8	IC05N
HEF4051BD	SOT74	16	DIL	10	IC04N
HEF4051BP	SOT38Z	16	DIL	10	IC04N
HEF4051BT	SOT109A	16	SO16	10	IC04N
HEF4051BU	-	16	pads	10	IC05N
HEF4052BD	SOT74	16	DIL	10	IC04N
HEF4052BP	SOT38Z	16	DIL	10	IC04N
HEF4052BT	SOT109A	16	SO16	10	IC04N
HEF4052BU	-	16	pads	10	IC05N
HEF4053BD	SOT74	16	DIL	10	IC04N
HEF4053BP	SOT38Z	16	DIL	10	IC04N
HEF4053BT	SOT109A	16	SO16	10	IC04N
HEF4053BU	-	16	pads	10	IC05N
HEF4059BD	SOT94	24	DIL	9	IC04N
HEF4059BP	SOT101A	24	DIL	9	IC04N
HEF4059BT	SOT137A	24	SO24	9	IC04N
HEF4059BU	-	24	pads	9	IC05N
HEF4060BD	SOT74	16	DIL	9	IC04N
HEF4060BP	SOT38Z	16	DIL	9	IC04N
HEF4060BT	SOT109A	16	SO16	9	IC04N
HEF4060BU	-	16	pads	9	IC05N
HEF4066BD	SOT73	14	DIL	10	IC04N
HEF4066BP	SOT27	14	DIL	10	IC04N
HEF4066BT	SOT108A	14	SO14	10	IC04N
HEF4066BU	-	14	pads	10	IC05N
HEF4067BD	SOT94	24	DIL	10	IC04N
HEF4067BP	SOT101A	24	DIL	10	IC04N
HEF4067BT	SOT137A	24	SO24	10	IC04N
HEF4067BU	-	24	pads	10	IC05N
HEF4068BD	SOT73	14	DIL	8	IC04N
HEF4068BP	SOT27	14	DIL	8	IC04N
HEF4068BT	SOT108A	14	SO14	8	IC04N
HEF4068BU	-	11	pads	8	IC05N
HEF4069UBD	SOT73	14	DIL	8	IC04N
HEF4069UBP	SOT27	14	DIL	8	IC04N
HEF4069UBT	SOT108A	14	SO14	8	IC04N
HEF4069UBU	-	14	pads	8	IC05N
HEF4070BD	SOT73	14	DIL	8	IC04N
HEF4070BP	SOT27	14	DIL	8	IC04N
HEF4070BT	SOT108A	14	SO14	8	IC04N
HEF4070BU	-	14	pads	8	IC05N
HEF4071BD	SOT73	14	DIL	8	IC04N
HEF4071BP	SOT27	14	DIL	8	IC04N
HEF4071BT	SOT108A	14	SO14	8	IC04N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
HEF4071BU	-	14	pads	8	IC05N
HEF4072BD	SOT73	14	DIL	8	IC04N
HEF4072BP	SOT27	14	DIL	8	IC04N
HEF4072BT	SOT108A	14	SO14	8	IC04N
HEF4072BU	-	12	pads	8	IC05N
HEF4073BD	SOT73	14	DIL	8	IC04N
HEF4073BP	SOT27	14	DIL	8	IC04N
HEF4073BT	SOT108A	14	SO14	8	IC04N
HEF4073BU	-	14	pads	8	IC05N
HEF4075BD	SOT73	14	DIL	8	IC04N
HEF4075BP	SOT27	14	DIL	8	IC04N
HEF4075BT	SOT108A	14	SO14	8	IC04N
HEF4075BU	-	14	pads	8	IC05N
HEF4076BD	SOT74	16	DIL	9	IC04N
HEF4076BP	SOT38Z	16	DIL	9	IC04N
HEF4076BT	SOT109A	16	SO16	9	IC04N
HEF4076BU	-	16	pads	9	IC05N
HEF4077BD	SOT73	14	DIL	8	IC04N
HEF4077BP	SOT27	14	DIL	8	IC04N
HEF4077BT	SOT108A	14	SO14	8	IC04N
HEF4077BU	-	14	pads	8	IC05N
HEF4078BD	SOT73	14	DIL	8	IC04N
HEF4078BP	SOT27	14	DIL	8	IC04N
HEF4078BT	SOT108A	14	SO14	8	IC04N
HEF4078BU	-	11	pads	8	IC05N
HEF4081BD	SOT73	14	DIL	8	IC04N
HEF4081BP	SOT27	14	DIL	8	IC04N
HEF4081BT	SOT108A	14	SO14	8	IC04N
HEF4081BU	-	14	pads	8	IC05N
HEF4082BD	SOT73	14	DIL	8	IC04N
HEF4082BP	SOT27	14	DIL	8	IC04N
HEF4082BT	SOT108A	14	SO14	8	IC04N
HEF4082BU	-	12	pads	8	IC05N
HEF4085BD	SOT73	14	DIL	8	IC04N
HEF4085BP	SOT27	14	DIL	8	IC04N
HEF4085BT	SOT108A	14	SO14	8	IC04N
HEF4085BU	-	14	pads	8	IC05N
HEF4086BD	SOT73	14	DIL	8	IC04N
HEF4086BP	SOT27	14	DIL	8	IC04N
HEF4086BT	SOT108A	14	SO14	8	IC04N
HEF4086BU	-	13	pads	8	IC05N
HEF4093BD	SOT73	14	DIL	11	IC04N
HEF4093BP	SOT27	14	DIL	11	IC04N
HEF4093BT	SOT108A	14	SO14	11	IC04N
HEF4093BU	-	14	pads	11	IC05N
HEF4094BD	SOT74	16	DIL	9	IC04N
HEF4094BP	SOT38Z	16	DIL	9	IC04N
HEF4094BT	SOT109A	16	SO16	9	IC04N
HEF4094BU	-	16	pads	9	IC05N
HEF4104BD	SOT74	16	DIL	11	IC04N
HEF4104BP	SOT38Z	16	DIL	11	IC04N
HEF4104BT	SOT109A	16	SO16	11	IC04N
HEF4104BU	-	16	pads	11	IC05N
HEF4502BD	SOT74	16	DIL	8	IC04N
HEF4502BP	SOT38Z	16	DIL	8	IC04N
HEF4502BT	SOT109A	16	SO16	8	IC04N
HEF4502BU	-	16	pads	8	IC05N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
HEF4505BD	SOT73	14	DIL	11	IC04N
HEF4505BP	SOT27	14	DIL	11	IC04N
HEF4505BU	-	14	pads	11	IC05N
HEF4508BD	SOT94	24	DIL	10	IC04N
HEF4508BP	SOT101A	24	DIL	10	IC04N
HEF4508BT	SOT137A	24	SO24	10	IC04N
HEF4508BU	-	24	pads	10	IC05N
HEF4510BD	SOT74	16	DIL	9	IC04N
HEF4510BP	SOT38Z	16	DIL	9	IC04N
HEF4510BT	SOT162A	16	SO16L	9	IC04N
HEF4510BU	-	16	pads	9	IC05N
HEF4511BD	SOT74	16	DIL	10	IC04N
HEF4511BP	SOT38Z	16	DIL	10	IC04N
HEF4511BT	SOT109A	16	SO16	10	IC04N
HEF4511BU	-	16	pads	10	IC05N
HEF4512BD	SOT74	16	DIL	10	IC04N
HEF4512BP	SOT38Z	16	DIL	10	IC04N
HEF4512BT	SOT109A	16	SO16	10	IC04N
HEF4512BU	-	16	pads	10	IC05N
HEF4514BD	SOT94	24	DIL	10	IC04N
HEF4514BP	SOT101A	24	DIL	10	IC04N
HEF4514BT	SOT137A	24	SO24	10	IC04N
HEF4514BU	-	24	pads	10	IC05N
HEF4515BD	SOT94	24	DIL	10	IC04N
HEF4515BP	SOT101A	24	DIL	10	IC04N
HEF4515BT	SOT137A	24	SO24	10	IC04N
HEF4515BU	-	24	pads	10	IC05N
HEF4516BD	SOT74	16	DIL	9	IC04N
HEF4516BP	SOT38Z	16	DIL	9	IC04N
HEF4516BT	SOT162A	16	SO16L	9	IC04N
HEF4516BU	-	16	pads	9	IC05N
HEF4517BD	SOT74	16	DIL	9	IC04N
HEF4517BP	SOT38Z	16	DIL	9	IC04N
HEF4517BT	SOT162A	16	SO16L	9	IC04N
HEF4517BU	-	16	pads	9	IC05N
HEF4518BD	SOT74	16	DIL	9	IC04N
HEF4518BP	SOT38Z	16	DIL	9	IC04N
HEF4518BT	SOT109A	16	SO16	9	IC04N
HEF4518BU	-	16	pads	9	IC05N
HEF4519BD	SOT74	16	DIL	10	IC04N
HEF4519BP	SOT38Z	16	DIL	10	IC04N
HEF4519BT	SOT109A	16	SO16	10	IC04N
HEF4519BU	-	16	pads	10	IC05N
HEF4520BD	SOT74	16	DIL	9	IC04N
HEF4520BP	SOT38Z	16	DIL	9	IC04N
HEF4520BT	SOT109A	16	SO16	9	IC04N
HEF4520BU	-	16	pads	9	IC05N
HEF4521BD	SOT74	16	DIL	9	IC04N
HEF4521BP	SOT38Z	16	DIL	9	IC04N
HEF4521BT	SOT109A	16	SO16	9	IC04N
HEF4521BU	-	16	pads	9	IC05N
HEF4522BD	SOT74	16	DIL	9	IC04N
HEF4522BP	SOT38Z	16	DIL	9	IC04N
HEF4522BT	SOT109A	16	SO16	9	IC04N
HEF4522BU	-	16	pads	9	IC05N
HEF4526BD	SOT74	16	DIL	9	IC04N
HEF4526BP	SOT38Z	16	DIL	9	IC04N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
HEF4526BT	SOT109A	16	SO16	9	IC04N
HEF4526BU	-	16	pads	9	IC05N
HEF4527BD	SOT74	16	DIL	11	IC04N
HEF4527BP	SOT38Z	16	DIL	11	IC04N
HEF4527BT	SOT109A	16	SO16	11	IC04N
HEF4527BU	-	16	pads	11	IC05N
HEF4528BD	SOT74	16	DIL	10	IC04N
HEF4528BP	SOT38Z	16	DIL	10	IC04N
HEF4528BT	SOT109A	16	SO16	10	IC04N
HEF4528BU	-	16	pads	10	IC05N
HEF4531BD	SOT74	16	DIL	10	IC04N
HEF4531BP	SOT38Z	16	DIL	10	IC04N
HEF4531BT	SOT109A	16	SO16	10	IC04N
HEF4531BU	-	16	pads	10	IC05N
HEF4532BD	SOT74	16	DIL	10	IC04N
HEF4532BP	SOT38Z	16	DIL	10	IC04N
HEF4532BT	SOT109A	16	SO16	10	IC04N
HEF4532BU	-	16	pads	10	IC05N
HEF4534BD	SOT94	24	DIL	9	IC04N
HEF4534BP	SOT101A	24	DIL	9	IC04N
HEF4534BT	SOT137A	24	SO24	9	IC04N
HEF4534BU	-	24	pads	9	IC05N
HEF4538BD	SOT74	16	DIL	10	IC04N
HEF4538BP	SOT38Z	16	DIL	10	IC04N
HEF4538BT	SOT109A	16	SO16	10	IC04N
HEF4538BU	-	16	pads	10	IC05N
HEF4539BD	SOT74	16	DIL	10	IC04N
HEF4539BP	SOT38Z	16	DIL	10	IC04N
HEF4539BT	SOT109A	16	SO16	10	IC04N
HEF4539BU	-	16	pads	10	IC05N
HEF4541BD	SOT73	14	DIL	10	IC04N
HEF4541BP	SOT27	14	DIL	10	IC04N
HEF4541BT	SOT108A	14	SO14	10	IC04N
HEF4541BU	-	12	pads	10	IC05N
HEF4543BD	SOT74	16	DIL	10	IC04N
HEF4543BP	SOT38Z	16	DIL	10	IC04N
HEF4543BT	SOT109A	16	SO16	10	IC04N
HEF4543BU	-	16	pads	10	IC05N
HEF4555BD	SOT74	16	DIL	10	IC04N
HEF4555BP	SOT38Z	16	DIL	10	IC04N
HEF4555BT	SOT109A	16	SO16	10	IC04N
HEF4555BU	-	16	pads	10	IC05N
HEF4556BD	SOT74	16	DIL	10	IC04N
HEF4556BP	SOT38Z	16	DIL	10	IC04N
HEF4556BT	SOT109A	16	SO16	10	IC04N
HEF4556BU	-	16	pads	10	IC05N
HEF4557BD	SOT74	16	DIL	9	IC04N
HEF4557BP	SOT38Z	16	DIL	9	IC04N
HEF4557BT	SOT162A	16	SO16	9	IC04N
HEF4557BU	-	16	pads	9	IC05N
HEF4585BD	SOT74	16	DIL	10	IC04N
HEF4585BP	SOT38Z	16	DIL	10	IC04N
HEF4585BT	SOT109A	16	SO16	10	IC04N
HEF4585BU	-	16	pads	10	IC05N
HEF4720BD	SOT74	16	DIL	11	IC04N
HEF4720VD	SOT74	16	DIL	11	IC04N
HEF4720BP	SOT38Z	16	SO16	11	IC04N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
HEF4720VP	SOT38Z	16	DIL	11	IC04N
HEF4720BT	SOT162A	16	SO16L	11	IC04N
HEF4720VT	SOT162A	16	SO16L	11	IC04N
HEF4720VU	-	15	pads	11	IC05N
HEF4724BD	SOT74	16	DIL	10	IC04N
HEF4724BP	SOT38Z	16	DIL	10	IC04N
HEF4724BT	SOT109A	16	SO16	10	IC04N
HEF4724BU	-	16	pads	10	IC05N
HEF4731BD	SOT73	14	DIL	9	IC04N
HEF4731VD	SOT73	14	DIL	9	IC04N
HEF4731BP	SOT27	14	DIL	9	IC04N
HEF4731VP	SOT27	14	DIL	9	IC04N
HEF4731VU	-	14	pads	9	IC05N
HEF4737BD	SOT133	18	DIL	9	IC04N
HEF4737VD	SOT133	18	DIL	9	IC04N
HEF4737BP	SOT102A	18	DIL	9	IC04N
HEF4737VP	SOT102A	18	DIL	9	IC04N
HEF4737VU	-	18	pads	9	IC05N
HEF4738VP	SOT129	40	DIL	11	IC04N
HEF4750VD	SOT135A	28	DIL	11;49	IC04N
HEF4750VU	-	28	pads	11;49	IC05N
HEF4751VD	SOT135A	28	DIL	9;49	IC04N
HEF4751VP	SOT117	28	DIL	9;49	IC04N
HEF4751VT	SOT136A	28	SO28	9;49	IC04N
HEF4751VU	-	28	pads	9;49	IC05N
HEF4752VD	SOT135A	28	DIL	11;50	IC04N
HEF4752VP	SOT117	28	DIL	11;50	IC04N
HEF4752VT	SOT136A	28	SO28	11;50	IC04N
HEF4753BD	SOT133	18	DIL	10	IC04N
HEF4753BP	SOT102A	18	DIL	10	IC04N
HEF4753VU	-	18	pads	10	IC05N
HEF4754VD	SOT135A	28	DIL	11	IC04N
HEF4754VP	SOT117	28	DIL	11	IC04N
HEF4754VT	SOT136A	28	SO28	11	IC04N
HEF4754VU	-	28	pads	11	IC05N
HEF4755VD	SOT135A	28	DIL	11	IC04N
HEF4755VP	SOT117	28	DIL	11	IC04N
HEF4755VT	SOT136A	28	SO28	11	IC04N
HEF4755VU	-	28	pads	11	IC05N
HEF40097BD	SOT74	16	DIL	8	IC04N
HEF40097BP	SOT38Z	16	DIL	8	IC04N
HEF40097BT	SOT109A	16	SO16	8	IC04N
HEF40097BU	-	16	pads	8	IC05N
HEF40098BD	SOT74	16	DIL	8	IC04N
HEF40098BP	SOT38Z	16	DIL	8	IC04N
HEF40098BT	SOT109A	16	SO16	8	IC04N
HEF40098BU	-	16	pads	8	IC05N
HEF40106BD	SOT73	14	DIL	11	IC04N
HEF40106BP	SOT27	14	DIL	11	IC04N
HEF40106BT	SOT108A	14	SO14	11	IC04N
HEF40106BU	-	14	pads	11	IC05N
HEF40160BD	SOT74	16	DIL	9	IC04N
HEF40160BP	SOT38Z	16	DIL	9	IC04N
HEF40160BT	SOT109A	16	SO16	9	IC04N
HEF40160BU	-	16	pads	9	IC05N
HEF40161BD	SOT74	16	DIL	9	IC04N
HEF40161BP	SOT38Z	16	DIL	9	IC04N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
HEF40161BT	SOT109A	16	SO16	9	IC04N
HEF40161BU	-	16	pads	9	IC05N
HEF40162BD	SOT74	16	DIL	9	IC04N
HEF40162BP	SOT38Z	16	DIL	9	IC04N
HEF40162BT	SOT109A	16	SO16	9	IC04N
HEF40162BU	-	16	pads	9	IC05N
HEF40163BD	SOT74	16	DIL	9	IC04N
HEF40163BP	SOT38Z	16	DIL	9	IC04N
HEF40163BT	SOT109A	16	SO16	9	IC04N
HEF40163BU	-	16	pads	9	IC05N
HEF40174BD	SOT74	16	DIL	9	IC04N
HEF40174BP	SOT38Z	16	DIL	9	IC04N
HEF40174BT	SOT109A	16	SO16	9	IC04N
HEF40174BU	-	16	pads	9	IC05N
HEF40175BD	SOT74	16	DIL	9	IC04N
HEF40175BP	SOT38Z	16	DIL	9	IC04N
HEF40175BT	SOT109A	16	SO16	9	IC04N
HEF40175BU	-	16	pads	9	IC05N
HEF40192BD	SOT74	16	DIL	9	IC04N
HEF40192BP	SOT38Z	16	DIL	9	IC04N
HEF40192BT	SOT109A	16	SO16	9	IC04N
HEF40192BU	-	16	pads	9	IC05N
HEF40193BD	SOT74	16	DIL	9	IC04N
HEF40193BP	SOT38Z	16	DIL	9	IC04N
HEF40193BT	SOT109A	16	SO16	9	IC04N
HEF40193BU	-	16	pads	9	IC05N
HEF40194BD	SOT74	16	DIL	9	IC04N
HEF40194BP	SOT38Z	16	DIL	9	IC04N
HEF40194BT	SOT109A	16	SO16	9	IC04N
HEF40194BU	-	16	pads	9	IC05N
HEF40195BD	SOT74	16	DIL	9	IC04N
HEF40195BP	SOT38Z	16	DIL	9	IC04N
HEF40195BT	SOT109A	16	SO16	9	IC04N
HEF40195BU	-	16	pads	9	IC05N
HEF40240BP	SOT146	20	DIL	11	IC04N
HEF40240BT	SOT163A	20	SO20	11	IC04N
HEF40240BU	-	20	pads	11	IC05N
HEF40244BP	SOT146	20	DIL	11	IC04N
HEF40244BT	SOT163A	20	SO20	11	IC04N
HEF40244BU	-	20	pads	11	IC05N
HEF40245BP	SOT146	20	DIL	11	IC04N
HEF40245BT	SOT163A	20	SO20	11	IC04N
HEF40245BU	-	20	pads	11	IC05N
HEF40373BP	SOT146	20	DIL	11	IC04N
HEF40373BT	SOT163A	20	SO20	11	IC04N
HEF40373BU	-	20	pads	11	IC05N
HEF40374BP	SOT146	20	DIL	11	IC04N
HEF40374BT	SOT163A	20	SO20	11	IC04N
HEF40374BU	-	20	pads	11	IC05N
LF398	F,N	8	DIL	46	IC11N
LM111	F,N/D	8	DIL/SO8	45	IC11N
LM119	F/D	14	DIL/SO14	45	IC11N
LM124	F,N/D	14	DIL/SO14	46	IC11N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
LM139	F,N/D	14	DIL/SO14	45	IC11N
LM158	F,N	8	DIL	46	IC11N
LM193	F,N	8	DIL	45	IC11N
LM211	F,N/D	8	DIL/SO8	45	IC11N
LM219	F/D	14	DIL/SO14	45	IC11N
LM224	F,N/D	14	DIL/SO14	46	IC11N
LM239	F,N/D	14	DIL/SO14	45	IC11N
LM258	F,N	8	DIL	46	IC11N
LM293	F,N	8	DIL	45	IC11N
LM311	F,N/D	8	DIL/SO8	45	IC11N
LM319	F/D	14	DIL/SO14	45	IC11N
LM324	F,N/D	14	DIL/SO14	46	IC11N
LM339	F,N/D	14	DIL/SO14	45	IC11N
LM358	F,N	8	DIL	46	IC11N
LM393	F,N	8	DIL	45	IC11N
LM1870	N	20	DIL	47;52	IC11N
LM2901	F,N/D	14	DIL/SO14	45	IC11N
LM2903	F,N	8	DIL	45	IC11N
MAB8021P	SOT117	28	DIL	60;70	IC01N;IC02N;IC11
MAB8031AH-12P	SOT129	40	DIL	60;70	●
MAB8031AH-15P	SOT129	40	DIL	60;70	●
MAB8032AHP	SOT129	40	DIL	60;70	●
MAB8032AHWP	SOT187A	44	PLCC	60;70	●
MAB8035HLP	SOT129	40	DIL	60;70	IC01N;IC02N;IC11
MAB8035HLT	SOT158A	40	VSO40	60;70	IC01N;IC02N;IC11
MAB8039HL-6P	SOT129	40	DIL	60;70	●
MAB8039HL-11P	SOT129	40	DIL	60;70	●
MAB8040HLP	SOT129	40	DIL	60;70	●
MAB8048HP	SOT129	40	DIL	60;70	IC01N;IC02N;IC11
MAB8048HT	SOT158A	40	VSO40	60;70	IC01N;IC02N;IC11
MAB8049H-6P	SOT129	40	DIL	60;70	●
MAB8049H-11P	SOT129	40	DIL	60;70	●
MAB8050HP	SOT129	40	DIL	60;70	IC11
MAB8051AHP	SOT129	40	DIL	60;70	●
MAB8052AHP	SOT129	40	DIL	60;70	●
MAB8052AHWP	SOT187A	44	PLCC	60;70	●
MAB8401B	-	28 + 28	PB	60;70	IC01N;IC02N;IC11
MAB8401WP	SOT188A	68	PLCC	60;70	IC01N;IC02N;IC11
MAB8411P	SOT117D	28	DIL	60;70	IC01N;IC02N;IC11
MAB8411T	SOT136A	28	SO28	60;70	IC01N;IC02N;IC11
MAB8421P	SOT117D	28	DIL	60;70	●
MAB8421T	SOT136A	28	SO28	60;70	●
MAB8422P	SOT146	20	DIL	60;70	●
MAB8441P	SOT117D	28	DIL	60;70	●
MAB8441T	SOT136A	28	SO28	60;70	●
MAB8442P	SOT146	20	DIL	60;70	●
MAB8461P	SOT117D	28	DIL	60;70	●
MAF8021P	SOT117	28	DIL	60;70	IC01N;IC02N;IC11
MAF80A31AHP	SOT129	40	DIL	60;70	●
MAF8031AHP	SOT129	40	DIL	60;70	●
MAF80A35HLP	SOT158A	40	VSO40	60;70	●
MAF8035HLT	SOT158A	40	VSO40	60;70	●
MAF80A39HLP	SOT129	40	DIL	60;70	●



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
MAF8039HLP	SOT129	40	DIL	60;70	●
MAF80A40HLP	SOT129	40	DIL	60;70	●
MAF8040HLP	SOT129	40	DIL	60;70	●
MAF8048HP	SOT129	40	DIL	60;70	●
MAF80A49AHP	SOT129	40	DIL	60;70	●
MAF8049HLT	SOT158A	40	VSO40	60;70	●
MAF8049H-11P	SOT129	40	DIL	60;70	●
MAF80A50HP	SOT129	40	DIL	60;70	●
MAF8050HP	SOT129	40	DIL	60;70	●
MAF80A51AHP	SOT129	40	DIL	60;70	●
MAF8051AHP	SOT129	40	DIL	60;70	●
MAF84A11P	SOT117D	28	DIL	60;70	●
MAF8411P	SOT117D	28	DIL	60;70	●
MAF8411T	SOT136A	28	SO28	60;70	●
MAF84A21P	SOT117D	28	DIL	60;70	●
MAF8421P	SOT117D	28	DIL	60;70	●
MAF8421T	SOT136A	28	SO28	60;70	●
MAF8422P	SOT146	20	DIL	60;70	●
MAF84A22P	SOT146	20	DIL	60;70	●
MAF84A41P	SOT117D	28	DIL	60;70	●
MAF8441P	SOT117D	28	DIL	60;70	●
MAF8441T	SOT136A	28	SO28	60;70	●
MAF84A42P	SOT146	20	DIL	60;70	●
MAF8442P	SOT146	20	DIL	60;70	●
MAF84A61P	SOT117D	28	DIL	60;70	●
MAF8461P	SOT117D	28	DIL	60;70	●
MC1408-7	F,N/D	16	DIL/SO16	45	IC11N
MC1408-8	F,N/D	16	DIL/SO16	45	IC11N
MC1458	F,N/D	8	DIL/SO8	46	IC11N
MC1488	F,N	14	DIL	45	IC11N
MC1489	F,N	14	DIL	45	IC11N
MC1489A	F,N	14	DIL	45	IC11N
MC1496	F,N	14	DIL	47;52	IC11N
MC1508-8	F,N/D	16	DIL/SO16	45	IC11N
MC1558	F,N/D	8	DIL/SO8	46	IC11N
MC1596	F,N	14	DIL	47;52	IC11N
MC3302	F,N/D	14	DIL/SO14	45	IC11N
MC3303	F,N/D	14	DIL/SO14	46	IC11N
MC3403	F,N/D	14	DIL/SO14	46	IC11N
MC3410	F	16	DIL	45	IC11N
MC3503	F,N/D	14	DIL/SO14	46	IC11N
MC3510	F	16	DIL	45	IC11N
MEB3000	SOT101A	24	DIL	51;61;66;79	IC01N
MEE3000	-	-	-	66	-
NE521	F,N/D	14	DIL/SO14	45	IC11N
NE522	F,N/D	14	DIL/SO14	45	IC11N
NE527	F,N/D	14	DIL/SO14	45	IC11N
NE529	F,N/D	14	DIL/SO14	45	IC11N
NE530	F,N	8	DIL	46	IC11N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
NE531	F,N	8	DIL	46	IC11N *
NE532	F,N	8	DIL	46	IC11N
NE538	F,N	8	DIL	46	IC11N
NE542	N	8	DIL	66	IC11N
NE544	N	14	DIL	46;66	IC11N
NE555	F,(F),N/D	8(14)	DIL/SO8	46	IC11N
NE556	F,N/D	14	DIL/SO14	46	IC11N
NE556-1	F,N/D	14	DIL/SO14	46	IC11N
NE558	F,N	16	DIL	46	IC11N
NE564	I,N/D	16	DIL/SO16	47	IC11N
NE565	F,N/D	14	DIL/SO14	47	IC11N
NE566	F,(N)/D	14(8)	DIL/SO8	47	IC11N
NE567	F,N/D	8	DIL/SO8	47	IC11N
NE570	F,N/D	16	DIL/SO16	47;66	IC11N
NE571	F,N/D	16	DIL/SO16	47;66	IC11N
NE572	N/D	16	DIL/SO16	47;66	IC11N
NE587	F,N	18	DIL	45;48	IC11N
NE589	F,N	18	DIL	45;48	IC11N
NE590	F,N	16	DIL	45	IC11N
NE591	F,N	18	DIL	45	IC11N
NE592	F,N/D	14	DIL/SO14	46;56	IC11N
NE594	F,N	18	DIL	45;48	IC11N
NE602	D,N	8	DIL	47	IC11N
NE604	D,N	16	DIL	47	IC11N
NE612	-	-	-	47	-
NE614	-	-	-	47	-
NE645	N	16	DIL	52	IC11N
NE646	N	16	DIL	52	IC11N
NE648	N	16	DIL	52	IC11N
NE649	N	16	DIL	52	IC11N
NE650	N	16	DIL	52	IC11N
NE4558	F,N/D	8	DIL/SO8	45	IC11N
NE5018	F,N	22	DIL	45	IC11N
NE5019	F,N	22	DIL	45	IC11N
NE5020	F,N	24	DIL	45	IC11N
NE5034	F	18	DIL	45	IC11N
NE5036	F,N/D	8/14	DIL/SO14	45	IC11N
NE5037	F,N/D	16	DIL/SO16	45	IC11N
NE5044	N/D	16	DIL/SO16	46;52	IC11N
NE5045	N/D	16	DIL/SO16	46;52	IC11N
NE5080	N	16	DIL	45	IC11N
NE5081	N	20	DIL	45	IC11N
NE5090	F,N	16	DIL	45	IC11N
NE5118	F,N	22	DIL	45	IC11N
NE5119	F,N	22	DIL	45	IC11N
NE5205	-	-	-	46	-
NE5230	-	-	-	46	-
NE5410	F	16	DIL	45	IC11N
NE5512	F,N/D	8	DIL/SO8	45	IC11N
NE5514	F,N/D	14/16	DIL/SO16	45	IC11N
NE5517	N/D	16	DIL/SO16	45	IC11N
NE5517A	N/D	16	DIL/SO16	45	IC11N
NE5520	F,(N)/D	16(14)	DIL/SO16	45	IC11N
NE5521	-	-	-	45	-
NE5532	F,N	8	DIL	46	IC11N
NE5532A	F,N	8	DIL	46	IC11N
NE5533	N	14	DIL	46	IC11N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
NE5533A	N	14	DIL	46	IC11N
NE5534	F,N/D	8	DIL/SO8	46	IC11N
NE5534A	F,N/D	8	DIL/SO8	46	IC11N
NE5535	N	8	DIL	46	IC11N
NE5537	N	8	DIL	46	IC11N
NE5539	F,N/D	14	DIL/SO14	46	IC11N
NE5560	F,N/D	16	DIL/SO16	65	IC11N
NE5561	F,N/D	8	DIL/SO8	65	IC11N
NE5562	F,N/D	20	DIL/SO20	47	IC11N
NE5563	-	-	-	47	-
NE5568	F,N/D	8	DIL/SO8	47	IC11N
NE5592	D,N	14	DIL	46	IC11N
OM200/S2	SOT20	4	SIL	52	IC01N
OM1099	-	-	-	61	-
OM8000	p.c.b.	-	-	51;66;79	-
OM8001	p.c.b.	-	-	51;66;79	-
OM8002	p.c.b.	-	-	51;66;79	-
OM8010	p.c.b.	-	-	51;66;79	-
OM8200	p.c.b.	-	-	51;66;79	IC01N
OM8201	p.c.b.	-	-	51;66;79	IC01N
OM8202	p.c.b.	-	-	51;66;79	-
OM8209	p.c.b.	-	-	51;66;79	-
OM8210	p.c.b.	-	-	51;66;79	IC01N
PCA1200	-	-	-	64	-
PCA1260	-	-	-	64	-
PCA1400	-	-	-	64	-
PCA1512	-	-	-	64	-
PCA1517	SOT97A	8	DIL	64	-
PCA1564	SOT97A	8	DIL	64	-
PCA1574	SOT97A	8	DIL	64	-
PCA1580	-	-	-	64	-
PCB80C31P	SOT129	40	DIL	61;71	●
PCB80C31WP	SOT187A	44	PLCC	61;71	●
PCB80C39P	SOT129	40	DIL	61;71	●
PCB80C39WP	SOT187A	44	PLCC	61;71	●
PCB80C49P	SOT129	40	DIL	61;71	●
PCB80C49WP	SOT187A	44	PLCC	61;71	●
PCB80C51P	SOT129	40	DIL	61;71	●
PCB80C51WP	SOT187A	44	PLCC	61;71	●
PCB80C351	-	-	-	61;71	-
PCB80C451	-	-	-	61;71	-
PCB80C552	-	-	-	61;71	-
PCB80C652	-	-	-	61;71	-
PCB83C351	-	-	-	61;71	-
PCB83C451	-	-	-	61;71	-
PCB83C552	-	-	-	61;71	-
PCB83C652	-	-	-	61;71	-
PCB8582	SOT97	8	DIL	44	-
PCB68070WP	SOT189A	84	PLCC	61;69;71	●



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PCC0330	SOT97C2	8	DIL	74	•
PCC0330	SOT97C2	8	DIL	74	•
PCC0330	SOT153B0	8	DIL	74	•
PCC0330	SOT73C3	14	DIL	74	•
PCC0330	SOT83B4	14	DIL	74	•
PCC0330	SOT38C13	16	DIL	74	•
PCC0330	SOT74C3	16	DIL	74	•
PCC0330	SOT84B4	16	DIL	74	•
PCC0330	SOT162AE4	16	SO16	74	•
PCC0330	SOT85B0	18	DIL	74	•
PCC0330	SOT102G13	18	DIL	74	•
PCC0330	SOT146C1	20	DIL	74	•
PCC0330	SOT152B4	20	DIL	74	•
PCC0330	SOT154B0	20	DIL	74	•
PCC0330	SOT163AE4	20	SO20	74	•
PCC0330	SOT116C1	22	DIL	74	•
PCC0330	SOT118B0	22	DIL	74	•
PCC0330	SOT134A1	22	DIL	74	•
PCC0330	SOT86A0	24	DIL	74	•
PCC0330	SOT94A4	24	DIL	74	•
PCC0330	SOT101D13	24	DIL	74	•
PCC0330	SOT137AE1	24	SO24	74	•
PCC0330	SOT87A0	28	DIL	74	•
PCC0330	SOT117D16	28	DIL	74	•
PCC0330	SOT135A	28	DIL	74	•
PCC0330	SOT136AE4	28	SO28	74	•
PCC0330	SOT88A4	40	DIL	74	•
PCC0330	SOT129C2	40	DIL	74	•
PCC0330	SOT145A7	40	DIL	74	•
PCC0330	SOT158A3	40	VSO40	74	•
PCC0336	SOT97C2	8	DIL	75	•
PCC0336	SOT153B0	8	DIL	75	•
PCC0336	SOT73C3	14	DIL	75	•
PCC0336	SOT83B4	14	DIL	75	•
PCC0336	SOT38C13	16	DIL	75	•
PCC0336	SOT74C3	16	DIL	75	•
PCC0336	SOT84B4	16	DIL	75	•
PCC0336	SOT162AE4	16	SO16	75	•
PCC0336	SOT85B0	18	DIL	75	•
PCC0336	SOT102G13	18	DIL	75	•
PCC0336	SOT146C1	20	DIL	75	•
PCC0336	SOT152B4	20	DIL	75	•
PCC0336	SOT154B0	20	DIL	75	•
PCC0336	SOT163AE4	20	SO20	75	•
PCC0336	SOT116C1	22	DIL	75	•
PCC0336	SOT118B0	22	DIL	75	•
PCC0336	SOT134A1	22	DIL	75	•
PCC0336	SOT86A0	24	DIL	75	•
PCC0336	SOT94A4	24	DIL	75	•
PCC0336	SOT101D13	24	DIL	75	•
PCC0336	SOT137AE1	24	SO24	75	•
PCC0336	SOT87A0	28	DIL	75	•
PCC0336	SOT117D16	28	DIL	75	•
PCC0336	SOT135A	28	DIL	75	•
PCC0336	SOT136AE4	28	SO28	75	•



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PCC0336	SOT88A4	40	DIL	75	●
PCC0336	SOT129C2	40	DIL	75	●
PCC0336	SOT145A7	40	DIL	75	●
PCC0336	SOT158A3	40	VSO40	75	●
PCC0450	SOT97C2	8	DIL	74	●
PCC0450	SOT153B0	8	DIL	74	●
PCC0450	SOT73C3	14	DIL	74	●
PCC0450	SOT83B4	14	DIL	74	●
PCC0450	SOT74C3	16	DIL	74	●
PCC0450	SOT84B4	16	DIL	74	●
PCC0450	SOT162AE4	16	SO16L	74	●
PCC0450	SOT85B0	18	DIL	74	●
PCC0450	SOT102G13	18	DIL	74	●
PCC0450	SOT146C1	20	DIL	74	●
PCC0450	SOT152B4	20	DIL	74	●
PCC0450	SOT154B0	20	DIL	74	●
PCC0450	SOT163AE4	20	SO20	74	●
PCC0450	SOT116C1	22	DIL	74	●
PCC0450	SOT118B0	22	DIL	74	●
PCC0450	SOT134A1	22	DIL	74	●
PCC0450	SOT86A0	24	DIL	74	●
PCC0450	SOT94A4	24	DIL	74	●
PCC0450	SOT101D13	24	DIL	74	●
PCC0450	SOT137AE1	24	SO24	74	●
PCC0450	SOT87A0	28	DIL	74	●
PCC0450	SOT117D16	28	DIL	74	●
PCC0450	SOT136AE4	28	SO28	74	●
PCC0450	SOT135A4	28	DIL	74	●
PCC0456	SOT97C2	8	DIL	75	●
PCC0456	SOT153B0	8	DIL	75	●
PCC0456	SOT73C3	14	DIL	75	●
PCC0456	SOT83B4	14	DIL	75	●
PCC0456	SOT74C3	16	DIL	75	●
PCC0456	SOT84B4	16	DIL	75	●
PCC0456	SOT162AE4	16	SO16L	75	●
PCC0456	SOT85B0	18	DIL	75	●
PCC0456	SOT102G13	18	DIL	75	●
PCC0456	SOT146C1	20	DIL	75	●
PCC0456	SOT152B4	20	DIL	75	●
PCC0456	SOT154B0	20	DIL	75	●
PCC0456	SOT163AE4	20	SO20	75	●
PCC0456	SOT116C1	22	DIL	75	●
PCC0456	SOT118B0	22	DIL	75	●
PCC0456	SOT134A1	22	DIL	75	●
PCC0456	SOT86A0	24	DIL	75	●
PCC0456	SOT94A4	24	DIL	75	●
PCC0456	SOT101D13	24	DIL	75	●
PCC0456	SOT137AE1	24	SO24	75	●
PCC0456	SOT87A0	28	DIL	75	●
PCC0456	SOT117D16	28	DIL	75	●
PCC0456	SOT136AE4	28	SO28	75	●
PCC0456	SOT135A4	28	DIL	75	●



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PCC0700	SOT116C2	22	DIL	74	●
PCC0700	SOT116C2	22	DIL	74	●
PCC0700	SOT118B0	22	DIL	74	●
PCC0700	SOT134A1	22	DIL	74	●
PCC0700	SOT86A4	24	DIL	74	●
PCC0700	SOT94A3	24	DIL	74	●
PCC0700	SOT101BE1	24	DIL	74	●
PCC0700	SOT87A4	28	DIL	74	●
PCC0700	SOT117D16	28	DIL	74	●
PCC0700	SOT135A4	28	DIL	74	●
PCC0700	SOT136AE5	28	SO28	74	●
PCC0700	SOT129C2	40	DIL	74	●
PCC0700	SOT88A4	40	DIL	74	●
PCC0700	SOT145A7	40	DIL	74	●
PCC0700	SOT158A5	40	VSO40	74	●
PCC0706	SOT116C2	22	DIL	75	●
PCC0706	SOT118B0	22	DIL	75	●
PCC0706	SOT134A1	22	DIL	75	●
PCC0706	SOT86A4	24	DIL	75	●
PCC0706	SOT94A3	24	DIL	75	●
PCC0706	SOT101BE1	24	DIL	75	●
PCC0706	SOT87A4	28	DIL	75	●
PCC0706	SOT117D16	28	DIL	75	●
PCC0706	SOT135A4	28	DIL	75	●
PCC0706	SOT136AE5	28	SO28	75	●
PCC0706	SOT129C2	40	DIL	75	●
PCC0706	SOT88A4	40	DIL	75	●
PCC0706	SOT145A7	40	DIL	75	●
PCC0706	SOT158A5	40	VSO40	75	●
PCC1100	SOT87B6	28	DIL	74	●
PCC1100	SOT88B5	40	DIL	74	●
PCC1100	SOT129C3	40	DIL	74	●
PCC1100	SOT145A3	40	DIL	74	●
PCC1106	SOT87B6	28	DIL	75	●
PCC1106	SOT88B5	40	DIL	75	●
PCC1106	SOT129C3	40	DIL	75	●
PCC1106	SOT145A3	40	DIL	75	●
PCD3310P	SOT146	20	DIL	63	-
PCD3310T	SOT136	28	SO	63	-
PCD3311P	SOT27	14	DIL	63	●
PCD3311T	SOT162A	16	SO16L	63	●
PCD3312P	SOT97A	8	DIL	63	●
PCD3312T	SOT176	8	VSO8	63	●
PCD3315P	SOT117	28	DIL	63;70	-
PCD3315T	SOT136	28	SO	63;70	-
PCD3320P	SOT102G	18	DIL	63	●
PCD3321P	SOT102G	18	DIL	63	●
PCD3322P	SOT102G	18	DIL	63	●
PCD3323P	SOT117D	28	DIL	63	●



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PCD3323T	SOT136A	28	SO28	63	●
PCD3325AP	SOT102G	18	DIL	63	●
PCD3326	-	-	-	63	-
PCD3327P	SOT102G	18	DIL	63	●
PCD3341P	SOT102G	18	DIL	63	●
PCD3341T	SOT136A	28	SO28	63	-
PCD3343P	SOT117D	28	DIL	63;70	●
PCD3343T	SOT136A	28	SO28	63;70	●
PCD3360P	SOT38	16	DIL	63	-
PCD3360T	SOT162A	16	SO16L	63	-
PCD5101P	SOT116	22	DIL	44;48	●
PCD5101T	SOT137A	24	SO24	44;48	●
PCD5114D	SOT133	18	DIL	44;48	-
PCD5114P	SOT102G	18	DIL	44;48	-
PCF0330	SOT97C2	8	DIL	74	●
PCF0330	SOT153B0	8	DIL	74	●
PCF0330	SOT73C3	14	DIL	74	●
PCF0330	SOT83B4	14	DIL	74	●
PCF0330	SOT38C13	16	DIL	74	●
PCF0330	SOT74C3	16	DIL	74	●
PCF0330	SOT84B4	16	DIL	74	●
PCF0330	SOT162AE4	16	SO16	74	●
PCF0330	SOT85B0	18	DIL	74	●
PCF0330	SOT102G13	18	DIL	74	●
PCF0330	SOT146C1	20	DIL	74	●
PCF0330	SOT152B4	20	DIL	74	●
PCF0330	SOT154B0	20	DIL	74	●
PCF0330	SOT163AE4	20	SO20	74	●
PCF0330	SOT116C1	22	DIL	74	●
PCF0330	SOT118B0	22	DIL	74	●
PCF0330	SOT134A1	22	DIL	74	●
PCF0330	SOT86A0	24	DIL	74	●
PCF0330	SOT94A4	24	DIL	74	●
PCF0330	SOT101D13	24	DIL	74	●
PCF0330	SOT137AE1	24	SO24	74	●
PCF0330	SOT87A0	28	DIL	74	●
PCF0330	SOT117D16	28	DIL	74	●
PCF0330	SOT135A	28	DIL	74	●
PCF0330	SOT136AE4	28	SO28	74	●
PCF0330	SOT88A4	40	DIL	74	●
PCF0330	SOT129C2	40	DIL	74	●
PCF0330	SOT145A7	40	DIL	74	●
PCF0330	SOT158A3	40	VSO40	74	●
PCF0336	SOT97C2	8	DIL	75	●
PCF0336	SOT153B0	8	DIL	75	●
PCF0336	SOT73C3	14	DIL	75	●
PCF0336	SOT83B4	14	DIL	75	●
PCF0336	SOT38C13	16	DIL	75	●
PCF0336	SOT74C3	16	DIL	75	●
PCF0336	SOT84B4	16	DIL	75	●
PCF0336	SOT162AE4	16	SO16	75	●
PCF0336	SOT85B0	18	DIL	75	●
PCF0336	SOT102G13	18	DIL	75	●
PCF0336	SOT146C1	20	DIL	75	●



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PCF0336	SOT152B4	20	DIL	75	●
PCF0336	SOT154B0	20	DIL	75	●
PCF0336	SOT163AE4	20	SO20	75	●
PCF0336	SOT116C1	22	DIL	75	●
PCF0336	SOT118B0	22	DIL	75	●
PCF0336	SOT134A1	22	DIL	75	●
PCF0336	SOT86A0	24	DIL	75	●
PCF0336	SOT94A4	24	DIL	75	●
PCF0336	SOT101D13	24	DIL	75	●
PCF0336	SOT137AE1	24	SO24	75	●
PCF0336	SOT87A0	28	DIL	75	●
PCF0336	SOT117D16	28	DIL	75	●
PCF0336	SOT135A	28	DIL	75	●
PCF0336	SOT136AE4	28	SO28	75	●
PCF0336	SOT88A4	40	DIL	75	●
PCF0336	SOT129C2	40	DIL	75	●
PCF0336	SOT145A7	40	DIL	75	●
PCF0336	SOT158A3	40	VSO40	75	●
PCF0450	SOT97C2	8	DIL	74	●
PCF0450	SOT153B0	8	DIL	74	●
PCF0450	SOT73C3	14	DIL	74	●
PCF0450	SOT83B4	14	DIL	74	●
PCF0450	SOT74C3	16	DIL	74	●
PCF0450	SOT84B4	16	DIL	74	●
PCF0450	SOT162AE4	16	SO16L	74	●
PCF0450	SOT85B0	18	DIL	74	●
PCF0450	SOT102G13	18	DIL	74	●
PCF0450	SOT146C1	20	DIL	74	●
PCF0450	SOT152B4	20	DIL	74	●
PCF0450	SOT154B0	20	DIL	74	●
PCF0450	SOT163AE4	20	SO20	74	●
PCF0450	SOT116C1	22	DIL	74	●
PCF0450	SOT118B0	22	DIL	74	●
PCF0450	SOT134A1	22	DIL	74	●
PCF0450	SOT86A0	24	DIL	74	●
PCF0450	SOT94A4	24	DIL	74	●
PCF0450	SOT101D13	24	DIL	74	●
PCF0450	SOT137AE1	24	SO24	74	●
PCF0450	SOT87A0	28	DIL	74	●
PCF0450	SOT117D16	28	DIL	74	●
PCF0450	SOT136AE4	28	SO28	74	●
PCF0450	SOT135A4	28	DIL	74	●
PCF0456	SOT97C2	8	DIL	75	●
PCF0456	SOT153B0	8	DIL	75	●
PCF0456	SOT73C3	14	DIL	75	●
PCF0456	SOT83B4	14	DIL	75	●
PCF0456	SOT74C3	16	DIL	75	●
PCF0456	SOT84B4	16	DIL	75	●
PCF0456	SOT162AE4	16	SO16L	75	●
PCF0456	SOT85B0	18	DIL	75	●
PCF0456	SOT102G13	18	DIL	75	●
PCF0456	SOT146C1	20	DIL	75	●
PCF0456	SOT152B4	20	DIL	75	●



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PCF0456	SOT154B0	20	DIL	75	●
PCF0456	SOT163AE4	20	SO20	75	●
PCF0456	SOT116C1	22	DIL	75	●
PCF0456	SOT118B0	22	DIL	75	●
PCF0456	SOT134A1	22	DIL	75	●
PCF0456	SOT86A0	24	DIL	75	●
PCF0456	SOT94A4	24	DIL	75	●
PCF0456	SOT101D13	24	DIL	75	●
PCF0456	SOT137AE1	24	SO24	75	●
PCF0456	SOT87A0	28	DIL	75	●
PCF0456	SOT117D16	28	DIL	75	●
PCF0456	SOT136AE4	28	SO28	75	●
PCF0456	SOT135A4	28	DIL	75	●
PCF0700	SOT116C2	22	DIL	74	●
PCF0700	SOT118B0	22	DIL	74	●
PCF0700	SOT134A1	22	DIL	74	●
PCF0700	SOT86A4	24	DIL	74	●
PCF0700	SOT94A3	24	DIL	74	●
PCF0700	SOT101BE1	24	DIL	74	●
PCF0700	SOT87A4	28	DIL	74	●
PCF0700	SOT117D16	28	DIL	74	●
PCF0700	SOT135A4	28	DIL	74	●
PCF0700	SOT136AE5	28	SO28	74	●
PCF0700	SOT129C2	40	DIL	74	●
PCF0700	SOT88A4	40	DIL	74	●
PCF0700	SOT145A7	40	DIL	74	●
PCF0700	SOT158A5	40	VSO40	74	●
PCF0706	SOT116C2	22	DIL	75	●
PCF0706	SOT118B0	22	DIL	75	●
PCF0706	SOT134A1	22	DIL	75	●
PCF0706	SOT86A4	24	DIL	75	●
PCF0706	SOT94A3	24	DIL	75	●
PCF0706	SOT101BE1	24	DIL	75	●
PCF0706	SOT87A4	28	DIL	75	●
PCF0706	SOT117D16	28	DIL	75	●
PCF0706	SOT135A4	28	DIL	75	●
PCF0706	SOT136AE5	28	SO28	75	●
PCF0706	SOT129C2	40	DIL	75	●
PCF0706	SOT88A4	40	DIL	75	●
PCF0706	SOT145A7	40	DIL	75	●
PCF0706	SOT158A5	40	VSO40	75	●
PCF1100	SOT87B6	28	DIL	74	●
PCF1100	SOT88B5	40	DIL	74	●
PCF1100	SOT129C3	40	DIL	74	●
PCF1100	SOT145A3	40	DIL	74	●
PCF1106	SOT87B6	28	DIL	75	●
PCF1106	SOT88B5	40	DIL	75	●
PCF1106	SOT129C3	40	DIL	75	●
PCF1106	SOT145A3	40	DIL	75	●



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
PCF1171BT	SOT158B	40	VSO40	64	●
PCF1171BT	SOT158B	40	VSO40	64	●
PCF1171U	uncased	40	pads	64	●
PCF1172BT	SOT158B	40	VSO40	64	●
PCF1172U	uncased	40	pads	64	●
PCF1251P	SOT97A	8	DIL	63;66;71;	●
PCF1251T	SOT96	8	SO8	63;66;71;	●
PCF1303T	SOT136A	28	SO28	48	-
PCF2100P	SOT117D	28	DIL	48;61;59;71	IC01N;IC02N
PCF2100T	SOT136A	28	SO28	48;61;59;71	IC01N;IC02N
PCF2110P	SOT129	40	DIL	48;61;59;71	IC01N;IC02N
PCF2110T	SOT158A	40	VSO40	48;61;59;71	IC01N;IC02N
PCF2111P	SOT129	40	DIL	48;61;59;63;71	IC01N;IC02N
PCF2111T	SOT158A	40	VSO40	48;61;59;63;71	IC01N;IC02N
PCF2112P	SOT129	40	DIL	48;61;59;71	IC01N;IC02N
PCF2112T	SOT158A	40	VSO40	48;61;59;71	IC01N;IC02N
PCF80C39P	SOT129	40	DIL	61;71	●
PCF80C39WP	SOT187A	44	PLCC	61;71	●
PCF80C49P	SOT129	40	DIL	61;71	●
PCF80C49WP	SOT187A	44	PLCC	61;71	●
PCF8200	SOT101A	24	DIL	51;61;66;79	IC01N
PCF8500B	-	28 + 28	PB	70	-
PCF8570P	SOT97A	8	DIL	44;48;59;63;71	●
PCF8570T	SOT176	8	SO8L	44;48;59;63;71	●
PCF8571P	SOT97	8	DIL8	48;59;63;71	●
PCF8571T	SOT176	8	SO8L	48;59;63;71	●
PCF8573P	SOT-38	16	DIL	48;57;63;71	●
PCF8573T	SOT162	8	SO16L	48;57;63;71	●
PCF8574P	SOT38	16	DIL	59;63;71	●
PCF8574T	SOT162A	16	SO16L	48;51;63;71	●
PCF8576T	SOT190	56	VSO56	48;59;61;63;71	●
PCF8577P	SOT129	40	DIL	48;59;61;63;71	●
PCF8577T	SOT158A	40	VSO40	48;59;61;63;71	●
PCF8591P	SOT38	16	DIL16	48;59;71	●
PCF8591T	SOT162	16	SO16L	48;59;71	●
PNA7509	SOT101	24	DIL	45;48	●
PNA7510P	SOT101	24	DIL	45;48	-
PNA7510T	SOT137A	24	SO24	45;48	-
PNA7518	SOT38	16	DIL	45;48	IC02N
SA571	F,N/D	16	DIL/SO16	47;66	IC11N
SA572	D,N	16	DIL	47	IC11N
SA594	F,N	18	DIL	45;48	IG11N
SA602	D,N	8	DIL	47	IC11N
SA604	D,N	16	DIL	47	IC11N
SA.723	D,F/N	14	DIL/SO14	47	IC11N
SAA1027	SOT38AE2	16	DIL	65	IC6
SAA1029	SOT38SE2	16	DIL	66	IC6
SAA1043	SOT117	28	DIL	55	●
SAA1044	SOT38	16	DIL	55	●
SAA1056P	SOT38Z	16	DIL	59	●
SAA1057	SOT102HE4	18	DIL	49;59	IC01N;IC02N IC01N;IC02N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
SAA1060	SOT101BE6	24	DIL	51;57;59	IC01N;IC02N
SAA1062A	SOT117BE1	28	DIL	51;59	IC01N
SAA1062AT	SOT136AD4	28	SO28	51;59	IC01N
SAA1063	SOT101BE6	24	DIL	51	IC01N
SAA1082P	SOT117	28	DIL	57	IC02N
SAA1097	SOT38	16	DIL	59	-
SAA1099	SOT102CS	18	DIL	61	IC01N
SAA1300	SOT142BE	9	SIL	49;59	IC01N;IC02N
SAA3004P	SOT146C1	20	DIL	57	IC01N;IC02N
SAA3004T	SOT163AC3	20	SO20	57	IC01N;IC02N
SAA3006P	SOT117	28	DIL	57	IC02N
SAA3006T	SOT136A	28	SO28	57	IC02N
SAA3007	-	20	DIL	57	-
SAA3008	-	20	DIL	57	-
SAA3027P	SOT117	28	DIL	57	•
SAA3027T	SOT136A	28	SO28	57	•
SAA3028	SOT38Z	16	DIL	57	•
SAA5020	SOT101A	24	DIL	58	IC01N;IC02N
SAA5025D	SOT117D	28	DIL	58	•
SAA5030	SOT101A	24	DIL	58	IC01N;IC02N
SAA5040B	SOT117	28	DIL	58	IC01N;IC02N
SAA5041	SOT117	28	DIL	58	IC01N;IC02N
SAA5042	SOT117	28	DIL	58	IC01N;IC02N
SAA5045	SOT117D	28	DIL	58	•
SAA5050	SOT117	28	DIL	58	IC01N;IC02N
SAA5051	SOT117	28	DIL	58	IC01N;IC02N
SAA5052	SOT117	28	DIL	58	IC01N;IC02N
SAA5053	SOT117	28	DIL	58	IC01N;IC02N
SAA5054	SOT117	28	DIL	58	IC01N;IC02N
SAA5055	SOT117	28	DIL	58	IC01N;IC02N
SAA5056	SOT117	28	DIL	58	IC01N;IC02N
SAA5057	SOT117	28	DIL	58	IC01N;IC02N
SAA5070	SOT129	40	DIL	58	IC01N;IC02N
SAA5230	SOT117	28	DIL	58	•
SAA5235	SOT117BE	28	DIL	55	•
SAA5240A;B	SOT129	40	DIL	58	•
SAA5350	SOT129	40	DIL	58;67	-
SAA7210	SOT129	40	DIL	51	-
SAA7220	SOT101A	24	DIL	51	-
SAA9001	SOT117	28	DIL	54;58	-
SAA9010	SOT129	40	DIL	54;58	-
SAA9020	SOT101	24	DIL	54;58	-
SAA9030	SOT101D13	24	DIL	54;58	-
SAA9035	SOT158.3	40	DIL	54	-
SAA9040	SOT101AE4	28	DIL	54;58	-
SAA9045	SOT158.3	40	DIL	54	-
SAA9050	SOT129	40	DIL	59	-
SAA9055	SOT117	28	DIL	59	-
SAA9057	SOT146A	20	DIL	59	-
SAA9058	SOT146A	20	DIL	59	-
SAA90XX	-	-	-	59	-
SAB1164P	SOT97A	8	DIL	48;57	•
SAB1165P	SOT97A	8	DIL	48;57	•
SAB1256P	SOT97	8	DIL	48;57	•
SAB3035	SOT117BE	28	DIL	57	IC01N;IC02N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
SAB3036	SOT102HE4	18	DIL	57	IC01N;IC02N
SAB3037	SOT101BE6	24	DIL	57	IC01N;IC02N
SAB3045	-	18	DIL	67	-
SAB3064	-	-	-	48	-
SAB6456	SOT97	8	DIL	48;57	-
SAB6456T	SOT96	8	DIL	48;57	-
SAD1009P	SOT101DE3	24	DIL	55	-
SAD1009T	SOT137AE1	24	SO24	55	-
SAF1032P	SOT102A	18	DIL	57	IC01N;IC02N
SAF1039P	SOT38Z	16	DIL	57	IC01N;IC02N
SAK150BT	SOT108A	14	SO14	65	IC6
SBB6116L-10P	SOT101A	24	DIL	44	●
SBB6116L-12P	SOT101A	24	DIL	44	●
SBB6164	SOT117	28	DIL	44	●
SCB2673	N,I	40	DIL	67	IC11
SCB2675	N,I	40	DIL	67	IC11
SCB2677	N,I	40	DIL	67	●
SCB68154	-	-	-	69	-
SCB68155	-	-	-	69	-
SCB68171	-	-	-	69	-
SCB68172	-	-	-	69	-
SCB68175	-	-	-	69	-
SCB68430	-	-	-	69	IC11
SCB68459	-	-	-	69	●
SCC68173	-	-	-	69	-
SCC68905	-	-	-	69	-
SCC68906	-	-	-	69	-
SCC68910	-	-	-	69	-
SCC68920	-	-	-	69	-
SCN2641	N	24	DIL	67;69	IC11
SCN2650A	SOT129	40	DIL	61	IC11
SCN2651	N,I	28	DIL	67	IC11
SCN2652	N,I	40	DIL	67	IC11
SCN2653	N,I	16	DIL	67	IC11
SCN2661	N,I	28	DIL	67	IC11
SCN2670	N,I	28	DIL	67	IC11
SCN2671	N,I	40	DIL	67	IC11
SCN2672	N,I	40	DIL	67	IC11
SCN2674	N,I	40	DIL	67	IC11
SCN2681	N,I	40	DIL	67	IC11
SCN68000	-	-	-	69	IC11
SCN68010	-	-	-	69	-
SCN68020	-	-	-	69	-
SCN68070	-	-	-	69	-



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
SCN68430	N	48	DIL	69	IC11
SCN68454	-	-	-	69	●
SCN68562	-	-	-	69	●
SCN68652	-	-	-	69	●
SCN68653	-	-	-	69	●
SCN68661	-	-	-	69	●
SCN68681	-	-	-	69	IC11
SE521	F,N/D	14	DIL/SO14	45	IC11N
SE522	F,N/D	14	DIL/SO14	45	IC11N
SE527	F,N/D	14	DIL/SO14	45	IC11N
SE529	F,N/D	14	DIL/SO14	45	IC11N
SE530	F,N	8	DIL	46	IC11N
SE531	F,N	8	DIL	46	IC11N
SE532	F,N	8	DIL	46	IC11N
SE538	F,N	8	DIL	46	IC11N
SE555	F,(F),N/D	8(14)	DIL/SO8	46	IC11N
SE556	F,N/D	14	DIL/SO14	46	IC11N
SE556-1	F,N/D	14	DIL/SO14	46	IC11N
SE558	F,N	16	DIL	46	IC11N
SE564	I,N/D	16	DIL/SO16	47	IC11N
SE565	F,N/D	14	DIL/SO14	47	IC11N
SE566	F,(N)/D	14(8)	DIL/SO8	47	IC11N
SE567	F,N/D	8	DIL/SO8	47	IC11N
SE592	F,N/D	14	DIL/SO14	46;56	IC11N
SE594	F,N	18	DIL	48	IC02N
SE4558	F,N/D	8	DIL/SO8	45	IC11N
SE5018	F,N	22	DIL	45	IC11N
SE5019	F,N	22	DIL	45	IC11N
SE5118	F,N	22	DIL	45	IC11N
SE5119	F,N	22	DIL	45	IC11N
SE5410	F	16	DIL	45	IC11N
SE5512	F,N/D	8	DIL/SO8	46	IC11N
SE5514	F,N/D	14/16	DIL/SO16	46	IC11N
SE5532	F,N	8	DIL	46	IC11N
SE5532A	F,N	8	DIL	46	IC11N
SE5534	F,N/D	8	DIL/SO8	46	IC11N
SE5534A	F,N/D	8	DIL/SO8	46	IC11N
SE5535	N	8	DIL	46	IC11N
SE5537	N	8	DIL	46	IC11N
SE5539	F,N/D	14	DIL/SO14	46	IC11N
SE5560	F,N/D	16	DIL/SO16	47;65	IC11N
SE5561	F,N/D	8	DIL/SO8	47;65	IC11N
SE5562	F,N/D	20	DIL/SO20	47	IC11N
SE5563	-	-	-	47	-
SG1526A	F,N	18	DIL	47	IC11N
SG2526A	F,N	18	DIL	47	IC11N
SG3524	F,N/D	16	DIL/SO16	65	IC11N
SG3526A	F,N	18	DIL	47	IC11N
TAA263	SOT18/7	4	CYL	52	IC01N
TAA320	SOT18/13	3	CYL	52	IC01N
TAA320A	SOT18/13	3	CYL	52	IC01N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
TBA120U	SOT27	14	DIL	55	IC02N
TBA540	SOT38	16	DIL	53	IC02N
TBA920S	SOT38WE	16	DIL	54	
TCA240	SOT38	16	DIL	65	IC6
TCA240D	SOT109A	16	SO16	65	IC6
TCA280A	SOT38	16	DIL	67	IC6
TCA420A	SOT38	16	DIL	49	-
TCA520B	SOT97A	8	DIL	46	IC6
TCA520D	SOT96A	8	SO8	46	IC6
TCA640	SOT38SE2	16	DIL	53	IC02N
TCA650	SOT38SE2	16	DIL	53	IC02N
TCA660B	SOT38SE2	16	DIL	53	IC02N
TCA730A	SOT38	16	DIL	50	IC01N
TCA740A	SOT38	16	DIL	50	IC01N
TCA770A	SOT38	16	DIL	65	IC6
TCA770D	SOT108A	14	SO14	65	IC6
TDA1001B	SOT38	16	DIL	49	IC01N
TDA1001BT	SOT109A	16	SO16	49	IC01N
TDA1002A	SOT38	16	DIL	50	IC01N
TDA1005A	SOT38WE2	16	DIL	49	IC01N
TDA1005AT	SOT109AC7	16	SO16	49	IC01N
TDA1010A	SOT110BE	9	SIL	50	IC01N
TDA1011	SOT110BE	9	SIL	50	IC01N
TDA1012	SOT38WE2	16	DIL	50	IC01N
TDA1013A	SOT110BE	9	SIL	50;55	IC01N
TDA1015	SOT110BE	9	SIL	50	IC01N
TDA1015T	SOT110	9	SIL	50	IC01N
TDA1016	SOT38WE2	16	DIL	50	IC01N
TDA1020	SOT110BE	9	SIL	50	IC01N
TDA1023	SOT38	16	DIL	67	IC6
TDA1024	SOT97A	8	DIL	67	IC6
TDA1029	SOT38	16	DIL	50;55	IC01N;IC02N
TDA1059B	SOT32	3	SIL	50	IC01N
TDA1059C	SOT32	3	SIL	50	IC01N
TDA1060	SOT38WE2	16	DIL	66	IC6
TDA1060A	SOT38WE2	16	DIL	65	IC6
TDA1060B	SOT74	16	DIL	65	IC6
TDA1072	SOT38	16	DIL	49	IC01N
TDA1072A	SOT38	16	DIL	49	●
TDA1074A	SOT102HE	18	DIL	50	IC01N
TDA1082	SOT38	16	DIL	56	IC02N
TDA1432P	SOT38Z	16	DIL	45;66	-
TDA1432T	SOT109A	16	SO16	45;66	-
TDA1506	SOT38WE2	16	DIL	50	IC01N
TDA1508	SOT102HE	18	DIL	50	IC01N
TDA1510	SOT141B	13	SBD	50	IC01N
TDA1512	SOT131B	9	SIL	50;55	IC01N;IC02N
TDA1512Q	SOT157B	9	SBD	50;55	IC01N;IC02N
TDA1514	-	9	SIL	50	-
TDA1515	SOT141B	13	SBD	50	IC01N
TDA1520	SOT131A	9	SIL	50;55	IC01N;IC02N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
TDA1520A	SOT131A	9	SIL	50;55	IC01N;IC02N
TDA1520AQ	SOT157A	9	SBD	50;55	IC01N;IC02N
TDA1520B	-	9	SIL	50	-
TDA1520Q	SOT157A	9	SBD	50;55	IC01N;IC02N
TDA1521	-	9	SIL	50	●
TDA1522	SOT142	9	SIL	50	IC01N
TDA1524A	SOT102HE	18	DIL	50;55	IC01N;IC02N
TDA1533	SOT102CS	18	DIL	50	IC01N
TDA1534A	SOT117	28	DIL	45	-
TDA1540D	SOT135A	28	DIL	45;51;52;66	IC01N;IC6
TDA1540P	SOT117BE	28	DIL	45;51;52;66	IC01N;IC6
TDA1541	SOT117	28	DIL	51	-
TDA1542	SOT117	28	DIL	51	-
TDA1559	SOT32	3	SIL	50	IC01N
TDA1574	SOT102HE	18	DIL	49	IC01N
TDA1576	SOT102HE	18	DIL	49	IC01N
TDA1578A	SOT102HE	18	DIL	49	IC01N
TDA1579	SOT102HE	18	DIL	49	IC01N
TDA1589	SOT102HE	18	DIL	49	IC01N
TDA1596	SOT102HE	18	DIL	49	IC01N
TDA1598	SOT102HE	18	DIL	49	IC01N
TDA1600	-	24	DIL	50	-
TDA1721	SOT38Z	16	DIL	66	-
TDA2501	SOT38WE9	16	DIL	55	IC02N
TDA2504P	SOT101BE6	24	DIL	55	●
TDA2504T	SOT137	24	SO24	55	●
TDA2505	SOT117	28	DIL	61	●
TDA2506	SOT101A	24	DIL	56	●
TDA2506T	SOT137A	24	SO24	56	●
TDA2507	SOT38	16	DIL	56	●
TDA2507T	SOT162A	16	SO16L	56	●
TDA2540	SOT38	16	DIL	53	IC02N
TDA2540Q	SOT58	16	QIL	53	IC02N
TDA2541	SOT38	16	DIL	53	IC02N
TDA2541Q	SOT58	16	QIL	53	IC02N
TDA2542	SOT38	16	DIL	53	IC02N
TDA2542Q	SOT58	16	QIL	53	IC02N
TDA2543	SOT102CS	18	DIL	55	IC02N
TDA2544	SOT38WE2	16	DIL	53	IC02N
TDA2544Q	SOT58	16	QIL	53	IC02N
TDA2545A	SOT38	16	DIL	55	IC02N
TDA2546A	SOT102CS	18	DIL	55	IC02N
TDA2548	SOT38	16	DIL	53	IC02N
TDA2548Q	SOT58	16	QIL	53	IC02N
TDA2549	SOT101A	24	DIL	53	IC02N
TDA2555	SOT102HE	18	DIL	55	●
TDA2557	SOT102	18	DIL	55	●
TDA2577A	SOT102HE4	18	DIL	54	IC02N
TDA2578A	SOT102HE4	18	DIL	54	IC02N
TDA2579	SOT102HE4	18	DIL	54	IC02N
TDA2581	SOT38	16	DIL	56	IC02N
TDA2581Q	SOT58	16	QIL	56	IC02N
TDA2582	SOT38WE2	16	DIL	56	IC02N
TDA2582Q	SOT58	16	QIL	56	IC02N
TDA2593	SOT38	16	DIL	54	IC02N
TDA2594	SOT102DS	18	DIL	54	IC02N
TDA2595	SOT102CS	18	DIL	54	●



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
TDA2611A	SOT110BE	9	SIL	50;55	IC01N;IC02N
TDA2653A	SOT141B	13	SBD	53	IC02N
TDA2654	SOT110BE	9	SIL	53	IC02N
TDA2655B	SOT150	12	DIL	53	IC02N
TDA2730	SOT38	16	DIL	55	IC02N
TDA2740	SOT38	16	DIL	55	IC02N
TDA2791	SOT38	16	DIL	55	IC02N
TDA2795	SOT102DS	18	DIL	55	IC02N
TDA3083	SOT38Z	16	DIL	65	IC6
TDA3083D	SOT109A	16	SO16	65	IC6
TDA3501	SOT117	28	DIL	53	IC02N
TDA3505	SOT117	28	DIL	53	IC02N
TDA3510	SOT101A	24	DIL	53	IC02N
TDA3540	SOT38WE2	16	DIL	53	IC02N
TDA3540Q	SOT58	16	QIL	53	IC02N
TDA3541	SOT38WE2	16	DIL	53	IC02N
TDA3541Q	SOT58	16	QIL	53	IC02N
TDA3560	SOT117BE1	28	DIL	53	IC02N
TDA3561A	SOT117BE1	28	DIL	53	IC02N
TDA3562A	SOT117BE1	28	DIL	53	IC02N
TDA3563	SOT117BE1	28	DIL	53	IC02N
TDA3564	SOT101BE6	24	DIL	53	IC02N
TDA3565	SOT102HE4	18	DIL	53	●
TDA3571B	SOT102HE4	18	DIL	54	IC02N
TDA3576B	SOT102HE4	18	DIL	54	IC02N
TDA3586	SOT117BE	28	DIL	54	●
TDA3590	SOT101BE6	24	DIL	53	IC02N
TDA3590A	SOT101BE6	24	DIL	53	IC02N
TDA3591	SOT101BE6	24	DIL	53	IC02N
TDA3591A	SOT101BE6	24	DIL	53	●
TDA3650B	SOT141B	13	SBD	54	IC02N
TDA3651	SOT110BE	9	SIL	54	IC02N
TDA3651A	SOT131B	9	SIL	54	IC02N
TDA3651AQ	SOT157B	9	SBD	54	IC02N
TDA3652	SOT131B	9	SIL	54	IC02N
TDA3652Q	SOT157B	9	SBD	54	IC02N
TDA3653	SOT110BE	9	SIL	54	IC02N
TDA3653A	SOT131B	9	SIL	54	IC02N
TDA3654	SOT131B	9	SIL	54	-
TDA3720	SOT102HE	18	DIL	55	IC02N
TDA3724	SOT102HE	18	DIL	55	●
TDA3730	SOT117	28	DIL	55	IC02N
TDA3740	SOT117	28	DIL	55	●
TDA3755	SOT102HE	18	DIL	55	●
TDA3760	SOT117BE	28	DIL	55	-
TDA3765	SOT117BE	28	DIL	55	●
TDA3766	SOT117BE	28	DIL	55	-
TDA3771	SOT102CS	18	DIL	55	IC02N
TDA3780	SOT102CS	18	DIL	55	IC02N
TDA3791	SOT38WE2	16	DIL	55	IC02N
TDA3800G	SOT117	28	DIL	55	IC02N
TDA3800GS	SOT117	28	DIL	55	IC02N
TDA3806	SOT102HE	18	DIL	55	-
TDA3810	SOT102CS	18	DIL	50;55	IC02N
TDA4301	SOT108A	14	SO14	55	●
TDA4302	SOT38	16	DIL	55	-
TDA4302T	SOT162	16	SO16	55	-

type no.	package code	no. of pins	pin position	catalogue page no.	handbook
TDA4303	SOT117BE	28	DIL	55	-
TDA4303T	SOT136AE4	28	SO28	55	-
TDA4304	SOT136A	20	SO28	55	●
TDA4305	SOT38	16	DIL	55	-
TDA4305T	SOT108	14	SO14	55	-
TDA4306	SOT146	20	DIL	55	-
TDA4306T	SOT163	20	SO20	55	-
TDA4500	SOT117	28	DIL	56	IC02N
TDA4501	SOT117BE1	28	DIL	56	●
TDA4503	SOT117BE1	28	DIL	56	-
TDA4505	SOT117	28	DIL	56	●
TDA4510	SOT38	16	DIL	53	IC02N
TDA4532	SOT117	28	DIL	53	●
TDA4555	SOT117	28	DIL	53	IC02N
TDA4556	SOT117	28	DIL	53	IC02N
TDA4565	SOT102HE	18	DIL	53	-
TDA4570	SOT38WE	16	DIL	53	-
TDA5030	SOT102CS	18	DIL	56	IC02N
TDA5030A	SOT102CS	18	DIL	56	IC02N
TDA5030AT	SOT163A	20	SO20	56	IC02N
TDA5702	SOT38	16	DIL	45;55;66	-
TDA5703	SOT101A	24	DIL	45;55;66	-
TDA5708	SOT117BE	28	DIL	51	●
TDA5708T	SOT136A	20	SO20	51	-
TDA5709	SOT146EE4	20	DIL	51	●
TDA5709T	SOT163A	20	SO20	51	-
TDA7000	SOT102HE	18	DIL	49;51	IC01N
TDA7010T	SOT109A	16	SO16	49;51	IC01N
TDA7020	SOT38WE	16	DIL	49;51	●
TDA7020T	SOT109A	16	SO16	49;51	-
TDA7021	SOT38WE	16	DIL	49;51	●
TDA7021T	SOT109AE	16	SO16	49;51	●
TDA7030T	SOT163AE	20	SO20	49;51;59	●
TDA7040T	SOT96A	8	SO8	49;51	●
TDA7050T	SOT96A	8	SO8	50	●
TDA8420	SOT117	28	DIL	50	-
TDA8440	SOT102	18	DIL	56	●
TDA8442	SOT38	16	DIL	53;56	●
tda8443	-	-	-	56	-
TDA9045	SOT102	18	DIL	56	-
TDA9080	SOT117	28	DIL	53	-
TDB1710P	SOT27	14	DIL	45	-
TDD1742T	SOT136A	28	SO28	49	-
TEA0651	SOT102HE	18	DIL	52	IC01N
TEA0652	SOT102HE	18	DIL	52	IC01N
TEA0653P	SOT102HE	18	DIL	52	IC01N
TEA0653T	SOT163A	20	SO20	52	-
TEA0654	SOT101A	24	DIL	52	IC01N
TEA0665	SOT117	28	DIL	52	IC01N
TEA0665T	SOT136A	28	SO28	52	IC01N
TEA0666	SOT117BE	28	DIL	52	IC01N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
TEA0666T	SOT136AE	28	S028	52	●
TEA0670T	SOT136A	28	SO28	51;52	●
TEA1011	SOT38	16	DIL	56;61	●
TEA1012	SOT38WE1	16	DIL	65	●
TEA1017	SOT102HE4	18	DIL	66	IC6
TEA1039	SOT110BE	9	SIL	65	IC6
TEA1042	SOT101BE6	24	DIL	62	IC03N
TEA1046P	SOT101BE3	24	DIL	62	IC03N
TEA1060	SOT102HE1	18	DIL	62	IC03N
TEA1061	SOT102HE1	18	DIL	62	IC03N
TEA1066T	SOT163	20	SO20	62	●
TEA1067	SOT102	18	DIL	62	●
TEA1068	SOT102HE	18	DIL	62	●
TEA1080	SOT97A	8	DIL	62	●
TEA1075P	SOT102HE3	18	DIL	62	IC03N
TEA2000	SOT102HE	18	DIL	56;61	●
TEA5550	SOT38WE2	16	DIL	49	IC01N
TEA5560	SOT142BE	9	SIL	49	IC01N
TEA5570	SOT38WE3	16	DIL	49	IC01N
TEA5580	SOT38WE1	16	DIL	49	IC01N
TEA6000	SOT102HE	18	DIL	49	IC01N
TEA6300	SOT117	28	DIL	50;55	●
ULN2001	-	-	-	47;65	IC11N
ULN2003	F,N	16	DIL	47;65	IC11N
ULN2004	F,N	16	DIL	47;65	IC11N
μA723	F,N/D	14	DIL/SO14	47;65	IC11N
μA723C	F,N/D	14	DIL/SO14	47;65	IC11N
μA733	F,N	14	DIL	46;56	IC11N
μA733C	F,N	14	DIL	46;56	IC11N
μA741	F,N/D	8	DIL/SO8	46	IC11N
μA741C	F,N/D	8	DIL/SO8	46	IC11N
μA747	F,N/D	14	DIL/SO14	46	IC11N
μA747C	F,N/D	14	DIL/SO14	46	IC11N
μA758	N	16	DIL	47;66	IC11N
8A1542	-	-	-	76	●
8A1664	-	-	-	76	●
8A1864	-	-	-	76	●
8A2176	-	-	-	76	●
8T09	-	-	-	33	IC09N
8T10	-	-	-	33	IC09N
8T13	-	16	DIL/SO16	33	IC09N
8T15	-	-	-	33	IC09N
8T16	-	-	-	33	IC09N
8T20	-	-	-	33	IC09N
8T22	-	-	-	33	IC09N
8T23	-	-	-	33	IC09N
8T24	-	16	DIL/SO16L	33	IC09N
8T26A	-	16	DIL	33	IC09N
8T28	-	16	DIL	33	IC09N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
8T31	N,F	24	DIL	68	IC11
8T32	N,F	24	DIL	68	IC11
8T34	-	-	-	33	-
8T36	N,F	24	DIL	68	IC11
8T37	-	-	-	33	-
8T38	-	-	-	33	-
8T95	-	16	DIL	33	IC09N
8T96	-	16	DIL	33	IC09N
8T97	-	16	DIL/SO16L	33	IC09N
8T98	-	16	DIL/SO16L	33	IC09N
8T125	N	20	DIL	33	IC09N
8T126	N	16	DIL	33	IC09N
8T127	N	16	DIL	33	IC09N
8T128	N	16	DIL	33	IC09N
8T129	N	16	DIL	33	IC09N
8T245	-	20	DIL	33	-
8T380	-	14	DIL/SO14	33	IC09N
8T3404	-	16	DIL	33	IC09N
8TS805	-	20	DIL	33	IC09N
8TS806	-	20	DIL	33	IC09N
8TS807	-	20	DIL	33	IC09N
8TS808	-	20	DIL	33	IC09N
8TS809	-	20	DIL	33	-
8X01A	N	14	DIL	68	IC11
8X60	N,F	28	DIL	68	IC11
8X300	I	50	DIL	68	IC11
8X300KT1SK	-	-	-	68	-
8X300KT2SK	-	-	-	68	-
8X305ICEPACK	-	-	-	68	-
8X305	N,I	50	DIL	68	IC11
8X310	N	40	DIL	68	IC11
8X320	N,I	40	DIL	68	IC11
8X330	N	40	DIL	68	IC11
8X350	N,F	22	DIL	41,68	IC7;IC11
8X353	N,F	20	DIL	68	IC11
8X355	N,F	20	DIL	68	IC11
8X360	N,I	40	DIL	68	IC11
8X371	N	24	DIL	68	IC11
8X372	N	24	DIL	68	IC11
8X374	N	28	DIL	68	IC11
8X376	N	24	DIL	68	IC11
8X382	N	24	DIL	68	IC11
74F00	D,N	14	DIL/SO14	25	IC15N
74F02	D,N	14	DIL/SO14	25	IC15N
74F04	D,N	14	DIL/SO14	25	IC15N
74F08	D,N	14	DIL/SO14	25	IC15N
74F10	D,N	14	DIL/SO14	25	IC15N
74F11	D,N	14	DIL/SO14	25	IC15N
74F13	D,N	14	DIL/SO14	27	IC15N
74F14	D,N	14	DIL/SO14	27	IC15N
74F20	D,N	14	DIL/SO14	25	IC15N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
74F27	D,N	14	DIL/SO14	25	-
74F30	-	14	DIL	25	-
74F32	D,N	14	DIL/SO14	25	IC15N
74F37	D,N	14	DIL/SO14	25	IC15N
74F38	D,N	14	DIL/SO14	25	IC15N
74F40	D,N	14	DIL/SO14	25	IC15N
74F51	D,N	14	DIL/SO14	25	-
74F64	D,N	14	DIL/SO14	25	IC15N
74F74	D,N	14	DIL/SO14	27	IC15N
74F85	D,N	14	DIL/SO16L	31	IC15N
74F86	D,N	14	DIL/SO14	25	IC15N
74F109	D,N	16	DIL/SO16	27	IC15N
74F112	-	16	DIL	27	IC15N
74F113	-	16	DIL	27	IC15N
74F114	-	16	DIL	27	IC15N
74F125	D,N	14	DIL/SO14	26	-
74F126	D,N	14	DIL/SO14	26	-
74F132	D,N	14	DIL/SO14	27	IC15N
74F138	D,N	16	DIL/SO16	30	IC15N
74F139	D,N	16	DIL/SO16	30	IC15N
74F148	-	16	DIL	30	IC15N
74F151	D,N	16	DIL/SO16	30	IC15N
74F153	D,N	16	DIL/SO16	30	IC15N
74F157	D,N	16	DIL/SO16	30	IC15N
74F158	D,N	16	DIL/SO16	30	IC15N
74F160A	-	16	DIL	28	IC15N
74F161A	-	16	DIL	28	IC15N
74F162A	-	16	DIL	28	IC15N
74F163A	-	16	DIL	28	IC15N
74F164	-	16	DIL	27	IC15N
74F165	-	16	DIL	27	-
74F168A	-	16	DIL	28	IC15N
74F169A	-	16	DIL	28	IC15N
74F174	D,N	16	DIL/SO16	27	IC15N
74F175	D,N	16	DIL/SO16	27	IC15N
74F181	N	24	DIL	31	IC15N
74F182	-	16	DIL	31	IC15N
74F189	-	16	DIL	31	IC15N
74F190	-	16	DIL	28	IC15N
74F191	-	16	DIL	28	IC15N
74F192	-	16	DIL	28	IC15N
74F193	-	16	DIL	28	IC15N
74F194	D,N	16	DIL/SO16	27	IC15N
74F195	D,N	16	DIL/SO16	27	IC15N
74F198	-	24	DIL	27	IC15N
74F199	-	24	DIL	27	-
74F225	N	-	DIL	27	-
74F240	D,N	20	DIL/SO20	26	IC15N
74F241	D,N	20	DIL/SO20	26	IC15N
74F242	D,N	14	DIL/SO14	26	IC15N
74F243	D,N	14	DIL/SO14	26	IC15N
74F244	D,N	20	DIL/SO20	26	IC15N
74F245	D,N	20	DIL/SO20	26	IC15N
74F251	-	16	DIL	30	IC15N
74F253	D,N	16	DIL/SO16	30	IC15N
74F256	D,N	16	DIL/SO16	29	IC15N
74F257	D,N	16	DIL/SO16	30	IC15N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
74F258	D,N	16	DIL/SO16	30	IC15N
74F259	N	16	DIL	29	IC15N
74F260	N	14	DIL	25	-
74F269	D,N	24	DIL/SO24	28	IC15N
74F273	D,N	20	DIL/SO20	27	IC15N
74F280A	D,N	14	DIL/SO14	31	IC15N
74F283	-	16	DIL	31	IC15N
74F298	D,N	16	DIL/SO16	30	IC15N
74F299	-	20	DIL	27	IC15N
74F322	-	20	DIL	27	IC15N
74F323	-	20	DIL	27	IC15N
74F350	D,N	16	DIL/SO16	31	IC15N
74F352	D,N	16	DIL/SO16	30	IC15N
74F353	D,N	16	DIL/SO16	30	IC15N
74F365A	D,N	16	DIL/SO16	26	IC15N
74F366A	D,N	16	DIL/SO16	26	IC15N
74F367A	D,N	16	DIL/SO16	26	IC15N
74F368A	D,N	16	DIL/SO16	26	IC15N
74F373	D,N	20	DIL/SO20	29	IC15N
74F374	D,N	20	DIL/SO20	27	IC15N
74F377	D,N	20	DIL/SO20	27	IC15N
74F378	D,N	16	DIL/SO16	27	IC15N
74F379	D,N	16	DIL/SO16	27	IC15N
74F381	-	20	DIL	31	IC15N
74F382	-	20	DIL	31	IC15N
74F384	-	16	DIL	30	IC15N
74F385	-	20	DIL	31	IC15N
74F395A	D,N	16	DIL/SO16	27	IC15N
74F398	D,N	20	DIL/SO20	27	IC15N
74F399	D,N	16	DIL/SO16	27	IC15N
74F412	-	24	DIL	28	IC15N
74F432	-	24	DIL	28	-
74F455	N	24	DIL	31	-
74F456	N	24	DIL	31	-
74F521	D,N	20	DIL/SO20	31	IC15N
74F524	-	20	DIL	31	IC15N
74F533	D,N	20	DIL/SO20	29	IC15N
74F534	D,N	20	DIL/SO20	29	IC15N
74F537	-	20	DIL	30	-
74F538	-	20	DIL	30	-
74F539	-	20	DIL	30	-
74F540	D,N	20	DIL/SO20	26	-
74F541	D,N	20	DIL/SO20	26	-
74F543	-	24	DIL	29	-
74F544	-	24	DIL	29	-
74F545	D,N	20	DIL/SO20	26	IC15N
74F547	-	20	DIL	30	IC15N
74F548	-	20	DIL	30	IC15N
74F550	-	28	DIL	26	-
74F551	-	28	DIL	26	-
74F552	-	28	DIL	26	-
74F557	-	40	DIL	30	-
74F558	-	40	DIL	30	-
74F563	-	20	DIL	29	-
74F564	-	20	DIL	27	-
74F568A	-	20	DIL	28	-
74F569A	-	20	DIL	28	-



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
74F573	-	20	DIL	29	-
74F574	-	20	DIL	27	-
74F579	N	20	DIL	28	IC15N
74F588	N	20	DIL	26	IC15N
74F595	N	16	DIL	28	IC15N
74F597	-	16	DIL	28	IC15N
74F598	-	16	DIL	28	IC15N
74F604	D,N	28	DIL/SO28	29	IC15N
74F605	D,N	28	DIL/SO28	29	IC15N
74F620	D,N	20	DIL/SO20	26	IC15N
74F621	D,N	20	DIL/SO20	26	IC15N
74F622	D,N	20	DIL/SO20	26	IC15N
74F623	N	20	DIL/	26	IC15N
74F630	-	28	DIL	31	IC15N
74F631	-	28	DIL	31	IC15N
74F640	D,N	20	DIL/SO20	26	-
74F641	D,N	20	DIL/SO20	26	-
74F642	N	20	DIL	26	-
74F646	-	24	DIL	26	IC15N
74F647	-	24	DIL	26	IC15N
74F648	-	24	DIL	26	IC15N
74F649	-	24	DIL	26	IC15N
74F655A	N	24	DIL	31	IC15N
74F656A	N	24	DIL	31	IC15N
74F657	N	24	DIL	31	IC15N
74F673	-	24	DIL	28	IC15N
74F674	-	24	DIL	28	IC15N
74F675	-	24	DIL	28	IC15N
74F676	-	24	DIL	28	IC15N
74F764	-	40	DIL	31	-
74F765	D,N	40	DIL/SO40	31	-
74F779	-	16	DIL	..	IC15N
74F784	-	20	DIL	31	IC15N
74F821	-	24	DIL	28	-
74F822	-	24	DIL	28	-
74F823	-	24	DIL	28	-
74F824	-	24	DIL	28	-
74F825	-	24	DIL	28	-
74F826	-	24	DIL	28	-
74F827	-	24	DIL	25	-
74F828	-	24	DIL	25	-
74F841	-	24	DIL	29	-
74F842	-	24	DIL	29	-
74F843	-	24	DIL	29	-
74F844	-	24	DIL	29	-
74F845	-	24	DIL	29	-
74F846	-	24	DIL	29	-
74F861	-	24	DIL	26	-
74F862	-	24	DIL	26	-
74F863	-	24	DIL	26	-
74F864	-	24	DIL	26	-
74F881	-	24	DIL	31	-
74F882	-	24	DIL	31	-
74F1240	N	20	DIL	25	-
74F1241	N	20	DIL	25	-
74F1242	N	20	DIL	26	-
74F1243	N	20	DIL	26	-



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
74F1244	N	20	DIL	25	-
74F1245	-	20	DIL	25	-
74F3037	N	16	DIL	26	IC15N
74F3038	N	16	DIL	26	-
74F3040	N	16	DIL	26	IC15N
74F30240	-	24	DIL	26	-
74F30241	-	24	DIL	26	-
74F30244	-	24	DIL	26	-
74HC/HCT00P	SOT27	14	DIL	20	IC06N
74HC/HCT00T	SOT108A	14	SO14	20	IC06N
74HC/HCT02P	SOT27	14	DIL	20	IC06N
74HC/HCT02T	SOT108A	14	SO14	20	IC06N
74HC/HCT03P	SOT27	14	DIL	20	IC06N
74HC/HCT03T	SOT108A	14	SO14	20	IC06N
74HC/HCT04P	SOT27	14	DIL	20	IC06N
74HC/HCT04T	SOT108A	14	SO14	20	IC06N
74HCJ04P	SOT27	14	DIL	20	IC06N
74HCJ04T	SOT108A	14	SO14	20	IC06N
74HC/HCT08P	SOT27	14	DIL	20	IC06N
74HC/HCT08T	SOT108A	14	SO14	20	IC06N
74HC/HCT10P	SOT27	14	DIL	20	IC06N
74HC/HCT10T	SOT108A	14	SO14	20	IC06N
74HC/HCT11P	SOT27	14	DIL	20	IC06N
74HC/HCT11T	SOT108A	14	SO14	20	IC06N
74HC/HCT14P	SOT27	14	DIL	23	IC06N
74HC/HCT14T	SOT108A	14	SO14	23	IC06N
74HC/HCT20P	SOT27	14	DIL	20	IC06N
74HC/HCT20T	SOT108A	14	SO14	20	IC06N
74HC/HCT21P	SOT27	14	DIL	20	IC06N
74HC/HCT21T	SOT108A	14	SO14	20	IC06N
74HC/HCT27P	SOT27	14	DIL	20	IC06N
74HC/HCT27T	SOT108A	14	SO14	20	IC06N
74HC/HCT30P	SOT27	14	DIL	20	IC06N
74HC/HCT30T	SOT108A	14	SO14	20	IC06N
74HC/HCT32P	SOT27	14	DIL	20	IC06N
74HC/HCT32T	SOT108A	14	SO14	20	IC06N
74HC/HCT42P	SOT38Z	16	DIL	23	IC06N
74HC/HCT42T	SOT109A	16	SO16	23	IC06N
74HC58P	SOT27	14	DIL	20	IC06N
74HC58T	SOT108A	14	SO14	20	IC06N
74HC/HCT73P	SOT27	14	DIL	21	IC06N
74HC/HCT73T	SOT108A	14	SO14	21	IC06N
74HC/HCT74P	SOT27	14	DIL	21	IC06N
74HC/HCT74T	SOT108A	14	SO14	21	IC06N
74HC/HCT75P	SOT38Z	16	DIL	21	IC06N
74HC/HCT75T	SOT109A	16	SO16	21	IC06N
74HC/HCT85P	SOT38Z	16	DIL	22	IC06N
74HC/HCT85T	SOT109A	16	SO16	22	IC06N
74HC/HCT86P	SOT27	14	DIL	20	IC06N
74HC/HCT86T	SOT108A	14	SO14	20	IC06N
74HC/HCT93P	SOT27	14	DIL	22	IC06N
74HC/HCT93T	SOT108A	14	DIL	22	IC06N
74HC/HCT107P	SOT27	14	DIL	21	IC06N
74HC/HCT107T	SOT108A	14	SO14	21	IC06N
74HC/HCT109P	SOT38Z	16	DIL	21	IC06N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
74HC/HCT109T	SOT109A	16	SO16	21	IC06N
74HC/HCT112P	SOT38Z	16	DIL	21	IC06N
74HC/HCT112T	SOT109A	16	SO16	21	IC06N
74HC/HCT123P	SOT38Z	16	DIL	23	IC06N
74HC/HCT123T	SOT109A	16	SO16	23	IC06N
74HC/HCT125P	SOT27	14	DIL	20	IC06N
74HC/HCT125T	SOT108A	14	SO14	20	IC06N
74HC/HCT126P	SOT27	14	DIL	20	IC06N
74HC/HCT126T	SOT108A	14	SO14	20	IC06N
74HC/HCT132P	SOT27	14	DIL	23	IC06N
74HC/HCT132T	SOT108A	14	SO14	23	IC06N
74HC/HCT137P	SOT38Z	16	DIL	23	IC06N
74HC/HCT137T	SOT109A	16	SO16	23	IC06N
74HC/HCT138P	SOT38Z	16	DIL	23	IC06N
74HC/HCT138T	SOT109A	16	SO16	23	IC06N
74HC/HCT139P	SOT38Z	16	DIL	23	IC06N
74HC/HCT139T	SOT109A	16	SO16	23	IC06N
74HC/HCT147P	SOT38Z	16	DIL	23	IC06N
74HC/HCT147T	SOT109A	16	SO16	23	IC06N
74HC/HCT151P	SOT38Z	16	DIL	22	IC06N
74HC/HCT151T	SOT109A	16	SO16	22	IC06N
74HC/HCT153P	SOT38Z	16	DIL	22	IC06N
74HC/HCT153T	SOT109A	16	SO16	22	IC06N
74HC/HCT154P	SOT101A	24	DIL	23	IC06N
74HC/HCT154T	SOT137A	24	SO24	23	IC06N
74HC/HCT157P	SOT38Z	16	DIL	22	IC06N
74HC/HCT157T	SOT109A	16	SO16	22	IC06N
74HC/HCT158P	SOT38Z	16	DIL	22	IC06N
74HC/HCT158T	SOT109A	16	SO16	22	IC06N
74HC/HCT160P	SOT38Z	16	DIL	22	IC06N
74HC/HCT160T	SOT109A	16	SO16	22	IC06N
74HC/HCT161P	SOT38Z	16	DIL	22	IC06N
74HC/HCT161T	SOT109A	16	SO16	22	IC06N
74HC/HCT162P	SOT38Z	16	DIL	22	IC06N
74HC/HCT162T	SOT109A	16	SO16	22	IC06N
74HC/HCT163P	SOT38Z	16	DIL	22	IC06N
74HC/HCT163T	SOT109A	16	SO16	22	IC06N
74HC/HCT164P	SOT27	14	DIL	21	IC06N
74HC/HCT164T	SOT108A	14	SO14	21	IC06N
74HC/HCT165P	SOT38Z	16	DIL	21	IC06N
74HC/HCT165T	SOT109A	16	SO16	21	IC06N
74HC/HCT166P	SOT38Z	16	DIL	21	IC06N
74HC/HCT166T	SOT109A	16	SO16	21	IC06N
74HC/HCT173P	SOT38Z	16	DIL	21	IC06N
74HC/HCT173T	SOT109A	16	SO16	21	IC06N
74HC/HCT174P	SOT38Z	16	DIL	21	IC06N
74HC/HCT174T	SOT109A	16	SO16	21	IC06N
74HC/HCT175P	SOT38Z	16	DIL	21	IC06N
74HC/HCT175T	SOT109A	16	SO16	21	IC06N
74HC/HCT181P	SOT101A	24	DIL	22	IC06N
74HC/HCT181T	SOT137A	24	SO24	22	IC06N
74HC/HCT182P	SOT38Z	16	DIL	22	IC06N
74HC/HCT182T	SOT109A	16	SO16	22	IC06N
74HC/HCT190P	SOT38Z	16	DIL	22	IC06N
74HC/HCT190T	SOT109A	16	SO16	22	IC06N
74HC/HCT191P	SOT38Z	16	DIL	22	IC06N
74HC/HCT191T	SOT109A	16	SO16	22	IC06N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
74HC/HCT192P	SOT38Z	16	DIL	22	IC06N
74HC/HCT192T	SOT109A	16	SO16	22	IC06N
74HC/HCT193P	SOT38Z	16	DIL	22	IC06N
74HC/HCT193T	SOT109A	16	SO16	22	IC06N
74HC/HCT194P	SOT38Z	16	DIL	21	IC06N
74HC/HCT194T	SOT109A	16	SO16	21	IC06N
74HC/HCT195P	SOT38Z	16	DIL	21	IC06N
74HC/HCT195T	SOT109A	16	SO16	21	IC06N
74HC/HCT221P	SOT38Z	16	DIL	23	IC06N
74HC/HCT221T	SOT109A	16	SO16	23	IC06N
74HC/HCT237P	SOT38Z	16	DIL	23	IC06N
74HC/HCT237T	SOT109A	16	SO16	23	IC06N
74HC/HCT238P	SOT38Z	16	DIL	23	IC06N
74HC/HCT238T	SOT109A	16	SO16	23	IC06N
74HC/HCT240P	SOT146	20	DIL	20	IC06N
74HC/HCT240T	SOT163A	20	SO20	20	IC06N
74HC/HCT241P	SOT146	20	DIL	20	IC06N
74HC/HCT241T	SOT163A	20	SO20	20	IC06N
74HC/HCT242P	SOT27	14	DIL	23	IC06N
74HC/HCT242T	SOT108A	14	SO14	23	IC06N
74HC/HCT243P	SOT27	14	DIL	23	IC06N
74HC/HCT243T	SOT108A	14	SO14	23	IC06N
74HC/HCT244P	SOT146	20	DIL	20	IC06N
74HC/HCT244T	SOT163A	20	SO20	20	IC06N
74HC/HCT245P	SOT146	20	DIL	23	IC06N
74HC/HCT245T	SOT163A	20	SO20	23	IC06N
74HC/HCT251P	SOT38Z	16	DIL	22	IC06N
74HC/HCT251T	SOT109A	16	SO16	22	IC06N
74HC/HCT253P	SOT38Z	16	DIL	22	IC06N
74HC/HCT253T	SOT109A	16	SO16	22	IC06N
74HC/HCT257P	SOT38Z	16	DIL	22	IC06N
74HC/HCT257T	SOT109A	16	SO16	22	IC06N
74HC/HCT258P	SOT38Z	16	DIL	22	IC06N
74HC/HCT258T	SOT109A	16	SO16	22	IC06N
74HC/HCT259P	SOT38Z	16	DIL	21	IC06N
74HC/HCT259T	SOT109A	16	SO16	21	IC06N
74HC7266P	SOT27	14	DIL	20	IC06N
74HC7266T	SOT108A	14	SO14	20	IC06N
74HC/HCT273P	SOT146	20	DIL	21	IC06N
74HC/HCT273T	SOT163A	20	SO20	21	IC06N
74HC/HCT280P	SOT27	14	DIL	22	IC06N
74HC/HCT280T	SOT108A	14	SO14	22	IC06N
74HC/HCT283P	SOT38Z	16	DIL	22	IC06N
74HC/HCT283T	SOT109A	16	SO16	22	IC06N
74HC/HCT297P	SOT38Z	16	DIL	23	IC06N
74HC/HCT297T	SOT109A	16	SO16	23	IC06N
74HC/HCT299P	SOT146	20	DIL	21	IC06N
74HC/HCT299T	SOT163A	20	SO20	21	IC06N
74HC/HCT354P	SOT146	20	DIL	22	IC06N
74HC/HCT354T	SOT163A	20	SO20	22	IC06N
74HC/HCT356P	SOT146	20	DIL	22	IC06N
74HC/HCT356T	SOT163A	20	SO20	22	IC06N
74HC/HCT365P	SOT38Z	16	DIL	20	IC06N
74HC/HCT365T	SOT109A	16	SO16	20	IC06N
74HC/HCT366P	SOT38Z	16	DIL	20	IC06N
74HC/HCT366T	SOT109A	16	SO16	20	IC06N
74HC/HCT367P	SOT38Z	16	DIL	20	IC06N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
74HC/HCT367T	SOT109A	16	SO16	20	IC06N
74HC/HCT368P	SOT38Z	16	DIL	20	IC06N
74HC/HCT368T	SOT109A	16	SO16	20	IC06N
74HC/HCT373P	SOT146	20	DIL	21	IC06N
74HC/HCT373T	SOT163A	20	SO20	21	IC06N
74HC/HCT374P	SOT146	20	DIL	21	IC06N
74HC/HCT374T	SOT163A	20	SO20	21	IC06N
74HC/HCT377P	SOT146	20	DIL	21	IC06N
74HC/HCT377T	SOT163A	20	SO20	21	IC06N
74HC/HCT390P	SOT38Z	16	DIL	22	IC06N
74HC/HCT390T	SOT109A	16	SO16	22	IC06N
74HC/HCT393P	SOT38Z	16	DIL	22	IC06N
74HC/HCT393T	SOT109A	16	SO16	22	IC06N
74HC/HCT423P	SOT38Z	16	DIL	23	IC06N
74HC/HCT423T	SOT109A	16	SO16	23	IC06N
74HC/HCT533P	SOT146	20	DIL	21	IC06N
74HC/HCT533T	SOT163A	20	SO20	21	IC06N
74HC/HCT534P	SOT146	20	DIL	21	IC06N
74HC/HCT534T	SOT163A	20	SO20	21	IC06N
74HC/HCT540P	SOT146	20	DIL	20	IC06N
74HC/HCT540T	SOT163A	20	SO20	20	IC06N
74HC/HCT541P	SOT146	20	DIL	20	IC06N
74HC/HCT541T	SOT163A	20	SO20	20	IC06N
74HC/HCT563P	SOT146	20	DIL	21	IC06N
74HC/HCT563T	SOT163A	20	SO20	21	IC06N
74HC/HCT564P	SOT146	20	DIL	21	IC06N
74HC/HCT564T	SOT163A	20	SO20	21	IC06N
74HC/HCT573P	SOT146	20	DIL	21	IC06N
74HC/HCT573T	SOT163A	20	SO20	21	IC06N
74HC/HCT574P	SOT146	20	DIL	21	IC06N
74HC/HCT574T	SOT163A	20	SO20	21	IC06N
74HC/HCT583P	SOT38Z	16	DIL	22	IC06N
74HC/HCT583T	SOT109A	16	SO16	22	IC06N
74HC/HCT7597P	SOT38Z	16	DIL	21	IC06N
74HC/HCT7597T	SOT109A	16	SO16	21	IC06N
74HC/HCT640P	SOT146	20	DIL	23	IC06N
74HC/HCT640T	SOT163A	20	SO20	23	IC06N
74HC/HCT643P	SOT146	20	DIL	23	IC06N
74HC/HCT643T	SOT163A	20	SO20	23	IC06N
74HC/HCT646P	SOT101A	24	DIL	23	IC06N
74HC/HCT646T	SOT137A	24	SO24	23	IC06N
74HC/HCT648P	SOT101A	24	DIL	23	IC06N
74HC/HCT648T	SOT137A	24	SO24	23	IC06N
74HC/HCT670P	SOT38Z	16	DIL	21	IC06N
74HC/HCT670T	SOT109A	16	SO16	21	IC06N
74HC/HCT688P	SOT146	20	DIL	22	IC06N
74HC/HCT688T	SOT163A	20	SO20	22	IC06N
74HC/HCT4002P	SOT27	14	DIL	20	IC06N
74HC/HCT4002T	SOT108A	14	SO14	20	IC06N
74HC/HCT4015P	SOT38Z	16	DIL	21	IC06N
74HC/HCT4015T	SOT109A	16	SO16	21	IC06N
74HC/HCT4016P	SOT27	14	DIL	23	IC06N
74HC/HCT4016T	SOT108A	14	SO14	23	IC06N
74HC/HCT4017P	SOT38Z	16	DIL	22	IC06N
74HC/HCT4017T	SOT109A	16	SO16	22	IC06N
74HC/HCT4020P	SOT38Z	16	DIL	22	IC06N
74HC/HCT4020T	SOT109A	16	SO16	22	IC06N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
74HC/HCT4024P	SOT27	14	DIL	22	IC06N
74HC/HCT4024T	SOT108A	14	SO14	22	IC06N
74HC/HCT4040P	SOT38Z	16	DIL	22	IC06N
74HC/HCT4040T	SOT109A	16	SO16	22	IC06N
74HC/HCT4046P	SOT38Z	16	DIL	23	IC06N
74HC/HCT4046T	SOT109A	16	SO16	23	IC06N
74HC/HCT4046AP	SOT38Z	16	DIL	23	IC06N
74HC/HCT4046AT	SOT109A	16	SO16	23	IC06N
74HC4049P	SOT38Z	16	DIL	20	IC06N
74HC4049T	SOT109A	16	SO16	20	IC06N
74HC4050P	SOT38Z	16	DIL	20	IC06N
74HC4050T	SOT109A	16	SO16	20	IC06N
74HC/HCT4051P	SOT38Z	16	DIL	23	IC06N
74HC/HCT4051T	SOT109A	16	SO16	23	IC06N
74HC/HCT4052P	SOT38Z	16	DIL	23	IC06N
74HC/HCT4052T	SOT109A	16	SO16	23	IC06N
74HC/HCT4053P	SOT38Z	16	DIL	23	IC06N
74HC/HCT4053T	SOT109A	16	SO16	23	IC06N
74HC/HCT4059P	SOT101A	24	DIL	22	IC06N
74HC/HCT4059T	SOT137A	24	SO24	22	IC06N
74HC/HCT4060P	SOT38Z	16	DIL	22	IC06N
74HC/HCT4060T	SOT109A	16	SO16	22	IC06N
74HC/HCT4066P	SOT27	14	DIL	23	IC06N
74HC/HCT4066T	SOT108A	14	SO14	23	IC06N
74HC/HCT4067P	SOT101A	24	DIL	23	IC06N
74HC/HCT4067T	SOT137A	24	SO24	23	IC06N
74HC/HCT4075P	SOT27	14	DIL	20	IC06N
74HC/HCT4075T	SOT108A	14	SO14	20	IC06N
74HC/HCT4094P	SOT38Z	16	DIL	21	IC06N
74HC/HCT4094T	SOT109A	16	SO16	21	IC06N
74HC/HCT4316P	SOT38Z	16	DIL	23	IC06N
74HC/HCT4316T	SOT109A	16	SO16	23	IC06N
74HC/HCT4351P	SOT102A	18	DIL	23	IC06N
74HC/HCT4352P	SOT102A	18	DIL	23	IC06N
74HC/HCT4353P	SOT102A	18	DIL	23	IC06N
74HC/HCT4510P	SOT38Z	16	DIL	22	IC06N
74HC/HCT4510T	SOT109A	16	SO16	22	IC06N
74HC/HCT4511P	SOT38Z	16	DIL	23	IC06N
74HC/HCT4511T	SOT109A	16	SO16	23	IC06N
74HC/HCT4514P	SOT101A	24	DIL	23	IC06N
74HC/HCT4514T	SOT137A	24	SO24	23	IC06N
74HC/HCT4515P	SOT101A	24	DIL	23	IC06N
74HC/HCT4515T	SOT137A	24	SO24	23	IC06N
74HC/HCT4516P	SOT38Z	16	DIL	22	IC06N
74HC/HCT4516T	SOT109A	16	SO16	22	IC06N
74HC/HCT4518P	SOT38Z	16	DIL	22	IC06N
74HC/HCT4518T	SOT109A	16	SO16	22	IC06N
74HC/HCT4520P	SOT38Z	16	DIL	22	IC06N
74HC/HCT4520T	SOT109A	16	SO16	22	IC06N
74HC/HCT4538P	SOT27	14	DIL	23	IC06N
74HC/HCT4538T	SOT108A	14	SO14	23	IC06N
74HC/HCT4543P	SOT38Z	16	DIL	23	IC06N
74HC/HCT4543T	SOT109A	16	SO16	23	IC06N
74HC/HCT7030P	SOT117D	28	DIL	21	IC06N
74HC/HCT7030T	SOT136A	28	SO28	21	IC06N
74HC/HCT7046P	SOT38Z	16	DIL	23	IC06N
74HC/HCT7046T	SOT109A	16	SO16	23	IC06N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
74HC/HCT40102P	SOT38Z	16	DIL	22	IC06N
74HC/HCT40102T	SOT109A	16	SO16	22	IC06N
74HC/HCT40103P	SOT38Z	16	DIL	22	IC06N
74HC/HCT40103T	SOT109A	16	SO16	22	IC06N
74HC/HCT40104P	SOT38Z	16	DIL	21	IC06N
74HC/HCT40104T	SOT109A	16	SO16	21	IC06N
74HC/HCT40105P	SOT38Z	16	DIL	21	IC06N
74HC/HCT40105T	SOT109A	16	SO16	21	IC06N
74LS00	D,N	14	DIL/SO14	25	IC09N
74LS01	N	14	DIL	25	IC09N
74LS02	D,N	14	DIL/SO14	25	IC09N
74LS04	D,N	14	DIL/SO14	25	IC09N
74LS05	D,N	14	DIL/SO14	25	IC09N
74LS08	D,N	14	DIL/SO14	25	IC09N
74LS09	D,N	14	DIL/SO14	25	IC09N
74LS10	D,N	14	DIL/SO14	25	IC09N
74LS11	D,N	14	DIL/SO14	25	IC09N
74LS13	N	14	DIL	27	IC09N
74LS14	D,N	14	DIL/SO14	27	IC09N
74LS20	D,N	14	DIL/SO14	25	IC09N
74LS21	D,N	14	DIL/SO14	25	IC09N
74LS26	D,N	14	DIL/SO14	25	IC09N
74LS27	D,N	14	DIL/SO14	25	IC09N
74LS30	D,N	14	DIL/SO14	25	IC09N
74LS32	D,N	14	DIL/SO14	25	IC09N
74LS33	N	14	DIL	25	IC09N
74LS37	N	14	DIL	25	IC09N
74LS38	D,N	14	DIL/SO14	25	IC09N
74LS40	N	14	DIL	25	IC09N
74LS42	D,N	16	DIL/SO16L	30	IC09N
74LS51	D,N	14	DIL/SO14	25	IC09N
74LS64	D,N	14	DIL/SO14	25	IC09N
74LS73	N	14	DIL	27	IC09N
74LS74A	D,N	14	DIL/SO14	27	IC09N
74LS75	D,N	16	DIL/SO16	29	IC09N
74LS76	N	16	DIL	27	IC09N
74LS83A	D,N	16	DIL/SO16	31	IC09N
74LS85	D,N	16	DIL/SO16	31	IC09N
74LS86	D,N	14	DIL/SO14	25	IC09N
74LS90	N	14	DIL	28	IC09N
74LS92	N	14	DIL	28	IC09N
74LS93	D,N	14	DIL/SO14	28	IC09N
74LS95B	N	14	DIL	27	IC09N
74LS96	N	16	DIL	27	IC09N
74LS107	D,N	14	DIL/SO14	27	IC09N
74LS109	D,N	16	DIL/SO16	27	IC09N
74LS112	D,N	16	DIL/SO16	27	IC09N
74LS113	N	14	DIL	27	IC09N
74LS125	D,N	14	DIL/SO14	26	IC09N
74LS126	N	14	DIL	26	IC09N
74LS132	N	14	DIL	27	IC09N
74LS136	N	14	DIL	25	IC09N
74LS138	D,N	16	DIL/SO16	30	IC09N
74LS139	D,N	16	DIL/SO16	30	IC09N
74LS151	D,N	16	DIL/SO16	30	IC09N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
74LS153	D,N	16	DIL/SO16	30	IC09N
74LS154	D,N	24	DIL/SO24	30	IC09N
74LS155	D,N	16	DIL/SO16L	30	IC09N
74LS156	D,N	16	DIL/SO16	30	IC09N
74LS157	D,N	16	DIL/SO16	30	IC09N
74LS158	D,N	16	DIL/SO16	30	IC09N
74LS160A	N	16	DIL	28	IC09N
74LS161A	D,N	16	DIL/SO16	28	IC09N
74LS162A	N	16	DIL	28	IC09N
74LS163A	D,N	16	DIL/SO16	28	IC09N
74LS164	D,N	14	DIL/SO14	27	IC09N
74LS168A	N	16	DIL	28	IC09N
74LS169A	D,N	16	DIL/SO16	28	IC09N
74LS170	N	16	DIL	27	IC09N
74LS173	D,N	16	DIL/SO16L	27	IC09N
74LS174	D,N	16	DIL/SO16	27	IC09N
74LS175	D,N	16	DIL/SO16	27	IC09N
74LS181	N	24	DIL	31	IC09N
74LS191	D,N	16	DIL/SO16L	28	IC09N
74LS192	N	16	DIL	28	IC09N
74LS193	D,N	16	DIL/SO16L	28	IC09N
74LS194A	D,N	16	DIL/SO16	27	IC09N
74LS195A	D,N	16	DIL/SO16	27	IC09N
74LS197	D,N	14	DIL/SO14	28	IC09N
74LS240	D,N	20	DIL/SO20	26	IC09N
74LS241	D,N	20	DIL/SO20	26	IC09N
74LS242	N	14	DIL	26	IC09N
74LS243	N	14	DIL	26	IC09N
74LS244	D,N	20	DIL/SO20	26	IC09N
74LS245	D,N	20	DIL/SO20	26	IC09N
74LS251A	N	16	DIL	30	IC09N
74LS253	D,N	16	DIL/SO16	30	IC09N
74LS256	D,N	16	DIL/SO16	29	IC09N
74LS257A	D,N	16	DIL/SO16L	30	IC09N
74LS258A	D,N	16	DIL/SO16L	30	IC09N
74LS259	D,N	16	DIL/SO16	29	IC09N
74LS260	D,N	14	DIL/SO14	25	IC09N
74LS266	D,N	14	DIL/SO14	25	IC09N
74LS273	D,N	20	DIL/SO20	27	IC09N
74LS283	D,N	16	DIL/SO16	31	IC09N
74LS290	D,N	14	DIL/SO14	28	IC09N
74LS293	D,N	14	DIL/SO14	28	IC09N
74LS295B	N	14	DIL	27	IC09N
74LS298	N	16	DIL	30	IC09N
74LS301	N,F	16	DIL	31,41	-
74LS352	N	16	DIL	30	IC09N
74LS353	D,N	16	DIL/SO16	30	IC09N
74LS363	N	20	DIL	29	IC09N
74LS364	N	20	DIL	27	IC09N
74LS365A	D,N	16	DIL/SO16	26	IC09N
74LS366A	N	16	DIL	26	IC09N
74LS367A	D,N	16	DIL/SO16	26	IC09N
74LS368A	D,N	16	DIL/SO16	26	IC09N
74LS373	D,N	20	DIL/SO20	29	IC09N
74LS374	D,N	20	DIL/SO20	27	IC09N
74LS375	D,N	16	DIL/SO16L	29	IC09N
74LS377	D,N	20	DIL/SO20	27	IC09N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
74LS378	N	16	DIL	27	IC09N
74LS390	D,N	16	DIL/SO16L	28	IC09N
74LS393	D,N	14	DIL/SO14	28	IC09N
74LS395A	N	16	DIL	27	IC09N
74LS445	N	16	DIL	29	IC09N
74LS490	N	16	DIL	28	IC09N
74LS540	N	20	DIL	26	IC09N
74LS541	N	20	DIL	26	IC09N
74LS568A	N	20	DIL	28	IC09N
74LS569A	N	20	DIL	28	IC09N
74LS620	N	20	DIL	26	IC09N
74LS621	N	20	DIL	26	IC09N
74LS622	N	20	DIL	26	IC09N
74LS623	N	20	DIL	26	IC09N
74LS640	N	20	DIL	28	IC09N
74LS640-1	N	20	DIL	26	IC09N
74LS641	N	20	DIL	26	IC09N
74LS641-1	N	20	DIL	26	IC09N
74LS642	N	20	DIL	26	IC09N
74LS642-1	N	20	DIL	26	IC09N
74LS645	N	20	DIL	26	IC09N
74LS645-1	N	20	DIL	26	IC09N
74LS670	D,N	16	DIL/SO16L	28	IC09N
74LS764	D,N	40	DIL/SO40	31	IC09N
74LS765	D,N	40	DIL/SO40	31	-
74LS1801	-	-	-	31	-
74LS1802	-	-	-	31	-
74S00	D,N	14	DIL/SO14	25	IC09N
74S02	D,N	14	DIL/SO14	25	IC09N
74S03	D,N	14	DIL/SO14	25	IC09N
74S04	D,N	14	DIL/SO14	25	IC09N
74S05	D,N	14	DIL/SO14	25	IC09N
74S08	D,N	14	DIL/SO14	25	IC09N
74S10	D,N	14	DIL/SO14	25	IC09N
74S11	D,N	14	DIL/SO14	25	IC09N
74S20	D,N	14	DIL/SO14	25	IC09N
74S32	D,N	14	DIL/SO14	25	IC09N
74S37	D,N	14	DIL/SO14	25	IC09N
74S38	D,N	14	DIL/SO14	25	IC09N
74S40	N	14	DIL	25	IC09N
74S51	D,N	14	DIL/SO14	25	IC09N
74S64	D,N	14	DIL/SO14	25	IC09N
74S74	D,N	14	DIL/SO14	27	IC09N
74S85	D,N	16	DIL/SO16	31	IC09N
74S86	D,N	14	DIL/SO14	25	IC09N
74S112	N	16	DIL	27	IC09N
74S113	N	14	DIL	27	IC09N
74S133	D,N	16	DIL/SO16L	25	IC09N
74S134	D,N	16	DIL/SO16L	25	IC09N
74S135	N	16	DIL	25	IC09N
74S138	D,N	16	DIL/SO16L	30	IC09N
74S139	D,N	16	DIL/SO16L	30	IC09N
74S140	N	14	DIL	29	IC09N
74S151	D,N	16	DIL/SO16	30	IC09N
74S153	D,N	16	DIL/SO16L	30	IC09N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
74S157	D,N	16	DIL/SO16L	30	IC09N
74S158	D,N	16	DIL/SO16L	30	IC09N
74S168A	D,N	16	DIL/SO16L	28	IC09N
74S169A	D,N	16	DIL/SO16L	28	IC09N
74S172	N	24	DIL	27	IC09N
74S174	D,N	16	DIL/SO16L	27	IC09N
74S175	D,N	16	DIL/SO16	27	IC09N
74S181	N	24	DIL	31	IC09N
74S182	D,N	16	DIL/SO16	31	IC09N
74S189	N,F	16	DIL	31,41	-
74S194	D,N	16	DIL/SO16	27	IC09N
74S195	N	16	DIL	27	IC09N
74S225	N	-	DIL	27	-
74S240	D,N	20	DIL/SO20	26	IC09N
74S241	N	20	DIL	26	IC09N
74S242	N	14	DIL	26	IC09N
74S243	N	14	DIL	26	IC09N
74S244	N	20	DIL	26	IC09N
74S251	N	16	DIL	30	IC09N
74S253	D,N	16	DIL/SO16	30	IC09N
74S257	D,N	16	DIL/SO16L	30	IC09N
74S258	N	16	DIL	30	IC09N
74S260	D,N	14	DIL/SO14	25	IC09N
74S273	D,N	20	DIL/SO20	27	IC09N
74S280	N	14	DIL	31	IC09N
74S301	N,F	16	DIL	31,41	-
74S350	N	16	DIL	31	IC09N
74S373	D,N	20	DIL/SO20	29	IC09N
74S374	D,N	20	DIL/SO20	27	IC09N
74S534	N	20	DIL	29	IC09N
82HS137	N,F	18	DIL	42	IC7
82HS187	N	24	DIL	42	-
82HS189	N	24	DIL	42	-
82HS195	N,F	20	DIL	43	IC7
82HS195A	N	20	DIL	43	-
82HS195B	N	20	DIL	43	-
82HS321	N,F	24	DIL	43	IC7
82HS321A	N	24	DIL	43	-
82HS321B	N	24	DIL	43	-
82HS641	N,F	24	DIL	43	IC7
82HS641A	N	24	DIL	43	-
82HS641B	N	24	DIL	43	-
82LS16	N,F	16	DIL	41	IC7
82LS135	N,F	20	DIL	42	●
82LS181	N,F	24	DIL	42	IC7
82S09	N,F	28	DIL	41	IC7
82S09A	N,F	28	DIL	41	IC7
82S16	N,F	16	DIL	41	IC7
82S19	N,F	28	DIL	41	IC7
82S23	N,F	16	DIL	42	IC7
82S23A	N,F	16	DIL	42	IC7



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
82S41	-	-	-	32	-
82S50	-	-	-	32	-
82S52	-	-	-	32	-
82S62	-	-	-	32	-
82S82	-	-	-	32	-
82S83	-	-	-	32	-
82S100	N,F	28	DIL	72	IC10
82S101	N,F	28	DIL	72	IC10
82S103	N,F	28	DIL	72	IC10
82S105	N,F	28	DIL	72	IC10
82S105A	N,F	28	DIL	72	IC10
82S115	N,F	24	DIL	42	IC7
82S123	N,F	16	DIL	42	IC7
82S123A	N,F	16	DIL	42	IC7
82S126	N,F	16	DIL	42	IC7
82S126A	N,F	16	DIL	42	IC7
82S129	N,F	16	DIL	42	IC7
82S129A	N,F	16	DIL	42	IC7
82S130	N,F	16	DIL	42	IC7
82S130A	N,F	16	DIL	42	IC7
82S131	N,F	16	DIL	42	IC7
82S131A	N,F	16	DIL	42	IC7
82S135	N,F	20	DIL	42	IC7
82S137	N,F	18	DIL	42	IC7
82S137A	N,F	18	DIL	42	IC7
82S137B	N,F	18	DIL	42	IC7
82S147	N,F	20	DIL	42	IC7
82S147A	N,F	20	DIL	42	IC7
82S151	N,F	20	DIL	72	IC10
82S152	N,F	20	DIL	72	IC10
82S153	N,F	20	DIL	72	IC10
82S153A	N,F	20	DIL	72	IC10
82S155	N,F	20	DIL	72	IC10
82S157	N,F	20	DIL	72	IC10
82S159	N,F	20	DIL	72	IC10
82S161	N,F	24	DIL	72	●
82S162	N,F	24	DIL	72	IC10
82S163	N,F	24	DIL	72	IC10
82S167(A)	N,F	24	DIL	72	●
82S168	N	24	DIL	72	●
82S173	N	24	DIL	72	●
82S179	N	24	DIL	72	●
82S181	N,F	24	DIL	42	IC7
82S181A	N,F	24	DIL	42	IC7
82S181B	N,F	24	DIL	42	IC7
82S183	N,F	24	DIL	42	IC7
82S185	N,F	18	DIL	42	IC7
82S185A	N,F	18	DIL	42	IC7
82S185B	N,F	18	DIL	42	IC7
82S191	N,F	24	DIL	42	IC7
82S191A	N,F	24	DIL	42	IC7
82S191B	N,F	24	DIL	42	IC10
82S195	N,F	20	DIL	42	IC7
82S212	N,F	22	DIL	41	IC7
82S212A	N,F	22	DIL	41	IC10
82S321	N	24	DIL	43	-



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
23-101PB	FO75	64	GRID	48	●
23-101PB	FO75	64	GRID	48	●
23-101PBH	FO99	64	GRID	48	●
231-101PB	FO75	64	GRID	48	●
231-101PBH	FO99	64	GRID	48	●
241-141PBK	FO108	144	GRID	48	●
241-141PBKH	FO128	144	GRID	48	●
2332	N,SOT101A	24	DIL	44	●
2364	N	28	DIL	44	●
2616	N,SOT101A	24	DIL	44	●
2632	N,SOT101A	24	DIL	44	●
2664	N,SOT101A	24	DIL	44	●
27C64	N	28	DIL	44	●
27C256	N	24	DIL	44	-
3101A	N,F	16	DIL	41	IC7
7400	N	14	DIL	25	IC09N
7402	N	14	DIL	25	IC09N
7403	N	14	DIL	25	IC09N
7404	N	14	DIL	25	IC09N
7405	N	14	DIL	25	IC09N
7406	D,N	14	DIL/SO14	25	IC09N
7407	D,N	14	DIL/SO14	25	IC09N
7408	N	14	DIL	25	IC09N
7410	N	14	DIL	25	IC09N
7411	N	14	DIL	25	IC09N
7413	N	14	DIL	27	IC09N
7414	D,N	14	DIL/SO14	27	IC09N
7416	N	14	DIL	25	IC09N
7417	D,N	14	DIL/SO14	25	IC09N
7420	N	14	DIL	25	IC09N
7421	N	14	DIL	25	IC09N
7425	N	14	DIL	25	IC09N
7426	N	14	DIL	25	IC09N
7427	N	14	DIL	25	IC09N
7428	N	14	DIL	25	IC09N
7430	N	14	DIL	25	IC09N
7432	N	14	DIL	25	IC09N
7433	N	14	DIL	25	IC09N
7437	N	14	DIL	25	IC09N
7438	N	14	DIL	25	IC09N
7439	N	14	DIL	25	IC09N
7440	N	14	DIL	25	IC09N
7442	N	16	DIL	30	IC09N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
7445	N	16	DIL	29	IC09N
7450	N	14	DIL	25	-
7451	N	14	DIL	25	IC09N
7473	N	14	DIL	27	IC09N
7474	N	14	DIL	27	IC09N
7475	N	16	DIL	29	IC09N
7476	N	16	DIL	27	IC09N
7483	N	16	DIL	31	IC09N
7485	N	16	DIL	31	IC09N
7486	N	14	DIL	25	IC09N
7490	N	14	DIL	28	IC09N
7492	N	14	DIL	28	IC09N
7493	N	14	DIL	28	IC09N
7494	N	16	DIL	27	IC09N
7495	N	14	DIL	27	IC09N
7496	N	16	DIL	27	IC09N
8234	-	-	-	32	-
8242	-	-	-	32	-
8262	-	-	-	32	-
8266	-	-	-	32	-
8271	-	-	-	32	-
8273	-	-	-	32	-
8274	-	-	-	32	-
8881	-	-	-	32	-
8890	-	-	-	32	-
8891	-	-	-	32	-
9309	-	-	-	32	-
9310	-	-	-	32	-
9316	-	-	-	32	-
9322	-	-	-	32	-
9324	-	-	-	32	-
9334	-	-	-	32	-
9386	-	-	-	32	-
9401	N	14	DIL	68	●
9403	N	24	DIL	68	●
9602	-	-	-	32	-
10100F	SOT74	16	DIL	36	IC08N
10100N	SOT38Z	16	DIL	36	IC08N
10101F	SOT74	16	DIL	36	IC08N
10101N	SOT38Z	16	DIL	36	IC08N
10102F	SOT74	16	DIL	36	IC08N
10102N	SOT38Z	16	DIL	36	IC08N
10103F	SOT74	16	DIL	36	IC08N
10103N	SOT38Z	16	DIL	36	IC08N
10104F	SOT74	16	DIL	36	IC08N
10104N	SOT38Z	16	DIL	36	IC08N
10105F	SOT74	16	DIL	36	IC08N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
10105N	SOT38Z	16	DIL	36	IC08N
10106F	SOT74	16	DIL	36	IC08N
10106N	SOT38Z	16	DIL	36	IC08N
10107F	SOT74	16	DIL	36	IC08N
10107N	SOT38Z	16	DIL	36	IC08N
10108F	SOT74	16	DIL	36	IC08N
10108N	SOT38Z	16	DIL	36	IC08N
10109F	SOT74	16	DIL	36	IC08N
10109N	SOT38Z	16	DIL	36	IC08N
10110F	SOT74	16	DIL	36	IC08N
10110N	SOT38Z	16	DIL	36	IC08N
10111F	SOT74	16	DIL	36	IC08N
10111N	SOT38Z	16	DIL	36	IC08N
10113F	SOT74	16	DIL	36	IC08N
10113N	SOT38Z	16	DIL	36	IC08N
10114F	SOT74	16	DIL	36	IC08N
10114N	SOT38Z	16	DIL	36	IC08N
10115F	SOT74	16	DIL	36	IC08N
10115N	SOT38Z	16	DIL	36	IC08N
10116F	SOT74	16	DIL	36	IC08N
10116N	SOT38Z	16	DIL	36	IC08N
10117F	SOT74	16	DIL	36	IC08N
10117N	SOT38Z	16	DIL	36	IC08N
10118F	SOT74	16	DIL	36	IC08N
10118N	SOT38Z	16	DIL	36	IC08N
10119F	SOT74	16	DIL	36	IC08N
10119N	SOT38Z	16	DIL	36	IC08N
10121F	SOT74	16	DIL	36	IC08N
10121N	SOT38Z	16	DIL	36	IC08N
10123F	SOT74	16	DIL	36	IC08N
10123N	SOT38Z	16	DIL	36	IC08N
10124F	SOT74	16	DIL	36	IC08N
10124N	SOT38Z	16	DIL	36	IC08N
10125F	SOT74	16	DIL	36	IC08N
10125N	SOT38Z	16	DIL	36	IC08N
10129F	SOT74	16	DIL	36	IC08N
10129N	SOT38Z	16	DIL	36	IC08N
10130F	SOT74	16	DIL	37	IC08N
10130N	SOT38Z	16	DIL	37	IC08N
10131F	SOT74	16	DIL	37	IC08N
10131N	SOT38Z	16	DIL	37	IC08N
10132F	SOT74	16	DIL	37	IC08N
10132N	SOT38Z	16	DIL	37	IC08N
10133F	SOT74	16	DIL	37	IC08N
10133N	SOT38Z	16	DIL	37	IC08N
10134F	SOT74	16	DIL	37	IC08N
10134N	SOT38Z	16	DIL	37	IC08N
10135F	SOT74	16	DIL	37	IC08N
10135N	SOT38Z	16	DIL	37	IC08N
10136F	SOT74	16	DIL	37	IC08N
10136N	SOT38Z	16	DIL	37	IC08N
10137F	SOT74	16	DIL	37	IC08N
10137N	SOT38Z	16	DIL	37	IC08N
10139F	SOT74	16	DIL	44	•
10139N	SOT38Z	16	DIL	44	•
10141F	SOT74	16	DIL	37	IC08N
10141N	SOT38Z	16	DIL	37	IC08N



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
10149F	SOT74	16	DIL	44	IC08N
10155F	SOT133;FK	18	DIL	44	IC7
10155N	SOT102A;NK	18	DIL	44	IC7
10158F	SOT74	16	DIL	37	IC08N
10158N	SOT38Z	16	DIL	37	IC08N
10159F	SOT74	16	DIL	37	IC08N
10159N	SOT38Z	16	DIL	37	IC08N
10160F	SOT74	16	DIL	37	IC08N
10160N	SOT38	16	DIL	37	IC08N
10161F	SOT74	16	DIL	37	IC08N
10161N	SOT38Z	16	DIL	37	IC08N
10162F	SOT74	16	DIL	37	IC08N
10162N	SOT38Z	16	DIL	37	IC08N
10164F	SOT74	16	DIL	37	IC08N
10164N	SOT38Z	16	DIL	37	IC08N
10165F	SOT74	16	DIL	37	IC08N
10165N	SOT38Z	16	DIL	37	IC08N
10171F	SOT74	16	DIL	37	IC08N
10171N	SOT38Z	16	DIL	37	IC08N
10172F	SOT74	16	DIL	37	IC08N
10172N	SOT38Z	16	DIL	37	IC08N
10173F	SOT74	16	DIL	37	IC08N
10173N	SOT38Z	16	DIL	37	IC08N
10174F	SOT74	16	DIL	37	IC08N
10174N	SOT38Z	16	DIL	37	IC08N
10175F	SOT74	16	DIL	37	IC08N
10175N	SOT38Z	16	DIL	37	IC08N
10176F	SOT74	16	DIL	37	IC08N
10176N	SOT38Z	16	DIL	37	IC08N
10179F	SOT74	16	DIL	37	IC08N
10179N	SOT38Z	16	DIL	37	IC08N
10180F	SOT74	16	DIL	37	IC08N
10180N	SOT38Z	16	DIL	37	IC08N
10181F	SOT149	24	DIL	37	IC08N
10181N	SOT101	24	DIL	37	IC08N
10188F	SOT74	16	DIL	36	IC08N
10188N	SOT38Z	16	DIL	36	IC08N
10189F	SOT74	16	DIL	36	IC08N
10189N	SOT38Z	16	DIL	36	IC08N
10191F	SOT74	16	DIL	37	IC08N
10191N	SOT38Z	16	DIL	37	IC08N
10192F	SOT74	16	DIL	36	IC08N
10192N	SOT38Z	16	DIL	36	IC08N
10210F	SOT74	16	DIL	36	IC08N
10210N	SOT38Z	16	DIL	36	IC08N
10211F	SOT74	16	DIL	36	IC08N
10211N	SOT38Z	16	DIL	36	IC08N
10216F	SOT74	16	DIL	36	IC08N
10216N	SOT38Z	16	DIL	36	IC08N
10231F	SOT74	16	DIL	37	IC08N
10231N	SOT38Z	16	DIL	37	IC08N
10422CF	SOT149	24	DIL	44	IC7
10422CY	SOT138	24	FP;4x6	44	IC7
10422F	SOT149	24	DIL	44	IC7
10422AF	SOT149	24	DIL	44	IC7
10422BF	SOT149	24	DIL	44	IC7
10422AY	SOT138	24	FP;4x6	44	IC7



type no.	package code	no. of pins	pin position	catalogue page no.	handbook
10470F	SOT133	18	DIL	44	IC7
10470AF	SOT133	18	DIL	44	IC7
10474F	SOT149	24	DIL	44	IC7
10474AF	SOT149	24	DIL	44	IC7
23128	N	28	DIL	44	●
23256A	N,SOT117	28	DIL	44	●
23512A	N	28	DIL	44	●
74107	N	14	DIL	27	IC09N
74109	N	16	DIL	27	IC09N
74116	N	24	DIL	29	IC09N
74121	D,N	14	DIL/SO14	27	IC09N
74123	D,N	16	DIL/SO16L	27	IC09N
74125	N	14	DIL	26	IC09N
74126	N	14	DIL	26	IC09N
74128	N	14	DIL	26	IC09N
74132	N	14	DIL	27	IC09N
74145	D,N	16	DIL/SO16L	29	IC09N
74147	N	16	DIL	30	IC09N
74148	D,N	16	DIL/SO16L	30	IC09N
74150	N	24	DIL	30	IC09N
74151	N	16	DIL	30	IC09N
74153	N	16	DIL	30	IC09N
74154	N	24	DIL	30	IC09N
74155	N	16	DIL	30	IC09N
74156	N	16	DIL	30	IC09N
74157	N	16	DIL	30	IC09N
74158	N	16	DIL	30	IC09N
74160	N	16	DIL	28	IC09N
74161	N	16	DIL	28	IC09N
74163	N	16	DIL	28	IC09N
74164	N	14	DIL	27	IC09N
74165	N	16	DIL	27	IC09N
74166	D,N	16	DIL/SO16L	27	IC09N
74170	N	16	DIL	27	IC09N
74173	N	16	DIL	27	IC09N
74174	N	16	DIL	27	IC09N
74175	N	16	DIL	27	IC09N
74180	N	14	DIL	31	IC09N
74181	N	24	DIL	31	IC09N
74190	N	16	DIL	28	IC09N
74191	N	16	DIL	28	IC09N
74192	N	16	DIL	28	IC09N
74193	N	16	DIL	28	IC09N
74194	N	16	DIL	27	IC09N
74195	N	16	DIL	27	IC09N
74199	N	24	DIL	27	IC09N
74221	D,N	16	DIL/SO16L	27	IC09N
74279	D,N	16	DIL/SO16	29	IC09N
74298	N	16	DIL	30	IC09N
74365A	N	16	DIL	26	IC09N
74366A	N	16	DIL	26	IC09N
74367A	N	16	DIL	26	IC09N
74368A	N	16	DIL	26	IC09N

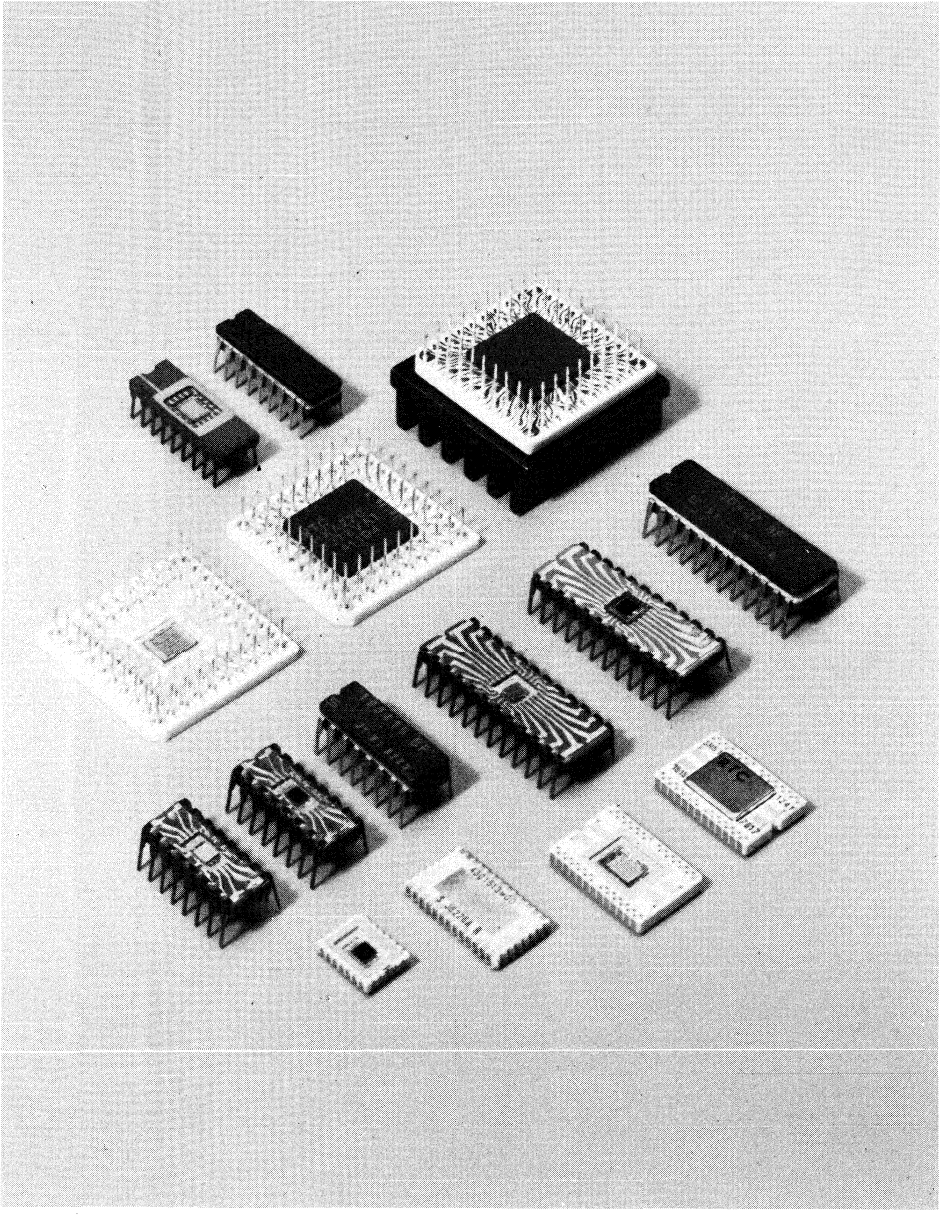


type no.	package code	no. of pins	pin position	catalogue page no.	handbook
100101F	SOT149	24	DIL	40	IC08N
100101F	SOT149	24	DIL	40	IC08N
100101Y	SOT138	24	FP:4x6	40	IC08N
100102F	SOT149	24	DIL	40	IC08N
100102Y	SOT138	24	FP:4x6	40	IC08N
100107F	SOT149	24	DIL	40	IC08N
100107Y	SOT138	24	FP:4x6	40	IC08N
100112F	SOT149	24	DIL	40	IC08N
100112Y	SOT138	24	FP:4x6	40	IC08N
100113F	SOT149	24	DIL	40	IC08N
100113Y	SOT138	24	FP:4x6	40	IC08N
100114F	SOT149	24	DIL	40	IC08N
100114Y	SOT138	24	FP:4x6	40	IC08N
100117F	SOT149	24	DIL	40	IC08N
100117Y	SOT138	24	FP:4x6	40	IC08N
100118F	SOT149	24	DIL	40	IC08N
100118Y	SOT138	24	FP:4x6	40	IC08N
100122F	SOT149	24	DIL	40	IC08N
100122Y	SOT138	24	FP:4x6	40	IC08N
100123F	SOT149	24	DIL	40	IC08N
100123Y	SOT138	24	FP:4x6	40	IC08N
100126F	SOT149	24	DIL	40	IC08N
100126Y	SOT138	24	FP:4x6	40	IC08N
100131F;AF	SOT149	24	DIL	40	IC08N
100131Y;AY	SOT138	24	FP:4x6	40	IC08N
100136F	SOT149	24	DIL	40	IC08N
100136Y	SOT138	24	FP:4x6	40	IC08N
100141F	SOT149	24	DIL	40	IC08N
100141Y	SOT138	24	FP:4x6	40	IC08N
100142F	SOT149	24	DIL	44	IC08N
100142Y	SOT138	24	FP:4x6	44	IC08N
100145F	SOT149	24	DIL	40	IC08N
100145Y	SOT138	24	FP:4x6	40	IC08N
100149F	-	-	-	44	IC7
100149Y	-	-	-	44	IC7
100150F	SOT149	24	DIL	40	IC08N
100150Y	SOT138	24	FP:4x6	40	IC08N
100151F	SOT149	24	DIL	40	IC08N
100151Y	SOT138	24	FP:4x6	40	IC08N
100155F	SOT149	24	DIL	40	IC08N
100155Y	SOT138	24	FP:4x6	40	IC08N
100158F	SOT149	24	DIL	40	IC08N
100158Y	SOT138	24	FP:4x6	40	IC08N
100160F	SOT149	24	DIL	40	IC08N
100160Y	SOT138	24	FP:4x6	40	IC08N
100163F	SOT149	24	DIL	40	IC08N
100163Y	SOT138	24	FP:4x6	40	IC08N
100164F	SOT149	24	DIL	40	IC08N
100164Y	SOT138	24	FP:4x6	40	IC08N
100165F	SOT149	24	DIL	40	IC08N
100165Y	SOT138	24	FP:4x6	40	IC08N
100166F	SOT149	24	DIL	40	IC08N
100166Y	SOT138	24	FP:4x6	40	IC08N
100170F	SOT149	24	DIL	40	IC08N
100170Y	SOT138	24	FP:4x6	40	IC08N
100171F	SOT149	24	DIL	40	IC08N
100171Y	SOT138	24	FP:4x6	40	IC08N



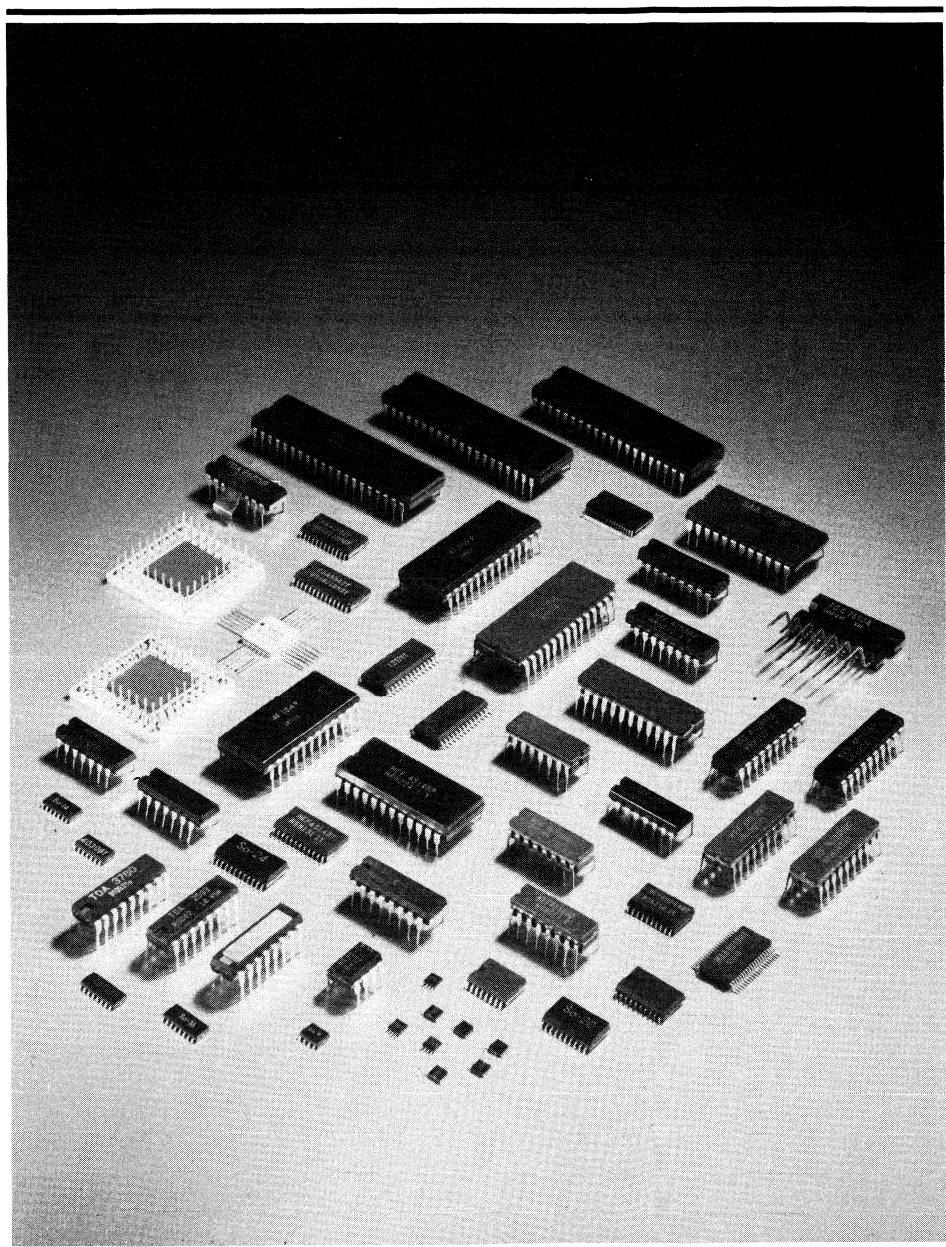
type no.	package code	no. of pins	pin position	catalogue page no.	handbook
100175F	SOT74	16	DIL	40	IC08N
100179F	SOT149	24	DIL	40	IC08N
100179Y	SOT138	24	FP;4x6	40	IC08N
100180F	SOT149	24	DIL	40	IC08N
100180Y	SOT138	24	FP;4x6	40	IC08N
100181F	SOT149	24	DIL	40	IC08N
100181Y	SOT138	24	FP;4x6	40	IC08N
100255F	SOT74B	16	DIL	40	●
100422F	SOT149	24	DIL	44	IC7
100422AF	SOT149	24	DIL	44	IC7
100422BF	SOT149	24	DIL	44	IC7
100422CF	SOT149	24	DIL	44	IC7
100422CY	SOT138	24	FP;4x6	44	IC7
100470F	SOT133	18	DIL	44	IC7
100470AF	SOT133	18	DIL	44	IC7
100474F	SOT149	24	DIL	44	IC7
100474AF	SOT149	24	DIL	44	IC7
100474AY	SOT138	24	FP;4x6	44	IC7





Electronic
components
and materials

PHILIPS



Electronic
components
and materials

PHILIPS

Semiconductors

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
S1	Diodes
S2a	Power diodes
S2b	Thyristors, triacs
S3	Small signal transistors
S4a	Low frequency power transistors and modules
S4b	High voltage and switching power transistors
S5	Field-effect transistors
S6	R.F. power transistors and modules
S7	Surface-mounted semiconductors
S8a	Light emitting diodes
S8b	Optoelectronic devices
S9	Power MOS transistors
S10	Wideband transistors and hybrids
S11	Microwave semiconductors
S12	Surface acoustic wave devices

Data Handbook System	S-ii	L.F. power transistors and modules	S56
Contents	S-iii	Field-effect transistors	S96
Letter symbols	S-iv	R.F. power transistors and modules	S102
Alphanumeric type number index	S-v	Wideband transistors	S116
Diodes:		Surface-mounting devices	
Small signal diodes	S1	Optoelectronic devices:	
Tuner diodes	S3	Fibre optic emitters-receivers	S137
Voltage reference diodes	S5	Infrared receivers	S138
Voltage regulator diodes	S6	Infrared emitters	S139
Transient suppressor diodes	S6	Light-emitting diodes	S140
Surface-mounting diodes	S7	Pyroelectric infrared detectors	S146
Rectifier diodes	S10	Liquid crystal displays	S147
Triacs, thyristors, bi-directional devices	S25	Optocouplers	S150
Transistors listed by voltage	S32	Microwave transistors	S152
Small signal transistors:		Accessories and heatsinks	S158
L.F. general purpose transistors	S39	Semiconductor sensor devices	S160
Dual transistors for		Guide to packing quantities	S162
differential amplifiers	S42	Case outlines and dimensions	S163
H.F. and switching transistors	S44	CECC approved types	S181



Cd	Diode capacitance	PS	Source power
Crb	Feedback capacitance (common base)	Ptot	Total power dissipation
Crd	Feedback capacitance (common drain)	PZRM	Repetitive peak reverse power dissipation
Cre	Feedback capacitance (common emitter)	PZSM	Non-repetitive peak reverse power dissipation
Crs	Feedback capacitance (common source)	rD	Diode series resistance
CMRR	Common mode rejection ratio	rdiff	Differential resistance
D*	Detectivity	rdo	Initial dark resistance
dim	Intermodulation distortion	rDSoff	Drain-source resistance (off)
dcm	Cross-modulation distortion	rds on	Drain-source resistance (on) at specified frequency
Ee tr	Irradiance to trigger a device	RL	Load resistance
F	Noise figure	rlo	Initial illumination resistance
f	Frequency	SF, SZ	Temperature coefficient of the working voltage
fhfe	Frequency at which hfe is -3 dB	Tamb	Ambient temperature
ft	Transition frequency	Tc	Colour temperature
$\Delta \frac{1}{gfs}$	Difference in transfer impedance	td	Forward conduction delay
$\Delta \frac{gfs}{gfs}$	Difference in penetration factor	tf	Fall time
Gp	Power gain	Th	Heatsink temperature
GUM	Maximum unilateral power gain	Tj	Junction temperature
hfe	Small-signal current gain	Tmb	Mounting base temperature
hFE	D.C. current gain	toff	Turn-off time
$\frac{\Delta I}{\Delta T}$	Equivalent differential current change with temperature	ton	Turn-on time
IA	Anode current	tq	Circuit commutated turn-off time
dIA/dT	Rate of rise of anode current	tr	Rise time
IARM	Repetitive peak anode current	trr	Reverse recovery time
IB	D.C. (or average) base current	ttot	Total recovery time
IC	D.C. (or average) collector current	VAK	Anode-cathode voltage
I(CL)SM	Non-repetitive peak clamping current	VB	Supply voltage
ICM	Peak value of IC	VCBO	Collector-base voltage (open emitter)
ID	Off-state current	VCEO	Collector-emitter voltage (open base)
IDSS	Drain current (source short-circuited to gate)	VCER	Collector-emitter voltage with a specified resistance between emitter and base
IDSX	Drain cut-off current (specified conditions)	VCERM	Peak value of VCER
Ie	Radiant intensity	VCES	Collector-emitter voltage (emitter to base)
IF	Forward current (d.c. or average)	VCESM	Peak value of VCES
IF(AV)	Total average forward current	VCESat	Collector-emitter saturation voltage
IFM	Peak forward current	V(CL)R	Output clamping voltage
IFRM	Repetitive peak forward current	dVcom/dt	Rate of rise of commutating voltage that will not trigger any device
IFSM	Non-repetitive peak forward current	VD	Continuous off-state voltage
IFWM	Working peak forward current	dVD/dt	Rate of rise of off-state voltage
IGSS	Gate cut-off current (source short-circuited to drain)	VDB	Drain-substrate voltage
IGT	Gate-cathode current that will trigger all devices	VDRM	Repetitive peak off-state voltage
IH	Holding current	VDS	Drain-source voltage
IISM	Non-repetitive peak input current	VDWM	Crest working off-state voltage
I(O(AV))	Average output current	VF	Continuous forward voltage
Iopt	Output current at optimum operation	VGA	Anode gate-anode voltage
IORM	Repetitive peak output current	VGK	Cathode gate-cathode voltage
IR	Reverse (cut-off) current	ΔVGS	Gate-source voltage difference
IR(D)	Dark reverse current	$\frac{d\Delta VGS}{dT}$	Thermal drift of gate-source voltage difference
IRRM	Repetitive peak reverse current	VGT	Gate-cathode voltage that will trigger all devices
ISDX	Source cut-off current (specified conditions)	Vi	Input stand-off voltage (transient suppressors)
ISGO	Source current (open drain)	VIRM	Repetitive peak input voltage
IT	On-state current	Vi(RMS)	R.M.S. value of the input voltage
dIT/dt	Rate of rise of on-state current	VIWM	Crest working input voltage
I(T(AV))	Average on-state current	Vn	Equivalent noise voltage
ITRM	Repetitive peak on-state current	VO	Output voltage
I(T(RMS))	R.M.S. value of the on-state current	V(opt)	Output voltage at optimum operation
ITSM	Non-repetitive peak on-state current	V(P)GS	Gate-source cut-off voltage
ITWM	Working peak on-state current	VR	Continuous reverse voltage; stand-off voltage
Iv	Luminous intensity	VRRM	Repetitive peak reverse voltage
IZ	Working current (d.c. or average)	VRWM	Crest working reverse voltage
IZM	Peak working current	VSB	Source-substrate voltage
IZRM	Repetitive peak working current	VZ	Working voltage
I ² t	I squared t for fusing	$\frac{\Delta V}{\Delta T}$	Equivalent differential voltage change with temperature
N	Light sensitivity	yfs	Transfer admittance (common source)
PD	Drive power	η	Efficiency
P.E.P.	Peak envelope power	α 50%	Beamwidth between half-intensity directions
PL	Load power	λ_{peak}	Wavelength at peak spectral response or emission
Po	Output power	ϕ_e	Radiant output power
Popt	Optimum output power		
PRRM	Repetitive peak reverse power dissipation		
PRSM	Non-repetitive peak reverse power dissipation		



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 | S | Sensor devices |
| I | Infrared devices | Saw | Surface acoustic wave filters |
| LED | Light-emitting diodes | SD | Small-signal diodes |
| LCD | Liquid crystal displays | Sm | Small-signal transistors |
| Mm | Surface-mounting devices | SP | Low-frequency switching power transistors |
| Mw | Microwave transistors | St | Rectifier stacks |
| P | Low-frequency power transistors and modules | T | Tuner diodes |
| PDT | Photodiodes or transistors | Th | Thyristors |
| Ph | Photoconductive devices | ThM | Thyristor modules |
| PhC | Photocouplers | Tri | Triacs |
| PM | Power MOS transistors | Vrf | Voltage reference diodes |
| R | Rectifier diodes | Vrg | Voltage regulator diodes |
| RFP | R.F. power transistors and modules | WBT | Wideband transistors and modules |
| RT | Tripler | | |

type	product code	page	type	product code	page	type	product code	page
BA220	SD/Vrf	S1	BAS56	Mm/SD	S7	BB130	T	S3
BA221	SD	S1	BAT17	Mm/SD	S8	BB204B	T	S3
BA223	T	S4	BAT18	Mm/SD	S8	BB212	T	S3
BA281	T	S4	BAT54	Mm/SD	S8	BB215	Mm/SD	S8
BA314	Vrf	S5	BAT74	Mm/SD	S8	BB219	Mm/SD	S8
BA315	Vrf	S5	BAT81	SD	S2	BB405B	T	S3
BA316	SD	S1	BAT82	SD	S2	BB417	T	S3
BA317	SD	S1	BAT83	SD	S2	BB809	T	S3
BA318	SD	S1	BAT85	SD	S2	BB909A	T	S3
BA423	T	S4	BAT86	SD	S2	BB909B	T	S3
BA480	T	S4	BAV10	SD	S1	BBY31	Mm/SD	S8
BA481	T	S4	BAV18	SD	S1	BBY39	Mm/SD	S8
BA482	T	S4	BAV19	SD	S1	BBY40	Mm/SD	S8
BA483	T	S4	BAV20	SD	S1	BC107*	Sm	S39
BA484	T	S4	BAV21	SD	S1	BC108*	Sm	S39
BA682	Mm/SD	S8	BAV23	Mm/SD	S7	BC109*	Sm	S39
BA683	Mm/SD	S8	BAV45	SD	S2	BC140	Sm	S39
BAS11	SD	S1	BAV70	Mm/SD	S7	BC141	Sm	S39
BAS15	SD	S1	BAV99	Mm/SD	S7	BC146*	Sm	S39
BAS16	Mm/SD	S7	BAV100	Mm/SD	S7	BC160	Sm	S39
BAS17	Mm/SD	S9	BAV101	Mm/SD	S7	BC161	Sm	S39
BAS19	Mm/SD	S7	BAV102	Mm/SD	S7	BC177	Sm	S39
BAS20	Mm/SD	S7	BAV103	Mm/SD	S7	BC178*	Sm	S39
BAS21	Mm/SD	S7	BAW56	Mm/SD	S7	BC179*	Sm	S39
BAS28	Mm/SD	S7	BAW62	SD	S1	BC200*	Sm	S39
BAS29	Mm/SD	S7	BAX12	SD	S1	BC264*	FET	S96
BAS31	Mm/SD	S7	BAX14	SD/Vrf	S1	BC327*	Sm	S39
BAS32	Mm/SD	S7	BAX18	SD	S1	BC328*	Sm	S39
BAS35	Mm/SD	S7	BB112	T	S3	BC337*	Sm	S39
BAS45	SD	S2	BB119	T	S3	BC338*	Sm	S39

* series



Electronic components and materials

For key to product code see page S-v

type	product code	page	type	product code	page	type	product code	page
BC368	Sm	S40	BCV72	Mm	S123	BD138	P	S68
BC369	Sm	S40	BCW29	Mm	S122	BD139	P	S68
BC375	Sm	S40	BCW30	Mm	S122	BD140	P	S68
BC376	Sm	S40	BCW31	Mm	S123	BD201	P	S68
BC546*	Sm	S40	BCW32	Mm	S123	BD202	P	S68
BC547*	Sm	S40	BCW33	Mm	S123	BD203	P	S68
BC548*	Sm	S40	BCW60*	Mm	S123	BD204	P	S68
BC549*	Sm	S40	BCW61*	Mm	S122	BD226	P	S68
BC550*	Sm	S40	BCW69	Mm	S122	BD227	P	S68
BC556*	Sm	S40	BCW70	Mm	S122	BD228	P	S68
BC557*	Sm	S40	BCW71	Mm	S123	BD229	P	S68
BC558*	Sm	S40	BCW72	Mm	S123	BD230	P	S68
BC559*	Sm	S40	BCW81	Mm	S123	BD231	P	S68
BC560*	Sm	S40	BCW89	Mm	S122	BD233	P	S68
BC635	Sm	S40	BCX17	Mm	S122	BD234	P	S68
BC636	Sm	S40	BCX18	Mm	S122	BD235	P	S68
BC637	Sm	S40	BCX19	Mm	S123	BD236	P	S68
BC638	Sm	S40	BCX20	Mm	S123	BD237	P	S68
BC639	Sm	S40	BCX51	Mm	S122	BD238	P	S68
BC640	Sm	S40	BCX52	Mm	S122	BD239*	P	S68
BC807	Mm	S122	BCX53	Mm	S122	BD240*	P	S68
BC808	Mm	S122	BCX54	Mm	S123	BD241*	P	S70
BC817	Mm	S123	BCX55	Mm	S123	BD242*	P	S70
BC818	Mm	S123	BCX56	Mm	S123	BD243*	P	S70
BC846	Mm	S123	BCX68	Mm	S123	BD244*	P	S70
BC847	Mm	S123	BCX69	Mm	S122	BD329	P	S70
BC848	Mm	S123	BCX70*	Mm	S123	BD330	P	S70
BC849	Mm	S123	BCX71*	Mm	S122	BD331	P	S70
BC850	Mm	S123	BCY56	Sm	S41	BD332	P	S70
BC856	Mm	S122	BCY57	Sm	S41	BD333	P	S70
BC857	Mm	S122	BCY58*	Sm	S41	BD334	P	S70
BC858	Mm	S122	BCY59*	Sm	S41	BD335	P	S70
BC859	Mm	S122	BCY70	Sm	S41	BD336	P	S70
BC860	Mm	S122	BCY71	Sm	S41	BD337	P	S70
BC868	Mm	S123	BCY72	Sm	S41	BD338	P	S70
BC869	Mm	S122	BCY78*	Sm	S41	BD433	P	S70
BCF29	Mm	S126	BCY79*	Sm	S41	BD434	P	S70
BCF30	Mm	S126	BCY87	Sm	S42	BD435	P	S70
BCF32	Mm	S126	BCY88	Sm	S42	BD436	P	S70
BCF33	Mm	S126	BCY89	Sm	S42	BD437	P	S70
BCF70	Mm	S126	BD131	P	S68	BD438	P	S70
BCF81	Mm	S126	BD132	P	S68	BD645	P	S70
BCV61	Mm	S123	BD135	P	S68	BD646	P	S70
BCV62	Mm	S122	BD136	P	S68	BD647	P	S70
BCV71	Mm	S123	BD137	P	S68	BD648	P	S70

* series

Electronic
components
and materials

For key to product code see page S-v

type	product code	page	type	product code	page	type	product code	page
BD649	P	S70	BD940	P	S74	BDT87*	P	S78
BD650	P	S70	BD941;A	P	S74	BDT88*	P	S78
BD651	P	S70	BD942;A	P	S74	BDT91	P	S78
BD652	P	S70	BD943	P	S74	BDT92	P	S78
BD675	P	S72	BD944	P	S74	BDT93	P	S78
BD676	P	S72	BD945	P	S74	BDT94	P	S78
BD677	P	S72	BD946	P	S74	BDT95	P	S78
BD678	P	S72	BD947	P	S74	BDT96	P	S78
BD679	P	S72	BD948	P	S74	BDV64*	P	S78
BD680	P	S72	BD949	P	S74	BDV65*	P	S78
BD681	P	S72	BD950	P	S74	BDV66*	P	S80
BD682	P	S72	BD951	P	S74	BDV67*	P	S80
BD683	P	S72	BD952	P	S74	BDV91	P	S80
BD684	P	S72	BD953	P	S74	BDV92	P	S80
BD813	P	S72	BD954	P	S74	BDV93	P	S80
BD814	P	S72	BD955	P	S74	BDV94	P	S80
BD815	P	S72	BD956	P	S74	BDV95	P	S80
BD816	P	S72	BDT20	P	S74	BDV96	P	S80
BD817	P	S72	BDT21	P	S74	BDW55	P	S80
BD818	P	S72	BDT29*	P	S74	BDW56	P	S80
BD825	P	S72	BDT30*	P	S74	BDW57	P	S80
BD826	P	S72	BDT31*	P	S76	BDW58	P	S80
BD827	P	S72	BDT32*	P	S76	BDW59	P	S80
BD828	P	S72	BDT41*	P	S76	BDW60	P	S80
BD829	P	S72	BDT42*	P	S76	BDX35	P	S80
BD830	P	S72	BDT51	P	S76	BDX36	P	S80
BD839	P	S72	BDT52	P	S76	BDX37	P	S80
BD840	P	S72	BDT53	P	S76	BDX42	P	S80
BD841	P	S72	BDT54	P	S76	BDX43	P	S80
BD842	P	S72	BDT55	P	S76	BDX44	P	S80
BD843	P	S72	BDT56	P	S76	BDX45	P	S80
BD844	P	S72	BDT57	P	S76	BDX46	P	S80
BD845	P	S72	BDT58	P	S76	BDX47	P	S80
BD846	P	S72	BDT60*	P	S76	BDX62*	P	S80
BD847	P	S72	BDT61*	P	S76	BDX63*	P	S80
BD848	P	S72	BDT62*	P	S76	BDX64*	P	S82
BD849	P	S72	BDT63*	P	S76	BDX65*	P	S82
BD850	P	S72	BDT64*	P	S78	BDX66*	P	S82
BD933	P	S74	BDT65*	P	S78	BDX67*	P	S82
BD934	P	S74	BDT81	P	S78	BDX68*	P	S82
BD935	P	S74	BDT82	P	S78	BDX69*	P	S82
BD936	P	S74	BDT83	P	S78	BDX77	P	S82
BD937	P	S74	BDT84	P	S78	BDX78	P	S82
BD938	P	S74	BDT85*	P	S78	BDX91	P	S82
BD939	P	S74	BDT86*	P	S78	BDX92	P	S82

* series



Alphanumeric type number index

For key to product code see page S-v

type	product code	page	type	product code	page	type	product code	page
BDX93	P	S82	BF579	Mm	S124	BFG90A	WBT	S117
BDX94	P	S82	BF583	Sm	S48	BFG91A	WBT	S117
BDX95	P	S82	BF585	Sm	S48	BFG96	WBT	S117
BDX96	P	S82	BF587	Sm	S48	BFG195	WBT	S117
BDY90	P	S82	BF620	Mm	S126	BFP90A	WBT	S117
BDY90A	P	S82	BF621	Mm	S126	BFP91A	WBT	S117
BDY91	P	S82	BF622	Mm	S126	BFP96	WBT	S117
BDY92	P	S82	BF623	Mm	S126	BFQ10	FET	S101
BF198	Sm	S48	BF660	Mm	S124	BFQ11	FET	S101
BF199	Sm	S48	BF819	P	S84	BFQ12	FET	S101
BF240	Sm	S48	BF820	Mm	S126	BFQ13	FET	S101
BF241	Sm	S48	BF821	Mm	S126	BFQ14	FET	S101
BF245*	FET	S96	BF822	Mm	S126	BFQ15	FET	S101
BF247*	FET	S96	BF823	Mm	S126	BFQ16	FET	S101
BF256*	FET	S96	BF824	Mm	S124	BFQ17	Mm	S124
BF324	Sm	S48	BF840	Mm	S124	BFQ18A	Mm	S124
BF370	Sm	S48	BF841	Mm	S124	BFQ19	Mm	S124
BF410*	FET	S96	BF857	P	S84	BFQ22S	WBT	S117
BF419	P	S82	BF858	P	S84	BFQ23*	WBT	S117
BF420	Sm	S48	BF859	P	S84	BFQ24	WBT	S117
BF421	Sm	S48	BF869	P	S84	BFQ32*	WBT	S117
BF422	Sm	S48	BF870	P	S84	BFQ32M	WBT	S117
BF423	Sm	S48	BF871	P	S84	BFQ34	WBT	S117
BF450	Sm	S48	BF872	P	S84	BFQ34T	WBT	S117
BF451	Sm	S48	BF926	Sm	S48	BFQ42	RFP	S109
BF457	Sm	S48	BF936	Sm	S48	BFQ43	RFP	S109
BF458	Sm	S48	BF939	Sm	S48	BFQ51*	WBT	S117
BF459	Sm	S48	BF960	FET	S97	BFQ52	WBT	S117
BF469	Sm	S48	BF964*	FET	S97	BFQ53	WBT	S117
BF470	Sm	S48	BF966*	FET	S97	BFQ63	WBT	S117
BF471	Sm	S48	BF967	Sm	S48	BFQ65	WBT	S117
BF472	Sm	S48	BF970	Sm	S48	BFQ66	WBT	S117
BF483	Sm	S48	BF979	Sm	S48	BFQ67	Mm	S124
BF485	Sm	S48	BF980	FET	S97	BFQ68	WBT	S117
BF487	Sm	S48	BF981	FET	S97	BFQ136	WBT	S117
BF494	Sm	S48	BF982	FET	S97	BFR29	FET	S99
BF495	Sm	S48	BF989	FET	S97	BFR30	FET	S96
BF496	Sm	S48	BF990	FET	S97	BFR31	FET	S96
BF510	FET	S96	BF991	FET	S97	BFR53	Mm	S124
BF511	FET	S96	BF992	FET	S97	BFR54	Sm	S48
BF512	FET	S96	BF994*	FET	S97	BFR64	WBT	S116
BF513	FET	S96	BF996*	FET	S97	BFR65	WBT	S116
BF536	Mm	S124	BFG34	WBT	S117	BFR84	FET	S97
BF550	Mm	S124	BFG65	WBT	S117	BFR90;A	WBT	S117
BF569	Mm	S124	BFG67	Mm	S124	BFR91	WBT	S117

* series



For key to product code see page S-v

type	product code	page	type	product code	page	type	product code	page
BFR91A	WBT	S117	BGD104;E	WBT	S120	BGY93C	RFP	S115
BFR92	Mm	S124	BGD502¹⁴	WBT	S120	BGY94*	RFP	S115
BFR92A	Mm	S124	BGY22	RFP	S115	BGY95*	RFP	S115
BFR93	Mm	S124	BGY22A	RFP	S115	BGY96*	RFP	S115
BFR93A	Mm	S124	BGY23	RFP	S115	BGY584A¹⁴	WBT	S120
BFR94	WBT	S117	BGY23A	RFP	S115	BGY585A¹⁴	WBT	S120
BFR95	WBT	S117	BGY32	RFP	S115	BLU20/12	RFP	S109
BFR96	WBT	S117	BGY33	RFP	S115	BLU30/12	RFP	S109
BFR96S	WBT	S117	BGY35	RFP	S115	BLU45/12	RFP	S109
BFR101A;B	FET	S96	BGY36	RFP	S115	BLU50	RFP	S109
BFS17*	Mm	S124	BGY40A	RFP	S115	BLU51	RFP	S109
BFS18	Mm	S124	BGY40B	RFP	S115	BLU52	RFP	S109
BFS19	Mm	S124	BGY41A	RFP	S115	BLU53	RFP	S109
BFS20	Mm	S124	BGY41B	RFP	S115	BLU60/12	RFP	S109
BFS21	FET	S101	BGY43	RFP	S115	BLU97	RFP	S109
BFS21A	FET	S101	BGY45A	RFP	S115	BLU98	RFP	S109
BFS22A	RFP	S109	BGY45B	RFP	S115	BLU99	RFP	S109
BFS23A	RFP	S109	BGY46A	RFP	S115	BLV10	RFP	S109
BFT24	WBT	S48	BGY46B	RFP	S115	BLV11	RFP	S109
BFT25	Mm	S124	BGY46D	RFP	S115	BLV20	RFP	S109
BFT44	Sm	S50	BGY47*	RFP	S115	BLV21	RFP	S109
BFT45	Sm	S50	BGY48*	RFP	S115	BLV25	RFP	S109
BFT46	FET	S96	BGY50	WBT	S118	BLV30	RFP	S110
BFT92	Mm	S124	BGY51	WBT	S118	BLV31	RFP	S110
BFT93	Mm	S124	BGY52	WBT	S118	BLV32F	RFP	S110
BFW10	FET	S96	BGY53	WBT	S118	BLV33;F	RFP	S110
BFW11	FET	S96	BGY54	WBT	S118	BLV36	RFP	S110
BFW12	FET	S96	BGY55	WBT	S118	BLV45/12	RFP	S110
BFW13	FET	S96	BGY56	WBT	S118	BLV57	RFP	S110
BFW16A	WBT	S116	BGY57	WBT	S118	BLV59	RFP	S110
BFW17A	WBT	S116	BGY58;A¹⁰	WBT	S118	BLV75/12	RFP	S110
BFW30	WBT	S116	BGY59	WBT	S118	BLV80/28	RFP	S110
BFW61	FET	S96	BGY60⁹	WBT	S118	BLV90	RFP	S110
BFW92*	WBT	S116	BGY61	WBT	S120	BLV91	RFP	S110
BFW93	WBT	S116	BGY65	WBT	S120	BLV92	RFP	S110
BFX34	Sm	S50	BGY67;A	WBT	S120	BLV93	RFP	S110
BFX89	WBT	S116	BGY70	WBT	S118	BLV94	RFP	S110
BFY50	Sm	S50	BGY71	WBT	S118	BLV95	RFP	S110
BFY51	Sm	S50	BGY78	WBT	S118	BLV97	RFP	S110
BFY52	Sm	S50	BGY84;A	WBT	S120	BLV98	RFP	S110
BFY55	Sm	S50	BGY85;A	WBT	S120	BLV99	RFP	S110
BFY90	WBT	S116	BGY88¹⁴	WBT	S120	BLW29	RFP	S111
BG2000	St	S24	BGY90*	RFP	S115	BLW31	RFP	S111
BG2097*	St	S24	BGY93A	RFP	S115	BLW32	RFP	S111
BGD102;E	WBT	S120	BGY93B	RFP	S115	BLW33	RFP	S111

* series

Electronic
components
and materials

For key to product code see page S-v

type	product code	page	type	product code	page	type	product code	page
BLW34	RFP	S111	BLY89A	RFP	S114	BSR18A	Mm	S125
BLW50F	RFP	S111	BLY89C	RFP	S114	BSR19*	Mm	S125
BLW60,C	RFP	S111	BLY90	RFP	S114	BSR20*	Mm	S125
BLW76	RFP	S111	BLY91A	RFP	S114	BSR30	Mm	S125
BLW77	RFP	S111	BLY91C	RFP	S114	BSR31	Mm	S125
BLW78	RFP	S111	BLY92A	RFP	S114	BSR32	Mm	S125
BLW79	RFP	S111	BLY92C	RFP	S114	BSR33	Mm	S125
BLW80	RFP	S111	BLY93A	RFP	S114	BSR40	Mm	S125
BLW81	RFP	S111	BLY93C	RFP	S114	BSR41	Mm	S125
BLW82	RFP	S111	BLY94	RFP	S114	BSR42	Mm	S125
BLW83	RFP	S111	BPF24	PDT	S137	BSR43	Mm	S125
BLW84	RFP	S111	BPW22A*	PDT	S138	BSR50	Sm	S50
BLW85	RFP	S111	BPW50	PDT	S138	BSR51	Sm	S50
BLW86	RFP	S111	BPW71	PDT	S138	BSR52	Sm	S50
BLW87	RFP	S112	BPX25	PDT	S138	BSR56	FET	S98
BLW89	RFP	S112	BPX29	PDT	S138	BSR57	FET	S98
BLW90	RFP	S112	BPX40	PDT	S138	BSR58	FET	S98
BLW91	RFP	S112	BPX41	PDT	S138	BSR60	Sm	S50
BLW95	RFP	S112	BPX42	PDT	S138	BSR61	Sm	S50
BLW96	RFP	S112	BPX61*	PDT	S138	BSR62	Sm	S50
BLW97	RFP	S112	BPX71*	PDT	S138	BSR63	Mm	S124
BLW98	RFP	S112	BPX72,D;E	PDT	S138	BSS38	Sm	S50
BLW99	RFP	S112	BR100	Th	S31	BSS50	Sm	S50
BLX13;C	RFP	S112	BR101	Sm	S47	BSS51	Sm	S50
BLX14	RFP	S112	BRY39	Sm	S31	BSS52	Sm	S50
BLX15	RFP	S112	BRY56	Sm	S47	BSS60	Sm	S50
BLX39	RFP	S112	BS107	FET	S100	BSS61	Sm	S50
BLX65;E	RFP	S112	BS170	FET	S100	BSS62	Sm	S50
BLX67	RFP	S112	BS250	FET	S100	BSS63	Mm	S125
BLX68	RFP	S113	BSD10	FET	S99	BSS64	Mm	S125
BLX69A	RFP	S113	BSD12	FET	S99	BSS68	Sm	S50
BLX91A	RFP	S113	BSD20	FET	S99	BSS83	FET	S99
BLX91CB	RFP	S113	BSD22	FET	S99	BST15	Mm	S126
BLX92A	RFP	S113	BSD212	FET	S99	BST16	Mm	S126
BLX93A	RFP	S113	BSD213	FET	S99	BST39	Mm	S126
BLX94A	RFP	S113	BSD214	FET	S99	BST40	Mm	S126
BLX94C	RFP	S113	BSD215	FET	S99	BST50	Mm	S125
BLX95	RFP	S113	BSR12	Mm	S125	BST51	Mm	S125
BLX96	RFP	S113	BSR13	Mm	S125	BST52	Mm	S125
BLX97	RFP	S113	BSR14	Mm	S125	BST60	Mm	S125
BLX98	RFP	S113	BSR15	Mm	S125	BST61	Mm	S125
BLY87A	RFP	S114	BSR16	Mm	S125	BST62	Mm	S125
BLY87C	RFP	S114	BSR17	Mm	S125	BST70A	FET	S100
BLY88A	RFP	S114	BSR17A	Mm	S125	BST72A	FET	S100
BLY88C	RFP	S114	BSR18	Mm	S125	BST74A	FET	S100

* series



Electronic components and materials

S-x

PHILIPS

For key to product code see page S-v

type	product code	page	type	product code	page	type	product code	page
BS76A	FET	S100	BTV59*	Th	S29	BUV26;A	P	S88
BS778	FET	S100	BTV60*	Th	S29	BUV27;A	P	S88
BS780	FET	S100	BTW23*	Th	S27	BUV28;A	P	S88
BS782	FET	S100	BTW38*	Th	S26	BUV89	P	S88
BS784	FET	S100	BTW40*	Th	S27	BUV90	P	S88
BS786	FET	S100	BTW42*	Th	S26	BUW11;A	P	S88
BS790	FET	S100	BTW43*	Tri	S30	BUW12;A	P	S88
BS797	FET	S100	BTW45*	Th	S27	BUW13;A	P	S90
BS7100	FET	S100	BTW58*	Th	S29	BUW84	P	S90
BS7110	FET	S100	BTW63*	Th	S28	BUW85	P	S90
BS7120	FET	S100	BTY79*	Th	S26	BUX46;A	P	S90
BS7122	FET	S100	BTY91*	Th	S27	BUX47;A	P	S90
BSV15*	Sm	S50	BU304F	P	S84	BUX48;A	P	S90
BSV16*	Sm	S50	BU305F	P	S84	BUX79	P	S90
BSV17*	Sm	S50	BU306F	P	S84	BUX80	P	S90
BSV52	Mm	S125	BU307F	P	S84	BUX81	P	S90
BSV64	Sm	S50	BU308F	P	S84	BUX84	P	S90
BSV78	FET	S98	BU309F	P	S84	BUX85	P	S90
BSV79	FET	S98	BU406	P	S84	BUX86	P	S90
BSV80	FET	S98	BU407	P	S84	BUX87	P	S90
BSV81	FET	S99	BU505;D	P	S84	BUX88	P	S90
BSW66A	Sm	S50	BU506;D	P	S84	BUX98;A	P	S90
BSW67A	Sm	S50	BU508;A;D	P	S84	BUX99	P	S90
BSW68A	Sm	S50	BU705	P	S86	BUY89	P	S90
BSX19	Sm	S50	BU706;D	P	S86	BUZ10	PM	S65
BSX20	Sm	S50	BU806;A-01	P	S86	BUZ10A	PM	S65
BSX45*	Sm	S50	BU807-01	P	S86	BUZ11	PM	S65
BSX46*	Sm	S50	BU808	P	S86	BUZ11A	PM	S65
BSX47*	Sm	S50	BU824	P	S86	BUZ14	PM	S65
BSX59	Sm	S50	BU826;A	P	S86	BUZ15	PM	S65
BSX60	Sm	S50	BUP21*	P	S86	BUZ20	PM	S65
BSX61	Sm	S50	BUP22*	P	S86	BUZ21	PM	S65
BT136*	Tri	S30	BUP23*	P	S86	BUZ23	PM	S65
BT137*	Tri	S30	BUS11;A	SP	S86	BUZ24	PM	S65
BT138*	Tri	S30	BUS12;A	SP	S86	BUZ25	PM	S65
BT139*	Tri	S30	BUS13;A	SP	S86	BUZ30	PM	S65
BT149*	Th	S26	BUS14;A	SP	S86	BUZ31	PM	S65
BT151*	Th	S26	BUS21*	P	S86	BUZ32	PM	S65
BT152*	Th	S27	BUS22*	P	S88	BUZ33	PM	S65
BT153	Th	S28	BUS23*	P	S88	BUZ34	PM	S65
BT155*	Th	S28	BUS24*	P	S88	BUZ35	PM	S65
BT157*	Th	S29	BUT11;A	P	S88	BUZ36	PM	S65
BTR59*	Th	S29	BUT12;A	P	S88	BUZ40	PM	S66
BTS59*	Th	S29	BUT21*	P	S88	BUZ41A	PM	S66
BTV58*	Th	S29	BUT22*	P	S88	BUZ42	PM	S66

* series



For key to product code see page S-v

type	product code	page	type	product code	page	type	product code	page
BUZ43	PM	S66	BY505	St	S24	BYV33*	R	S14
BUZ44A	PM	S66	BY509	St	S24	BYV34*	R	S17
BUZ45	PM	S66	BY527	R	S21	BYV36*	R	S16
BUZ45A	PM	S66	BY584	St	S24	BYV39*	R	S14
BUZ45B	PM	S66	BY609	St	S24	BYV42*	R	S18
BUZ45C	PM	S65	BY610	St	S24	BYV43*	R	S14
BUZ46	PM	S66	BY614	R	S24	BYV44*	R	S18
BUZ50A	PM	S66	BY619	St	S24	BYV72*	R	S18
BUZ50B	PM	S66	BY620	St	S24	BYV73*	R	S14
BUZ53A	PM	S66	BY627	R	S21	BYV79*	R	S17
BUZ54	PM	S66	BY707	St	S24	BYV92*	R	S18
BUZ54A	PM	S66	BY708	St	S24	BYV93*	R	S18
BUZ60	PM	S65	BY709	St	S24	BYV95*	R	S19
BUZ60B	PM	S65	BY710	St	S24	BYV96*	R	S19
BUZ63	PM	S65	BY711	St	S24	BYW25*	R	S20
BUZ63B	PM	S65	BY712	St	S24	BYW29*	R	S17
BUZ64	PM	S65	BY713	St	S24	BYW30*	R	S17
BUZ71	PM	S65	BY714	St	S24	BYW31*	R	S18
BUZ71A	PM	S65	BYD13*	R	S21	BYW54	R	S21
BUZ72	PM	S65	BYD14*	R	S21	BYW55	R	S21
BUZ72A	PM	S65	BYD33*	R	S19	BYW56	R	S21
BUZ73A	PM	S65	BYD73*	R	S16	BYW92*	R	S18
BUZ74	PM	S66	BYD74*	R	S16	BYW93*	R	S18
BUZ74A	PM	S66	BYM56*	R	S21	BYW94*	R	S18
BUZ76	PM	S65	BYQ28*	R	S16	BYW95*	R	S19
BUZ76A	PM	S65	BYR28*	R	S16	BYW96*	R	S19
BUZ80	PM	S66	BYR34*	R	S17	BYX25*	R	S21
BUZ80A	PM	S66	BYR79*	R	S17	BYX28*	R	S16
BUZ83	PM	S66	BYR29*	R	S17	BYX30*	R	S19
BUZ83A	PM	S66	BYT28*	R	S17	BYX32*	R	S22
BUZ84	PM	S66	BYT79*	R	S17	BYX38*	R	S22
BUZ84A	PM	S66	BYV18*	R	S14	BYX39*	R	S21
BWP50	PDT	S139	BYV19*	R	S14	BYX42*	R	S22
BY224*	R	S23	BYV20*	R	S14	BYX46*	R	S19
BY225*	R	S23	BYV21*	R	S15	BYX50*	R	S19
BY228	R	S23	BYV22*	R	S15	BYX52*	R	S22
BY229*	R	S20	BYV23*	R	S15	BYX56*	R	S21
BY249*	R	S22	BYV24*	R	S20	BYX90G	H	S24
BY260*	R	S23	BYV26*	R	S16	BYX96*	R	S22
BY261*	R	S23	BYV27*	R	S16	BYX97*	R	S22
BY329*	R	S20	BYV28*	R	S16	BYX98*	R	S22
BY359*	R	S20	BYV29*	R	S17	BYX99*	R	S22
BY438	R	S23	BYV30*	R	S17	BZD23*	Vrg	S6
BY448	R	S23	BYV31*	R	S18	BZT03*	Vrg	S6
BY458	R	S23	BYV32*	R	S17	BZV10	Vrf	S5

* series



For key to product code see page S-v

type	product code	page	type	product code	page	type	product code	page
BZV11	Vrf	S5	CQS54	LED	S142	CQY50	LED	S139
BZV12	Vrf	S5	CQS82*	LED	S140	CQY52	LED	S139
BZV13	Vrf	S5	CQS84L	LED	S140	CQY54A	LED	S142
BZV14	Vrf	S5	CQS86L	LED	S140	CQY58A*	LED	S139
BZV37	VRF	S6	CQS93*	LED	S142	CQY89A*	LED	S139
BZV46*	Vrf	S5	CQS95*	LED	S142	CQY94B	LED	S140
BZV49*	Mm/Vrg	S9	CQS97	LED	S142	CQY95B	LED	S142
BZV55*	Mm/Vrg	S9	QQT10B	LED	S144	CQY96	LED	S140
BZV85*	Vrg	S6	QQT11	LED	S144	CQY97A	LED	S142
BZW03*	Vrg	S6	QQT24	LED	S140	D44Q5	P	S90
BZW14	VRF	S6	QQT60	LED	S144	H11A1	PhC	S150
BZX55*	Vrg	S6	QQT70	LED	S144	H11A2	PhC	S150
BZX79*	Vrg	S6	QQT80L	LED	S144	H11A3	PhC	S150
BZX84*	Mm/Vrg	S9	CQV70*	LED	S144	H11A4	PhC	S150
BZX90	Vrf	S5	CQV71A	LED	S144	HX10607600-380	LCD	S148
BZX91	Vrf	S5	CQV72	LED	S144	KMZ10A	S	S161
BZX92	Vrf	S5	CQV80*	LED	S144	KMZ10B	S	S161
BZX93	Vrf	S5	CQV81L	LED	S144	KMZ10C	S	S161
BZX94	Vrf	S5	CQV82L	LED	S144	KP100A	S	S161
CFX13	Mw	S157	CQV10*	LED	S144	KP100AE	S	S161
CFX21	Mw	S157	CQW11B	LED	S144	KP100G	S	S161
CFX30	Mw	S157	CQW12B	LED	S144	KP101A	S	S161
CFX31	Mw	S157	CQW20A	LED	S142	KP101AE	S	S161
CFX32	Mw	S157	CQW21	LED	S142	KP101G	S	S161
CFX33	Mw	S157	CQW22	LED	S142	KTY81-110	S	S160
CNX35	PhC	S150	CQW24	LED	S140	KTY81-120	S	S160
CNX36	PhC	S150	CQW54	LED	S142	KTY81-210	S	S160
CNX38	PhC	S150	CQW60	LED	S144	KTY81-220	S	S160
CNX39	PhC	S150	CQW60A	LED	S144	KTY83-110	S	S160
CNX44	PhC	S150	CQW61	LED	S144	KTY83-120	S	S160
CNX48	PhC	S150	CQW62	LED	S144	KTY84-130	S	S160
CNX62	PhC	S150	CQW89A	LED	S139	KTY84-150	S	S160
CNX72	PhC	S150	CQW93	LED	S142	KTY85-110	S	S160
CNX82	PhC	S150	CQW95	LED	S142	KTY85-120	S	S160
CNX91	PhC	S150	CQW97	LED	S142	KTY85-150	S	S160
CNX92	PhC	S150	CQX24	LED	S140	LAE4001R	Mw	S152
CNY50-1	PhC	S150	CQX51	LED	S140	LAE4002S	Mw	S152
CNY50-2	PhC	S150	CQX54	LED	S140	LAE6000Q	Mw	S152
CNY57	PhC	S150	CQX64	LED	S140	LBE2003S	Mw	S152
CNY57A	PhC	S150	CQX74	LED	S140	LBE2009S	Mw	S152
CQF24	Ph	S137	CQY11B	LED	S139	LC241440-101	LCD	S148
CQL10A	Ph	S137	CQY11C	LED	S139	LC283020-300	LCD	S148
CQL13A	Ph	S137	CQY24B	LED	S140	LC283020-301	LCD	S148
CQL16	Ph	S137	CQY49B	LED	S139	LC382040-401	LCD	S148
CQS51	LED	S140	CQY49C	LED	S139	LC382080-411	LCD	S148

series



Electronic components and materials

Alphanumeric type number index

For key to product code see page S-v

type	product code	page	type	product code	page	type	product code	page
LC382232-700	LCD	S148	MB7030320	LCD	S148	PTB42002X	Mw	S154
LC512332-300	LCD	S148	MCT2	PhC	S150	PTB42003X	Mw	S154
LC513000-300	LCD	S148	MCT26	PhC	S150	PVB42004X	Mw	S154
LC513031-300	LCD	S148	MG7020160	LCD	S148	PV3742B4X	Mw	S154
LC513031-302	LCD	S148	MJ8504	P	S90	PZ1418B15U	Mw	S154
LC513031-303	LCD	S148	MJ8505	P	S90	PZ1418B30U	Mw	S154
LC513031-307	LCD	S148	MJE13004	P	S90	PZ1721B12U	Mw	S154
LC513031-309	LCD	S148	MJE13005	P	S90	PZ1721B25U	Mw	S154
LC513040-301	LCD	S148	MJE13006	P	S90	PZ2024B10U	Mw	S154
LC513040-303	LCD	S148	MJD13007	P	S90	PZ2024B20U	Mw	S154
LC513041-300	LCD	S148	MJE13008	P	S90	PZB16035U	Mw	S154
LC513041-301	LCD	S148	MJE13009	P	S90	PZB27020U	Mw	S154
LC513041-320	LCD	S148	OSB9115-4*	St	S24	RPY100	I	S146
LC513050-300	LCD	S148	OSB9215-4*	St	S24	RPY101	I	S146
LC518000-300	LCD	S148	OSB9415-4*	St	S24	RPY102	I	S146
LC522232-300	LCD	S148	OSM9115-4*	St	S24	RPY103	I	S146
LC554731-412	LCD	S148	OSM9215-4*	St	S24	RPY109	I	S146
LC7020160-412	LCD	S148	OSM9415-4*	St	S24	RV3135B5X	Mw	S156
LC7020160-430	LCD	S148	OSM9510-12	St	S24	RX1214B300W	Mw	S156
LC703000-300	LCD	S148	OSS9115-4*	St	S24	RXB12350Y	Mw	S156
LC703060-301	LCD	S148	OSS9215-4*	St	S24	RZ1214B35Y	Mw	S156
LC7030160-340	LCD	S148	OSS9415-4*	St	S24	RZ1214B65Y	Mw	S156
LC7030320-350	LCD	S148	P2105	I	S146	RZ1214B125Y	Mw	S156
LC703831-300	LCD	S148	PH2222;A	Sm	S52	RZ1214B150Y	Mw	S156
LC703840-300	LCD	S148	PH2369	Sm	S52	RZ2833B45W	Mw	S156
LC0761010-300	LCD	S148	PH2907;A	Sm	S52	RZ3135B15W	Mw	S156
LC943080-301	LCD	S148	PH2955T	P	S90	RZ3135B30W	Mw	S156
LC9430160-344	LCD	S148	PH3055T	P	S90	RZB12100Y	Mw	S156
LC11402600-310	LCD	S148	PH5415	Sm	S52	RZB12250Y	Mw	S156
LC11401650-301	LCD	S148	PH5416	Sm	S52	RZZ1214B300Y	Mw	S156
LCE2003S	Mw	S152	PH13002	P	S90	TIP29*	P	S92
LCE2009S	Mw	S152	PH13003	P	S90	TIP30*	P	S92
LTE42005S	Mw	S152	PHSD51	R	S15	TIP31*	P	S92
LTE42008R	Mw	S152	PMBF4391	FET	S98	TIP32*	P	S92
LTE42012R	Mw	S152	PMBF4392	FET	S98	TIP33*	P	S92
LV1721E50R	Mw	S153	PMBF4393	FET	S98	TIP34*	P	S92
LV2024E45R	Mw	S153	PPC5001T	Mw	S155	TIP47	P	S92
LV2327E40R	Mw	S153	PGC5001T	Mw	S155	TIP48	P	S92
LV3742E16R	Mw	S153	PTB23001X	Mw	S154	TIP49	P	S92
LV3742E24R	Mw	S153	PTB23003X	Mw	S154	TIP50	P	S92
LWE2015R	Mw	S152	PTB23005X	Mw	S154	TIP110	P	S92
LWE2025R	Mw	S152	PTB32001X	Mw	S154	TIP111	P	S92
LZ1418E100R	Mw	S153	PTB32003X	Mw	S154	TIP112	P	S92
MB7020160	LCD	S148	PTB32005X	Mw	S154	TIP115	P	S92
MB7030160	LCD	S148	PTB42001X	Mw	S154	TIP116	P	S92

* series



For key to product code see page S-v.

type	product code	page	type	product code	page	type	product code	page
TIP117	P	S92	1N4153	SD	S1	2N3966	FET	S98
TIP120	P	S94	1N4446	SD	S1	2N4030	Sm	S54
TIP121	P	S94	1N4448	SD	S1	2N4031	Sm	S54
TIP122	P	S94	1N4531	SD	S1	2N4032	Sm	S54
TIP125	P	S94	1N4532	SD	S1	2N4033	Sm	S54
TIP126	P	S94	1N5059	R	S21	2N4091	FET	S98
TIP127	P	S94	1N5060	R	S21	2N4092	FET	S98
TIP130	P	S94	1N5061	R	S21	2N4093	FET	S98
TIP131	P	S94	1N5062	R	S21	2N4123	Sm	S54
TIP132	P	S94	1N6097	R	S15	2N4124	Sm	S54
TIP135	P	S94	1N6098	R	S15	2N4125	Sm	S54
TIP136	P	S94	2N918	Sm	S52	2N4126	Sm	S54
TIP137	P	S94	2N929	Sm	S41	2N4391	FET	S98
TIP140	P	S94	2N930	Sm	S41	2N4392	FET	S98
TIP141	P	S94	2N1613	Sm	S52	2N4393	FET	S98
TIP142	P	S94	2N1711	Sm	S52	2N4427	RFP	S114
TIP145	P	S94	2N1893	Sm	S52	2N4856	FET	S98
TIP146	P	S94	2N2218;A	Sm	S52	2N4857	FET	S98
TIP147	P	S94	2N2219;A	Sm	S52	2N4858	FET	S98
TIP2955*	P	S94	2N2221;A	Sm	S52	2N4859	FET	S98
TIP3055*	P	S94	2N2222;A	Sm	S52	2N4860	FET	S98
1N821	Vrf	S5	2N2297	Sm	S52	2N4861	FET	S98
1N823	Vrf	S5	2N2368	Sm	S52	2N5400	Sm	S54
1N825	Vrf	S5	2N2369;A	Sm	S52	2N5401	Sm	S54
1N827	Vrf	S5	2N2483	Sm	S41	2N5415	Sm	S54
1N829	Vrf	S5	2N2484	Sm	S41	2N5416	Sm	S54
1N914	SD	S1	2N2904;A	Sm	S52	2N5550	Sm	S54
1N916	SD	S1	2N2905;A	Sm	S52	2N5551	Sm	S54
1N3879	R	S19	2N2906;A	Sm	S52	2N6659	FET	S100
1N3880	R	S19	2N2907;A	Sm	S52	2N6660	FET	S100
1N3881	R	S19	2N3019	Sm	S52	2N6661	FET	S100
1N3882	R	S19	2N3020	Sm	S52	2N6676	P	S94
1N3889	R	S19	2N3375	RFP	S114	2N6677	P	S94
1N3890	R	S19	2N3553	RFP	S114	2N6678	P	S94
1N3891	R	S19	2N3632	RFP	S114	4N25*	PhC	S150
1N3892	R	S19	2N3822	FET	S96	4N26	PhC	S150
1N3909	R	S19	2N3823	FET	S96	4N27	PhC	S150
1N3910	R	S19	2N3866	RFP	S114	4N28	PhC	S150
1N3911	R	S19	2N3903	Sm	S54	375CQY-B	Ph	S137
1N3912	R	S19	2N3904	Sm	S54	502CQF	Ph	S137
1N3913	R	S19	2N3905	Sm	S54	503CQF	Ph	S137
1N4148	SD	S1	2N3906	Sm	S54	504CQL	Ph	S137
1N4149	SD	S1	2N3924	RFP	S114	516CQF-B	Ph	S137
1N4150	SD	S1	2N3926	RFP	S114			
1N4151	SD	S1	2N3927	RFP	S114			

* series

Electronic
components
and materials

S-xv

PHILIPS

General purpose and high speed switching diodes

For detailed information on these and other types see Data Handbook S1
 For case outlines and dimensions see page S163
 For packing quantities see page S162

- 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 $10 \times 10^{-9}/h$ at $T_j < 100 \text{ }^\circ\text{C}$



type	status	case	V_R V	I_F mA	t_{rr} ns	C_d pF	V_R at	and	f MHz	V_F V	at-	I_F mA
BA316	P	DO-35	10	100	4	2	0		1	1,1		100
BAX14	P	DO-35	20	500	50	35	0		1	1,0		300
BA317	P	DO-35	30	100	4	2	0		1	1,1		100
BA221	C	DO-35	30	200	4	2,5	0		1	1,05		200
BAS15	P	DO-34	50	100	4	2	0		1	1,1		100
BA318	P	DO-35	50	100	4	2	0		1	1,1		100
1N4151	C	DO-35	50	200	2	2	0		1	1,0		50
1N4153	C	DO-35	50	200	2	2	0		1	0,88		20
BAV18	P	DO-35	50	250	50	5	0		1	1,25		200
1N4150	P	DO-35	50	300	4	2,5	0		1	1,0		200
BAV10	P	DO-35	60	300	6	2,5	0		1	1,25		500
1N914	C	DO-35	75	75	4	4	0		1	1,0		10
1N916	C	DO-35	75	75	4	2	0		1	1,0		10
1N4148	P	DO-35	75	200	4	4	0		1	1,0		10
1N4149	C	DO-35	75	200	4	2	0		1	1,0		10
1N4446	C	DO-35	75	200	4	4	0		1	1,0		20
1N4448	P	DO-35	75	200	4	4	0		1	1,0		100
1N4531	P	DO-34	75	200	4	4	0		1	1,0		10
1N4532	P	DO-34	75	200	2	2	0		1	1,0		10
BAW62	P	DO-35	75	200	4	2	0		1	1,0		100
BAX18	P	DO-35	75	500	50	35	0		1	1,0		300
BAX12*	P	DO-35	90	400	50	35	0		1	1,25		400
BAV19	P	DO-35	100	250	50	5	0		1	1,25		200
BAV20	P	DO-35	150	250	50	5	0		1	1,25		200
BAV21	P	DO-35	200	250	50	5	0		1	1,25		200
BAS11*	P	DO-35	300	350	1000	15	0		1	1,1		300

* avalanche type

N.B. All values are maximum ones unless stated otherwise
 For surface-mounting devices see page S128

Schottky-Barrier switching and low-leakage diodes

For detailed information on these and other types see Data Handbook S1

For case outlines and dimensions see page S163

For packing quantities see page S162

- 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

Schottky-barrier switching diodes

type	status	case	V_R V	I_F mA	t_{rr} ns	C_d		f MHz	V_F	
						at V_R	at V_R and		at	at
BAT85	P	DO-34	30	200	5	10	1	1	320	1
BAT81	P	DO-34	40	30	1	1,6	1	1	410	1
BAT82	P	DO-34	50	30	1	1,6	1	1	410	1
BAT86	P	DO-34	50	200	4	8	1	1	380	1
BAT83	P	DO-34	60	30	1	1,6	1	1	410	1

Low-leakage diodes

type	status	case	V_R V	I_R^*		C_d		f MHz
				at V_R	at V_R	at V_R	at V_R and	
BAS45	P	DO-34	125	1000	125	8	0	1
BAV45	C	TO-18	20	5	5	1,3	0	1

* $T_j = 25^\circ\text{C}$ N.B. For surface-mounting devices see page S128
All values are maximum ones
unless stated otherwise.Electronic
components
and materials

For detailed information on these and other types see Data Handbook S1
For case outlines and dimensions see page S163
For packing quantities see page S162

- 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	status	case	V _R V	r _D max. Ω	C _d pF	at	V _R V	C _d ratio* over tuning voltage range	
								V ₁ V	V ₂ V
AFC									
BB417	C	DO-34	20	1,2	8-11		4	2-5	4 15
BB119	P	DO-35	15	1,5	20-25		4	>1,3	4 10
FM radio									
BB204B*	P	TO-92	30	0,4	37-42		3	2,5-2,8	3 30
AM radio									
BB112	C	SOD-69	12	1,5	440-540		1	>18	1 9
BB130	C	SOD-69	30	2	440-550		1	>23	1 28
BB212*	C	TO-92	12	2,5	500-620		0,5	>22,5	0,5 8
VHF television									
BB809	P	DO-34	28	0,8	39-46 min.		1	8-10	1 28
BB909A	P	DO-34	30	0,9	31 min.		1	12-15	1 28
BB909B	P	DO-34	30	0,9	33,5 min.		1	12-15	1 28
UHF television									
BB405B	P	DO-34	28	0,75	18 min.		1	>7,6	1 28

* double diode
N.B. All values are maximum ones unless stated otherwise
For surface-mounting devices see page S128



For detailed information on these and other types see Data Handbook S1

For case outlines and dimensions see page S163

For packing quantities see page S162

Band switching diodes

type	status	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
AM radio														
BA223	P	DO-34	20	50	3,5		6		1	1,5		10		1
BA423	P	DO-34	20	50	2,5		3		1	1,2		10		1
VHF television														
BA482	P	DO-34	35	100	1,2		3		1-100	0,7		3		200
BA483	P	DO-34	35	100	1,0		3		1-100	1,2		3		200
BA484	P	DO-34	35	100	1,6		3		1-100	1,2		3		200

UHF mixer Schottky-Barrier diodes

type	status	case	V_R V	I_F mA	C_d pF	at	V_R V	V_F mV	at	I_F mA
BA480	C	DO-34	4	30	1,2		0,2	280		1
BA481	C	DO-34	4	30	1,1		0,2	450		1

FM detection diode

type	status	case	V_R V	I_F mA	C_d pF	at	V_R V	and	f MHz	V_F mV	at	I_F μ A
BA281	C	DO-35	50	200	1,2		0		1	360-420		10

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

For surface-mounting devices see page S128



Voltage reference diodes; stabistors

For detailed information on these and other types see Data Handbook S1
 For case outlines and dimensions see page S163
 For packing quantities see page S162

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

Voltage reference diodes

type	status	case	V_{ref} nom. V	at I_z mA	I_z, I_{ZM} & I_{ZRM} mA	$ S_z $ %/K	r_{diff} Ω at	I_z mA
1N821	C	DO-34	6,2	7,5	50	0,01	15	7,5
1N823	C				0,005			
1N825	C				0,002			
1N827	C				0,001			
1N829	-				0,0005			
BZX90	P	DO-34	6,5	7,5	50	0,01	15	7,5
BZX91	P				0,005			
BZX92	P				0,002			
BZX93	C				0,001			
BZX94	-				0,0005			
BZV10	C	DO-34	6,5	2,0	50	0,01	50	2
BZV11	C				0,005			
BZV12	C				0,002			
BZV13	C				0,001			
BZV14	-				0,0005			



Stabistors

type	status	case	typical V_F (V) at:			V_R V_{FRM}	I_{FRM} mA	S_F at $I_F = 1$ mA mV/K	r_{diff} at $I_F = 10$ mA Ω
			$I_F = 1$ mA	$I_F = 5$ mA	$I_F = 10$ mA				
BAX14	P	DO-35	0,55	0,62	0,65	40	2000	-2,2	6
BA220	C	DO-35	0,58	0,66	0,70	10	400	-2,2	7
BA315	P	DO-35	0,62	0,70	0,75	5	225	-2,1	7
BA314	P	DO-35	0,72	0,77	0,79	4	250	-1,8	6
BZV46-1V5	P	DO-35	1,35	1,45	1,50	4	120	-3,6*	20*
BZV46-2V0	P	DO-35	2,00	2,15	2,20	4	80	-5,6*	30*

* at $I_F = 5$ mA
 N.B. All values are maximum ones unless stated otherwise.
 For surface-mounting devices see page S128

Voltage regulator/transient suppressor diodes

For detailed information see Data Handbooks S1 and S2
 For case outlines and dimensions see page S163
 For ordering quantities see page S162

Voltage regulator diodes

P_{tot} W	at T_{ip} °C	status	type	working voltage E24 series V	tolerance	P_{RSM} at $T_j = 25\text{ °C}$ $t_p = 100\ \mu\text{s square}$ W	case
0,4	50	P	BZV37	6,5	5%	40	DO-34
0,5	50	C	BZX55 series	2,4 to 75	5%	40	DO-35
0,5	50	P	BZX79 series	2,4 to 75	5%	40	DO-35
0,5	50	C	BZX79 series	2,4 to 75	2%	40	DO-35
1,3	55	P	BZV85 series	3,6 to 75	5%	60	DO-41
2,5	25	-	BZD23 series	3,9 to 270	5%	300	SOD-81
3,25	25	P	BZT03 series	7,5 to 500	5%	600	SOD-57
6	25	P	BZW03 series	7,5 to 500	5%	1000	SOD-64

Transient suppressor diodes

type	status	V_R (stand-off voltage) V	$V_{(CL)R}$ at	I_{RSM} A	P_{RSM} W	case
BZW14	C	12	28	50*	-	SOD-64
BZT03 series	P	6,2 to 220	11,3 to 380	26,5 to 0,8**	300**	SOD-57
BZW03 series	P	6,2 to 220	11,3 to 380	44,2 to 1,3**	500**	SOD-64

* 6/320 μs exponential; $T_{amb} = 25-85\text{ °C}$
 ** pulse according to IEC60-2, section 6:
 10/1000 μs $T_j = 25\text{ °C}$ prior to the pulse

For surface-mounting devices see page S128

General-purpose and switching diodes.

For detailed information on these and other types see Data Handbook S1 and S7
 For case outlines and dimensions see page S163
 For packing quantities see page S162

- 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 BAS35
- 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)

General-purpose diodes

type	status	case	V_R V	I_F mA	t_{rr} ns	C_d pF	leaded equivalent	configuration
BAV19	P	SOT-23	100	200	50	5	BAV19	two separate diodes
BAS20	P	SOT-23	150	200	50	5	BAV20	
BAS21	P	SOT-23	200	200	50	5	BAV21	
BAV23	C	SOT-143	200	200	50	5	2 x BAV21	
BAV100	P	SOD-80	50	250	50	5	BAV18	two separate diodes
BAV101	P	SOD-80	100	250	50	5	BAV19	
BAV102	P	SOD-80	150	250	50	5	BAV20	
BAV103	P	SOD-80	200	250	50	5	BAV21	

Switching diodes

type	status	case	V_R V	I_F mA	t_{rr} ns	C_d pF	leaded equivalent	configuration
BAS32	P	SOD-80	75	200	4	2	IN4148	series-connected double diode
BAS16	P	SOT-23	75	250	6	2	BAW62	
BAS29*	C	SOT-23	90	250	50	35	BAX12	
BAS31*	C	SOT-23	90	200	50	35	2 x BAX12	common-anode double diode
BAS35*	C	SOT-23	90	200	50	35	2 x BAX12	common-anode double diode
BAS28	P	SOT-143	70	250	4	1,5	2 x BAX12	two separate diodes
BAS56	C	SOT-143	60	200	6	2,5	BAV10	two separate diodes
BAV70	P	SOT-23	70	250	6	1,5	2 x BAW62	common-cathode double diode
BAV99	P	SOT-23	70	250	6	1,5	2 x BAW62	series-connected double diode
BAW56	P	SOT-23	70	250	6	2	2 x BAW62	common-anode double diode

* avalanche diode

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



Electronic
components
and materials

Tuner and Schottky-Barrier diodes

For detailed information on these and other types see Data Handbook S1 and S7

For case outlines and dimensions see page S163

For packing quantities see page S162

Variable capacitance tuning diodes

type	status	case	V_R V	I_F mA	C_d pF at	V_R V and	f MHz	C_d ratio at V	r_D Ω	leaded equivalent	
BBY31	P	SOT-23	28	20	1,8-2,8	25	1	typ. 5	3/25	1,2	BB405
BBY39	P	SOT-23	30	20	1,8-2,0	28	1	> 7,6	1/28	0,75	-
BBY40	P	SOT-23	28	20	4,3-6	25	1	> 5	3/25	0,6	BB809
BB215	C	SOD-80	28	20	> 18	1	1	> 7,6	1/28	-	BB405B
BB219	C	SOD-80	28	20	> 31	1	1	> 12	1/28	-	BB909

Band switching diodes

type	status	case	V_R V	I_F mA	r_D Ω at	I_F mA and	f MHz	C_d pF at	V_R V and	f MHz	leaded near equivalent
BA682	P	SOD-80	35	100	0,7	3	200	1,25	3	1	BA482
BA683	P	SOD-80	35	100	1,2	3	200	1,2	3	1	BA483
BAT18	P	SOT-23	35	100	0,7	5	200	1	20	1	BA482

Schottky-Barrier diodes

type	status	case	V_R V	I_F mA	V_F mV at	I_F mA	C_d pF at	V_R V and	f MHz	leaded equivalent
BAT17	P	SOT-23	4	30	450	1	1	0	1	BA481
BAT54	C	SOT-23	30	200	400	10	10	0	1	BAT85
BAT74	C	SOT-143	30	200	400	10	10	0	1	BAT85

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



Voltage regulator diodes/low voltage stabistors

For detailed information on these and other types see Data Handbook S1

For case outlines and dimensions see page S163

For packing quantities see page S162

**Voltage regulator diodes**

series	status	case	V _Z E24 series V	V _Z tol.	P _{tot} mW	leaded equivalent
BZV49	P	SOT-98	2,4 to 75	5%	1000	BZV85
BZV55	P	SOD-80	2,4 to 75	5%	500	BZX79
BZX84	P	SOT-23	2,4 to 75	5%	300	BZX79
BZX84	C	SOT-23	2,4 to 75	2%	300	BZX79

Low voltage stabistor

type	status	case	V _F mV at	I _F mA	I _{FRM} mA	C _d pF at	V _R V and	f MHz	leaded equivalent
BAS17	P	SOT-23	610-690	0,1	250	140	0	1	BA314
			680-760	1,0				1	
			750-830	10				1	
			870-960	100				1	
								0	

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



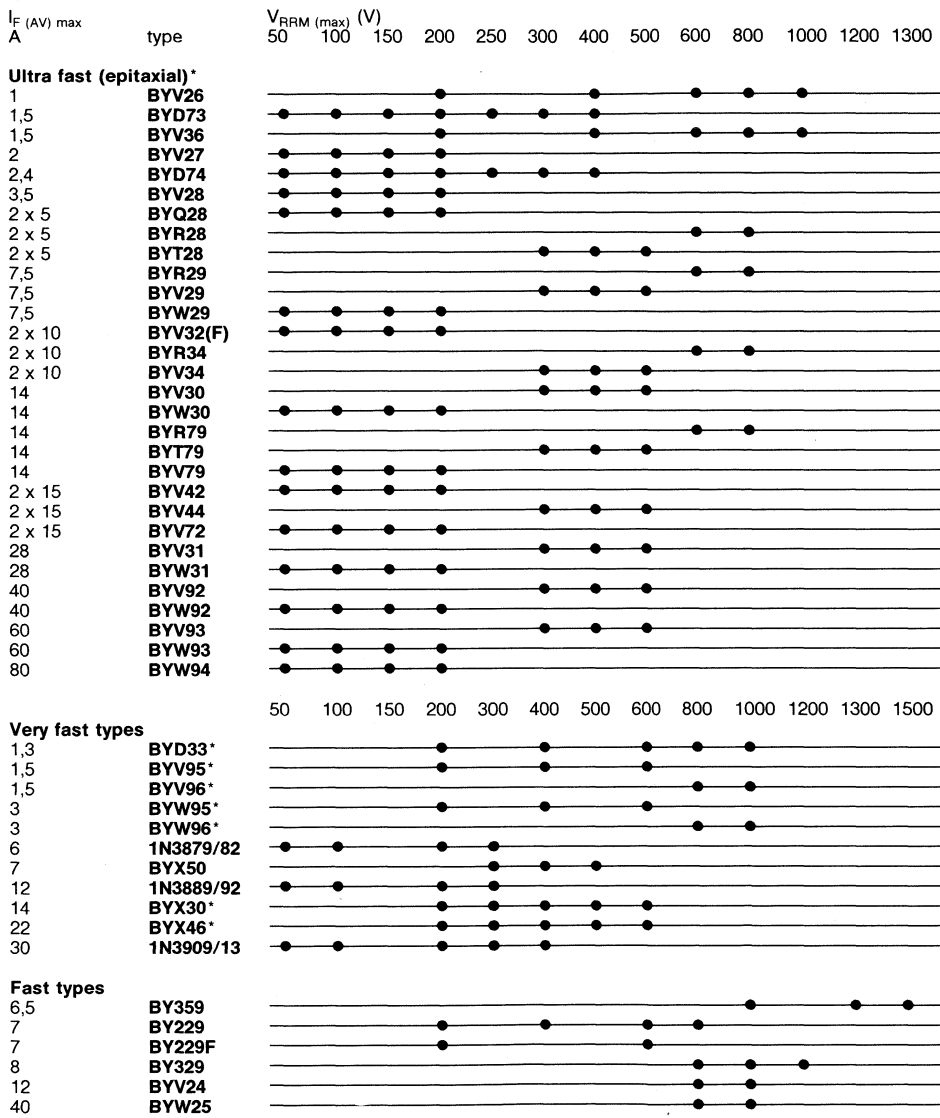
For detailed information on these and other types see Data Handbook S1 and S2

Schottky-Barrier

$I_F (AV)_{max}$ A	type	$V_{RRM (max)} (V)$				
		30	35	40	40(A) _{AVALANCHE}	45
2 x 5	BYV18	●	●	●	●	●
10	BYV19	●	●	●	●	●
2 x 10	BYV33	●	●	●	●	●
15	BYV20	●	●	●	●	●
2 x 15	BYV43	●	●	●	●	●
2 x 15	BYV73	●	●	●	●	●
16	BYV39	●	●	●	●	●
28	BYV21	●	●	●	●	●
50	1N6097/98	●	●	●	●	●
60	BYV22	●	●	●	●	●
60	PHSD51	●	●	●	●	●
80	BYV23	●	●	●	●	●



For detailed information on these and other types see Data Handbooks S1 and S2



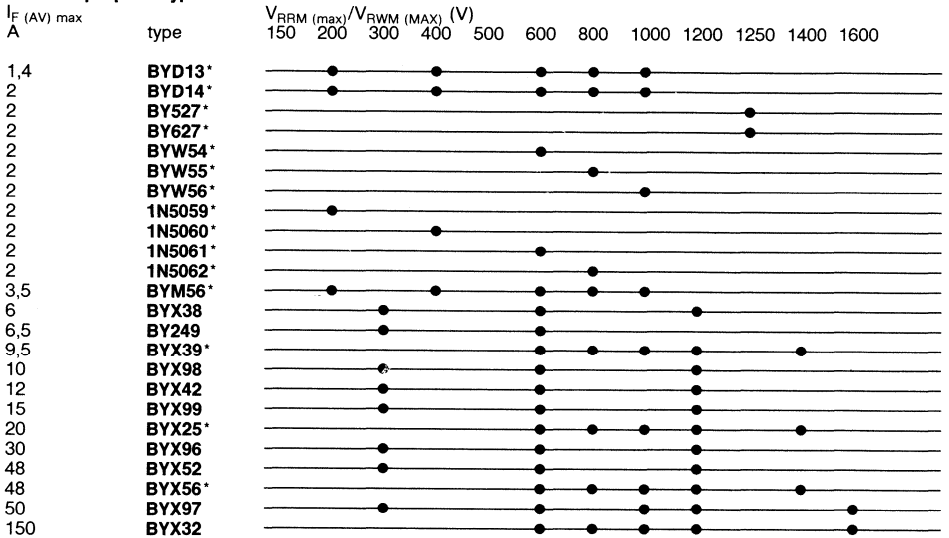
* with avalanche characteristics



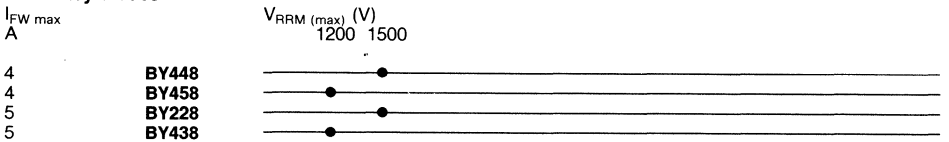
General purpose, avalanche, efficiency and bridge types

For detailed information on these and other types see Data Handbooks S1 and S2

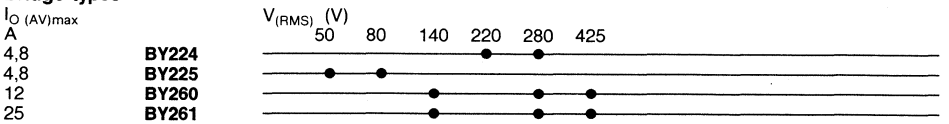
General purpose types



Efficiency diodes



Bridge types



* with avalanche characteristics

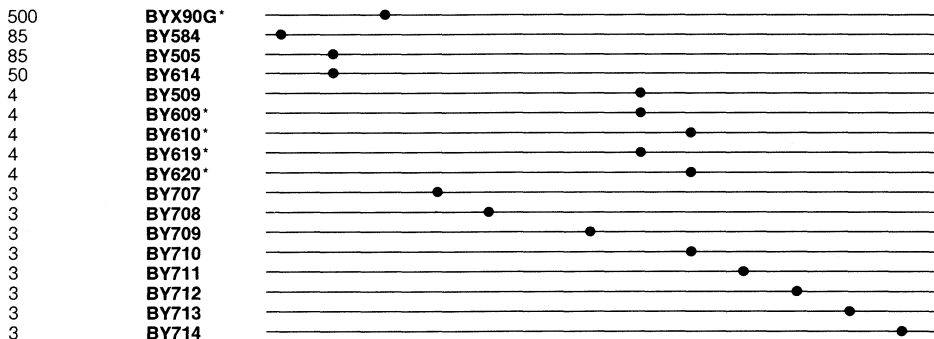
For detailed information on these and other types see Data Handbooks S1 and S2



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

$I_{F(AV) \text{ max}}$
mA

V_{RRM} (kV)
1,8 2,2 7,5 10 12 12,5 14 15 17 19 22 24 30



* avalanche type

E.H.T. power rectifier stacks
(See page S24)

Voltage tripler units
(See page S24)

E.H.T. output: 1,7 mA; 27,5 kV
BG2000-641
BG2097-641/642

For detailed information on these and other types see Data Handbooks S1 and S2
For case outlines and dimensions see page S163
For packing quantities see page S162

- Schottky barrier rectifiers with very low forward voltage and zero switching times are available up to 45 V

type	status	case	ratings				characteristics	
			I_F (AV) max A	V_{RRM} max V	I_{FSM} and T_j max. $t = 10$ ms A	I^2t A ² s	C_d typ pF	V_F max at I_F $T_j = 100^\circ\text{C}$ V/A
BYV18 - 30 - 35 - 40* - 45	P	TO-220AB	2 x 5	30 35 40 45	-	-	-	-
BYV19 - 30 - 35 - 40* - 45	P	TO-220AC	10	30 35 40 45	150	112	200	0,6/7
BYV33 (double) - 30 - 35 - 40* - 45	P	TO-220AB	2 x 10	30 35 40 45	2 x 200	200	300	0,6/7
BYV43 (double) - 30 - 35 - 40* - 45	P	TO-220AB	2 x 15	30 35 40 45	2 x 200	200	500	0,6/15
BYV73 (double) - 30 - 35 - 40* - 45	P	SOT-93	2 x 15	30 35 40 45	2 x 150	112	500	0,6/15
BYV20 - 30 - 35 - 40* - 45	P	DO-4(1) unified stud	15	30 35 40 45	300	450	520	0,6/15
BYV39 - 30 - 35 - 40* - 45	P	TO-220AC	16	30 35 40 45	150	112	520	0,6/15

* 110 V avalanche types available, e.g. **BYV20-40(A)**
data section continues next page



For detailed information on these and other types see Data Handbooks S1 and S2
 For case outlines and dimensions see page S163
 For packing quantities see page S162



type	status	case	ratings				characteristics	
			I_F (AV) max A	V_{RRM} max V	I_{FSM} and I^2t T_J max; $t = 10$ ms A	C_d typ pF	V_F max at I_F $T_J = 100$ °C V/A	
BYV21 - 30 - 35 - 40* - 45	P	DO-4(2) unified stud	28	30 35 40 45	600	1800	1150	0,55/30
1N6097	P	DO-5	50	30	800	-	2000	0,86/160
1N6098	P	DO-5	50	40	800	-	2000	0,86/160
PHSD51	P	DO-5 unified stud	50	45	700	- -	2100	0,6/60
BYV22 - 30 - 35 - 40* - 45	P	DO-5 unified stud	60	30 35 40 45	1000	5000	2100	0,55/50
BYV23 - 30 - 35 - 40* - 45	P	DO-5 unified stud	80	30 35 40 45	1500	11250	2500	0,55/70

* 110 V avalanche types available, e.g. **BYV20-40(A)**



Ultra fast (epitaxial) types *

For detailed information on these and other types see Data Handbooks S1 and S2

For case outlines and dimensions see page S163

For packing quantities see page S162

type*	status	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 ² s	t_{rr} max ns	V_F max at I_F $T_j = 25^\circ\text{C}$ V/A	I_{RRM} A		
BYV26 -A -B -C -D -E	P	SOD-57	1	200	-	10	20	2	30	2,5/1		
				400					30			
				600					30			
				800					75			
				1000					75			
BYD73 -A -B -C -D -E -F -G	P	SOD-81	1,75	50	-	15	25	3,1	25	0,95/1		
				100								
				150								
				200								
				250								
BYV36 -A -B -C -D -E	P	SOD-57	1,6	200	-	10	30	4,5	100	1,35/1		
				400					100			
				600					100			
				800					150			
				1000					150			
BYV27 - 50 - 100 - 150 - 200	P	SOD-57	2	50	-	15	50	12,5	25	1,07/3		
				100								
				150								
				200								
BYD74 -A -B -C -D -E -F -G	P	SOD-84	2,4	50	-	21	50	12,5	25	0,94/2		
				100					25			
				150					25			
				200					25			
				250					50			
				300					50			
				400					50			
BYV28 - 50 - 100 - 150 - 200	P	SOD-64	3,5	50	-	25	90	40	30	1,1/5		
				100								
				150								
				200								
BYQ28 double - 50 - 100 - 150 - 200	P	TO-220AB(3)	2 x 5	50	50	80	50	12,5	20	0,85/5	1,2	
				100	100							
				150	150							
				200	200							
BYR28 - 600 - 800	P	TO-220AB	2 x 5	600	600	80	50	12,5	75	-	-	
			2 x 5	800	800							

with avalanche characteristics
data section continues next page

Ultra fast (epitaxial) types (cont.)*

For detailed information on these and other types see Data Handbook S1 and S2

For case outlines and dimensions see page S163

For packing quantities see page S162

type*	status	case	ratings						characteristics			
			I_F A	V_{RRM} V	V_{RWM} V	I_{FRM} A	I_{FSM} and T_j max t = 10 ms A	I^2t A ² s	t_{rr} max ns	V_F max at I_F $T_j = 25^\circ\text{C}$ V/A	I_{RRM} A	
BYT28 - 300 - 400 - 500	P	TO-220AB	2 x 5	300 400 500	-	-	50	-	50	1,05/5		
BYR29 - 600 - 800	P P	TO-220AC TO-220AC	7,5 7,5	600 800	500 600	130 130	60 60	18 18	75 75	1,3/10 1,3/10	6,0 6,0	
BYV29 - 300 - 400 - 500	P	TO-220AC	7,5	300 400 500	200 300 400	100	80	50	50	1,05/5		
BYW29 - 50 - 100 - 150 - 200	P	TO-220AC	7,5	50 100 150 200	50 100 150 200	240	80	32	25	0,8/8	4,0	
BYV32 - 50 double *** - 100 - 150 - 200	P	TO-220AB(3)	2 x 10	50 100 150 200	50 100 150 200	300	150	112	35	0,85/5		
BYR34 - 600 - 800	P	TO-220AB TO-220AB	2 x 10 2 x 10	600 800	- -	-	150 -	- -	75	1,25/12	4,0	
BYV34 - 300 double - 400 - 500	P	TO-220AB(3)	2 x 10	300 400 500	200 300 400	240	120	12	50	0,93/10	5,0	
BYV30 - 300 - 400 - 500	P	DO-4(1) unified stud	14	300 400 500	-	-	150	-	100	1,35/10		
BYW30 - 50 - 100 - 150 - 200	P	DO-4(1) metric stud**	14	50 100 150 200	50 100 150 200	420	200	200	30	0,8/15	4,0	
BYR79 - 600 - 800	P	TO-220AC TO-220AC	14 14	600 800	- -	-	200 -	-	75	1,25/14		
BYT79 - 300 - 400 - 500	P	TO-220AC	14	300 400 500	200 300 400	320	150	112	50	1,05/15	5,2	
BYV79 - 50 - 100 - 150 - 200	P	TO-220AC	14	50 100 150 200	50 100 150 200	200	200	200	35	0,85/10		

* with avalanche characteristics
 ** unified stud available, add suffix **U**
 (e.g. **BYW30-50U**)
 data section continues next page

*** **BYV32F** = F-pack in SOT-186



Electronic
 components
 and materials

PHILIPS

Ultra fast (epitaxial) types (cont.)*

For detailed information on these and other types see Data Handbook S1 and S2
 For case outlines and dimensions see page S163
 For packing quantities see page S162

type*	status	case	ratings						characteristics			
			I_F (AV) A	V_{RRM} V	V_{RWM} V	I_{FRM} A	I_{FSM} and $T_{j\ max}$, t = 10 ms A	I^2t A ² s	t_{rr} max ns	V_F max at I_F $T_j = 25^\circ\text{C}$ V/A	I_{RRM} A	
BYV42 - 50 double - 100 - 150 - 200	P	TO-220AB(3)	2 x 15	50 100 150 200	50 100 150 200	400	200	-	35	0,85/10		
BYV44 - 300 - 400 - 500	P	TO-220AB	2 x 15	300 400 500	-	-	150	-	50	1,05/15		
BYV72 - 50 double - 100 - 150 - 200	P	SOT-93	2 x 15	50 100 150 200	50 100 150 200	300	150	112	35	0,85/10		
BYV31 - 50 - 100 - 150 - 200	P	DO-4(2) metric stud**	28	50 100 150 200	-	-	300	-	50	1,05/30		
BYW31 - 50 - 100 - 150 - 200	P	DO-4(2) metric stud**	28	50 100 150 200	50 100 150 200	550	320	500	40	0,8/30	4,0	
BYV92 - 300 - 400 - 500	P	DO-5 unified stud	40	300 400 500	-	-	500	-	100	1,4/100		
BYW92 - 50 - 100 - 150 - 200	P	DO-5 metric stud**	40	50 100 150 200	50 100 150 200	800	500	1250	40	0,8/35	4,5	
BYV93 - 300 - 400 - 500	P	DO-5	60	300 400 500	-	-	800	-	100	1,05/60		
BYW93 - 50 - 100 - 150 - 200	P	DO-5 metric stud**	60	50 100 150 200	50 100 150 200	1500	800	3200	45	0,8/50	6,0	
BYW94 - 50 - 100 - 150 - 200	P	DO-5 metric stud**	80	50 100 150 200	50 100 150 200	1800	1500	1250	50	0,8/70	4,0	

* with avalanche characteristics

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



Electronic
components
and materials

For detailed information on these and other types see Data Handbooks S1 and S2
 For case outlines and dimensions see page S163
 For packing quantities see page S162

type	status	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 ² s	t_{rr} max ns	V_F max at I_F $T_j = 25$ °C V/A		
BYD33*	-D -G -J -K -M	P	SOD-81	1,3	200 400 600 800 1000		7	20	2	250	1,3/1
BYV95*	-A -B -C	P	SOD-57	1,5	200 400 600		10	35	6,1	250	1,6/3
BYV96*	-D -E	P	SOD-57	1,5	800 1000		10	35	6,1	300	1,6/3
BYW95*	-A -B -C	P	SOD-64	3	200 400 600		15	70	24,5	250	1,5/5
BYW96*	-D -E	P	SOD-64	3	800 1000		15	70	24,5	300	1,5/5
1N3879 1N3880 1N3881 1N3882		C	DO-4(1) unified stud	6	50 100 200 300	50 100 200 300	75	75	28	200	1,4/6
BYX50	- 300 - 400 - 500	C	DO-4(1)	7	300 400 500	300 400 500	80	80	32	100	1,95/20
1N3889 1N3890 1N3891 1N3892		C	DO-4(1)	12	50 100 200 300	50 100 200 300	140	140	100	200	1,4/12
BYX30*	- 200(R) - 300(R) - 400(R) - 500(R) - 600(R)	C	DO-4(2)	14	- - - - -	200 300 300 500 600	310	250	312	200	2,1/14
BYX46	- 200(R) - 300(R) - 400(R) - 500(R) - 600(R)	C	DO-4(2)	22	- - - - -	200 300 400 500 600	400	300	450	200	2,0/50
1N3909 1N3910 1N3911 1N3912 1N3913		C	DO-5(1)	30	50 100 200 300 400	50 100 200 300 400	125	275	450	200	1,4/30

* with avalanche characteristics

(R) Reverse polarity types available, add suffix **R** to type number (e.g. **BYX30-200R**)



For detailed information on these and other types see Handbooks S1 and S2
 For case outlines and dimensions see page S163
 For packing quantities see page S162

type	status	case	ratings						characteristics	
			I_F (AV) A*	V_{RRM} V	V_{RWM} V	I_{FRM} A	I_{FSM} and I^2t T_{Jmax} : t = 10 ms A ² s	t_{rr} max ns	V_F max at I_F $T_J = 25$ °C V/A	
BY359 - 1000 - 1300 - 1500	P	TO-220AC	6,5	1000 1300 1500	800 1200 1300	60	60	-	600	2,30/20
BY229 - 200(R)* - 400(R) - 600(R)* - 800(R)	P	TO-220AC	7	200 400 600 800	150 300 500 600	75	60	-	450	1,85/20
BY329 - 800(R) - 1000(R)	P	TO-220AC	8	800 1000 1200	600 800 1000	80	80	-	150	1,85/20
BYV24 - 800(R) - 1000(R)	C	DO-4(1) metric stud	12	800 1000	650 800	130	150	112	450	1,7/20
BYW25 - 800(R) - 1000(R)	C	DO-5 metric stud	40	800 1000	650 800	600	550	1500	450	2,25/150

* F-pack in SOT-186, add suffix **F** to type number (e.g. **BY229F-200-**)

(**R**) Reverse polarity types available, add suffix **R** to type number (e.g. **BY229-200R**)



Avalanche types (general purpose)

For detailed information on these and other types see Data Handbooks S1 and S2

For case outlines and dimensions see page S163

For packing quantities see page S162

type	status	case	ratings								
			I_F (AV) A	V_{RRM} V	V_{RWM} V	I_{FRM} A	I_{FSM} and T_j max: t = 10 ms A	I^2t A ² s	P_{RRM} t = 10 μ s kW	P_{RSM} kW	E_{RSM} mJ
BYD13 -D -G -J -K -M	P	SOD-81	1,4		200 400 600 800 1000	5,5	20	2	-	-	7
BYD14 -D -G -J -K -M	P	SOD-84	2	-	200 400 600 800 1000	20	50	12,5	-	-	40
BYW54 BYW55 BYW56	P	SOD-57	2		600 800 1000	12	50	12,5	-	1	20
BY527	C	SOD-57	2	1250	800	12	50	12,5	-	-	20
BY627	P	SOD-84	2	1250	800	20	50	12,5	-	-	40
1N5059 1N5060 1N5061 1N5062	P	SOD-57	2		200, 400 600 800	12	50	12,5	-	1	20
BYM56 -A -B -C -D -E	P	SOD-64	3,5		200 400 600 800 1000	20	80	32	-	1	20
BYX39 - 600(R) - 800(R) - 1000(R) - 1200(R) - 1400(R)		DO-4(1) unified stud	9,5		600 800 1000 1200 1400	100	125	78	2	4	
BYX25 - 600(R) - 800(R) - 1000(R) - 1200(R) - 1400(R)		DO-4(2) unified stud	20		600 800 1000 1200 1400	440	360	650	3	18	
BYX56 - 600(R) - 800(R) - 1000(R) - 1200(R) - 1400(R)		DO-5	48		600 800 1000 1200 1400	450	800	3200	6,5	40	

(R) Reverse polarity types available, add suffix R to type number (e.g. **BXY39-600R**)

For detailed information on these and other types see Data Handbooks S1 and S2
 For case outlines and dimensions see page S163
 For packing quantities see page S162

type	status	case	ratings					characteristics
			I_F (AV) A	V_{RRM} V	I_{FRM} A	I_{FSM} and I_{Tj}^{2t} $T_{j \max}$, $t = 10$ ms A ² s	V_F max at I_F $T_j = 25$ °C V/A	
BYX38 - 300(R) - 600(R) - 1200(R)	C	DO-4(3) unified stud	6	300 600 1200	50	50	13	1,7/20
BY249 - 300(R) - 600(R)	C	TO-220AC	6,5	300 600	20	60	8	1,6/20
BYX98 - 300(R) - 600(R) - 1200(R)	C	DO-4(1) unified stud	10	300 600 1200	75	75	28	1,7/20
BYX42 - 300(R) - 600(R) - 1200(R)	C	DO-4(1) unified stud	12	300 600 1200	60	125	75	1,7/20
BYX99 - 300(R) - 600(R) - 1200(R)	C	DO-4(1) unified stud	15	300 600 1200	180	180	162	1,55/50
BYX96 - 300(R) - 600(R) - 1200(R)	C	DO-4(3) metric stud*	30	300 600 1200	400	400	800	1,7/100
BYX52 - 300(R) - 600(R) - 1200(R)	C	DO-5 metric stud	48	300 600 1200	450	800	3200	1,8/150
BYX97 - 300(R) - 600(R) - 1000(R) - 1200(R) - 1600(R)	C	DO-5 metric stud	50	300 600 1000 1200 1600	550	800	3200	1,45/150
BYX32 - 600(R) - 800(R) - 1000(R) - 1200(R) - 1600(R)	C	DO-30 metric stud	150	600 800 1000 1200 1600	750	1600	12800	1,6/500

* For unified stud, add final letter **U** (e.g. **BYX96-300RU**)
 (R) Reverse polarity types available, add suffix **R** to type number (e.g. **BYX38-300R**)



Efficiency diodes and bridge types

For detailed information on these and other types see Data Handbooks S1 and S2

For case outlines and dimensions see page S163

For packing quantities see page S162

Efficiency diodes

type	status	case	ratings			characteristics
			I_{FWM} A	V_{RRM} V	I_{FRM} A	
BY448	P	SOD-57	4	1500	8	20
BY458	P	SOD-57	4	1200	8	20
BY228	P	SOD-64	5	1500	10	20
BY438	P	SOD-64	5	1200	10	20

Bridge types

A range of full-wave rectifier bridge modules in plastic encapsulations.

Types for both PCB and bolt-down mounting are included.

type	status	case	input				output		
			V_{IRMS} max V	V_{IRM} max V	V_{IWM} V	I_{ISM} max A	$I_{O(AV)}$ R loaded A	I_{ORM} A	
BY224	- 400 - 600	C	SOT-112*	220 280	400 600	350 400	100	4,8	50
BY225	- 100 - 200	C	SOT-112*	50 80	100 200	70 112	100	4,8	50
BY260	- 200 - 400 - 600	- - -	- - -	140 280 420	200 400 600	200 400 600	125	12	20
BY261	- 200 - 400 - 600	- - -	- - -	140 280 420	200 400 600	200 400 600	320	25	75

* plastic module with heatsink face



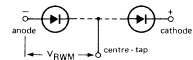
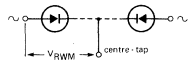
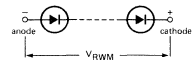
For detailed information on these and other types see Data Handbooks S1 and S2
For case outlines and dimensions see page S163
For packing quantities see page S162

E.H.T. rectifiers

type	status	case	V_{RW} (kV)	V_{RRM} (kV)	$I_{F(AV)}$ (mA)
BYX90G*	P	SOD-83	6	7,5	550
BY584	P	SOD-61	1,5	1,8	85
BY505	P	SOD-61	2	2,2	85
BY614	-	SOD-61	2	2,2	50
BY509	C	SOD-61	11,5	15	4
BY609*	P	SOD-61	12	15	4
BY610*	P	SOD-61	12	17	4
BY619*	P	SOD-61	12	15	4
BY620*	P	SOD-61	12	17	4
BY707	P	SOD-61	9	10	4
BY708	P	SOD-61	10	12	4
BY709	P	SOD-61	12	14	4
BY710	P	SOD-61	14	17	3
BY711	P	SOD-61	16	19	3
BY712	P	SOD-61	18	22	3
BY713	P	SOD-61	20	24	3
BY714	P	SOD-61	24	30	3

E.H.T. power rectifier stacks

type	I_F (AV)	V_{RWM}	for use in
OSS9115-4 to 30 OSS9215-4 to 30 OSS9415-4 to 30	3,5 A (6 A in oil) 5 A (20 A in oil) 10 A (30 A in oil)	4,5 kV to 54 kV	single-phase rectifiers
OSB9115-4 to 30 OSB9215-4 to 30 OSB9415-4 to 30	7 A (12 A in oil) 10 A (40 A in oil) 20 A (60 A in oil)	3 kV to 27 kV	two-phase half-wave circuits
OSM9115-4 to 30 OSM9215-4 to 30 OSM9415-4 to 30	3,5 A (6 A in oil) 5 A (20 A in oil) 10 A (30 A in oil)	3 kV to 27 kV	bridges and voltage doublers, single or three-phase
OSM9510-12	1,5 A	6 kV	



Voltage tripler units

type	status	case sizes in mm	T_{amb} max °C	ratings				
				input V_I (p-p) kV	output V_O (EHT) kV	I_O (EHT) mA	I_O (FOC) μ A	
BG2000	- 641	C	24 x 52 x 51	65	10	27,5	1,7	400
BG2097	- 641 - 642	C	24 x 80 x 57	65	10	27,5	1,7	-

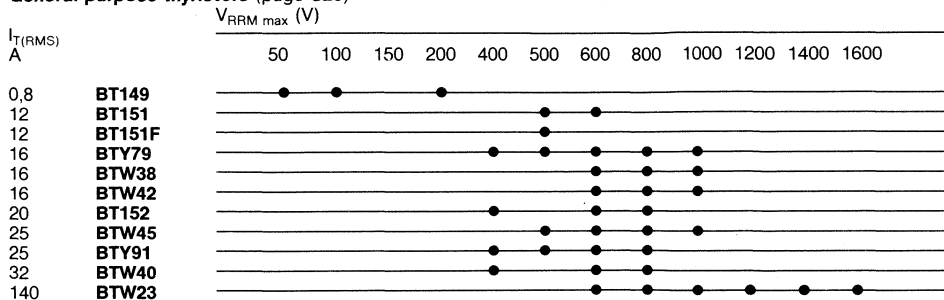
* avalanche types



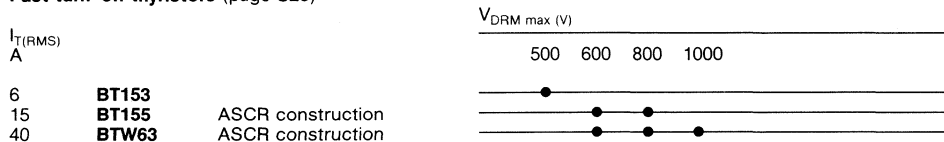
Triacs, thyristors and bi-directional devices

For detailed information see Data Handbook S2

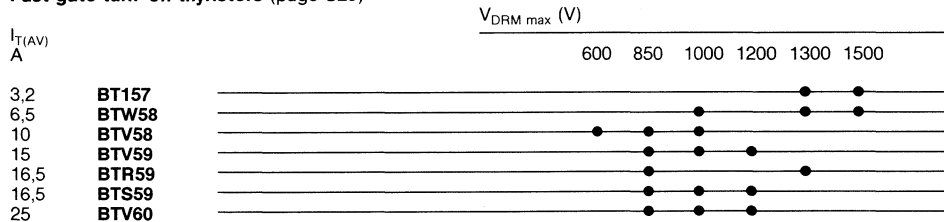
General purpose thyristors (page S26)



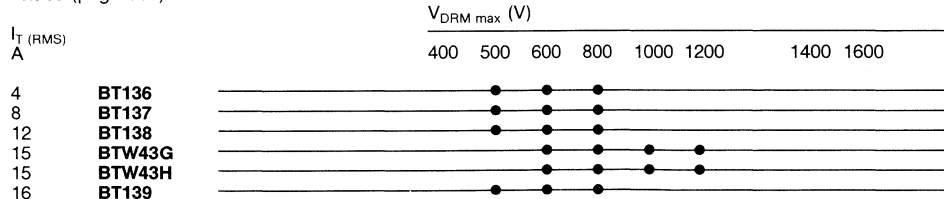
Fast turn-off thyristors (page S28)



Fast gate turn-off thyristors (page S29)



Triacs (page S30)



Bi-directional devices (page S31)

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.



For detailed information on these and other types see Data Handbook S2
For case outlines and dimensions see page S163
For packing quantities see page S162

Voltage range 50 to 1600 V
Current range 0,8 to 140 A

type	status	case	ratings					characteristics			
			$I_{T(RMS)}$ A	$I_{T(AV)}$ max $T_{MB} = 85^\circ\text{C}$ 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; $T_j = 25^\circ\text{C}$ V	I_{GT} min at T_j max mA	
BT149 F - 50 A - 100 B - 200 D - 400 E - 500 M - 600	P	TO-92 variant	0,8	0,5	50 100 200 400 500 600	8	30	100	0,8	0,2	
BT151 - 500R - 650R - 800R	P	TO-220AB	12	7,5	50 650 800	100	50	200	1,5	15	
BTY79 - 400R - 500R - 600R - 800R - 1000R	C	TO-64 metric stud	16	10	400 500 600 800 1000	150	50	200	1,5	30	
BTW38 - 600R - 800R - 1000R	C	TO-64 metric stud	16	10	600 800 1000	150	50	200	1,5	50	
BTW42 - 600R - 800R - 1000R	C	TO-64 metric stud	16	10	600 800 1000	150	50	500*	1,5	50	

* up to 1000 V/ μs on request



For detailed information on these and other types see Data Handbook S2
For case outlines and dimensions see page S163
For packing quantities see page S162



type	status	case	ratings					characteristics			
			$I_{T(RMS)}$ A	$I_{T(AV)}$ max $T_{MB} = 85^\circ C$ A	V_{RRM} max V	I_{TSM} max at t_i max $t = 10$ ms A	di_T/dt max A/ μs	dV_D/dt max at T_i max V/ μs	V_{GT} min $V_D = 6$ V; $T_i = 25^\circ C$ V	I_{GT} min at T_i max mA	
BT152 - 400R - 600R - 800R	P	TO-220AB	20	13	400 600 800	200	200	200	1.5	32	
BTW45 - 400R - 500R - 800R - 1000R - 1200R	C	TO-48 metric stud**	25	16	400 600 800 1000 1200	300	100	200*	1.5	75	
BTY91 - 400R - 500R - 600R - 800R	C	TO-48 unified stud	25	16	400 500 600 800	200	20	200	3	40	
BTW40 - 400R - 600R - 800R	C	TO-48 metric stud**	32	20	400 600 800	400	100	100	1.5	75	
BTW23 - 600R - 800R - 1000R - 1200R - 1400R - 1600R	P	TO-94	140	90	600 800 1000 1200 1400 1600	2000	300	200*	2.5	150	

* Up to 1000 V/ μs on request.

** unified stud available (e.g. **BTW45-400 RU**)

Reverse polarity (anode to stud) **R**



Electronic
components
and materials

For detailed information on these and other types see Data Handbook S2
For case outlines and dimensions see page S163
For packing quantities see page S162

Voltage range 500 to 1000 V
Current range 6 to 40 A

Fast turn-off thyristors for motor control and 3-phase inverters. Excellent di_T/dt and dV_D/dt ratings mean fewer protection components.

For use in high-frequency applications such as

- choppers
- pulse circuits
- frequency converters
- d.c. supplies

type	suffix = V_{RRM} max	stat.	case	ratings					characteristics				
				$I_{T(RMS)}$ A	$I_{T(AV)}$ A	I_{TRM} (I_{TM}) A	I_{TSM} and I^2t $T_{j\max}$; 10 ms A	I^2t A ² s	DI_T/dt A/ μ s	t_q max μ s	dV_D/dt max* V/ μ s	V_{GT}^{**} min V	I_{GT}^{**} min mA
BT153	- 500	P	TO-220AB(3)	6	4	30	40	-	200	20	200	2,5	40
BT155	- 600RK - 600RN - 600RP - 800RK - 800RN - 800RP	P	TO-220AB(3)	15	9,5	90	110	60	60	4 6 8 4 6 8	200	2,0	100
BTW63	- 600RK - 600RN - 600RP - 800RK - 800RN - 800RP - 1000RK - 1000RN - 1000RP	C	TO-48(1)	40	25	250	370	700		4 6 8 4 6 8 4 6 8		2,0	250

* at $T_j = T_{j\max}$.

** $V_D = 6\text{ V}$, $T_j = 25\text{ }^\circ\text{C}$.



For detailed information on these and other types see Data Handbook S2
For case outlines and dimensions see page S163
For packing quantities see page S162

Voltage range 850 to 150 V
Current range 3,2 to 25 A



status = P

type	stat.	case	$I_{T(AV)}$ max A	I_{TCRM} max controllable anode current A	I_{TSM} max $T_{mb} = 120\text{ }^\circ\text{C};$ $T = 10\text{ ms}$ A	V_{DRM} max V	dV_D/dt max V/ μs	V_{GT} min V	I_{GT} min mA	t_f max μs^*
BT157 -1300R -1500R	P	TO-220AB	3,2	12	20	1300 1500	10 000	1,5	200	0,2
BTW58 -1000R -1300R -1500R	P	TO-220AB	6,5	25	50	1000 1300 1500	10 000	1,5	200	0,25
BTV58 - 600R - 850R -1000R	P	TO-220AB	10	25	75	600 850 1000	10 000	1,5	200	0,25
BTV59 - 850R -1000R -1200R ***	P	TO-238AA**	15	50	100	850 1000 1200	10 000	1,5	200	0,25
BTR59 - 800 -1300	P	SOT-93	16,5	50	-	800 1300	10 000	1,5	-	0,25
BTS59 - 850 -1000 -1200	P	SOT-93	16,5	50	-	850 1000 1200	10 000	1,5	-	0,25
BTV60 - 850R -1000R -1200R ***	P	TO-238AA**	25	120	150	850 1000 1200	10 000	1,5	500	0,3

* when switching off $0,2 \times I_{TCRM}$ max;
- $V_{GG} = 10\text{ V}; L_G = 0,8\text{ MH}; T_{mb} = 25\text{ }^\circ\text{C}.$
** isolated base plate

*** also available with built-in parallel diode;
add suffix D (e.g. **BTV60D**)



For detailed information on these and other types see Data Handbook S2
 For case outlines and dimensions see page S163
 For packing quantities see page S162

Voltage range 500 to 1200 V
 Current range 4 to 16 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.

status = P

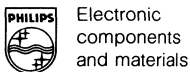
type*	suffix = V _{DRM} max	case	ratings				characteristics					
			I _{T(RMS)} A	I _{TRM} A	I _{TSM} and I ² t T _{j max} : 10 ms A A ² s		di _T /dt A/μs	dV _D /dt max at T _{j max} ***		V _{GT} ** min V	I _{GT} ** min mA	
					normal commutating at: V/μs	V/μs		di _T /dt A/ms				
BT136	- 500 - 600 - 800	TO-220AB(3)	4	25	25	-	10	100	10	1,8	1,5	35*
BT137	- 500 - 600 - 800	TO-220AB(3)	8	55	55	15	20	100	10	3,6	1,5	35*
BT138	- 500 - 600 - 800	TO-220AB(3)	12	90	90	40	30	100	10	5,4	1,5	35*
BT139	- 500 - 600 - 800	TO-220AB(3)	16	115	115	65	30	100	10	7,2	1,5	35*
BTW43G	- 600 - 800 - 1000 - 1200	TO-64(2)	15	50	120	72	50	200	10	5	2,5	100
BTW43H	- 600 - 800 - 1000 - 1200	TO-64(2)	15	50	120	72	50	200	10	12	2,5	100

* 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

* see table above for variants (where suffix G or H has been added to the main type no. the di_T/dt value is indicated at which the specified dV_{COM}/dt max occurs)

** V_D = 12 V, T_j = 25 °C
 *** It should be noted that a change in gate sensitivity does have effect on the commutation characteristics and dV_D/dt



For detailed information on these and other types see Data Handbook S2
For case outlines and dimensions see page S163
For packing quantities see page S162



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	TO-72(3)	$V_D = V_R$ I_{TSM} at T_j max $T = 10 \mu s$ L_T di_T/dt	max 70 V max 3 A max 250 mA max 20 A/ μs	characteristics at $T_j = 25^\circ C$ $V_{GKT} > 0,5 V$ $I_{GKT} > 1 \mu A$ $-V_{GAT} > 1 V$ $-I_{GAT} > 100 \mu A$



N = n-p-n P = p-n-p F = FET M = MOS-FET PM = power MOS
(Excluding r.f. power, microwave wideband and optoelectronic devices).

V_{CE0} V_{DS} max V	P_{tot} max W	type no.	page	V_{CE0} V_{DS} max V	P_{tot} max W	type no.	page	V_{CE0} V_{DS} max V	P_{tot} max W	type no.	page		
5	N	BFT24	S48	20	N	BC146	S39	22	N	BD433	S70		
	N	BFT25	S124		P	BC200	S39		P	BD434	S70		
10	M	BSD20	S127	P	0,14	BF979	S48	N	40	BD943	S74		
	M	BSS83	S127	P	0,15	BF579	S124	P		BD944	S74		
	N	BFR53	S124	M	0,2	BF989	S97	25	M	0,23	BSD22	S99	
	N	BFQ67	S124	M		BF991	S97			F	0,25	BF247	S96
12	N	BFR93	S124	M		BF992	S97			F		BFR30	S96
	P	BFT93	S124	M		BF994	S97			F		BFR31	S96
15	N	BFR93A	S124	M	0,225	BF996	S127	F		BFT46	S96		
	N	BSV52	S125	M		BF960	S97	F	0,255	BF939	S48		
18	N			M	0,23	BF982	S97	* M	0,275	BSD12	S99		
	N			F	0,25	BSD22	S127	* M		BSD214	S99		
	N			F		BF510	S96	* M		BSD215	S99		
	N			F		BF511	S96	F	0,3	BC178	S39		
	N			F		BF512	S96	P		BFW61	S96		
	N			F		BF513	S96	P	0,31	BC808	S122		
	N			P		BF926	S48	N		BC818	S123		
	N			P		BF936	S48	P	0,35	BCY72	S41		
	N			N		BFS18	S124	N		2N4125	S54		
	N			N		BFS19	S124	P		2N4126	S54		
	N			N		BFS20	S124	P	0,425	BCX18	S122		
	N			N	0,3	BC108	S39	N	0,5	BF199	S48		
N			N		BC109	S39	P	0,8	BC328	S39			
N			P		BC179	S39	N		BC338	S39			
N			N		BCY57	S41	N	1	BFQ17	S124			
N			F		BF410	S96	30	F	0,15	BFW12	S96		
N			N		BF494	S48				F		BFW13	S96
N			N		BF495	S48				P	0,16	BF967	S48
N			N		BF496	S48				P	0,2	BC858	S122
N			F		BF510	S127				P		BC859	S122
N			F		BF511	S127				N		BCV61	S123
N			F		BF512	S127				P		BCV62	S122
N			F		BF513	S127				P		BF536	S124
N			F		BF994S	S97				N		BF660	S124
N			F		BF996S	S97				P		BFR29	S99
N			M		BFR84	S97				* M		BFR101	S96
N			N	0,8	BC375	S40				F		BSV81	S99
N			P		BC376	S40	M		BFQ10	S101			
N			N	1	BFY52	S50	F	0,25	BFQ11	S101			
N			N		BC368	S40	F		BFQ12	S101			
N			P		BC369	S40	F		BFQ13	S101			
N			N		BC868	S123	F		BFQ14	S101			
N			N	1	BCX69	S122	F						
N			N	15	BD329	S70	F						
N			P		BD330	S70	F						
18	M	BF990	S97										
	M	BF980	S97										

* $V_{DB}V_{SB}$
** V_{CBO}
*** V_{CER}



Electronic components and materials

N = n-p-n P = p-n-p F = FET M = MOS-FET PM = power MOS
(Excluding r.f. power, microwave wideband and optoelectronic devices).

V_{CE0} V_{DS} max V	P_{tot} max W	type no.	page	V_{CE0} V_{DS} max V	P_{tot} max W	type no.	page	V_{CE0} V_{DS} max V	P_{tot} max W	type no.	page				
30	F	0,25	BFQ15	S101	35	P	0,16	BF970	S48	40	P	0,8	BSV15	S50	
	F		BFQ16	S101		P	0,2	BF569	S124		N		2N2219A	S52	
	F	0,3	BC264	S96		N	0,8	BFY50	S50		F	1,8	2N4091	S98	
	F		BF245	S96		N		2N2297	S52		F		2N4092	S98	
	F		BF256	S96		N		2N6659	S100		F		2N4093	S98	
	P		BF824	S124		M	6,25				F		2N4391	S98	
	F		BFS21	S101							F		2N4392	S98	
	F		BFS21A	S101							F		2N4393	S98	
	F		BFW10	S96		40	N	0,15	BCY87		S42	N	3,7	BC140	S39
	F		BFW11	S96			N		BCY88		S42	P	5	BC160	S39
	F		2N3823	S96			N		BCY89		S42	N	30	BSX45	S50
	F		2N3966	S98			N		BF550		S124	P		BOT29	S74
	N	0,35	2N4123	S54			P	0,2	BF240		S48	N		BDT30	S74
	N		2N4124	S54			N	0,25	BF241		S48	N		TIP29	S92
	F	0,36	2N4859	S98			N		BF450		S48	P		TIP30	S92
	F		2N4860	S98			P		BF451		S48	N	40	BDT31	S76
	F		2N4861	S98			P		BSR18		S125	N		BDT32	S76
	N	0,425	BSR13	S125			P		BSR18A		S125	P		TIP31	S92
	N	0,5	BC548	S40			P		BSR56		S98	N	65	TIP32	S92
	N		BC549	S40			F		BSR57		S98	N		BDT41	S76
N		BC558	S40	F			BSR58	S98	N	80	BDT42	S76			
P		BC559	S40	F			PMBF4391	S98	N		TIP33	S92			
N		BF198	S48	F			PMBF4392	S98	P		TIP34	S92			
N		2N2222	S52	F			PMBF4393	S98							
N	0,625	PH2222	S52	F					45						
N	0,8	BFY51	S50	N	0,3		BF840	S124		N	0,15	BCX70	S123		
N		BSX60	S50	N			BF841	S124		P		BCX71	S122		
N		2N2219	S52	N	0,35		BCY70	S41		N	0,2	BC847	S123		
32	N			N		BSR17	S125	N			BC850	S123			
	N			N		BSR17A	S125	N			BC857	S122			
	N			F		BSV78	S98	P			BC860	S122			
	N	0,15	BCW60	S123	F		BSV79	S98		N	0,3	BC107	S39		
	P		BCW61	S122	F		BSV80	S98		N		BC177	S39		
	P	0,35	BCF29	S126	N		2N3903	S54		N		BCY56	S41		
	P		BCF30	S126	N		2N3904	S54		N		2N929	S41		
	N		BCF32	S126	P		2N3905	S54		N		2N930	S41		
	N		BCF33	S126	P		2N3906	S54		N		BC807	S122		
	P		BCW29	S122	F	0,36	2N4856	S98		P	0,31	BC817	S123		
	P		BCW30	S122	F		2N4857	S98		N		BCF70	S126		
	N		BCW31	S123	F		2N4858	S98		P	0,35	BCF81	S126		
	N		BCW32	S123	P	0,4	2N2906	S52		N		BCW69	S122		
	N		BCW33	S123	P		2N2907	S52		P		BCW70	S122		
	N	1	BCY58	S41	N	0,425	BSR14	S125		P		BCW71	S123		
	N		BCY78	S41	P		BSR15	S125		N		BCW72	S123		
	P		BD435	S70	N	0,5	2N2222A	S52	N		BCW81	S123			
	P	36	BD436	S70	N	0,6	2N2904	S52	N		BCY71	S41			
	P	40	BD945	S74	P		2N2905	S52	P		BCX17	S122			
	N		BD946	S74	N	0,625	PH2222A	S52	P	0,425	BCX19	S122			
				P		PH2907	S52	N			S123				

* $V_{DB} V_{SB}$
** V_{CBO}
*** V_{CER}



Electronic components and materials

N = n-p-n P = p-n-p F = FET M = MOS-FET PM = power MOS
(Excluding r.f. power, microwave wideband and optoelectronic devices).

V_{CE0} V_{DS} max V	P_{tot} max W	type no.	page	V_{CE0} V_{DS} max V	P_{tot} max W	type no.	page	V_{CE0} V_{DS} max V	P_{tot} max W	type no.	page	
45	N	BC547	S40	45	N	BD947	S74	60	N	BST100	S100	
		BC550	S40			P	BD948			S74	P	BST120
	P	BC557	S40	N	60	BD201	S68	N	3,7	BC141	S39	
	P	BC560	S40	N	65	BD202	S68	P	5	BC161	S39	
	P	BC327	S39	N	P	BD243	S70	P	5	BDX43	S80	
	N	BC337	S39	P	P	BD244	S70	N	8	BDX46	S80	
	***N	BSR50	S50	50	F	0,3	2N3822	S96	M	6,25	BSV64	S50
	***P	BSR60	S50		***N	0,8	2N1613	S52	N	8	BSX46	S50
	***N	BSS50	S50	M	0,83	2N1711	S52	N	10	2N6660	S100	
	***P	BSS60	S50	M	1	BST110	S100	P	10	BD137	S68	
	N	BSX59	S50	***N	0,83	BST122	S100	N	12,5	BD138	S68	
	N	BSX61	S50	M	40	BUZ71	S65	P	10	BD827	S72	
	M	BS250	S100	M	75	BUZ10	S65	N	10	BD828	S72	
	N	BC635	S40	M	125	BUZ11	S65	P	12,5	BDW57	S80	
	P	BC636	S40	PM	40	BUZ14	S65	P	12,5	BDW58	S80	
	P	BCX51	S122	PM	75	BUZ15	S65	N	15	BD841	S72	
	N	BCX54	S123	PM	125			P	15	BD842	S72	
	N	BCY59	S41	PM				N	25	BD228	S68	
	P	BCY79	S41	PM				P	30	BD229	S68	
	N	BST50	S125					N	30	BD815	S72	
	P	BST60	S125					P	30	BD816	S72	
	N	BDX42	S80	60	N	0,35	BCV71	S123	N	15	BDX35	S80
	P	BDX45	S80		N	0,36	BCV72	S123	N	25	BDX36	S80
	N	BD135	S68	N	0,4	BCW89	S122	P	30	BD235	S68	
	P	BD136	S68	N	0,425	2N2483	S41	P	30	BD236	S68	
	N	BD825	S72	N	0,6	2N2484	S41	N	30	BD239A	S68	
	P	BD826	S72	N	0,625	2N2906A	S52	P	40	BD240A	S68	
	N	BDW55	S80	P	0,83	2N2907A	S52	N	40	BD935	S74	
	P	BDW56	S80	P	0,87	BSR16	S125	P	40	BD936	S74	
	N	BD839	S72	P	1	2N2904A	S52	N	40	BDT29A	S74	
	P	BD840	S72	P	1	2N2905A	S52	P	40	BDT30A	S74	
	N	BD226	S68	P	1	PH2907A	S52	N	40	TIP29A	S92	
P	BD227	S68	P	1	BSV16	S50	P	40	TIP30A	S92		
N	BD813	S72	P	1	2N4030	S54	N	40	BD241A	S70		
P	BD814	S72	P	1	2N4032	S54	P	40	BD242A	S70		
N	BD131	S68	P	1	BS170	S100	N	40	BD677	S72		
P	BD132	S68	M	0,83	BFX34	S50	N	40	BD678	S72		
N	BD233	S68	N	0,87	BC637	S40	N	40	BD949	S74		
P	BD234	S68	N	1	BC638	S40	P	40	BD950	S74		
N	BD239	S68	N	1	BCX52	S122	N	40	BDT31A	S76		
P	BD240	S68	P	1	BCX55	S123	P	40	BDT32A	S76		
N	BD933	S74	N	1	BSR30	S125	N	40	BDY92	S82		
P	BD934	S74	N	1	BSR31	S125	N	40	TIP31A	S92		
N	BD437	S70	P	1	BSR40	S125	P	40	TIP32A	S92		
P	BD438	S70	N	1	BSR41	S125	N	40	BDT60	S76		
N	BD241	S70	N	1	BST51	S125	N	40	BDT61	S76		
P	BD242	S70	N	1	BST61	S125	P	40	TIP110	S92		
N	BD675	S72	P	1			N	40	TIP115	S92		
P	BD676	S72	P	1			P	40				

* $V_{DB}V_{SB}$
 ** V_{CBO}
 *** V_{CER}

N = n-p-n P = p-n-p F = FET M = MOS-FET PM = power MOS
(Excluding r.f. power, microwave wideband and optoelectronic devices).

V_{CE0} V_{DS} max V	P_{tot} max W	type no.	page	V_{CE0} V_{DS} max V	P_{tot} max W	type no.	page	V_{CE0} V_{DS} max V	P_{tot} max W	type no.	page
60	N	BD203	S68					80	N	BD237	S68
	P	BD204	S68	65					P	BD238	S68
	N	BD331	S70		N	0,2	BC846	S123	N	BD239B	S68
	N	BD332	S70		P		BC856	S122	P	BD240B	S68
	N	BD645	S70		N	0,5	BC546	S40	N	BD937	S74
	N	BD646	S70		P		BC556	S40	P	BD938	S74
	N	BD243A	S70						N	BDT29B	S74
	N	BD244A	S70						P	BDT30B	S74
	N	BDT41A	S76	80					N	TIP29B	S92
	P	BDT42A	S76		M	0,3	BST82	S100	P	TIP30B	S92
	N	TIP120	S94		N	0,35	BSS64	S113	N	BD241B	S70
	N	TIP125	S94		**N	0,8	BSR51	S50	P	BD242B	S70
	N	TIP130	S94		**P		BSR61	S50	N	BD679	S72
	P	TIP135	S94		**N		BSS51	S50	P	BD680	S72
	P	PH2955T	S90		**P		BSS61	S50	N	BD951	S74
	N	PH3055T	S90		P		BSV17	S50	P	BD952	S74
	N	TIP2955T	S94		N		2N1893	S52	N	BDT31B	S76
	N	TIP3055T	S94		N		2N3019	S52	P	BDT32B	S76
	N	TIP33A	S92		N		2N3020	S52	N	BDY91	S82
	N	TIP34A	S92		P		2N4031	S54	N	TIP31B	S92
	N	BDT51	S76		P		2N4033	S54	P	TIP32B	S92
	P	BDT52	S76		M	0,83	BST72A	S100	P	BDT60A	S76
	N	BDT62	S76		N	1	BC639	S40	N	BDT61A	S76
	N	BDT63	S76		P		BC640	S40	N	TIP111	S92
	N	BDT91	S78		P		BCX53	S122	P	TIP116	S92
	N	BDT92	S78		N		BCX56	S123	N	BD333	S70
	N	BDX62	S80		P		BSR32	S125	P	BD334	S70
	N	BDX63	S80		P		BSR33	S125	N	BDX77	S82
	N	BDX91	S82		N		BSR42	S125	P	BDX78	S82
	N	BDX92	S82		N		BSR43	S125	N	BD647	S70
	N	BDV91	S80		P		BST52	S113	P	BD648	S70
	N	BDV92	S80		P		BST62	S125	N	BD243B	S70
	N	TIP2955	S94		M		BST70A	S100	N	BD244B	S70
	N	TIP3055	S94		M		BST80	S100	P	BDT41B	S76
	N	BDX64	S82		M	2,5	BST90	S100	N	BDT42B	S76
	N	BDX65	S82		N	5	BDX44	S78	P	TIP121	S94
	N	BDT64	S78		P		BDX47	S78	P	TIP126	S94
	N	BDT65	S78		N		BSX47	S50	N	TIP131	S94
	N	BDT81	S78		N		BD829	S72	N	TIP136	S94
	N	BDT82	S78		P		BD830	S72	N	TIP33B	S92
	N	BDV64	S78		N		BDW59	S78	P	TIP34B	S92
	N	BDV65	S78		P		BDW60	S78	N	BDT53	S76
	N	TIP140	S94		N	10	BD843	S72	P	BDT54	S76
	N	TIP145	S94		P		BD844	S72	P	BDT62A	S76
	N	BDX66	S80		N	12,5	BD230	S68	N	BDT63A	S76
	N	BDX67	S80		P		BD231	S68	N	BDT93	S78
	N	BDX68	S80		N		BD817	S72	P	BDT94	S78
	N	BDX69	S80		P		BD818	S72	P	BDX62A	S78
					N	15	BDX37	S78	N	BDX63A	S78

* $V_{DB}V_{SB}$
** V_{CBO}
*** V_{CER}



Electronic components and materials

N = n-p-n P = p-n-p F = FET M = MOS-FET PM = power MOS
(Excluding r.f. power, microwave wideband and optoelectronic devices).

V_{CE0} V_{DS} max V	P_{tot} max W	type no.	page	V_{CE0} V_{DS} max V	P_{tot} max W	type no.	page	V_{CE0} V_{DS} max V	P_{tot} max W	type no.	page				
80	N	90	BDX93	S82	100	N	30	TIP29C	S92	100	N	100	BDV95	S80	
	P		BDX94	S82		P		TIP30C	S92		P		BDV96	S80	
	N	100	BDV93	S80		N	40	BD241C	S70		P	117	BDX64B	S82	
	P		BDV94	S80		N		BD242C	S70		N		BDX65B	S82	
	P	117	BDX64A	S82		N		BD681	S72		P	125	BDT64B	S78	
	N		BDX65A	S82		P		BD682	S72		N		BDT65B	S78	
	P	125	BDT64A	S78		N		BD953	S74		N		BDT85	S78	
	N		BDT65A	S78		N		BD954	S74		N		BDT85A	S78	
	N		BDT83	S78		N		BDT31C	S76		P		BDT86	S78	
	P		BDT84	S78		N		BDT32C	S76		P		BDT86A	S78	
	P		BDV64A	S78		N		BDY90	S82		P		BDV64B	S78	
	N		BDV65A	S78		N		BDY90A	S82		N		BDV65B	S78	
	N		TIP141	S94		PM		BUZ72	S65		PM		BUZ24	S65	
	P		TIP146	S94		N		TIP31C	S92		N		TIP142	S94	
	P	150	BDX66A	S82		P		TIP32C	S92		N		TIP147	S94	
	N		BDX67A	S82		N	50	BDT60B	S76		P	150	BDX66B	S82	
	N	200	BDV66A	S80		N		BDT61B	S76		N		BDX67B	S82	
	P		BDV67A	S80		N		TIP112	S92		N	200	BDV66B	S80	
	N		BDX68A	S82		N		TIP117	S92		N		BDV67B	S80	
	N		BDX69A	S82		N	60	BD335	S70		P		BDX68B	S82	
85	N	0,8	BFY55	S50	N	62,5	BD336	S70	N		BDX69B	S82			
	90	N	65	BUV26	S88	N	65	BD649	S70	120	P	0,625	2N5400	S54	
		M	6,25	2N6661	S100	N		BD650	S70		P	0,8	BSW67A	S50	
		100	N				N		BD243C		S70	N	10	BD847	S72
			P	0,35	BSS63	S125	PM	75	BD244C		S70	N		BD848	S72
			N	0,5	BSS38	S50	PM	78	BDT41C		S76	N		BD941	S74
			N		BSS68	S50	PM		BDT42C		S76	P	30	BD942	S74
			**N	0,8	BSR52	S50	PM		BUV26A		S88	N		TIP29D	S92
			**P		BSR62	S50	N	70	TIP122		S94	P		TIP30D	S92
			**N		BSS52	S50	P		TIP127		S94	N	40	BD955	S74
			**P		BSS62	S50	N	90	TIP132		S94	N		BD956	S74
			N		BSW66A	S50	N		TIP137		S94	P		TIP31D	S92
N			1	BST52	S125	P		BUZ20	S65		N		TIP32D	S92	
N	10		BD845	S72	N	80	BUZ21	S65	P	50	BDT60C	S76			
N	30		BD846	S72	N		BUZ23	S65	N	60	BDT61C	S76			
N		BD239C	S68	P		BUZ25	S65	P		BD337	S70				
N		BD240C	S68	P		BUZ26	S65	P		BD338	S70				
N		BD939	S74	N		BDT56	S76	N	62,5	BD651	S70				
N		BD940	S74	N		BDT62B	S76	N		BD652	S70				
N		BDT29C	S74	N		BDT63B	S76	P	65	BUV27	S88				
N		BDT30C	S74	P		BDT95	S78	N	90	BDT57	S76				
						BDT96	S78	N		BDT58	S76				
						BDX62B	S80	P		BDT62C	S76				
						BDX63B	S80	N		BDT63C	S76				
						BDX95	S82	N		BDX62C	S80				
						BDX96	S82	P		BDX63C	S80				

* $V_{DB}V_{SB}$
** V_{CBO}
*** V_{CER}



Electronic components and materials

PHILIPS

N = n-p-n P = p-n-p F = FET M = MOS-FET PM = power MOS
(Excluding r.f. power, microwave wideband and optoelectronic devices).

V _{CEO} V _{DS} max V	P _{tot} max W	type no.	page	V _{CEO} V _{DS} max V	P _{tot} max W	type no.	page	V _{CEO} V _{DS} max V	P _{tot} max W	type no.	page
120	117	BDX64C	S82					250	6	BF419	S82
N		BDX65C	S82	180				N		BF458	S48
N	125	BDT64C	S78	M	1	BST76A	S100	N		BF819	S84
N		BDT65C	S78	M		BST86	S100	N		BF858	S84
N		BDT87	S78	M	1,5	BST97	S100	N	40	TIP47	S92
N		BDT87A	S78	N	60	BU806A/01	S86				
N		BDT88	S78					300			
N		BDT88A	S78					** N	0,31	BF820	S126
N		BDV64C	S78	200				** P		BF821	S126
N		BDV65C	S78	P	0,5	PH5415	S52	** P		PH5416	S52
N	150	BDX66C	S82	P	1	BST15	S126	P	0,5	PH420	S48
N		BDX67C	S82	M		BST74A	S100	*** N	0,83	BF421	S48
N		BDV66C	S80	M		BST84	S100	*** P		BF421	S48
N	200	BDV67C	S80	P		2N5415	S54	N		BF485	S48
N		BDX68C	S82	PM	40	BUZ73A	S65	** N	1	BF620	S126
N		BDX69C	S82	N	60	BU406	S84	** P		BF621	S126
				N		BU806/01	S86	P		BST16	S126
				N		BUV28	S88	P		2N5416	S54
				PM	75	BUZ30	S65	*** N	1,8	BF471	S48
130	62,5	BDT20	S74	PM		BUZ31	S65	*** P		BF472	S48
N		BDT21	S74	PM		BUZ32	S65	N	5	BF585	S48
				PM	78	BUZ33	S65	P		BFT44	S50
				PM		BUZ35	S65	N	6	BF459	S48
140	0,3	BSR19	S125	PM	125	BUZ34	S65	N		BF859	S84
N	0,625	2N5550	S54	PM		BUZ36	S65	N	28	BUX99	S90
N	10	BD849	S72					N		PH13002	S90
N		BD850	S72					N	40	TIP48	S92
				225				N	75	BU304F	S84
				N	31,25	D44Q5	S90	N		MJE13004	S90
				N	65	BUV28A	S88	N	80	BU306F	S84
150	0,625	2N5401	S54					N	100	MJE13006	S90
N	0,8	BSW68A	S50	250				N		BU308F	S84
N	30	BD941A	S74	N	0,31	BF822	S126	N		BUP21	S86
N		BD942A	S74	P		BF823	S126	N		BUS21	S86
N	60	BU407	S84	N	0,83	BF422	S48	N		BUT21	S88
N		BU807/01	S86	P		BF423	S48	N	125	MJE13008	S90
N	65	BUV27A	S88	N		BF483	S48	N		BUP22	S86
N	200	BDV66D	S80	N	1	BF622	S126	N		BUS22	S88
N		BDV67D	S80	P		BF623	S126	N	175	BUP23	S86
				N		BST40	S126	N		BUS23	S88
				N	1,8	BF469	S48	N		2N6676	S94
				P		BF470	S48	N	250	BUS24	S88
160	0,3	BSR19A	S125	N	5	BF583	S48				
N	0,625	2N5551	S54	N		BF869	S84				
N	6	BF457	S48	*** N		BF870	S84	350			
N		BF857	S84	*** P		BF871	S84	N	1	BST39	S126
				P		BF872	S84	N	40	TIP49	S92
				P		BFT45	S50				

* V_{DB}V_{SB}
** V_{CBO}
*** V_{CER}



Electronic components and materials

PHILIPS

N = n-p-n P = p-n-p F = FET M = MOS-FET PM = power MOS
(Excluding r.f. power, microwave wideband and optoelectronic devices).

V_{CE0} V_{DS} max V	P_{tot} max W	type no.	page	V_{CE0} V_{DS} max V	P_{tot} max W	type no.	page	V_{CE0} V_{DS} max V	P_{tot} max W	type no.	page		
350N	100	BUP21A	S86	400N	125	BUS22B	S88	500	40	BUZ74	S66		
		BUS21A	S86			BUT12	S88					BUZ74A	S66
		BUT21A	S88			BUT22B	S88					BUZ40	S66
		BUP22A	S86			BUV90	S88					BUZ41A	S66
	125	BUS22A	S88		N	BUW12	S88		BUZ42			S66	
		BUT22A	S88		N	BUX47	S90		BUZ43			S66	
		BUP23A	S86		PM	BUZ64	S65		BUZ44A			S66	
		BUS23A	S88		N	BUP23B	S86		BUZ46			S66	
	175	BUP23A	S86		N	BUS13	S86		BUZ46			S66	
		BUS23A	S88		N	BUS23B	S88		BUZ45			S66	
		2N6677	S94		N	BUX48	S90		BUZ45A			S66	
		BUS24A	S88		N	BUW13	S90		BUZ45B			S66	
250			N	2N6678	S94								
			N	BUS14	S86								
			N	BUS24B	S88								
			N	BUX98	S90								
375	12.5	BU824	S86	250				700	75	BU505;D	S84		
		BUX79	S90				BU705			S86			
		BU826	S86				BU506;D			S84			
400	0.83	BF487	S48	450	15	BST78	S100	800	75	BUZ80	S66		
		BF587	S48			N	20			BUX87	S90	BUZ80A	S66
		BUX86	S90			N	40			BUX85	S90	BUZ83	S66
		PH13003	S90			N	50			BUW85	S90	BUZ83A	S66
	28	BUX84	S90		N	100	BUP21C		S86	N	78	BUZ83A	S66
		BUZ76	S65		N		BUS11A		S86	PM	75	BUY89	S90
		BUZ76A	S65		N		BUS21C		S86	PM	78	BUV89	S88
		TIP50	S92		N		BUT11A		S88	PM	80	BUZ84	S66
	40	BUW84	S90		N		BUT21C		S88	PM	125	BUZ84A	S66
		BU305F	S84		N		BUW11A		S88	PM	160	BUX88	S90
		BUZ60	S65		N		BUX46A		S90	N	175	MJ8504	S90
		BUZ60B	S65		N		BUX81		S90	N			
PM	MJE13005	S90	N	125	BUP22C	S86	PM						
	BUZ63	S65	N			BUS12A	S86	PM					
	BUZ63B	S65	N			BUS22C	S88	N					
	BU307F	S84	N			BUT12A	S88	N					
PM	MJE13007	S90	N		BUT22C	S88	N						
	BU309F	S84	N		BUW12A	S88	N						
	BUP21B	S86	N		BUX47A	S90	N						
	BUS11	S86	PM	175	BUZ45C	S65	PM						
BUS21B	S86	N			BUP23C	S86	PM						
BUT11	S88	N			BUS13A	S86	PM						
BUT21B	S88	N			BUS23C	S88	PM						
PM	BUW11	S88	N	250	BUW13A	S90	PM						
	BUX46	S90	N			BUX48A	S90	PM					
	BUX80	S90	N			BUS14A	S86						
	MJE13009	S90	N			BUS24C	S88						
115	BU826A	S86	N		BUX98A	S90							
	BUP22B	S86	N										
	BUS12	S86	N										

* $V_{DB}V_{SB}$
** V_{CBO}
*** V_{CER}

L.F. general-purpose transistors

For detailed information on these and other types see Data Handbook S3

For case outlines and dimensions see page S163

For packing quantities see page S162

Voltage range 2 to 80 V
 Current range 0,05 to 1 A
 D.C. current gain h_{FE} 40 to 800

type	pol.*	case	ratings				characteristics				
			V_{CE0} V	I_C A	P_{tot} at W	T_{amb} (T_{case}) °C	h_{FE} at min-max	I_C mA	f_T typ MHz	V_{CEsat} at typ mV	I_C/I_B A/mA
BC107 BC108 BC109 BC107A,B BC108A,B,C BC109B,C	N	TO-18(1)	45 20 20 45 20 20	0,1	0,3	25	110-450 110-800 200-800 110-220 200-450 420-800	2	300	200	0,1/5
BC140 BC141	N	TO-39	40 60	1	3,7	45	40-250 40-250	100	> 50	0,6	1/100
BC146/01 BC146/02 BC146/03	N	SOT-42	20	0,05	0,05	45	80-200 140-350 280-550	0,2	150	-	-
BC160 BC161	P	TO-39	40 60	1	3,7	45	40-250 40-250	100	> 50	0,6	1/100
BC177 BC178 BC179 BC178A,B BC179A,B	P	TO-18(1)	45 25 20 25 20	0,1	0,3	25	75-260 75-500 125-500 125-260 240-500	2	150	250	0,1/5
BC200/01 BC200/02 BC200/03	P	SOT-42	20	0,05	0,05	45	50-105 85-200 165-400	0,2	90	-	-
BC327 BC328 BC327-16,25,40 BC328-16,25,40 BC327A	P	TO-92(2)	45 25 45 25	0,5	0,8	25	100-600 100-600 100-250 160-400 250-600 100-400	100	100	700	0,5/50
BC337 BC338 BC337-16,25,40 BC338-16,25,40 BC337A	N	TO-92(2)	45 25 45 25	0,5	0,8	25	100-600 100-600 100-250 160-400 250-600 100-400	100	200	700	0,5/50

* polarity indication

P = p-n-p

N = n-p-n



Electronic
 components
 and materials

L.F. general-purpose transistors (cont.)

For detailed information on these and other types see Data Handbook S3
 For case outlines and dimensions see page S163
 For packing quantities see page S162

type	pol.*	case	ratings				characteristics				
			V _{CEO} V	I _C A	P _{tot} at W	T _{amb} (T _{case}) °C	h _{FE} at min-max	I _C mA	f _T typ MHz	V _{CEsat} at typ mV	I _C /I _B A/mA
BC368	N	TO-92(3)	20	1	1	25	85-375	500	60	500	1/100
BC369	P	TO-92(3)	20	1	1	25	85-375	500	60	500	1/100
BC375	N	TO-92(2)	20	1	0,8	25	60-340	150	150	500	0,5/50
BC376	P	TO-92(2)	20	1	0,8	25	60-340	150	150	500	0,5/50
BC546	N	TO-92(2)	65	0,1	0,5	25	110-450	2	300	600	0,1/5
BC547			45				110-800				
BC548			30				110-800				
BC546A,B			65				110-220				
BC547A,B,C			45				200-450				
BC548A,B,C			30				420-800				
BC549	N	TO-92(2)	30	0,1	0,5	25	200-800	2	300	600	0,1/5
BC550			45				200-800				
BC549B,C			30				200-450				
BC550B,C			45				420-800				
BC556	P	TO-92(2)	65	0,1	0,5	25	75-250	2	150	650	0,1/5
BC557			45				75-475				
BC558			30				75-475				
BC556A			65								
BC557A,B,C			45				125-250				
BC558A,B,C			30				220-475				
BC559	P	TO-92(2)	30	0,1	0,5	25	125-475	2	150	650	0,1/5
BC560			45				125-475				
BC559A,B,C			30				125				
BC560A,B,C			45				220-475				
BC635	N	TO-92(3)	45	1	1	25	40-250	150	130	500	0,5/50
BC637			60				40-250				
BC639			80				40-250				
BC636	P	TO-92(3)	45	1	1	25	40-250	150	50	0,5	0,5/50
BC638			60				40-250				
BC640			80				40-250				

* polarity indication

P = p-n-p
 N = n-p-n



Electronic components and materials

PHILIPS

L.F. general-purpose transistors (cont.)

For detailed information on these and other types see Data Handbook S3

For case outlines and dimensions see page S163

For packing quantities see page S162

type	pol.*	case	ratings				characteristics				
			V _{CEO} V	I _C A	P _{tot} at W	T _{amb} (T _{case}) °C	h _{FE} at min-max	I _C mA	f _T typ MHz	V _{CEsat} at typ mV	I _C /I _B A/mA
BCY56	N	TO-18(1)	45	0,1	0,3	25	100-450	2	85	typ. 0,2	0,1/10
BCY57	N	TO-18(1)	20	0,1	0,3	25	200-800	2	100	typ. 0,2	0,1/10
BCY58VII VIII,IX,X	N	TO-18(1)	32	0,2	1	45	VII 120-220 VIII 180-310 IX 250-460 X 380-630	2	280	0,7	0,1/2,5
BCY59VII VIII,IX,X			45			(T _{case})					
BCY70	P	TO-18(1)	40	0,2	0,35	25	100	10	450	0,5	0,05/5
BCY71			45				100-400				
BCY72			25				100				
BCY78VII VIII,IX,X	P	TO-18(1)	32	0,2	1	45	VII 120-220 VIII 180-310 IX 250-460 X 380-630	2	180	0,8	0,1/2,5
BCY79VII VIII,IX			45			(T _{case})					
2N929	N	TO-18(1)	45	0,03	0,3	25	100-350	0,01	80	1	0,01/ 0,5
2N930	N	TO-18(1)	45	0,03	0,3	25	150-600	0,01	80	1	0,01/ 0,5
2N2483	N	TO-18(1)	60	(0,05)	0,36	(25)	40-120	0,01	80	0,35	0,001/ 0,1
2N2484	N	TO-18(1)	60	(0,05)	0,36	(25)	100-500	0,01	80	0,35	0,001/ 0,1

* polarity indication

P = p-n-p

N = n-p-n

Electronic
components
and materials

Dual transistors for differential amplifiers

For detailed information on these and other types see Data Handbook S3

For case outlines and dimensions see page S163

For packing quantities see page S162

Matched dual n-p-n transistors in TO-71(2)

status = P

type	ratings				characteristics					total device		
	individual transistor				individual transistor					total device		
	V_{CE0} V	I_C mA	P_{tot} mW	T_{amb} °C	h_{FE} at min-max	I_C mA	F max dB	f_T min MHz	I_{C1} I_{C2}	$V_{1BE} - V_{2BE}$ max mV	$\left \frac{\Delta V}{\Delta T} \right $ max μV/°C	$\left \frac{\Delta I}{\Delta T} \right $ max nA/°C
BCY87 BCY88 BCY89	40	30	150	25	100-450 120-600 100-600	0,05 0,5 10	3 4 4	50	0,90 - 1,11 0,80 - 1,25 0,67 - 1,50	3 6 10	$T_{amb} =$ -20 to +90°C 3 6 10	0,5 2 10

Note: for dual n-channel junction FETs for differential amplifiers see page S101



For detailed information see Data Handbook S3

type	polar- ity	Television						Radio					
		tuner preamp		mixer or self- osc. mixer		oscillator		vision amp		r.f. amp		mixer or self- osc. mixer	i.f. amp
		u.h.f.	v.h.f.	u.h.f.	v.h.f.	u.h.f.	v.h.f.	i.f.	video output	a.m.	f.m.	a.m.	
BF198	N							•					
BF199	N							•					
BF240	N									•		•	•
BF241	N									•		•	•
BF324	P			•			•				•		
BF370	N							•					
BF410	J									•		•	
BF420/422	N								•				
BF421/423	P								•				
BF450	P									•		•	•
BF451	P									•		•	•
BF457/458/459	N								•				
BF469/471	N								•				
BF470/472	P								•				
BF483/485/487	N								•				
BF494	N						•			•	•	•	•
BF495	N						•			•	•	•	•
BF496	N		•							•			
BF583/585/587	N								•				
BF857/858/859	N								•				
BF869/871	N								•				
BF870/872	P								•				
BF926	P						•						
BF936	P						•						
BF939	P		•			•							
BF960	M*	•											
BF964	M*		•										
BF964S	M*		•										
BF966	M*	•											
BF966S	M*	•											
BF967	P	•			•								
BF970	P				•								
BF979	P	•	•	•									
BF980	M*	•											
BF981	M*		•		•								
BF982	M*		•		•					•		•	



Polarity indication: P = p-n-p J = junction-FET
N = n-p-n M = MOS

* For general data on MOS - FETs see page S97
For surface-mounting devices see page S124

For detailed information see Data Handbook S3

Industrial

	type	polarity	f_T min MHz
general purpose; selected by f_T	BSS68	P	50
	BSS38	N	60
	2N3020	N	80
	2N3019	N	100
	2N4030	P	100
	2N4031	P	100
	2N4032	P	150
	2N4033	P	150
	BFY50	N	typ. 140
	BFY51	N	typ. 160
	BFY52	N	typ. 185
	2N2904	P	200
	2N2904A	P	200
	2N2905	P	200
	2N2905A	P	200
	2N2906	P	200
	2N2906A	P	200
	2N2907	P	200
	2N2907A	P	200
	2N2219	N	250
	2N2219A	N	300
	2N2222	N	250
	2N2222A	N	300
BFR54	N	500	
h.f. and v.h.f. oscillators and amplifiers, output stages of servo amplifiers	BFY55	N	60
	2N2297	N	60
	2N918	N	900
d.c. to h.f. amplifiers, also for switching	2N1893	N	50
	2N1613	N	60
	2N1711	N	70
u.h.f. low-power amplifier, e.g. for pocket phones	BFT24	N	1200
high-voltage transistors	BFT44	P	typ. 60
	BFT45	P	typ. 60
	2N5415	P	15
	2N5416	P	15



Medium speed switching transistors

For detailed information see Data Handbook S3

Medium-speed

type	polar ity	V _{CEO} V	V _{CER} V	P _{tot} W	t _{off} max ns	
drivers for numerical indicator tubes	BSS38	N	100	-	0,5	1000
	BSS68	P	100	-	0,5	-
drivers, e.g. for print hammers	BSR50	N	-	45	0,8	1500
	BSR51	N	-	60	0,8	1500
	BSR52	N	-	80	0,8	1500
	BSR60	P	-	45	0,8	1500
	BSR61	P	-	60	0,8	1500
	BSR62	P	-	80	0,8	1500
	BSS50	N	-	45	0,8	1500
	BSS51	N	-	60	0,8	1500
	BSS52	N	-	80	0,8	1500
	BSS60	P	-	45	0,8	1500
	BSS61	P	-	60	0,8	1500
	BSS62	P	-	80	0,8	1500
	BSV64	N	60	-	5	1200
	general industrial and switching	BFT44	P	300	-	5
BFT45		P	250	-	5	125
BSV15		P	40	-	0,8	650
BSV16		P	60	-	0,8	650
BSV17		P	80	-	0,8	650
BSX45		N	40	-	5	850
BSX46		N	60	-	5	850
BSX47		N	80	-	5	850
switching inductive loads	BSW66A	N	100	-	0,8	1000
	BSW67A	N	120	-	0,8	1000
	BSW68A	N	150	-	0,8	1000
amplifiers and switching circuits	2N3019	N	80	-	0,8	-
	2N3020	N	80	-	0,8	-
	2N5415	P	200	-	1	-
	2N5416	P	300	-	1	-

type	polar ity	V _{CEO} V	V _{CER} V	P _{tot} W	t _{off} max ns	
invertng, regulating, etc.	BFX34	N	60	-	0,87	1200
	BCY58*	N	32	-	0,33	800
	BCY59*	N	45	-	0,33	800
	BDY90*	N	100	-	40	1500
	BDY91*	N	80	-	40	1500
	BDY92*	N	60	-	40	1500
general purpose	BFR54	N	15	-	0,5	-
	PH2222	N	30	-	0,5	-
	PH2222A	N	40	-	0,5	-
	PH2369	N	15	-	0,5	21
	PH2907	P	40	-	0,4	100
	PH2907A	P	60	-	0,4	100
	PH5415	P	200	-	0,5	-
	PH5416	P	300	-	0,5	-
	2N3903	N	40	-	0,35	-
	2N3904	N	40	-	0,35	-
	2N3905	P	40	-	0,35	-
	2N3906	P	40	-	0,35	-
	2N4123	N	30	-	0,35	-
	2N4124	N	25	-	0,35	-
2N4125	P	30	-	0,35	-	
2N4126	P	25	-	0,35	-	
2N5400	P	120	-	0,625	-	
2N5401	P	150	-	0,625	-	
2N5550	N	140	-	0,625	-	
2N5551	N	160	-	0,625	-	



Polarity indication: P = p-n-p
N = n-p-n
For general data see l.f. transistors

High speed switching transistors

For detailed information see Data Handbook S3
 For case outlines and dimensions see page S163
 For packing quantities see page S162

High-speed

	type	polar- ity	V_{CE0} V	P_{tot} W	t_{off} max ns		type	polar- ity	V_{CE0} V	P_{tot} W	t_{off} max ns	
core driving	BSX59	N	45	0,8	60	saturated switching and driver applications for industrial service	2N2904	P	40	0,6	100	
	BSX60	N	30	0,8	70		2N2904A	P	60	0,6	100	
	BSX61	N	45	0,8	100		2N2905	P	40	0,6	100	
saturated switching							2N2905A	P	60	0,6	100	
	BSX19	N	15	0,36	18		2N2906	P	40	0,4	100	
	BSX20	N	15	0,36	21		2N2906A	P	60	0,4	100	
	2N2368	N	15	0,36	15		2N2907	P	40	0,4	100	
							2N2907A	P	60	0,4	100	
	2N2369	N	15	0,36	18							
	2N2369A	N	15	0,36	18		2N2218	N	30	0,8	-	
							2N2218A	N	40	0,8	285	
							2N2219	N	30	0,8	-	
							2N2219A	N	40	0,8	285	
						2N2221	N	30	0,5	-		
						2N2221A	N	40	0,5	285		
						2N2222	N	30	0,5	-		
					2N2222A	N	40	0,5	285			



For detailed information see Data Handbook S3
 For case outlines and dimensions see page S163
 For packing quantities see page S162

**Trigger devices**

PNPN devices for relay and lamp drivers, sensing networks for temperature control, oscillators, timers, pulse shapers, and as replacements for relays, silicon controlled switches, programmable unijunction transistors. The BRY39 can also be used for driving numerical indicator tubes.

type	status	case	ratings					characteristics		
			V_{GA} V	V_{EBO} V_{GK} V	I_{ERM} I_{ARM} 10 μ s; $\delta = 0,01$ A	dI_A/dt A/ μ s	P_{tot} mW	V_{AK} max V	I_H max mA	t_r max ns
BR101	D	TO-72(3)	50	5	2,5	-	275	1,4	1	-
BRY39	D	TO-72(3)	70	5	2,5	20	275	1,4	1	80
BRY56	D	TO-92(4)	70	70	2,5	20	300	1,4	-	80



For detailed information on these and other types see Data Handbook S3 and S4

For case outlines and dimensions see page S163

For packing quantities see page S162

type	pol	case	ratings								characteristics	
			V_{CBO} V	V_{CEO} V	V_{CER} V	I_C mA	I_{CM} mA	P_{tot} at W	T_{amb} °C	T_{mb} °C	h_{FE} at min-max	I_C mA
BF198	N	TO-92(1)	40	30	-	25	-	0,5	25	-	27	4
BF199	N	TO-92(1)	40	25	-	25	-	0,5	25	-	37	7
BF240	N	TO-92(1)	40	40	-	25	-	0,25	25	-	65-220	1
BF241	N	TO-92(1)	40	40	-	25	-	0,25	25	-	35-125	1
BF324	P	TO-92(2)	30	30	-	25	-	0,25	45	-	25	4
BF370	N	TO-92(2)	40	15	-	100	-	0,5	25	-	40	10
BF420	N	TO-92(3)	300	-	300	50	-	0,83	25	-	50	25
BF421	P	TO-92(3)	300	-	300	50	-	0,83	25	-	50	25
BF422	N	TO-92(3)	250	250	-	50	-	0,83	25	-	50	25
BF423	P	TO-92(3)	250	250	-	50	-	0,83	25	-	50	25
BF450	P	TO-92(1)	40	40	-	25	-	0,25	45	-	60-200	1
BF451	P	TO-92(1)	40	40	-	25	-	0,25	45	-	30-90	1
BF457	N	TO-126	160	160	-	100	-	6,0	-	90	26	80
BF458	N	TO-126	250	250	-	100	-	6,0	-	90	26	30
BF459	N	TO-126	300	300	-	100	-	6,0	-	90	26	30
BF469	N	TO-126	250	250	-	50	-	1,8	-	< 114	> 50	25
BF471	N	TO-126	300	-	-	50	-	1,8	-	< 114	> 50	25
BF470	P	TO-126	250	250	-	50	-	1,8	-	< 114	> 50	25
BF472	P	TO-126	300	-	-	50	-	1,8	-	< 114	> 50	25
BF483	N	TO-92	300	250	-	50	-	0,83	25	-	≥ 50	25
BF485	N	TO-92	350	300	-	50	-	0,83	25	-	≥ 50	25
BF487	N	TO-92	400	400	-	50	-	0,83	25	-	≥ 50	25
BF494	N	TO-92(1)	30	20	-	30	-	0,3	75	-	typ 115	1
BF495	N	TO-92(1)	30	20	-	30	-	0,3	75	-	typ 67	1
BF496	N	TO-92(1)	30	20	-	20	-	0,3	75	-	-	-
BF583	N	TO-202	300	250	-	50	-	5,0	25	-	≥ 50	25
BF585	N	TO-202	350	300	-	50	-	5,0	25	-	≥ 50	25
BF587	N	TO-202	400	400	-	50	-	5,0	25	-	≥ 50	25
BF926	P	TO-92(2)	30	20	-	25	-	0,25	45	-	-	-
BF936	P	TO-92(2)	30	20	-	25	-	0,25	45	-	-	-
BF939	P	TO-92(2)	30	25	-	20	-	0,255	55	-	-	-
BF967	P	SOT-37(1)	30	30	-	20	-	0,16	55	-	15	3
BF970	P	SOT-37(1)	40	35	-	30	-	0,16	55	-	25	3
BF979	P	SOT-37(1)	20	20	-	20	-	0,14	55	-	15	2
BFR54	N	TO-92(1)	40	15	-	350	-	0,5	25	-	40	10
BFT24	N	SOT-37(2)	8	5	-	2,5	-	0,03	135	-	40	1



For detailed information on these and other types see Data Handbook S3 and S4

For case outlines and dimensions see page S163

For packing quantities see page S162

characteristics (cont.)

f_T typ. MHz	V_{CEsat} at max V	I_C/I_B mA/mA	F at typ. dB	f MHz	C_{re} and typ. pF	C_C at typ. pF	f MHz	G_{UM} at typ. dB	f MHz	t_{off} at max ns	I_C A	type
400 550	- -	- -	3 -	35 -	0,2 0,3	- -	10,7 10,7	42 43	35 35	- -	- -	BF198 BF199
380 350	- -	- -	< 35 < 3,5	0,2 0,2	0,27 0,27	- -	1 1	- -	- -	- -	- -	BF240 BF241
450 > 490	- -	- -	3 -	100 -	0,1 1,6	- -	1 1	- -	- -	- -	- -	BF324 BF370
> 60 > 60 > 60 > 60	- - - -	- - - -	- - - -	- - - -	< 1,6 < 1,6 < 1,6 < 1,6	- - - -	1 1 1 1	- - - -	- - - -	- - - -	- - - -	BF420 BF421 BF422 BF423
325 325	- -	- -	2 2	0,1 0,1	0,35 0,35	- -	1 1	- -	- -	- -	- -	BF450 BF451
90 90 90	< 1 < 1 < 1	30/6 30/6 30/6	- - -	- - -	< 3,5 < 3,5 < 3,5	- - -	1 1 1	- - -	- - -	- - -	- - -	BF457 BF458 BF459
> 60 > 60	- -	- -	- -	- -	< 1,8 < 1,8	- -	0,5 0,5	- -	- -	- -	- -	BF469 BF471
> 60 > 60	- -	- -	- -	- -	< 1,8 < 1,8	- -	0,5 0,5	- -	- -	- -	- -	BF470 BF472
70-110 70-110 70-110	- - -	- - -	- - -	- - -	< 1,4 < 1,4 < 1,4	- - -	1 1 1	- - -	- - -	- - -	- - -	BF483 BF485 BF487
260 200 550	- - -	- - -	4 4 2,5	100 100 200	0,85 0,85 0,8	- - -	0,45 0,45 10,7	- - 27	- - 200	- - -	- - -	BF494 BF495 BF496
70-110 70-110 70-110	- - -	- - -	- - -	- - -	< 1,4 < 1,4 < 1,4	- - -	1 1 1	- - -	- - -	- - -	- - -	BF583 BF585 BF587
350 350 675	- - -	- - -	5 5 25	200 200 200	0,5 0,9 0,7	- - -	1 - 0,5	- - -	- - -	- - -	- - -	BF926 BF936 BF939
900 850 1350	- - -	- - -	4 4,5 4,5	800 800 800	0,45 0,45 0,65	- - -	0,5 1 0,5	- - -	- - -	- - -	- - -	BF967 BF970 BF979
600	0,25	10/1	-	-	-	< 4	1	10	200	-	-	BFR54
2300	1,25	1/0,1	3,8	500	< 0,4	-	1	17	500	-	-	BFT24

S



For detailed information on these and other types see Data Handbook S3
 For case outlines and dimensions see page S163
 For packing quantities see page S162

type	pol	case	ratings								characteristics	
			V _{CBO} V	V _{CEO} V	V _{CER} V	I _C mA	I _{CM} mA	P _{tot} at W	T _{amb} °C	T _{case} °C	h _{FE} at min-max	I _C mA
BFT44	P	TO-39(1)	300	300	-	500	-	5	-	-	50-150	10
BFT45	P	TO-39(1)	250	250	-	500	-	5	-	-	50-150	10
BFX34	N	TO-39(1)	120	60	-	2000	-	0,87	25	-	40-150	2000
BFY50	N	TO-39(1)	80	35	-	1000	-	0,8	25	-	112	150
BFY51			60	30	-							
BFY52			40	20	-							
BFY55			80	85	-							
BSR50	N	TO-92(3)	60	-	45	1000	-	0,8	25	-	2000	500
BSR51			80	-	60							
BSR52			100	-	80							
BSR60	P	TO-92(3)	60	-	45	1000	-	0,8	25	-	2000	500
BSR61			80	-	60							
BSR62			100	-	80							
BSS38	N	TO-92(2)	120	100	-	100	-	0,5	25	-	20	4
BSS50	N	TO-39(1)	60	-	45	1000	-	0,8	25	-	2000	500
BSS51			80	-	60							
BSS52			100	-	80							
BSS60	P	TO-39(1)	60	-	45	1000	-	0,8	25	-	2000	500
BSS61			80	-	60							
BSS62			100	-	80							
BSS68	P	TO-92(2)	110	100	-	100	-	0,5	25	-	30	25
BSV15-6,10,16	P	TO-39(1)	-	40	-	1000	-	0,8	25	-	6 40-100	100
BSV16-6,10,16			60	-	160							
BSV17-6,10			80	-	250							
BSV64	N	TO-39(1)	100	60	-	2000	-	5	-	50	40	2000
BSW66A	N	TO-39(1)	100	100	-	1000	-	0,8	25	-	30	500
BSW67A			120	120	-							
BSW68A			150	150	-							
BSX19	N	TO-18(1)	40	15	-	-	500	0,36	25	-	20-60	10
RSX20	N	TO-18(1)	40	15	-	-	500	0,36	25	-	40-120	10
BSX45-6,10,16	N	TO-39(1)	-	40	-	1000	-	5	-	25	6 40-100	100
BSX46-6,10,16			60	-	160							
BSX47-6,10			80	-	250							
BSX59	N	TO-39(1)	70	45	-	1000	-	0,8	25	-	30-90	500
BSX60			30	-	-							
BSX61			45	-	-							



For detailed information on these and other types see Data Handbook S3
 For case outlines and dimensions see page S163
 For packing quantities see page S162

characteristics (cont.)

f_T typ. MHz	V_{CEsat} at max V	I_C/I_B mA/mA	F_{at} typ. dB	f MHz	C_{re} and typ. pF	C_C at typ. pF	f MHz	G_{UM} typ. dB	f MHz	t'_{off} at max ns	I_C A	type
70 70	1,4 1,4	100/10 100/10	- -	- -	- -	< 15 < 15	1 1	- -	- -	125 125	0,5 0,5	BFT44 BFT45
100	1	5000/500	-	-	-	36	1	-	-	1200	5	BFX34
140 160 185 > 60	0,7 1 1 1	500/50 500/50 500/50 1000/100	- - - -	- - - -	- - - -	12	1	- - - -	- - - -	360	0,15	BFY50 BFY51 BFY52 BFY55
-	1,3	500/0,5	-	-	-	-	-	-	-	1500	1	BSR50 BSR51 BSR52
-	1,3	500/50	-	-	-	-	-	-	-	1500	0,5	BSR60 BSR61 BSR62
> 60	0,7	4/0,4	-	-	< 4,5	-	1	-	-	1000	0,015	BSS38
-	1,6	1000/4 1000/1 1000/4	-	-	-	-	-	-	-	1500	0,5	BSS50 BSS51 BSS51
-	1,6	1000/4 1000/1 1000/4	-	-	-	-	-	-	-	1500	0,5	BSS60 BSS61 BSS62
50	0,25	25/2,5	-	-	-	5	1	-	-	-	-	BSS68
50	1	500/25	-	-	-	20 20 15	1	-	-	650	0,1	BSV15-6,10,16 BSV16-6,10,16 BSV17-6,10
100	1	5000/500	-	-	-	80	1	-	-	1200	5	BSV64
130	0,4	500/50	-	-	-	20	1	-	-	900 typ.	0,5	BSW66A BSW67A BSW68A
500 600	1,5 1,5	100/10 100/10	- -	- -	- -	4 4	1 1	- -	- -	18 21	0,1 0,1	BSX19 BSX20
50	1 1 0,9	1000/100 1000/100 500/25	- - -	- - -	- - -	25 20 15	1	- - -	- - -	850	0,1	BSX45-6,10,16 BSX46-6,10,16 BSX47-6,10
450 475 475	1,2 1,3 1,3	500/50	- - -	- - -	- - -	6	1	- - -	- - -	60 70 100	0,5	BSX59 BSX60 BSX61



For detailed information on these and other types see Data Handbook S3

For case outlines and dimensions see page S163

For packing quantities see page S162

type	pol	case	ratings								characteristics	
			V _{CBO} V	V _{CEO} V	V _{CER} V	I _C mA	I _{CM} mA	P _{tot} at W	T _{amb} °C	T _{case} °C	h _{FE} at min-max	I _C mA
PH2222	N	TO-92(2)	60	30	-	800	-	0,625	25	-	75	10
PH2222A	N		75	40	-	-	50	-	-	-	-	-
PH2369	P		40	15	-	-	-	0,5	25	-	40-120	10
PH2907	P		60	40	-	600	-	0,625	25	-	100-300	150
PH2907A	P		60	60	-	600	-	0,625	25	-	100-300	150
PH5415	P	TO-92(2)	200	200	-	1000	-	0,5	25	-	30-150	50
PH5416	P	TO-92(2)	350	300	-	1000	-	0,5	25	-	30-150	50
2N918	N	TO-72(1)	30	15	-	50	-	0,2	25	-	20	3
2N1613		TO-39(1)	75	-	50	-	1000	0,8	-	-	40-120	150
2N1711		TO-39(1)	75	-	50	-	1000	0,8	-	-	100-300	150
2N1893		TO-39(1)	120	80	-	500	-	0,8	-	-	40-120	150
2N2219	N	TO-39(1)	60	30	-	800	-	0,8	25	-	100-300	150
2N2222		TO-18(1)	-	-	-	-	-	0,5	-	-	100-300	-
2N2219A	N	TO-39(1)	75	40	-	800	-	0,8	25	-	100-300	150
2N2222A		TO-18(1)	-	-	-	-	-	0,5	-	-	100-300	-
2N2297	N	TO-39(1)	80	35	-	1000	-	0,8	25	-	40-120	150
2N2368	N	TO-18(1)	40	15	-	-	500	0,36	25	-	20-60	10
2N2369			-	-	-	-	500	-	-	-	40-120	-
2N2369A			-	-	-	200	-	-	-	-	40-120	-
2N2904	P	TO-39(1)	60	40	-	600	-	0,6	25	-	40-120	150
2N2905		TO-39(1)	-	-	-	-	-	0,6	-	-	100-300	-
2N2906		TO-18(1)	-	-	-	-	-	0,4	-	-	40-120	-
2N2907		TO-18(1)	-	-	-	-	-	0,4	-	-	100-300	-
2N2904A	P	TO-39(1)	60	60	-	600	-	0,6	25	-	40-120	150
2N2905A		TO-39(1)	-	-	-	-	-	0,6	-	-	100-300	-
2N2906A		TO-18(1)	-	-	-	-	-	0,4	-	-	40-120	-
2N2907A		TO-18(1)	-	-	-	-	-	0,4	-	-	100-300	-
2N3019	N	TO-39(1)	140	80	-	1000	-	0,8	25	-	100-300	150
2N3020	N	TO-39(1)	140	80	-	1000	-	0,8	25	-	40-120	150



For detailed information on these and other types see Data Handbook S3

For case outlines and dimensions see page S163

For packing quantities see page S162

characteristics (cont.)

f_T typ. MHz	V_{CEsat} at max V	I_C/I_B mA/mA	F at typ. dB		f MHz	C_{re} and typ. pF	C_C at max. pF	f MHz	G_{UM} at typ. dB		f MHz	t_{off} at max ns	I_C A	type
250	0,4	150/15	-	-	-	-	8	0,1	-	-	-	-	-	PH2222
300	0,3	150/15	4	0,001	-	-	8	0,1	-	-	-	-	-	PH2222A
500	0,6	100/10	-	-	-	-	4	1	-	-	-	21	0,1	PH2369
200	1,6	500/50	-	-	-	-	8	0,1	-	-	-	-	-	PH2907
200	1,6	500/50	-	-	-	-	8	0,1	-	-	-	-	-	PH2907A
> 15	2,5	50/5	-	-	-	-	-	-	-	-	-	-	-	PH5415
> 15	2,5	50/5	-	-	-	-	-	-	-	-	-	-	-	PH5416
> 900	0,4	10/1	< 6	60	-	-	3	0,14	36	200	-	-	-	2N918
60	1,5	150/15	< 12	0,001	-	-	25	1	-	-	-	-	-	2N1613
70	1,5	150/15	< 8	0,001	-	-	25	1	-	-	-	-	-	2N1711
50	5	150/15	-	-	-	-	15	-	-	-	-	-	-	2N1893
250	0,4	150/15	-	-	-	-	8	0,1	-	-	-	-	-	2N2219
														2N2222
250	0,3	150/15	4	0,001	-	-	8	0,1	-	-	285	0,15	-	2N2219A
			4											2N2222A
> 60	1,0	1000/100	-	-	-	-	12	0,5	-	-	-	-	-	2N2297
> 400	0,25	10/1	-	-	-	-	4	0,14	-	-	15	0,01	-	2N2368
> 500	0,25										18		-	2N2369
> 500	0,2										18		-	2N2369A
> 200	0,4	150/15	-	-	-	-	8	0,1	-	-	100	0,15	-	2N2904
													-	2N2905
													-	2N2906
													-	2N2907
> 200	0,4	150/15	-	-	-	-	8	0,1	-	-	100	0,15	-	2N2904A
													-	2N2905A
													-	2N2906A
													-	2N2907A
> 100	0,2	150/15	-	-	-	-	12	1	-	-	-	-	-	2N3019
> 80	0,2	150/15	-	-	-	-	12	1	-	-	-	-	-	2N3020

S



For detailed information on these and other types see Data Handbook S3

For case outlines and dimensions see page S163

For packing quantities see page S162

type	pol	case	ratings								characteristics	
			V _{CBO} V	V _{CEO} V	V _{CER} V	I _C mA	I _{CM} mA	P _{tot} at W	T _{amb} °C	T _{case} °C	h _{FE} at min-max	I _C mA
2N3903	N	TO-92	60	40	-	200	-	0,35	25	-	50-150	10
2N3904	N	TO-92	40	40	-	200	-	0,35	25	-	100-300	10
2N3905	P										50-150	
2N3906	P										100-300	
2N4030	P	TO-39(1)	60	60	-	1000	-	0,8	25	-	25	500
2N4031			80	80	-						25	
2N4032			60	60	-						70	
2N4033			80	80	-						70	
2N4123	N	TO-92	40	30	-	200	-	0,35	25	-	50-150	2
2N4124	N	TO-92	30	25	-	200	-	0,35	25	-	120-360	2
2N4125	P										50-150	
2N4126	P										120-360	
2N5400	P	TO-92	130	120	-	600	-	0,625	20	-	-	-
2N5401	P	TO-92	160	150	-	600	-	0,625	20	-	-	-
2N5415	P	TO-39(1)	200	200	-	1000	-	1	50	-	30-150	50
2N5416	P	TO-39(1)	350	300	-	1000	-	1	50	-	30-120	50
2N5550	N	TO-92	160	140	-	600	-	0,625	20	-	40-180	10
2N5551	N	TO-92	180	160	-	600	-	0,625	20	-	50-240	10



For detailed information on these and other types see Data Handbook S3

For case outlines and dimensions see page S163

For packing quantities see page S162



characteristics (cont.)

f_T typ. MHz	V_{CEsat} at max V	I_C/I_B mA/mA	F at typ. dB	f MHz	C_{re} and typ. pF	C_C at max. pF	f MHz	G_{UM} at typ. dB	f MHz	t_{off} at max ns	I_C A	type
250	0,3	50/5	6		-	4	0,1	-	-	-	-	2N3903
300	0,3	50/5	5	at 10 Hz	-	4	0,1	-	-	-	-	2N3904
200	0,4	50/5	5	to	-	4,5	0,1-1	-	-	-	-	2N3905
250	0,4	50/5	4	15,7 KHz	-	4,5	0,1-1	-	-	-	-	2N3906
> 100	0,5	500/50	-	-	-	20	1	-	-	400	0,5	2N4030
> 100												2N4031
> 150												2N4032
> 150												2N4033
250	0,3	50/5	6		-	4	0,1	-	-	-	-	2N4123
300	0,3	50/5	5	at 10 Hz	-	4	0,1	-	-	-	-	2N4124
200	0,4	50/5	5	to	-	4,5	0,1	-	-	-	-	2N4125
250	0,4	50/5	4	15,7 KHz	-	4,5	0,1	-	-	-	-	2N4126
-	0,5	50/5	8	-	-	6	1	-	-	-	-	2N5400
-	0,5	50/5	8	-	-	6	1	-	-	-	-	2N5401
	2,5	50/5	-	-	-	15	1	-	-	125	0,5	2N5415
	2,0	50/5	-	-	-	15	1	-	-	125	0,5	2N5416
-	0,25	50/5	10	-	-	6	1	-	-	-	-	2N5550
-	0,25	50/5	8	-	-	6	1	-	-	-	-	2N5551



General-purpose Darlingtons

For detailed information on these and other types see Data Handbook S4a

For case outlines and dimensions see page S163

For packing quantities see page S162

Voltage range 45 to 15 V
 Current range 1 to 25 A
 D.C. current gain 500 to 1000

I_C A	V_{CE0} V	N-P-N type	P-N-P type	h_{FE}	case
1	45 60 80	BDX42 BDX43 BDX44	BDX45 BDX46 BDX47	1500 1500 1500	TO-126 TO-126 TO-126
4	45 60 80 100 120 80 80 100 120 60 80 100	BD675 BD677 BD679 BD681 BD683 BDT61 BDT61A BDT61B BDT61C TIP110 TIP111 TIP112	BD676 BD678 BD680 BD682 BD684 BDT60 BDT60A BDT60B BDT60C TIP115 TIP116 TIP117	750 750 750 750 750 750 750 750 750 500 500 500	TO-126 TO-126 TO-126 TO-126 TO-126 TO-220* TO-220* TO-220* TO-220* TO-220 TO-220 TO-220
5	60 80 100	TIP120 TIP121 TIP122	TIP125 TIP126 TIP127	1000 1000 1000	TO-220 TO-220 TO-220
6	60 80 100 120	BD331 BD333 BD335 BD337	BD332 BD334 BD336 BD338	750 750 750 750	SOT-82 SOT-82 SOT-82 SOT-82
8	60 80 100 120 60 80 100 120 200 180 150 60 80 100	BD645 BD647 BD649 BD651 BDX63 BDX63A BDX63B BDX63C BU806/01 BU806A/01 BU807/01 TIP130 TIP131 TIP132	BD646 BD648 BD650 BD652 BDX62 BDX62A BDX62B BDX62C - - - TIP135 TIP136 TIP137	750 750 750 750 1000 1000 1000 1000 - - - 1000 1000 1000	TO-220* TO-220* TO-220* TO-220* TO-3 TO-3 TO-3 TO-3 TO-220* TO-220 TO-220* TO-220 TO-220 TO-220
10	60 80 100 120 60 80 100	BDT63 BDT63A BDT63B BDT63C TIP140 TIP141 TIP142	BDT62 BDT62A BDT62B BDT62C TIP145 TIP146 TIP147	1000 1000 1000 1000 1000 1000 1000	TO-220* TO-220* TO-220* TO-220* SOT-93 SOT-93 SOT-93

* also available in SOT-186 (F-pack): 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 S4a
 For case outlines and dimensions see page S163
 For packing quantities see page S162



I_C A	V_{CE0} V	N-P-N type	P-N-P type	h_{FE}	case
12	60	BDT65	BDT64	1000	TO-220*
	80	BDT65A	BDT64A	1000	TO-220*
	100	BDT65B	BDT64B	1000	TO-220*
	120	BDT65C	BDT64C	1000	TO-220*
	60	BDV65	BDV64	1000	SOT-93
	80	BDV65A	BDV64A	1000	SOT-93
	100	BDV65B	BDV64B	1000	SOT-93
	120	BDV65C	BDV64C	1000	SOT-93
	60	BDX65	BDX64	1000	TO-3
	80	BDX65A	BDX64A	1000	TO-3
	100	BDX65B	BDX64B	1000	TO-3
	120	BDX65C	BDX64C	1000	TO-3
16	80	BDV67A	BDV66A	1000	SOT-93
	100	BDV67B	BDV66B	1000	SOT-93
	120	BDV67C	BDV66C	1000	SOT-93
	150	BDV67D	BDV66D	1000	SOT-93
	60	BDX67	BDX66	1000	TO-3
	80	BDX67A	BDX66A	1000	TO-3
	100	BDX67B	BDX66B	1000	TO-3
	120	BDX67C	BDX66C	1000	TO-3
25	60	BDX69	BDX68	1000	TO-3
	80	BDX69A	BDX68A	1000	TO-3
	100	BDX69B	BDX68B	1000	TO-3
	120	BDX69C	BDX68C	1000	TO-3

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



Electronic
 components
 and materials

PHILIPS

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 S4a
 For case outlines and dimensions see page S163
 For packing quantities see page S162

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

I_C A	V_{CE0} V	N-P-N type	P-N-P type	h_{FE}	case	
1	45	BD135	BD136	40-250	TO-126	
	60	BD137	BD138	40-250	TO-126	
	80	BD139	BD140	40-250	TO-126	
	45	BD825	BD826	40-250	TO-202	
	60	BD827	BD828	40-250	TO-202	
	80	BD829	BD830	40-250	TO-202	
	40	BDT29	BDT30	15-75	TO-220*	
	60	BDT29A	BDT30A	15-75	TO-220*	
	80	BDT29B	BDT30B	15-75	TO-220*	
	100	BDT29C	BDT30C	15-75	TO-220*	
	40	TIP29	TIP30	15-75	TO-220	
	60	TIP29A	TIP30A	15-75	TO-220	
	80	TIP29B	TIP30B	15-75	TO-220	
	100	TIP29C	TIP30C	15-75	TO-220	
	45	BDW55	BDW56	40-250	TO-126	
	60	BDW57	BDW58	40-250	TO-126	
	80	BDW59	BDW60	40-250	TO-126	
	1,5	45	BD226	BD227	40-250	TO-126
		60	BD228	BD229	40-160	TO-126
		80	BD230	BD231	40-160	TO-126
45		BD839	BD840	40-250	TO-202	
60		BD841	BD842	40-250	TO-202	
80		BD843	BD844	40-250	TO-202	
100		BD845	BD846	30	TO-202	
120		BD847	BD848	30	TO-202	
140		BD849	BD850	30	TO-202	
2		45	BD233	BD234	40-250	TO-126
	60	BD235	BD236	40-250	TO-126	
	80	BD237	BD238	40-250	TO-126	
	45	BD813	BD814	25	TO-202	
	60	BD815	BD816	25	TO-202	
	80	BD817	BD818	25	TO-202	

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



Electronic components and materials

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

For detailed information on these and other types see Data Handbook S44

For case outlines and dimensions see page S163

For packing quantities see page S162

I_C A	V_{CE0} V	N-P-N type	P-N-P type	h_{FE}	case
3	45	BD131	BD132	40	TO-126
	45	BD239	BD240	15	TO-220
	60	BD239A	BD240A	15	TO-220
	80	BD239B	BD240B	15	TO-220
	100	BD239C	BD240C	15	TO-220
	20	BD329	BD330	85-375	TO-126
	45	BD933	BD934	40-250	TO-220*
	60	BD935	BD936	40-250	TO-220*
	80	BD937	BD938	40-250	TO-220*
	100	BD939	BD940	40-250	TO-220*
	120	BD941	BD942	40-250	TO-220*
	150	BD941A	BD942A	40-250	TO-220*
	45	BDT31	BDT32	10-50	TO-220*
	60	BDT31A	BDT32A	10-50	TO-220*
	80	BDT31B	BDT32B	10-50	TO-220*
	100	BDT31C	BDT32C	10-50	TO-220*
	45	TIP31	TIP32	10-50	TO-220
	60	TIP31A	TIP32A	10-50	TO-220
	80	TIP31B	TIP32B	10-50	TO-220
	100	TIP31C	TIP32C	10-50	TO-220
4	22	BD433	BD434	85-475	TO-126
	32	BD435	BD436	85-475	TO-126
	45	BD437	BD438	85-475	TO-126
5	45	BD241	BD242	25	TO-220
	60	BD241A	BD242A	25	TO-220
	80	BD241B	BD242B	25	TO-220
	100	BD241C	BD242C	25	TO-220
	22	BD943	BD944	85-475	TO-220*
	32	BD945	BD946	85-475	TO-220*
	45	BD947	BD948	85-475	TO-220*
	60	BD949	BD950	40	TO-220*
	80	BD951	BD952	40	TO-220*
	100	BD953	BD954	40	TO-220*
	120	BD955	BD956	40	TO-220*
	60	BDX35	-	45-450	TO-126
	60	BDX36	-	45-450	TO-126
80	BDX37	-	45-450	TO-126	
6	40	BDT41	BDT42	15-75	TO-220*
	60	BDT41A	BDT42A	15-75	TO-220*
	80	BDT41B	BDT42B	15-75	TO-220*
	100	BDT41C	BDT42C	15-75	TO-220*
	40	TIP41	TIP42	15-75	TO-220
	60	TIP41A	TIP42A	15-75	TO-220
	80	TIP41B	TIP42B	15-75	TO-220
	100	TIP41C	TIP42C	15-75	TO-220

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

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 S4a and S4b
 For case outlines and dimensions see page S163
 For packing quantities see page S162

I_C A	V_{CE0} V	N-P-N type	P-N-P type	h_{FE}	case	
7	150	BU407	-	50	TO-220*	
	200	BU406	-	50	TO-220*	
8	45	BD201	BD202	30	TO-220*	
	60	BD203	BD204	30	TO-220*	
	80	BDX77	BDX78	30	TO-220*	
	45	BD243	BD244	15	TO-220*	
	60	BD243A	BD244A	15	TO-220*	
	80	BD243B	BD244B	15	TO-220*	
	100	BD243C	BD244C	15	TO-220*	
	130	BDT21	BDT20	500	TO-220*	
	60	BDX91	BDX92	20	TO-3	
	80	BDX93	BDX94	20	TO-3	
	100	BDX95	BDX96	20	TO-3	
	10	60	BDT91	BDT92	20-200	TO-220*
		80	BDT93	BDT94	20-200	TO-220*
100		BDT95	BDT96	20-200	TO-220*	
60		BDV91	BDV92	20	SOT-93	
80		BDV93	BDV94	20	SOT-93	
100		BDV95	BDV96	20	SOT-93	
60		BDY92	-	30-120	TO-3	
80		BDY91	-	30-120	TO-3	
100		BDY90	-	30-120	TO-3	
60		PH3055T	PH2955T	20-70	TO-220	
40		TIP33	TIP34	20-100	SOT-93	
60		TIP33A	TIP34A	20-100	SOT-93	
80		TIP33B	TIP34B	20-100	SOT-93	
100		TIP33C	TIP34C	20-100	SOT-93	
12		100	BDY90A	-	30-120	TO-3
	120	BUV27	-	-	TO-220*	
	150	BUV27A	-	-	TO-220*	
14	90	BUV26	-	-	TO-220*	
	100	BUV26A	-	-	TO-220*	
15	60	BDT51	BDT52	50	TO-220	
	80	BDT53	BDT54	50	TO-220	
	100	BDT55	BDT56	50	TO-220	
	120	BDT57	BDT58	50	TO-220	
	60	BDT81	BDT82	50	TO-220*	
	80	BDT83	BDT84	50	TO-220*	
	100	BDT85	BDT86	50	TO-220*	
	100	BDT85A	BDT86A	50	TO-220	
	120	BDT87	BDT88	50	TO-220*	
	120	BDT87A	BDT88A	50	TO-220*	
	60	TIP3055	TIP2955	5	SOT-93	

* also available in SOT-186 (F-pack): 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 S4b

For case outlines and dimensions see page S163

For ordering quantities see page S162

Voltage range 90 to 700 V
Current range 0,05 to 30 A

I_C A	V_{CE0} V	V_{CBO} V	type	pol.	case	remarks
0,05	250	250	BF469	NPN	TO-126	
	250	250	BF470	PNP	TO-126	
	300	300	BF471	NPN	TO-126	
	300	300	BF472	PNP	TO-126	
	250	250	BF869	NPN	TO-202	
	250	250	BF870	PNP	TO-202	
	300	300	BF871	NPN	TO-202	
	300	300	BF872	PNP	TO-202	
0,1	250	300	BF419	NPN	TO-126	
	160	160	BF457	NPN	TO-126	
	250	250	BF458	NPN	TO-126	
	300	300	BF459	NPN	TO-126	
	250	300	BF819	NPN	TO-202	
	160	160	BF857	NPN	TO-202	
	250	250	BF858	NPN	TO-202	
	300	300	BF859	NPN	TO-202	
0,5	375	650	BU824	NPN	TO-202	Darlington
	400	800	BUX86	NPN	TO-126	
	450	1000	BUX87	NPN	TO-126	
1	250	350	TIP47	NPN	TO-220	
	300	400	TIP48	NPN	TO-220	
	350	450	TIP49	NPN	TO-220	
	400	500	TIP50	NPN	TO-220	
1,5	300	730	BUX99	NPN	TO-126	
	300	600	PH13002	NPN	TO-126	
	400	700	PH13003	NPN	TO-126	
2	400	800	BUW84	NPN	SOT-82	
	450	1000	BUW85	NPN	SOT-82	
	375	500	BUX79	NPN	SOT-82	
	400	800	BUX84	NPN	TO-220*	
	450	1000	BUX85	NPN	TO-220*	
2,5	700	1500	BU505	NPN	TO-220	
	700	1500	BU505D**	NPN	TO-220	
	700	1500	BU705	NPN	SOT-93	

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

** incl. efficiency diode. $V_F < 1,8$ V at $I_F = 2$ A



Electronic
components
and materials

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

High voltage transistors (cont.)

For detailed information on these and other types see Data Handbook S4b
 For case outlines and dimensions see page S163
 For ordering quantities see page S162

I_C A	V_{CE0} V	V_{CBO} V	type	pol.	case	remarks
4	700	1500	BU506	NPN	TO-220	
	700	1500	BU506D**	NPN	TO-220	
	700	1500	BU705	NPN	SOT-93	
	700	1500	BU706	NPN	SOT-93	
	700	1500	BU706D**	NPN	SOT-93	
	225	300	D44Q5	NPN	TO-220	
	300	600	MJE13004	NPN	TO-220	
	400	700	MJE13005	NPN	TO-220	
	300	600	BU304F	NPN	SOT-186	
	400	700	BU305F	NPN	SOT-186	
	5	300	550	BUP21	NPN	SOT-93
350		650	BUP21A	NPN	SOT-93	
400		750	BUP21B	NPN	SOT-93	
450		850	BUP21C	NPN	SOT-93	
400		850	BUS11	NPN	TO-3	
450		1000	BUS11A	NPN	TO-3	
300		550	BUS21	NPN	TO-3	
350		650	BUS21A	NPN	TO-3	
400		750	BUS21B	NPN	TO-3	
450		850	BUS21C	NPN	TO-3	
400		850	BUT11	NPN	TO-220*	
450		1000	BUT11A	NPN	TO-220*	
300		550	BUT21	NPN	TO-220*	
350		650	BUT21A	NPN	TO-220*	
400		750	BUT21B	NPN	TO-220*	
450		850	BUT21C	NPN	TO-220*	
400		850	BUW11	NPN	SOT-93	
450		1000	BUW11A	NPN	SOT-93	
400		850	BUX46	NPN	TO-3	
450		1000	BUX46A	NPN	TO-3	
6	400	800	BU826	NPN	TO-3	Darlington
	450	900	BU826A	NPN	TO-3	Darlington
	800	1500	BUY89	NPN	TO-3	

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

** incl. efficiency diode. $V_F < 1,8 \text{ V}$ at $I_F = 2 \text{ A}$



Electronic
components
and materials

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

High voltage transistors (cont.)

For detailed information on these and other types see Data Handbook S4b

For case outlines and dimensions see page S163

For ordering quantities see page S162

I_C A	V_{CE0} V	V_{CB0} V	type	pol.	case
8	700	1500	BU508	NPN	SOT-93
	700	1500	BU508D**	NPN	SOT-93
	300	550	BUP22	NPN	SOT-93
	350	650	BUP22A	NPN	SOT-93
	400	750	BUP22B	NPN	SOT-93
	450	850	BUP22C	NPN	SOT-93
	400	850	BUS12	NPN	TO-3
	450	1000	BUS12A	NPN	TO-3
	300	550	BUS22	NPN	TO-3
	350	650	BUS22A	NPN	TO-3
	400	750	BUS22B	NPN	TO-3
	450	850	BUS22C	NPN	TO-3
	300	550	BUT22	NPN	TO-220
	350	650	BUT22A	NPN	TO-220
	400	750	BUT22B	NPN	TO-220
	450	850	BUT22C	NPN	TO-220
	800	1200	BUV89	NPN	SOT-93
	400	850	BUW12	NPN	SOT-93
	450	1000	BUW12A	NPN	SOT-93
	400	850	BUX47	NPN	TO-3
	450	1000	BUX47A	NPN	TO-3
	400	800	BUX80	NPN	TO-3
	450	1000	BUX81	NPN	TO-3
	300	600	MJE13006	NPN	TO-220
	400	700	MJE13007	NPN	TO-220
	300	600	BU306F	NPN	SOT-186
	400	700	BU307F	NPN	SOT-186
10	400	850	BUT12	NPN	TO-220
	450	1000	BUT12A	NPN	TO-220
	200	400	BUV28	NPN	TO-220*
	225	450	BUV28A	NPN	TO-220*
	700	1200	MJ8504	NPN	TO-3
	800	1400	MJ8505	NPN	TO-3

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

** incl. efficiency diode. $V_F < 2,2$ V at $I_F = 4$ A



Electronic
components
and materials

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

High voltage transistors (cont.)

For detailed information on these and other types see Data Handbook S4b

For case outlines and dimensions see page S163

For ordering quantities see page S162

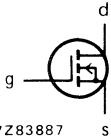
I_C A	V_{CEO} V	V_{CBO} V	type	pol.	case	remarks
12	700	1500	BU808	NPN	TO-3	Darlington
	400	650	BUV90	NPN	SOT-93	
	800	1200	BUX88	NPN	TO-3	
	300	600	MJE13008	NPN	TO-220	
	400	700	MJE13009	NPN	TO-220	
	300	600	BU308F	NPN	SOT-186	
	400	700	BU309F	NPN	SOT-186	
15	300	550	BUP23	NPN	SOT-93	
	350	650	BUP23A	NPN	SOT-93	
	400	750	BUP23B	NPN	SOT-93	
	450	850	BUP23C	NPN	SOT-93	
	400	850	BUS13	NPN	TO-3	
	450	1000	BUS13A	NPN	TO-3	
	300	550	BUS23	NPN	TO-3	
	350	650	BUS23A	NPN	TO-3	
	400	750	BUS23B	NPN	TO-3	
	450	850	BUS23C	NPN	TO-3	
	400	850	BUW13	NPN	SOT-93	
	450	1000	BUW13A	NPN	SOT-93	
	400	850	BUX48	NPN	TO-3	
	450	1000	BUX48A	NPN	TO-3	
	300	450	2N6676	NPN	TO-3	
	350	550	2N6677	NPN	TO-3	
400	650	2N6678	NPN	TO-3		
30	400	850	BUS14	NPN	TO-3	
	450	1000	BUS14A	NPN	TO-3	
	300	550	BUS24	NPN	TO-3	
	350	650	BUS24A	NPN	TO-3	
	400	750	BUS24B	NPN	TO-3	
	450	850	BUS24C	NPN	TO-3	
	400	850	BUX98	NPN	TO-3	
	450	100	BUX98A	NPN	TO-3	



For detailed information on these and other types see Data Handbook S9
For case outlines and dimensions see page S163
For packing quantities see page S162

- Very low on-state resistance
- Microcomputer and TTL compatibility
- Intended for use in motor control, SMPS, welding, dc/dc and dc/ac converters

Drain source voltage 50 to 1000 V
Drain current 2 to 45 A



V_{DS} max. V	I_D max. A	type number	P_{tot} max. W	$R_{DS ON} < \Omega$	V_F typ. V	g_{fs} typ. A/V	t_f typ. ns	C_{rs} typ pF	case
50	12	BUZ10	75	0,1	1,4	4,8	60	120	TO-220
	12	BUZ10A	75	0,12	1,4	4,8	60	120	TO-220
	30	BUZ11	75	0,04	1,7	8,0	450	360	TO-220
	25	BUZ11A	75	0,06	1,6	8,0	450	360	TO-220
	12	BUZ71	40	0,1	1,6	4,8	150	160	TO-220
	12	BUZ71A	40	0,12	1,6	4,8	-	160	TO-220
	39	BUZ14	125	0,04	1,7	12,0	200	500	TO-3
	45	BUZ15	125	0,03	1,8	12,0	200	500	TO-3
	100	12	BUZ20	75	0,2	1,4	4,0	60	80
18		BUZ21	75	0,1	1,6	3,5	60	200	TO-220
10		BUZ72	40	0,2	1,55	3,8	150	80	TO-220
9		BUZ72A	40	0,25	1,55	3,8	150	80	TO-220
10		BUZ23	78	0,2	1,3	4,0	60	80	TO-3
32		BUZ24	125	0,06	1,5	10,0	200	500	TO-3
19		BUZ25	78	0,1	1,5	8,0	450	360	TO-3
200		7	BUZ30	75	0,75	1,15	3,5	60	100
	12,5	BUZ31	75	0,2	1,4	5,0	60	140	TO-220
	9,5	BUZ32	75	0,4	1,3	3,5	60	100	TO-220
	5,8	BUZ73A	40	0,6	1,4	3,5	130	60	TO-220
	7,2	BUZ33	78	0,75	1,15	3,5	60	100	TO-3
	17	BUZ34	125	0,2	1,15	7,5	200	500	TO-3
	9,9	BUZ35	78	0,4	1,3	3,5	60	100	TO-3
	22	BUZ36	125	0,12	1,2	7,5	200	500	TO-3
	400	5,5	BUZ60	75	1,0	1,15	2,5	100	30
4,5		BUZ60B	75	1,5	1,15	2,5	100	30	TO-220
3,0		BUZ76	40	1,8	1,1	2,5	100	25	TO-220
2,6		BUZ76A	40	2,5	1,1	2,5	100	25	TO-220
5,9		BUZ63	78	1,0	1,2	2,5	100	30	TO-3
4,5		BUZ63B	78	1,5	1,15	2,5	100	30	TO-3
10,5		BUZ64	125	0,4	1,3	4,5	100	100	TO-3
450		10	BUZ45C	125	0,5	1,3	4,0	100	100



For detailed information on these and other types see Data Handbook S9
For case outlines and dimensions see page S163
For packing quantities see page S162

V_{DS} max. V	I_D max. A	type number	P_{tot} max. W	$R_{DS\ ON}$ < Ω	V_F typ. V	g_{fs} typ. A/V	t_f typ. ns	C_{rs} typ pF	case
500	2,5	BUZ40	75	4,5	1,0	2,5	100	30	TO-220
	4,5	BUZ41A	75	1,5	1,1	2,5	100	30	TO-220
	4,0	BUZ42	75	2,0	1,1	2,5	100	30	TO-220
	2,4	BUZ74	40	3,0	1,0	2,5	100	20	TO-220
	2,0	BUZ74A	40	3,0	1,0	2,5	100	20	TO-220
	2,8	BUZ43	78	4,5	1,05	2,5	100	30	TO-3
	4,8	BUZ44A	78	1,5	1,15	2,5	100	30	TO-3
	9,6	BUZ45	125	0,6	1,3	4,0	100	100	TO-3
	8,3	BUZ45A	125	0,8	1,3	4,0	100	100	TO-3
	10	BUZ45B	125	0,5	1,3	4,0	100	100	TO-3
	4,2	BUZ46	78	2,0	1,1	2,5	100	30	TO-3
800	2,6	BUZ80	75	4,0	1,05	1,8	100	30	TO-220
	3,0	BUZ80A	75	3,0	1,05	1,8	100	30	TO-220
	2,9	BUZ83	78	4,0	1,05	1,8	100	30	TO-3
	3,4	BUZ83A	78	3,0	1,1	1,8	100	30	TO-3
	5,3	BUZ84	125	2,0	1,0	3,0	100	100	TO-3
	6,0	BUZ84A	125	1,5	1,1	3,0	100	100	TO-3
1000	2,5	BUZ50A	75	5,0	1,05	1,5	100	30	TO-220
	2,0	BUZ50B	75	8,0	1,05	1,5	100	30	TO-220
	2,6	BUZ53A	78	5,0	1,05	1,5	100	30	TO-3
	5,3	BUZ54	125	2,0	1,15	2,0	100	100	TO-3
	4,6	BUZ54A	125	2,6	1,15	2,0	100	100	TO-3



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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbook S4a
For case outlines and dimensions see page S163
For packing quantities see page S162

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.



Electronic
components
and materials

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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbook S4a

For case outlines and dimensions see page S163

For packing quantities see page S162

type	pol.	case	ratings						
			V_{CBO} V	V_{CERM} V	V_{CEO} V	V_{CER} V	I_C A	P_{tot} at W	T_{mb} °C
BD131	N	TO-126	70		45		3	15	60
BD132	P	TO-126	45		45		3	15	60
BD135	N	TO-126	45		45		1	8	70
BD137			60		60				
BD139			100		80				
BD136	P	TO-126	45		45		1	8	70
BD138			60		60				
BD140			100		80				
BD201	N	TO-220AB	60		45		8	60	25
BD203	N	TO-220AB	60		60		8	60	25
BD202	P	TO-220AB	60		45		8	60	25
BD204	P	TO-220AB	60		60		8	60	25
BD226	N	TO-126	45		45		1,5	12,5	62
BD228			60		60				
BD230			100		80				
BD227	P	TO-126	45		45		1,5	12,5	62
BD229			60		60				
BD231			100		80				
BD233	N	TO-126	45		45		2	25	25
BD235			60		60				
BD237			100		80				
BD234	P	TO-126	45		45		2	25	25
BD236			60		60				
BD238			100		80				
BD239	N	TO-220AB	45		45		3	30	25
BD239A			60		60				
BD239B			80		80				
BD239C			100		100				
BD240	P	TO-220AB	45		45		3	30	25
BD240A			60		60				
BD240B			80		80				
BD240C			100		100				



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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbook S4a

For case outlines and dimensions see page S163

For packing quantities see page S162

characteristics						type
h_{FE} at min-max	I_C A	f_{hfe} typ kHz	f_T typ MHz	V_{CEsat} max V	at I_C/I_B A/mA	
40 40	0,5 0,5	- -	> 60 > 60	0,7 0,7	2/200 2/200	BD131 BD132
40-250	0,15	-	250	0,5	0,5/5	BD135 BD137 BD139 BD136 BD138 BD140
40-250	0,15	-	75	0,5	0,5/5	
30 30	3 2	25 25	> 3 > 3	1 1	3/300 3/300	BD201 BD203
30 30	3 2	25 25	> 3 > 3	1 1	3/300 3/300	BD202 BD204
40-250 40-160 40-160	0,15	-	125	0,8	1/100	BD226 BD228 BD230
40-250 40-160 40-160	0,15	-	50	0,8	1/100	BD227 BD229 BD231
40-250	0,15	-	> 3	0,6	1/100	BD233 BD235 BD237
40-250	0,15	-	> 3	0,6	1/100	BD234 BD236 BD238
15	1	-	> 3	0,6	1/200	BD239 BD239A BD239B BD239C
15	1	-	> 3	0,6	1/200	BD240 BD240A BD240B BD240C



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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbook S4a
 For case outlines and dimensions see page S163
 For packing quantities see page S162

type	pol.	case	ratings						
			V_{CBO} V	V_{CERM} V	V_{CEO} V	V_{CER} V	I_C A	P_{tot} at W	T_{mb} °C
BD241 BD241A BD241B BD241C	N	TO-220AB	45 60 80 100		45 60 80 100		5	40	25
BD242 BD242A BD242B BD242C	P	TO-220AB	45 60 80 100		45 60 80 100		5	40	25
BD243 BD243A BD243B BD243C	N	TO-220AB	45 60 80 100		45 60 80 100		8	65	25
BD244 BD244A BD244B BD244C	P	TO-220AB	45 60 80 100		45 60 80 100		8	65	25
BD329 BD330	N P	TO-126 TO-126	32 32		20 20		3 3	15 15	45 45
BD331 BD333 BD335 BD337	N	SOT-82	60 80 100 120		60 80 100 120		6	60	25
BD332 BD334 BD336 BD338	P	SOT-82	60 80 100 120		60 80 100 120		6	60	25
BD433 BD435 BD437	N	TO-126	22 32 45		22 32 45		4	36	25
BD434 BD436 BD438	P	TO-126	22 32 45		22 32 45		4	36	25
BD645 BD647 BD649 BD651	N	TO-220AB*	80 100 120 140		60 80 100 120		8	62,5	25
BD646 BD648 BD650 BD652	P	TO-220AB*	60 80 100 120		60 80 100 120		8	62,5	25

* Also available in SOT-186 (F-pack): add suffix **F** to type number



For detailed information on these and other types see Data Handbook S4a

For case outlines and dimensions see page S163

For packing quantities see page S162

characteristics						type
h_{FE} at min-max	I_C A	f_{hfe} typ kHz	f_T typ MHz	V_{CEsat} at max V	I_C/I_B A/mA	
25	1	-	> 3	1,2	3/600	BD241 BD241A BD241B BD241C
25	1	-	> 3	1,2	3/600	BD242 BD242A BD242B BD242C
15	3	-	> 3	1,5	6/1000	BD243 BD243A BD243B BD243C
15	3	-	> 3	1,5	6/1000	BD244 BD244A BD244B BD244C
85-375 85-375	0,5 0,5	- -	130 100	0,5 0,5	2/200 2/200	BD329 BD330
750	3	60	7	2	3/12	BD331 BD333 BD335 BD337
750	3	60	7	2	3/12	BD332 BD334 BD336 BD338
85-475 85-475 85-375	0,5	-	> 3	0,5 0,5 0,7	2/200 2/200 3/300	BD433 BD435 BD437
85-475 85-475 85-375	0,5	-	> 3	0,5 0,5 0,7	2/200 2/200 3/300	BD434 BD436 BD438
750	3	50	-	2	3/12	BD645 BD647 BD649 BD651
750	3	100	-	2	3/12	BD646 BD648 BD650 BD652



For detailed information on these and other types see Data Handbook S4a

For case outlines and dimensions see page S163

For packing quantities see page S162

type	pol.	case	ratings						
			V_{CBO} V	V_{CERM} V	V_{CEO} V	V_{CER} V	I_C A	P_{tot} at W	T_{mb} °C
BD675	N	TO-126	45		45		4	40	25
BD677			60		60				
BD679			80		80				
BD681			100		100				
BD683			120		120				
BD676	P	TO-126	45		45		4	40	25
BD678			60		60				
BD680			80		80				
BD682			100		100				
BD684			120		120				
BD813	N	TO-202	45		45		2	12,5	25
BD815			60		60				
BD817			100		80				
BD814	P	TO-202	45		45		2	12,5	25
BD816			60		60				
BD818			100		80				
BD825	N	TO-202	45		45		1	8	50
BD827			60		60				
BD829			100		80				
BD826	P	TO-202	45		45		1	8	50
BD828			60		60				
BD830			100		80				
BD839	N	TO-202	45		45		1,5	10	62
BD841			60		60				
BD843			100		80				
BD840	P	TO-202	45		45		1,5	10	62
BD842			60		60				
BD844			100		80				
BD845	N	TO-202	100		100		1,5	10	25
BD847			120		120				
BD849			140		140				
BD846	P	TO-202	100		100		1,5	10	25
BD848			120		120				
BD850			140		140				



For detailed information on these and other types see Data Handbook S4a

For case outlines and dimensions see page S163

For packing quantities see page S162

characteristics						type
h_{FE} at min-max	I_C A	f_{hfe} typ kHz	f_T typ MHz	V_{CEsat} at max V	I_C/I_B A/mA	
750	1,5	-	7	2,5	1,5/6	BD675 BD677 BD679 BD681 BD683
750	1,5	-	7	2,5	1,5/6	BD676 BD678 BD680 BD682 BD684
25	1	-	>3	0,6	1/100	BD813 BD815 BD817
25	1	-	>3	0,6	1/100	BD814 BD816 BD818
40-250	0,15	-	250	0,5	0,5/50	BD825 BD827 BD829
40-250	0,15	-	75	0,5	0,5/50	BD826 BD828 BD830
40-250	0,15	-	125	0,8	1/100	BD839 BD841 BD843
40-250	0,15	-	50	0,8	1/100	BD840 BD842 BD844
30	0,5	-	150	1,0	0,5/50	BD845 BD847 BD849
30	0,5	-	75	1,0	0,5/50	BD846 BD848 BD850



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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4a

For case outlines and dimensions see page S163

For packing quantities see page S162

type	pol.	case	ratings						
			V_{CBO} V	V_{CERM} V	V_{CEO} V	V_{CER} A	I_C W	P_{tot} at $^{\circ}C$	T_{mb}
BD933 BD935 BD937 BD939 BD941 BD941A	N	TO-220AB*	45 60 100 120 140 160		45 60 80 100 120 150		3	30	25
BD934 BD936 BD938 BD940 BD942 BD942A	P	TO-220AB*	45 60 100 120 140 160		45 60 80 100 120 150		3	30	25
BD943 BD945 BD947	N	TO-220AB*	22 32 45		22 32 45		5	40	25
BD944 BD946 BD948	P	TO-220AB*	22 32 45		22 32 45		5	40	25
BD949 BD951 BD953 BD955	N	TO-220AB*	60 80 100 120		60 80 100 120		5	40	25
BD950 BD952 BD954 BD956	P	TO-220AB*	60 80 100 120		60 80 100 120		5	40	25
BDT20 BDT21	P N	TO-220AB TO-220AB	130 130		130 130		8 8	62,5 62,5	25 25
BDT29 BDT29A BDT29B BDT29C	N	TO-220AB*	40 60 80 100		40 60 80 100		1	30	25
BDT30 BDT30A BDT30B BDT30C	P	TO-220AB*	40 60 80 100		40 60 80 100		1	30	25

* Also available in SOT-186 (F-pack): add suffix **F** to type number



Electronic
components
and materials

PHILIPS

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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4a

For case outlines and dimensions see page S163

For packing quantities see page S162

characteristics						type
h_{FE} at min-max	I_C A	f_{hfe} typ kHz	f_T typ MHz	V_{CEsat} at max V	I_C/I_B A/mA	
40-250	0,15	-	3	0,6	1/100	BD933 BD935 BD937 BD939 BD941 BD941A
40-250	0,15	-	3	0,6	1/100	BD934 BD936 BD938 BD940 BD942 BD942A
85-475	0,5	-	3	0,5	2/200	BD943 BD945 BD947
85-475	0,5	-	3	0,5	2/200	BD944 BD946 BD948
40	0,5	-	3	1	2/200	BD949 BD951 BD953 BD955
40	0,5	-	3	1	2/200	BD950 BD952 BD954 BD956
500	3	-	-	1,5	1/2	BDT20
500	3	-	-	1,5	1/2	BDT21
15/75	1	-	>3	0,7	1/125	BDT29 BDT29A BDT29B BDT29C
15/75	1	-	>3	0,7	1/125	BDT30 BDT30A BDT30B BDT30C



Electronic
components
and materials

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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4a
 For case outlines and dimensions see page S163
 For packing quantities see page S162

type	pol.	case	ratings						
			V_{CBO} V	V_{CERM} V	V_{CEO} V	V_{CER} V	I_C A	P_{tot} at W	T_{mb} °C
BDT31 BDT31A BDT31B BDT31C	N	TO-220AB*	40 60 80 100		40 60 80 100		3	40	25
BDT32 BDT32A BDT32B BDT32C	P	TO-220AB*	40 60 80 100		40 60 80 100		3	40	25
BDT41 BDT41A BDT41B BDT41C	N	TO-220AB*	40 60 80 100		40 60 80 100		6	65	25
BDT42 BDT42A BDT42B BDT42C	P	TO-220AB*	40 60 80 100		40 60 80 100		6	65	25
BDT51 BDT53 BDT55 BDT57	N	TO-220AB	60 80 100 120		60 80 100 120		15	90	25
BDT52 BDT54 BDT56 BDT58	P	TO-220AB	60 80 100 120		60 80 100 120		15	90	25
BDT60 BDT60A BDT60B BDT60C	P	TO-220AB*	60 80 100 120		60 80 100 120		4	50	25
BDT61 BDT61A BDT61B BDT61C	N	TO-220AB*	60 80 100 120		60 80 100 120		4	50	25
BDT62 BDT62A BDT62B BDT62C	P	TO-220AB*	60 80 100 120		60 80 100 120		10	90	25
BDT63 BDT63A BDT63B BDT63C	N	TO-220AB*	60 80 100 120		60 80 100 120		10	90	25

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



Electronic
components
and materials

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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4a

For case outlines and dimensions see page S163

For packing quantities see page S162

characteristics						type
f_{FE} at min-max	I_C A	f_{nfe} typ kHz	f_T typ MHz	V_{CEsat} at max V	I_C/I_B A/mA	
10/50	3	-	-	1,2	3/375	BDT31 BDT31A BDT31B BDT31C
10/50	3	-	-	1,2	3/375	BDT32 BDT32A BDT32B BDT32C
15/75	3	-	> 3	1,5	6/600	BDT41 BDT41A BDT41B BDT41C
15/75	3	-	> 3	1,5	6/600	BDT42 BDT42A BDT42B BDT42C
50	5	-	10	0,8 0,8 0,9 0,9	10/400 10/500 10/600 10/600	BDT51 BDT53 BDT55 BDT57
50	5	-	10	0,8 0,8 0,9 0,9	10/400 10/500 10/600 10/600	BDT52 BDT54 BDT56 BDT58
750	1,5	> 25	-	2,5	1,5/6	BDT60 BDT60A BDT60B BDT60C
750	1,5	25	-	2,5	1,5/6	BDT61 BDT61A BDT61B BDT61C
1000	3	100	-	2	3/12	BDT62 BDT62A BDT62B BDT62C
1000	3	50	-	2	3/12	BDT63 BDT63A BDT63B BDT63C



Electronic
components
and materials

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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4a

For case outlines and dimensions see page S163

For packing quantities see page S162

type	pol.	case	ratings						
			V_{CBO} V	V_{CERM} V	V_{CEO} V	V_{CER} V	I_C A	P_{tot} at W	T_{mb} °C
BDT64 BDT64A BDT64B BDT64C	P	TO-220AB*	60 80 100 120		60 80 100 120	1	12	125	25
BDT65 BDT65A BDT65B BDT65C	N	TO-220AB*	60 80 100 120		60 80 100 120		12	125	25
BDT81 BDT83 BDT85 BDT85A BDT87 BDT87A	N	TO-220AB*	60 80 100 100 120 120		60 80 100 100 120 120		15	125	25
BDT82 BDT84 BDT86 BDT86A BDT88 BDT88A	P	TO-220AB*	60 80 100 100 120 120		60 80 100 100 120 120		15	125	25
BDT91 BDT93 BDT95	N	TO-220AB*	60 80 100		60 80 100		10	90	25
BDT92 BDT94 BDT96	P	TO-220AB*	60 80 100		60 80 100		10	90	25
BDV64 BDV64A BDV64B BDV64C	P	SOT-93	60 80 100 120		60 80 100 120		12	125	25
BDV65 BDV65A BDV65B BDV65C	N	SOT-93	60 80 100 120		60 80 100 120		12	125	25

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



Electronic
components
and materials

PHILIPS

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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4a

For case outlines and dimensions see page S163

For packing quantities see page S162

characteristics						type
h_{FE} at min-max	I_C A	f_{hfe} typ kHz	f_T typ MHz	V_{CEsat} at max V	I_C/I_B A/mA	
1000	5	-	-	2	5/20	BDT64 BDT64A BDT64B BDT64C
1000	5	-	-	2	5/20	BDT65 BDT65A BDT65B BDT65C
50	5	-	10	1	5/500 5/500 5/500 5/50 5/500 5/50	BDT81 BDT83 BDT85 BDT85A BDT87 BDT87A
50	5	-	10	1	5/500 5/500 5/500 5/50 5/500 5/50	BDT82 BDT84 BDT86 BDT86A BDT88 BDT88A
20-200	4	> 20	4	1	4/400	BDT91 BDT93 BDT95
20-200	4	> 20	4	1	4/400	BDT92 BDT94 BDT96
1000	5	100	-	2	5/20	BDV64 BDV64A BDV64B BDV64C
1000	5	70	-	2	5/20	BDV65 BDV65A BDV65B BDV65C



Electronic
components
and materials

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

L.F.power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4a

For case outlines and dimensions see page S163

For packing quantities see page S162

type	pol.	case	ratings						
			V_{CBO} V	V_{CERM} V	V_{CEO} V	V_{CER} V	I_C A	P_{tot} at W	T_{mb} °C
BDV66A BDV66B BDV66C BDV66D	P	SOT-93	100 120 140 160		80 100 120 150		16	200	25
BDV67A BDV67B BDV67C BDV67D	N	SOT-93	100 120 140 160		80 100 120 150		16	200	25
BDV91 BDV93 BDV95	N	SOT-93	60 80 100		60 80 100		10	100	25
BDV92 BDV94 BDV96	P	SOT-93	60 80 100		60 80 100		10	100	25
BDW55 BDW57 BDW59	N	TO-126	45 60 100		45 60 80		1	8	95
BDW56 BDW58 BDW60	P	TO-126	45 60 100		45 60 80		1	8	95
BDX35 BDX36 BDX37	N	TO-126	100 120 120		60 60 80		5	15	75
BDX42 BDX43 BDX44	N	TO-126	60 80 100		45 60 80		1	5	100
BDX45 BDX46 BDX47	P	TQ-126	60 80 100		45 60 80		1	5	100
BDX62 BDX62A BDX62B BDX62C	P	TO-3	60 80 100 120		60 80 100 120		8	90	25
BDX63 BDX63A BDX63B BDX63C	N	TO-3	80 100 120 140		60 80 100 120		8	90	25



For detailed information on these and other types see Data Handbooks S4a

For case outlines and dimensions see page S163

For packing quantities see page S162

characteristics							type
h_{FE} at min-max	I_C A	f_{hfe} typ kHz	f_T typ MHz	V_{CEsat} at max V	I_C/I_B A/mA		
1000	10	60	-	2	10/40	BDV66A BDV66B BDV66C BDV66D	
1000	10	60	-	2	10/40	BDV67A BDV67B BDV67C BDV67D	
20	4	-	> 3	1	4/400	BDV91 BDV93 BDV95	
20	4	-	> 4	1	4/400	BDV92 BDV94 BDV96	
40-250	0,15	-	250	0,5	0,5/50	BDW55 BDW57 BDW59	
40-250	0,15	-	75	0,5	0,5/50	BDW56 BDW58 BDW60	
45-450	0,5	-	100	0,9 0,7 0,9	5/500	BDX35 BDX36 BDX37	
1500	0,5	-	-	1,6 1,6 1,3	1/4 1/1 0,5/0,5	BDX42 BDX43 BDX44	
1500	0,5	-	-	1,6 1,6 1,3	1/4 1/1 0,5/0,5	BDX45 BDX46 BDX47	
1000	3	100	-	2	3/12	BDX62 BDX62A BDX62B BDX62C	
1000	3	100	-	2	3/12	BDX63 BDX63A BDX63B BDX63C	

S



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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4a and S4b

For case outlines and dimensions see page S163

For packing quantities see page S162

type	pol.	case	ratings						
			V_{CBO} V	V_{CERM} V	V_{CEO} V	V_{CER} V	I_C A	P_{tot} at W	T_{mb} °C
BDX64 BDX64A BDX64B BDX64C	P	TO-3	60 80 100 120		60 80 100 120		12	117	25
BDX65 BDX65A BDX65B BDX65C	N	TO-3	80 100 120 140		60 80 100 120		12	117	25
BDX66 BDX66A BDX66B BDX66C	P	TO-3	60 80 100 120		60 80 100 120		16	150	25
BDX67 BDX67A BDX67B BDX67C	N	TO-3	80 100 120 140		60 80 100 120		16	150	25
BDX68 BDX68A BDX68B BDX68C	P	TO-3	60 80 100 120		60 80 100 120		25	200	25
BDX69 BDX69A BDX69B BDX69C	N	TO-3	60 80 100 120		60 80 100 120		25	200	25
BDX77 BDX78	N P	TO-220AB* TO-220AB*	100 80		80 80		8 8	60 60	25 25
BDX91 BDX93 BDX95	N	TO-3	60 80 100		60 80 100		8	90	25
BDX92 BDX94 BDX96	P	TO-3	60 80 100		60 80 100		8	90	25
BDY90 BDY90A BDY91 BDY92	N	TO-3	120 120 100 80		100 100 80 60		10 12 10 10	40	70
BF419	N	TO-126	300		250		0,1	6	90

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



Electronic
components
and materials

PHILIPS

For detailed information on these and other types see Data Handbooks S4a and S4b

For case outlines and dimensions see page S163

For packing quantities see page S162

characteristics						type
h_{FE} at min-max	I_C A	f_{hfe} typ kHz	f_T typ MHz	V_{CEsat} at max V	I_C/I_B A/mA	
1000	5	80	-	2	5/20	BDX64 BDX64A BDX64B BDX64C
1000	5	50	-	2	5/20	BDX65 BDX65A BDX65B BDX65C
1000	10	60	-	2	10/40	BDX66 BDX66A BDX66B BDX66C
1000	10	50	-	2	10/40	BDX67 BDX67A BDX67B BDX67C
1000	20	60	-	2	20/80	BDX68 BDX68A BDX68B BDX68C
1000	20	50	-	2	20/80	BDX69 BDX69A BDX69B BDX69C
30	2	> 25	> 3	1	3/300	BDX77
30	2	> 25	> 3	1	3/300	BDX78
20	3	-	> 4	0,8	3/300	BDX91 BDX93 BDX95
20	3	-	> 4	0,8	3/300	BDX92 BDX94 BDX96
30-120	5	-	70	1	10/1000 12/1000 10/1000 10/1000	BDY90 BDY90A BDY91 BDY92
typ 45	0,02	-	90	11	0,2/20	BF419

S



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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4b

For case outlines and dimensions see page S163

For packing quantities see page S162

type	pol.	case	ratings						
			V_{CBO} V	V_{CERM} V	V_{CEO} V	V_{CER} V	I_C A	P_{tot} at W	T_{mb} °C
BF457 BF458 BF459	N	TO-126	160 250 300		160 250 300		0,1	6	90
BF469 BF471	N N	TO-126	250 300		250	300	0,05 0,05	1,8 1,8	114 114
BF470 BF472	P P	TO-126	250 300		250	300	0,05 0,05	1,8 1,8	114 114
BF819	N	TO-202	300		250		0,1	6	75

type	pol.	case	ratings						
			V_{CBO} V	V_{CERM} V	V_{CEO} V	V_{CER} V	I_C A	P_{tot} at W	T_{mb} °C
BF857 BF858 BF859	N	TO-202	160 250 300		160 250 300		0,1	6	75
BF869 BF871	N N	TO-202	250 300		250	250	0,05 0,05	5 5	25 25
BF870 BF872	P P	TO-202	250 300		250	250	0,05 0,05	5 5	25 25
BU304F BU305F BU306F BU307F BU308F BU309F	N	SOT-186		600 700 600 700 600 700	300 400 300 400 300 400		4 4 8 8 12 12	75 75 80 80 100 100	25
BU406 BU407	N N	TO-220AB*	400 330		200 150		7 7	60 60	25 25
BU505 BU505D**	N N	TO 220AB		1500 1500	700 700		2,5 2,5	75 75	25 25
BU506 BU506D**	N N	TO-220AB		1500 1500	700 700		4 4	78 78	25 25
BU508 BU508A BU508D**	N	SOT-93		1500 1500 1500	700 700 700		8	125	-

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

** incl. efficiency diode



Electronic
components
and materials

PHILIPS

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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4b

For case outlines and dimensions see page S163

For packing quantities see page S162

characteristics						type
h_{FE} at min-max	I_C A	f_{hfe} typ kHz	f_T typ MHz	V_{CEsat} at max V	I_C/I_B A/mA	
26	0,03	-	90	1	0,03/6	BF457 BF458 BF459
50 50	0,025 0,025	- -	60 60	- -	- -	BF469 BF471
50 50	0,025 0,025	- -	60 60	- -	- -	BF470 BF472
typ 45	0,02	-	90	11	0,2/20	BF819

characteristics						type
h_{FE} at min-max	I_C A	$t_{r\max}$ T_{mb} 95°C μ S	f_T typ MHz	V_{CEsat} at max V	I_C/I_B A/mA	
26	0,03	-	90	1	0,03/6	BF857 BF858 BF859
50 50	0,025 0,025	- -	60 60	- -	- -	BF869 BF871
50 50	0,025 0,025	- -	60 60	- -	- -	BF870 BF872
8-40	2 2 5 5 5 5	0,9 0,9 0,7 0,7 0,7 0,7	min. 4*	0,6 0,6 1,5 1,5 1,5 1,5	2/500 2/500 5/1000 5/1000 8/1600 8/1600	BU304F BU305F BU306F BU307F BU308F BU309F
- -	- -	0,75 0,75	- -	1 1	5/500 5/500	BU406 BU407
- -	- -	typ 0,7 typ 0,7	- -	5 5	2/900 2/900	BU505 BU505D**
- -	- -	0,7 0,7	- -	5 5	3/1330 3/1330	BU506 BU506D**
-	-	typ 0,7 typ 0,7 typ 0,7	- 7 -	5 1 1	4,5/2000	BU508 BU508A BU508D**

** incl. efficiency diode



Electronic
components
and materials

L.F. POWER TRANSISTORS AND MODULES

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4b
 For case outlines and dimensions see page S163
 For packing quantities see page S162

type	pol.	case	ratings						
			V_{CBO} V	V_{CERM} V	V_{CEO} V	V_{CER} V	I_C A	P_{tot} at W	T_{mb} °C
BU705	N	SOT-93A		1500	700		4	75	25
BU706 BU706D**	N N	SOT-93		1500 1500	700 700		4 4	78 78	25 25
BU806/01 BU806A/01 BU807/01	N N N	TO-220AB*	400 400 330		200 180 150		8 8 8	60 60 60	25 25 25
BU808	N	TO-3		1500	700		12	160	25
BU824 BU826 BU826A	N	TO-202 SOT-93		650 800 900	375 375 400		0,5 6 6	12,5 115 115	- - -
BUP21 BUP21A BUP21B BUP21C	N	SOT-93		550 650 750 850	300 350 400 450		5	100	25
BUP22 BUP22A BUP22B BUP22C	N	SOT-93		550 650 750 850	300 350 400 450		8	125	25
BUP23 BUP23A BUP23B BUP23C	N	SOT-93		550 650 750 850	300 350 400 450		15	175	25
BUS11 BUS11A	N N	TO-3		850 1000	400 450		5 5	100 100	25 25
BUS12 BUS12A	N N	TO-3		850 1000	400 450		8 8	125 125	25 25
BUS13 BUS13A	N N	TO-3		850 1000	400 450		15 15	175 175	25 25
BUS14 BUS14A	N N	TO-3 TO-3		850 1000	400 450		30 30	250 250	25 25
BUS21 BUS21A BUS21B BUS21C	N	TO-3		550 650 750 850	300 350 400 450		5	100	25

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

** incl. efficiency diode



Electronic
components
and materials

PHILIPS

L.F. POWER TRANSISTORS AND MODULES

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4b
 For case outlines and dimensions see page S163
 For packing quantities see page S162

characteristics						type
h_{FE} at min-max	I_C A	$t_{r\max}$ $T_{mb} 95^\circ C$ μS	f_T typ MHz	V_{CEsat} at max V	I_C/I_B A/mA	
2,2	2	0,9	7	5	2/900	BU705
-	-	0,7	-	5	3/1330	BU706
-	-	0,7	-	5	3/1330	BU706D**
-	-	typ 0,2	-	1,5	5/50	BU806/01
-	-	typ 0,2	-	1,5	5/50	BU806A/01
-	-	typ 0,2	-	1,5	5/50	BU807/01
-	-	typ 0,5	-	7	9/400	BU808
-	-	-	-	5	0,2/0,6	BU824
-	-	0,6	-	2	2,5/55	BU826
-	-	0,6	-	2	2,5/55	BU826A
10 9 7,5 6	3	typ. 0,08	-	1,5	3/300 3/340 3/400 3/500	BUP21 BUP21A BUP21B BUP21C
10 9 7,5 6	6	typ. 0,08	-	1,5	6/600 6/670 6/800 6/1000	BUP22 BUP22A BUP22B BUP22C
10 9 7,5 6	10	typ. 0,08	-	1,5	10/1000 10/1110 10/1330 10/1670	BUP23 BUP23A BUP23B BUP23C
typ 30 typ 30	0,5 0,5	0,8 0,8	- -	1,5 1,5	3/600 2,5/500	BUS11 BUS11A
typ 30 typ 30	- -	0,8 0,8	- -	1,5 1,5	6/1200 5/1000	BUS12 BUS12A
typ 30 typ 30	- -	0,8 0,8	- -	1,5 1,5	10/2000 8/1600	BUS13 BUS13A
typ 30 typ 30	- -	0,8 0,8	- -	1,5 1,5	20/4000 16/3200	BUS14 BUS14A
10 9 7,5 6	3	typ. 0,08	-	1,5	3/300 3/340 3/400 3/500	BUS21 BUS21A BUS21B BUS21C

** incl. efficiency diode



Electronic components and materials

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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4b

For case outlines and dimensions see page S163

For packing quantities see page S162

type	pol.	case	ratings						
			V_{CBO} V	V_{CERM} V	V_{CEO} V	V_{CER} V	I_C A	P_{tot} at W	T_{mb} °C
BUS22 BUS22A BUS22B BUS22C	N	TO-3		550 650 750 850	300 350 400 450		8	125	25
BUS23 BUS23A BUS23B BUS23C	N	TO-3		550 650 750 850	300 350 400 450		15	175	25
BUS24 BUS24A BUS24B BUS24C	N	TO-3		550 650 750 850	300 350 400 450		30	250	25
BUT11 BUT11A	N N	TO-220AB*		850 1000	400 450		5 5	100 100	25 25
BUT12 BUT12A	N N	TO-220AB		850 1000	400 450		10 10	125 125	25 25
BUT21 BUT21A BUT21B BUT21C	N	TO-220AB*		550 650 750 850	300 350 400 450		5	100	25
BUT22 BUT22A BUT22B BUT22C	N	TO-220AB		550 650 750 850	300 350 400 450		8	125	25
BUV26 BUV26A	N N	TO-220AB*	180 200		90 100		14 14	65 65	25 25
BUV27 BUV27A	N N	TO-220AB*	240 300		120 150		12 12	65 65	25 25
BUV28 BUV28A	N N	TO-220AB*	400 450		200 225		10 10	65 65	25 25
BUV89 BUV90	N N	SOT-93		1200 650	800 400		8 12	125 125	25 25
BUW11 BUW11A	N N	SOT-93		850 1000	400 450		5 5	100 100	25 25
BUW12 BUW12A	N N	SOT-93		850 1000	400 450		8 8	125 125	25 25

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



Electronic
components
and materials

PHILIPS

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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4b

For case outlines and dimensions see page S163

For packing quantities see page S162

characteristics						type
h_{FE} at min-max	I_C A	$t_{r\max}$ T_{mb} 95°C μS	f_T typ MHz	V_{CEsat} at max V	I_C/I_b A/mA	
10 9 7,5 6	6	typ. 0,08	-	1,5	6/600 6/670 6/800 6/1000	BUS22 BUS22A BUS22B BUS22C
10 9 7,5 6	10	typ. 0,04	-	1,5	10/1000 10/1110 10/1330 10/1670	BUS23 BUS23A BUS23B BUS23C
10 9 7,5 6	20	typ. 0,04	-	1,5	20/200 20/2220 20/2660 20/3340	BUS24 BUS24A BUS24B BUS24C
- -	- -	0,8 0,8	- -	1,5 1,5	3/600 2,5/500	BUT11 BUT11A
- -	- -	0,8 0,8	- -	1,5 1,5	6/1200 5/1000	BUT12 BUT12A
10 9 7,5 6	3	typ. 0,08	-	1,5	3/300 3/340 3/400 3/500	BUT21 BUT21A BUT21B BUT21C
10 9 7,5 6	6	typ. 0,08	-	1,5	6/600	BUT22 BUT22A BUT22B BUT22C
- -	- -	typ. 0,04	- -	1,5 1	12/1200 10/1000	BUV26 BUV26A
- -	- -	typ. 0,04	- -	1,5 1	12/1200 10/1000	BUV27 BUV27A
- -	- -	typ. 0,04	- -	1,5 1,5	6/600 4/400	BUV28 BUV28A
- -	- -	typ 0,5 typ 0,7	7 7	1 2	4,5/2000 10/300	BUV89 BUV90
- -	- -	0,8 0,8	- -	1,5 1,5	3/600 2,5/500	BUW11 BUW11A
- -	- -	0,8 0,8	- -	1,5 1,5	6/1200 5/1000	BUW12 BUW12A



Electronic
components
and materials

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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4a and S4b
 For case outlines and dimensions see page S163
 For packing quantities see page S162

type	pol.	case	ratings							
			V_{CBO} V	V_{CERM} V	V_{CEO} V	V_{CER} V	I_C A	P_{tot} at W	T_{mb} °C	
BUW13	N	SOT-93		850	400			15	175	25
BUW13A	N			1000	450			15	175	25
BUW84	N	SOT-82		800	400			2	50	-
BUW85	N			1000	450			2	50	-
BUX46	N	TO-3		850	400			5	100	25
BUX46A				1000	450			5	100	
BUX47				850	400			8	125	
BUX47A				1000	450			8	125	
BUX48				850	400			15	175	
BUX48A				1000	450			15	175	
BUX79	N	SOT-82		500	375			2	40	25
BUX80	N	TO-3		800	400			10	100	40
BUX81	N			1000	450			10	100	40
BUX84	N	TO-220AB*		800	400			2	40	50
BUX85	N			1000	450			2	40	50
BUX86	N	TO-126		800	400			0,5	20	60
BUX87	N			1000	450			0,5	20	60
BUX88	N	TO-3		1200	800			12	160	25
BUX98				850	400			30	250	
BUX98A				1000	450			30	250	
BUX99	N	TO-126		730	300			1,5	28	25
BUY89	N	TO-3		1500	800			6	80	60
D44Q5	N	TO-220AB		300	225			4	31,25	25
MJ8504	N	TO-3		1200	700			10	175	25
MJ8505	N			1400	800			10	175	25
MJE13004	N	TO-220AB		600	300			4	75	25
MJE13005				700	400			4	75	
MJE13006				600	300			8	80	
MJE13007				700	400			8	80	
MJE13008				600	300			12	100	
MJE13009				700	400			12	100	
PH2955T	P	TO-220AB	70		60			10	75	25
PH3055T	N	TO-220AB	70		60			10	75	25
PH13002	N	TO-126		600	300			1,5	28	25
PH13003	N			700	400			1,5	28	25

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



Electronic
components
and materials

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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4a and S4b

For case outlines and dimensions see page S163

For packing quantities see page S162

characteristics						type
h_{FE} at min-max	I_C A	$t_{f\max}$ T_{mb} 95°C μS	f_T typ MHz	V_{CEsat} at max V	I_C/I_B A/mA	
-	-	0,8 0,8	- -	1,5	10/2000 8/1800	BUW13 BUW13A
typ 50 typ 50	0,1 0,1	1,4 1,4	20 20	- -	0,3/30 0,3/30	BUW84 BUW85
typ 30	0,5	0,8	-	1,5	3/600 2,5/500 6/1200 5/1000 10/2000 8/1600	BUX46 BUX46A BUX47 BUX47A BUX48 BUX48A
typ 25	0,1	-	-	1	1/200	BUX79
typ 30 typ 30	1,2 1,2	0,8 0,8	6 6	1,5 1,5	5/1000 5/1000	BUX80 BUX81
typ 50 typ 50	0,1 0,1	1,4 1,4	20 20	1,0 1,0	1/200 1/200	BUX84 BUX85
typ 50 typ 50	0,05 0,05	1,3 1,3	20 20	3,0 3,0	0,2/20 0,2/20	BUX86 BUX87
-	-	typ 0,5 typ 0,8 typ 0,8	7 - -	1,0 1,5 1,5	9/4000 20/4000 16/3200	BUX88 BUX98 BUX98A
16	0,05	-	min. 4*	1	1/250	BUX99
-	-	typ 0,5	7	1	4,5/2000	BUY89
20	2	typ 0,13	-	1	2/200	D44Q5
7,5 7,5	1,5 1,5	- -	- -	2 2	5/2000 5/2000	MJ8504 MJ8505
8-40 2 5 5 5 5	2 2 5 5 5 5	0,9 0,9 0,7 0,7 0,7 0,7	min. 4*	0,6 0,6 1,5 1,5 1,5 1,5	2/500 2/500 5/1000 5/1000 8/1600 8/1600	MJE13004 MJE13005 MJE13006 MJE13007 MJE13008 MJE13009
20-70 20-70	4 4	- -	min. 2*	0,8 0,8	4/400 4/400	PH2955T PH3055T
8-40 8-40	0,5 0,5	0,7 0,7	typ. 4	1 1	1/250 1/250	PH13002 PH13003

* typical



Electronic
components
and materials

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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4a and S4b

For case outlines and dimensions see page S163

For packing quantities see page S162

type	pol.	case	ratings						
			V_{CBO} V	V_{CERM} V	V_{CEO} V	V_{CER} V	I_C A	P_{tot} at W	T_{mb} °C
TIP29	N	TO-220AB	80		40		1	30	25
TIP29A			100		60				
TIP29B			120		80				
TIP29C			140		100				
TIP29D			160		120				
TIP30	P	TO-220AB	80		40		1	30	25
TIP30A			100		60				
TIP30B			120		80				
TIP30C			140		100				
TIP30D			160		120				
TIP31	N	TO-220AB	80		40		3	40	25
TIP31A			100		60				
TIP31B			120		80				
TIP31C			140		100				
TIP31D			160		120				
TIP32	P	TO-220AB	80		40		3	40	25
TIP32A			100		60				
TIP32B			120		80				
TIP32C			140		100				
TIP32D			160		120				
TIP33	N	SOT-93	80		40		10	80	25
TIP33A			100		60				
TIP33B			120		80				
TIP33C			140		100				
TIP34	P	SOT-93	80		40		10	80	25
TIP34A			100		60				
TIP34B			120		80				
TIP34C			140		100				
TIP47	N	TO-220AB	350		250		1	40	25
TIP48			400		300				
TIP49			450		350				
TIP50			500		400				
TIP110	N	TO-220AB	60		60		4	50	25
TIP111			80		80				
TIP112			100		100				
TIP115	P	TO-220AB	60		60		4	50	25
TIP116			80		80				
TIP117			100		100				



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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4a and S4b

For case outlines and dimensions see page S163

For packing quantities see page S162

characteristics						type
h_{FE} at min-max	I_C A	$t_{f\ max}$ T_{mb} 95°C μS	f_T typ MHz	V_{CEsat} at max V	I_C/I_B A/mA	
15-75	1	-	min 3*	0,7	1/125	TIP29 TIP29A TIP29B TIP29C TIP29D
15-75	1	-	min 3*	0,7	1/125	TIP30 TIP30A TIP30B TIP30C TIP30D
10-50	3	-	min 3*	1,2	3/375	TIP31 TIP31A TIP31B TIP31C TIP31D
10-50	3	-	min 3*	1,2	3/375	TIP32 TIP32A TIP32B TIP32C TIP32D
20-100	3	-	min. 3*	1	3/300	TIP33 TIP33A TIP33B TIP33C
20-100	3	-	min. 3*	1	3/300	TIP34 TIP34A TIP34B TIP34C
30-150	0,3	-	min. 5	1	1,200	TIP47 TIP48 TIP49 TIP50
500	2	-	-	2,5	2/8	TIP110 TIP111 TIP112
500	2	-	-	2,5	2/8	TIP115 TIP116 TIP117

* typical



Electronic
components
and materials

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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4a and S4b

For case outlines and dimensions see page S163

For packing quantities see page S162

type	pol.	case	ratings						
			V_{CBO} V	V_{CERM} V	V_{CEO} V	V_{CER} V	I_C A	P_{tot} at W	T_{mb} °C
TIP120	N	TO-220AB	60		60		5	65	25
TIP121			80		80				
TIP122			100		100				
TIP125	P	TO-220AB	60		60		5	65	25
TIP126			80		80				
TIP127			100		100				
TIP130	N	TO-220AB	60		60		8	70	25
TIP131			80		80				
TIP132			100		100				
TIP135	P	TO-220AB	60		60		8	70	25
TIP136			80		80				
TIP137			100		100				
TIP140	N	SOT-93	60		60		10	125	25
TIP141			80		80				
TIP142			100		100				
TIP145	P	SOT-93	60		60		10	125	25
TIP146			80		80				
TIP147			100		100				
TIP2955	P	SOT-93	100		60		15	100	25
TIP3055	N	SOT-93	100		60		15	100	25
TIP2955T	P	TO-220AB	70		60		8	75	25
TIP3055T	N	TO-220AB	70		60		8	75	25
2N6676	N	TO-3		450	300		15	175	25
2N6677			550	350					
2N6678			650	400					



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

L.F. power: alphanumeric list

For detailed information on these and other types see Data Handbooks S4a and S4b

For case outlines and dimensions see page S163

For packing quantities see page S162

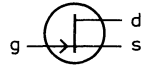
characteristics						type
h_{FE} at min-max	I_C A	$t_{f\max}$ T_{mb} 95°C μS	f_T typ MHz	V_{CEsat} at max V	I_C/I_B A/mA	
1000	3	-	-	2	3/12	TIP120 TIP121 TIP122
1000	3	-	-	2	3/12	TIP125 TIP126 TIP127
1000	4	-	-	2	4/16	TIP130 TIP131 TIP132
1000	4	-	-	2	4/16	TIP135 TIP136 TIP137
1000	5	-	-	2	5/10	TIP140 TIP141 TIP142
1000	5	-	-	2	5/10	TIP145 TIP146 TIP147
5	10	-	min.	1,1	4/400	TIP2955
5	10	-	3	1,1	4/400	TIP3055
5	10	-	min.	0,8	4/400	TIP2955T
5	10	-	2	0,8	4/400	TIP3055T
typ. 25	1	0,5	-	1,5	15/3000	2N6676 2N6677 2N6678



Electronic components and materials

For detailed information on these and other types see Data Handbook S5
For case outlines and dimensions see page S163
For packing quantities see page S162

Voltage range 20 to 50 V
Current range 0,2 to 250 mA



Status = P

type	ratings			characteristics								case
	$\pm V_{DS}$ V	P_{tot} at mW	T_{amb} °C	$-I_{GSS}$ max. nA	I_{DSS} min.-max. mA	$-V_{(P)GS}$ max. V	$ y_{fs} $ min. $f = 1$ kHz mA/V	C_{rs} typ. pF	F typ. dB	V_n max. μV		
BC264A BC264B BC264C BC264D	30	300	25	10	2,0-4,5 3,5-6,5 5,0-8,0 7,0-12,0	> 0,5	2,5 3,0 3,5 4,0	1,2	0,5	-	TO-92 var.	
BF245A BF245B BF245C	30	300	75	5	2,0-6,5 6-15 12-25	8,0	3,0-6,5	1,1	1,5	-	TO-92 var.	
BF247A BF247B BF247C	25	250	75	5	30-80 60-140 110-250	0,6-14,5	8,0	3,5	-	-	TO-92	
BF256A BF256B BF256C	30	300	75	5	3-7 6-13 11-18	-	4,5	0,7	7,5	-	TO-92 var.	
BF410A BF410B BF410C BF410D	20**	300	75	10	0,7-3,0 2,5-7,0 6-12 10-18	typ.0,8 typ.1,5 typ.2,2 typ.3,0	2,5 4,0 6,0 7,0	0,3	1,5	-	TO-92 var.	
BF510* BF511* BF512* BF513*	20	250	65	10	0,7-3,0 2,5-7,0 6-12 10-18	typ.0,8 typ.1,5 typ.2,2 typ.3,0	2,5 4,0 6,0 7,0	0,3	1,5	-	SOT-23	
BFR30* BFR31*	25	250	65	0,2	4-10 1-5	5 2,5	1,0-4,0 1,5-4,5	< 1,5	-	0,5	SOT-23	
BFR101A* BFR101B*	30	200	60	5	0,2-1,5 1-5	1,0 2,5	1,2 2,5	-	-	-	SOT-143	
BFT46*	25	250	65	0,2	0,2-1,5	1,2	1,0	< 1,5	-	0,5	SOT-23	
BFW10 BFW11	30	300	25	0,1	8-20 4-10	8 6	3,5-6,5 3,0-6,5	0,6	< 2,5	-	TO-72	
BFW12 BFW13	30	150	110	0,1	1-5 0,2-1,5	2,5 1,2	2,0 1,0	< 0,8	-	0,5	TO-72	
BFW61	25	300	25	1,0	2-20	8	2,0-6,5	< 2,0	-	-	TO-72	
2N3822 2N3823	50 30	300 300	25 25	0,1 0,5	2-10 4-20	6 8	3,0-6,5 3,5-6,5	< 3,0 < 2,0	< 5 < 2,5	- -	TO-72 TO-72	

* surface mounting devices; see page S127

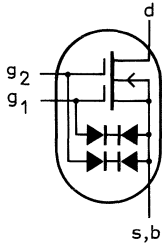
** asymmetrical



Dual-gate n-channel MOS FETs

For detailed information on these and other types see Data Handbook S5
 For case outlines and dimensions see page S163
 For packing quantities see page S162

Voltage range 18 to 20 V
 Current range 2 to 55 mA



Status = P

type*	ratings			characteristics						case
	V _{DS} V	P _{tot} at mW	T _{amb} °C	± I _{G1-SS} ± I _{G2-SS} max. nA	I _{DSS} mA	-V _{(P)GS} -V _{(P)G1-S} V	y _{fs} f = 1 kHz min. mS	F max. dB	at freq. MHz	
BF960	20	225	75	50	2-20	< 3,5	9,5	2,8***	800	SOT-103
BF964	20	225	75	50	2-20	< 2,5	15	2,8	200	SOT-103
BF964S	20	225	75	50	4-20	< 2,5	15	1,0***	200	SOT-103
BF966	20	225	75	50	2-20	< 2,5	15	3,9	800	SOT-103
BF966S	20	225	75	50	4-20	< 2,5	15	1,8***	800	SOT-103
BF980	18	225	75	25	-	< 1,3	17	2,8***	800	SOT-103
BF981	20	225	75	50	4-25	< 2,5	10	2,0	200	SOT-103
BF982	20	225	75	25	-	< 1,3	20	1,2***	200	SOT-103
BF989**	20	200	60	50	2-20	< 2,7	9,5	2,8***	800	SOT-143
BF990**	18	200	60	25	-	< 1,3	17	2,8***	800	SOT-143
BF991**	20	200	60	50	4-25	< 2,5	10	2,0	200	SOT-143
BF992**	20	200	60	25	-	< 1,3	20	1,2***	200	SOT-143
BF994**	20	200	60	50	2-20	< 2,5	15	2,8	200	SOT-143
BF994S**	20	300	25	50	4-20	< 2,5	15	1,0***	200	SOT-143
BF996**	20	200	60	50	2-20	< 2,5	15	3,9	800	SOT-143
BF996S**	20	300	25	50	4-20	< 2,5	15	1,8***	800	SOT-143
BFR84	20	300	25	10	20-55	1,5-3,8	12	3,0	200	TO-72

* all types protected against excessive input voltage surges
 ** surface mounting devices. See page S127
 *** typical

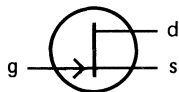
N-channel junction FETs for switching

For detailed information on these and other types see Data Handbook S5

For case outlines and dimensions see page S163

For packing quantities see page S162

Voltage range 30 to 40 V
Current range 2 to 50 mA



Status = P

type	ratings			characteristics							case		
	$\pm V_{DS}$ V	P_{tot} at mW	T_{amb} °C	$-I_{GSS}$ (I_{SGO}) max. pA	I_{DSS} min. mA	$-V_{(P)GS}$ max. V	$r_{ds\ on}$ max. Ω	C_{rs} max. pF	t_{on} max. ns	t_{off} max. ns			
BSR56**	40	250	65	1000	50	10	25	5	9	25	SOT-23		
BSR57**					20	6	40			50			
BSR58**					8	4	60			100			
BSV78	40	350	25	250	50	11	25	5	10	10	TO-18		
BSV79					20	7,0	40			18			
BSV80					10	5,0	60			30		32	
PMBF4391**	40	250	65	1000	50	10	30	3,5	15	20	SOT-23		
PMBF4392**					25	5	60			35			
PMBF4393**					5	3	100			50			
2N3966	30	300	25	100	2	6	220	1,5	120	100	TO-72		
2N4091	40	1800	25	200	30	10	30	5	25	40	TO-18		
2N4092					15	7,0	50			60			
2N4093					8	5,0	80			80			
2N4391	40	1800	25	100	50	10	30	3,5	15	20	TO-18		
2N4392					25	5,0	60			35			
2N4393					5	3,0	100			50			
2N4856	40	360	25	250	50	10	25	8	9	25	TO-18		
2N4857					20	6	40			50			
2N4858					8	4	60			10		100	
2N4859					30	50	25			9		25	
2N4860					30	20	6			40		10	50
2N4861					30	8	4			60		20	100

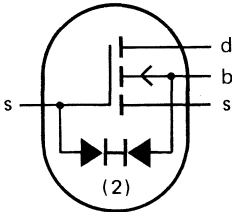
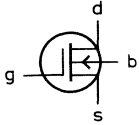
** surface mounting devices. See page S127



N-channel MOS FETs for switching

For detailed information on these and other types see Data Handbook S5
 For case outlines and dimensions see page S163
 For packing quantities see page S162

Voltage range 15 to 30 V



N-channel MOS FETs for switching
 Status = P

type	ratings			characteristics						case
	V_{DB} V_{SB} V	P_{tot} at mW	T_{amb} °C	$\pm I_{GSS}$ max. nA	I_{DSX} I_{SDX} max. nA	$r_{ds\ on}$ max. Ω	$r_{DS\ off}$ min. G Ω	C_{rs} max. pF	C_{rd} max. pF	
BFR29	30	200	25	0,01	-	-	-	0,7	-	TO-72
BSD10	15	275	25	-	-	30	-	0,6	-	TO-72
BSD12	25	275	25	-	-	30	-	0,6	-	TO-72
BSD20**	15	230	25	-	-	30	-	0,6	-	SOT-143
BSD22**	25	230	25	-	-	30	-	0,6	-	SOT-143
BSD212	15	275	25	-	-	70	-	0,6	-	TO-72
BSD213	15	275	25	-	-	70	-	0,6	-	TO-72
BSD214	25	275	25	-	-	70	-	0,6	-	TO-72
BSD215	25	275	25	-	-	70	-	0,6	-	TO-72
BSS83**	15	230	25	-	-	45	-	0,6	-	SOT-143
BSV81	30	200	25	0,01	1	100	10	0,5	0,5	TO-72

** surface mounting devices; see page S127

(2) diode protection **BSD213** and **BSD215** only (see pinning diagram, above)



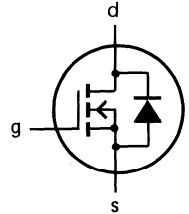
P- and N-channel D-MOS FETs for switching

For detailed information on these and other types see Data Handbook S5

For case outlines and dimensions see page S163

For packing quantities see page S162

Voltage range 50 to 450 V



N-channel vertical D-MOS FETs for switching

Status = P

type	ratings				characteristics					case
	V_{DS} V	I_D mA	P_{tot} at T_{amb} mW °C	$V_{GS(th)}$ V	R_{DSon}		y_{fs} typ. mS	t_{on}/t_{off} max. ns		
					typ. Ω	max. Ω				
BS107	200	120	500	25	1,8 (typ.)	15	28	200	10/10	TO-92 var.
BS170	60	500	830	25	0,8-3,0	2,5	5	200	10/10	TO-92 var.
BS170A	80	500	1000	25	1,5-3,5	2	4	300	10/15	TO-92 var.
BS172A	80	300	830	25	1,5-3,5	7	10	150	10/10	TO-92 var.
BS174A	200	300	1000	25	0,8-2,8	6	12	250	10/25	TO-92 var.
BS176A	180	300	1000	25	0,7-2,7	7	10	250	10/15	TO-92 var.
BS178	450	750	15000	75	2,0-4,0	10	14	400	10/100	TO-126
BST80**	80	500	1000	25	1,5-3,5	2	4	300	10/15	SOT-89
BST82**	80	175	300	25	1,5-3,5	7	10	150	10/10	SOT-89
BST84**	200	250	1000	25	0,8-2,8	6	12	250	10/25	SOT-89
BST86**	180	300	1000	25	0,7-2,7	7	10	250	10/15	SOT-89
BST90	80	500	2500	25*	1,5-3,5	2	4	300	10/15	TO-39
BST97	180	300	1500	25*	0,7-2,7	7	10	250	10/15	TO-18
2N6659	35	1400	6250	25*	0,8-2,0	1,5	5	170	10/20	TO-39
2N6660	60	1100	6250	25*	0,8-2,0	1,8	5	170	10/20	TO-39
2N6661	90	900	6250	25*	0,8-2,0	2,4	5,3	170	10/20	TO-39

P-channel vertical D-MOS FETs for switching

Status = P

type	ratings				characteristics					case
	V_{DS} V	I_D mA	P_{tot} at T_{amb} mW °C	$V_{GS(th)}$ V	R_{DSon}		y_{fs} typ. mS	t_{on}/t_{off} max. ns		
					typ. Ω	max. Ω				
BS250	45	250	830	25	1,0-3,5	9,0	14	125	4/10	TO-92 var.
BST100	60	300	1000	25	1,5-3,5	4,5	6	200	4/20	TO-92 var.
BST110	50	300	830	25	1,5-3,5	7,5	10	125	4/20	TO-92 var.
BST120**	60	300	1000	25	1,5-3,5	4,5	6	200	4/20	SOT-89
BST122**	50	250	1000	25	1,5-3,5	7,5	10	125	4/20	SOT-89

** surface mounting devices; see page S127

FIELD-EFFECT TRANSISTORS General data

Dual N-channel junction FETs for differential amplifiers

For detailed information on these and other types see Data Handbook S5

For case outlines and dimensions see page S163

For packing quantities see page S162



Note: BFQ..types: dual transistors in TO-71(1)
BFS..types: matched pairs in SOT-52

Status = P

type	ratings			characteristics			total device				
	individual transistor		total device	individual transistor			total device				
	$\pm V_{DS}$ 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	$ \Delta V_{GS} $ max mV	$ \frac{d\Delta V_{GS}}{dT} $ max $\mu V/^\circ C$	$ \Delta \frac{1}{g_{fs}} $ max Ω	$ \Delta \frac{g_{os}}{g_{fs}} $ max $\mu V/V$	CMRR min dB
BFQ10	30	250 (75)	250 (75)	0,1	0,5-10	3,5	5	5	6	10	100
BFQ11							10	5	6	30	90
BFQ12							10	10	12	30	90
BFQ13							10	20	12	30	90
BFQ14							15	20	12	30	90
BFQ15							20	40	20	30	90
BFQ16							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

Note: for n-p-n silicon planar dual transistors for differential amplifiers see page S97



Electronic
components
and materials

For detailed information on these and other types see Data Handbook S6
For case outlines and dimensions see page S163

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	BLY88A	SOT-48/2
	10	13,5	18	BLY88C	SOT-120
	10	13,5	18	BLV11	SOT-123
	15	13,5	18	BLY89A	SOT-56
	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	BLY92A	SOT-48/2
	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
	40	28	17	BLX39	SOT-120
	45	28	17	BLW86	SOT-123
	50	28	13	BLX14	SOT-56
	80	28	13	BLW76	SOT-121
	100	28	19	BLW78	SOT-121
	130	28	12	BLW77	SOT-121
	175	28	11,5	BLW97	SOT-121
	50	50	18	BLW50F	SOT-123
	150	50	14	BLX15	SOT-56
	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 S6
 For case outlines and dimensions see page S163



Status = C

application	P_L (P.E.P) W	V_{CE} V	Gp dB	type	case
s.s.b. class-A; f = 28 MHz; $d_3; d_5 < -40$ dB	1	12	18	BLY87A	SOT-48/2
	1	12	18	BLY87C	SOT-120
	1	12	18	BLV10	SOT-123
	2	12	18	BLY88A	SOT-48/2
	2	12	18	BLY88C	SOT-120
	2	12	18	BLV11	SOT-123
	6	12	18	BLV89A	SOT-56
	6	12	18	BLY89C	SOT-120
	6	12	18	BLW87	SOT-123
	1,3	26	20	BLY91A	SOT-48/2
	1,3	26	20	BLY91C	SOT-120
	1,3	26	20	BLV20	SOT-123
	2,5	26	20	BLY92A	SOT-48/2
	2,5	26	20	BLY92C	SOT-120
	2,5	26	20	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



Electronic
 components
 and materials

R.F. power transistors (cont.)

For detailed information on these and other types see Data Handbook S6

For case outlines and dimensions see page S163

Status = C

application	P_L W	V_{CE} V	f MHz	Gp dB	type	case
v.h.f. base stations; class-B operation	1	28	175	15	2N3866	TO-39/1
	4	28	175	10	BFS23A	TO-39/1
	8	28	175	12	BLY91A	SOT-48/2
	8	28	175	12	BLY91C	SOT-120
	8	28	175	12	BLV20	SOT-123
	15	28	175	10	BLY92A	SOT-48/2
	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
	45	28	175	7,5	BLX39	SOT-120
	45	28	175	7,5	BLW86	SOT-123
	50	28	175	7	BLY94	SOT-55
	80	28	175	6,5	BLV80/28	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
	160	50	108	7	BLW95	SOT-121
200	50	108	6,5	BLW96	SOT-121	
v.h.f. mobile transmitters; class-B operation	1	12	175	10	2N4427	TO-39/1
	2	13,5	175	11	BFQ42	TO-39/1
	4	13,5	175	8	BFS22A	TO-39/1
	4	13,5	175	12	BFQ43	TO-39/3
	8	13,5	175	9	BLY87A	SOT-48/2
	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	BLY88A	SOT-48/2
	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
	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 S6
For case outlines and dimensions see page S163

Status = C

application	P _L W	V _B V	f MHz	G _p dB	type	case	
v.h.f. modules for mobile transmitters	2	9,5	68-88	17,5	BGY93A	SOT-182	
	2	9,6	136-156	17,5	BGY93B	SOT-182	
	2	9,6	148-174	17,5	BGY93C	SOT-182	
	5	9,6	68-88	17,5	BGY94A	SOT-182	
	5	9,6	132-156	17,5	BGY94B	SOT-182	
	5	9,6	148-174	17,5	BGY94C	SOT-182	
	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	
	30	12,5	68-88	20,0	BGY45A	SOT-183	
	30	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	15,0	BGY46B	SOT-181
2		9,6	400-470	16,0	BGY47A	SOT-181	
2		9,6	430-470	16,0	BGY47B	SOT-181	
2		9,6	460-512	16,0	BGY47C	SOT-181	
3,2		9,6	370-420	18,0	BGY47D	SOT-181	
3,2		9,6	410-470	18,0	BGY47E	SOT-181	
5		9,6	400-470	21,5	BGY48A	SOT-182	
5		9,6	430-470	21,5	BGY48B	SOT-182	
5		9,6	460-512	21,5	BGY48C	SOT-182	
2,5		12,5	420-480	17	BGY22A	SOT-75A	
2,5		13,5	380-512	17	BGY22	SOT-75A	
7		13,5	380-480	4,5	BGY23	SOT-75A	
7		12,5	420-480	4,5	BGY23A	SOT-75A	
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	
2,5		7,5	825-845	21	BGY95A		
2,5		7,5	890-915	21	BGY95B		
2,5		9,6	825-845	21	BGY96A		
2,5		9,6	890-915	21	BGY96B		
7,5		12,5	806-890	15,7	BGY90A	SOT-179	
7,5		12,5	890-950	15,7	BGY90B	SOT-179	



Electronic components and materials

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 S6
For case outlines and dimensions see page S163

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	8,5	BLU97	SOT-122
	7	-	12,5	470	5	BLX68	SOT-48/1
	10	-	12,5	470	6	BLW81	SOT-122
	20	-	12,5	470	6,5	BLU20/12	SOT-119
	20	-	13,5	470	4	BLX69A	SOT-48/2
	30	-	12,5	470	5,7	BLU30/12	SOT-119
	45	-	12,5	470	4,8	BLU45/12	SOT-119
60	-	12,5	470	4,4	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 S6
 For case outlines and dimensions see page S163



Status = C

application	P_L W	V_{CE} V	f MHz	Gp dB	type	case
900 MHz base stations class-B operation	2	24	900	7	BLV99	SOT-172
	14	24	900	8,5	BLV98	SOT-171
	30	24	900	7	BLV97	SOT-171
900 MHz mobile transmitters class-B operation	0,5	12,5	900	8,5	BLU98	SOT-103
	1	12,5	900	7,5	BLV90	SOT-172
	2	12,5	900	6,5	BLV91	SOT-172
	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 transmitters class-B operation	1	28	87,5-108	18	2N3866	TO-39/3
	4	28	87,5-108	20	BLW90	SOT-122
	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



Electronic
 components
 and materials

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 S6
 For case outlines and dimensions see page S163

TV transposer types for application in band III, IV and V. Status = C

application	P _{o, sync} W	V _{CE} V	f MHz	G _p dB	d _{im} dB	type	case
TV transposer circuits; band III; class-A operation	1,5	25	225	18	-60	BLV30	SOT-122
	5	25	225	15	-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
TV transposer circuits; band IV-V; class-A operation	0,12	10	860	10	-60	BFR96S**	SOT-37
	0,3	15	860	11	-60	BFQ34**	SOT-122
	0,5	25	860	11	-60	BLW32	SOT-122
	0,7	15	860	10	-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	7,3	-	BLV59	SOT-171

* at 1 dB power gain compression.

** see also pages S117, S118 and Data Handbook 'Wideband transistors and hybrids'



Electronic
 components
 and materials

PHILIPS

For detailed information on these and other types see Data Handbook S6

For case outlines and dimensions see page S163

Status = C

type	case	mode of operation	V _{CE} V	frequency MHz	output power W	power gain dB
BFQ42	TO-39/1	c.w.; class-B	13,5	175	2	> 11
			12,5	175	2	typ. 10,5
BFQ43	TO-39/3	c.w.; class-B	13,5	175	4	> 12
			12,5	175	4	typ. 12
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 S115					
BLU20/12	SOT-119	c.w.; class-B	12,5	470	20	> 6,5
			12,5	470	30	>> 5,7
BLU30/12	SOT-119	c.w.; class-B	12,5	470	45	>> 4,8
BLU45/12	SOT-119	c.w.; class-B	12,5	470	45	>> 4,8
BLU50	SOT-161	c.w.; class-B	28	400	30	> 10
BLU51	SOT-161	c.w.; class-B	28	400	45	> 9
BLU52	SOT-161	c.w.; class-B	28	400	60	> 8
			28	400	100	>> 7
BLU53	SOT-161	c.w.; class-C	28	400	100	>> 7
BLU60/12	SOT-119	c.w.; class-B	12,5	470	60	> 4,4
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
			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
			12	28	2 (note 3)	18
			13,5	28	10 (note 4)	18
BLV20	SOT-123	c.w.; class-B	28	175	8	> 12
			26	28	1,3-(note 3)	20
BLV21	SOT-123	c.w.; class-B	28	175	15	> 10
			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 d₃ < -40 dB.
4. P.E.P. at d₃ typ. -30 dB.



Electronic
components
and materials



For detailed information on these and other types see Data Handbook S6
 For case outlines and dimensions see page S163

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
BLV33F	SOT-119	lin. ampl., class-AB	28	225	90	(note 2)	typ. 6,5
		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
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 2)	> 8,0
			25	860	12	(note 2)	typ. 9
		c.w.; class-AB	25	860	38		typ. 6,5
BLV59	SOT-161	lin. ampl., class-AB	25	860	35	(note 2)	8
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
BLV91	SOT-172	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	25		> 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		> 7

Notes

1. P_{o sync} at d_{im} < -60 dB
2. P_{o sync} at d_{im} < -55 dB

3. P.E.P. at d₃ < -40 dB
4. P.E.P. at d₃ typ. -30 dB



Electronic components and materials

For detailed information on these and other types see Data Handbook S6
For case outlines and dimensions see page S163

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 12,5	175	15	> 10 typ. 10,5
BLW31	SOT-120	c.w.; class-B	13,5 12,5	175 175	28 28	> 9 typ. 9,5
BLW32	SOT-122	lin. ampl., class-A	25 25	860 860	0,5 (note 1) 0,63 (note 1)	> 11 typ. 12,2
BLW33	SOT-122	lin. ampl., class-A	25 25	860 860	1,0 (note 1) 1,15 (note 1)	> 10 typ. 10,5
BLW34	SOT-122	lin. ampl., class-A	25 25	860 860	1,8 (note 1) 2,15 (note 1)	> 9 typ. 10,2
BLW50F	SOT-123	s.s.b.; class-A s.s.b.; class-AB	45 50	1,6-28 1,6-28	0-16 (note 3) 10-65 (note 4)	> 19,5 typ. 18
BLW60	SOT-56	c.w.; class-B s.s.b.; class-AB	12,5 12,5	175 1,6-28	45 3-30 (note 4)	> 5,0 typ. 19,5
BLW60C	SOT-120	c.w.; class-B s.s.b.; class-AB	12,5 12,5	175 1,6-28	45 3-30 (note 4)	> 5 typ. 19,5
BLW76	SOT-121	s.s.b.; class-AB c.w.; class-B	28 28	1,6-28 108	8-80 (note 4) 80	> 13 typ. 7,9
BLW77	SOT-121	s.s.b.; class-AB c.w.; class-B	28 28	1,6-28 87,5	15-130 (note 4) 130	> 12 typ. 7,5
BLW78	SOT-121	c.w.; class-B s.s.b.; class-A s.s.b.; class-AB	28 26 28	150 28 28	100 35 (note 3) 100 (note 4)	> 6 typ. 19,5 typ. 19,0
BLW79	SOT-122	c.w.; class-B	12,5 12,5	470 175	2 2	> 9,0 typ. 13,5
BLW80	SOT-122	c.w.; class-B	12,5 12,5	470 175	4 4	> 8,0 typ. 15
BLW81	SOT-122	c.w.; class-B	12,5 12,5	470 175	10 10	> 6,0 typ. 13,5
BLW82	SOT-119	c.w.; class-B	12,5 13,5	470 470	30 30	> 5 typ. 5
BLW83	SOT-123	s.s.b.; class-A s.s.b.; class-AB	26 28	1,6-28 1,6-28	0-10 (note 3) 3-30 (note 4)	> 20 typ. 21
BLW84	SOT-123	c.w.; class-B	28	175	25	> 9
BLW85	SOT-123	c.w.; class-AB s.s.b.; class-AB	12,5 12,5	175 1,6-28	45 3-30 (note 4)	> 4,5 typ. 19,5
BLW86	SOT-123	c.w.; class-B s.s.b.; class-AB s.s.b.; class-A	28 28 26	175 1,6-28 1,6-28	45 5-47 (note 4) 17 (note 3)	> 7,5 typ. 19 typ. 22

Notes

1. P_{o sync} at d_{im} < -60 dB.
2. P_{o sync} at d_{im} < -55 dB.

3. P.E.P. at d₃ < -40 dB.
4. P.E.P. at d₃ typ. -30 dB.



Electronic
components
and materials

For detailed information on these and other types see Data Handbook S6
For case outlines and dimensions see page S163

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 c.w.; class-B s.s.b.; class-A	50 50 40	1,6-28 108 28	25-200 (note 4) 200 50 (note 3)	> 13,5 typ. 6,5 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 25	860 860	3,5 (note 1) 4,4 (note 1)	> 6,5 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 s.s.b.; class-AB c.w.; class-B	26 28 28	28 28 70	0-8 (note 3) 25 (note 4) 25	> 18 > 18 typ. 17
BLX13C	SOT-120	s.s.b.; class-A s.s.b.; class-AB	26 28	1,6-28 1,6-28	0,8 (note 3) 3-25 (note 4)	> 20 typ. 21
BLX14	SOT-55	s.s.b.; class-A s.s.b.; class-AB c.w.; class-B c.w.; class-B	28 28 28 28	1,6-28 1,6-28 70 30	25 (note 3) 7,5-50 (note 4) 50 50	> 13 > 13 > 7,5 typ. 16
BLX15	SOT-55	s.s.b.; class-AB s.s.b.; class-A c.w.; class-B c.w.; class-B	50 40 50 50	1,6-28 1,6-28 70 108	20-150 (note 4) 30 (note 3) 150 150	> 14 > 14 > 10 typ. 7,4
BLX39	SOT-120	c.w.; class-B s.s.b.; class-AB s.s.b.; class-A	28 28 26	175 1,6-28 1,6-28	45 5-42,5 (note 4) 15 (note 3)	> 7,5 typ. 19 typ. 20
BLX65	TO-39/1	c.w.; class-B	13,8 12,5 12,5	470 470 175	2 2 2	typ. 7 > 6 typ. 12
BLX65E	TO-39/3	c.w.; class-B	12,5 12,5	175 470	2 2	typ. 16 > 9
BLX67	SOT-48/1	c.w.; class-B	13,8 13,8 12,5 12,5	470 470 470 175	1,5 3,0 2,5 3,0	typ. 10 typ. 9,3 > 8,5 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 d₃ < -40 dB.
4. P.E.P. at d₃ typ. -30 dB.

For detailed information on these and other types see Data Handbook S6
For case outlines and dimensions see page S163

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
BLX96	SOT-48/3	class-A	25	860	0,5 (note 1)	> 6
			25	860	0,6 (note 1)	typ. 7
BLX97	SOT-48/3	class-A	25	860	1,0 (note 1)	> 5,5
			25	860	1,1 (note 1)	typ. 6,5
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 d₃ < -40 dB.
4. P.E.P. at d₃ typ. -30 dB.



Electronic
components
and materials

For detailed information on these and other types see Data Handbook S6
For case outlines and dimensions see page S163

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	28	175	2,5	> 10
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



For detailed information on these and other types see Data Handbook S6
For case outlines and dimensions see page S163

Status = C

module type	case	mode of operation	$V_{S1,S2}$ V	frequency MHz	output power W	power gain dB
BGY22	SOT-75A	c.w.	13,5	380-512	> 2,5	17
BGY22A	SOT-75A	c.w.	12,5	420-480	> 2,5	17
BGY23	SOT-75A	c.w.	13,5	380-480	> 7,0	4,5
BGY23A	SOT-75A	c.w.	12,5	420-480	> 7,0	4,5
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	> 11,5	18,8
BGY40B	SOT-132	c.w.	12,5	440-470	> 10	18,8
BGY41A	SOT-132	c.w.	12,5	400-440	> 15,6	19,4
BGY41B	SOT-132	c.w.	12,5	440-470	> 15	19,4
BGY43	SOT-132	c.w.	12,5	148-174	> 13	19,4
BGY45A	SOT-183	c.w.	12,5	68-88	> 30	20,0
BGY45B	SOT-183	c.w.	12,5	148-174	> 30	20,0
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	16,0
BGY47D	SOT-181	c.w.	9,6	370-420	> 3,2	18,0
BGY47E	SOT-181	c.w.	9,6	410-470	> 3,2	18,0
BGY48A	SOT-182	c.w.	9,6	400-440	> 5	21,0
BGY48B	SOT-182	c.w.	9,6	430-470	> 5	21,0
BGY48C	SOT-182	c.w.	9,6	460-512	> 5	21,0
BGY90A	SOT-179	c.w.	12,5	806-890	> 7,5	17,5
BGY90B	SOT-179	c.w.	12,5	870-950	> 7,5	17,5
BGY93A	SOT-182	c.w.	9,6	68-88	> 2,0	17,5
BGY93B	SOT-182	c.w.	9,6	136-156	> 2,0	17,5
BGY93C	SOT-182	c.w.	9,6	148-174	> 2,0	17,5
BGY94A	SOT-182	c.w.	9,6	68-88	> 5,0	17,5
BGY94B	SOT-182	c.w.	9,6	132-156	> 5,0	17,5
BGY94C	SOT-182	c.w.	9,6	148-174	> 5,0	17,5
BGY95A	special	c.w.	7,5	825-845	> 2,5	21,5
BGY95B	special	c.w.	7,5	890-915	> 2,5	21,5
BGY96A	special	c.w.	9,6	825-845	> 2,5	21,5
BGY96B	special	c.w.	9,6	890-915	> 2,5	21,5



Wideband transistors

For detailed information on these and other types see Data Handbook S10
 For case outlines and dimensions see page S163
 For packing quantities see page S162

Wideband transistors for MATV and CATV: BFQ34, BFQ68, BFQ136 and BFR94 meet all NCTA crossmodulation and DIN intermodulation requirements.
Interdigitated emitter and collector prevent "hot spots" and diffused emitter ballast resistors avoid second breakdown.

Ti-Pt-Au metallization: Gold for conduction, Titanium for adhesion and Platinum as migration barrier.
Corresponding types in SOT-23 or SOT-89

	SOT-23	SOT-89
BFT24	BFT25	-
BFQ23	BFT93	-
BFQ34	-	BFQ18A
BFR90;A	BFR92;A	-
BFR91;A	BFR93;A	-
BFR96	-	BFQ19
BFW16A	-	BFQ17
BFW30	BFR53	-
BFY90	BFS17	-

Application	Recommended types
wideband aerial amplifiers band I to V (40-860 MHz) wideband distribution amplifiers	BFQ22S,23,24,32,136; BFR90A,91A,96S; BFQ34,68; BFW30,92,93; BFX89; BFY90
low noise wideband amplifiers in measuring equipment. r.f. amplifiers and mixers for communication systems (microwave link radar i.f. amplifiers)	BFQ22S,23,24,34,68,136; BFR90A,91A; BFQ65; BFG65; BFP90A,91A,96
high output channel and band aerial amplifiers in driver and final stages channel amplifiers in CATV & MATV.	BFQ34,68,136; BFR64,65,95; BFW16A,17A
high-voltage output stages in CATV and MATV wideband amplifiers	BFQ34,68,136; BFR94

status = C	N-P-N type	case	circuit values (typ)					ratings			characteristics			
			f MHz	Po* mW	Gp dB	G _{UM} dB	V _{CE} V	I _C mA	V _{CEO} V	I _{CM} mA	P _{tot} mW	h _{FE}	f _T typ GHz	F typ dB
	BFX89	TO-72	200 800	6	22 7	- -	10	8	15	50	200	20-150	1,2	3,3 7,0
	BFW92	SOT-37	200 800	8	23 11	- -	10	10	15	50	190	20-150	1,6	4 at 500 MHz
	BFW92A	SOT-37	800	-	-	13	10	14	15	50	200	75	2,8	2,5
	BFY90	TO-72	200 800	12	23 8	- -	10	14	15	50	200	25-150	1,4	2,5 5,5
	BFW30	TO-72	200 800	15	21 7,5	- -	5	30	10	100	250	> 25	1,6	< 5,0 at 500 MHz
	BFW93	SOT-37	200 800	15	- -	22 10,5	5	30	10	100	190	> 25	1,7	< 5,0 at 500 MHz
	BFW16A	TO-39	200 800	150 90	16 6,5	- -	18	70	25	300	1500	> 25	1,2	< 6,0
	BFW17A	TO-39	200	150	16	-	18	70	25	300	1500	> 25	1,1	-
	BFR64	SOT-48	200 800	150 90	16 6,5	- -	20	70	25	500	3500	> 25	1,2	6,0 -
	BFR65	SOT-48	200 800	450 -	19 4,5	- -	20	200	25	1000	5000	> 30	> 1,2	-

* VSWR at output < 2 measured at f_(2q-p)
 f_p = 202 MHz, f_q = 205 MHz or
 f_p = 798 MHz, f_q = 802 MHz.

Wideband transistors (cont.)

For detailed information on these and other types see Data Handbook S10

For case outlines and dimensions see page S163

For packing quantities see page S162

type	status	pol.	case	characteristics (typ)								
				d_{im}^* at	$f_{(p+q-r)}$	V_o	V_{CE}	I_c	G_{UM}	F at	f	f_r
				dB	MHz	mV	V	mA	typ dB	typ dB	MHz	GHz
BFG34	C	N	SOT-103	-60	285,25	1000	10	100	22**	4,5	800	3,7
BFG65	C	N	SOT-103	-	-	-	-	-	11,5	2,5	2000	7,5
BFG90A	C	N	SOT-103	-60	793,25	150	10	14	18	1,8	800	5,0
BFG91A	C	N	SOT-103	-60	793,25	425	8	30	17	2,3	800	6,0
BFG96	C	N	SOT-103	-60	793,25	700	10	70	14	4	800	5,0
BFG195	C	N	SOT-103	-	-	-	-	-	12	-	2000	7,5
BFP90A	C	N	SOT-173	-	-	-	-	-	19	2,4	800	6,0
BFP91A	C	N	SOT-173	-	-	-	-	-	18	2,3	800	6,0
BFP96	C	N	SOT-173	-	-	-	-	-	15	2,5	800	4,5
BFQ22S	C	N	TO-72	-	-	-	-	-	16	1,9	500	5,0
BFQ23	C	P	SOT-37	-60	493,25	300	5	30	16,5	2,4	500	5,0
BFQ23C	C	P	SOT-173	-	-	-	-	-	15	2,3	800	5,0
BFQ24	C	P	TO-72	-	-	-	-	-	-	2,4	500	5,0
BFQ32	C	P	SOT-37	-60	493,25	500	10	50	14	3,75	500	4,2
BFQ32C	C	P	SOT-173	-	-	-	-	-	13	4,3	800	4,5
BFQ32M	-	P	TO-72	-	-	-	-	-	-	3,75	500	4,2
BFQ34	C	N	SOT-122	-60	793,25	1200	15	120	16	8	500	3,9
BFQ34T	C	N	SOT-37	-60	285,25	1000	10	100	20**	4,5	800	3,5
BFQ51	C	P	SOT-37	-	-	-	-	-	19	2,6	500	5,0
BFQ51C	C	P	SOT-173	-	-	-	-	-	17	3,5	800	5,0
BFQ52	C	P	TO-72	-	-	-	-	-	17	2,7	500	5,0
BFQ53	C	N	TO-72	-	-	-	-	-	18	2,4	500	5,0
BFQ63	C	P	TO-72	-	-	-	-	-	11,5	2,3	500	4,5
BFQ65	C	N	SOT-37	-	-	-	-	-	8	3	2000	7,5
BFQ66	C	N	SOT-173	-	-	-	-	-	12,5	3	2000	7,5
BFQ68	C	N	SOT-122	-60	793,25	1600	15	240	13	-	800	4,0
BFQ136	C	N	SOT-122	-60	793,25	2200	15	500	12,5	-	800	4,0
BFR90	C	N	SOT-37	-60	493,25	150	10	14	19,5	2,4	500	5,0
BFR90A	C	N	SOT-37	-60	793,25	150	10	14	15,5	1,7	800	5,0
BFR91	-	N	SOT-37	-60	493,25	300	5	30	16,5	1,9	500	5,0
BFR91A	C	N	SOT-37	-60	793,25	425	8	30	14	1,6	800	6,0
BFR94	C	N	SOT-48	-60	493,25	700	20	90	13,5	5	200	3,5
BFR95	C	N	TO-39	-61	194,25	1000	18	80	13,5	9	200	3,5
BFR96	-	N	SOT-37	-60	493,25	500	10	50	16	3,3	500	5,0
BFR96S	C	N	SOT-37	-60	793,25	700	10	70	11,5	4	800	5,0
BFT24	C	N	SOT-37	-	-	-	-	-	17	3,8	500	2,3

* intermodulation distortion measured according to DIN three-tone test.

** power gain at 300 MHz



Electronic components and materials

PHILIPS

Wideband modules for CATV

For detailed information on these and other types see Data Handbook S10

For case outlines and dimensions see page S163

For packing quantities see page S162

type	status	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						
BGY50	C	12,5 ± 0,4	0,2-0,8	± 0,2	20	dBmV ⁵⁾ 61
BGY51	C	12,5 ± 0,4	0,2-0,8	± 0,2	20	63,5
BGY52	C	16,4 ± 0,4	0-1	± 0,1	20	61
BGY53	C	16,4 ± 0,4	0-1	± 0,1	20	63,5
BGY54	C	17,0 ± 0,4	0-1	± 0,1	20	61
BGY55	C	17,0 ± 0,4	0-1	± 0,1	20	63,5
BGY56	C	22,0 ± 0,6	0-1	± 0,2	20	61,5
BGY57	C	22,0 ± 0,6	0-1	± 0,2	20	64
BGY58	C	33,0 ± 1,0	0,5-1,5	± 0,3	20	64
BGY58A¹⁰⁾	C	34,0 ± 1,0	0,5-1,5	± 0,3	20	64
BGY59	C	38,5 ± 1,0	0-1,5	± 0,3	18	64
BGY60⁹⁾	C	33,5 ± 1,0	0,5-1,5	± 0,3	18	64
40 to 450 MHz frequency range						
BGY70	C	12,5 ± 0,4	0,5-2,0	± 0,2	18	dBmV ⁶⁾ 61
BGY71	C	12,5 ± 0,4	0,5-2,0	± 0,2	18	63,5
BGY78	C	34,0 ± 1,0	0,5-2,5	± 0,3	18	62

General remarks

Source & load impedance of all devices = 75 Ω

Characteristics of all devices specified at $T_{mb} = 30\text{ °C}$

For further information please consult the relevant data sheet.



Wideband modules for CATV (cont.)

For detailed information on these and other types see Data Handbook S10
 For case outlines and dimensions see page S163
 For packing quantities see page S162

2nd order beat		max. composite triple beat dB	max. cross-modulation dB	max. noise figure dB*	total d.c. current consumption mA ⁸⁾		max. r.f. input voltage dBmV	type
dB	dB							
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	67	BGY50
-73 ²⁾	-	-67	-65	8,0	200	220	67	BGY51
-71 ²⁾	-	-65	-60	6,0	160	180	65	BGY52
-73 ²⁾	-	-67	-65	7,0	200	220	65	BGY53
-71 ²⁾	-	-65	-60	6,0	160	180	65	BGY54
-73 ²⁾	-	-67	-65	7,0	200	220	65	BGY55
-64 ¹⁾	-	-64	-59	6,0	160	180	63	BGY56
-66 ¹⁾	-	-66	-62	7,0	200	220	63	BGY57
-68 ¹⁾	-	-67	-65	6,0	320	340	55	BGY58
-70 ²⁾	-	-67	-65	6,0	320	340	55	BGY58A¹⁰⁾
-68 ¹⁾	-	-	-	6,0	320	340	53	BGY59
-66 ¹⁾	-	-67	-65	6,0	320	340	55	BGY60⁹⁾
40 to 450 MHz frequency range (cont.)								
typ. ³⁾	max. ²⁾	52 chs ⁷⁾	52 chs ⁷⁾		typ.	max.		
-68	-71	-55	-58	7,5	160	180	67	BGY70
-70	-73	-59	-62	8,5	200	220	67	BGY71
-67	-70	-59	-59	6,0	320	340	55	BGY78



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; $V_q = V_o - 6$ dB;
 $f_q = 294,25$ MHz; $V_r = V_o - 6$ dB; $f_r = 296,25$ MHz;
 measured at $f_{(p+q-r)} = 285,25$ MHz
- 6) as ⁵⁾ but with $f_p = 387,25$ MHz; $f_q = 394,25$ MHz;
 $f_r = 396,25$ MHz; $f_{(p+q-r)} = 385,25$ MHz
- 7) $V_o = 46$ dBmV measured in ch H14
- 8) measured at 24 V d.c. supply
- 9) interstage amplifier module
- 10) BGY58A has operating frequency range from 40-330 MHz

WIDEBAND TRANSISTORS AND MODULES (cont.) General data

Wideband modules for CATV (cont.)

For detailed information on these and other types see Data Handbook S10
 For case outlines and dimensions see page S163
 For packing quantities see page S162

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)							
BGY84	C	at 50 MHz 17,0 ± 0,4	0,3-1,5	± 0,2	dB ¹³⁾ 18	dBmV ¹⁰⁾ 60	
BGY85	C	17,0 ± 0,4	0,3-1,5	± 0,2	18	62,5	
BGY84A	C	18,4 ± 0,4	0,3-1,5	± 0,2	18	60	
BGY85A	C	18,4 ± 0,4	0,3-1,5	± 0,2	18	62,5	
BGY88¹⁴⁾	C	34,5 ± 1,0	0,5-2,5	± 0,3	18	62	

Power doublers - 40 to 450 MHz frequency range

BGD102	C	at 50 MHz 18,5 ± 0,5	0,5-2,5	± 0,3	dB 18	dBmV ¹⁰⁾ -	
BGD104	C	20,0 ± 0,5	0,5-2,5	± 0,3	18	-	
BGD102E	C	18,5 ± 0,5	0,5-2,5	± 0,3	18 ¹³⁾	65	
BGD104E	C	20,0 ± 0,5	0,5-2,5	± 0,3	18 ¹³⁾	64,5	

40 to 50 MHz frequency range

BGY584A¹⁴⁾	-	at 50 MHz 18,2 ± 0,5	0,5-2,0	± 0,2	dB 18 ¹³⁾	-	
BGY585A¹⁴⁾	-	18,2 ± 0,5	0,5-2,0	± 0,2	18 ¹³⁾	-	

Power doubler - 40 to 550 MHz frequency range

BGD502¹⁴⁾	-	at 50 MHz 18 ± 0,5	0,2-2,7	± 0,3	dB 18 ¹³⁾	-	
-----------------------------	---	-----------------------	---------	-------	-------------------------	---	--

Reverse amplifiers - 5 to 200 MHz frequency range

BGY61	-	at 10 MHz 13,0 ± 0,5	- 0,2 - + 0,5	± 0,2	dB ¹⁾ 20	dBmV ¹¹⁾ 67	dBmV ¹²⁾ 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	-	24,0 ± 0,5	- 0,2 - + 0,5	± 0,2	20	67	64

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



Wideband modules for CATV (cont.)

For detailed information on these and other types see Data Handbook S10

For case outlines and dimensions see page S163

For packing quantities see page S162

2nd order beat		max. composite triple beat dB	max. cross-modulation dB	max. noise figure dB ¹⁾	total d.c. current consumption ⁴⁾		max. r.f. input voltage dBmV	type
dB	dB				mA	mA		

40 to 450 MHz frequency range (high dynamic range) cont.

typ. ²⁾	max. ³⁾	60 chs ⁵⁾	60 chs ⁶⁾		typ.	max.		
-80	-70	-55	-57	6,5	180	200	65	BGY84 BGY85 BGY84A BGY85A BGY88¹⁴⁾
-80	-70	-58	-60	7,0	220	240	65	
-80	-72	-55	-58	6,5	180	200	65	
-80	-72	-59	-61	7,0	220	240	65	
-80	-70	-58	-59	6,0	320	340		

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 BGD104 BGD102E BGD104E
-	-72	-64	-66	7,0	415	435	65	
-	-73	-	-	7,0	415	435	65	
-	-73	-	-	7,0	415	435	65	



40 to 550 MHz frequency range, cont.

	max. ¹⁵⁾	77 chs ¹⁶⁾	77 chs ¹⁷⁾		typ.	max.		
-	-70	-56	-59	7,0	180	200		BGY58A¹⁴⁾ BGY585A¹⁴⁾
-	-72	-59	-62	8,0	210	240		

Power doubler - 40 to 550 MHz frequency range, cont.

	max. ¹⁵⁾	77 chs ¹⁶⁾	77 chs ¹⁷⁾		typ.	max.		
-	-73	-65	-68	8,0	415	435		BGD502¹⁴⁾

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 BGY65 BGY67 BGY67A
-	-72	-68	-61	5,5	200	230	65	
-	-67	-67	-60	5,5	200	230	63	
-	-67	-67	-59	5,5	200	230	63	

Notes (cont.):

- 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; $V_q = V_o - 6$ dB; $f_q = 447,25$ MHz; $V_r = V_o - 6$ dB; $f_r = 449,25$ MHz; measured at $f_{p+q-r} = 438,25$ MHz 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) provisional data
- 15) $V_o = 44$ dBmV, ch 2; $V_o = 44$ dBmV, ch 18; measured in ch 27
- 16) measured in channel 27 with $V_o = 44$ dBmV
- 17) measured in channel 2 with $V_o = 44$ dBmV



Surface-mounting general purpose transistors

For detailed information on these and other types see Data Handbook S7

For case outlines and dimensions see page S163

For packing quantities see page S162

P-N-P type	case*	ratings				characteristics				
		V _{CB0} 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
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
BC859	SOT-23	30	30	100	200	125/800	2/5	0,30	10/0,5	150
BC860	SOT-23	45	45	100	200	125/800	2/5	0,30	10/0,5	150
BC869	SOT-89	20	20	1000	1000	85/375	500/1	0,50	1000/100	60
BCV62	SOT-143	30	30	100	200	100/800	2/5	0,65	100/5	150
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				
BCX69	SOT-89	20	20	1000	1000	85/375	500/1	0,50	1000/100	60
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				

* Reverse-pinning types are available on request for many SOT-23 types

Surface-mounting general purpose transistors (cont.)

For detailed information on these and other types see Data Handbook S7

For case outlines and dimensions see page S163

For packing quantities see page S162

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. at V	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					
BC849	SOT-23	30	30	100	200	450/800	2/5	0,25	10/0,5	300
BC850	SOT-23	45	45	100	200					
BC868	SOT-89	20	20	1000	1000	85/375	500/1	0,50	1000/100	60
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				
BCX68	SOT-89	20	20	1000	1000	85/375	500/1	0,50	1000/100	60
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

* Reverse-pinning types are available on request for many SOT-23 types

Electronic
components
and materials

Surface-mounting h.f. and wideband transistors

For detailed information on these and other types see Data Handbook S7

For case outlines and dimensions see page S163

For packing quantities see page S162

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 dB	f MHz	f _T typ. MHz	C _{re} typ. pF
P-N-P											
BF536	SOT-23	30	30	25	200	25/-	1/10	5	200	350	-
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
BF824	SOT-23	30	30	25	300	25/-	4/-	3	100	450	0,1
N-P-N											
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

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											
BFG67	SOT-143	20	10	50	300	60/100	15/5	2,5	2000	7500	0,5
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
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
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

* Reverse-pinning types are available on request for many SOT-23 types



Surface-mounting switching transistors

For detailed information on these and other types see Data Handbook S7

For case outlines and dimensions see page S163

For packing quantities see page S162

type	case*	ratings				characteristics					
		V_{CB0} 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/mA	t(max.) on/off at ns	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
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

* Reverse-pinning types are available on request for many SOT-23 types

Electronic
components
and materials

PHILIPS

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

For detailed information on these and other types see Data Handbook S7

For case outlines and dimensions see page S163

For packing quantities see page S162

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



Surface-mounting FETs and trigger devices

For detailed information on these and other types see Data Handbook S7

For case outlines and dimensions see page S163

For packing quantities see page S162

For FET configurations see general data pages, beginning S97

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. μ V
BF510	SOT-23	(1)	20	-	30	300	10	0,7/3,0	0,8	2,5	0,4	-
BF511	SOT-23	(1)						2,5/7,0	1,5	4		
BF512	SOT-23	(1)						6/12	2,2	6		
BF513	SOT-23	(1)						10/18	3	7		
BF989	SOT-143	(2)	20	-	20	200	50	2/20	2,7	9,5	0,025	-
BF990	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	-
BF994	SOT-143	(2)	20	-	30	200	50	2/20	2,5	15	0,025	-
BF994S	SOT-143	(2)	20	-	-	300	50	4/20	2,5	15	-	-
BF996	SOT-143	(2)	20	-	30	200	50	2/20	2,5	15	0,025	-
BF996S	SOT-143	(2)	20	-	-	300	50	4/20	2,5	15	-	-
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	-
BSS83	SOT-143	(4)	10	-	50	230	10	-	2,0	-	0,6	-
BSR56	SOT-23	(3)	40	40	-	250	1	50/-	10	-	5	-
BSR57	SOT-23	(3)						20/100	6			
BSR58	SOT-23	(3)						8/8000	4			
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	-



Trigger devices

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

- (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

For detailed information on these and other types see Data Handbook S1 and S7

For case outlines and dimensions see page S163

For packing quantities see page S162

- 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)

General-purpose diodes

type	status	case	V_R V	I_F mA	t_{rr} ns	C_d pF	leaded equivalent	configuration
BAS19	P	SOT-23	100	200	50	5	BAV19	two separate diodes
BAS20	P	SOT-23	150	200	50	5	BAV20	
BAS21	P	SOT-23	200	200	50	5	BAV21	
BAV23	C	SOT-143	200	200	50	5	2 x BAV21	
BAV100	P	SOD-80	50	250	50	5	BAV18	
BAV101	P	SOD-80	100	250	50	5	BAV19	
BAV102	P	SOD-80	150	250	50	5	BAV20	
BAV103	P	SOD-80	200	250	50	5	BAV21	

Switching diodes

type	status	case	V_R V	I_F mA	t_{rr} ns	C_d pF	leaded equivalent	configuration
BAS32	P	SOD-80	75	200	4	2	IN4148	
BAS16	P	SOT-23	75	250	6	2	BAW62	
BAS29*	C	SOT-23	90	250	50	35	BAX12	
BAS31*	C	SOT-23	90	200	50	35	2 x BAX12	series-connected double diode common-anode double diode
BAS35*	C	SOT-23	90	200	50	35	2 x BAX12	
BAS28	P	SOT-143	70	250	4	1,5	2 x BAX12	two separate diodes
BAS56	C	SOT-143	60	200	6	2,5	BAV10	two separate diodes
BAV70	P	SOT-23	70	250	6	1,5	2 x BAW62	common-cathode double diode series-connected double diode common-anode double diode
BAV99	P	SOT-23	70	250	6	1,5	2 x BAW62	
BAW56	P	SOT-23	70	250	6	2	2 x BAW62	

Variable capacitance tuning diodes

type	status	case	V_R V	I_F mA	C_d pF	at	V_R V	and	f MHz	C_d ratio	at	V	r_D Ω	leaded equivalent
BBY31	P	SOT-23	28	20	1,8-2,8		25		1	typ. 5		3/25	1,2	BB405
BBY39	P	SOT-23	30	20	1,8-2,0		28		1	> 7,6		1/28	0,75	-
BBY40	P	SOT-23	28	20	4,3-6		25		1	> 5		3/25	0,6	BB809
BB215	C	SOD-80	28	20	> 18		1		1	> 7,6		1/28	-	BB405B
BB219	C	SOD-80	28	20	> 31		1		1	> 12		1/28	-	BB909

* avalanche diode

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



Surface-mounting diodes (cont.)

For detailed information on these and other types see Data Handbook S1 and S7

For case outlines and dimensions see page S163

For packing quantities see page S162

Band switching diodes

type	status	case	V_R V	I_F mA	r_D Ω at	I_F mA and	f MHz	C_d pF at	V_R V and	f MHz	leaded near equivalent
BA682	P	SOD-80	35	100	0,7	3	200	1,25	3	1	BA482
BA683	P	SOD-80	35	100	1,2	3	200	1,2	3	1	BA483
BAT18	P	SOT-23	35	100	0,7	5	200	1	20	1	BA482

Schottky-Barrier diodes

type	status	case	V_R V	I_F mA	V_F mV at	I_F mA	C_d pF at	V_R V and	f MHz	leaded equivalent
BAT17	P	SOT-23	4	30	450	1	1	0	1	BA481
BAT54	C	SOT-23	30	200	400	10	10	0	1	BAT85
BAT74	C	SOT-143	30	200	400	10	10	0	1	BAT85

Voltage regulator diodes

series	status	case	V_Z E24 series V	V_Z tol.	P_{tot} mW	leaded equivalent
BZV49	P	SOT-98	2,4 to 75	5%	1000	BZV85
BZV55	P	SOD-80	2,4 to 75	5%	500	BZX79
BZX84	P	SOT-23	2,4 to 75	5%	300	BZX79
BZX84	C	SOT-23	2,4 to 75	2%	300	BZX79

Low voltage stabistor

type	status	case	V_F mV at	I_F mA	I_{FRM} mA	C_d pF at	V_R V and	f MHz	leaded equivalent
BAS17	P	SOT-23	610-690 680-760 750-830 870-960	0,1 1,0 10 100	250	140	0 0 0 0	1 1 1 1	BA314

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



Surface-mounting devices: alphanumeric list

For detailed information on these and other types see Data Handbook S7
 For case outlines and dimensions see page S163
 For packing quantities see page S162

type number	case				marking		device type	nearest conventional type(s)	complement
	SOT-23	SOT-89	SOT-143	SOD-80	type*	rev. type			
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	
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	
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	BC327-16	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 S7

For case outlines and dimensions see page S163

For packing quantities see page S162

type number	case				marking		device type	nearest conventional type(s)	comment
	SOT-23	SOT-89	SOT-143	SOD-80	type	rev. type			
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	
BCV61	●	●			D91		NPN	-	BCV62
BCV62	●	●			C91		PNP	-	BCV61
BCV71	●				K7	K71	NPN	BC546A	
BCV72	●				K8	K81	NPN	BC546B	
BCW29	●				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 S7

For case outlines and dimensions see page S163

For packing quantities see page S162

type number	case				marking		device type	nearest conventional type(s)	complement
	SOT-23	SOT-89	SOT-143	SOD-80	type	rev. type			
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
BCX68		●			CA		NPN	BC368, BD329	BCX69
BCX69		●			CE		PNP	BC369, BD300	BCX68
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 S7
 For case outlines and dimensions see page S163
 For packing quantities see page S162

type number	case				marking		device type	nearest conventional type(s)	complement
	SOT-23	SOT-89	SOT-143	SOD-80	type	rev. type			
BF536	●				G3		PNP	BF936	
BF550	●				G2	G5	PNP	BF450	
BF569	●				G6		PNP	BF970	
BF579	●				G7		PNP	BF979	
BF620		●			DC		NPN	BF420, BF471, BF871	BF621
BF621		●			DF		PNP	BF421, BF472, BF872	BF620
BF622		●			DA		NPN	BF422, BF469, BF869	BF623
BF623		●			DB		PNP	BF423, BF470, BF870	BF622
BF660	●				G8	G81	PNP	BF606A	
BF767	●				G9		PNP	BF967	
BF820	●				1V		NPN	BF420	BF821
BF821	●				1W		PNP	BF421	BF820
BF822	●				1X		NPN	BF422	BF823
BF823	●				1Y		PNP	BF423	BF822
BF824	●				F8		PNP	BF324	
BF840	●				F3		NPN	BF240	
BF841	●				F31		NPN	BF241	
BF989			●		M89		FET	BF960	
BF990			●		M90		FET	BF980	
BF991			●		M91		FET	BF981	
BF992			●		M92		FET	BF982	
BF994			●		M94		FET	BF964	
BF994S			●		M93		FET	BF964S	
BF996			●		M96		FET	BF966	
BF996S			●		M95		FET	BF966S	
BFG67			●		V3		NPN	BFG65	
BFQ17		●			FA		NPN	BFW16A	
BFQ18A		●			FF		NPN	BFQ34	
BFQ19		●			FB		NPN	BFR96	
BFQ67		●			V2		NPN	BFQ65	
BFR30	●				M1		FET	BFW11, BF245	
BFR31	●				M2		FET	BFW12, BF245	
BFR53	●				N1	N4	NPN	BFW30, BFW93	
BFR92	●				P1	P4	NPN	BFR90	BFT92
BFR92A	●				P2	P5	NPN	BFR90	BFT92
BFR93	●				R1	R4	NPN	BFR91	BFT93
BFR93A	●				R2	R5	NPN	BFR91	BFT93
BFR101A			●		M97		FET	-	
BFR101B			●		M98		FET	-	
BFS17	●				E1	E4	NPN	BFY90, BFW92	
BFS17A	●				E2	E5	NPN	BFW92A	
BFS18	●				F1	F4	NPN	BF185, BF495	
BFS19	●				F2	F5	NPN	BF184, BF494	



Surface-mounting devices: alphanumeric list

For detailed information on these and other types see Data Handbook S7
 For case outlines and dimensions see page S163
 For packing quantities see page S162

type number	case				marking		device type	nearest conventional type(s)	complement
	SOT-23	SOT-89	SOT-143	SOD-80	type	rev. type			
BFS20	●				G1	G4	NPN	BF199	
BFT25	●				V1	V4	NPN	BFT24	
BFT46	●				M3		FET	BFW13, BF245	
BFT92	●				W1	W4	PNP	BFQ51; 52	BFR92A
BFT93	●				X1	X4	PNP	BFQ23;24	BFR93
BRY61	●				A5		PNPN	BRY56	
BRY62	●				A51		PNPN	BRY56, BRY39	
BSD20			●		M31		FET		
BSD22			●		M32		FET		
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	
BSS63	●				T3	T6	PNP	BSS68	BSS64
BSS64	●				U3	U6	NPN	BSS38	BSS63
BSS83			●		M74		FET		

Surface-mounting devices: alphanumeric list

For detailed information on these and other types see Data Handbook S7
 For case outlines and dimensions see page S163
 For packing quantities see page S162



type number	case				marking		device type	nearest conventional type(s)	complement
	SOT-23	SOT-89	SOT-143	SOD-80	type	rev. type			
BST15	—●—	—	—	—	BT1		PNP	2N5415 2N5416	BST40 BST39 BST16 BST15
BST16	—●—	—	—	—	BT2		PNP		
BST39	—●—	—	—	—	AT1		NPN		
BST40	—●—	—	—	—	AT2		NPN		
BST50	—●—	—	—	—	AS1		NPN		
BST51	—●—	—	—	—	AS2		NPN	BSR50, BSS50, BDX42	
BST52	—●—	—	—	—	AS3		NPN		
BST60	—●—	—	—	—	BS1		PNP		
BST61	—●—	—	—	—	BS2		PNP		
BST62	—●—	—	—	—	BS3		PNP		
BST80	—●—	—	—	—	KM		FET		BST70A BST72A BST24A BST76A BST100
BST82	—●—	—	—	—			FET		
BST84	—●—	—	—	—	KN		FET		
BST86	—●—	—	—	—	KQ		FET		
BST120	—●—	—	—	—	LM		FET		
BST122	—●—	—	—	—	LN		FET	BST110, BS250 PH2369, BSX20 BZV85 BZX79	
BSV52	—●—	—	—	—	B2	B3	NPN		
BZV49	—●—	—	—	—	*		diode		
BZV55	—●—	—	—	—	*		diode		
BZX84	—●—	—	—	—	*		diode		
PBMF4391	—●—	—	—	—	M62		FET	BSR12	
PBMF4392	—●—	—	—	—	M63		FET		
PBMF4393	—●—	—	—	—	M64		FET		

* For marking of these types see next page

Surface-mounting devices: alphanumeric list

For detailed information on these and other types see Data Handbook S7

For case outlines and dimensions see page S163

For packing quantities see page S162

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



For detailed information on these and other types see Data Handbook S8b

Optical fibre technology has matured to the point where it is a serious contender to take over many of the traditional tasks of coaxial cable. Amongst its advantages are:

- very large bandwidth, high information capacity
- immunity to electromagnetic interference
- low attenuation, independent of frequency
- electrical isolation of input and output, no earth-loop problems
- wide-range temperature independence

As input and output devices for optical fibres, the emitters and receivers listed here are but the first in a projected range of Philips products for fibre-optic signal transfer in the broadcasting and telecommunication industries.

Emitters

type	description
CQF24	GaAlAs high intensity LED. Hermetic TO-46 header with microlens. Radiant power coupled in fibre of 200 μm core diameter is 400 μW at 830 nm.
516CQF-B	GaAlAs multi-longitudinal mode diode laser coupled to a 50/125 μm graded index fibre; radiant output power 3 mW at 850 nm. Options also available for 820 and 870 nm.
502CQF	Buried heterostructure InGaAsP laser diode emitting at 1,3 μm and coupled to a 50/125 μm graded index fibre. Built in SOT-191 together with a fast responding monitor diode.
503CQF	Buried heterostructure InGaAsP laser diode coupled to a single mode fibre pigtail; radiant output power 1,5 mW at 1,3 μm .
CQL10A	AlGaAs double heterostructure laser with photo p-i-n diode optically coupled to the rear facet; radiant output power 5 mW at 820 nm.
504CQL	AlGaAs double heterostructure visible laser diode with photo p-i-n diode optically coupled to the rear facet; output power 5 mW at 780 nm.
CQL13A	Collimator pen consisting of lens system and laser device with output power 2 mW.
CQL16	Collimator pen consisting of lens system and laser device with output power 2 mW.
375CQY/B	AlGaAs double heterostructure laser coupled to a 50/125 graded index fibre; radiant output power 3 mW at 850 nm. Options also available for 780 to 880 nm.

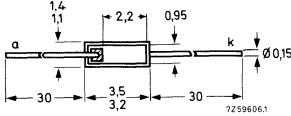
Receivers

BPF24	Si-PIN photodiode in hermetic sealed TO-46 header with microlens. Responsivity 0,4 A/W.
--------------	--

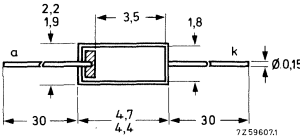


For detailed information on these and other types see Data Handbook S8b
For smallest packing quantity (SPQ) see table, below
For case outlines and dimensions see page S163

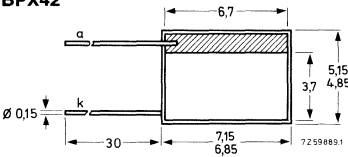
BPX40



BPX41



BPX42



Note: **BPX40 to 42** are unencapsulated

type	status	λ_p nm	$\Delta\lambda$ nm	$\theta_{1/2}$ deg.	V_R or V_{CE} max V**	I_R or I_C max mA**	P_{tot} max mW	I_R I_C at E_e and V_R			$I_R C(L)$ at $E_e = 1 \text{ mW/cm}^2$ and $V_{CE/R} = 5 \text{ V}$ mA	SPQ	case
								mA	mW/ cm ²	V			
BPX40	-	800	350	120	18	5	-	0,019	7,7	15	$1,7 \times 10^{-3}$	100	see above
BPX41	-	800	350	120	18	10	-	0,04	7,7	15	5×10^{-3}	100	see above
BPX42	-	800	350	120	12	50	-	0,15	7,7	10	17×10^{-3}	120	see above
BPW22A-1	P	800	400	20	50	25	100	1,5-8	1,0	5	11,0	1000	SOD-53F
BPW22A-2	C	800	400	20	50	25	100	5-25	1,0	5	11,0	1000	SOD-53F
BPW50	P	930	-	-	32	-	150	0,045	1,0	5	0,045	1000	SOD-67
BPW71	-	800	400	20	30	100	100	-	-	37	-	-	SOT-71A
BPX71	-	800	400	40	50	20	100	0,5-15	20	5	1,0	100	SOT-71A
BPX71-204	-	800	400	40	50	20	100	7-15	20	5	1,0	100	SOT-71A
BPX72D	-	800	300	120	30	25	180	0,85-2	4,75	5	0,2	100	SOT-70A
BPX72E	-	800	300	120	30	25	180	1,4-3	4,75	5	0,2	100	SOT-70A
BPX25	-	800	300	30	32	100	300	10	7,7	6	-	100	TO-18*
BPX29	-	800	300	80	32	100	300	0,6	7,7	6	-	100	TO-18***
BPX61	-	850	-	-	32	-	325	2	-	10	0,045	-	SOT-49
BPX-61P	-	850	-	-	70	-	325	0,6	-	10	0,045	-	SOT-49

* TO-18 except for lens; collector connected to case
** V_R & I_R with diodes, V_{CE} & I_C with transistors.
*** TO-18 except for window; collector connected to case.

For detailed information on these and other types see Data Handbook S8b
 For case outlines and dimensions see page S163
 For packing quantities see page S162



LEDs (infrared)

dimensions in mm/case	type	crystal	light colour	λ_{peak} nm	θ 1/2	V_F V	at	I_F mA	I_F max. mA	package colour/ diffuser
SOD-67	BWP50	-	IR	930	120	-	-	-	-	
Ø5 TO-18	CQY11B	GaAs	IR	880	-	1,6	-	30	30	TO-18**
	CQY11C	GaAs	IR	880	-	1,6	-	30	30	TO-18*
	CQY49B	GaAs	IR	930	80	1,5	-	50	100	TO-18**
	CQY49C	GaAs	IR	930	15	1,5	-	50	100	TO-18*
Ø2 SOT-71A (DO-31)	CQY50	GaAs	IR	930	35	1,5	-	50	100	
	CQY52	GaAs	IR	930	35	1,5	-	50	100	
Ø3 SOD-53F	CQY58A	GaAs	IR	930	10	1,25	-	10	50	
	BPW22A	-	IR	800	40	-	-	-	-*	
Ø5 SOD-63D2	CQW89A	GaAlAs	IR	830	40	2,2	-	100	130	blue/diff.
	CQY89A	GaAs	IR	930	40	1,6	-	100	130	blue/diff.

* TO-18 except for lens

** TO-18 except for window



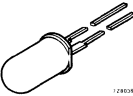
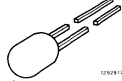
Electronic
components
and materials

For detailed information on these and other types see Data Handbook S8a
For case outlines and dimensions see page S163
Smallest packing quantity: $\varnothing 5 = 1000$.

Status:

P - all non-classified and middle classes
C - all other classes

LEDs (visible light) grouped according to light families:
5 mm round lens top

dimensions in mm/case	type	crystal	light colour	λ_{peak} nm	$\theta_{1/2}$	V_F at $I_F = 10$ mA V	I_F max. mA	package colour/ diffusor	
$\varnothing 5$ SOD-63 	CQX24 *	GaAlAs	hyper-red	650	20°	1,75	100	clear	
	CQX54 *	GaAsP/GaP	super-red	630	20°	2,1	30	clear	
	CQX64 *	GaP	super-green	565	20°	2,1	60	clear	
	CQX74 *	GaPAs	yellow	590	20°	2,1	30	clear	
	CQW24 *	GaAlAs	hyper-red	650	100°	1,75	100	red/diff.	
	CQS51 *	GaP(ZnO)	ultra-red	700	70°	2,0	30	red/diff.	
	CQX51 *	GaAsP/GaP	super-red	630	70°	2,1	30	red/diff.	
	CQY94B *	GaP	super-green	565	70°	2,1	60	green/diff.	
	CQY96 *	GaPAs	yellow	590	70°	2,1	30	yellow/diff.	
	CQY24B **	GaAsP	standard-red	650	70°	1,7	50	red/diff.	
	CQT24 *	GaAlAs	hyper-red	650	70°	1,75	100	colourless/ diff.	
			GaP	super-green	565	70°	2,1**	60	
	$\varnothing 5$ SOD-85AL 	CQS82AL	GaAlAs	hyper-red	650	70°	1,75	100	red/diff.
		CQS82L	GaAsP	standard-red	650	70°	1,7	50	red/diff.
CQS84L		GaP	super-green	565	70°	2,1	60	green/diff.	
CQS86L		GaPAs	yellow	590	70°	2,1	30	yellow/diff.	

* Also available in long leads (25 mm); add suffix L, e.g. **CQX24L**

** Specified at $I_F = 20$ mA for all data



Electronic
components
and materials

For detailed information on these and other types see Data Handbook S8a

For case outlines and dimensions see page S163

Smallest packing quantity: $\varnothing 5 = 1000$



existing I_V classes in mcd at $I_F = 10$ mA

1	2	3	4	5	6	7	8	9	10
0,7-1,6	1,0-2,2	1,6-3,5	3,0-7,0	5-12	10-22	16-35	30-70	50-120	> 100
-	-	-	-	-	-	X*	8	9	10*
-	-	-	-	-	X*	7	8	9*	
-	-	-	-	-	X*	7	8	9*	
-	-	-	-	-	X*	7	8	9*	
-	-	X > 3	4	5	6*				
X*	-	3	4						
-	-	X*	4	5	6*				
X*	-	3	4	5*					
X*	-	3	4	5*					
X*/**	2	3	4						
-	-	-	X*						
-	-	-	X*/**						
-	-	X*	4	5	6*				
X*/**	2	3	4*						
X*	-	3	4	5*					
X*	-	3	4	5*					

* I_V max. not specified

** For these classes $I_F = 20$ mA

X Type unclassified



Electronic
components
and materials

For detailed information on these and other types see Data Handbook S8a

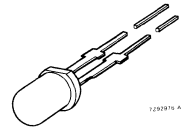
For case outlines and dimensions see page S163

Smallest packing quantity: $\varnothing 3 = 1000$

Status:

P - all non-classified and middle classes

C - all other classes



LEDs (visible light) grouped according to light families
3 mm round lens and 2 mm flat top

dimensions in mm/case	type	crystal	light colour	λ_{peak} nm	$\theta_{1/2}$	V_F at $I_F =$ 10 mA V	I_F - max. mA	package colour/ diffusor
$\varnothing 3$ SOD-53E	CQS54	GaP(ZnO)	ultra-red	700	70°	2,0	30	red/diff.
	CQW54	GaAlAs	hyper-red	650	100°	1,75	60	red/diff.
	CQW93 **	GaAlAs	hyper-red	650	60°	1,75	60	red/clear
	CQW95 **	GaP	super-green	565	60°	2,1	60	green/clear
	CQW97 **	GaPAs	yellow	590	60°	2,1	30	yellow/clear
	CQY54A	GaAsP	standard-red	650	70°	1,7	50	red/diff.
	CQY95B	GaP	super-green	565	70°	2,1	60	green/diff.
	CQY97A	GaPAs	yellow	590	70°	2,1	30	yellow/diff.
	$\varnothing 3$ SOD-82C	CQS93	GaP(ZnO)	ultra-red	700	60°	2,2*	25
CQS95		GaP	super-green	565	60°	2,2	30	green/diff.
CQS97		GaPAs	yellow	590	60°	2,2	30	yellow/diff.
$\varnothing 3$ SOD-82A*	CQS93L	GaP(ZnO)	ultra-red	700	60°	2,2*	25	red/diff.
	CQS95L	GaP	super-green	565	60°	2,2	30	green/diff.
	CQS97L	GaPAs	yellow	590	60°	2,2	30	yellow/diff.
$\varnothing 3$ SOD-82B	CQS93E	GaP(ZnO)	ultra-red	700	60°	2,2*	25	red/diff.
	CQS95E	GaP	super-green	565	60°	2,2	30	green/diff.
	CQS97E	GaPAs	yellow	590	60°	2,2	30	yellow/diff.
$\varnothing 2$ SOD-79	CQW20A	GaAlAs	hyper-red	650	110°	1,75	60	red/diff.
	CQW21	GaP	super-green	565	110°	2,1	60	green/diff.
	CQW22	GaPAs	yellow	590	110°	2,1	60	yellow/diff.

* Specified at $I_F = 20$ mA for all data

** This device to be used behind a diffusing screen



Electronic
components
and materials

PHILIPS

Light-emitting diodes (cont.)

For detailed information on these and other types see Data Handbook S8a

For case outlines and dimensions see page S163

Smallest packing quantity: $\varnothing 3 = 1000$ existing I_V classes in mcd at $I_F = 10$ mA

1	2	3	4	5	6	7	8	9	10
0,7-1,6	1,0-2,2	1,6-3,5	3,0-7,0	5-12	10-22	16-35	30-70	50-120	> 100
X*	-	3	4	5*	-	-			
-	-	-	X*	5	6	7*			
-	-	-	-	5	6	7	8		
-	-	-	X*	5	6	7*			
-	-	-	X*	5	6	7*			
X*/**	2	3*	-	-					
X*	-	3	4	5*					
X*	-	3	4	5*					
X*/**	2	3*	-	-					
X*	2	3*	-	-					
X*	2	3*	-	-					
X*/**	2	3*	-	-					
-	-	X*	4	5*					
-	-	X*	4	5*					
X*/**	2	3*	4	5*					
-	-	X*	4	5*					
-	-	X*	4	5*					
X*									
X*									
X*									

* I_V max. not specified** For these classes $I_F = 20$ mA

X Type unclassified

Electronic
components
and materials

For detailed information on these and other types see Data Handbook S8a

For case outlines and dimensions see page S163

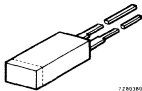
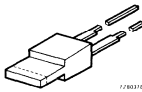
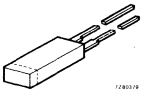
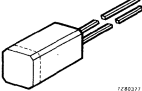
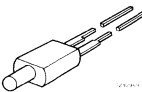
Smallest packing quantity: $\varnothing 5 = 1000$

Status:

P = all non-classified and middle classes

C = all other classes

**LEDs (visible light) grouped according to light families:
single cast rectangular**

dimensions in mm/case	type	crystal	light colour	λ_{peak} nm	$\theta_{1/2}$	V_F at $I_F =$ 10 mA V	I_F max. mA	package colour/ diffusor
 728036	CQW10A *	GaAlAs	hyper-red	650	100°	1,75	100	red/diff.
	CQW10B *	GaAsP/GaP	super-red	630	100°	2,1	30	red/diff.
	CQW11B *	GaP	super-green	565	100°	2,1	60	green/diff.
	CQW12B *	GaPAs	yellow	590	100°	2,1	30	yellow/diff.
	CQW10U *	GaP(ZnO)	ultra-red	700	100°	2,0	30	red/diff.
	CQW10B	GaAlAs	hyper-red	650	110°	1,75	100	colourless/ diff.
	CQT10B	GaP	super-green	565	110°	2,1**	60	
 728037	CQW60A *	GaAlAs	hyper-red	650	110°	1,75	100	red/diff.
	CQW60 *	GaAsP/GaP	super-red	630	110°	2,1	30	red/diff.
	CQW61 *	GaP	super-green	565	110°	2,1	60	green/diff.
	CQW62 *	GaPAs	yellow	590	110°	2,1	30	yellow/diff.
	CQW60U *	GaP(ZnO)	ultra-red	700	110°	2,0	30	red/diff.
	CQW60	GaAlAs	hyper-red	650	110°	1,75	100	colourless/ diff.
	CQT60	GaP	super-green	565	110°	2,2**	60	
 728038	CQV70A *	GaAlAs	hyper-red	650	100°	1,75	100	red/diff.
	CQV70 *	GaAsP/GaP	super-red	630	100°	2,1	30	red/diff.
	CQV71A *	GaP	super-green	565	100°	2,1	60	green/diff.
	CQV72 *	GaPAs	yellow	590	100°	2,1	30	yellow/diff.
	CQV70U *	GaP(ZnO)	ultra-red	700	100°	2,0	30	red/diff.
	CQV70	GaAlAs	hyper-red	650	110°	1,75	100	colourless/ diff.
	CQT70	GaP	super-green	565	110°	2,2**	60	
 728039	CQV80AL	GaAlAs	hyper-red	650	100°	1,75	100	red/diff.
	CQV80U *	GaP(ZnO)	ultra-red	700	100°	2,0	30	red/diff.
	CQV80L	GaAsP/GaP	super-red	630	100°	2,1	30	red/diff.
	CQV81L	GaP	super-green	565	100°	2,1	60	green/diff.
	CQV82L	GaPAs	yellow	590	100°	2,1	30	yellow/diff.
	CQV80L	GaAlAs	hyper-red	650	110°	1,75	100	colourless/ diff.
	CQT80L	GaP	super-green	565	110°	2,1**	60	
 728040	CQT11	GaAlAs	hyper-red	650	110°	1,75	60	colourless/ diff.
		GaP	super-green	565	110°	2,2**	60	

* Also available in long leads (25 mm): add suffix L, e.g. **CQW10AL**** Specified at $I_F = 20$ mA for all data

Light-emitting diodes (cont.)

For detailed information on these and other types see Data Handbook S8a
 For case outlines and dimensions see page S163
 Smallest packing quantity: $\varnothing 5 = 1000$

existing I_V classes in mcd at $I_F = 10$ mA

1	2	3	4	5	6	7	8	9	10
0,7-1,6	1,0-2,2	1,6-3,5	3,0-7,0	5-12	10-22	16-35	30-70	50-120	> 100
X*	-	3	4						
X*	2	3	-						
X*	2	3	-						
X*	2	3	-						
X*	2	3	-						
-	X*	-	-						
-	X*/**	-	-						
X*	-	3	4						
X*	2	3	-						
X*	2	3	-						
X*	2	3	-						
X*	2	3	-						
-	X*	-	-						
-	X*/**	-	-						
-	X*	3	4						
X*	2	3	-						
X*	2	3	-						
X*	2	3	-						
X*	2	3	-						
-	X*	-	-						
-	X*/**	-	-						
X*	-	3	4						
X*	2	3	-						
X*	2	3	-						
X*	2	3	-						
X*	2	3	-						
-	X*	-	-						
-	X*/**	-	-						
X*									
X*/**									



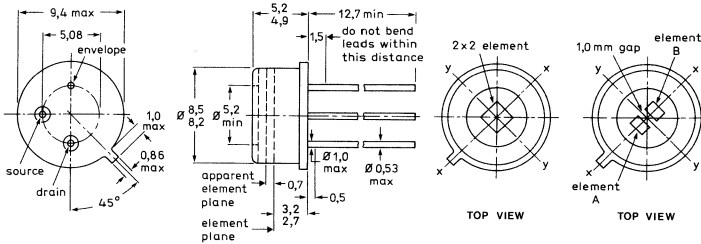
* I_V max. not specified
 ** For these classes $I_F = 20$ mA
 X type unclassified



Pyroelectric infrared detectors

For detailed information on these and other types see Data Handbook S8b

SOT-49H



The ceramic pyroelectric detector consists of an infrared sensitive element, a low-noise impedance-matching network, and an infrared window, all in a TO-5 encapsulation. The devices are rugged, low-cost components ideally suited for use in intruder detection systems, infrared radiometry and similar applications.

type	number of elements	element dimension mm	spectral response μm	responsivity typ V/W	N.E.P typ W/Hz ^{1/2}	case
RPY100	1	2 x 1	6 to 15	(10 μm , 10) 150	(10 μm , 10,1) $2,5 \times 10^{-9}$	SOT-49H
RPY101	1	2 x 1,5	6 to 15	(10 μm , 10) 150	(10 μm , 10,1) $3,8 \times 10^{-9}$	SOT-49H
RPY102	1	2 x 2	6 to 15	(10 μm , 10) 75	(10 μm , 10,1) 5×10^{-9}	SOT-49H
RPY103	2	2 x 1	6 to 15	(10 μm , 10) 150	(10 μm , 10,1) $2,2 \times 10^{-9}$	SOT-49H
RPY109	1	2 x 2	1 to 15	(500 K, 10) 65	(500 K, 10,1) 6×10^{-9}	SOT-49H
P2105	1	2 x 2	1 to 25	(500 K, 10) 90	(500 K, 10,1) $1,4 \times 10^{-9}$	SOT-49G

For detailed information please refer to:
 Fabrikstrasse 5, CH-5600 Lenzburg, Switzerland.
 Telephone: 064/50 41 22; telex 981 360 vid ch; telefax: 064/51 80 07

liquid crystal displays

- very low power consumption
- low operating voltage
- flat dimensions and light weight
- excellent readability in any ambient light
- normal and extended temperature range
- expected life time > 100 000 hours
- large selection of standard designs
- custom designed LCDs on glass sizes
- up to 330 mm
- reflective, transreflective and transmissive versions with positive and negative contrast
- various colour options

integrated displays

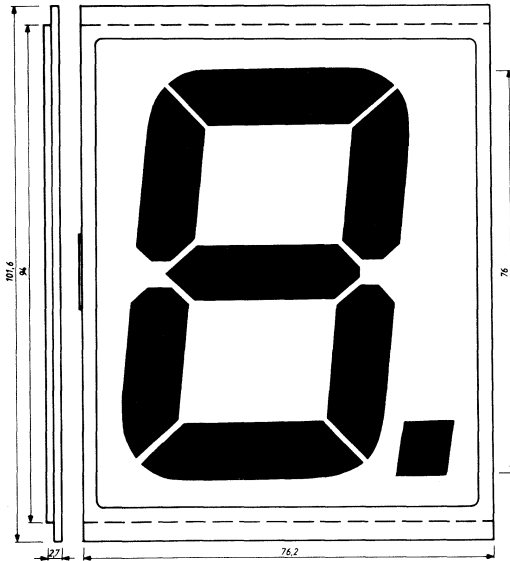
- LCDs with driver chips on glass
 - extremely flat display modules
 - only 5 to 8 external contacts
 - serial I²C-Bus compatible with most microcomputers
 - wide viewing angle and temperature range
 - easy to connect, mount and illuminate
- ask for detailed information

LCD modules

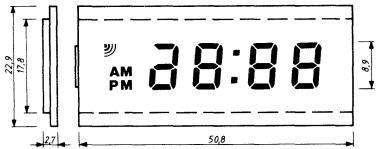
- LCD-modules with complete driver circuitry in a compact unit

Selection of standard designs

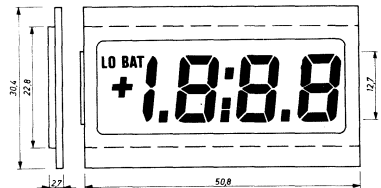
LC 07610110-300**



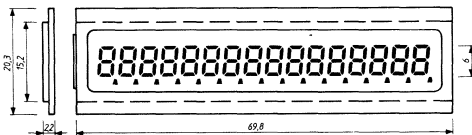
LC 512332-300*



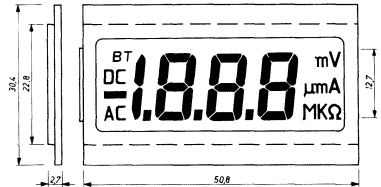
LC 513031-302**/303*



LC 7020160-412* (Mux 1:2)***



LC 513031-307*



For LCD-Drivers see 'Integrated Circuits'

LCDs for industrial applications

For detailed information please refer to:

Fabrikstrasse 5, CH-5600 Lenzburg, Switzerland.

Telephone: 064/50 41 22; telex: 981 360 vid ch; telefax: 064/51 80 07

type number	overall size (l x h) (mm)	char. height (mm)	driving method	no. and type of connections*	description of display
LC 241440-101	23,9 x 14,0	6,8	direct	32E	4 digits, 3 points (p)
LC 283020-300	27,9 x 30,4	12,7	direct	18E	2 digits, 2 p
LC 283020-301	27,9 x 30,4	12,7	direct	18 DIP	2 digits, 2 p
LC 382040-401	38,0 x 20,3	8,0	direct	37 E	4 digits, 3 p, colon, ±, B,
LC 382080-411	38,0 x 20,3	6,0	Mux 1:2	38 E	8 digits, 8 p, 2 pointers
LC 382232-700	38,1 x 21,6	8,5	direct	26 E	3 1/2 digits, 1 colon
LC 512332-300	50,8 x 22,9	8,9	direct	29 E	3 1/2 digits, 1 colon, AM/PM, bell
LC 513000-300	50,8 x 30,4	3,7 **	direct	44 E	dual bar graph
LC 513031-300	50,8 x 30,4	12,7	direct	32 DIP	3 1/2 dig., 3 p, 1 colon, ±, BAT, ~, Δ
LC 513031-309	50,8 x 30,4	12,7	direct	31 E	3 1/2 dig., 3 p, 1 colon, ±, BAT, ~, Δ
LC 513031-302	50,8 x 30,4	12,7	direct	31 DIP	3 1/2 dig., 2 p, 1 colon, ±, LO BAT
LC 513031-303	50,8 x 30,4	12,7	direct	31 E	3 1/2 dig., 3 p, 1 colon, ±, LO BAT
LC 513031-307	50,8 x 30,4	12,7	direct	38 E	3 1/2 dig., 3 p, ~, 8 signs for DMM
LC 513040-301	50,8 x 30,4	12,7	direct	35 DIP	4 dig., 3 p, 1 colon
LC 513040-303	50,8 x 30,4	12,7	direct	35 E	4 dig., 3 p, 1 colon
LC 513041-300	50,8 x 30,4	10,0	direct	39 DIP	4 1/2 dig., 4 p, 2 colon, ±, LO BAT
LC 513041-301	50,8 x 30,4	10,0	direct	39 E	4 1/2 dig., 4 p, 2 colon, ±, LO BAT
LC 513041-320	50,8 x 30,4	11,0	Mux 1:3	15 E	4 1/2 dig., 4 p, ~, LO BAT, cont.
LC 513050-300	50,8 x 30,4	10,0	direct	40 DIP	5 digits, 4 p
LC 518000-300	50,0 x 80,0	62,0	direct	36 DIP	1 5 x 7 dot-matrix character
LC 522232-300	52,0 x 22,0	10,0	direct	30 E	3 1/2 dig., 1 colon, AM/PM, \$, bell
LC 554731-412	46,8 x 54,8	5,6	Mux 1:2	78 E	analog + digital clock
LC 7020160-412	69,8 x 20,3	6,0	Mux 1:2	68 E	16 digits, 16 p
LC 7020160-430	69,8 x 20,3	6,0	Mux 1:4	32 E	16 digits, 16 p
LC 703000-300	69,8 x 30,4	5,0 **	direct	46 DIP	dual bar graph
LC 703060-301	69,8 x 30,4	12,7	direct	50 DIP	5 digits, 5 p, 2 colon
LC 7030160-340	69,8 x 30,4	8,35 (6,95)	Mux 1:8-11	91 E	16-character dot-matrix
LC 7030320-350	69,8 x 30,4	6,25 (4,85)	Mux 1:16	96 E	2 x 16-character dot-matrix
LC 703831-300	69,8 x 30,4	17,8	direct	32 DIP	3 1/2 dig., 3 p, 1 colon, ±, BAT, ~, Δ
LC 703840-300	69,8 x 30,4	17,7	direct	33 DIP	4 digits 3 p, 1 colon
LC 0761010-300	76,2 x 101,6	76,0	direct	9 DIP	1 digit, 1 p
LC 943080-301	93,8 x 30,4	12,7	direct	67 DIP	8 digits, 7 p, 3 colon
LC 9430160-344	93,8 x 30,4	7,5 (5,8)	Mux 1:8	88 E	16-character dot-matrix
LC 11402600-310	26,0 x 104,0	5,0 **	Mux 1:2	107 E	dual bar graph
LC 11401650-301	114,0 x 46,0	25,0	direct	50 DIP	5 dig., 4 p, 4 commas, 4 sale signs
MB 7020160	92,5 x 25,0	6,0	Mux 1:2	16 dig. LCD module with serial data input	
MG 7020160	82,0 x 25,0	6,0	Mux 1:2	16 dig. LCD module with serial data input	
MB 7030160	96,0 x 36,0	8,35 (6,95)	Mux 1:11	16 char. dot-matrix module with char. generator	
MB 7030320	96,0 x 36,0	6,25 (4,85)	Mux 1:16	2 x 16 char. dot-matrix module with char. generator	
HX 10607600-380	76,2 x 106,2	79,8	Mux 1:2	7 x 9 dot-matrix with on-glass integrated driver PCE2111	

* E = Elastomer connector

DIP = DIL-pin-connector

** bar width



Electronic components and materials

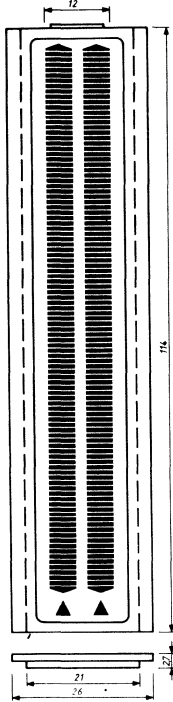
PHILIPS

LIQUID CRYSTAL DISPLAYS (cont.)

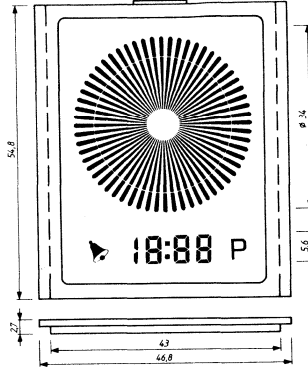
LCDs for industrial applications

For detailed information please refer to:
Fabrikstrasse 5, CH-5600 Lenzburg, Switzerland.
Telephone: 064/50 41 22; telex: 981 360 vid ch; telefax: 064/51 80 07

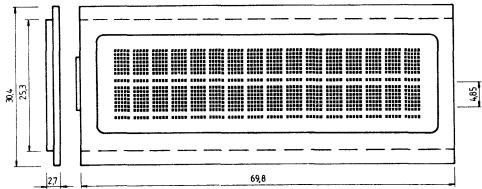
LC 11402600-310* (Mux 1:2)



LC 554731-312* (Mux 1:2)



LC 7030320-350* (Mux 1:16)***



Electronic
components
and materials

For detailed information on these and other types see Data Handbook S8b

Use diagram 7Z94316 here

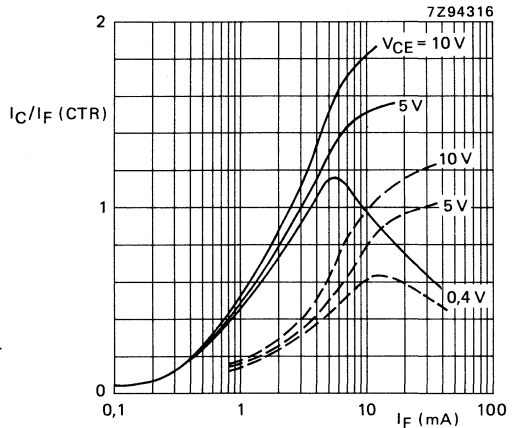


Fig.1 Current transfer ratio versus forward current.

- Piece with a high I_C/I_F (CTR)
- - - Piece with a low I_C/I_F (CTR).

type	status	current transfer ratio τ_{min} (see Fig. 1)			isolation voltage d.c. kV	photodiode I_F mA	V_R max V
		$V_{CE} = 0,4$ V $I_F = 10$ mA	$V_{CE} = 1$ V $I_F = 1$ mA	$V_{CE} = 10$ V $I_F = 10$ mA			
CNX35	P	0,4	-	-	4,4	100	5
CNX36*	C	0,8	-	-	4,4	100	5
CNX38*	C	-	-	0,7	4,4	100	5
CNX39	P	0,6	-	-	4,4	100	5
CNX44	-	0,3	-	-	1,0	100	3
CNX48*	P	-	5,0	-	4,4	100	5
CNX62*	P	0,4	-	-	5,3	100	5
CNX72*	-	0,4	-	-	5,3	100	5
CNX82*	-	0,4	-	-	5,3	100	5
CNX91	-	-	-	-	0,8	100	7
CNX92	-	-	-	-	0,8	100	7
CNY50-1	-	0,25	-	-	1,0	100	3
CNY50-2	-	4,0	-	-	1,0	100	5
CNY57*	P	0,2	-	-	4,4	100	3
CNY57A*	P	0,4	-	-	4,4	100	3
MCT2*	-	-	-	0,2	4,4	60	3
MCT26*	-	-	-	0,06	4,4	60	3
4N25*	-	-	-	0,2	2,5	60	3
4N25A*	-	-	-	0,2	2,5	80	3
4N26*	-	-	-	0,2	1,5	80	3
4N27*	-	-	-	0,1	1,5	80	3
4N28*	-	-	-	0,1	0,5	80	3
H11A1*	-	-	-	0,5	1,5	60	3
H11A2*	-	-	-	0,2	0,950	60	3
H11A3*	-	-	-	0,2	1,5	60	3
H11A4*	-	-	-	0,1	0,950	60	3

* These types are available with UL and VDE approval.



For detailed information on these and other types see Data Handbook S8b
For smallest packing quantity (SPQ) see table, below

phototransistor V_{CEmax} V	$P_{tot max}$ mW	switching times $V_{CC} = 5 V; I_{C on} = 2 mA$				case	SPQ	type
		$t_{on} \mu s$		$t_{off} \mu s$				
		$R_L = 2 k\Omega$	$R_L = 100 \Omega$	$R_L = 2 k\Omega$	$R_L = 100 \Omega$			
30	200	-	3	-	3	SOT-90B	75	CNX35
30	200	-	3	-	3	SOT-90B	75	CNX36
80	200	-	5*	-	5*	SOT-90B	75	CNX38
30	200	-	3	-	3	SOT-90B	-	CNX39
50	300	-	5	-	5	SOT-104C	50	CNX44
30	200	-	5	-	30	SOT-90B	75	CNX48
50	200	-	3	-	3	SOT-174	75	CNX62
30	200	-	26	-	2,5	SOT-90B	-	CNX72
50	200	-	3	-	3	SOT-90B	-	CNX82
50	230	-	5	-	5	SOT-18F	-	CNX91
50	230	-	-	-	-	SOT-18F	-	CNX92
50	150	20	-	70	-	SOT-104B	100	CNY50-1
50	150	20	-	70	-	SOT-104B	100	CNY50-2
30	200	-	3	-	3	SOT-90B	75	CNY57
30	200	-	5	-	5	SOT-90B	75	CNY57A
30	200	5	-	30	-	SOT-90B	-	MCT2
30	250	-	2	-	2	SOT-90B	-	MCT26
30	250	5	-	30	-	SOT-90B	-	4N25
30	250	5	-	30	-	SOT-90B	-	4N25A
30	250	5	-	30	-	SOT-90B	-	4N26
30	250	5	-	30	-	SOT-90B	-	4N27
30	250	5	-	30	-	SOT-90B	-	4N28
30	250	-	2	-	2	SOT-90B	-	H11A1
30	250	-	2	-	2	SOT-90B	-	H11A2
30	250	-	2	-	2	SOT-90B	-	H11A3
30	250	-	2	-	2	SOT-90B	-	H11A4

* $I_C = 4 mA$



Class A bipolar medium power transistors

For case outlines and dimensions see page S163
 Products supplied as single units

Status = C

Class-A medium power

type	f GHz	V _{CE} V	I _C mA	P _{L1} * mW	N _F dB	G _{po} ** dB	G _a dB	case
LAE6000Q***	2	10	4	-	1,8	-	12	SOT-100
LBE2003S	2	18	30	250	-	11	-	FO-45
LCE2003S	2	18	30	250	-	11	-	FO-46
LBE2009S	2	18	110	900	-	9,8	-	FO-45
LCE2009S	2	18	110	900	-	9,8	-	FO-46
LWE2015R	2,3	16	250	1600	-	8,1	-	FO-93
LWE2025R	2,3	16	400	2800	-	7,8	-	FO-93
LAE4001R	4	15	25	110	-	9,5	-	SOT-100
LAE4002S	4	18	30	160	-	8	-	SOT-100
LTE42005S	4,2	18	110	550	-	7,2	-	FO-41B
LTE42008R	4,2	16	250	940	-	7,5	-	FO-41B
LTE42012R	4,2	16	400	1250	-	7	-	FO-41B

* Load power for 1 dB compressed power gain

** Low-level power gain associated with P_{L1}

*** Low-noise type



Electronic
components
and materials

Class A bipolar high power transistors

For case outlines and dimensions see page S163
 Products supplied as single units



Status = C

Class-A high power

type	f GHz	V _{CE} V	I _C A	P _{L1} * W	G _{po} ** dB	case
LZ1418E100R	1,4 to 1,8	16	2	11	11	FO-57C
LV1721E50R	1,7 to 2,1	16	1,1	5,5	8	FO-83
LV2024E45R	2,0 to 2,4	16	1,1	5	7	FO-83
LV2327E40R	2,3 to 2,7	16	1	5	8	FO-83
LV3742E16R	3,7 to 4,2	16	0,5	2	5,5	FO-83
LV3742E24R	3,7 to 4,2	16	0,8	2,4	6,5	FO-83

* Load power for 1 dB compressed power gain

** Low-level power gain associated with P_{L1}



Electronic
 components
 and materials

Class C bipolar power transistors

For case outlines and dimensions see page S163
 Products supplied as single units

Status = C

Class-C medium power

type	f GHz	V _{CE} V	P _L W	G _p dB	η _C %	case
PTB23001X	2	24	1,8	9	50	FO-41B
PTB23003X	2	24	4,0	10	50	FO-41B
PTB23005X	2	24	7,0	11	50	FO-41B
PTB32001X	3	24	1,8	9,5	45	FO-41B
PTB32003X	3	24	3,5	9,5	40	FO-41B
PTB32005X	3	24	5,5	9,5	40	FO-41B
PTB42001X	4,2	24	1,0	6	33	FO-41B
PTB42002X	4,2	24	2,0	6	35	FO-41B
PTB42003X	4,2	24	3,0	6	33	FO-41B
PVB42004X	1	24	15	13	60	FO-83
	2	24	11	10	55	
	3	24	8	8	45	
	4	24	5	6	30	

Class-C high power

type	f GHz	V _{CE} V	P _L W	G _p dB	η _C %	case
PZ1418B15U	1,4 to 1,8	28	15	7,8	45	FO-57C
PZ1418B30U	1,4 to 1,8	28	35	8,4	45	FO-57C
PZB16035U	1,55	28	38	9,8	50	FO-57C
PZ1721B12U	1,7 to 2,1	28	16	8	45	FO-57C
PZ1721B25U	1,7 to 2,1	28	30	7,8	41	FO-57C
PZ2024B10U	2,0 to 2,4	28	12	6,8	45	FO-57C
PZ2024B20U	2,0 to 2,4	28	26	7	42	FO-57C
PZB27020U	1	28	70	10	62	FO-57C
	2	28	40	7,8	48	
	3	28	22	5	25	
PV3742B4X	3,7 to 4,2	24	4,5	7,4	32	FO-83



Oscillator power transistors

For case outlines and dimensions see page S163
 Products supplied as single units



Status = C

Oscillator power transistors

type	f GHz	V _{CE} 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 case outlines and dimensions see page S163
 Products supplied as single units

Radar pulsed power transistors

Status = C

L-band

type	f GHz	V _{CE} V	t _p at μs	δ %	P _L W	G _p dB	η _C %	case
RZ1214B35Y	1,2 to 1,4	42	50	10	40	7,8	40	FO-57C
	1,2 to 1,4	50	300	10	40	7	35	
RZ1214B65Y	1,2 to 1,4	42	50	10	80	7	38	FO-57C
	1,2 to 1,4	50	300	10	80	7	30	
RZ1214B125Y	1,2 to 1,4	42	50	10	150	7	38	FO-57C
	1,2 to 1,4	50	300	10	150	7	30	
RZ1214B150Y	1,2 to 1,4	42	50	10	200	7	38	FO-57C
	1,2 to 1,4	50	300	10	200	7	35	
RXZ1214B300Y	1,2 to 1,4	42	50	10	380	7	40	2-FO-57C
	1,2 to 1,4	50	300	10	380	7	35	
RX1214B300Y	1,2 to 1,4	50	150	4	300	7	35	FO-91
	1,2 to 1,4	50	300	10	300	7,5	30	

S-band

RZ2833B45W	2,8 to 3,3	40	100	10	45	5,5	25	FO-57C
	2,7 to 3,1	40	50	5	55	6,5	30	
	2,9 to 3,1	42	50	5	65	7,0	30	
RV3135B5X	3,1 to 3,5	24	100	10	5,6	5,7	47	FO-83
RZ3135B15W	3,1 to 3,5	42	100	10	18	5,5	33	FO-57C
RZ3135B30W	3,1 to 3,5	42	100	10	34	5,5	33	FO-57C

Avionics pulsed power transistors

type	f GHz	V _{CE} V	t _p at μs	δ %	P _L W	G _p dB	η _C %	case
RZB12100Y	1,09	50	100	10	100	10	45	FO-57C
	1,09	50	300	10	100	10	40	
RZB12250Y	1,09	50	100	10	250	7,5	25	FO-57C
	1,09	50	300	10	200	7,0	30	
RXB12350Y	1,09	50	100	10	350	7,8	38	FO-91
	1,09	50	300	10	300	7,5	35	



Low noise and Class A power Ga As FETs

For case outlines and dimensions see page S163
 Products supplied as single units



Status = C

type	f GHz	V _{DS} V	I _D A	P _{L1} * mW	N _F dB	G _{po} ** dB	G _a dB	case
CFX13***	10	3	10	-	2,2	-	8	FO-92
	12	3	10	-	2,5	-	7,5	
CFX21	8	6	40	80	-	10	-	FO-92
	11	6	40	65	-	7,5	-	
CFX30	11	8	50	125	-	8	-	FO-85
CFX31	11	8	100	280	-	8	-	FO-85
CFX32	6	8	180	550	-	8,5	-	FO-85
	8,5	8	180	550	-	7,5	-	
CFX33	6	8	370	1100	-	7,0	-	FO-85
	8,5	8	370	1100	-	5,5	-	

* Load power for 1 dB compressed power gain

** Low-level power gain associated with P_{L1}

*** Low-noise type



Electronic
 components
 and materials

PHILIPS

Accessories and heatsinks: alphanumeric list

For detailed information on these types refer to our Data Handbook System

	type	description	case application
Accessories	56201j	Insulating bushes (height 5 mm)	TO-3
	56201d	Mica washer	TO-3
	56234	Mounting strip	Heatsinks
	56245	Distance disc of insulating material	TO-5; TO-39
	56246	Distance disc of insulating material	TO-18; TO-72
	56261a	2 insulating bushes (height 6,5 mm)	TO-3
	56262a	Mica washer; insulating ring; plain washer	DO-4; TO-64
	56264a	Mica washer; insulating ring; soldering tag	DO-4; DO-5; TO-48
	56295	PTFE bush; 2 mica washers; plain washer; soldering tag	DO-4; TO-64
	56316	Mica washer	SOD-38
	56326	Metal washer	TO-126 (SOT-32)
	56339	Mica washer	TO-3
	56352	Mounting support	TO-3
	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	
Heatsinks	56230	HE	
	56231	HE	
	56253	DH	
	56256	DH	
	56266	DH	
	56290	HE	
	56312	DH	
	56313	DH	
	56314	DH	
	56348	DH	
	56350	DH	

DH = Diecast heatsink
HE = Heatsink extrusion



For detailed information on these types refer to our Data Handbook System

type	K-code to DIN 41882								extrusions		
	K15	K9	K9	K3	K3	K3	K1,1	K1,1	56230	56231	56290
Rectifier diodes											
Thyristors											
Triacs											
BYX38	•								•		•
BYX39	•	•							•		•
BYX50	•								•		•
1N3879 to 3882	•								•		•
1N3989 to 3892	•	•							•	•	•
BYX98	•	•							•	•	•
BYX42	•	•							•	•	•
BYV20		•							•	•	•
BYV24		•							•	•	•
BYX99		•							•	•	•
BYX30		•							•	•	•
BYX25		•							•	•	•
BYX46		•							•	•	•
BYW30		•	•								
BYV30		•									
BYW31			•			•					
BYV21		•									
BYX96						•			•	•	
BYW92				•	•		•		•	•	
BYV92				•					•	•	
BYV22									•	•	
BYW93				•					•	•	
BYX56				•					•	•	
BYX97					•		•		•	•	
BYX32									•	•	
BYX52				•					•	•	
1N3909 to 3912				•							
BYW25					•		•				
BYW94					•		•	•			
BYV23						•	•	•			
BTY79	•	•									•
BTW38	•	•	•				•				•
BTW42	•	•	•				•				•
BTY91				•					•	•	
BTW45				•	•				•	•	•
BTW40				•	•		•		•	•	•
BTW92				•	•		•		•	•	•
BTW63					•		•		•	•	•
BTV24								•	•	•	
BTW23									•	•	
BTW43			•								•
BTX94				•					•	•	•
BTV34								•	•	•	



More detailed information on these types can be supplied on request

Temperature sensors

type	case	characteristics							
		R ₂₅ Ω	at	tol. %	and	I mA	measuring temperature range (°C)	temperature coefficient typ. 0,75%/k at 25°C	
								R ₁₀₀ /R ₂₅	R _{min} /R ₂₅
KTY81-110	SOD-70	1000		± 1		1	-55 to +150	1,69 ± 0,02	0,49 ± 0,01
KTY81-120	SOD-70	1000		± 2		1	-55 to +150	1,69 ± 0,02	0,49 ± 0,01
KTY81-210	SOD-70	2000		± 1		0,5	-55 to +150	1,69 ± 0,02	0,49 ± 0,01
KTY81-220	SOD-70	2000		± 2		0,5	-55 to +150	1,69 ± 0,02	0,49 ± 0,01
KTY83-110	DO-34 (SOD-68)	1000		± 1		1	-55 to +175	1,68 ± 0,02	0,49 ± 0,01
KTY83-120	DO-34 (SOD-68)	1000		± 2		1	-55 to +175	1,68 ± 0,02	0,49 ± 0,01
KTY85-110	SOD-80	1000		± 1		1	-25 to +125	1,66 ± 0,02	0,665 ± 0,007
KTY85-120	SOD-80	1000		± 2		1	-25 to +125	1,66 ± 0,02	0,665 ± 0,007
KTY85-150	SOD-80	1000		± 5		1	-25 to +125	1,66 ± 0,02	0,665 ± 0,007

type	case	characteristics							
		R ₁₀₀ Ω	at	tol. %	and	I mA	measuring temperature range (°C)	temperature coefficient typ. 0,6%/k at 100°C	
								R ₂₅₀ /R ₁₀₀	R ₂₅ /R ₁₀₀
KTY84-130	DO-34 (SOD-68)	1000		± 3		2	0 to +300	2,17 ± 0,04	0,592 ± 0,01
KTY84-150	DO-34 (SOD-68)	1000		± 5		2	0 to +300	2,17 ± 0,04	0,592 ± 0,01

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	output signal typ.
KP100A	0 to 2 bar	absolute	13 mV/V bar
KP101A	0 to 1,2 bar	absolute	21 mV/V bar
KP100AE	0 to 2 bar	absolute	0,2 to 4,5 V at $V_B = 5 V$
KP101AE	0 to 1,2 bar	absolute	0,2 to 4,5 mV bar at $V_B = 5 V$
KP100G	-1 to +2 bar	referential	13 mV/V bar
KP101G	-1 to 1,2 bar	referential	21 mV/V bar

Magnetic field sensors

type	magnetic field range	sensitivity mV/V kA/m	supply voltage max. V
KMZ10A	$\pm 0,5$ kA/m typ.	14	9
KMZ10B	$\pm 2,0$ kA/m typ.	4	12
KMZ10C	$\pm 7,5$ kA/m typ.	1,5	10

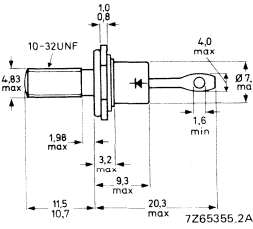


SPQ = smallest packing quantity
PQ = packing quantity

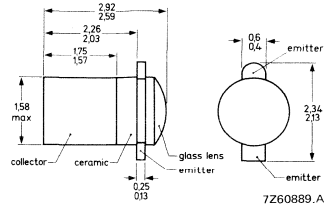
case	packing description	SPQ	PQ	case	packing description	SPQ	PQ
DO-4	box	25	250	SOT-37	bulk (bags)	500	8000
DO-5	box	10	100	SOT-42	bulk (bags)	500	5000
DO-7	tape	7000	7000	SOT-48	tray/box	25	75
DO-30	box	1	8	SOT-54	bulk (bags)	500	4000
DO-34	reel	10000	10000		tape (reel)	1600	8000
DO-35	reel	5000	5000		tape (ammo pack)	2000	10000
DO-41	reel	5000	5000	SOT-70	bags	100	2000
FO38	tray/box	25	75	SOT-71	bags	100	2000
FO41	box	1	-	SOT-82	bulk (bags)	50	1000
FO45	box	1	-		rail	50	1000
FO46	box	1	-	SOT-89	bulk (phials)	1000	10000
FO49	tray/box	25	75		tape (reel)	1000	1000
FO53	box	1	-	SOT-90	rail	75	1000
FO57	box	1	-	SOT-91	box	50	200
FO58	box	1	-	SOT-93	rail	25	500
FO67	box	1	-	SOT-103	bulk (bags)	500	5000
FO83	box	1	-	SOT-104	bulk (bags)	500	4000
FO85	box	1	-	SOT-112	box	200	200
FO91	box	1	-	SOT-115	bulk (tray)	1	50
FO92	box	1	-	SOT-122	tray/box	25	75
FO93	box	1	-	SOT-128	rail	50	1000
FO96	box	1	-	SOT-143	bulk (phials)	500	25000
FO102	box	1	-		tape (reel)	3000	6000
NO-243	bulk (box)	50	50	SOT-148	box	20	120
SOD-18	box	450	450	SOT-173	bulk (box)	50	50
SOD-53	bulk (bags)	1000	6000	SOT-174	rail	75	1000
SOD-57	reel	5000	5000	SOT-186	rail	50	1000
SOD-61	reel	5000	5000	TO-3	box	50	250
SOD-63	bulk (bags)	1000	2000	TO-18	bulk (bags)		
SOD-64	reel	4000	4000		transistors	500	4000
SOD-67	bulk	1000	2000		LEDS	100	2000
SOD-70	box	500	4000	TO-39	bulk (bags)	50	1000
SOD-74	bulk (bags)	1000	2000	TO-46	bulk (bags)	100	100
SOD-75	bulk (bags)	1000	2000	TO-48	box	10	100
SOD-76	bulk (bags)	1000	2000	TO-64	box	25	250
SOD-77	bulk (bags)	1000	2000	TO-65	box	5	50
SOD-78	bulk (bags)	1000	2000	TO-72	bulk (bags)	500	4000
SOD-79	bulk (bags)	1000	6000	TO-92	bulk (bags)	2000	2000
SOD-80	blister tape	2500	2500		tape (reel)	1600	8000
SOD-81	reel	5000	5000		tape (ammo pack)	2000	10000
SOD-82	bags	100	1000	TO-94	box	-	-
SOD-83	reel	5000	5000	TO-126	bulk (bags)	50	1500
SOD-85	bulk (bags)	1000	2000		rail	50	1000
SOT-5	bulk (bags)	50	1000	TO-202	rail	50	1000
SOT-18	bulk (bags)	500	4000	TO-220	rail	50	1000
SOT-23	bulk (phials)	500	25000	TO-238	box	5	50
	tape (reel)/box	3000	6000	TO-240	box	1	10
SOT-32	bulk (bags)	50	1500				
	rail	50	1000				



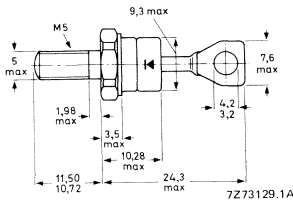
DO-4 (1) 10-32 UNF



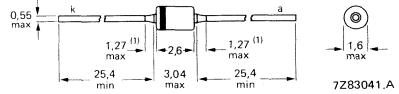
DO-31 (= SOT-71A)



DO-4 (2) M5

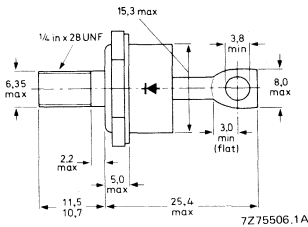


DO-34

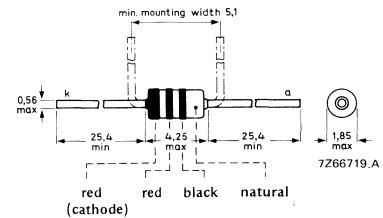


(1) Lead diameter in this zone uncontrolled

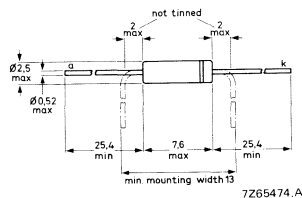
DO-5 (1) 1/4 in x 28 UNF



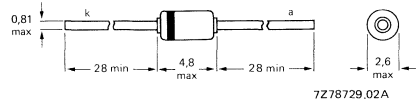
DO-35



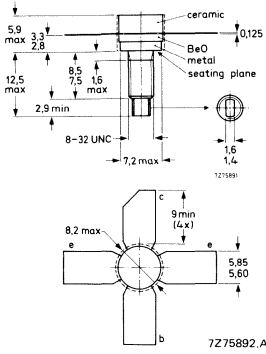
DO-7



DO-41

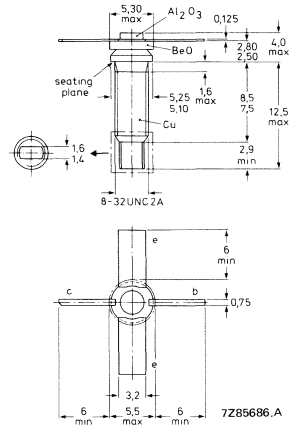


FO-38



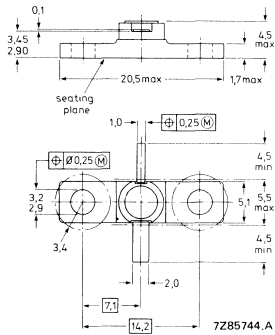
7Z75892.A

FO-46



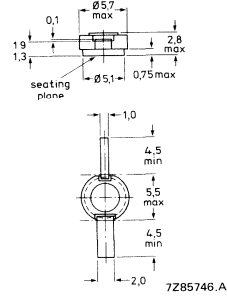
7Z85686.A

FO-41



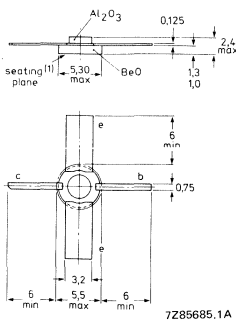
7Z85744.A

FO-49



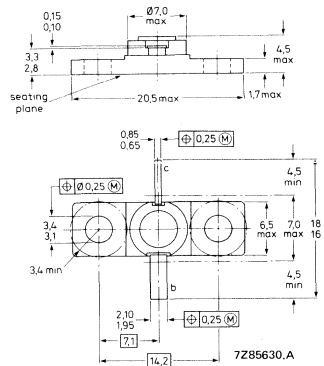
7Z85746.A

FO-45



7Z85685.1A

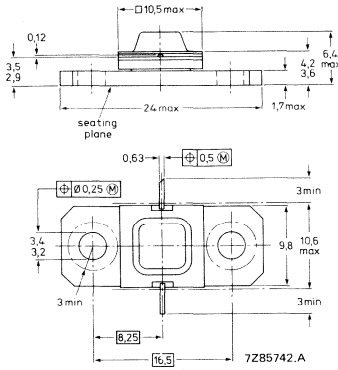
FO-53



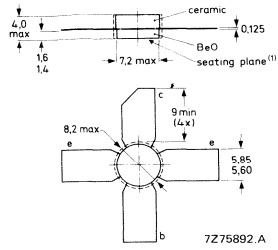
7Z85630.A



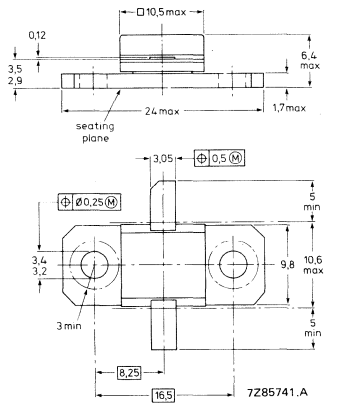
FO-57B



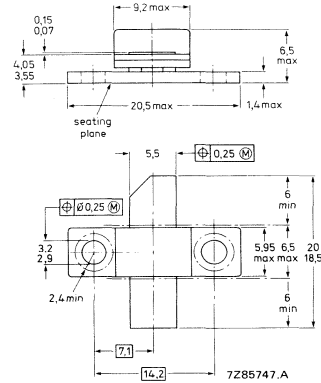
FO-58



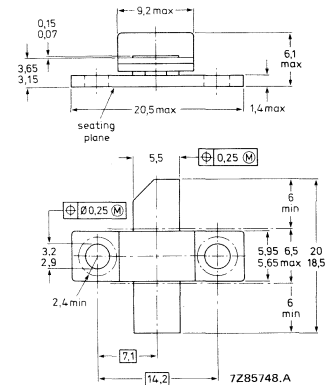
FO-57C



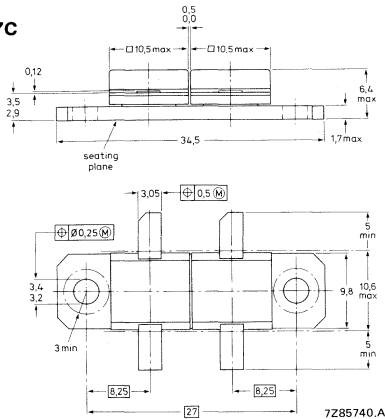
FO-67



FO-67C

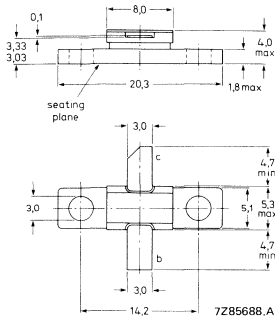


2FO-57C

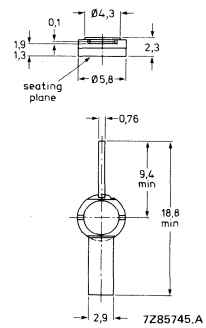


Dimensions in mm.

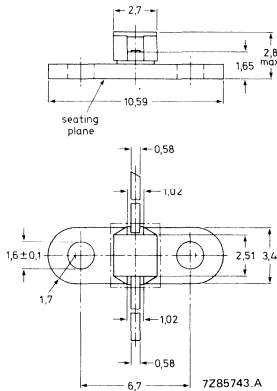
FO-83



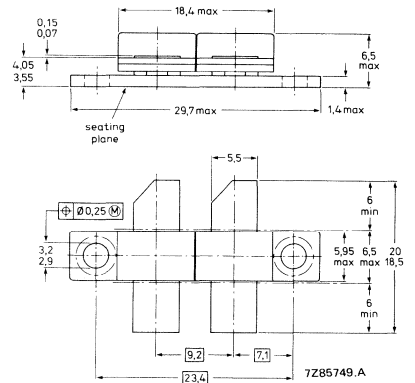
FO-93



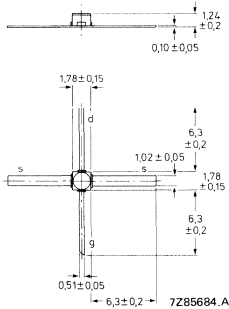
FO-85



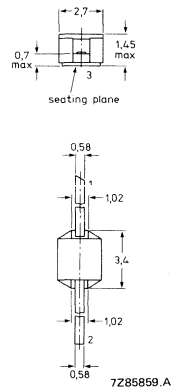
FO-96



FO-92



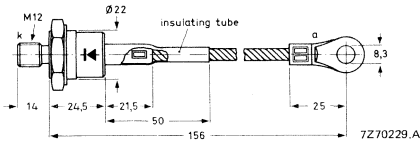
FO-102



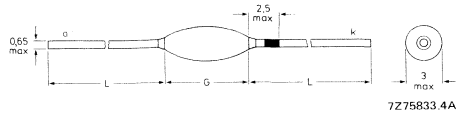
* other versions available

Dimensions in mm.

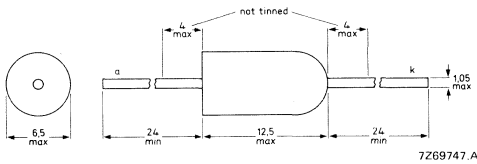
SOD-8



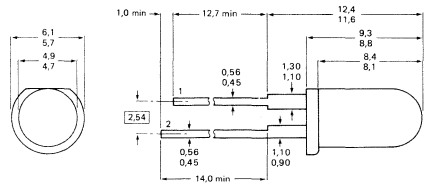
SOD-61



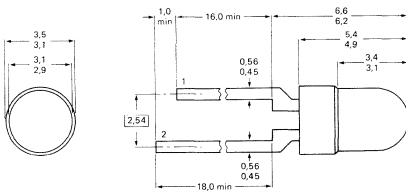
SOD-18



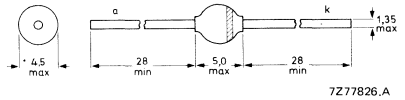
SOD-63*



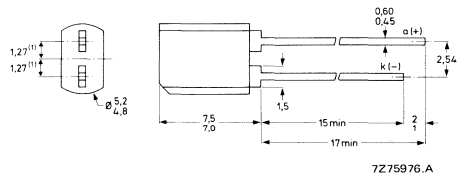
SOD-53*



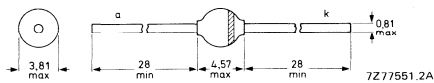
SOD-64



SOD-67



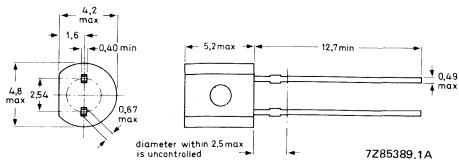
SOD-57



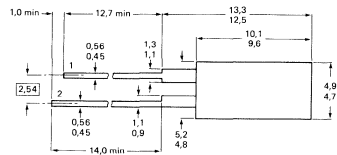
* other versions available

Dimensions in mm.

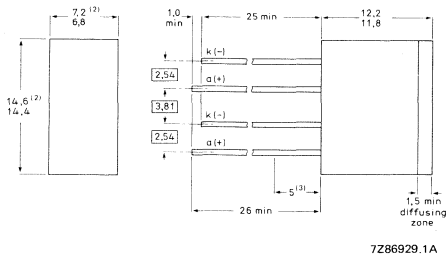
SOD-70



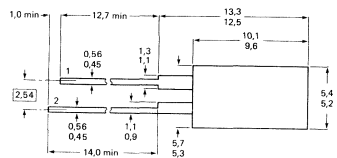
SOD-76*



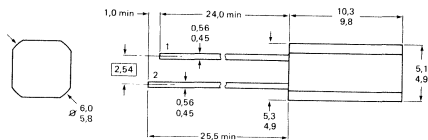
SOD-73



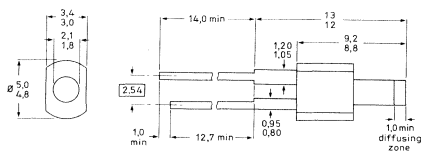
SOD-77*



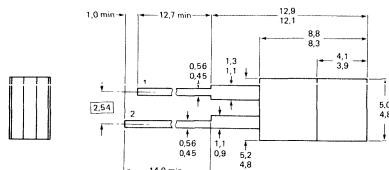
SOD-74L



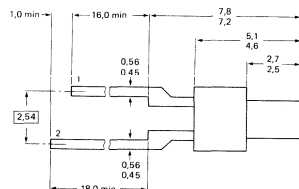
SOD-78



SOD-75*



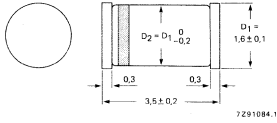
SOD-79



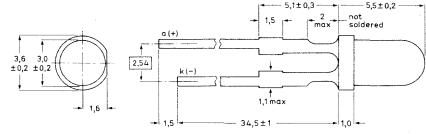
* other versions available

Dimensions in mm.

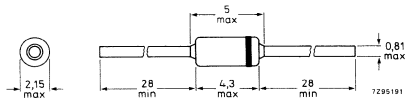
SOD-80



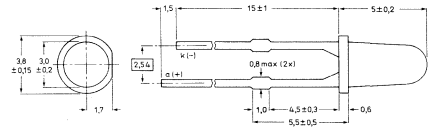
SOD-82B



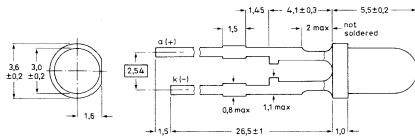
SOD-81



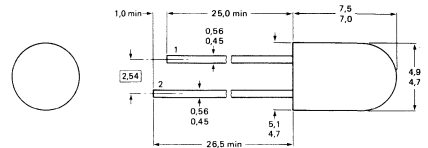
SOD-82C



SOD-82A



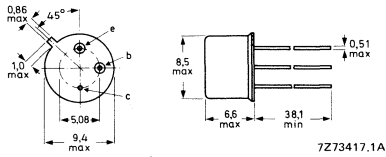
SOD-85*



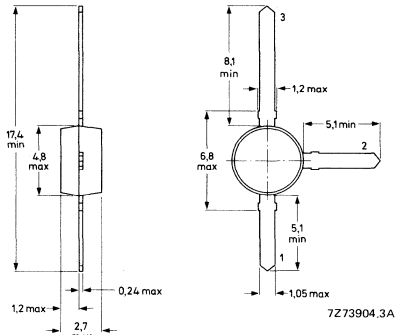
Electronic components and materials

Dimensions in mm.

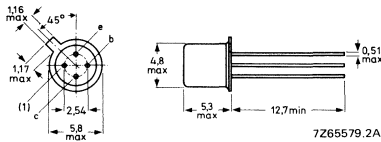
SOT-5



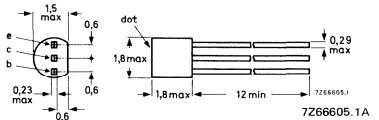
SOT-37 (1)



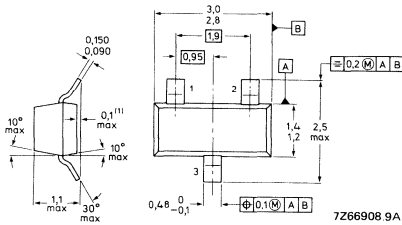
SOT-18



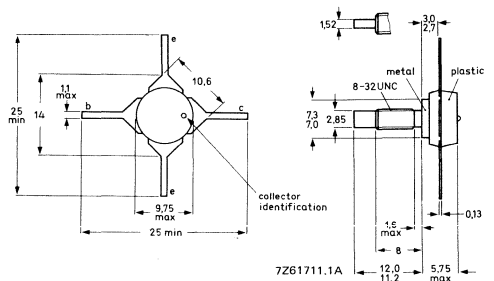
SOT-42



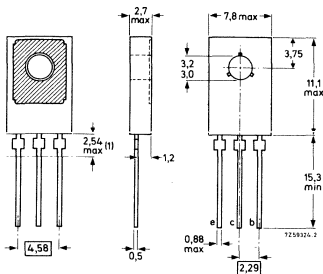
SOT-23



SOT-48 (1)



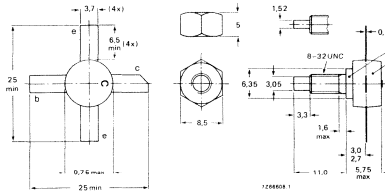
SOT-32



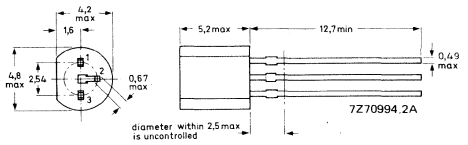
TOP VIEW
(1) Also available in 0,1 - 0,2 mm version

Dimensions in mm.

SOT-48 (2)

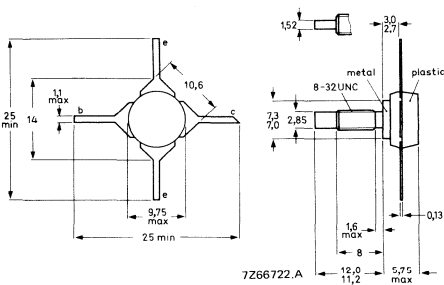


SOT-54 (TO-92 variant)

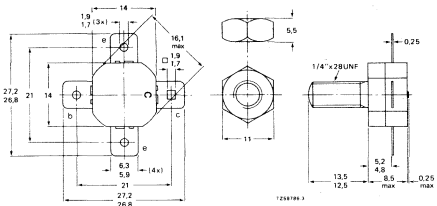


SOT-55

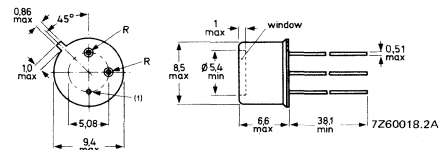
SOT-48 (4)



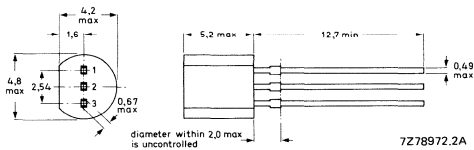
SOT-56



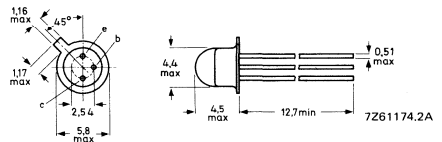
SOT-49



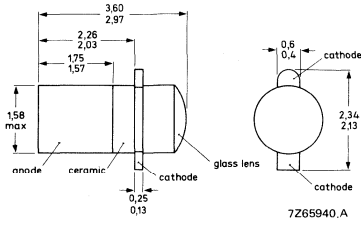
SOT-54 (= TO-92)



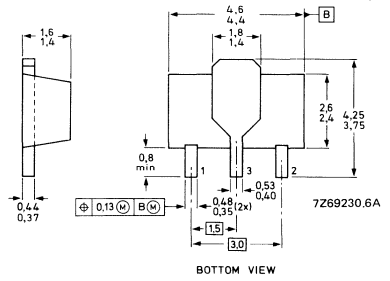
SOT-70



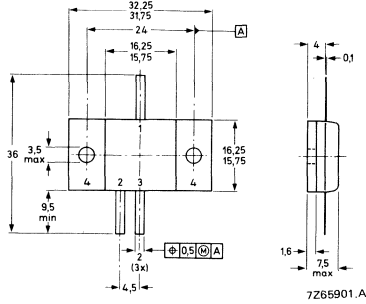
SOT-71B



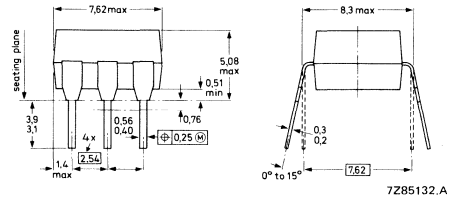
SOT-89



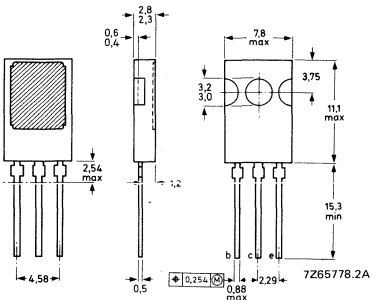
SOT-75A



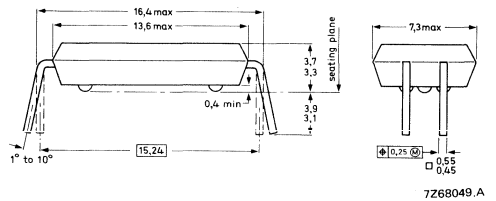
SOT-90B



SOT-82

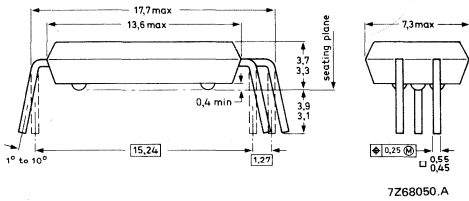


SOT-91A

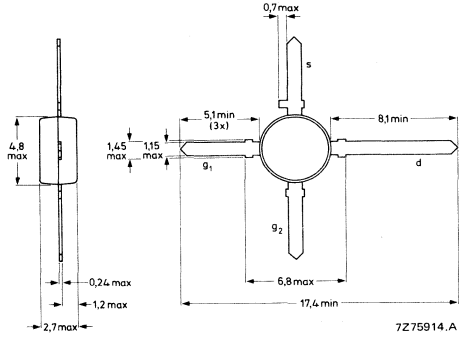


Dimensions in mm.

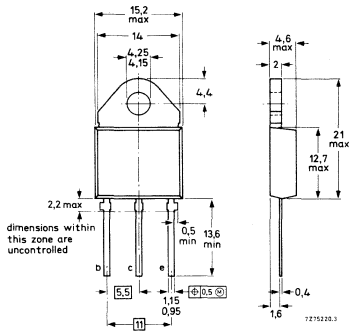
SOT-91B



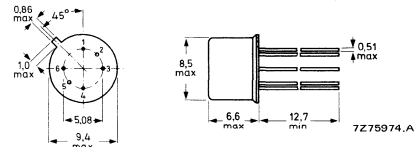
SOT-103



SOT-93

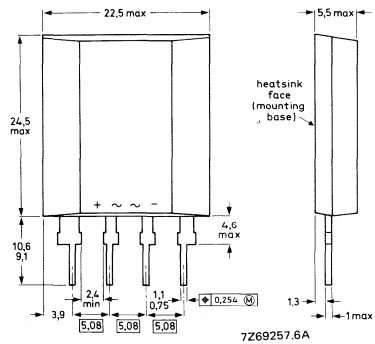
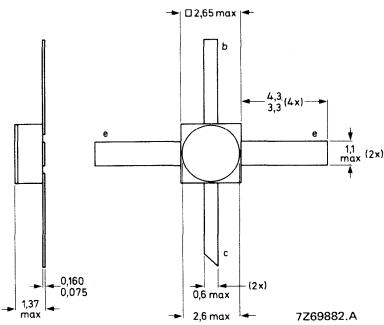


SOT-104B

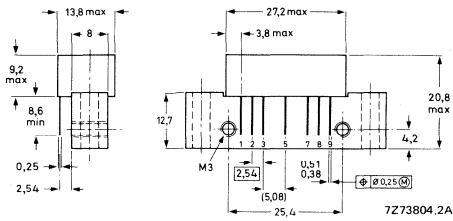


SOT-112

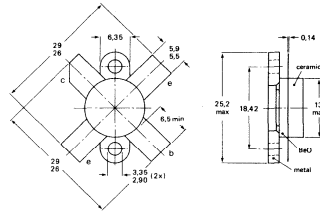
SOT-100



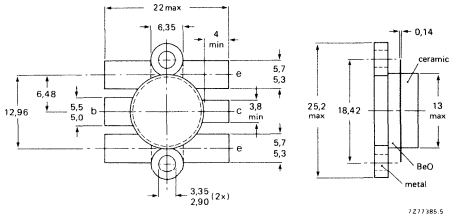
SOT-115



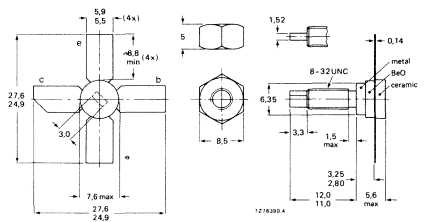
SOT-121



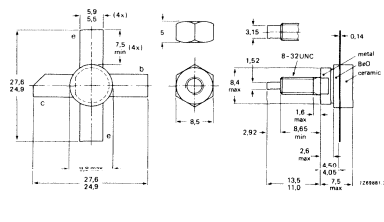
SOT-119



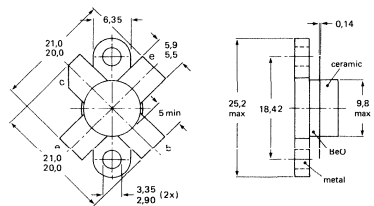
SOT-122



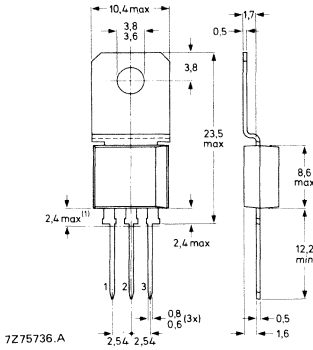
SOT-120



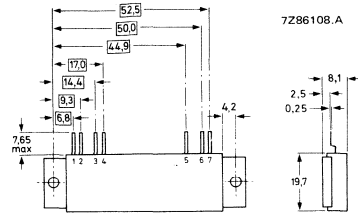
SOT-123



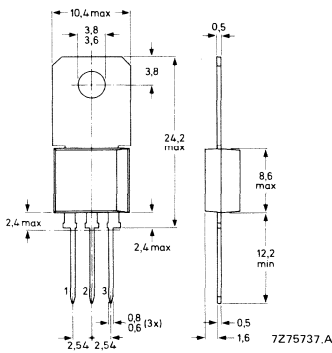
SOT-128A



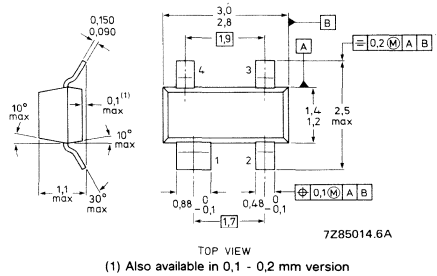
SOT-132C



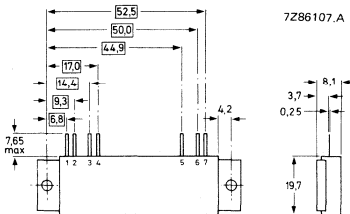
SOT-128B



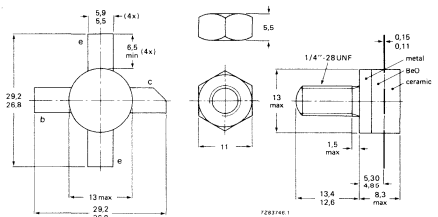
SOT-143



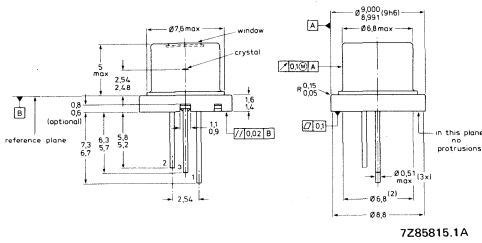
SOT-132B



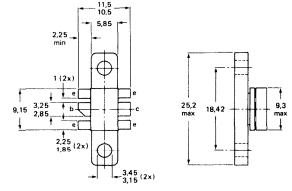
SOT-147



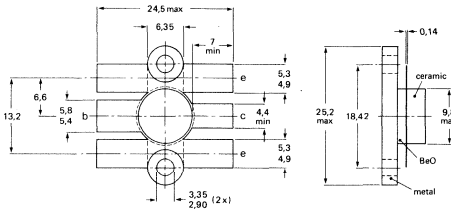
SOT-148



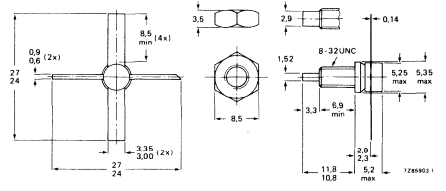
SOT-171



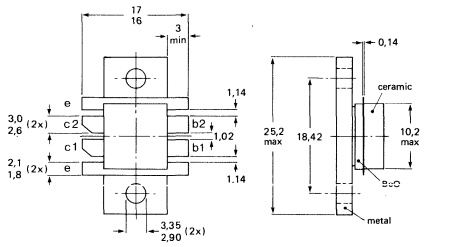
SOT-160



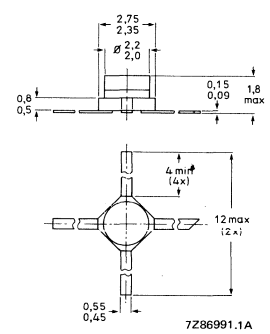
SOT-172A1



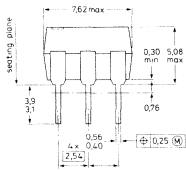
SOT-161



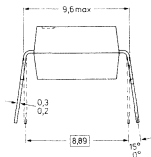
SOT-173



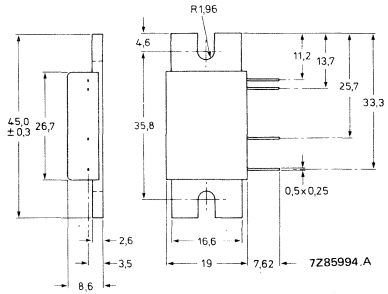
SOT-174



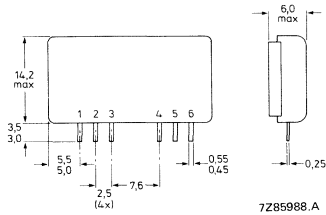
7Z85851.A



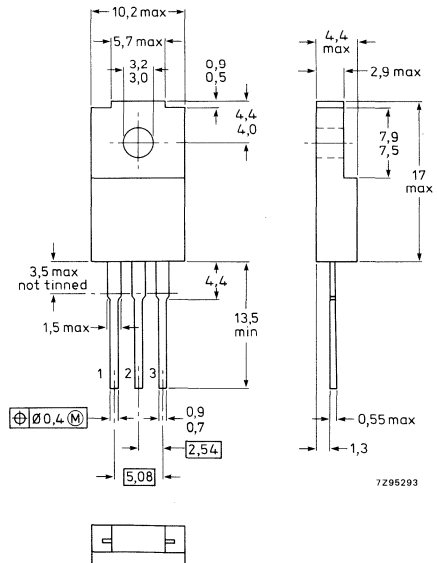
SOT-183



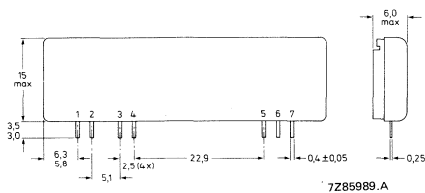
SOT-181



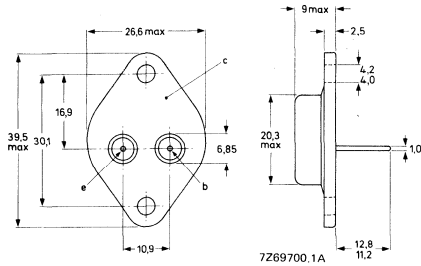
SOT-186



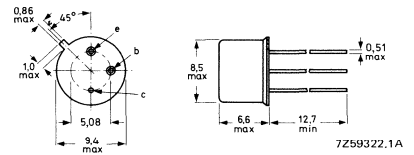
SOT-182



TO-3

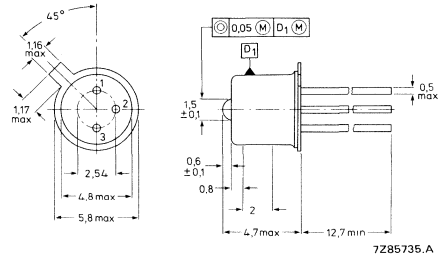
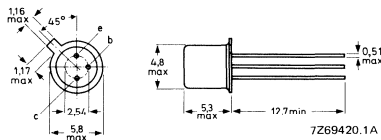


TO-39

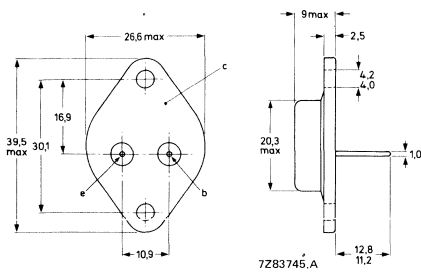


TO-46

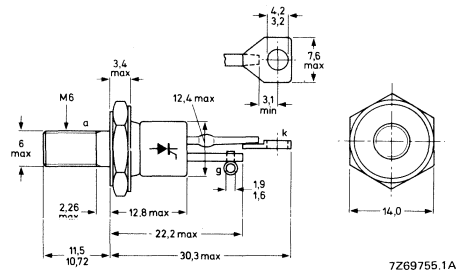
TO-18



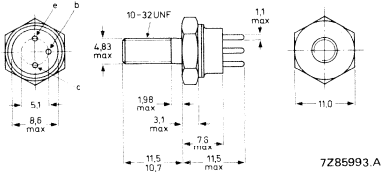
TO-34



TO-48



TO-60

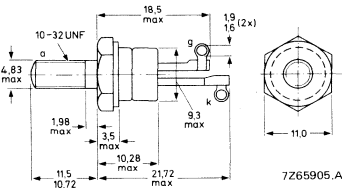


TO-72 (see SOT-18)

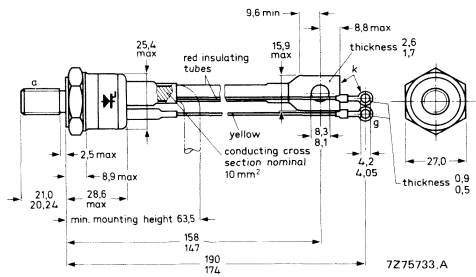
TO-92 variant (see SOT-54)

TO-92 (see SOT-54)

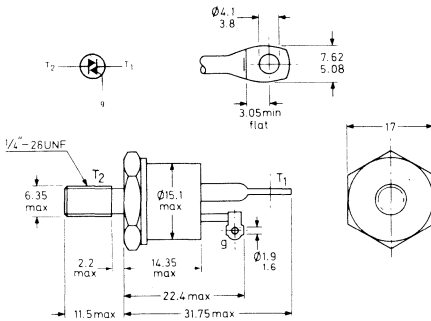
TO-64



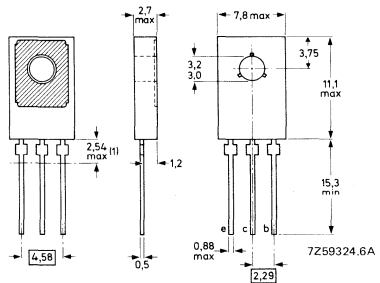
TO-94



TO-65



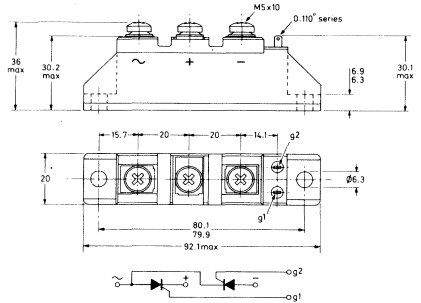
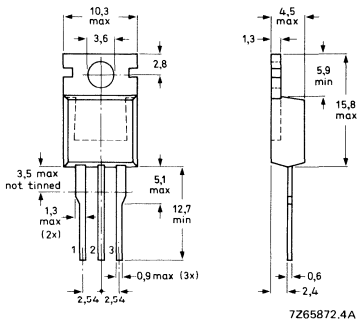
TO-126 (see SOT-32)



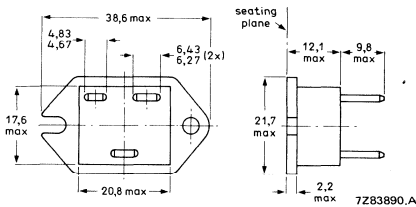
TO-202 (see SOT-128)

TO-240

TO-220



TO-238



Products approved to the CECC (Cenelec Electronic Components Committee)
harmonized system for electronic components of assessed quality

type	CECC detail specification	type	CECC detail specification
BA314	CECC 50 001-026	BT151-650R	CECC 50 011-003
BAV18	CECC 50 001-022	BT152-400	CECC 50 011-011
BAV19	CECC 50 001-022	BT152-600	CECC 50 011-011
BAV20	CECC 50 001-022	BT152-800	CECC 50 011-011
BAV21	CECC 50 001-022	BT155-600	CECC 50 011-009
BAW62	CECC 50 001-021	BT155-800	CECC 50 011-009
BAX16	CECC 50 001-022	BTW38-600	CECC 50 011-006
BAX17	CECC 50 001-022	BTW38-800	CECC 50 011-006
BC107	CECC 50 002-076	BTW38-1000	CECC 50 011-006
BC108	CECC 50 002-077	BTW38-1200	CECC 50 011-006
BC109	CECC 50 002-078	BTW42-600	CECC 50 011-006
BC140	CECC 50 002-004	BTW42-800	CECC 50 011-006
BC141	CECC 50 002-005	BTW42-1000	CECC 50 011-006
BC160	CECC 50 002-015	BTW42-1200	CECC 50 011-006
BC161	CECC 50 002-016	BTW45-200R	CECC 50 011-002
BCY70	CECC 50 002-079	BTW45-400R	CECC 50 011-002
BCY71	CECC 50 002-080	BTW45-600R	CECC 50 011-002
BCY72	CECC 50 002-081	BTW45-800R	CECC 50 011-002
BD645	CECC 50 004-063	BTW45-1000R	CECC 50 011-002
BD646	CECC 50 004-064	BTW45-1200R	CECC 50 011-002
BD647	CECC 50 004-063	BTW63-600	CECC 50 011-010
BD648	CECC 50 004-064	BTW63-800	CECC 50 011-010
BD649	CECC 50 004-063	BTY79-100	CECC 50 011-006
BD650	CECC 50 004-064	BTY79-200	CECC 50 011-006
BD651	CECC 50 004-063	BTY79-300	CECC 50 011-006
BD652	CECC 50 004-064	BTY79-400	CECC 50 011-006
BDX77	CECC 50 004-061	BTY79-500	CECC 50 011-006
BDX78	CECC 50 004-062	BTY79-600	CECC 50 011-006
BFX29	CECC 50 002-071	BTY79-800	CECC 50 011-006
BFX30	CECC 50 004-083	BTY79-1000	CECC 50 011-006
BFX37	CECC 50 002-185	BY229-200	CECC 50 009-021
BFX84	CECC 50 004-100	BY229-400	CECC 50 009-021
BFX85	CECC 50 004-100	BY229-600	CECC 50 009-021
BFX86	CECC 50 004-100	BY229-800	CECC 50 009-021
BFX87	CECC 50 002-071	BY229-1000	CECC 50 009-021
BFX88	CECC 50 002-071	BYV21-30	CECC 50 009-018
BFY50	CECC 50 002-089	BYV21-35	CECC 50 009-018
BFY51	CECC 50 002-089	BYV21-40	CECC 50 009-018
BFY52	CECC 50 002-089	BYV21-45	CECC 50 009-018
BLW78	CECC 50 007-001	BYV32-50(R)	CECC 50 009-026
BSS50	CECC 50 004-073	BYV32-100(R)	CECC 50 009-026
BSS51	CECC 50 004-073	BYV32-150(R)	CECC 50 009-026
BSS52	CECC 50 004-073	BYV32-200(R)	CECC 50 009-026
BSV15	CECC 50 002-131	BYW29-50	CECC 50 009-014
BSV16	CECC 50 002-131	BYW29-100	CECC 50 009-014
BSV17	CECC 50 002-131	BYW29-150	CECC 50 009-014
BSV78	CECC 50 012-011	BYW29-200	CECC 50 009-014
BSV79	CECC 50 012-011	BYW30-50	CECC 50 009-001
BSV80	CECC 50 012-011	BYW30-100	CECC 50 009-001
BSX45	CECC 50 002-174	BYW30-150	CECC 50 009-001
BSX46	CECC 50 002-174	BYW30-200	CECC 50 009-001
BSX47	CECC 50 002-174	BYW31-50	CECC 50 009-002
BT151-500R	CECC 50 011-003	BYW31-100	CECC 50 009-002



Products approved to the CECC (Cenelec Electronic Components Committee) harmonized system for electronic components of assessed quality

type	CECC detail specification	type	CECC detail specification
BYW31-150	CECC 50 009-002	1N3879(R)	CECC 50 009-006
BYW54	CECC 50 008-015	1N3880(R)	CECC 50 009-006
BYW55	CECC 50 008-015	1N3881(R)	CECC 50 009-006
BYW56	CECC 50 008-015	1N3882(R)	CECC 50 009-006
BYW92-50	CECC 50 009-003	1N3883(R)	CECC 50 009-006
BYW92-100	CECC 50 009-003	1N3890(R)	CECC 50 009-007
BYW92-150	CECC 50 009-003	1N3891(R)	CECC 50 009-007
BYW93-50	CECC 50 009-028	1N3892(R)	CECC 50 009-007
BYW93-100	CECC 50 009-028	1N3899	CECC 50 009-035
BYW93-150	CECC 50 009-028	1N3900	CECC 50 009-035
BYW93-200	CECC 50 009-028	1N3901	CECC 50 009-035
BYX25-600(R)	CECC 50 009-022	1N3902	CECC 50 009-035
BYX25-800(R)	CECC 50 009-022	1N3903	CECC 50 009-035
BYX25-1000(R)	CECC 50 009-022	1N3909	CECC 50 009-035
BYX25-1200(R)	CECC 50 009-022	1N3910	CECC 50 009-035
BYX25-1400(R)	CECC 50 009-022	1N3911	CECC 50 009-035
BYX38-300(R)	CECC 50 009-019	1N3912	CECC 50 009-035
BYX38-600(R)	CECC 50 009-019	1N3913	CECC 50 009-035
BYX38-900(R)	CECC 50 009-019	1N4148	CECC 50 001-021
BYX38-1200(R)	CECC 50 009-019	1N4149	CECC 50 001-021
BYX42-300(R)	CECC 50 009-020	1N4446	CECC 50 001-021
BYX42-600(R)	CECC 50 009-020	1N4447	CECC 50 001-021
BYX42-900(R)	CECC 50 009-020	1N4448	CECC 50 001-021
BYX42-1200(R)	CECC 50 009-020	1N4449	CECC 50 001-021
BYX49-300(R)	CECC 50 009-011	1N5059	CECC 50 008-015
BYX49-600(R)	CECC 50 009-011	1N5060	CECC 50 008-015
BYX49-1200(R)	CECC 50 009-011	1N5061	CECC 50 008-015
BYX52-300(R)	CECC 50 009-024	1N5062	CECC 50 008-015
BYX52-600(R)	CECC 50 009-024	2N1613	CECC 50 002-104
BYX52-1200(R)	CECC 50 009-024	2N1711	CECC 50 002-104
BYX56-600(R)	CECC 50 009-023	2N1893	CECC 50 002-104
BYX56-800(R)	CECC 50 009-023	2N2222(A)	CECC 50 004-030
BYX56-1000(R)	CECC 50 009-023	2N2904(A)	CECC 50 002-102
BYX56-1200(R)	CECC 50 009-023	2N2905(A)	CECC 50 002-102
BYX56-1400(R)	CECC 50 009-023	2N2906(A)	CECC 50 002-103
BYX98-300(R)	CECC 50 009-004	2N2907(A)	CECC 50 002-103
BYX98-600(R)	CECC 50 009-004	2N3019	CECC 50 002-175
BYX98-900(R)	CECC 50 009-004	2N3020	CECC 50 002-175
BYX98-1200(R)	CECC 50 009-004	CV7099	CECC 50 005-005
BYX99-300(R)	CECC 50 009-005	CV7100	CECC 50 005-005
BYX99-600(R)	CECC 50 009-005	CV7101	CECC 50 005-005
BYX99-900(R)	CECC 50 009-005	CV7102	CECC 50 005-005
BYX99-1200(R)	CECC 50 009-005	CV7103	CECC 50 005-005
BZT03 C9V1-C270	CECC 50 005-017	CV7104	CECC 50 005-005
BZV85 series	CECC 50 005-010	CV7105	CECC 50 005-005
BZW03 series	CECC 50 005-019	CV7106	CECC 50 005-005
BZW70 series	CECC 50 005-015	CV7138	CECC 50 005-005
BZX55 C2V4-C75	CECC 50 005-005	CV7139	CECC 50 005-005
BZX70 series	CECC 50 005-015	CV7140	CECC 50 005-005
BZX79 C2V4-C75	CECC 50 005-005	CV7141	CECC 50 005-005
BZY88 C2V4-C75	CECC 50 005-005	CV7142	CECC 50 005-005
1N914	CECC 50 001-021	CV7143	CECC 50 005-005
1N916	CECC 50 001-021	CV7144	CECC 50 005-005

Products approved to the CECC (Cenelec Electronic Components Committee)
harmonized system for electronic components of assessed quality

type	CECC detail specification	type	CECC detail specification
CV7145	CECC 50 005-005	CV10440	CECC 50 004-087
CV7146	CECC 50 005-005	CV10806	CECC 50 002-165
CV7311	CECC 50 009-019	CV10807	CECC 50 004-085
CV7312	CECC 50 009-019	CV10814	CECC 50 002-141
CV7313	CECC 50 009-019	CV12253	CECC 50 004-095
CV7314	CECC 50 009-019	CVA7026	CECC 50 008-015
CV7315	CECC 50 009-019	CVA7027	CECC 50 008-015
CV7316	CECC 50 009-019	CVA7028	CECC 50 008-015
CV7317	CECC 50 009-019	CVA7029	CECC 50 008-015
CV7318	CECC 50 009-019	CVA7030	CECC 50 008-015
CV7319	CECC 50 009-019	CVA7476	CECC 50 008-015
CV7320	CECC 50 009-019	PO15	CECC 50 004-084
CV7367	CECC 50 001-021	PO17	CECC 50 004-085
CV7368	CECC 50 001-021	PO33	CECC 50 001-026
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		
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		



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:

book	title
T1	Tubes for r.f. heating
T2a	Transmitting tubes for communications, glass types
T2b	Transmitting tubes for communications, ceramic types
T5	Cathode-ray tubes
T6	Geiger-Müller tubes
T8	Colour display system
T9	Photo and electron multipliers
T10	Plumbicon camera tubes and accessories
T12	Vidicon and Newvicon camera tubes and deflection units
T13	Image intensifiers and infrared detectors
T16	Monochrome tubes and deflection units



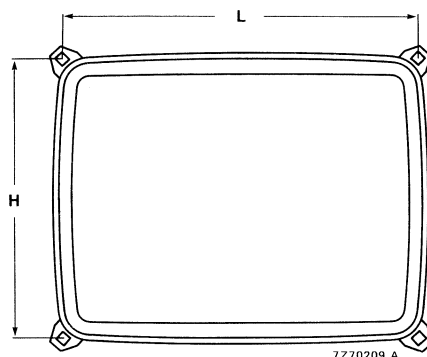
Data Handbook System	E2	
Contents	E3	
Display tubes:		
Colour TV picture tubes	E4	
Flat, square colour TV picture tube assemblies	E5	
Black and white TV picture tubes	E6	
Black and white TV: deflection units	E7	
Colour data graphic display tube assemblies	E8	
Monochrome data graphic display tubes	E9	
Flat, square monochrome data graphic display tubes	E10	
Screen phosphors and deflection units	E11	
Industrial cathode ray tubes:		
Instrument CRTs	E12	
CRTs for special applications	E13	
Survey of screen phosphors	E14	
Transmitting tubes:		
R.F. heating	E15	
Telecommunication	E17	
Camera tubes:		
Plumbicon tubes	E20	
Vidicon and Newvicon® tubes	E22	
Frame transfer sensors	E23	
Geiger Müller tubes	E24	
Image intensifiers	E25	
Photomultipliers: survey of types	E26	
Channel electron multipliers	E28	
Replacement types for electron tubes: alphanumeric selection guide		E29
CECC approved types	E46	



For detailed information on these and other types see Data Handbook T8

- high brightness
- pigmented phosphors
- self-converging
- in-line guns
- no N-S correction

type	L x H mm
14 inch	311,4 x 243,2
16 inch	355,8 x 276,7
20 inch	434,0 x 337,0
22 inch	476,5 x 370,0
26 inch	549,0 x 422,0



screen diag. inch	type	defl. angle deg.	useful screen diag. min. mm	overall length max. mm	JEDEC base	neck dia- meter mm	typical operating conditions			
							V_i/I_f V/mA	$V_{a,g4}$ kV	V_{g3} kV	V_{g2} V
14	A34EAC00X**	90	335,4	339,4	B8 -288	22,5	6,3/360	23	6,1-6,9	310-600
14	A34EAR00X*	90	336,6	346,6	B10-277	29,1	6,3/685	25	6,6-7,5	390-760
14	A37-570X	90	335,4	345,1	B12-262	29,1	6,3/685	25	4,7-5,5	310-560
14	A37-590X**	90	335,4	348,6	B10-277	29,1	6,3/685	25	6,6-7,5	390-760
14	A37-591X**	90	335,4	353	B8 -274	29,1	6,3/685	25	6,6-7,5	390-760
14	A37-598X	90	335,4	348,6	B10-277	29,1	6,3/685	25	6,6-7,5	390-760
14	A37-599X	90	335,4	348,6	B10-277	29,1	6,3/685	25	6,6-7,5	390-760
16	A38EAC00X**	90	382,3	370,9	B8 -288	22,5	6,3/300	23	6,1-6,9	310-600
16	A42-570X	90	382,3	374,0	B12-262	29,1	6,3/685	25	4,7-5,5	310-560
16	A42-580X	90	382,3	384,4	B10-277	29,1	6,3/685	25	6,6-7,5	390-760
16	A42-590X**	90	382,3	378,6	B10-277	29,1	6,3/685	25	6,6-7,5	390-760
16	A42-591X**	90	382,3	383	B8 -274	29,1	6,3/685	25	6,6-7,5	390-760
20	A48EAC00X**	90	480,0	431,6	B8 -288	22,5	6,3/300	25	7,3-8,3	310-650
20	A51-540X	110	480,0	367,4	-	36,5	6,3/720	25	6,5-7,45	590-800
20	A51-570X	90	480,0	433,5	B12-262	29,1	6,3/685	25	4,7-5,5	310-560
20	A51-590X**	90	480,0	436,7	B10-277	29,1	6,3/685	25	6,6-7,5	390-760
20	A51-591X**	90	480,0	441,2	B8 -274	29,1	6,3/685	25	6,6-7,5	390-760
22	A56-540X	110	530,6	389,8	-	36,5	6,3/720	25	6,5-7,45	590-800
26	A66-540X	110	617,8	427,6	-	36,5	6,3/720	25	6,5-7,45	590-800

* dark glass featuring extra high contrast performance

** with appropriate deflection unit it forms a self converging and raster correction free assembly.



Electronic
components
and materials

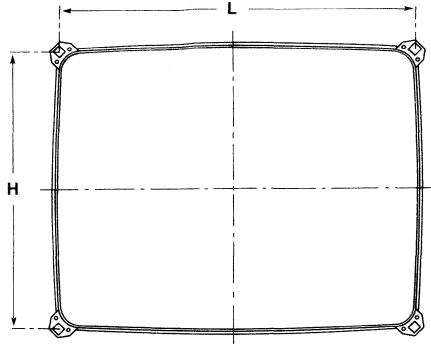
PHILIPS

Flat, square colour TV picture tube assemblies

For detailed information on these and other types see Data Handbook T8

- flat and square screen
- factory preset tube/coil assemblies
- self-converging and raster correction free
- high brightness
- pigmented phosphors

type	L x H mm
51 cm	449 x 354
59 cm	524 x 406,5
66 cm	581,5 x 450



screen diag. cms	type	defl. angle deg.	useful screen diag. min. mm	overall length max. mm	JEDEC base	neck dia- meter mm	typical operating conditions			
							V_{t1}/I_t V/mA	$V_{a,g4}$ kV	V_{g3} kV	V_{g2} V
51	A51EAL00X01	90	508	448,7	B10-277	29,1	6,3/310	25	7,25-8,25	575-825
59	A59EAK00X01	110	590	398	B10-277	29,1	6,3/310	25	7,25-8,25	575-825
66	A66EAK00X01	110	660	428	B10-277	29,1	6,3/310	25	7,25-8,25	575-825

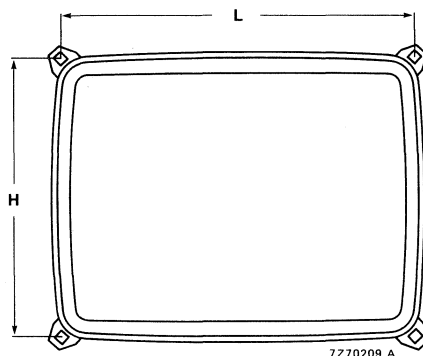


Electronic components and materials

PHILIPS

For detailed information on these and other types see Data Handbook T16

type	L x H mm
9 inch	212 x 160
12 inch (110°)	267,5 x 204,4
12 inch (90°)	273,3 x 190,2
14 inch (110°)	290 x 226
17 inch	363,5 x 288,5
20 inch	414 x 331
24 inch	496 x 392



Lug position

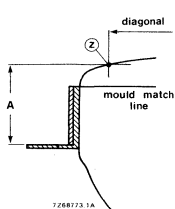


Fig. 1

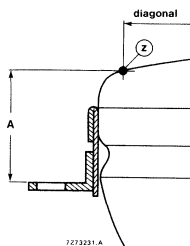


Fig. 2

screen diag. inch	type	defl. angle deg.	useful screen diag. min. mm	overall length max. mm	neck dia- meter mm	typical operating conditions					lug position	
						V_f/I_f V/mA	V_{g2} V	V_{g4} kV	V_a kV	V_{KR} V	Fig.	A mm
9	A24-512W	90	222,5	227	20	11/140	130	0 to 130	12	45 to 65	1	27,5
12	A31-510W	110	295	233	20	11/140	130	0 to 130	12	30 to 50	1	27,6
12	A31-322W	90	292,2	280	20	11/140	130	0 to 130	12	45 to 65	1	28,5
14	A34-510W	110	322	247	20	11/140	130	0 to 130	12	30 to 50	1	32
14	A34-111W	90	322	287	20	11/140	130	0 to 130	12	45 to 65	1	29
17	A44-520W	110	413	291	28,6	6,3/240	130	0 to 130	20	42 to 62	2	40
20	A50-520W	110	473	319	28,6	6,3/240	130	0 to 130	20	42 to 62	2	45
24	A61-520W	110	577,5	370	28,6	6,3/240	130	0 to 130	20	42 to 62	2	38,5



Black and white TV: deflection units

For detailed information on these and other types see Data Handbook T16



type	defl. angle deg.	tube neck dia. mm	line coil		field coil		sensitivity			tube size inch
			inductance μ H	resistance Ω	inductance mH	resistance Ω	at EHT kV	full-scan currents		
								line Ap-p	field Ap-p	
AT1040/04	110	28,6	2090	3,55	17,0	7,37	18	2,92	1,09	17,20,24
AT1040/15	110	28,6	3320	6,10	17,0	7,37	18	2,35	1,09	17,20,24
AT1040/17	110	28,6	8360	14,20	17,0	7,37	18	1,46	1,09	17,20,24
AT1077/01	90	20	475	0,80	72	40	10	2,70	0,24	9
AT1077/02	90	20	436	0,80	68	33	12	2,93	0,26	12,14



Colour data graphic display tube assemblies

For detailed information on these and other types see Data Handbook T8

For all types: neck diameter = 29,1 mm
 cut-off voltage = typ. 100 V
 grid 2 voltage = 270 to 570 V

High resolution colour display tube assemblies for Data Graphic Displays

screen diag. inch	type	defl. angle deg.	JEDEC base	dot triplet pitch mm	min. number of displayable pixels	anode voltage typ. kV	focusing voltage typ. kV	light transmission at screen centre (%)
10	M25-100X/N/4100	76	B10-277	0,28	576 x 480	22	5,3	55
10	M25-101X/4100	76	B10-277	0,28	576 x 480	22	5,3	87,5
12	M29JAL00X	90	B10-277	0,31	720 x 580	23	5,5	85,5
12	M29JAL70X	90	B10-277	0,31	720 x 580	23	5,5	44
14	M37-103X/N/1000	90	B10-277	0,29	800 x 600	25	7,0	85
14	M37-108X/N/1000	90	B10-277	0,29	800 x 600	25	7,0	60
14	M37-118X/N/1000	90	B11-277	0,29	800 x 600	25	7,0	46,5
16	M42-105X/6100	90	B10-277	0,31	820 x 670	25	6,0	86
16	M42-106X/N/6100	90	B10-277	0,31	820 x 670	25	6,0	45
20	M51-106X/7100	90	B10-277	0,32	860 x 720	25	6,0	85
20	M51-107X/N/7100	90	B10-277	0,32	860 x 670	25	6,0	40



For detailed information on these and other types see Data Handbook T16

- various phosphors
- anti-reflective treatments
- various glass transmissions
- appropriate wound components

type	L x H (fig.2) mm
9 inch	212 x 160
12 inch	273,3 x 190,2
14 inch	290,3 x 231,7
15 inch	311,4 x 244,5
17 inch	363,5 x 288,5
20 inch	414 x 331

Fig. 2

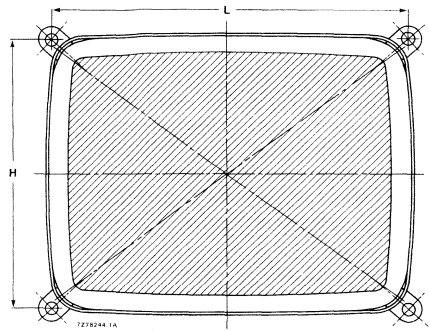
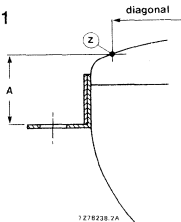


Fig. 1



screen diag. inch	type	defl. angle deg.	useful screen diag. min. mm	overall length max. mm	neck dia- meter mm	typical operating conditions					lug position A (Fig.1) mm
						V_f/I_f V/mA	V_{g2} V	V_{g4} V	V_a kV	V_{KR} V	
9	M24-306	90	222,3	227	20	12/130	400	0-300	12	30-60	27,5
12	M31-326	110	295	241	28,6	6,3/240	400	0-400	17	40-70	24,8
12	M31-336	90	292	280	20	12/130	400	0-300	12	30-60	28,5
12	M31-340	90	295	277	20	12/130	400	0-300	12	30-60	25,5
14	M32EAA0	90	322	287	20	12/130	400	0-300	14	30-60	28,5
15	M38-328	110	352	279	28,6	6,3/240	400	0-400	17	40-70	25,7
17	M41EAA0	114	413	291	28,6	6,3/240	400	0-400	20	40-70	28,0
20	M47EAA0	114	473	319	28,6	6,3/240	400	0-400	20	40-70	31,0



Flat, square monochrome data graphic display tubes

For detailed information on these and other types see Data Handbook T16

- various phosphors
- anti-reflective treatments
- various glass transmissions
- appropriate wound components

type	L x H (fig.2) mm
12 inch	373,3 x 190,2
14 inch	296,3 x 238,0
15 inch	326,4 x 261,0

Fig. 2

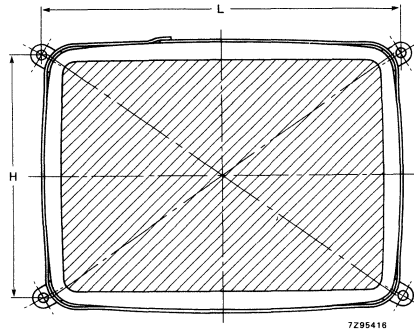
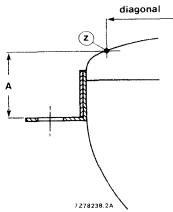


Fig. 1



screen diag. inch	type	defl. angle deg.	useful screen diag. min. mm	overall length max. mm	neck dia- meter mm	typical operating conditions					lug position A (Fig.1) mm
						V_f/I_f V/mA	V_{g2} V	V_{g4} V	V_a kV	V_{KR} V	
12	M29EAA	90	294	275	20	12/130	400	0-300	12	30-60	-
12	M29EAB	90	294	275	20	12/130	400	0-300	12	30-60	27,6
14	M33EAA	90	333	295	20	12/130	400	0-300	14	30-60	-
14	M33EAB	90	333	295	20	12/130	400	0-300	14	30-60	28,5
15	M36EAB	110	363	278	28,6	6,3/240	400	0-400	17	40-70	34



Monochrome data graphics: screen phosphors & deflection units

For detailed information on these and other types see Data Handbook T16

Survey of screen phosphors

type	design-ation	fluorescent colour	phosphorescent colour	persistence*	colour co-ordinates		relative brightness (%) with respect to type W
					x	Y	
W (WW) GA	P4	white	white	medium short	0,265	0,295	100
	P40	white	yellowish-green	medium	0,250	0,300	approx. 80
GH GR	P31	green	green	medium short	0,270	0,565	approx. 150
	P39	yellowish-green	yellowish-green	long	0,205	0,715	approx. 75
GW	P42	yellowish-green	yellowish-green	medium	0,238	0,568	approx. 115
HA	-	yellowish-green	yellowish-green	medium	0,220	0,660	approx. 85
KC	-	yellow-green	yellow-green	medium short	0,425	0,550	approx. 170
LA	-	orange	orange	medium	0,557	0,442	approx. 60
LM	-	orange	orange	medium short	0,547	0,446	approx. 95
WD	-	white	white	medium	0,355	0,395	approx. 70



Deflection units for monochrome data graphic display tubes

type	defl. angle deg.	tube neck dia mm	line coil		field coil		sensitivity			tube size inch
			induct-ance µH	resist-ance Ω	induct-ance mH	resist-ance Ω	at EHT kV	full-scan currents		
								line Ap-p	field Ap-p	
AT1038/40A	110	28,6	700	1,1	14,1	7,6	17	4,56	1,12	12,15
AT1039/00**	110	28,6	228	0,41	9,18	10,2	17	6,4	1,35	15 portrait
AT1039/01**	110	28,6	206	0,39	9,72	10,6	17	8,35	1,02	15 landscape
AT1039/03**	110	28,6	228	0,41	9,18	10,2	17	7,95	1,21	12 landscape
AT1077/05	90	20	475	0,8	18	10	12	2,9	0,48	12
AT1077/06	90	20	475	0,8	72	40	12	2,9	0,24	12
AT1077/07	90	20	118	0,22	18	10	12	5,8	0,48	12
AT1077/09	90	20	475	0,8	18	10	12	2,9	0,51	9
AT1077/10	90	20	475	0,8	72	40	12	2,9	0,25	9
AT1077/15	90	20	240	0,42	12,5	7,25	12	4,2	0,6	12
AT1077/16	90	20	170	0,35	6,6	4,35	12	4,92	0,8	12
AT1077/20	90	20	145	0,25	18	10	12	5,3	0,5	12
AT1077/22	90	20	112	0,20	7,7	4,15	12	6,1	0,74	12
AT1077/23	90	20	240	0,42	31	16,6	12	4,2	0,37	12
AT1078/01	90	20	310	0,66	23,8	13,6	12	3,4	0,48	12
AT1078/10***	90	20	310	0,66	23,8	13,6	12	3,33	0,44	12
AT1078/19	90	20	245	0,53	6,85	4,1	12	3,9	0,85	12

* medium short: 10 to 100 µs; medium: 1 to 100 ms; long: 100 ms to 1s

** line and field coils can be connected in series or parallel. The indicated values apply to parallel-connected line coils, and series-connected field coils.

*** for flat square application.



Electronic components and materials

PHILIPS

For detailed information on these and other types see Data Handbook T5

Instrument tubes

- All types in rectangular bulb with flat face
- Internal graticule is standard for most types
- Internal magnetic correction for orthogonality, astigmatism and eccentricity
- All higher bandwidth tubes with advanced domed mesh post deflection acceleration
- Types listed are available with GH or GY phosphor (GY phosphor recommended for monoaccelerator tubes, GH phosphor for post-deflection accelerator tubes)
- Quick-heating cathode 6,3 V/240 mA or 6,3 V/100 mA

type	min. useful scan mm	acceleration voltage		deflection coefficient		max. overall length mm	heater V/mA	typ. bandwidth MHz
		first kV	final kV	hor. V/cm	vert. V/cm			
D7-221GH	60 x 36	1	-	12,5	20	225	6,3/100	10
D7-221GY	60 x 36	1	-	12,5	20	225	6,3/100	10
D7-222GH	60 x 36	1	-	12,5	20	225	6,3/240	10
D7-222GY	60 x 36	1	-	12,5	20	225	6,3/240	10
D10-180GY	70 x 56	2	-	36	23	240	6,3/240	10-25
D10-181GY	70 x 56	2	-	36	23	240	6,3/100	10-25
D12-130GY/119	80 x 64	2	-	32	21	257	6,3/100	10-25
D12-140GH/119	80 x 64	2,2	16,5	10	5	299	6,3/100	50-150
D14-361GY/93	100 x 80	2	-	19	11,5	333	6,3/100	10-25
D14-362GY/93	100 x 80	2	-	19	11,5	333	6,3/240	10-25
D14-370GH/93	100 x 80	2,2	16,5	8,3	4	338	6,3/240	25-75
D14-380GH/93	100 x 80	2,2	16,5	8,3	4	338	6,3/240	50-150

Storage tubes - with variable persistence, internal graticule and correction coils, flat faced.

type	min. useful screen mm	min. useful scan		typ. deflection coefficient		typ. accel. voltage		min. writing speed* div/ms	min. storage time** minute	max. overall length mm
		hor. mm	vert. mm	hor. V/cm	vert. V/cm	first kV	final kV			
L14-131GH/55	90 x 72	90	72	9,5	8,5	1,5	8,5	125	1,5	445
L14-140GH/95	90 x 72	90	72	18,5	4,8	3	10	250	1	454
L14-150GH/95	90 x 72	90	72	9,5	4,1	1,5	8,5	250	1,5	452

Type L14-140GH/95 is a charge transfer storage tube and has vertical scan magnification with 3 quadruple lenses.

* Defined as the maximum speed at which a trace is just visible against a "just black" background. If some background is tolerated the writing speed can be raised.

** Defined as the time taken for the background to rise from zero luminance to 10% of saturated luminance. At reduced intensity the storage time can be longer.



Electronic components and materials

PHILIPS

For detailed information on these and other types see Data Handbook T5



Special monitor and data display tubes

type	min. useful screen		defl. angle deg.	neck diameter mm	typ. accel. voltage		max. overall length mm	notes
	hor. mm	vert. mm			first V	final kV		
M17-142WE	124	93	70	28	400	14	234	- with bonded faceplate and metal mounting band
M17-143WE	124	93	70	28	600	16	240	
M17-144WE	124	93	70	28	600	16	234	special photographic type
M38-201WA*	290	226	70	37	800	18	484,5	very high resolution: 1728 x 2288 picture elements
M38-201WE*								

Flying spot scanner tube

Heater 6,3 V/300 mA; magnetic deflection

type	min. useful screen dia. mm	deflection angle deg.	neck diameter mm	typ. accelerator voltage		max. overall length mm	focusing
				first V	final kV		
Q13-110GU	108	40	38	-	25	347	magnetic

* Pre-adjusted tube/coil combination

For detailed information see Data Handbook T5

Screen phosphors and equivalents

type designation		JEDEC	fluorescence colour	phosphorescence colour	persistence	typical use
Pro Electron	old					
BA	C	-	purplish-blue	-	very short	black and white flying spot scanners
BE	B	P11	blue	blue	medium short	oscillography and photography
GH	H	P31	green	green	medium short	general purpose oscillography
GJ	G	P1	yellowish-green	yellowish-green	medium	general purpose oscillography
GM	P	P7	purplish-blue	yellowish-green	long	low-speed oscillography
GP	-	P2	bluish-green	green	medium short	medium-speed oscillography, photography
GR	-	P39	green	green	long	monitoring and display devices
GU	-	-	white	white	very short	colour flying spot scanners
GY	-	P43	green	green	medium	oscillography
KC	-	-	yellow-green	yellow-green	medium short	data graphic display tube
W	W	P4	white	-	medium short	television and monitoring devices
WA	-	-	white	-	medium short	studio monitors (white point matched to colour tv white point, D6500)
WE	-	P45	white	white	medium short	with high burning resistivity (thanks to rare earth additives)



For detailed information on these and other types see Data Handbook Part T1

Triodes

type	oscillator output power kW	cooling*	frequency at full ratings max. MHz	V _f V	I _f A	V _a kV	I _a A	W _a max kW
YD1240	2,67	FA	250	6,3	33	5	0,75	1,5
YD1244	2,67	FA	250	6,3	33	5	0,75	1,5
TBL6/4000	4	FA	50	6,3	65	7	0,9	1,7
YD1150A	4,75	FA	85	6,3	33	5	1	2,5
YD1152	4,75	WH	85	6,3	33	5	1	2,5
TBL7/8000	6	FA	50	12,6	33	6	1,5	6
TBW7/8000	6	W	50	12,6	33	6	1,5	6
TBL6/6000	6,9	FA	50	12,6	33	6	1,5	5
TBW6/6000	6,9	W	50	12,6	33	6	1,5	6
TBW7/9000	7,2	W	50	12,6	33	7,2	1,5	6
YD1160	8,8	FA	85	6,3	66	6,5	1,8	5
YD1162	8,8	WH	85	6,3	66	6,5	1,8	5
YD1173	13,2	FA	50	5,4	65	10	1,75	10
YD1170	15,4	FA	120	5,8	130	6	3,4	10
YD1172	15,4	WH	120	5,8	130	6	3,4	10
TBL6/14	17,7	FA	30	6,3	136	7	3,5	10
TBW6/14	17,7	W	30	6,3	136	7	3,5	10
TBL12/25	25	FA	30	8	98	12	3,2	15
TBW12/25	25	W	30	8	98	12	3,2	20
YD1175	26,2	FA	120	5,8	130	10	3,4	10
YD1177	26,2	WH	120	5,8	130	10	3,4	15

N.B. Data section continues next page

* FA = Forced air; W = Water; WH = Water (helix)



Electronic components and materials



For detailed information on these and other types see Data Handbook Part T1

Triodes (cont.)

type	oscillator output power kW	cooling*	frequency at full ratings max. MHz	V_f V	I_f A	V_a kV	I_a A	W_a max kW
TBL12/38	30	FA	30	8	130	12	4,5	15
TBW12/38	30	W	30	8	130	12	4,5	20
YD1174	30,3	FA	50	5,8	130	10	4,0	10
YD1180	31,6	FA	100	7	175	7,5	5,4	15
YD1182	31,6	W	100	7	175	7,5	5,4	20
YD1185	50	FA	100	7	175	12	5,33	15
YD1186	50	FA	100	7	175	12	5,4	15
YD1187	50	W	100	7	175	12	5,33	20
YD1192	62,7	W	100	8,4	235	8	10	40
YD1195	90	FA	30	8,4	235	12	9,75	30
YD1197	108	W	30	8,4	235	12	12	50
YD1202	163	W	30	12,2	250	12	18	80
YD1212	240	W	30	12,6	380	14	23,5	120
YD1342	530	W	30	14	555	16	42	240

* FA = Forced air; W = Water



For detailed information on these and other types see Data Handbooks Part T2

Triodes

type	output power kW	cooling*	freq. max. MHz	V _f V	I _f A	V _a kV	I _a A	W _a max W
TB2,5/300	0,39	N	75	6,3	5,4	2,5	0,2	0,135
TB2,5/400	0,39	N	150	6,3	5,8	2,5	0,2	0,15
TBL2/300	0,48	FA	175			2,5	0,26	0,3
TBL2/400	0,6	FA	900	3,4	19	2	0,4	0,4
TBL2/500	0,67	FA	400			2,5	0,38	0,5
TB3/750	1,2	N	100	5	14,1	4	0,38	0,35
TB4/1250	1,69	N	100	10	9,9	4	0,54	0,45
TBL6/6000	6,9	FA	75	12,6	33	6	1,5	5
TBW6/6000	6,9	W	75	12,6	33	6	1,5	6
TBL7/8000	9,5	FA	30	12,6	33	6,5	2	6
TBW7/8000	9,5	W	30	12,6	33	6,5	2	6
TBL12/40	41	FA	30	830	130	12	4,5	15
YD1000	120	W	10	12,6	160	15	9,8	45
YD1001	120	FA	10	12,6	160	15	9,8	35
YD1002	120	V	10	12,6	160	15	9,8	60
YD1010	360	W	10	18	280	15	29,3	120
YD1012	360	W	10	18	280	15	29,3	180



Tetrodes

type	output power W	cooling*	freq. max. MHz	V _f V	I _f A	V _a kV	I _a A	W _a max W
YL1100	80	FA	1200	26,5	0,52	1,9	170	115
YL1101	80	FA	1200	6,3	2,1	1,9	170	115
QB3/200	280	N	50	6	3,5	3	115	65
QEO8/200	290	N	30	6,3	3,9	1	385	100
QEO8/200H	290	N	30	26,5	0,85	1	385	100
QEL1/150	370	FA	150	6	2,6	2	250	250
QEL1/150H	370	FA	150	26,5	0,85	2	250	250
7609	370	FA	150	26,5	0,58	2	250	250

N.B. Data section continues next page

* FA = Forced air; N = Natural; V = Vapour; W = Water



Electronic components and materials

PHILIPS

For detailed information on these and other types see Data Handbooks Part T2

Tetrodes (cont.)

type	output power W	cooling*	freq. max. MHz	V _f V	I _f A	V _a kV	I _a A	W _a max W
QB3/300	375	N	120	5	6,5	3	167	125
QB3/300GA	375	N	120	5	6,5	3	167	125
QEL2/275	390	FA	500	6	2,6	2	250	250
QEL2/275H	390	FA	500	26,5	0,58	2	250	250
QBL4/800	930	FA	120	5	13,5	4	315	500
QB3,5/750	1000	N	75	5	14,1	400	310	250
QB3,5/750GA	1000	N	75	5	14,1	400	310	250
QB4/1100	1100	N	110	5	14,1	4	350	400
YL1460	1100	N	110	5	14,1	4	350	400
QB4/1100GA	1100	N	110	5	14,1	4	350	400
YL1461	1100	N	110	5	14,1	4	350	400
QB5/1750	1760	N	75	10	9,9	5	440	500
QBL3,5/2000	2100	FA	1000	3,6	58	4,3	850	1500
QB5/2000	2400	N	30	7,5	22,6	5	600	800
QBL5/3500	4100	FA	75	6,3	32,5	5	1100	3

Tetrodes for television/FM

type	output power sync kW	cooling*	gain sync dB	V _f V	I _f A	V _a kV	V _{g2} V	I _{ao} A	I _a black A	V _a max. kV	W _a max. kW	range
YL1420	8,6	FA	14	6,3	118	5	600	0,65	2,1	6,5	6	VHF
YL1430	18,4	FA	14,5	8	116	7	700	0,75	2,9	9	12	VHF
YL1440	1,5	FA	14,5	4,2	53	3	500	0,2	0,7	4	1,5	VHF
YL1520	27,5	FA	15	10,4	115	8	700	0,9	3,9	9	18	VHF
YL1540	1,1	FA	20	4,2	53	3	700	0,3	0,5	4,2	2	VHF
YL1560	5,5	FA	17	5	130	5,5	700	1,0	1,9	6	7	UHF
YL1610	11	FA	17	8	113	5,5	500	1,2	2,9	7	14	VHF
YL1630	30	FA	17	10,4	170	7,5	700	1,8	5,7	8,5	26	VHF
YL1631	20	FA	16	10,4	115	7,5	800	1,0	3,6	10	17	VHF/FM

* FA = Forced air; N = Natural



For detailed information on these and other types see Data Handbooks Part T2

Tetrodes for AM

type	output power kW	cooling*	freq. max. MHz	V _f V	I _f A	V _a kV	I _a A	W _a max kW
YL1640	120	W	30	10	280	11	15	150
YL1660	550	W	30	23	500	12,5	54	500
YL1531	50	W	250	7,5	180	12	6	30
YL1530	35	FA	250	7,5	180	10	5,9	30
YL1680	120	W	250	12	265	12	15	100



Double tetrodes

type	output power W	cooling*	freq. max. MHz	V _f V	I _f A	V _a kV	I _a A	W _a max W
QQE02/5	5,8	N	500	6,3 12,6	0,6 0,3	180	27,5	3
QQE04/5	7	N	960	6,3 12,6	0,6 0,3	160	35	8
QQE03/12	12	N	200	6,3 12,6	0,82 0,41	175	37,5	5
QQE03/20	48	N	200	6,3 12,6	1,3 0,65	250	50	10
QQE06/40	90	N	250	6,3 12,6	1,8 0,9	250	100	20
YL1060	132	N	175	6,3	1,8	245	110	30

* W = Water; N = Natural; FA = Forced air



Electronic components and materials

PHILIPS

For detailed information on these and other types see Data Handbook T10

Photoconductive layer;	ER(F)	With extended red exposure and IR reflecting filter on anti-halation glass disc
ACT Anti comet tail	HR	High resolution
BL Bias light	HSD	High stability diode
D Diode	IG	Industrial grade
ED Electrostatic deflection	LOC	Low output capacitance
EF Electrostatic focus	SR	Standard resolution
ER With extended red response		

Plumbicon® tubes 1,25 inch (30 mm)

type	max. length mm	photo-conductive layer
XQ1020L	210	SR
XQ1020R	210	SR
XQ1020G	210	SR
XQ1020B	210	SR
XQ1023R	210	ER
XQ1025R	210	ER(F)
XQ1410L	216	HR/BL
XQ1410R	216	HR/BL
XQ1410G	216	HR/BL
XQ1410B	216	HR/BL
XQ1413R	216	ER/BL
XQ1415R	216	ER/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
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	HR/D/LOC/BL
XQ3445R	216	HR(F)/D/LOC/BL

Plumbicon® tubes 1 inch (25 mm)

'front loading' type	'rear loading' type	max. length mm	photo-conductive layer
XQ1070/02R	XQ1070/03R	170	SR/BL
XQ1070/02G	XQ1070/03G	170	SR/BL
XQ1070/02B	XQ1070/03B	170	SR/BL
XQ1073/02R	XQ1073/03R	170	ER/BL
XQ1075/02R	XQ1075/03R	170	ER(F)/BL
XQ1500R	XQ1510R	167	HR/ACT/BL
XQ1500G	XQ1510G	167	HR/ACT/BL
XQ1500B	XQ1510B	167	HR/ACT/BL
XQ1530R	XQ1513R	167	ER/ACT/BL
XQ1505R	XQ1515R	167	ER(F)/ACT/BL
XQ2070/02R	XQ2070/03R	170	HR/D/BL
XQ2070/02G	XQ2070/03G	170	HR/D/BL
XQ2070/02B	XQ2070/03B	170	HR/D/BL
XQ2073/02R	XQ2073/03R	170	ER/D/BL
XQ2075/02R	XQ2075/03R	170	ER(F)/D/BL
XQ3070/02R	XQ3070/05R	170	HR/LOC/D/BL
XQ3070/02G	XQ3070/05G	170	HR/LOC/D/BL
XQ3070/02B	XQ3070/05B	170	HR/LOC/D/BL
XQ3073/02R	XQ3073/05R	170	ER/LOC/D/BL
XQ3075/02R	XQ3075/05R	170	ER(F)/LOC/D/BL
XQ2172		170	X-RAY



For detailed information on these and other types see Data Handbook T10

Photoconductive layers:

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 exposure 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
XQ1427R	109	ER/SR
XQ1427G	109	SR
XQ1427B	109	SR
XQ1428R	109	ER/SR/IG
XQ1428G	109	SR/IG
XQ1428B	109	SR/IG
XQ2427R	108	ER/HR/D
XQ2427G	108	HR/D
XQ2427B	108	HR/D
XQ3427R	108	ER/HR/D/LOC
XQ3427G	108	HR/D/LOC
XQ3427B	108	HR/D/LOC
XQ3457R	88	ER/HR/D/LOC/ED
XQ3457G	88	HR/D/LOC/ED
XQ3457B	88	HR/D/LOC/ED
XQ3467R	112	ER/SR/EF
XQ3467G	112	SR/EF
XQ3467B	112	SR/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



For detailed information on these see Data Handbook T12

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

Vidicon and Newvicon® tubes 1 inch (25 mm)

type	max. length mm	mesh electrode	photoconductive layer	focusing
XQ1031	130	I	A	M
XQ1032	130	I	A	M
XQ1240	159	S	A	M
XQ1241	159	S	A	M
XQ1280	159	S	B	M
XQ1285	159	S	B	M
XQ1440	159	S	Nw	M
XQ1442	159	S	Nw	M
XQ1443	159	S	Nw(IR)	M
XQ1444	159	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



Application information and data sheets for these products are available on request

General description

The frame transfer sensor is a solid state imaging device which produces two interlaced 294-line fields (including 6 lines for dark reference and testing) with an aspect ratio of 4:3.

NXA1010 : The device is compatible with CCIR TV standards and has a 7,5 mm diagonal image matching the half-inch camera tube format.

NXA1020 : The sensor is equipped with an on-chip colour stripe filter. The device is compatible with PAL and SECAM TV standards and has a 7,5 mm diagonal image matching the half-inch camera tube format.

Applications

- Surveillance cameras - solid state reliability, high resolution and sensitivity of the quality to provide ideal successors for the Newwicon® or Ultricon® pick-up element (NXA1010) and for stripe filter camera tubes (NXA1020)
- Visual aids - the low voltage and mechanical ruggedness of this device allow design of safe and reliable cameras for visual aids

NXA1010

- ENG cameras - the high blue sensitivity and good horizontal resolution make this sensor very suitable for 3-chip ENG colour cameras
- Character and pattern recognition - excellent linearity and uniformity recommend this sensor as first choice for these applications
- Robotics - the small size, light-weight and mechanical ruggedness make this sensor extremely suitable for all types of high resolution robot-vision applications

NXA1020

- Consumer entertainment cameras
- Slide and film scanners for consumer applications

Features

- Effective number of elements: 1 line per field for black clamping
- Cyan, green, yellow and stripe filter on the chip (NXA1020 only)
- Optical black: 1 line per field for black clamping
- 100x anti-blooming margin
- Gamma is 1
- High sensitivity, low noise
- Freedom from lag, burn-in, geometrical distortion and microphonic noise

Device organization

- Frame transfer charge coupled device
- Unit cell size: 10 μm (horizontal) x 15,6 μm (vertical)
- Separate outputs for the cyan, green and yellow channels (NXA1020 only)
- Dummy elements; the first 3 elements of the 3 output registers are dummy elements
- Chip size: 7,02 mm (horizontal) x 9,42 mm (vertical)
- On-chip high sensitive output amplifier
- Image area: 6,0 mm (horizontal) x 4,5 mm (vertical)

Caution : The image sensor is a MOS device which can be destroyed by static charging of the gates. Always store the device with short-circuiting clamps or on conductive foam plastic. When cleaning the glass window always use alcohol or acetone. Rub the window carefully and slowly. Dry rubbing of the window may cause static charges which can destroy the device.



For detailed information on these and other types see Data Handbook T6

Cylinder tubes

type	sensitive for:			counting rate at 10 ⁻¹ mGy/h** count/s	sensitive length mm	plateau:			dead time µs	back-ground shielded count/min	dose rate range mGy/h
	α	β	γ			thresh-hold V	length V	slope %/V			
ZP1200	●			130	40	400	200	0,04	90	10	10 ⁻³ - 10
ZP1201*	●			210	40	400	200	0,04	110	10	10 ⁻³ - 10
ZP1210	●			1200	140	400	100	0,15	200	70	10 ⁻³ - 2
ZP1220	●			1600	240	400	100	0,15	210	90	10 ⁻³ - 1
ZP1300	●	●		2500***	8	500	100	0,30	11	1	10 ⁻¹ - 2 x 10 ⁴
ZP1301*	●	●		3400***	8	500	100	0,30	13	1	10 ⁻¹ - 2 x 10 ⁴
ZP1302*	●	●		3400***	8	500	100	0,30	13	-	10 ⁻¹ - 2 x 10 ⁴
ZP1310	●	●		11000***	16	500	150	0,15	15	2	4 x 10 ⁻³ - 3 x 10 ³
ZP1313*	●	●		13000***	16	500	150	0,15	15	2	4 x 10 ⁻³ - 3 x 10 ³
ZP1320	●	●		80	28	500	150	0,08	45	12	10 ⁻³ - 10 ²
ZP1321*	●	●		80	28	500	150	0,08	45	12	10 ⁻³ - 10 ²
ZP1330	●	●		1200	75	450	350	0,02	70	30	3 x 10 ⁻⁴ - 10

Cosmic ray guard tube

ZP1700	●			-	-	800	400	903	1000	70	3 x 10 ⁻⁴ - 3 x 10 ⁻¹
--------	---	--	--	---	---	-----	-----	-----	------	----	---

Window tubes

type	sensitive for:			counting rate at 10 ⁻¹ mGy/h** count/s	window Ø / type mm	plateau			dead time µs	back-ground shielded count/min	dose rate range mGy/h
	α	β	γ			thresh-hold V	length V	slope %/V			
ZP1400	●	●	●	210	9c	400	200	0,04	90	10	10 ⁻³ - 10
ZP1401	●	●	●	210	9a	400	200	0,04	90	10	10 ⁻³ - 10
ZP1410	●	●	●	320	19,8a	450	250	0,02	175	15	10 ⁻³ - 30
ZP1430	●	●	●	540	27,8a	450	250	0,04	190	25	10 ⁻³ - 20
ZP1431	●	●	●	540	27,8c	450	250	0,04	190	25	10 ⁻³ - 20
ZP1441	●	●	●	200	19,8a	500	200	0,09	65	5	10 ⁻³ - 10 ²
ZP1442	●	●	●	200	19,8c	500	200	0,09	65	8	10 ⁻³ - 10 ²
ZP1451	●	●	●	400	27,8a	500	250	0,07	60	9	10 ⁻³ - 30
ZP1452	●	●	●	400	27,8c	500	250	0,07	60	18	10 ⁻³ - 30
ZP1470	●	●	●	340	24,1b	550	150	0,15	70	25	10 ⁻³ - 20
ZP1480	●	●	●	270	17d	400	100	0,20	120	30	10 ⁻³ - 20
ZP1481	●	●	●	270	17d	400	100	0,20	120	30	10 ⁻³ - 20

X-ray sensitive tubes

ZP1610	2,5-40 keV	7 x 18b	1900	working voltage 1460 to 1850 V
--------	------------	---------	------	--------------------------------

* With compensating filter

** 1R = 8,69 mGy

*** Counting rate at 10² mGy

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 2,3; f:3,5 to 4,0



Electronic components and materials

PHILIPS

For detailed information on these and other types see Data Handbook T13



type	XX1332	XX1380	XX1390	XX1410	XX1500	XX1500TV	
Photocathode	S25	S25	S25	S25	S25	S25	
White light sensitivity	320	350	400	420	350	350	µA/lm
Sensitivity at 800 nm	28	35	35	40	35	35	mA/W
Sensitivity at 850 nm	17	30	30	30	25	25	mA/W
Gain	45000	22000	-	10000	45000	65000	
Modulation transfer factor							
5 cycles/mm	86				92	92	%
10 cycles/mm	63				67	67	%
20 cycles/mm	30				33	33	%
2,5 lp/mm		96		90			%
7,5 lp/mm		81		62			%
15 lp/mm		53		30			%
Limiting resolution	23	48	29	29	36	36	lp/mm
Useful photocathode area	39∅	20∅	18∅	18∅	18∅	10,8 x 14,4	mm



Photomultipliers: survey of types

For details of these and other types see Data Handbook T9

Photomultipliers

(Type survey continues on next page)

photocathode	useful dia mm	type	no. of stages	photocathode spectral sensitivity, $sk_e(\lambda)$		anode sensitivity		rise time ns	anode pulse linearity mA
				mA/W	λ (nm)	1) A/lm 2) A/lmF 3) kA/W 4) gain	at total voltage V		
bialkaline SbKCs on quartz window	44	XP2020Q	12	80	400	4) 3×10^7	2200	1,5	280
bialkaline SbRbCs on quartz window	32	XP2018B	10	75	440	3) 60	1350	2,5	200
bialkaline SbKCs on UV-glass window	110	XP2041	14	85	400	4) 3×10^7	2200	2,0	280
bialkaline SbKCs	23	XP2962	8	75	400	2) 1	1100	1,8	80
	23	XP2972 +	10	75	400	2) 10	1300	1,9	80
	23	XP2982	11	75	400	2) 30	1350	1,9	80
	32	XP2012*	10	90	400	3) 60	1350	2,5	200
	44	XP2020	12	85	400	4) 3×10^7	2200	1,5	280
	44	XP2102* +	10VB	85	400	2) 1,5	1250	10	10
	44H	XP2112* +	10VB	85	400	2) 1,5	1250	10	10
	44	XP2202*	10	75	400	3) 60	1400	3,5	200
	44	XP2212* +	12	75	400	4) 3×10^7	1900	4,0	250
	44	XP2230*	12	85	400	4) 3×10^7	2300	1,6	280
	44	XP2242B	6	80	400	4) 10^4	1100	1,6	350
	44	XP2252*	12	80	400	4) 3×10^7	1850	2,0	250
	44	XP2262*	12	80	400	4) 3×10^7	1850	2,0	250
	44	XP3102* +	8	90	400	2) 1,5	950	3,0	100
	44	XP3202* +	8	75	400	2) 1,5	950	3,0	100
	56	XP2432* +	10VB	90	400	2) 1,5	1250	10	10
	56H	XP2422* +	10VB	90	400	2) 1,5	1250	10	10
	56H	XP3422* +	8	95	400	2) 1,5	950	3,0	100
	59	XP2402* +	10VB	90	400	2) 1,5	1250	10	10
	59H	XP2452* +	10VB	90	400	2) 1,5	1250	10	10
	68	XP2312*	12	85	400	4) 3×10^7	2000	2,5	250
68	XP3462* +	8	85	400	4) 10^6	1500	3,0	100	
70	XP2412* +	10VB	105	400	2) 1,5	1250	11	10	
70H	XP2442* +	10VB	105	400	2) 1,5	1250	11	10	
110	XP2050	10VB	95	400	3) 12	1270	16	10	

H = hexagonal shape, dimensions between flats

VB = venetian blind multiplier

* = also available with plastic base by adding B to the type number

+ = can be supplied with standard or customized integral PC-board voltage divider.



Electronic components and materials

PHILIPS

Photomultipliers: survey of types

For details of these and other types see Data Handbook T9



Photomultipliers (cont.)

photocathode	useful dia mm	type	no. of stages	photocathode spectral sensitivity, $sk_e(\lambda)$		anode sensitivity		rise time ns	anode pulse linearity mA
				mA/W	λ (nm)	1) A/lm 2) A/lmF 3) kA/W 4) gain	at total voltage V		
bialkaline SbRbCs	14	XP1911	10	80	440	2) 10	1200	2,3	80
	32	XP2011*	10	85	440	2) 7,5	1300	2,5	200
	32	XP2061*	10	85	440	2) 7,5	1300	2,5	200
trialkaline SbNaKCs (S20)	14	XP1117 +	9	13	700	1) 30	1520	3,5	30
	23	XP2963	8	20	700	1) 6	1120	1,8	80
	32	XP2023B	8	20	700	1) 6	1120	2,5	200
	44	XP2203B	10	16	700	1) 60	1350	3,5	200
	44	XP2233B	12	15	700	4) 3×10^7	2050	2,0	250
trialkaline SbNaKCs on quartz window	44	XP2254B	12	15	700	4) 3×10^7	2700	1,5	280
trialkaline SbNaKCs (S20R)	32	XP1017	10	6,5	860	1) 60	1470	3,5	100
bialkaline SbRbCs	20	AV29	diode	80	440	$C_{ak} = 6 \text{ pF}$	1-1000	3,0	15×10^{-3}

* = also available with plastic base by adding B to the type number

+ = can be supplied with standard or customized integral PC-board voltage divider.



Electronic components and materials

PHILIPS

Channel electron multipliers

For detailed information on these and other types see Data Handbook T9

Single channel electron multipliers

type	input	back-ground cps	R_{nom} G Ω	starting voltage kV	gain	max.op. voltage kV
X810AL	1,25 \varnothing circular	0,15	0,6	1,8	$5,0 \times 10^7$	3,5
X812AL	2,0 x 8,0 rectangular	0,15	0,6	1,8	$5,0 \times 10^7$	3,5
X814AL	2,0 x 8,0 rectangular	0,15	0,6	1,8	$5,0 \times 10^7$	3,5
X818AL	5,0 \varnothing conical	0,15	0,6	1,8	$5,0 \times 10^7$	3,5
X910AL-BL	2,2 \varnothing circular	0,15	0,6	1,6	$1,8 \times 10^8$	4
X913AL-BL	3,5 x 15,5 rectangular	0,15	0,6	1,6	$1,8 \times 10^8$	4
X914AL-BL	3,5 x 15,5 rectangular	0,15	0,6	1,6	$1,8 \times 10^8$	4
X919AL-BL	10,0 \varnothing conical	0,15	0,6	1,6	$1,8 \times 10^8$	4
X959AL-BL	10,0 \varnothing conical	0,15	0,6	1,6	$1,8 \times 10^8$	4

Channel electron multipliers plates

type	channel diameter μ m	plate dimensions mm	useful area mm	thickness mm	R_{nom} M Ω	channel pitch μ m
G12-25SE	12,5	\varnothing 25	$\varnothing > 19$	0,5	250-750	15
G12-36	12,5	\varnothing 36	\varnothing 32,5	0,5	80-300	15
G12-36DT/13	12,5	\varnothing 36	\varnothing 32,5	1,0	200-600	15
G12-46	12,5	\varnothing 46	\varnothing 42	0,5	30-100	15
G12-46DT/13	12,5	\varnothing 46	\varnothing 42	1,0	60-250	15
G12-70	12,5	\varnothing 70	\varnothing 68	0,5	20	15
G25-20 x 50	25	20 x 50	$> 18,8 \times 48,8$	1,0	35	31
G25-25	25	\varnothing 27,1	\varnothing 26,5	1,0	30-150	31
G25-50	25	\varnothing 53,0	\varnothing 51,8	1,0	7-40	31
G25-70	25	\varnothing 70,0	\varnothing 68	1,0	5	31



(Numbers in brackets) = nearest equivalent types
Replacement types not listed in this catalogue are non-preferred products;
for detailed information see Data Handbooks

type to be replaced	replacement type(s)	type to be replaced	replacement type(s)
A4051	QE06/50;807	AX9908	QB5/1750;6079
ACS4	QBL5/3500;6076	AX9909	PE1/100;6083
ACT70	YD1120	AX9910	QQE03/20;6252
ACT100	(TBL6/14);(7804)	B1135	TB3/750;5867
AG575A	(DCG6/18IGB)	B1135A	TB3/750
AG869B	(DCG9/20)	B1152	TB4/1500
AG5005	(DCG7/100)	B1153	TB5/2500
AG5006	(DCG6/18)	BK42	ZX1051
AGR9950	(DCG6/6000)	BK42A	ZX1051
AGR9951	(DCG6/6000)	BK42B	(ZX1051)
AH213	(DCG9/20)	BK42C	ZX1051
AJ5551	ZX1051	BT5	PL5559
AJ5551A	ZX1051	BT17	(PL105)
AJ6346	(ZX1051)	BT19	(PL5557)
AR14	ZX1051	BT29	PL255
AR14T	(ZX1051)	BT91	PL5544
AR14TP	(ZX1051)	BR191B	YD1120
AR14TWS	(ZX1051)	BR1126	YD1230
ASG5007	(DCG12/30)	BR1160	YD1120
ASG5017	PL5557	BR1162	TBL7/8000
ASG5121	PL2D21;PL5727	BR1165	TBL6/6000
ASG5155A	(PL255)	BR1181	(YD1175)
ASG5545	PL5545	BR1182	(YD1185)
ASG5727	PL5727	BR1195	YD1150A
ASG5830	(DCG7/100)	BR1196	YD1160
ASG6011	PL5684/C3JA	BR1512	YD1240
ASG6574	PL6574	BR1512A	YD1244
ATS25	QE06/50;807	BR1513	YD1175
AX4-125A	QB3/300;6155	BR1513A	(YD1175)
AX4-250A	QB3.5/750;6156	BR1514	YD1174
AX105	PL105	BR1514F	(YD1174)
AX224	DCX4/1000	BTL6-3	(TBL6/14)
AX228	(DCX4/5000)	BTW6-3	(TBW6/14)
AX230	DCX4/5000	BW1102J2	(YD1197)
AX5551	ZX1051	BW1143J2	(YD1202)
AX5551A	ZX1051	BW1162	TBW7/8000
AX9900	TB2.5/300;5866	BW1162J2	TBH7/8000
AX9901	TB3/750;5867	BW1162J3	TBH7/8000
AX9902	TB4/1250;5868	BW1165	TBW6/6000
AX9903	QQE06/40;5894	BW1165J3	TBH6/6000
AX9904	TBW6/6000;5923	BW1176J1	(YD1197)
AX9904R	TBL6/6000;5924	BW1176J2	(YD1197)
AX9905	QQC04/15;5895	BW1181J3	(YD1177)
AX9907	QBW5/3500;6075	BW1182J2	(YD1187)
AX9907R	QBL5/3500;6076	BW1182J3	(YD1187)



(Numbers in brackets) = nearest equivalent types
Replacement types not listed in this catalogue are non-preferred products;
for detailed information see Data Handbooks

type to be replaced	replacement type(s)	type to be replaced	replacement type(s)
BW1183J1 BW1183J2 BW1184J2 BW1185J2 BW1195	(YD1197) (YD1197) YD1202 YD1212 YD1151	CR1502 CST2/12 CT1/2500 CV5 CV26	YL1440 (PL255) PL5559 (DCG4/5000) QB2/250;813
BW1195J3 BW1195J3F BW1196 BW1195J3 BW1196J3F	YD1152 YD1152 YD1161 YD1162 YD1162	CV124 CV273 CV309 CV417 CV424	QE06/50;807 TD03 - 10 QE04/10 EC91;6AQ4 QQE06/40;5894
BW1513J2 BW1513J2F BW1514J2 BW1514J2F BW1515J2	(YD1177) (YD1177) (YD1178) (YD1178) (YD1197)	CV483 CV635 CV788 CV797 CV1350	QE04/10 (TB4/1250);(5868) QQE04/20;832A PL2D21;PL5727 TB3/750;5867
BW1515J2F BW1601J2F C932 C933 C3JA	(YD1197) (YD1197) (XQ1031);(XQ1032) (XQ1031) PL5684/C3JA	CV1351 CV1510 CV1572 CV1835 CV1838	TB4/1250;5868 QE04/10 QE06/50;807 DCX4/1000 QQC04/15;5895
C144 C178A C180 C1108 C1112	(QQE06/40);(5894) QQE06/40;5894 QQE04/120;832A QB3/300;6155 QB3.5/750;6156	CV1865 CV1886 CV1888 CV1905 CV1924	EC81 EC80 EC81 QB3/200;4 - 65A TB2.5/300;5866
C1134 C1136 C7151W C31000A C33031DPI	QQE03/20;6252 QB4/1100;YL1460;7527 (XP1017) (56TVP) XX1306	CV2129 CV2130 CV2131 CV2175 CV2210	M8096;QE03/10;5763 QB3/300;6155 QB3.5/750;6156 DG7 - 5 PL5544
C33004 C33004A C33095PI C70007A C70102B	XX1050 XX1050 XX1060/01 (56CVP) (XP1116)	CV2215 CV2253 CV2302 CV2466 CV2487	PL5545 PL6574 DH3 - 91 QQE02/5;6939 QEL2/275;4CX250B
CCa CE305 CE308 CE309 CE311	(E88CC) (PL5557) (PL105) PL5557 PL3C23A	CV2492 CV2518 CV2519 CV2666 CV2729	E88CC DCX4/5000 QEL 1/150;4X150A (QQE06/40);(5894) E80F
CK5654 CK5725 CQIO.3-1 CR1100 CR1501	E95F 5725 QEL2/275 QBL5/3500;6076 YL1430	CV2753 CV2797 CV2798 CV2799 CV2876	PL5684/C3JA QQE06/40;5894 QQE03/12;(6360) QQE03/20;6252 PL5727



(Numbers in brackets) = nearest equivalent types
Replacement types not listed in this catalogue are non-preferred products;
for detailed information see Data Handbooks

type to be replaced	replacement type(s)	type to be replaced	replacement type(s)
CV2957	PL5557	DN7-3	DG7-5;3ALP1
CV2963	QB3.5/300GA;4-125A	DN7-4	DG7-6
CV2964	QB3.5/750GA;4-250A	DN7-5	DG7-5;3ALP1
CV2967	8020	DQ5	(DCG6/18)
CV3522	QB5/1750;-6079	DQ5B	(DCG6/18GB)
CV3523	QE05/40;6146	DQ5C	(DCG6/18)
CV3599	QQV5-P10;3E29	DQ6	(DCG6/20)
CV3611	5586	DQ7	(DCG7/100B)
CV3879	QB4/1100GA;4-400A	DR7-3	DG7-5
CV3926	TBL6/6000;5924	DR7-4	DG7-6
CV3991	4X150D	DR7-5	DG7-5
CV3998	E180F;E186F	DR7-6	DG7-6
CV4003	E82CC	DR869B	(DCG9/20)
CV4010	E95F	DX2	DCX4/1000
CV4011	5725	DX274	QBW5/3500;6075
CV4018	PL5727	DX285	YJ1180
CV4108	E188CC	DX290	YJ1320
CV5027	PL5559	E91N	PL5727
CV5140	EA52;6923	E152A	QB3/300;6155
CV5171	DP7-5	E250A	QB3.5/750;6156
CV5188	E182CC	E1955	PL2D21;PL5727
CV5214	E90CC	E5001	(XQ1070);(XQ1440)
CV5216	E95F	E5022	(XQ1427);(XQ1428);(XQ1274)
CV5219	QBL5/3500;6076	E5036	(XQ1400)
CV5231	E188CC	E5038	(XQ1285)
CV5234	PL5684/C3JA	E5040,R,G,B	(XQ1020,R,G,B)
CV5269	DG7-6	E5054	(XQ1022)
CV6240	XX1060/01	E5055,R	(XQ1023,R)
CV8884	DH7-11;3BYP31	E5058	(XQ1400)
CW1100	QBW5/3500;6075	E5061	(XQ1274);(XQ1428)
DET22	TD03-10	E5062	(XQ1275)
DET22G	EC55;5861	E5063	(XQ1070);(XQ1440)
DET40	(TB3/750)	E5064	(XQ1070);(XQ1440)
DG7-1	DG7-5;3ALP1	E5067	(XQ1275)
DG7-2	DG7-6	E5070	(XQ1241)
DG7-3	DG7-5;3ALP1	E5072	(XQ1274);(XQ1428)
DG7-4	DG7-6	E5073	(XQ1070);(XQ1440)
DG7-5	3ALP1	E5074	(XQ1070);(XQ1440)
DG7-32	3ALP1A	E5091	(XQ1070);(XQ1440)
DH3-91	1CF31	E5092	(XQ1427)
DH7-11	3BYP31	E5093	(XQ1428)
DH7-91	DH7-11	E5095	(XQ1275)
DHM10-93	E10-12GH	E5100	(XQ1285)
DN7-1	DG7-5;3ALP1	E5134R	(XQ1024R)
DN7-2	DG7-6	E5139A	(XQ1272)



(Numbers in brackets) = nearest equivalent types
Replacement types not listed in this catalogue are non-preferred products;
for detailed information see Data Handbooks

type to be replaced	replacement type(s)	type to be replaced	replacement type(s)
E5153	(XQ1070);(XQ1440)	FTW3-1	(TBW7/8000)
E5165	(XQ1275)	FTW8-1	(TBW12/25)
E5171	(XQ1285);(XQ1442)	FTW12-1	(TBW12/38)
E5172	(XQ1274)	G101dv	DX4/1000
E5173	(XQ1070);(XQ1440)	G20/5d	HDLG9/20
E5174	(XQ1070);(XQ1440)	GD85WR	(ZZ1000)
E5175	(XQ1275)	GL2D21	PL2D21;PL5727
E5185A	(XQ1272)	GL57	PL5559
E5187	(XQ1272)	GL414	PL5559
E5195A	(XQ1275)	GL575A	(DCG6/18GB)
E5250	(XQ1285);(XQ1442)	GL673	(DCG6/18)
E5270	(XQ1070);(XQ1440)	GL807	QE06/50;807
E5271	(XQ1070);(XQ1440)	GL813	QB2/250;813
EF575A	DCG6/18GB	GL829B	(QQE06/40);(5894)
EL-C3JA	PL5684/C3JA	GL832A	QQE04/20;832A
EN91	PL2D21;PL5727	GL5551	ZX1051
ES85	(TB2.5/300);(5866)	GL5551A	ZX1051
ES204A	TB3/750;5867	GL5557	PL5557
ES833	(TB4/1250);(5868)	GL5559	PL5559
ES833A	(TB4/1250);(5868)	GL5720	(PL5559)
ESU103	DCX4/1000	GL5855	(PL255)
ESU575	(DCG6/18GB)	GL6011	(PL5684/C3JA)
ESU673	DCG6/18	GL6159	QE05/40H;6159
F672B	DCG9/20	GL6346	(ZX1051)
F369A	(DCG9/20)	GLE5000/3/12	DCG6/18
F369B	(DCG9/20)	GLE2000/2.5/10	DCG9/20
F869B	DCG9/20	GRG250/3000	PL5557
F4700	XX1050	GTR83X	(ZZ1000)
F4706	XX1060/01	GXU1	DCX4/1000
F4720	XX1062	GXU2	DCX4/5000
F4721	XX1060/01;XX1063	H8362	(XQ1070/01)
F4747	F23XX	H8397	(XQ1427);(XQ1428)
F9475	XX1060/01	H8397A	(XQ1427)
FG17	PL5557	H9311	(XQ1428)
FG27A	(PL5559)	HF255	(DCG9/20)
FG57	PL5559	HS200	(XQ1031)
FG97	(PL5557)	HS201	(XQ1031);(XQ1032)
FG98A	(PL5557)	HT17	PL5557
FG105	PL105	ITK3-1	(YD1152)
FG172	(PL105)	ITK5-1	(YD1162)
FG271	ZX1051	ITK10-2	(YD1177)
FTL2-1	TBL6/4000	ITK12-1	(YD1174)
FTL3-2	(TBL7/8000);(6961)	ITK15-2	(YD1187)
FTL8-1	(TLB12/25)	ITK30-2	(YD1197)
FTL12-1	(TLB12/38)	ITK60-2	(YD1202)



(Numbers in brackets) = nearest equivalent types
Replacement types not listed in this catalogue are non-preferred products;
for detailed information see Data Handbooks

type to be replaced	replacement type(s)	type to be replaced	replacement type(s)
ITK120-2	(YD1212)	MT5559	PL5559
ITK200-1	(YD1342)	MW13-32	MW13-38
ITL3-1	(YD1150A)	MX9648	F23XX
ITL5-1	(YD1160)	NL710	PL5559
ITL10-1	(YD1173)	NL715	PL5557
ITL10-2	(YD1175)	NL869B	(DCG9/20)
ITL12-1	(YD1178)	NL1005	ZX1051
ITL15-2	(YD1185)	NL1005A	ZX1051
ITL30-2	(YD1195)	NL1031	ZX1051
K1295	(XP2000)	NL1051A	ZX1051
K1322	(XP2008)	NL1051A/P	ZX1051
K1361	(XP2008)	NL6989/C6J/KL	PL5545
K1390	(XP2030)	NL-C6JK/Ne	PL5545
K1404	(XP1117)	NU832	QQE04/20;832A
K1427	(XP1004)	OT400	(TB4/1250);(5868)
K1428	(XP2000)	P2-12	QQE04/20;832A
K1430	(XP2030)	P2-0B	(QQE06/40)(5894)
K1447	(XP1002)	P810	(XQ1032)
K1500	(XP2000)	P813	(XQ1031)
K3017	YK1190	P820	(XQ1031)
K3018	YK1191	P826	(XQ1032)
K3082	YK1190	P826/4478	(XQ1032)
K3083	YK1191	P841	(XQ1240)
K3084	YK1192	P841X	(XQ1240);(XQ1280)
KT8	(QE06/50);(807)	P842X	XQ1240
L4261	F23XX	P842X	(XQ1240);(XQ1280)
M7075	XQ1271	P843	(XQ1240)
M542	5586	P844	XQ1240
MC13-16	Q13-110BA	P846	(XQ1240)
ME1504	PL5559	P847	XQ1240
MI1050	ZX1051	P848	(XQ1241)
MI1053	ZX1051	P848D	(XQ1241)
MI2053A	ZX1051	P849	XQ1241
MK13-16	(Q13-110GU)	P849D	XQ1241
ML4-125A	QB3/300GA;4-125A	P862	(XQ1241)
ML4-250A	QB3.5/750GA;4-250A	P896	XX1060/01
ML4-400A	QB4/1100GA;4-400A	P8000,L,R,G,B	55875,L,R,G,B
ML833A	(TB4/1250);(5868)	P8000IG,R,G,B	55875IG,R,G,B
ML869A	(DCG9/20)	P8000X	55876/01
ML6198	(XQ1031);(XQ1032)	P8001,L,R,G,B	(XQ1020,L,R,G,B)
MT17	PL5557	P8001X	(XQ1022)
MT57	PL5559	P8003	(XQ1023)
MT105	PL105	P8003F	(XQ1025)
MT5544	PL5544	P8005	(XQ1410,L,R,G,B)
MT5557	PL5557	P8007	(XQ1413R)



(Numbers in brackets) = nearest equivalent types
Replacement types not listed in this catalogue are non-preferred products;
for detailed information see Data Handbooks

type to be replaced	replacement type(s)	type to be replaced	replacement type(s)
P8007F P8021 P8021X P8022 P8022X	(XQ1415R) XQ1070,R,G,B XQ1072 (XQ1070,R,G,B) (XQ1072)	QQV04-16 QQV06-40 QQV06-40A QQV07-40 QQZ03-10	QQE04/5;7377 (5894) QQE06/40;5894 (QQE6/40);829B QQC03/14;7983
P8023A P8023F P8024 P8024F P80241G	XQ1073 (XQ1073) (XQ1073) (XQ1075) (XQ1074)	QQZ03-20 QQZ04-15 QQZ06-40 QV03-12 QV04-7	YL1020;8118 QQC04/15;5895 YL1030 QE03/10;5763 QE04/10
P8073 P8076 P8130 P8131 P8132A	XX1050 XX1063 (XQ1020);(XQ1410);(5587) (XQ1020);(XQ1410);(5587) (XQ1413)	QV06-20 QV06-20B QV06-20C QV08-100 QV08-100B	QE05/40;6146 QE05/40F;6883 QE05/40H;6159 QE08/200 YL1290
P8132F P8133A P8133F P8136 P8138	(XQ1415) (XQ1413) (XQ1415) (XQ1520) (XQ1525)	QV1-150A QV1-150D QV2-250C QY3-65 QY3-125	QEL1/150 QEL1/150H;4X150D QEL2/275;4CX250B QB3/200;4-65A QB3/300;6155
P8142 P8144A P8144F P8145 P8146A	(XQ1070/02) (XQ1073/02) (XQ1075/02) (XQ1080);(XQ1500) (XQ1083);(XQ1503)	QY3-125B QY3-1000A QY4-250 QY4-250B QY4-400	QB3/300GA;4-125A QBL3.5/2000;8177 QB3.5/750;6156 QB3.5/750GA;4-250A QB4/1100;7527
P8146F PE06/40E PL2D21 PL17 PL21	(XQ1085);(XQ1505) PE06/40N PL5727 PL5557 PL2D21;PL5727	QY4-400B QY4-500A QY5-500 QY5-800 QY5-3000A	QB4/1100GA;4-400A QBL4/800;4X500A QB5/1750;6079 QB5/2000;8179 QBL5/3500;6076
PL57 PL5551 PL5551A PL6011 PL6549	PL5559 ZX1051 ZX1051 PL5684/C3JA (QB3/200)	QY5-3000W QZ06-20 R189 R208 R329	QBW5/3500;6075 QC05/35;8042 PM2018B XP1004 XP2230
PL6755 PM55 Q160-1 Q400-1 Q450-1	PL6755A XP1002 (QB3/300);(G155) (QB4/1100);7527 QB4/1100;7527	R375 R464 R550 R562 R580	(XP1003) (56DVP) XP1002 (XP1003) PM2012B;XP2010
QB2/250 V02-6 QQV03-10 V03-20A QV03-15	813 QQE02/5;6939 QQE03/12;6360 QQE03/20;6252 QQE04/20;832A	R592 R593 R594 R632 R654	PM2013B PM2013B XP2030 (XP1116) PM1910



(Numbers in brackets) = nearest equivalent types
Replacement types not listed in this catalogue are non-preferred products;
for detailed information see Data Handbooks

type to be replaced	replacement type(s)	type to be replaced	replacement type(s)
R750	PM1910	RS2021L	YD1001
R762	PM1918	RS2021V	YD1002
R763	(XP1117)	RS2021W	YD1000
R877	XP2015	RS2022CL	(YL1430)
R878	XP2000	RS2032CL	(YL1470)
RD300S	TB3/750	RS3005CJ	YD1152
RG4-3000	DCG6/18	RS3005CL	YD1150A
RK807	QE06/50;807	RS3010CJ	YD1162
RL17	PL5557	RS3010CL	YD1160
RL21	PL2D21;PL5727	RS3026CJ	(YD1178)
RL57	PL5559	RS3026CL	(YD1174)
RL16989/Ne	(PL5545)	RS3040CJ	(YD1187)
RR3-250;1835	DCX4/1000	RS3040CL	(YD1185)
RR3-1250	DCX4/5000	RS3060CJ	(YD1197)
RR3-1250B	DCX4/5000	RS3060CL	(YD1195)
RS612	(TB2.5/400)	RS3150CJ	(YD1202)
RS613	TB2.5/300;5866	RS3300CJ	(YD1212)
RS614	TB2.5/400	RS3500CJ	(YD1342)
RS630	TB4/1250;5868	RY12-100	8020
RS685	QB3/300;6155	S1.5/80dv	PL5545
RS686	QB3.5/750;6156	S15/5d	(DCG12/30)
RS687	QB5/1750;6079	S15/40	(DCG7/100)
RS1002A	QB4/1100;7527	S15/40i	(DCG7/100)
RS1003	(YL1200)	S50XQ	570XQ
RS1006B	TB2.5/400	S4075	XQ1274
RS1007	QB3/300;6155	S4076	XQ1440
RS1009	QQE06/40;5894	S4092	XQ1275
RS1011L	(TBL6/20)	S4093	XQ1442
RS1011W	(TBW6/20)	S4113	XQ1276
RS1012L	YL1181	SBS	ZX1051
RS1012V	YL1182	SR6	ZZ1000
RS1016	TB4/1250;5868	SR44	ZZ1000
RS1019	QQE03/20;6252	SRS360	TB3/750;5867
RS1026	TB3/750;5867	SRS361	TB2.5/300;5866
RS1029	QQE03/12;6360	SRS362	TB4/1250;5868
RS1036	TB4/1500	SRS455	QB3/300;6155
RS1041V	YD1012	SRS456	QB3.5/750;6156
RS1041W	YD1010	SRS457	QB5/1750;6079
RS1046	TB5/2500;7092	SRS4451	QQE06/40;5894
RS1082CL	YL1011	SRS4452	QQE3/20;6252
RS1082CV	YL1012	Ste1000/2.5/15	PL5559
RS1082CW	YL1010	Ste1300/01/05	PL2D21;PL5727
RS1084CJ	YL1570	Ste1500/15/45	(DCG7/100)
RS2002V	YL1091	Ste2500/6/40	PL105
RS2002W	YL1090	T130-1	(TB2.5/400H)



(Numbers in brackets) = nearest equivalent types
Replacement types not listed in this catalogue are non-preferred products;
for detailed information see Data Handbooks

type to be replaced	replacement type(s)	type to be replaced	replacement type(s)
T300-1	(TB4/1250);(5868)	TH6011	PL5557
T350-1	(TB3/750);(5867)	TH6031	PL5559
T380-1	TB3/750;5867	TH6050	(PL5559)
T500-1	TB4/1250;5868	TH6120	(PL105)
T1000-1	(TB5/2500)	TH7020	ZX1051
TA12/20000K	TAW12/20	TH7021	(ZX1051)
TC2/250	TB3/750;5867	TH7023	ZX1051
TC2/3000	TB3/750;5867	TH9303	XX1063
TD03-10G	EC55;5861	TH9473	XX1050
TD2-300A	TBL2/300;7004	TH9475	XX1060/01
TD2-400A	TBL2/400;8119	TH9540	S58XQ
TD2-500A	TBL2/500;8120	TQ2	(PL5527)
TFZ103	(PL5544)	TQ2/3	(PL6755A)
TFZ106B	(PL5545)	TQ2/12	(PL255)
TG57	(PL5559)	TQ6	(DCG12/30)
TH206	(YD1160)	TT10	QB2/250
TH294	YD1337	TT15	(QQE04/20);(832A)
TH302	(YD1300)	TT16	QB3/300GA;4-125A
TH306	YD1300	TT16D	QB3/300;6155
TH308	(YD1333)	TT17	PL5557
TH316	YD1302	TT20	QQE03/20;6252
TH326	YD1304	TX2/3	PL5544
TH328	(YD1333)	TX920	PL5559
TH336	YD1303	TXM100	PL2D21
TH338	YD1336	TY2-125	TB2.5/300;5866
TH350	(YD1174)	TY2-150	TB2.5/400
TH351	(YD1185)	TY2-250	TB2.5/400
TH352	(YD1195)	TY3-250	TB3/750;5867
TH533	(YD1212)	TY4-350	(TB4/1250);(5868)
TH534	(YD1342)	TY3-400	TB3/750;5867
TH537	YL1650	TY4-400C	YD1220
TH553	(YD1202)	TY4-500	TB4/1250;5868
TH554A	(YD1342)	TY4-1250A	TBL6/4000
TH555	YL1740	TY5-500	TB4/1500
TH558	YL1660	TY6-12A	TBL6/20
TH581	YL1640	TY6-12W	TBW6/20
TH583	YL1740	TY6-800	TB5/2500;7092
TH750	(YD1178)	TY6-1250A	TBL6/4000;7753
TH751	(YD1187)	TY6-3000A	YD1230
TH752	(YD1197)	TY6-5000A	TBL6/6000;5924
TH1586	5586	TY6-5000B	YD1120
TH5040	(DCG9/20)	TY6-5000H	TBH6/6000;8610
TH5090	(DCG6/18GB)	TY6-5000W	TBW6/6000;5923
TH5130	(DCG6/18)	TY7-6000A	TBL7/8000;6961
TH5521V/B	DCX4/1000	TY7-6000H	TBL7/8000;8592



(Numbers in brackets) = nearest equivalent types
Replacement types not listed in this catalogue are non-preferred products;
for detailed information see Data Handbooks

type to be replaced	replacement type(s)	type to be replaced	replacement type(s)
TY7-6000W	TBW7/8000;6960	VX550A	DCX4/1000
TY8-15A	TBL6/14;7804	VX7400	DCX4/5000
TY8-15H	TBH16/14;8591	WE17	PL5557
TY8-6000A	TBL7/9000;8269	WL2D21	PL2D21;PL5727
TY8-6000H	TBH7/9000;8593	WL17	PL5557
TY8-6000W	TBW7/9000;8268	WL57	PL5559
TY12-15A	TBL12/40;7800	WL105	PL105
TY12-20A	TBL12/38;7806	WL172	(PL105)
TY12-20W	TBW12/38;7807	WL414	(PL255)
TY12-25A	TBL12/25;6618	WL502A	PL5727
TY12-25W	TBW12/25;6617	WL575A	(DCG6/18GB)
TY12-120W	YD1010	WL624	(PL105)
TY12-250A	TBL12/25;6618	WL631	PL5559
TY74	(PL5557)	WL632A	(PL5559)
TY76	(PL5559)	WL676	(PL105)
TY77	(PL5559)	WL807	PL807
TY78	(PL5559)	WL813	QB2/250;813
TY84	(PL5559)	WL864B	(DCG9/20)
TY85	(PL105)	WL885	(PL2D21);(PL5727)
TY6030	(PL5559)	WL5551	ZX1051
TY6050	(PL5559)	WL5551A	ZX1051
TY6100	(PL5559)	WL5557	PL5557
TY6120	(PL105)	WL5559	PL5559
TY6220	(PL5545)	WL5720	(PL5559)
U-70/08	(ZX1051)	WL22789	(YD1162)
U-70/08P	(ZX1051)	WT210-0001	PL2D21;PL5727
UE967	PL5557	WT210-0015	PL5727
UY807	QE06/50;807	WT210-0056	PL5559
V40	8040	WT210-0062	PL5557
V1103	QQE03/12;6360	WT210-0069	PL5557
VJ5551	ZX1051	WT210-0071	ZX1051
VJ5551A	ZX1051	WT210-0074	PL105
VT39A	(DCG9/20)	WT210-0079	PL105
VT79	(QE06/50);(807)	WT272	PL5557
VT88	(QQE04/20);(823H)	WTT11	PL5559
VT88A	QQE04/20;832A	WTT117	PL5557
VT100	QE06/50;807	WTT118	PL105
VT100A	(QE06/50);(807)	XB767A	(PL2D21);(PL5727)
VT118	QQE04/20;832A	XG1-2500	(PL5559)
VT144	QB2/250	XG2-12	PL255
VT259	(QQE06/40);(5894)	XG2-25	PL260
VT267	8020	XG2-500	(PL5557)
VT286	QQE04/20;832A	XG2-6400	(PL105)
VT510	QQE04/10	XG5-500	PL5557
VTP7386	(PL5545)	XG15-10	DCG7/100B



(Numbers in brackets) = nearest equivalent types
Replacement types not listed in this catalogue are non-preferred products;
for detailed information see Data Handbooks

type to be replaced	replacement type(s)	type to be replaced	replacement type(s)
XG15-12	(DCG7/100B)	XQ1295	XQ1240
XGQ2-6400	PL105	XQ1296	XQ1280
XN3	ZM1080	XQ1297	XQ1280
XQ1001	(XQ1240)	XQ1310	XQ1271
XQ1002	(XQ1240)	XQ1315	XQ1272
XQ1003	(XQ1241)	XQ1330	S7001
XQ1004	(XQ1241)	XQ1331	S7002
XQ1005	XQ1240;XQ1280	XQ1332	S7003;S7004
XQ1006	XQ1240	XQ1450 series	(XQ1440)
XQ1007	XQ1240;XQ1241	XQ1460 series	(XQ1274)
XQ1008	XQ1241	XR11-600	PL5684/C3JA
XQ1030	XQ1031;XQ1032	XR1-1600A	PL5684/C3JA
XQ1040	XQ1240	XR1-3200	PL5544
XQ1041	XQ1240;XQ1280	YD1331	YD1333
XQ1042	XQ1240	ZT1011	PL5684/C3JA
XQ1043	XQ1241	1CP31	DH3-91
XQ1044	XQ1241	2B29	(QQE06/40;(5894)
XQ1050	(XQ1240)	2B32	QQE04/20;832A
XQ1051	(XQ1240);(XQ1280)	2B46	QE05/40;6146
XQ1052	(XQ1240)	2B52	QQE03/20;6252
XQ1053	(XQ1241)	2B94	QQE06/40;5894
XQ1054	(XQ1241)	2C39BA	7289
XQ1060	(XQ1240);(XQ1280)	2D21	PL2D21;PL5727
XQ1061	(XQ1240)	2D21W	PL5727
XQ1062	(XQ1240)	2D21WA	PL5727
XQ1063	(XQ1241)	2G57	PL5557
XQ1064	(XQ1241)	2G402A	DCX4/1000
XQ1065	(XQ1240)	2V/530A	(DCG9/20)
XQ1066	(XQ1285)	2V/530E	(DCG9/20)
XQ1067	(XQ1285)	2V/531E	(DCG9/20)
XQ1180	XQ1280	3-400Z	(YD1130)
XQ1181	XQ1280	3-500Z	(YD1130)
XQ1200	(XQ1400)	3ALP1	DG7-5
XQ1201	(XQ1401)	3AMP1A	DG7-32
XQ1202	(XQ1402)	3BKP31	DH7-11
XQ1205	(XQ1400)	3BYP31	DH7-11
XQ1206	(XQ1401)	3C/402E	(TB4/1250)
XQ1207	(XQ1402)	3C500E	TB4/1500
XQ1220	XQ1230	3C800E	TB5/2500
XQ1250	XQ1400	3CW5000H3	(YD 1162)
XQ1290	XQ1280	3CW10000H3	(YD 1177)
XQ1291	XQ1240	3CW20000H3	(YD 1177)
XQ1292	XQ1240	3CW30000H3	(YD 1187)
XQ1293	XQ1241	3CW40000H3	(YD 1197)
XQ1294	XQ1241	3CW100000H3	(YD 1202)



(Numbers in brackets) = nearest equivalent types
Replacement types not listed in this catalogue are non-preferred products;
for detailed information see Data Handbooks

type to be replaced	replacement type(s)	type to be replaced	replacement type(s)
3CW250000H3	(YD 1342)	4F21	QB3/300;6155
3CX2500H3	(YD 1160)	4G/280K	PL2D21;PL5727
3CX4500H3	(YD 1170)	4H/135M	QEL1/150;4X150A
3CX5000H3	(YD 1175)	4H/136M	QEL1/150;4X150D
3CX10000H3	(YD 1175)	4H/160M	QEL2/275;4X250B
3CX15000H3	(YD 1185)	4J	QQE06/40;5894
3CX20000H3	(YD 1195)	4X150A	QEL1/150
3CX100A5	7289	4X150D	QEL1/150H
3CX10000A3	(YD 1170)	4X250B	QEL2/275
3F65	QB3/200	4X500A	QBL4/800
3J 167E	(YD 1150)	5C/100A	QB2/250;813
3J 187E	(YD 1160)	5D22	QB3.5/750GA;4-250A
3J 188E	TBL 6/6000	5F20RA	QEL2/275
3J 199E	TBL 7/8000	5F22	QB3.5/750GA
3J 222E	(TBL 12/38)	5F23	QB4/1100GA
3L030K	TBL2/300	5T23	TB3/750
3L050K	TBL2/500	5T31	(TB 4/1250)
3L 5T	TBL 7/8000	5T33	(TB 4/1250)
3Q 167E	YD 1151	5T68	TB4/1250;5868
3Q 188E	TBW 6/6000	6AQ4	EC91
3Q 199E	TBW 7/8000	6AS6W	5725
3R 167E	(YD 1152)	6F50R	QBL4/800;4X500A
3R 187E	(YD 1160)	6Q4	EC80
3R 188E	TBH 6/6000	6R4	ECB1
3R 199E	TBH 7/8000	6T40	TB4/1500
3R 225E	(YD 1177)	6T 50	TB5/2500
3S013T-1	TB2.5/300	6T 51	(TB5/2500)
3SO35T-1	TB3/750	6T 61R	(TB4/1250)
3V/390A	PL5599	6T 66R	(TB4/1250)
3V/490A	(PL105)	6T 66R	(TB4/1500)
3V/531E	(DCG12/30)	7T 23	TB3/750
4-65A	QB3/200	7C 23	TBL 6/6000
4-125A	QB3/300GA	7T 25R	(TBL 6/6000)
4-250A	QB3.5/750GA	7T 54RA	(TBL 6/6000)
4-400A	QB4/1100GA;YL1461	7T 69RA	(TBL 7/8000)
4B13	QB2/250	7T 62R	(TB5/2500)
4CX250B	QEL2/275	7T 70	(TBW 7/8000)
4CX250F	QEL2/275H	7T 72R	(YD 1240)
4CX250FG	8621	7T 75R	(YD 1150A)
4CX250R	7580W	8T 40	(TBH 12/38)
4CX350A	YL1340;8321	8T 41	(TBW 12/38)
4CX350F	YL1341;8322	8T 41	(YD 1187)
4D21	QB3/300GA;4-125A	8T 43R	(TBL 12/38)
4F15R	QEL1/150;4X150A	8T 43R	(YD 1185)
4F20R	4X150D	8T 45R	TBL 12/25



(Numbers in brackets) = nearest equivalent types
Replacement types not listed in this catalogue are non-preferred products;
for detailed information see Data Handbooks

type to be replaced	replacement type(s)	type to be replaced	replacement type(s)
8T 60	(YD 1197)	676	(PL105)
8T 60A	(YD 1197)	710	PL5684/C3JA
8T 63R	(YD 1185)	715	PL5557
8T 63RA	(YD 1185)	807	QE06/50
8T 72A	(YD 1187)	813	QB2/250
8T87RB	TBL 12/38	829B	(QQE06/40);(5894)
9T71	(YD 1202)	832	QQE04/40;832A
9T 71A	(YD 1202)	832A	QQE04/20
9T 75	(YD 1342)	833A	(TB4/1250)
9T 94	(YD 1212)	857B	(DCG7/100B)
11E 13	QQE03/12;6360	869	(DCG9/20)
20A2	PL6574	869A	(DCG9/20)
20A3	PL2D21;PL5727	872A	ZY 1000
20PE11	XQ1270	873	(DCG6/6000)
20PE13	XQ1271	884	(PL2D21);(PL5727)
20PE14	XQ1272	885	(PL2D21);(PL5727)
20PE19	XQ1272	967	PL5557
20PE20	XQ1272	1170	(XQ1270);(XQ1271)
21A1	PL6574	1171	(XQ1270);(XQ1271)
25PE14	(XQ1400);(XQ1401)	1172	(XQ1270);(XQ1271)
25PE14	(XQ1402)	1173	(XQ1270);(XQ1271)
43QV26	(XQ1240)	1180	(XQ1270);(XQ1271)
43QV26/P	(XQ1241)	1181	(XQ1270);(XQ1271)
43QV26/R	(XQ1241)	1182	(XQ1270);(XQ1271)
43QV26/T	(XQ1240);(XQ1241)	1183	(XQ1270);(XQ1271)
45BA6	367	1191	(XQ1270);(XQ1271)
52QV26	(XQ1240);(XQ1280)	1192	(XQ1270);(XQ1271)
55QV26	(XQ1241)	1193	(XQ1270);(XQ1271)
57	PL5559	1255FIM	(XQ1031)
63QV26	(XQ1240)	1255NOR	(XQ1031)
63QV26/P	(XQ1241)	1255IND	(XQ1032)
100R	8020	1707	PL5557
105A	PL105	2100A	8020
172	(PL105)	2255FI	(XQ1285)
272	PL5557	2255FIM,NOR	(XQ1240)
287A	PL5557	2255IND,BAE,ENT	(XQ1241)
309	PL5557	2255ROE	(XQ1240);(XQ1280)
356	(YD 1187)	2260	(XQ1285)
500D0058	F23XX	2260FIM,NOR	XQ1240
502A	(PL2D21);(PL5727)	2260IND,BAE,ENT	XQ1241
575A	(DCG6/18GB)	2260ROE	XQ1240;XQ1280
631	PL5559	2800	XX1306
652	ZX1051	3101	(XQ1400)
657	ZX1051	3102	(XQ1401)
673	(DCG6/18)	3103	(XQ1402)



(Numbers in brackets) = nearest equivalent types
Replacement types not listed in this catalogue are non-preferred products;
for detailed information see Data Handbooks

type to be replaced	replacement type(s)	type to be replaced	replacement type(s)
3300	(XQ1070)	5551	ZX1051
3301	(XQ1070)	5551A	ZX1051
3302	(XQ1071)	5557	PL5557
3303	(XQ1071)	5559	PL5559
3350	(XQ1072)	5604	(YD1175)
3861B	QEL1/150;4X150A	5656KS	(XP2000)
3874A	QB2/250;813	5684	PL5684/C3JA
3878A	(DCG9/20)	5727	PL5727
3885A	DCX4/1000	5736	(YD1160)
4078A	(DCG9/20)	5762	TBLG/6000
4078GA	(DCG9/20)	5763	QE03/10;M8096
4078Z	(DCG9/20)	5771	(TBW 12/38,YD1187)
4101	(XQ1440)	5819	(XP2000)
4101X	(XQ1440)	5861	EC55
4102	(XQ1440)	5866	TB2.5/300
4103	(XQ1440)	5867	TB3/750
4260	PL5557	5868	TB4/1250
4261	PL5557	5869	(DCG/6000)
4440	XP1011	5870	DCG12/30
4463	(XP1002)	5894	QQE06/40
4478	(XQ1032)	5895	QQC04/15
4501	(XQ1274)	5918A	(YD1202)
4502	(XQ1274)	5920	E90CC
4503	(XQ1274)	5923	TBW6/6000
4507	(XP1230)	5924	TBL6/6000
4517	(PM2012B);(XP2010)	5960-00-082-4124	XQ1031;XQ1032
4522	XP2041	5960-00-800-0602	(XQ1031)
4523	(XP2000)	5960-00-958-0083	XQ1031;XQ1032
4524	(XP2030)	5960-17-035-0700	XQ1241
4532	(XQ1401)	5960-99-038-0698	XX1063
4532A	(XQ1400)	5960-99-038-0699	XX1063
4532AMR	(XQ1402)	5960-99-038-0717	XX1060/01
4543	XQ1240	5960-99-038-0732	XX1332
4591L,R,G,B	55875L,R,G,B	5960-99-118-1616	XQ1241
4592L,R,G,B	(XQ1020L,R,G,B)	6011	PL5684/C3JA
4593	XQ1023P	6075	QBW5/3500
4594	XQ1025R	6076	QBL5/3500
4803	XX1063	6076A	(QBL5/3500)
4804	S30XQ	6079	QB5/1750
4816	(55876/01)	6083	PE1/100
4817	(XQ1022)	6084	E80F
4844	XX1306	6085	E80CC
5121	DCX4/1000	6086	18042
5541	(YD1170)	6096	E95F
5545	PL5545	6097B	(XP2000)



(Numbers in brackets) = nearest equivalent types
Replacement types not listed in this catalogue are non-preferred products;
for detailed information see Data Handbooks

type to be replaced	replacement type(s)	type to be replaced	replacement type(s)
6097KB	(XP2000)	6697	(YD1195)
6097KL	(XP2000)	6786	-DCG7/100B
6097L	(XP1000)	6800	(YD1178)
6146	QE05/40	6810A	(56AVP)
6146A	QE05/40	6816	YL1101
6146B	YL1370	6850	(QQE03/20)
6155	QB3/300	6883	QE05/40F
6156	QB3.5/750	6883A	QE05/40F
6159	QE05/40H	6883B	YL1371
6159A	QE05/40H	6884	YL1100
6159B	YL1372	6894	(DCG6/18GB)
6189	E82CC	6895	(DCG6/18)
6198	(XQ1031);(XQ1032)	6903	(XP1004)
6199	PM2060B;(XP2008)	6922	E88CC
6227	E80L	6923	EA52
6252	QQE03/20	6926J	(YD1162)
6292	(XP2000)	6939	QQE02/5
6308	(ZZ1000)	6960	TBW7/8000
6326	(XQ1031);(1032)	6960A	(TBW7/8000)
6342A	PM2202B	6961	TBL7/8000
6342/V1	PM2202FLB	6961A	(TBL7/8000)
6346	(ZX1051)	7004	TBL2/300
6360(A)	QQE03/12	7014XX	XX1306
6363	(XP2030)	7034	QEL1/150;4X150A
6364	(54AVP)	7035	QEL1/150H;4X150D
6366	(YD1160)	7038	(XQ1031)
6367	(YD1160)	7062	E180CC
6399	(YD1150)	7064	(XP2000)
6400	(YD1162)	7065	(XP2008)
6414XX	XX1063	7092	TB5/2500
6424	(YD1178)	7102	150CVP
6425F	(YD1175)	7114XX	XX1332
6427	(YD1195)	7119	E182CC
6508	DCG9/20	7136	DCG6/18GB
6511	(ZX1061)	7203	QEL2/275;4CX250B
6524	(QQE03/20);(6252)	7204	QEL2/275H;4CX250F
6617	TBW12/25	7213	YL1280
6618	TBW12/25	7215	(YD1162)
6623	(YD1160)	7226	(XQ1031);(XQ1032)
6681	E83CC	7237	(TBL7/8000);(6961)
6686	E81L	7262A	XQ1031;XQ1032
6688	E180F	7265	(56TVP)
6689	E83F	7290	XQ1280
6693	DCG6/18	7291	(XQ1031)
6696A	(YD1202)	7308	E188CC



(Numbers in brackets) = nearest equivalent types
Replacement types not listed in this catalogue are non-preferred products;
for detailed information see Data Handbooks

type to be replaced	replacement type(s)	type to be replaced	replacement type(s)
7320	E84L	8117A	YL1070
7325	(XQ1031);(XQ1032)	8118	YL1020
7377	QQE04/5	8119	TBL2/400
7378	QE08/200	8120	TBL2/500
7459	(YD1120)	8132	YD1170
7480	(YD1197)	8163	YD1130
7527	YL1460	8165	QB3/200
7527A	YL1461	8177	QBL3.5/2000
7534	E130L	8179	QB5/2000
7560	(YD1342)	8223	E288CC
7580	QEL2/200	8228	ZZ1000
7580W	YL1170	8233	E55L
7643	E80CF	8254	EC1000
7645	(QQE02/5);(6939)	8255	E88C
7696	XP2000	8268	TBW7/9000
7704	QBL5/4000	8269	TBL7/9000
7721	D3a	8270	ZT1000
7722	E280F	8298A	YL1370;6146B
7735	(XQ1032)	8321	YL1340
7735A	(XQ1031);(XQ1032)	8322	YL1341
7735B	(XQ1031)	8386	(YD1202)
7737	E186F	8408	YL1130
7753	TBL6/4000	8429	YL1120
7767	PM1910	8436	EC158
7788	E810F	8438	QB41100GA;YL1461
7800	(TBL12/40)	8438A	YL1461
7804	TBL6/14	8457	YL1210
7805	TBW6/14	8458	YL1240
7806	TBL12/38	8463	YL1000
7807	TBW12/38	8482	ZT1001
7836	QE08/200H	8484	(XQ1031)
7854	YL1060	8485	(XQ1240)
7983	QQC03/14	8505	YL1250
7986	TB2.5/400	8507	(XQ1241)
8008A	ZY1001	8507A	(XQ1240)
8032	QE05/40K	8541	XQ1241
8032A	YL1371	8541A	XQ1240
8042	QC05/35	8552	YL1371
8053	XP2000	8560	YL1320
8054	XP2030	8566	XQ1240
8055	XP2050	8572	(XQ1240);(XQ1241)
8063	PL5684/C3JA	8572A	XQ1240
8078	TB4/1500	8575	XP2230
8104R	(YD1160)	8577	YL1220
8116	YL1071	8579	YL1150



(Numbers in brackets) = nearest equivalent types
Replacement types not listed in this catalogue are non-preferred products;
for detailed information see Data Handbooks

type to be replaced	replacement type(s)	type to be replaced	replacement type(s)
8580	YL1190	8952	YD1175
8585/V1	XX1050	8958	YD1177
8585/V2	XX1050	8987	YL1540
8586	XX1060/01	9012	YL1630
8591	TBH6/14	9014	YL1610
8592	TBH7/8000	9018	YL1631
8593	TBH7/9000	9514B	(XP2230)
8603	YL1310	9514S	(XP2230)
8604	XQ1240	9524B	PM1982
8610	TBH6/6000	9526B	(150UVP)
8625	(XQ1240)	9530B	(54AVP)
8626	XQ1240	9558B	(XP1002)
8637	YL1300	9558F	(XP1002)
8644	XP1117	9558QB	(XP1003)
8654	YL1230	9594B	(XP2020)
8660	4CX1500B	9596B	(XP1002)
8666	YD1170	9597B	(56TVP)
8668	YD1172	9597QB	(56TUVP)
8680	YD1212	9620	XQ1241
8683	YL1360	9635B	(XP2230)
8728	YD1150	9635QB	(56DUVP)
8729	YD1151	9656F	(XP2000)
8730	YD1152	9656KB	XP2000
8731	YD1160	9656KL	XP2000
8732	YD1161	9656KQB	XP1004
8733	YD1162	9656KR	XP2000
8734	YD1173	9656QB	(XP1004)
8735	YD1182	9658F	(XP1002)
8736	YD1192	9684B	(56CVP)
8744	YL1330	9677F1,F2	XQ1240
8752	YD1202	9677M,P	XQ1241
8801	YD1180	9677S1,S2,SC	XQ1240
8812	YL1420	9698B	(XP1117)
8813	YL1430	9708B	(XP2030)
8814	YL1440	9709B	(54AVP)
8844	(XQ1271)	9734B	PM1982
8867	YD1352S	9734QB	(150UVP)
8888	YL1470	9758B	(XP2030)
8913	YD1195	9813B	(XP2020)
8915	YL1520	9814B	(XP2020)
8918	YD1342	9812PA	XQ1241
8929	(XQ1272)	9815B	(XP2020)
8935	YD1185	9817PA	XQ1240
8936	YD1187	9820QB	(XP1230Q)
8937	YD1197	9734B	PM1982



(Numbers in brackets) = nearest equivalent types
Replacement types not listed in this catalogue are non-preferred products;
for detailed information see Data Handbooks

type to be replaced	replacement type(s)
9750KB	XP2000
9757B	(XP2000)
9758KB	(XP2030)
9791KB	(XP2050)
9810KB	56AVP
9811KB	(50AVP)
9812KB	XP1000
9813KB	56DVP
9813KQB	56DUVP
9841B	PM2202;PM2232;(XP2230)
9814KB	(XP2230B)
9816KB	56TVP
9816KQB	56TUVP
9817KB	(56TVP)
9820B	(XP1230)
9821B	PM2312
9824B	(PM1980)
9825B	PM1912
9826	PM1912
9826B	PM1912
9855	XP2040
9856	PM2202
10067B,F,G,SC	(XQ1031)
10667M,S	(XQ1032)
18042	6086
55850F,S,SR	(XQ1031)
55850N,AM	(XQ1032)
55851F,S	XQ1240
55851SR	XQ1240;XQ1280
55851N,AM	XQ1241
55852F,S	(XQ1240)
55852N,AM	(XQ1241)
55875L,R,G,B	55875L,R,G,B
56000	8020



Products approved to the CECC (Cenelec Electronic Components Committee)
harmonized system for electronic components of assessed quality

Transmitting tubes

type	CECC detail specificaton
QB 3/200	CECC 45 003-009
QB 3/300	CECC 45 003-008
QB 3/300GA	CECC 45 003-008
QB 3,5/750	CECC 45 003-007
QB 3,5/750GA	CECC 45 003-007
QB 4/1100	CECC 45 003-006
QB 4/1100GA	CECC 45 003-006
QQV 06-40A	CECC 45 003-005
CV 2797	CECC 45 003-005



Capacitors

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
C7	Variable capacitors
C14	Electrolytic and solid capacitors
C15	Ceramic capacitors
C22	Film capacitors



Data Handbook System	C2	Polypropylene film/foil capacitors:	
Contents	C3	2222 357 5 (KP)	C53
Aluminium electrolytic capacitors:		2222 455-457 (KP)	C54
2222 013	C4	2222 460-462 (KP)	C55
2222 021	C5	Polysterene film/foil capacitors:	
2222 030/031/032/033/041/042/043	C7	2222 424-431 (KS)	C56
2222 035	C11	A.C. and pulse metallized	
2222 036	C13	polypropylene film capacitors:	
2222 037	C14	2222 357 (KP/MKP)	C57
2222 050/052	C16	2222 376 (KP/MMKP)	C58
2222 051/053	C18	Miniature ceramic capacitors:	
2222 085 (surface mounting)	C19	2222 629 (K14000)	C59
2222 108	C20	2222 630 (K2000)	C60
2222 114/115	C21	2222 680/683/679/689 (P100)	C61
2222 116	C22	2222 680/683/679/689 (NP0)	C62
2222 118	C23	2222 680/683/679/689 (N150)	C63
Packing information	C25	2222 680/683/679/689 (N750)	C64
Solid aluminium capacitors:		2222 680/683/679/689 (N1500)	C65
2222 122	C27	Packing information	C66
2222 123	C29	Ceramic multilayer capacitors	
2222 125	C30	(surface mounting)	C67
Packing information	C31	Film dielectric trimmers:	
Interference suppression capacitors:		2222/2238 808 2 (5 mm)	C71
2222 330 (MKT-P)	C32	2222/2238 808 1 (7,5 mm)	C72
Metallized film capacitors:		2222 808 3 (10 mm)	C73
2222 341 (MKT and MKC)	C35	2222 809 050 (125 °C)	C74
2222 344 (MKT and MKC)	C37	2222 809 070 (125 °C)	C75
2222 365 (MKT)	C40	2222 809 080 (125 °C)	C76
2222 366 (MKT)	C42	2222 809 090 (125 °C)	C77
2222 367 (MKT)	C44	CECC approved types	C78
2222 368 (MKT)	C46		
2222 369 (MKT)	C48		
2222 370 (MKT)	C50		
2222 371 (MKT)	C51		



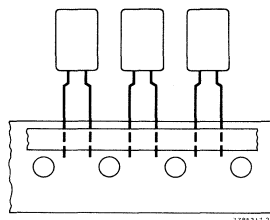
For detailed information on these and other types see Data Handbook C14
 For packing information see page C25

Nominal capacitance range (E3 series)	0,22 to 220 μF
Tolerance on nominal capacitance	-20 to +20%
Rated voltage range, U_R (R5 series)	10 to 25 V
Leakage current after 2 min.	0,002 CU or 0,7 μA
Category temperature range	-55 to +85 $^{\circ}\text{C}$
Endurance test at 85 $^{\circ}\text{C}$	2000 h
Shelf life at 0 V, 85 $^{\circ}\text{C}$	500 h
Basic specification	IEC 384-4, long-life grade
Climatic category:	DIN 41332/DIN 41259
IEC 68	55/085/56
DIN 40040	FPF

case size	nominal dimensions (mm)
11	\varnothing 5 x 11
13	\varnothing 8,2 x 11



style 2



style 4

U_R V	C_{nom} μF	case size	cat. number style 2 in box	cat. number style 4 on reel
10	47	11	2222 013 84479	2222 013 24479
	220	13	2222 013 64221	2222 013 24221
16	100	13	2222 013 65101	2222 013 25101
25	0,22	11	2222 013 86227	2222 013 26227
	0,47	11	2222 013 86477	2222 013 26477
	1,0	11	2222 013 86108	2222 013 26108
	2,2	11	2222 013 86228	2222 013 26228
	4,7	11	2222 013 86478	2222 013 26478
	10	11	2222 013 86109	2222 013 26109
	22	11	2222 013 86229	2222 013 26229
	47	13	2222 013 66479	2222 013 26479
	68	13	2222 013 66689	2222 013 26689



For detailed information on these and other types see Data Handbook C14
 For packing information see page C25

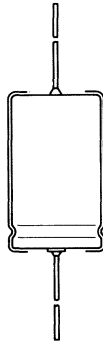
Nominal capacitance range (E3 series)
 Tolerance on nominal capacitance
 Rated voltage range, U_R
 Category temperature range
 Endurance test at 85 °C

Shelf life at 0 V, 85 °C
 Basic specification

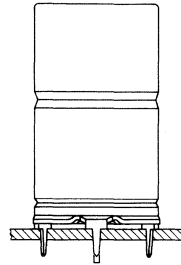
Climatic category

0,22 to 15000 μ F
 \pm 20%
 10 to 63 V
 -55 to +85 °C
 2000 h (case sizes 00 to 05)
 1000 h (case sizes 2 to 7)
 500 h
 IEC 384-4, long-life grade (case sizes 00 to 05)
 IEC 384-4, general purpose grade (case sizes 2 to 7)
 55/085/56

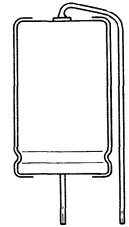
case size	nominal dimensions (mm)
2	\varnothing 4,5 x 10
3	\varnothing 6 x 10
5a	\varnothing 8 x 11
4	\varnothing 6,5 x 18
5	\varnothing 8 x 18
6	\varnothing 10 x 18
7	\varnothing 10 x 25
00	\varnothing 10 x 30
01	\varnothing 12,5 x 30
02	\varnothing 15 x 30
03	\varnothing 18 x 30
04	\varnothing 18 x 40
05	\varnothing 21 x 40



style 1



style 2



style 3

U_R V	C_{nom} μ F	case size	cat. number style 1 (case sizes 2 to 7 on reel)	cat. number style 2	cat. number style 3
10	100	2	2222 021 24101	-	-
	220	3	2222 021 24221	-	-
	470	4	2222 021 24471	-	-
	1000	6	2222 021 24102	-	-
	1500	00	2222 021 14152	-	-
	2200	01	2222 021 14222	-	2222 021 84222
	3300	01	2222 021 14332	-	-
	4700	02	2222 021 14472	-	2222 021 84472
	6800	03	2222 021 14682	-	-
	10000	04	2222 021 14103	2222 021 44103	-
	15000	04	2222 021 14153	-	-
	16	220	5a	2222 021 25221	-
470		5	2222 021 25471	-	-
1000		7	2222 021 90517	-	-
1000		00	2222 021 15102	-	2222 021 85102
1500		01	2222 021 15152	-	-
2200		01	2222 021 15222	-	2222 021 85222
3300		02	2222 021 15332	-	-
4700		03	2222 021 15472	2222 021 45472	-
6800		04	2222 021 15682	-	-
10000		05	2222 021 15103	2222 021 45103	-



For detailed information on these and other types see Data Handbook C14
For packing information see page C21

U_R V	C_{nom} μF	case size	cat. number style 1 (case sizes 2 to 7 on reel)	cat. number style 2	cat. number style 3
25	47	2	2222 021 26479	-	-
	100	3	2222 021 26101	-	-
	220	4	2222 021 26221	-	-
	470	6	2222 021 26471	-	-
	680	00	2222 021 16681	-	-
	1000	01	2222 021 16102	-	2222 021 86102
	1500	01	2222 021 16152	-	-
	2200	02	2222 021 16222	-	2222 021 86222
	3300	03	2222 021 16332	-	-
	4700	04	2222 021 16472	2222 021 46472	-
	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	-	-
330		7	2222 021 27331	-	-
470		00	2222 021 17471	-	-
680		01	2222 021 17681	-	2222 021 87471
1000		01	2222 021 17102	-	2222 021 87102
1500		02	2222 021 17152	-	-
2200		03	2222 021 17222	2222 021 47222	-
3300		04	2222 021 17332	-	-
4700		05	2222 021 17472	2222 021 47472	-
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	7	2222 021 90511	-	-
	220	00	2222 021 18221	-	2222 021 88221
	330	01	2222 021 18331	-	-
	470	01	2222 021 18471	-	2222 021 87471
	680	02	2222 021 18681	-	-
	1000	03	2222 021 18102	2222 021 48102	-
	1500	04	2222 021 18152	-	-
	2200	05	2222 021 18222	2222 021 48222	-

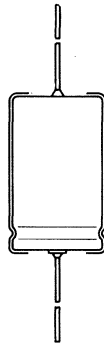


For detailed information on these and other types see Data Handbook C14
 For packing information see page C25

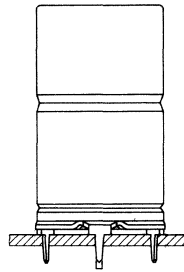
Nominal capacitance range (E6 series)
 Tolerance on nominal capacitance
 Rated voltage range U_R
 Category temperature range
 Endurance test at 85 °C:
 case sizes 2 to 7
 case sizes 00 to 05
 Shelf life at 0 V, 85 °C
 Basic specification
 Climatic category

0,33 to 10000 μ F
 - 10 to + 50%
 6,3 to 385 V
 - 40 to + 85 °C
 2000 h
 5000 h
 500 h
 IEC 384-4, long-life grade
 40/085/56

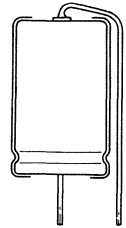
case size	nominal dimensions (mm)
2	∅ 4,5 x 10
3	∅ 6 x 10
5a	∅ 8 x 11
4	∅ 6,5 x 18
5	∅ 8 x 18
6	∅ 10 x 18
7	∅ 10 x 25
00	∅ 10 x 30
01	∅ 12,5 x 30
02	∅ 15 x 30
03	∅ 18 x 30
04	∅ 18 x 40
05	∅ 21 x 40



style 1



style 2



style 3

U_R V	C_{nom} μ F	case size	cat. number style 1 (case sizes 2 to 7 on reel)	cat. number style 1 ammo pack	cat. number style 2	cat. number style 3
6,3	33	2	2222 030 23339	2222 030 33339	-	-
	68	2	2222 030 23689	2222 030 33689	-	-
	150	3	2222 030 23151	2222 030 33151	-	-
	470	5	2222 031 23471	2222 031 33471	-	-
	680	6	2222 031 23681	2222 031 33681	-	-
	1000	7	2222 031 23102	2222 031 33102	-	-
10	22	2	2222 030 24229	2222 030 34229	-	2222 030 84229
	47	2	2222 030 24479	2222 030 34479	-	2222 030 84479
	100	3	2222 030 24101	2222 030 34101	-	2222 030 84101
	220	5a	2222 030 24221	2222 030 34221	-	2222 030 84221
	220	4	2222 031 24221	2222 031 34221	-	2222 031 84221
	330	5	2222 031 24331	2222 031 34331	-	2222 031 84331
	470	6	2222 031 24471	2222 031 34471	-	2222 031 84471
	1000	00	2222 032 14102	-	-	2222 032 84102
	1500	01	2222 032 14152	-	-	-
	2200	02	2222 032 14222	-	-	2222 032 84222
	3300	03	2222 032 14332	-	-	-
	4700	04	2222 033 14472	-	2222 033 44472	-
	6800	05	2222 033 14682	-	-	-
	10000	05	2222 033 14103	-	2222 033 44103	-



For detailed information on these and other types see Data Handbook C14
For packing information see page C25

U_R V	C_{nom} μF	case size	cat. number style 1 (case sizes 2 to 7 on reel)	cat. number style 1 ammo pack	cat. number style 2	cat. number style 3	
16	15	2	2222 030 25159	2222 030 35159	-	2222 030 85159	
	33	2	2222 030 25339	2222 030 35339	-	2222 030 85339	
	68	3	2222 030 25689	2222 030 35689	-	2222 030 85689	
	150	5a	2222 030 25151	2222 030 35151	-	2222 030 85151	
	220	5	2222 031 25221	2222 031 35221	-	2222 031 85221	
	330	6	2222 031 25331	2222 031 35331	-	2222 031 85331	
	470	7	2222 031 25471	2222 031 35471	-	2222 031 85471	
	680	00	2222 032 25681	-	-	-	
	1000	01	2222 032 15102	-	-	2222 032 85102	
	1500	02	2222 032 15152	-	-	-	
	2200	03	2222 032 15222	-	2222 032 45222	-	
	3300	04	2222 033 15332	-	-	-	
	4700	05	2222 033 15472	-	2222 033 45472	-	
	6800	05	2222 033 15682	-	-	-	
	25	10	2	2222 030 26109	2222 030 36109	-	2222 030 86109
		22	2	2222 030 26229	2222 030 36229	-	2222 030 86229
47		3	2222 030 26479	2222 030 36479	-	2222 030 86479	
100		4	2222 031 26101	2222 031 36101	-	2222 031 86101	
220		6	2222 031 26221	2222 031 36221	-	2222 031 86221	
470		00	2222 032 16471	-	-	2222 032 86471	
680		01	2222 032 16681	-	-	-	
1000		02	2222 032 16102	-	-	2222 032 86102	
1500		03	2222 032 16152	-	-	-	
2200		04	2222 033 16222	-	2222 033 46222	-	
3300		05	2222 033 16332	-	-	-	
4700		05	2222 033 16472	-	2222 033 46472	-	
40	6,8	2	2222 030 27688	2222 030 37688	-	2222 030 87688	
	10	2	2222 030 27109	2222 030 37109	-	2222 030 87109	
	15	2	2222 030 27159	2222 030 37159	-	2222 030 87159	
	22	3	2222 030 27229	2222 030 37229	-	2222 030 87229	
	33	3	2222 030 27339	2222 030 37339	-	2222 030 87339	
	47	4	2222 031 27479	2222 031 37479	-	2222 031 87479	
	100	5	2222 031 27101	2222 031 37101	-	2222 031 87101	
	150	6	2222 031 27151	2222 031 37151	-	2222 031 87151	
	220	7	2222 031 27221	2222 031 37221	-	2222 031 87221	
	220	00	2222 032 17221	-	-	2222 032 87221	
	330	01	2222 032 17331	-	-	-	
	470	01	2222 032 17471	-	-	2222 032 87471	
	680	02	2222 032 17681	-	-	-	
	1000	03	2222 032 17102	-	2222 032 47102	-	
	1500	04	2222 033 17152	-	-	-	
	2200	05	2222 033 17222	-	2222 033 47222	-	
	3300	05	2222 033 17332	-	-	-	



2222 030/031/032/033/041/042/043 (cont.)

For detailed information on these and other types see Data Handbook C14
For packing information see page C25

U_R V	C_{nom} μF	case size	cat. number style 1 (case sizes 2 to 7 on reel)	cat. number style 1 ammo pack	cat. number style 2	cat. number style 3
63	0,33	2	2222 030 28337	2222 030 38337	-	2222 030 88337
	0,47	2	2222 030 28477	2222 030 38477	-	2222 030 88477
	0,68	2	2222 030 28687	2222 030 38687	-	2222 030 88687
	1	2	2222 030 28108	2222 030 38108	-	2222 030 88108
	1,5	2	2222 030 28158	2222 030 38158	-	2222 030 88158
	2,2	2	2222 030 28228	2222 030 38228	-	2222 030 88228
	3,3	2	2222 030 28338	2222 030 38338	-	2222 030 88338
	4,7	2	2222 030 28478	2222 030 38478	-	2222 030 88478
	6,8	2	2222 030 28688	2222 030 38688	-	2222 030 88688
	10	3	2222 030 28109	2222 030 38109	-	2222 030 88109
	15	3	2222 030 28159	2222 030 38159	-	2222 030 88159
	22	5a	2222 030 28229	2222 030 38229	-	2222 030 88229
	22	4	2222 031 28229	2222 031 38229	-	2222 031 88229
	47	5	2222 031 28479	2222 031 38479	-	2222 031 88479
	68	6	2222 031 28689	2222 031 38689	-	2222 031 88689
	100	7	2222 031 28101	2222 031 38101	-	2222 031 88101
	150	00	2222 032 18151	-	-	-
	220	01	2222 032 18221	-	-	2222 032 88221
	330	02	2222 032 18331	-	-	-
	470	02	2222 032 18471	-	-	2222 032 88471
680	03	2222 032 18681	-	-	-	
1000	05	2222 033 18102	-	2222 033 48102	-	
1500	05	2222 033 18152	-	-	-	
100	47	7	2222 031 29479	2222 031 39479	-	2222 031 89479
	68	00	2222 032 19689	-	-	-
	100	01	2222 032 19101	-	-	2222 032 89101
	150	02	2222 032 19151	-	-	-
	220	03	2222 032 19221	-	2222 032 49221	-
	330	04	2222 033 19331	-	-	-
	470	05	2222 033 19471	-	2222 033 49471	-
	680	05	2222 033 19681	-	-	-
160	4,7	4	2222 041 21478	2222 041 31478	-	-
	10	5	2222 041 21109	2222 041 31109	-	-
	22	7	2222 041 21229	2222 041 31229	-	-
	22	00	2222 042 11229	-	-	-
	47	02	2222 042 11479	-	-	-
	100	03	2222 042 11101	-	-	-
	220	05	2222 043 11221	-	-	-

C



For detailed information on these and other types see Data Handbook C14

For packing information see page C25

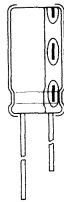
U_R V	C_{nom} μF	case size	cat. number style 1 (case sizes 2 to 7 on reel)	cat. number style 1 ammo pack	cat. number style 2	cat. number style 3
250	2,2	4	2222 041 23228	2222 041 33228	-	-
	4,7	5	2222 041 23478	2222 041 33478	-	-
	10	7	2222 041 23109	2222 041 33109	-	-
	10	00	2222 042 13109	-	-	2222 042 83109
	15	01	2222 042 13159	-	-	-
	22	01	2222 042 13229	-	-	2222 042 83229
	33	02	2222 042 13339	-	-	-
	47	03	2222 042 13479	-	2222 042 43479	-
	68	04	2222 043 13689	-	-	-
	100	05	2222 043 13101	-	2222 043 43101	-
350	4,7	6	2222 041 25478	2222 041 35478	-	-
	10	01	2222 042 15109	-	-	-
	22	02	2222 042 15229	-	-	-
	47	04	2222 043 15479	-	-	-
385	1	4	2222 041 28108	2222 041 38108	-	-
	2,2	5	2222 041 28226	2222 041 38226	-	-
	4,7	7	2222 041 28478	2222 041 38478	-	-
	6,8	00	2222 042 18688	-	-	-
	10	01	2222 042 18109	-	-	2222 042 88109
	15	02	2222 042 18159	-	-	-
	22	03	2222 042 18229	-	2222 042 48229	-
	33	04	2222 043 18339	-	-	-
	47	04	2222 043 18479	-	2222 043 48479	-
	68	05	2222 043 18689	-	-	-



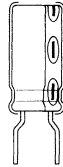
For detailed information on these and other types see Data Handbook C14
 For packing information see page C25

Nominal capacitance range (E3 series)	0,1 to 2200 μ F
Tolerance on nominal capacitance	\pm 20%
Rated voltage range, U_R	6,3 to 63 V
Category temperature range	- 40 to + 85 $^{\circ}$ C
Endurance test at 85 $^{\circ}$ C	1000 h
Shelf life at 0 V, 85 $^{\circ}$ C	500 h
Basic specification	IEC 384-4, gen. purpose grade
Climatic category	40/085/56

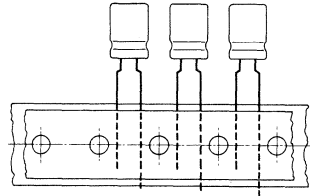
case size	nominal dimensions (mm)
11	\varnothing 5 x 11
12	\varnothing 6 x 11
13	\varnothing 8 x 12
14	\varnothing 10 x 12
15	\varnothing 10 x 16
16	\varnothing 10 x 20
17	\varnothing 12,5 x 20
18	\varnothing 12,5 x 25
19	\varnothing 16 x 25
20	\varnothing 16 x 31



style 1



style 3



style 4



U_R V	C_{nom} μ F	case size	cat. number style 1 in box	cat. number style 3 in box	cat. number style 4 on reel
10	47	11	2222 035 54479	2222 035 64479	2222 035 24479
	100	12	2222 035 54101	2222 035 64101	2222 035 24101
	220	13	2222 035 54221	2222 035 64221	2222 035 24221
	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 C14

For packing information see page C25

U_R V	C_{nom} μF	case size	cat. number style 1 in box	cat. number style 3 in box	cat. number style 4 on reel
25	47	12	2222 035 56479	2222 035 66479	2222 035 26479
	100	13	2222 035 56101	2222 035 66101	2222 035 26101
	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	2222 035 90005	2222 035 90034
	100	14	2222 035 90059	-	-
	1000	19	2222 035 90006	-	-
40	22	12	2222 035 57229	2222 035 67229	2222 035 27229
	220	16	2222 035 57221	-	-
	470	18	2222 035 57471	-	-
50	10	11	2222 035 90008	2222 035 90011	2222 035 90035
	22	12	2222 035 90012	2222 035 90014	2222 035 90036
	47	13	2222 035 90015	2222 035 90033	2222 035 90037
	100	15	2222 035 90019	-	-
	220	17	2222 035 90024	-	-
	1000	20	2222 035 90031	-	-
63	0,1	11	2222 035 58107	2222 035 68107	2222 035 28107
	0,15	11	2222 035 58157	2222 035 68157	2222 035 28157
	0,22	11	2222 035 58227	2222 035 68227	2222 035 28227
	0,47	11	2222 035 58477	2222 035 68477	2222 035 28477
	1,0	11	2222 035 58108	2222 035 68108	2222 035 28108
	2,2	11	2222 035 58228	2222 035 68228	2222 035 28228
	4,7	11	2222 035 58478	2222 035 68478	2222 035 28478
	10	12	2222 035 58109	2222 035 68109	2222 035 28109
	22	13	2222 035 58229	2222 035 68229	2222 035 28229
	47	14	2222 035 58479	-	-
	100	16	2222 035 58101	-	-
	220	18	2222 035 58221	-	-
	470	19	2222 035 58471	-	-

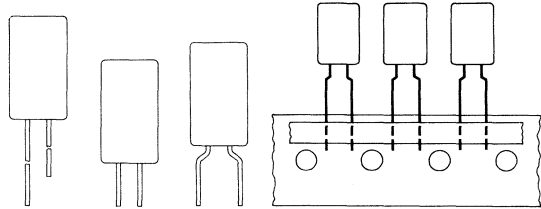


For detailed information on these and other types see Data Handbook C14
 For low-leakage version see 2222 013; for high temperature version see 2222 116
 For packing information see page C25

Nominal capacitance range (E3 series)
 Tolerance on nominal capacitance
 Rated voltage range, U_R (R5 series)
 Category temperature range
 Endurance test at 85 °C
 Shelf life at 0 V, 85 °C
 Basic specification
 Climatic category:
 IEC 68
 DIN 40040

0,22 to 470 μ F
 - 20 to +20%
 6,3 to 63 V
 - 55 to + 85 °C
 2000 h
 500 h
 IEC 384-4, long-life grade DIN41332/DIN 41259
 55/085/56
 FPF

case size	nominal dimensions (mm)
11	\varnothing 5 x 11
13	\varnothing 8,2 x 11



style 1 style 2 style 3 style 4

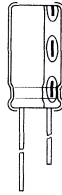
U_R V	C_{nom} μ F	case size	cat. number style 1 in box	cat. number style 2 in box	cat. number style 3 in box	cat. number style 4 on reel
6,3	100	11	2222 036 53101	2222 036 83101	2222 036 63101	2222 036 23101
10	47	11	2222 036 54479	2222 036 84479	2222 036 64479	2222 036 24479
	220	13	2222 036 54221	2222 036 64221	-	2222 036 24221
	470	13	2222 036 54471	2222 036 64471	-	2222 036 24471
16	100	11	2222 036 55101	2222 036 85101	2222 036 65101	2222 036 25101
	220	13	2222 036 55221	2222 036 65221	-	2222 036 25221
25	100	13	2222 036 56101	2222 036 66101	-	2222 036 26101
	220	13	2222 036 56221	2222 036 66221	-	2222 036 26221
35	22	11	2222 036 90001	2222 036 90002	2222 036 90003	2222 036 90016
	47	11	2222 036 90094	2222 036 90095	2222 036 90096	2222 036 90097
50	10	11	2222 036 90004	2222 036 90005	2222 036 90006	2222 036 90017
	47	13	2222 036 90011	2222 036 90012	-	2222 036 90019
	100	13	2222 036 90109	2222 036 90111	-	2222 036 90112
63	0,22	11	2222 036 58227	2222 036 88227	2222 036 68227	2222 036 28227
	0,47	11	2222 036 58477	2222 036 88477	2222 036 68477	2222 036 28477
	1,0	11	2222 036 58108	2222 036 88108	2222 036 68108	2222 036 28108
	2,2	11	2222 036 58228	2222 036 88228	2222 036 68228	2222 036 28228
	4,7	11	2222 036 58478	2222 036 88478	2222 036 68478	2222 036 28478
	10	11	2222 036 58109	2222 036 88109	2222 036 68109	2222 036 28109
	22	11	2222 036 58229	2222 036 88229	2222 036 68229	2222 036 28229
	47	13	2222 036 58479	2222 036 68479	-	2222 036 28479



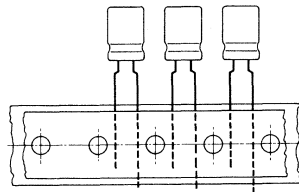
For detailed information on these and other types see Data Handbook C14
 For packing information see page C25

Nominal capacitance range	0,1 to 10000 μF
Tolerance on nominal capacitance	$\pm 20\%$
Rated voltage range, U_R	6,3 to 100 V
Category temperature range	-40 to +85 °C
Endurance test at 85 °C	
$U_R = 6,3$ to 16 V	1000 h
$U_R = 25$ to 100 V	2000 h
Shelf life at 0 V, 85 °C	500 h
Basic specification	IEC 384-4, gen. purpose grade; DIN 41332/DIN 41259
Climatic category	
IEC 68	40/085/56
DIN 40040	GPF

case size	nominal dimensions (mm)
11	$\varnothing 5 \times 11$
12	$\varnothing 6 \times 11$
13	$\varnothing 8 \times 12$
14	$\varnothing 10 \times 12$
15	$\varnothing 10 \times 16$
16	$\varnothing 10 \times 20$
17	$\varnothing 12,5 \times 20$
18	$\varnothing 12,5 \times 25$
19	$\varnothing 16 \times 25$
20	$\varnothing 16 \times 31$



style 1



style 4

U_R V	C_{nom} μF	case size	cat. number style 1 in box	cat. number style 4 on reel
6,3	220	12	-	2222 037 23221
	470	13	-	2222 037 23471
	2200	17	2222 037 53222	-
	10000	20	2222 037 53103	-
10	47	11	-	2222 037 24479
	100	11	-	2222 037 24101
	220	13	-	2222 037 24221
	1000	15	2222 037 54102	-
	4700	19	2222 037 54472	-
16	100	12	-	2222 037 25101
	220	13	-	2222 037 25221
	470	14	2222 037 55471	-
	1000	16	2222 037 55102	-
	2200	18	2222 037 55222	-
	4700	20	2222 037 55472	-



For detailed information on these and other types see Data Handbook C14
For packing information see page C25

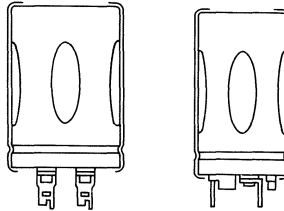
U_R V	C_{nom} μF	case size	cat. number styles 1 in box	cat. number style 4 on reel
25	47	11	-	2222 037 26479
	100	13	-	2222 037 26101
	1000	17	2222 037 56102	-
	2200	19	2222 037 56222	-
35	22	11	-	2222 037 20229
	220	14	2222 037 50221	-
	470	16	2222 037 50471	-
	1000	18	2222 037 50102	-
	2200	20	2222 037 50222	-
40	22	11	-	2222 037 27229
	47	12	-	2222 037 27479
	100	13	-	2222 037 27101
	470	17	2222 037 57472	-
	1000	19	2222 037 57102	-
50	10	11	-	2222 037 21109
	22	12	-	2222 037 21229
	47	13	-	2222 037 21479
	220	15	2222 037 51221	-
	470	17	2222 037 51471	-
	1000	19	2222 037 51102	-
63	0,10	11	-	2222 037 28107
	0,22	11	-	2222 037 28227
	0,47	11	-	2222 037 28477
	1,0	11	-	2222 037 28108
	2,2	11	-	2222 037 28228
	4,7	11	-	2222 037 28478
	10	11	-	2222 037 28109
	22	12	-	2222 037 28229
	47	13	-	2222 037 28479
	100	14	2222 037-58101	-
	220	16	2222 037 58221	-
	470	18	2222 037 58471	-
	1000	20	2222 037 58102	-
100	0,22	11	-	2222 037 29227
	0,47	11	-	2222 037 29477
	1,0	11	-	2222 037 29108
	2,2	11	-	2222 037 29228
	4,7	11	-	2222 037 29478
	10	12	-	2222 037 29109
	22	13	-	2222 037 29229
	47	15	2222 037 59479	-
	100	16	2222 037 59101	-
	220	18	2222 037 59221	-
	470	20	2222 037 59471	-



For detailed information on these and other types see Data Handbook C14
For packing information see page C25

Nominal capacitance range (E6 series)	47 to 47000 µF
Tolerance on nominal capacitance	- 10 to + 30%
Rated voltage range, U _R	10 to 385 V
Category temperature range	- 40 to + 85 °C
Endurance test at 85 °C	2000 h
Shelf life at 0 V, 85 °C	500 h
Basic specification	IEC 384-4, long-life grade
Climatic category	40/085/56

case size	nominal dimensions (mm)
1	∅ 25 x 35
2	∅ 25 x 45
3	∅ 30 x 45
4	∅ 35 x 45
5	∅ 35 x 55
6	∅ 40 x 45
7	∅ 40 x 55
8	∅ 40 x 75
9	∅ 40 x 105



U _R V	C _{nom} µF	case size	cat. number solder tags	cat. number printed-wiring pins
10	4700	1	2222 050 14472	2222 050 54472
	6800	2	2222 050 14682	2222 050 54682
	10000	3	2222 050 14103	2222 050 54103
	15000	4	2222 050 14153	2222 050 54153
	22000	5	-	2222 050 54223
	33000	7	-	2222 050 54333
	47000	8	-	2222 050 54473
	16	3300	1	2222 050 15332
4700		2	2222 050 15472	2222 050 55472
6800		3	2222 050 15682	2222 050 55682
10000		4	2222 050 15103	2222 050 55103
15000		5	2222 050 15153	2222 050 55153
22000		7	2222 050 15223	2222 050 55223
47000		9	2222 050 15473	-
25		2200	1	2222 050 16222
	3300	2	2222 050 16332	2222 050 56332
	4700	3	2222 050 16472	2222 050 56472
	6800	4	2222 050 16682	2222 050 56682
	10000	5	2222 050 16103	2222 050 56103
	15000	7	2222 050 16153	2222 050 56153
	22000	8	2222 050 16223	2222 050 56223
	33000	9	2222 050 16333	-



For detailed information on these and other types see Data Handbook C14
For packing information see page C25

U_R V	C_{nom} μF	case size	cat. number solder tags	cat. number printed-wiring pins
40	1500	1	2222 050 17152	2222 050 57152
	2200	2	2222 050 17222	2222 050 57222
	3300	3	2222 050 17332	2222 050 57332
	4700	4	2222 050 17472	2222 050 57472
	6800	5	2222 050 17682	2222 050 57682
	10000	7	2222 050 17103	2222 050 57103
	15000	8	2222 050 17153	-
	22000	9	-	2222 050 57223
	63	1000	1	2222 050 18102
1500		2	2222 050 18152	2222 050 58152
2200		3	2222 050 18222	2222 050 58222
3300		4	2222 050 18332	2222 050 58332
4700		5	2222 050 18472	2222 050 58472
6800		7	2222 050 18682	2222 050 58682
10000		8	2222 050 18103	2222 050 58103
100		470	1	2222 050 19471
	680	2	2222 050 19681	-
	1000	3	2222 050 19102	2222 050 59102
	1500	4	-	2222 050 59152
	2200	5	2222 050 19222	2222 050 59222
	4700	8	2222 050 19472	-
	250	100	1	-
220		3	-	2222 052 53221
330		4	-	2222 052 53331
470		5	2222 052 13471	2222 052 53471
470		6	-	2222 052 43471
680		7	-	2222 052 53681
1000		8	-	2222 052 53102
385		47	1	2222 052 18479
	100	3	2222 052 18101	2222 052 58101
	150	4	2222 052 18151	2222 052 58151
	220	5	2222 052 18221	2222 052 58221
	470	8	-	2222 052 58471

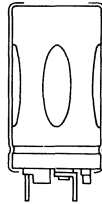


For detailed information on these and other types see Data Handbook C14
For packing information see page C25

Nominal capacitance range (E6 series)
Tolerance on nominal capacitance
Rated voltage range, U_R
Temperature range:
for $U_R < 63$ V
for $U_R > 63$ V
Endurance test at 85 °C
Shelf life at 0 V, 85 °C
Basic specification
Climatic category

68 to 47000 μ F
 $\pm 20\%$
10 to 385 V
-55 to +85 °C
-40 to +85 °C
2000 h
500 h
IEC 384-4, long-life grade
40/085/56

case size	nominal dimensions (mm)
1	∅ 25 x 35
2	∅ 25 x 45
3	∅ 30 x 45
4	∅ 35 x 45
5	∅ 35 x 55
6	∅ 40 x 45
7	∅ 40 x 55
8	∅ 40 x 75
9	∅ 40 x 105



U_R V	C_{nom} μ F	case size	cat. number printed-wiring pins
10	10000 22000	1	2222 051 54103
		3	2222 051 54223
16	6800 10000 15000 22000 47000	1	2222 051 55682
		2	2222 051 55103
		3	2222 051 55153
		4	2222 051 55223
		7	2222 051 55473
25	4700 10000 22000	1	2222 051 56472
		3	2222 051 56103
		5	2222 051 56223
40	4700 10000 15000 22000	2	2222 051 56472
		4	2222 051 56103
		5	2222 051 56153
		7	2222 051 56223
63	2200 4700 6800 10000	1	2222 051 58222
		3	2222 051 58472
		4	2222 051 58682
		5	2222 051 58103

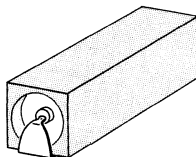
U_R V	C_{nom} μ F	case size	cat. number printed-wiring pins
100	1000 2200 4700 6800 10000	2	2222 051 59102
		4	2222 051 59222
		7	2222 051 59472
		8	2222 051 59682
		9	2222 051 59103
200	220 330 470 680 1000 1500 2200	2	2222 053 52221
		3	2222 053 52331
		4	2222 053 52471
		5	2222 053 52681
		7	2222 053 52102
		8	2222 053 52152
385	68 100 150 220 330 330 470	1	2222 053 58689
		2	2222 053 58101
		3	2222 053 58151
		4	2222 053 58221
		5	2222 053 58331
		6	2222 053 48331
		7	2222 053 58471



For detailed information on these and other types see Data Handbook C14
 For packing information see page C25

Nominal capacitance range (E3 series)	0,1 to 22 μ F
Tolerance on nominal capacitance	- 10 to + 50%
Rated voltage range, U_R (R5 series)	6,3 to 63 V
Category temperature range	- 40 to + 85 °C
Endurance test at 85 °C	1000 h
Shelf life at 0 V, 85 °C	500 h
Resistance to soldering heat	260 °C, 10s; immersion in solder permitted
Basic specifications	IEC 384-4, G.P. grade DIN 41332, type II
Climatic category:	
IEC 68	40/085/56
DIN 40040	GPF

case size	maximum dimensions (mm) length x width x height
1a	9 x 4 x 4
1	12 x 4 x 4

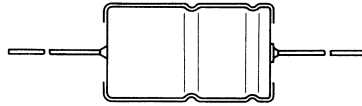


U_R V	C_{nom} μ F	case size	cat. number capacitors in rail	cat. number capacitors on tape
6,3	10	1a	2222 085 33109	2222 085 23109
	22	1	2222 085 33229	2222 085 23229
10	15	1	2222 085 34159	2222 085 24159
16	4,7	1a	2222 085 35478	2222 085 25478
	10	1	2222 085 35109	2222 085 25109
25	6,8	1	2222 085 36688	2222 085 26688
40	2,2	1	2222 085 37228	2222 085 27228
	4,7	1	2222 085 37478	2222 085 27478
63	0,1	1a	2222 085 38107	2222 085 28107
	0,22	1a	2222 085 38227	2222 085 28227
	0,47	1a	2222 085 38477	2222 085 28477
	1	1a	2222 085 38108	2222 085 28108
	2,2	1	2222 085 38228	2222 085 28228
	3,3	1	2222 085 38338	2222 085 28338

For detailed information on these and other types see Data Handbook C14
 For packing information see page C25

Nominal capacitance range (E6 series)	2,2 to 1500 μF
Tolerance on nominal capacitance	- 10 to + 50%
Rated voltage range, U_R	10 to 100 V
Category temperature range	- 40 to + 85 °C
Endurance test at 85 °C	5000 h
Shelf life at 0 V, 85 °C	500 h
Basic specification	IEC 384-4, long-life grade
Climatic category	40/085/56

case size	nominal dimensions (mm)
5	\varnothing 8 x 18
6	\varnothing 10 x 18
00	\varnothing 10 x 30
01	\varnothing 12,5 x 30
02	\varnothing 15 x 30
03	\varnothing 18 x 30



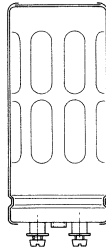
U_R V	C_{nom} μF	case size	cat. number
10	100	5	2222 108 34101
	220	6	2222 108 34221
	330	00	2222 108 34331
	680	01	2222 108 34681
	1000	02	2222 108 34102
	1500	03	2222 108 34152
16	68	5	2222 108 35689
	150	6	2222 108 35151
	220	00	2222 108 35221
	470	01	2222 108 35471
	680	02	2222 108 35681
	1000	03	2222 108 35102
25	33	5	2222 108 36339
	47	5	2222 108 36479
	100	6	2222 108 36101
	150	00	2222 108 36151
	220	01	2222 108 36221
	470	02	2222 108 36471
40	15	5	2222 108 37159
	22	5	2222 108 37229
	33	6	2222 108 37339
	47	6	2222 108 37479
	68	00	2222 108 37689
	100	01	2222 108 37101

U_R V	C_{nom} μF	case size	cat. number
40	150	01	2222 108 37151
	220	02	2222 108 37221
	330	03	2222 108 37331
63	2,2	5	2222 108 38228
	3,3	5	2222 108 38338
	4,7	5	2222 108 38478
	6,8	5	2222 108 38688
	10	5	2222 108 38109
	15	6	2222 108 38159
	22	6	2222 108 38229
	33	00	2222 108 38339
	47	00	2222 108 38479
	68	01	2222 108 38689
	100	02	2222 108 38101
	150	03	2222 108 38151
100	4,7	5	2222 108 39478
	6,8	5	2222 108 39688
	10	5	2222 108 39109
	15	6	2222 108 39159
	22	6	2222 108 39229
	33	00	2222 108 39339
	47	00	2222 108 39479
	68	01	2222 108 39689
	100	02	2222 108 39101
	150	03	2222 108 39151

For detailed information on these and other types see Data Handbook C14
For packing information see page C25

Nominal capacitance range (E6 series)	220 to 68000 μF
Tolerance on nominal capacitance	- 10 to + 30%
Rated voltage range, U_R	10 to 385 V
Category temperature range	- 40 to + 85 $^{\circ}\text{C}$
Endurance test at 85 $^{\circ}\text{C}$	5000 h
Shelf life at 0 V, 85 $^{\circ}\text{C}$	500 h
Basic specification	IEC 384-4, long-life grade
Climatic category	40/085/56

case size	nominal dimensions (mm)
10	\varnothing 35 x 60
11	\varnothing 35 x 80
12a	\varnothing 35 x 105
14	\varnothing 50 x 80
15a	\varnothing 50 x 105
16a	\varnothing 65 x 105
17	\varnothing 75 x 105



U_R V	C_{nom} μF	case size	cat. number
10	15000	10	2222 114 14153
	22000	11	2222 114 14223
	33000	12a	2222 114 14333
	47000	14	2222 114 14473
16	10000	10	2222 114 15103
	15000	11	2222 114 15153
	22000	12a	2222 114 15223
	33000	14	2222 114 15333
	47000	15a	2222 114 15473
	68000	16a	2222 114 15683
25	6800	10	2222 114 16682
	10000	11	2222 114 16103
	15000	12a	2222 114 16153
	22000	14	2222 114 16223
	47000	16a	2222 114 16473
40	4700	10	2222 114 17472
	6800	11	2222 114 17682
	10000	12a	2222 114 17103
	15000	14	2222 114 17153
	22000	15a	2222 114 17223
	33000	16a	2222 114 17333

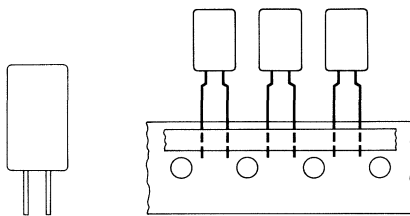
U_R V	C_{nom} μF	case size	cat. number
63	2200	10	2222 114 18222
	3300	10	2222 114 18332
	4700	11	2222 114 18472
	6800	12a	2222 114 18682
	10000	14	2222 114 18103
	15000	15a	2222 114 18153
	22000	16a	2222 114 18223
100	1000	10	2222 114 19102
	1500	10	2222 114 19152
	2200	11	2222 114 19222
	3300	12a	2222 114 19332
	4700	14	2222 114 19472
	10000	16a	2222 114 19103
250	680	12a	2222 115 13681
	1000	14	2222 115 13102
	4700	17	2222 115 13472
385	220	11	2222 115 18221
	470	14	2222 115 18471
	1000	16a	2222 115 18102
	1500	16a	2222 115 18152
	2200	17	2222 115 18222



For detailed information on these and other types see Data Handbook C14
For packing information see page C25

Nominal capacitance range (E3 series)	- 0,47 to 470 μ F
Tolerance on nominal capacitance	- 20 to +20%
Rated voltage range, U_R (R5 series)	6,3 to 50 V
Category temperature range	- 55 to +105 °C
Endurance test	1500 h at 105 °C/ 5000 h at 85 °C
Shelf life at 0 V	1500 h at 105 °C/ 5000 h at 85 °C
Basic specification	IEC 384-4, long-life grade DIN 41332/DIN 41259
Climatic category:	
IEC 68	55/105/56
DIN 40040	PPF

case size	nominal dimensions (mm)
11	\varnothing 5 x 11
13	\varnothing 8,2 x 11



style 2

style 4

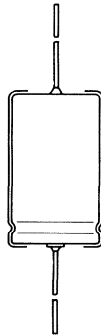
U_R V	C_{nom} μ F	case size	cat. number style 2 in box	cat. number style 4 on reel
6,3	470	13	2222 116 63471	2222 116 23471
10	100	11	2222 116 84101	2222 116 24101
16	220	13	2222 116 65221	2222 116 25221
25	47	11	2222 116 86479	2222 116 26479
35	100	13	2222 116 60101	2222 116 20101
50	0,47	11	2222 116 81477	2222 116 21477
	1	11	2222 116 81108	2222 116 21108
	2,2	11	2222 116 81228	2222 116 21228
	4,7	11	2222 116 81478	2222 116 21478
	10	11	2222 116 81109	2222 116 21109
	22	11	2222 116 81229	2222 116 21229
	47	13	2222 116 61479	2222 116 21479
	68	13	2222 116 61689	2222 116 21689



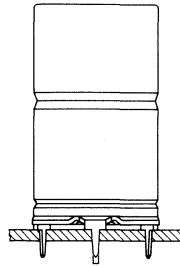
For detailed information on these and other types see Data Handbook C14
For packing information see page C25

Nominal capacitance range (E3 series)	1 to 10000 μF
Tolerance on nominal capacitance	$\pm 20\%$
Rated voltage range, U_R	6,3 to 63 V
Category temperature range	- 55 to + 125 $^{\circ}\text{C}$
Endurance test at 85 $^{\circ}\text{C}$	2000 h
Shelf life at 0 V, 85 $^{\circ}\text{C}$	500 h
Basic specification	IEC 384-4, long-life grade DIN 41257; DIN 41240, type 1
Climatic category	
IEC 68	55/125/56
DIN 40040	FKD

case size	nominal dimensions (mm)
4	$\varnothing 6,5 \times 18$
5	$\varnothing 8 \times 18$
6	$\varnothing 10 \times 18$
7	$\varnothing 10 \times 25$
00	$\varnothing 10 \times 30$
01	$\varnothing 12,5 \times 30$
02	$\varnothing 15 \times 30$
03	$\varnothing 18 \times 30$
04	$\varnothing 18 \times 40$
05	$\varnothing 21 \times 40$



style 1



style 2



U_R V	C_{nom} μF	case size	cat. number style 1	cat. number style 2
6,3	1000	6	2222 118 23102	-
	2200	01	2222 118 13222	-
	4700	02	2222 118 13472	2222 118 43472
	10000	04	2222 118 13103	2222 118 43103
10	220	4	2222 118 24221	-
	470	5	2222 118 24471	-
	1000	7	2222 118 90504	-
	1000	00	2222 118 14102	-
	2200	01	2222 118 14222	-
	4700	03	2222 118 14472	2222 118 44472
	10000	05	2222 118 14103	2222 118 44103



For detailed information on these and other types see Data Handbook C14
For packing information see page C25

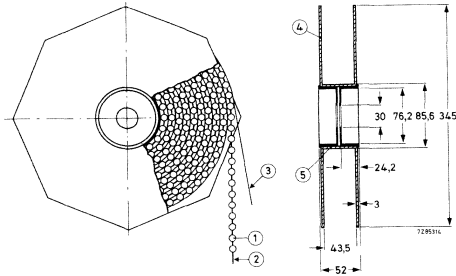
U_R V	C_{nom} μF	case size	cat. number style 1	cat. number style 2
16	220	5	2222 118 25221	-
	470	6	2222 118 25471	-
	1000	01	2222 118 15102	-
	2200	02	2222 118 15222	2222 118 45222
	4700	04	2222 118 15472	2222 118 45472
25	100	4	2222 118 26101	-
	220	6	2222 118 26221	-
	470	7	2222 118 90508	-
	470	00	2222 118 16471	-
	1000	01	2222 118 16102	-
	2200	03	2222 118 16222	2222 118 46222
	4700	05	2222 118 16472	2222 118 46472
40	47	4	2222 118 27479	-
	100	5	2222 118 27101	-
	220	7	2222 118 90511	-
	220	00	2222 118 17221	-
	470	01	2222 118 17471	-
	1000	03	2222 118 17102	2222 118 47102
	2200	05	2222 118 17222	2222 118 47222
63	1,0	4	2222 118 28108	-
	2,2	4	2222 118 28228	-
	4,7	4	2222 118 28476	-
	10	4	2222 118 28109	-
	22	4	2222 118 28229	-
	47	5	2222 118 28479	-
	100	7	2222 118 90513	-
	100	00	2222 118 18101	-
	220	01	2222 118 18221	-
	470	03	2222 118 18471	2222 118 48471
	1000	05	2222 118 18102	2222 118 48102



ALUMINIUM ELECTROLYTIC CAPACITORS (cont.)

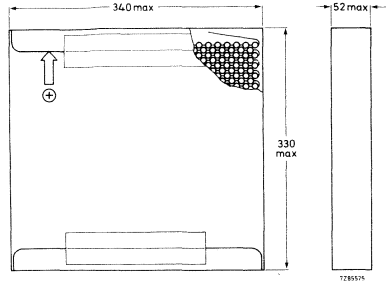
Packing information

For detailed information see Data Handbook C14



Capacitors on tape on reel

- 1 = capacitor
- 2 = tape
- 3 = paper
- 4 = flange
- 5 = cylinder



Capacitors on tape in ammunition pack

Types 2222 013, 2222 035, 2222 036, 2222 037, 2222 116

case size	number of capacitors				
	style 1 per box	style 2 per box	style 3 per box	style 4 per reel	style 5 per ammunition pack
11	1000	1000	1000	1000	2000
12	1000	1000	1000	1000	2000
13	1000	1000	1000	500	1000
14	1000	1000			
15	500	500			
16	500	500			
17	200	200			
18	200	200			
19	200	200			
20	200	200			

Types 2222 050, 2222 051, 2222 052, 2222 053

Packed in boxes of 100.

Type 2222 085

Packed in rails
(100 per rail, 5000 per inner box, 20000 outer box)
and in 16 mm blister tape of 2000 on reel.

Type 2222 114

case size	number of capacitors per box
10, 11, 12a, 14, 15a	50
16a, 17	25

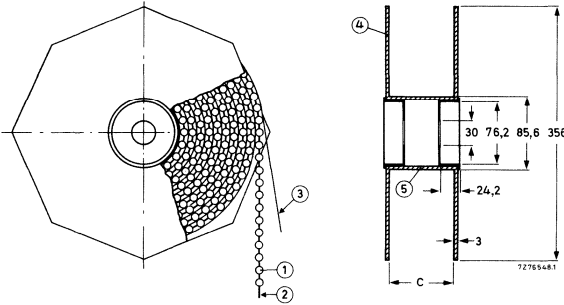


Electronic
components
and materials

ALUMINIUM ELECTROLYTIC CAPACITORS (cont.)

Packing information (cont.)

For detailed information see Data Handbook C14



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

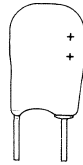
Types 2222 021, 2222 030, 2222 031, 2222 032, 2222 033, 2222 041, 2222 042, 2222 043, 2222 108, 2222 118

case size	number of capacitors				
	style 1 on bandoliers per reel	style 1 on bandoliers per box	style 1 per box	style 2 per box	style 3 per box
1	4000	1000	-	-	1000
2	3000	1000	-	-	1000
3	1000	1000	-	-	1000
5a	500	500	-	-	1000
4	1000	1000	-	-	1000
5	500	500	-	-	1000
6	500	500	-	-	1000
7	500	500	-	-	500
00	-	-	200	-	200
01	-	-	200	-	200
02	-	-	200	200	200
03	-	-	200	200	-
04	-	-	100	100	-
05	-	-	100	100	-

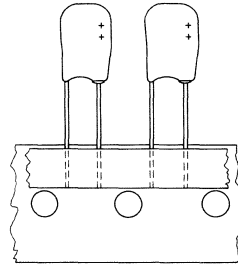
For detailed information on these and other types see Data Handbook C14
 For packing information see page C31

Nominal capacitance range (E3 series)	0,1 to 68 μF
Tolerance on nominal capacitance	$\pm 20\%$
Rated voltage range, U_R	6,3 to 40 V
Category temperature range	- 55 to + 125 °C
Endurance test at 85 °C	5000 h
at 125 °C	2000 h
Basic specification	IEC 384-4, long-life grade
Climatic category	55/125/56

case size	nominal dimensions (mm)
1	$\varnothing 12,5 \times 8 \times 3,5$
2	$\varnothing 12,5 \times 8 \times 4,5$
3	$\varnothing 12,5 \times 8 \times 5$
4	$\varnothing 12,5 \times 8 \times 6$



style 1



style 3



U_R V	C_{nom} μF	case size	cat. number style 1	cat. number style 3
6,3	10	1	2222 122 53109	2222 122 23109
	15	2	2222 122 53159	2222 122 23159
	22	2	2222 122 53229	2222 122 23229
	33	3	2222 122 53339	2222 122 23339
	47	4	2222 122 53479	2222 122 23479
	68	4	2222 122 53689	2222 122 23689
10	4,7	1	2222 122 54478	2222 122 24478
	6,8	1	2222 122 54688	2222 122 24688
	10	2	2222 122 54109	2222 122 24109
	15	2	2222 122 54159	2222 122 24159
	22	3	2222 122 54229	2222 122 24229
	33	4	2222 122 54339	2222 122 24339
16	2,2	1	2222 122 55228	2222 122 25228
	3,3	1	2222 122 55338	2222 122 25338
	4,7	2	2222 122 55478	2222 122 25478
	6,8	2	2222 122 55688	2222 122 25688
	10	3	2222 122 55109	2222 122 25109
	15	4	2222 122 55159	2222 122 25159



For detailed information on these and other types see Data Handbook C14
For packing information see page C31

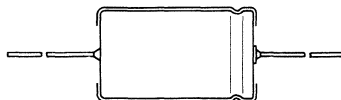
U_R V	C_{nom} μF	case size	cat. number style 1	cat. number style 3
25	0,68	1	2222 122 56687	2222 122 26687
	1,0	1	2222 122 56108	2222 122 26108
	1,5	1	2222 122 56158	2222 122 26158
	2,2	2	2222 122 56228	2222 122 26228
	3,3	2	2222 122 56338	2222 122 26338
	4,7	3	2222 122 56478	2222 122 26478
	6,8	4	2222 122 56688	2222 122 26688
35	1,0	2	2222 122 50108	2222 122 20108
40	0,1	1	2222 122 57107	2222 122 27107
	0,15	1	2222 122 57157	2222 122 27157
	0,22	1	2222 122 57227	2222 122 27227
	0,33	1	2222 122 57337	2222 122 27337
	0,47	2	2222 122 57477	2222 122 27477
	0,68	2	2222 122 57687	2222 122 27687
	1,0	3	2222 122 57108	2222 122 27108
	1,5	4	2222 122 57158	2222 122 27158
	2,2	4	2222 122 57228	2222 122 27228



For detailed information on these and other types see Data Handbook C14
For packing information see page C31

Nominal capacitance range (E3 series)	2,2 to 1500 μF
Tolerance on nominal capacitance	$\pm 20\%$
Rated voltage range, U_R	6,3 to 40 V
Category temperature range	-55 to +125 $^{\circ}\text{C}$
Endurance test at 125 $^{\circ}\text{C}$	2000 h
Basic specification	IEC 384-4, long-life grade
Climatic category	55/125/56

case size	nominal dimensions (mm)
1	\varnothing 6,5 x 15
2a	\varnothing 7,5 x 20
4	\varnothing 9 x 23
5	\varnothing 10 x 31,5
6	\varnothing 12,5 x 31,5



U_R V	C_{nom} μF	case size	cat. number
6,3	47	1	2222 123 13479
	68	1	2222 123 13689
	150	2a	2222 123 13151
	330	4	2222 123 13331
	680	5	2222 123 13681
	1000	6	2222 123 13102
	1500	6	2222 123 13152
10	33	1	2222 123 14339
	47	1	2222 123 14479
	68	2a	2222 123 14689
	100	2a	2222 123 14101
	150	4	2222 123 14151
	220	4	2222 123 14221
	330	5	2222 123 14331
	470	5	2222 123 14471
	680	6	2222 123 14681
1000	6	2222 123 14102	
16	10	1	2222 123 15109
	15	1	2222 123 15159
	22	1	2222 123 15229
	33	2a	2222 123 15339
	47	2a	2222 123 15479
	68	2a	2222 123 15689
	100	4	2222 123 15101
	150	4	2222 123 15151
	220	5	2222 123 15221
	330	5	2222 123 15331
	470	6	2222 123 15471
	680	6	2222 123 15681

U_R V	C_{nom} μF	case size	cat. number
25	10	1	2222 123 16109
	15	1	2222 123 16159
	22	2a	2222 123 16229
	33	2a	2222 123 16339
	68	4	2222 123 16689
	100	4	2222 123 16101
	150	5	2222 123 16151
	220	6	2222 123 16221
35	2,2	1	2222 123 97228
	4,7	1	2222 123 97478
	10	2a	2222 123 97109
	22	2a	2222 123 97229
	47	4	2222 123 97479
	100	6	2222 123 97101
40	2,2	1	2222 123 17228
	3,3	1	2222 123 17338
	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

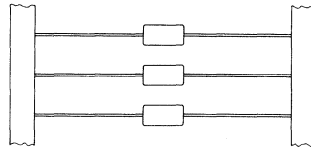


For detailed information on these and other types see Data Handbook C14
 For packing information see page C31

Nominal capacitance range (E3 series)
 Tolerance on nominal capacitance
 Rated voltage range, U_R
 Category temperature range
 Endurance test at 125 °C
 Basic specification
 Climatic category

0,22 to 47 μ F
 \pm 20%
 6,3 to 35 V
 - 55 to + 125 °C
 2000 h
 IEC 384-4, long-life grade
 55/125/56

case size	nominal dimensions (mm)
A2	\varnothing 5 x 10
A3	\varnothing 6 x 10
B	\varnothing 5 x 15



U_R V	C_{nom} μ F	case size	cat. number
6,3	22	A2	2222 125 23229
	47	B	2222 125 23479
10	15	A2	2222 125 24159
	33	B	2222 125 24339
16	10	A2	2222 125 25109
	22	B	2222 125 25229
20	15	B	2222 125 90515
25	4,7	A2	2222 125 26476
	10	B	2222 125 26109
35	0,22	A2	2222 125 20227
	0,47	A2	2222 125 20477
	1,0	A2	2222 125 20108
	2,2	A2	2222 125 20228
	4,7	B	2222 125 20478
	6,8	B	2222 125 20688



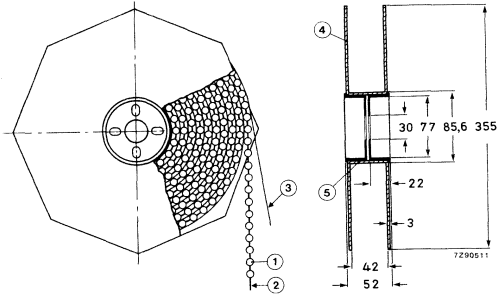
For detailed information see Data Handbook C14

Type 2222 122

Style 3 capacitors on tape on reel

- 1 = capacitor
- 2 = tape
- 3 = paper
- 4 = flange
- 5 = cylinder

case size	number of capacitors	
	style 1 per box	style 3 per reel
1,2	1000	2000
3,4	1000	1000



Type 2222 123

Number of capacitors (on bandoliers) per box is 100

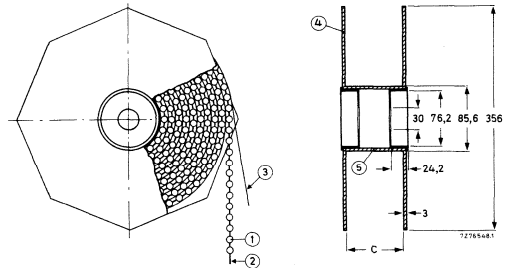


Type 2222 125

Number of capacitors (on bandoliers) per reel is 1000

Capacitors on bandoliers on reel; C = 83,5 mm; overall width is 94,5 mm

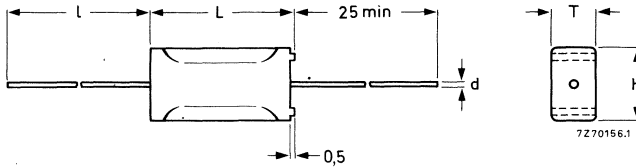
- 1 = capacitor
- 2 = tape
- 3 = paper
- 4 = flange
- 5 = cylinder



For detailed information on these and other types see Data Handbook C22

Rated capacitance range (E6 series):

type with axial leads	0,01 to 0,47 μF
type with radial leads	0,01 to 1 μF
Tolerance on rated capacitance	$\pm 20\%$
Rated voltage U_R (a.c.), 50/60 Hz	250 V
Temperature range	- 40 to + 85 °C
Climatic category	40/085/21
Related specification	IEC 384-14
Approvals	VDE0565, part 1 and SEMKO
Class	X2
Dielectric	metallized PETP film and paper film



250 V-range

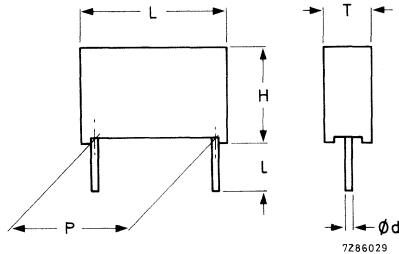
rated cap. μF	T_{max} mm	H_{max} mm	L_{max} mm	d mm	l_{min} mm	catalogue number
0,010	6,6	10,4	18,1	0,8	40	2222 330 00103
0,015	6,6	10,4	18,1	0,8	40	2222 330 00153
0,022	6,6	10,4	18,1	0,8	40	2222 330 00223
0,033	6,6	10,4	18,1	0,8	40	2222 330 00333
0,047	6,6	10,4	18,1	0,8	40	2222 330 00473
0,068	7,9	11,5	18,1	0,8	40	2222 330 00683
0,10	7,8	11,6	23,5	0,8	40	2222 330 00104
0,15	9,2	12,9	23,5	0,8	40	2222 330 00154
0,22	10,8	14,5	23,5	0,8	40	2222 330 00224
0,33	12,5	19,5	31	1	50	2222 330 00334
0,47	12,5	19,5	31	1	50	2222 330 00474



INTERFERENCE SUPPRESSION CAPACITORS (cont.) General data

2222 330 (MKT-P) cont.

For detailed information on these and other types see Data Handbook C22



250 V-range

rated cap. μF	T_{max} mm	H_{max} mm	L_{max} mm	P mm	d mm	l = 5 mm cat.number	l = 25 mm cat.number
0,010	5	11	17,5	15	0,8	2222 330 40103	2222 330 44103
0,015	5	11	17,5	15	0,8	2222 330 40153	2222 330 44153
0,022	5	11	17,5	15	0,8	2222 330 40223	2222 330 44223
0,033	5	11	17,5	15	0,8	2222 330 40333	2222 330 44333
0,047	6	11,5	17,5	15	0,8	2222 330 40473	2222 330 44473
0,068	7	13	17,5	15	0,8	2222 330 40683	2222 330 44683
0,10	8,5	14,5	17,5	15	0,8	2222 330 40104	2222 330 44104
0,15	7	16	26	22,5	0,8	2222 330 40154	2222 330 44154
0,22	8,5	17,5	26	22,5	0,8	2222 330 40224	2222 330 44224
0,33	10	18,5	26	22,5	0,8	2222 330 40334	2222 330 44334
0,47	13	22,5	31	27,5	0,8	2222 330 40474	2222 330 44474
0,68	15	25	31	27,5	0,8	2222 330 40684	2222 330 44684
1,0	18	28	31	27,5	1	2222 330 40105	2222 330 44105

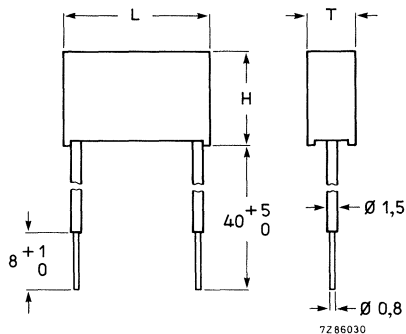


Electronic
components
and materials

INTERFERENCE SUPPRESSION CAPACITORS (cont.) General data

2222 330 (MKT-P) cont.

For detailed information on these and other types see Data Handbook C22



250 V-range

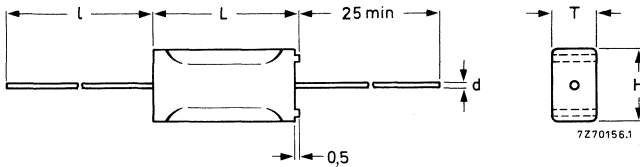
rated cap. μF	T_{max} mm	H_{max} mm	L_{max} mm	catalogue number
0,010	6	12	17,5	2222 330 84103
0,015	6	12	17,5	2222 330 84153
0,022	6	12	17,5	2222 330 84223
0,033	6	12	17,5	2222 330 84333
0,047	6	12	17,5	2222 330 84473
0,068	7	13	17,5	2222 330 84683
0,10	8,5	14,5	17,5	2222 330 84104



Electronic components and materials

For detailed information on these and other types see Data Handbook C22

Rated capacitance range (E12 series)	0,01 to 6,8 μ F
Tolerance on rated capacitors	\pm 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
Temperature range	- 55 to + 100 °C
Climatic category, IEC 68	55/100/56
Related specification	IEC 384-2 and IEC 384-6
Dielectric	polyester (MKT) and polycarbonate (MKC)



100 V-range

rated cap. μ F	T_{max} mm	H_{max} mm	L_{max} mm	d mm	l_{min} mm	MKC cat. number	MKT cat. number
0,10	5,1	8,8	14,6	0,8	40	2222 341 29104	2222 341 27104
0,15	5,1	8,8	14,6	0,8	40	2222 341 29154	2222 341 27154
0,22	7,0	10,6	14,6	0,8	40	2222 341 29224	2222 341 27224
0,33	6,6	10,4	18,1	0,8	40	2222 341 29334	2222 341 27334
0,47	7,9	11,5	18,1	0,8	40	2222 341 29474	2222 341 27474
0,68	7,8	11,6	23,5	0,8	40	2222 341 29684	2222 341 27684
1,0	9,2	12,9	23,5	0,8	40	2222 341 29105	2222 341 27105
1,5	10,8	14,5	23,5	0,8	40	2222 341 29155	2222 341 27155
2,2	10,7	14,6	31	1	50	2222 341 29225	2222 341 27225
3,3	12,5	19,5	31	1	50	2222 341 29335	2222 341 27335
4,7	12,5	19,5	31	1	50	2222 341 29475	2222 341 27475
6,8	15,4	22,1	31	1	50	2222 341 29685	2222 341 27685

For detailed information on these and other types see Data Handbook C22

250 V-range

rated cap. μF	T _{max} mm	H _{max} mm	L _{max} mm	d mm	l _{min} mm	MKC cat. number	MKT cat. number
0,047	5,1	8,8	14,6	0,8	40	2222 341 49473	2222 341 89473
0,068	5,1	8,8	14,6	0,8	40	2222 341 49683	2222 341 89683
0,10	5,7	9,5	14,6	0,8	40	2222 341 49104	2222 341 89104
0,15	6,6	10,4	18,1	0,8	40	2222 341 49154	2222 341 89154
0,22	7,9	11,5	18,1	0,8	40	2222 341 49224	2222 341 89224
0,33	7,8	11,6	23,5	0,8	40	2222 341 49334	2222 341 89334
0,47	9,2	12,9	23,5	0,8	40	2222 341 49474	2222 341 89474
0,68	10,8	14,5	23,5	0,8	40	2222 341 49684	2222 341 89684
1,0	10,7	14,6	31	1	50	2222 341 49105	2222 341 89105
1,5	12,5	19,5	31	1	50	2222 341 49155	2222 341 89155
2,2	15,4	22,1	31	1	50	2222 341 49225	2222 341 89225

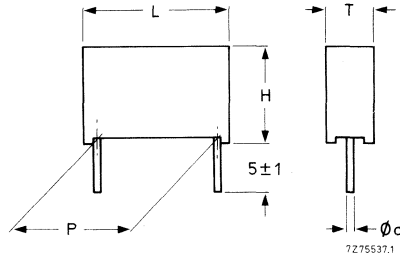
400 V-range

rated cap. μF	T _{max} mm	H _{max} mm	L _{max} mm	d mm	l _{min} mm	MKC cat. number	MKT cat. number
0,010	5,1	8,8	14,6	0,8	40	2222 341 59103	2222 341 55103
0,015	5,1	8,8	14,6	0,8	40	2222 341 59153	2222 341 55153
0,022	5,1	8,8	14,6	0,8	40	2222 341 59223	2222 341 55223
0,033	5,7	9,5	14,6	0,8	40	2222 341 59333	2222 341 55333
0,047	7,0	10,6	14,6	0,8	40	2222 341 59473	2222 341 55473
0,068	6,6	10,4	18,1	0,8	40	2222 341 59683	2222 341 55683
0,10	7,9	11,5	18,1	0,8	40	2222 341 59104	2222 341 55104
0,15	7,8	11,6	23,5	0,8	40	2222 341 59154	2222 341 55154
0,22	9,2	12,9	23,5	0,8	40	2222 341 59224	2222 341 55224
0,33	10,8	14,5	23,5	0,8	40	2222 341 59334	2222 341 55334
0,47	10,7	14,6	31	1	50	2222 341 59474	2222 341 55474
0,68	12,5	19,5	31	1	50	2222 341 59684	2222 341 55684
1,0	15,4	22,1	31	1	50	2222 341 59105	2222 341 55105



For detailed information on these and other types see Data Handbook C22

Rated capacitance (E12 series)	0,01 to 10 μF
Tolerance on rated capacitance	$\pm 10\%$
Rated voltage U_R (d.c.)	63 V, 100 V, 250 V, 400 V
Rated voltage U_R , 50/60 Hz	40 V, 63 V, 160 V, 220 V
Temperature range	- 55 to + 100 °C
Climatic category, IEC 68	55/100/56
Related specification	IEC 384-2 and IEC 384-6
Dielectric	polyester (MKT) polycarbonate (MKC)



63 V-range

rated cap. μF	T_{max} mm	H_{max} mm	L_{max} mm	P mm	d mm	MKT cat. number
0,22	4,5	10	13	10	0,8	2222 344 15224
0,33	5	11	13	10	0,8	2222 344 15334
0,47	6	12	13	10	0,8	2222 344 15474
0,68	6	11,5	17,5	15	0,8	2222 344 15684
1,0	7	13	17,5	15	0,8	2222 344 15105
1,5	8,5	14,5	17,5	15	0,8	2222 344 15155
2,2	6,5	15,5	26	22,5	0,8	2222 344 15225
3,3	8,5	17,5	26	22,5	0,8	2222 344 15335
4,7	9,5	19	26	22,5	0,8	2222 344 15475
6,8	11	20	31	27,5	0,8	2222 344 15685
10	13,5	22,5	31	27,5	0,8	2222 344 15106



For detailed information on these and other types see Data Handbook C22

100 V-range

rated cap. μF	T_{max} mm	H_{max} mm	L_{max} mm	P mm	d mm	MKC cat. number	MKT cat. number
0,10	4,5	10	13	10	0,8	2222 344 21104	2222 344 25104
0,15	4,5	10	13	10	0,8	2222 344 21154	2222 344 25154
0,22	5	11	13	10	0,8	2222 344 21224	2222 344 25224
0,33	5	11	17,5	15	0,8	2222 344 21334	2222 344 25334
0,47	6	11,5	17,5	15	0,8	2222 344 21474	2222 344 25474
0,68	7	13	17,5	15	0,8	2222 344 21684	2222 344 25684
1,0	8,5	14,5	17,5	15	0,8	2222 344 21105	2222 344 25105
1,5	6,5	15,5	26	22,5	0,8	2222 344 21155	2222 344 25155
2,2	8,5	17,5	26	22,5	0,8	2222 344 21225	2222 344 25225
3,3	9,5	19	26	22,5	0,8	2222 344 21335	2222 344 25335
4,7	11	20	31	22,5	0,8	2222 344 21475	2222 344 25475
6,8	13	22,5	31	27,5	0,8	2222 344 21685	2222 344 25685
10	15	25	31	27,5	1,0		2222 344 25106

250 V-range

rated cap. μF	T_{max} mm	H_{max} mm	L_{max} mm	P mm	d mm	MKC cat. number	MKT cat. number
0,047	4,5	10	13	10	0,8	2222 344 45473	2222 344 41473
0,068	4,5	10	13	10	0,8	2222 344 45683	2222 344 41683
0,10	5	11	17,5	15	0,8	2222 344 45104	2222 344 41104
0,15	6	11,5	17,5	15	0,8	2222 344 45154	2222 344 41154
0,22	7	13	17,5	15	0,8	2222 344 45224	2222 344 41224
0,33	8,5	14,5	17,5	15	0,8	2222 344 45334	2222 344 41334
0,47	6,5	15,5	26	22,5	0,8	2222 344 45474	2222 344 41474
0,68	7,5	16,5	26	22,5	0,8	2222 344 45684	2222 344 41684
1,0	9,5	19	26	22,5	0,8	2222 344 45105	2222 344 41105
1,5	11	20	31	27,5	0,8	2222 344 45155	2222 344 41155
2,2	13	22,5	31	27,5	0,8	2222 344 45225	2222 344 41225



For detailed information on these and other types see Data Handbook C22

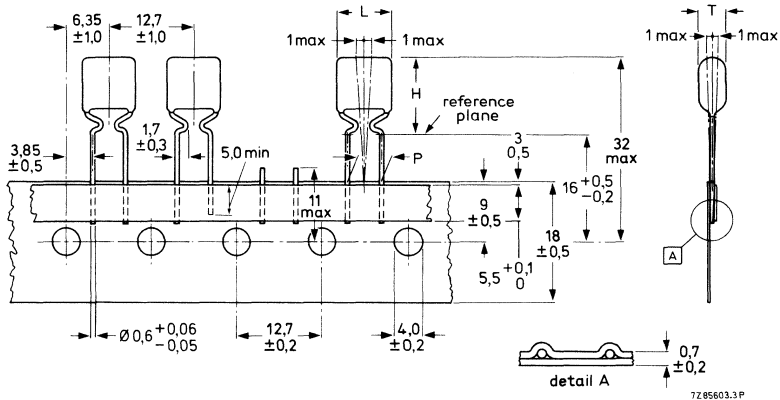
**400 V-range**

rated cap. μF	T_{max} mm	H_{max} mm	L_{max} mm	P mm	d mm	MKC cat. number	MKT cat. number
0,010	4,5	10	13	10	0,8	2222 344 51103	2222 344 55103
0,015	4,5	10	13	10	0,8	2222 344 51153	2222 344 55153
0,022	4,5	10	13	10	0,8	2222 344 51223	2222 344 55223
0,033	4,5	10	13	10	0,8	2222 344 51333	2222 344 55333
0,047	5	11	17,5	15	0,8	2222 344 51473	2222 344 55473
0,068	6	11,5	17,5	15	0,8	2222 344 51683	2222 344 55683
0,10	7	13	17,5	15	0,8	2222 344 51104	2222 344 55104
0,15	8,5	14,5	17,5	15	0,8	2222 344 51154	2222 344 55154
0,22	6,5	15,5	26	22,5	0,8	2222 344 51224	2222 344 55224
0,33	7,5	16,5	26	22,5	0,8	2222 344 51334	2222 344 55334
0,47	9,5	19	26	22,5	0,8	2222 344 51474	2222 344 55474
0,68	11	20	31	27,5	0,8	2222 344 51684	2222 344 55684
1,0	13	22,5	31	27,5	0,8	2222 344 51105	2222 344 55105



For detailed information on these and other types see Data Handbook C22

Rated capacitance range (E12 series)	0,0047 to 1,0 μ F
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
Temperature range	-40 to +100 °C
Climatic category, IEC 68	40/100/56
Related specification	IEC 384-2, general-purpose grade
Dielectric	polyester (MKT)



63 V-range; 2e (3e) version

rated cap. μ F	T_{max} mm	H_{max} mm	L_{max} mm	cat. number on reel	cat. number ammo pack
0,15	4	13,5	10	2222 365 11154	2222 365 15154
0,22	4	13,5	10	2222 365 11224	2222 365 15224
0,33	5	14,5	10,5	2222 365 11334	2222 365 15334
0,47	5,5	15,0	10,5	2222 365 11474	2222 365 15474
0,68	5,5	15,0	10,5	2222 365 11684	2222 365 15684
1,0	5,5	15,0	10,5	2222 365 11105	2222 365 15105

63 V-range; 2e version

0,047	3,5	12,5	7,5	2222 365 71473	2222 365 75473
0,068	3,5	12,5	7,5	2222 365 71683	2222 365 75683
0,10	3,5	12,5	7,5	2222 365 71104	2222 365 75104
0,15	4,0	13,0	7,5	2222 365 71154	2222 365 75154
0,22	4,5	13,5	7,5	2222 365 71224	2222 365 75224
0,33	5,5	14,5	7,5	2222 365 71334	2222 365 75334
0,47	5,5	15,0	7,5	2222 365 71474	2222 365 75474
0,68	5,5	14,5	7,5	2222 365 71684	2222 365 75684
1,0	6,5	15,5	7,5	2222 365 71105	2222 365 75105



For detailed information on these and other types see Data Handbook C22

100 V-range; 2e (3e) version

rated cap. μF	T_{max} mm	H_{max} mm	L_{max} mm	cat. number on reel	cat. number ammo-pack
0,047	4	13,5	10	2222 365 21473	2222 365 25473
0,068	4	13,5	10	2222 365 21683	2222 365 25683
0,10	4	13,5	10	2222 365 21104	2222 365 25104
0,15	5	14,5	10,5	2222 365 21154	2222 365 25154
0,22	5,5	15,0	10,5	2222 365 21224	2222 365 25224
0,33	6,0	15,5	10,5	2222 365 21334	2222 365 25334
0,47	6,0	15,5	10,5	2222 365 21474	2222 365 25474

**100 V-range; 2e version**

0,010	3,5	12,5	7,5	2222 365 81103	2222 365 85103
0,015	3,5	12,5	7,5	2222 365 81153	2222 365 85153
0,022	3,5	12,5	7,5	2222 365 81223	2222 365 85223
0,033	3,5	12,5	7,5	2222 365 81333	2222 365 85333
0,047	4,0	13,0	7,5	2222 365 81473	2222 365 85473
0,068	4,5	13,5	7,5	2222 365 81683	2222 365 85683
0,10	4,5	13,5	7,5	2222 365 81104	2222 365 85104

250 V-range; 2e (3e) version

0,022	4	13,5	10	2222 365 41223	2222 365 45223
0,033	4	13,5	10	2222 365 41333	2222 365 45333
0,047	4,5	14	10,5	2222 365 41474	2222 365 45474

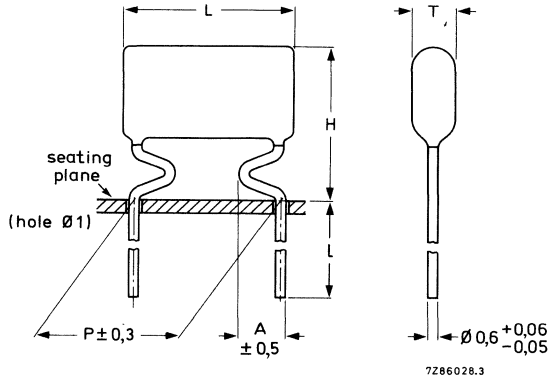
400 V-range; 2e (3e) version

0,0047	4	13,5	10	2222 365 51472	2222 365 55472
0,0068	4	13,5	10	2222 365 51682	2222 365 55682
0,010	4	13,5	10	2222 365 51103	2222 365 55103
0,015	4	13,5	10	2222 365 51153	2222 365 55153



For detailed information on these and other types see Data Handbook C22

Rated capacitance range (E12 series)	0,0047 to 1,0 μ F
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
Temperature range	-40 to +100 °C
Climatic category IEC 68	40/100/56
Related specification	IEC 384-2
Dielectric	polyester (MKT)



63 V-range; pitch (P) = 7,62 mm

rated cap. μ F	T_{\max} mm	H_{\max} mm	L_{\max} mm	A mm	l = 5 mm cat. number	l = 17 mm cat. number
0,15	4	11	10	2,0	2222 366 15154	2222 366 11154
0,22	4	11	10	2,0	2222 366 15224	2222 366 11224
0,33	5	12	10,5	2,0	2222 366 15334	2222 366 11334
0,47	5,5	12,5	10,5	2,0	2222 366 15474	2222 366 11474
0,68	5,5	14,5	10,5	2,0	2222 366 15684	2222 366 11684
1,0	5,5	14,5	10,5	2,0	2222 366 15105	2222 366 11105

63 V-range; pitch (P) = 5,08 mm

0,047	3,5	12,5	7,5	1,7	2222 366 75473	2222 366 71473
0,068	3,5	12,5	7,5	1,7	2222 366 75683	2222 366 71683
0,10	3,5	12,5	7,5	1,7	2222 366 75104	2222 366 71104
0,15	4,0	13,0	7,5	1,7	2222 366 75154	2222 366 71154
0,22	4,5	13,5	7,5	1,7	2222 366 75224	2222 366 71224
0,33	5,5	14,5	7,5	1,7	2222 366 75334	2222 366 71334
0,47	5,5	15,0	7,5	1,7	2222 366 75474	2222 366 71474
0,68	5,5	14,5	7,5	1,7	2222 366 75684	2222 366 71684
1,0	6,5	15,5	7,5	1,7	2222 366 75105	2222 366 71105



For detailed information on these and other types see Data Handbook C22

100 V-range; pitch (P) = 7,62 mm

rated cap. μF	T _{max} mm	H _{max} mm	L _{max} mm	A mm	l = 5 mm cat. number	l = 17 mm cat. number
0,047	4	11	10	2,0	2222 366 25473	2222 366 21473
0,068	4	11	10	2,0	2222 366 25683	2222 366 21683
0,10	4	11	10	2,0	2222 366 25104	2222 366 21104
0,15	5	12	10,5	2,0	2222 366 25104	2222 366 21154
0,22	5,5	12,5	10,5	2,0	2222 366 25154	2222 366 21224
0,33	6,0	15,0	10,5	2,0	2222 366 25334	2222 366 21334
0,47	6,0	15,0	10,5	2,0	2222 366 25474	2222 366 21474

100 V-range; pitch (P) = 5,08 mm

0,010	3,5	12,5	7,5	1,7	2222 366 85103	2222 366 81103
0,015	3,5	12,5	7,5	1,7	2222 366 85153	2222 366 81153
0,022	3,5	12,5	7,5	1,7	2222 366 85223	2222 366 81223
0,033	3,5	12,5	7,5	1,7	2222 366 85333	2222 366 81333
0,047	4,0	13,0	7,5	1,7	2222 366 85473	2222 366 81473
0,068	4,5	13,5	7,5	1,7	2222 366 85683	2222 366 81683
0,10	4,5	13,5	7,5	1,7	2222 366 85104	2222 366 81104

250 V-range; pitch (P) = 7,62 mm

0,022	4	11	10	2,0	2222 366 45223	2222 366 41223
0,033	4	11	10	2,0	2222 366 45333	2222 366 41333

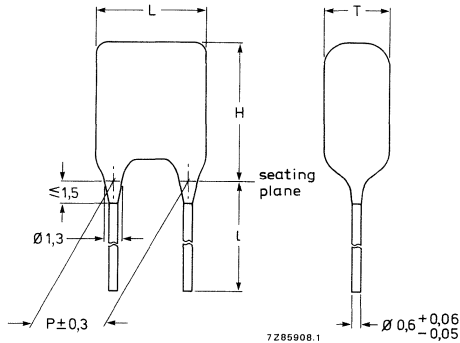
400 V-range; pitch (P) = 7,62 mm

0,0047	4	11	10	2,0	2222 366 55472	2222 366 51472
0,0068	4	11	10	2,0	2222 366 55682	2222 366 51682
0,010	4	11	10	2,0	2222 366 55103	2222 366 51103
0,015	4	11	10	2,0	2222 366 55153	2222 366 51153



For detailed information on these and other types see Data Handbook C22

Rated capacitance range (E12 series)	0,0047 to 1,0 μ F
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
Temperature range	-40 to +100 °C
Climatic category IEC 68	40/100/56
Related specification	IEC 384-2
Dielectric	polyester (MKT)



63 V-range; pitch (P) = 7,62 mm

rated cap. μ F	T_{max} mm	H_{max} mm	L_{max} mm	$l = 5$ mm cat. number	$l = 22$ mm cat. number
0,15	4	8	10	2222 367 15154	2222 367 11154
0,22	4	8	10	2222 367 15224	2222 367 11224
0,33	5	9	10,5	2222 367 15334	2222 367 11334
0,47	5,5	9,5	10,5	2222 367 15474	2222 367 11474
0,68	5,5	10	10,5	2222 367 15684	2222 367 11684
1,0	5,5	10	10,5	2222 367 15105	2222 367 11105

63 V-range; pitch (P) = 5,08 mm

0,047	3,5	7,5	7,5	2222 367 75473	2222 367 71473
0,068	3,5	7,5	7,5	2222 367 75683	2222 367 71683
0,10	3,5	7,5	7,5	2222 367 75104	2222 367 71104
0,15	4,0	8,0	7,5	2222 367 75154	2222 367 71154
0,22	4,5	8,5	7,5	2222 367 75224	2222 367 71224
0,33	5,5	9,5	7,5	2222 367 75334	2222 367 71334
0,47	5,5	11,0	7,5	2222 367 75474	2222 367 71474
0,68	5,5	10,5	7,5	2222 367 75684	2222 367 71684
1,0	6,5	11,5	7,5	2222 367 75105	2222 367 71105



For detailed information on these and other types see Data Handbook C22

100 V-range; pitch (P) = 7,62 mm

rated cap. μF	T _{max} mm	H _{max} mm	L _{max} mm	l = 5 mm cat. number	l = 22 mm cat. number
0,047	4	8	10	2222 367 25473	2222 367 21473
0,068	4	8	10	2222 367 25683	2222 367 21683
0,10	4	8,5	10	2222 367 25104	2222 367 21104
0,15	5	9,5	10,5	2222 367 25154	2222 367 21154
0,22	5,5	10	10,5	2222 367 25224	2222 367 21224
0,33	6,0	10	10,5	2222 367 25334	2222 367 21334
0,47	6,0	10,5	10,5	2222 367 25474	2222 367 21474

100 V-range; pitch (P) = 5,08 mm

0,010	3,5	7,5	7,5	2222 367 85103	2222 367 81103
0,015	3,5	7,5	7,5	2222 367 85153	2222 367 81153
0,022	3,5	7,5	7,5	2222 367 85223	2222 367 81223
0,033	3,5	7,5	7,5	2222 367 85333	2222 367 81333
0,047	4,0	8,0	7,5	2222 367 85473	2222 367 81473
0,068	4,5	8,5	7,5	2222 367 85683	2222 367 81683
0,10	4,5	8,5	7,5	2222 367 85104	2222 367 81104

250 V-range; pitch (P) = 7,62 mm

0,022	4	8,5	10	2222 367 45223	2222 367 41223
0,033	4	8,5	10	2222 367 45333	2222 367 41333

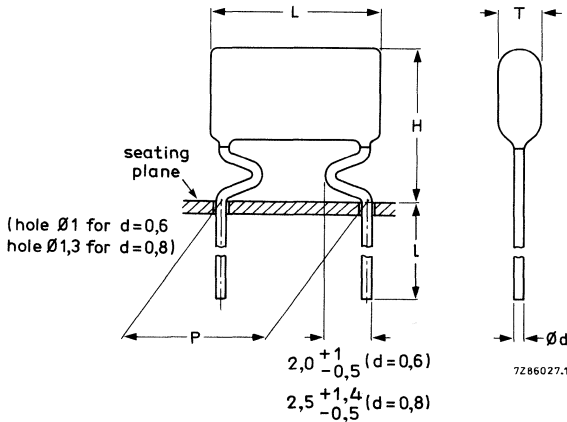
400 V-range; pitch (P) = 7,62 mm

0,0047	4	8,5	10	2222 367 55472	2222 367 51472
0,0068	4	8,5	10	2222 367 55682	2222 367 51682
0,010	4	8,5	10	2222 367 55103	2222 367 51103
0,015	4	8,5	10	2222 367 55153	2222 367 51153



For detailed information on these and other types see Data Handbook C22

Rated capacitance range (E 12 series)	0,001 to 6,8 μ F
Tolerance on rated capacitance	\pm 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
Temperature range	- 40 to + 100 °C
Climatic category IEC 68	40/100/56
Related specification	IEC 384-2, long-life grade
Dielectric	polyester (MKT)



100 V-range

rated cap. μ F	T_{max} mm	H_{max} mm	L_{max} mm	P mm	d mm	l = 5 mm cat. number	l = 17 mm cat. number
0,068	4	12	12,5	10	0,6	2222 368 25683	2222 368 21683
0,10	4	12	12,5	10	0,6	2222 368 25104	2222 368 21104
0,15	4	12	12,5	10	0,6	2222 368 25154	2222 368 21154
0,22	5	13	12,5	10	0,6	2222 368 25224	2222 368 21224
0,33	5	14	17,5	15	0,8	2222 368 25334	2222 368 21334
0,47	5,5	14,5	17,5	15	0,8	2222 368 25474	2222 368 21474
0,68	6,0	15,0	17,5	15	0,8	2222 368 25684	2222 368 21684
1,0	7,5	16,5	17,5	15	0,8	2222 368 25105	2222 368 21105
1,5	6,0	18,0	26	23	0,8	2222 368 25155	2222 368 21155
2,2	6,5	18,5	26	23	0,8	2222 368 25225	2222 368 21225
3,3	8,5	20,5	26	23	0,8	2222 368 25335	2222 368 21335
4,7	9,5	21,5	30	28	0,8	2222 368 25475	2222 368 21475
6,8	11,5	23,5	30	28	0,8	2222 368 25685	2222 368 21685



For detailed information on these and other types see Data Handbook C22

250 V-range

rated cap. μF	T_{max} mm	H_{max} mm	L_{max} mm	P mm	d mm	l = 5 mm cat. number	l = 17 mm cat. number
0,033	4	12	12,5	10	0,6	2222 368 45333	2222 368 41333
0,047	4	12	12,5	10	0,6	2222 368 45473	2222 368 41473
0,068	4,5	12,5	12,5	10	0,6	2222 368 45683	2222 368 41683
0,1	5	13	12,5	10	0,6	2222 368 45104	2222 368 41104

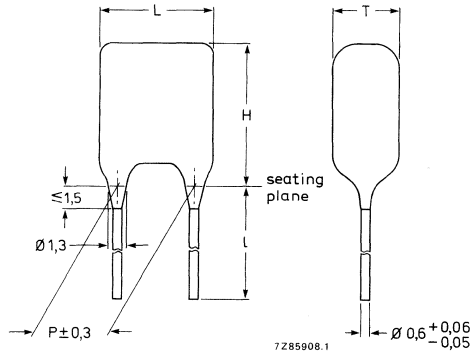
400 V-range

rated cap. μF	T_{max} mm	H_{max} mm	L_{max} mm	P mm	d mm	l = 5 mm cat. number	l = 17 mm cat. number
0,0010	4	12	12,5	10	0,6	2222 368 55102	2222 368 51102
0,0015	4	12	12,5	10	0,6	2222 368 55152	2222 368 51152
0,0022	4	12	12,5	10	0,6	2222 368 55222	2222 368 51222
0,0033	4	12	12,5	10	0,6	2222 368 55332	2222 368 51332
0,0047	4	12	12,5	10	0,6	2222 368 55472	2222 368 51472
0,0068	4	12	12,5	10	0,6	2222 368 55682	2222 368 51682
0,010	4	12	12,5	10	0,6	2222 368 55103	2222 368 51103
0,015	4	12	12,5	10	0,6	2222 368 55153	2222 368 51153
0,022	4	12	12,5	10	0,6	2222 368 55223	2222 368 51223
0,033	4,5	12,5	12,5	10	0,6	2222 368 55333	2222 368 51333



For detailed information on these and other types see Data Handbook C22

Rated capacitance range (E 12 series)	0,001 to 0,22 μ F
Tolerance on rated capacitance	$\pm 10\%$
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
Temperature range	- 40 to + 100 °C
Climatic category IEC 68	40/100/56
Related specification	IEC 384-2, long-life grade
Dielectric	polyester (MKT)



100 V-range

rated cap. μ F	T_{max} mm	H_{max} mm	L_{max} mm	P mm	l = 5 mm cat. number	l = 22 mm cat. number
0,068	4	9,5	12,5	10	2222 369 25683	2222 369 21683
0,10	4	9,5	12,5	10	2222 369 25104	2222 369 21104
0,15	4	9,5	12,5	10	2222 369 25154	2222 369 21154
0,22	5	10,5	12,5	10	2222 369 25224	2222 369 21224

For detailed information on these and other types see Data Handbook C22

250 V-range

rated cap. μF	T_{max} mm	H_{max} mm	L_{max} mm	P mm	l = 5 mm cat. number	l = 22 mm cat. number
0,033	4	9,5	12,5	10	2222 369 45333	2222 369 41333
0,047	4	9,5	12,5	10	2222 369 45473	2222 369 41473
0,068	4,5	10	12,5	10	2222 369 45683	2222 369 41683
0,1	5	10,5	12,5	10	2222 369 45104	2222 369 41104

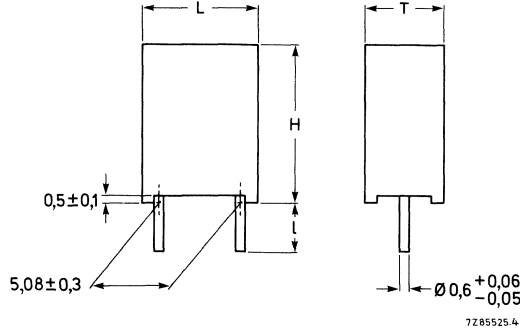
400 V-range

rated cap. μF	T_{max} mm	H_{max} mm	L_{max} mm	P mm	l = 5 mm cat. number	l = 22 mm cat. number
0,0010	4	9,5	12,5	10	2222 369 55102	2222 369 51102
0,0015	4	9,5	12,5	10	2222 369 55152	2222 369 51152
0,0022	4	9,5	12,5	10	2222 369 55222	2222 369 51222
0,0033	4	9,5	12,5	10	2222 369 55332	2222 369 51332
0,0047	4	9,5	12,5	10	2222 369 55472	2222 369 51472
0,0068	4	9,5	12,5	10	2222 369 55682	2222 369 51682
0,010	4	9,5	12,5	10	2222 369 55103	2222 369 51103
0,015	4	9,5	12,5	10	2222 369 55153	2222 369 51153
0,022	4	9,5	12,5	10	2222 369 55223	2222 369 51223
0,033	4,5	10	12,5	10	2222 369 55333	2222 369 51333



For details on these and other types see Data Handbook C22

Rated capacitance range (E 12 series) 0,0047 to 1,0 μ F
 Tolerance on rated capacitance $\pm 10\%$
 Rated voltage U_R (d.c.) 63 V, 100 V
 Rated voltage U_R (a.c.), 50/60 Hz 40 V, 63 V
 Temperature range -55 to $+100$ $^{\circ}$ C
 Climatic category IEC 68 (CECC 30400) 55/100/56
 Related specification IEC 384-2, long-life grade
 Dielectric polyester (MKT)



63 V-range

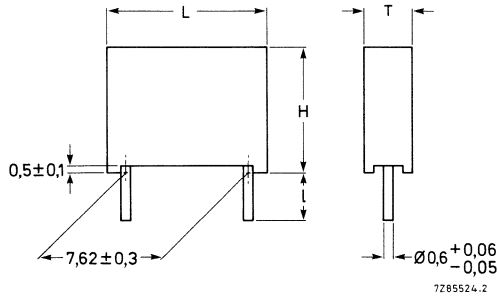
rated cap. μ F	T_{max} mm	H_{max} mm	L_{max} mm	$l = 4$ mm cat. number	$l = 25$ mm cat. number	cat. number on reel	cat. number ammo pack
0,047	2,5	6	7,2	2222 370 11473	2222 370 15473	2222 370 18473	2222 370 78473
0,068	2,5	6	7,2	2222 370 11683	2222 370 15683	2222 370 18683	2222 370 78683
0,10	2,5	6	7,2	2222 370 11104	2222 370 15104	2222 370 18104	2222 370 78104
0,15	3,5	8	7,2	2222 370 11154	2222 370 15154	2222 370 18154	2222 370 78154
0,22	3,5	8	7,2	2222 370 11224	2222 370 15224	2222 370 18224	2222 370 78224
0,33	4,5	9	7,2	2222 370 11334	2222 370 15334	2222 370 18334	2222 370 78334
0,47	5	10	7,2	2222 370 11474	2222 370 15474	2222 370 18474	2222 370 78474
0,68	6	11	7,2	2222 370 11684	2222 370 15684	2222 370 18684	2222 370 78684
1,0	6	11	7,2	2222 370 11105	2222 370 15105	2222 370 18105	2222 370 78105

100 V-range

0,0047	2,5	6	7,2	2222 370 21472	2222 370 25472	2222 370 28472	2222 370 88472
0,0068	2,5	6	7,2	2222 370 21682	2222 370 25682	2222 370 28682	2222 370 88682
0,010	2,5	6	7,2	2222 370 21103	2222 370 25103	2222 370 28103	2222 370 88103
0,015	2,5	6	7,2	2222 370 21153	2222 370 25153	2222 370 28153	2222 370 88153
0,022	2,5	6	7,2	2222 370 21223	2222 370 25223	2222 370 28223	2222 370 88223
0,033	2,5	6	7,2	2222 370 21333	2222 370 25333	2222 370 28333	2222 370 88333
0,047	3,5	8	7,2	2222 370 21473	2222 370 25473	2222 370 28473	2222 370 88473
0,068	3,5	8	7,2	2222 370 21683	2222 370 25683	2222 370 28683	2222 370 88683
0,10	3,5	8	7,2	2222 370 21104	2222 370 25104	2222 370 28104	2222 370 88104

For detailed information on these and other types see Data Handbook C33

Rated capacitance range (E12-series)	0,0047 to 1 μ F
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
Temperature range	- 55 to + 100 °C
Climatic category IEC 68 (CECC 30400)	55/100/56
Related specification	IEC 384-2, long-life grade
Dielectric	polyester (MKT)



63 V-range

rated cap. μ	T_{max} mm	H_{max} mm	L_{max} mm	$l = 4$ mm cat. number	$l = 25$ mm cat. number	cat. number on reel
0,068	2,5	6	10	2222 371 11683	2222 371 15683	2222 371 18683
0,10	2,5	6	10	2222 371 11104	2222 371 15104	2222 371 18104
0,15	3	8	10	2222 371 11154	2222 371 15154	2222 371 18154
0,22	3	8	10	2222 371 11224	2222 371 15224	2222 371 18224
0,33	4	9	10	2222 371 11334	2222 371 15334	2222 371 18334
0,47	4	9	10	2222 371 11474	2222 371 15474	2222 371 18474
0,68	5	10,5	10	2222 371 11684	2222 371 15684	2222 371 18684
1,0	6	11,5	10	2222 371 11105	2222 371 15105	2222 371 18105



For detailed information on these and other types see Data Handbook C33

100 V-range

rated cap. μF	T_{max} mm	H_{max} mm	L_{max} mm	$l = 4 \text{ mm}$ cat. number	$l = 25 \text{ mm}$ cat. number	cat. number on reel
0,022	2,5	6	10	2222 371 21223	2222 371 25223	2222 371 28223
0,033	2,5	6	10	2222 371 21333	2222 371 25333	2222 371 28333
0,047	2,5	6	10	2222 371 21473	2222 371 25473	2222 371 28473
0,068	3	8	10	2222 371 21683	2222 371 25683	2222 371 28683
0,10	3	8	10	2222 371 21104	2222 371 25104	2222 371 28104
0,15	4	9	10	2222 371 21154	2222 371 25154	2222 371 28154
0,22	4	9	10	2222 371 21224	2222 371 25224	2222 371 28224
0,33	5	10,5	10	2222 371 21334	2222 371 25334	2222 371 28334
0,47	6	11,5	10	2222 371 21474	2222 371 25474	2222 371 28474

250 V-range

0,010	2,5	6	10	2222 371 41103	2222 371 45103	2222 371 48103
0,015	2,5	6	10	2222 371 41153	2222 371 45153	2222 371 48153
0,022	3	8	10	2222 371 41223	2222 371 45223	2222 371 48223
0,033	3	8	10	2222 371 41333	2222 371 45333	2222 371 48333

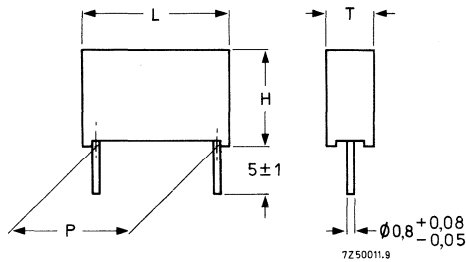
400 V-range

0,0047	2,5	6	10	2222 371 51472	2222 371 55472	2222 371 58472
0,0068	2,5	6	10	2222 371 51682	2222 371 55682	2222 371 58682
0,010	3	8	10	2222 371 51103	2222 371 55103	2222 371 58103



For detailed information on these and other types see Data Handbook C22

Rated capacitance range (E12 series)	47 to 680 nF
Tolerance on rated capacitance	± 10%
Rated voltage U_R (d.c.)	250 V
Rated voltage U_R (a.c.), 50/60 Hz	160 V
Temperature range	- 40 to +85 °C
Related specification	IEC 384-13
Climatic category, IEC 68	40/085/56
Dielectric	polypropylene (KP)

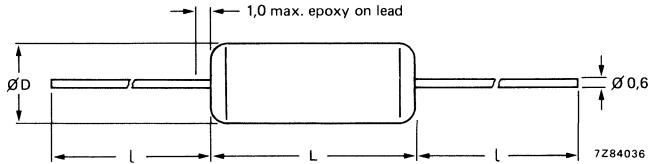


rated cap. μF	T_{max} mm	H_{max} mm	L_{max} mm	P mm	cat. number
0,047	8	15	21,5	15	2222 357 51473
0,068	10	17	21,5	15	2222 357 51683
0,10	8,5	18,5	29	22,5	2222 357 51104
0,15	8,5	18,5	29	22,5	2222 357 51154
0,22	10	20	34	27,5	2222 357 51224
0,33	12	22	34	27,5	2222 357 51334
0,47	15	25	34	27,5	2222 357 51474
0,68	15	25	34	27,5	2222 357 51684



For detailed information on these and other types see Data Handbook C22

Rated capacitance range	47 to 47000 pF
Tolerance on rated capacitance	± 2% (E24-series and E48-series)
Rated voltage U_R (d.c.)	63 V, 160 V, 250 V
Rated voltage U_R (a.c.), 50/60 Hz	40 V, 63 V, 160 V
Temperature range	-40 to +100 °C
Climatic category, IEC 68	40/100/21
Related specification	IEC 384-13
Dielectric	polypropylene (KP)



63 V-range

rated cap. pF	D_{max} mm	L_{max} mm	l_{max} mm	cat. number on reel	cat. number in box
3300	4	11	30	2222 455 73302	2222 455 33302
4700	4,5	11	30	2222 455 74702	2222 455 34702
6800	5	11	30	2222 455 76802	2222 455 36802
10000	4,5	15	28	2222 455 71003	2222 455 31003
15000	5	15	28	2222 455 71503	2222 455 31503
22000	5,5	15	28	2222 455 72203	2222 455 32203
33000	6,5	15	28	2222 455 73303	2222 455 33303
47000	7,5	15	28	2222 455 74703	2222 455 34703

160 V-range

2200	4	11	30	2222 456 72202	2222 456 32202
------	---	----	----	-----------------------	-----------------------

250 V-range

47	4	11	30	2222 457 74709	2222 457 34709
66	4	11	30	2222 457 76609	2222 457 36609
100	4	11	30	2222 457 71001	2222 457 31001
150	4	11	30	2222 457 71501	2222 457 31501
220	4	11	30	2222 457 72201	2222 457 32201
330	4	11	30	2222 457 73301	2222 457 33301
470	4,5	11	30	2222 457 74701	2222 457 34701
680	4,5	11	30	2222 457 76801	2222 457 36801
1000	4,5	11	30	2222 457 71002	2222 457 31002
1500	4,5	11	30	2222 457 71502	2222 457 31502

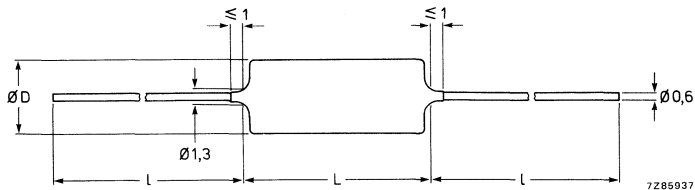


POLYPROPYLENE FILM/FOIL CAPACITORS (cont.) General data

2222 460-462 (KP)

For detailed information on these and other types see Data Handbook C22

Rated capacitance range	47 to 47000 pF
Tolerance on rated capacitance	± 1% (E24-series and E48-series)
Rated voltage U_R (d.c.)	63 V, 160 V, 250 V
Rated voltage U_R (a.c.), 50/60 Hz	40 V, 63 V, 160 V
Temperature range	- 40 to + 100 °C
Climatic category, IEC 68	40/100/56
Related specification	IEC 384-13
Dielectric	polypropylene (KP)



7285937

63 V-range

rated cap. pF	D_{max} mm	L_{max} mm	l_{max} mm	cat. number on reel	cat. number ammo pack
6800	5	11	30	2222 460 86802	2222 460 46802
10000	5,5	15	28	2222 460 81003	2222 460 41003
15000	5,5	15	28	2222 460 81503	2222 460 41503
22000	5,5	15	28	2222 460 82203	2222 460 42203
33000	6,5	15	28	2222 460 83303	2222 460 43303
47000	7,5	15	28	2222 460 84703	2222 460 44703



160 V-range

4700	5	11	30	2222 461 84702	2222 461 44702
------	---	----	----	-----------------------	-----------------------

250 V-range

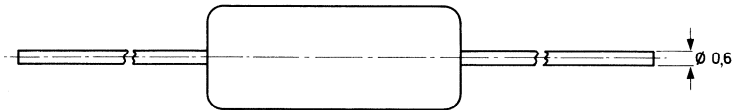
47	5	11	30	2222 462 84709	2222 462 44709
68	5	11	30	2222 462 86809	2222 462 46809
100	5	11	30	2222 462 81001	2222 462 41001
150	5	11	30	2222 462 81501	2222 462 41501
220	5	11	30	2222 462 82201	2222 462 42201
330	5	11	30	2222 462 83301	2222 462 43301
470	5	11	30	2222 462 84701	2222 462 44701
680	5	11	30	2222 462 86801	2222 462 46801
1000	5	11	30	2222 462 81002	2222 462 41002
1500	5	11	30	2222 462 81502	2222 462 41502
2200	5	11	30	2222 462 82202	2222 462 42202
3300	5	11	30	2222 462 83302	2222 462 43302



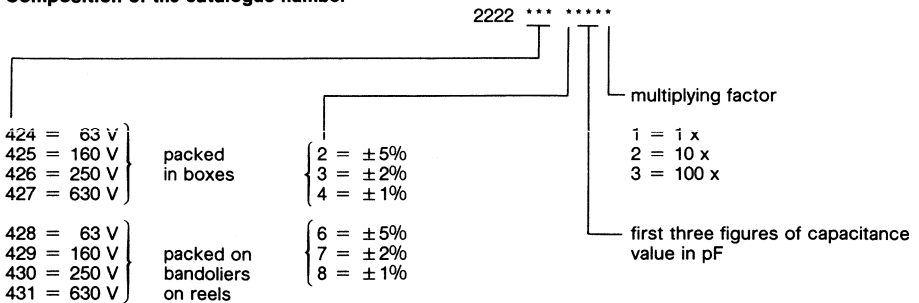
Electronic
components
and materials

For detailed information on these and other types see Data Handbook C22

Rated capacitance range	51 to 39000 pF
Tolerance on rated capacitance	± 1%, ± 2%, ± 5% (E24-series)
Rated voltage U_R (d.c.)	63 V, 160 V, 250 V, 630 V
Rated voltage U_R (a.c.), 50/60 Hz	25 V, 63 V, 125 V, 250 V
Temperature range:	
63 V version	- 40 to + 70 °C
160 V, 250 V, 630 V versions	- 40 to + 85 °C
Climatic category, IEC 68:	
63 V version	40/070/21
160 V, 250 V, 630 V versions	40/085/21
Related specification	IEC 384-7
Dielectric	polystyrene (KS)



Composition of the catalogue number

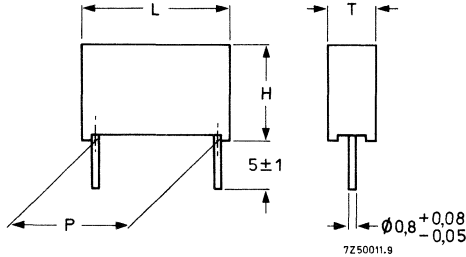


A.C. & pulse metallized polypropylene film capacitors General data

2222 357 (KP/MKP)

For detailed information on these and other types see Data Handbook C22

Rated capacitance range (E12 series)	1 to 39 nF
Tolerance on rated capacitance	± 5%
Rated voltage U_R (d.c.)	1000 V, 1500 V, 2000 V
Rated voltage U_R (a.c.), 50/60 Hz	400 V, 600 V, 700 V
Temperature range	- 40 to + 85 °C
Climatic category, IEC 68	40/085/56
Related specification	IEC 384-16
Dielectric	polypropylene (KP/MKP)



1000 V-range

rated cap. μF	T_{max} mm	H_{max} mm	L_{max} mm	P mm	cat. number
0,018	8,5	18,5	29	22,5	2222 357 72183
0,022	8,5	18,5	29	22,5	2222 357 72223
0,027	8,5	18,5	29	22,5	2222 357 72273

1500 V-range

0,0082	8,5	18,5	29	22,5	2222 357 82822
0,010	8,5	18,5	29	22,5	2222 357 82103
0,012	8,5	18,5	29	22,5	2222 357 82123
0,015	8,5	18,5	29	22,5	2222 357 82153

2000 V-range

0,0010	8,5	18,5	29	22,5	2222 357 92102
0,0012	8,5	18,5	29	22,5	2222 357 92122
0,0015	8,5	18,5	29	22,5	2222 357 92152
0,0018	8,5	18,5	29	22,5	2222 357 92182
0,0022	8,5	18,5	29	22,5	2222 357 92222
0,0027	8,5	18,5	29	22,5	2222 357 92272
0,0033	8,5	18,5	29	22,5	2222 357 92332
0,0039	8,5	18,5	29	22,5	2222 357 92392
0,0047	8,5	18,5	29	22,5	2222 357 92472
0,0056	8,5	18,5	29	22,5	2222 357 92562
0,0068	8,5	18,5	29	22,5	2222 357 92682
0,0082	10	20	29	22,5	2222 357 92822
0,010	10	20	29	22,5	2222 357 92103
0,012	10	20	29	22,5	2222 357 92123



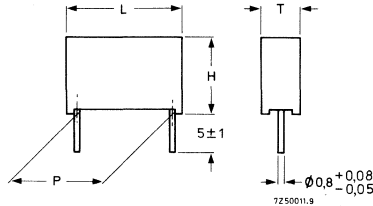
Electronic components and materials

A.C. & pulse metallized polypropylene film capacitors General data

2222 376 (KP/MMKP)

For detailed information on these and other types see Data Handbook C22

Rated capacitance range (E12 series)	1 to 39 nF
Tolerance on rated capacitance	± 5%
Rated voltage U_R (d.c.)	1000 V, 1500 V, 2000 V
Rated voltage U_R (a.c.), 50/60 Hz	400 V, 600 V, 700 V
Temperature range	-40 to +85 °C
Climatic category, IEC 68	40/085/56
Related specification	IEC 384-16
Dielectric	polypropylene (KP/MMKP)



1000 V-range

rated cap. μF	T_{max} mm	H_{max} mm	L_{max} mm	P mm	cat. number
0,015	6,5	15	26	22,5	2222 376 72153
0,018	7,5	16	26	22,5	2222 376 72183
0,022	8,5	17,5	26	22,5	2222 376 72223
0,027	8,5	17,5	26	22,5	2222 376 72273
0,033	8,5	17,5	26	22,5	2222 376 72333
0,039	9,5	18,5	26	22,5	2222 376 72393

1500 V-range

0,0068	6,5	15	26	22,5	2222 376 82682
0,0082	6,5	15	26	22,5	2222 376 82822
0,010	7,5	16	26	22,5	2222 376 82103
0,012	8,5	17,5	26	22,5	2222 376 82123
0,015	9,5	18,5	26	22,5	2222 376 82153

2000 V-range

0,0010	6,5	15	26	22,5	2222 376 92102
0,0012	6,5	15	26	22,5	2222 376 92122
0,0015	6,5	15	26	22,5	2222 376 92152
0,0018	6,5	15	26	22,5	2222 376 92182
0,0022	6,5	15	26	22,5	2222 376 92222
0,0027	6,5	15	26	22,5	2222 376 92272
0,0033	6,5	15	26	22,5	2222 376 92332
0,0039	6,5	15	26	22,5	2222 376 92392
0,0047	6,5	15	26	22,5	2222 376 92472
0,0056	7,5	16	26	22,5	2222 376 92562
0,0068	7,5	16	26	22,5	2222 376 92682
0,0082	8,5	17,5	26	22,5	2222 376 92822
0,010	9,5	18,5	26	22,5	2222 376 92103



Electronic
components
and materials

For detailed information on these and other types see Data Handbook C15
For packing information see page C66

Capacitance range	1000 to 22000 pF
Tolerance	- 20 to + 80%
Rated d.c. voltage	63 V
Sectional specification	IEC 384-9, class 2
Climatic category, IEC 68	10/055/21
Colour code	green

size	W _{max} mm	H _{max} (mm)		l (mm)	
		fig. 1	fig. 2	fig. 1	fig. 2
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

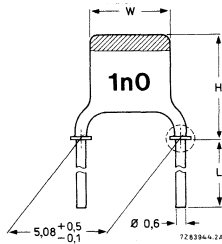


Fig. 1

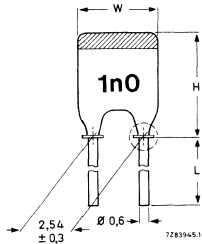


Fig. 2

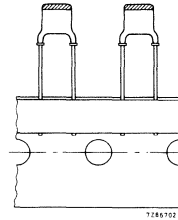


Fig. 3



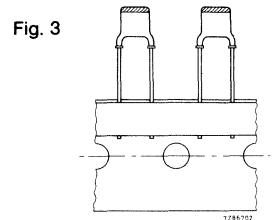
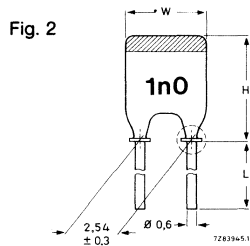
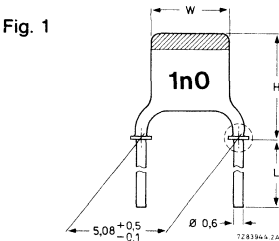
cap. pF	size	cat. number lead spacing 0,1" long leads, fig 2, bulk packing	cat. number lead spacing 0,2" short leads, fig 1, bulk packing	cat. number lead spacing 0,2" on tape on reel, fig. 3	cat. number lead spacing 0,2" on tape in ammpack, fig. 3
1000	I	2222 629 08102	2222 629 19102	2222 629 53102	2222 629 63102
2200	I	2222 629 08222	2222 629 19222	2222 629 53222	2222 629 63222
4700	I	2222 629 08472	2222 629 19472	2222 629 53472	2222 629 63472
10000	IIB	2222 629 08103	2222 629 19103	2222 629 53103	2222 629 63103
22000	IV	2222 629 08223	2222 629 19223	2222 629 53223	2222 629 63223



For detailed information on these and other types see Data Handbook C15
For packing information see page C66

Capacitance range 180 to 4700 pF
Tolerance $\pm 10\%$
Rated d.c. voltage 100 V
Sectional specification IEC 384-9, class 2
Climatic category, IEC 68 55/085/21
Colour code yellow

size	W _{max} mm	H _{max} (mm)		l (mm)	
		fig. 1	fig. 2	fig. 1	fig. 2
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



cap. 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	cat. number lead spacing 0,2" on tape on reel, fig. 3	cat. number lead spacing 0,2" on tape in ammopack, fig. 3
180	I	2222 630 08181	2222 630 19181	2222 630 53181	2222 630 63181
220	I	2222 630 08221	2222 630 19221	2222 630 53221	2222 630 63221
270	I	2222 630 08271	2222 630 19271	2222 630 53271	2222 630 63271
330	I	2222 630 08331	2222 630 19331	2222 630 53331	2222 630 63331
390	I	2222 630 08391	2222 630 19391	2222 630 53391	2222 630 63391
470	I	2222 630 08471	2222 630 19471	2222 630 53471	2222 630 63471
560	I	2222 630 08561	2222 630 19561	2222 630 53561	2222 630 63561
680	I	2222 630 08681	2222 630 19681	2222 630 53681	2222 630 63681
820	I	2222 630 08821	2222 630 19821	2222 630 53821	2222 630 63821
1000	IIA	2222 630 08102	2222 630 19102	2222 630 53102	2222 630 63102
1200	IIA	2222 630 08122	2222 630 19122	2222 630 53122	2222 630 63122
1500	IIB	2222 630 08152	2222 630 19152	2222 630 53152	2222 630 63152
1800	IIB	2222 630 08182	2222 630 19182	2222 630 53182	2222 630 63182
2200	III	2222 630 08222	2222 630 19222	2222 630 53222	2222 630 63222
2700	III	2222 630 08272	2222 630 19272	2222 630 53272	2222 630 63272
3300	IV	2222 630 08332	2222 630 19332	2222 630 53332	2222 630 63332
3900	IV	2222 630 08392	2222 630 19392	2222 630 53392	2222 630 63392
4700	IV	2222 630 08472	2222 630 19472	2222 630 53472	2222 630 63472



For detailed information on these and other types see Data Handbook C15
 For packing information see page C66

Capacitance range	0,56 to 1,5 pF
Tolerance	± 2% or ± 0,25 pF
Rated d.c. voltage	100 V
Temperature coefficient	P 100 (+ 100 x 10 ⁻⁶ /K)
Sectional specification	IEC 384/8, class 1B
Climatic category, IEC 68	55/085/21
Colour code	red/violet

size	W _{max} mm	H _{max} (mm)		l (mm)	
		fig. 1	fig. 2	fig. 1	fig. 2
I	3,6	6,3	5,0	4 ± 0,5	> 13

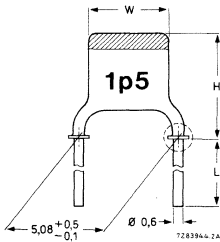


Fig. 1

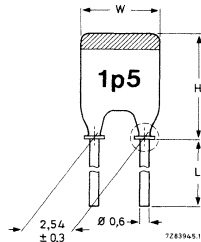


Fig. 2

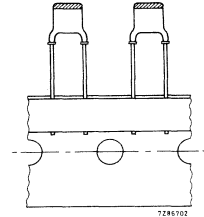


Fig. 3



cap. pF	tolerance 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	cat. number lead spacing 0,2" on tape/reel, fig. 3	cat. number lead spacing 0,2" on tape in ammopack, fig. 3
0,56	± 0,25	I	2222 680 03567	-	2222 679 03567	2222 689 03567
0,68	± 0,25	I	2222 680 03687	-	2222 679 03687	2222 689 03687
0,82	± 0,25	I	2222 680 03827	-	2222 679 03827	2222 689 03827
1,0	± 0,25	I	2222 680 03108	2222 683 03108	2222 679 03108	2222 689 03108
1,2	± 0,25	I	2222 680 03128	2222 683 03128	2222 679 03128	2222 689 03128
1,5	± 0,25	I	2222 680 03158	2222 683 03158	2222 679 03158	2222 689 03158



For details on these and other types see Data Handbook C15
 For packing information see page C66

Capacitance range	1,8 to 120 pF	Sectional specification	IEC 384, 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	NP0 (0 x 10 ⁶ /K)		

size	W _{max} mm	H _{max} (mm)		l (mm)	
		fig. 1	fig. 2	fig. 1	fig. 2
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

For drawing see opposite page.

cap. pF	tolerance 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	cat. number lead spacing 0,2" on tape/reel, fig. 3	cat. number lead spacing 0,2" on tape in ammopack, fig. 3
1,8	± 0,25	I	2222 680 09188	2222 683 09188	2222 679 09188	2222 689 09188
2,2	± 0,25	I	2222 680 09228	2222 683 09228	2222 679 09228	2222 689 09228
2,7	± 0,25	I	2222 680 09278	2222 683 09278	2222 679 09278	2222 689 09278
3,3	± 0,25	I	2222 680 09338	2222 683 09338	2222 679 09338	2222 689 09338
4,7	± 0,25	I	2222 680 09478	2222 683 09478	2222 679 09478	2222 689 09478
5,6	± 0,25	I	2222 680 09568	2222 683 09568	2222 679 09568	2222 689 09568
6,8	± 0,25	I	2222 680 09688	2222 683 09688	2222 679 09688	2222 689 09688
8,2	± 0,25	I	2222 680 09828	2222 683 09828	2222 679 09828	2222 689 09828
10	± 2%	I	2222 680 10109	2222 683 10109	2222 679 10109	2222 689 10109
12	± 2%	I	2222 680 10129	2222 683 10129	2222 679 10129	2222 689 10129
15	± 2%	I	2222 680 10159	2222 683 10159	2222 679 10159	2222 689 10159
18	± 2%	I	2222 680 10189	2222 683 10189	2222 679 10189	2222 689 10189
22	± 2%	I	2222 680 10229	2222 683 10229	2222 679 10229	2222 689 10229
27	± 2%	I	2222 680 10279	2222 683 10279	2222 679 10279	2222 689 10279
33	± 2%	I	2222 680 10339	2222 683 10339	2222 679 10339	2222 689 10339
39	± 2%	IIA	2222 680 10399	2222 683 10399	2222 679 10399	2222 689 10399
47	± 2%	IIA	2222 680 10479	2222 683 10479	2222 679 10479	2222 689 10479
56	± 2%	IIB	2222 680 10569	2222 683 10569	2222 679 10569	2222 689 10569
68	± 2%	IIB	2222 680 10689	-	2222 679 10689	2222 689 10689
82	± 2%	IIB	2222 680 10829	-	2222 679 10829	2222 689 10829
100	± 2%	III	2222 680 10101	-	2222 679 10101	2222 689 10101
120	± 2%	III	2222 680 10121	-	2222 679 10121	2222 689 10121



For detailed information on these and other types see Data Handbook C15
 For packing information see page C66

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)		l (mm)	
		fig. 1	fig. 2	fig. 1	fig. 2
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	6,0	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

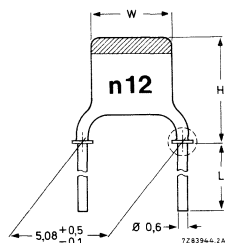


Fig. 2

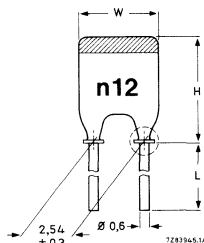
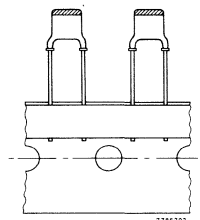


Fig. 3



cap. pF	tolerance 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	cat. number lead spacing 0,2" on tape/reel, fig. 3	cat. number lead spacing 0,2" on tape in ammopack, fig. 3
3,9	± 0,25	I	2222 680 33398	2222 683 33398	2222 679 33398	2222 689 33398
4,7	± 0,25	I	2222 680 33478	2222 683 33478	2222 679 33478	2222 689 33478
5,6	± 0,25	I	2222 680 33568	2222 683 33568	2222 679 33568	2222 689 33568
6,8	± 0,25	I	2222 680 33688	2222 683 33688	2222 679 33688	2222 689 33688
8,2	± 0,25	I	2222 680 33828	2222 683 33828	2222 679 33828	2222 689 33828
10	± 2%	I	2222 680 34109	2222 683 34109	2222 679 34109	2222 689 34109
12	± 2%	I	2222 680 34129	2222 683 34129	2222 679 34129	2222 689 34129
15	± 2%	I	2222 680 34159	2222 683 34159	2222 679 34159	2222 689 34159
18	± 2%	I	2222 680 34189	2222 683 34189	2222 679 34189	2222 689 34189
22	± 2%	I	2222 680 34229	2222 683 34229	2222 679 34229	2222 689 34229
27	± 2%	I	2222 680 34279	2222 683 34279	2222 679 34279	2222 689 34279
33	± 2%	I	2222 680 34339	2222 683 34339	2222 679 34339	2222 689 34339
39	± 2%	IIA	2222 680 34399	2222 683 34399	2222 679 34399	2222 689 34399
47	± 2%	IIA	2222 680 34479	2222 683 34479	2222 679 34479	2222 689 34479
56	± 2%	IIB	2222 680 34569	2222 683 34569	2222 679 34569	2222 689 34569
68	± 2%	IIB	2222 680 34689	2222 683 34689	2222 679 34689	2222 689 34689
82	± 2%	III	2222 680 34829	2222 683 34829	2222 679 34829	2222 689 34829
100	± 2%	III	2222 680 34101	2222 683 34101	2222 679 34101	2222 689 34101
120	± 2%	IV	2222 680 34121	2222 683 34121	2222 679 34121	2222 689 34121
150	± 2%	IV	2222 680 34151	2222 683 34151	2222 679 34151	2222 689 34151



For details on these and other types see Data Handbook C15
 For packing information see page C66

Capacitance range 3,9 to 330 pF
 Tolerance $\pm 2\%$ or $\pm 0,25$ pF
 Rated d.c. voltage 100 V
 Temperature coefficient N750 (750 x 10⁶/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	fig. 1	fig. 2
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 opposite page.

cap. pF	tolerance 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	cat. number lead spacing 0,2" on tape/reel, fig. 3	cat. number lead spacing 0,2" on tape in ammopack fig. 3
3,9	± 0,25	I	2222 680 57398	2222 683 57398	2222 679 57398	2222 689 57398
4,7	± 0,25	I	2222 680 57478	2222 683 57478	2222 679 57478	2222 689 57478
5,6	± 0,25	I	2222 680 57568	2222 683 57568	2222 679 57568	2222 689 57568
6,8	± 0,25	I	2222 680 57688	2222 683 57688	2222 679 57688	2222 689 57688
8,2	± 0,25	I	2222 680 57828	2222 683 57828	2222 679 57828	2222 689 57828
10	± 2%	I	2222 680 58109	2222 683 58109	2222 679 58109	2222 689 58109
12	± 2%	I	2222 680 58129	2222 683 58129	2222 679 58129	2222 689 58129
15	± 2%	I	2222 680 58159	2222 683 58159	2222 679 58159	2222 689 58159
18	± 2%	I	2222 680 58189	2222 683 58189	2222 679 58189	2222 689 58189
22	± 2%	I	2222 680 58229	2222 683 58229	2222 679 58229	2222 689 58229
27	± 2%	I	2222 680 58279	2222 683 58279	2222 679 58279	2222 689 58279
33	± 2%	I	2222 680 58339	2222 683 58339	2222 679 58339	2222 689 58339
39	± 2%	I	2222 680 58399	2222 683 58399	2222 679 58399	2222 689 58399
47	± 2%	I	2222 680 58479	2222 683 58479	2222 679 58479	2222 689 58479
56	± 2%	IIA	2222 680 58569	2222 683 58589	2222 679 58569	2222 689 58569
68	± 2%	IIA	2222 680 58689	2222 683 58689	2222 679 58689	2222 689 58689
82	± 2%	IIB	2222 680 58829	2222 683 58829	2222 679 58829	2222 689 58829
100	± 2%	IIB	2222 680 58101	2222 683 58101	2222 679 58101	2222 689 58101
120	± 2%	III	2222 680 58121	2222 683 58121	2222 679 58121	2222 689 58121
150	± 2%	III	2222 680 58151	2222 683 58151	2222 679 58151	2222 689 58151
180	± 2%	IV	2222 680 58181	2222 683 58181	2222 679 58181	2222 689 58181
220	± 2%	IV	2222 680 58221	2222 683 58221	2222 679 58221	2222 689 58221
270	± 2%	V	2222 680 58271	2222 683 58271	2222 679 58271	2222 689 58271
330	± 2%	V	2222 680 58331	2222 683 58331	2222 679 58331	2222 689 58331

For detailed information on these and other types see Data Handbook C15
 For packing information see page C66

Capacitance range	390 to 560 pF
Tolerance	± 2% or ± 0,25 pF
Rated d.c. voltage	100 V
Temperature coefficient	N1500 (1500 x 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	fig. 1	fig. 2
IV	6,2	9,0	7,7	4 ± 0,5	> 13
V	6,2	11,2	8,9	4 ± 0,5	> 13

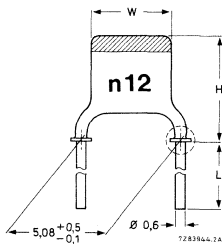


Fig. 1

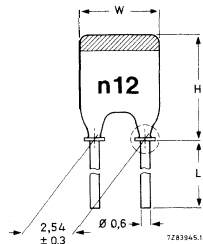


Fig. 2

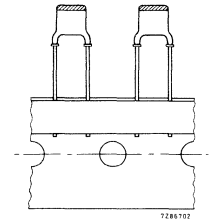


Fig. 3



cap. pF	tolerance 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	cat. number lead spacing 0,2" on tape/reel, fig.3	cat. number lead spacing 0,2" on tape in ammpack, fig. 3
390	± 2%	IV	2222 680 70391	2222 683 70391	2222 679 70391	2222 689 70391
470	± 2%	V	2222 680 70471	2222 683 70471	2222 679 70471	2222 689 70471
560	± 2%	V	2222 680 70561	2222 683 70561	2222 679 70561	2222 689 70561



For detailed information see Data Handbook C15

The miniature ceramic capacitors are supplied in bulk packing, on tape on reel, and on tape in ammpack.

Bulk packing: boxes of 1000 (sizes I, IIA, IIB, III) or 500 capacitors sizes IV, V).

On tape on reel: 4000 capacitors per reel; see also Figs. 1 and 2

On tape in ammpack: 4000 capacitors per box, see also figs. 1 and 3.

Fig. 1

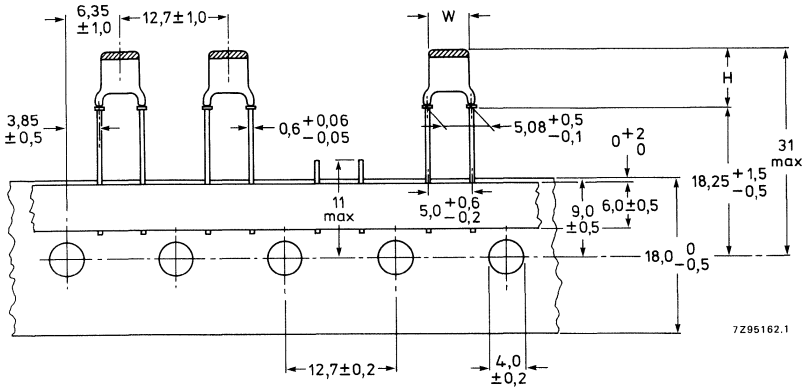


Fig. 2

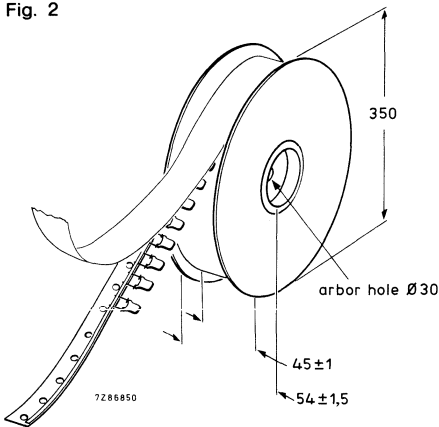
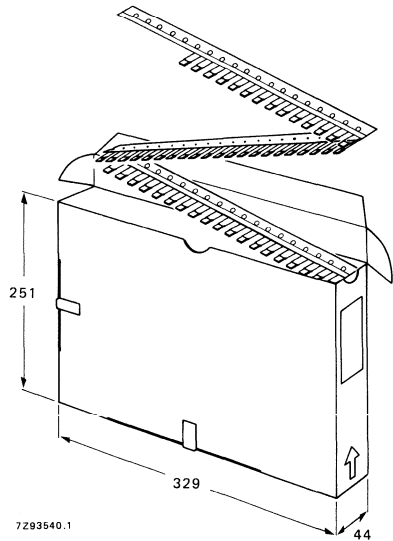


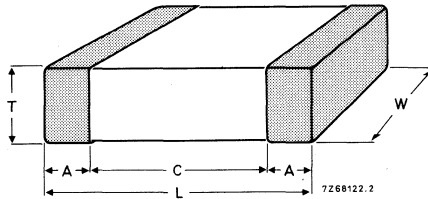
Fig. 3



Surface mounting ceramic multilayer capacitors

For detailed information see Data Handbook C15

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 to 470000 pF (E12-series)
Z5U (Y5V) dielectric	2200 to 100000 pF (E6-series)**
Rated voltage U_R (d.c.)	50 V (EIA), 63 V (IEC)
Tolerance on capacitance:	
NPO, N220, N750 dielectrics	$\pm 10\%$, $\pm 5\%$; below 10 pF: $\pm 0,5$ pF; below 5,6 pF: $\pm 0,25$ pF
X7R dielectric	$\pm 20\%$, $\pm 10\%$
Z5U (Y5V) dielectric	-20 to +80%, $\pm 20\%$
Sectional specification	IEC 384-10, currently 40 (secretariat) 544 (EIA RS198/B)
Climatic category (IEC 68):	
NPO, N220, N750 dielectrics	55/125/56
X7R dielectric	55/125/56
Z5U (incl. Y5V) dielectric	30/085/56
Resistance to soldering heat	260 °C, 10 s



Dimensions in mm

size	status	L	W	T		A		C
				min.	max.	min.	max.	
0805	P	2,0 ± 0,15	1,25 ± 0,15	0,51****	1,27***	0,25	0,75	0,4
1206	P	3,2 ± 0,15	1,6 ± 0,15	0,51****	1,60***	0,25	0,75	
1210	C	3,4 ± 0,2	2,5 ± 0,2	0,51	1,90	0,3	1,0	
1808	C	4,5 ± 0,2	2,0 ± 0,2	0,51	1,90	0,3	1,0	
1812	C	4,5 ± 0,2	3,2 ± 0,2	0,51	1,90	0,3	1,0	
2220	C	5,7 ± 0,2	5,0 ± 0,2	0,51	1,90	0,3	1,0	

* Other values, below 10 pF, on request.

** Values up to 1 µF under development.

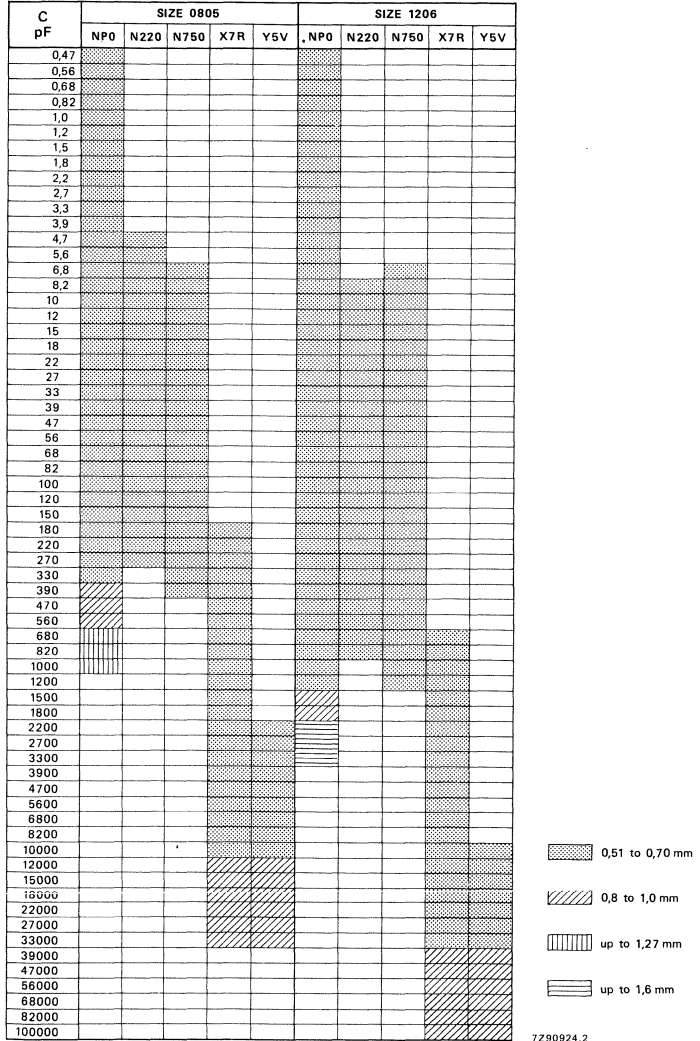
*** See also table on next page

Capacitor thickness, sizes 0805 and 1206

For detailed information see Data Handbook C15

Status P: sizes 0805 and 1206

Status C: sizes 1210, 1808, 1812, 2220



Class 1 capacitors: NP0, N220, N750 dielectric

For detailed information see Data Handbook C15

C PF	DIELECTRIC									
	NP0					N220		N750		
	0805	1206	1210	1808	1812	2220	0805	1206	0805	1206
0.47										
0.56										
0.68										
0.82										
1.0										
1.2										
1.5										
1.8										
2.2										
2.7										
3.3										
3.9										
4.7										
5.6										
6.8										
8.2										
10										
12										
15										
18										
22										
27										
33										
39										
47										
56										
68										
82										
100										
120										
150										
180										
220										
270										
330										
390										
470										
560										
680										
820										
1000										
1200										
1500										
1800										
2200										
2700										
3300										
3900										
4700										
5600										
6800										
8200										
10000										



 available in box and in 8 mm tape on reel
 available in box

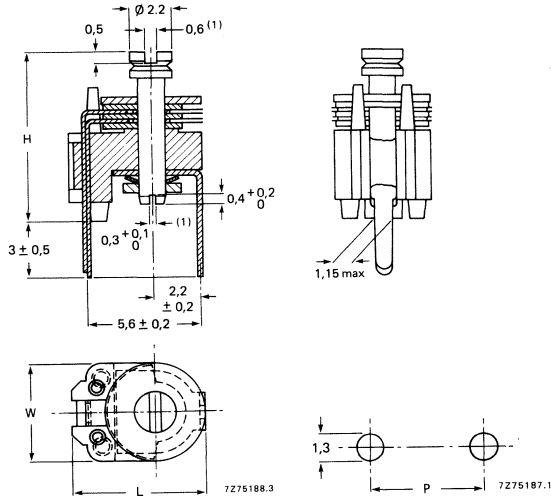
7Z90923.1



Electronic components and materials

For detailed information on these and other types see Data Handbook C7

Capacitance range	5 to 27 pF
Diameter	5 mm
Rated voltage	150 V
Basic specification	IEC 481-1 and 4
Climatic category, IEC 68	40/070/21



Hole pattern; P = 5,6 mm

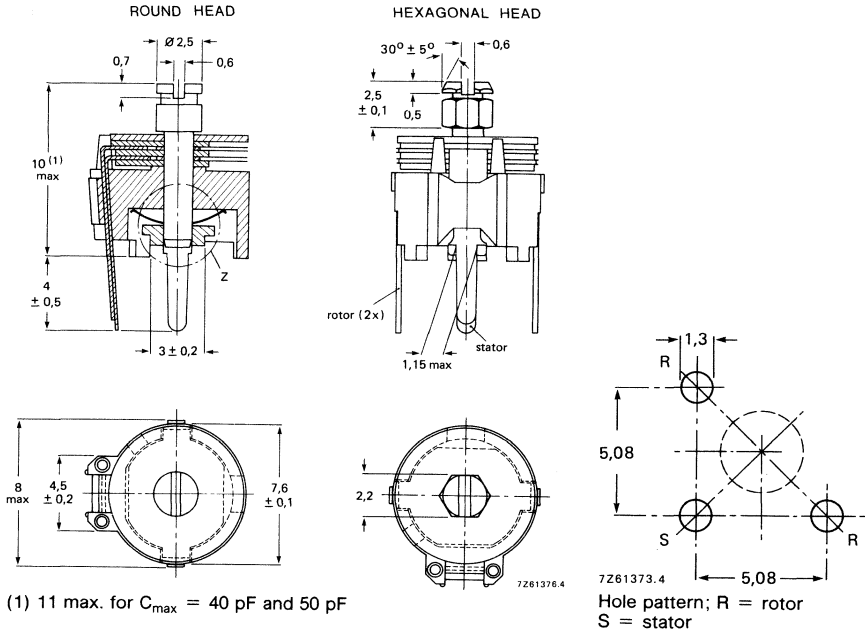
C _{max} pF	C _{min} pF	temperature coefficient 10 ⁻⁶ /K	colour code	H _{max} mm	cat. number
5	1,5	-200	grey	7,0	2222 808 23508
10	2	-200	yellow	7,0	2222 808 23109
15	2,5	-50	blue	8,8	2222 808 23159
20	4	-50	green	8,8	2222 808 23209
27	3	-250	red	9,0	2238 808 23279



For detailed information on these and other types see Data Handbook C7

Capacitance range
 Diameter
 Rated voltage
 Basic specification
 Climatic category, IEC 68

5,5 to 50 pF
 7,5 mm
 250 V
 IEC 418-1 and 4
 40/070/21 and 40/085/21



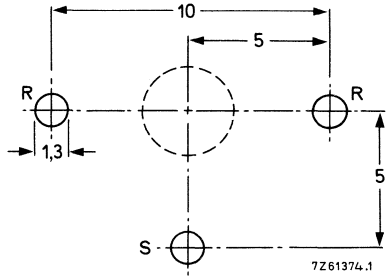
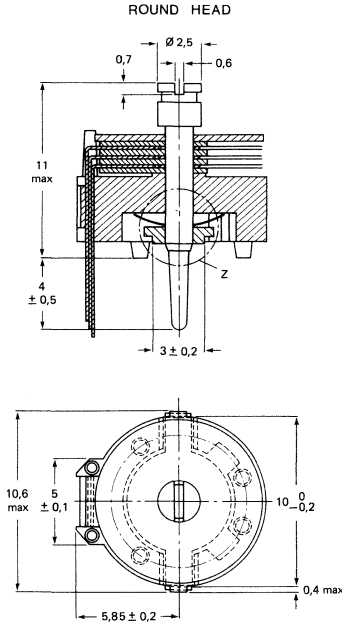
C_{max} pF	C_{min} pF	temperature coefficient $10^{-6}/K$	max. permissible temperature °C	colour code	cat. number
5,5	1,4	-400	85	grey	2222 808 11558
10	2	-450	70	yellow	2222 808 11109
15	2	-200	70	blue	2222 808 11159
22	2	-250	70	green	2222 808 11229
27	2	-250	85	red	2222 808 11279
33	3	-250	70	brown	2222 808 11339
40	3	-250	85	violet	2222 808 11409
50	3	-100	85	black	2222 808 11509
10	2	-450	70	yellow	2238 808 17109 *
22	2	-250	70	green	2238 808 17229 *
40	2	-250	85	violet	2238 808 17409 *
50	3	-100	85	black	2238 808 17509 *

* version with hexagonal head



For detailed information on these and other types see Data Handbook C7

Capacitance values	40, 65, 80 and 100 pF
Diameter	10 mm
Rated voltage	250 V
Basic specification	IEC 418-1 and 4
Climatic category, IEC 68	40/070/21 and 40/085/21



Hole pattern; R = rotor
 S = stator



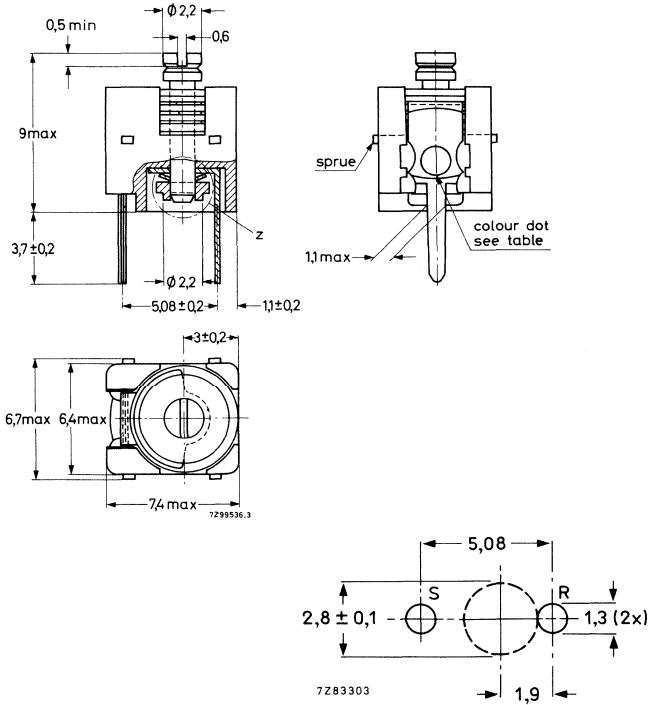
C_{max} pF	C_{min} pF	temperature coefficient $10^{-6}/K$	max. permissible temperature $^{\circ}C$	colour code	cat. number
40	5,5	-150	70	grey	2222 808 31409
65	5,5	-200	70	yellow	2222 808 31659
80	6	-100	85	red	2222 808 31809
100	7	-100	85	violet	2222 808 31101



Electronic
 components
 and materials

For detailed information on these and other types see Data Handbook C7

Capacitance values	3,5, 10 and 18 pF
Dimensions	6 x 8 x 9 mm
Rated voltage	300 V
Basic specification	IEC 418-1 and 4
Climatic category, IEC 68	40/125/21

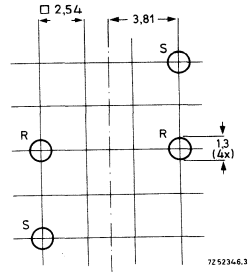
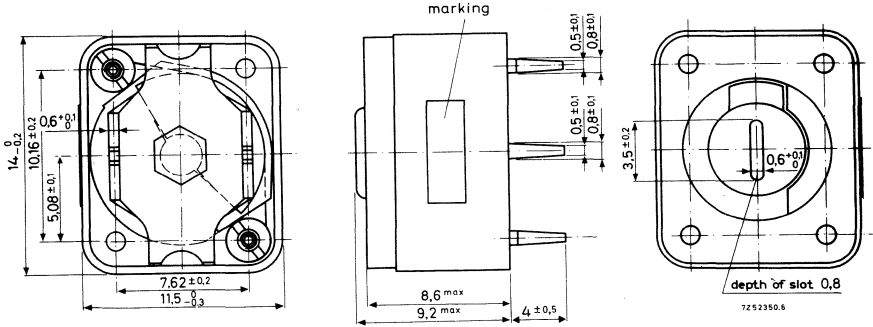


Hole pattern; R = rotor,
 S = stator

C_{max} pF	C_{min} pF	temperature coefficient $10^{-6}/K$	max. $\tan \delta$ at 1 MHz	colour code	cat. number
3,5	1,2	- 250	10×10^{-4}	orange	2222 809 05001
10	1,8	- 350	10×10^{-4}	white	2222 809 05002
18	2	- 350	10×10^{-4}	red	2222 809 05003

For detailed information on these and other types see Data Handbook C7

Capacitance range	20 to 100 pF
Dimensions	11 x 14 x 9 mm
Rated voltage	200 V
Basic specification	IEC 418-1 and 4
Climatic category, IEC 68	40/125/21



Hole pattern; R = rotor,
 S = stator

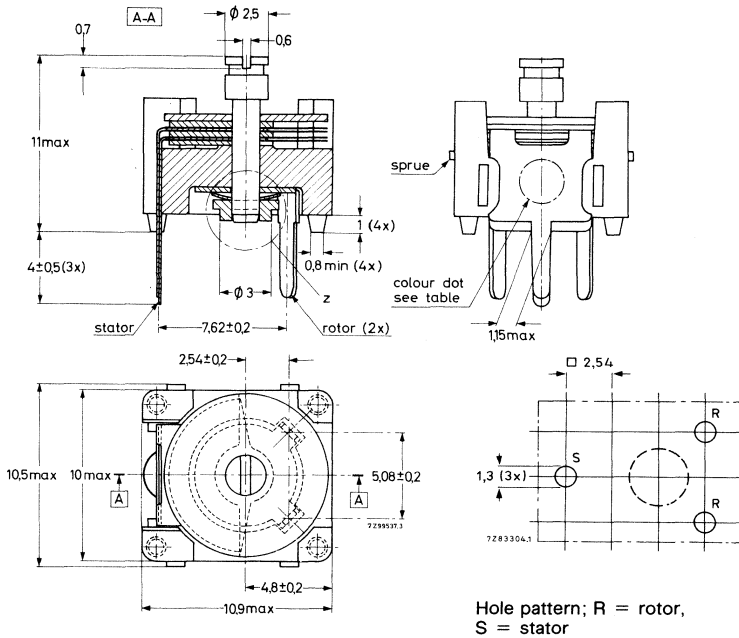
C_{max} pF	C_{min} pF	temperature coefficient $10^{-6}/K$	max $\tan \delta$ at 100 MHz	cat. number
20	2,5	0	17×10^{-4}	2222 809 07004
40	4	0	17×10^{-4}	2222 809 07008
60	5	0	25×10^{-4}	2222 809 07011
80	6	0	25×10^{-4}	2222 809 07013
100	7	0	25×10^{-4}	2222 809 07015



Electronic
 components
 and materials

For detailed information on these and other types see Data Handbook C7

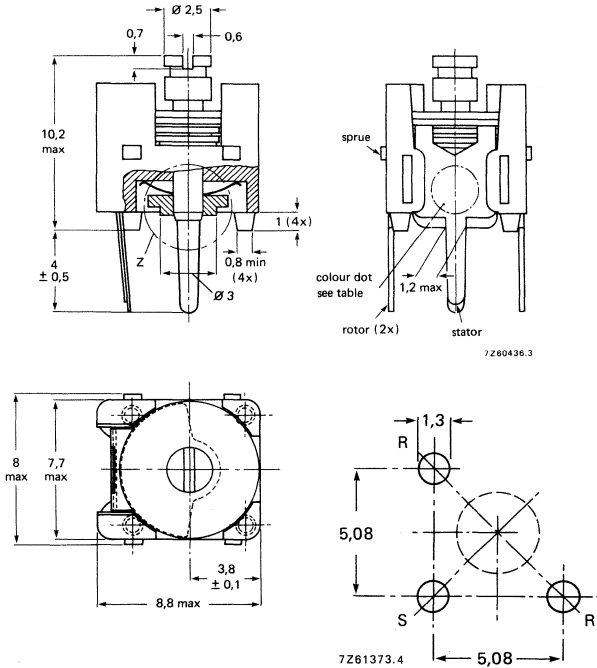
Capacitance values	40 and 60 pF
Dimensions	10 x 11 x 11 mm
Rated voltage	300 V
Basic specifications	IEC 418-1 and 4
Climatic category, IEC 68	40/125/21



C_{max} pF	C_{min} pF	temperature coefficient $10^{-6}/K$	max. $\tan \delta$ at 1 MHz	colour code	cat. number
40	4	-250	10×10^{-4}	yellow	2222 809 08002
60	5	-250	10×10^{-4}	blue	2222 809 08003

For detailed information on these and other types see Data Handbook C7

Capacitance values	5,5, 9 and 18 pF
Dimensions	8 x 9 x 10 mm
Rated voltage	300 V
Basic specification	IEC 418-1 and 4
Climatic category, IEC 68	40/125/21



Hole pattern; R = rotor,
 S = stator

C _{max} pF	C _{min} pF	temperature coefficient 10 ⁻⁶ /K	colour code	3 solder tags, cat. number
5,5	1,4	-250	green	2222 809 09001
9	2	-250	white	2222 809 09002
18	2	-250	red	2222 809 09003

Fig. 1
 3 solder tags

Products approved to the CECC (Cenelec Electronic Components Committee)
harmonized system for electronic components of assessed quality

Capacitors

type	CECC detail specification
2211 188	CECC 30 301-019
2222 050	CECC 30 301-033
2222 052	CECC 30 301-033
2222 108 3	CECC 30 301-027
2222 121	CECC 30 302-001
2222 122	CECC 30 302-002
2222 344	CECC 30 401-023
	CECC 30 401-039
2222 362	CECC 30 401-020
2222 364	CECC 30 401-039
2222 370	CECC 30 401-039
2222 371	CECC 30 401-039
2222 443 1	CECC 30 901-005
2222 443 2	CECC 30 901-005



Resistors

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
C11	Varistors, thermistors and sensors
C12	Potentiometers, encoders and switches
C13	Fixed resistors



Data Handbook System	R2	NTC thermistors:	
Contents	R3	2322 626	R33
Fixed resistors:		2322 633	R34
Packaging information	R4	2322 633 2....	R35
Carbon film resistors CR25	R5	2322 633 72224	R36
Standard film resistors SFR16T	R7	2322 640 1....	R37
Standard film resistors SFR25	R9	2322 640 19....	R38
Metal film resistors MRS25	R11	2322 640 900..	R39
Power metal film resistors PR37	R16	NTC thermistors, disc:	
Power metal film resistors PR52	R17	2322 642 6....	R40
Cemented wirewound resistors		2322 645	R41
AC04, AC05, AC07,	R18	NTC thermistors, threaded:	
Chip resistors RC-01	R19	2322 642 7....	R42
Carbon potentiometers:		PTC thermistors, disc:	
Carbon potentiometers, single	R22	2322 660 9100.	R43
Carbon potentiometers, tandem	R23	2322 660 91001	R44
Carbon potentiometers, snap-in spindle	R24	2322 660 93001	R45
		2322 661 9100.	R46
Carbon preset potentiometers:		Dual PTC thermistors:	
CPT10	R25	2322 662 980..	R47
ECP10	R26	PTC thermistors, overload protection:	
MTP10	R27	2322 66. 1...1	R48
EMP10	R28	2322 66. 1...3	R49
Varistors		PTC thermistors, for heating:	
Epoxy series: 2322 592 to 595	R29	2322 680 930..	R50
LDR light dependent resistors:		Humidity sensor:	
2322 600 9....	R32	2322 691 90001	R51
		CECC approved types	R52



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 C13.

Standard packaging:
CR25, SFR16T, SFR25, MRS25, PR37, PR52, AC04, AC05, AC07

Resistors having axial leads are supplied on tape. These tapes, or bandoliers, are either reeled or concertinaed in a cardboard box ('ammopack').

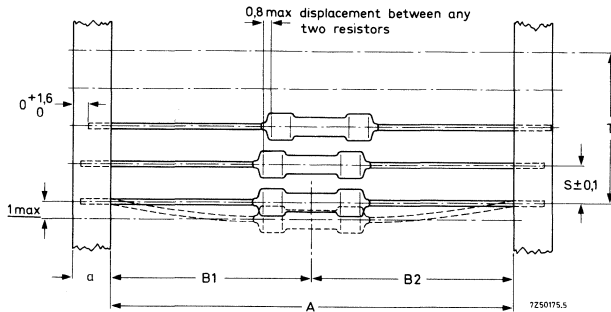


Fig. 1 Configuration of bandolier (dimensions in mm) S = spacing; T = maximum deviation of spacing: 1 mm per 10 spacings or 0,5 mm per 5 spacings.

- a = tape width
- A = tape distance
- B1 - B2 = centricity

Carbon film resistors: CR25

For detailed information on these and other types see Data Handbook C12

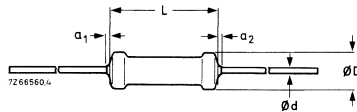
Standard packing: 5000 pieces, in box

See page R4 for additional packing information

Resistance range 1 Ω to 1 MΩ, tol. ± 5%, E24-series
 Max. dissipation at $T_{amb} = 70\text{ °C}$ 0,33 W
 Limiting voltage, r.m.s. 250 V

D_{max} mm	L_{max} mm	d mm	a ± 0,5 mm	A ± 1,6 mm	$B_1 - B_2$ ± max mm	S mm	T
2,5	6,5	0,6	6	52,4	1,2	5	1 mm per 10 spaces

See page R4 for additional drawing with dimensions



Status = P

R_N Ω	catalogue number	R_N Ω	catalogue number	R_N Ω	catalogue number
1	2322 211 73108	6,8	2322 211 73688	47	2322 211 73479
1,1	2322 211 73118	7,5	2322 211 73758	51	2322 211 73519
1,2	2322 211 73128	8,2	2322 211 73828	56	2322 211 73569
1,3	2322 211 73138	9,1	2322 211 73918	62	2322 211 73629
1,5	2322 211 73158	10	2322 211 73109	68	2322 211 73689
1,6	2322 211 73168	11	2322 211 73119	75	2322 211 73759
1,8	2322 211 73188	12	2322 211 73129	82	2322 211 73829
2	2322 211 73208	13	2322 211 73139	91	2322 211 73919
2,2	2322 211 73228	15	2322 211 73159	100	2322 211 73101
2,4	2322 211 73248	16	2322 211 73169	110	2322 211 73111
2,7	2322 211 73278	18	2322 211 73189	120	2322 211 73121
3	2322 211 73308	20	2322 211 73209	130	2322 211 73131
3,3	2322 211 73338	22	2322 211 73229	150	2322 211 73151
3,6	2322 211 73368	24	2322 211 73249	160	2322 211 73161
3,9	2322 211 73398	27	2322 211 73279	180	2322 211 73181
4,3	2322 211 73438	30	2322 211 73309	200	2322 211 73201
4,7	2322 211 73478	33	2322 211 73339	220	2322 211 73221
5,1	2322 211 73518	36	2322 211 73369	240	2322 211 73241
5,6	2322 211 73568	39	2322 211 73399	270	2322 211 73271
6,2	2322 211 73628	43	2322 211 73439	300	2322 211 73301



For detailed information on these and other types see Data Handbook C12

Standard packing: 5000 pieces, in box

See page R4 for additional packing information

R_N Ω	catalogue number	R_N Ω	catalogue number	R_N Ω	catalogue number
330	2322 211 73331	5,6 k	2322 211 73562	100 k	2322 211 73104
360	2322 211 73361	6,2 k	2322 211 73622	110 k	2322 211 73114
390	2322 211 73391	6,8 k	2322 211 73682	120 k	2322 211 73124
430	2322 211 73431	7,5 k	2322 211 73752	130 k	2322 211 73134
470	2322 211 73471	8,2 k	2322 211 73822	150 k	2322 211 73154
510	2322 211 73511	9,1 k	2322 211 73912	160 k	2322 211 73164
560	2322 211 73561	10 k	2322 211 73103	180 k	2322 211 73184
620	2322 211 73621	11 k	2322 211 73113	200 k	2322 211 73204
680	2322 211 73681	12 k	2322 211 73123	220 k	2322 211 73224
750	2322 211 73751	13 k	2322 211 73133	240 k	2322 211 73244
820	2322 211 73821	15 k	2322 211 73153	270 k	2322 211 73274
910	2322 211 73911	16 k	2322 211 73163	300 k	2322 211 73304
1 k	2322 211 73102	18 k	2322 211 73183	330 k	2322 211 73334
1,1 k	2322 211 73112	20 k	2322 211 73203	360 k	2322 211 73364
1,2 k	2322 211 73122	22 k	2322 211 73223	390 k	2322 211 73394
1,3 k	2322 211 73132	24 k	2322 211 73243	430 k	2322 211 73434
1,5 k	2322 211 73152	27 k	2322 211 73273	470 k	2322 211 73474
1,6 k	2322 211 73162	30 k	2322 211 73303	510 k	2322 211 73514
1,8 k	2322 211 73182	33 k	2322 211 73333	560 k	2322 211 73564
2 k	2322 211 73202	36 k	2322 211 73363	620 k	2322 211 73624
2,2 k	2322 211 73222	39 k	2322 211 73393	680 k	2322 211 73684
2,4 k	2322 211 73242	43 k	2322 211 73433	750 k	2322 211 73754
2,7 k	2322 211 73272	47 k	2322 211 73473	820 k	2322 211 73824
3 k	2322 211 73302	51 k	2322 211 73513	910 k	2322 211 73914
3,3 k	2322 211 73332	56 k	2322 211 73563	1 M	2322 211 73105
3,6 k	2322 211 73362	62 k	2322 211 73623		
3,9 k	2322 211 73392	68 k	2322 211 73683		
4,3 k	2322 211 73432	75 k	2322 211 73753		
4,7 k	2322 211 73472	82 k	2322 211 73823		
5,1 k	2322 211 73512	92 k	2322 211 73913		



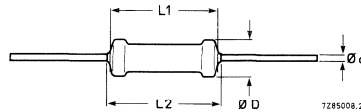
Standard film resistors (metal film): SFR16T

For detailed information on these and other types see Data Handbook C13
 Standard packing: 5000 pieces, in box
 See page R4 for additional packing information

Resistance range	1 Ω to 3 MΩ, tol. ± 5%, E24-series
Temperature coefficient	R < 4,7 Ω: < ± 250 x 10 ⁻⁶ /K R > 4,7 Ω < 100 kΩ: < ± 100 x 10 ⁻⁶ /K R > 100 kΩ: < ± 250 x 10 ⁻⁶ /K
Max. dissipation to T _{amb} = 70 °C	0,5 W
Noise	R < 68 kΩ: max. 0,1 μV/V R > 68 kΩ < 100 kΩ: max. 0,5 μV/V R > 100 kΩ: max. 1,5 μV/V
Limiting voltage, r.m.s.	150 V

D _{max}	L1 _{max}	L2 _{max}	d	a ± 0,5	A ± 1,5	B ₁ - B ₂ ± max	S	T
mm	mm	mm	mm	mm	mm	mm	mm	
1,7	3,5	3,7	0,5	6	52,5	0,5	5	1 mm per 10 spaces

See page R4 for additional drawing with dimensions



Status = P

R _N Ω	catalogue number	R _N Ω	catalogue number	R _N Ω	catalogue number
1,0	2322 180 53108	4,3	2322 180 53438	18	2322 180 53189
1,1	2322 180 53118	4,7	2322 180 53478	20	2322 180 53209
1,2	2322 180 53128	5,1	2322 180 53518	22	2322 180 53229
1,3	2322 180 53138	5,6	2322 180 53568	24	2322 180 53249
1,5	2322 180 53158	6,2	2322 180 53628	27	2322 180 53279
1,6	2322 180 53168	6,8	2322 180 53688	30	2322 180 53309
1,8	2322 180 53188	7,5	2322 180 53758	33	2322 180 53339
2,0	2322 180 53208	8,2	2322 180 53828	36	2322 180 53369
2,2	2322 180 53228	9,1	2322 180 53918	39	2322 180 53399
2,4	2322 180 53248	10	2322 180 53109	43	2322 180 53439
2,7	2322 180 53278	11	2322 180 53119	47	2322 180 53479
3,0	2322 180 53308	12	2322 180 53129	51	2322 180 53519
3,3	2322 180 53338	13	2322 180 53139	56	2322 180 53569
3,6	2322 180 53368	15	2322 180 53159	62	2322 180 53629
3,9	2322 180 53398	16	2322 180 53169	68	2322 180 53689



Standard film resistors (metal film) cont.: SFR16T

For detailed information on these and other types see Data Handbook C13

Standard packing: 5000 pieces, in box

See page R4 for additional packing information

R_N Ω	catalogue number	R_N Ω	catalogue number	R_N Ω	catalogue number
75	2322 180 53759	2,2 k	2322 180 53222	62 k	2322 180 53623
82	2322 180 53829	2,4 k	2322 180 53242	68 k	2322 180 53683
91	2322 180 53919	2,7 k	2322 180 53272	75 k	2322 180 53753
100	2322 180 53101	3 k	2322 180 53302	82 k	2322 180 53823
110	2322 180 53111	3,3 k	2322 180 53332	91 k	2322 180 53913
120	2322 180 53121	3,6 k	2322 180 53362	100 k	2322 180 53104
130	2322 180 53131	3,9 k	2322 180 53392	110 k	2322 180 53114
150	2322 180 53151	4,3 k	2322 180 53432	120 k	2322 180 53124
160	2322 180 53161	4,7 k	2322 180 53472	130 k	2322 180 53134
180	2322 180 53181	5,1 k	2322 180 53512	150 k	2322 180 53154
200	2322 180 53201	5,6 k	2322 180 53562	160 k	2322 180 53164
220	2322 180 53221	6,2 k	2322 180 53622	180 k	2322 180 53184
240	2322 180 53241	6,8 k	2322 180 53682	200 k	2322 180 53204
270	2322 180 53271	7,5 k	2322 180 53752	220 k	2322 180 53224
300	2322 180 53301	8,2 k	2322 180 53822	240 k	2322 180 53244
330	2322 180 53331	9,1 k	2322 180 53912	270 k	2322 180 53274
360	2322 180 53361	10 k	2322 180 53103	300 k	2322 180 53304
390	2322 180 53391	11 k	2322 180 53113	330 k	2322 180 53334
430	2322 180 53431	12 k	2322 180 53123	360 k	2322 180 53364
470	2322 180 53471	13 k	2322 180 53133	390 k	2322 180 53394
510	2322 180 53511	15 k	2322 180 53153	430 k	2322 180 53434
560	2322 180 53561	16 k	2322 180 53163	470 k	2322 180 53474
620	2322 180 53621	18 k	2322 180 53183	510 k	2322 180 53514
680	2322 180 53681	20 k	2322 180 53203	560 k	2322 180 53564
750	2322 180 53751	22 k	2322 180 53223	620 k	2322 180 53624
820	2322 180 53821	24 k	2322 180 53243	680 k	2322 180 53684
910	2322 180 53911	27 k	2322 180 53273	750 k	2322 180 53754
i k	2322 180 53102	30 k	2322 180 53303	820 k	2322 180 53624
1,1 k	2322 180 53112	33 k	2322 180 53333	910 k	2322 180 53914
1,2 k	2322 180 53122	36 k	2322 180 53363	1 M	2322 180 53105
1,3 k	2322 180 53132	39 k	2322 180 53393	1,2 M	2322 180 53125
1,5 k	2322 180 53152	43 k	2322 180 53433	1,5 M	2322 180 53155
1,6 k	2322 180 53162	47 k	2322 180 53473	1,8 M	2322 180 53185
1,8 k	2322 180 53182	51 k	2322 180 53513	2,2 M	2322 180 53225
2 k	2322 180 53202	56 k	2322 180 53563	2,7 M	2322 180 53275



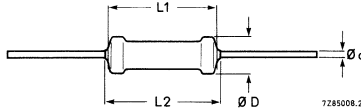
Standard film resistors (metal film) cont.: SFR25

For detailed information on these and other types see Data Handbook C13
 Standard packing: 5000 pieces, in box
 See page R4 for additional packing information

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
 Max. 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}	L1 _{max}	L2 _{max}	d	a ± 0,5	A ± 1,5	B ₁ -B ₂ ± max	S	T
mm	mm	mm	mm	mm	mm	mm	mm	
2,5	6,5	7,0	0,6	6	52,5	1,2	5	1 mm per 10 spaces

See page R4 for additional drawing with dimensions



Status = P

R _N Ω	catalogue number	R _N Ω	catalogue number	R _N Ω	catalogue number
O-Ohm	2322 181 90031	5,6	2322 181 43568	39	2322 181 43399
1	2322 181 43108	6,2	2322 181 43628	43	2322 181 43439
1,1	2322 181 43118	6,8	2322 181 43688	47	2322 181 43479
1,2	2322 181 43128	7,5	2322 181 43758	51	2322 181 43519
		8,2	2322 181 43828	56	2322 181 43569
1,3	2322 181 43138	9,1	2322 181 43918	62	2322 181 43629
1,5	2322 181 43158	10	2322 181 43109	68	2322 181 43689
1,6	2322 181 43168	11	2322 181 43119	75	2322 181 43759
1,8	2322 181 43188	12	2322 181 43129	82	2322 181 43829
2	2322 181 43208	13	2322 181 43139	91	2322 181 43919
2,2	2322 181 43228	15	2322 181 43159	100	2322 181 43101
2,4	2322 181 43248	16	2322 181 43169	110	2322 181 43111
2,7	2322 181 43278	18	2322 181 43189	120	2322 181 43121
3	2322 181 43308	20	2322 181 43209	130	2322 181 43131
3,3	2322 181 43338	22	2322 181 43229	150	2322 181 43151
3,6	2322 181 43368	24	2322 181 43249	160	2322 181 43161
3,9	2322 181 43398	27	2322 181 43279	180	2322 181 43181
4,3	2322 181 43438	30	2322 181 43309	200	2322 181 43201
4,7	2322 181 43478	33	2322 181 43339	220	2322 181 43221
5,1	2322 181 43518	36	2322 181 43369	240	2322 181 43241



Standard Film resistors (metal film) cont.: SFR25

For detailed information on these and other types see Data Handbook C13

Standard packing: 5000 pieces, in box

See page R4 for additional packing information

R _N Ω	catalogue number	R _N Ω	catalogue number	R _N Ω	catalogue number
270	2322 181 43271	7,5 k	2322 181 43752	220 k	2322 181 43224
300	2322 181 43301	8,2 k	2322 181 43822	240 k	2322 181 43244
330	2322 181 43331	9,1 k	2322 181 43912	270 k	2322 181 43274
360	2322 181 43361	10 k	2322 181 43103	300 k	2322 181 43304
390	2322 181 43391	11 k	2322 181 43113	330 k	2322 181 43334
430	2322 181 43431	12 k	2322 181 43123	360 k	2322 181 43364
470	2322 181 43471	13 k	2322 181 43133	390 k	2322 181 43394
510	2322 181 43511	15 k	2322 181 43153	430 k	2322 181 43434
560	2322 181 43561	16 k	2322 181 43163	470 k	2322 181 43474
620	2322 181 43621	18 k	2322 181 43183	510 k	2322 181 43514
680	2322 181 43681	20 k	2322 181 43203	560 k	2322 181 43564
750	2322 181 43751	22 k	2322 181 43223	620 k	2322 181 43624
820	2322 181 43821	24 k	2322 181 43243	680 k	2322 181 43684
910	2322 181 43911	27 k	2322 181 43273	750 k	2322 181 43754
1 k	2322 181 43102	30 k	2322 181 43303	820 k	2322 181 43824
1,1 k	2322 181 43112	33 k	2322 181 43333	910 k	2322 181 43914
1,2 k	2322 181 43122	36 k	2322 181 43363	1 M	2322 181 43105
1,3 k	2322 181 43132	39 k	2322 181 43393	1,2 M	2322 181 43125
1,5 k	2322 181 43152	43 k	2322 181 43433	1,5 M	2322 181 43155
1,6 k	2322 181 43162	47 k	2322 181 43473	1,8 M	2322 181 43185
1,8 k	2322 181 43182	51 k	2322 181 43513	2,2 M	2322 181 43225
2 k	2322 181 43202	56 k	2322 181 43563	2,7 M	2322 181 43275
2,2 k	2322 181 43222	62 k	2322 181 43623	3,3 M	2322 181 43335
2,4 k	2322 181 43242	68 k	2322 181 43683	3,9 M	2322 181 43395
2,7 k	2322 181 43272	75 k	2322 181 43753	4,7 M	2322 181 43475
3 k	2322 181 43302	82 k	2322 181 43823	5,6 M	2322 181 43565
3,3 k	2322 181 43332	91 k	2322 181 43913	6,8 M	2322 181 43685
3,6 k	2322 181 43362	100 k	2322 181 43104	8,2 M	2322 181 43825
3,9 k	2322 181 43392	110 k	2322 181 43114	10 M	2322 181 43106
4,3 k	2322 181 43432	120 k	2322 181 43124		
4,7 k	2322 181 43472	130 k	2322 181 43134		
5,1 k	2322 181 43512	150 k	2322 181 43154		
5,6 k	2322 181 43562	160 k	2322 181 43164		
6,2 k	2322 181 43622	180 k	2322 181 43184		
6,8 k	2322 181 43682	200 k	2322 181 43204		



For detailed information on these and other types see Data Handbook C12

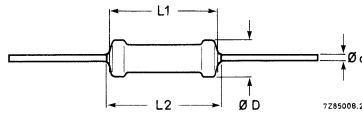
Standard packing: 5000 pieces, in box

See page R4 for additional packing information

Resistance range 1 Ω to 10 MΩ, tol. ± 1%, E48-series
 Temperature coefficient R < 4,99 Ω: < ± 100 x 10⁻⁶/K
 R > 4,99 Ω: < ± 50 x 10⁻⁶/K
 Max. dissipation at T_{amb} = 70 °C 0,6 W
 Noise < 0,1 μV/V
 Limiting voltage, r.m.s. 250 V

D _{max} mm	L _{max} mm	d mm	a ± 0,5 mm	A ± 1,5 mm	B ₁ - B ₂ ± max mm	S mm	T
2,5	7,0	0,6	6	52,4	1,2	5	1 mm per 10 spaces

See page R4 for additional drawing with dimensions



Status = P

R _N Ω	catalogue number	R _N Ω	catalogue number	R _N Ω	catalogue number
1,00	2322 156 21008	2,37	2322 156 22378	6,19	2322 156 26198
1,05	2322 156 21058	2,49	2322 156 22498	6,49	2322 156 26498
1,10	2322 156 21108	2,61	2322 156 22618	6,81	2322 156 26818
1,15	2322 156 21158	2,74	2322 156 22748	7,15	2322 156 27158
1,21	2322 156 21218	2,87	2322 156 22878	7,50	2322 156 27508
1,27	2322 156 21278	3,01	2322 156 23018	7,87	2322 156 27878
1,33	2322 156 21338	3,16	2322 156 23168	8,25	2322 156 28258
1,40	2322 156 21408	3,32	2322 156 23328	8,66	2322 156 28668
1,47	2322 156 21478	3,48	2322 156 23488	9,09	2322 156 29098
1,50	2322 156 21508	3,65	2322 156 23568	9,53	2322 156 29538
1,54	2322 156 21548	3,83	2322 156 23838	10,0	2322 156 21009
1,62	2322 156 21628	4,02	2322 156 24028	10,5	2322 156 21059
1,69	2322 156 21698	4,22	2322 156 24228	11,0	2322 156 21109
1,78	2322 156 21788	4,42	2322 156 24428	11,5	2322 156 21159
1,87	2322 156 21878	4,64	2322 156 24648	12,1	2322 156 21219
1,96	2322 156 21968	4,87	2322 156 24878	12,7	2322 156 21279
2,00	2322 156 22008	5,11	2322 156 25118	13,3	2322 156 21339
2,05	2322 156 22058	5,36	2322 156 25368	14,0	2322 156 21409
2,15	2322 156 22158	5,62	2322 156 25628	14,7	2322 156 21479
2,26	2322 156 22268	5,90	2322 156 25908	15,4	2322 156 21549



Metal film resistors (cont.): MRS25

For detailed information on these and other types see Data Handbook C12

Standard packing: 5000 pieces, in box

See page R4 for additional packing information

R_N Ω	catalogue number	R_N Ω	catalogue number	R_N Ω	catalogue number
16,2	2322 156 21629	140	2322 156 21401	1,21 k	2322 156 21212
16,9	2322 156 21699	147	2322 156 21471	1,27 k	2322 156 21272
17,8	2322 156 21789	154	2322 156 21541	1,33 k	2322 156 21332
18,7	2322 156 21879	162	2322 156 21621	1,40 k	2322 156 21402
19,6	2322 156 21969	169	2322 156 21691	1,47 k	2322 156 21472
20,5	2322 156 22059	178	2322 156 21781	1,54 k	2322 156 21542
21,5	2322 156 22159	187	2322 156 21871	1,62 k	2322 156 21622
22,6	2322 156 22269	196	2322 156 21961	1,69 k	2322 156 21692
23,7	2322 156 22379	205	2322 156 22051	1,78 k	2322 156 21782
24,9	2322 156 22499	215	2322 156 22151	1,87 k	2322 156 21872
26,1	2322 156 22619	226	2322 156 22261	1,96 k	2322 156 21962
27,4	2322 156 22749	237	2322 156 22371	2,05 k	2322 156 22052
28,7	2322 156 22879	249	2322 156 22491	2,15 k	2322 156 22152
30,1	2322 156 23019	261	2322 156 22611	2,26 k	2322 156 22262
31,6	2322 156 23169	274	2322 156 22741	2,37 k	2322 156 22372
33,2	2322 156 23329	287	2322 156 22871	2,49 k	2322 156 22492
34,8	2322 156 23489	301	2322 156 23011	2,61 k	2322 156 22612
36,5	2322 156 23659	316	2322 156 23161	2,74 k	2322 156 22742
38,3	2322 156 23839	332	2322 156 23321	2,87 k	2322 156 22872
40,2	2322 156 24029	348	2322 156 23481	3,01 k	2322 156 23012
42,2	2322 156 24229	365	2322 156 23651	3,16 k	2322 156 23162
44,2	2322 156 24429	383	2322 156 23831	3,32 k	2322 156 23322
46,4	2322 156 24649	402	2322 156 24021	3,48 k	2322 156 23482
48,7	2322 156 24879	422	2322 156 24221	3,65 k	2322 156 23652
51,1	2322 156 25119	442	2322 156 24421	3,83 k	2322 156 23832
53,6	2322 156 25369	464	2322 156 24641	4,02 k	2322 156 24022
56,2	2322 156 25629	487	2322 156 24871	4,22 k	2322 156 24222
59,0	2322 156 25909	511	2322 156 25111	4,42 k	2322 156 24422
61,9	2322 156 26199	536	2322 156 25361	4,64 k	2322 156 24642
64,9	2322 156 26499	562	2322 156 25621	4,87 k	2322 156 24872
68,1	2322 156 26819	590	2322 156 25901	5,11 k	2322 156 25112
71,5	2322 156 27159	619	2322 156 26191	5,36 k	2322 156 25362
75,0	2322 156 27509	649	2322 156 26491	5,62 k	2322 156 25622
78,7	2322 156 27879	681	2322 156 26811	5,90 k	2322 156 25902
82,5	2322 156 28259	715	2322 156 27151	6,19 k	2322 156 26192
86,6	2322 156 28669	750	2322 156 27501	6,49 k	2322 156 26492
90,9	2322 156 29099	787	2322 156 27871	6,81 k	2322 156 26812
95,3	2322 156 29539	825	2322 156 28251	7,15 k	2322 156 27152
100	2322 156 21001	866	2322 156 28661	7,50 k	2322 156 27502
105	2322 156 21051	909	2322 156 29091	7,87 k	2322 156 27872
110	2322 156 21101	953	2322 156 29531	8,25 k	2322 156 28252
115	2322 156 21151	1,00 k	2322 156 21002	8,66 k	2322 156 28662
121	2322 156 21211	1,05 k	2322 156 21052	9,09 k	2322 156 29092
127	2322 156 21271	1,10 k	2322 156 21102	9,53 k	2322 156 29532
133	2322 156 21331	1,15 k	2322 156 21152	10,0 k	2322 156 21003



Metal film resistors (cont.): MRS25

For detailed information on these and other types see Data Handbook C12

Standard packing: 5000 pieces, in box

See page R4 for additional packing information

R _N Ω	catalogue number	R _N Ω	catalogue number	R _N Ω	catalogue number
10,5 k	2322 156 21053	90,9 k	2322 156 29093	787 k	2322 156 27874
11,0 k	2322 156 21103	95,3 k	2322 156 29533	825 k	2322 156 28254
11,5 k	2322 156 21153	100 k	2322 156 21004	866 k	2322 156 28664
12,1 k	2322 156 21213	105 k	2322 167 21054	909 k	2322 156 29094
12,7 k	2322 156 21273	110 k	2322 156 21104	953 k	2322 156 29534
13,3 k	2322 156 21333	115 k	2322 156 21154	1,00 M	2322 156 21005
14,0 k	2322 156 21403	121 k	2322 156 21214		
14,7 k	2322 156 21473	127 k	2322 156 21274		
15,4 k	2322 156 21543	133 k	2322 156 21334		
16,2 k	2322 156 21623	140 k	2322 156 21404		
16,9 k	2322 156 21693	147 k	2322 156 21474		
17,8 k	2322 156 21783	154 k	2322 156 21544		
18,7 k	2322 156 21873	162 k	2322 156 21624		
19,6 k	2322 156 21963	169 k	2322 156 21694		
20,5 k	2322 156 22053	178 k	2322 156 21784		
21,5 k	2322 156 22153	187 k	2322 156 21964		
22,6 k	2322 156 22263	196 k	2322 156 21964		
23,7 k	2322 156 22373	205 k	2322 156 22054		
24,9 k	2322 156 22493	215 k	2322 156 22154		
26,1 k	2322 156 22613	226 k	2322 156 22264		
27,4 k	2322 156 22743	237 k	2322 156 22374		
28,7 k	2322 156 22873	249 k	2322 156 22494		
30,1 k	2322 156 23013	261 k	2322 156 22614		
31,6 k	2322 156 23163	274 k	2322 156 22744		
33,2 k	2322 156 23323	287 k	2322 156 22874		
34,8 k	2322 156 23483	301 k	2322 156 23014		
36,5 k	2322 156 23653	316 k	2322 156 23164		
38,3 k	2322 156 23833	332 k	2322 156 23324		
40,2 k	2322 156 24023	348 k	2322 156 23484		
42,2 k	2322 156 24223	365 k	2322 156 23654		
44,2 k	2322 156 24423	383 k	2322 156 23834		
46,4 k	2322 156 24643	402 k	2322 156 24024		
48,7 k	2322 156 24873	422 k	2322 156 24224		
51,1 k	2322 156 25113	442 k	2322 156 24424		
53,6 k	2322 156 25363	464 k	2322 156 24644		
56,2 k	2322 156 25623	487 k	2322 156 24874		
59,0 k	2322 156 25903	511 k	2322 156 25114		
61,9 k	2322 156 26193	536 k	2322 156 25364		
64,9 k	2322 156 26493	562 k	2322 156 25624		
68,1 k	2322 156 26813	590 k	2322 156 25904		
71,5 k	2322 156 27153	619 k	2322 156 26194		
75,0 k	2322 156 27503	649 k	2322 156 26494		
78,7 k	2322 156 27873	681 k	2322 156 26814		
82,5 k	2322 156 28253	715 k	2322 156 27154		
86,6 k	2322 156 28663	750 k	2322 156 27504		



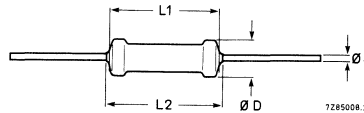
Metal film resistors (cont.): MRS25

For detailed information on these and other types see Data Handbook C12
 Standard packing: 5000 pieces, in box
 See page R4 for additional packing information

Resistance range 1 Ω to 1 MΩ, tol. ± 1%, E24-series
 Temperature coefficient R < 4,99 Ω: < ± 100 x 10⁻⁶/K
 R > 4,99 Ω: < ± 50 x 10⁻⁶/K
 Max. dissipation at T_{amb} = 70 °C 0,6 W
 Noise < 0,1 μV/V
 Limiting voltage, r.m.s. 250 V

D _{max}	L _{max}	d	a ± 0,5 mm	A ± 1,5 mm	B ₁ - B ₂ ± max mm	S	T
2,5	7,0	0,6	6	52,4	1,2	5	1 mm per 10 spaces

See page R4 for additional drawing with dimensions



Status = P

R _N Ω	catalogue number	R _N Ω	catalogue number	R _N Ω	catalogue number
1	2322 156 21008	6,8	2322 156 26808	47	2322 156 24709
1,1	2322 156 21108	7,5	2322 156 27508	51	2322 156 25109
1,2	2322 156 21208	8,2	2322 156 28208	56	2322 156 25609
1,3	2322 156 21308	9,1	2322 156 29108	62	2322 156 26209
1,5	2322 156 21508	10	2322 156 21009	68	2322 156 26809
1,6	2322 156 21608	11	2322 156 21109	75	2322 156 27509
1,8	2322 156 21808	12	2322 156 21209	82	2322 156 28209
2	2322 156 22008	13	2322 156 21309	91	2322 156 29109
2,2	2322 156 22208	15	2322 156 21509	100	2322 156 20001
2,4	2322 156 22408	16	2322 156 21609	110	2322 156 21101
2,7	2322 156 22708	18	2322 156 21809	120	2322 156 21201
3	2322 156 23008	20	2322 156 22009	130	2322 156 21301
3,3	2322 156 23308	22	2322 156 22209	150	2322 156 21501
3,6	2322 156 23608	24	2322 156 22409	160	2322 156 21601
3,9	2322 156 23908	27	2322 156 22709	180	2322 156 21801
4,3	2322 156 24308	30	2322 156 23009	200	2322 156 20001
4,7	2322 156 24708	33	2322 156 23309	220	2322 156 22201
5,1	2322 156 25108	36	2322 156 23609	240	2322 156 22401
5,6	2322 156 25608	39	2322 156 23909	270	2322 156 22701
6,2	2322 156 26208	43	2322 156 24309	300	2322 156 23001

Metal film resistors (cont.): MRS25

For detailed information on these and other types see Data Handbook C12
 Standard packing: 5000 pieces, in box
 See page R4 for additional packing information

R_N Ω	catalogue number	R_N Ω	catalogue number	R_N Ω	catalogue number
330	2322 156 23301	5,6 k	2322 156 25602	100 k	2322 156 21004
360	2322 156 23601	6,2 k	2322 156 26202	110 k	2322 156 21104
390	2322 156 23901	6,8 k	2322 156 26802	120 k	2322 156 21204
430	2322 156 24301	7,5 k	2322 156 27502	130 k	2322 156 21304
470	2322 156 24701	8,2 k	2322 156 28202	150 k	2322 156 21504
510	2322 156 25101	9,1 k	2322 156 29102	160 k	2322 156 21604
560	2322 156 25601	10 k	2322 156 21003	180 k	2322 156 21804
620	2322 156 26201	11 k	2322 156 21103	200 k	2322 156 22004
680	2322 156 26801	12 k	2322 156 21203	220 k	2322 156 22204
750	2322 156 27501	13 k	2322 156 21303	240 k	2322 156 22404
820	2322 156 28201	15 k	2322 156 21503	270 k	2322 156 22704
910	2322 156 29101	16 k	2322 156 21603	300 k	2322 156 23004
1 k	2322 156 21002	18 k	2322 156 21803	330 k	2322 156 23304
1,1 k	2322 156 21102	20 k	2322 156 22003	360 k	2322 156 23604
1,2 k	2322 156 21202	22 k	2322 156 22203	390 k	2322 156 23904
1,3 k	2322 156 21302	24 k	2322 156 22403	430 k	2322 156 24304
1,5 k	2322 156 21502	27 k	2322 156 22703	470 k	2322 156 24704
1,6 k	2322 156 21602	30 k	2322 156 23003	510 k	2322 156 25104
1,8 k	2322 156 21802	33 k	2322 156 23303	560 k	2322 156 25604
2 k	2322 156 22002	36 k	2322 156 23603	620 k	2322 156 26204
2,2 k	2322 156 22202	39 k	2322 156 23903	680 k	2322 156 26804
2,4 k	2322 156 22402	43 k	2322 156 24303	750 k	2322 156 27504
2,7 k	2322 156 22702	47 k	2322 156 24703	820 k	2322 156 28204
3 k	2322 156 23002	51 k	2322 156 25103	910 k	2322 156 29104
3,3 k	2322 156 23302	56 k	2322 156 25603	1 M	2322 156 21005
3,6 k	2322 156 23602	62 k	2322 156 26203		
3,9 k	2322 156 23902	68 k	2322 156 26803		
4,3 k	2322 156 24302	75 k	2322 156 27503		
4,7 k	2322 156 24702	82 k	2322 156 28203		
5,1 k	2322 156 25102	91 k	2322 156 29103		



FIXED RESISTORS

Power metal film resistors: PR37

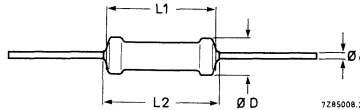
For detailed information on these and other types see Data Handbook C12
 Standard packing: 1000 pieces, in box
 See page R4 for additional packing information

Resistance range 1Ω to $1 \text{ M}\Omega$, tol. $\pm 5\%$, E12-series
 Max. body temperature (hot spot) 300°C
 Dissipation at $T_{\text{amb}} = 70^\circ\text{C}$
 $R < 27 \text{ k}\Omega$: 1,6 W
 $R > 27 \text{ k}\Omega$: 1,2 W

Limiting voltage, r.m.s. 500 V

D_{max}	$L1_{\text{max}}$	$L2_{\text{max}}$	d	a $\pm 0,5$	A $\pm 1,5$	$B_1 - B_2$ $\pm \text{max}$	S	T
mm	mm	mm	mm	mm	mm	mm	mm	
3,9	10,0	11,0	0,6	6	73,0	1,2	5	1 mm per 10 spaces

See page R4 for additional drawing with dimensions



Status = P

R_N Ω	catalogue number	R_N Ω	catalogue number	R_N Ω	catalogue number
1,0	2322 191 31008	120	2322 191 31201	15 k	2322 191 31503
1,2	2322 191 31208	150	2322 191 31501	18 k	2322 191 31803
1,5	2322 191 31508	180	2322 191 31801	22 k	2322 191 32203
1,8	2322 191 31808	220	2322 191 32201	27 k	2322 191 32703
2,2	2322 191 32208	270	2322 191 32701	33 k	2322 191 33303
2,7	2322 191 32708	330	2322 191 33301	39 k	2322 191 33903
3,3	2322 191 33308	390	2322 191 33901	47 k	2322 191 34703
3,9	2322 191 33908	470	2322 191 34701	56 k	2322 191 35603
4,7	2322 191 34708	560	2322 191 35601	68 k	2322 191 36803
5,6	2322 191 35608	680	2322 191 36801	82 k	2322 191 38203
6,8	2322 191 36808	820	2322 191 38201	100 k	2322 191 31004
8,2	2322 191 38208	1 k	2322 191 31002	120 k	2322 191 31204
10	2322 191 31009	1,2 k	2322 191 31202	150 k	2322 191 31504
12	2322 191 31209	1,5 k	2322 191 31502	180 k	2322 191 31804
15	2322 191 31509	1,8 k	2322 191 31802	220 k	2322 191 32204
18	2322 191 31809	2,2 k	2322 191 32202	270 k	2322 191 32704
22	2322 191 32209	2,7 k	2322 191 32702	330 k	2322 191 33304
27	2322 191 32709	3,3 k	2322 191 33302	390 k	2322 191 33904
33	2322 191 33309	3,9 k	2322 191 33902	470 k	2322 191 34704
39	2322 191 33909	4,7 k	2322 191 34702	560 k	2322 191 35604
47	2322 191 34709	5,6 k	2322 191 35602	680 k	2322 191 36804
56	2322 191 35609	6,8 k	2322 191 36802	820 k	2322 191 38204
68	2322 191 36809	8,2 k	2322 191 38202	1 M	2322 191 31005
82	2322 191 38209	10 k	2322 191 31003		
100	2322 191 31001	12 k	2322 191 31203		



Electronic components and materials

PHILIPS

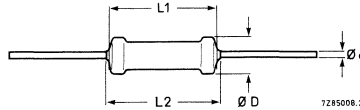
Power metal film resistors (cont.): PR52

For detailed information on these and other types see Data Handbook C12
 Standard packing: 500 pieces, in box
 See page R4 for additional packing information

Resistance range 1 Ω to 1 MΩ, tol. ± 5%, E12-series
 Max. body temperature (hot spot) 300 °C
 Dissipation at T_{amb} = 70 °C R < 51 kΩ: 2,5 W
 R > 51 kΩ: 2,0 W
 Limiting voltage, r.m.s. 750 V

D _{max}	L1 _{max}	L2 _{max}	d	a	A	B ₁ - B ₂	S	T
mm	mm	mm	mm	± 0,5 mm	± 1,5 mm	± max mm	mm	
5,2	16,7	17,9	0,6	6	80,0	1,2	10	1 mm per 10 spaces

See page R4 for additional drawing with dimensions



Status = P

R _N Ω	catalogue number	R _N Ω	catalogue number	R _N Ω	catalogue number
1,0	2322 192 31008	120	2322 192 31201	15 k	2322 192 31503
1,2	2322 192 31208	150	2322 192 31501	18 k	2322 192 31803
1,5	2322 192 31508	180	2322 192 31801	22 k	2322 192 32203
1,8	2322 192 31808	220	2322 192 32201	27 k	2322 192 32703
2,2	2322 192 32208	270	2322 192 32701	33 k	2322 192 33303
2,7	2322 192 32708	330	2322 192 33301	39 k	2322 192 33903
3,3	2322 192 33308	390	2322 192 33901	47 k	2322 192 34703
3,9	2322 192 33908	470	2322 192 34701	56 k	2322 192 35603
4,7	2322 192 34708	560	2322 192 35601	68 k	2322 192 36803
5,6	2322 192 35608	680	2322 192 36801	82 k	2322 192 38203
6,8	2322 192 36808	820	2322 192 38201	100 k	2322 192 31004
8,2	2322 192 38208	1 k	2322 192 31002	120 k	2322 192 31204
10	2322 192 31009	1,2 k	2322 192 31202	150 k	2322 192 31504
12	2322 192 31209	1,5 k	2322 192 31502	180 k	2322 192 31804
15	2322 192 31509	1,8 k	2322 192 31802	220 k	2322 192 32204
18	2322 192 31809	2,2 k	2322 192 32202	270 k	2322 192 32704
22	2322 192 32209	2,7 k	2322 192 32702	330 k	2322 192 33304
27	2322 192 32709	3,3 k	2322 192 33302	390 k	2322 192 33904
33	2322 192 33309	3,9 k	2322 192 33902	470 k	2322 192 34704
39	2322 192 33909	4,7 k	2322 192 34702	560 k	2322 192 35604
47	2322 192 34709	5,6 k	2322 192 35602	680 k	2322 192 36804
56	2322 192 35609	6,8 k	2322 192 36802	820 k	2322 192 38204
68	2322 192 36809	8,2 k	2322 192 38202	1 M	2322 192 31005
82	2322 192 38209	10 k	2322 192 31003		
100	2322 192 31001	12 k	2322 192 31203		



Cemented wirewound resistors: AC04, AC05, AC07

For detailed information on these and other types see Data Handbook C12

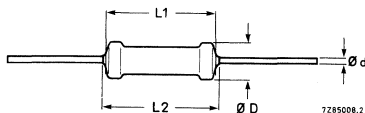
Standard packing: 500 pieces, in box

See page R4 for additional packing information

Resistance range	0,1 Ω to 8,2 Ω, tol. ± 10%, E6-series
	10 Ω to 10 kΩ, tol. ± 5%, E6-series
Max. body temperature	350 °C
Dissipation at T _{amb} = 40 °C	AC 04 4W
	AC 05 5W
	AC 07 7W

type	D _{max} mm	L _{max} mm	d mm	a ± 0,5 mm	A ± 1,5 mm	B ₁ - B ₂ ± max mm	S mm	T
AC04	6	19	0,6	5 or 6	66	1,2	10	1 mm per 10 spaces
AC05	8	19	0,8	6	66	1,2	10	
AC07	8	27	0,8	6	74	1,2	10	

See page R4 for additional drawing with dimensions

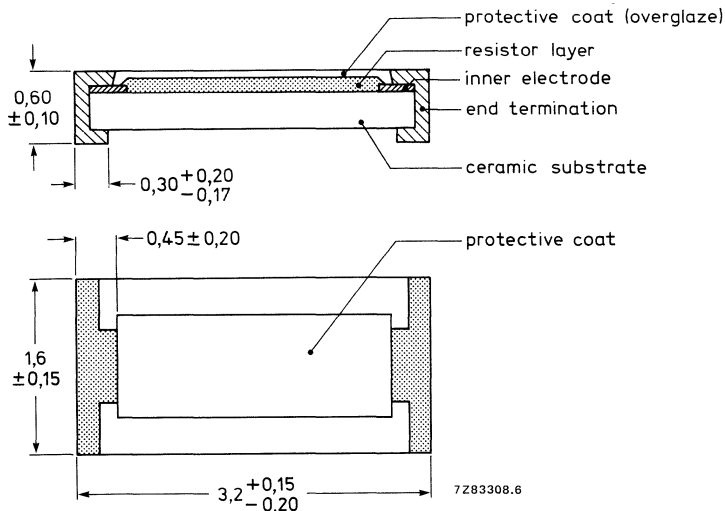


Status = P

R _N Ω	tolerance %	AC04 cat. number	AC05 cat. number	AC07 cat. number
0,1	10	2322 329 34107	2322 329 35107	2322 329 37107
0,15	10	2322 329 34157	2322 329 35157	2322 329 37157
0,22	10	2322 329 34227	2322 329 35227	2322 329 37227
0,33	10	2322 329 34337	2322 329 35337	2322 329 37337
0,47	10	2322 329 34477	2322 329 35477	2322 329 37477
0,68	10	2322 329 34687	2322 329 35687	2322 329 37687
1	10	2322 329 34108	2322 329 35108	2322 329 37108
1,5	10	2322 329 34158	2322 329 35158	2322 329 37158
2,2	10	2322 329 34228	2322 329 35228	2322 329 37228
3,3	10	2322 329 34338	2322 329 35338	2322 329 37338
4,7	10	2322 329 34478	2322 329 35478	2322 329 37478
6,8	10	2322 329 34688	2322 329 35688	2322 329 37688
10	5	2322 329 04109	2322 329 05109	2322 329 07109
15	5	2322 329 04159	2322 329 05159	2322 329 07159
22	5	2322 329 04229	2322 329 05229	2322 329 07229
33	5	2322 329 04339	2322 329 05339	2322 329 07339
47	5	2322 329 04479	2322 329 05479	2322 329 07479
68	5	2322 329 04689	2322 329 05689	2322 329 07689
100	5	2322 329 04101	2322 329 05101	2322 329 07101
150	5	2322 329 04151	2322 329 05151	2322 329 07151
220	5	2322 329 04221	2322 329 05221	2322 329 07221
330	5	2322 329 04331	2322 329 05331	2322 329 07331
470	5	2322 329 04471	2322 329 05471	2322 329 07471
680	5	2322 329 04681	2322 329 05681	2322 329 07681
1 k	5	2322 329 04102	2322 329 05102	2322 329 07102

For detailed information on these and other types see Data Handbook C13
Standard packing: 4000, in blister, on reel
See page R21 for additional packing information

Resistance range: 1 Ω to 10 Ω, tol. ± 5%, E24-series and jumper (0 Ω)
Temperature coefficient: < ± 200.10⁻⁶K
Abs. max dissipation at T_{amb} = 70 °C: 0,25 W
Max permissible voltage: 200 V (r.m.s.)
Climatic category (IEC 68): 55/155/56
Basic specification: IEC 115-1



Status = P

R _N Ω	catalogue number	R _N Ω	catalogue number	R _N Ω	catalogue number
1,0	2322 712 30108	4,3	2322 712 30438	18	2322 712 30189
1,1	2322 712 30118	4,7	2322 712 30478	20	2322 712 30209
1,2	2322 712 30128	5,1	2322 712 30518	22	2322 712 30229
1,3	2322 712 30138	5,6	2322 712 30568	24	2322 712 30249
1,5	2322 712 30158	6,2	2322 712 30628	27	2322 712 30279
1,6	2322 712 30168	6,8	2322 712 30478	30	2322 712 30309
1,8	2322 712 30188	7,5	2322 712 30518	33	2322 712 30339
2,0	2322 712 30208	8,2	2322 712 30568	36	2322 712 30369
2,2	2322 712 30228	9,1	2322 712 30628	39	2322 712 30399
2,4	2322 712 30248	10	2322 712 30109	43	2322 712 30439
2,7	2322 712 30378	11	2322 712 30119	47	2322 712 30479
3,0	2322 712 30308	12	2322 712 30129	51	2322 712 30519
3,3	2322 712 30338	13	2322 712 30139	56	2322 712 30569
3,6	2322 712 30368	15	2322 712 30159	62	2322 712 30629
3,9	2322 712 30398	16	2322 712 30169	68	2322 712 30689

N.B. In the course of 1986 new preferred types will be introduced

For detailed information on these and other types see Data Handbook C13
Standard packing: 4000, in blister, on reel
See page R21 for additional packing information

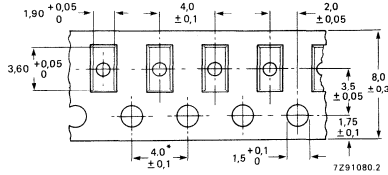
R_N Ω	catalogue number	R_N Ω	catalogue number	R_N Ω	catalogue number
75	2322 712 30759	5,6 k	2322 712 30562	430 k	2322 712 30434
82	2322 712 30829	6,2 k	2322 712 30622	470 k	2322 712 30474
91	2322 712 30919	6,8 k	2322 712 30682	510 k	2322 712 30514
100	2322 712 30101	7,5 k	2322 712 30752	560 k	2322 712 30564
110	2322 712 30111	8,2 k	2322 712 30822	620 k	2322 712 30624
120	2322 712 30121	9,1 k	2322 712 30912	680 k	2322 712 30684
130	2322 712 30131	10 k	2322 712 30103	750 k	2322 712 30754
150	2322 712 30151	11 k	2322 712 30113	820 k	2322 712 30824
160	2322 712 30161	12 k	2322 712 30123	910 k	2322 712 30914
180	2322 712 30181	13 k	2322 712 30133	1,0 M	2322 712 30105
200	2322 712 30201	15 k	2322 712 30153	1,1 M	2322 712 30105
220	2322 712 30221	16 k	2322 712 30163	1,2 M	2322 712 30125
240	2322 712 30241	18 k	2322 712 30183	1,3 M	2322 712 30135
270	2322 712 30271	20 k	2322 712 30203	1,5 M	2322 712 30155
300	2322 712 30301	22 k	2322 712 30223	1,6 M	2322 712 30165
330	2322 712 30331	24 k	2322 712 30243	1,8 M	2322 712 30185
360	2322 712 30361	27 k	2322 712 30273	2,0 M	2322 712 30205
390	2322 712 30391	30 k	2322 712 30303	2,2 M	2322 712 30225
430	2322 712 30431	33 k	2322 712 30333	2,4 M	2322 712 30245
470	2322 712 30471	36 k	2322 712 30363	2,7 M	2322 712 30275
510	2322 712 30511	39 k	2322 712 30393	3,0 M	2322 712 30308
560	2322 712 30561	43 k	2322 712 30433	3,3 M	2322 712 30338
620	2322 712 30621	47 k	2322 712 30473	3,6 M	2322 712 30368
680	2322 712 30681	51 k	2322 712 30513	3,9 M	2322 712 30398
750	2322 712 30751	56 k	2322 712 30563	4,3 M	2322 712 30438
820	2322 712 30821	62 k	2322 712 30623	4,7 M	2322 712 30478
910	2322 712 30911	68 k	2322 712 30683	5,1 M	2322 712 30518
1,0 k	2322 712 30102	75 k	2322 712 30753	5,6 M	2322 712 30568
1,1 k	2322 712 30112	82 k	2322 712 30823	6,2 M	2322 712 30628
1,2 k	2322 712 30122	91 k	2322 712 30913	6,8 M	2322 712 30478
1,3 k	2322 712 30132	100 k	2322 712 30104	7,5 M	2322 712 30518
1,5 k	2322 712 30152	110 k	2322 712 30114	8,2 M	2322 712 30568
1,6 k	2322 712 30162	120 k	2322 712 30124	9,1 M	2322 712 30628
1,8 k	2322 712 30182	130 k	2322 712 30134	10 M	2322 712 30109
2,0 k	2322 712 30202	150 k	2322 712 30154	0(jump.)	2322 712 90003
2,2 k	2322 712 30222	160 k	2322 712 30164		
2,4 k	2322 712 30242	180 k	2322 712 30184		
2,7 k	2322 712 30272	200 k	2322 712 30204		
3,0 k	2322 712 30302	220 k	2322 712 30224		
3,3 k	2322 712 30332	240 k	2322 712 30244		
3,6 k	2322 712 30362	270 k	2322 712 30274		
3,9 k	2322 712 30392	300 k	2322 712 30304		
4,3 k	2322 712 30432	330 k	2322 712 30334		
4,7 k	2322 712 30472	360 k	2322 712 30364		
5,1 k	2322 712 30512	390 k	2322 712 30394		

N.B. In the course of 1986 new preferred types will be introduced



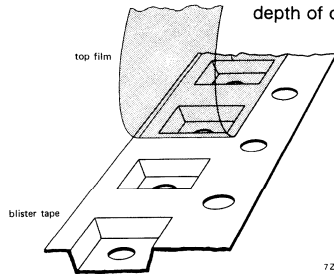
For complete details of RC-01 packaging see Data Handbook C13

Standard packaging for RC-01; blister tape on reel.



Cumulative pitch error : 0.2 mm over 10 pitches

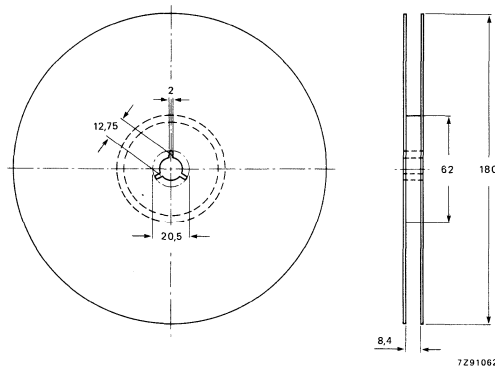
Blister tape



7291088



Reel



Electronic components and materials

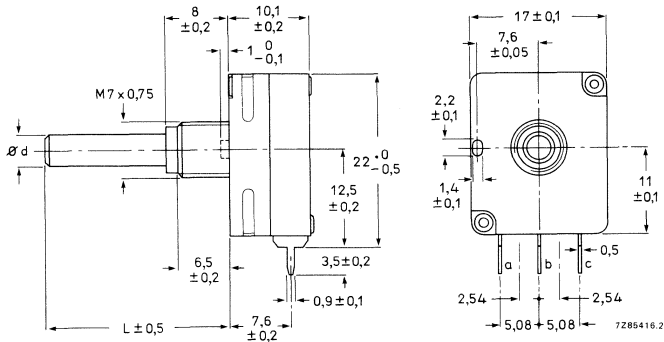
R21

PHILIPS

For detailed information see Data Handbook C12

Resistance range (E3-series):
 linear law 470 Ω to 1 MΩ
 logarithmic law 4,7 kΩ to 1 MΩ
 Maximum dissipation at $T_{amb} = 40\text{ °C}$:
 linear law 0,2 W
 logarithmic law 0,1 W
 Climatic category (IEC 68) 25/070/10
 Spindle material plastic

L (mm)	d (mm)
30	4
40	6

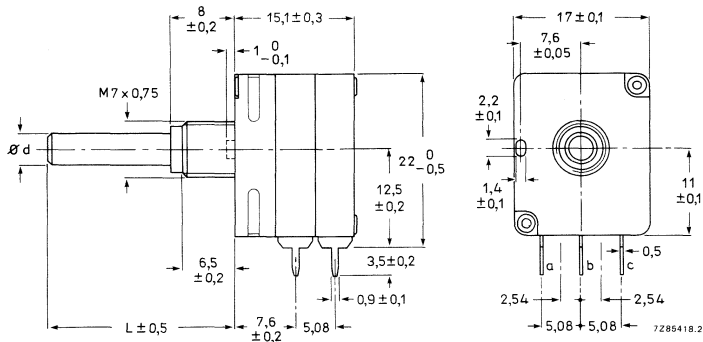


nominal resistance R_N	catalogue number spindle $\varnothing 4 \times 30$		catalogue number spindle $\varnothing 6 \times 40$	
	linear law	logarithmic law	linear law	logarithmic law
470 Ω	2322 501 02103		2322 501 90001	
1 kΩ	2322 501 02104		2322 501 90002	
2,2 kΩ	2322 501 02105		2322 501 90003	
4,7 kΩ	2322 501 02106	2322 501 02126	2322 501 90004	2322 501 90013
10 kΩ	2322 501 02107	2322 501 02127	2322 501 90005	2322 501 90014
22 kΩ	2322 501 02108	2322 501 02128	2322 501 90006	2322 501 90015
47 kΩ	2322 501 02109	2322 501 02129	2322 501 90007	2322 501 90016
100 kΩ	2322 501 02111	2322 501 02131	2322 501 90008	2322 501 90017
220 kΩ	2322 501 02112	2322 501 02132	2322 501 90009	2322 501 90018
470 kΩ	2322 501 02113	2322 501 02133	2322 501 90011	2322 501 90019
1 MΩ	2322 501 02114	2322 501 02134	2322 501 90012	2322 501 90021

For detailed information see Data Handbook C12

Resistance range (E3-series):	470 Ω to 1 MΩ
linear law	4,7 kΩ to 1 MΩ
logarithmic law	
Maximum dissipation at $T_{amb} = 40\text{ °C}$:	
linear law	0,2 W
logarithmic law	0,1 W
Ganging tolerance	2 dB

L (mm)	L1 (mm)	d (mm)
30	8	4

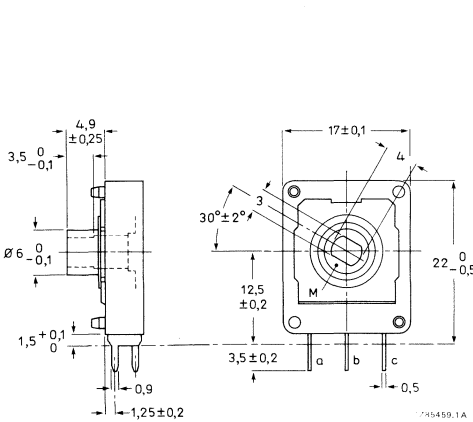


nominal resistance R_N	catalogue number	
	linear law	logarithmic law
470 Ω	2322 502 02103	
1 kΩ	2322 502 02104	
2,2 kΩ	2322 502 02105	
4,7 kΩ	2322 502 02106	2322 502 02126
10 kΩ	2322 502 02107	2322 502 02127
22 kΩ	2322 502 02108	2322 502 02128
47 kΩ	2322 502 02109	2322 502 02129
100 kΩ	2322 502 02111	2322 502 02131
220 kΩ	2322 502 02112	2322 502 02132
470 kΩ	2322 502 02113	2322 502 02133
1 MΩ	2322 502 02114	2322 502 02134

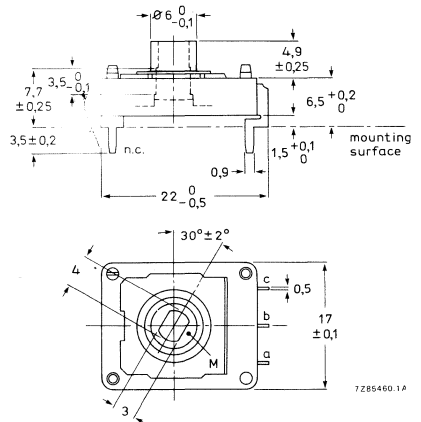


For detailed information see Data Handbook C12

Resistance range (E3-series) linear law 470 Ω to 1 MΩ
 Maximum dissipation at $T_{amb} = 40\text{ °C}$ 0,2 W
 Climatic category (IEC 68) 25/070/10



version V



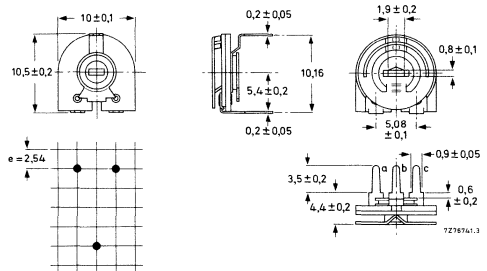
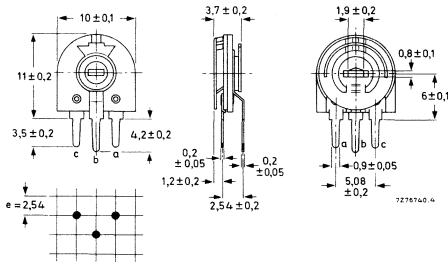
version H

nominal resistance R_N	catalogue number	catalogue number
	version V	version H
470 Ω	2322 500 00103	2322 500 00503
1 kΩ	2322 500 00104	2322 500 00504
2,2 kΩ	2322 500 00105	2322 500 00505
4,7 kΩ	2322 500 00106	2322 500 00506
10 kΩ	2322 500 00107	2322 500 00507
22 kΩ	2322 500 00108	2322 500 00508
47 kΩ	2322 500 00109	2322 500 00509
100 kΩ	2322 500 00111	2322 500 00511
220 kΩ	2322 500 00112	2322 500 00512
470 kΩ	2322 500 00113	2322 500 00513
1 MΩ	2322 500 00114	2322 500 00514

For detailed information see Data Handbook C12

Resistance range
Maximum dissipation at $T_{amb} = 40\text{ }^\circ\text{C}$
Climatic category, IEC 68

100 Ω to 4,7 M Ω , E 3-series
0,1 W
25/070/21



version V

version H

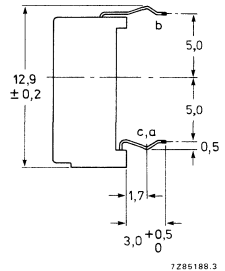
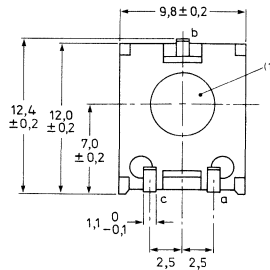
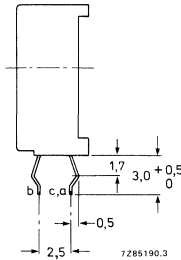
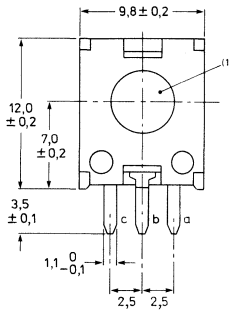
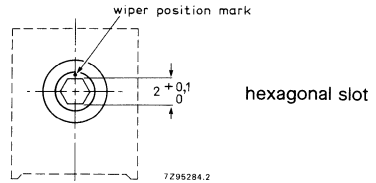
nominal resistance R_N	catalogue number	catalogue number
	version V	version H
100	2322 410 01151	2322 410 03351
200	2322 410 01152	2322 410 03352
330	2322 410 01169	2322 410 03369
470	2322 410 01153	2322 410 03353
1 k	2322 410 01154	2322 410 03354
2,2 k	2322 410 01155	2322 410 03355
4,7 k	2322 410 01156	2322 410 03356
10 k	2322 410 01157	2322 410 03357
22 k	2322 410 01158	2322 410 03358
47 k	2322 410 01159	2322 410 03359
100 k	2322 410 01161	2322 410 03361
220 k	2322 410 01162	2322 410 03362
470 k	2322 410 01163	2322 410 03363
1 M	2322 410 01164	2322 410 03364
2,2 M	2322 410 01165	2322 410 03365
4,7 M	2322 410 01166	2322 410 03366



For detailed information see Data Handbook C12

Resistance range, linear law
 Max. dissipation at $T_{amb} = 40\text{ }^{\circ}\text{C}$
 Tolerance
 Temperature coefficient
 Climatic category, IEC 68
 Bulk packaging

100 Ω to 4,7 M Ω , E 3-series
 0,1 W
 $\pm 20\%$
 $\pm 300 \cdot 10^{-6}/\text{K}$
 55/100/10



(1) = hexagonal slot

version V

version H

nominal resistance R_N	catalogue number	catalogue number
	version V hexagonal slot	version H hexagonal slot
100	2322 483 12101	2322 483 62101
220	2322 483 12221	2322 483 62221
470	2322 483 12471	2322 483 62471
1 k	2322 483 12102	2322 483 62102
2,2 k	2322 483 12222	2322 483 62222
4,7 k	2322 483 12472	2322 483 62472
10 k	2322 483 12103	2322 483 62103
22 k	2322 483 12223	2322 483 62223
47 k	2322 483 12473	2322 483 62473
100 k	2322 483 12104	2322 483 62104
220 k	2322 483 12224	2322 483 62224
470 k	2322 483 12474	2322 483 62474
1 M	2322 483 12105	2322 483 62105
2,2 M	2322 483 12225	2322 483 62225
4,7 M	2322 483 12475	2322 483 62475

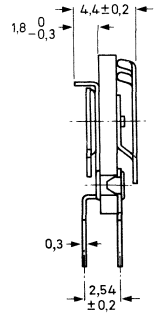
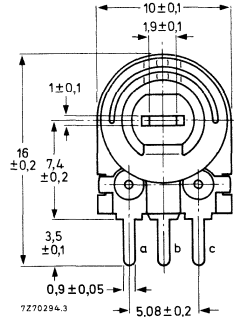
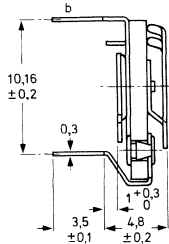
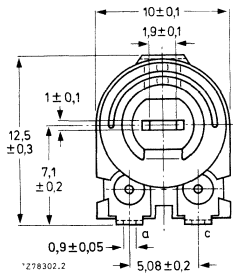


Electronic components and materials

For detailed information see Data Handbook C12

Resistance range
Max. dissipation at $T_{amb} = 40\text{ }^\circ\text{C}$
Tolerance
Temperature coefficient
Climatic category (IEC 68)

100 Ω to M7, E 3-series
0,5 W
 $\pm 20\%$
 $\pm 300 \cdot 10^{-6}/\text{K}$
55/125/56



version V

version H

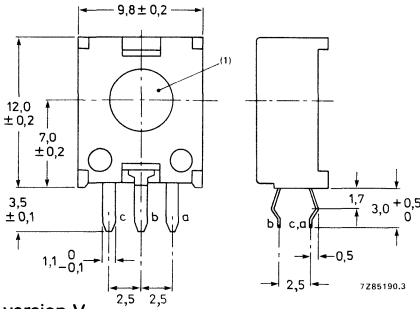
nominal resistance R_N	catalogue number	catalogue number
	version V	version H
100	2322 482 30101	2322 482 40101
220	2322 482 30221	2322 482 40221
470	2322 482 30471	2322 482 40471
1 k	2322 482 30102	2322 482 40102
2,2 k	2322 482 30222	2322 482 40222
4,7 k	2322 482 30472	2322 482 40472
10 k	2322 482 30103	2322 482 40103
22 k	2322 482 30223	2322 482 40223
47 k	2322 482 30473	2322 482 40473
100 k	2322 482 30104	2322 482 40104
220 k	2322 482 30224	2322 482 40224
470 k	2322 482 30474	2322 482 40474
1 M	2322 482 30105	2322 482 40105
2,2 M	2322 482 30225	2322 482 40225
4,7 M	2322 482 30475	2322 482 40475



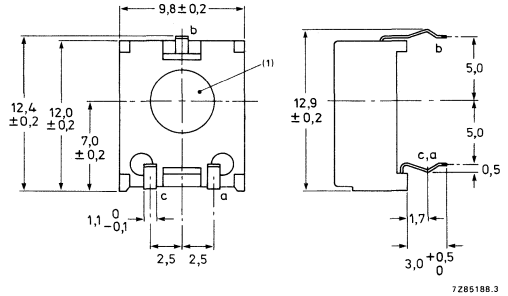
For detailed information see Data Handbook C12

Resistance range, linear
 Max. dissipation at $T_{amb} = 40\text{ }^{\circ}\text{C}$
 Tolerance
 Temperature coefficient
 Climatic category IEC 68
 Rail packaging

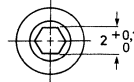
100 Ω to 10 M Ω , E 3-series
 0,5 W
 $\pm 10\%$
 $\pm 300 \cdot 10^{-6}/\text{K}$
 55/125/56



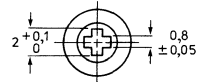
version V



version H



hexagonal slot



cross slot

(1) = either hexagonal slot or cross slot

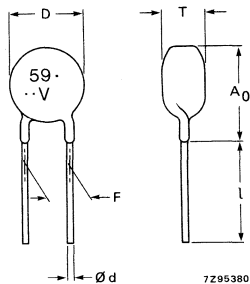
nominal resistance R_N	catalogue number (version V)		catalogue number (version H)	
	hexagonal slot	cross slot	hexagonal slot	cross slot
100	2322 484 17101	2322 484 27101	2322 484 67101	2322 484 77101
220	2322 484 17221	2322 484 27221	2322 484 67221	2322 484 77221
470	2322 484 17471	2322 484 27471	2322 484 67471	2322 484 77471
1 k	2322 484 17102	2322 484 27102	2322 484 67102	2322 484 77102
2,2 k	2322 484 17222	2322 484 27222	2322 484 67222	2322 484 77222
4,7 k	2322 484 17472	2322 484 27472	2322 484 67472	2322 484 77472
10 k	2322 484 17103	2322 484 27103	2322 484 67103	2322 484 77103
22 k	2322 484 17223	2322 484 27223	2322 484 67223	2322 484 77223
47 k	2322 484 17473	2322 484 27473	2322 484 67473	2322 484 77473
100 k	2322 484 17104	2322 484 27104	2322 484 67104	2322 484 77104
220 k	2322 484 17224	2322 484 27224	2322 484 67224	2322 484 77224
470 k	2322 484 17474	2322 484 27474	2322 484 67474	2322 484 77474
1 M	2322 484 17105	2322 484 27105	2322 484 67105	2322 484 77105
2,2 M	2322 484 17225	2322 484 27225	2322 484 67225	2322 484 77225
4,7 M	2322 484 17475	2322 484 27475	2322 484 67475	2322 484 77475
10 M	2322 484 17106	2322 484 27106	2322 484 67106	2322 484 77106

For detailed information on these and other types see Data Handbook C11

Max. a.c. voltage (r.m.s.)	30 to 460 V
Max. d.c. voltage	38 to 615 V
Max. non-repetitive transient current (8/20 μ s)	100 to 4500 A
Climatic category	40/125/56
Specification	based CECC 42000
Packaging	in bulk (592 and 593 also on tape on reel)

Table 1 Dimensions in mm

series	D max.	T max.	A ₀ max.	l min.	d $\pm 10\%$	F
2322 592	7	7	11	20	0,6	5,00 +0,8 -0,2
2322 593	9	7	13	19	0,6	5,00 +0,8 -0,2
2322 594	12,5	7	16	17	0,8	7,62 ± 1
2322 595	16	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 C11

catalogue number	maximum continuous voltage		voltage at 1 mA		max. voltage at current (8 x 20 µs)		max. energy 10 x 1000 µs J	max. non rep. surge current 8 x 20 µs A	typical capacitance at 1 KHz pF	
	V r.m.s.	V d.c.	V min	V max	V	A				
2322 592 53006	30	38	42	52	96	1	0,5	100	1000	
2322 593 53006					93	2,5	0,8			250
2322 594 53006					93	5	1,5			500
2322 595 53006					90	10	3,1			1000
2322 592 53506	35	45	50	62	123	1	0,6	100	850	
2322 593 53506					115	2,5	1,0			250
2322 594 53506					110	5	2,1			500
2322 595 53506					105	10	3,8			1000
2322 592 54006	40	56	61	75	145	1	0,8	100	700	
2322 593 54006					135	2,5	1,3			250
2322 594 54006					130	5	2,5			500
2322 595 54006					130	10	5,0			1000
2322 592 55006	50	65	74	90	145	5	2,4	400	500	
2322 593 55006					140	10	4,1			1200
2322 594 55006					140	25	6,5			2500
2322 595 55006					140	50	10,5			4500
2322 592 56006	60	85	90	110	165	5	2,7	400	330	
2322 593 56006					165	10	4,6			1200
2322 594 56006					165	25	8			2500
2322 595 56006					165	50	12			4500
2322 592 57506	75	100	108	132	190	5	3,5	400	270	
2322 593 57506					200	10	5,5			1200
2322 594 57506					200	25	10			2500
2322 595 57506					200	50	14			4500
2322 592 59506	95	125	135	165	230	5	4	400	220	
2322 593 59506					250	10	7			1200
2322 594 59506					250	25	12			2500
2322 595 59506					250	50	19			4500
2322 592 51316	130	170	185	225	310	5	5,5	400	150	
2322 593 51316					340	10	9,5			1200
2322 594 51316					340	25	16			2500
2322 595 51316					380	50	26			4500



Epoxy series 2322 592 to 595 (cont.)

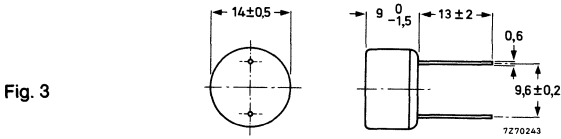
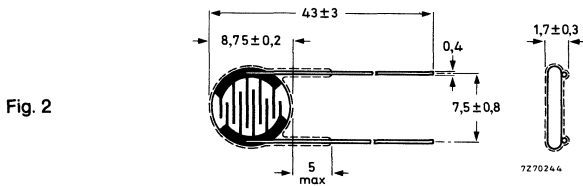
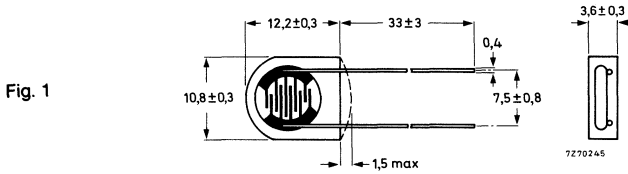
For detailed information on these and other types see Data Handbook C11

catalogue number	maximum continuous voltage		voltage at 1 mA		max. voltage at current (8 x 20 µs)		max. energy 10 x 1000 µs J	max. non rep. surge current 8 x 20 µs A	typical capacitance at 1 KHz pF		
	V r.m.s.	V d.c.	V min	V max							
					V	A					
2322 592 51516	150	200	216	264	395	5	6,5	400	130		
2322 593 51516					400	10				11	
2322 594 51516					400	25				18	2500
2322 595 51516					400	50				30	4500
2322 592 51716	175	225	247	303	410	5	7	400	110		
2322 593 51716					455	10				13	1200
2322 594 51716					455	25				22	2500
2322 595 51716					455	50				35	4500
2322 592 52316	230	300	324	396	560	5	9	400	90		
2322 593 52316					600	10				16	1200
2322 594 52316					600	25				29	2500
2322 595 52316					600	50				48	4500
2322 592 52516	250	320	351	429	600	5	10	400	80		
2322 593 52516					650	10				18	1200
2322 594 52516					650	25				32	2500
2322 595 52516					650	50				51	4500
2322 592 52716	275	350	387	473	695	5	11	400	80		
2322 593 52716					710	10				20	1200
2322 594 52716					710	25				35	2500
2322 595 52716					710	50				56	4500
2322 592 53016	300	385	423	517	750	5	12	400	70		
2322 593 53016					800	10				22	1200
2322 594 53016					800	25				38	2500
2322 595 53016					800	50				61	4500
2322 592 54216	420	560	612	748	1100	5	17	400	60		
2322 593 54216					1120	10				30	1200
2322 594 54216					1120	25				54	2500
2322 595 54216					1120	50				93	4500
2322 592 54616	460	615	675	825	1200	5	20	400	50		
2322 593 51316					1250	10				32	1200
2322 594 51316					1240	25				59	2500
2322 595 51316					1240	50				102	4500



For detailed information on these and other types see Data Handbook C11

Dark resistance R_D	$> 10 \text{ M}\Omega$
Light resistance R_L	30 to 300 Ω
Recovery rate	$> 200 \text{ k}\Omega/\text{s}$
Max. dissipation at 40 °C	0,2 W
Temperature range	-20 to +60 °C



status = P cat. number	resistance		recovery time k Ω /s	fig.	max. dissipation at 40 °C W
	dark R_D Ω	light R_L Ω			
2322 600 93001	min. 10 M	75 to 300	> 200	1	0,1
2322 600 94001	min. 10 M	75 to 300	> 200	2	0,1
2322 600 95001	min. 10 M	75 to 300	> 200	3	0,2
2322 600 95003	min. 10 M	max. 250	> 200	3	0,2

For details of these and other types see Data Handbook C11

Resistance at +25 °C	10-22-47-100 kΩ
B _{25/85}	3560 to 39900 K
Max. dissipation	25 mW
Dissipation factor	0,8/1,2 mW/K
Thermal time constant	7,5 to 10 s
Tolerance	± 5%*, ± 10%

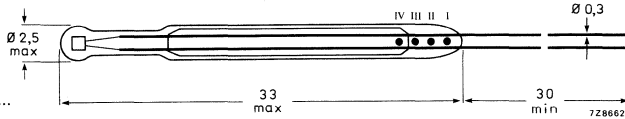


Fig. 1 2322 626 1....

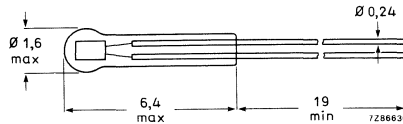


Fig. 2 2322 626 2....

status = P						
cat. number	R ₂₅ kΩ	tolerance* %	thermal time constant s	B _{25/85} K	temperature coefficient at 25 °C %/K	fig. no.
2322 626 12102	1	± 10	10	2075	-2,3	1
2322 626 12222	2,2	± 10	10	2285	-2,6	1
2322 626 12472	4,7	± 10	10	2485	-2,8	1
2322 626 12103	10	± 10	10	2750	-4,2	1
2322 626 12223	22	± 10	10	3560	-4,0	1
2322 626 12473	47	± 10	10	3750	-4,2	1
2322 626 12104	100	± 10	10	3900	-4,4	1
2322 626 12224	220	± 10	10	3860	-4,3	1
2322 626 12474	470	± 10	10	3950	-4,5	1
2322 626 12105	1000	± 10	10	4100	-4,6	1
2322 626 22102	1	± 10	7,5	2075	-2,3	2
2322 626 22222	2,2	± 10	7,5	2285	-2,6	2
2322 626 22472	4,7	± 10	7,5	2485	-2,8	2
2322 626 22103	10	± 10	7,5	3750	-4,2	2
2322 626 22223	22	± 10	7,5	3560	-4,0	2
2322 626 22473	47	± 10	7,5	3750	-4,2	2
2322 626 22104	100	± 10	7,5	3900	-4,4	2
2322 626 22224	220	± 10	7,5	3860	-4,3	2
2322 626 22474	470	± 10	7,5	3950	-4,5	2
2322 626 22105	1000	± 10	7,5	4100	-4,6	2



* To specify products with ± 5% tolerance change 9th digit of catalogue number to 3 (e.g. 2322 626 12102 becomes **2322 626 13101** for ± 5% tolerance.)

For details of these and other types see Data Handbook C11

Resistance at +25 °C
 $B_{25/85}$
 Tolerance

10-22-47-100 kΩ
 3560 to 3900 K
 ±5%*, ±10%

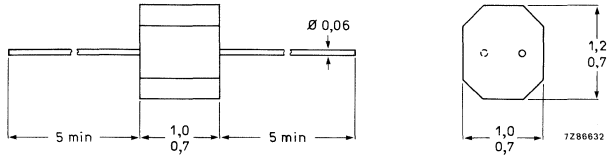


Fig. 1 2322 633 0...

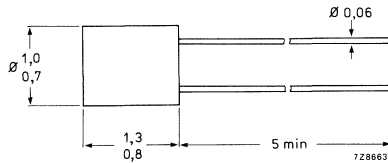


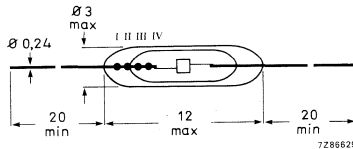
Fig 2. 2322 633 1...

status = P	R_{25} kΩ	tolerance* %	fig.	$B_{25/85}$ 5% K	temperature coefficient at 25 °C %/K
cat. number					
2322 633 02102	1	± 10	1	2075	-2,3
2322 633 02222	2,2	± 10	1	2285	-2,6
2322 633 02472	4,7	± 10	1	2485	-2,8
2322 633 02103	10	± 10	1	3750	-4,2
2322 633 02223	22	± 10	1	3560	-4,0
2322 633 02473	47	± 10	1	3750	-4,2
2322 633 02104	100	± 10	1	3900	-4,4
2322 633 02224	220	± 10	1	3860	-4,1
2322 633 02474	470	± 10	1	3950	-4,5
2322 633 02105	1000	± 10	1	4100	-4,6
2322 633 12102	1	± 10	2	2075	-2,3
2322 633 12222	2,2	± 10	2	2285	-2,6
2322 633 12472	4,7	± 10	2	2485	-2,8
2322 633 12103	10	± 10	2	3750	-4,2
2322 633 12223	22	± 10	2	3560	-4,0
2322 633 12473	47	± 10	2	3750	-4,2
2322 633 12104	100	± 10	2	3900	-4,4
2322 633 12224	220	± 10	2	3860	-4,1
2322 633 12474	470	± 10	2	3950	-4,5
2322 633 12105	1000	± 10	2	4100	-4,6

* To specify products with ±5% tolerance change 9th digit of catalogue number to 3 (e.g. 2322 633 02102 becomes **2322 633 03102** for ±5% tolerance.)

For detailed information on these and other types see Data Handbook C11

Resistance at +25 °C	10-20-47 and 100 kΩ
B _{25/85}	3560 to 3900 K
Max. dissipation	60 mW
Dissipation factor	~ 0,5 mW/K
Thermal time constant	~ 5,5 s
Tolerance	±5%* and ±10%



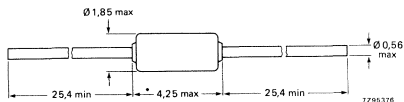
status = P	R ₂₅ kΩ	tolerance* %	B _{25/85} ±5% K	temperature coefficient at 25 °C %/K
cat. number				
2322 633 22102	1	± 10	2075	-2,3
2322 633 22222	2,2	± 10	2285	-2,6
2322 633 22472	4,7	± 10	2485	-2,8
2322 633 22103	10	± 10	3750	-4,2
2322 633 22223	22	± 10	3560	-4,0
2322 633 22473	47	± 10	3570	-4,2
2322 633 22104	100	± 10	3900	-4,4
2322 633 22224	220	± 10	3860	-4,3
2322 633 22474	470	± 10	3950	-4,5
2322 633 22105	1000	± 10	4100	-4,6

* To specify products with ±5% tolerance change 9th digit of catalogue number to 3 (e.g. 2322 633 22102 becomes **2322 633 23102** for ±5% tolerance.)



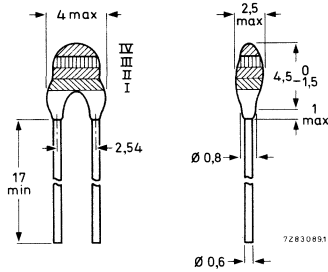
For details of these and other types see Data Handbook C11

Resistance at +25 °C	22 k Ω \pm 10%
B _{25/85}	3800 K \pm 5%
Max. dissipation	250 mW
Temperature range	-25 to +300 °C (peak)



For detailed information on these and other types see Data Handbook C11

Resistance value at +25 °C	2,7 kΩ to 330 kΩ
B _{25/85} value	3660 to 4150 K
Max. dissipation	0,25 W
Dissipation factor	7,0 mW/K
Thermal time constant	10 s

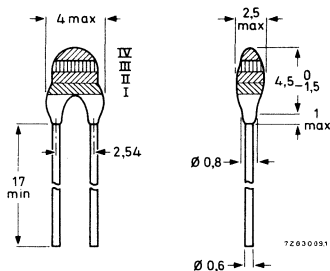


status = P	cat. number	cat. number	R ₂₅ kΩ	B _{25/85} ± 5% K	temperature coefficient at +25 °C %/K
	R ₂₅ ± 5%	R ₂₅ ± 10%			
2322 640 13472	2322 640 12472		4,2	3660	-4,12
2322 640 13103	2322 640 12103		10	3600	-4,10
2322 640 13223	2322 640 12223		22	3700	-4,17
2322 640 13473	2322 640 12473		47	3850	-4,33
2322 640 13104	2322 640 12104		100	4000	-4,50
2322 640 13224	2322 640 12224		220	4100	-4,60



For detailed information on these and other types see Data Handbook C11

Max. dissipation at $T_{amb} = 55^{\circ}C$	0,25 W
Dissipation factor	7,0 mW/K approx.
Thermal time constant	10 s approx.
Heat capacity	0,135 J/K approx.
operating temperature range	-25 to +125 °C
at zero power	0 to +55 °C
at max. power	



status = P	nominal resistance value Ω $5 \pm 1^{\circ}C$	nominal resistance value Ω $25 \pm 1^{\circ}C$
cat. number		
2322 640 19472	10900	4700
2322 640 19103	23000	10000
2322 640 19223	52000	22000
2322 640 19473	114000	47000
2322 640 19104	250000	100000



For detailed information on these and other types see Data Handbook C11

Resistance	see table
$B_{25/85}$	3750 to 4300
Max. dissipation	0,25 W
Dissipation factor	6,7 to 7 mW/K
Thermal time constant	17 to 19 s

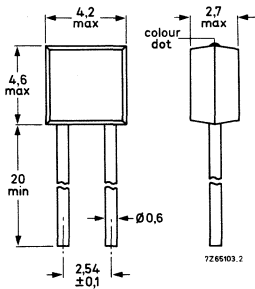


Fig. 1

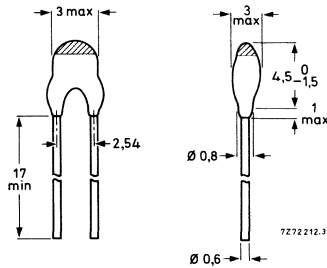


Fig. 2



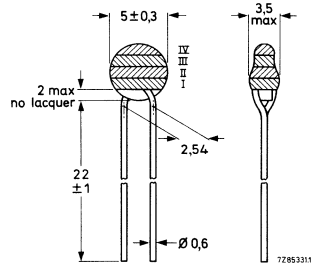
status = P	resistance in $k\Omega$ at temperature in $^{\circ}C$				$B_{25/85}$ K	thermal time constant s	fig.
cat. number							
2322 640 90004	R_{25}	12	R_{100}	0,95	3750	19	1
2322 640 90005	R_{100}	16,7	R_{200}	1,12	4300	19	1
2322 640 90012	R_{-30}	50	R_{-20}	27	4000	19	2
2322 640 90013	R_{-30}	50	R_{-10}	15	4000	17	1
2322 640 90014	R_{-10}	15	R_{25}	2,7	4000	19	2
2322 640 90015	R_{-10}	15	R_{25}	2,7	4000	17	1



For detailed information on these and other types see Data Handbook C11

Resistance range at +25 °C
Tolerance
B_{25/85}
Max. dissipation
Thermal time constant
Temperature range

3,3 Ω to 470 kΩ, E6-series
±5%* and ±10%
2600 to 4800 K
0,5 W
8,5 mW/K
-25 to +125 °C



status = P cat. number	R ₂₅ Ω	tolerance* %	B _{25/85} K	temperature coefficient %/K
2322 642 62338	3,3	± 10	2675	-3,0
2322 642 62478	4,7	± 10	2750	-3,1
2322 642 62688	6,8	± 10	2800	-3,2
2322 642 62109	10	± 10	2875	-3,2
2322 642 62159	15	± 10	2950	-3,3
2322 642 62229	22	± 10	3025	-3,4
2322 642 62339	33	± 10	3100	-3,5
2322 642 62479	47	± 10	3150	-3,5
2322 642 62689	68	± 10	3225	-3,6
2322 642 62101	100	± 10	3300	-3,7
2322 642 62151	150	± 10	3375	-3,8
2322 642 62221	220	± 10	3475	-3,9
2322 642 62331	330	± 10	3575	-4,0
2322 642 62471	470	± 10	3650	-4,1
2322 642 62681	680	± 10	3725	-4,2
2322 642 62102	1,0 k	± 10	3825	-4,2
2322 642 62152	1,5 k	± 10	3975	-4,5
2322 642 62222	2,2 k	± 10	4125	-4,6
2322 642 62332	3,3 k	± 10	4250	-4,8
2322 642 62472	4,7 k	± 10	4350	-4,9
2322 642 62682	6,8 k	± 10	4400	-5,0
2322 642 62103	10 k	± 10	4275	-4,8
2322 642 62153	15 k	± 10	4350	-4,7
2322 642 62223	22 k	± 10	4275	-4,8
2322 642 62333	33 k	± 10	4350	-4,9
2322 642 62473	47 k	± 10	4400	-5,0
2322 642 62683	68 k	± 10	4450	-5,1
2322 642 62104	100 k	± 10	4500	-5,2
2322 642 62154	150 k	± 10	4550	-5,2
2322 642 62224	220 k	± 10	4600	-5,3
2322 642 62334	330 k	± 10	4625	-5,3
2322 642 62474	470 k	± 10	4650	-5,4

* To specify products with ±5% tolerance change 9th digit of catalogue number to 3 (e.g. 2322 642 62338 becomes 2322 642 63338 for ±5% tolerance.)

For detailed information on these and other types see Data Handbook C11

Resistance at +25°C		1kΩ to 10kΩ
Tolerance		±5% and ±10%*
B _{25/75}		3965 ± 1,25%
Max.dissipation	2322 645 0....	0,1W
	2322 645 2....	0,25W
	2322 645 4....	0,75W

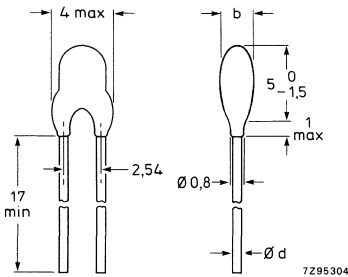


Fig.1 0,1W types

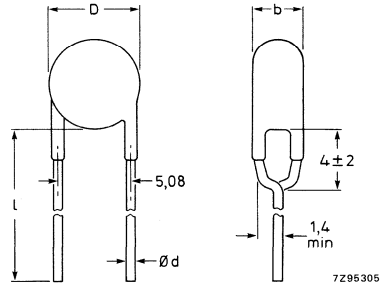


Fig.2 0,25W and 0,75W types



status = P	R ₂₅ Ω	tolerance* %	fig. no.
cat. number			
2322 645 03502	5k	5	1
2322 645 03602	6k	5	1
2322 645 03802	8k	5	1
2322 645 03103	10k	5	1
2322 645 23202	2k	5	2

status = P	R ₂₅ Ω	tolerance* %	fig. no.
cat. number			
2322 645 23252	2k5	5	2
2322 645 23302	3k	5	2
2322 645 23502	5k	5	2
2322 645 43102	1k	5	2
2322 645 43202	2K	5	2

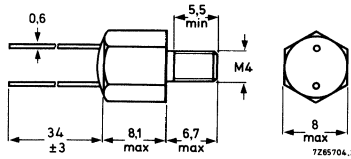
* To specify products with ±10% tolerance change 9th digit of catalogue number to **2** (e.g. 2322 645 03502 becomes **2322 645 02502** for ±10% tolerance.)



For detailed information on these and other types see Data Handbook C11

Resistance at +25 °C
 $B_{25/85}$
 Max. dissipation
 Dissipation factor
 Thermal time constant
 Temperature range

1 k Ω to 100 k Ω , E3-series
 3825 to 4500 K
 0,5 W
 25 mW/K
 20 s
 -25 to +100 °C

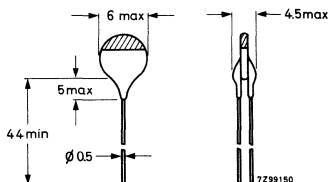


status = P cat. number	R_{25} Ω	tolerance %	$B_{25/85}$ $\pm 5\%$ K	temperature coefficient at 25 °C %/K
2322 642 73102	1 k	±5	3825	-4,1
2322 642 73222	2,2 k	±5	4125	-4,4
2322 642 73472	4,7 k	±5	4350	-4,7
2322 642 73103	10 k	±5	4275	-5,0
2322 642 73223	22 k	±5	4275	-4,7
2322 642 73473	47 k	±5	4400	-4,9
2322 642 73104	100 k	±5	4500	-5,0



For detailed information on these and other types see Data Handbook C11

Resistance at 25 °C	50 to 60 Ω
Switch temperature	+ 30 to + 105 °C
Temperature coefficient	7 to 40%/K
Thermal time constant	18 to 20 s
Temperature range	- 10 to + 125 °C



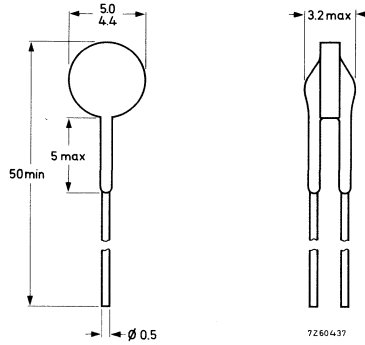
status = P	resistance at 25 °C Ω	resistance at 125 °C Ω	switch temperature °C	temperature coefficient %/K
cat. number				
2322 660 91006	60	3 to 15 k	30	7
2322 660 91007	50	100 to 500 k	50	16
2322 660 91008	50	50 to 500 k	80	23
2322 660 91009	50	0,1 to 1,2 M	105	40



Electronic components and materials

For detailed information on these and other types see Data Handbook C11

Resistance at +25 °C	250 Ω to ±25%
Switch temperature	+6 °C
Temperature coefficient	+5%/K
Dissipation factor	±6 mW/K
Temperature range	0 to +55 °C



status = P

catalogue number

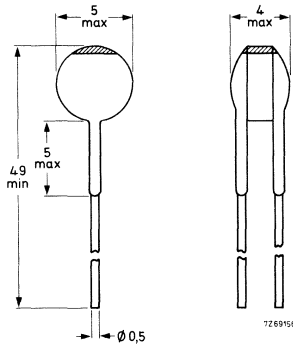
2322 660 91001



Electronic
 components
 and materials

For detailed information on these and other types see Data Handbook C11

Resistance at +25 °C	750 to 1500 Ω
Resistance at +175 °C:	
$V_{\text{pulse}} = 345 \text{ V}$	7000 Ω
Switch temperature	+26%/K
Maximum voltage (r.m.s.)	245 V
Dissipation factor	7 mW/K
Operating temperature range	-25 to +155 °C



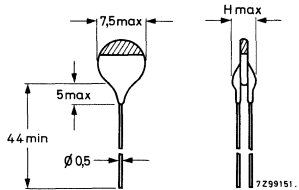
status = P

catalogue number

2322 660 93001

For detailed information on these and other types see Data Handbook C11

Resistance at 25 °C	30 to 50 Ω
Switch temperature	+25 to +110 °C
Temperature coefficient	9 to 75%/K
Thermal time constant	40 to 50 s



status = P

cat. number	resistance in Ω at temperature in °C				V _{max} V _{d.c.}
	R ₆₀	< 100	R ₁₀₀	> 1 k	
2322 661 91002	R ₉₅	< 80	R ₁₃₀	> 10 k	50
2322 661 91003	R ₄₀	< 90	R ₁₀₀	> 10 k	50
2322 661 91004	R ₁₀₀	3-20 k			50
2322 661 91005					40

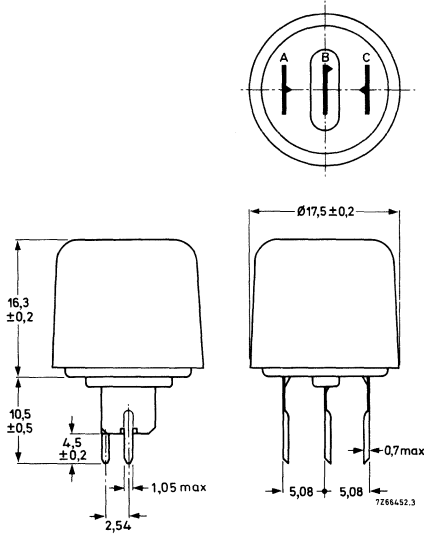


DUAL PTC THERMISTORS

General data
2322 662 980..

For detailed information on these and other types see Data Handbook C11

Min. peak current 5
 Max. r.m.s. voltage 265 V
 Temperature range 0 to +60 °C

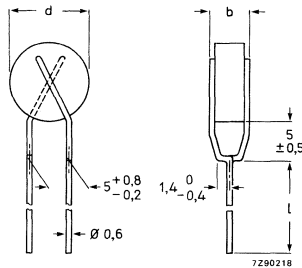


cat. number	minimum current			max. current after 5 s at		max. current after 30 s at			max. current after 3 min. at		
	100V A	120V A	200V A	100V mA	200V mA	100V mA	120V mA	200V mA	100V mA	120V mA	200V mA
2322 662 98009 *	-	-	5	-	70	-	-	5	-	-	2
2322 622 98011 *	-	3,6	6,5	-	-	-	5	5	-	2	2
2322 662 98013 *	10	-	-	140	-	10	-	-	5	-	-
2322 662 98018	-	-	5	-	70	-	-	5	-	-	1

* for these types, status = P

For detailed information on these and other types see Data Handbook C11

Resistance at 25 °C	1,8 to 90 Ω
Switch temperature	approx. 120 °C
Maximum d.c. voltage	56 V
Trip current at 10 °C	112 to 1360 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	D approx. mW/K	H approx. J/K	d mm	b max. mm	l ±3 mm
2322 660 15691	56	112	90	460	30	56	6	0,08	4,5	4	20
2322 660 16891	68	136	60	600	30	51	6	0,08	4,5	4	20
2322 660 18291	82	164	42	750	30	43	6	0,08	4,5	4	20
2322 661 11011	100	200	32	950	35	36	7	0,15	6,5	4	20
2322 661 11211	120	240	22	1300	35	27	7	0,15	6,5	4	20
2322 661 11511	150	300	18	1600	40	22	7,5	0,16	8,0	4	20
2322 662 11811	180	360	12,5	2200	45	16	8	0,42	10,0	4,5	20
2322 662 12211	220	440	9	2900	50	13	9	0,55	12,0	4,5	20
2322 662 12711	270	540	6,5	4000	50	10	9	0,55	12,0	4,5	20
2322 663 13311	330	660	4,3	6300	60	5,6	10	0,83	13,0	5	20
2322 663 13911	390	780	3,8	7300	70	5,1	12	1,24	16,0	5	20
2322 663 14711	470	9400	2,6	12000	70	2,7	12	1,24	16,0	5	20
2322 664 15611	560	1120	2,2	14000	100	2,4	16	2,34	20,0	6	16
2322 664 16811	680	1360	1,6	18000	100	2,0	16	2,34	20,0	6	16

N.B. Series 2322 660/661/662 available on tape.
All series available without leads.

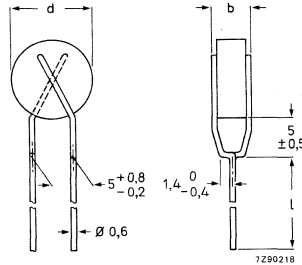


Electronic components and materials

PHILIPS

For detailed information on these and other types see Data Handbook C11

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	D approx. mW/K	H 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	65	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.



For detailed information on these and other types see Data Handbook C11

Resistance at +25 °C	300 Ω to 9,9 kΩ
Switch temperature	115 to 245 C
Max. voltage	145 and 265 V
Temperature range	0 to +55 C

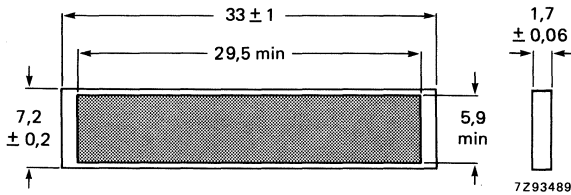


Fig. 1

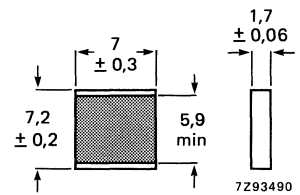


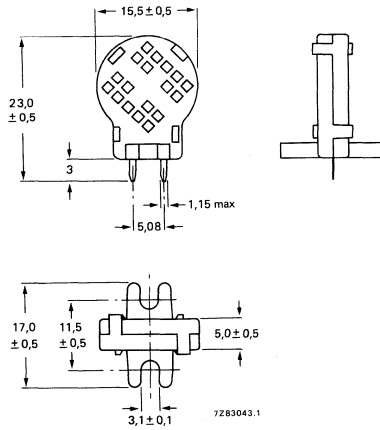
Fig.2

status = P	switch temperature C	max. voltage V	fig.
catalogue number			
2322 680 93021	115	265	1
2322 680 93022	145	265	1
2322 680 93023	170	265	1
2322 680 93024	200	265	1
2322 680 93025	230	265	1
2322 680 93026	245	265	1
2322 680 93027	170	145	1
2322 680 93028	240	145	1
2322 680 93029	115	265	2
2322 680 93031	145	265	2
2322 680 93032	170	265	2
2322 680 93033	200	265	2
2322 680 93034	230	265	2
2322 680 93035	245	265	2
2322 680 93036	170	145	2
2322 680 93037	240	145	2



For detailed information on these and other types see Data Handbook C11

Humidity range	10 to 90% R.H.
Capacity 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



status = P

catalogue number

2322 691 90001

Products approved to the CECC (Cenelec Electronic Components Committee) harmonized system for electronic components of assessed quality

Resistors

type	CECC detail specification
SFR16T	CECC 40 101-041
SFR25	CECC 40 101-001
SFR25	CECC 40 101-002
SFR25	CECC 40 101-003
SFR25	CECC 40 101-019
SFR25H	CECC 40 101-041
MR16	CECC 40 101-001
MR16	CECC 40 101-002
MR16	CECC 40 101-009
MR16	CECC 40 101-019
MRS16T	CECC 40 101-019
MRS16T	CECC 40 101-042
MR25	CECC 40 101-001
MR25	CECC 40 101-002
MR25	CECC 40 101-008
MR25	CECC 40 101-009
MR25	CECC 40 101-019
MR25M	CECC 40 101-019
MRS25	CECC 40 101-019
MRS25	CECC 40 101-042
MR30	CECC 40 101-001
MR30	CECC 40 101-002
MR30	CECC 40 101-008
MR30	CECC 40 101-009
MR30/8	CECC 40 101-019
MR52	CECC 40 101-002
MR52	CECC 40 101-008



Materials and other products

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

C1 Programmable controller modules
C3 Loudspeakers
C4 Ferroxcube potcores, square cores and cross cores
C5 Ferroxcube for power, audio/video and accelerators
C6 Synchronous motors and gearboxes
C8 Variable mains transformers
C9 Piezoelectric quartz devices
C16 Permanent magnet materials
C17 Stepping motors and associated electronics
C18 D.C. motors
C19 Piezoelectric ceramics
C21 Assemblies for industrial use: HNIL FZ/30-series
T15 Dry reed switches

✻



Data Handbook System	M2	Loudspeakers	M29
Contents	M3	Unidirectional synchronous motors	M33
Variable mains transformers	M4	Reversible synchronous motors	M34
A.C. stabilizer module	M8	Reversible hybrid synchronous motors	M34
Annular fixed transformers	M9	Stepping motors	M36
Programmable logic controller PLC10	M10	Direct current motors	M39
Programmable controller PC20	M12	Gearboxes	M42
Hybrid integrated circuits	M16	Ferroxcube	M43
Dry reed switches	M23	Permanent magnet materials	M70
Piezoelectric quartz devices	M24	Piezoelectric ceramics	M78
Glass delay lines and comb. filters	M26	CECC approved types	M84



For detailed information see Data Handbook C8

Applications

The main applications are:

- distortion-free voltage control for measuring equipment and voltage stabilizers;
- power control for electric heating, heat sealing of plastics;
- current control for galvanizing plants;
- lighting control;
- ventilation control in farm buildings and greenhouses;
- motor speed control.

Types

These variable transformers have an output current range from 0,5 to 32 A.

Most are auto-transformers; transformers with separate windings for 3 A output current are available.

All auto-transformers are available as panel model and some also as bench model or laboratory model.

A panel model is a transformer of which the live parts are not protected.

A bench model is a transformer in a protective housing and has a knob and dial.

A laboratory model is a bench model with a handle, an input cable with plug and a fused outlet socket.

The transformers with separate windings are available as a panel model or a laboratory model. The laboratory model is a bench model with a handle, overload protection, a voltmeter for indicating the output voltage, a cable with plug for input connection, and an outlet socket.

Features

- continuous voltage control;
- small size and high efficiency by using high quality core material;
- very low stray losses by using toroidal coil and specially treated track with low and stable contact resistance between brush and track resulting in low losses at the most critical place; under normal conditions, the brush track needs no maintenance;
- corrosion proof;
- long life carbon brushes and smooth contact surface;
- simple replacement of carbon brushes;
- adjustable sliding spindle;
- low winding resistance;
- high overload capability.

The majority of the transformers meet the safety requirements laid down in SEV1003; the relevant types (output current ≤ 10 A) have SEV approval, which is indicated on the transformer.

Variable mains transformers can be electrically connected in parallel or in series.

To ensure correct current distribution chokes can be supplied, which should be inserted between the output terminals of transformers connected in parallel.

For mechanical ganging of two or three variable transformers ganging units can be used, which are supplied either completely assembled or in an assembly kit.

Most transformers, either ganged or individual, can be provided with a remote-controlled motor drive.

Motor drive kits and base plate assemblies are available for this purpose.

Instructions for assembling come with all kits.

Replacement carbon brushes are available for all variable transformers.

For panel model transformers control knobs with dials are available, which can be locked in any position on the spindle by means of a clamping collet.



For detailed information see Data Handbook C8

- The given nominal input voltage may continuously be exceeded by 10%.
- The transformers may be used at frequencies between 50 and 400 Hz.
- The ambient temperature range is -15 to $+40$ °C for auto-transformers, and -10 to $+40$ °C for transformers with separate windings.
- The insulation resistance between live and non-live parts after the damp heat test (IEC 68-2-3, test Ca, 21 days) is > 5 M Ω .
- All auto-transformers are tested for 1 min at 2000 V, 50 Hz between live and non-live parts.
- The transformers with separate windings are tested for 1 min at 3500 V, 50 Hz (size code E2.1) or 5000 V, 50 Hz (size code E7.1).
- The air gap between live and non-live parts is ≥ 4 mm.
- The leakage path between live and non-live parts is ≥ 5 mm.
- The total angle of rotation is $\sim 320^\circ$.
- The guaranteed life of the carbon brushes, if used within the ratings, is 100000 two-way turns, however, the life expectancy is well beyond 250000 two-way turns.
- The climatic category, according to IEC68, is 15/040/21 for auto-transformers, and 10/040/21 for transformers with separate windings.

Survey

In the tables below the transformers are listed in order of their nominal input voltages, and for each input voltage in order of their output currents.

Note: In addition to the standard transformers listed in the tables, a variety of transformers made to customer's specification are available from running production, and further versions can be designed upon request.

Status = C

Auto-transformers

1	2	3	4	5*	6*	7*	8	9	10	11
input voltage nom. V	output current		output voltage no-load V	output current		output voltage no-load V	trans-former size code	catalogue number 2422 530		
	nom. A	max. A		nom. A	max. A			panel model	bench model	lab. model
32	7	8	0-32	-	-	-	E1.1	90033	-	-
42	2,5	3	0-42	-	-	-	E1.1 E2	90032	-	-
	4	4,8	0-42	-	-	-		90031	-	-
60	1,2	1,32	0-60	-	-	-	E1 E1.1	00007	-	-
	3,15	3,7	0-60	-	-	-		10007	-	-
110	0,6	0,7	0-110	-	-	-	E1 E1.1 E6	00107	-	-
	1,4	1,7	0-110	-	-	-		10107	-	-
	10	-	0-130	-	-	-		90034	-	-
115	1,2	1,4	0-130	1,32	1,54	0-115	E2	01607	-	-
	1,4	1,7	0-115	-	-	-		11607	-	-
127	2,5	3	0-150	2,75	3,25	0-127	E3.1 E4 E6.1	22307	-	-
	5	6	0-150	5,5	6,5	0-127		23307	-	-
	10	12,6	0-150	11	13	0-127		04307	-	-
			-	-	-	-		-	-	-

* The data given in the 5th, 6th and 7th columns hold for overwound transformers (transformers with a maximum output voltage higher than the input voltage) with the input voltage applied across the complete winding.



Electronic components and materials



For detailed information see Data Handbook C8

Auto-transformers (continued)

1	2	3	4	5*	6*	7*	8	9	10	11
input voltage nom. V	output current		output voltage no-load V	output current		output voltage no-load V	trans-former size code	cat. number 2422 530		
	nom. A	max. A		nom. A	max. A			panel model	bench model	lab. model
220	0,5	0,6	0-220	-	-	-	E1.1	10407	-	-
	0,7	0,83	0-240	0,77	0,91	0-220	E2	01407	-	-
	0,83	1	0-220	-	-	-	E2	11407	-	-
	1	1,25	0-260	1,1	1,3	0-220	E3.1	22407	22411	-
	1,2	1,4	0-260	1,32	1,56	0-220	E3	08407	-	-
	1,4	1,7	0-220	-	-	-	E3	18407	-	-
	2	2,4	0-260	2,2	2,6	0-220	E4	03407	-	-
	2,5	3	0-220	-	-	-	E4	13407	-	-
	2,5	3	0-260	2,75	3,25	0-220	E4	23407	23411	-
	4	4,8	110-220	-	-	-	E5	90023	-	-
	4	4,8	0-220	-	-	-	E5	90024	-	-
	4,5	5	0-253	5	5,85	0-220	E6	90028	-	-
	5	6	0-220	-	-	-	E6	90027	-	-
	5	6,3	0-260	5,5	6,5	0-220	E6.1	04407	04411	04415
	8,5	11,2	0-260	9,3	11,5	0-220	E7	05407	05411	05415
	10	12	0-220	-	-	-	E7	15407	-	-
	12	15	0-260	13,2	15,6	0-220	E8	06407	-	-
	15	18	0-220	-	-	-	E8	16407	-	-
	23	30	0-260	25,3	30	0-220	E10	07407	07411	-
	32	34	0-220	-	-	-	E10	90051	-	-
240	0,5	0,55	120-0	-	-	-	E1	00407	-	-
	0,5	0,55	120-240	-	-	-	E2	00407	-	-
	0,5	0,55	120-0	-	-	-	E1	90004	-	-
	0,5	0,55	120-240	-	-	-	E1	90004	-	-
	0,5	0,55	0-120	-	-	-	E1	90011	-	-
	0,5	0,55	240-120	-	-	-	E1	90011	-	-
	1	1,25	0-270	1	1,25	0-240	E3.1	22507	22511	-
	2	2,4	0-260	2	2,4	0-240	E4	03507	-	-
	2,5	3	0-270	2,5	3,2	0-240	E4	23507	23511	-
	4,5	5	0-276	4,5	5	0-240	E6	90028	-	-
	5	6,3	0-270	5	6,3	0-240	E6.1	04507	04511	-
	8,5	11,2	0-270	8,5	11,2	0-240	E7	05507	05511	-
	12	15	0-260	12	15	0-240	E8	06507	-	-
	23	30	0-260	23	30	0-240	E10	07507	07511	-
	32	34	0-240	-	-	-	E10	90051	-	-

Transformers with separate windings

input voltage nom. V	output current		output voltage no-load V	output current		output voltage no-load V	trans-former size code	cat. number 2422 529		
	nom. A	max. A		nom. A	max. A			panel model	bench model	lab. model
220	3	-	0-262	-	-	-	E7.1	00008	-	00007
	3	-	0-262	-	-	-	E7.1	-	-	00017
	3	-	0-16	-	-	-	E2.1	00009	-	-

* See note on preceding page.

For detailed information see Data Handbook C8

Ganging and motor drive components

transf. size	no. of transf.	parallel connection choke 2422 532	mechanical ganging		base plate assembly 2422 532	motor drive							
			ganging unit 2422 532	spindle 4322		motor drive kit 4322 028 07...							
						rotation time (s/rev)*							
						6,67	10	13,3	33,3	40	66,7	200	800
E2	1	-	-	-	00073	301	311	321	331	341	351	361	371
E3	2	▲	00057	026 66750	00073	381	311	321	331	341	351	361	371
E3.1		E4	▲	00053	026 66740	00073	381	391	321	331	341	351	361
E6	1	-	-	-	00073	301	311	321	331	341	351	361	371
	2	00017	00055	026 66750	-	381	391	321	331	341	351	361	371
	3	2 x 00017	00056	026 66740	-	381	391	401	331	341	351	361	371
E6.1	1	-	-	-	00073	301	311	321	331	341	351	361	371
E7		E7.1	00017	00055	026 08350	-	381	391	321	331	341	351	361
E8	1	-	-	-	00069	431	441	451	461	471	481	491	501
	2	00017	00066	026 08350	-	431	441	451	461	471	481	491	501
	3	2 x 00017	00067	026 08360	-	-	441	451	461	471	481	491	501
						motor drive kit (cont.) 4322 028 07...							
						20	30	40	100	120	200	600	2400
E10	1	-	-	-	00062	511	521	531	541	551	561	571	581
	2	00017	00063	028 01850	-	511	521	531	541	551	561	571	581
	3	2 x 00017	00064	028 01860	-	-	521	531	541	551	561	571	581



Note Motor drive kits with motors for other supply voltages, and gear boxes with other rotation times can be supplied to special order.
 ▲ No standard chokes are available for transformer size codes C2, E2, E3, E3.1 and E4, since a single transformer of the standard range with larger size code, is a more economic proposition than ganging these smaller size transformers.

* The effective rotation angle of the variable mains transformers is 320°, so the actual rotation time between end stops is $\frac{320}{360} \times$ listed rotation time.

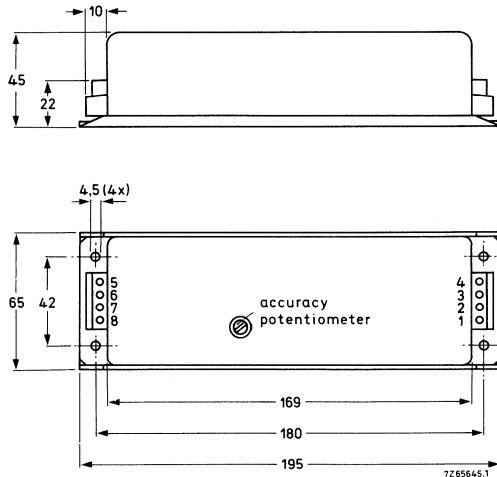
For detailed information see Data Handbook C8

Input voltage	220 V, + 10%, - 15%
Frequency range	50-60 Hz
Stabilized output voltage transformers 220 V/0-220 V	5 to 100% of input voltage
transformers 220 V/0-260 V	5 to 115% of input voltage
Maximum stabilization accuracy	± 0,5 V
Ambient temperature range	- 10 to + 45 °C
catalogue number	2422 532 00071

This automatic stabilizer module can be used in combination with motor driven transformers for correction of voltage variations. Its main use will be in those applications where the speed of response is of secondary importance to waveform distortion, and where the price per kVA of controlled power must be kept low. Application areas are in test and research laboratories, service centres, and factories. The module can also be used as a voltage, light or temperature-sensitive control for power sources. It is not intended for transformers with separate windings.

A complete a.c. stabilizer circuit consists of:

- one or more mains transformers;
- a transformer ganging unit, if two or three transformers are used;
- a motor drive with 220 V reversible synchronous motor;
- the a.c. stabilizer module;
- a control potentiometer.



For detailed information see Data Handbook C8

Insulation resistance	> 5 MΩ
Test voltage	5000 V, 50 Hz
Leakage path	> 6 mm
Ambient temperature range	- 10 to + 140 °C
Climatic category, IEC68	10/140/21

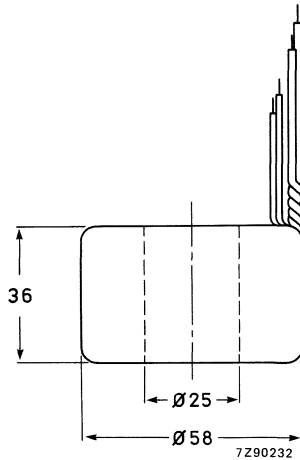
Due to such excellent properties of these annular fixed transformers as very low stray losses, ability to withstand high temperatures, small size and low mass, they are suitable for various kinds of applications. For example, they are used in halogen spotlights, where they withstand the high temperatures occurring in the lamp units.

Two layers of insulated copper wire, which are separated by means of polyamide paper, are wound on an annular core.

The connecting wires are insulated with glass-fibre-filled silicon sleeves; the primary wires are double insulated.

The transformers comply with the insulation requirements for class II equipment; all insulation materials used apply to temperature class H (180 °C), according to IEC85.

Other versions can be supplied to special order.



input voltage V	frequency Hz	output power VA	output voltage V	cat. number
240	50/60	15	6	4322 028 06340
225	50/60	15	6	4322 028 06200
120	60	15	6	4322 028 06400



For detailed information see Data Handbook C1

The programmable logic controller PLC10 is used for the controlling of machines or processes. It can be easily programmed and re-programmed as required.

The modular design of the PLC10 enables a user to build a PLC which is "tailor-made" for his control task. By specifying the number and the types of PLC modules that he requires, he avoids purchasing more of the expensive electronic capability than he needs.

The PLC modules are formed on standard double Eurocards. Optically coupled interface circuits, specifically designed for an industrial environment, provide excellent noise immunity and a high degree of isolation. The internationally accepted machine signal level of 24 V is used and generous tolerances on operational margins and thresholds ensure good compatibility. Besides the PLC modules, the PLC comprises back panels, a frame (19 inch rack) and a standard power supply. The frame must conform to IEC297 or DIN41494 (for racks) and IEC130-14 or DIN41612 (for connectors). The adoption of these standards means that the frame and the power supply should be easily obtainable.

Status = C

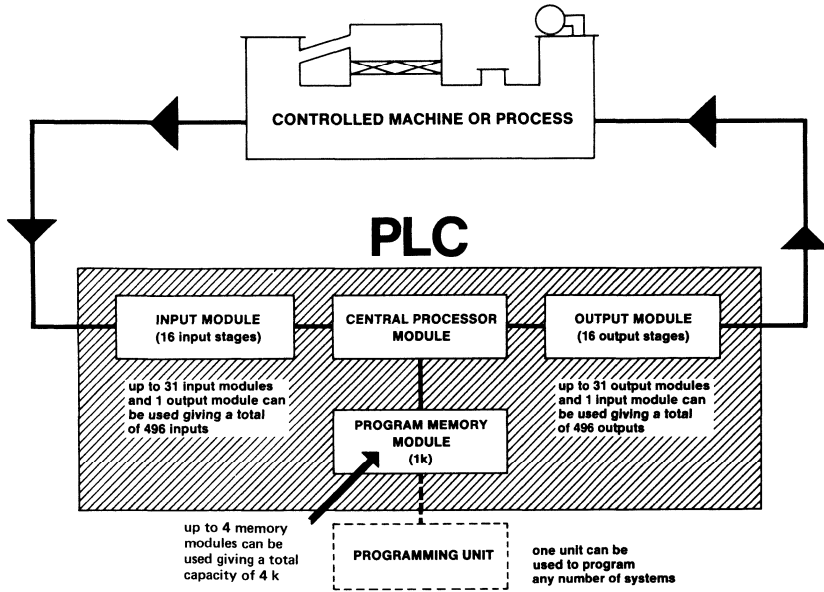
The following PLC modules are available.

type	description	cat. number
CP10	central processor, 32 registers	4322 027 90420
CP11	central processor, without registers	4322 027 90390
IM10	input module, 16 inputs, 24 V d.c.	4322 027 90434
IM11	input module, 16 inputs, 24 V a.c.	4322 027 90403
LX10	load external interface module	4322 027 91600
MM10	program memory module, 1 k, non-volatile core RAM	4322 027 91400
MM11	program memory module, non-volatile. UV-erasable PROMs. 1 k 13 or 2 k 13 capacity; for program copying or read-out	4322 027 91630
MM12	program memory module, non-volatile. UV-erasable PROMs. 1 k 13 or 2 k 13 capacity; for read-out only	4322 027 91640
MM13	memory module	4322 027 91861
OM10	output module, 16 outputs, max. 0,1 A each, 24 V d.c.	4322 027 90440
OM12	output module, 8 outputs max. 2 A each, 24 V d.c.	9360 011 50112
PU10	programming unit	4322 027 90410
BP11 to BP16	back panels	9390 269 00112



For detailed information see Data Handbook C1

The diagram shows, in a simplified form, the function of each of the PLC modules. In operation the PLC cycles continuously through a data input/output cycle and a data processing cycle.



The input module converts the signals from the plant into a binary form acceptable to the central processor.

The central processor reads the data from the input module, performs logic equations on it in accordance with the program instructions and transfers the results to the output module.

The output module converts the binary data from the central processor to electrical signals suitable for the control of the plant.

The program memory is the store in which the set of instructions that comprise the program are stored. These instructions dictate the actions which must be taken in response to the condition of each input.

The programming unit is the means by which an operator can write a program, or changes to a program, into the program memory. The unit is portable and thus one may be used to serve any number of PLCs. It is also sufficiently inexpensive to make the permanent location of one in each PLC monitoring or test purposes, a realistic and useful proposition.

For detailed information see Data Handbook C1

The programmable controller PC20 is used for controlling machines and/or processes. It can be easily programmed and re-programmed.

The modular design of the PC20 enables a user to build a programmable controller which is "tailor-made" for his task. By specifying the number and the types of PC20 modules that he requires, he only has to purchase the electronic capability he needs.

The PC20 modules are on standard double Eurocards.* Optically isolated interface circuits, specifically designed for an industrial environment, provide excellent noise immunity and a high degree of isolation. The internationally accepted machine signal level of 24 V is used and generous tolerances on operational margins and thresholds ensure good compatibility.

Besides these modules, the PC20 comprises back panels, frames (19 in racks), input and output cables, and a standard power supply. The frames and modules conform to IEC297 or DIN41494 (for racks) and IEC130-14 or DIN41612 (for connectors). For smaller controllers the special frame SC20 and power supply SO20 are available.

The microcontroller MC20 is suited for controlling small systems. The controller is based on the same principles as the PC20 system, however, it is built on a single printed board** with sufficient inputs and outputs for the general run of machine tool and process controls. Software modules are available e.g. for communication in hierarchical systems.

Status = P

Tables 1 to 5 give a survey of the available modules, accessories and cables.

Table 1 Modules

type	description	cat. number
AD20	analogue to digital module	4322 027 94200
AD21	analogue to digital module	4322 027 95381
CI20	computer interface	4322 027 94630
CP20	central processor with program memory (2 k (E) PROM)	4322 027 92040
CP22	central processor without program memory	4322 027 92060
CP24	central processor with program memory (2 k RAM)	4322 027 94140
DA20	digital to analogue module	4322 027 94210
DA21	digital to analogue module	4322 027 94800
IM20	input module (16 inputs, 24 V)	4322 027 92000
IM22	input module (32 inputs, 24 V)	4322 027 94660
IM23	input module (16 inputs, 48 V)	4322 027 94610
MM20	program memory module (8 k (E) PROM)	4322 027 92070
MM21	program memory module (8 k RAM)	4322 027 92080
MM22	program memory module (4 K RAM)	4322 027 94160
OM21	output module (8 x 2 A)	4322 027 92020
OM22	output module (32 x 0,1 A)	4322 027 94100
OM23	output module (16 x 0,5 A; 24/48 V)	4322 027 94700
RP20	bidirectional parallel interface	4322 027 92170
RS20	bidirectional serial interface	4322 027 92180
SM20	supply module	4322 027 94761
SO20	supply and output module (8 x 0,5 A)	4322 027 92030
VI20	bidirectional serial interface	4322 027 92200
MC20	microcontroller	4322 027 23000
PLC773	microcontroller	4322 027 23300

* Except programming unit PU20, which is a desk-top apparatus.

** Different from standard Eurocards.



For detailed information see Data Handbook C1

Figure 1 shows, in a simplified form, the function of each of the PC20 modules. In operation the PC20 cycles continuously through a data input/output cycle and a data processing cycle.

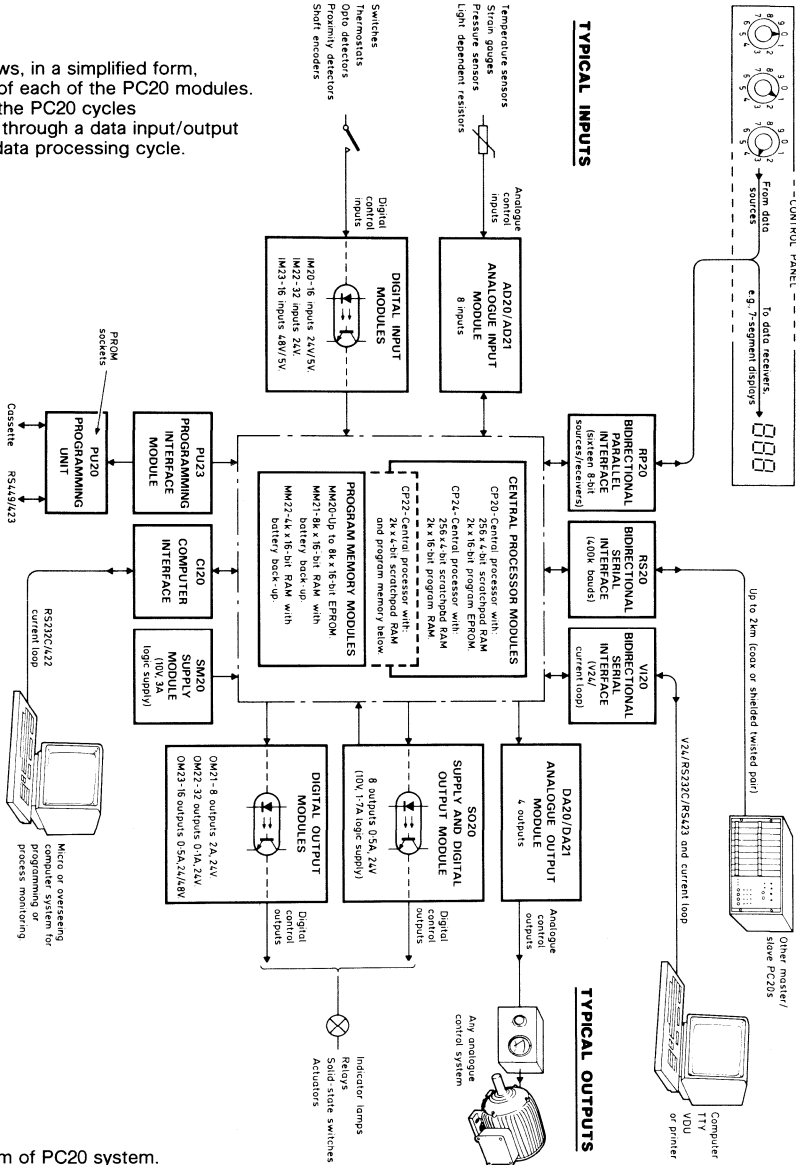


Fig. 1 Diagram of PC20 system.

For detailed information see Data Handbook C1

Table 2 Programming aids

type	description	cat. number
MI20	microcontroller interface for MC20	4322 027 94190
PU20/2	programming unit for PC20 and MC20	4322 027 92090
PU23	programming unit interface for PC20 and MC20	4322 027 94180

Table 3 Accessories

type	description	cat. number
BP22	terminal strip for inputs/outputs in controller cabinet SC20	4322 027 92140
BP23	back panel for main Eurorack	4322 027 94010
BP25	back panel for half extension rack	4322 027 94030
BP26	back panel for full extension rack	4322 027 94040
BP27	terminal strip for output module OM22 in controller cabinet SC20	4322 027 93950
FP20	front plate, 15 mm width, in controller cabinet SC20	4322 027 92150
FP21	front plate, 20 mm width (standard module width)	4322 027 92160
MB20	mounting clip for microcontroller MC20	4322 027 23080
RA23	main rack assembly	9390 294 10112
RA25	half extension rack assembly (for 15 I/O modules)	9390 294 20112
RA26	full extension rack assembly (for 21 I/O modules)	9390 294 30112
SC20	small controller cabinet	4322 027 92110
	CP front panel kit (one LED hole)	4322 027 91440
	IM/OM front panel kit (16 LED holes)	4322 027 91450
	front panel kit, double width (no holes)	4322 027 91460

Table 4 Cables

type	description	cat. number
BI21	bus extension cable for one I/O extension rack	4322 027 37910
BI22	bus extension cable with bus interface for two I/O extension racks	4322 027 37920
BI23	bus extension cable with bus interface for three I/O extension racks	4322 027 37930
CC20	connecting cable for module OM21	9390 293 50000
CC21	connecting cable for module SO20	9390 293 60000
CC22	connecting cable for module IM20	9390 293 70000
CC23	connecting cable for modules IM20 and OM20	9390 293 80000

Table 5 Software modules

type	description	cat. number
PV11	message program	4322 027 99011
PV12	data terminal program	4322 027 99021
PV13	mass memory program	4322 027 99031
PV14	communication program A	4322 027 99041
PV15	communication program B	4322 027 99051
PV17	communication program C	4322 027 99071
PV18	PID control loop (continuous control)	4322 027 99081
PV19	PID control loop (continuous or incremental control)	4322 027 99091
PDS2	program development system	4322 027 99921



For detailed information see Data Handbook C1

The input module converts the signals from the plant into a binary form acceptable to the central processor.

The central processor reads the data from the input module, performs logic equations on it in accordance with the program instructions and transfers the results to the output module.

The output module converts the binary data from the central processor to electrical signals suitable for the control of the plant.

The program memory is the store in which the set of instructions that comprise the program are stored. These instructions dictate the actions which must be taken in response to the condition of each input.

The programming unit PU20 is the means by which an operator can write a program, or changes to a program, into the program memory. The unit is a portable desk-top apparatus so that only one is required to serve any number of PC20 systems. It is connected to the PC20 system via the programming unit interface PU23, which is not too expensive to leave in the PC20 system.

The PC20 system can also be programmed using either a Personal Computer or data terminal in conjunction with the Computer Interface module CI20.

For programming and monitoring the MC20 or PLC773 microcontrollers, the same programming unit (PU20) as for the PC20 system is used, however, this unit has to be used in conjunction with microcontroller interface MI20 and programming unit interface PU23, see Fig. 2.

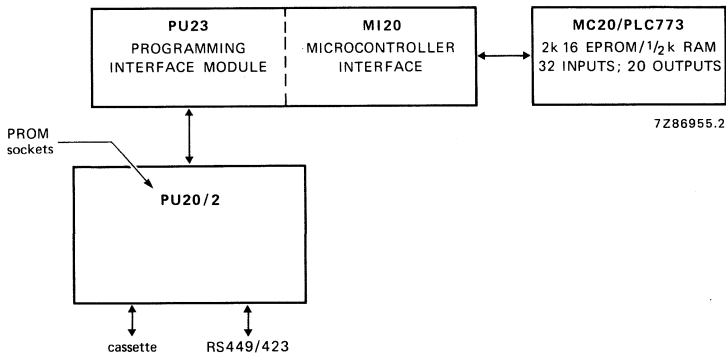
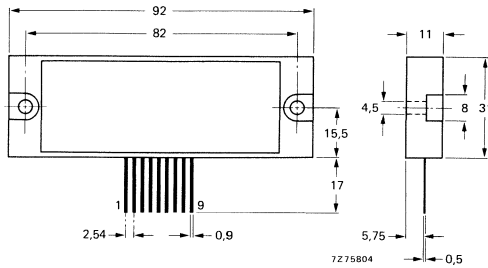


Fig. 2 Diagram of MC20 or PLC773 programming system.

For detailed information on these and other types see Data Handbook S4a



type	P_o at $d_{tot} < 0,2\%$ $R_L = 4 \Omega$	$R_L = 8 \Omega$	d_{tot} at $D_o = 1 W; f = 1 kHz$
OM931	> 30 W at $\pm 23 V$	> 30 W at $\pm 26 V$	typ. 0,02%
OM961	> 60 W at $\pm 31 V$	> 60 W at $\pm 35 V$	typ. 0,02%



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 $V_B = 24 V \pm 10\%$

type	gain $ S_{f1} ^2$ dB	$V_o(rms)^*$ dBμV	supply current mA	noise figure dB	max VSWR typical values		dimensions	
					input	output	L mm	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 $V_B = 12 V \pm 10\%$

OM345	12	97	11,5	5,5	2,0	1,4	14	8
OM350	18	98	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	111	105	7	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 S13

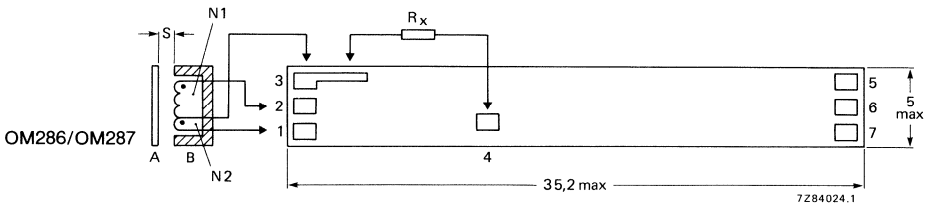
D.C. supply voltage range	4,5 to 30 V
Output current at $V_B = 24$ V	max. 250 mA
Switching distance; depends on R_x and oscillator coil	typ. 1 to 5 mm
Hysteresis in switching distance	3 to 10%
Operating frequency	< 5 kHz
Operating substrate temperature range	-40 to +85 °C

Hybrid integrated circuits intended for inductive proximity detectors in tubular construction, especially the M8 hollow stud. The OM286 and OM286M are for positive and the OM287 and OM287M are for negative supply voltage. The circuit consists of an oscillator, a rectifier stage, a Schmitt trigger and an output stage.

The circuit performs a make function: when actuated the current flows trough the load, which can be, for example, the coil of an electromagnetic relay, a LED or a photocoupler.

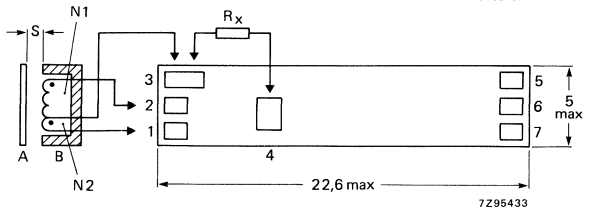
The output transistor is protected against transients from the inductive load by a voltage regulator diode. The circuit is protected against false polarity connection of the supply voltage.

The devices OM286/OM287 are thick-film circuits and the OM286M/OM287M are thin-film circuits deposited on ceramic substrates. They may be potted, together with the oscillator coil and a resistor (R_x), in a non-magnetic tube.



OM286M/OM287M

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 and OM286M; for OM287 and OM287M 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.

type	supply voltage	technology
OM286	positive	thick film
OM286M	positive	thin film
OM287	negative	thick film
OM287M	negative	thin film

For detailed information on these and other types see Data Handbook S13

D.C. supply voltage range	10 to 30 V
Output current at $V_B = 10$ to 30 V	max. 250 mA
Switching distance; depends on R_x and oscillator coil	typ. 1 to 5 mm
Hysteresis is switching distance	3 to 10%
Operating frequency	< 5 kHz
Operating substrate temperature range	-40 to +85 °C

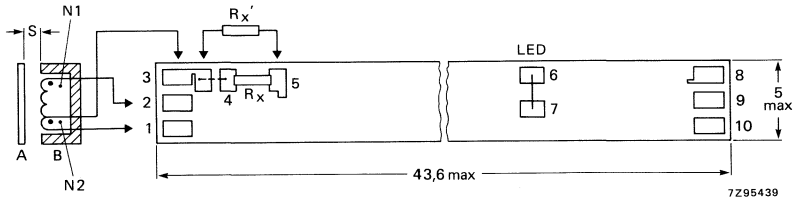
Hybrid integrated circuits intended for inductive proximity detectors in tubular construction, especially the M8 hollow stud. The OM386B is for positive supply voltage and the OM387B is for negative supply voltage. The circuit consists of a voltage regulator, an oscillator, a rectifier stage, a Schmitt trigger, an output stage and a protection circuit.

The circuit performs a make function: when actuated the current flows through the load, which can be, for example, the coil of an electromagnetic relay, a LED or a photocoupler.

Features

- protection against short-circuit and overload
- protection of output transistor against transients by a voltage regulator diode
- protection against false polarity of the three connection leads
- choice between two methods to adjust the operating (switching) distance, i.e. trimming a resistor integrated on the substrate or mounting a resistor
- possibility of connecting a LED for function control

The devices are thin-film circuits deposited on ceramic substrates. They may be potted, together with the oscillator coil, in a non-magnetic tube.



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.

type	supply voltage
OM386B	positive
OM387B	negative



Inductive proximity detectors (cont.)

For detailed information on these and other types see Data Handbook S13

D.C. supply voltage range	10 to 30 V
Output current at $V_B = 10$ to 30 V	max. 200 mA
Switching distance; depends on R_x and oscillator coil	typ. 1 to 5 mm
Hysteresis is switching distance	3 to 10%
Operating frequency	< 5 kHz
Operating substrate temperature range	- 40 to + 85 °C

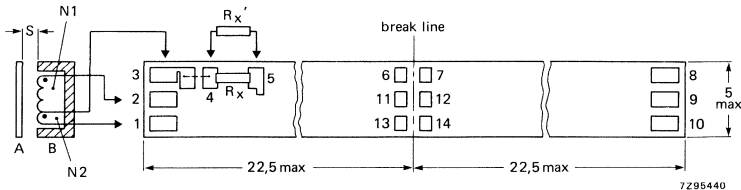
Hybrid integrated circuits intended for inductive proximity detectors in tubular construction, especially the M8 hollow stud. The OM386M is for positive supply voltage and the OM387M is for negative supply voltage. The circuit consists of a voltage regulator, an oscillator, a rectifier stage, a Schmitt trigger, an output stage and a protection circuit.

The circuit performs a make function: when actuated the current flows through the load, which can be, for example, the coil of an electromagnetic relay, a LED or a photocoupler. Compared to the types OM386B/OM387B the substrate length is drastically reduced.

Features

- extra small dimensions
- protection against short-circuit and overload
- protection of output transistor against transients by a voltage regulator diode
- protection against false polarity of the three connection leads
- choice between two methods to adjust the operating (switching) distance i.e. trimming a resistor integrated on the substrate or mounting a resistor
- possibility of connecting a LED for function control

The devices are thin-film circuits deposited on ceramic substrates. They may be potted, together with the oscillator coil, in a non-magnetic tube.



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.

type	supply voltage
OM386M	positive
OM387M	negative

Inductive proximity detectors (cont.)

For detailed information on these and other types see Data Handbook S13

D.C. supply voltage range	10 to 30 V
Output current at $V_B = 10$ to 30 V	max. 250 mA
Switching distance; depends on R_x and oscillator coil	typ. 2 to 5 mm
Hysteresis is switching distance	3 to 10%
Operating frequency	< 5 kHz
Operating substrate temperature range	- 40 to +85 °C

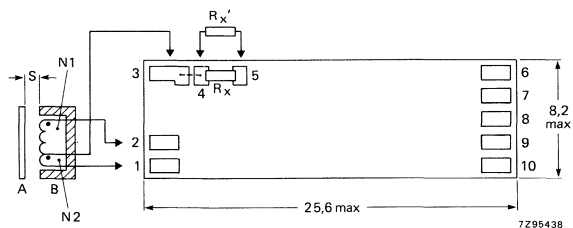
Hybrid integrated circuits intended for inductive proximity detectors in tubular construction, especially the M12 hollow stud. The OM388B is for positive supply voltage and the OM389B is for negative supply voltage. The circuit consists of a voltage regulator, an oscillator, a rectifier stage, a Schmitt trigger, an output stage and a protection circuit.

The circuit performs a make function: when actuated the current flows through the load, which can be, for example, the coil of an electromagnetic relay, a LED or a photocoupler.

Features

- protection against short-circuit and overload
- protection of output transistor against transients by a voltage regulator diode
- protection against false polarity of the three connection leads
- choice between two methods to adjust the operating (switching) distance i.e. trimming a resistor integrated on the substrate or mounting a resistor
- possibility of connecting a LED for function control

The devices are thin-film circuits deposited on ceramic substrates. They may be potted, together with the oscillator coil, in a non-magnetic tube.



- 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.

type	supply voltage
OM388B	positive
OM389B	negative

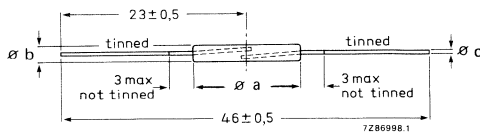


- Impartial advice for customers to choose between:
pcb - Hybrid ICs - gate arrays or fully monolithic ICs
- Basic factory load guaranteed by standard catalogue hybrid modules
- Wide range of in-house surface mounted components and naked crystals
- Wide variety of application know-how
- Various factories 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 T15

Single pole, single throw, dry reed switches for relays, push buttons, level detectors, etc.



type series	max. dimensions			max. switched			
	a mm	b mm	c mm	power W	voltage V d.c.	current mA	voltage V a.c.
RI-22	15	2,8	0,65	10	200	500	110
RI-23	15	2,54	0,60	10	200	500	110
RI-26	15	2,54	0,60	15	200	1000	110
RI-27	13,5	1,8	0,50	10	200	500	110
RI-45	21,5	2,8	0,65	40	200	1000	250
RI-46AA RI-46A	21,5	2,8	0,65	30	200	1000	250
RI-46B RI-46C	21,5	2,8	0,65	40	200	1000	250



For detailed information on these and other types see Data Handbook C9

Philips have strong technological and industrial capabilities in the field of piezoelectric quartz devices.

Three types of devices are generally available:

- 1) Standard crystals for frequency stabilization in the frequency range 4 MHz to 14 MHz.
- 2) Customized crystals for different, 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	3 to 10	RW-36 RW-10	resistance welded resistance welded	pins flying leads	4322 148 5 4322 148 6
	1,8 to 25	RW-36	resistance welded	pins	4322 149 5
	1 to 1,8	HC-6/U	solder sealed	pins	4322 152 5
	1,8 to 25	HC-27/U	all-glass	pins	4322 154 5
	4,5 to 25	HC-26/U HC-29/U RW-43 RW-42	all-glass all-glass resistance welded resistance welded	flying leads pins flying leads pins	4322 155 5 4322 155 6 4322 156 5 4322 156 6
third overtone	10 to 75	HC-27/U RW-36	all-glass resistance welded	pins pins	4322 159 5 4322 162 5
	17 to 75	RW-43 RW-42	resistance welded resistance welded	flying leads pins	4322 161 5 4322 161 6
	20 to 75	HC-26/U HC-29/U	all-glass all-glass	flying leads pins	4322 160 5 4322 160 6
fifth overtone	50 to 125	HC-27/U HC-26/U HC-29/U RW-43 RW-42 RW-36 RW-33	all-glass all-glass all-glass resistance welded resistance welded resistance welded resistance welded	pins flying leads pins flying leads pins pins flying leads	4322 165 5 4322 166 5 4322 166 6 4322 167 5 4322 167 6 4322 168 5 4322 168 6

Special types

fundamental	1 MHz	HC-6/U	solder sealed	pins	4322 152 01240
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 C9

TCXO, temperature compensated quartz oscillators

frequency range MHz	temperature range °C	frequency tolerance $\times 10^{-6}$	supply voltage	basic catalogue number
4,5 to 15*	0 to +50 -10 to +60 -20 to +70	± 1 $\pm 1,5$ ± 2	12 V \pm 20% 12 V \pm 20% 12 V \pm 20%	4322 190 2... 4322 190 1... 4322 190 0...
4,5 to 15**	0 to +50 -10 to +60 -20 to +70	± 1 $\pm 1,5$ ± 2	12 V \pm 20% 12 V \pm 20% 12 V \pm 20%	4322 190 2... 4322 190 1... 4322 191 2...
4,5 to 12***	0 to +50 -10 to +60 -20 to +70	± 1 $\pm 1,5$ ± 2	12 V \pm 20% 12 V \pm 20% 12 V \pm 20%	4322 192 2... 4322 192 1... 4322 192 0...
20 to 50**	0 to +50 -20 to +70 0 to +50 -20 to +70	± 1 ± 2 ± 2 ± 3	12 V \pm 2% 12 V \pm 2% 12 V \pm 10% 12 V \pm 10%	4322 195 0... 4322 195 1... 4322 195 2... 4322 195 3...
4,5 to 15***	-40 to +85	$\pm 0,5$	5 V \pm 5%	4322 198

Quartz crystals for temperature measurement

frequency range	4 to 20 MHz	1 to 25 MHz
temperature range	-100 to +150 °C	-100 to +300 °C
temperature coefficient	-40 to +80 $\times 10^{-6}/K$	-50 to +850 $\times 10^{-6}/K$
linearity	$< \pm 2,5\%$	$< \pm 1,5\%$
adjusting tolerance	$< \pm 150 \times 10^{-6}$	$< \pm 50 \times 10^{-6}$
thermal time constant	typ. 10 s	3 to 30 s
holder envelope	RW 43	RW43, RW80, TO39

CIO, compact integrated oscillators

frequency range	1 to 20 MHz
frequency tolerance at +25 °C	$\pm 100 \times 10^{-6}$
frequency stability	$\pm 20 \times 10^{-6}$
operating temperature range	0 to +70 °C
supply voltage	5 V \pm 10%
fan-out	max. 10 standard TTL
basic catalogue number	4322 199 00...

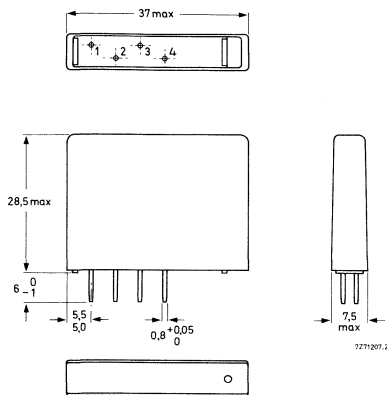
- * frequency not adjustable
 ** frequency adjustable by external capacitor
 *** frequency adjustable by external resistor



Electronic
components
and materials



For detailed information see Data Handbook C20



type	DL63	DL680	DL701	DL703	DL711
catalogue number	4322 027 84631	4322 027 84661	4322 027 84771	4322 027 84831	4322 027 84781
application	CTV	VLP	CTV/VCR	VCR	CTV
system	PAL-Brazil	PAL	PAL-Europe	PAL-Europe	PAL/SECAM
nominal frequency	3,575611 MHz	7,500000 MHz	4,433619 MHz	4,433619 MHz	4,433619 MHz
- 3 dB lower limit	2,8 MHz	5,5 MHz	3,43 MHz	3,03 MHz	3,43 MHz
- 3 dB upper limit	4,5 MHz	8,5 MHz	5,23 MHz	5,43 MHz	5,23 MHz
insertion loss	9 ± 3 dB	max. 17 dB	9 ± 3 dB	9 ± 3 dB	9 ± 3 dB
delay time	63486 ± 5 ns	64400 ± 50 ns	63943 ± 5 ns	63935 ± 5 ns	63943 ± 5 ns
nominal phase	0°	-	180°	180°	180°
drift (+ 10/ + 60°C)	typ. 5 ns	< 10 ns	< 5 ns	< 5 ns	< 5 ns
spurious (3τ)	< - 22 dB	< - 20 dB	< - 25 dB	< - 28 dB	< - 33 dB*
spurious ('others')	< - 30 dB	< - 30 dB	< - 33 dB	< - 26 dB	< - 33 dB*
R1 (input)	560 Ω	150 Ω	390 Ω	390 Ω	390 Ω
R2 (output)	560 Ω	150 Ω	390 Ω	390 Ω	390 Ω
L1 eff. (input)	18 μH	2,2 μH	10 μH	18 μH	10 μH
L2 eff. (output)	18 μH	2,2 μH	10 μH	18 μH	10 μH

* Spurious signals measured in frequency range 3,9 to 4,75 MHz



Glass delay lines / comb filter

For detailed information see Data Handbook C20

type	DL720	DL721	DL722	DL750
catalogue number	4322 027 84721	4322 027 84731	4322 027 84741	4322 027 84751
application	CTV	CTV	CTV	CTV comb f./VCR
system	PAL-Argentina	PAL-Argentina	PAL-Argentina	NTSC
nominal frequency	3,582056 MHz	3,582056 MHz	3,582056 MHz	3,579545 MHz
-3 dB lower limit	2,8 MHz	2,8 MHz	2,8 MHz	2,8 MHz
-3 dB upper limit	4,5 MHz	4,5 MHz	4,5 MHz	4,5 MHz
insertion loss	9 ± 3 dB	9 ± 3 dB	9 ± 3 dB	9 ± 3 dB
delay time	63929 ± 5 ns	64069 ± 50 ns	64069 ± 5 ns	63555 ± 5 ns
nominal phase	0°	180°	180°	180°
drift (+10/ +60°C)	< 5 ns	< 5 ns	< 5 ns	typ. 5 ns
spurious (3τ)	< -22 dB	< -22 dB	< -22 dB	< -22 dB
spurious ('others')	< -28 dB	< -28 dB	< -28 dB	< -28 dB
R1 (input)	560 Ω	560 Ω	390 Ω	560 Ω
R2 (output)	560 Ω	560 Ω	390 Ω	560 Ω
L1 eff. (input)	18 μH	18 μH	10 μH	18 μH
L2 eff. (output)	18 μH	18 μH	10 μH	18 μH



For detailed information see Data Handbook C20

type	DL872	CF873
catalogue number	4322 027 84841	4322 027 84581
application	VCR comb filter	VCR comb filter
system	PAL-Europe	PAL-Europe
nominal frequency	4,433619 MHz	4,433619 MHz
-3 dB lower limit	3,93 MHz	3,93 MHz
-3 dB upper limit	4,93 MHz	4,93 MHz
insertion loss	18 ± 3 dB	18 ± 3 dB
delay time	128 µs	128 µs
spurious (2τ)	< -12 dB	< -18 dB
spurious ('others')	< -23 dB	< -23 dB
comb depth at f_o	> 20 dB	> 20 dB
comb depth at f_+	> 10 dB	> 12 dB
comb depth at f_-	> 10 dB	> 12 dB

Note: $f_o = 4,42971$ MHz
 $f_+ = 4,92971$ MHz
 $f_- = 3,92971$ MHz



Electronic
components
and materials

Tweeter and squawker loudspeakers

For detailed information on these and other types see Data Handbook C3

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'.

Tweeter loudspeakers

basic part of type number	impedance Ω	resonance frequency Hz	core diameter mm	power handling capacity W	max. dimensions		
					flange		mounting depth mm
					inch	mm	
AD01700/T8	8	2000	10	1,5	0,5	54 \emptyset	13
AD11700/T8	8	2000	10	1,5	0,5	64 \square	13
AD11400/T.	4/8	1500	25	6	1	82 \square	27,7
AD11410/T.	4/8	1500	25	6	1	82 \square	27,7
AD11430/T.	4/8	1000	25	3,5	1	82 \square	40,1
AD11600/T	4/8	1300	25	6	1	96 \square	33,6
AD11610/T.	4/8	1300	25	6	1	96 \square	33,6
AD11800/T.	4/8	1700	25	4	1	75 \square	25
AD11810/T.	4/8	1600	25	4	1	75 \square	25
AD11830/T.	4/8	1000	25	4	1	75 \square	37,4
AD20303/T.	4/8/15	2000	14,5	4	2	55 \emptyset	23
AD22303/T.	4/8/15	2000	14,5	4	2	66 \square	23
AD20311/T.	4/8/15	2000	14,5	4	2	55 \emptyset	30
AD22311/T.	4/8/15	2000	14,5	4	2	66 \square	33
AD20851/T.	4/8/15	1900	14,5	4	2	55 \emptyset	26
AD22851/T.	4/8/15	1900	14,5	4	2	66 \square	29



Squawker loudspeakers

AD02110/Sq.	4/8	340/360	50	30	2	134 \square	103
AD33303/Sq.	4/8/15	900	14,5	5	3	97 \square	32
AD50600/Sq.	4/8	260	25	20	5	129	107
AD50800/Sq.	4/8	280	18	15	5	129	107

TIC = steel alloy; PXE = piezoelectric; RE = rare earth; \emptyset = diameter; \square = square.



Electronic components and materials

For detailed information of these and other types see Data Handbook C3

basic part of type number	impedance Ω	resonance frequency Hz	core diameter mm	power handling capacity W	max. dimensions		
					flange		mounting depth mm
					inch	mm	
AD10202/W8	8	26	50	80	10	259 ∅	116
AD10252/W8	8	28	50	100	10	259 ∅	118,5
AD10602/W8	8	39	25	40	10	259 ∅	105,3
AD10672/W8	8	27	35	60	10	259 ∅	109,5
AD12202/W.	4/8	22/24	30	80	12	311 ∅	118,6
AD12252/W.	4/8	25/27	50	100	12	294 ∅	120,8
AD12672/W.	4/8	25/26	35	60	12	294 ∅	114,5
AD36510/W4	4	68	18	15	3 X 6	80 X 160	62,4
AD36901/X.	4/8/15	95	18	8	3 X 6	80 X 160	57,6
AD38903/X.	4/8/15	95	18	8	3 X 8	81,6 X 204,6	59
AD38902/P.	4/8/15	95	18	13	3 X 8	81,6 X 204,6	59,5
AD44900/W4	4	65	18	8	4	102 □	56
AD44901/W4	4	65	18	8	4	102 □	56
AD44900/P.	4/8/15	110	18	8	4	102 □	56
AD70604/W.	4/8	43	25	30	7	166 ∅	67,5
AD70804/W.	4/8	86	18	20	7	166 ∅	66,5
AD80400/W8	8	62	18	40	8	205 Δ	75,6
AD80602/W.	4/8	42	25	50	8	204 ∅	85,6
AD80606/W.	4/6/8	36/40/38	25	50	8	204 ∅	84
AD80652/W.	4/8	39	25	50	8	204 ∅	87,6

∅ = diameter; □ = square; Δ = octagonal.



For detailed information on these and other types see Data Handbook C3

basic part of type number	impedance Ω	resonance frequency Hz	core diameter mm	power handling capacity W	max. dimensions		
					flange		mounting depth mm
					inch	mm	
AD01980/Y.	8/15/25	600	14,5 RE	0,3	1,33	34 \emptyset	5
AD01985/Y.	8/15/25	600	14,5	0,3	1,5	36 \emptyset	5
AD2071/Z.	4/8/15/25/150	360	10	1	2,5	64 \emptyset	19,7
AD3071/Y.	4/8/15/25/150	250	10	2	3	81 \emptyset	23
AD3371/Y.	4/8/15/25/150	250	10	2	3	81 \square	23
AD4072/X.	4/8/15/25	170	10	3	4	105 \emptyset	30,5
AD4472/X.	4/8/15/25	170	10	3	4	105 \emptyset	30,5
AD4074/X.	4/8/15/25	170	10	2,5	4	105 \emptyset	44
AD4474/X.	4/8/15/25	170	10	2,5	4	105 \emptyset	44
AD12202/M.	4/8	45	35	100	12	312,4 \emptyset	135
AD12202/P8	8	45	35	100	12	312,4 \emptyset	135
AD12252/HP.	4/8	55	50	150	12	312,4 \emptyset	152
AD35720/X.	4/8/15/25	160	10	3	3 X 5	75 X 130	35
AD35740/X.	4/8/15/25	160	10	3	3 X 5	75 X 130	47
AD35721/X.	4/8/15/25	160	10	2,5	3 X 5	75 X 130	35
AD35741/X.	4/8/15/25	160	10	2,5	3 X 5	75 X 130	47
AD35722/X.	4/8/15/25	160	10	3	3 X 5	75 X 130	35
AD35742/X.	4/8/15/25	160	10	3	3 X 5	75 X 130	47
AD35725/X.	4/8/15/25	160	10	5	3 X 5	75 X 130	35
AD35746/X.	4/8/15/25	160	10	5	3 X 5	75 X 130	47
AD35726/X.	4/8/15/25	160	10	5	3 X 5	75 X 130	35
AD35747/X.	4/8/15/25	160	10	5	3 X 5	75 X 130	47
AD35727/X.	4/8/15/25	160	10	5	3 X 5	75 X 130	35
AD35748/X.	4/8/15/25	160	10	5	3 X 5	75 X 130	47
AD36720/X.	4/8/15/25	130	10	3	3 X 6	80 X 160	45
AD36740/X.	4/8/15/25	130	10	5	3 X 6	80 X 160	55
AD36722/X.	4/8/15/25	130	10	3	3 X 6	80 X 160	45
AD36742/X.	4/8/15/25	130	10	5	3 X 6	80 X 160	55
AD36725/X.	4/8/15/25	130	10	5	3 X 6	80 X 160	45
AD36746/X.	4/8/15/25	130	10	4,5	3 X 6	80 X 160	55
AD36727/X.	4/8/15/25	130	10	5	3 X 6	80 X 160	45
AD36748/X.	4/8/15/25	130	10	4,5	3 X 6	80 X 160	55
AD36901/X.	8/15	95	18	8	3 X 6	80 X 160	57,6
AD40725/X.	4/8/15/25	170	10	5	4	105 \emptyset	30,5
AD40745/X.	4/8/15/25	170	10	5	4	105 \emptyset	44
AD40830/X.	4	115	18	15	4	102,2 \emptyset	45,6
AD40880/X.	4/8	150	14,5	6	4	102 \emptyset	40,5
AD44322/X.	4/8/15	170	14,5	4	4	102 \square	39,1
AD44401/M4K	4	110	18	15	4	102 \square	52,2
AD44725/X.	4/8/15/25	170	10	5	4	105 \emptyset	30,5
AD44745/X.	4/8/15/25	170	10	5	4	105 \emptyset	44

\emptyset = diameter; \square = square; Δ = octagonal.



Electronic components and materials

For detailed information on these and other types see Data Handbook C3

basic part of type number	impedance Ω	resonance frequency Hz	core diameter mm	power handling capacity W	max. dimensions		
					flange		mounting depth mm
					inch	mm	
AD44830/X.	4/8	140	18	8	4	102 □	42,7
AD44880/X.	4/8	150	14,5	6	4	102 □	40,5
AD44900/X.	4/8/15/25	90	18	8	4	102 □	56
AD44901/X.	4/8/15/25	90	18	8	4	102 □	56
AD46720/X.	4/8/15/25	130	10	4	4 X 6	102 X 154	44
AD46740/X.	4/8/15/25	130	10	4	4 X 6	102 X 154	56
AD46721/X.	4/8/15/25	130	10	5	4 X 6	102 X 154	44
AD46741/X.	4/8/15/25	130	10	5	4 X 6	102 X 154	56
AD46722/X.	4/8/15/25	130	10	5	4 X 6	102 X 154	44
AD46742/X.	4/8/15/25	130	10	5	4 X 6	102 X 154	56
AD46725/X.	4/8/15/25	130	10	5	4 X 6	102 X 154	44
AD46746/X.	4/8/15/25	130	10	5	4 X 6	102 X 154	56
AD46726/X.	4/8/15/25	130	10	5	4 X 6	102 X 154	44
AD46747/X.	4/8/15/25	130	10	5	4 X 6	102 X 154	56
AD46727/X.	4/8/15/25	130	10	5	4 X 6	102 X 154	44
AD46748/X.	4/8/15/25	130	10	5	4 X 6	102 X 154	56
AD46801/X4	4	120	18	8	3,5 X 6	96 X 155	49,8
AD46810/X4	4	140	18	6	3,5 X 6	96 X 155	38
AD50720/X.	4/8/15/25	130	10	3	5,25	131 ∅	43
AD50740/X.	4/8/15/25	130	10	3	5,25	131 ∅	55
AD50725/X.	4/8/15/25	130	10	5	5,25	131 ∅	43
AD50745/X.	4/8/15/25	130	10	5	5,25	131 ∅	55
AD50800/X,M	4/8	140	18	6	5	120 ∅	48,5
AD55720/X.	4/8/15/25	130	10	3	5,25	131 ∅	43
AD55740/X.	4/8/15/25	130	10	3	5,25	131 ∅	55
AD55725/X.	4/8/15/25	130	10	5	5,25	131	43
AD55745/X.	4/8/15/25	130	10	5	5,25	131	55
AD70720/X.	4/8/15/25	100	10	5	7	160 ∅	46
AD70740/X.	4/8/15/25	100	10	5	7	160 ∅	58
AD70725/X.	4/8/15/25	100	10	5	7	160 ∅	46
AD70745/X.	4/8/15/25	100	10	5	7	160 ∅	58
AD70800/X,M	4/8	100/105	18	12/13	7	165 Δ	63,5
AD70850/X,M	4/8	105	14,5	7	7	165 Δ	61,5
AD77720/X.	4/8/15/25	100	10	5	7	160 ∅	46
AD77740/X.	4/8/15/25	100	10	5	7	160 ∅	58
AD77725/X.	4/8/15/25	100	10	5	7	160 ∅	46
AD77745/X.	4/8/15/25	100	10	5	7	160 ∅	58
AD80800/XM	4/8	75...95	18	10/13	8	205 Δ	73,6

∅ = diameter; □ = square; Δ = octagonal

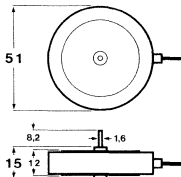


Electronic components and materials

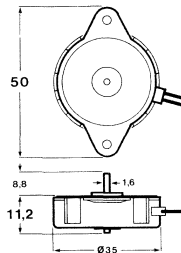
Unidirectional synchronous motors

For detailed information on these and other types see Data Handbook C6

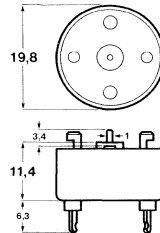
dimensions in mm



US02



US05



US09

Unidirectional synchronous motors



catalogue number (and commercial identification)	suffix to catalogue number at nominal voltages				power input		speed		torque		direction of rotation
	220 V	110 V	48 V	24 V	coils parallel W	coils series W	50 Hz	60 Hz	coils parallel mNm	coils series mNm	
							r.p.m.	r.p.m.			
9904 110 02... (US02)	101 111	301 311	- -	- -	- -	1,6 1,6	250 250	- -	- -	3 3	CW CCW
9904 110 05... (US05)	102* 112*	301 311	- -	- -	- -	0,5 0,5	250 250	- -	- -	0,5 0,5	CW CCW
9904 110 09... (US09)	special purpose miniature motor				specification determined by the application (see data sheet)						

* This motor to be used with a series resistor (20 kΩ), total power input 1,8 W.

Reversible synchronous motors

For detailed information on these and other types see Data Handbook C6

Reversible synchronous motors

catalogue number (and commercial identification)	suffix to catalogue number at nominal voltages				power input		speed		torque		spindle \varnothing x length mm
	220 V	110 V	48 V	24 V	coils parallel W	coils series W	50 Hz r.p.m.	60 Hz r.p.m.	coils parallel mNm	coils series mNm	
9904 111 06... (RS06)	101 111	- -	- -	- 511	5 5	- -	250 250	- -	37,5 37,5	- -	3 x 8,2 4 x 16
9904 111 27... (RS27)	101 111	301 311	401 411	501 511	6 6	- -	250 250	300 300	70 70	- -	3 x 8,2 6 x 18
9904 111 28... (RS28)***	101 111	301 311	401 411	511 511	15 15	- -	500 500	- -	70 70	- -	3 x 8,2 6 x 18
9904 111 30... (RS30)	112	-	special purpose		25	*	500	-	130	-	6 x 20
9904 111 31... (RS31)	- 101 111	302 301 311	401 411	501 511	1,8 3,5 3,5	** - -	250 250 250	300 300 300	10 20 20	- - -	special 3 x 8,2 1,8x 8,2
9904 111 32... (RS32)	104 114	304 314	404 414	504 514	3,5 3,5	- -	250 250	300 300	20 20	- -	3 x 8,2 1,8x 8,2
9904 111 31... (RS31E)	- 311	311 411	411 511	511 -	0,8 0,8	1,7 1,7	250 250	300 300	4 4	7 7	2 x 8,8 2 x 8,8
9904 111 32... (RS32E)	- 314	314 414	414 415	514 -	0,8 0,8	1,7 1,7	250 250	300 300	4 4	7 7	2 x 8,8 2 x 8,8
9904 111 33... (RS33E)	104 114	304 314	404 414	504 514	6 6	- -	250 250	300 300	70 70	- -	3 x 8,2 6 x 18
9904 111 34... (RS34E)***	104 114	304 314	404 414	504 514	14 14	- -	500 500	- -	70 70	- -	3 x 8,2 6 x 18
9904 111 35... (RS35E)	104 114	304 314	404 414	504 514	3,5 3,5	- -	250 250	300 300	33 33	- -	3 x 8,2 4 x 16
9904 111 36... (RS36E)***	104 114	304 314	404 414	504 514	6 6	- -	500 500	- -	33 33	- -	3 x 8,2 4 x 16

Reversible hybrid synchronous motors

9904 116 23... (RHS23)	101	-	-	501	6	-	60	72	200	-	6,34 (0,25 in.)
-------------------------------	-----	---	---	-----	---	---	----	----	-----	---	--------------------

Notes: All versions with spindle diameter \varnothing 3 and \varnothing 2 mm may be used in conjunction with gearbox series 9912 200 0....

* Heavy duty motor with high detent torque to hold loads, unenergized.

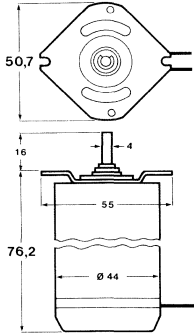
** Motor for audio, turntable drive (see data sheet).

*** Motor should not to be used at more than 50% duty cycle.

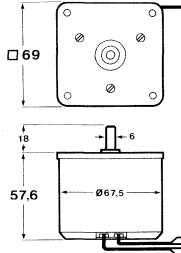
Reversible synchronous motors

For detailed information on these and other types see Data Handbook C6

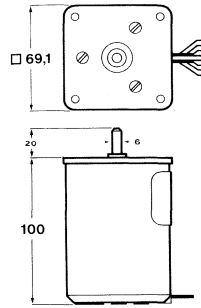
dimension in mm



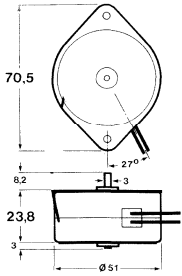
RS06



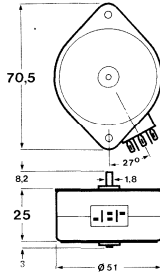
RS27/RS28



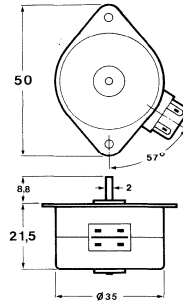
RS30



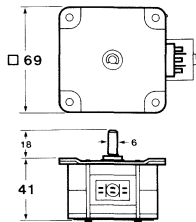
RS31



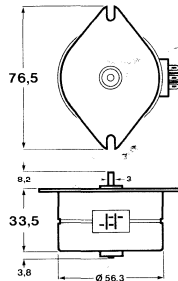
RS31E



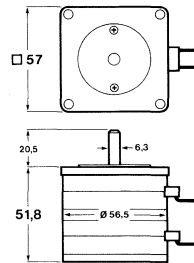
RS32E



RS33E/34E



RS35E/RS36E



RHS23



Electronic components and materials

Permanent-magnet unipolar and bipolar stepping motors

For detailed information on these and other types see Data Handbook C17

Permanent-magnet unipolar stepping motors

catalogue number	commercial identification	step angle	holding torque mNm	max pull-in st/s	max pull-out st/s	work-ing torque at 10 st/s mNm	dynamic torque at 50% of pull-in pull-out		current per phase mA	resistance per phase Ω	electronic driver (two excitation modes)	
							mNm	mNm			mode	phases
9904 112 06001	(ID 06001)	7°30'	70	110	-	40	30	-	250	45	IC	4
9904 112 06101	(ID 06101)	7°30'	70	200	320	50	30	37	400	12	UD	4
9904 112 27001	(ID 27001)	7°30'	140	80	-	100	70	-	290	39	IC	4
9904 112 27101	(ID 27101)	7°30'	150	275	275	110	80	85	580	9,8	UD	4
9904 112 28001	(ID 28001)	15°	80	90	-	60	45	-	290	39	IC	4
9904 112 28101	(ID 28101)	15°	85	200	250	65	50	60	580	9,8	UD	4
9904 112 31001	(ID 31001)	7°30'	30	180	-	22	18	-	190	62	IC	4
9904 112 31101	(ID 31101)	7°30'	34	400	500	24	18	22	325	17	UD	4
9904 112 31004	(ID 31E004)	7°30'	28	240	-	20	14	-	175	65	IC	4
9904 112 31104	(ID 31E104)	7°30'	32	400	500	22	14	20	400	11	UD	4
9904 112 31006	(ID 31E006)	7°30'	42	245	-	30	19	-	175	65	IC	4
9904 112 31106	(ID 31E106)	7°30'	46	450	620	33	22	28	400	11	UD	4
9904 112 32001	(ID 32001)	7°30'	10	350	-	6	4	-	100	120	IC	4
9904 112 32101	(ID 32101)	7°30'	10	550	850	7	6	6	220	21	UD	4
9904 112 33004	(ID 33E004)	7°30'	130	100	-	90	50	-	300	38,5	IC	4
9904 112 33104	(ID 33E104)	7°30'	130	275	275	90	80	90	615	7,8	UD	4
9904 112 33105	(ID 33E105)	7°30'	150	275	275	110	85	100	615	7,8	UD	4
9904 112 34004	(ID 34E004)	15°	75	100	-	55	45	-	300	38,5	IC	4
9904 112 34104	(ID 34E104)	15°	80	190	240	60	50	55	615	7,8	UD	4
9904 112 35014	(ID 35E104)	7°30'	85	130	-	57	40	-	240	47	IC	4
9904 112 35114	(ID 35E114)	7°30'	85	300	350	65	45	55	575	7,7	UD	4
9904 112 35016	(ID 35E016)	7°30'	95	150	-	68	40	-	240	47	IC	4
9904 112 35116	(ID 35E116)	7°30'	95	360	380	70	50	60	575	7,7	UD	4
9904 112 36014	(ID 36E014)	15°	60	110	-	32	26	-	240	47	IC	4
9904 112 36114	(ID 36E114)	15°	60	200	350	37	28	28	575	7,7	UD	4

Permanent-magnet bipolar stepping motors

9904 112 27201	(ID 27B201)	7°30'	170	450	5000	130	85	30	500	7,5	BD2	2
9904 112 28201	(ID 28B201)	15°	110	275	3000	90	35	40	500	7,5	BD2	2
9904 112 29201	(ID 29B201)	3°45'	300	900	10000	280	180	60	500	7,5	BD4	4
9904 112 30201	(ID 30B201)	7°30'	210	500	5000	190	150	140	500	7,5	BD4	4
9904 112 31206	(ID 31EB206)	7°30'	55	620	5000	45	26	26	500	7	BD2	2
9904 112 32204	(ID 32EB204)	7°30'	11	600	2000	8	3	7	360	7,7	BD2	2
9904 112 35214	(ID 35EB214)	7°30'	90	300	1000	63	56	64	500	8,5	BD2	2
9904 112 35216	(ID 35EB216)	7°30'	125	400	1000	95	70	80	500	8,5	BD2	2

Electronic drivers:

- IC = Unipolar, 4 phase, IC
- UD = Unipolar, 4 phase, PCB
- BD2 = Bipolar chopper drive, 2 phase, PCB
- BD4 = Bipolar chopper drive, 4 phase, PCB
- SAA 1027
- 9904 131 03 006
- 9904 131 03 007
- 9904 131 03 008

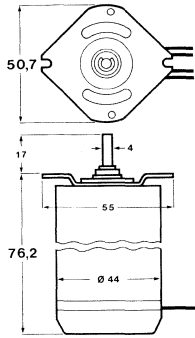


Electronic components and materials

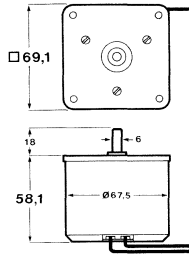
PHILIPS

Permanent-magnet unipolar and bipolar stepping motors

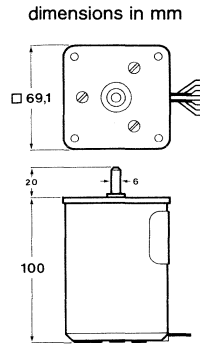
For detailed information on these and other types see Data Handbook C17



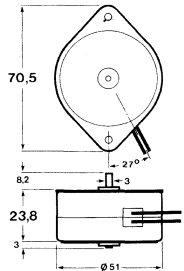
ID06



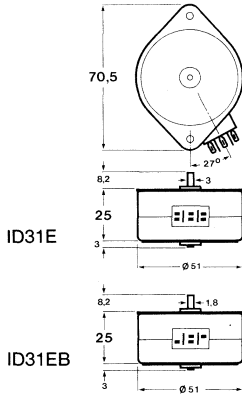
ID27/ID28



ID29/ID30

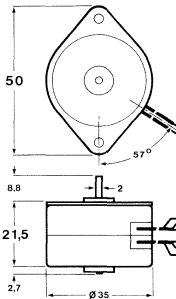


ID31

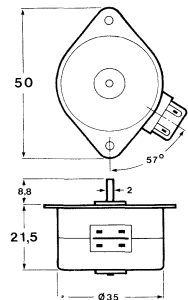


ID31E

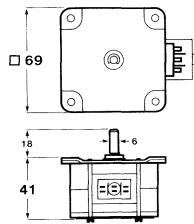
ID31EB



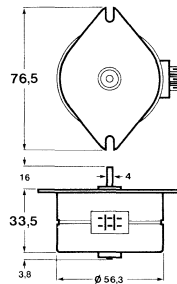
ID32



ID32EB



ID33E/ID34E



ID35E/ID36E

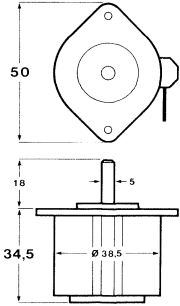
dimensions in mm



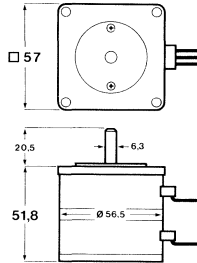
Hybrid, fine-angle stepping motors

For detailed information on these and other types see Data Handbook C17

dimensions in mm



HR15



HR23

Hybrid, fine-angle stepping motors

catalogue number	commercial identification	step angle	holding torque mNm	max pull-in st/s	max pull-out st/s	working torque at 10 st/s mNm	dynamic torque at 50% of pull-in pull out		current per phase mA	resistance per phase Ω	electronic driver (two excitation modes)	
							mNm	mNm			mode and phases	
9904 115 23101	(HR 23101)	1°48' (1,8°)	500	450	5000	360	120	100	500	8	BD2	2
9904 115 15101	(HR 15101)	1°48' (1,8°)	65	675	750	55	25	35	160	75	UD	4
9904 115 15201	(HR 15201)		100	500	600	65	25	40	210	37	BD2	2

Electronic drivers: UD = Unipolar, 4 phase, PCB - 9904 131 03 006
 BD2 = Bipolar chopper/drive, 2 phase, PCB - 9904 131 03 007

For detailed information on these and other types see Data Handbook C18

Miniature iron-core d.c. motors

∅ □ mm	catalogue number	voltage V	torque mNm	speed rpm	rotation direction	I mA	rotor resistance Ω	emf mV/rpm	t ₀ const. mNm/A	rotor inertia gcm ²	time const. ms	remarks (see notes)
∅ 32,2	4322 010 71660	4,8	1	2000	rev*	94	13	1,84	17,5	10	48	SS, SB
	4322 010 71670	6,7	1	2000	rev*	70	26	2,58	24,6	10	48	SS, SB
∅ 27	4322 010 72320	5,5	1	2400	CW	85	16	1,7	16,2	9	34	SS, SB
	4322 010 72360	7,5	1,3	2400	CW	83	25,6	2,2	20,8	9	34	SS, SB
	4322 010 72370	7,5	1,3	2400	CCW	83	25,6	2,2	20,8	9	34	SS, SB
□ 35	9904 120 09601	12	5	5900	rev*	550	6,15	1,5	14,3	-	80	SS, SB

Instrument type, coreless, d.c. motors

∅ 40	4322 010 74080	24	10	2815	rev*	180	24,5	7,3	70	39,2	19,6	SB
	4322 010 74090	12	10	2815	rev*	365	6,2	3,7	35	39,2	19,6	SB
	4322 010 74190	15	22	3000	rev*	660	6,2	3,7	35	43,3	21,0	SS, BB
	4322 010 75060	24	10	2815	rev*	180	24,5	7,3	70	39,2	19,6	SB, RT
	4322 010 75110	12	10	2815	rev*	365	6,2	3,7	35	39,2	19,6	SB, RT
	4322 010 75130	15	22	3000	rev*	660	6,2	3,7	35	43,3	22,0	SS, SB, RS
	4322 010 75140	24	10	2815	rev*	165	24,5	6,7	70	41,0	21,0	SB, FT
	4322 010 75180	24	10	2815	rev*	165	24,5	6,7	70	39,2	20,0	BB, RS
∅ 29	4322 010 75210	24	10	2815	rev*	165	24,5	6,7	70	39,2	20,0	SB
	4322 010 75300	30	22	3000	rev*	335	24,5	7,3	70	43,3	22,0	SS, SB
	4322 010 76000	12	5	3000	rev*	200	12	9,1	29	9,0	12,0	BB
	4322 010 76050	12	5	3000	rev*	200	12	9,6	30	9,0	11,0	SB
	4322 010 76130	12	5	3000	rev*	212	12	9,1	29	10,4	13,0	SB, FT
∅ 19	4322 010 76150	24	5	3000	rev*	100	47	19,2	60	9,0	11,0	SB
	4322 010 76200	9	5	3500	rev*	100	47	6,2	20	9,0	13,0	SB
∅ 19	4322 010 77000	9	0,3	5430	CCW	30	85,5	3,5	11	0,76	50	SB, RT
∅ 20	4322 010 77010	7,5	0,3	4500	rev*	35	73	2,3	7,3	0,69	45	SB, RT
∅ 66	4322 010 78010	30	100	2150	rev*	1070	7,8	31,0	98	214	17	SS, BB, RS



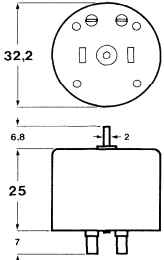
* reversible
SS built-in spark suppression
BB ball bearings
SB slide bearings

RT rear thrust bearing
FT frequency tacho incl.
RS rear spindle

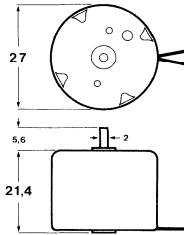
PHILIPS Electronic components and materials

For detailed information on these and other types see Data Handbook C18

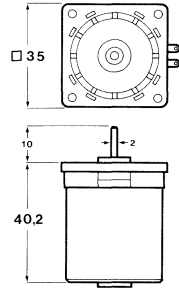
dimensions in mm



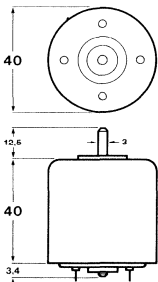
4322 010 71660/71670



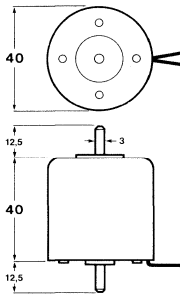
4322 010 72320/72360/72370



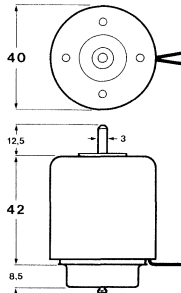
9904 120 09601



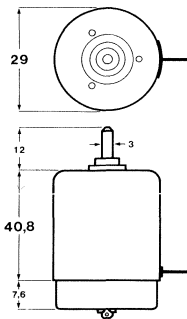
4322 010 74080/74090/75060/75110
(4322 010 74190/75300 with leads)



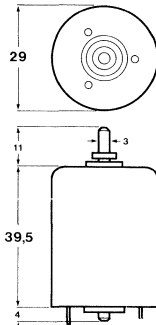
4322 010 75210/75180
(4322 010 75130 with solder tags)



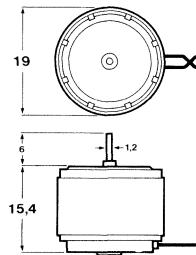
4322 010 75140



4322 010 76130



4322 010 76000/76050/76150/76200

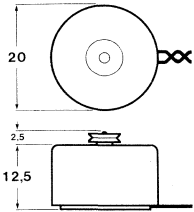


4322 010 77000

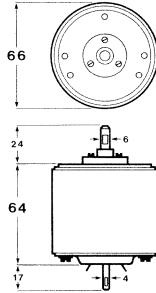


For detailed information on these and other types see Data Handbook C18

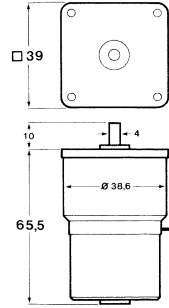
dimensions in mm



4322 010 77010



4322 010 78010



9904 120 52...

Multi-purpose, iron-core, d.c. motors with integral gearbox

□ mm	catalogue number	voltage V	torque mNm	speed r.p.m.	rotation direction	current mA	input power W	gear reduction	remarks (see notes)
39	9904 120 52402	16	25	330	CW	360	2,1	9,00:1	SS, SB
	9904 120 52405	6	125	60	CW	360	2,1	50,00:1	SS, SB
	9904 120 52407	6	125	23	CCW	180	1,1	150,40:1	SS, SB
	9904 120 52409	6	125	8,2	CW	110	0,7	451,25:1	SS, SB
	9904 120 52602	12	25	330	CW	185	2,2	9,00:1	SS, SB
	9904 120 52605	12	125	60	CW	185	2,2	50,00:1	SS, SB
	9904 120 52607	12	125	23	CCW	100	1,2	150,40:1	SS, SB
	9904 120 52609	12	125	8,2	CW	60	0,7	451,25:1	SS, SB
	9904 120 52702	24	25	330	CW	105	2,5	9,00:1	SS, SB
	9904 120 52705	24	125	60	CW	105	2,5	50,00:1	SS, SB
	9904 120 52707	24	125	23	CCW	60	1,4	150,40:1	SS, SB
	9904 120 52709	24	125	8,2	CW	45	1,1	451,25:1	SS, SB

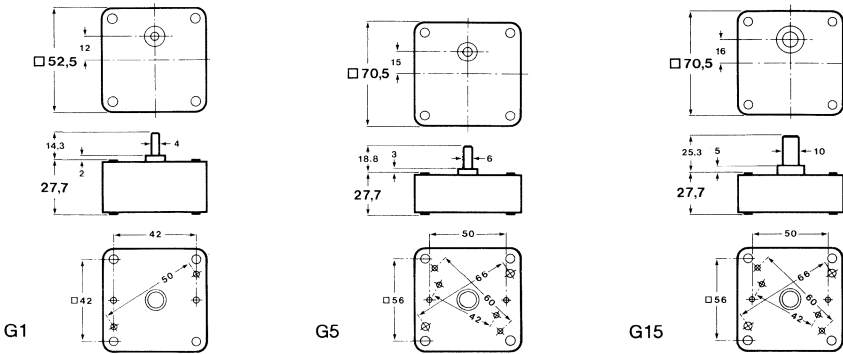
SS built-in spark suppression
SB slide bearings



Electronic components and materials

Gearboxes for reversible synchronous motors

For detailed information on these and other types see Data Handbook C6



Gearboxes for reversible synchronous motors

	type G1	type G5	type G15
reduction ratios	from 25:6 to 15.000:1	from 25:6 to 15.000:1	from 25:1 to 5.000:1
maximum output torque	1 Nm	3 Nm	10 Nm
locating holes	10 mm	12 mm	12 mm
maximum radial force	10 N	20 N	30 N
maximum axial force, push/pull	10 N	20 N	20 N
maximum power handling	1,8 W	5 W	8 W
gear ratio	catalogue number	catalogue number	catalogue number
25:6	9912 200 01001	9912 200 00001	-
25:4	9912 200 01003	9912 200 00003	-
25:3	9912 200 01004	9912 200 00004	-
10:1	9912 200 01005	9912 200 00005	-
25:2	9912 200 01006	9912 200 00006	-
50:3	9912 200 01008	9912 200 00008	-
20:1	9912 200 01009	9912 200 00009	-
25:1	9912 200 01011	9912 200 00011	9912 200 02011
100:3	9912 200 01014	9912 200 00014	-
125:3	9912 200 01016	9912 200 00016	-
50:1	9912 200 01017	9912 200 00017	9912 200 02017
125:2	9912 200 01019	9912 200 00019	-
250:3	9912 200 01021	9912 200 00021	-
100:1	9912 200 01022	-	9912 200 02022
125:1	9912 200 01023	9912 200 00023	9912 200 02023
500:3	9912 200 01025	-	-
250:1	9912 200 01027	9912 200 00027	9912 200 02027
375:1	9912 200 01031	-	-
500:1	9912 200 01034	9912 200 00034	9912 200 02034
625:1	-	-	9912 200 02036
750:1	9912 200 01037	9912 200 00037	-
1.000:1	9912 200 01039	9912 200 00039	-
1.250:1	9912 200 01041	9912 200 00041	-
5.000:1	9912 200 01054	9912 200 00054	9912 200 02054
15.000:1	9912 200 01062	9912 200 00062	-

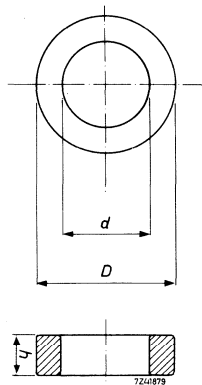
For detailed information see Data Handbook C5

Although toroids are well known for their use in pulse transformers and broadband transformers, they can also be used to advantage in interference suppression filter coils when the d.c. current is low.

Having no air gap, they have little magnetic stray field, and a high permeability. Their losses are low due to the favourable properties of Ferroxcube. They are barrel finished and can be obtained in nylon insulated and non-coated versions.

Effective dimensions (nominal)

D x d x h of coated toroids mm	D x d x h of non-coated toroids mm	l_0 mm	$\Sigma \frac{l_0}{A_0}$ mm^{-1}	A_0 mm^2
4,3 x 1,9 x 1,4	4 x 2,2 x 1,1	9,46	9,56	0,91
6,3 x 3,7 x 2,3	6 x 4 x 2	15,5	7,75	2,0
9,4 x 5,6 x 3,4	9 x 6 x 3	23,3	5,17	4,5
14,5 x 8,5 x 5,5	14 x 9 x 5	35,5	2,85	12,5
23,6 x 13,4 x 7,6	23 x 14 x 7	57,0	1,81	31,5
29,6 x 18,4 x 8,1	29 x 19 x 7,5	75,0	2,01	37,3
36,6 x 22,4 x 10,6	36 x 23 x 10	92,0	1,42	64,8
36,6 x 22,4 x 15,6	36 x 23 x 15	92,0	0,942	97,7
	19 x 10,6 x 15	44	0,719	61,2
	26 x 14,5 x 10	60	1,08	55
	26 x 14,5 x 20	60	0,538	111



N.B. Data section continues on next page

For detailed information on these and other types see Data Handbook C5

grade	μ_{tor}	colour coating	dimensions* mm	catalogue number	A_1 nH
3E1	2700 \pm 20% at 25 °C	green	29 x 19 x 7,5 36 x 23 x 10 36 x 23 x 15	4322 020 97000 4322 020 97010 4322 020 97020	1685 \pm 2 2385 \pm 2 3600 \pm 2
3E2	> 5000 at +25 to +70 °C	blue	4 x 2,2 x 1,1 6 x 4 x 2 9 x 6 x 3 14 x 9 x 5 23 x 14 x 7	4322 020 97030 4322 020 97040 4322 020 97050 4322 020 97060 4322 020 97070	> 657 > 810 > 121 > 220 > 347
3H2	2300 to 3100 at +25 °C $D_F < 5 \times 10^{-6}$ at 23 \pm 1 °C	grey	4 x 2,2 x 1,1 6 x 4 x 2 9 x 6 x 3 14 x 9 x 5 23 x 14 x 7	4322 020 97110 4322 020 97120 4322 020 97130 4322 020 97140 4322 020 97150	302 - 4 373 - 5 559 - 7 1014 - 13 1596 - 2
4C6	> 100 at +5 to +55 °C	violet	6 x 4 x 2 9 x 6 x 3 14 x 9 x 5 23 x 14 x 7 36 x 23 x 15	4322 020 97160 4322 020 97170 4322 020 97180 4322 020 97190 4322 020 97200	> 16 > 24 > 44 > 69 > 133
3C11	4000 \pm 25% at 25 °C	no coating	19 x 10,6 x 15 26 x 14,5 x 10 26 x 14,5 x 20 36 x 23 x 15	4312 020 36300 4312 020 36280 4312 020 36250 4312 020 36310	> 524 > 350 > 797 > 405

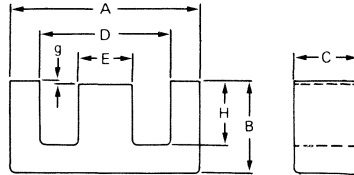
* These dimensions refer to non-coated toroids.



For detailed information on these and other types see Data Handbook C5

FXC grade 3E1 - for wideband and pulse transformers.
FXC grades 3C8 - for power application (high magnetic saturation and low losses).

Cores with air gap Δ available on request.



type	dimensions (mm)						catalogue number grade 3E1	catalogue number grade 3C8
	A max	B max	C max	D min	E min	H min		
E20/10/5	20,7	10,2	5,3	12,8	5,2	6,3	4322 020 34830	4312 020 34070
E25/13/7	25,8	12,9	7,5	17,25	7,65	8,7	-	4312 020 34020
E30/15/7	30,8	15,2	7,3	19,5	7,2	9,7	4322 020 34840	4312 020 34550
E42/21/15	43,0	21,2	15,2	29,5	12,2	14,8	4322 020 34850	4312 020 34110
E42/21/20	43,0	21,2	20,0	29,5	12,2	14,8	-	4312 020 34120
E42/33/15	43,0	33,2	15,2	29,5	12,2	14,8	-	4312 020 34190
E55/28/21	56,2	27,8	21,0	37,5	17,2	18,5	4322 020 34900	4312 020 34100
E65/32/13	66,5	32,8	13,7	44,2	20,0	22,2	4322 020 34910	-
E65/33/27	66,5	32,8	27,4	44,2	20,0	22,2	-	4312 020 34380



Coil formers and mounting parts for E-cores

E-core type	catalogue number coil formers			catalogue number mounting parts	
	without pins	with pins		clasp	spring
		horizontal mounting	vertical mounting		
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 28490	4312 021 28500
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 26090*
E65/32/13	4312 021 28720	-	-	4312 021 26110*	4312 021 26110*
E65/32/27	4312 021 28720	-	-	4312 021 26110*	4312 021 26110*

* clasp and spring will be delivered as a set
N.B. data section continues on next page

For detailed information on these and other types see Data Handbook C5

All electrical properties are guaranteed for EE or EI combinations without air gap.
The cores must be selected at random and pressed together.

combination	grade	guaranteed values		A ₁ ± 25% nH	corres- ponding μ _e	measuring conditions				effective dim.		
		max.loss W	min.ind.B mT			T °C	B mT	H A/m	f kHz	l _e mm	A _e mm ²	V _e mm ³
EE20/20/5	3E1			2405	2627	25	0,1		4	42,8	31,2	1340
EE20/20/5	3C6	0,3 0,25	275			25 100 100	200 200		16 16 16	42,8	31,2	1340
EE25/25/7	3C8	0,65	340			25 25	200		16 16	57,5	55	3160
EE30/30/7	3E1			3330	2970	25	0,1		4	66,9	59,7	4000
EE42/42/15	3E1			7555	3210	25	0,1		4	97,0	182	17600
EE42/42/15	3C8	2,0	315 90			100 100 100	200		16 16 16	97,0	182	17600
EE42/42/20	3C8	2,6	315 90			100 100 100	200		16 16 16	98	236	23100
EE42/54/20	3C8	3,5 3,2	315			25 100 100	200 200		16 16 16	122	236	28800
EI42/29/15	3E1			10265	3000	25	200		16	67,2	183	12300
EE55/55/21	3E1			11937	3307	25	0,1		4	123	354	43700
EE55/55/21	3C8	5,5 5,0	315			25 100 100	200 200		16 16 16	123	354	43700
EE55/55/25	3C8	6,2 5,7	315			25 100 100	200 200		16 16 16	123	420	52000
EE65/65/27	3E1			15450	3382	25	0,1		4	147	532	78200
EE65/65/27	3C8	9,5 8,7	315			25 100 100	200 200		16 16 16	147	532	78200

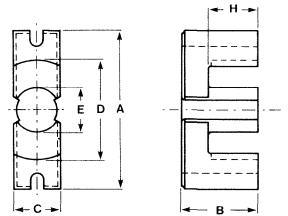


For detailed information on these and other types see Data Handbook C5

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.

All cores are made of Ferroxcube grade 3C8 for good high-frequency performance and are assumed to be used in pairs in a core configuration.

	A max	B max	C max	D min	E max	H min
EC35/17/10	35,3	17,45	9,8	22,2	9,8	11,9
EC41/19/12	41,6	19,65	11,9	26,3	11,9	13,5
EC52/24/14	53,5	24,35	13,75	32,1	13,75	15,5
EC70/34/17	71,7	34,65	16,8	43,3	16,8	22,3



7291232

type	core catalogue number* 4322 020	coil former**				mounting parts (set)
		coil former cat.no. 4322 026	no. of tags	mounting horizontal or vertical	cat. no. of tags 4322 021	cat. no. of set 4312 021
EC35	52500	33410 33310	11 13	H H	-	26010
EC41	52510	33010 33320 33480 33490	- 9 12 21	- H H H + V	33060	26020 without mounting stud 26030 with mounting stud
EC52	52520	33020 33330 33360 33500 33510	- 11 11 14 25	- H V H H + V	33070	26040 without mounting stud 26050 with mounting stud
EC70	52530	33030 33340 33370	- 15 15	- H V	33070	26060 without mounting stud 26070 with mounting stud

* cores without air gap

** coil formers glass fibre filled polyteraphthalate UL 94 VO

N.B. data section continues on next page



Electronic components and materials

M47

PHILIPS



For detailed information on these and other types see Data Handbook C5

The wound coil former and cores may be assembled by means of non-magnetic M4 screws or studs along the grooves provided. The use of a clamping bar is strongly recommended to ensure that the maximum clamping force of 600 N is uniformly distributed over the cross-section of the outer poles.

The assembly studs can be extended for mounting purposes or to support another sub-assembly.

Dimensional parameters for a pair of cores
(Assuming nominal dimensions, unless otherwise stated)

		EC51	EC35	EC41	EC70	unit
Core constant*	C_l	0,581	0,918	0,735	0,514	mm ⁻¹
Minimum cross-sectional centre pole area	$A_{cp\min}$	133,8	66,5	100,3	201,1	mm ²
Cross-sectional centre pole area	A_{cp}	141,0	71,0	106	211	mm ²
Back and leg cross-sectional area	A_b	222,0	96,0	130	386	mm ²
Centre pole volume	V_{cp}	4480	1740	2950	9600	mm ³
Back and leg volume	V_b	19820	6040	9650	46000	mm ³
Total core volume	V_f	24300	7780	12600	55600	mm ³
Effective magnetic path length*	l_e	105	77,4	89,3	144	mm
Effective cross-sectional area*	A_e	180	84,3	121	279	mm ²
Effective core volume*	V_e	18800	6530	10800	40100	mm ³

Magnetic properties for a pair of cores without air gap

		EC51	EC35	EC41	EC70	unit
Relative amplitude permeability at $\theta = 100\text{ }^\circ\text{C}$, $\hat{B} = 320\text{ mT}$ in $A_{cp\min}$	μ_a	> 1000	> 1000	> 1000	> 1000	
Permissible induction in centre pole with min. cross-sectional area, at $\theta = 100\text{ }^\circ\text{C}$	\hat{B}	< 320	< 320	< 320	< 320	mT
Resistivity, measured with d.c. current Curie point	ρ	≥ 1 ≥ 200	≥ 1 ≥ 200	≥ 1 ≥ 200	≥ 1 ≥ 200	Ωm $^\circ\text{C}$
Effective total core loss at $f = 25\text{ kHz}$, $\theta = 100\text{ }^\circ\text{C}$, $\hat{B} = 160\text{ mT}$	P	< 2,7	< 1,1	< 2,2	< 5	W
Inductive factor at $f < 100\text{ kHz}$, $\theta = 25\text{ }^\circ\text{C}$, $\hat{B} < 0,1\text{ mT}$	A_l	> 2550	> 1600	> 2000	> 2900	



For detailed information on these and other types see Data Handbook C5

The ETD-series of high frequency power cores in Ferroxcube 3C8 ferrite has been optimized to meet the current requirements of switched-mode power supplies.

Features

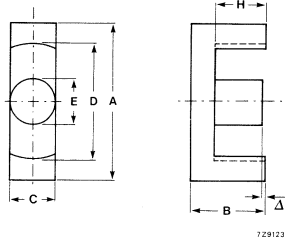
- Round centre pole for minimum conductor length.
- Maximum throughput power in the frequency range 20 to 150 kHz.
- Minimum core weight due to constant cross-sectional area proper choice of transition frequency.
- Winding breadth sufficient for full IEC mains isolation in specified configurations.
- Sufficient winding height for minimum loss windings.

Introduction

The characteristics of the ETD-cores given here are intended for the guidance of designers wishing to incorporate these cores in new designs.

The polyteraphthalate 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 using the stainless steel clips.

	A max	B max	C max	D min	E max	H min
ETD34/17/11	35	17,5	11,1	25,6	11,1	11,8
ETD39/20/13	40	20	12,8	29,3	12,8	14,2
ETD44/22/15	45	22,5	15,2	32,5	15,2	16,1
ETD49/25/16	49,8	24,9	16,7	36,1	16,7	17,7



7291231



N.B. Data section continues on next page

For detailed information on these and other types see Data Handbook C5

type	gap length g	nominal A_l (nH)	catalogue number	coil former no. of pins	clips (one clip)
ETD34/17/11	≥ 0	2400	4312 020 37000	4322 021 33850 14 pins	4322 021 33890
	$0,1 \pm 0,02$	800	4312 020 37010		
	$0,2 \pm 0,03$	480	4312 020 37020		
	$0,5 \pm 0,05$	230	4312 020 37030		
	$1,0 \pm 0,1$	140	4312 020 37040		
ETD39/20/13	≥ 0	2700	4312 020 37050	4322 021 33860 16 pins	4322 021 33900
	$0,1 \pm 0,02$	1000	4312 020 37060		
	$0,2 \pm 0,03$	600	4312 020 37070		
	$0,5 \pm 0,05$	295	4312 020 37080		
	$1,0 \pm 0,1$	170	4312 020 37090		
ETD44/22/15	≥ 0	3300	4312 020 37100	4322 021 33870 18 pins	4322 021 33910
	$0,2 \pm 0,03$	800	4312 020 37110		
	$0,5 \pm 0,05$	400	4312 020 37120		
	$1,0 \pm 0,1$	230	4312 020 37130		
	$1,5 \pm 0,15$	170	4312 020 37140		
ETD49/25/16	≥ 0	3700	4312 020 37150	4322 021 33880 20 pins	4322 021 33920
	$0,2 \pm 0,03$	1000	4312 020 37160		
	$0,5 \pm 0,05$	480	4312 020 37170		
	$1,0 \pm 0,1$	270	4312 020 37180		
	$2,0 \pm 0,2$	150	4312 020 37190		

The A_l -values shown above apply to the gapped core indicated, assembled with an ungapped core.

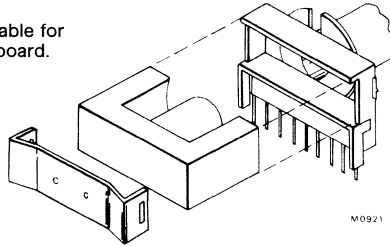


For detailed information on these and other types see Data Handbook C5

The polyteraphthalate 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.



Effective parameters

		ETD 34	ETD 39	ETD 44	ETD 49	
parameter	symbol	value	value	value	value	unit
effective magnetic path length	l_e	78,6	92,2	103	114	mm
effective area of magnetic path	A_e	97,1	125	173	211	mm ²
effective magnetic volume	V_e	7640	11500	17800	24000	mm ³
core factor $\Sigma \frac{1}{A}$	C_1	-	-	-	-	mm ⁻¹

Nominal design data for a pair of cores

		ETD 34	ETD 39	ETD 44	ETD 49	
parameter	symbol	value	value	value	value	unit
minimum centre pole area	$A_{cp,min}$	87	117	167	204	mm ²
length of mean turn	l_w	60	69	77	85	mm



Electrical and magnetic properties of a pair of cores at f = 25 kHz

			ETD 34	ETD 39	ETD 44	ETD 49	
property	temperature °C	parameter	value	value	value	value	unit
effective total loss (P)	60-100	$B = 200 \text{ mT}^*$	< 1,6	< 2,2	< 3,6	< 4,6	W
saturation induction (\hat{B}_{max})	100	$H = 250 \text{ A/m}$	> 320	> 320	> 320	> 320	mT

*
$$\hat{B} = \frac{\sqrt{2} U}{\omega A_{min} N}$$

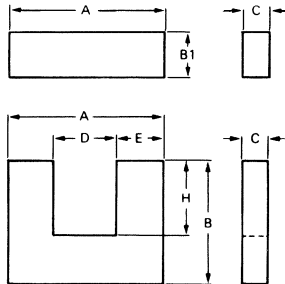
For detailed information on these and other types see Data Handbook C5

**U10, U15, U20, U25, U30
 I15, I20, I25**

These U-cores are for use in power supplies. Their excellent magnetic and electrical properties make them the designer's choice for small, light weight and highly efficient power supplies. U-cores are ideal in suppression applications. In case of pre-magnetisation, the influence of d.c. on the inductance of the choke can be reduced by using U-cores in combination with spacers to get an airgap.

U-I93, U-I100

High power to several kilowatts? Simple. Just stack up several U-cores into one big E-core with a square centre leg, or use UI and UU combinations. The result: low losses and high efficiency without weight penalty.



type	A max	B max	B1 max	C max	D min	E max	H min
U10/8/3	10,2	8,2		2,9	4	2,9	5,1
U15/11/6	15,9	11,65		6,25	5	4,8	5,57
U20/16/7	21,6	15,8		7,5	6	7,2	8
U25/20/13	25,5	20		12,5	8	8	11
U30/25/16	32	25,5		16	10	9,8	14,5
U93/52/30	94,8	52,5		30	36,2	28	23,5
I93/28/30	94,8		28	30			
U93/76/16	94,8	76,5		16	36,2	28	47
I93/28/16	94,8		28	16			
U93/76/30	94,8	76,5		30	36,2	28	47
I93/28/30	94,8		28	30			
U100/57/25	103,6	57,5		25,4	47	25,4	30,3
I100/25/25	103,6		26,2	25,4			
I15/3/3	15,3		2,9	2,9			
I20/6/5	20,1		5,3	6,55			
I25/8/8	25,5		7,75	7,75			

For detailed information on these and other types see Data Handbook C5

type	catalogue number	coil former with pins	no. of pins
U10/8/3 I15/3/3	3122 134 91160 3122 134 90730	3122 134 02590 3122 134 02590	4* 4
U15/11/6 I20/6/5	3122 134 90690 3122 134 90720	3122 134 02540 3122 134 02540	4* 4
U20/16/7 I25/8/8	3122 134 90200 3122 134 90620	3122 137 64140 3122 137 64140	4* 4
U25/20/13	3122 134 90460	3122 137 61910	8
U30/25/16	3122 134 90760	3122 137 55360	10
U93/52/30 I93/28/30	4312 020 33580 4312 020 33590	- -	- -
U93/76/16 I93/28/16	4312 020 33550 4312 020 33560	- -	- -
U93/76/30 I93/28/30	4312 020 33570 4312 020 33590	- -	- -
U100/57/25 I100/25/25	4312 020 33600 4312 020 33610	- -	- -

* U and I cannot be used in combination.
The coil former is to be used for two U-cores or for one I-core only.
N.B. Data section continues on next page



Electronic
components
and materials

M53

PHILIPS

For detailed information on these and other types see Data Handbook C5.

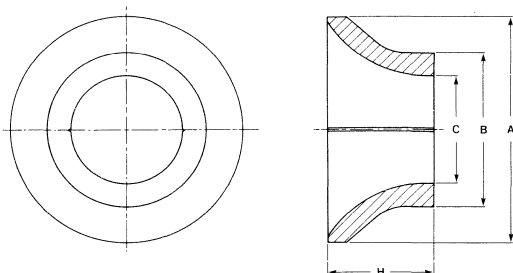
All electrical properties are guaranteed for UU combinations without air gap. The cores must be selected at random and pressed together.

Technical data measured at 16 kHz

type	Temperature θ (°C)	Induction B (mT)	Field Strength H (A/m)	Losses (W/pair)	Effective dimensions		V_e (mm ³)
					l_e	A_e (mm ²)	
U10/8/3	25 ± 5	200	-		38,4	8,63	331
	25 ± 5	> 140	50				
	100 ± 5	200	-				
	100 ± 5	> 315	250				
U15/11/6	25 ± 5	200	-	< 0,18	48	30	1440
	25 ± 5	> 140	50				
	100 ± 5	200	-	< 0,16			
	100 ± 5	> 315	250	-			
U20/16/7	25 ± 5	200	-	< 0,46	68	56	3800
	100 ± 5	200	-	< 0,42			
	100 ± 5	> 100	50	-			
	100 ± 5	> 315	250	-			
U25/20/13	25 ± 5	200	-	< 1,1	86	100	8600
	100 ± 5	200	-	< 1,0			
	100 ± 5	> 100	50	-			
	100 ± 5	> 315	250	-			
U30/25/16	25 ± 5	200	-	< 2,4	111	157	17400
	100 ± 5	200	-	< 2,0			
	100 ± 5	> 335	400	-			
U93/52/30 193/28/30	25 ± 5	200	-	< 19,0	204	780	158000
	100 ± 5	200	-	< 17,4			
	100 ± 5	> 330	250	-			
U93/76/16 193/28/16	25 ± 5	200	-	< 12,8	254	420	107000
	100 ± 5	200	-	< 11,8			
	100 ± 5	> 330	250	-			
193/76/30 193/28/30	25 ± 5	200	-	< 24,0	254	780	200000
	100 ± 5	200	-	< 22,0			
	100 ± 5	> 330	250	-			
U100/57/25 1100/25	25 ± 5	200	-	< 17,9	244	640	157700
	100 ± 5	200	-	< 16,4			
	100 ± 5	> 330	250	-			



For detailed information on these and other types see Data Handbook C5



application	grade	mass g	dimensions in mm				catalogue number
			A	B	C	H	
B/W							
90 ° (Tiny vision)	2A2	62	47	37	29	26	3122 134 91680
110 °	2A2	135	58	58	39,5	27,5	3122 134 91940
110 °	3C2	135	58	58	39,5	26	3122 104 93840
110 °	3C2	227	79	54	-	37	3122 134 90750
Colour							
90 °	2A2	268	92	60	48	46,5	3122 134 91610
90 °	2A2	135	74	52	40	37	3122 134 92510
90 °	2A2	268	92	50	48	42	3122 134 92600
110 ° (30AX)	3C2	530	138	73,5	60	57,6	3122 134 92500

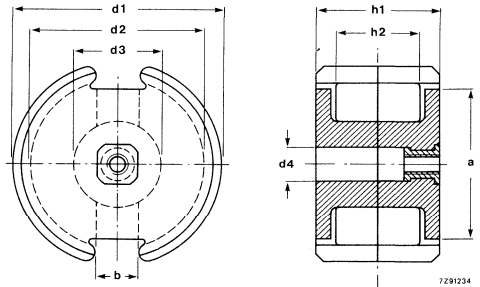


Potcores with ground mating faces

For detailed information on these and other types see Data Handbook C4

type	dimensions (mm)							
	d1	d2	d3	d4	h1	h2	a	b
P5,8/3,3	5,8	4,5	2,5	0,95	3,3	2,2	-	1,4
P7,4/4,2	7,4	5,8	3	1,4	4,2	2,8	5,7	1,6
P9/5	9,3	7,5	3,9	2,04	5,4	3,6	6,5	2
P11/7	11,1	9	4,7	2,04	6,5	4,4	6,8	2,2
P14/8	14	11,6	6	3	8,4	5,6	9,5	3,3
P18/11	17,9	14,9	7,6	3	10,6	7,2	13,4	3,8
P22/13	21,5	17,9	9,4	4,4	13,4	9,2	15	3,8
P26/16	25,5	21,2	11,5	5,4	16	11	18	3,8
P30/19	30	25	13,5	5,4	18,9	13	20,5	4,3
P36/22	35,5	29,9	16	5,4	21,9	14,6	26,2	4,9
P42/29	42,4	35,6	17,7	5,4	29,4	20,3	32	5,1

Ferroxcube potcores with ground mating faces in material grades 3H1, 3D3 and 4C6 are used for stable low loss filter cores; in 3B8 grade for power applications



type	grade	A _L	cat. number core halves without nut, without air gap
P5,8/3,3	3H1	820 ± 25%	4322 020 54400
P7,4/4,2	3H1	970 ± 25%	4322 020 54600

type	grade	A _L	cat. number core sets with nut	cat. number core sets without nut
P9/5	4C6	25 ± 1%	4322 022 61810	-
	3H1	100 ± 1,5%	4322 022 61240	-
	3H1	160 ± 2%	4322 022 61250	-
P11/7	4C6	25 ± 1%	4322 022 21810	-
	3D3	40 ± 1%	4322 022 21420	-
	3H1	100 ± 1%	4322 022 21240	-
	3H1	160 ± 1,5%	4322 022 21250	-
	3B8	250 ± 3%	-	4322 022 01920
	3H1	250 ± 3%	4322 022 21260	-

Potcores with ground mating faces (cont.)

For detailed information on these and other types see Data Handbook C4

type	grade	A_L	cat. number core sets with nut	cat. number core sets without nut
P14/8	4C6	40 ± 1%	4322 022 23820	-
	3D3	63 ± 1%	4322 022 23430	-
	3H1	160 ± 1,5%	4322 022 23250	-
	3B8	250 ± 2%	-	4322 022 03860
	3H1	250 ± 2%	4322 022 23260	-
P18/11	4C6	40 ± 1%	4322 022 25820	-
	3D3	63 ± 1%	4322 022 25430	-
	3H1	250 ± 1,5%	4322 022 25260	-
	3H3	250 ± 1,5%	4322 022 25560	-
	3H1	315 ± 2%	4322 022 25270	-
	3H3	315 ± 2%	4322 022 25570	-
	3B8	400 ± 2%	-	4322 022 05940
P22/13	4C6	40 ± 1%	4322 022 27820	-
	3D3	63 ± 1%	4322 022 27430	-
	3H1	250 ± 1,5%	4322 022 27260	-
	3H1	315 ± 2%	4322 022 27270	-
	3B8	400 ± 2%	-	4322 022 07940
	3H1	400 ± 2%	4322 022 27280	-
	3E4	10000 ± 25%	4322 022 07900	-
P26/16	3D3	100 ± 1%	4322 022 29440	-
	4C6	100 ± 1%	4322 022 29840	-
	3D3	250 ± 1%	4322 022 29460	-
	3B8	400 ± 2%	-	4322 022 09880
	3H1	400 ± 2%	4322 022 29280	-
	3B8	630 ± 3%	-	4322 022 09890
	3H1	630 ± 3%	4322 022 29300	-
P30/19	3D3	160 ± 1%	4322 022 31450	-
	3H1	400 ± 1,5%	4322 022 31280	-
	3B8	630 ± 2%	-	4322 022 11870
	3H1	630 ± 2%	4322 022 31300	-
P36/22	3B8	160 ± 1%	-	4322 022 13800
	3D3	250 ± 1%	4322 022 33460	-
	3B8	400 ± 1,5%	-	4322 022 13830
	3H1	400 ± 1,5%	4322 022 33280	-
	3H1	630 ± 2%	4322 022 33300	-
P42/29	3H1	400 ± 1%	4322 022 35280	-
	3H1	1000 ± 3%	4322 022 35310	-



For detailed information on these and other types see Data Handbook C4

Coil formers

potcore type	cat. number 1 section	cat. number 2 sections
P5,8/3,3	4322 021 33550	-
P7,4/4,2	4322 021 32990	-
P9/5	4322 021 31700	-
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	4322 021 30340
P30/19	4322 021 30360	4322 021 30370
P36/22	4322 021 30390	4322 021 30400
P42/29	4322 021 30420	4322 021 30430

Inductance adjusters, catalogue number 4322 021

A _L	grade	P9/5	P11/7	P14/8	P18/11	P22/13	P26/16	P30/19	P36/22	P42/29
25	4C6	31250	32150	-	-	-	-	-	-	-
40	3D3	-	31250	-	-	-	-	-	-	-
	4C6	-	-	30940	32160	31060	-	-	-	-
63	3D3	-	-	39740	32160	31040	-	-	-	-
	4C6	-	-	-	-	31000	-	-	-	-
100	3D3	-	-	-	32160	-	30780	-	-	-
	3H1	31270	31270	-	-	-	-	-	-	-
	4C6	-	-	-	-	-	30790	-	-	-
160	3D3	-	-	-	-	38440	-	30800	-	-
	3H1	39810	39810	39780	-	-	-	30790	-	-
250	3D3	-	-	-	-	-	39480	38380	-	-
	3H1	-	39890	39710	39680	38480	39480	-	-	-
	3H3	-	-	-	39680	-	-	-	-	-
315	3H1	-	-	-	39610	38490	39480*	-	-	-
	3H3	-	-	-	39610	-	-	-	-	-
400	3H1	-	-	-	39670	38410	49410	38380*	38380	38380
630	3H1	-	-	-	-	-	39490	38390	38390*	38390
1000	3H1	-	-	-	-	-	-	-	-	39290

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

* or **39410**

Potcores without ground mating faces

For detailed information on these and other types see Data Handbook C4

Ferroxcube potcore halves without ground mating faces in material grades 3D3 and 3H1 are used in inductive proximity detectors.



potcore half* A x B	mat. grade	cat. number potcore halves	cat. number coil former
5,6 x 3,6	3D3	4322 020 54210	4322 021 33540
7,4 x 3,9	3D3	4322 020 54510	4322 021 32990
9,4 x 4,8	3D3	4322 020 54710	4322 021 31700
14 x 7,5	3H1	4322 020 54800	4322 021 30250
26 x 9,2	3H1	4322 020 54900	4322 021 33700

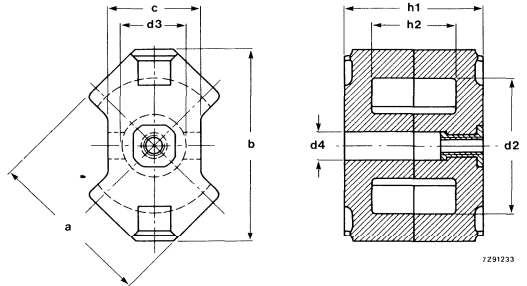
- * A = outer diameter (mm)
B = outer height of core half (mm).



For detailed information on these and other types see Data Handbook C4

type	dimensions (mm)							
	a	b	c	d2	d3	d4	h1	h2
RM4	9,8	11	4,6	8	3,9	2,04	10,4	7
RM5	12,3	14,6	6,8	10,2	4,9	2,04	10,4	6,3
RM6R	14,7	17,9	6,3	12,6	6,3	3	12,4	8
RM6S	14,7	17,9	8,2	12,4	6,2	3	12,4	8
RM8	19,7	23,2	11	17	8,4	4,4	16,4	10,8
RM10	24,7	28,5	13,5	21,2	10,9	5,4	18,7	12,4
RM14	34,7	42,2	19	29	15	5,4	29	20,8

Ferroxcube RM cores in material grades 3H1, 3H3, 3D3, 4C6 are used for stable low loss filter cores; in 3B8 and 3C85 grades for power applications.



RM cores in grades 3E4, 3E5, 3B8, and 3C85 for transformers have no centrehole d4 and, consequently, no adjuster nut (with the exception of the RM14 which has a centre hole).

type	grade	A_L	cat. number core sets with nut	cat. number core sets without nut
RM4	3H1	100 ± 2%	4322 022 77240	-
	3E4	2790 ± 25%	-	4322 022 57900
RM5	3D3	25 ± 1%	4322 022 79410	-
	4C6	25 ± 1%	4322 022 79810	-
	4C6	40 ± 1%	4322 022 79820	-
	3D3	63 ± 1%	4322 022 79430	-
	3B8	100 ± 1%	-	4322 022 59470
	3H1	100 ± 1%	4322 022 79240	-
	3H3	100 ± 1%	4322 022 79540	-
	3H1	160 ± 2%	4322 022 79250	-
	3H3	160 ± 2%	4322 022 79550	-
	3H1	250 ± 3%	4322 022 79260	-
	3H3	250 ± 3%	4322 022 79560	-
	3E4	4975 ± 25%	-	4322 022 59990



For detailed information on these and other types see Data Handbook C4

type	grade	A _L	cat. number core sets with nut	cat. number core sets without nut
RM6R	3D3	40 ± 1%	4322 022 75420	-
	4C6	40 ± 1%	4322 022 75820	-
	4C6	63 ± 1%	4322 022 75830	-
	3D3	100 ± 2%	4322 022 75440	-
	3B8	160 ± 2%	-	4322 022 55500
	3C85	160 ± 2%	-	4322 022 54620
	3H1	160 ± 2%	4322 022 75250	-
	3H3	200 ± 2%	4322 022 75680	-
	3H1	250 ± 2%	4322 022 75260	-
	3H3	250 ± 2%	4322 022 75560	-
	3E4	6710 ± 25%	-	4322 022 55900
RM6S	3D3	40 ± 1%	4322 022 67420	-
	4C6	40 ± 1%	4322 022 67820	-
	4C6	63 ± 1%	4322 022 67830	-
	3B8	100 ± 2%	-	4322 022 47740
	3C85	160 ± 2%	-	4322 025 05250
	3D3	100 ± 2%	4322 022 67440	-
	3H1	160 ± 2%	4322 022 67250	-
	3H1	200 ± 2%	4322 022 67350	-
	3H3	200 ± 2%	4322 022 67680	-
	3H1	250 ± 2%	4322 022 67260	-
	3H3	250 ± 2%	4322 022 67560	-
3E4	6050 ± 25%	-	4322 022 47920	
RM8	3D3	100 ± 1%	4322 022 71440	-
	4C6	63 ± 1%	4322 022 71830	-
	4C6	100 ± 1%	4322 022 71840	-
	3B8	160 ± 3%	-	4322 022 51470
	3C85	160 ± 3%	-	4322 025 01250
	3B8	250 ± 3%	-	4322 022 51480
	3C85	250 ± 3%	-	4322 025 01260
	3H1	250 ± 2%	4322 022 71260	-
	3H3	250 ± 2%	4322 022 71760	-
	3H1	315 ± 2%	4322 022 71270	-
	3E4	8000 ± 25%	-	4322 022 51900
RM10	3B8	250 ± 2%	-	4322 022 50480
	3C85	250 ± 2%	-	4322 022 50660
	3H1	250 ± 2%	4322 022 70260	-
	3B8	400 ± 3%	-	4322 022 50500
	3C85	400 ± 3%	-	4322 022 50680
	3H1	400 ± 3%	4322 022 70280	-
	3E4	11000 ± 25%	-	4322 022 50910
RM14	3B8	250 ± 2%	-	4322 022 56950
	3C85	250 ± 2%	-	4322 025 03260
	3B8	630 ± 3%	-	4322 022 56890
	3C85	630 ± 3%	-	4322 025 03300



For detailed information on these and other types see Data Handbook C4

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 32830	4322 021 32840	-
RM6R	4322 021 32280	4322 021 32290	-
RM6S	4312 021 29240	4312 021 29250	-
RM8	-	-	4322 021 32390
RM10	-	-	4322 021 32470
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 32310	-	-
RM6S	4322 021 32950	-	-
RM8	-	4322 021 32420	-
RM10	-	-	4322 021 32790

Inductance adjusters, catalogue number 4322 021

A _L	mat	RM4	RM5	RM6R + S	RM8	RM10
25	3D3	-	38750	-	-	-
	4C6	-	38750	-	-	-
40	3D3	-	-	32160	-	-
	4C6	-	38720	32160	-	-
63	3D3	-	38750	-	31060	-
	4C6	-	-	32160	31060	-
100	3D3	-	-	32170	31060	-
	3H1/3H3	31270	38720	-	-	-
	4C6	-	-	-	31060	-
160	3H1/3H3	-	38710	32130	38440	-
200	3H1/3H3	-	-	38680	-	-
250	3H1/3H3	-	38790	38670	38480	38380
315	3H1	-	-	-	38490	38380
400	3H1	-	-	-	-	38380*

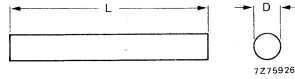
Mounting parts, catalogue numbers

	RM4	RM5	RM6R + S	RM8	RM10	RM14
clip (2 per core set)	4322 021 31900	4322 021 31900	4322 021 31780	4322 021 31840	4313 021 04120	4322 021 33690

* or **39410**



For detailed information on these and other types see Data Handbook C5



Rods

D		L		FXC grade		status	catalogue number
max.	tol.	max.	tol.	3	4		
1,40	-0,02	6,85	-0,20	3D3		C	3122 104 91920
1,60	-0,10	3,95	-0,20		4D2		3122 134 91190
1,65	-0,05	9,2	-0,4	3D3			4312 020 30160
1,65	-0,05	9,2	-0,4		4B1		3122 104 91060
1,65	-0,05	12,2	-0,4	3B			3122 104 91100
1,65	-0,05	12,2	-0,4		4B1	P	3122 104 91110
1,65	-0,05	25,2	-0,4	3B			3122 104 91170
1,65	-0,05	28,2	-0,4		4B1		4322 020 32090
1,70	-0,15	8,4	-0,4		4D1		3122 104 93160
1,70	-0,15	14,2	-0,4		4E1		4322 020 32060
1,70	-0,15	17,8	-1,0	3B		P	3122 104 92020
1,75	-0,20	12,2	-0,4		4B1		3122 104 92070
1,75	-0,20	14,2	-0,4		4B1		4312 020 30560
1,75	-0,20	18,5	-1,0		4B1		3122 104 91150
1,78	-0,03	8,25	-0,30		4D1		4330 030 30300
1,78	-0,03	8,95	-0,45	3D3		P	4322 020 39480
2,0	-0,2	12,0	-0,7		4C6		4330 030 30320
2,0	-0,2	16,5	-1,0		4B1		4330 030 30360
2,1	-0,2	9,4	-0,8		4D1		4330 030 30140
2,1	-0,2	12,5	-1,0		4B1		4330 030 30130
2,2	-0,2	16,5	-1,0		4B1		4312 020 30460
2,30	-0,05	10,2	-0,4	3D3			4312 020 30030
2,50	-0,25	16,3	-0,8		4B1		4330 030 30450
2,50	-0,25	20	-1		4B1		4312 020 30510
3,0	-0,1	14	-0,5		4B1		4330 030 30060
3,05	-0,10	16,5	-1,0		4C6	4330 030 30390	
3,00	-0,25	20	-0,6		4B1	4330 030 30220	
3,15	-0,3	16,5	-1,0		4C6	4330 030 30070	
3,15	-0,3	24,35	-0,7		4B1	4312 020 30520	
3,2	-0,2	11,5	-1,0		4B1	4330 020 30560	



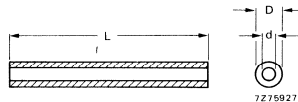
N.B. Data section continues on next page

Cores for small fixed chokes (cont.)

For detailed information on these and other types see Data Handbook C5

Rods (cont.)

D		L		FXC grade		status	catalogue number
max.	tol.	max.	tol.	3	4		
3,5	-0,3	17	-0,5	3B		P	4330 030 30400
4,0	-0,3	20	-0,6	3C6			4312 020 30320
4,0	-0,3	25	-1,0		4B1		4330 030 30250
4,00	-0,05	25	-1,0	3C6			4312 020 30290
4,1	-0,2	21	-1,0		4B1		4330 030 30120
4,95	-0,10	50	-0,5	3C6		P	3122 134 90110
5,0	-0,3	14	-0,8		4B1		4330 030 30110
5,0	-0,3	20,5	-1,0		4B1		4312 020 30570
5,0	-0,3	25	-1,0		4B1		4330 030 30080
5,0	-0,2	25,5	-1,0	3B			4322 020 39450
5,0	-0,3	30	-1,2		4B1		4330 030 30030
5,0	-0,2	41	-2,0	3B		4322 020 39470	
5,3	-0,6	18,3	-0,6		4B1	4312 020 30490	



Tubes

D		d		L		FXC grade		status	catalogue number
max.	tol.	min.	tol.	max.	tol.	3	4		
2,2	-0,4	0,6	+0,2	3,25	-0,5		4E1	C	4330 030 32670
2,7	-0,4	1,2	+0,2	3,5	-0,5		4E1		3122 104 91690
2,8	-0,05	1,2	+0,2	8,4	-0,4	3B			4322 020 34340
3,10	-0,02	1,3	+0,2	18,8	-0,5	3B			3122 134 90770
3,5	-0,05	1,7	+0,2	14,2	-0,4	3B			3122 104 92800
3,6	-0,3	1,3	+0,2	3,5	-0,5	3B		P	4312 020 31050
3,7	-0,4	1,2	+0,2	3,5	-0,5	3B			4322 020 34400
3,7	-0,4	1,2	+0,2	3,5	-0,5		4A1	P	4322 020 34410
3,7	-0,4	1,2	+0,2	3,5	-0,5		4B1		4322 020 34420
3,7	-0,4	1,5	+0,2	3,5	-0,5	3B		4322 020 34430	
3,7	-0,4	1,0	+0,4	5,5	-1,0		4E1	P	4330 030 32660
3,7	-0,4	1,0	+0,4	5,5	-1,0		4D1		4330 030 32630
3,7	-0,4	1,3	+0,2	5,5	-0,5	3B			4312 020 31060
3,7	-0,4	1,3	+0,2	8,0	-0,5	3B			4312 020 31330
3,7	-0,4	1,5	+0,2	8,0	-0,5	3B			4330 030 32650

For detailed information on these and other types see Data Handbook C5

Tubes (cont.)

D		d		L		FXC grade		status	catalogue number
max.	tol.	min.	tol.	max.	tol.	3	4		
3,7	-0,4	1,3	+0,2	15,2	-0,4	3B		C	4312 020 31320
4,05	-0,25	1,35	+0,3	5,7	-0,4		4B1		4313 020 15460
4,15	-0,05	2,0	+0,2	7,2	-0,4		4A1		4322 020 34440
4,15	-0,05	2,0	+0,2	12,2	-0,4		4B1		4322 020 34450
4,15	-0,05	2,0	+0,2	12,2	-0,4		4D1		4322 020 34470
4,15	-0,05	2,0	+0,2	15,2	-0,4		4B1		4322 020 34380
4,15	-0,3	2,0	+0,2	36,6	-1,2	3C6			4312 020 31450
4,2	-0,4	1,8	+0,4	5,5	-1,0	3B5			4313 020 15170
4,2	-0,1	2,0	+0,2	7,2	-0,4	3D3			4313 020 31220
4,2	-0,1	2,0	+0,2	11,2	-0,4	3D3			4312 020 31250
4,2	-0,1	2,0	+0,2	20,2	-0,4	3B			4312 020 31030
4,3	-0,2	2,0	+0,2	7,2	-0,4	3B			3122 104 92900
4,3	-0,2	2,0	+0,2	7,2	-0,4		4A1		4311 020 53460
4,3	-0,2	2,0	+0,2	7,2	-0,4		4B1		4311 020 50710
4,3	-0,2	2,0	+0,2	15,4	-0,8	3B			4322 020 36750
4,3	-0,2	2,0	+0,2	25,5	-1,0	3B		4322 020 36780	
4,3	-0,2	2,0	+0,2	25,5	-1,0		4B1	3122 104 90810	
4,3	-0,2	2,0	+0,2	30,5	-1,0		4B1	4311 020 54310	
4,95	-0,10	1,3	+0,2	15,2	-0,4	3C6		3122 104 90370	
4,95	-0,10	1,3	+0,2	23,2	-0,4	3C6		3122 104 90380	
4,95	-0,10	1,3	+0,2	26,2	-0,5	3C6		3122 104 94030	
4,95	-0,10	2,9	+0,2	36,0	-0,5	3C6		3122 104 93760	
5,3	-0,2	3,0	- 0,2	22,4	-0,8	3B		4322 020 36810	
5,4	-0,4	3,3	+0,3	21,2	-0,4		4A1	3104 101 80630	
8,0	-0,4	4,2	+0,6	51,4	-2,8	3B		4322 020 34310	
8,5	-0,5	3,5	+0,3	15,3	-0,6		4B1	4312 020 31200	
9,6	-0,3	7,1	+0,1	8,2	-0,4		4B1	3122 134 91490	
9,8	-0,6	6,3	+0,4	17,5	-0,5	3B		4313 020 15180	
10,8	-0,5	6,7	+0,4	19,5	-0,4		4A4	3122 134 90780	
14,5	-1,0	7,3	+1,0	28	-6,0		4A1	4311 020 51880	



For detailed information on these and other types see Data Handbook C5

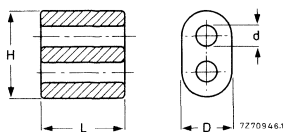


Fig. 1

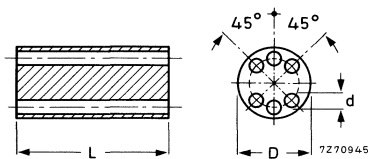


Fig. 2

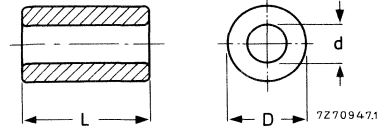
Multi-hole tubes

D mm	d mm	L mm	H mm	grade	status	Fig.	catalogue number
8,5-0,5	3,5 + 0,5	8 ± 0,3	11 + 0,5	4B1	C	1	4312 020 31570
8,5-0,5	3,5 + 0,5	14 ± 0,4	11 + 0,5	4B1	C	1	4312 020 31520
6 ± 0,3	0,7 + 0,2	10 ± 0,5	-	3B	C	2	4312 020 31500
6 ± 0,3	0,7 + 0,2	10 ± 0,5	-	4B1	C	2	4312 020 31550



Cores for small fixed chokes (cont.)

For detailed information on these and other types see Data Handbook C5

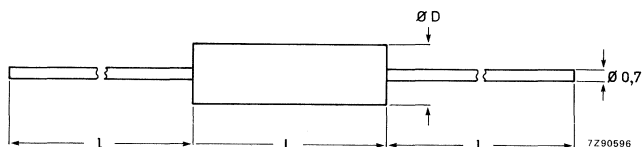


Guaranteed minimum bead impedances $|Z_s|$ (Ω) at various frequencies.

	frequency in MHz $ Z_s $ (Ω)			catalogue number	dimensions in mm		
	1	10	300		D	d	L
grade 3S1	10	24	15	4330 030 32180	5	2,0	4
	14	30	18	4330 030 32120	3	1,0	4
	10	32	20	4330 030 32160	5	1,5	4
	19	39	23	4330 030 32100	3	0,7	4
	27	53	32	4330 030 32140	5	0,7	4
	29	61	37	4330 030 32190	5	2,0	10
	33	73	44	4330 030 32130	3	1,0	10
	40	80	48	4330 030 32170	5	1,5	10
	58	97	58	4330 030 32110	3	0,7	10
	70	128	50	4330 030 32150	5	0,7	10
grade 3S2 (blue)	2	16	17	4330 030 32280	5	2,0	4
	2	17	18	4330 030 32340	8	3,0	4
	3	19	20	4330 030 32220	3	1,0	4
	3	21	22	4330 030 32260	5	1,5	4
	4	24	26	4330 030 32320	8	2,0	4
	2	25	27	4330 030 32200	3	0,7	4
	4	29	31	4330 030 32300	8	1,5	4
	5	34	37	4330 030 32240	5	0,7	4
	6	40	43	4330 030 32290	5	2,0	10
	6	42	45	4330 030 32350	8	3,0	10
	7	48	51	4330 030 32230	3	1,0	10
	7	52	55	4330 030 32270	5	1,5	10
	9	60	64	4330 030 32330	8	2,0	10
9	63	67	4330 030 32210	3	0,7	10	
10	72	77	4330 030 32310	8	1,5	10	
12	75	91	4330 030 32250	5	0,7	10	
grade 4S3 (red)	1	7	36	4330 030 32440	5	2,0	4
	1	8	38	4330 030 32500	3	3,0	4
	1	9	43	4330 030 32380	3	1,0	4
	1	9	47	4330 030 32420	5	1,5	4
	1	11	55	4330 030 32480	8	2,0	4
	1	11	57	4330 030 32360	3	0,7	4
	1	13	65	4330 030 32460	8	1,5	4
	2	16	77	4330 030 32400	5	0,7	4
	2	18	89	4330 030 32450	5	2,0	10
	2	19	95	4330 030 32510	8	3,0	10
	2	21	107	4330 030 32390	3	1,0	10
	2	23	116	4330 030 32430	5	1,5	10
	2	27	134	4330 030 32490	8	2,0	10
	2	28	140	4330 030 32370	3	0,7	10
	3	32	161	4330 030 32470	8	1,5	10
	4	38	190	4330 030 32410	5	0,7	10



For detailed information on these and other types see Data Handbook C5



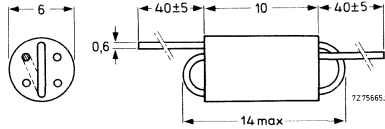
Ferrite coil former

D	L	l	grade	catalogue number
2,7	8	28	4A4	8230 302 02080
4	14	34	4B1	4330 030 38070
6	20	28	4A4	8230 302 02170

The coil formers are also available with lead diameters of 0,5mm and 0,6mm

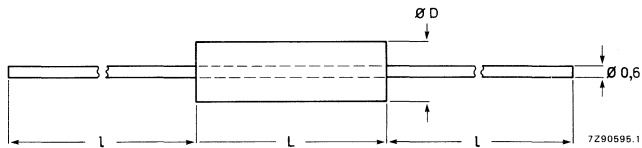


For detailed information on these and other types see Data Handbook C5



Wound six-hole beads

number of turns	Z _{max} kΩ	f at Z _{max} MHz	decrease of impedance		grade	status	catalogue number
			in the freq. range MHz	dB			
1,5	> 0,3	120	10-300	< 7	3B	P	4312 020 36630
1,5	> 0,35	260	80-300	< 3	4B1	C	4312 020 36690
2,5	> 0,6	50	10-200, 30-100	< 7, < 3	3B	P	4312 020 36640
2,5	> 0,7	180	50-300, 80-220	< 6, < 3	4B1	P	4312 020 36700
2 x 1,5	> 0,7*	50	10-220, 30-100	< 7, < 3	3B	P	4312 020 36650
2 x 1,5	> 0,8*	110	50-300, 80-220	< 7, < 3	4B1	C	4312 020 36710



Beads on wire (supplied on tape)

D	L	l	grade	catalogue numbers
3,7	6,2	34	3B	8230 301 03330
3,5	3,5	61	3S2	8230 301 04100
3,5	3,5	61	4A1	8230 301 04110
3,5	3,5	61	4S3	8230 301 04120
3,5	3,5	61	4S2	8230 301 04130
3,5	3,5	61	4E2	8230 301 04140
3,5	4,7	61	4S2	8230 301 04050
3,5	6	61	4S2	8230 301 04060
3,5	6,7	61	4S2	8230 301 04070
3,5	7,6	61	4S2	8230 301 04080
3,5	8,9	61	4S2	8230 301 04090

* measured with two 1,5 turn windings in series



Permanent magnet materials, shapes and applications

For detailed information see Data Handbook C16

Samarium, Cobalt 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 C16 for type list)
segments: in motors, magnetos
rings: in loudspeakers, motors, magnetos
disc and blocks: in metal separators, chucks, clamping rings
- **Anisotropic plastic-bonded Ferroxdure**
(see Data Handbook C16 for type list)
wide range of shapes
- **Isotropic plastic-bonded Ferroxdure**
(see Data Handbook C16 for type list)
wide range of shapes: where flexible products and/or complex magnetizing patterns are required
- **Anisotropic sintered rare earth magnets**
blocks, slugs, segments: in applications requiring highest magnetic energies



Permanent magnet materials: survey

For detailed information see Data Handbook C16

type	max BH product (BH) _{max} (kJ/m ³)		remanence B _r (mT)		coercivity H _{cB} (kA/m)		polarization coercivity H _{cJ} (kA/m)		B and H at (BH) _{max} B _d (mT) H _d (kA/m)		saturation field strength H _{sat} (kA/m) min.
	typ.	min.	typ.	min.	typ.	min.	typ.	min.	typ.	typ.	

Anisotropic ceramic Ferroxdure, SrFe₁₂O₁₉ (ferroxdure 300: BaFe₁₂O₁₉)

Magnets are pressed and sintered and may be ground.

FXD 300	29,5	27,8	400	390	160	145	165	150	220	135	560
FXD 425	33,0	31,5	420	410	225	215	240	225	200	160	875
FXD 330	25,5	24,0	370	360	240	225	245	230	180	145	875
FXD 380	28,5	27,0	390	380	265	250	275	260	190	150	955
FXD 400	31,5	30,0	410	400	265	250	275	260	200	160	955
FXD 270	21,5	20,0	340	330	265	250	335	320	165	131	1115
FXD 405	24,0	22,5	360	350	270	225	340	325	175	140	1115
FXD 410	27,0	25,5	380	370	280	270	320	305	190	145	1115

Anisotropic plastic-bonded Ferroxdure, BaFe₁₂O₁₉

Magnets are produced by injection moulding.

FXD SP130	11	10	240	230	175	167	240	-	-	-	typ. 800
FXD SP170	14	13	270	260	196	188	260	-	-	-	typ. 800

Isotropic plastic-bonded Ferroxdure, BaFe₁₂O₁₉

Magnets from SP5, SP10 and SP50 are produced by injection moulding, P30 and P40 by extruding.

FXD SP10	0,9	0,8	80	75	58	54	190	-	-	-	typ. 800
FXD P30	2,8	2,4	125	115	88	84	190	-	-	-	typ. 800
FXD P40	3,6	3,2	145	135	96	88	190	-	-	-	typ. 800
FXD SP50	4,4	4	155	150	104	100	190	-	-	-	typ. 800

Anisotropic sintered rare earth magnets

RES 160	128	120	810	790	600	560	-	1100	-	-	min. 1100
RES 190	154	144	890	870	670	620	-	1100	-	-	min. 1100
RES 220	176	144	950	920	710	670	-	1100	-	-	min. 1100



For detailed information see Data Handbook C16

The general data sections which follow give initial information on the main dimensions etc. of types for which tooling already exists. Choice of a type from these lists eliminates the need for new tools and consequent delay in delivery. It is important to check with the supplier if the data are still valid. Frequent additions, eliminations or changes may render the survey in this catalogue outdated. In that case, an updated list should be consulted.

The exact mechanical and magnetic data and the correct code number (last digit) have been laid down in the magnet specifications, which exist for each type, and which will be sent on request.

For optimum results, supply of pre-magnetized magnets is not always advisable because self-demagnetization may occur due to unfavourable combinations of grade, the ratio of magnetic area to magnetic length and temperature variation.

Permanent magnets can also be ordered to your own design (within the limits of the material and manufacturing techniques). Our technical assistance on the design and application of permanent magnets is always at your disposal.

The indication S, in some cases placed before the material grade, means that the product in question has magnetic properties which deviate slightly from the basic properties of that material grade.

Some products are made in material grades which are not listed in the survey. These grades have the following main properties (minimum values):

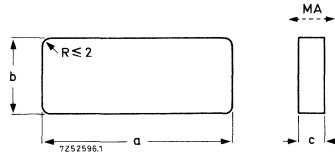
FXD370: BR = 370 mT; H_cJ = 230 kA/m.



Anisotropic sintered Ferroxdure: blocks

For detailed information on these and other types see Data Handbook C16
 The catalogue numbers mentioned in the table refer to both unmagnetized and magnetized (*) products

Orientation: perpendicular to a x b.



a mm	b mm	c mm	FXD	mass g	catalogue no.
12,0 + 0,1 - 0,5	8,0 ± 0,3	7,0 + 0,3	330	3,2	4311 021 31220 *
12,0 + 0,1 - 0,5	11,0 - 0,6	7,0 ± 0,1	330	4,6	4311 021 30150 4311 021 31290
13,0 ± 0,3	10,0 ± 0,3	5,0 ± 0,4	330	3,1	4311 021 32680 *
17,0 ± 0,4	10,0 ± 0,3	5,0 ± 0,4	330	4,3	4311 021 30980 *
18,0 - 0,9	15,0 - 0,7	9,0 - 0,1	330	10,8	4311 021 31920 *
20,0 ± 0,5	10,0 ± 0,3	5,0 ± 0,4	330	4,6	4311 021 30720 *
25,0 ± 0,6	11,0 ± 0,3	5,6 ± 0,5	330	7,2	4311 021 35070
30,0 ± 0,7	30,0 ± 0,7	8,0 ± 0,05	S 380	34,2	4322 020 67350
40,0 ± 1,0	21,0 ± 0,5	10,0 ± 0,5	330	41	4311 021 30260 *
40,0 ± 1,0	25,0 ± 0,75	10,0 ± 0,1	330	46	4322 020 62300 4322 020 62180 *
42,5 + 1,6	25,2 + 1,2	8,8 ± 0,05	300	40	4311 021 34650

* magnetized product

N.B. data section continues on the next page



PERMANENT MAGNETS (cont.)

Anisotropic sintered Ferroxdure: blocks (cont.)

For detailed information on these and other types see Data Handbook C16
The catalogue numbers mentioned in the table refer to both unmagnetized and magnetized (*) products

a mm	b mm	c mm	FXD	mass g	catalogue no.
42,5 + 1,6	25,2 + 1,2	8,8 ± 0,05	330	46	4311 021 34560
49,2 ± 1,2	49,2 ± 1,2	4,5 ± 0,5	330	53,5	4311 021 33630
50,0 ± 1,3	19,0 ± 0,5	4,9 - 0,25	330	21	4322 020 62220 4322 020 62270 *
50,0 ± 1,3	19,0 ± 0,5	6,1 ± 0,1	330	26	4322 020 62190 4322 020 62210 *
51,5 + 3,0	51,5 + 3,0	6,0 ± 0,1	380	109	4322 020 67360
51,5 + 3,0	51,5 + 3,0	10,0 ± 0,1	S 330	123	4322 020 67340
60,0 ± 1,5	20,0 ± 0,6	15,0 ± 0,5	330	85	4311 021 35880 *
64,0 ± 1,5	32,0 ± 0,7	20,0 ± 0,1	330	192	4311 021 36050
75,0 ± 2,0	50,0 ± 1,5	19,9 ± 0,1	330	353	4322 020 62310 4322 020 62320 *
100,0 ± 2,5	75,0 ± 1,9	25,4 ± 0,2	330	900	4311 021 32330 4311 021 32910 *
131,0 ± 3,0	51,0 ± 1,5	15,0 ± 0,2	330	460	4322 020 62470
131,0 ± 3,0	51,0 ± 1,5	17,5 ± 0,2	330	550	4322 020 62140 4322 020 62480 *
150,0 ± 3,7	100,0 ± 2,5	25,4 ± 0,2	330	1800	4322 020 62330 4322 020 62340 *

* magnetized product



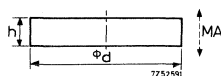
Electronic
components
and materials

Anisotropic sintered Ferroxdure: discs, rods and cylinders

For detailed information on these and other types see Data Handbook C16
 The catalogue numbers mentioned in the tables refer to both unmagnetized and magnetized (*) products

Discs and rods

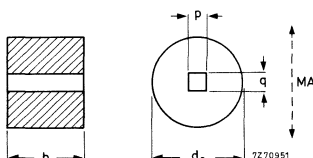
Orientation: axial



d mm	h mm	FXD	mass g	catalogue number
10 ± 0,5	10 ± 0,2	S 330	3,8	4322 020 61020 *
10 ± 0,5	15 ± 0,2	S 330	5,5	4322 020 61000 *
12,1 ± 0,3	6 ± 0,4	330	3,3	4311 021 33690 *
29,25 ± 0,75	10,5 ± 0,5	330	33	4311 021 32570 *
45 ± 1	9 ± 0,1	330	67,7	4311 021 34870
53 ± 1,3	9 ± 0,1	330	94	4311 021 34720

Cylinders

Orientation: diametrical



d_o mm	$p \times q$ mm	h mm	FXD	mass g	catalogue number
14,7 ± 0,03	3,9 ± 0,3 x 3,5 ± 0,3	25,5 ± 0,1	250**	20	4203 014 80120
18,3 ± 0,03	5,5 ± 0,2 x 4,8 ± 0,2	30 ± 0,1	250**	30	4203 014 80280

* magnetized product

** modified FXD330 with $B_r = 330$ mT. $H_{cB} = 200$ kA/m and $H_{cJ} = 210$ kA/m.



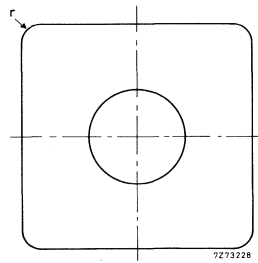
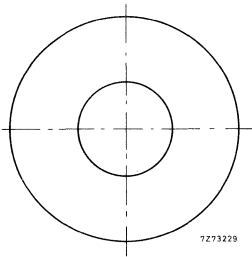
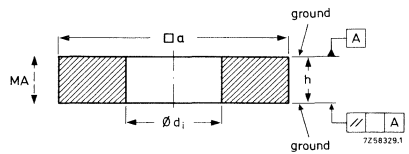
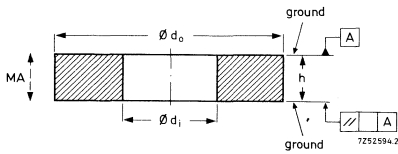
Anisotropic sintered Ferroxdure: rings

For detailed information on these and other types see Data Handbook C16

Orientation: axial

These are mainly for loudspeakers.

Unmagnetized versions only are listed, magnetized products from this range are also available. Some loss of performance can be expected when using pre-magnetized rings. The extent of this is dependent on dimensions and storage conditions. Please ask for details.



Anisotropic sintered Ferroxdure: rings (cont.)

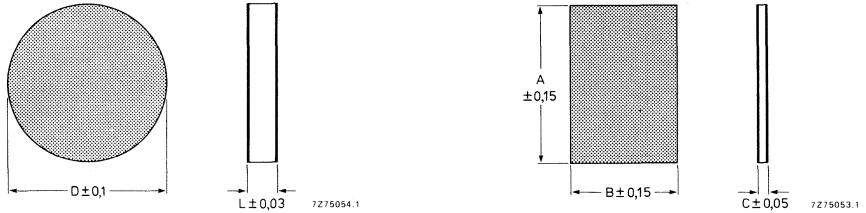
For detailed information on these and other types see Data Handbook C16

d _o mm	d _i mm	h mm	FXD	mass g	catalogue number
28,5 ± 0,7*	12,9 ± 0,4	5,0 ± 0,15	300	17,0	4311 021 35000 (square magnet)
30,0 ± 0,75	16,0 ± 0,4	5,0 ± 0,1	300	12,4	4311 021 37270
36,0 ± 0,8	18,0 ± 0,5	6,0 ± 0,1	300	23,0	4311 021 35210
36,0 ± 0,8	18,0 ± 0,5	8,0 ± 0,1	300	30,0	4311 021 36840
40,0 ± 1,3 - 0,7	22,0 ± 0,5	9,0 ± 0,1	300	39,0	4311 021 36610
45,0 ± 1,0	22,0 ± 0,6	8,0 ± 0,1	300	47,0	4311 021 35220
45,0 ± 1,0	22,0 ± 0,6	9,0 ± 0,1	300	53,0	4311 021 36620
55,0 ± 1,2	24,0 ± 0,6	8,0 ± 0,1	300	75,0	4311 021 36670
55,0 ± 1,2	24,0 ± 0,6	12,0 ± 0,1	300	113,0	4311 021 35910
60,0 ± 1,5	24,0 ± 0,6	9,0 ± 0,1	300	105,0	4311 021 35920
60,0 ± 1,5	24,0 ± 0,6	13,0 ± 0,1	300	151,0	4311 021 36730
60,0 ± 1,5	30,0 ± 0,7	10,0 ± 0,1	300	104,0	4311 021 36760
72,0 ± 1,5	32,0 ± 0,7	10,0 ± 0,1	300	160,0	4322 021 37410
72,0 ± 1,5	32,0 ± 0,7	12,0 ± 0,1	300	192,0	4311 021 35760
72,0 ± 1,5	32,0 ± 0,7	15,0 ± 0,1	300	240,0	4322 020 60240
72,0 ± 1,5	32,0 ± 0,7	20,0 ± 0,1	300	320,0	4311 021 35770
84,0 ± 1,8	32,8 ± 0,8	15,0 ± 0,1	300	345,0	4311 021 33660
84,0 ± 2,1	42,0 ± 1,1	15,0 ± 0,15	300	306,0	4322 020 60980
90,0 ± 1,8	36,0 ± 0,9	17,0 ± 0,15	300	448,0	4322 020 60280
90,0 ± 1,8	42,0 ± 1,1	17,0 ± 0,15	300	415,0	4322 020 60750
90,0 ± 1,8	42,0 ± 1,1	18,0 ± 0,15	300	439,0	4311 021 35780
90,0 ± 1,8	42,0 ± 1,1	21,0 ± 0,15	300	520,0	4322 020 60880
100,0 ± 2,5	45,0 ± 1,1	18,0 ± 0,15	300	552,0	4311 021 35230
102,0 ± 2,5	42,0 ± 1,1	17,0 ± 0,2	300	565,0	4311 021 34910
102,0 ± 3,0	51,0 ± 1,5	10,0 ± 0,15	300	300,0	4322 020 60300
102,0 ± 3,0	51,0 ± 1,5	14,0 ± 0,15	300	420,0	4322 020 60310
102,0 ± 3,0	51,0 ± 1,5	18,0 ± 0,15	300	540,0	4311 021 33900
102,0 ± 3,0	51,0 ± 1,5	20,0 ± 0,2	300	600,0	4311 021 35790
102,0 ± 3,0	57,0 ± 1,5	12,0 ± 0,15	300	330,0	4322 020 60790
102,0 ± 3,0	57,0 ± 1,5	17,0 ± 0,15	300	470,0	4322 020 60930
110,0 ± 3,0	45,0 ± 1,1	18,0 ± 0,15	300	698,0	4311 021 35800
110,0 ± 3,0	57,0 ± 1,5	20,0 ± 0,15	300	681,0	4311 021 35810
121,0 ± 3,6	42,0 ± 1,1	20,0 ± 0,15	300	991,0	4311 021 35820
121,0 ± 3,6	57,0 ± 1,7	12,0 ± 0,2	300	527,0	4322 020 60320
121,0 ± 3,6	57,0 ± 1,7	17,5 ± 0,2	300	767,0	4322 020 60570
121,0 ± 3,6	57,0 ± 1,7	20,0 ± 0,15	300	876,0	4311 021 35830
121,0 ± 3,6	64,0 ± 1,7	20,0 ± 0,2	300	811,0	4322 020 60900
134,0 ± 4,0	57,0 ± 1,7	20,0 ± 0,2	300	1132,0	4322 020 60020
224,0 ± 5,0	122,0 ± 3,0	23,0 ± 0,2	300	3124,0	4311 021 35840

* dimension □ a, square magnet



For detailed information on these and other types see Data Handbook C19



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

$k_{31} > 0,30$

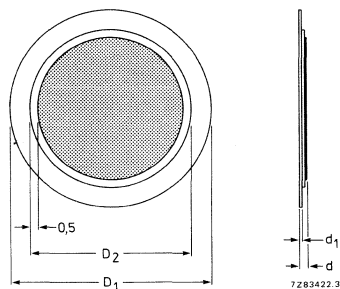
A mm	B mm	C mm	catalogue number
4	4	0,3	4322 020 13500
6	4	0,3	4322 020 13510
8	4	0,3	4322 020 13520
10	4	0,3	4322 020 13530
12	4	0,3	4322 020 13540
6	6	0,3	4322 020 13550
8	6	0,3	4322 020 13560
10	6	0,3	4322 020 13570
12	6	0,3	4322 020 13580
8	8	0,3	4322 020 13590
10	8	0,3	4322 020 13600
12	8	0,3	4322 020 13610
			4322 020 13620
10	10	0,3	4322 020 13620
12	10	0,3	4322 020 13630
12	12	0,3	4322 020 13640



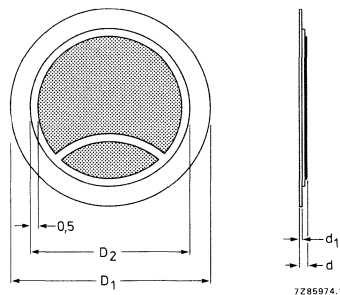
For detailed information on these and other types see Data Handbook C19

Discs glued on nickel plated membrane for buzzers; acoustic elements

Available in 2-electrode or 3-electrode version
Electrodes are nickel, solderable



Two electrode configuration.



Three electrode configuration.



Material: PXE 52

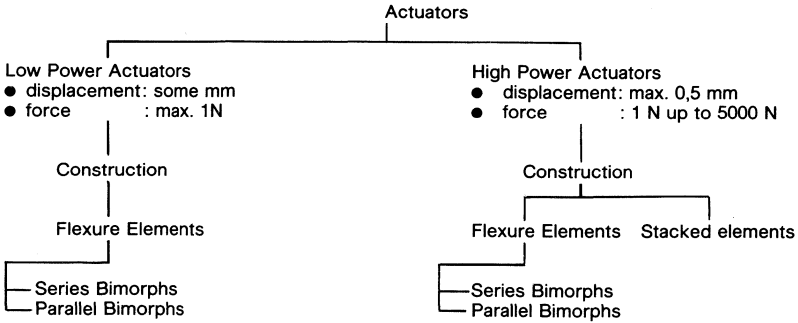
D ₁ mm	D ₂ mm	d1 mm	d mm	2 electrodes catalogue no.	3 electrodes catalogue no.
12,5	10	0,1	0,3	4322 020 16320	-
20	16	0,15	0,4	4322 020 16330	4322 020 16390
27	20	0,15	0,4	4322 020 16340	4322 020 16400
35	25	0,15	0,4	4322 020 16350	4322 020 16410
43	25	0,15	0,4	4322 020 16360	-
46	25	0,15	0,4	4322 020 16370	-
50	25	0,15	0,4	4322 020 16380	-



For detailed information on these and other types see Data Handbook C19

Actuators

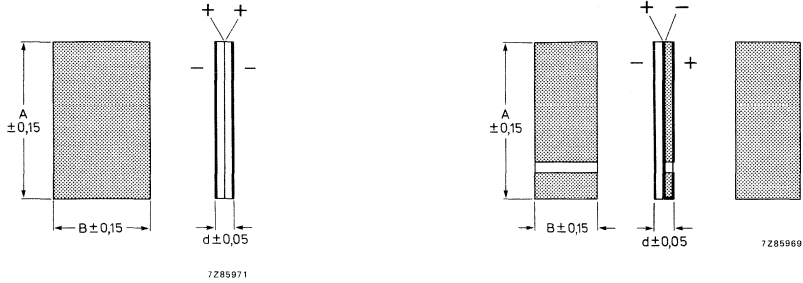
Operating in the 31 or 33 mode below the resonant frequency, actuators transfer electrical energy into "large" displacements in comparison with the displacements of simple PXE transducers.



A range of square and rectangular plates in grade PXE 5 for use in record players, accelerometers, detection systems in machinery, medical equipment and air transducers. The electrodes are nickel plated and are solderable.



For detailed information on these and other types see Data Handbook C19



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

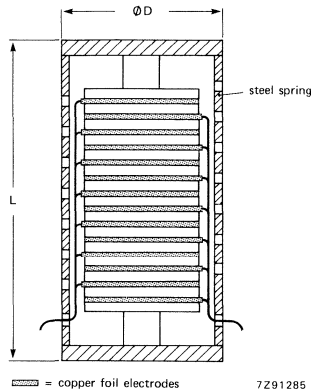


For detailed information on these and other types see Data Handbook C19

High-power actuators

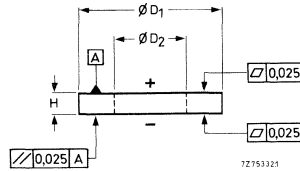
The high-power actuators produces in the 33 mode displacements far greater than those possible with simple PXE transducers operating in the 31 or 33 modes. It comprises a pile of PXE discs, held in compression with a force of about 1000 N by a cylindrical steel spring and interleaved with copper foil 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 μ s.



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	μ m
Stroke 0 to 800 V	~ 35	~ 50	~ 90	μ m
Capacitance at 25 °C	~ 100	~ 250	~ 800	nF
Stiffness	~ 30	~ 50	~ 80	N/ μ m
Max. applied force	2000	3000	5000	N

For detailed information on these and other types see Data Handbook C19



Rings for ultrasonic applications

Material: PXE 42

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 42

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
38,1 ± 0,6	19,1 ± 0,5	6,35 ± 0,1	1500	4322 020 06070
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
38,1 ± 0,6	19 ± 0,5	5 ± 0,1	1500	4322 020 06160
50 ± 1	20 ± 0,5	5 ± 0,1	2900	4322 020 06150
50 ± 1	20 ± 0,5	6 ± 0,1	2400	4322 020 06140



Products approved to the CECC (Cenelec Electronic Components Committee) harmonized system for electronic components of assessed quality

Ferrites

type	CECC detail specification
4322 022 25260 (class 3H1, 18/11)	CECC 25 100-018
4322 022 67260 (class 3H1, RM6-S)	CECC 25 100-019
LA1436	CECC 25 100-021
LA1437	CECC 25 100-021
LA1441	CECC 25 100-021
LA1442	CECC 25 100-021
LA1487	CECC 25 100-021
LA1530	CECC 25 100-021
LA4145	CECC 25 100-020
LA4146	CECC 25 100-020
LA4147	CECC 25 100-020
LA4148	CECC 25 100-020
LA4245	CECC 25 100-022
LA4246	CECC 25 100-022
LA4247	CECC 25 100-022
LA4248	CECC 25 100-022
LA4344	CECC 25 100-023
LA4345	CECC 25 100-023
LA4346	CECC 25 100-023
LA4347	CECC 25 100-023
LA4348	CECC 25 100-023
LA4543	CECC 25 100-024
LA4544	CECC 25 100-024
LA4545	CECC 25 100-024
LA4546	CECC 25 100-024
LA4547	CECC 25 100-024



Our Data Handbook System comprises over seventy books with specifications on electronic components, subassemblies and materials. The System is made up of four series of handbooks.

SEMICONDUCTORS	RED
INTEGRATED CIRCUITS	PURPLE
ELECTRON TUBES	BLUE
COMPONENTS AND MATERIALS	GREEN

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.

SEMICONDUCTORS (RED SERIES)

The red series of data handbooks comprises:

- S1 Diodes**
Small-signal silicon diodes, voltage regulator diodes (< 1,5 W), voltage reference diodes, tuner diodes, rectifier diodes.
 - S2a Power diodes**
 - S2b Thyristors and triacs**
 - S3 Small-signal transistors**
 - S4a Low-frequency power transistors and hybrid modules**
 - S4b High-voltage and switching power transistors**
 - S5 Field-effect transistors**
 - S6 R.F. power transistors and modules**
 - S7 Surface mounted semiconductors**
 - S8 Devices for optoelectronics**
Photosensitive diodes and transistors, light-emitting diodes, displays, photocouplers, infrared sensitive devices, photoconductive devices.
 - S9 Power MOS transistors**
 - S10 Wideband transistors and wideband hybrid IC modules**
 - S11 Microwave transistors**
 - S12 Surface acoustic wave devices**
 - S13 Semiconductor sensors**
-



INTEGRATED CIRCUITS (PURPLE SERIES)

The purple series of data handbooks comprises:

EXISTING SERIES

- IC1 Bipolar ICs for radio and audio equipment**
(superseded by IC01N)
- IC2 Bipolar ICs for video equipment**
(superseded by IC02Na and IC02Nb)
- IC3 ICs for digital systems in radio, audio and video equipment**
(superseded by IC01N, IC02Na and IC02Nb)
- IC4 Digital integrated circuits**
CMOS HE4000B family
- IC5 Digital integrated circuits - ECL**
ECL10 000 (GX family), ECL100 000 (HX family), dedicated designs
(superseded by IC08N)
- IC6 Professional analogue integrated circuits**
- IC7 Signetics bipolar memories**
- IC8 Signetics analogue circuits**
(superseded by IC11N)
- IC9 Signetics TTL logic**
(superseded by IC09N and IC15N)
- IC10 Signetics Integrated Fuse Logic (IFL)**
(superseded by IC13N)
- IC11 Microprocessors, microcomputers and peripheral circuitry**
(superseded by IC14N)

NEW SERIES

- IC01N Radio, audio and associated systems**
Bipolar, MOS
- IC02Na Video and associated systems**
Bipolar, MOS
Types MAB8031AH to TDA1524A
- IC02Nb Video and associated systems**
Bipolar, MOS
Types TDA2501 to TEA1002
- IC03N Integrated circuits for telephony**
- IC04N HE4000B logic family**
CMOS
- IC05N HE4000B logic family - uncased ICs**
CMOS
- IC06N High-speed CMOS; PC74HC/HCT/HCU**
Logic family
- IC06N High-speed CMOS; PC74HC/HCT/HCU**
(cont.) Logic family
(supplement to IC06N)
- IC07N High-speed CMOS; PC74HC/HCT/HCU uncased ICs** - Logic family
- IC08N ECL 10K and 100K logic families**
- IC09N TTL logic series**
- IC10N Memories**
MOS, TTL, ECL
- IC11N Linear LSI**
- IC12N Semi-custom gate arrays & cell libraries**
ISL, ECL, CMOS
- IC13N Semi-custom integrated fuse logic**
- IC14N Microprocessors, microcontrollers and peripherals** - Bipolar, MOS
- IC15N FAST TTL logic series**



ELECTRON TUBES (BLUE SERIES)

The blue series of data handbooks comprises:

- T1 Tubes for r.f. heating**
- T2a Transmitting tubes for communications, glass types**
- T2b Transmitting tubes for communications, ceramic types**
- T3 Klystrons**
- T4 Magnetrons for microwave heating**
- T5 Cathode-ray tubes**
Instrument tubes, monitor and display tubes, C.R. tubes for special applications
- T6 Geiger-Müller tubes**
- T7 Gas-filled tubes** (will not be reprinted)
- T8 Colour display systems**
Colour TV picture tubes, colour data graphic display tube assemblies, deflection units
- T9 Photo and electron multipliers**
- T10 Plumbicon camera tubes and accessories**
- T11 Microwave semiconductors and components**
- T12 Vidicon and Newvicon camera tubes**
- T13 Image intensifiers and infrared detectors**
- T15 Dry reed switches**
- T16 Monochrome tubes and deflection units**
Black and white TV picture tubes, monochrome data graphic display tubes, deflection units



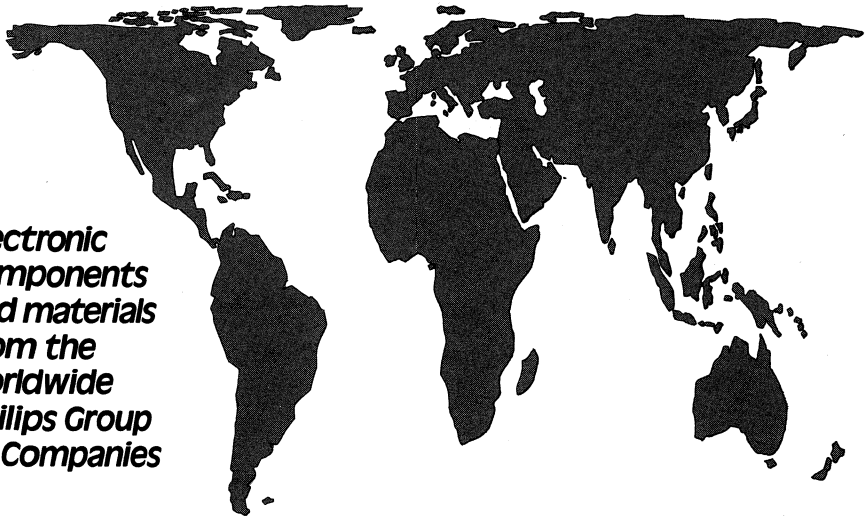
COMPONENTS AND MATERIALS (GREEN SERIES)

The green series of data handbooks comprises:

- C1 Programmable controller modules**
PLC modules, PC20 modules
- C2 Television tuners, coaxial aerial input assemblies, surface acoustic wave filters**
- C3 Loudspeakers**
- C4 Ferroxcube potcores, square cores and cross cores**
- C5 Ferroxcube for power, audio/video and accelerators**
- C6 Synchronous motors and gearboxes**
- C7 Variable capacitors**
- C8 Variable mains transformers**
- C9 Piezoelectric quartz devices**
- C10 Connectors**
- C11 Varistors, thermistors and sensors**
- C12 Potentiometers, encoders and switches**
- C13 Fixed resistors**
- C14 Electrolytic and solid capacitors**
- C15 Ceramic capacitors**
- C16 Permanent magnet materials**
- C17 Stepping motors and associated electronics**
- C18 Direct current motors**
- C19 Piezoelectric ceramics**
- C20 Wire-wound components for TVs and monitors**
- C21 Assemblies for industrial use**
HNIL FZ/30 series, NORbits 60-, 61-, 90-series, input devices
- C22 Film capacitors**



**Electronic
components
and materials
from the
worldwide
Philips Group
of Companies**



Argentina: PHILIPS ARGENTINA S.A., Div. Elcoma, Vedia 3892, 1430 BUENOS AIRES, Tel. 541-7141/7242/7343/7444/7545.
Australia: PHILIPS INDUSTRIES HOLDINGS LTD., Elcoma Division, 11 Waltham Street, ARTARMON, N.S.W. 2064, Tel. (02) 439 3322.
Austria: ÖSTERREICHISCHE PHILIPS BAUELEMENTE INDUSTRIE G.m.b.H., Triester Str. 64, A-1101 WIEN, Tel. 62 91 11.
Belgium: N.V. PHILIPS & MBLE ASSOCIATED, 9 rue du Pavillon, B-1030 BRUXELLES, Tel. (02) 242 7400.
Brazil: IBRAPE, Caixa Postal 7383, Av. Brigadeiro Faria Lima, 1735 SAO PAULO, SP, Tel. (011) 211-2600.
Canada: PHILIPS ELECTRONICS LTD., Elcoma Division, 601 Milner Ave., SCARBOROUGH, Ontario, M1B 1M8, Tel. 292-5161.
Chile: PHILIPS CHILENA S.A., Av. Santa Maria 0760, SANTIAGO, Tel. 39-4001.
Colombia: IND. PHILIPS DE COLOMBIA S.A., c/o IPRELENCO LTD., Cra. 21, No. 56-17, BOGOTA, D.E., Tel. 2497624.
Denmark: MINIWATT A/S, Strandlodsvej 2, P.O. Box 1919, DK 2300 COPENHAGEN S, Tel. (01) 54 11 33.
Finland: OY PHILIPS AB, Elcoma Division, Kaivokatu 8, SF-00100 HELSINKI 10, Tel. 1 72 71.
France: R.T.C. LA RADIOTECHNIQUE-COMPELEC, 130 Avenue Ledru Rollin, F-75540 PARIS 11, Tel. 338 80-00.
Germany (Fed. Republic): VALVO, UB Bauelemente der Philips G.m.b.H., Valvo Haus, Burchardstrasse 19, D-2 HAMBURG 1, Tel. (040) 3296-0.
Greece: PHILIPS S.A. HELLENIQUE, Elcoma Division, 52, Av. Syngrou, ATHENS, Tel. 9215111.
Hong Kong: PHILIPS HONG KONG LTD., Elcoma Div., 15/F Philips Ind. Bldg., 24-28 Kung Yip St., KWAI CHUNG, Tel. (0)-2451 21.
India: PEICO ELECTRONICS & ELECTRICALS LTD., Elcoma Dept., Band Box Building, 254-D Dr. Annie Besant Rd., BOMBAY - 400 025, Tel. 4220387/4220311.
Indonesia: P.T. PHILIPS-RALIN ELECTRONICS, Elcoma Div., Setiabudi II Building, 6th Fl., Jalan H.R. Rasuna Said (P.O. Box 223/KBY) Kuningan, JAKARTA - Selatan, Tel. 512572.
Ireland: PHILIPS ELECTRICAL (IRELAND) LTD., Newstead, Clonskeagh, DUBLIN 14, Tel. 693355.
Italy: PHILIPS S.p.A., Sezione Elcoma, Piazza IV Novembre 3, I-20124 MILANO, Tel. 2-6752.1.
Japan: NIHON PHILIPS CORP., Shuwa Shinagawa Bldg., 26-33 Takanawa 3-chome, Minato-ku, TOKYO (108), Tel. 448-5611.
 (IC Products) SIGNETICS JAPAN LTD., 8-7 Sanbancho Chiyoda-ku, TOKYO 102, Tel. (03) 230-1521.
Korea (Republic of): PHILIPS ELECTRONICS (KOREA) LTD., Elcoma Div., Philips House, 260-199 Itaewon-dong, Yongsan-ku, SEOUL, Tel. 794-5011.
Malaysia: PHILIPS MALAYSIA SDN. BERHAD, No. 4 Persiaran Barat, Petaling Jaya, P.O. B. 2163, KUALA LUMPUR, Selangor, Tel. 77 44 11.
Mexico: ELECTRONICA, S.A. de C.V., Carr. México-Toluca km. 62.5, TOLUCA, Edo. de México 50140, Tel. Toluca 91 (721) 613-00.
Netherlands: PHILIPS NEDERLAND, Marktgroep Elonco, Postbus 90050, 5600 PB EINDHOVEN, Tel. (040) 793333.
New Zealand: PHILIPS NEW ZEALAND LTD., Elcoma Division, 110 Mt. Eden Road, C.P.O. Box 1041, AUCKLAND, Tel. 605-914.
Norway: NORSK A/S PHILIPS, Electronics Dept., Sandstuveien 70, OSLO 6, Tel. 680200.
Peru: CADESA, Av. Alfonso Ugarte 1268, LIMA 5, Tel. 326070.
Philippines: PHILIPS INDUSTRIAL DEV. INC., 2246 Pasong Tamo, P.O. Box 911, Makati Comm. Centre, MAKATI-RIZAL 3116, Tel. 86-89-51 to 59.
Portugal: PHILIPS PORTUGUESA S.A.R.L., Av. Eng. Duarte Pacheco 6, 1009 LISBOA Codex, Tel. 683121.
Singapore: PHILIPS PROJECT DEV. (Singapore) PTE LTD., Elcoma Div., Lorong 1, Toa Payoh, SINGAPORE 1231, Tel. 3502000.
South Africa: EDAC (PTY) LTD., 3rd Floor Rainer House, Upper Railway Rd. & Ove St., New Doornfontein, JOHANNESBURG 2001, Tel. 614-2362/9.
Spain: MINIWATT S.A., Balmes 22, BARCELONA 7, Tel. 3016312.
Sweden: PHILIPS KOMPLEMENTER A.B., Lidingsvägen 50, S-11584 STOCKHOLM 27, Tel. 08/7821000.
Switzerland: PHILIPS A.G., Elcoma Dept., Allmendstrasse 140-142, CH-8027 ZÜRICH, Tel. 01-4882211.
Taiwan: PHILIPS TAIWAN LTD., 150 Tun Hua North Road, P.O. Box 22978, TAIPEI, Taiwan, Tel. 7120500.
Thailand: PHILIPS ELECTRICAL CO. OF THAILAND LTD., 283 Silom Road, P.O. Box 961, BANGKOK, Tel. 233-6330-9.
Turkey: TÜRK PHILIPS TICARET A.Ş., Elcoma Department, İnönü Cad. No. 78-80, P.K.504, 80074 ISTANBUL, Tel. 4359 10.
United Kingdom: MULLARD LTD., Mullard House, Torrington Place, LONDON WC1E 7HD, Tel. 01-5806633.
United States (Active Devices & Materials): AMPEREX SALES CORP., Providence Pike, SLATERSVILLE, P.I. 02878, Tel. (401) 762 9000.
 (Passive Devices) MERCOP/ELECTRA INC., Columbia Rd., MORRISTOWN, N.J. 07960, Tel. (201) 539-2000.
 (Passive Devices & Electromechanical Devices) CENTRALAB INC., 5855 N. Glen Park Rd., MILWAUKEE, WI 53201, Tel. (414)228-7380.
 (IC Products) SIGNETICS CORPORATION, 811 East Arques Avenue, SUNNYVALE, California 94086, Tel. (408) 991-2000.
Uruguay: LUZILECTRON S.A., Avda Uruguay 1287, P.O. Box 907, MONTEVIDEO, Tel. 91 4321.
Venezuela: IND. VENEZOLANAS PHILIPS S.A., c/o MAGNETICA S.A., Calle 6, Ed. Las Tres Jotas, App. Post. 78117, CARACAS, Tel. (02) 2393931.

For all other countries apply to: Philips Electronic Components and Materials Division, International Business Relations, Building BAE, P.O. Box 218, 5600 MD EINDHOVEN, The Netherlands, Tel. +31 40 72 33 04, Telex 35000 phntnl