



Electronic
components
and materials

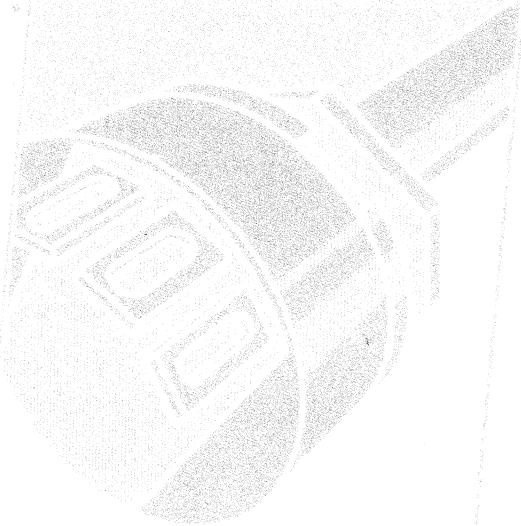
PHILIPS

'84

electronic components
and materials

**preferred
type range**

1984 catalogue



ELECTRONIC COMPONENTS AND MATERIALS

CATALOGUE

1984

PREFERRED TYPE RANGE

PREFACE

This catalogue lists type numbers, catalogue numbers and brief data of the preferred products of the Electronic Components and Materials division. For complete data, we refer you to our system of Data Handbooks. That system, which now comprises fifty-one volumes, is divided into four series distinguished by colour:

- **IC series** Integrated circuits **Purple**
- **S series** Semiconductors **Red**
- **T series** Electron tubes **Blue**
- **C series** Components and materials **Green**

The contents of each volume are listed on pages III to IV.

On most pages, directly underneath the title, reference is made to the Data Handbook in which you will find complete relevant data.

Editor
January 1984

Note
Dimensions in tables and drawings are in mm, unless otherwise stated.



INTEGRATED CIRCUITS (PURPLE SERIES)

The purple series of data handbooks is comprised of the following parts:

- IC1** Bipolar ICs for radio and audio equipment
- IC2** Bipolar ICs for video equipment
- IC3** ICs for digital systems in radio, audio and video equipment
- IC4** Digital integrated circuits
CMOS HE4000B family
- IC5** Digital integrated circuits - ECL
ECL10000 (GX family), ECL100000 (HX family), dedicated designs
- IC6** Professional analogue integrated circuits
- IC7** Signetics bipolar memories
- IC8** Signetics analogue circuits
- IC9** Signetics TTL logic
- IC10** Signetics Integrated Fuse Logic (IFL)
- IC11** Microprocessors, microcomputers and peripheral circuitry

SEMICONDUCTORS (RED SERIES)

The red series of data handbooks is comprised of the following parts:

- S1 Diodes**
Small-signal germanium diodes, small-signal silicon diodes, voltage diodes ($< 1,5$ W), voltage reference diodes, tuner diodes, rectifier diodes
- S2 Power diodes, thyristors, triacs**
Rectifier diodes, voltage regulator diodes ($> 1,5$ W), rectifier stacks, thyristors, 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 Microminiature semiconductors for hybrid circuits**
- 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**

ELECTRON TUBES (BLUE SERIES)

The blue series of data handbooks is comprised of the following parts:

- T1 Tubes for r.f. heating**
- T2a Transmitting tubes for communications, glass types**
- T2b Transmitting tubes for communications, ceramic types**
- T3 Klystrons, travelling-wave tubes, microwave diodes**
- ET3 Special Quality tubes, miscellaneous devices (will not be reprinted)**
- T4 Magnetrons**
- T5 Cathode-ray tubes**
Instrument tubes, monitor and display tubes, C.R. tubes for special applications
- T6 Geiger-Muller tubes**
- T7 Gas-filled tubes**
Segment indicator tubes, indicator tubes, dry reed contact units, thyratrons, industrial rectifying tubes, ignitrons, high-voltage rectifying tubes, associated accessories
- T8 Picture tubes and components**
Colour TV picture tubes, black and white TV picture tubes, colour monitor tubes for data graphic display, monochrome monitor tubes for data graphic display, components for colour television, components for black and white television and monochrome data graphic display
- T9 Photo and electron multipliers**
Photomultiplier tubes, phototubes, single channel electron multipliers, channel electron multiplier plates
- T10 Camera tubes and accessories, image intensifiers**
- T11 Microwave semiconductors and components**

COMPONENTS AND MATERIALS (GREEN SERIES)

The green series of data handbooks is comprised of the following parts:

- C1 Assemblies for industrial use**
PLC modules, PC20 modules, HNIL FZ/30 series, NORbits 60-, 61-, 90-series, input devices, hybrid ICs
- C2 Television tuners, video modulators, surface acoustic wave filters**
- C3 Loudspeakers**
- C4 Ferroxcube potcores, square cores and cross cores**
- C5 Ferroxcube for power, audio/video and accelerators**
- C6 Electric motors and accessories**
Permanent magnet synchronous motors, stepping motors, direct current motors
- C7 Variable capacitors**
- C8 Variable mains transformers**
- C9 Piezoelectric quartz devices**
Quartz crystal units, temperature compensated crystal oscillators, compact integrated oscillators, quartz crystal cuts for temperature measurements
- C10 Connectors**
- C11 Non-linear resistors**
Voltage dependent resistors (VDR), light dependent resistors (LDR), negative temperature coefficient thermistors (NTC), positive temperature coefficient thermistors (PTC)
- C12 Variable resistors and test switches**
- C13 Fixed resistors**
- C14 Electrolytic and solid capacitors**
- C15 Film capacitors, ceramic capacitors**
- C16 Piezoelectric ceramics, permanent magnet materials**

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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. 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.

Advantages of the CMOS

- low power dissipation - typically 10 nW per gate (static)
- wide operating supply voltage range
- wide operating temperature range from -40 to +85 °C
- 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

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
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 mW
Operating ambient temperature range	T_{amb}	-40 to +85 °C
Storage temperature range	T_{stg}	-65 to +150 °C

CMOS HE4000B FAMILY SPECIFICATIONS (continued)
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} $V_I = V_{SS}$ or V_{DD} $V_I = V_{SS}$ 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} $V_I = V_{SS}$ or V_{DD} $V_I = V_{SS}$ 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	
Input voltage LOW $ I_O < 1\text{ }\mu\text{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\text{ }\mu\text{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; $V_I = 0$ or 5 V $V_O = 0,5$ V; $V_I = 0$ or 10 V $V_O = 1,5$ V; $V_I = 0$ or 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; $V_I = 0$ or 5 V $V_O = 9,5$ V; $V_I = 0$ or 10 V $V_O = 13,5$ V; $V_I = 0$ or 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	-	1,4	-	1,1	-	5	$V_O = 2,5$ V; $V_I = 0$ or 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}	-	1,6	-	1,6	-	12,0	15	output returned to V_{DD}
3-state output leakage current LOW	$-I_{OZL}$	-	1,6	-	1,6	-	12,0	15	output returned to V_{SS}
Input capacitance per unit load	C_i	-	-	-	7,5	-	-	-	digital inputs

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

CMOS HE4000B FAMILY**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

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

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 units

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

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

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

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

HCMOS PC54/74 FAMILY SPECIFICATIONS**General**

These family specifications cover the common electrical ratings and characteristics of the entire HCMOS PC54/74 family, unless otherwise specified in the individual device data sheet.

Introduction

The PC54 and 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 54/74 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 PC54/74HCXXXXX, 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 PC54/74HCTXXXXX, 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 PC54/74HCUXXXXX, 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 (PC54HC/PC74HC)
- TTL input switching levels for PC54HCT/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 PC54HC/HCU and PC74HC/HCU devices
 $5\text{ V} \pm 10\%$ for PC54HCT and PC74HCT devices
- Wide operating temperature range:
standard: -40 to $+85\text{ }^\circ\text{C}$ (PC74HC/HCT/HCUXXXXX)
extended: -55 to $+125\text{ }^\circ\text{C}$ (PC54HC/HCT/HCUXXXXX)
- Available package:
plastic DIL and mini-pack (SO)
ceramic (cerdip) DIL
- Built-in protection against latch-up
- Highly immune to electrostatic discharge
- Alternate source is RCA

Type number designation

Basic families:

PC54HCXXXXXP	complete type number; extended temperature range
PC74HCXXXXXP	complete type number; standard temperature range
P	package code: e.g. P = plastic DIL; D = ceramic (cerdip) DIL; T = plastic mini-pack (SO)
XXXXX	device number (up to 5 digits)
HC	CMOS input switching levels; supply voltage range 2 to 6 V; fully buffered
HCT*	TTL input switching levels; supply voltage range 5 V \pm 10%; fully buffered
HCU*	CMOS input switching levels; supply voltage range 2 to 6 V; unbuffered (single-stage devices)
54	extended temperature range: -55 to +125 °C
74	standard temperature range: -40 to +85 °C
PC	family identification (high-speed CMOS)

* Family subset.

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	$\pm I_O$	-	-	25	mA
	standard outputs	$\pm I_O$	-	-	35	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 standard temperature range; -40 to +85 °C; PC74HC/HCT/HCU plastic and ceramic (cerdip) DIL	P_{tot}	-	-	500	mW
	above +60 °C	P_{tot}^*	-	-	500	mW
	plastic mini-pack (SO)	P_{tot}	-	-	200	mW
	above +70 °C	P_{tot}^{**}	-	-	200	mW
Power dissipation per package	for extended temperature range; -55 to +125 °C; PC54HC/HCT/HCU ceramic (cerdip) DIL	P_{tot}	-	-	500	mW
	above +100 °C	P_{tot}^*	-	-	500	mW

* Derate linearly with 8 mW/K.
 ** Derate linearly with 5 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; PC54HC/HCU PC74HCT; PC54HCT	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/HCU PC54HC/HCT/HCU	T_{amb}	-40	-	+ 85	°C	
	T_{amb}	-55	-	+ 125	°C	
Input rise and fall times except for Schmitt trigger inputs		-	-	1000	ns	$V_{CC} = 2,0\text{ V}$
	$t_r; t_f$	-	6,0	500	ns	$V_{CC} = 4,5\text{ V}$
		-	-	400	ns	$V_{CC} = 6,0\text{ V}$

D.C. family characteristics

For PC54HC, PC74HC, voltages are referenced to GND (ground = 0 V)

parameter	V _{CC} V	symbol	T _{amb} (°C)						unit	conditions	
			PC54HC/PC74HC + 25		PC74HC -40 to + 85		PC54HC -55 to + 125				
			min.	typ.	max.	min.	max.	min.			max.
HIGH level input voltage	2.0	V _{IH}	1.5	1.3	-	1.5	-	1.5	V	V _{IH} or V _{IIL} V _{IH} or V _{IIL} V _{IH} or V _{IIL}	
	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	0.3	-	0.3	-	0.3	V	
	4.5		-	1.8	0.9	-	0.9	-	0.9	V	
	6.0		-	2.3	1.2	-	1.2	-	1.2	V	
HIGH level output voltage all outputs	2.0	V _{OH}	1.9	2.0	-	1.9	-	1.9	V	-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 outputs	4.5	V _{OH}	3.98	-	-	3.84	-	3.7	V	-I _O = 4.0 mA -I _O = 5.2 mA	
	6.0		5.48	-	-	5.34	-	5.2	V		
	4.5	V _{OH}	3.98	-	-	3.84	-	3.7	V		
HIGH level output voltage bus driver outputs	4.5	V _{OH}	3.98	-	-	3.84	-	3.7	V	-I _O = 6.0 mA -I _O = 7.8 mA	
	6.0		5.48	-	-	5.34	-	5.2	V		
	2.0	V _{OL}	-	0	0.1	-	0.1	-	0.1		V
LOW level output voltage all outputs	4.5	V _{OL}	-	0	0.1	-	0.1	-	0.1	V	
	6.0		-	0	0.1	-	0.1	-	0.1	V	
	4.5	V _{OL}	-	-	0.26	-	0.33	-	0.4	V	
LOW level output voltage standard outputs	6.0		-	-	0.26	-	0.33	-	0.4	V	
	4.5	V _{OL}	-	-	0.26	-	0.33	-	0.4	V	
	6.0		-	-	0.26	-	0.33	-	0.4	V	
LOW level output voltage bus driver outputs	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
Analog switch OFF-state current per channel	6.0	± I _S	-	-	0.1	-	1.0	-	1.0	µA	V _{IH} or V _{IIL}
3-state output OFF-state current	6.0	± I _{OZ}	-	-	0.5	-	5.0	-	10.0	µA	V _{IH} or V _{IIL}
Quiescent supply current	6.0	I _{CC}	-	-	2.0	-	20.0	-	40.0	µA	V _{CC} or GND
SSI flip-flops	6.0	I _{CC}	-	-	4.0	-	40.0	-	80.0	µA	V _{CC} or GND
MSI	6.0	I _{CC}	-	-	8.0	-	80.0	-	160.0	µA	V _{CC} or GND



D.C. family characteristics

For PC54HCU; PC74HCU; voltages are referenced to GND (ground = 0 V)

parameter	V _{CC}	symbol	T _{amb.} (°C)						unit	conditions			
			PC54HCU/PC74HCU +25			PC74HCU -40 to +85					PC54HCU -55 to +125		
			min.	typ.	max.	min.	max.	min.			max.		
HIGH level input voltage	2.0 4.5 6.0	V _{IH}	1.7 3.6 4.8	- - -	1.7 3.6 4.8	- - -	1.7 3.6 4.8	- - -	V	V _I			
LOW level input voltage	2.0 4.5 6.0	V _{IL}	- - -	0.3 0.9 1.2	- - -	0.3 0.9 1.2	- - -	0.3 0.9 1.2	V	V _{IH} or V _{IL} V _{IH} or V _{IL} V _{IH} or V _{IL}	-I _O = 20 µA -I _O = 20 µA -I _O = 20 µA		
HIGH level output voltage	2.0 4.5 6.0	V _{OH}	1.8 4.0 5.5	- - -	1.8 4.0 5.5	- - -	1.8 4.0 5.5	- - -	V	V _{IH} or V _{IL} V _{IH} or V _{IL} V _{IH} or V _{IL}	-I _O = 4.0 mA -I _O = 5.2 mA		
HIGH level output voltage	4.5 6.0	V _{OH}	3.98 5.48	- -	3.84 5.34	- -	3.7 5.2	- -	V	V _{IH} or V _{IL} V _{IH} or V _{IL}	-I _O = 4.0 mA -I _O = 5.2 mA		
LOW level output voltage	2.0 4.5 6.0	V _{OL}	- - -	0.2 0.5 0.5	- - -	0.2 0.5 0.5	- - -	0.2 0.5 0.5	V	V _{IH} or V _{IL} V _{IH} or V _{IL} V _{IH} or V _{IL}	I _O = 20 µA I _O = 20 µA I _O = 20 µA		
LOW level output voltage	4.5 6.0	V _{OL}	- -	0.26 0.26	- -	0.33 0.33	- -	0.4 0.4	V	V _{IH} or V _{IL} V _{IH} or V _{IL}	I _O = 4.0 mA I _O = 5.2 mA		
input leakage current	6.0	±I _I	-	0.1	-	1.0	-	1.0	µA	V _{CC} or GND			
Quiescent supply current	6.0	I _{CC}	-	2.0	-	20.0	-	40.0	µA	V _{CC} or GND	I _O = 0		
SSI													



D.C. family characteristics

For PC54HCT; PC74HCT: voltages are referenced to GND (ground = 0 V)

parameter	V _{CC} V	symbol	T _{amb} (°C)						unit	conditions	
			PC54HCT/PC74HCT +25		PC74HCT -40 to +85		PC54HCT -55 to +125				
			min.	typ.	max.	min.	max.	min.			max.
HIGH level input voltage	4.5 to 5.5	V _{IH}	2.0	-	-	2.0	-	2.0	-	V	V _I
LOW level input voltage	4.5 to 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 outputs	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 outputs	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 outputs	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 outputs	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 _{IH} or V _{IL}
Analog switch OFF-state current per channel	5.5	±I _S	-	-	0.1	-	1.0	-	1.0	µA	V _H or V _{IL}
3-state output OFF-state current	5.5	±I _{OZ}	-	-	0.5	-	5.0	-	10.0	µA	V _{IH} or V _{IL}
Quiescent supply current	5.5	I _{CC}	-	-	2.0	-	20.0	-	40.0	µA	V _{CC} or GND
SSI	5.5	I _{CC}	-	-	4.0	-	40.0	-	80.0	µA	V _{CC} or GND
flip-flops	5.5	I _{CC}	-	-	8.0	-	80.0	-	160.0	µA	V _{CC} or GND
MSI	5.5	I _{CC}	-	-	-	-	-	-	-	-	V _{CC} or GND; I _O = 0



A.C. family characteristics

GND = 0 V; $C_L = 50 \text{ pF}$; $t_r = t_f = 6 \text{ ns}$

For PC54HC; PC74HC

parameter	V_{CC} V	symbol	$T_{amb} (\text{°C})$						unit	
			PC54HC/PC74HC + 25			PC74HC -40 to +85		PC54HC -55 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

For PC54HCU; PC74HCU

parameter	V_{CC} V	symbol	$T_{amb} (\text{°C})$						unit	
			PC54HCU/PC74HCU + 25			PC74HCU -40 to +85		PC54HCU -55 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

For PC54HCT; PC74HCT

parameter	V_{CC} V	symbol	$T_{amb} (\text{°C})$						unit	
			PC54HCT/PC74HCT + 25			PC74HCT -40 to +85		PC54HCT -55 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

Type numbers have a suffix which signifies the type of package:

P = plastic DIL; D = ceramic (cerdip) DIL; T = plastic SO mini-pack

HCMOS PC54/74 FAMILY**NAND/NOR gates**

HC/HCT00	quad 2-input NAND gate
HC/HCT02	quad 2-input NOR gate
HC/HCT10	triple 3-input NAND gate
HC/HCT20	dual 4-input NAND gate
HC/HCT27	triple 3-input NOR gate
HC/HCT4002	dual 4-input NOR gate

AND/OR/EXCLUSIVE-OR gates

HC/HCT08	quad 2-input AND gate
HC/HCT11	triple 3-input AND gate
HC/HCT32	quad 2-input OR gate
HC/HCT86	quad 2-input EXCLUSIVE-OR gate
HC/HCT4075	triple 3-input OR gate

Inverters/buffers/bus drivers

HC/HCT04	hex inverter
HCU04	hex inverter (unbuffered)
HC/HCT240*	octal buffer/line driver; 3-state; inverting
HC/HCT241*	octal buffer/line driver; 3-state
HC/HCT244*	octal buffer/line driver; 3-state
HC/HCT365*	hex buffer/line driver; 3-state
HC/HCT366*	hex buffer/line driver; 3-state; inverting
HC/HCT367*	hex buffer/line driver; 3-state
HC/HCT368*	hex buffer/line driver; 3-state; inverting
HC/HCT540*	octal buffer/line driver; 3-state; inverting
HC/HCT541*	octal buffer/line driver; 3-state
HC/HCT4049	hex inverting HIGH-to-LOW level shifter
HC/HCT4050	hex HIGH-to-LOW level shifter

* Types with a bus driver output stage.

Flip-flops/latches/registers

HC/HCT73	dual JK flip-flop with reset; negative-edge trigger
HC/HCT74	dual D-type flip-flop with set and reset; positive-edge trigger
HC/HCT75	quad bistable transparent latch
HC/HCT107	dual JK flip-flop with reset; negative-edge trigger
HC/HCT109	dual JK flip-flop with set and reset; positive-edge trigger
HC/HCT112	dual JK flip-flop with set and reset; negative-edge trigger
HC/HCT173*	quad D-type flip-flop; positive-edge trigger; 3-state
HC/HCT174	hex D-type flip-flop with reset; positive-edge trigger
HC/HCT175	quad D-type flip-flop with reset; positive-edge trigger
HC/HCT259	8-bit addressable latch
HC/HCT273	octal D-type flip-flop with reset; positive-edge trigger
HC/HCT373*	octal transparent latch; 3-state
HC/HCT374*	octal D-type flip-flop; positive-edge trigger; 3-state
HC/HCT377	octal D-type flip-flop with data enable; positive-edge trigger
HC/HCT533*	octal transparent latch; 3-state; inverting
HC/HCT534*	octal D-type flip-flop; positive-edge trigger; 3-state; inverting
HC/HCT563*	octal transparent latch; 3-state; inverting
HC/HCT564*	octal D-type flip-flop; positive-edge trigger; 3-state; inverting
HC/HCT573*	octal transparent latch; 3-state
HC/HCT574*	octal D-type flip-flop; positive-edge trigger; 3-state
HC/HCT670	4 x 4 register file; 3-state
HC/HCT40105	4-bits x 16 words fifo register

Shift registers

HC/HCT164	8-bit serial-in/parallel-out shift register
HC/HCT165	8-bit parallel-in/serial-out shift register
HC/HCT166	8-bit parallel/serial-in/serial-out shift register
HC/HCT194	4-bit bidirectional universal shift register
HC/HCT195	4-bit parallel access shift register
HC/HCT299*	8-bit universal shift register; 3-state
HC/HCT4015	dual 4-bit serial-in/parallel-out shift register
HC/HCT4094	8-stage shift-and-store bus register
HC/HCT40104*	4-bit bidirectional universal shift register; 3-state

* Types with a bus driver output stage.



Arithmetic circuits

HC/HCT85	4-bit magnitude comparator
HC/HCT384	8-bit serial/parallel two's complement multiplier
HC/HCT688	8-bit magnitude comparator

Counters

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

Multiplexers

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

* Types with a bus driver output stage.

Decoders/encoders

HC/HCT42	BCD to decimal decoder (1-of-10)
HC/HCT138	3-to-8 line decoder/demultiplexer; inverting
HC/HCT139	dual 2-to-4 line decoder/demultiplexer
HC/HCT147	10-to-4 line priority encoder
HC/HCT154	4-to-16 line decoder/demultiplexer
HC/HCT238	3-to-8 line decoder/demultiplexer
HC/HCT280	9-bit odd/even parity generator/checker
HC/HCT4511	BCD to 7-segment latch/decoder/driver
HC/HCT4514	4-to-16 line decoder/demultiplexer with input latches
HC/HCT4515	4-to-16 line decoder/demultiplexer with input latches
HC/HCT4543	BCD-to-7 segment latch/decoder/driver for LCDs

Switches

HC/HCT4016	quad bilateral switch
HC/HCT4051	8-channel analogue multiplexer/demultiplexer
HC/HCT4052	dual 4-channel analogue multiplexer/demultiplexer
HC/HCT4053	triple 2-channel analogue multiplexer/demultiplexer
HC/HCT4066	quad bilateral switch
HC/HCT4067	16-channel analogue multiplexer/demultiplexer

Bus transceivers

HC/HCT242*	quad bus transceiver; 3-state; inverting
HC/HCT243*	quad bus transceiver; 3-state
HC/HCT245*	octal bus transceiver; 3-state
HC/HCT640*	octal bus transceiver; 3-state; inverting
HC/HCT643*	octal bus transceiver; 3-state; true/inverting
HC/HCT645*	octal bus transceiver; 3-state
HC/HCT646*	octal bus transceiver/register; 3-state
HC/HCT648*	octal bus transceiver/register; 3-state; inverting

Schmitt triggers

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

One-shot multivibrators

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

Miscellaneous

HC/HCT297	digital phase-locked-loop filter
HC/HCT4046	phase-locked loop with VCO

* 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
<p>STANDARD TTL 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.</p>	10 ns at 10 mW	25 MHz	28 ns
<p>LOW POWER SCHOTTKY TTL 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.</p>	10 ns at 2 mW	30 MHz	21 ns
<p>SCHOTTKY TTL 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.</p>	3 ns at 30 mW	90 MHz	11 ns
<p>FAST TTL 74F00 Series SSI and MSI New FAST Series offer higher speed than Schottky TTL.</p>	3 ns at 4 mW	-	-



TTL 54/74 SERIES		STD	LS	S	F
Gates					
54/7400	quad 2-input NAND gate	*	*	*	*
54/7401	quad 2-input NAND gate (open collector)	-	*	-	-
54/7402	quad 2-input NOR gate	*	*	*	P
54/7403	quad 2-input NAND gate (open collector)	*	-	*	-
54/7408	quad 2-input AND gate	*	*	*	*
54/7409	quad 2-input AND gate (open collector)	-	*	-	-
54/7410	triple 2-input NAND gate	*	*	*	*
54/7411	triple 3-input AND gate	*	*	*	*
54/7420	dual 4-input NAND gate	*	*	*	*
54/7421	dual 4-input AND gate	*	*	-	-
54/7425	dual 4-input NOR gate with strobe	*	-	-	-
54/7426	quad 2-input NAND gate (open collector)	*	*	-	-
54/7427	triple 3-input NOR gate	*	*	-	-
54/7430	8-input NAND gate	*	*	-	-
54/7432	quad 2-input OR gate	*	*	*	*
54/7450	expandable dual 2-wide 2-input AND-OR-invert gate	*	-	-	-
54/7451	dual 2-wide 2-input AND-OR-invert gate	*	*	*	-
54/7454	4-wide 2 and 3-input AND-OR-invert gate	-	*	-	-
54/7464	4-2-3-2-input AND-OR-invert gate	-	-	*	*
54/7486	quad 2-input EXCLUSIVE-OR gate	*	*	*	*
54/74133	13-input NAND gate	-	-	*	-
54/74134	12-input NAND gate (3-state)	-	-	*	-
54/74135	quad EXCLUSIVE-OR/NOR gate	-	-	*	-
54/74136	quad EXCLUSIVE-OR gate (open collector)	-	*	-	-
54/74260	dual 5-input NOR gate	-	*	*	-
54/74266	quad 2-input EXCLUSIVE-NOR gate (open collector)	-	*	-	-
Buffers, inverters					
54/7404	hex inverter	*	*	*	*
54/7405	hex inverter (open collector)	*	*	*	-
54/7406	hex inverter buffer/driver (open collector)	*	-	-	-
54/7407	hex buffer/driver (open collector)	*	-	-	-
54/7416	hex inverter buffer/driver (open collector)	*	-	-	-
54/7417	hex buffer/driver (open collector)	*	-	-	-
54/7428	quad 2-input NOR buffer	*	-	-	-
54/7433	quad 2-input NOR buffer (open collector)	*	*	-	-
54/7437	quad 2-input NAND buffer	*	*	*	P
54/7438	quad 2-input NAND buffer (open collector)	*	*	*	P
54/7439	quad 2-input NAND buffer (open collector)	*	-	-	-
54/7440	dual 4-input NAND buffer	*	*	*	P

P = planned

TTL 54/74 SERIES

STD LS S F

Bus drivers, transceivers

54/74125	quad buffer (3-state)	*	*	-	-
54/74126	quad buffer (3-state)	*	*	-	-
54/74128	quad 2-input NOR buffer	*	-	-	-
54/74240	octal inverter buffer (3-state)	-	*	*	P
54/74241	octal buffer (3-state)	-	*	*	P
54/74242	quad bus inverting transceiver (3-state)	-	*	-	P
54/74243	quad transceiver (3-state)	-	*	-	P
54/74244	octal buffer (3-state)	-	*	*	P
54/74245	octal bus transceiver (3-state)	-	*	-	P
54/74365A	hex buffer/driver (3-state)	*	*	-	-
54/74366A	hex inverter buffer (3-state)	*	*	-	-
54/74367A	hex buffer/driver (3-state)	*	*	-	-
54/74368A	hex inverter buffer (3-state)	*	*	-	-
54/74540	octal buffer/line driver (3-state)	-	*	-	-
54/74541	octal non-inverting buffer/line driver (3-state)	-	*	-	-
54/74640	inverting octal bus transceiver (3-state)	-	*	-	-
54/74640-1	inverting octal bus transceiver (3-state)	-	*	-	-
54/74641	octal bus transceiver (open collector)	-	*	-	-
54/74641-1	octal bus transceiver (open collector)	-	*	-	-
54/74642	inverting octal bus transceiver (open collector)	-	*	-	-
54/74642-1	inverting octal bus transceiver (open collector)	-	*	-	-
54/74645	octal bus transceiver (3-state)	-	*	-	-
54/74645-1	octal bus transceiver (3-state)	-	*	-	-

Flip-flops

54/7413	dual 4-input NAND Schmitt trigger	*	*	-	P
54/7414	hex inverter Schmitt trigger	*	*	-	*
54/7473	dual JK master-slave flip-flop	*	*	-	-
54/7474	dual D-type edge-triggered flip-flop	*	-	*	*
54/7474A	dual D-type edge-triggered flip-flop	-	*	-	-
54/7476	dual JK master-slave flip-flop	*	*	-	-
54/74107	dual JK master-slave flip-flop	*	*	-	-
54/74109	dual JK positive-edge triggered flip-flop	*	*	-	*
54/74112	dual JK negative-edge triggered flip-flop	-	*	*	-
54/74113	dual JK positive-edge triggered flip-flop	-	*	*	-
54/74121	monostable multivibrator	*	-	-	-
54/74123	dual retriggerable monostable multivibrator	*	-	-	-
54/74132	quad 2-input NAND Schmitt trigger	*	*	-	P
54/74173	quad D-type flip-flop (3-state)	*	*	-	-
54/74174	hex D-type flip-flop with reset	*	*	*	-
54/74175	quad D-type edge-triggered flip-flop with reset	*	*	*	-
54/74221	dual monostable multivibrator	*	-	-	-
54/74273	octal D-type flip-flop with reset	-	*	*	P
54/74364	octal D-type flip-flop (3-state)	-	*	-	-
54/74374	octal D-type flip-flop (3-state)	-	*	*	*
54/74377	octal D-type flip-flop with clock enable	-	*	-	P
54/74378	hex D-type flip-flop with clock enable	-	*	-	-

P = planned

TTL 54/74 SERIES		STD	LS	S	F
Shift registers					
54/7491A	8-bit shift register	*	-	-	-
54/7494	4-bit shift register	*	-	-	-
54/7495	4-bit shift register	*	-	-	-
54/7495B	4-bit left-right shift register	-	*	-	-
54/7496	5-bit shift register	*	*	-	-
54/74164	8-bit serial-in/parallel-out shift register	*	*	-	-
54/74165	8-bit parallel-in/serial-out shift register	*	-	-	-
54/74166	8-bit parallel-in/serial-out shift register	*	-	-	-
54/74170	4x4 register file (open collector)	*	*	-	-
54/74172	16-bit multiple port register file (3-state)	-	-	*	-
54/74194	4-bit bidirectional universal shift register	*	-	*	*
54/74194A	4-bit bidirectional universal shift register	-	*	-	-
54/74195	4-bit parallel access shift register	*	-	*	P
54/74195A	4-bit parallel access shift register	-	*	-	-
54/74199	8-bit parallel-access shift register	*	-	-	-
54/74295B	4-bit shift register (3-state)	-	*	-	-
54/74395A	4-bit cascadable shift register (3-state)	-	*	-	P
54/74670	4x4 register file (3-state)	-	*	-	-
Counters					
54/7490	4-bit decade ripple counter	*	*	-	-
54/7492	divide-by-twelve counter	*	*	-	-
54/7493	4-bit binary ripple counter	*	*	-	-
54/74160	synchronous BCD decade counter	*	-	-	-
54/74160A	synchronous BCD decade counter	-	*	-	-
54/74161	synchronous 4-bit binary counter	*	-	-	-
54/74161A	synchronous 4-bit binary counter	-	*	-	-
54/74162A	synchronous BCD decade counter	-	*	-	-
54/74163	synchronous 4-bit binary counter	*	-	-	-
54/74163A	synchronous 4-bit binary counter	-	*	-	-
54/74168	synchronous BCD decade up/down counter	-	-	*	-
54/74168A	synchronous BCD decade up/down counter	-	*	-	-
54/74169	synchronous 4-bit binary up/down counter	-	-	*	-
54/74169A	synchronous 4-bit binary up/down counter	-	*	-	-
54/74190	presettable BCD/decade up/down counter	*	-	-	-
54/74191	presettable 4-bit binary up/down counter	*	*	-	-
54/74192	presettable BCD/decade up/down counter	*	*	-	-
54/74193	presettable 4-bit binary up/down counter	*	*	-	-
54/74197	presettable 4-bit binary ripple counter	-	*	-	-
54/74290	4-bit decade ripple counter	-	*	-	-
54/74293	4-bit binary ripple counter	-	*	-	-
54/74390	dual decade ripple counter	-	*	-	-
54/74393	dual 4-bit binary ripple counter	-	*	-	-
54/74490	dual BCD decade ripple counter	-	*	-	-
54/74568A	BCD decade up/down synchronous counter (3-state)	-	*	-	-
54/74569A	4-bit binary up/down synchronous counter (3-state)	-	*	-	-

P = planned

TTL 54/74 SERIES		STD	LS	S	F
Latches					
54/7475	quad bistable latch	*	*	-	-
54/74116	dual 4-bit transparent latch with reset	*	-	-	-
54/74256	dual 4-bit addressable latch	-	-	-	P
54/74259	8-bit addressable latch	-	*	-	P
54/74279	quadruple S-R latch	*	-	-	-
54/74363	octal transparent latch (3-state)	-	*	-	-
54/74373	octal transparent latch (3-state)	-	*	*	*
54/74375	quad transparent bistable latch	-	*	-	-
54/74533	inverting octal D-type latch (3-state)	*	-	-	*
54/74534	octal D-type flip-flop (3-state)	-	-	*	*
Decoders/drivers					
54/7445	BCD-to-decimal decoder/driver (open collector)	*	-	-	-
54/74140	dual 4-input NAND line driver (50 Ohm)	-	-	*	-
54/74145	BCD-to-decimal decoder/driver (open collector)	*	-	-	-
54/74445	BCD-to-decimal decoder/driver (open collector)	-	*	-	-
Decoders/(de)multiplexers					
54/7442	BCD-to-decimal decoder (1-of-10)	*	*	-	-
54/74138	3-line to 8-line decoder/demultiplexer	-	*	*	*
54/74139	dual 2-line to 4-line decoder/demultiplexer	-	*	*	*
54/74147	10-line to 4-line priority encoder	*	-	-	-
54/74148	8-line to 3-line priority encoder	*	-	-	-
54/74150	16-line to 1-line multiplexer	*	-	-	-
54/74151	8-line to 1-line multiplexer	*	*	*	P
54/74153	dual 4-line to 1-line multiplexer	*	*	*	-
54/74154	4-line to 16-line decoder/demultiplexer	*	*	-	-
54/74155	dual 2-line to 4-line decoder/demultiplexer	*	*	-	-
54/74156	dual 2-line to 4-line decoder/demultiplexer (open collector)	*	*	-	-
54/74157	quad 2-input data selector/multiplexer; non-inverting	*	*	*	*
54/74158	quad 2-input data selector/multiplexer; inverting	*	*	*	*
54/74251	8-line to 1-line multiplexer (3-state)	-	-	*	P
54/74251A	8-line to 1-line multiplexer (3-state)	-	*	-	-
54/74253	dual 4-line to 1-line multiplexer (3-state)	-	*	*	-
54/74257	quad 2-line to 1-line data selector/multiplexer (3-state)	-	-	*	*
54/74257A	quad 2-line to 1-line data selector/multiplexer (3-state)	-	*	-	-
54/74258	quad 2-line to 1-line data selector/multiplexer (3-state)	-	-	*	*
54/74258A	quad 2-line to 1-line data selector/multiplexer (3-state)	-	*	-	-
54/74298	quad 2-port register	*	*	-	-

P = planned

TTL 54/74 SERIES

		STD	LS	S	F
Arithmetic units					
54/7483	4-bit binary full adder (ripple carry)	*	-	-	-
54/7483A	4-bit binary full adder (fast carry)	-	*	-	-
54/7485	4-bit magnitude comparator	*	*	*	P
54/74180	8-bit odd/even parity generator/checker	*	-	-	-
54/74181	4-bit arithmetic logic unit	*	*	*	P
54/74182	look-ahead carry generator	-	-	*	-
54/74280	9-bit odd/even parity generator/checker	-	-	*	-
54/74280A	9-bit odd/even parity generator/checker	-	-	-	*
54/74283	4-bit full adder with fast carry	-	*	-	-
54/74350	4-bit shifter (3-state)	-	-	*	*
54/74521	8-bit identify comparator	-	-	-	*
Memories					
54/74189	64-bit bipolar scratchpad memory (16x4)	-	-	*	-
54 74301	256-bit TTL RAM (256x1)	-	*	*	-

P = planned

TTL 8200, 9300 AND 9600 SERIES

Arithmetic units

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

Counters

8280	presetable decade counter
8281	presetable binary counter
9310	4-bit decade counter
9316	4-bit binary counter

Decoders/display drivers

8250	binary-to-octal decoder
82S50	binary-to-octal decoder
82S52	BCD-to-decimal decoder
9301	BCD-to-decimal decoder

Flip-flops

9602	dual monostable multivibrator
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Multiplexers

8230	8-input digital multiplexer
8233	2-input, 4-bit digital multiplexer
8234	2-input, 4-bit digital multiplexer
8266	2-input, 4-bit digital multiplexer
9309	dual 4-input multiplexer
9312	8-input digital multiplexer
9322	data selector/multiplexer

Parity functions

8242	quad EXCLUSIVE-NOR gate
82S42	quad EXCLUSIVE-NOR gate
8262	8-bit parity generator and checker
82S62	8-bit parity generator and checker
9324	5-bit comparator

Registers/latches

8202	10-bit buffer/register
8271	4-bit shift register
82S71	4-bit shift register
8273	10-bit serial-in/parallel-out shift register
8274	10-bit parallel-in/serial-out shift register
8277	dual 8-bit shift register

9300	4-bit shift register
9334	8-bit addressable latch

TTL 8T00 SERIES**Translators/buffers**

8T80	quad 2-input NAND gate (high voltage)
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Timing circuits

8T20	bidirectional one shot
8T22	retriggerable monostable multivibrator

Line drivers/receivers/transceivers

8T09	quad 3-state bus driver
8T10	quad 3-state D-type bus latch
8T13	dual low impedance line driver
8T14	triple line receiver/Schmitt trigger
8T15	dual communications line driver
8T16	dual communications line receiver
8T23	dual IBM 360/370 line driver
8T24	triple IBM 360/370 line receiver
8T25	dual MOS to TTL interface
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)
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

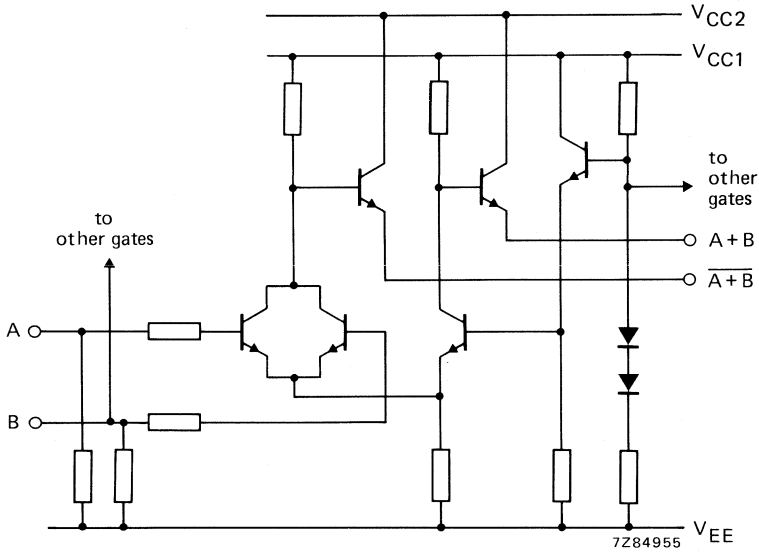
Decoders/drivers

8T04	7-segment decoder display driver (active-LOW outputs)
8T05	7-segment decoder display driver (active-HIGH outputs)
8T06	7-segment decoder display driver (active-LOW outputs)

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 +125 °C



D.C. family characteristics

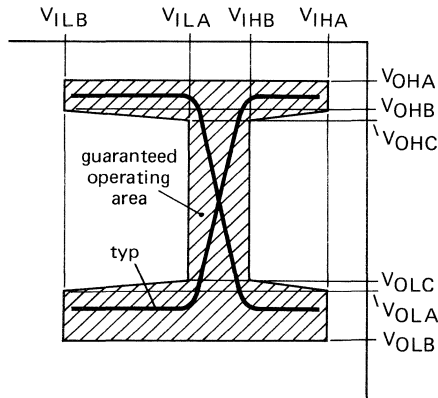
$V_{CC} = \text{ground}$; $V_{EE} = -5,2 \text{ V}$; $R_L = 50 \text{ Ohm to } -2 \text{ V}$

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	+ 75	°C
V_{IHA}	-890	-810	-700	mV
V_{IHB}	-1205	-1105	-1035	mV
V_{ILA}	-1500	-1475	-1440	mV
V_{ILB}	-1890	-1850	-1825	mV

7Z55963.2



parameter	symbol	T_{amb}			unit	conditions
		-30 °C	+ 25 °C	+ 75 °C		
Output voltage HIGH	V_{OHA}	-890	-810	-700	mV	inputs at V_{IHA}
	V_{OHB}	-1060	-960	-890	mV	
Output voltage LOW	V_{OLA}	-1625	-1650	-1615	mV	inputs at V_{ILB}
	V_{OLB}	-1890	-1850	-1825	mV	
Output threshold voltage HIGH	V_{OHC}	-1080	-980	-960	mV	inputs at V_{IHB}
Output threshold voltage LOW	V_{OLC}	-1655	-1630	-1595	mV	inputs at V_{ILA}

Type numbers have a suffix which signifies the type of package:

P = plastic DIL; D = ceramic (cerdip) DIL

ECL 10 000 FAMILY

Gates

10100	quadruple 2-input NOR gate and 1 common input
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 4-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 2-input 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

Interfaces

10112	dual 3-input/3-output (1 OR and 2 NOR) line driver
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
10216	high speed triple differential OR/NOR line receiver

Flip-flops

10130	clocked 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

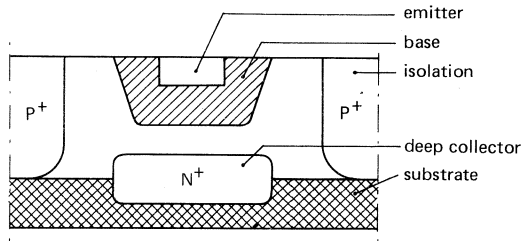
10136	universal hexadecimal counter
10137	universal decade counter
10141	4-bit universal shift register

Complex

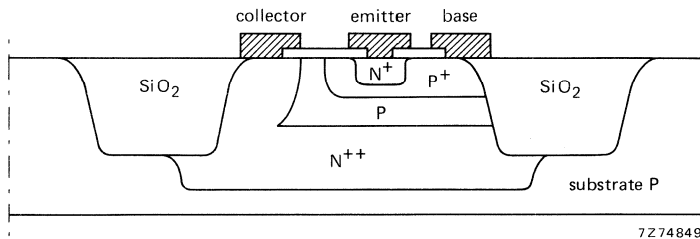
10132	dual 2-input multiplexer with clocked D-type latches and common reset
10134	dual 2-input multiplexer with clocked D-type latches
10158	quadruple 2-to-1 multiplexer (non-inverting)
10159	quadruple 2-to-1 multiplexer (inverting)
10160	12-bit parity checker/generator
10161	3-bit decoder with two enable 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	
Transistor area	3000	700	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 -4,5 V
Output current	I _O max. 55 mA
Storage temperature range	T _{stg} -55 to +125 °C

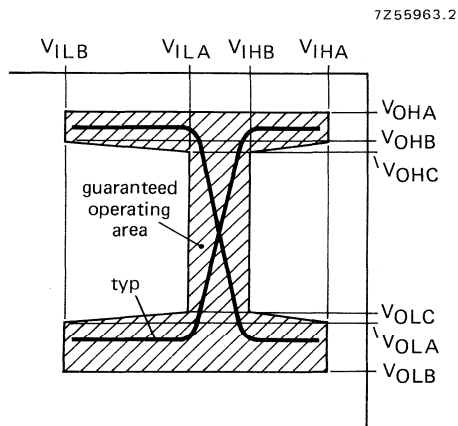
D.C. family characteristics

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**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 double 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
100122	9-bit buffer gate
100126	9-bit buffer gate

Driver

100123	hex bus driver
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Interface

100114	quintuple differential line receiver
100175	5-bit 100K to 10K interface with latch
100255	5-bit bidirectional ECL/TTL interface

Flip-flops

100131	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
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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

100156	mask-merge selector
100160	dual 9-bit parity generator/8-bit comparator
100165	universal priority encoder
100166	9-bit comparator
100170	universal decoder
100180	fast 6-bit adder
100181	4-bit ALU binary/decimal

BIPOLAR TTL RAM

device	organization	output circuit note 1	output logic note 2	access time (ns)	temp. range note 3	package	no. of pins	max. I_{CC} (mA)
3101A	16x4	OC	B	35	C	F,N	16	105
74S189	16x4	TS	B	35	C	F,N	16	110
54				50	M	F,W		110
82S21	32x2	OC	T	50	C	F,N	16	130
82S16	256x1	TS	T	50	C	F,N	16	115
				70	M	F,R		120
82S17	256x1	OC	T	50	C	F,N	16	115
				70	M	F,R		120
74S301	256x1	OC	B	50	C	F,N	16	115
54				70	M	F,R		120
82LS16	256x1	TS	T	40	C	F,N	16	70
				70	M	F,W		100
82LS17	256x1	OC	T	40	C	F,N	16	70
				70	M	F,W		100
74LS301	256x1	OC	B	40	C	F,N	16	70
54				70	M	F,W		100
82S09	64x9	OC	T	45	C	I,N	28	190
				80	M	I,R		200
82S19	64x9	OC	B	35	C	I,N	28	190
				60	M	I,R		200
82S210	256x9	TS	B	60	C	F,N	24	185
				90	M	F		200
82S212	256x9	TS	B	45	C	F,N	24	185
				70	M	F		200
8X350	256x8	TS	B	N/A	C	F,N	22	185
				N/A	M	F		200

Notes

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

BIPOLAR TTL PROM

device	organization	output circuit note 1	access time (ns)	temp. range note 2	package	no. of pins	max. I _{CC} (mA)
82S23	32x8	OC	50 65	C M	F,N F,W	16	77 85
82S123	32x8	TS	50 65	C M	F,N F,W	16	77 85
82S126	256x4	OC	50 70	C M	F,N F,R	16	120 125
82S129	256x4	TS	50 70	C M	F,N F,R	16	120 125
82S130	512x4	OC	50 70	C M	F,N F,R	16	140 140
82S131	512x4	TS	50 70	C M	F,N F,R	16	140 140
82S115	512x8	TS	60 90	C M	F,N F,R	24	175 185
82S140	512x8	OC	60	C	F,N	24	175
82S141	512x8	TS	60 90	C M	F,N F,R	24	175 185
82S137	1024x4	TS	60 80	M,C M	F,N F	18	140 150
82HS137	1024x4	TS	45 70	C M	F,N F	18	140 150
82HS137A	1024x4	TS	35	C	F,N	18	140
82S147	512x8	TS	60 75	C M	F,N F	16	155 165
82HS147	512x8	TS	45	C	F,N	20	155
82LS181	1024x8	TS	150	C	F,N	24	80
82S180	1024x8	OC	70	C	F,N	24	175
82S181	1024x8	TS	70 90	C M	F,N F,R,G	24	175 185
82HS181	1024x8	TS	50 80	C M	F,N F,R,G	24	175 185
82HS181A	1024x8	TS	45	C	F,N	24	175
82S183	1024x8	TS	60 90	C M	F,N F,R,G	24	175 185
82S2708	1024x8	TS	90	M	F,R,G	24	185
82S185	2048x4	TS	100 115	C M	I,N I	18	120 130
82HS185	2048x4	TS	50 80	C M	F,N F	18	155 160
82HS185A	2048x4	TS	45	C	F,N	18	155
82S191	2048x8	TS	80 100	C M	F,N F,R,G	24	175 185
82HS191	2048x8	TS	60 80	M,C M	F,N F,R,G	24	175 185
82HS195	4096x4	TS	35 50	C M	F,N F	20	155 165
82S321	4096x8	TS	80	C	F,N	24	175

Notes

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

BIPOLAR ECL RAM

10415; A; B/100415; A; B	1024x1-bit RAM
10422; A; B/100422; A; B	256x4-bit RAM
10470; A/100470; A	4096x1-bit RAM
10474; A/100474; A	1024x4-bit RAM

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

SBB2616	16 384-bit static ROM (2048x8)
SBB2632	32 768-bit static ROM (4096x8) (2532 pin compatible)
SBB2633	32 768-bit static ROM (4096x8) (2732 pin compatible)
SBB2664	65 536-bit static ROM (8192x8)

All parts offer 300 ns to 450 ns access times;
2 TTL loads for outputs; programmable chip selects;
3-state power supplies; fully TTL compatible.

SBB23128	131 072-bit static ROM (16 384x8)
SBB23256A	262 144-bit static ROM (32 768x8)

NMOS RAM

SBB2016-1	2048x8-bit static RAM; max. access time 150 ns
SBB2016-2	2048x8-bit static RAM; max. access time 200 ns
SBB2114-20	1024x4-bit static RAM; max. access time 200 ns
SBB2114-25	1024x4-bit static RAM; max. access time 250 ns
SBB2114-30	1024x4-bit static RAM; max. access time 300 ns
SBB2114-45	1024x4-bit static RAM; max. access time 450 ns
SBB2114L-20	1024x4-bit static RAM; max. access time 200 ns; low power version
SBB2114L-25	1024x4-bit static RAM; max. access time 250 ns; low power version
SBB2114L-30	1024x4-bit static RAM; max. access time 300 ns; low power version
SBB2114L-45	1024x4-bit static RAM; max. access time 450 ns; low power version

CMOS RAM

PCD8571	128x8-bit static RAM with I ² C bus interface
PCD5101	256x4-bit static RAM
PCD5114	1024x4-bit static RAM

Bipolar: see chapter Microprocessors
MOS: see chapter Microprocessors

PERIPHERAL INTERFACES

*DS8820/8820A	dual differential line receiver
*DS8830	dual differential line receiver
MC1488	quad line driver
MC1489/1489A	quad line receiver
NE590	addressable peripheral drivers
NE591	addressable peripheral drivers
NE5090	addressable relay driver
NE5520	LVDI 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

DAC-08	series 8-bit 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}
NE/SE5034	8-bit general purpose A/D converter
NE/SE5036	8-bit A/D converter (serial output)
NE/SE5037	6-bit A/D converter (parallel outputs)
TDA1540D;P	14-bit D/A converter with 85 dB S/N ratio, 1/2 LSB accuracy

OP AMPS

LF355	high performance JFET input op amp
LF356	high performance JFET input op amp
*LM124/224/324	general purpose single supply quad op amp
*LM158/258/358	dual low power op amp
LM301A	high performance op amp
LM13600/13600A	dual transconductance amp

* Available with military processing

*MC1456/1556	high performance 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/SE535	single high slew rate 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/SE5530	dual high slew rate op 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/SE5538	dual high slew rate op amp
NE/SE5539	ultra high frequency op amp
TCA220; A	triple high-output current op amp
TCA520B; D	low-power/low-voltage op amp
TEA1016	dual op amp and high-speed comparator
* μ A741/741C	general purpose op amp
* μ A747/747C	dual op amp
* μ A748/748C	general purpose op amp

MONOLITHIC 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

PHASE LOCKED LOOPS

*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

* Available with military processing

TRANSISTOR ARRAYS

CA3046	five-transistor array
CA3081	seven-transistor array; common emitter
CA3082	seven-transistor array; common collector
CA3183	high voltage five-transistor array
ULN2001/3/4	high-voltage/high current Darlington transistor array

CMOS LCD DRIVERS

PCE2100	LCD duplex driver; 40 segments
PCE2110	LCD duplex driver; 60 segments and 2 LEDs
PCE2111	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

BIPOLAR DISPLAY DRIVERS

NE582-1	hex universal driver
NE587/589	LED decoder/driver
NE/SA594	vacuum fluorescent display driver

CMOS CLOCK TIMERS

SAF3019	clock/timer with serial I/O
PCB8573	clock/calendar with serial I/O; I ² C bus interface

NMOS A/D AND D/A CONVERTERS

PNA7506	6-bit/20MHz analogue-to-digital (A/D) converter
PNA7518	8-bit/20MHz digital-to-analogue (D/A) converter

BIPOLAR ECL MISCELLANEOUS

220-384	4-byte multiplexer
220-402	4-byte comparator and multiplexer
231-101	16 lines to 8 lines high level connection matrix; 100K compatible
23-101	16 lines to 8 lines high level connection matrix; 10K compatible
SAA1059	divider-by-32/33
SAA1090T	signal regenerator
SAB1009B	wideband limiting amplifier
SAB1018	sensitive 950 MHz divider-by-256
SAB1034P	1,05 GHz divider-by-4
SAB1077	sensitive 1 GHz divider-by-248/256
SAB1078	600 MHz divider-by-10/11
SAB1164	sensitive 1 GHz divider-by-64
SAB1165	sensitive 1 GHz divider-by-64
SAB1256	sensitive 1 GHz divider-by-256
SAB1534P	1,5 GHz divider-by-4
SAB3064	display driver
SAF1034E	1,05 GHz divider-by-4
SAF1534E	1,5 GHz divider-by-4

AM CHANNELS

TDA1072	AM receiver circuit
TDA1072A	AM receiver circuit
TEA5550	AM car radio receiver circuit
TEA5570	AM/FM radio receiver circuit

FM CHANNELS

TDA1571	balanced mixer/modulator/demodulator
TDA1576	FM/IF amplifier
TDA1576A	FM/IF amplifier
TEA5560	FM/IF system
TEA5570	AM/FM radio receiver circuit
TEA6000	FM/IF system and microcomputer-based tuning interface

AM/FM COMBINED CHANNELS

TBA570A	AM/FM radio receiver circuit
TBA570AQ	AM/FM radio receiver circuit
TDA1571	balanced mixer/modulator/demodulator
TDA5700	AM/FM radio receiver circuit
TDA5700Q	AM/FM radio receiver circuit
TEA5570	AM/FM radio receiver circuit

STEREO DECODERS

TDA1005A;AT	frequency multiplex PLL stereo decoder
TDA1578A	time multiplex PLL stereo decoder
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

SAA1057	radio tuning PLL frequency synthesizer
SAA1300	tuner switching circuit
TDA1574	integrated FM tuner for radio receivers
TDA1580	automatic tuning circuit
TDA1584	memory converter for 4 presets

D.C. CONTROLLED AUDIO CIRCUITS

TCA730A	d.c. volume and balance stereo control circuit
TCA740A	d.c. treble and bass stereo control circuit
TDA1028	signal-sources switch (2 x four channels)
TDA1029	signal-sources switch (4 x two channels)
TDA1074A	dual tandem electronic potentiometer circuit
TDA1524	stereo-tone/volume control circuit
TDA1527	signal sources switch
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
TDA1011A	2 to 6 W audio power amplifier with inverted input/output
TDA1013A	4 W audio power amplifier with d.c. volume control
TDA1015	1 to 4 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
TDA1512A	12 to 20 W hi-fi audio power amplifier
TDA1512Q	12 to 20 W hi-fi audio power amplifier
TDA1515	24 W BTL or 2x12 W stereo car radio power amplifier
TDA1520; A	20 W hi-fi audio power amplifier
TDA2611A	5 W audio power amplifier

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

MOTOR SPEED CONTROL CIRCUITS

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
TDA1594	display/driver circuit for 11 LEDs

RADIO CIRCUITS

TDA7000 FM radio circuit (in plastic DIL-18)
TDA7010T FM radio circuit (in SO-16 plastic mini-pack)

COMPACT DISC DIGITAL AUDIO SYSTEM CIRCUITS

SAA7000 interpolation and muting circuit
SAA7010 demodulator
SAA7011 demodulator
SAA7020 error corrector
SAA7030 digital filter

MISCELLANEOUS

CA3089 FM/IF system
CA3189 FM/IF system

LM387 dual low-noise preamplifier
LM1870 stereo demodulator with blend

MC1496/1596 balanced modulator/demodulator

NE645/646* Dolby noise reduction circuit
NE648/649* low voltage Dolby noise reduction circuit
NE650* Dolby B/C type noise reduction circuit
NE5044 programmable 7-channel RC encoder
NE5045 7-channel RC decoder
NE5046 2-channel RC decoder

OM200/S2 integrated amplifier for use in hearing aids

TAA263 low-level amplifier
TAA320 integrated MOST amplifier
TAA320A integrated MOST level sensor

TDA1008 gating/frequency divider for electronic musical instruments
TDA1540D;P 14-bit DAC with 85 dB S/N ratio
TDA1589 traffic control messages and warning tone 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

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
TBA540Q	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
TDA2501	PAL/NTSC encoder
TDA2510	chrominance combination
TDA2510Q	chrominance combination
TDA2520	colour demodulator combination
TDA2520Q	colour demodulator combination
TDA2522	colour demodulator combination
TDA2522Q	colour demodulator combination
TDA2523	colour demodulator combination
TDA2523Q	colour demodulator combination
TDA2524	colour demodulator combination
TDA2525	colour demodulator combination
TDA2530	RGB matrix preamplifier
TDA2530Q	RGB matrix preamplifier
TDA2532	RGB matrix preamplifier
TDA2532Q	RGB matrix preamplifier
TDA2560	luminance and chrominance control combination
TDA2560Q	luminance and chrominance control combination
TDA3500	video control combination
TDA3501	video control combination
TDA3505	video control combination with automatic cut-off control
TDA3510	PAL decoder
TDA3520	SECAM decoder
TDA3530	SECAM 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
TDA3566	PAL/NTSC decoder
TDA3567	NTSC decoder
TDA3570	NTSC decoder
TDA3590	SECAM processor circuit
TDA3590A	SECAM processor circuit (improved TDA3590)
TDA3591	SECAM processor circuit
TDA3591A	SECAM processor circuit
TDA3592	SECAM/PAL transcoder
TDA4510	PAL decoder
TDA4530	SECAM decoder
TDA4550	multi-standard decoder
TDA4560	colour transient improvement circuit

VERTICAL DEFLECTION CIRCUITS

TDA2652	vertical deflection circuit; 20AX; 30AX
TDA2653	vertical deflection circuit; PIL-S4; 30AX
TDA2653A	vertical deflection circuit; PIL-S4; 30AX
TDA2654	vertical deflection circuit; monochrome, 110°; tiny-vision colour, 90°
TDA2655A	vertical deflection circuit; colour, 90°
TDA2655B	vertical deflection circuit; colour and monochrome, 90°
TDA3650	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 protection
TDA3653A	vertical deflection circuit
TDA3654	vertical deflection circuit with +60 V protection

SYNC PROCESSORS; HORIZONTAL; VERTICAL

TBA720A	horizontal oscillator circuit
TBA720AQ	horizontal oscillator circuit
TBA890	signal processing circuit
TBA890Q	signal processing circuit
TBA920	horizontal combination
TBA920Q	horizontal combination
TBA920S	horizontal combination
TDA2571A	horizontal synchronization and vertical 625 divider system
TDA2571AQ	horizontal synchronization and vertical 625 divider system
TDA2575A	horizontal synchronization and vertical 625 divider system
TDA2575AQ	horizontal synchronization and vertical 625 divider system
TDA2576A	horizontal oscillator combination with vertical 625 divider system
TDA2577A	synchronization circuit with vertical oscillator and driver stages
TDA2578A	synchronization circuit with vertical oscillator and driver stages
TDA2579	signal processor
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
TDA3576	sync combination with transmitter identification and vertical 625 divider system
TDA3576B	sync combination with transmitter identification and vertical 625 divider system

SOUND CIRCUITS

TBA120U	sound i.f. amplifier/demodulator for TV
TBA750C	limiter/amplifier
TBA750CQ	limiter/amplifier
TDA1028	signal sources switch (2 x four channels)
TDA1029	signal sources switch (4 x two channels)
TDA1038	sound i.f. for French standard
TDA1512	12 to 20 W hi-fi audio power amplifier
TDA1512Q	12 to 20 W hi-fi audio power amplifier
TDA1520; A	20 W hi-fi audio power amplifier
TDA1524	stereo-tone/volume control circuit
TDA2543	AM sound i.f. circuit for French standard
TDA2545	quasi-split-sound circuit
TDA2545A	quasi-split-sound circuit
TDA2546	quasi-split-sound circuit with 5,5 MHz demodulation
TDA2546A	quasi-split-sound circuit with 5,5 MHz demodulation
TDA2611A	5 W audio power amplifier
TDA2791	TV sound combination; volume, treble, bass
TDA2795	TV stereo/dual sound identification decoder
TDA3800; A	stereo/dual TV sound processing circuit
TDA3800G; GS	stereo/dual TV sound processing circuit
TDA3800S; AS	stereo/dual TV sound processing circuit
TDA3803	stereo/dual sound processing circuit
TDA3805S	stereo/dual sound decoder circuit
TDA3810	spatial, stereo and pseudo-stereo sound circuit

VIDEO RECORDER CIRCUITS

TDA0820T	double balanced modulator/demodulator
TDA2502	tacho controller
TDA2503	track sensing amplifier
TDA2504	FM modem
TDA2721	colour sub-carrier oscillator and mixer
TDA2730	FM limiter/demodulator
TDA2740	amplifier and drop-out identification circuit
TDA3700A	PAL synchronization processor
TDA3701	PAL synchronization processor
TDA3710	chrominance signal/mixer
TDA3720T	SECAM processor
TDA3730	frequency demodulator and drop out compensator
TDA3740	video processor/frequency modulator
TDA3771	video processor
TDA3780	frequency modulator
TDA5010	VCR tape-end detector

TDA5020 VCR actuators driver
TDA5030 mixer/oscillator for UHF tuner

VIDEO CAMERAS

SAA1043 universal sync generator
SAA1044 subcarrier coupling circuit

VIDEO AMPLIFIERS

NE/SE592 differential video amp
 μ A733/733C differential video amp

MISCELLANEOUS

SAA5030 videotex/video processor

TDA0820T double balanced modulator/demodulator
TDA1082 east-west correction driver circuit
TDA2581 control circuit for SMPS
TDA2581Q control circuit for SMPS
TDA2582 control circuit for PPS
TDA2582Q control circuit for PPS
TDA2640 SMPS drive circuit
TDA2640Q SMPS drive circuit
TDA3047 infrared receiver
TDA3048 infrared receiver
TDA4500 small signal combination IC for monochrome TV
TDA4501 black-and-white, sandcastle and sound IC
TDA4502 black-and-white and sandcastle IC
TDA4503 small signal combination IC for monochrome TV
TDA4505 RGB back-end

TEA1002 PAL colour encoder and video summer

DEDICATED FUNCTIONS DIG SYST - RADIO/AUDIO/VIDEO

REMOTE CONTROL SYSTEMS

For general purpose applications

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

For simple and middle class TV receivers

SAA5000A remote control transmitter encoder
SAA5012 remote control receiver decoder

For sophisticated radio and video systems

SAA1082P remote control transmitter for infrared operation
SAA3004 remote control transmitter for infrared operation
SAA3006 low voltage infrared remote control transmitter (RC-5)
SAA3027 infrared remote control transmitter (RC-5)
SAA3028 infrared remote control transcoder (RC-5); I²C bus compatible

SAB3021 remote or local transmitter/encoder (128 commands)
SAB3022;C receiver and analogue memory
SAB3023;B;E receiver and analogue memory

TDA3047 infrared receiver
TDA3048 infrared receiver

TDB2033 preamplifier for infrared remote control transmission

VIDEO TUNING SYSTEM (VTS)

Control systems

MAB8021 single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
MAB8035HL single-chip 8-bit microcontroller; ROM-less version of MAB8048
MAB8041A single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
MAB8048H single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
MAB8049H single-chip 8-bit microcontroller; 2Kx8 ROM, 128x8 RAM
MAB8050H single-chip 8-bit microcontroller; 4Kx8 ROM, 256x8 RAM
MAB8051 single-chip 8-bit microcontroller; 4Kx8 ROM, 128x8 RAM
MAB8400B single-chip 8-bit microcontroller; 128 RAM bytes ("Piggy-back" version); 28-lead "Piggy-back" package, up to 28-lead EPROM on top
MAB8400F single-chip 8-bit microcontroller; bond-out version in a 56-lead flat-pack leadless chip carrier (VO-62); 128 RAM bytes and drive of 8K bytes of ROM
MAB8410 single-chip 8-bit microcontroller; 1K ROM/64 RAM bytes
MAB8420 single-chip 8-bit microcontroller; 2K ROM/64 RAM bytes
MAB8421 single-chip 8-bit microcontroller; 2K ROM/64 RAM bytes; LED-driver
MAB8440 single-chip 8-bit microcontroller; 4K ROM/128 RAM bytes
PCB80C48 single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
PCB80C49 single-chip 8-bit microcontroller; 2Kx8 ROM, 128x8 RAM
PCB80C50 single-chip 8-bit microcontroller; 4Kx8 ROM, 256x8 RAM
SAB3021 remote or local transmitter/encoder (128 commands)
TDB2033 preamplifier for infrared remote control transmission

DEDICATED FUNCTIONS DIG SYST - RADIO/AUDIO/VIDEO

Tuning systems

SAB1009B	wide-band limiting amplifier
SAB1018	sensitive 950 MHz divider-by-256
SAB1164	sensitive 1 GHz divider-by-64
SAB1165	sensitive 1 GHz divider-by-64
SAB1256	sensitive 1 GHz divider-by-256
SAB3013	computer controlled analogue memory providing 6 analogue functions
SAB3024	computer interface for tuning systems (CITUS)
SAB3034	analogue and tuning circuit (A & T)
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

Display systems

SAA1060	LED display/interface circuit
SAA1061	output port expander

Additional optional circuits

SAF3019	clock/timer with serial I/O; microcontroller controlled
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TEXT DECODER SYSTEMS

Teletext decoder ICs

SAA5020	teletext timing chain circuit (625 lines)
SAA5025A	teletext timing chain circuit for USA 525 line system (USTIC); 40 characters per row, 20 rows
SAA5025B	teletext timing chain circuit for USA 525 line system (USTIC); 40 characters per row, 24 rows
SAA5030	teletext video processor
SAA5040;A;B;C	teletext acquisition and control circuit
SAA5041;42;43	teletext acquisition and control circuit
SAA5050	teletext character generator (English, 625 lines)
SAA5051	teletext character generator (German, 625 lines)
SAA5052	teletext character generator (Swedish, 625 lines)
SAA5053	teletext character generator (Italian, 625 lines)
SAA5054	teletext character generator (Belgian, 625 lines)
SAA5055	teletext character generator (US ASCII, 525 lines)
SAA5056	teletext character generator (Hebrew, 625 lines)
SAA5057	teletext character generator (Cyrillic, 625 lines)

Antiope decoder ICs

SAA5120	antiope timing chain circuit (French, 625 lines)
SAA5125	antiope timing chain circuit (USA, 525 lines)
SAA5150	antiope character generator (AROM) for French character set
SAA5151	antiope character generator (AROM) for European character set
SAA5155	antiope character generator for USA 525 line system (US-AROM)

DEDICATED FUNCTIONS · DIG SYST - RADIO/AUDIO/VIDEO

Interactive videotex

MAB8021	single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
MAB8035HL	single-chip 8-bit microcontroller; ROM-less version of MAB8048
MAB8041A	single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
MAB8048H	single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
MAB8049H	single-chip 8-bit microcontroller; 2Kx8 ROM, 128x8 RAM
MAB8050H	single-chip 8-bit microcontroller; 4Kx8 ROM, 256x8 RAM
MAB8051	single-chip 8-bit microcontroller; 4Kx8 ROM, 128x8 RAM
MAB8400B	single-chip 8-bit microcontroller; 128 RAM bytes ("Piggy-back" version); 28-lead "Piggy-back" package with up to 28-lead EPROM on top
MAB8400F	single-chip 8-bit microcontroller; bond-out version in a 56-lead flat-pack leadless chip carrier (VO-62); 128 RAM bytes and drive of 8K bytes of ROM
MAB8410	single-chip 8-bit microcontroller; 1K ROM/64 RAM bytes
MAB8420	single-chip 8-bit microcontroller; 2K ROM/64 RAM bytes
MAB8421	single-chip 8-bit microcontroller; 2K ROM/64 RAM bytes; LED-driver
MAB8440	single-chip 8-bit microcontroller; 4K ROM/128 RAM bytes
PCB80C48	single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
PCB80C49	single-chip 8-bit microcontroller; 2Kx8 ROM, 128x8 RAM
PCB80C50	single-chip 8-bit microcontroller; 4Kx8 ROM, 256x8 RAM
SAA5020	timing chain circuit (625 lines)
SAA5025A	timing chain circuit for USA 525 line system (USTIC); 40 characters per row, 20 rows
SAA5025B	timing chain circuit for USA 525 line system (USTIC); 40 characters per row, 24 rows
SAA5050	character generator (English, 625 lines)
SAA5051	character generator (German, 625 lines)
SAA5052	character generator (Swedish, 625 lines)
SAA5053	character generator (Italian, 625 lines)
SAA5054	character generator (Belgian, 625 lines)
SAA5055	character generator (US ASCII, 525 lines)
SAA5056	character generator (Hebrew, 625 lines)
SAA5057	character generator (Cyrillic, 625 lines)
SAA5070	microcontroller/microprocessor peripheral IC for viewdata (LUCY)
SAA5120	antiope timing chain circuit (French, 625 lines)
SAA5125	antiope timing chain circuit for USA 525 line system
SAA5150	antiope character generator (AROM) for French character set
SAA5151	antiope character generator (AROM) for European character set
SAA5155	antiope character generator for USA 525 line system (US-AROM)

DEDICATED FUNCTIONS DIG SYST - RADIO/AUDIO/VIDEO

RADIO TUNING SYSTEM (RTS)

Tuning, display and control ICs

MAB8021	single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
MAB8035HL	single-chip 8-bit microcontroller; ROM-less version of MAB8048
MAB8041A	single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
MAB8048H	single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
MAB8049H	single-chip 8-bit microcontroller; 2Kx8 ROM, 128x8 RAM
MAB8050H	single-chip 8-bit microcontroller; 4Kx8 ROM, 256x8 RAM
MAB8051	single-chip 8-bit microcontroller; 4Kx8 ROM, 128x8 RAM
MAB8400B	single-chip 8-bit microcontroller; 128 RAM bytes ("Piggy-back" version); 28-lead "Piggy-back" package with up to 28-lead EPROM on top
MAB8400F	single-chip 8-bit microcontroller; bond-out version in a 56-lead flat-pack leadless chip carrier (VO-62); 128 RAM bytes and drive of 8K bytes of ROM
MAB8410	single-chip 8-bit microcontroller; 1K ROM/64 RAM bytes
MAB8420	single-chip 8-bit microcontroller; 2K ROM/64 RAM bytes
MAB8421	single-chip 8-bit microcontroller; 2K ROM/64 RAM bytes; LED-driver
MAB8440	single-chip 8-bit microcontroller; 4K ROM/128 RAM bytes
PCB80C48	single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
PCB80C49	single-chip 8-bit microcontroller; 2Kx8 ROM, 128x8 RAM
PCB80C50	single-chip 8-bit microcontroller; 4Kx8 ROM, 256x8 RAM
PCE2100	LCD duplex driver; 40 segments
PCE2110	LCD duplex driver; 60 segments and 2 LEDs
PCE2111	LCD duplex driver; 64 segments
PCF2112	LCD driver; 32 segments
SAA1056P	PLL frequency synthesizer
SAA1057	radio tuning PLL frequency synthesizer (SYMO II)
SAA1060	LED display/interface circuit
SAA1061	output port expander
SAA1062A;AT	LCD display/interface circuit
SAA1300	tuner switching unit

FREQUENCY MEASUREMENT AND DISPLAY SYSTEM

SAA1070	display interface and frequency counter
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DEDICATED FUNCTIONS DIG SYST - RADIO/AUDIO/VIDEO

MICROCONTROLLERS

MAB8021	single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
MAB8035HL	single-chip 8-bit microcontroller; ROM-less version of MAB8048
MAB8041A	single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
MAB8048H	single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
MAB8049H	single-chip 8-bit microcontroller; 2Kx8 ROM, 128x8 RAM
MAB8050H	single-chip 8-bit microcontroller; 4Kx8 ROM, 256x8 RAM
MAB8051	single-chip 8-bit microcontroller; 4Kx8 ROM, 128x8 RAM
MAB8400B	single-chip 8-bit microcontroller; 128 RAM bytes ("Piggy-back" version); 28-lead "Piggy-back" package with up to 28-lead EPROM on top
MAB8400F	single-chip 8-bit microcontroller; bond-out version in a 56-lead flat-pack leadless chip carrier (VO-62); 128 RAM bytes and drive of 8K bytes of ROM
MAB8410	single-chip 8-bit microcontroller; 1K ROM/64 RAM bytes
MAB8420	single-chip 8-bit microcontroller; 2K ROM/64 RAM bytes
MAB8421	single-chip 8-bit microcontroller; 2K ROM/64 RAM bytes; LED-driver
MAB8440	single-chip 8-bit microcontroller; 4K ROM/128 RAM bytes
PCB80C48	single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
PCB80C49	single-chip 8-bit microcontroller; 2Kx8 ROM, 128x8 RAM
PCB80C50	single-chip 8-bit microcontroller; 4Kx8 ROM, 256x8 RAM

MISCELLANEOUS

TEA1002	PAL colour encoder and video summer
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MAB2650A	8-bit Microprocessor
MEA8000	Voice Synthesizer
MEB2621	Universal Sync Generator (USG); PAL systems
MEB2622	Universal Sync Generator (USG); NTSC systems
MEB2636	Programmable Video Interface (PVI)
TEA1002	PAL Colour Encoder and Video Summer
2637	Universal Video Interface (UVI)

BIPOLAR INTEGRATED CIRCUITS FOR TELEPHONE SUBSCRIBER SETS**DTMF diallers with line interface**

TDA1077	DTMF generator for telephone dialling
TEA1021P;D	DTMF generator for telephone dialling
TEA1043P;D	DTMF generator for telephone dialling
TEA1044P;D	DTMF generator for telephone dialling

Speech/transmission circuits

TEA1042	telephone transmission circuit for handsfree loudspeaking
TEA1053	telephone transmission circuit
TEA1054	telephone transmission circuit
TEA1055	telephone transmission circuit
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
TEA1062	versatile telephone transmission circuit; for dynamic and magnetic microphones
TEA1063	versatile telephone transmission circuit; for piezoelectric and electret microphones

DTMF/speech transmission combination

TEA1046	DTMF/speech transmission IC for telephone applications
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Miscellaneous bipolar ICs

TBA915G	audio amplifier
TCA980G	microphone amplifier

CMOS INTEGRATED CIRCUITS FOR TELEPHONE SUBSCRIBER SETS**Pulse diallers with redial**

PCD3310	pulse/DTMF dialler 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
PCD3324	interrupted current-loop dialling circuit
PCD3325	interrupted current-loop dialling circuit

Pulse repertory dialler/telephone-set controller

PCD3341	pulse repertory dialler/telephone-set controller
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Microcontroller peripherals (DTMF/MODEM, RAM, LCD, clock)

PCB8573	clock/calendar with serial I/O; I ² C bus interface
PCD3311	DTMF generator/modem generator with I ² C bus interface
PCD3312	DTMF generator/modem generator with I ² C bus interface
PCD8571	128x8-bit static RAM with I ² C bus interface
PCE2111	LCD duplex driver; 64 segments
PCF8577	LCD direct driver (32 segments) or duplex driver (64 segments) with I ² C bus interface

Multi-tone ringer

PCD3360	programmable multi-tone ringer
PCD3361	programmable multi-tone ringer

4-digit clock circuit

MJ123	4-digit/5-function LCD clock circuit
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DIGITAL WATCHES

MJ7	8-digit/6-function LCD watch circuit
MJ11-2	6-digit/6-function LCD watch circuit
MJ123	4-digit/5-function LCD watch circuit
MJ125	4-digit/5-function LCD watch circuit
MJ150	6-digit/6-function LCD watch circuit with alarm
PCA1122	4-digit/5-function LCD watch circuit

ANALOG WATCHES

MB101	32 kHz watch circuit; bipolar motor; $T = 1$ s; $t_p = 7,8$ ms
MB102	32 kHz watch circuit; bipolar motor; $T = 60$ s; $t_p = 7,8$ ms
MB103	32 kHz watch circuit; bipolar motor; $T = 12$ s; $t_p = 7,8$ ms
MB104	32 kHz watch circuit; bipolar motor; $T = 5$ s; $t_p = 7,8$ ms
MB105	32 kHz watch circuit; unipolar motor; $T = 1$ s; $t_p = 3,9$ ms
MB106	32 kHz watch circuit; bipolar motor; $T = 1$ s; $t_p = 23,4$ ms
MB107	32 kHz watch circuit; bipolar motor; $T = 10$ s; $t_p = 7,8$ ms
MB109	32 kHz watch circuit; bipolar motor; $T = 30$ s; $t_p = 7,8$ ms
MB125	32 kHz watch circuit; bipolar motor; $T = 1$ s; $t_p = 3,17$ ms
MB126	32 kHz watch circuit; bipolar motor; $T = 30$ s; $t_p = 3,42$ ms
MB140	32 kHz watch circuit; bipolar motor; $T = 1$ s; $t_p = 13,7$ ms
MB141	32 kHz watch circuit; bipolar motor; $T = 5$ s; $t_p = 13,7$ ms
MB142	32 kHz watch circuit; bipolar motor; $T = 30$ s; $t_p = 23,4$ ms
MB143	32 kHz watch circuit; bipolar motor; $T = 1$ s; $t_p = 9,8$ ms
MB144	32 kHz watch circuit; bipolar motor; $T = 20$ s; $t_p = 7,8$ ms
MB145	32 kHz watch circuit; bipolar motor; $T = 10$ s; $t_p = 3,9$ ms
MB146	32 kHz watch circuit; bipolar motor; $T = 1$ s; $t_p = 3,9$ ms

ANALOG CLOCKS

MB512	4 MHz d.c. alarm clock circuit; bipolar motor; $T = 2$ s; $t_p = 1$ s
MB513	4 MHz a.c. alarm clock circuit; bipolar motor; $T = 2(1)$ s; $t_p = 32$ ms
MB522	4 MHz d.c. alarm clock circuit; bipolar motor; $T = 1$ s; $t_p = 7,8$ ms
MB523	4 MHz a.c. alarm clock circuit; unipolar motor; $T = 1$ s; $t_p = 7,8$ ms
MB531	4 MHz a.c. alarm clock circuit; bipolar motor; $T = 2$ s; $t_p = 1$ s
MB551A	4 MHz a.c. alarm clock circuit; bipolar motor; $T = 1$ s; $t_p = 46,8$ ms
MB551B	4 MHz d.c. alarm clock circuit; bipolar motor; $T = 1$ s; $t_p = 46,8$ ms
MB561	32 kHz a.c. alarm clock circuit; bipolar motor; $T = 2$ s; $t_p = 46,8$ ms
PCA1515	4 MHz a.c. alarm clock circuit; bipolar motor; $T = 2$ s; $t_p = 46,8$ ms
PCA1516	4 MHz a.c. alarm clock circuit; bipolar motor; $T = 2$ s; $t_p = 46,8$ ms
PCA1517	4 MHz a.c. alarm clock circuit; bipolar motor; $T = 2$ s; $t_p = 46,8$ ms
PCA1564	32 kHz a.c. alarm clock circuit; bipolar motor; $T = 2$ s; $t_p = 46,8$ ms
PCA1574	32 kHz a.c. alarm clock circuit; bipolar motor; $T = 2$ s; $t_p = 46,8$ ms
PCA1584	32 kHz a.c. alarm clock circuit; bipolar motor; $T = 2$ s; $t_p = 46,8$ ms (electrically erasable)

CAR CLOCKS

PCF1171	4-digit LCD car clock circuit
PCF1172	3½-digit LCD car clock circuit

MODULATORS

TBA673 ring modulator for telephony and industrial equipment

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

A.F. AMPLIFIERS

TBA915G audio amplifier

TCA210; T audio amplifier
TCA980G microphone amplifier

I.F./A.F. CIRCUITS

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

TDB1080; T i.f. limiting amplifier, FM detector and low distortion a.f. amplifier

CONTROL CIRCUITS FOR SWITCHED-MODE POWER SUPPLIES (SMPS)

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

SG1524,2524,3524 SMPS control circuit

TDA1060; A; B control circuits for SMPS

TEA1039 control circuit for SMPS

μ A723/723C precision voltage regulator

MOTOR DRIVE CIRCUITS

SAA1027 stepping motor drive circuit

SAK150BT servo-motor control circuit

TRANSISTOR ARRAYS

CA3046 five-transistor array
CA3081 seven-transistor array; common emitter
CA3082 seven-transistor array; common collector
CA3183 high voltage five-transistor array

TDA3081 seven-transistor array
TDA3083; D five-transistor array

ULN2001/3/4 high-voltage/high-current Darlington transistor array

BUCKET BRIGADE DELAY LINES (BBD)

TDA1022 512-stage bucket-brigade analogue delay line
TDA1097 1536-stage bucket-brigade analogue delay line

MISCELLANEOUS

NE/SE540	power driver
NE542	dual low-noise preamp
NE544/644	servo amplifier
NE570/571/SA571	analog compandor
NE572	programmable analog compandor
SAA1029	universal industrial logic and interface circuit
TCA440	AM receiver
TDA1432	8-bit multiplying DAC
TDA1540D;P	14-bit DAC with 85 dB S/N ratio
TDA1721	8-bit multiplying DAC
TEA1017	13-bit series-parallel converter and display driver
μA758	FM stereo multiplex decoder; PLL

DEDICATED FUNCTIONS

DOMESTIC APPLIANCES

TCA280A	general-purpose triggering circuit
TDA1023	proportional-control triac triggering circuit
TDA1024	on-off triac triggering circuit
TEA1010; T	touch-controlled lamp dimmer circuit
TEA1058; T	touch-controlled lamp dimmer circuit

DEDICATED FUNCTIONS

DATA COMMUNICATIONS

SCN2651	Programmable Communications Interface (PCI)
SCN2652	Multi-Protocol Communications Controller (MPCC)
SCN2653	Polynomial Generator Checker (PGC)
SCN2661 (N28)	28-pin Enhanced Programmable Communications Interface (EPCI)
SCN2661 (N24)	24-pin Enhanced Programmable Communications Interface (EPCI)
SCN2681	Dual Asynchronous Receiver/Transmitter (DUART)

DEDICATED FUNCTIONS

VIDEO DISPLAY (CRT)

SC2670	Display Character and Graphics Generator (DCGG)
SC2671	Programmable Keyboard & Comm Controller (PKCC)
SC2672	Programmable Video Timing Controller (PVTC)
SC2673	Video Attributes Controller (VAC)
SCB2675	Color/Monochrome Attributes Controller (CMAC)
SCB2677	Video Attributes Controller (VAC)
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
8T33	Addressable I/O Port;8-bit bidirectional,synchronous
8T35	Addressable I/O Port;8-bit bidirectional,asynchronous
8T36	Addressable I/O Port;8-bit bidirectional,asynchronous
8X31	Transparent I/O Port;8-bit bidirectional
8X32	Addressable I/O Port;8-bit bidirectional,synchronous
8X36	Addressable I/O Port;8-bit bidirectional,asynchronous
8X42	Addressable I/O Port;4-in/4-out
8X300	Microcontroller
8X305	Microcontroller
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

I/O modules

PG3100	VMEbus disk controller module
PG3300	VMEbus serial I/O controller module

Target software

PG4000	SIGbug monitor; 27128 EPROM set
PG4100	PSOS 68 K, real time kernel
PG4200	CP/M - 68 K*, single-user general purpose operating system

* CP/M is a registered trademark of Digital Research.

SINGLE-CHIP 8-BIT MICROCONTROLLERS

MAB8021	single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
MAB8035HL	single-chip 8-bit microcontroller; ROM-less version of MAB8048
MAB8041A	single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
MAB8048H	single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
MAB8049H	single-chip 8-bit microcontroller; 2Kx8 ROM, 128x8 RAM
MAB8050H	single-chip 8-bit microcontroller; 4Kx8 ROM, 256x8 RAM
MAB8051	single-chip 8-bit microcontroller; 4Kx8 ROM, 128x8 RAM
MAB8400B	single-chip 8-bit microcontroller; 128 RAM bytes ("Piggy-back" version); 28-lead "Piggy-back" package with up to 28-lead EPROM on top
MAB8400F	single-chip 8-bit microcontroller; bond-out version in a 56-lead flat-pack leadless chip carrier (VO-62); 128 RAM bytes and drive of 8K bytes of ROM
MAB8410	single-chip 8-bit microcontroller; 1K ROM/64 RAM bytes
MAB8420	single-chip 8-bit microcontroller; 2K ROM/64 RAM bytes
MAB8421	single-chip 8-bit microcontroller; 2K ROM/64 RAM bytes; LED-driver
MAB8440	single-chip 8-bit microcontroller; 4K ROM/128 RAM bytes
PCB80C48	single-chip 8-bit microcontroller; 1Kx8 ROM, 64x8 RAM
PCB80C49	single-chip 8-bit microcontroller; 2Kx8 ROM, 128x8 RAM
PCB80C50	single-chip 8-bit microcontroller; 4Kx8 ROM, 256x8 RAM
PCD3340	single-chip 8-bit microcontroller; 3K ROM/224 RAM bytes
PCF8500B	single chip 8-bit microcontroller; 256 RAM bytes ("Piggy-back" version); 28-lead "Piggy-back" package with up to 28-lead EPROM on top
PCF8500F	single-chip 8-bit microcontroller; 256 RAM bytes; 56-lead flat-pack, leadless chip carrier (VO-62)
PCF8520	single-chip 8-bit microcontroller; 2K ROM/96 RAM bytes

PERIPHERAL CIRCUITS

PCF8574	remote 8-bit I/O for I ² C bus
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IFL SERIES 20

82S150/151	Field Programmable Gate Array (FPGA) (18x15x12)
82S152/153	Field Programmable Logic Array (FPLA) (18x42x10)
82S152A/153A	Field Programmable Logic Array (FPLA) (18x42x10)
82S154/155	Field Programmable Logic Sequencer (FPLS) (16x45x12) 4-bit register
82S156/157	Field Programmable Logic Sequencer (FPLS) (16x45x12) 6-bit register
82S158/159	Field Programmable Logic Sequencer (FPLS) (16x45x12) 8-bit register

IFL SERIES 28

82S100/101	Field Programmable Logic Array (FPLA) (16x48x8)
82S102/103	Field Programmable Gate Array (FPGA) (16x9x9)
82S104/105	Field Programmable Logic Sequencer (FPLS) (16x48x8)
82S104A/105A	Field Programmable Logic Sequencer (FPLS) (16x48x8)

SEMI-CUSTOM CIRCUITS**GATE ARRAYS****CMOS**

PCF/PCC0330	330 gates; 38 I/Os
PCF/PCC0335H	330 gates; 38 I/Os
PCF/PCC0450	448 gates; 26 I/Os
PCF/PCC0455H	448 gates; 26 I/Os
PCF/PCC0700	704 gates; 38 I/Os
PCF/PCC0705H	704 gates; 38 I/Os
PCF/PCC1100	1116 gates; 66 I/Os
PCF/PCC1105H	1116 gates; 66 I/Os

ISL

8A1200	1196 gates; 36 I/Os
8A1260	1196 gates; 60 I/Os
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)

221-XXX/ACE600	638 gates; 48 I/Os
231-XXX/ACE900	878 gates; 48 I/Os
241-XXX/ACE1400	1414 gates; 96 I/Os
251-XXX/ACE2200	2204 gates; 128 I/Os
261-XXX/ACE1320M	1000 gates; 96 I/Os; 320-bit RAM

CMOS

Compact Cell Logic

ISL

Composite Cell Logic

Full custom facilities available in MOS and Bipolar technologies.

MEA8000

Voice synthesizer



MILITARY PRODUCTS

The Signetics Mil 38510/883 program is organized to provide a broad selection of processing options, structured around the most commonly requested customer flows.

The program is designed to provide our customers :

- Fully compliant 883 flows on all products.
- Standard processing flows to help minimize the need for custom specs.
- Cost savings realized by using standard processing flows in lieu of custom flows.
- Better delivery lead times by minimizing spec negotiation time, plus allows customers to buy product off-the-shelf or in various stages of production rather than waiting for devices started specifically to custom specs.

The following explains the different processing options available to you. Special device marking clearly distinguishes the type of screening performed. Refer to tables.

JAN qualified (JB)

JAN qualified product is designed to give you the optimum in quality and reliability. The JAN processing level is offered as the result of the government's product standardization programs, and is monitored by the Defense Electronic Supply Center (DESC), through the use of industry-wide procedures and specifications.

JAN qualified products are manufactured, processed and tested in a government certified facility to Mil-M 38510, and appropriate device slash sheet specifications. Design documentation, lot sampling plans, electrical test data and qualification data for each specific part type has been approved by the Defense Electronic Supply Center (DESC) and products appear on the DESC qualified products list (QPL-38510).

Group B testing, per Mil-Std-883 method 5005, is performed on each six weeks of production on each slash sheet for each package type. Group C, per Mil-Std-883 method 5005, is performed every 90 days for each microcircuit group. Group D testing, per Mil-Std-883 method 5005, is performed every six months for each package type.

In addition to the common specs used throughout the industry for processing and testing, JAN qualified products also possess a requirement for a standard marking used throughout the IC industry.

MIL-STD-883, level B

Processing to this option is ideal when no JAN slash sheets are realised on devices required. Product is processed to Mil-Std-883, method 5004, and is 100% electrically tested to industry data sheets.

Devices are selectively available as custom processed parts with electricals screened to the JAN slash sheets.

Military products processing matrix

process level and marking	pre-cap visual	burn-in	functional test	dc/ac at 25°C	dc/ac at temp	QPL	offshore assembly
JB							
JM38510xxxx	2010, cond. B	yes	100%	100%	100%	yes	no
RB	2010, cond. B	yes	100%	100%	100%	no	yes
Sxxxx 883B							



JAN part number marking

The following chart is offered for your reference to help take some of the mystery out of JAN part number marking. For an example, we will take the marking for a 5400F processed to JAN and explain its meaning as well as other options.

JM38510

MILITARY
DESIGNATOR

calls out
MIL-M-38510
JAN IC
The "J" in the
marking is very
important.
If it's not
there it's not a
JAN device.
DO NOT be
confused by
JAN equivalents
market M38510

/001

DETAIL
SPECIFICATION

refers to detail
slash sheet spec.
001, 002, 003...
A slash sheet
detail spec will
usually represent
a family of devices
with similar functions.

i.e. the /001

detail spec represents
many positive NAND
gates such as the
5400, 5401, 5403, 5410
5420 and 5430 etc.
The /002 detail spec
on the other hand
represents many
flip-flop functions
such as the 5472,
5473, 54107, 5476,
5474, 5470 and so on
for the rest of the
slash sheets.

04

DEVICE
TYPE

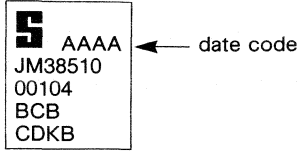
refers to a specific
part type under the
detail spec.
This, plus the detail
spec no. will denote
a part type.

i.e. :
detail + dev. = generic
spec type type
001 01 = 5430
001 02 = 5420
001 03 = 5410
001 04 = 5400

detail + dev. = generic
spec type type
002 01 = 5472
002 02 = 5473
002 03 = 54107

and so for the rest
of the slash sheets.

Actual marking for our 5400F as it appears on the device.



Signetics manufacturer's code (per Mil-M-35810)

B
DEVICE CLASS
 calls out processing to either class S, B or C of MIL-STD-883

C
CASE OUTLINE
 The code denotes the package i.e.
 A = 1/4" x 1/4" flat pack 14 pin
 B = 1/4" x 1/8" flat pack 14 pin
 C = 1/4" x 3/4" 14 pin dual in-line
 D = 1/4" x 3/8" flat pack 14 pin
 E = 1/4" x 3/4" 16 pin dual in-line
 F = 1/4" x 3/8" flat pack 16 pin
 G = 8 lead metal can
 H = 1/4" x 1/4" 10 pin flat pack
 I = 10 lead metal can
 J = 1/2" x 1/4" 24 pin dual in-line
 K = 3/8" x 1/2" 24 pin flat pack
 L = 3/8" x 1/2" 24 pin flat pack
 Z = 1/4" x 3/8" 24 pin flat pack

B
LEAD FINISH
 A = Kovar or alloy 42 with hot solder dip
 B = Kovar or alloy 42 with tin plate
 C = Kovar or alloy with gold plate



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 reference page number in this catalogue. The third column refers to the relevant Handbook (IC., see list below). Where only loose data sheets exist, this column shows an asterisk (*); a hyphen (-) indicates that **NO** data are available at date of printing this publication.

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IC1	Bipolar ICs for radio and audio equipment
IC2	Bipolar ICs for video equipment
IC3	ICs for digital systems in radio, audio and video equipment
IC4	Digital integrated circuits - CMOS HE4000B family
IC5	Digital integrated circuits - ECL ECL10 000 (GX family), ECL100 000 (HX family), dedicated designs
IC6	Professional analogue integrated circuits
IC7	Signetics bipolar memories
IC8	Signetics analogue circuits
IC9	Signetics TTL logic
IC10	Signetics Integrated Fuse Logic (IFL)
IC11	Microprocessors, microcomputers and peripheral circuitry Digital integrated circuits - HCMOS PC54/74 family (in preparation)

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HC/HCT20	20	-	HC/HCT354	22	-
HC/HCT27	20	-	HC/HCT356	22	-
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DATA HANDBOOK SYSTEM

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

type	title
S1	Diodes
S2	Power diodes, thyristors, triacs
S3	Small-signal transistors
S4	Low-frequency power transistors and modules
S4a	Low-frequency power transistors
S4b	High voltage and switching power transistors
S5	Field-effect transistors
S6	Transmitting transistors and modules
S7	Microminiature semiconductors for hybrid circuits
S8	Devices for optoelectronics
S9	Power MOS transistors
S10	Wideband transistors and wideband hybrid IC modules



In this alpha-numeric list we present all semiconductors mentioned in this catalogue. The product code mentioned behind the type refers to the section of this catalogue where abridged data can be found.

KEY TO PRODUCT CODE

FET	Field-effect transistors	SD	Small-signal diodes
LED	Light-emitting diodes	Sm	Small-signal transistors
Mm	Microminiature semiconductors	Th	Thyristors
OE	Opto elements	Tra	Transmitting transistors and modules
P	Low-frequency power transistors and modules	Tri	Triacs
R	Rectifier diodes	WBT	Wideband transistors and modules

* = series

type	product-code	type	product-code	type	product-code	type	product-code
BA220	SD	BAV99	Mm	BC547*	Sm	BCF70;R	Mm
BA221	SD	BAW56	Mm	BC548*	Sm	BCF81;R	Mm
BA223	SD	BAW62	SD	BC549*	Sm	BCV71;R	Mm
BA243	SD	BAX12;A	SD	BC550*	Sm	BCV72;R	Mm
BA281	SD	BAX14	SD	BC556*	Sm	BCW29;R	Mm
BA314;A	SD	BAX18	SD	BC557*	Sm	BCW30;R	Mm
BA315	SD	BB112	SD	BC558*	Sm	BCW31;R	Mm
BA316	SD	BB119	SD	BC559*	Sm	BCW32;R	Mm
BA317	SD	BB130	SD	BC560*	Sm	BCW33;R	Mm
BA318	SD	BB204B;G	SD	BC635	Sm	BCW60*	Mm
BA481	SD	BB212	SD	BC636	Sm	BCW61*	Mm
BA482	SD	BB305B;G	SD	BC637	Sm	BCW69;R	Mm
BA483	SD	BB417	SD	BC638	Sm	BCW70;R	Mm
BA484	SD	BB809	SD	BC639	Sm	BCW71;R	Mm
BAS11	SD	BB909A;B	SD	BC640	Sm	BCW72;R	Mm
BAS15	SD	BBY31	Mm	BC807*	Mm	BCW81;R	Mm
BAS16	Mm	BBY40	Mm	BC808*	Mm	BCW89;R	Mm
BAS17	Mm	BC107*	Sm	BC817*	Mm	BCX17;R	Mm
BAS19	Mm	BC108*	Sm	BC818*	Mm	BCX18;R	Mm
BAS20	Mm	BC109*	Sm	BC846*	Mm	BCX19;R	Mm
BAS21	Mm	BC146*	Sm	BC847*	Mm	BCX20;R	Mm
BAS45	Mm	BC177	Sm	BC848*	Mm	BCX51	Mm
BAT17	Mm	BC178*	Sm	BC849*	Mm	BCX52	Mm
BAT18	Mm	BC179*	Sm	BC850*	Mm	BCX53	Mm
BAT81	SD	BC200*	Sm	BC856*	Mm	BCX54	Mm
BAT82	SD	BC264*	FET	BC857*	Mm	BCX55	Mm
BAT83	SD	BC327*	Sm	BC858*	Mm	BCX56	Mm
BAT85	SD	BC328*	Sm	BC859*	Mm	BCX70*	Mm
BAT86	SD	BC337*	Sm	BC860*	Mm	BCX71*	Mm
BAV10	SD	BC338*	Sm	BC868	Mm	BCY58*	Sm
BAV18	SD	BC368	Sm	BC869	Mm	BCY59*	Sm
BAV19	SD	BC369	Sm	BCF29;R	Mm	BCY78*	Sm
BAV20	SD	BC375	Sm	BCF30;R	Mm	BCY79*	Sm
BAV21	SD	BC376	Sm	BCF32;R	Mm	BD131	P
BAV70	Mm	BC546*	Sm	BCF33;R	Mm	BD132	P



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BD135	P	BD652	P	BD958	P	BF324	Sm
BD136	P	BD675	P	BDT60*	P	BF410*	FET
BD137	P	BD676	P	BDT61*	P	BF419	P
BD138	P	BD677	P	BDT62*	P	BF422	Sm
BD139	P	BD678	P	BDT63*	P	BF423	Sm
BD140	P	BD679	P	BDT64*	P	BF450	Sm
BD201	P	BD680	P	BDT65*	P	BF451	Sm
BD202	P	BD681	P	BDT91	P	BF457	P
BD203	P	BD682	P	BDT92	P	BF458	P
BD204	P	BD683	P	BDT93	P	BF459	P
BD226	P	BD684	P	BDT94	P	BF469	P
BD227	P	BD825	P	BDT95	P	BF470	P
BD228	P	BD826	P	BDT96	P	BF471	P
BD229	P	BD827	P	BDV64*	P	BF472	P
BD230	P	BD828	P	BDV65*	P	BF494	Sm
BD231	P	BD829	P	BDV66*	P	BF495	Sm
BD233	P	BD830	P	BDV67*	P	BF510	Mm
BD234	P	BD839	P	BDV91	P	BF511	Mm
BD235	P	BD840	P	BDV92	P	BF512	Mm
BD236	P	BD841	P	BDV93	P	BF513	Mm
BD237	P	BD842	P	BDV94	P	BF536	Mm
BD238	P	BD843	P	BDV95	P	BF550,R	Mm
BD239*	P	BD844	P	BDV96	P	BF569	Mm
BD291	P	BD845	P	BDW55	P	BF579	Mm
BD292	P	BD846	P	BDW56	P	BF620	Mm
BD293	P	BD847	P	BDW57	P	BF621	Mm
BD294	P	BD848	P	BDW58	P	BF623	Mm
BD295	P	BD849	P	BDW59	P	BF660	Mm
BD296	P	BD850	P	BDW60	P	BF767	Mm
BD329	P	BD933	P	BDX35	P	BF819	P
BD330	P	BD934	P	BDX36	P	BF820	Mm
BD331	P	BD935	P	BDX37	P	BF821	Mm
BD332	P	BD936	P	BDX62*	P	BF822	Mm
BD333	P	BD937	P	BDX63*	P	BF823	Mm
BD334	P	BD938	P	BDX64*	P	BF869	P
BD335	P	BD939	P	BDX65*	P	BF870	P
BD336	P	BD940	P	BDX66*	P	BF871	P
BD337	P	BD941;A	P	BDX67*	P	BF872	P
BD338	P	BD942;A	P	BDX68*	P	BF960	FET
BD433	P	BD943	P	BDX69*	P	BF964	FET
BD434	P	BD944	P	BDX77	P	BF966	FET
BD435	P	BD945	P	BDX78	P	BF980	FET
BD436	P	BD946	P	BDX91	P	BF981	FET
BD437	P	BD947	P	BDX92	P	BF982	FET
BD438	P	BD948	P	BDX93	P	BF989	FET
BD643	P	BD949	P	BDX94	P	BF990	FET
BD644	P	BD950	P	BDX95	P	BF991	FET
BD645	P	BD951	P	BDX96	P	BF992	FET
BD646	P	BD952	P	BF198	Sm	BF994	FET
BD647	P	BD953	P	BF199	Sm	BF996	FET
BD648	P	BD954	P	BF240	Sm	BFG90A	WBT
BD649	P	BD955	P	BF241	Sm	BFG91A	WBT
BD650	P	BD956	P	BF245*	FET	BFG96	WBT
BD651	P	BD957	P	BF256*	FET	BFP90	WBT

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SEMICONDUCTORS

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BFP91A	WBT	BFW17A	WBT	BLU51	Tra	BLW98	Tra
BFP96	WBT	BFW30	WBT	BLU52	Tra	BLW99	Tra
BFQ12	FET	BFW61	FET	BLU53	Tra	BLX13;C	Tra
BFQ13	FET	BFW92;A	WBT	BLU60/12	Tra	BLX14	Tra
BFQ14	FET	BFW93	WBT	BLU98	Tra	BLX15	Tra
BFQ15	FET	BFX89	WBT	BLU99	Tra	BLX39	Tra
BFQ16	FET	BFY90	WBT	BLV10	Tra	BLX98	Tra
BFQ17	Mm	BGS57	Tra	BLV11	Tra	BLY87A;C	Tra
BFQ18A	Mm	BGX11*	Th	BLV20	Tra	BLY88A;C	Tra
BFQ19	Mm	BGX12*	Th	BLV21	Tra	BLY89A;C	Tra
BFQ22;S	WBT	BGX13*	Th	BLV22	Tra	BLY90	Tra
BFQ23	WBT	BGX14*	Th	BLV25	Tra	BLY91A;C	Tra
BFQ24	WBT	BGX15*	Th	BLV30/12	Tra	BLY92A;C	Tra
BFQ32	WBT	BGX17*	Th	BLV31	Tra	BLY93A;C	Tra
BFQ34;T	WBT	BGY32	Tra	BLV32F	Tra	BLY94	Tra
BFQ42	Tra	BGY33	Tra	BLV33;F	Tra	BPW22A*	OE
BFQ43	Tra	BGY35	Tra	BLV36	Tra	BPW50	OE
BFQ51	WBT	BGY36	Tra	BLV37	Tra	BPX25	OE
BFQ52	WBT	BGY40A;B	Tra	BLV38	Tra	BPX29	OE
BFQ53	WBT	BGY41A;B	Tra	BLV42/12	Tra	BPX40	QE
BFQ63	WBT	BGY43	Tra	BLV57	Tra	BPX41	OE
BFQ68	WBT	BGY45A;B	Tra	BLV58	Tra	BPX42	OE
BFR29	FET	BGY46A	Tra	BLV59	Tra	BPX71*	OE
BFR30	Mm	BGY47A;B	Tra	BLV75/12	Tra	BPX72*	OE
BFR31	Mm	BGY48	Tra	BLV80/28	Tra	BPX95C*	OE
BFR49	WBT	BGY50;A	WBT	BLV90	Tra	BRV61	Mm
BFR53;R	Mm	BGY51;A	WBT	BLV91	Tra	BR62	Mm
BFR64	WBT	BGY52	WBT	BLV92	Tra	BSR12;R	Mm
BFR65	WBT	BGY53	WBT	BLV93	Tra	BSR13;R	Mm
BFR84	FET	BGY54;A	WBT	BLV94	Tra	BSR14;R	Mm
BFR90;A	WBT	BGY55;A	WBT	BLV95	Tra	BSR15;R	Mm
BFR91;A	WBT	BGY56	WBT	BLV97	Tra	BSR16;R	Mm
BFR92;R*	Mm	BGY57	WBT	BLW32	Tra	BSR17;R	Mm
BFR93;R*	Mm	BGY58;A	WBT	BLW33	Tra	BSR18;R	Mm
BFR94	WBT	BGY59	WBT	BLW34	Tra	BSR30	Mm
BFR95	WBT	BGY60	WBT	BLW50F	Tra	BSR31	Mm
BFR96;S	WBT	BGY61	WBT	BLW60;C	Tra	BSR32	Mm
BFR101*	Mm	BGY65	WBT	BLW76	Tra	BSR33	Mm
BFS17;R	Mm	BGY67	WBT	BLW77	Tra	BSR40	Mm
BFS18;R	Mm	BGY70	WBT	BLW78	Tra	BSR41	Mm
BFS19;R	Mm	BGY71	WBT	BLW79	Tra	BSR42	Mm
BFS20;R	Mm	BGY74	WBT	BLW80	Tra	BSR43	Mm
BFS22A	Tra	BGY75	WBT	BLW81	Tra	BSR56	Mm
BFS23A	Tra	BGY78	WBT	BLW83	Tra	BSR57	Mm
BFT24	WBT	BGY90	Tra	BLW84	Tra	BSR58	Mm
BFT25;R	Mm	BGY91	Tra	BLW85	Tra	BSS38	Sm
BFT46	Mm	BGY93	Tra	BLW86	Tra	BSS50	Sm
BFT92;R	Mm	BGY94	Tra	BLW87	Tra	BSS51	Sm
BFT93;R	Mm	BGY95	Tra	BLW89	Tra	BSS52	Sm
BFW10	FET	BGY96	Tra	BLW90	Tra	BSS60	Sm
BFW11	FET	BLU20/12	Tra	BLW91	Tra	BSS61	Sm
BFW12	FET	BLU30/12	Tra	BLW95	Tra	BSS62	Sm
BFW13	FET	BLU45/12	Tra	BLW96	Tra	BSS63;R	Mm
BFW16A	WBT	BLU50	Tra	BLW97	Tra	BSS64;R	Mm



ALPHA-NUMERICAL INDEX

SEMICONDUCTORS

type	product-code	type	product-code	type	product-code	type	product-code
BST15;R	Mm	BU826;A	P	BY260*	R	BYX38*	R
BST16;R	Mm	BUS11;A	P	BY261*	R	BYX39*	R
BST50	Mm	BUS12;A	P	BY329*	R	BYX42*	R
BST51	Mm	BUS13;A	P	BY359*	R	BYX45*	R
BST52	Mm	BUS14;A	P	BY438	R	BYX46*	R
BST60	Mm	BUT11;A	P	BY448	R	BYX50*	R
BST61	Mm	BUV82	P	BY458	R	BYX52*	R
BST62	Mm	BUV83	P	BY505	R	BYX56*	R
BSV52;R	Mm	BUV89	P	BY509	R	BYX96*	R
BSV78	FET	BUV90	P	BY527	R	BYX97*	R
BSV79	FET	BUW11;A	P	BY584	R	BYX98*	R
BSV80	FET	BUW12;A	P	BY588	R	BYX99*	R
BSV81	FET	BUW13;A	P	BY609	R	BZT03	SD
BSW66A	Sm	BUW84	P	BY610	R	BZV10	SD
BSW67A	Sm	BUW85	P	BY710	R	BZV11	SD
BSW68A	Sm	BUX80	P	BY711	R	BZV12	SD
BSX19	Sm	BUX81	P	BY712	R	BZV13	SD
BSX20	Sm	BUX84	P	BY713	R	BZV14	SD
BSX60	Sm	BUX85	P	BYR29*	R	BZV46*	SD
BT136*	Tri	BUX86	P	BYT95*	R	BZV49*	Mm
BT137*	Tri	BUX87	P	BYV19*	R	BZV85*	SD
BT138*	Tri	BUX88	P	BYV20*	R	BZW03	SD
BT139*	Tri	BUX89	P	BYV21*	R	BZX55*	SD
BT149*	Th	BUY89	P	BYV22*	R	BZX70*	SD
BT151*	Th	BUZ10	P	BYV23*	R	BZX75*	SD
BT152*	Th	BUZ11	P	BYV24*	R	BZX79*	SD
BT153	Th	BUZ14	P	BYV27*	R	BZX84*	Mm
BT155*	Th	BUZ15	P	BYV28*	R	BZX90	SD
BT157*	Th	BUZ20	P	BYV29*	R	BZX91	SD
BTV24*	Th	BUZ21	P	BYV30*	R	BZX92	SD
BTV34*	Tri	BUZ23	P	BYV32*	R	BZX93	SD
BTV58*	Th	BUZ24	P	BYV33*	R	BZX94	SD
BTV59*	Th	BUZ25	P	BYV34*	R	CNX21	OE
BTW23*	Th	BUZ30	P	BYV42	R	CNX35	OE
BTW38*	Th	BUZ31	P	BYV43*	R	CNX36	OE
BTW40*	Th	BUZ33	P	BYV72*	R	CNX37	OE
BTW42*	Th	BUZ34	P	BYV79*	R	CNX38	OE
BTW43*	Tri	BUZ40	P	BYV92*	R	CNX44	OE
BTW45*	Th	BUZ41	P	BYV95*	R	CNX48	OE
BTW58*	Th	BUZ43	P	BYV96*	R	CNX62	OE
BTW59*	Th	BUZ44	P	BYW30*	R	CNY50*	OE
BTW63*	Th	BUZ45	P	BYW31*	R	CNY57*	OE
BTW92*	Th	BUZ50	P	BYW54	R	CNY62	OE
BTX94*	Tri	BUZ53	P	BYW55	R	CNY63	OE
BTY79*	Th	BUZ54	P	BYW56	R	CQN10	OE
BTY91*	Th	BUZ80	P	BYW92*	R	CQN11	OE
BU426;A	P	BUZ83	P	BYW93*	R	CQT10	OE
BU433	P	BUZ84	P	BYW94*	R	CQT12	OE
BU505	P	BY188	R	BYW95*	R	CQV60A*	OE
BU508;A;D	P	BY224*	R	BYW96*	R	CQV61A	OE
BU705	P	BY225*	R	BYX22*	R	CQV62	OE
BU806	P	BY228	R	BYX25*	R	CQV70*	OE
BU807	P	BY229*	R	BYX30*	R	CQV71A	OE
BU824	P	BY249*	R	BYX32*	R	CQV72	OE



type	product-code	type	product-code	type	product-code	type	product-code
CQV80*	OE	1N3892	R				
CQV81	OE	1N3899	R				
CQV82	OE	1N3900	R				
CQW10	OE	1N3901	R				
CQW24*	OE	1N3902	R				
CQW54	OE	1N3903	R				
CQX10	OE	1N3909	R				
CQX11	OE	1N3910	R				
CQX12	OE	1N3911	R				
CQX24*	OE	1N3912	R				
CQX54	OE	1N3913	R				
CQX64	OE	1N4148	SD				
CQX74	OE	1N4150	SD				
CQY11B;C	OE	1N4151	SD				
CQY24B*	OE	1N4154	SD				
CQY49B;C	OE	1N4446	SD				
CQY50	OE	1N4448	SD				
CQY52	OE	1N4531	SD				
CQY54A*	OE	1N4532	SD				
CQY58A*	OE	1N5059	R				
CQY89A*	OE	1N5060	R				
CQY94*	OE	1N5061	R				
CQY95A*	OE	1N5062	R				
CQY96*	OE	2N2219;A	Sm				
CQY97*	OE	2N2222;A	Sm				
PH2222;A	Sm	2N2368	Sm				
PH2369	Sm	2N2369;A	Sm				
PH2907;A	Sm	2N2904;A	Sm				
PH2955T	P	2N2905;A	Sm				
PH3055T	P	2N2906;A	Sm				
RPY58A	OE	2N2907;A	Sm				
RPY86	OE	2N3019	Sm				
RPY87	OE	2N3823	FET				
RPY88	OE	2N3866	Tra				
RPY89	OE	2N3966	FET				
RPY93	OE	2N4033	Sm				
RPY94	OE	2N4091	FET				
RPY95	OE	2N4092	FET				
RPY96	OE	2N4093	FET				
RPY97	OE	2N4391	FET				
1N821;A	SD	2N4392	FET				
1N823;A	SD	2N4393	FET				
1N825;A	SD	2N4427	Tra				
1N827;A	SD	2N4856	FET				
1N829;A	SD	2N4857	FET				
1N914	SD	2N4858	FET				
1N916	SD	2N4859	FET				
1N3879	R	2N4860	FET				
1N3880	R	2N4861	FET				
1N3881	R						
1N3882	R						
1N3889	R						
1N3890	R						
1N3891	R						

SMALL-SIGNAL DIODES

For detailed information see Data Handbook S1

Variable capacitance diodes

type	case	V_R (V)	I_F (mA)	C_d at (pF)	V_R (V)	C_d ratio at V_R (.V/..V)
AFC						
BB417	DO-34	20	20	8-11	4	2-5 4/15
BB119	DO-35	15	200	20-25	4	> 1,3 4/10
radio FM						
BB204G	TO-92	30	100	34-39	3	2,5-2,8 3/30
BB204B	TO-92	30	100	37-42	3	2,5-2,8 3/30
radio AM						
BB112	SOD-69	12	50	440-540	1	> 18 1/9
BB130	SOD-69	30	50	450-550	1	> 23 1/28
BB212	TO-92	12	100	500-620	0,5	> 22,5 0,5/8
television VHF						
BB405G	DO-34	28	20	> 15,5	1	4,3-6,0 3/25
BB809	DO-34	28	20	26-32	3	5,0-6,5 3/25
BBY40	SOT-23	28	20	26-32	3	5,0-6,5 3/25
BB909A	DO-34	30	20	> 31	1	12-15 1/28
BB909B	DO-34	30	20	> 33,5	1	12-15 1/28
television UHF						
BB405B	DO-34	28	20	> 15,5	1	4,8-5,8 3/25
BBY31	SOT-23	28	20	typ. 17,5	1	typ. 5 3/25

Band switching diodes

type	case	V_R (V)	I_F (mA)	C_d at V_R (pF)	V_R (V)	r_d at I_F (Ω)	I_F (mA)	f (MHz)	F at f (dB)	f (MHz)
radio AM										
BA223	DO-34/35	20	50	< 3,5	6	< 1,5	10	1		
BA423	DO-34	20	50	< 2,5	3	< 1,2	10	1		
television VHF										
BA482	DO-34	35	100	< 1,2	3	< 0,7	3	200		
BA483	DO-34	35	100	< 1,0	3	< 1,2	3	200		
BA484	DO-34	35	100	< 1,6	3	< 1,2	3	200		
BAT18	SOT-23	35	100	< 1,0	20	< 0,7	5	200		
UHF mixer Schottky barrier diode										
BA481	DO-34	4	30	< 1,1	0				8	900
BAT17	SOT-23	4	30	< 1,0	0	< 15	5	1 kHz	8	900
Radio FM detection diode										
BA281	DO35	50	200	< 1,2	0					

SMALL-SIGNAL DIODES

For detailed information see Data Handbook S1

Stabitors (used in forward direction)

type	case	typical V_F at			V_R V_{RRM}	I_{FRM}	S_F at I_F		r_{diff} at I_F	
		$I_F = 1$ mA (V)	$I_F = 5$ mA (V)	$I_F = 10$ mA (V)			typ.	(mA)	(Ω)	(mA)
BAX14	DO-35	0,55	0,62	0,65	40	2000	-2,2	1	6	10
BA220	DO-35	0,58	0,66	0,70	10	400	-2,2	1	7	10
BA315	DO-35	0,62	0,70	0,75	5	225	-2,1	1	7	10
BA314	DO-35	0,72	0,77	0,79	4	250	-1,8	1	6	10
BAS17	SOT-23	0,72	0,77	0,79	4	250	-1,8	1	-	-
BZX75C1V4	DO-7	1,25	1,35	1,40	10	250	-4	1	10	10
BZV46-1V5	DO-7	1,35	1,45	1,50	4	120	-3,65	5	20	5
BZX75C2V1	DO-7	1,90	2,05	2,10	10	250	-6	1	15	10
BZV46-2V0	DO-35	2,00	2,15	2,20	4	80	-5,6	5	30	5
BZX75C2V8	DO-7	2,50	2,70	2,80	10	250	-8	1	20	10
BZX75C3V6	DO-7	3,20	3,45	3,60	10	250	-10	1	25	10

Schottky barrier switching diodes

type	case	V_R (V)	I_F (mA)	C_d at (pF)	V_R (V)	t_{rr} (ns)	V_F at (mV)	I_F (mA)
BAT81	DO-34	40	30	< 1,6	1	1	< 410	1
BAT82	DO-34	50	30	< 1,6	1	1	< 410	1
BAT83	DO-34	60	30	< 1,6	1	1	< 410	1
BAT85	DO-34	30	200	< 10	1	5	< 320	1
BAT86	DO-34	50	200	< 8	1	4	< 380	1

Voltage reference diodes

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



SMALL-SIGNAL DIODES

For detailed information see Data Handbook S1

Low leakage diodes

type	case	V (V)	I _R at (pA)	V _R (V)	C _d (pF)	
BAS45	DO-34	125	1000	125	< 8	
BAV45	TO-18	20	5	5	< 1,3	

General purpose and high-speed switching diodes

type	case	V _R (V)	I _F (mA)	I _{FRM} (mA)	t _{rr} (ns)	C _D (pF)	V _F at (V)	I _F (mA)
BA220	DO-35	10	200	400	4	2,5	0,95	100
BA316	DO-35	10	100	225	4	2	1,1	100
BAX14	DO-35	20	500	2000	50	35	1,0	300
1N4154	DO-35	25	200	450	2	4	1,0	30
BA221	DO-35	30	200	400	4	2,5	1,05	200
BA317	DO-35	30	100	225	4	2	1,1	100
1N4150	DO-35	50	300	600	6	2,5	1,0	200
BAV18	DO-35	50	250	625	50	5	1,25	200
1N4151	DO-35	50	200	450	2	2	1,0	50
BA318	DO-35	50	100	225	4	2	1,1	100
BAV10	DO-35	60	300	600	6	2,5	1,25	500
BAV70	SOT-23	70	250	250	6	1,5	1,25	150
BAV99	SOT-23	70	250	250	6	1,5	1,25	150
BAW56	SOT-23	70	250	250	6	2	1,25	150
BAX18	DO-35	75	500	2000	-	35	1,0	300
BAS15	DO-34	50	100	225	-	2	1,1	100
BAS16	SOT-23	75	250	250	6	2	1,25	150
BAS45	DO-34	125	225	450	-	8	1,0	100
1N4532	DO-34	75	200	450	2	2	1,0	10
BAW62	DO-35	75	200	450	4	2	1,0	100
1N4448	DO-35	75	200	450	4	4	1,0	100
1N4446	DO-35	75	200	450	4	4	1,0	20
1N4148	DO-35	75	200	450	4	4	1,0	10
1N4531	DO-34	75	200	450	4	4	1,0	10
1N916	DO-35	75	75	225	4	2	1,0	10
1N914	DO-35	75	75	225	4	4	1,0	10
BAX12	DO-35	90	400	800	50	35	1,25	400
BAV19	DO-35	100	250	625	50	5	1,25	200
BAS19	SOT-23	100	200	625	50	5	1,25	200
BAV20	DO-35	150	250	625	50	5	1,25	200
BAS20	SOT-23	150	200	625	50	5	1,25	200
BAV21	DO-35	200	250	625	50	5	1,25	200
BAS21	SOT-23	200	200	625	50	5	1,25	200
BAS11	DO-35	300	350	2000	1000	15	1,1	300



SMALL-SIGNAL DIODES

For detailed information see Data Handbook S1

Voltage regulator diodes

type	case	working voltage E24 series (V) $\pm 5\%$	I_{FRM} (mA)	P_{tot} (W)	P_{ZSM} at $T_j = 25^\circ\text{C}$ $t_p = 100 \mu\text{s}$ (W)
BZX84C....	SOT-23	2,4 to 75	250	0,35	-
BZX55C....	DO-35	2,4 to 75	250	0,5	40
BZX79C....	DO-35	2,4 to 75	250	0,5	40
BZV49C....	SOT-89	2,4 to 75	250	1	40
BZV85C....	DO-41	5,1 to 75	250	1,3	60
BZX70C....	SOD-18	7,5 to 75	-	2,5	700
BZT03C....	SOD-57	9,1 to 270	-	3,25	600
BZW03C....	SOD-64	7,5 to 270	-	6	1000

RECTIFIER DIODES

SELECTION TABLE

For detailed information see Data Handbook S1 and S2

$I_{F(AV)max}$ (A)	type	$V_{RRM(max)}(V)$											
		50	100	150	200	300	350	400	500	600	800	1000	1200
Super fast													
7	BYX50				●	●							
8	BYR29									●	●		
12	BYV30				●	●			●				
35	BYV92				●	●			●				
Ultra fast													
2	BYV27	●	●	●	●								
3,5	BYV28	●	●	●	●								
7,6	BYW29	●	●	●	●								
9	BYV29						●		●	●			
2 x 10	BYV32	●	●	●	●								
2 x 10	BYV34						●		●	●			
14	BYW30	●	●	●	●								
14	BYV73	●	●	●	●								
2 x 15	BYV42	●	●	●	●								
2 x 15	BYV72	●	●	●	●								
28	BYW31	●	●	●	●								
40	BYW92	●	●	●	●								
60	BYW93	●	●	●	●								
80	BYW94	●	●	●	●								
Very fast													
1	BYT95				●			●		●			
1,5	BYV95				●			●		●			
1,5	BYV96				●			●		●	●	●	
3	BYW95				●			●		●			
3	BYW96				●			●		●	●	●	
6	1N3879	●											
6	1N3880	●											
6	1N3881			●									
6	1N3882				●								
12	1N3889	●											
12	1N3890		●										
12	1N3891				●								
12	1N3892					●							
14	BYX30				●	●		●	●	●			
20	1N3899	●				●		●	●	●			
20	1N3900		●										
20	1N3901				●								
20	1N3902					●							
20	1N3903							●					
22	BYX46				●	●		●	●	●			
30	1N3909	●											
30	1N3910		●										
30	1N3911				●								
30	1N3912					●							
30	1N3913							●					
Fast													
7	BY229				●			●		●	●		
8	BY329											●	●
14	BYV24										●	●	
40	BYW25										●	●	



For detailed information see Data Handbook S2

Schottky-barrier

$I_{F(AV)max}$ (A)	type	$V_{RRM(max)}$ (V)			
		30	35	40	45
10	BYV19	●	●	●	●
2 x 10	BYV33	●	●	●	●
15	BYV20	●	●	●	●
28	BYV21	●	●	●	●
56	BYV22	●	●	●	●
70	BYV23	●	●	●	●
2 x 15	BYV43	●	●	●	●

General data

Repetitive peak reverse voltage range	50 to 1000 V
Average forward current range	1,5 to 70 A
Reverse recovering time	
Fast	± 450 ns
Very fast	200 to 300 ns
Super fast	60 to 100 ns
Ultra fast	25 to 60 ns

For detailed information see Data Handbook S2

type	I_F (A)	V_{RRM} (V)	case	version
BYV95A	1,5	200	SOD-57	very fast
BYV95B	1,5	400	SOD-57	very fast
BYV95C	1,5	600	SOD-57	very fast
BYV96D	1,5	800	SOD-57	very fast
BYV96E	1,5	1000	SOD-57	very fast
BYV27-50	2	50	SOD-57	ultra fast
BYV27-100	2	100	SOD-57	ultra fast
BYV27-150	2	150	SOD-57	ultra fast
BYV27-200	2	200	SOD-57	ultra fast
BYW95A	3	200	SOD-64	very fast
BYW95B	3	400	SOD-64	very fast
BYW95C	3	600	SOD-64	very fast
BYW96D	3	800	SOD-64	very fast
BYW96E	3	1000	SOD-64	very fast
BYV28-50	3,5	50	SOD-64	ultra fast
BYV28-100	3,5	100	SOD-64	ultra fast
BYV28-150	3,5	150	SOD-64	ultra fast
BYV28-200	3,5	200	SOD-64	ultra fast
BY359-1300	4,5	1300	TO-220AC	very fast
BY359-1500	4,5	1500	TO-220AC	very fast
1N3879	6	50	DO-4	very fast
1N3879R	6	50	DO-4	very fast
1N3880	6	100	DO-4	very fast
1N3880R	6	100	DO-4	very fast
1N3881	6	200	DO-4	very fast
1N3881R	6	200	DO-4	very fast
1N3882	6	300	DO-4	very fast
1N3882R	6	300	DO-4	very fast
BYR29-600	8	600	TO-220AC	super fast
BYR29-800	8	800	TO-220AC	super fast
BYV29-300	9	300	TO-220AC	super fast
BYV29-400	9	400	TO-220AC	super fast
BYV29-500	9	500	TO-220AC	ultra fast
BYW29-50	7,6	50	TO-220AC	ultra fast
BYW29-100	7,6	100	TO-220AC	ultra fast
BYW29-150	7,6	150	TO-220AC	ultra fast
BYW29-200	7,6	200	TO-220AC	ultra fast
BYX50-200	7	200	DO-4	super fast
BYX50-200R	7	200	DO-4	super fast
BYX50-300	7	300	DO-4	super fast
BYX50-300R	7	300	DO-4	super fast

type	I_F (A)	V_{RRM} (V)	case	version
BY229-200	7	200	TO-220AC	fast
BY229-200R	7	200	TO-220AC	fast
BY229-400	7	400	TO-220AC	fast
BY229-400R	7	400	TO-220AC	fast
BY229-600	7	600	TO-220AC	fast
BY229-600R	7	600	TO-220AC	fast
BY229-800	7	800	TO-220AC	fast
BY229-800R	7	800	TO-220AC	fast
BY329-1000	8	1000	TO-220AC	fast
BY329-1200	8	1200	TO-220AC	fast
BYV19-30	10	30	TO-220AC	Schottky barrier
BYV19-35	10	35	TO-220AC	Schottky barrier
BYV19-40(A)	10	40	TO-220AC	Schottky barrier
BYV45	10	45	TO-220AC	Schottky barrier
BYV32-50	2 x 10	50	TO-220AB	ultra fast
BYV32-100	2 x 10	100	TO-220AB	ultra fast
BYV32-150	2 x 10	150	TO-220AB	ultra fast
BYV32-200	2 x 10	200	TO-220AB	ultra fast
BYV33-30	2 x 10	30	TO-220AB	Schottky barrier
BYV33-35	2 x 10	35	TO-220AB	Schottky barrier
BYV33-40(A)	2 x 10	40	TO-220AB	Schottky barrier
BYV33-45	2 x 10	45	TO-220AB	Schottky barrier
BYV34-300	2 x 10	300	TO-220AB	ultra fast
BYV34-400	2 x 10	400	TO-220AB	ultra fast
BYV34-500	2 x 10	500	TO-220AB	ultra fast
BYV30-200	12	200	DO-4	super fast
BYV30-200R	12	200	DO-4	super fast
BYV30-300	12	300	DO-4	super fast
BYV30-300R	12	300	DO-4	super fast
BYV30-400	12	400	DO-4	super fast
BYV30-400R	12	400	DO-4	super fast
1N3889	12	50	DO-4	very fast
1N3889R	12	50	DO-4	very fast
1N3890	12	100	DO-4	very fast
1N3890R	12	100	DO-4	very fast
1N3891	12	200	DO-4	very fast
1N3891R	12	200	DO-4	very fast
1N3892	12	300	DO-4	very fast
1N3892R	12	300	DO-4	very fast
BYV24-800	14	800	DO-4	fast
BYV24-800R	14	800	DO-4	fast
BYV24-1000	14	1000	DO-4	fast
BYV24-1000R	14	1000	DO-4	fast
BYV79-50	14	50	TO-220AC	ultra fast
BYV79-100	14	100	TO-220AC	ultra fast
BYV79-150	14	150	TO-220AC	ultra fast
BYV79-200	14	200	TO-220AC	ultra fast
BYW30-50	14	50	DO-4	super fast
BYW30-100	14	100	DO-4	super fast
BYW30-150	14	150	DO-4	super fast
BYW30-200	14	200	DO-4	super fast
BYX30-200*	14	200	DO-4	very fast
BYX30-200R*	14	200	DO-4	very fast

type	I_F (A)	V_{RRM} (V)	case	version
BYX30-300*	14	300	DO-4	very fast
BYX30-300R*	14	300	DO-4	very fast
BYX30-400*	14	400	DO-4	very fast
BYX30-400R*	14	400	DO-4	very fast
BYX30-500*	14	500	DO-4	very fast
BYX30-500R*	14	500	DO-4	very fast
BYX30-600*	14	600	DO-4	very fast
BYX30-600R*	14	600	DO-4	very fast
BYV20-30	15	30	DO-4	Schottky barrier
BYV20-35	15	35	DO-4	Schottky barrier
BYV20-40(A)	15	40	DO-4	Schottky barrier
BYV20-45	15	45	DO-4	Schottky barrier
BYV43-30	2 x 15	30	TO-220AB	Schottky barrier
BYV43-35	2 x 15	35	TO-220AB	Schottky barrier
BYV43-40(A)	2 x 15	40	TO-220AB	Schottky barrier
BYV43-45	2 x 15	45	TO-220AB	Schottky barrier
BYV72-50	2 x 15	50	TO-220AC	ultra fast
BYV72-100	2 x 15	100	TO-220AC	ultra fast
BYV72-150	2 x 15	150	TO-220AC	ultra fast
BYV72-200	2 x 15	200	TO-220AC	ultra fast
1N3899	20	50	DO-5	very fast
1N3899R	20	50	DO-5	very fast
1N3900	20	100	DO-5	very fast
1N3900R	20	100	DO-5	very fast
1N3901	20	200	DO-5	very fast
1N3901R	20	200	DO-5	very fast
1N3902	20	300	DO-5	very fast
1N3902R	20	300	DO-5	very fast
1N3903	20	400	DO-5	very fast
1N3903R	20	400	DO-5	very fast
BYX46-200*	22	200	DO-4	very fast
BYX46-200R*	22	200	DO-4	very fast
BYX46-300*	22	300	DO-4	very fast
BYX46-300R*	22	300	DO-4	very fast
BYX46-400*	22	400	DO-4	very fast
BYX46-400R*	22	400	DO-4	very fast
BYX46-500*	22	500	DO-4	very fast
BYX46-500R*	22	500	DO-4	very fast
BYX46-600*	22	600	DO-4	very fast
BYX46-600R*	22	600	DO-4	very fast
BYW31-50	25	50	DO-4	ultra fast
BYW31-100	25	100	DO-4	ultra fast
BYW31-150	25	150	DO-4	ultra fast
BYW31-200	25	200	DO-4	ultra fast
BYV21-30	28	30	DO-4	Schottky barrier
BYV21-35	28	35	DO-4	Schottky barrier
BYV21-40(A)	28	40	DO-4	Schottky barrier
BYV21-45	28	45	DO-4	Schottky barrier

RECTIFIER DIODES

FAST RECOVERY

type	I_F (A)	V_{RRM} (V)	case	version
1N3909	30	50	DO-5	very fast
1N3909R	30	50	DO-5	very fast
1N3910	30	100	DO-5	very fast
1N3910R	30	100	DO-5	very fast
1N3911	30	200	DO-5	very fast
1N3911R	30	200	DO-5	very fast
1N3912	30	300	DO-5	very fast
1N3912R	30	300	DO-5	very fast
1N3913	30	400	DO-5	very fast
1N3913R	30	400	DO-5	very fast
BYV92-200	35	200	DO-5	super fast
BYV92-200R	35	200	DO-5	super fast
BYV92-300	35	300	DO-5	super fast
BYV92-300R	35	300	DO-5	super fast
BYV92-400	35	400	DO-5	super fast
BYV92-400R	35	400	DO-5	super fast
BYW92-50	40	50	DO-5	ultra fast
BYW92-100	40	100	DO-5	ultra fast
BYW92-150	40	150	DO-5	ultra fast
BYW92-200	40	200	DO-5	ultra fast
BYW25-800	40	800	DO-5	fast
BYW25-800R	40	800	DO-5	fast
BYW25-1000	40	1000	DO-5	fast
BYW25-1000R	40	1000	DO-5	fast
BYV22-30	56	30	DO-5	Schottky barrier
BYV22-35	56	35	DO-5	Schottky barrier
BYV22-40(A)	56	40	DO-5	Schottky barrier
BYV22-45	56	45	DO-5	Schottky barrier
BYW93-50	60	50	DO-5	ultra fast
BYW93-100	60	100	DO-5	ultra fast
BYW93-150	60	150	DO-5	ultra fast
BYW93-200	60	200	DO-5	ultra fast
BYV23-30	70	30	DO-5	Schottky barrier
BYV23-35	70	35	DO-5	Schottky barrier
BYV23-40(A)	70	40	DO-5	Schottky barrier
BYV23-45	70	45	DO-5	Schottky barrier
BYW94-50	80	50	DO-5	ultra fast
BYW94-100	80	100	DO-5	ultra fast
BYW94-150	80	150	DO-5	ultra fast
BYW94-200	80	200	DO-5	ultra fast



Fast recovery, general purpose

$I_{F(AV)max}$ (A)	Type	$V_{RRM(max)}$ (V)											
		150	200	300	400	500	600	800	1000	1200	1400	1600	
1,4	BYX22						●			●			
1,5	BYX45*						●	●	●	●		●	
2	BYW54						●						
2	BYW55							●					
2	BYW56								●				
2	1N5059	●											
2	1N5060				●								
2	1N5061						●						
2	1N5062							●					
6	BYX38			●			●			●			
6,5	BY249			●			●						
9,5	BYX39*						●	●	●	●		●	
10	BYX98			●			●			●			
12	BYX42			●			●			●			
15	BYX99			●			●			●			
20	BYX25*						●	●	●	●		●	
30	BYX96			●			●			●			●
47	BYX97			●			●			●			●
48	BYX52			●			●			●			
48	BYX56*						●	●	●	●		●	
150	BYX32						●	●	●	●			●

Bridge types

$I_{O(AV)max}$ (A)	Type	$V_{(RMS)}$ (V)			
		50	80	140	280
4,8	BY224				●
4,8	BY225	●	●		
12	BY260			●	●
25	BY261			●	●

Efficiency diodes

I_{FWmax} (A)	Type	$V_{RRM(max)}$ (V)					
		50	600	750	1200	1300	1500
1,5	BY188	●					
4	BY448						●
4	BY458				●		
4,5	BY359				●	●	
5	BY228					●	
5	BY438				●		
10	BY277		●	●			

* with avalanche characteristics

General data

Voltage range	50 to 1600 V
Current	0,36 to 150 A

For detailed information see Data Handbook S2

type	I_F (A)	V_{RRM} (V)	case	version
BY588	1,5	50	SOD-57	
BY188G	1,5	50	SOD-57	
BYX22-600	1,4	600	DO-1	
BYX22-1200	1,4	1200	DO-1	
BYX45-600R	1,5	600	DO-1	avalanche type
BYX45-800R	1,5	800	DO-1	avalanche type
BYX45-1000R	1,5	1000	DO-1	avalanche type
BYX45-1200R	1,5	1200	DO-1	avalanche type
BYX45-1400R	1,5	1400	DO-1	avalanche type
BY527	2	1250	SOD-57	avalanche type
BYW54	2	600	SOD-57	avalanche type
BYW55	2	800	SOD-57	avalanche type
BYW56	2	1000	SOD-57	avalanche type
1N5059	2	200	SOD-57	avalanche type
1N5060	2	400	SOD-57	avalanche type
1N5061	2	600	SOD-57	avalanche type
1N5062	2	800	SOD-57	avalanche type
BY448	4	1500	SOD-57	
BY458	4	1200	SOD-57	
BY224-400	4,8	400	SOT-112	bridge type
BY224-600	4,8	600	SOT-112	bridge type
BY225-100	4,8	100	SOT-112	bridge type
BY225-200	4,8	200	SOT-112	bridge type
BY228	5	1500	SOD-64	
BY438	5	1200	SOD-64	
BYX38-300	6	300	DO-4	
BYX38-300R	6	300	DO-4	
BYX38-600	6	600	DO-4	
BYX38-600R	6	600	DO-4	
BYX38-1200	6	1200	DO-4	
BYX38-1200R	6	1200	DO-4	
BY249-300	6	300	TO-220AC	
BY249-300R	6	300	TO-220AC	
BY249-600	6	600	TO 220AC	
BY249-600R	6	600	TO-220AC	
BYX39-600	9,5	600	DO-4	avalanche type
BYX39-600R	9,5	600	DO-4	avalanche type
BYX39-800	9,5	800	DO-4	avalanche type
BYX39-800R	9,5	800	DO-4	avalanche type
BYX39-1000	9,5	1000	DO-4	avalanche type
BYX39-1000R	9,5	1000	DO-4	avalanche type
BYX39-1200	9,5	1200	DO-4	avalanche type

type	I_F (A)	V_{RRM} (V)	case	version
BYX39-1200R	9,5	1200	DO-4	avalanche type
BYX39-1400	9,5	1400	DO-4	avalanche type
BYX39-1400R	9,5	1400	DO-4	avalanche type
BYX98-300	10	300	DO-4	
BYX98-300R	10	300	DO-4	
BYX98-600	10	600	DO-4	
BYX98-600R	10	600	DO-4	
BYX98-1200	10	1200	DO-4	
BYX98-1200R	10	1200	DO-4	
BYX42-300	12	300	DO-4	
BYX42-300R	12	300	DO-4	
BYX42-600	12	600	DO-4	
BYX42-600R	12	600	DO-4	
BYX42-1200	12	1200	DO-4	
BYX42-1200R	12	600	DO-4	
BY260-200	12	200	-	bridge type
BY260-400	12	400	-	bridge type
BY260-600	12	600	-	bridge type
BYX99-300	15	300	DO-4	
BYX99-300R	15	300	DO-4	
BYX99-600	15	600	DO-4	
BYX99-600R	15	600	DO-4	
BYX99-1200	15	1200	DO-4	
BYX99-1200R	15	1200	DO-4	
BYX25-600	20	1000	DO-4	avalanche type
BYX25-600R	20	1000	DO-4	avalanche type
BYX25-800	20	1200	DO-4	avalanche type
BYX25-800R	20	1200	DO-4	avalanche type
BYX25-1000	20	1400	DO-4	avalanche type
BYX25-1000R	20	1400	DO-4	avalanche type
BYX25-1200	20	1200	DO-4	avalanche type
BYX25-1200R	20	1200	DO-4	avalanche type
BYX25-1400	20	1400	DO-4	avalanche type
BYX25-1400R	20	1400	DO-4	avalanche type
BY261-200	25	200	-	bridge type
BY261-400	25	400	-	bridge type
BY261-600	25	600	-	bridge type
BYX96-300	30	300	DO-4	
BYX96-300R	30	300	DO-4	
BYX96-600	30	600	DO-4	
BYX96-600R	30	600	DO-4	
BYX96-1200	30	1200	DO-4	
BYX96-1200R	30	1200	DO-4	
BYX96-1600	30	1600	DO-4	
BYX96-1600R	30	1600	DO-4	
BYX97-300	47	300	DO-5	
BYX97-300R	47	300	DO-5	
BYX97-600	47	600	DO-5	
BYX97-600R	47	600	DO-5	
BYX97-1200	47	1200	DO-5	
BYX97-1200R	47	1200	DO-5	
BYX97-1600	47	1600	DO-5	
BYX97-1600R	47	1600	DO-5	

RECTIFIER DIODES

GEN. PURPOSE

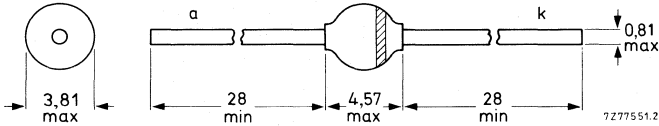
type	I_F (A)	V_{RRM} (V)	case	version
BYX52-300	48	300	DO-5	
BYX52-300R	48	400	DO-5	
BYX52-600	48	600	DO-5	
BYX52-600R	48	600	DO-5	
BYX52-1200	48	1200	DO-5	
BYX52-1200R	48	1200	DO-5	
BYX56-600	48	600	DO-5	avalanche type
BYX56-600R	48	600	DO-5	avalanche type
BYX56-800	48	800	DO-5	avalanche type
BYX56-800R	48	800	DO-5	avalanche type
BYX56-1000	48	1000	DO-5	avalanche type
BYX56-1000R	48	1000	DO-5	avalanche type
BYX56-1200	48	1200	DO-5	avalanche type
BYX56-1200R	48	1200	DO-5	avalanche type
BYX56-1400	48	1400	DO-5	avalanche type
BYX56-1400R	48	1400	DO-5	avalanche type
BYX32-600	150	600	SOD-8	
BYX32-600R	150	600	SOD-8	
BYX32-800	150	800	SOD-8	
BYX32-800R	150	800	SOD-8	
BYX32-1000	150	1000	SOD-8	
BYX32-1000R	150	1000	SOD-8	
BYX32-1200	150	1200	SOD-8	
BYX32-1200R	150	1200	SOD-8	
BYX32-1600	150	1600	SOD-8	
BYX32-1600R	150	1600	SOD-8	



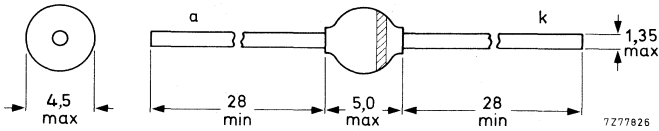
General data

Reverse recovery time	25 to 450 ns
Voltage range	50 to 1200 V
Current range	1,5 to 7 A

For detailed information see Data Handbook S1



SOD-57



SOD-64

type	$I_{F(AV)}$ max. (A)	V_{RRM} max. (V)	I_{FSM} max. (A)	t_{rr} max. (ns)	case
BYT95A	1	200	15	250	SOD-72
BYT95B	1	400	15	250	SOD-72
BYT95C	1	600	15	250	SOD-72
BYV95A	1,5	200	35	250	SOD-57
BYV95B	1,5	400	35	250	SOD-57
BYV95C	1,5	600	35	250	SOD-57
BYV96D	1,5	800	35	300	SOD-57
BYV96E	1,5	1000	35	300	SOD-57
BYV27-50	2	50	50	25	SOD-57
BYV27-100	2	100	50	25	SOD-57
BYV27-150	2	150	50	25	SOD-57
BYV27-200	2	200	50	25	SOD-57
BYW95A	3	200	70	250	SOD-64
BYW95B	3	400	70	250	SOD-64
BYW95C	3	600	70	250	SOD-64
BYW96D	3	800	70	300	SOD-64
BYW96E	3	1000	70	300	SOD-64
BYV28-50	3,5	50	80	30	SOD-64
BYV28-100	3,5	100	80	30	SOD-64
BYV28-150	3,5	150	80	30	SOD-64
BYV28-200	3,5	200	80	30	SOD-64
BY458*	4	1200	30	-	SOD-57
BY448*	4	1500	30	-	SOD-57
BY438	5	1200	50	-	SOD-57

* double diffused

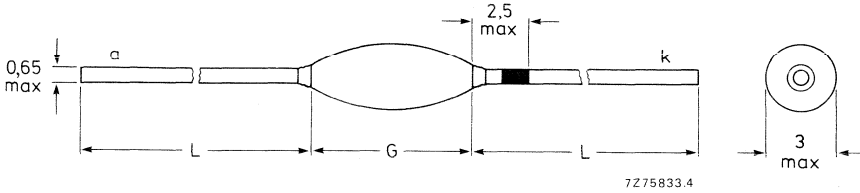
type	$I_{F(AV)}$ max. (A)	V_{RRM} max. (V)	I_{FSM} max. (A)	t_{rr} max. (ns)	case
BY228*	5	1500	50	-	SOD-64
BYW29-50	7,6	50	80	35	TO-220AC
BYW29-100	7,6	100	80	35	TO-220AC
BYW29-150	7,6	150	80	35	TO-220AC
BYW29-200	7,6	200	80	35	TO-220AC
BYR29-50	8	50	80	100	TO-220AC
BYR29-100	8	100	80	100	TO-220AC
BYR29-150	8	150	80	100	TO-220AC
BYR29-200	8	200	80	100	TO-220AC
BYV29-300	9	300	100	50	TO-220AC
BYV29-400	9	400	100	50	TO-220AC
BYV29-500	9	500	100	50	TO-220AC
BYV32-50	2 x 10	50	2 x 150	35	TO-220AB
BYV32-100	2 x 10	100	2 x 150	35	TO-220AB
BYV32-150	2 x 10	150	2 x 150	35	TO-220AB
BYV32-200	2 x 10	200	2 x 150	35	TO-220AB
BYV34-300	2 x 10	300	2 x 150	50	TO-220AB
BYV34-400	2 x 10	400	2 x 150	50	TO-220AB
BYV34-500	2 x 10	500	2 x 150	50	TO-220AB
BYV79-50	14	50	180	35	TO-220AC
BYV79-100	14	100	180	35	TO-220AC
BYV79-150	14	150	180	35	TO-220AC
BYV79-200	14	200	180	35	TO-220AC
BYV42-50	2 x 15	50	2 x 200	35	TO-220AB
BYV42-100	2 x 15	100	2 x 200	35	TO-220AB
BYV42-150	2 x 15	150	2 x 200	35	TO-220AB
BYV42-200	2 x 15	200	2 x 200	35	TO-220AB
BYW30-50	14	50	200	35	DO-4
BYW30-100	14	100	200	35	DO-4
BYW30-150	14	150	200	35	DO-4
BYW30-200	14	200	200	35	DO-4
BYV72-50	2 x 15	50	2 x 200	35	SOT-93
BYV72-100	2 x 15	100	2 x 200	35	SOT-93
BYV72-150	2 x 15	150	2 x 200	35	SOT-93
BYV72-200	2 x 15	200	2 x 200	35	SOT-93
BYW31-50	28	50	320	50	DO-4
BYW31-100	28	100	320	50	DO-4
BYW31-150	28	150	320	50	DO-4
BYW31-200	28	200	320	50	DO-4
BYW92-50	40	50	500	50	DO-5
BYW92-100	40	100	500	50	DO-5
BYW92-150	40	150	500	50	DO-5
BYW92-200	40	200	500	50	DO-5
BYW93-50	60	50	200	60	DO-5
BYW93-100	60	100	200	60	DO-5
BYW93-150	60	150	200	60	DO-5
BYW93-200	60	200	200	60	DO-5
BYW94-50	80	50	340	60	DO-5
BYW94-100	80	100	340	60	DO-5
BYW94-150	80	150	340	60	DO-5
BYW94-200	80	200	340	60	DO-5

* double diffused

General data

Voltage range	50 to 18.000 V
Current range	2 mA to 10 A

For detailed information see Data Handbook S1



SOD-61

type	$I_{F(AV)}$ (mA)	V_{RRM} (kV)	case
BY505	85	2,2	SOD-61
BY584	85	1,8	SOD-61
BY509	4	15	SOD-61
BY609*	4	15	SOD-61
BY610*	4	17	SOD-61
BY710	3	17	SOD-61
BY711	3	19	SOD-61
BY712	3	22	SOD-61
BY713	3	24	SOD-61

* with avalanche characteristics

Thyristors for general purpose

$I_{T(RMS)}$ (A)	type	V_{RRMmax} (V)															
		50	100	200	300	400	500	600	650	800	1000	1200	1400	1600			
1	BT149	●	●	●		●	●	●									
1,6	BTX18		●	●	●	●	●										
12	BT151						●		●								
16	BTY79					●		●		●	●						
16	BTW38							●		●	●						
16	BTW42							●		●	●						
20	BT152					●		●		●	●						
25	BTW45					●		●		●	●	●					
25	BTY91					●		●		●	●						
31	BTW92							●		●	●	●	●				
32	BTW40					●		●		●	●	●	●	●		●	
70	BTV24							●		●	●	●	●	●			
140	BTW23							●		●	●	●	●	●	●	●	

Fast turn-off thyristors

$I_{T(RMS)}$ (A)	type	V_{RRMmax} (V)															
		50	100	200	300	400	500	600	650	800	1000	1200	1400	1600			
6	BT153						●										
15	BT155									●							
40	BTW63							●		●							

Fast gate turn-off thyristors

$I_{T(AV)}$ (A)	type	V_{RRMmax} (V)															
		50	100	200	300	400	500	600	650	850	1000	1300	1500	1600			
3,2	BT157											●	●				
6,5	BTW58										●	●	●				
10	BTV58							●		●	●						
13,5	BTW59										●	●	●				
15	BTV59							●		●	●						

Triacs

$I_{T(RMS)}$ (A)	type	$V_{RRM(max)}$ (V)															
		50	100	200	300	400	500	600	650	800	1000	1200	1400	1600			
4	BT136						●	●		●							
8	BT137						●	●		●							
12	BT138						●	●		●							
15	BTW43G							●		●	●	●					
15	BTW43H							●		●	●	●					
16	BT139						●	●		●							
25	BTX94H					●		●		●	●	●					
25	BTX94J					●		●		●	●	●					
55	BTV34G							●		●	●	●	●	●			
55	BTV34H							●		●	●	●	●	●			

THYRISTORS AND TRIACS

General data

Voltage range	50 to 1600 V
Current range	1 to 140 A

For detailed information see Data Handbook S2

type	I_T (rms) (A)	V_{RRM} (max) (V)	case	version
BT149F	1	50	TO-92	thyristor
BT149A	1	100	TO-92	thyristor
BT149B	1	200	TO-92	thyristor
BT149D	1	400	TO-92	thyristor
BT149E	1	500	TO-92	thyristor
BT149M	1	600	TO-92	thyristor
BT157-1300R	3,2	1300	TO-220AB	fast G.T.O.
BT157-1500R	3,2	1500	TO-220AB	fast G.T.O.
BT136-500	4	500	TO-220AB	triac
BT136-600	4	600	TO-220AB	triac
BT136-800	4	800	TO-220AB	triac
BT153	6	500	TO-220AB	fast turn off thyristor
BTW58-1000R	6,5	1000	TO-220AB	fast G.T.O.
BTW58-1300R	6,5	1300	TO-220AB	fast G.T.O.
BTW58-1500R	6,5	1500	TO-220AB	fast G.T.O.
BT137-500	8	500	TO-220AB	triac
BT137-600	8	600	TO-220AB	triac
BT137-800	8	800	TO-220AB	triac
BTV58-600R	10	600	TO-220AB	fast G.T.O.
BTV58-850R	10	850	TO-220AB	fast G.T.O.
BTV58-1000R	10	1000	TO-220AB	fast G.T.O.
BT151-500	12	500	TO-220AB	thyristor
BT151-650	12	650	TO-220AB	thyristor
BTW59-1300R	13,5	1300	TO-238AA*	fast G.T.O.
BTW59-1500R	13,5	1500	TO-238AA*	fast G.T.O.
BT138-500	12	500	TO-220AB	triac
BT138-600	12	600	TO-220AB	triac
BT138-800	12	800	TO-220AB	triac
BTV59-600R	15	600	TO-238AA*	fast G.T.O.
BTV59-850R	15	850	TO-238AA*	fast G.T.O.
BTV59-1000R	15	1000	TO-238AA*	fast G.T.O.
BTW43-600G	15	600	TO-64(2)	triac
BTW43-800G	15	800	TO-64(2)	triac
BTW43-1000G	15	1000	TO-64(2)	triac
BTW43-1200G	15	1200	TO-64(2)	triac
BTW43-600H	15	600	TO-64(2)	triac
BTW43-800H	15	800	TO-64(2)	triac
BTW43-1000H	15	1000	TO-64(2)	triac
BTW43-1200H	15	1200	TO-46(2)	triac
BT155-600RK	15	600	TO-220AB	fast turn off thyristor
BT155-600RN	15	600	TO-220AB	fast turn off thyristor

* with isolated base

THYRISTORS AND TRIACS

type	I_T (rms) (A)	V_{RRM} (max) (V)	case	version
BT155-600RP	15	600	TO-220AB	fast turn off thyristor
BT155-800RK	15	800	TO-220AB	fast turn off thyristor
BT155-800RN	15	800	TO-220AB	fast turn off thyristor
BT155-800RP	15	800	TO-220AB	fast turn off thyristor
BT139-500	16	500	TO-220AB	triac
BT139-600	16	600	TO-220AB	triac
BT139-800	16	800	TO-220AB	triac
BTY79-400R	16	400	TO-64	thyristor
BTY79-500R	16	500	TO-64	thyristor
BTY79-600R	16	600	TO-64	thyristor
BTY79-800R	16	800	TO-64	thyristor
BTY79-1000R	16	1000	TO-64	thyristor
BTW38-600R	16	600	TO-64	thyristor
BTW38-800R	16	800	TO-64	thyristor
BTW38-1000R	16	1000	TO-64	thyristor
BTW42-600R	16	600	TO-64	thyristor
BTW42-800R	16	800	TO-64	thyristor
BTW42-1000R	16	1000	TO-64	thyristor
BT152-400R	20	400	TO-220AB	thyristor
BT152-600R	20	600	TO-220AB	thyristor
BT152-800R	20	800	TO-220AB	thyristor
BTW45-400R	25	400	TO-48	thyristor
BTW45-600R	25	600	TO-48	thyristor
BTW45-800R	25	800	TO-48	thyristor
BTW45-1000R	25	1000	TO-48	thyristor
BTW45-1200R	25	1200	TO-48	thyristor
BTY91-400R	25	400	TO-48	thyristor
BTY91-500R	25	500	TO-48	thyristor
BTY91-600R	25	600	TO-48	thyristor
BTY91-800R	25	800	TO-48	thyristor
BTX94-400H	25	400	TO-48	triac
BTX94-600H	25	600	TO-48	triac
BTX94-800H	25	800	TO-48	triac
BTX94-1000H	25	1000	TO-48	triac
BTX94-1200H	25	1200	TO-48	triac
BTX94-400J	25	400	TO-48	triac
BTX94-600J	25	600	TO-48	triac
BTX94-800J	25	800	TO-48	triac
BTX94-1000J	25	1000	TO-48	triac
BTX94-1200J	25	1200	TO-48	triac
BTW92-800R	32	800	TO-48	thyristor
BTW92-1000R	32	1000	TO-48	thyristor
BTW92-1200R	32	1200	TO-48	thyristor
BTW92-1400R	32	1400	TO-48	thyristor
BTW92-1600R	32	1600	TO-48	thyristor
BTW40-400R	32	400	TO-48	thyristor
BTW40-600R	32	600	TO-48	thyristor
BTW40-800R	32	800	TO-48	thyristor
BTW63-600RK	40	600	TO-48	fast turn off thyristor
BTW63-600RN	40	600	TO-48	fast turn off thyristor
BTW63-600RP	40	600	TO-48	fast turn off thyristor
BTW63-800RK	40	800	TO-48	fast turn off thyristor
BTW63-800RN	40	800	TO-48	fast turn off thyristor

* with isolated base

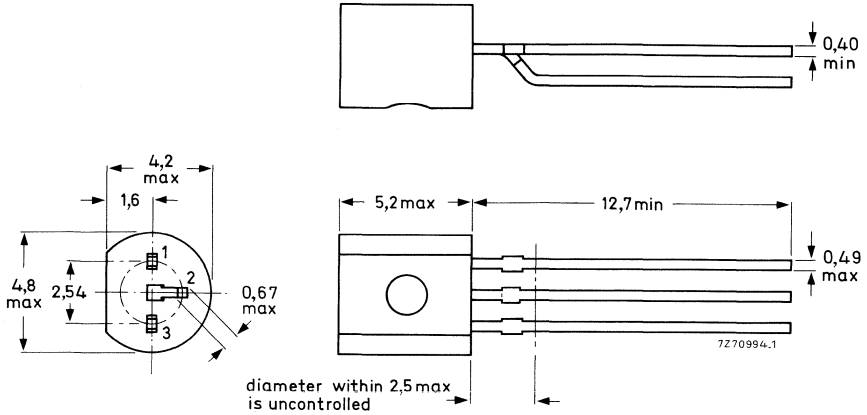
THYRISTORS AND TRIACS

type	I_T (rms) (A)	V_{RRM} (max) (V)	case	version
BTW63-800RP	40	800	TO-48	fast turn off thyristor
BTV34-600G	55	600	TO-65	triac
BTV34-800G	55	800	TO-65	triac
BTV34-1000G	55	1000	TO-65	triac
BTV34-1200G	55	1200	TO-65	triac
BTV34-1400G	55	1400	TO-65	triac
BTV34-1600G	59	1600	TO-65	triac
BTV34-600H	55	600	TO-65	triac
BTV34-800H	55	800	TO-65	triac
BTV34-1000H	55	1000	TO-65	triac
BTV34-1200H	55	1200	TO-65	triac
BTV34-1400H	55	1400	TO-65	triac
BTV34-1600H	55	1600	TO-65	triac
BTV24-600R	70	600	TO-65	thyristor
BTV24-800R	70	800	TO-65	thyristor
BTV24-1200R	70	1200	TO-65	thyristor
BTV24-1400R	70	1400	TO-65	thyristor
BTW23-600R	140	600	TO-94	thyristor
BTW23-800R	140	800	TO-94	thyristor
BTW23-1000R	140	1000	TO-94	thyristor
BTW23-1200R	140	1200	TO-94	thyristor
BTW23-1400R	140	1400	TO-94	thyristor
BTW23-1600R	140	1600	TO-94	thyristor
BGX11-600	50	600	TO-240	double thyristor
BGX11-800	50	800	TO-240	double thyristor
BGX11-1200	50	1200	TO-240	double thyristor
BGX11-1200C	50	1200	TO-240	double thyristor
BGX11-1400C-TT	50	1400	TO-240	double thyristor
BGX12-600	75	600	TO-240	double thyristor
BGX12-800	75	800	TO-240	double thyristor
BGX12-1200	75	1200	TO-240	double thyristor
BGX12-1200C	75	1200	TO-240	double thyristor
BGX12-1400C-TT	75	1400	TO-240	double thyristor
BGX13-600	80	600	TO-240	double thyristor
BGX13-800	80	800	TO-240	double thyristor
BGX13-1200	80	1200	TO-240	double thyristor
BGX13-1200C	80	1200	TO-240	double thyristor
BGX13-1400C-TT	80	1400	TO-240	double thyristor
BGX14-600	95	600	TO-240	double thyristor
BGX14-800	95	800	TO-240	double thyristor
BGX14-1200	95	1200	TO-240	double thyristor
BGX14-1200C	95	1200	TO-240	double thyristor
BGX14-1400C-TT	95	1400	TO-240	double thyristor
BGX15-600	110	600	TO-240	double thyristor
BGX15-800	110	800	TO-240	double thyristor
BGX15-1200	110	1200	TO-240	double thyristor
BGX15-1200C	110	1200	TO-240	double thyristor
BGX15-1400C-TT	110	1400	TO-240	double thyristor
BGX17-600	140	600	TO-240	double thyristor
BGX17-800	140	800	TO-240	double thyristor
BGX17-1200	140	1200	TO-240	double thyristor
BGX17-1200C	140	1200	TO-240	double thyristor
BGX17-1400C-TT	140	1400	TO-240	double thyristor

General data

Voltage range	15 to 250 V
Current range	15 to 800 mA
Transition frequency f_T	60 to 2000 MHz

For detailed information see Data Handbook S3

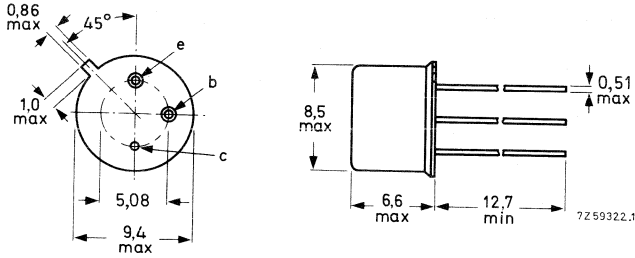


type	pol.	I_C (mA)	V_{CE0} (V)	V_{CBO} (V)	f_T (MHz)	case
BF198	NPN	25	30	40	400	TO-72(1)
BF199	NPN	25	25	40	550	TO-92(1)
BF240	NPN	25	40	40	380	TO-92(1)
BF241	NPN	25	40	40	350	TO-92(1)
BF324	PNP	25	30	30	450	TO-92(2)
BF422	NPN	50	250	250	60	TO-92(3)
BF423	PNP	50	250	250	60	TO-92(3)
BF450	PNP	25	40	40	325	TO-92(1)
BF451	PNP	25	40	40	325	TO-92(1)
BF494	NPN	30	20	30	260	TO-92(1)
BF495	NPN	30	20	30	200	TO-92(1)
PH2222	NPN	800	30	60	250	TO-92(1)
PH2222A	NPN	800	40	75	300	TO-92(1)
PH2369	NPN	500	15	40	> 500	TO-92(1)
PH2907	PNP	600	40	60	> 200	TO-92(1)
PH2907A	PNP	600	60	60	> 200	TO-92(1)

General data

Voltage range	15 to 80 V
Current range	0,2 to 1 A
Transition frequency f_T	> 100 to > 500 MHz

For detailed information see Data Handbook S3



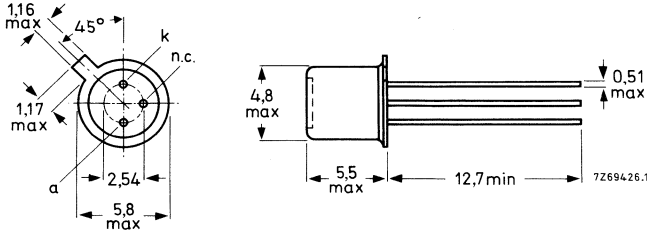
TO-39(1)

type	pol.	I_C (mA)	V_{CEO} (V)	V_{CBO} (V)	f_T (MHz)	case	
2N2219	NPN	800	30	60	250	TO-39(1)	
2N2219A	NPN	800	40	75	250	TO-39(1)	
2N2222	NPN	800	30	60	250	TO-18(1)	
2N2222A	NPN	800	40	75	250	TO-18(1)	
2N2368	NPN	500	15	40	> 400	TO-18(1)	
2N2369	NPN	500	15	40	> 500	TO-18(1)	
2N2369A	NPN	200	15	40	> 500	TO-18(1)	
2N2904	PNP	600	40	60	> 200	TO-39(1)	
2N2904A	PNP	600	60	60	> 200	TO-39(1)	
2N2905	PNP	600	40	60	> 200	TO-39(1)	
2N2905A	PNP	600	60	60	> 200	TO-39(1)	
2N2906	PNP	600	40	60	> 200	TO-18(1)	
2N2906A	PNP	600	60	60	> 200	TO-18(1)	
2N2907	PNP	600	40	60	> 200	TO-18(1)	
2N2907A	PNP	600	60	60	> 200	TO-18(1)	
2N3019	NPN	1000	80	140	> 100	TO-18(1)	
2N4033	PNP	1000	80	80	> 150	TO-18(1)	

General data

Voltage range	15 to 150 V
Current range	0,1 to 1 A

For detailed information see Data Handbook S3



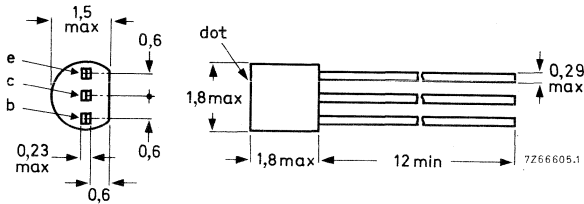
TO-18(1)

type	pol.	I_C (mA)	V_{CEO} (V)	V_{CBO} (V)	t_{off} (ns)	case	
BSS38	NPN	100	100	120	1000	TO-92(2)	
BSS50	NPN	1000	45	60	1500	TO-39(1)	
BSS51	NPN	1000	60	80	1500	TO-39(1)	
BSS52	NPN	1000	80	100	1500	TO-39(1)	
BSS60	PNP	1000	45	60	1500	TO-39(1)	
BSS61	PNP	1000	60	80	1500	TO-39(1)	
BSS62	PNP	1000	80	100	1500	TO-39(1)	
BSW66A	NPN	1000	100	100	1000	TO-39(1)	
BSW67A	NPN	1000	120	120	1000	TO-39(1)	
BSW68A	NPN	1000	150	150	1000	TO-39(1)	
BSX19	NPN	500	15	40	18	TO-18(1)	
BSX20	NPN	500	15	40	21	TO-18(1)	
BSX60	NPN	1000	30	70	70	TO-39(1)	

General data

Voltage range	20 to 80 V
Current range	0,05 to 1 A
D.C. current gain h_{fe}	40 to 800

For detailed information see Data Handbook S3



SOT-42

I_C (A)	V_{CE0} (V)	NPN type	h_{fe}	PNP type	h_{fe}	case
0,05	20	BC146-01	80-200	BC200-01	50-105	SOT-42
0,05	20	BC146-02	140-350	BC200-02	85-200	SOT-42
0,05	20	BC146-03	280-550	BC200-03	165-400	SOT-42
1,1	45	BC107	110-450	BC177	75-260	TO-18(1)
0,1	45	BC107A	110-450			TO-18(1)
0,1	45	BC107B	110-450			TO-18(1)
0,1	20	BC108	110-800	BC178	75-500	TO-18(1)
0,1	20	BC108A	110-220	BC178A	125-260	TO-18(1)
0,1	20	BC108B	200-450	BC178B	240-500	TO-18(1)
0,1	20	BC108B	200-450			TO-18(1)
0,1	20	BC109	200-800	BC179	125-500	TO-18(1)
0,1	20	BC109B	200-450	BC179A	125-260	TO-18(1)
0,1	20	BC109C	420-800	BC179B	240-500	TO-18(1)
0,1	65	BC546	110-450	BC556	75-475	TO-92(2)
0,1	65	BC546A	110-220	BC556A	125-250	TO-92(2)
0,1	65	BC546B	200-450	BC556B	220-475	TO-92(2)

SMALL-SIGNAL TRANSISTORS

L.F.

I_C (A)	V_{CEO} (V)	NPN type	h_{fe}	PNP type	h_{fe}	case
0,1	45	BC547	110-800	BC557	75-475	TO-92(2)
0,1	45	BC547A	110-220	BC557A	125-250	TO-92(2)
0,1	45	BC547B	200-450	BC557B	220-475	TO-92(2)
0,1	45	BC547C	420-800			TO-92(2)
0,1	30	BC548	110-800	BC558	75-475	TO-92(2)
0,1	30	BC548A	110-220	BC558A	125-250	TO-92(2)
0,1	30	BC548B	200-450	BC558B	220-450	TO-92(2)
0,1	30	BC548C	420-800	BC558C	420-800	TO-92(2)
0,1	30	BC549	200-800	BC559	125-475	TO-92(2)
0,1	30			BC559A	125-250	TO-92(2)
0,1	30	BC549B	200-450	BC559B	220-450	TO-92(2)
0,1	30	BC549C	420-800	BC559C	420-800	TO-92(2)
0,1	45	BC550	200-800	BC560	125-475	TO-92(2)
0,1	45			BC560A	125-250	TO-92(2)
0,1	45	BC550B	200-450	BC560B	220-450	TO-92(2)
0,1	45	BC550C	420-800	BC560C	420-800	TO-92(2)
0,2	32	BCY58-VII	120-220	BCY78-VII	120-220	TO-18(1)
0,2	32	BCY58-VIII	180-310	BCY78-VIII	180-310	TO-18(1)
0,2	32	BCY58-IX	250-460	BCY78-IX	250-460	TO-18(1)
0,2	32	BCY58-X	380-630	BCY78-X	380-630	TO-18(1)
0,2	45	BCY59-VII	120-220	BCY79-VII	120-220	TO-18(1)
0,2	45	BCY59-VIII	180-310	BCY79-VIII	180-310	TO-18(1)
0,2	45	BCY59-IX	250-460	BCY79-IX	250-460	TO-18(1)
0,2	45	BCY59-X	380-630	BCY79-X	380-630	TO-18(1)
0,5	45	BC337	100-600	BC327	100-600	TO-92(2)
0,5	45	BC337-16	100-250	BC327-16	100-250	TO-92(2)
0,5	45	BC337-25	160-400	BC327-25	160-400	TO-92(2)
0,5	45	BC337-40	250-600	BC327-40	250-600	TO-92(2)
0,5	45	BC338	100-600	BC328	100-600	TO-92(2)
0,5	45	BC338-16	100-250	BC328-16	100-250	TO-92(2)
0,5	45	BC338-25	160-400	BC328-25	160-400	TO-92(2)
0,5	45	BC338-40	250-600	BC328-40	250-600	TO-92(2)
1	20	BC368	85-375	BC369	85-375	TO-92(3)
1	20	BC375	60-340	BC376	60-340	TO-92(3)
1	45	BC635	40-250	BC636	40-250	TO-92(3)
1	60	BC637	40-160	BC638	40-160	TO-92(3)
1	80	BC639	40-160	BC640	40-160	TO-92(3)



General data

Voltage range	20 to 40 V
Current range	2 to 55 mA

For detailed information see Data Handbook S6

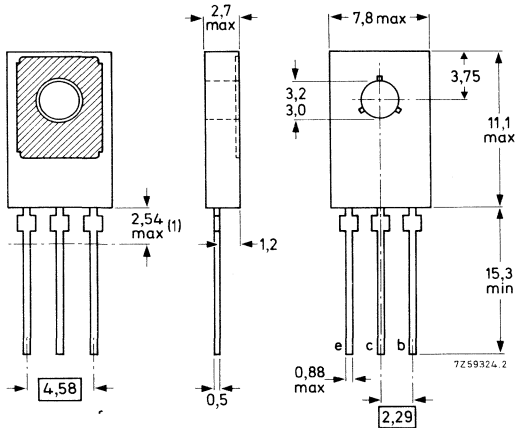
type	technology	V_{DS} (V)	P_{max} (mW)	I_{DSS} (mA)	
BC264A	FET	30	300	2 to 4	TO-92
BC264B	FET	30	300	3,5 to 6,5	TO-92
BC264C	FET	30	300	5 to 8	TO-92
BC264D	FET	30	300	7 to 12	TO-92
BF245A	FET	30	300	2 to 6,5	TO-92
BF245B	FET	30	300	6 to 15	TO-92
BF245C	FET	30	300	12 to 25	TO-92
BF256A	FET	30	300	3 to 7	TO-92
BF256B	FET	30	300	6 to 13	TO-92
BF256C	FET	30	300	11 to 18	TO-92
BF410A	FET	20	300	0,7 to 3	TO-92
BF410B	FET	20	300	2,5 to 7	TO-92
BF410C	FET	20	300	6 to 12	TO-92
BF410D	FET	20	300	10 to 18	TO-92
BFQ12	FET	30	250	0,5 to 10	TO-71 (dual)
BFQ13	FET	30	250	0,5 to 10	TO-71 (dual)
BFQ14	FET	30	250	0,5 to 10	TO-71 (dual)
BFQ15	FET	30	250	0,5 to 10	TO-71 (dual)
BFQ16	FET	30	250	0,5 to 10	TO-71 (dual)
BFR29	MOSFET	30	250	10 to 40	TO-72
BFR84	MOSFET	20	250	20 to 55	TO-72
BFW10	FET	30	300	8 to 20	TO-72
BFW11	FET	30	300	4 to 10	TO-72
BFW12	FET	30	150	1 to 5	TO-72
BFW13	FET	30	150	0,2 to 1,4	TO-72
BFW61	FET	25	300	2 to 20	TO-72
BSV78	FET	40	350	> 50	TO-18
BSV79	FET	40	350	> 20	TO-18
BSV80	FET	40	350	> 10	TO-18
BSV81	MOSFET	30	200	-	TO-72
2N3823	FET	30	300	4 to 20	TO-72
2N3966	FET	30	300	> 2	TO-72
2N4091	FET	40	1800	> 30	TO-18
2N4092	FET	40	1800	> 15	TO-18
2N4093	FET	40	1800	> 8	TO-18
2N4391	FET	40	1800	> 50	TO-18
2N4392	FET	40	1800	> 25	TO-18
2N4393	FET	40	1800	> 5	TO-18
2N4856	FET	40	360	> 50	TO-18
2N4857	FET	40	360	> 20	TO-18
2N4858	FET	40	360	> 8	TO-18
2N4859	FET	30	360	> 50	TO-18
2N4860	FET	30	360	> 20	TO-18
2N4861	FET	30	360	> 8	TO-18

L.F. POWER TRANSISTORS AND MODULES

General data

Voltage range	22 to 200 V
Current range	1 to 25 A
D.C. current gain	25 to 1000

For detailed information see Data Handbook S4



TO-126

NPN	PNP	I_C (A)	V_{CE0} (V)	h_{fe}	case
type	Type				
BD135	BD136	1	45	40-250	TO-126
BD137	BD138	1	60	40-250	TO-126
BD139	BD140	1	80	40-250	TO-126
BDW55	BDW56	1	45	40-250	TO-126
BDW57	BDW58	1	60	40-250	TO-126
BDW59	BDW60	1	80	40-250	TO-126
BD825	BD826	1	45	25	TO-202
BD827	BD828	1	60	25	TO-202
BD829	BD830	1	80	25	TO-202
BD226	BD227	1,5	45	40-250	TO-126
BD228	BD229	1,5	60	40-160	TO-126
BD230	BD231	1,5	80	40-160	TO-126
BD839	BD840	1,5	45	40-250	TO-202
BD841	BD842	1,5	60	40-250	TO-202
BD843	BD844	1,5	80	40-250	TO-202
BD845	BD846	1,5	100	30	TO-202
BD847	BD848	1,5	120	30	TO-202
BD849	BD850	1,5	140	30	TO-202
BD233	BD234	2	45	40-250	TO-126
BD235	BD236	2	60	40-250	TO-126
BD237	BD238	2	80	40-250	TO-126
BD329	BD330	3	20	85-375	TO-126
BD131	BD132	3	45	40	TO-126
BD933	BD934	3	45	40-250	TO-220

L.F. POWER TRANSISTORS AND MODULES

NPN	PNP	I_C	V_{CE0}	h_{fe}	case
type	Type	(A)	(V)		
BD935	BD936	3	60	40-250	TO-220
BD937	BD938	3	80	40-250	TO-220
BD939	BD940	3	100	40-250	TO-220
BD941	BD942	3	120	40-250	TO-220
BD941A	BD942A	3	150	40-250	TO-220
BD433	BD434	4	22	85-475	TO-126
BD435	BD436	4	32	85-475	TO-126
BD437	BD438	4	45	85-475	TO-126
BD675	BD676	4	45	750	TO-126
BD677	BD678	4	60	750	TO-126
BD679	BD680	4	80	750	TO-126
BD681	BD682	4	100	750	TO-126
BD683	BD684	4	120	750	TO-126
BDT61	BDT60	4	80	750	TO-126
BDT61A	BDT60A	4	80	750	TO-126
BDT61B	BDT60B	4	100	750	TO-220
BDT61C	BDT60C	4	120	750	TO-220
BDX35		5	60	45-450	TO-126
BDX37		5	80	45-450	TO-126
BDX36		5	100	45-450	TO-126
BD943	BD944	5	22	85-475	TO-220
BD945	BD946	5	32	85-475	TO-220
BD947	BD948	5	45	85-475	TO-220
BD949	BD950	5	60	40	TO-220
BD951	BD952	5	80	40	TO-220
BD953	BD954	5	100	40	TO-220
BD955	BD956	5	120	40	TO-220
BD957	BD958	5	150	40	TO-220
BD291	BD292	6	45		SOT-82
BD293	BD294	6	60		SOT-82
BD295	BD296	6	80		SOT-82
BD331	BD332	6	60	750	SOT-82
BD333	BD334	6	80	750	SOT-82
BD335	BD336	6	100	750	SOT-82
BD337	BD338	6	120	750	SOT-82
BD201	BD202	8	45	30	TO-220
BD203	BD204	8	60	30	TO-220
BDX77	BDX78	8	80	30	TO-220
BD643	BD644	8	45		TO-220
BD645	BD646	8	60	750	TO-220
BD647	BD648	8	80	750	TO-220
BD649	BD650	8	100	750	TO-220
BD651	BD652	8	120	750	TO-220
BDX91	BDX92	8	60	20	TO-3
BDX93	BDX94	8	80	20	TO-3
BDX95	BDX96	8	100	20	TO-3
BDX63	BDX62	8	60	1000	TO-3
BDX63A	BDX62A	8	80	1000	TO-3
BDX63B	BDX62B	8	100	1000	TO-3
BDX63C	BDX62C	8	120	1000	TO-3
BU806	-	8	200	-	TO-220
BU807	-	8	150	-	TO-220
BDT91	BDT92	10	60	20-200	TO-220



L.F. POWER TRANSISTORS AND MODULES

NPN	PNP	I_C	V_{CEO}	h_{fe}	case
type	Type	(A)	(V)		
BDT93	BDT94	10	80	20-200	TO-220
BDT95	BDT96	10	100	20-200	TO-220
BDT63	BDT62	10	60	1000	TO-220
BDT63A	BDT62A	10	80	1000	TO-220
BDT63B	BDT62B	10	100	1000	TO-220
BDT63C	BDT62C	10	120	1000	TO-220
BDV91	BDV92	10	60	20	SOT-93
BDV93	BDV94	10	80	20	SOT-93
BDV95	BDV96	10	100	20	SOT-93
PH3055T	PH2955T	10	60	30	TO-220
BDT65	BDT64	12	60	1000	TO-220
BDT65A	BDT64A	12	80	1000	TO-200
BDT65B	BDT64B	12	100	1000	TO-220
BDT65C	BDT64C	12	120	1000	TO-220
BDV65	BDV64	12	60	1000	SOT-93
BDV65A	BDV64A	12	80	1000	SOT-93
BDV65B	BDV64B	12	100	1000	SOT-93
BDV65C	BDV64C	12	120	1000	SOT-93
BDX65	BDX64	12	60	1000	TO-3
BDX65A	BDX64A	12	80	1000	TO-3
BDX65B	BDX64B	12	100	1000	TO-3
BDX65C	BDX64C	12	120	1000	TO-3
BDV67A	BDV66A	16	80	1000	SOT-93
BDV67B	BDV66B	16	100	1000	SOT-93
BDV67C	BDV66C	16	120	1000	SOT-93
BDV67D	BDV66D	16	150	1000	SOT-93
BDX67	BDX66	16	60	1000	TO-3
BDX67A	BDX66A	16	80	1000	TO-3
BDX67B	BDX66B	16	100	1000	TO-3
BDX67C	BDX66C	16	120	1000	TO-3
BDX69	BDX68	25	60	1000	TO-3
BDX69A	BDX68A	25	80	1000	TO-3
BDX69B	BDX68B	25	100	1000	TO-3
BDX69C	BDX68C	25	120	1000	TO-3



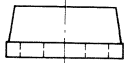
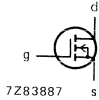
L.F. POWER TRANSISTORS AND MODULES

Power MOS General Data

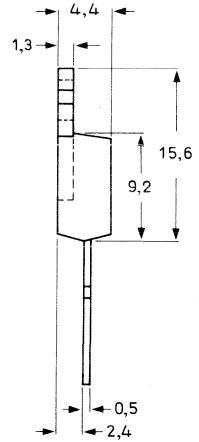
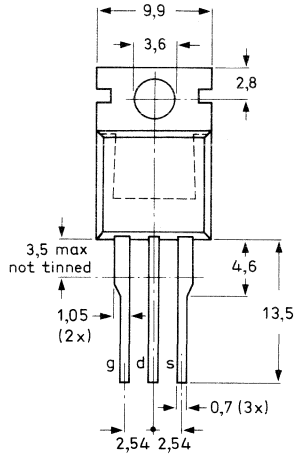
Drain-source voltage
Drain-current

50 to 1000 V
2 to 12,5 A

For detailed information see Data Handbook S9



TO-220



7Z83884

type	V_{DS} (V)	R_{DS} (Ω)	I_D (A)	case
BUZ10	50	0,01	12	TO-220
BUZ11	50	0,04	30	TO-220
BUZ14	50	0,04	39	TO-3
BUZ15	50	0,03	45	TO-3
BUZ20	100	0,2	12	TO-220
BUZ21	100	0,1	19	TO-220
BUZ23	100	0,2	10	TO-3
BUZ24	100	0,06	32	TO-3
BUZ25	100	0,1	19	TO-3
BUZ30	200	0,75	7	TO-220
BUZ33	200	0,75	7,2	TO-3
BUZ34	200	0,2	14	TO-3
BUZ40	500	4,5	2,5	TO-220
BUZ41	500	1,1	5,5	TO-220
BUZ43	500	4,5	2,8	TO-3
BUZ44	500	1,1	5,6	TO-3
BUZ45	500	0,6	9,6	TO-3
BUZ80	800	4	2,6	TO-220
BUZ83	800	4	2,9	TO-3
BUZ84	800	2	5,3	TO-3
BUZ50	1000	3,5	3	TO-220
BUZ53	1000	3,5	3	TO-3
BUZ54	1000	2	5,3	TO-3

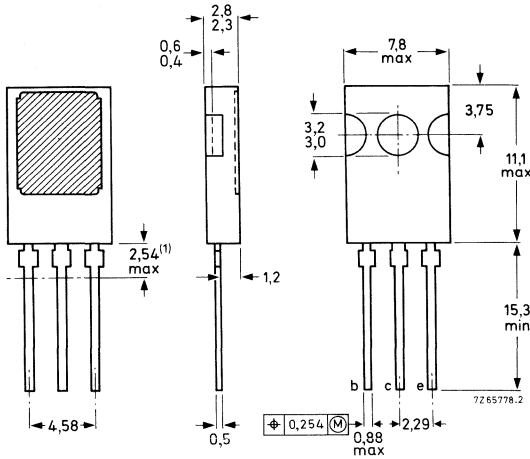
L.F. POWER TRANSISTORS AND MODULES

High voltage transistors, General Data

Voltage range
Current range

160 to 1500 V
1 to 30 A

For detailed information see Data Handbook S4



SOT-82

type	pol.	I_C (A)	V_{CE0} (V)	V_{CBO} (V)	case	remarks
BF469	NPN	0,05	250	250	TO-126	Darlington
BF470	PNP	0,05	250	250	TO-126	
BF471	NPN	0,05	300	300	TO-126	
BF472	PNP	0,05	300	300	TO-126	
BF869	NPN	0,05	250	250	TO-202	
BF870	PNP	0,05	250	250	TO-202	
BF871	NPN	0,05	300	300	TO-202	
BF872	PNP	0,05	300	300	TO-202	
BF457	NPN	0,1	160	160	TO-126	
BF458	NPN	0,1	250	250	TO-126	
BF459	NPN	0,1	300	300	TO-126	
BF419	NPN	0,1	250	300	TO-126	
BF819	NPN	0,1	250	300	TO-202	
BU824	NPN	0,5	375	650	TO-202	
BUX86	NPN	0,5	400	800	TO-126	
BUX87	NPN	0,5	450	1000	TO-126	
BUW84	NPN	2	400	800	SOT-82	
BUW85	NPN	2	450	1000	SOT-82	
BUX84	NPN	2	400	800	TO-220	
BUX85	NPN	2	450	1000	TO-220	
BU505	NPN	2,5	700	1500	TO-220	
BU705	NPN	2,5	700	1500	SOT-93	
BUT11	NPN	5	400	850	TO-220	
BUT11A	NPN	5	450	1000	TO-220	
BUW11	NPN	5	400	850	SOT-93	

L.F. POWER TRANSISTORS AND MODULES

type	pol.	I_C (A)	V_{CE0} (V)	V_{CB0} (V)	case	remarks
BUW11A	NPN	5	450	1000	SOT-93	
BUS11	NPN	5	400	850	TO-3	
BUS11A	NPN	5	450	1000	TO-3	
BUX89	NPN	6	400	650	TO-220	Darlington
BU426	NPN	6	400	800	SOT-93	
BU426A	NPN	6	450	900	SOT-93	
BU826	NPN	6	400	800	TO-3	Darlington
BU826A	NPN	6	450	900	TO-3	Darlington
BU433	NPN	6	400	800	SOT-93	
BUV82	NPN	6	450	850	SOT-93	
BUV83	NPN	6	600	1000	SOT-93	
BUY89	NPN	6	800	1500	TO-3	
BUW12	NPN	8	400	850	SOT-93	
BUW12A	NPN	8	450	1000	SOT-93	
BU508A	NPN	8	700	1500	SOT-93	
BUS12	NPN	8	400	850	TO-3	
BUS12A	NPN	8	450	1000	TO-3	
BUX80	NPN	8	400	800	TO-3	
BUX81	NPN	8	450	1000	TO-3	
BUV89	NPN	8	800	1200	SOT-93	
BUV90	NPN	12	400	650	TO-3	Darlington
BUX88	NPN	12	800	1200	TO-3	
BUW13	NPN	15	400	850	SOT-93	
BUW13A	NPN	15	450	1000	SOT-93	
BUS13	NPN	15	400	850	TO-3	
BUS13A	NPN	15	450	1000	TO-3	
BUS14	NPN	30	400	850	TO-3	
BUS14A	NPN	30	450	1000	TO-3	

TRANSMITTING TRANSISTORS AND MODULES - SURVEY

For detailed information see Data Handbook S6

P _o (W)	H.F.-S.S.B. (1,6-30 MHz)	V.H.F. mobile (30-175 MHz)	F.M. broadcast (87-108 MHz)	Band III transposer (175-225 MHz)
0,5				BGY55
1,0	BLY87/BLV10 BLY91/BLV20	2N3866 2N4427	2N3866	BLV30
2,0		BGY93 BFQ42		
4,0		BFS22A/23A BFQ43 BGY94	BLW90	BLV31
8,0		BLY91 BLV20 BLY87 BLV10		
10	BLY88 BLV11 BLY92 BLV22			BLV32F
13		BGY43		
15	BLY89 BLW87	BLY88 BLV11, BLY92 BLV21	BLV21	
18		BGY32/35/36	BGY33	BLV33F
20				BLV33
21		BLY89 BLY93 BLW84 BLW87		
25	BLX13 BLW83 BLW85 BLW60			
30		BGY45 BLV30/12		
45	BLX39 BLW86	BLX39 BLW86, BLW60 BLW85, BLV45/12	BLX39 BLW86	
50	BLX14	BLY90 BLY94		
65	BLW50F			
80	BLW76 BLW99	BLV75/12 BLV80/28	BLV80/28 BLW76 BLW78	
100		BLW77		
130	BLW77	BLV25	BLV25	
150	BLX15 BLW95	BLX15, BLW95		
180	BLW97	BLW97		
200	BLW96	BLW96	BLV37	BLV38
250				

MODULES ARE PRINTED BOLD



TRANSMITTING TRANSISTORS AND MODULES - SURVEY

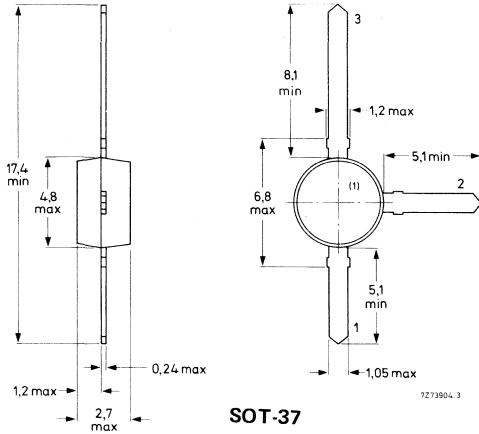
P _o (W)	U.H.F. mobile (225-512 MHz)	Band IV-V transposer (470-860 MHz)	U.H.F. mobile (790-960 MHz)
0,5		BLW32	BLU98
1,0	2N3866	BLW33	BLV90
		BLW34	BGY95
2,0	BGY46/47		BLV91
	BLW89 BLW79		
	BLW80 BLW90	BLU99 BLW98 BLX98	BLV92 BLU99
4,0			
	BGY40 BGY48		BGY96
8,0		BLV57	BLV93
			BGY90
10	BLW81 BLW91		
13	BGY41		
15			
			BLV94
18			
20	BLU20/12	BGS57 BLY58	BGY91
21			
25			
			BLV95
30			
	BLU30/12	BLV59	BLV97
	BLU50		
45	BLU51 BLU45/12		
50			
	BLU60/12		
	BLU52		
65			
80			
100	BLU53		
130			
150			
180			
200			
250			

MODULES ARE PRINTED BOLD



WIDEBAND TRANSISTORS AND MODULES

For detailed information see Data Handbook S10



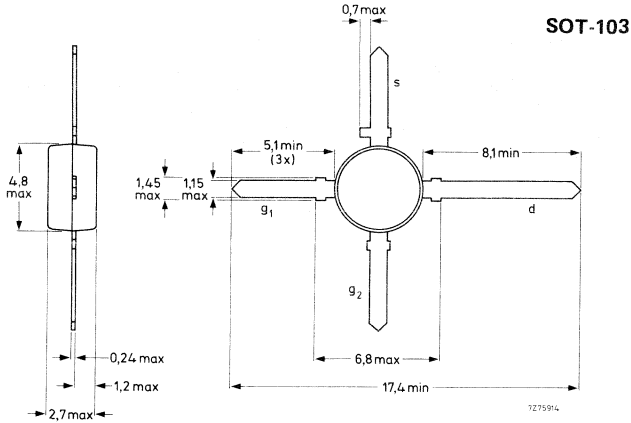
type	technology	case	application
BF960	MOSFET	SOT-103	UHF
BF964	MOSFET	SOT-103	VHF
BF966	MOSFET	SOT-103	UHF
BF980	MOSFET	SOT-103	UHF
BF981	MOSFET	SOT-103	VHF
BF982	MOSFET	SOT-103	VHF

WIDEBANDTRANSISTORS

type	polarity	V_{CE0} (V)	I_{CM} (mA)	H_{fe}	case
BFX89	NPN	15	50	20-150	TO-72
BFW92	NPN	15	50	20-150	SOT-37
BFY90	NPN	15	50	25-150	TO-72
BFW30	NPN	10	100	> 25	TO-72
BFW93	NPN	10	100	> 25	SOT-37
BFW16A	NPN	25	300	> 25	TO-39
BFW17A	NPN	25	300	> 25	TO-39
BFR64	NPN	25	500	> 25	SOT-48
BFR65	NPN	25	1000	> 30	SOT-48

WIDEBAND TRANSISTORS AND MODULES

For detailed information see Data Handbook S10



type	polarity	F_{typ} (dB)	at f (MHz)	case
BFG90A	NPN	-	-	SOT-103/E1
BFG91A	NPN	-	-	SOT-103/E1
BFG96	NPN	-	-	SOT-103/E1
BFP90A	NPN	1,7	800	SOT-173
BFP91A	NPN	1,6	800	SOT-173
BFP96	NPN	2,5	800	SOT-173
BFQ22	NPN	1,9	500	TO-72
BFQ22S	NPN	1,9	500	TO-72
BFQ23	PNP	2,4	500	SOT-37
BFQ24	PNP	2,4	500	TO-72
BFQ32	PNP	3,75	500	SOT-37
BFQ34	NPN	8	500	SOT-122
BFQ34T	NPN	-	-	SOT-37
BFQ51	PNP	2,6	500	SOT-37
BFQ52	PNP	2,7	500	TO-72
BFQ53	NPN	2,4	500	TO-72
BFQ63	PNP	2,3	500	TO-72
BFQ68	NPN	-	800	SOT-122
BFR49	NPN	2,5	1000	SOT-100
BFR90	NPN	2,4	500	SOT-37
BFR90A	NPN	2,4	500	SOT-37
BFR91	NPN	1,6	500	SOT-37
BFR91A	NPN	1,6	800	SOT-37
BFR94	NPN	5	200	SOT-48
BFR95	NPN	9	200	TO-39
BFR96	NPN	3,3	500	SOT-37
BFR96S	NPN	4	800	SOT-37
BFT24	NPN	3,8	500	SOT-37
BFW92A	NPN	2,5	800	SOT-37

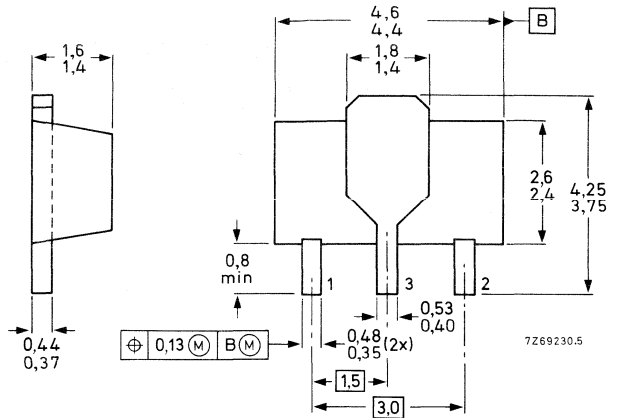
WIDEBAND TRANSISTORS AND MODULES

For detailed information see Data Handbook S10

type	frequency range (MHz)	power gain (dB) at $f = 50$ MHz	application	V_o (dBmV) at $d_{im} = -60$ dB (DIN 45004B, par.6.3:3-tone)
BGY61	5 - 200	$13,0 \pm 0,5$	reverse amplifier	≥ 64
BGY65	5 - 200	$18,5 \pm 0,5$	reverse amplifier	≥ 65
BGY67	5 - 200	$22,5 \pm 0,5$	reverse amplifier	≥ 64
BGY50	40 - 300	$12,5 \pm 0,4$	preamplifier	≥ 61
BGY51	40 - 300	$12,5 \pm 0,4$	post amplifier	$\geq 63,5$
BGY52	40 - 300	$16,4 \pm 0,4$	preamplifier	≥ 61
BGY53	40 - 300	$16,4 \pm 0,4$	post amplifier	$\geq 63,5$
BGY54	40 - 300	$17,0 \pm 0,4$	preamplifier	≥ 61
BGY55	40 - 300	$17,0 \pm 0,4$	post amplifier	$\geq 63,5$
BGY56	40 - 300	$22,0 \pm 0,6$	preamplifier	$\geq 61,5$
BGY57	40 - 300	$22,0 \pm 0,6$	post amplifier	≥ 64
BGY58	40 - 300	$33,0 \pm 1,0$	line extender	≥ 64
BGY58A	40 - 330	$34,0 \pm 1,0$	line extender	≥ 64
BGY59	40 - 300	$38,5 \pm 1,0$	line extender	≥ 64
BGY60	40 - 300	$33,3 \pm 1,0$	interstage amplifier (2 x 17 dB)	≥ 64
BGY70	40 - 450	$12,5 \pm 0,4$	preamplifier	$\geq 62,5$
BGY71	40 - 450	$12,5 \pm 0,4$	post amplifier	≥ 65
BGY74	40 - 450	$17,0 \pm 0,4$	preamplifier	$\geq 62,5$
BGY75	40 - 450	$17,0 \pm 0,4$	post amplifier	≥ 65
BGY78	40 - 450	$34,0 \pm 1,0$	line extender	≥ 62

All modules normally operate at $V_B = 24$ V, but are able to withstand supply transients up to 30 V.

For detailed information see Data Handbook S7



SOT-89

Diodes

type	V_R (V)	t_{rr} max. (ns)	case	description
BAS16	75	6	SOT-23	high-speed switch
BAS17		-	SOT-23	low-voltage stabilizer
BAS19	100	50	SOT-23	high-speed switch
BAS20	150	50	SOT-23	high-speed switch
BAS21	200	50	SOT-23	high-speed switch
BAT17	4	-	SOT-23	Schottky barrier
BAT18	35	-	SOT-23	band switch
BAV70	70	6	SOT-23	common cathode double diode
BAV99	70	6	SOT-23	two diodes in series
BAW56	70	6	SOT-23	common anode double diode

Variable capacitance diodes

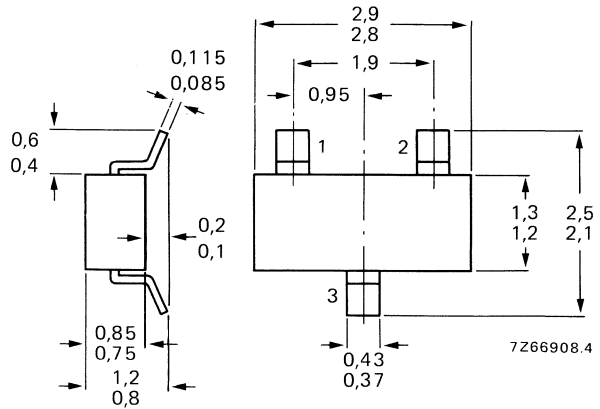
type	V_R (V)	C_d at $V_R = 25$ V (pF)	case	C_d ratio at $V_R = 3/25$
BBY31	28	1,8 - 2,8	SOT-23	typ 5
BBY40	28	4,3 - 6	SOT-23	> 5

Voltage regulator diodes

type	range (V)	P_{tot} (mW)	case	
BZV49	2,4 to 75	1000	SOT-89	
BZX84	2,4 to 75	350	SOT-23	



For detailed information see Data Handbook S7



SOT-23

General purpose transistors in SOT-23/SOT-89*

type	V_{CE0} (V)	I_C (mA)	h_{FE} min./max.	V_{CEsat} max. (V)	f_T typ. (MHz)
PNP					
BC807	45	500	100/600	0,70	100
BC808	25	500	100/600	0,70	100
BC856	65	100	75/475	0,30	150
BC857	45	100	75/475	0,30	150
BC858	30	100	75/800	0,30	150
BC869*	20	1000	85/375	0,50	60
BCW29;R	32	100	120/260	0,30	150
BCW30;R	32	100	215/500	0,30	150
BCW61A	32	200	120/220	0,25	180
BCW61B	32	200	180/310	0,25	180
BCW61C	32	200	250/460	0,25	180
BCW61D	32	200	380/630	0,25	180
BCW69R	45	100	120/260	0,30	150
BCW70;R	45	100	215/500	0,30	150
BCW89;R	60	100	120/260	0,30	150
BCX17;R	45	500	100/600	0,62	100
BCX18;R	25	500	100/600	0,62	100
BCX51*	45	1000	40/250	0,50	50
BCX52*	60	1000	40/160	0,50	50
BCX53*	80	1000	40/160	0,50	50
BCX71G	45	200	120/220	0,25	180
BCX71H	45	200	180/310	0,25	180
BCX71J	45	200	250/460	0,25	180
BCX71K	45	200	380/630	0,25	180

* Types in SOT-89 are denoted by an asterisk (*).

MICROMINIATURE SEMICONDUCTORS

General purpose transistors in SOT-23/SOT-89*

type	V _{CEO} (V)	I _C (mA)	h _{FE} min./max.	V _{CEsat} max. (V)	f _T typ. (MHz)
N-P-N					
BC817	45	500	100/600	0,70	200
BC818	25	500	100/600	0,70	200
BC846	65	100	220/800	0,25	300
BC847	45	100	220/800	0,25	300
BC848	30	100	220/800	0,25	300
BC868*	20	1000	85/375	0,50	60
BCV71	60	100	110/220	0,25	300
BCV72	60	100	200/450	0,25	300
BCW31;R	32	100	110/220	0,25	300
BCW32;R	32	100	200/450	0,25	300
BCW33;R	32	100	420/800	0,25	300
BCW60A	32	200	120/220	0,35	250
BCW60B	32	200	180/310	0,35	250
BCW60C	32	200	250/460	0,35	250
BCW60D	32	200	380/630	0,35	250
BCW71;R	45	100	110/220	0,25	300
BCW72;R	45	100	220/450	0,25	300
BCW81;R	45	100	420/800	0,25	300
BCX19;R	45	500	100/600	0,62	200
BCX20;R	25	500	100/600	0,62	200
BCX54*	45	1000	45/250	0,50	130
BCX55*	60	1000	40/160	0,50	130
BCX56*	80	1000	40/160	0,50	130
BCX70G	45	200	120/220	0,35	250
BCX70H	45	200	180/310	0,35	250
BCX70J	45	200	250/460	0,35	250
BCX70K	45	200	380/630	0,35	250

Low-noise transistors in SOT-23 (F < 4 dB at f = 1 kHz; B = 200 Hz)

type	V _{CEO} (V)	I _C (mA)	h _{FE} min./max.	V _{CEsat} max. (V)	f _T typ. (MHz)
P-N-P					
BCF29	32	100	120/260	0,3	150
BCF30	32	100	215/500	0,3	150
BCF70	45	100	215/500	0,3	150
BC859	30	100	125/800	0,3	150
BC860	45	100	125/800	0,3	150
N-P-N					
BCF32	32	100	200/450	0,25	300
BCF33	32	100	420/800	0,25	300
BCF81	45	100	420/800	0,25	300
BC849	30	100	450/800	0,25	300
BC850	45	100	450/800	0,25	300

* Types in SOT-89 are denoted by an asterisk (*).



High frequency transistors in SOT-23

type	V _{CEO} (V)	I _C (mA)	h _{FE} min/max	F typ. (dB)	f _T typ. (MHz)
PNP					
BF536	30	25	25/-	5	350
BF550;R	40	25	50/-	2	325
BF569	35	30	25/-	4,5	900
BF579	20	25	20/-	4,5	1350
BF660	30	25	30/-	-	650
BF767	30	20	15/-	4	900
NPN					
BFS18;R	20	30	35/125	4	200
BFS19;R	20	30	65/225	4	260
BFS20;R	20	25	40/85	-	450

Wideband transistors SOT23/SOT-89*

type	V _{CEO} (V)	I _C (mA)	h _{FE} min/max	F typ. (dB)	f _T typ. (GHz)
PNP					
BFT92;R	15	25	20/-	2,7	5
BFT93;R	12	35	20/-	2,4	5
NPN					
BFQ17	25	150	25/-	-	1,2
BFQ18A*	15	150	25/-	-	3,6
BFQ19*	15	75	25/-	3,3	5,0
BFR53;R	10	50	25/-	<5	2,0
BFR92;R	15	25	25/-	2,4	5,0
BFR92A;R	15	25	40/-	1,8	5,0
BFR93;R	12	35	25/-	1,9	5,0
BFR93A;R	12	35	40/-	1,6	5,0
BFS17;R	15	25	20/150	4,5	1,3
BFT25;R	5	2,5	20/-	3,8	2,3

* Types in SOT-89 are denoted by an asterisk (*)



Switching transistors in SOT-23/SOT-89*

type	V _{CEO} (V)	I _C (mA)	h _{FE} min/max	V _{CEsat} max. (V)	t (max) on/off (ns)
PNP					
BSR12;R	15	100	30/120	0,45	20/30
BSR15;R	40	600	100/300	1,6	45/100
BSR16;R	60	600	100/300	1,6	45/100
BSR18;R	40	200	50/150	0,40	70/250
BSR18A;R	40	200	100/300	0,4	70/300
BSR30*	60	1000	40/120	0,5	500/650
BSR31*	60	1000	100/300	0,5	500/650
BSR32*	80	1000	40/120	0,5	500/650
BSR33*	80	1000	100/300	0,5	500/650
BSS63;R	100	100	30/-	0,25	-
BST60*	45	500	1000/-	1,3	400/1500
BST61*	60	500	1000/-	1,3	400/1500
BST62*	80	500	1000/-	1,3	400/1500
NPN					
BRS13;R	30	800	100/300	1,6	35/285
BSR14;R	40	800	100/300	1,0	35/285
BSR17;R	40	200	50/150	0,3	70/225
BSR17A;R	40	200	100/300	0,3	70/250
BSR40*	60	1000	40/120	0,5	250/1000
BSR41*	60	1000	100/300	0,5	250/1000
BSR42*	80	1000	40/120	0,5	250/1000
BSR43*	80	1000	100/300	0,5	250/1000
BSS64;R	80	100	20/80	0,2	-/1000
BSV52;R	12	100	40/120	0,4	12/18
BST50*	45	500	1000/-	1,3	400/1500
BST51*	60	500	1000/-	1,3	400/1000
BST52*	80	500	1000/-	1,3	400/1000

High voltage transistors in SOT-23/SOT89*

type	V _{CEO} (V)	I _C (mA)	h _{FE} min/max	V _{CEsat} max. (V)	t (max) min. (MHz)
PNP					
BF621*	-	20	50/-	0,8	60
BF623*	250	20	50/-	0,8	60
BF821	-	50	50/-	0,8	60
BF823	250	50	50/-	0,8	60
BST15*	200	1000	30/150	2,5	15
BST16*	300	1000	30/120	2,0	15
NPN					
BF620*	-	20	50/-	0,6	60
BF622*	250	20	50/-	0,6	60
BF820	-	50	50/-	0,6	60
BF822	250	50	50/-	0,6	60

* Types in SOT-89 package are denoted by an asterisk (*)



Field-effect transistors in SOT-23/SOT-143*

type	$\pm V_{DS}$ (V)	I_D (mA)	I_{DPS} min/max (mA)	$-V_{(P)GS}$ max. (V)	$ y_{fs} $ min. (mA/V)
BF510	20	30	0,7/3,0	0,8	2,5
BF511	20	30	2,5/7,0	1,5	4
BF512	20	30	6/12	2,2	6
BF513	20	30	10/18	3	7
BFR30	25	10	4/10	5	1
BFR31	25	10	1/5	2,5	1,5
BFR101A*	30	10	0,2/1,5	1,0	1,2
BFR101B*	30	10	1/5	2,5	2,5
BFT46	25	10	0,2/1,5	1,2	1,0
BSR56	40	-	50/-	10	-
BSR57	40	-	20/100	6	-
BSR58	40	-	8/80	4	-

* Types in SOT-143 are denoted by an asterisk (*)

Dual-gate field-effect transistors in SOT-143

type	$\pm V_{DS}$ (V)	I_D (mA)	I_{DPS} min/max (mA)	$-V_{(P)GS}$ max. (V)	$ y_{fs} $ min. (mA/V)
BF989	20	20	2/20	2,7	9,5
BF990	18	30	-	1,3	17
BF991	20	20	4/25	2,5	10
BF992	20	40	-	1,3	20
BF994	20	30	2/20	2,5	15
BF996	20	30	2/20	2,5	15

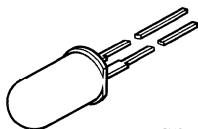
Trigger devices

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

For detailed information see Data Handbook S8

Light Emitting Diodes

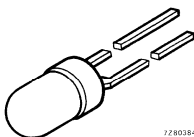
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SOD-63

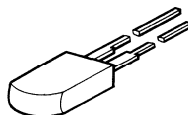
Ø 3



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SOD-53E

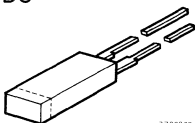
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SOD-65

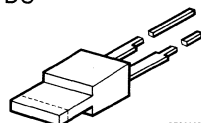
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DC



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SOD-76

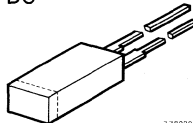
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DC



7280378

SOD-75

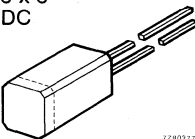
5 x 3
DC



7280380

SOD-77

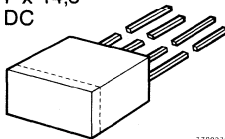
5 x 5
DC



7280377

SOD-74

7 x 14,5
DC



7280375

SOD-73

For detailed information see Data Handbook S8

outline indication dimensions in mm item no.	type	light colour	λ_{peak} (nm)	$\alpha 50\%$	V_F at $I_F = 10 \text{ mA}$ (V)	I_F max. (mA)	case colour/ diffusor	
Ø 5	1*	CQX24	hyper-red	650	25°	1,75	100	transparent
	2*	CQX54	super-red	630	25°	2,1	30	transparent
	3*	CQX64	super-green	565	25°	2,1	60	transparent
	4*	CQX74	yellow	590	25°	2,1	30	transparent
	5*	CQW24	hyper-red	650	60°	1,75	100	red/diff.
	6*	CQY24B	standard-red	650	60°	1,6	50	red/diff.
	7*	CQY94B	super-green	565	60°	2,1	60	green/diff.
SOD-63	8*	CQY96	yellow	590	60°	2,1	30	yellow/diff.
Ø 3	9	CQW54	hyper-red	650	60°	1,75	60	red/diff.
	10	CQY54A	standard-red	650	60°	1,6	50	red/diff.
	11	CQY95B	super-green	565	60°	2,1	60	green/diff.
	12	CQY97A	yellow	590	60°	2,1	30	yellow/diff.
SOD-53E								
5 x 2,5	13	CQX10	super-red	630	50°	2,1	30	red/diff.
	14	CQX11	super-green	565	50°	2,1	60	green/diff.
	15	CQX12	yellow	590	50°	2,1	30	yellow/diff.
SOD-65								
5 x 2,5 DC	16*	CQW10A	hyper-red	650	100°	1,75	100	dark red
	17*	CQW10B	super-red	630	100°	2,1	30	dark red
	18*	CQW11B	super-green	565	100°	2,1	60	dark green
	19*	CQW12B	yellow	590	100°	2,1	30	dark yellow
	SOD-76							
5 x 1 DC	20*	CQV60A	hyper-red	650	110°	1,75	100	red
	21*	CQV60	super-red	630	110°	2,1	30	red
	22*	CQV61A	super-green	565	110°	2,1	60	green
	23*	CQV62	yellow	590	110°	2,1	30	yellow
SOD-75								

* indicates availability of a long lead (25 mm) version; in that case letter L is added to the type number e.g. CQX24L.

DC double cast product (with diffusing zone), flat top.



existing I_v classes in mcd ad $I_f = 10$ mA

0,5	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
	I _{*¹⁾} I _* I _*	II ¹⁾	III ¹⁾ III III	I _* > 4,0 IV _{*¹⁾} IV IV	II _* > 7,5 V _* V _*	X _* > 12 X _* > 12 X _* > 12	I _* > 20	II _* > 50	III _* > 100
	X _{*¹⁾} X _* X _*	II ¹⁾	III _{*¹⁾} III III	X _* > 4,0 IV IV	V V _* V _*	VI	VII _*		
	I _* I _* I _*	II II II	III III III	IV _* IV _* IV _*					
		X _*	III	IV					
X _* X _* X _*		II II II	III III III						
X _* X _* X _*		X _* II II II	III III III	IV					

X class without classification number; basic type number used only, e.g. CQX54.

* class without maximum I_v value; minimum I_v level specified only.

1) for these classes $I_f = 20$ mA



outline indication dimensions in mm item no.	type	light colour	λ_{peak} (nm)	$\alpha 50\%$	V_F at $I_F = 10$ mA (V)	I_F max. (mA)	case colour/ diffusor	
5 x 3 DC	24*	CQV70A	hyper-red	650	100°	1,75	100	red
	25*	CQV70	super-red	630	100°	2,1	30	red
	26*	CQV71A	super-green	565	100°	2,1	60	green
	27*	CQV72	yellow	590	100°	2,1	30	yellow
SOD-77								
5 x 5 DC	28	CQV80AL	hyper-red	650	100°	1,75	100	red
	29	CQV80L	super-red	630	100°	2,1	30	red
	30	CQV81L	super-green	565	100°	2,1	60	green
	31	CQV82L	yellow	590	100°	2,1	30	yellow
SOD-74								
7 x 14,5 DC	32	CQN10	hyper-red	650	100°	1,75	100	red
	33	CQN11	super-green	565	100°	2,1	60	green
SOD-73								
5 x 3 SOD-77	34	CQT10	hyper-red	650	110°	1,75	100	trans. DC
5 x 1 SOD-75	35	CQT12	super-green	565	110°	2,1	60	trans. DC
			hyper-red	650	110°	1,75	100	trans. DC
			super-green	565	110°	2,1	60	trans. DC

* indicates availability of long lead (25 mm) version; in that case letter L is added to the type number e.g. CQX24L.

DC double cast product (with diffusing zone), flat top.

existing I_v classes in mcd at $I_F = 10$ mA

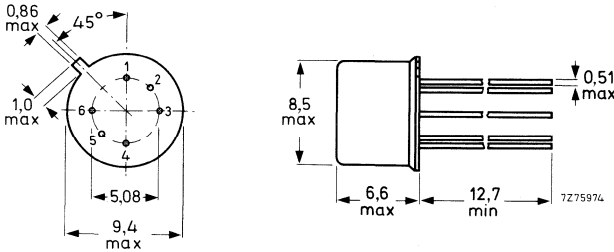
0,5	0,7 - 1,6	1,0 - 2,2	1,6 - 3,5	3,0 - 7,0	5 - 12	10 - 22	16 - 35	30 - 70	50 - 120
X*		X*	III	IV					
X*		II	III	IV					
X*		II	III						
X*		II	III						
X*		X*	III	IV					
X*		II	III						
X*		II	III						
X*		II	III						
			X* > 2 X* > 2 ¹⁾						
		X*							
		X* ¹⁾							
		X*							
		X* ¹⁾							

X class without classification number; basic type number used only, e.g. CQX54.

* class without maximum I_v value; minimum I_v level specified only.

¹⁾ For this class $I_F = 20$ mA.

For detailed information see Data Handbook S8

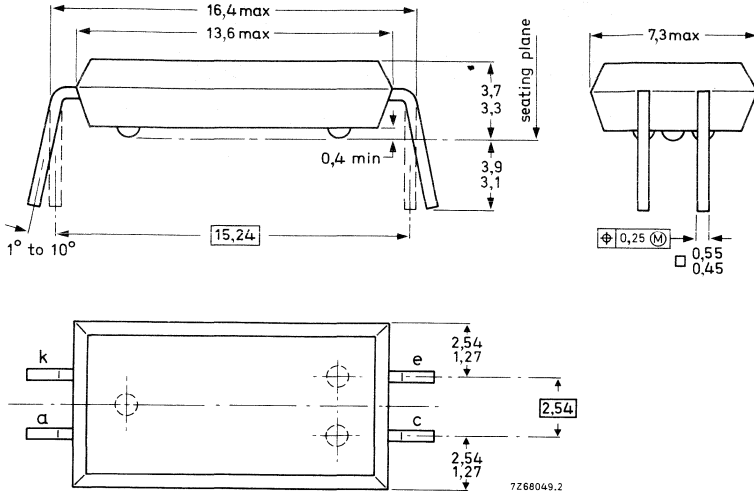


type	current transfer ratio $V_{CE} = 0,4 \text{ V}; I_F = 10 \text{ mA}$		isolation voltage d.c. (kV)	photodiode I_F (mA)	$V_{R \text{ max}}$ (V)
	τ_{min}	τ_{typ}			
CNX21	0,2	0,44	10	100	5
CNX35	0,4 - 0,6	0,8	4,4	100	3
CNX36	0,8	0,8	4,4	100	3
CNX37	0,4	0,8	5,3	100	3
CNX38	0,7	0,8	4,4	100	3
CNX44	0,3	0,6	1,0	100	3
CNX48	5,0*	12,0*	4,4	60	3
CNX62	0,4	0,8	5,3	100	3
CNY50-1	0,25 - 1,0	0,4	10	100	3
CNY50-2	0,4 - 1,6	0,8	10	100	3
CNY57	0,2 - 0,8	0,5	4,3	100	3
CNY57A	0,4	1,0	4,3	100	3
CNY62	0,25	0,5	5,3	100	3
CNY63	0,5	1,0	4,3	100	3

* CNX48: tested at $V_{CE} = 1 \text{ V}; I_F = 1 \text{ mA}$.



For detailed information see Data Handbook S8

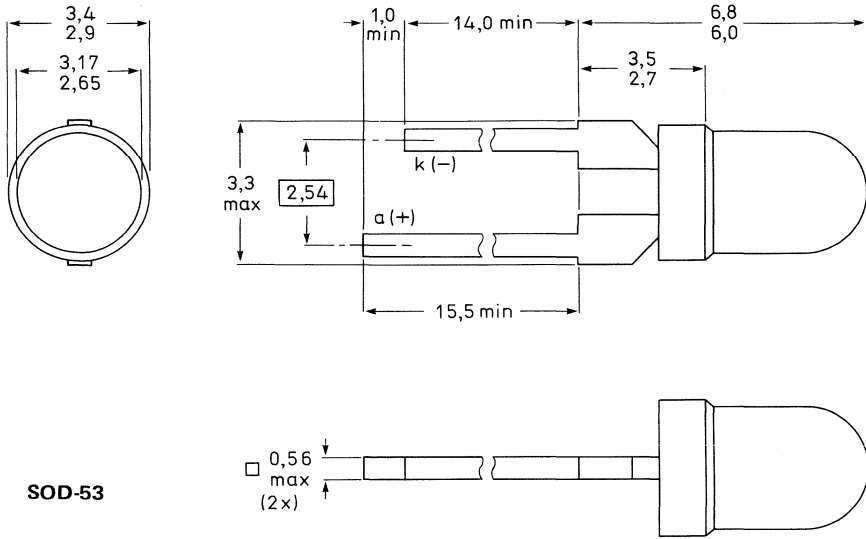


SOT-91B

phototransistor V_{CEmax}	$P_{tot max}$	switching times $V_{CC} = 5 V; R_L = 100 \Omega$ $I_{C on} = 2 mA$		case	type
(V)	(mW)	t_{on} (μs)	t_{off} (μs)		
30	100	2	2	-	CNX21
30	200	3	3	SOT-90	CNX35
30	200	3	3	SOT-90	CNX36
30	200	3	3	SOT-90	CNX37
80	200	3	3	SOT-90	CNX38
50	300	5	5	SOT-104C	CNX44
30	200	5	30	SOT-90	CNX48
50	200	3	3	SOT-174	CNX62
50	150	5	5	SOT-104B	CNY50-1
50	150	5	5	SOT-104B	CNY50-2
30	200	3	3	SOT-90	CNY57
30	200	6	5	SOT-90	CNY57A
50	200	3	3	SOT-91B	CNY62
30	200	5	5	SOT-91B	CNY63



For detailed information see Data Handbook S8



SOD-53

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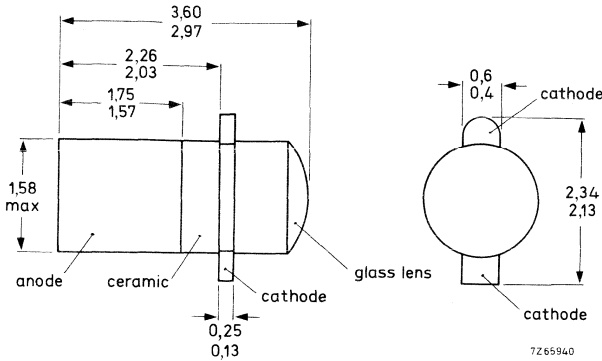
IR-receivers*

type	λ_p (nm)	$B_{50\%}$ (nm)	$\alpha_{50\%}$ (deg.)	V_R max or V_{CE} max (V)*	I_R max 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)
							(mA)	(mW/cm ²)	(V)	
BPX40	800	350	120	18	5	-	0,019	7,7	15	$1,7 \times 10^{-3}$
BPX41	800	350	120	18	10	-	0,04	7,7	15	5×10^{-3}
BPX42	800	350	120	12	50	-	0,15	7,7	10	17×10^{-3}
BPW22A-1	800	400	20	50	25	100	1,5 - 8	1,0	5	11,0
BPW22A-2	800	400	20	50	25	100	5 - 25	1,0	5	11,0
BPW50	930	150	120	32	-	150	0,045	1,0	5	0,045
BPX95C-1	800	400	20	30	25	100	3 - 5	1,0	5	9,0
BPX95C-2	800	400	20	30	25	100	> 10	1,0	5	9,0
BPX71-203	800	400	40	50	20	100	4 - 8	20	5	1,0
BPX71-204	800	400	40	50	20	100	7 - 15	20	5	1,0
BPX72D	800	300	120	30	25	180	0,85 - 2	4,75	5	0,2
BPX72E	800	300	120	30	25	180	1,4 - 3	4,75	5	0,2
BPX25	800	300	15	32	100	300	13	7,7	6	125
BPX29	800	300	62	32	100	300	0,8	7,7	6	-

* V_R & I_R with diodes, V_{CE} & I_C with transistors.



For detailed information see Data Handbook S8



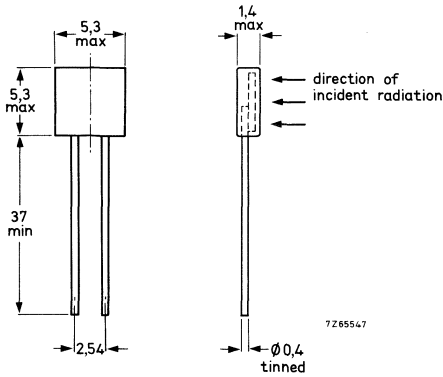
DO-31

IR-emitters

type	λ_p	$B_{50\%}$	$\alpha_{50\%}$	$I_F \text{ max}$	P_{totmax}	$I_e \text{ typ at } I_F \text{ and } V_p$			$I_e \text{ typ at } I_F = 20 \text{ mA}$	case
	(nm)	(nm)	(deg.)	(mA)	(mA)	(mW/sr)	(mA)	(V)		
CQY58A-1	930	50	20	50	100	3	20	1,2	3	SOD-53
CQY58A-2	930	50	20	50	100	6	20	1,2	6	SOD-53
CQY89A-1	930	50	40	130	215	15	100	1,4	4,4	SOD-63A
CQY89A-2	930	50	40	130	215	22	100	1,4	4,4	SOD-63A
CQY50	930	40	34	100	150	0,18	20	1,2	0,18	SOT-71
CQY52	930	40	34	100	150	0,45	20	1,2	0,45	(DO-31)
CQY11C	880	40	10	30	50	1,25	20	1,3	1,25	SOT-29/1
CQY11B	880	40	70	30	50	0,064	20	1,3	0,064	SOT-29/2
CQY49B	930	30	80	100	250	2,5	50	1,3	1,0	SOT-29/2
CQY49C	930	30	15	100	250	10,0	50	1,3	2,0	SOT-29/1



For detailed information see Data Handbook S8



RPY58A

type	P_{max} (mW)	V_{max} (V)	description	case
RPY58A	100	50	light-sensitive CdS cell	
RPY86	-	30	infrared sensitive	SOD-49D
RPY87	-	30	infrared sensitive	SOD-49D
RPY88	-	30	infrared sensitive	SOD-49D
RPY89	-	30	infrared sensitive	SOD-49D
RPY93	-	30	infrared sensitive, dual element	SOT-63
RPY94	-	30	infrared sensitive, dual element	SOT-49E
RPY95	-	30	infrared sensitive, dual element	SOT-49E
RPY96	-	30	infrared sensitive, dual element	SOT-49F
RPY97	-	30	infrared sensitive, dual element	SOT-49E



For detailed information see Data Handbook S2

SELECTION TABLE

type	56268	56256	56350	56253	56312	56348	56313	56230	56231	56290
k-code to DIN 41882	K15	K9	K9	K3	K3	K3	K1,1	extrusions		
BYX38	●							●		●
BYX39	●	●						●		●
BYX50	●							●		●
1N3870 to 3882	●							●		●
1N3889 to 3892	●	●						●	●	●
BYX98	●	●						●	●	●
BYX42	●	●						●	●	●
BYV20		●						●	●	●
BYV24		●						●	●	●
BYX99		●						●	●	●
BYX30		●						●	●	●
BYX25		●						●	●	●
BYX46		●						●	●	●
BYW30		●	●							
BYV30		●								
BYW31			●			●				
BYV21		●								
BYX96						●		●	●	
BYW92				●	●		●	●	●	
BYV92				●				●	●	
BYV22								●	●	
BYW93				●				●	●	
BYX56				●				●	●	
BYX97					●		●	●	●	
BYX32								●	●	
BYX52				●				●	●	
1N3899 to 3902				●						
1N3909 to 3912				●						
BYW25					●		●			
BYW94					●	●	●			
BYV23					●	●	●			
BTY79	●	●								●
BTW38	●	●	●			●				●
BTW42	●	●	●			●				●
BTY91				●				●	●	●
BTW45				●	●		●	●	●	●
BTW40				●	●		●	●	●	●
BTW92				●	●		●	●	●	●
BTW31W					●		●	●	●	●
BTW63					●		●	●	●	●
BTV24								●	●	
BTW23										
BTW43			●							●
BTX94				●				●	●	●
BTV34								●	●	



For detailed information see Data Handbooks S2, S3, S4, S5, S6 and S10

type	description	case
56201j	2 insulating bushes (insulation up to 500 V)	TO-3
56201d	mica washer (insulation up to 500 V)	TO-3
56261a	2 insulating bushes (insulation up to 500 V)	TO-3
56339	mica washer (insulation 500 to 2000 V)	TO-3
56352	insulating mounting support	TO-3
56326	metal washer	TO-126
56353	spring clip	TO-126
56354	mica insulator	TO-126
56387a	mica washer	TO-126
56387b	insulating bush	TO-126
56359b	mica washer	TO-220
56359c	insulating bush	TO-220
56359d	rectangular insulating bush	TO-220
56360a	rectangular metal washer	TO-220
56363	spring clip	TO-220
56364	spring clip	TO-220
56367	alumina insulator	TO-220
56369	mica insulator	TO-220
56368a	mica insulator	SOT-93
56368b	insulating bush	SOT-93
56378	mica insulator	SOT-93
56379	spring clip	SOT-93
56366	spring clip	SOT-112
56262A	mica washer, insulating ring and plain washer	DO-4/TO-64
56264A	mica washer, insulating ring and soldering tag	DO-4/TO-64
56295	PTFE bush, 2 mica washers, 1 plain washer and a terminal tag	DO-4/TO-64
56245	insulating distance disc	TO-5/TO-39
56246	insulating distance disc	TO-18/TO-72

Contents	E 1
Data Handbook System	E 2
Colour picture tubes	E 3
Monochrome picture tubes	E 4
Display tube assemblies	E 5
Monochrome display tubes	E 6
Cathode-ray tubes	E 7
Transmitting tubes, R.F. heating	E10
Transmitting tubes, telecommunications	E12
Camera tubes	E16
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Image intensifiers	E19
Channel electron multipliers	E20
Photomultipliers	E21

DATA HANDBOOK SYSTEM

On most pages, directly underneath the title, reference is made to a "Data Handbook". That Handbook is part of the Philips Data Handbook System which is a comprehensive source of information on electronic components, subassemblies and materials.

For this catalogue section the following Handbooks are of interest:

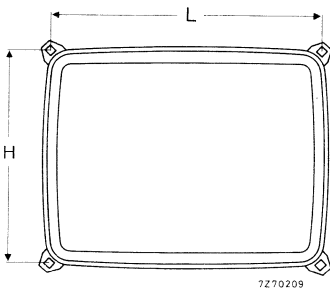
type	title
T1	Tubes for RF heating
T2	Transmitting tubes for communications
T3	Klystrons, travelling-wave tubes, microwave diodes
T4	Magnetrons
T5	Cathode-ray tubes
T6	Geiger-Müller tubes
T7	Gas-filled tubes
T8	Picture tubes and components
T9	Photo and electron multipliers
T10	Camera tubes and accessories, image intensifiers
T11	Microwave components and assemblies

COLOUR PICTURE TUBES

For detailed information see Data Handbook T8

- high brightness
- pigmented phosphors
- self-converging
- in-line guns
- quick-heating cathodes
- no N-S correction

type	defl. angle	neck dia-meter	overall length	useful screen diag.	typical operating conditions			
	(deg)	(mm)	max. (mm)	min. (mm)	V_f/I_f (V/mA)	$V_{a,g4}$ (kV)	V_{g3} (kV)	V_{g2} (V)
14 INCH								
A37-570X	90	29,1	345,1	335,4	6,3/685	25	4,7-5,5	310-560
A37-590X*	90	29,1	348,6	335,4	6,3/685	25	6,6-7,5	390-760
A37-591X*	90	29,1	353**	335,4	6,3/685	25	6,6-7,5	390-760
16 INCH								
A42-570X	90	29,1	374,0	382,3	6,3/685	25	4,7-5,5	310-560
A42-580X	90	29,1	384,4	382,3	6,3/685	25	6,6-7,5	390-760
A42-590X*	90	29,1	378,6	382,3	6,3/685	25	6,6-7,5	390-760
A42-591X*	90	29,1	383**	382,3	6,3/685	25	6,6-7,5	390-760
20 INCH								
A51-540X	110	36,5	367,4	480,0	6,3/720	25	6,5-7,5	560-800
A51-570X	90	29,1	433,5	480,0	6,3/685	25	4,7-5,5	310-560
A51-580X	90	29,1	441,2	480,0	6,3/685	25	6,6-7,5	390-760
A51-590X*	90	29,1	436,7	480,0	6,3/685	25	6,6-7,5	390-760
A51-591X*	90	29,1	441,2**	480,0	6,3/685	25	6,6-7,5	390-760
22 INCH								
A56-540X	110	36,5	389,8	530,6	6,3/720	25	6,5-7,5	560-800
26 INCH								
A66-540X	110	36,5	427,6	617,8	6,3/720	25	6,5-7,5	560-800



- * With appropriate deflection unit it forms a self converging and raster correction free assembly.
- ** Base JEDEC B8-274.

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

MONOCHROME PICTURE TUBES

For detailed information see Data Handbook T8

type	defl. angle (deg.)	neck diameter (mm)	typical operating conditions					overall length (mm)	useful screen		lug position Fig. A (mm)
			V_f/I_f (V/mA)	V_{g2} (V)	V_{g4} (V)	V_a (kV)	V_{KR} (V)		max. (mm)	min. (mm)	
9 INCH											
A24-512W	90	20	11/140	130	0 to 130	10	45 to 65	227	229	1	27,5
12 INCH											
A31-410W	110	20	11/140	250	0 to 350	12 to 15	32 to 58	233	295	1	27,6
A31-510W	110	20	11/140	130	0 to 130	12 to 15	30 to 50	233	295	1	27,6
A31-322W	90	20	11/140	130	0 to 130	12 to 15	45 to 65	280	292,2	1	28,5
14 INCH											
A34-510W	110	20	11/140	130	0 to 130	12 to 15	30 to 50	247	322	1	32
A34-111W	90	20	11/140	130	0 to 130	12 to 15	45 to 65	287	322	1	29
17 INCH											
A44-120W	110	28,6	6,3/300	400	0 to 400	20	36 to 66	291	413	2	40
A44-520W	110	28,6	6,3/240	130	0 to 130	20	42 to 62	291	413	2	40
20 INCH											
A50-120W	110	28,6	6,3/300	400	0 to 400	20	36 to 66	319	473	2	45
A50-520W	110	28,6	6,3/240	130	0 to 130	20	42 to 62	319	473	2	45
24 INCH											
A61-120W	110	28,6	6,3/300	400	0 to 400	20	36 to 66	370	577,5	2	38,5
A61-520W	110	28,6	6,3/240	130	0 to 130	20	42 to 62	370	577,5	2	38,5

Lug position

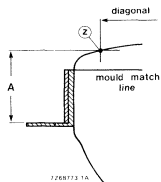


Fig. 1

7268732 1A

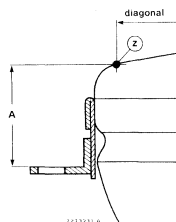
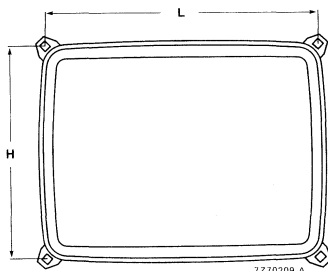


Fig. 2

7173231 A



7270209 A

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	290 x 226
17 inch	363,5 x 288,5
20 inch	414 x 331
24 inch	496 x 392

DISPLAY TUBE ASSEMBLIES

For detailed information see Data Handbook T8

High resolution colour display tube assemblies for Data Graphic Displays.

type	defl. angle (deg.)	base JEDEC	dot triplet pitch (mm)	min. number of displayable pixels	anode voltage typ. (kV)	focusing voltage typ. (kV)	light transmission at screen centre (%)
10 INCH							
M25-100X/N/4100	76	B10-277	0,28	576 x 480	22	5,3	55
M25-100X/4100	76	B10-277	0,28	576 x 480	22	5,3	87,5
12 INCH							
M32-101X/5100	76	B10-278	0,31	720 x 580	23	5,5	85,5
M32-102X/N/5100	76	B10-277	0,31	720 x 580	23	5,5	44
14 INCH							
M37-104X/3100	90	B10-278	0,31	800 x 654	25	6,0	85,5
M37-105X/N/3100	90	B10-277	0,31	760 x 620	25	6,0	46,5
16 INCH							
M42-105X/6100	90	B10-277	0,31	820 x 670	25	6,0	86
M42-106X/N/6100	90	B10-277	0,31	820 x 670	25	6,0	45
20 INCH							
M51-106X/7100	90	B10-278	0,32	860 x 720	25	6,0	85
M51-107X/N/7100	90	B10-277	0,32	820 x 670	25	6,0	40

For all types:

neck diameter = 29,1 mm

cut-off voltage = typ. 100 V

grid 2 voltage = 270 to 570 V

MONOCHROME DISPLAY TUBES

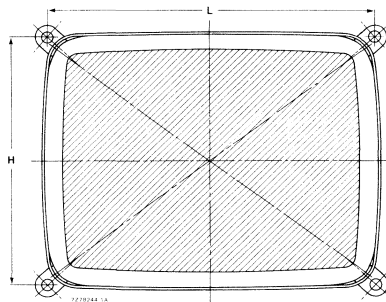
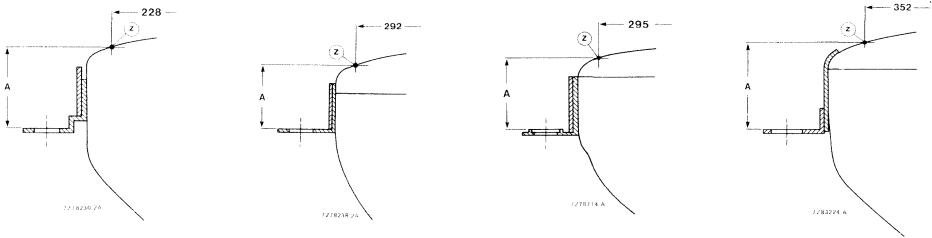
For detailed information see Data Handbook T8

Display tubes for Data Graphic Displays

- various phosphors
- anti-reflective treatments
- various glass transmissions
- appropriate wound components

type	defl. angle (deg.)	neck diameter (mm)	typical operating conditions					overall length (mm)	useful screen diag. (mm)	lug position	
			V_f/I_f (V/mA)	V_{g2} (V)	V_{g4} (V)	V_a (kV)	V_{KR} (V)			Fig.	A (mm)
9 INCH											
M24-306	90	20	12/130	400	0-300	12	30-60	227	222,3	1	27,5
12 INCH											
M31-326	110	28,6	6,3/240	400	0-400	17	40-70	241	295	3	24,8
M31-336	90	20	12/130	400	0-300	12	30-60	280	292	2	28,5
M31-340	90	20	12/130	400	0-300	12	30-60	277	295	3	25,5
15 INCH											
M38-328	110	28,6	6,3/240	400	0-400	17	40-70	279	352	4	25,7

Lug position



type	L x H (mm)
9 inch	212 x 160
12 inch	273,3 x 190,2
15 inch	311,4 x 244,5



CATHODE-RAY TUBES

For detailed information 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
- 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	6,3/95	10
D7-221GY	60 x 36	1	-	12,5	20	225	6,3/95	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
D14-361GY/93	100 x 80	2	-	18	11,5	333	6,3/100	10-25
D14-362GY/93	100 x 80	2	-	18	11,5	333	6,3/240	10-25
D14-370GH/93	100 x 80	2,2	16,5	8	4	338	6,3/240	25-75
D14-380GH/93	100 x 80	2,2	16,5	8	4	338	6,3/240	50-150
109D12GH*	80 x 64	2	-	32	21	257	6,3/100	10-25
110D12GH*	80 x 64	1,5	10	7,2	3,5	299	6,3/100	25-100

* In development.



CATHODE-RAY TUBES

For detailed information see Data Handbook T5.

Special monitor and Data Display tubes.

type	min. useful screen		defl. angle (deg.)	neck diameter (mm)	typ accelerator voltage		max. overall length (mm)	notes
	hor. (mm)	vert. (mm)			first (V)	final (kV)		
M17-140W	124	93	70	28	400	14	234	
M17-141W	124	93	70	28	600	16	240	with bonded faceplate and metal mounting band
M38-201WA	290	226	70	36,8	800	18	484,5	very high resolution: 1728 x 2288 picture elements
M38-201GH								

Storage tubes - with variable persistence, internal graticule and correction coils, flat faced.

type	min. useful screen (mm)	min. useful scan		typ deflection coefficient		typ accelerator 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	450
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.

Flying spot scanner tubes.

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)		
Q13-110BA	108	40	38	-	25	347	magnetic
Q13-110GU	108	40	38	-	25	347	magnetic

* 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.

CATHODE-RAY TUBES

For detailed information see Data Handbook T5.

Screen phosphors and equivalents

type designation Pro Electron	old	JEDEC	fluores- cence colour	phosphor- escence colour	persistence	typical use
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 technical data and complete range see Data Handbook Part T1 "Tubes for R.F. Heating".

Cooling

FA = Forced out
N = Natural
W = Water

WH = Water (helix)
V = Vapour

type	oscillator output power (kW)	cooling	frequency at full ratings max. (MHz)	V_f (V)	I_f (A)	V_a (kV)	I_a (A)	$W_a(\text{max})$ (kW)
TRIODES	2,67	FA	250	6,3	33	5	0,75	1,5
YD1240								
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
YD1150	4,75	FA	85	6,3	33	5	1	2,5
YD1152	4,75	WH	85	6,3	33	5	1	2,5
TBH7/8000	6	WH	50	12,6	33	6	1,5	6
TBL7/8000	6	FA	50	12,6	33	6	1,5	6
TBW7/8000	6	W	50	12,6	33	6	1,5	6
TBH6/6000	6,9	WH	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
TAW12/20	9,5	W	28	21,5	80	10	1,4	18
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
TBH6/14	17,7	WH	30	6,3	136	7	3,5	15
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	15
TBH12/25	25	WH	30	8	98	12	3,2	20
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

TRANSMITTING TUBES**R.F. HEATING**

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) 8kW
TBH12/38	30	WH	30	8	130	12	4,5	20
TBL12/38	30	FA	30	8	130	12	4,5	15
TBW12/38	30	W	30	8	130	12	4,5	20
YD1180	31,6	FA	100	7	175	7,5	5,4	15
YD1182	31,6	WH	100	7	175	7,5	5,4	20
YD1185	50	FA	100	7	175	12	5,33	15
YD1187	50	WH	100	7	175	12	5,33	20
YD1192	62,7	WH	100	8,4	235	8	10	40
YD1195	90	FA	30	8,4	235	12	9,75	30
YD1197	108	WH	30	8,4	235	12	12	50
YD1202	163	WH	30	12,2	250	12	18	80
YD1212	240	WH	30	12,6	380	14	23,5	120
YD1342	480	WH	30	14	555	16	42	240

TRANSMITTING TUBES

TELECOMMUNICATION

For detailed technical information and complete range see Data Handbook Part T2 "Transmitting tubes for communications".

Cooling

FA = Forced air
 N = Natural
 W = Water

WH = Water (helix)
 V = Vapour

type	output power (kW)	cooling	freq. (max) (MHz)	V _f (V)	I _f (A)	V _a (kV)	I _a (A)	W _a (max) (kW)
TRIODES								
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		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		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
TBH6/6000	6,9	WH	75	12,6	33	6	1,5	6
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
TBL6/20	17	FA	110	6,3	154	5,5	4,8	10
TAW12/20	22	W	28	21,5	80	12	2,7	18
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



TRANSMITTING TUBES

TELECOMMUNICATION

type	output power (kW)	cooling	freq. (max) (MHz)	V_f (V)	I_f (A)	V_a (kV)	I_a (A)	W_a (max) (kW)
TETRODES								
YL1370	63	N	60	6,3	1,125	0,6	150	27
YL1371	63	N	60	12,6	0,562	0,6	150	27
YL1372	63	N	60	26,5	0,3	0,6	150	27
QE05/35	65	N	60	1,6	3,2	180	150	25
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
QB08/200	290	N	30	6,3	3,9	1	385	100
QB08/200H	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
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
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
YL1110	730	FA	1215	6,3	7,85	2,5	500	700
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
QBW5/3500	4100	W	75	6,3	32,5	5	1100	3

TRANSMITTING TUBES

TELECOMMUNICATION

type	output power sync (kW)	gain sync (dB)	V _a (kV)	V _{g2} (V)	I _{ao} (A)	I _{a black} (A)	V _a max. (kV)	W _a max. (kW)	range
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TETRODES FOR TELEVISION

YL1420	8,6	14	5	600	0,65	2,1	6,5	6	VHF
YL1430	18,4	14,5	7	700	0,75	2,9	9	12	VHF
YL1440	1,5	14,5	3	500	0,2	0,7	4	1,5	VHF
YL1520	27,5	15	8	700	0,9	3,9	9	18	VHF
YL1540	1,1	20	3	700	0,3	0,5	4,2	2	VHF
YL1560	5,5	17	5,5	700	1,0	1,9	6	7	UHF
YL1580	12	17	5,5	600	1,8	3,5	7,2	12	UHF
YL1590	0,6	15,5	3,5	700	0,4	0,6	4	2	UHF
YL1610	11	17	5,5	500	1,2	2,9	7	14	VHF
YL1630	30	18	7	500	1,2	5,7	8,5	26	VHF

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	520	W	30	23	500	12	54	500
YL1530	35	W	250	7,5	180	10	5,9	30
YL1680	120	W	250	12	265	12	15	100

PENTODES

PE06/40E	45	N	20	12,6	0,65	600	110	25
PE06/40N	45	N	20	6,3	1,3	600	110	25
PE06/40P	45	N	20	6,3	1,3	600	110	25
PE1/100	132	N	60	12,6	1,3	1000	177	45

type	output power (kW)	cooling	freq. max. (MHz)	V_f (V)	I_f (A)	V_a (kV)	I_a (A)	W_a (max) (kW)
DOUBLE TETRODES								
QQE02/5	5,8	N	500	6,3 12,6	0,6 0,3	180	27,5	3
YL1220	5,8	N	500	6,75 13,5	0,56 0,28	180	27,5	3
QQE04/5	7	N	960	6,3 12,6	0,6 0,3	160	35	8
YL1360	7	N	960	13,5	0,28	160	35	8
QQE03/14	11	N	200	3,15	1,65	160	45	7
QQE03/12	12	N	200	6,3 12,6	0,82 0,41	175	37,5	5
YL1210	12	N	200	6,75 13,5	0,72 0,36	175	37,5	5
YL1130	13	N	200	1,1	2,9	170	42,5	4
YL1240	21	N	200	6,75 13,5	0,8 0,4	180	45	7,5
QQE04/20	26	N	200	6,3 12,6	1,6 0,8	200	24	7,5
YL1190	26	N	200	1,1	4,2	132	70	8
QQE0415	26,6	N	186	3,15 6,3	1,36 0,68	200	30	6
YL1020	35	N	200	1,6	4	250	50	10
YL1030	45	N	200	2,1	4,5	250	100	20
QQE03/20	48	N	200	6,3	1,3	250	50	10
QQE03/32	48	N	200	12,6	0,65	250	50	10
QQE06/40	90	N	250	6,3	1,8	250	100	20
QQE06/40	90	N	250	12,6	0,9	250	100	20
YL1060	132	N	175	6,3	1,8	245	110	30

CAMERA TUBES

For detailed information see Data Handbook T10

Photoconductive layer	
SR	standard resolution
HR	high resolution
ER	with extended red response
ER(F)	with extended red response and IR reflecting filter on anti-halation glass disc
LOC	Low output capacitance
D	Diode
ACT	Anti comet tail
BL	Bias light

type	max. length (mm)	photo-conductive layer	"front loading" type	"rear loading" type	max. length (mm)	photo-conductive layer
PLUMBICON® TUBES 1,25 inch (30 mm)			PLUMBICON® TUBES 1 inch (25 mm)			
XQ1020	210	SR	XQ1070/02R	XQ1070/03	170	SR/BL
XQ1020R	210	SR	XQ1070/02G	XQ1070/03	170	SR/BL
XQ1020G	210	SR	XQ1070/02B	XQ1070/03	170	SR/BL
XQ1020B	210	SR	XQ1073/02R	XQ1073/03	170	ER/BL
XQ1023	210	ER	XQ1075/02R	XQ1075/03	170	ER(F)/BL
XQ1023R	210	ER				
XQ1025	210	ER(F)	XQ1080R	XQ1090R	167	HR/ACT/BL
XQ1025R	210	ER(F)	XQ1080G	XQ1090G	167	HR/ACT/BL
			XQ1080B	XQ1090B	167	HR/ACT/BL
XQ1410	216	HR/BL	XQ1083R	XQ1093R	167	ER/ACT/BL
XQ1410R	216	HR/BL	XQ1085R	XQ1095R	167	ER(F)/ACT/BL
XQ1410G	216	HR/BL				
XQ1410B	216	HR/BL	XQ1500R	XQ1510R	167	HR/ACT/BL
XQ1413	216	ER/BL	XQ1500G	XQ1510G	167	HR/ACT/BL
XQ1413R	216	ER/BL	XQ1500B	XQ1510B	167	HR/ACT/BL
XQ1413	216	ER(F)/BL	XQ1503R	XQ1513R	167	ER/ACT/BL
XQ1415R	216	ER(F)/BL	XQ1505R	XQ1515R	163	ER(F)/ACT/BL
XQ1520	216	HR/ACT/BL	XQ2070/02R	XQ2070/03R	170	HR/D/B
XQ1520R	216	HR/ACT/BL	XQ2070/02G	XQ2070/03R	170	HR/D/BL
XQ1520G	216	HR/ACT/BL	XQ2070/02B	XQ2070/03R	170	HR/D/BL
XQ1520B	216	HR/ACT/BL	XQ2073/02R	XQ2073/03R	170	HR/D/BL
XQ1523	216	ER/ACT/BL	XQ2075/02R	XQ2075/03R	170	ER(F)/D/BL
XQ1523R	216	ER/ACT/BL				
XQ1525	216	ER(F)/ACT/BL	XQ3070/02R		170	HR/LOC/D/BL
XQ1525R	216	ER(F)/ACT/BL	XQ3070/02G		170	HR/LOC/D/BL
			XQ3070/02B		170	HR/LOC/D/BL
			XQ3073/02R		170	ER/LOC/D/BL
			XQ3075/02R		170	ER(F)/LOC/D/BL

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CAMERA TUBES

For detailed information see Data Handbook T10

Photoconductive layer

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

type	max. length (mm)	photo-conductive layer	type	max. length (mm)	mesh electrode	photo-cond. layer	focusing
PLUMBICON® TUBES 2/3 inch (18 mm)			VIDICON and NEWVICON® TUBES 1 inch (25 mm)				
XQ1427R	109	ER/SR	XQ1031	130	I	A	M
XQ1427G	109	SR	XQ1032	130	I	A	M
XQ1427B	109	SR					
XQ1428R	109	ER/SR	XQ1240	159	S	A	M
XQ1428G	109	SR	XQ1241	159	S	A	M
XQ1428B	109	SR	XQ1280	159	S	B	M
			XQ1285	159	S	B	M
XQ2427R	108	ER/HR/D					
XQ2427G	108	HR/D	XQ1440	159	S	Nw	M
XQ2427B	108	HR/D	XQ1442	160	S	Nw	M
			XQ1443	159	S	Nw(IR)	M
XQ3427R	108	ER/HR/D/LOC	XQ1444	159	S	Nw*	M
XQ3427G	108	HR/D/LOC					
XQ3427B	108	HR/D/LOC					
			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	E
			XQ1276	108	S	Nw(IR)	M
			XQ1277	108	S	Nw(IR)	E
			XQ1278	108	S	Nw	E
			XQ1380	108	S	Nw*	M
			XQ1381	108	S	Nw*	E

* Tube with radiation resistant faceplate

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GEIGER MÜLLER TUBES

For detailed information see Data Handbook T6

type number	sensitive for			counting rate at 10^{-1} mGy/h ⁻¹ (count/s)*	sensitive length (mm)	plateau threshold (V)	plateau length (V)	plateau slope (%/V)	dead time ⁻² (μs)**	background shielded (count/min)	dose rate range (mGy/h)
	α	β	γ								

CYLINDER TUBES

ZP1200	●			230	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} - 2×10^4
ZP1301***	●			3400**	8	500	100	0,30	13	1	10^{-1} - 2×10^4
ZP1302***	●			3400**	8	500	100	0,30	13	(-)	10^{-1} - 2×10^4
ZP1310	●			11000**	16	500	150	0,15	15	2	4×10^{-3} - 3×10^3
ZP1313***	●			13000**	16	500	150	0,15	15	2	4×10^{-3} - 3×10^3
ZP1320	○	●		230	28	500	150	0,08	45	12	10^{-3} - 10^2
ZP1322	○	●		230	28	500	150	0,08	45	12	10^{-3} - 10^2
ZP1330	○	●		1200	75	450	350	0,02	70	30	3×10^{-4} - 10

COSMIC RAY GUARD TUBE

ZP1700	●			-	-	800	400	903	1000	70	3×10^{-4} - 3×10^{-1}
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WINDOW TUBES

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} - 3×10
ZP1430	●	●	○	540	27,8a	450	250	0,04	190	25	10^{-3} - 2×10
ZP1431	●	○		540	27,8c	450	250	0,04	190	25	10^{-3} - 2×10
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} - 3×10
ZP1452	●	○		400	27,8c	500	250	0,07	60	18	10^{-3} - 3×10
ZP1461	●	○		1100	51f	700	200	0,04	45	45	3×10^{-4} - 1
ZP1470	●	●		340	24,1b	550	150	0,15	70	25	10^{-3} - 2×10
ZP1480	●	○		270	17d	400	100	0,20	120	30	10^{-3} - 2×10
ZP1481	●	○		270	17d	400	100	0,20	120	30	10^{-3} - 2×10

X-RAY SENSITIVE TYPES

ZP1600	6 - 20 keV	660		19,8e	1600	400	0,07	110	25	-	
ZP1610	2,5 - 40 keV	-		7x18b	1900	working voltage 1460 to 1850 V					-

Notes * 1R = 8,69 mGy

** Counting rate at 10^2 mGy

*** With compensating filter

Window thickness mg/cm²

a: 1,5 to 2,0

d: 2,5 to 3,0

b: 1,5 to 2,5

e: 2,5 to 3,5

c: 2,0 to 3,0

f: 3,5 to 4,0



IMAGE INTENSIFIERS

For detailed information see relevant Data Collation

type	XX1332	XX1380	XX1390	XX1410	XX1500	XX1500TV	
Photocathode	S25	S25	S25	S25	S25	S25	
White light sensitivity	310	350	300	420	350	350	μA/lm
Sensitivity at 800 nm	28	35	20	40	35	35	mA/W
Sensitivity at 850 nm	17	30	12	25	25	25	mA/W
Gain	45000	22000	-	15000	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		89			%
7,5 lp/mm		81		60			%
15 lp/mm		53		30			%
Limiting resolution	23	48	29	29	36	36	lp/mm
Useful photocathode area	39∅	20∅	18∅	18∅	18∅	10,8x14,4	mm

CHANNEL ELECTRON MULTIPLIERS

For detailed information see Data Handbook T9

type	input	back-ground (t/s)	R_{nom} ($G\Omega$)	starting voltage (kV)	gain	max. op. voltage (kV)
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SINGLE CHANNEL ELECTRON MULTIPLIERS

B310../01	1,25 \varnothing circular	0,1	3	2,5	$1,3 \times 10^8$	4,0
B312../01	2,0 x 8,0 rectangular	0,2	3	2,5	$1,3 \times 10^8$	4,0
B314../01	2,0 x 8,0 rectangular	0,2	3	2,5	$1,3 \times 10^8$	4,0
B318../01	5,0 \varnothing conical	0,25	3	2,5	$1,3 \times 10^8$	4,0
B330../01	1,25 \varnothing circular	0,1	3	2,5	$1,5 \times 10^8$	4,0
B410../01	2,2 \varnothing circular	0,1	3	2,0	$1,5 \times 10^8$	3,5
B413../01	3,5 x 15,5 rectangular	0,25	3	2,0	$1,7 \times 10^8$	3,5
B419../01	10,0 \varnothing conical	0,25	3	2,0	$1,7 \times 10^8$	3,5
X919..	10,0 \varnothing conical	0,15	0,6	1,5	$3,0 \times 10^8$	4,0

type	channel diameter μm	plate dimensions (mm)	useful area (mm)	thickness (mm)	R_{nom} ($M\Omega$)	channel pitch (μm)
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CHANNEL ELECTRON MULTIPLIER PLATES

G12-25SE	12,5	$\varnothing 25$	$\varnothing > 19$	0,5	500	15
G12-36	12,5	$\varnothing 36$	$\varnothing 32,5$	0,5	65	15
G12-36DT	12,5	$\varnothing 36$	$\varnothing 32,5$	1,0	125	15
G12-46	12,5	$\varnothing 46$	$\varnothing 42$	0,5	45	15
G12-46DT	12,5	$\varnothing 46$	$\varnothing 42$	1,0	75	15
G25-20x50	25	20 x 50	$> 18,8 \times 48,8$	1,0	35	31
G25-25	25	$\varnothing 27,1$	$\varnothing 26,5$	1,0	50	31
G25-50	25	$\varnothing 53,0$	$\varnothing 51,8$	1,0	10	31
G25-70	25	$\varnothing 70,0$	$\varnothing 68$	1,0	5	31

PHOTOMULTIPLIERS

For detailed information see Data Handbook T9

type	useful dia. meter (mm)	number of stages	spectral sensitivity (mA/W) at λ (Nm)	anode radiant sensitivity (A/lm) at V_{nt} (V)	anode pulse rise time (ns)	socket		
S11(1) Cathode material								
XP1920	14	6	60	437	0,2	700	2,0	FE1004
SUPER A Cathode material								
XP2008	32	10	70	437	60	1180	2,5	FE1012
XP2010	32	10	80	437	60	1180	2,5	FE1012
XP2060	32	10	70	437	60	1180	2,5	FE1112
S11 (UV extended) Cathode material								
XP2040	110	14	70	437	$3 \cdot 10^7$	2000	2,0	FE1020
S13 (U) Cathode material								
PM2018B	32	10	75	437	60	1350	2,5	FE1012
BIALKALI (D) Cathode material								
PM1911	14	10	70	400	10^6	1250	2,3	FE1004
PM2962	23	8	75	400	7	1100	1,8	FE1114
PM2972	23	10	75	400	60	1200	2,0	FE1114
PM2982	23	11	75	400	210	1350	1,9	FE1114
XP2012	32	10	77	400	60	1350	2,5	FE1112
PM2102	44	10VB	85	400	12	1250	10	FE2019
XP2020	44	12	85	400	$3 \cdot 10^7$	2200	1,5	FE1020
XP2202	44	10	75	400	60	1400	3,5	FE2019
PM2211	44	12	75	437	$3 \cdot 10^7$	1900	4,0	FE2019
XP2212	44	12	75	400	$3 \cdot 10^7$	1900	4,0	FE2019
XP2230	44	12	85	400	$3 \cdot 10^7$	2300	1,6	FE2021
XP2232	44	12	80	400	$3 \cdot 10^7$	1900	2,0	FE2019
PM2232B	44	6	80	400	$2 \cdot 10^{-4}$	2000	1,6	FE1020
XP2262	44	12	80	400	$3 \cdot 10^7$	1850	2,0	FE2019
PM2412	70	10VB	105	400	12	1250	11	FE2019
XP2050	110	10VB	95	400	12	1270	16	FE1014
D (UV extended) Cathode material								
XP1931	14	10	70	400	10^6	1250	2,3	FE1004
XP2041	110	14	85	400	$3 \cdot 10^7$	2200	2,0	FE1020



PHOTOMULTIPLIERS

For detailed information see Data Handbook T9

type	useful dia. meter (mm)	number of stages	spectral sensitivity (mA/W) at λ (Nm)	anode radiant sensitivity (A/lm) at V_{ht} (V)	anode pulse rise time (ns)	socket
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DU Cathode material

XP2020Q	44	12	80	400	$3 \cdot 10^7$	2200	1,5	FE1020
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S20 (T) Cathode material

XP1117	14	9	13	698	30	1520	3,5	FE1004
PM2963	23	8	16	698	6	1050	2,0	FE1114
XP2013N	32	10	20	698	60	1250	2,5	FE1012
PM2023B	32	8	20	698	6	1050	2,5	FE1012
XP2203B	44	10	16	698	60	1460	3,5	FE1014
XP2233B	44	12	15	698	$3 \cdot 10^7$	2050	2,0	FE1020

TU Cathode material

PM2254B	44	12	15	698	$3 \cdot 10^7$	2300	1,5	FE1020
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S20R Cathode material

XP2017	32	10	6,5	858	60	1470	3,5	FE1012
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S1 (C) Cathode material

150CVP	32	10	1,4	903	10	1600	3,5	FE1012
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Contents capacitors	C 1
Data Handbook system	C 2
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Aluminium electrolytic capacitors 2222 030 etc	C 5
Aluminium electrolytic capacitors 2222 035	C 9
Aluminium electrolytic capacitors 2222 039	C12
Aluminium electrolytic capacitors 2222 050/052	C13
Aluminium electrolytic capacitors 2222 108	C15
Aluminium electrolytic capacitors 2222 114/115	C16
Solid aluminium capacitors 2222 122	C17
Solid aluminium capacitors 2222 123	C18
Interference suppression capacitors (MKT-P) 2222 330	C19
Metallized film capacitors (MKT en MKC) 2222 341	C22
Metallized film capacitors (MKT en MKC) 2222 344	C25
Polypropylene film/foil capacitors (KP) 2222 357 5	C28
Polypropylene film/foil capacitors (KP/MKP) 2222 357	C29
Metallized film capacitors (MKT) 2222 365	C30
Metallized film capacitors (MKT) 2222 366	C31
Metallized film capacitors (MKT) 2222 368	C32
Metallized film capacitors (MKT) 2222 371	C34
Polypropylene film/foil capacitors (KP) 2222 455-457	C35
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Miniature ceramic capacitors P100, 2222 680-683-679	C38
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Film dielectric trimmers (10 mm) 2222 808 3	C44
Film dielectric trimmers (125 °C) 2222 809 050	C45
Film dielectric trimmers (125 °C) 2222 809 070	C46
Film dielectric trimmers (125 °C) 2222 809 080	C47
Film dielectric trimmers (125 °C) 2222 809 090	C48
Ceramic multilayer chip capacitors	C49

DATA HANDBOOK SYSTEM

On most pages, directly underneath the title, reference is made to a "Data Handbook". That Handbook is part of the Philips Data Handbook System which is a comprehensive source of information on electronic components, subassemblies and materials.

For this catalogue section the following Handbooks are of interest:

type	title
C7	Variable capacitors
C14	Electrolytic and solid capacitors
C15	Film capacitors, ceramic capacitors

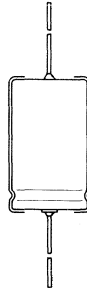


General data

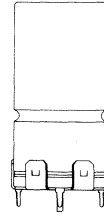
Nominal capacitance range (E6 series)	15 to 15000 μF
Tolerance on nominal capacitance	$\pm 20\%$
Rated voltage range, U_R	10 to 63 V
Temperature range	-55 to +85 $^{\circ}\text{C}$
Basic specification	IEC 384-4, long life grade
Climatic category	55/085/56

For detailed information see Data Handbook C14

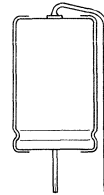
case size	nominal dimensions (mm)
2	$\varnothing 4,5 \times 10$
3	$\varnothing 6 \times 10$
5a	$\varnothing 8 \times 11$
4	$\varnothing 6,5 \times 18$
5	$\varnothing 8 \times 18$
6	$\varnothing 10 \times 18$
7	$\varnothing 10 \times 25$
00	$\varnothing 10 \times 30$
01	$\varnothing 12,5 \times 30$
02	$\varnothing 15 \times 30$
03	$\varnothing 18 \times 30$
04	$\varnothing 18 \times 40$
05	$\varnothing 21 \times 40$



style 1



style 2



style 3

U_R (V)	C_{nom} (μF)	case-size	cat. number style 1 on reel	cat. number style 1 ammo pack	cat. number style 2	cat. number style 3
10	100	2	2222 021 24101	2222 021 34101		
10	220	3	2222 021 24221	2222 021 34221		
10	330	5a	2222 021 24331	2222 021 34331		
10	470	4	2222 021 24471	2222 021 34471		
10	680	5	2222 021 24681	2222 021 34681		
10	1000	6	2222 021 24102	2222 021 34102		
10	1500	00	2222 021 14152			
10	2200	01	2222 021 14222			2222 021 84222
10	3300	01	2222 021 14332			
10	4700	02	2222 021 14472			2222 021 84472
10	6800	03	2222 021 14682			
10	10000	04	2222 021 14103		2222 021 44103	
10	15000	04	2222 021 14153			
16	68	2	2222 021 25689	2222 021 35689		
16	150	3	2222 021 25151	2222 021 35151		
16	220	5a	2222 021 25221	2222 021 35221		
16	330	4	2222 021 25331	2222 021 35331		
16	470	5	2222 021 25471	2222 021 35471		
16	680	6	2222 021 25681	2222 021 35681		
16	1000	00	2222 021 15102			2222 021 85102
16	1500	01	2222 021 15122			
16	2200	01	2222 021 15222			2222 021 85222
16	3300	02	2222 021 15332			

ALUMINIUM ELECTROLYTIC CAPACITORS

2222 021

U _R (V)	C _{nom} (µF)	case-size	cat. number style 1 on reel	cat. number style 1 ammo pack	cat. number style 2	cat. number style 3
16	4700	03	2222 021 15472			
16	6800	04	2222 021 15682			
16	10000	05	2222 021 15103		2222 021 45472	
					2222 021 45103	
25	47	2	2222 021 26479	2222 021 36479		
25	100	3	2222 021 26101	2222 021 36101		
25	150	5a	2222 021 26151	2222 021 36151		
25	220	4	2222 021 26221	2222 021 36221		
25	330	5	2222 021 26331	2222 021 36331		
25	470	6	2222 021 26471	2222 021 36471		
25	680	00	2222 021 16681			
25	1000	01	2222 021 16102			2222 021 86102
25	1500	01	2222 021 16152			
25	2200	02	2222 021 16222			2222 021 86222
25	3300	03	2222 021 16332			
25	4700	04	2222 021 16472		2222 021 46472	
25	6800	05	2222 021 16682			
40	22	2	2222 021 27229	2222 021 37229		
40	47	3	2222 021 27479	2222 021 37479		
40	100	4	2222 021 27101	2222 021 37101		
40	150	5	2222 021 27151	2222 021 37151		
40	220	6	2222 021 27221	2222 021 37221		
40	330	7	2222 021 27331	2222 021 37331		
40	470	00	2222 021 17471			2222 021 87471
40	680	01	2222 021 17681			
40	1000	01	2222 021 17102			2222 021 87102
40	1500	02	2222 021 17152			
40	2200	03	2222 021 17222		2222 021 47222	
40	3300	04	2222 021 17332			
40	4700	05	2222 021 17472		2222 021 47472	
63	15	2	2222 021 28159	2222 021 38159		
63	33	3	2222 021 28339	2222 021 38339		
63	68	5a	2222 021 28689	2222 021 38689		
63	100	5	2222 021 28101	2222 021 38101		
63	150	6	2222 021 28151	2222 021 38151		
63	220	00	2222 021 18221			2222 021 88221
63	330	01	2222 021 18331			
63	470	01	2222 021 18471			2222 021 88471
63	680	02	2222 021 18681			
63	1000	03	2222 021 18102		2222 021 48102	
63	1500	04	2222 021 18152			
63	2200	05	2222 021 18222		2222 021 48222	



General data

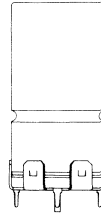
Nominal capacitance range (E6 series)	0,33 to 10000 μ F
Tolerance on nominal capacitance	-10 to +50%
Rated voltage range, U_R	6,3 to 385 V
Temperature range	-40 to +85 °C
Endurance test at 85 °C	
case sizes 2 to 7	2000 h
case sizes 00 to 05	5000 h
Basic specification	IEC 384-4, long life grade
Climatic category	40/085/56

For detailed information see Data Handbook C14

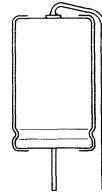
case size	nominal dimensions (mm)
2	\varnothing 4,5 x 10
3	\varnothing 6 x 10
5a	\varnothing 8 x 11
4	\varnothing 6,5 x 18
5	\varnothing 8 x 18
6	\varnothing 10 x 18
7	\varnothing 10 x 25
00	\varnothing 10 x 30
01	\varnothing 12,5 x 30
02	\varnothing 15 x 30
03	\varnothing 18 x 30
04	\varnothing 18 x 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 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		
6,3	68	2	2222 030 23689	2222 030 33689		
6,3	150	3	2222 030 23151	2222 030 33151		
6,3	470	5	2222 031 23471	2222 031 33471		
6,3	680	6	2222 031 23681	2222 031 33681		
10	22	2	2222 030 24229	2222 030 34229		2222 030 84229
10	47	2	2222 030 24479	2222 030 34479		2222 030 84479
10	100	3	2222 030 24101	2222 030 34101		2222 030 84101
10	220	5a	2222 030 24221	2222 030 34221		2222 030 84221
10	220	4	2222 031 24221	2222 031 34221		2222 031 84221
10	330	5	2222 031 24331	2222 031 34331		2222 031 84331
10	470	6	2222 031 24471	2222 031 34471		2222 031 84471
10	1000	00	2222 032 14102			2222 032 84102
10	1500	01	2222 032 14152			
10	2200	02	2222 032 14222			2222 032 84222
10	3300	03	2222 032 14332			
10	4700	04	2222 033 14472		2222 033 44472	
10	6800	05	2222 033 14682			
10	10000	05	2222 033 14103		2222 033 44103	
16	15	2	2222 030 25159	2222 030 35159		2222 030 85159
16	33	2	2222 030 25339	2222 030 35339		2222 030 85339
16	68	3	2222 030 25689	2222 030 35689		2222 030 85689

ALUMINIUM ELECTROLYTIC CAPACITORS

2222 030 etc.

U _R (V)	C _{nom} (µF)	case-size	cat. number style 1 on reel	cat. number style 1 ammo pack	cat. number style 2	cat. number style 3
16	150	5a	2222 030 25151	2222 030 35151		2222 030 85151
16	220	5	2222 031 25221	2222 031 35221		2222 031 85221
16	330	6	2222 031 25331	2222 031 35331		2222 031 85331
16	680	00	2222 032 15681			
16	1000	01	2222 032 15102			2222 032 85102
16	1500	02	2222 032 15152			
16	2200	03	2222 032 15222		2222 032 45222	
16	3300	04	2222 033 15332			
16	4700	05	2222 033 15472		2222 033 45472	
16	6800	05	2222 033 15682			
25	10	2	2222 030 26109	2222 030 36109		2222 030 86109
25	22	2	2222 030 26229	2222 030 36229		2222 030 86229
25	47	2	2222 030 26479	2222 030 36479		2222 030 86479
25	100	5a	2222 030 26101	2222 030 36101		2222 030 86101
25	100	4	2222 031 26101	2222 031 36101		2222 031 86101
25	220	6	2222 031 26221	2222 031 36221		2222 031 86221
25	470	00	2222 032 16471			2222 032 86471
25	680	01	2222 032 16681			
25	1000	02	2222 032 16102			2222 032 86102
25	1500	03	2222 032 16152			
25	2200	04	2222 033 16222		2222 033 46222	
25	3300	05	2222 033 16332			
25	4700	05	2222 033 16472		2222 033 46472	
40	6,8	2	2222 030 27688	2222 030 37688		2222 030 87688
40	10	2	2222 030 27109	2222 030 37109		2222 030 87109
40	15	2	2222 030 27159	2222 030 37159		2222 030 87159
40	22	3	2222 030 27229	2222 030 37229		2222 030 87229
40	33	3	2222 030 27339	2222 030 37339		2222 030 87339
40	47	5a	2222 030 27479	2222 030 37479		2222 030 87479
40	47	4	2222 031 27479	2222 031 37479		2222 031 87479
40	100	5	2222 031 27101	2222 031 37101		2222 031 87101
40	150	6	2222 031 27151	2222 031 37151		2222 031 87151
40	220	00	2222 032 17221			2222 032 87221
40	330	01	2222 032 17331			
40	470	01	2222 032 17471			2222 032 87471
40	680	02	2222 032 17681			
40	1000	03	2222 032 17102		2222 032 47102	
40	1500	04	2222 033 17152			
40	2200	05	2222 033 17222		2222 033 47222	
40	3300	05	2222 033 17332			
63	0,33	2	2222 030 28337	2222 030 38337		2222 030 88337
63	0,47	2	2222 030 28477	2222 030 38477		2222 030 88477
63	0,68	2	2222 030 28687	2222 030 38687		2222 030 88687
63	1	2	2222 030 28108	2222 030 38108		2222 030 88108
63	1,5	2	2222 030 28158	2222 030 38158		2222 030 88158
63	2,2	2	2222 030 28228	2222 030 38228		2222 030 88228
63	3,3	2	2222 030 28338	2222 030 38338		2222 030 88338
63	4,7	2	2222 030 28478	2222 030 38478		2222 030 88478
63	6,8	2	2222 030 28688	2222 030 38688		2222 030 88688
63	10	3	2222 030 28109	2222 030 38109		2222 030 88109



ALUMINIUM ELECTROLYTIC CAPACITORS

2222 030 etc.

U _R (V)	C _{nom} (µF)	case-size	cat. number style 1 on reel	cat. number style 1 ammo pack	cat. number style 2	cat. number style 3
63	15	3	2222 030 28159	2222 030 38159		2222 030 88159
63	22	5a	2222 030 28229	2222 030 38229		2222 030 88229
63	22	4	2222 031 28229	2222 031 38229		2222 031 88229
63	47	5	2222 031 28479	2222 031 38479		2222 031 88479
63	68	6	2222 031 28689	2222 031 38689		2222 031 88689
63	150	00	2222 032 18151			
63	220	01	2222 032 18221			2222 032 88221
63	330	02	2222 032 18331			
63	470	02	2222 032 18471			2222 032 88471
63	680	03	2222 032 18681			
63	1000	05	2222 033 18102		2222 033 48102	
63	1500	05	2222 033 18152			
100	68	00	2222 032 19689			
100	100	01	2222 032 19101			2222 032 89101
100	150	02	2222 032 19151			
100	220	03	2222 032 19221		2222 032 49221	
100	330	04	2222 033 19331			
100	470	05	2222 033 19471		2222 033 49471	
100	680	05	2222 033 19681			
160	4,7	4	2222 041 21478	2222 041 31478		
160	10	5	2222 041 21109	2222 041 31109		
160	22	7	2222 041 21229	2222 041 31229		
160	22	00	2222 042 11229			
160	47	02	2222 042 11479			
160	100	03	2222 042 11101			
160	220	05	2222 043 11221			
250	2,2	4	2222 041 23228	2222 041 33228		
250	4,7	5	2222 041 23478	2222 041 33478		
250	10	7	2222 041 23109	2222 041 33109		
250	10	00	2222 042 13109			2222 042 83109
250	15	01	2222 042 13159			
250	22	01	2222 042 13229			2222 042 83229
250	33	02	2222 042 13339			
250	47	03	2222 042 13479		2222 042 43479	
250	68	04	2222 043 13689			
250	100	05	2222 043 13101		2222 043 43101	
350	4,7	6	2222 041 25478	2222 041 35478		
350	10	01	2222 042 15109			
350	22	02	2222 042 15229			
350	47	04	2222 043 15479			
385	1	4	2222 041 28108	2222 041 38108		
385	2,2	5	2222 041 28228	2222 041 38228		
385	4,7	7	2222 041 28478	2222 041 38478		
385	6,8	00	2222 042 18688			
385	10	01	2222 042 18109			2222 042 88109
385	15	02	2222 042 18159			
385	22	03	2222 042 18229		2222 042 48229	
385	33	04	2222 043 18339			

PHILIPS



ALUMINIUM ELECTROLYTIC CAPACITORS

2222 030 etc.

U _R (V)	C _{nom} (μF)	case- size	cat. number style 1 on reel	cat. number style 1 ammo pack	cat. number style 2	cat. number style 3
385 385	47 68	04 05	2222 043 18479 2222 043 18689		2222 043 48479	

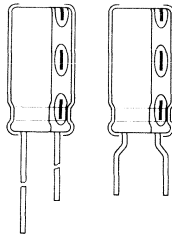


General data

Nominal capacitance range (E6 series)	0,22 to 3300 μF
Tolerance on nominal capacitance	$\pm 20\%$
Rated voltage range, U_R	6,3 to 63 V
Temperature range	-40 to +85 °C
Basic specification	IEC 384-4, gen. purpose grade
Climatic category	40/085/56

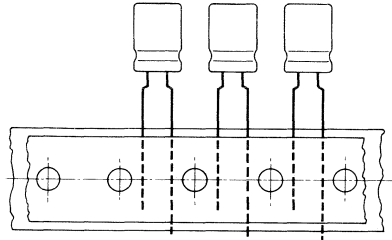
For detailed information see Data Handbook C14

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 3



style 4

U_R (V)	C_{nom} (μF)	case-size	cat. number style 1 ammo pack	cat. number style 3 ammo pack	cat. number style 4 on reel
6,3	150	12			2222 035 23151
6,3	330	13			2222 035 23331
10	47	11	2222 035 54479	2222 035 64479	2222 035 24479
10	100	12	2222 035 54101	2222 035 64101	2222 035 24101
10	220	13	2222 035 54221	2222 035 64221	2222 035 24221
10	330	14	2222 035 54331		
10	470	15	2222 035 54471		
10	680	16	2222 035 54681		
10	1000	17	2222 035 54102		
10	1500	18	2222 035 54152		
16	33	11	2222 035 55339	2222 035 65339	2222 035 25339
16	68	12	2222 035 55689	2222 035 65689	2222 035 25689
16	150	13	2222 035 55151	2222 035 65151	2222 035 25151
16	220	14	2222 035 55221		
16	330	15	2222 035 55331		
16	470	16	2222 035 55471		
16	680	17	2222 035 55681		
16	1000	18	2222 035 55102		
16	1500	19	2222 035 55152		
16	2200	19	2222 035 55222		
16	3300	20	2222 035 55332		

ALUMINIUM ELECTROLYTIC CAPACITORS

2222 035

U _R (V)	C _{nom} (μF)	case-size	cat. number style 1 ammo pack	cat. number style 3 ammo pack	cat. number style 4 on reel
25	47	12	2222 035 56479	2222 035 66479	2222 035 26479
25	100	13	2222 035 56101	2222 035 66101	2222 035 26101
25	150	14	2222 035 56151		
25	220	15	2222 035 56221		
25	330	16	2222 035 56331		
25	470	17	2222 035 56471		
25	680	18	2222 035 56681		
25	1000	19	2222 035 56102		
25	1500	20	2222 035 56152		
35	22	11	2222 035 90003	2222 035 90005	2222 035 90034
35	100	14	2222 035 90059		
35	1000	19	2222 035 90006		
40	15	11	2222 035 57159	2222 035 67159	2222 035 27159
40	22	12	2222 035 57229	2222 035 67229	2222 035 27229
40	33	12	2222 035 57339	2222 035 67339	2222 035 27339
40	68	13	2222 035 57689	2222 035 67689	2222 035 27689
40	150	15	2222 035 57151		
40	220	16	2222 035 57221		
40	330	17	2222 035 57331		
40	470	18	2222 035 57471		
40	680	19	2222 035 57681		
50	10	11	2222 035 90008	2222 035 90011	2222 035 90035
50	22	12	2222 035 90012	2222 035 90014	2222 035 90036
50	47	13	2222 035 90015	2222 035 90033	2222 035 90037
50	68	14	2222 035 90017		
50	100	15	2222 035 90019		
50	150	16	2222 035 90022		
50	220	17	2222 035 90024		
50	330	18	2222 035 90026		
50	680	19	2222 035 90028		
50	1000	20	2222 035 90031		
63	0,22	11	2222 035 58227	2222 035 68227	2222 035 28227
63	0,33	11	2222 035 58337	2222 035 68337	2222 035 28337
63	0,47	11	2222 035 58477	2222 035 68477	2222 035 28477
63	0,68	11	2222 035 58687	2222 035 68687	2222 035 28687
63	1,0	11	2222 035 58108	2222 035 68108	2222 035 28108
63	1,5	11	2222 035 58158	2222 035 68158	2222 035 28158
63	2,2	11	2222 035 58228	2222 035 68228	2222 035 28228
63	3,3	11	2222 035 58338	2222 035 68338	2222 035 28338
63	4,7	11	2222 035 58478	2222 035 68478	2222 035 28478
63	6,8	11	2222 035 58688	2222 035 68688	2222 035 28688
63	10	12	2222 035 58109	2222 035 68109	2222 035 28109
63	15	12	2222 035 58159	2222 035 68159	2222 035 28159
63	22	13	2222 035 58229	2222 035 68229	2222 035 28229
63	33	13	2222 035 58339	2222 035 68339	2222 035 28339
63	47	14	2222 035 58479		
63	68	15	2222 035 58689		
63	100	16	2222 035 58101		
63	150	17	2222 035 58151		



ALUMINIUM ELECTROLYTIC CAPACITORS

2222 035

U_R (V)	C_{nom} (μF)	case- size	cat. number style 1 ammo pack	cat. number style 3 ammo pack	cat. number style 4 on reel	
63	220	18	2222 035 58221			
63	330	19	2222 035 58331			
63	470	19	2222 035 58471			
63	680	20	2222 035 58681			

PHILIPS

C 11



General data

Nominal capacitance range (E6 series)	1 to 47 μF
Tolerance on nominal tolerance	$\pm 20\%$
Rated voltage range, U_R	63 V (p)
Temperature range	-40 to +85 °C
Endurance test at 85 °C	5000 h
Basic specification	IEC 384-4, long life grade
Climatic category	40/085/56

For detailed information see Data Handbook C14

case size	nominal dimensions (mm)
00	\varnothing 10 x 30
01	\varnothing 12,5 x 30
02	\varnothing 15 x 30
03	\varnothing 18 x 30



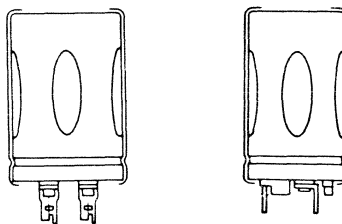
U_R (V)	C_{nom} (μF)	case size	cat. number
63	1	00	2222 039 18108
63	1,5	00	2222 039 18158
63	2,2	00	2222 039 18228
63	3,3	00	2222 039 18338
63	4,7	00	2222 039 18478
63	6,8	00	2222 039 18688
63	10	01	2222 039 18109
63	15	01	2222 039 18159
63	22	02	2222 039 18229
63	33	02	2222 039 18339
63	47	03	2222 039 18479

General data

Nominal capacitance range (E6 series)	47 to 47000 μF
Tolerance on nominal capacitance	-10 to +30%
Rated voltage range, U_R	10 tot 385 V
Temperature range	-40 tot + 85 °C
Basic specification	IEC 384-4, long life grade
Climatic category	40/085/56

For detailed information see Data Handbook C14

case size	nominal dimensions (mm)
1	\varnothing 25 x 35
2	\varnothing 25 x 45
3	\varnothing 30 x 45
4	\varnothing 35 x 45
5	\varnothing 35 x 55
6	\varnothing 40 x 45
7	\varnothing 40 x 55
8	\varnothing 40 x 75
9	\varnothing 40 x 105



U_R (V)	C_{nom} (μF)	case size	cat. number solder tags	cat. number p.w. pins		
10	4700	1	2222 050 14472	2222 050 54472		
10	6800	2	2222 050 14682	2222 050 54682		
10	10000	3	2222 050 14103	2222 050 54103		
10	15000	4	2222 050 14153	2222 050 54153		
10	22000	5		2222 050 54223		
10	33000	7		2222 050 54333		
10	47000	8		2222 050 54473		
16	3300	1	2222 050 15332	2222 050 55332		
16	4700	2	2222 050 15472	2222 050 55472		
16	6800	3	2222 050 15682	2222 050 55682		
16	10000	4	2222 050 15103	2222 050 55103		
16	15000	5	2222 050 15153	2222 050 55153		
16	22000	7	2222 050 15223	2222 050 55223		
16	47000	9	2222 050 15473			
25	2200	1	2222 050 16222	2222 050 56222		
25	3300	2	2222 050 16332	2222 050 56332		
25	4700	3	2222 050 16472	2222 050 56472		
25	6800	4	2222 050 16682	2222 050 56682		
25	10000	5	2222 050 16103	2222 050 56103		
25	15000	7	2222 050 16153	2222 050 56153		
25	22000	8	2222 050 16223	2222 050 56223		
25	33000	9	2222 050 16333			

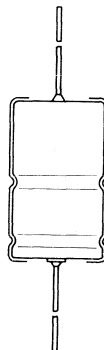
U_R (V)	C_{nom} (μF)	case size	cat. number solder tags	cat. number p.w. pins		
40	1500	1	2222 050 17152	2222 050 57152		
40	2200	2	2222 050 17222	2222 050 57222		
40	3300	3	2222 050 17332	2222 050 57332		
40	4700	4	2222 050 17472	2222 050 57472		
40	6800	5	2222 050 17682	2222 050 57682		
40	10000	7	2222 050 17103	2222 050 57103		
40	15000	8	2222 050 17153			
40	22000	9		2222 050 57223		
63	1000	1	2222 050 18102	2222 050 58102		
63	1500	2	2222 050 18152	2222 050 58152		
63	2200	3	2222 050 18222	2222 050 58222		
63	3300	4	2222 050 18332	2222 050 58332		
63	4700	5	2222 050 18472	2222 050 58472		
63	6800	7	2222 050 18682	2222 050 58682		
63	10000	8	2222 050 18103	2222 050 58103		
100	470	1	2222 050 19471	2222 050 59471		
100	680	2	2222 050 19681			
100	1000	3	2222 050 19102	2222 050 59102		
100	1500	4		2222 050 59152		
100	2200	5	2222 050 19222	2222 050 59222		
100	4700	8	2222 050 19472			
250	100	1		2222 052 53101		
250	220	3		2222 052 53221		
250	330	4		2222 052 53331		
250	470	5	2222 052 13471	2222 052 53471		
250	470	6		2222 052 43471		
250	680	7		2222 052 53681		
250	1000	8		2222 052 53102		
385	47	1	2222 052 18479	2222 052 58479		
385	100	3	2222 052 18101	2222 052 58101		
385	150	4	2222 052 18151	2222 052 58151		
385	220	5	2222 052 18221	2222 052 58221		
385	470	8		2222 052 58471		

General data

Nominal capacitance range (E6 series)	2,2 tot 1500 μF
Tolerance on nominal capacitance	-10 tot +50%
Rated voltage range, U_R	10 to 63 V
Temperature range	-40 tot +85 °C
Basic specification	IEC 384-4, long life grade
Climatic category	40/085/56

For detailed information see Data Handbook C14

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*	U_R (V)	C_{nom} (μF)	case size	cat. number*
10	100	5	2222 108 34101	40	15	5	2222 108 37159
10	220	6	2222 108 34221	40	22	5	2222 108 37229
10	330	00	2222 108 34331	40	33	6	2222 108 37339
10	680	01	2222 108 34681	40	47	6	2222 108 37479
10	1000	02	2222 108 34102	40	68	00	2222 108 37689
10	1500	03	2222 108 34152	40	100	01	2222 108 37101
				40	150	01	2222 108 37151
16	68	5	2222 108 35689	40	220	02	2222 108 37221
16	150	6	2222 108 35151	40	330	03	2222 108 37331
16	220	00	2222 108 35221				
16	470	01	2222 108 35471	63	2,2	5	2222 108 38228
16	680	02	2222 108 35681	63	3,3	5	2222 108 38338
16	1000	03	2222 108 35102	63	4,7	5	2222 108 38478
				63	6,8	5	2222 108 38688
25	33	5	2222 108 36339	63	10	5	2222 108 38109
25	47	5	2222 108 36479	63	15	6	2222 108 38159
25	100	6	2222 108 36101	63	22	6	2222 108 38229
25	150	00	2222 108 36151	63	33	00	2222 108 38339
25	220	01	2222 108 36221	63	47	00	2222 108 38479
25	470	02	2222 108 36471	63	68	01	2222 108 38689
25	680	03	2222 108 36681	63	100	02	2222 108 38101
				63	150	03	2222 108 38151

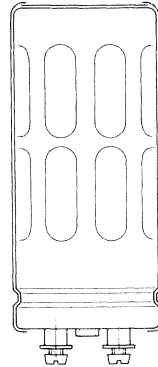
* For case series 5 and 6 the 8th digit is 3 (on reel) or 2 (ammo pack).

General data

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
Temperature range	-40 to +85 °C
Endurance test at 85 °C	5000 h
Basic specification	IEC 384-4, long life grade
Climatic category	40/085/56

For detailed information see Data Handbook C14

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



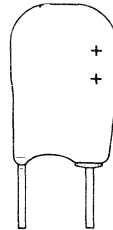
U_R (V)	C_{nom} (μF)	case size	cat. number	U_R (V)	C_{nom} (μF)	case size	cat. number
10	15000	10	2222 114 14153	63	2200	10	2222 114 18222
10	22000	11	2222 114 14223	63	3300	10	2222 114 18332
10	33000	12a	2222 114 14333	63	4700	11	2222 114 18472
10	47000	14	2222 114 14473	63	6800	12a	2222 114 18682
				63	10000	14	2222 114 18103
16	10000	10	2222 114 15103	63	15000	15a	2222 114 18153
16	15000	11	2222 114 15153	63	22000	16a	2222 114 18223
16	22000	12a	2222 114 15223				
16	33000	14	2222 114 15333	100	1000	10	2222 114 19102
16	47000	15a	2222 114 15473	100	1500	10	2222 114 19152
16	68000	16a	2222 114 15683	100	2200	11	2222 114 19222
				100	3300	12a	2222 114 19332
25	6800	10	2222 114 16682	100	4700	14	2222 114 19472
25	10000	11	2222 114 16103	100	10000	16a	2222 114 19103
25	15000	12a	2222 114 16153				
25	22000	14	2222 114 16223	250	680	12a	2222 115 13681
25	47000	16a	2222 114 16473	250	1000	14	2222 115 13102
				250	4700	17	2222 115 13472
40	4700	10	2222 114 17472	385	220	11	2222 115 18221
40	6800	11	2222 114 17682	385	470	14	2222 115 18471
40	10000	12a	2222 114 17103	385	1000	16a	2222 115 18102
40	15000	14	2222 114 17153	385	1500	16a	2222 115 18152
40	22000	15a	2222 114 17223	385	2200	17	2222 115 18222
40	33000	16a	2222 114 17333				

General data

Nominal capacitance range (E6 series)	0,1 to 68 μ F
Tolerance on nominal capacitance	$\pm 20\%$
Rated voltage range, U_R	6,3 to 40 V
Temperature range	-55 to +125 °C
Basic specification	IEC 384-4, long life grade
Climatic category	55/125/56

For detailed information see Data Handbook C14

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	$\varnothing 12,5 \times 8 \times 6$



U_R (V)	C_{nom} (μ F)	case size	cat. number	U_R (V)	C_{nom} (μ F)	case size	cat. number
6,3	10	1	2222 122 53109	25	0,68	1	2222 122 56687
6,3	15	2	2222 122 53159	25	1,0	1	2222 122 56108
6,3	22	2	2222 122 53229	25	1,5	1	2222 122 56158
6,3	33	3	2222 122 53339	25	2,2	2	2222 122 56228
6,3	47	4	2222 122 53479	25	3,3	2	2222 122 56338
6,3	68	4	2222 122 53689	25	4,7	3	2222 122 56478
				25	6,8	4	2222 122 56688
10	4,7	1	2222 122 54478	40	0,1	1	2222 122 57107
10	6,8	1	2222 122 54688	40	0,15	1	2222 122 57157
10	10	2	2222 122 54109	40	0,22	1	2222 122 57227
10	15	2	2222 122 54159	40	0,33	1	2222 122 57337
10	22	3	2222 122 54229	40	0,47	2	2222 122 57477
10	33	4	2222 122 54339	40	0,68	2	2222 122 57687
16	2,2	1	2222 122 55228	40	1,0	3	2222 122 57108
16	3,3	1	2222 122 55338	40	1,5	4	2222 122 57158
16	4,7	2	2222 122 55478	40	2,2	4	2222 122 57228
16	6,8	2	2222 122 55688				
16	10	3	2222 122 55109				
16	15	4	2222 122 55159				

General data

Nominal capacitance range (E6 series)	2,2 to 680 μF
Tolerance on nominal capacitance	$\pm 20\%$
Rated voltage range, U_R	6,3 to 40 V
Temperature range	-55 to +125 °C
Basic specification	IEC 384-4, long life grade
Climatic category	55/125/56

For detailed information see Data Handbook C14

case size	nominal dimensions (mm)
1	$\varnothing 6,5 \times 17$
2	$\varnothing 6,5 \times 22$
3	$\varnothing 8 \times 22$
4	$\varnothing 10 \times 22$
5	$\varnothing 10 \times 31$
6	$\varnothing 12,5 \times 31$



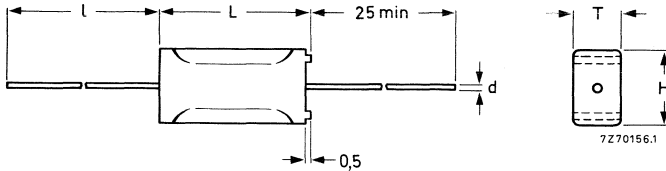
U_R (V)	C_{nom} (μF)	case size	cat. number	U_R (V)	C_{nom} (μF)	case size	cat. number
6,3	47	1	2222 123 13479	16	220	6	2222 123 15221
6,3	100	2	2222 123 13101				
6,3	150	3	2222 123 13151	25	10	1	2222 123 16109
6,3	330	4	2222 123 13331	25	22	2	2222 123 16229
6,3	470	5	2222 123 13471	25	33	3	2222 123 16339
6,3	680	6	2222 123 13681	25	47	3	2222 123 16479
				25	68	4	2222 123 16689
10	33	1	2222 123 14339	25	100	5	2222 123 16101
10	47	2	2222 123 14479	25	150	6	2222 123 16151
10	68	2	2222 123 14689				
10	100	3	2222 123 14101	40	2,2	1	2222 123 17228
10	150	4	2222 123 14151	40	3,3	1	2222 123 17338
10	220	4	2222 123 14221	40	4,7	1	2222 123 17478
10	330	5	2222 123 14331	40	6,8	1	2222 123 17688
10	470	6	2222 123 14471	40	10	2	2222 123 17109
				40	15	2	2222 123 17159
16	10	1	2222 123 15109	40	22	3	2222 123 17229
16	15	1	2222 123 15159	40	33	4	2222 123 17339
16	22	1	2222 123 15229	40	47	4	2222 123 17479
16	33	2	2222 123 15339	40	68	5	2222 123 17689
16	47	3	2222 123 15479	40	100	6	2222 123 17101
16	68	3	2222 123 15689				
16	100	4	2222 123 15101				
16	150	5	2222 123 15151				

General data

(MKT-P)

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	20%
Rated voltage U_R (a.c.) 50/60 Hz	250 V
Temperature range	-40 to +85 °C
Climatic category	40/085/21
Approvals	
type with axial leads	VDE0565, part 1
type with radial leads	VDE0565, part 1 and SEMKO
Class	X2

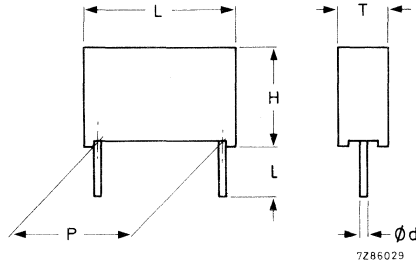
For detailed information see Data Handbook C15



250 V-range

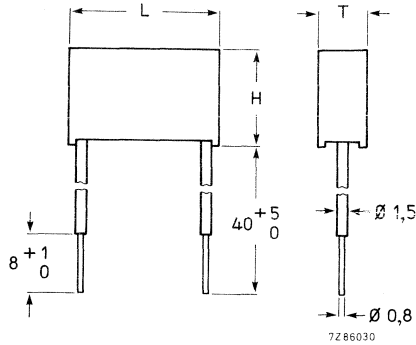
rated cap. (μF)	T_{max} (mm)	H_{max} (mm)	L_{max} (mm)	d (mm)	l_{min} (mm)	catalogue number
0,010	6,5	10,4	18	0,8	40	2222 330 00103
0,015	6,5	10,4	18	0,8	40	2222 330 00153
0,022	6,5	10,4	18	0,8	40	2222 330 00223
0,033	6,5	10,4	18	0,8	40	2222 330 00333
0,047	6,5	10,4	18	0,8	40	2222 330 00473
0,068	7,6	11,5	18	0,8	40	2222 330 00683
0,10	7,4	11,5	23,5	0,8	40	2222 330 00104
0,15	8,7	12,8	23,5	0,8	40	2222 330 00154
0,22	10,4	14,4	23,5	0,8	40	2222 330 00224
0,33	10,4	14,6	31	1	50	2222 330 00334
0,47	12,4	19,5	31	1	50	2222 330 00474





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,	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,	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,	17,5	26	22,5	0,8	2222 330 40224	2222 330 44224
0,33	10	18,	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



250 V-range

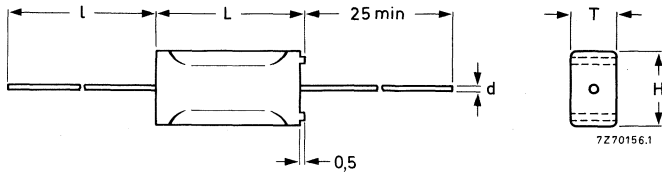
rated cap. (μF)	T_{max} (mm)	H_{max} (mm)	L_{max} (mm)		catalogue number
0,010	6	12	17,5		2222 330 84103
0,015	6	12	17,5		2222 330 84153
0,022	6	12	17,5		2222 330 84223
0,033	6	12	17,5		2222 330 84333
0,047	6	12	17,5		2222 330 84473
0,068	7	13	17,5		2222 330 84683
0,10	8,5	14,5	17,5		2222 330 84104

General data

(MKT and MKC)

Rated capacitance range (E12 series)	0,01 to 6,8 μF
Tolerance on rated capacitors	$\pm 10\%$
Rated voltage U_R (d.c.)	100 V, 250 V, 400 V, 630 V, 1000 V
Rated voltage U_R (a.c.), 50/60 Hz	63 V, 160 V, 220 V, 250 V
Temperature range	-55 to +100 °C
Climatic category, IEC 68	55/100/56
Basic specification	IEC 384-1 and IEC 384-2
Foil	Polyester (MKT) Polycarbonate (MKC)

For detailed information see Data Handbook C15



100 V-range

rated cap. (μF)	T_{max} (mm)	L_{max} (mm)	H_{max} (mm)	d (mm)	l_{min} (mm)	MKC cat. number	MKT cat. number
0,10	4,7	14,5	8,7	0,8	40	2222 341 29104	2222 341 27104
0,15	4,7	14,5	8,7	0,8	40	2222 341 29154	2222 341 27154
0,22	6,5	14,5	10,4	0,8	40	2222 341 29224	2222 341 27224
0,33	6,5	18	10,4	0,8	40	2222 341 29334	2222 341 27334
0,47	7,6	18	11,5	0,8	40	2222 341 29474	2222 341 27474
0,68	7,4	23,5	11,5	0,8	40	2222 341 29684	2222 341 27684
1,0	8,7	23,5	12,8	0,8	40	2222 341 29105	2222 341 27105
1,5	10,4	23,5	14,4	0,8	40	2222 341 29155	2222 341 27155
2,2	10,4	31	14,6	1	50	2222 341 29225	2222 341 27225
3,3	12,4	31	19,5	1	50	2222 341 29335	2222 341 27335
4,7	12,4	31	19,5	1	50	2222 341 29475	2222 341 27475
6,8	15	31	22	1	50	2222 341 29685	2222 341 27685

250 V-range

rated cap. (μF)	T _{max} (mm)	L _{max} (mm)	H _{max} (mm)	d (mm)	l _{min} (mm)	MKC cat. number	MKT cat. number
0,047	4,7	14,5	8,7	0,8	40	2222 341 49473	2222 341 89473
0,068	4,7	14,5	8,7	0,8	40	2222 341 49683	2222 341 89683
0,10	5,5	14,5	9,4	0,8	40	2222 341 49104	2222 341 89104
0,15	6,5	18	10,4	0,8	40	2222 341 49154	2222 341 89154
0,22	7,6	18	11,5	0,8	40	2222 341 49224	2222 341 89224
0,33	7,4	23,5	11,5	0,8	40	2222 341 49334	2222 341 89334
0,47	8,7	23,5	12,8	0,8	40	2222 341 49474	2222 341 89474
0,68	10,4	23,5	14,4	0,8	40	2222 341 49684	2222 341 89684
1,0	10,4	31	14,6	1	50	2222 341 49105	2222 341 89105
1,5	12,4	31	19,5	1	50	2222 341 49155	2222 341 89155
2,2	15	31	22	1	50	2222 341 49225	2222 341 89225

400 V-range

rated cap. (μF)	T _{max} (mm)	L _{max} (mm)	H _{max} (mm)	d (mm)	l _{min} (mm)	MKC cat. number	MKT cat. number
0,010	4,7	14,5	8,7	0,8	40	2222 341 59103	2222 341 55103
0,015	4,7	14,5	8,7	0,8	40	2222 341 59153	2222 341 55153
0,022	4,7	14,5	8,7	0,8	40	2222 341 59223	2222 341 55223
0,033	4,7	14,5	8,7	0,8	40	2222 341 59333	2222 341 55333
0,047	6,5	14,5	10,4	0,8	40	2222 341 59473	2222 341 55473
0,068	6,5	18	10,4	0,8	40	2222 341 59683	2222 341 55683
0,10	7,6	18	11,5	0,8	40	2222 341 59104	2222 341 55104
0,15	7,4	23,5	11,5	0,8	40	2222 341 59154	2222 341 55154
0,22	8,7	23,5	12,8	0,8	40	2222 341 59224	2222 341 55224
0,33	10,4	23,5	14,4	0,8	40	2222 341 59334	2222 341 55334
0,47	10,4	31	14,6	1	50	2222 341 59474	2222 341 55474
0,68	12,4	31	19,5	1	50	2222 341 59684	2222 341 55684
1,0	15	31	22	1	50	2222 341 59105	2222 341 55105

630 V-range

rated cap. (μF)	T _{max} (mm)	L _{max} (mm)	H _{max} (mm)	d (mm)	l _{min} (mm)	MKC cat. number
0,010	4,7	14,5	8,7	0,8	40	2222 341 61103
0,015	5,5	14,5	9,4	0,8	40	2222 341 61153
0,022	6,5	14,5	10,4	0,8	40	2222 341 61223
0,033	6,5	18	10,4	0,8	40	2222 341 61333
0,047	7,6	18	11,5	0,8	40	2222 341 61473
0,068	7,4	23,5	11,5	0,8	40	2222 341 61683
0,10	8,7	23,5	12,8	0,8	40	2222 341 61104
0,15	10,4	23,5	14,4	0,8	40	2222 341 61154
0,22	10,4	31	14,6	0,8	40	2222 341 61224
0,33	10,4	31	19,5	0,8	40	2222 341 61334
0,47	15	31	22	0,8	40	2222 341 61474

1000 V-range

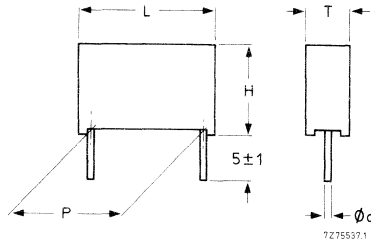
rated cap. (μF)	T _{max} (mm)	L _{max} (mm)	H _{max} (mm)	d (mm)	l _{min} (mm)	MKC cat. number
0,010	6,5	18	10,4	0,8	40	2222 341 71103
0,015	7,6	18	11,5	0,8	40	2222 341 71153
0,022	7,4	23,5	11,5	0,8	40	2222 341 71223
0,033	8,7	23,5	12,8	0,8	40	2222 341 71333
0,047	10,4	23,5	14,4	0,8	40	2222 341 71473
0,068	10,4	31	14,6	1	50	2222 341 71683
0,10	12,4	31	19,5	1	50	2222 341 71104
0,15	15	31	22	1	50	2222 341 71154

General data

(MKT and MKC)

Rated capacitance (E12 series)	0,01 to 10 μ F
Tolerance on rated capacitance	$\pm 10\%$
Rated voltage U_R (d.c.)	63 V, 100 V, 250 V, 400 V, 630 V
Rated voltage U_R 50/60 Hz	40 V, 63 V, 160 V, 220 V, 220 V
Temperature range	-55 to + 100°C
Climatic category, IEC 68	55/100/56
Basic specification	IEC 384 and IEC 384-2

For detailed information see Data Handbook C15



63 V-range

rated cap. (μ F)	T_{max} (mm)	L_{max} (mm)	H_{max} (mm)	P (mm)	d (mm)	MKT cat. number
0,22	4,5	13	10	10	0,8	2222 344 15224
0,33	5	13	11	10	0,8	2222 344 15334
0,47	6	13	12	10	0,8	2222 344 15474
0,68	6	17,5	11,5	15	0,8	2222 344 15684
1,0	7	17,5	13	15	0,8	2222 344 15105
1,5	8,5	17,5	14,5	15	0,8	2222 344 15155
2,2	8,5	26	15,5	22,5	0,8	2222 344 15225
3,3	8,5	26	18	22,5	0,8	2222 344 15335
4,7	9,5	26	19	22,5	0,8	2222 344 15475
6,8	11	31	20,5	27,5	0,8	2222 344 15685
10	13,5	31	23	27,5	0,8	2222 344 15106

100 V-range

rated cap. (μF)	T _{max} (mm)	L _{max} (mm)	H _{max} (mm)	P (mm)	d (mm)	MKC cat. number	MKT cat. number
0,10	4,5	13	10	10	0,8	2222 344 21104	2222 344 25104
0,15	4,5	13	10	10	0,8	2222 344 21154	2222 344 25154
0,22	5	13	11	10	0,8	2222 344 21224	2222 344 25224
0,33	5	17,5	11	15	0,8	2222 344 21334	2222 344 25334
0,47	6	17,5	11,5	15	0,8	2222 344 21474	2222 344 25474
0,68	7	17,5	13	15	0,8	2222 344 21684	2222 344 25684
1,0	8,5	17,5	14,5	15	0,8	2222 344 21105	2222 344 25105
1,5	6,5	26	15,5	22,5	0,8	2222 344 21155	2222 344 25155
2,2	8,5	26	18	22,5	0,8	2222 344 21225	2222 344 25225
3,3	9,5	26	19	22,5	0,8	2222 344 21335	2222 344 25335
4,7	11	31	20,5	22,5	0,8	2222 344 21475	2222 344 25475
6,8	13	31	23	27,5	0,8	2222 344 21685	2222 344 25685
10	15	31	25	27,5	1,0		2222 344 25106

250 V-range

rated cap. (μF)	T _{max} (mm)	L _{max} (mm)	H _{max} (mm)	P (mm)	d (mm)	MKC cat. number	MKT cat. number
0,022	4,5	10,5	10	10	0,8		2222 344 41223
0,047	4,5	13	10	10	0,8	2222 344 45473	2222 344 41473
0,068	4,5	13	10	10	0,8	2222 344 45683	2222 344 41683
0,10	5	17,5	11	15	0,8	2222 344 45104	2222 344 41104
0,15	6	17,5	11,5	15	0,8	2222 344 45154	2222 344 41154
0,22	7	17,5	13	15	0,8	2222 344 45224	2222 344 41224
0,33	8,5	17,5	14,5	15	0,8	2222 344 45334	2222 344 41334
0,47	6,5	26	15,5	22,5	0,8	2222 344 45474	2222 344 41474
0,68	7,5	26	16,5	22,5	0,8	2222 344 45684	2222 344 41684
1,0	9,5	26	19	22,5	0,8	2222 344 45105	2222 344 41105
1,5	11	31	20,5	27,5	0,8	2222 344 45155	2222 344 41155
2,2	13,5	31	23	27,5	0,8	2222 344 45225	2222 344 41225

400 V-range

rated cap. (μF)	T_{max} (mm)	L_{max} (mm)	H_{max} (mm)	P (mm)	d (mm)	MKC cat. number	MKT cat. number
0,010	4,5	13	10	10	0,8	2222 344 51103	2222 344 55103
0,015	4,5	13	10	10	0,8	2222 344 51153	2222 344 55153
0,022	4,5	13	10	10	0,8	2222 344 51223	2222 344 55223
0,033	4,5	13	10	10	0,8	2222 344 51333	2222 344 55333
0,047	5	17,5	11	15	0,8	2222 344 51473	2222 344 55473
0,068	6	17,5	11,5	15	0,8	2222 344 51683	2222 344 55683
0,10	7	17,5	13	15	0,8	2222 344 51104	2222 344 55104
0,15	8,5	17,5	14,5	15	0,8	2222 344 51154	2222 344 55154
0,22	6,5	26	15,5	22,5	0,8	2222 344 51224	2222 344 55224
0,33	7,5	26	16,5	22,5	0,8	2222 344 51334	2222 344 55334
0,47	9,5	26	19	22,5	0,8	2222 344 51474	2222 344 55474
0,68	11	31	20,5	27,5	0,8	2222 344 51684	2222 344 55684
1,0	13,	31	23	27,5	0,8	2222 344 51105	2222 344 55105

630 V-range

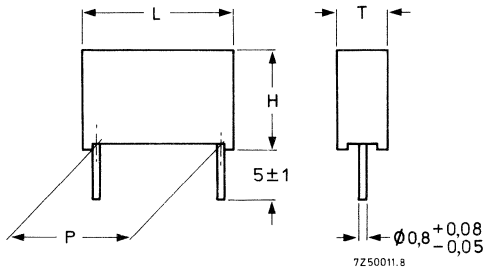
rated cap. (μF)	T_{max} (mm)	L_{max} (mm)	H_{max} (mm)	P (mm)	d (mm)	MKC cat. number	
0,010	4,5	13	10	10	0,8	2222 344 61103	
0,015	5	13	11	10	0,8	2222 344 61153	
0,022	6	13	12	10	0,8	2222 344 61223	
0,033	6	17,5	11,5	15	0,8	2222 344 61333	
0,047	7	17,5	13	15	0,8	2222 344 61473	
0,068	8,5	17,5	14,5	15	0,8	2222 344 61683	
0,10	6,5	26	15,5	22,5	0,8	2222 344 61104	
0,15	7,5	26	16,5	22,5	0,8	2222 344 61154	
0,22	9,5	26	19	22,5	0,8	2222 344 61224	
0,33	11	31	20,5	27,5	0,8	2222 344 61334	
0,47	13,5	31	23	27,5	0,8	2222 344 61474	

General data

(KP)

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	-40 to + 85 °C
Climatic category, IEC 68	40/085/56

For detailed information see Data Handbook C15



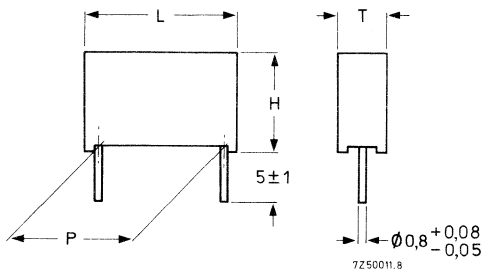
rated cap. (μF)	T_{max} (mm)	L_{max} (mm)	H_{max} (mm)	P (mm)	cat. number
0,047	8	21,5	15	15	2222 357 51473
0,068	10	21,5	17	15	2222 357 51683
0,10	8,5	29	18,5	22,5	2222 357 51104
0,15	8,5	29	18,5	22,5	2222 357 51154
0,22	10	34	20	27,5	2222 357 51224
0,33	12	34	22	27,5	2222 357 51334
0,47	15	34	25	27,5	2222 357 51474
0,68	18	34	28	27,5	2222 357 51684

General data

(KP/MKP)

Rated capacitance range (E12 series)	1 to 27 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	-40 to +85 °C
Climatic category, IEC 68	40/085/56

For detailed information see Data Handbook C15



1000 V-range

rated cap. (μ F)	T_{max} (mm)	L_{max} (mm)	H_{max} (mm)	P (mm)	cat. number
0,018	8,5	29	18,5	22,5	2222 357 72183
0,022	8,5	29	18,5	22,5	2222 357 72223
0,027	8,5	29	18,5	22,5	2222 357 72273

1500 V-range

0,0082	8,5	29	18,5	22,5	2222 357 82822
0,010	8,5	29	18,5	22,5	2222 357 82103
0,012	8,5	29	18,5	22,5	2222 357 82123
0,015	8,5	29	18,5	22,5	2222 357 82153

2000 V-range

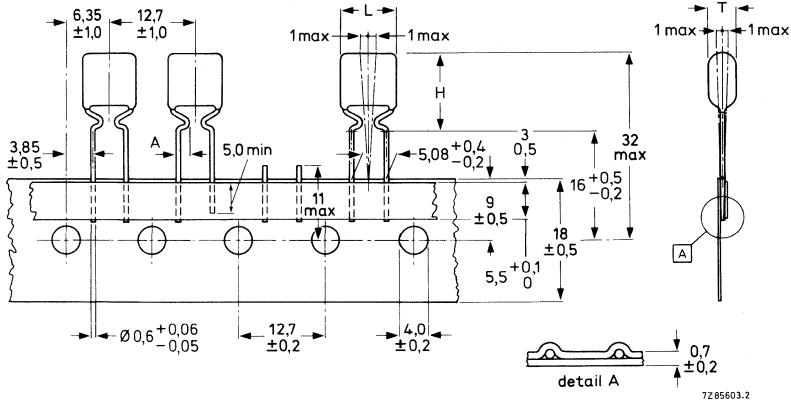
0,0010	8,5	29	18,5	22,5	2222 357 92102
0,0012	8,5	29	18,5	22,5	2222 357 92122
0,0022	8,5	29	18,5	22,5	2222 357 92222
0,0027	8,5	29	18,5	22,5	2222 357 92272
0,0033	8,5	29	18,5	22,5	2222 357 92332
0,0039	8,5	29	18,5	22,5	2222 357 92392
0,0047	8,5	29	18,5	22,5	2222 357 92472
0,0056	8,5	29	18,5	22,5	2222 357 92562
0,0068	8,5	29	18,5	22,5	2222 357 92682
0,0082	10	29	20	22,5	2222 357 92822
0,010	10	29	20	22,5	2222 357 92103
0,012	10	29	20	22,5	2222 357 92123

General data

(MKT)

Rated capacitance range (E12 series)	0,0047 to 0,47 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	40/100/21
Basic specification	IEC 384-2, general-purpose grade

For detailed information see Data Handbook C15



63 V-range

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	4,5	14	10,5	2222 365 11224	2222 365 15224
0,33	5	14,5	10,5	2222 365 11334	2222 365 15334
0,47	6	15,5	10,5	2222 365 11474	2222 365 15474

100 V-range

0,047	4	11,5	10	2222 365 21473	2222 365 2547
0,068	4	11,5	10	2222 365 21683	2222 365 2568
0,10	4	11,5	10	2222 365 21104	2222 365 2510
0,15	5	12,5	10,5	2222 365 21154	2222 365 2515
0,22	6	13,5	10,5	2222 365 21224	2222 365 2522

250 V-range

0,022	4	11,5	10	2222 365 41223	2222 365 45223
0,033	4	11,5	10	2222 365 41333	2222 365 45333

400 V-range

0,0047	4	11,5	10	2222 365 51472	2222 365 55472
0,0068	4	11,5	10	2222 365 51682	2222 365 55682
0,010	4	11,5	10	2222 365 51103	2222 365 55103
0,015	4	11,5	10	2222 365 51153	2222 365 55153

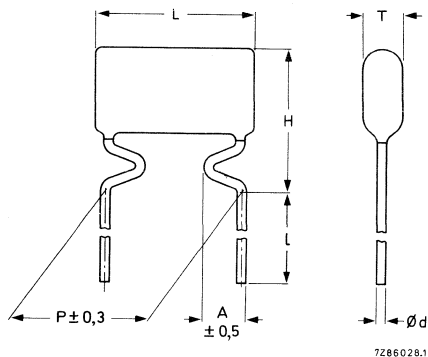


General data

(MKT)

Rated capacitance range (E12 series)	0,0047 to 0,47 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	40/100/21
Basic specification	IEC 384-2, general-purpose grade
Foil	polyester (MKT)

For detailed information see Data Handbook C15



63 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
0,15	4	13,5	10	7,5	0,6	2222 366 15154	2222 366 11154
0,22	4,5	14	10,5	7,5	0,6	2222 366 15224	2222 366 11224
0,33	5	14,5	10,5	7,5	0,6	2222 366 15334	2222 366 11334
0,47	6	15,5	10,5	7,5	0,6	2222 366 15474	2222 366 11474

100 V-range

0,047	4	11	10	7,5	0,6	2222 366 25473	2222 366 21473
0,068	4	11	10	7,5	0,6	2222 366 25683	2222 366 21683
0,10	4	11	10	7,5	0,6	2222 366 25104	2222 366 21104
0,15	5	12	10,5	7,5	0,6	2222 366 25154	2222 366 21154
0,22	6	13	10,5	7,5	0,6	2222 366 25224	2222 366 21224

250 V-range

0,022	4	11	10	7,5	0,6	2222 366 45223	2222 366 41223
0,033	4	11	10	7,5	0,6	2222 366 45333	2222 366 41333

400 V-range

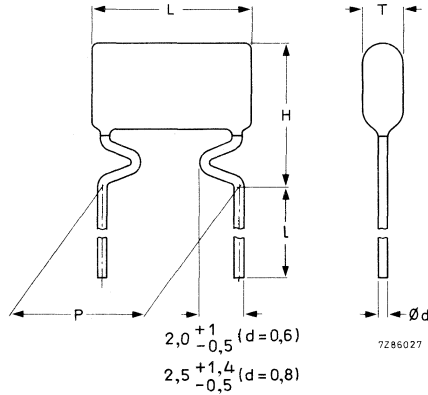
0,0047	4	11	10	7,5	0,6	2222 366 55472	2222 366 51472
0,0068	4	11	10	7,5	0,6	2222 366 55682	2222 366 51682
0,010	4	11	10	7,5	0,6	2222 366 55103	2222 366 51103
0,015	4	11	10	7,5	0,6	2222 366 55153	2222 366 51153

General data

(MKT)

Rated capacitance range (E12 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
Basic specification	IEC 384-2, long-life grade
Foil	polyester (MKT)

For detailed information see Data Handbook C15



100 V-range

rated cap. (μ F)	T_{max} (mm)	H_{max} (mm)	L_{max} (mm)	P (mm)	d (mm)	l = 5 cat. number	l = 17 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	4,5	12,5	12,5	10	0,6	2222 368 25154	2222 368 21154
0,22	5,5	13,5	12,5	10	0,6	2222 368 25224	2222 368 21224
0,33	5	14	17,5	15,24	0,8	2222 368 25334	2222 368 21334
0,47	6	15	17,5	15,24	0,8	2222 368 25474	2222 368 21474
0,68	7	16	17,5	15,24	0,8	2222 368 25684	2222 368 21684
1,0	8,5	17,5	17,5	15,24	0,8	2222 368 25105	2222 368 21105
1,5	6,5	18,5	26	22,9	0,8	2222 368 25155	2222 368 21155
2,2	8	20	26	22,9	0,8	2222 368 25225	2222 368 21225
3,3	9,5	21,5	26	22,9	0,8	2222 368 25335	2222 368 21335
4,7	11	23	30	28	0,8	2222 368 25475	2222 368 21475
6,8	13	25	30	28	0,8	2222 368 25685	2222 368 21685



250 V-range

rated cap. (μF)	T_{max} (mm)	H_{max} (mm)	L_{max} (mm)	P (mm)	d (mm)	l = 5 cat. number	l = 17 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

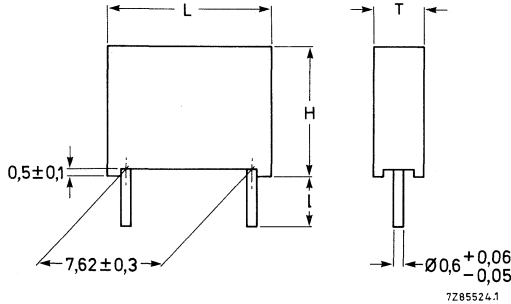
rated cap. (μF)	T_{max} (mm)	H_{max} (mm)	L_{max} (mm)	P (mm)	d (mm)	l = 5 cat. number	l = 17 cat. number
0,0010	4	12	12,5	10	0,6	2222 368 55102	2222 368 51102
0,0015	4	12	12,5	10	0,6	2222 368 55152	2222 368 51152
0,0022	4	12	12,5	10	0,6	2222 368 55222	2222 368 51222
0,0033	4	12	12,5	10	0,6	2222 368 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	12	12,5	10	0,6	2222 368 55333	2222 368 51333

General data

(MKT)

Rated capacitance range (E12-series)	0,0047 to 0,15 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	-55 to +100 °C
Climatic category IEC 68 (CECC 30400)	55/100/56
Basic specification	IEC 384-2, long-life grade
Foil	polyester (MKT)

For detailed information see Data Handbook C15



100 V-range

rated cap. (μ F)	T_{max} (mm)	H_{max} (mm)	L_{max} (mm)			$l = 4$ mm cat. number	$l = 10$ mm cat. number
0,047	3	8	10			2222 371 21473	2222 371 25473
0,068	3	8	10			2222 371 21683	2222 371 25683
0,10	3	8	10			2222 371 21104	2222 371 25104
0,15	4	9	10			2222 371 21154	2222 371 25154

250 V-range

0,015	3	8	10			2222 371 41153	2222 371 45153
0,022	3	8	10			2222 371 41223	2222 371 45223
0,033	3	8	10			2222 371 41333	2222 371 45333
0,047	4	9	10			2222 371 41473	2222 371 45473

400 V-range

0,0047	3	8	10			2222 371 51472	2222 371 55472
0,0068	3	8	10			2222 371 51682	2222 371 55682
0,010	3	8	10			2222 371 51103	2222 371 55103
0,015	4	9	10			2222 371 51153	2222 371 55153

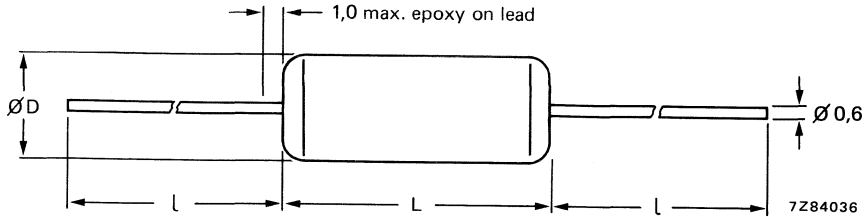


General data

(KP)

Rated capacitance range	47 to 22000 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 tot + 100 °C
Climatic category, IEC 68	40/100/21
Basic specification	IEC 384-13

For detailed information see Data Handbook C15



63 V-range

rated cap. (pF)	D_{max} (mm)	L_{max} (mm)	l_{max} (mm)		cat. number on reel	cat.number ammo pack
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
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250 V-range

47	4	11	30		2222 457 74709	2222 457 34709
68	4	11	30		2222 457 76809	2222 457 36809
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

General data

Capacitance range	1000 to 22000 pF
Tolerance	-20 to +80%
Rated d.c. voltage	63 V
Basic specification	IEC 384-9, class 2
Climatic category, IEC 68	10/055/21
Colour code	green

For detailed information see Data Handbook C15

size	W _{max} (mm)	H _{max} (mm)	
		fig. 1	fig. 2
I	3,6	6,3	5,0
II B	4,5	7,3	6,0
IV	6,2	9,0	7,7

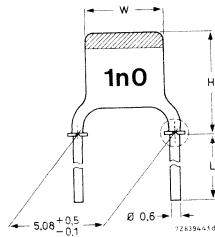


Fig. 1

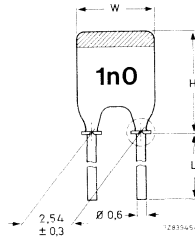


Fig. 2

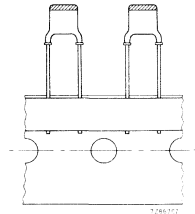


Fig. 3

cap. (pF)	size	cat. number lead spacing 0,1" long leads, fig. 2	cat. number lead spacing 0,2" short leads, fig. 1	cat. number lead spacing 0,2" on tape on reel fig. 3
1000	I	2222 629 08102	2222 629 19102	2222 629 53102
2200	I	2222 629 08222	2222 629 19222	2222 629 53222
4700	I	2222 629 08472	2222 629 19472	2222 629 53472
10000	II B	2222 629 08103	2222 629 19103	2222 629 53103
22000	IV	2222 629 08223	2222 629 19223	2222 629 53223

General data

Capacitance range	180 to 4700 pF
Tolerance	± 10%
Rated d.c. voltage	100 V
Basic specification	IEC 384-9, class 2
Climatic category, IEC 68	55/085/21
Colour code	yellow

For detailed information see Data Handbook C15

size	W _{max} (mm)	H _{max} (mm)	
		fig. 1	fig. 2
I	3,6	6,3	5,0
IIA	3,9	6,7	5,3
IIB	4,5	7,3	6,0
III	5,1	7,9	6,6
IV	6,2	9,0	7,7

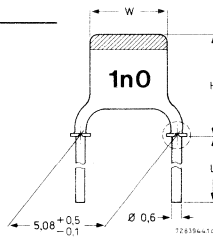


Fig. 1

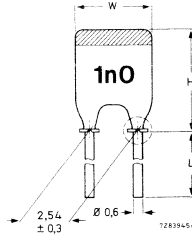


Fig. 2

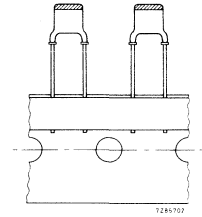


Fig. 3

cap. (pF)	size	cat. number lead spacing 0,1" long leads, fig. 2	cat. number lead spacing 0,2" short leads, fig. 1	cat. number lead spacing 0,2" on tape on reel fig. 3
180	I	2222 630 08181	2222 630 19181	2222 630 53181
220	I	2222 630 08221	2222 630 19221	2222 630 53221
270	I	2222 630 08271	2222 630 19271	2222 630 53271
330	I	2222 630 08331	2222 630 19331	2222 630 53331
390	I	2222 630 08391	2222 630 19391	2222 630 53391
470	I	2222 630 08471	2222 630 19471	2222 630 53471
560	I	2222 630 08561	2222 630 19561	2222 630 53561
680	I	2222 630 08681	2222 630 19681	2222 630 53681
820	I	2222 630 08821	2222 630 19821	2222 630 53821
1000	IIA	2222 630 08102	2222 630 19102	2222 630 53102
1200	IIA	2222 630 08122	2222 630 19122	2222 630 53122
1500	IIB	2222 630 08152	2222 630 19152	2222 630 53152
1800	IIB	2222 630 08182	2222 630 19182	2222 630 53182
2200	III	2222 630 08222	2222 630 19222	2222 630 53222
2700	III	2222 630 08272	2222 630 19272	2222 630 53272
3300	IV	2222 630 08332	2222 630 19332	2222 630 53332
3900	IV	2222 630 08392	2222 630 19392	2222 630 53392
4700	IV	2222 630 08472	2222 630 19472	2222 630 53472

General data

2222 680 / 683 / 679

Capacitance range	0,56 to 1,5 pF
Tolerance	±2% or ±0,25 pF
Rated d.c. voltage	100 V
Temperature coefficient	P100 (+ 100 x 10 ⁻⁶ /K)
Basic specification	IEC 384-8, class 1B
Climatic category, IEC 68	55/085/21
Colour code	red/violet

For detailed information see Data Handbook C15

size	W _{max} (mm)	H _{max} (mm)	
		fig. 1	fig. 2
I	3,6	6,3	5,0

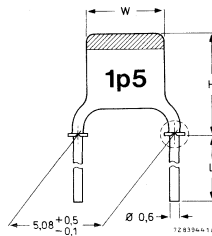


Fig. 1

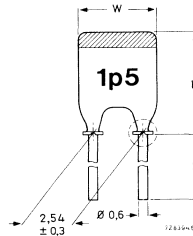


Fig. 2

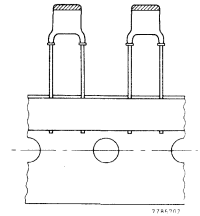


Fig. 3

cap. (pF)	tolerance (pF)	size	cat. number lead spacing 0,1" long leads, fig. 2	cat. number lead spacing 0,2" short leads, fig. 1	cat. number lead spacing 0,2" on tape/reel fig.3
0,56	± 0,25	I	2222 680 03567		2222 679 03567
0,68	± 0,25	I	2222 680 03687		2222 679 03687
0,82	± 0,25	I	2222 680 03827		2222 679 03827
1,0	± 0,25	I	2222 680 03108	2222 683 03108	2222 679 03108
1,2	± 0,25	I	2222 680 03128	2222 683 03128	2222 679 03128
1,5	± 0,25	I	2222 680 03158	2222 683 03158	2222 679 03158

General data

2222 680 / 683 / 679

Capacitance range	1,8 to 120 pF
Tolerance	± 2% or ± 0,25 pF
Rated d.c. voltage	100 V
Temperature coefficient	NPO (0 x 10 ⁻⁶ /K)
Basic specification	IEC 384, class 1B
Climatic category, IEC 68	55/085/21
Colour code	black

For detailed information see Data Handbook C15

size	W _{max} (mm)	H _{max} (mm)	
		fig. 1	fig. 2
I	3,6	6,3	5,0
IIA	3,9	6,7	5,3
IIIB	4,5	7,3	6,0
III	5,1	7,9	6,6

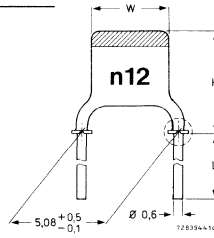


Fig. 1

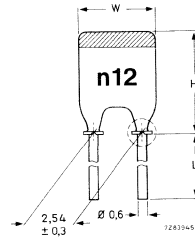


Fig. 2

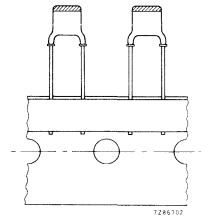


Fig. 3

cap. (pF)	tolerance (pF)	size	cat. number lead spacing 0,1" long leads, fig. 2	cat. number lead spacing 0,2" short leads, fig. 1	cat. number lead spacing 0,2" on tape/reel fig.3
1,8	± 0,25	I	2222 680 09188	2222 683 09188	2222 679 09188
2,2	± 0,25	I	2222 680 09228	2222 683 09228	2222 679 09228
2,7	± 0,25	I	2222 680 09278	2222 683 09278	2222 679 09278
3,3	± 0,25	I	2222 680 09338	2222 683 09338	2222 679 09338
4,7	± 0,25	I	2222 680 09478	2222 683 09478	2222 679 09478
5,6	± 0,25	I	2222 680 09568	2222 683 09568	2222 679 09568
6,8	± 0,25	I	2222 680 09688	2222 683 09688	2222 679 09688
8,2	± 0,25	I	2222 680 09828	2222 683 09828	2222 679 09828
10	± 2%	I	2222 680 10109	2222 683 10109	2222 679 10109
12	± 2%	I	2222 680 10129	2222 683 10129	2222 679 10129
15	± 2%	I	2222 680 10159	2222 683 10159	2222 679 10159
18	± 2%	I	2222 680 10189	2222 683 10189	2222 679 10189
22	± 2%	I	2222 680 10229	2222 683 10229	2222 679 10229
27	± 2%	I	2222 680 10279	2222 683 10279	2222 679 10279
33	± 2%	I	2222 680 10339	2222 683 10339	2222 679 10339
39	± 2%	IIA	2222 680 10399	2222 683 10399	2222 679 10399
47	± 2%	IIA	2222 680 10479	2222 683 10479	2222 679 10479
56	± 2%	IIIB	2222 680 10569	2222 683 10569	2222 679 10569
68	± 2%	IIIB	2222 680 10689		2222 679 10689
82	± 2%	IIIB	2222 680 10829		2222 679 10829
100	± 2%	III	2222 680 10101		2222 679 10101
120	± 2%	III	2222 680 10121		2222 679 10121

General data

2222 680 / 683 / 679

Capacitance range	3,9 to 150 pF
Tolerance	± 2% or ± 0,25 pF
Rated d.c. voltage	100 V
Temperature coefficient	N150 (150 x 10 ⁻⁶ /K)
Basic specification	IEC 384-8, class 1B
Climatic category, IEC 68	55/085/21
Colour code	orange

For detailed information see Data Handbook C15

size	W _{max} (mm)	H _{max} (mm)	
		fig. 1	fig. 2
I	3,6	6,3	5,0
IIA	3,9	6,7	5,3
IIIB	4,5	6,0	6,0
III	5,1	7,9	6,6
IV	6,2	9,0	7,7

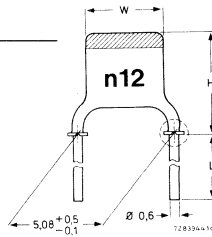


Fig. 1

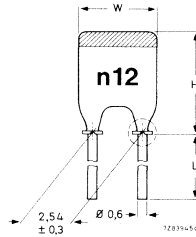


Fig. 2

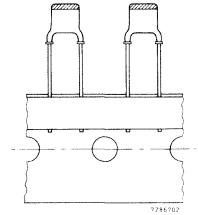


Fig. 3

cap. (pF)	tolerance (pF)	size	cat. number lead spacing 0,1" long leads, fig. 2	cat. number lead spacing 0,2" short leads, fig. 1	cat. number lead spacing 0,2" on tape/reel fig.3
3,9	± 0,25	I	2222 680 33398	2222 683 33398	2222 679 33398
4,7	± 0,25	I	2222 680 33478	2222 683 33478	2222 679 33478
5,6	± 0,25	I	2222 680 33568	2222 683 33568	2222 679 33568
6,8	± 0,25	I	2222 680 33688	2222 683 33688	2222 679 33688
8,2	± 0,25	I	2222 680 33828	2222 683 33828	2222 679 33828
10	± 2%	I	2222 680 34109	2222 683 34109	2222 679 34109
12	± 2%	I	2222 680 34129	2222 683 34129	2222 679 34129
15	± 2%	I	2222 680 34159	2222 683 34159	2222 679 34159
18	± 2%	I	2222 680 34189	2222 683 34189	2222 679 34189
22	± 2%	I	2222 680 34229	2222 683 34229	2222 679 34229
27	± 2%	I	2222 680 34279	2222 683 34279	2222 679 34279
33	± 2%	I	2222 680 34339	2222 683 34339	2222 679 34339
39	± 2%	IIA	2222 680 34399	2222 683 34399	2222 679 34399
47	± 2%	IIA	2222 680 34479	2222 683 34479	2222 679 34479
56	± 2%	IIIB	2222 680 34569	2222 683 34569	2222 679 34569
68	± 2%	IIIB	2222 680 34689	2222 683 34689	2222 679 34689
82	± 2%	III	2222 680 34829	2222 683 34829	2222 679 34829
100	± 2%	III	2222 680 34101	2222 683 34101	2222 679 34101
120	± 2%	IV	2222 680 34121	2222 683 34121	2222 679 34121
150	± 2%	IV	2222 680 34151	2222 683 34151	2222 679 34151

General data

2222 680 / 683 / 679

Capacitance range	3,9 to 330 pF
Tolerance	± 2% or ± 0,25 pF
Rated d.c. voltage	100 V
Temperature coefficient	N750 (750 x 10 ⁻⁶ /K)
Basic specification	IEC 384-8, class 1B
Climatic category, IEC 68	55/085/21
Colour code	violet

For detailed information see Data Handbook C15

size	W _{max} (mm)	H _{max} (mm) fig.1 fig. 2	
I	3,6	6,3	5,0
IIA	3,9	6,7	5,3
IIIB	4,5	7,3	6,0
III	5,1	7,9	6,6
IV	6,2	9,0	7,7
V	6,2	11,2	9,9

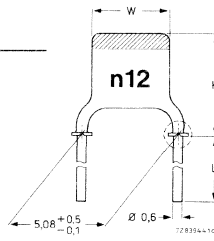


Fig. 1

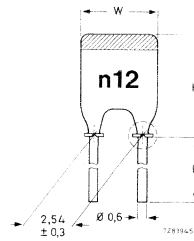


Fig. 2

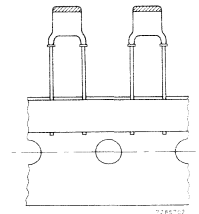


Fig. 3

cap. (pF)	tolerance (pF)	size	cat. number lead spacing 0,1" long leads, fig. 2	cat. number lead spacing 0,2" short leads, fig. 1	cat. number lead spacing 0,2" on tape/reel fig.3
3,9	± 0,25	I	2222 680 57398	2222 683 57398	2222 679 57398
4,7	± 0,25	I	2222 680 57478	2222 683 57478	2222 679 57478
5,6	± 0,25	I	2222 680 57568	2222 683 57568	2222 679 57568
6,8	± 0,25	I	2222 680 57688	2222 683 57688	2222 679 57688
8,2	± 0,25	I	2222 680 57828	2222 683 57828	2222 679 57828
10	± 2%	I	2222 680 58109	2222 683 58109	2222 679 58109
12	± 2%	I	2222 680 58129	2222 683 58129	2222 679 58129
15	± 2%	I	2222 680 58159	2222 683 58159	2222 679 58159
18	± 2%	I	2222 680 58189	2222 683 58189	2222 679 58189
22	± 2%	I	2222 680 58229	2222 683 58229	2222 679 58229
27	± 2%	I	2222 680 58279	2222 683 58279	2222 679 58279
33	± 2%	I	2222 680 58339	2222 683 58339	2222 679 58339
39	± 2%	I	2222 680 58399	2222 683 58399	2222 679 58399
47	± 2%	I	2222 680 58479	2222 683 58479	2222 679 58479
56	± 2%	IIA	2222 680 58569	2222 683 58569	2222 679 58569
68	± 2%	IIA	2222 680 58689	2222 683 58689	2222 679 58689
82	± 2%	IIIB	2222 680 58829	2222 683 58829	2222 679 58829
100	± 2%	IIIB	2222 680 58101	2222 683 58101	2222 679 58101
120	± 2%	III	2222 680 58121	2222 683 58121	2222 679 58121
150	± 2%	III	2222 680 58151	2222 683 58151	2222 679 58151
180	± 2%	IV	2222 680 58181	2222 683 58181	2222 679 58181
220	± 2%	IV	2222 680 58221	2222 683 58221	2222 679 58221
270	± 2%	V	2222 680 58271	2222 683 58271	2222 679 58271
330	± 2%	V	2222 680 58331	2222 683 58331	2222 679 58331

MINIATURE CERAMIC CAPACITORS

N1500

General data

2222 680 / 683 / 679

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)
Basic specification	IEC 384-8, class 1B
Climatic category, IEC 68	55/085/21
Colour code	orange/orange

For detailed information see Data Handbook C15

size	W _{max} (mm)	H _{max} (mm)	
		fig. 1	fig. 2
IV	6,2	9,0	7,7
V	6,2	11,2	8,9

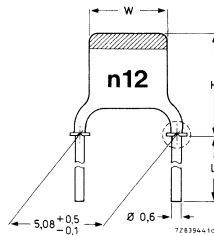


Fig. 1

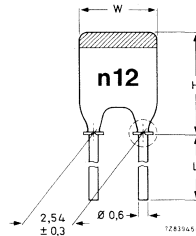


Fig. 2

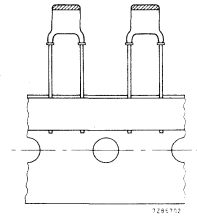


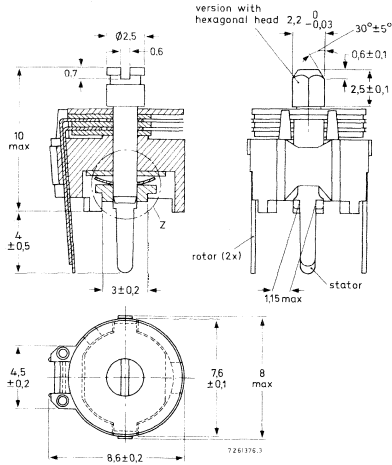
Fig. 3

cap. (pF)	tolerance (pF)	size	cat. number lead spacing 0,1" long leads, fig. 2	cat. number lead spacing 0,2" short leads, fig. 1	cat. number lead spacing 0,2" on tape/reel fig.3
390	± 2%	IV	2222 680 70391	2222 683 70391	2222 679 70391
470	± 2%	V	2222 680 70471	2222 683 70471	2222 679 70471
560	± 2%	V	2222 680 70561	2222 683 70561	2222 679 70561

General data

Capacitance range	5,5 to 40 pF
Diameter	7,5 mm
Rated voltage	250 V
Basic specification	IEC 418-1 and 4
Climatic category, IEC 68	40/070/21 and 40/085/21

For detailed information see Data Handbook C7



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	-200	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
40	3	-250	85	violet	2222 808 11409

General data

Capacitance values	40, 65 and 80 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

For detailed information see Data Handbook C7

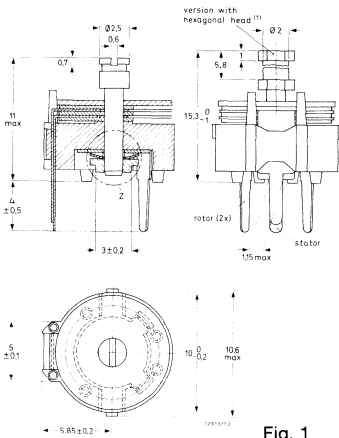


Fig. 1

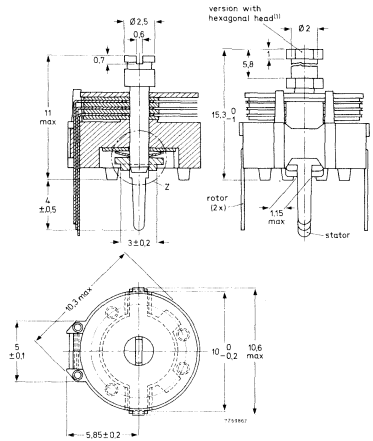


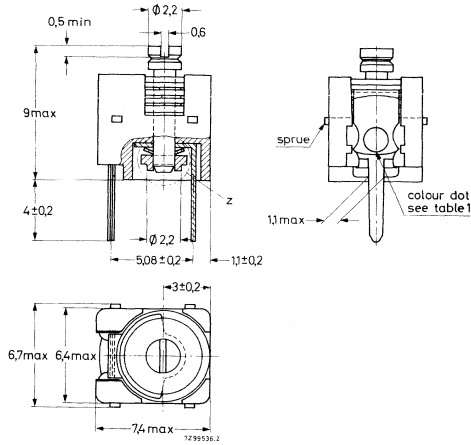
Fig. 2

C_{max} (pF)	C_{max} (pF)	temperature coefficient (10 ⁻⁶ /K)	max. permissible temperature (°C)	colour code	fig.	cat. number
40	5,5	-150	70	grey	1	2222 808 32409
40	5,5	-150	70	grey	2	2222 808 31409
65	5,5	-200	70	yellow	1	2222 808 32659
65	5,5	-200	70	yellow	2	2222 808 31659
80	6	-100	85	red	1	2222 808 32809
80	6	-100	85	red	2	2222 808 31809

General data

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

For detailed information see Data Handbook C7

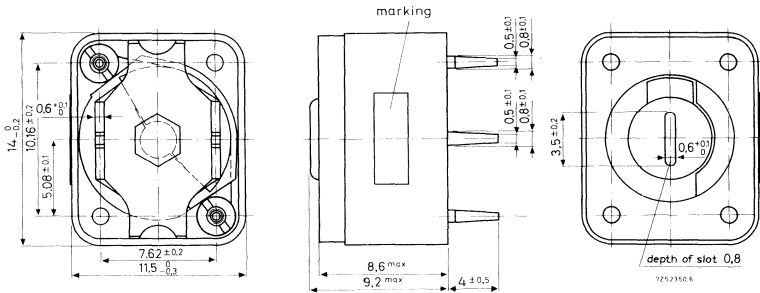


C_{max} (pF)	C_{max} (pF)	temperature coefficient ($10^{-6}/K$)	cat. number
3,5	1,2	-250	2222 809 05001
10	1,8	-350	2222 809 05002
18	2	-350	2222 809 05003

General data

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

For detailed information see Data Handbook C7

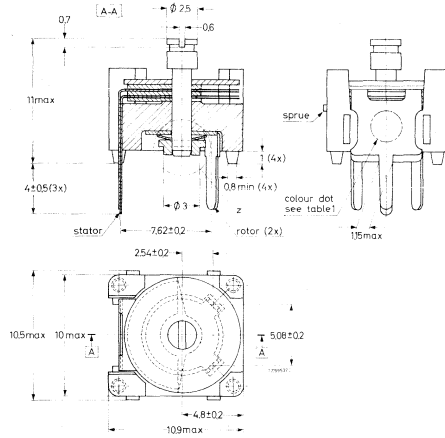


C_{max} (pF)	C_{max} (pF)	temperature coefficient ($10^{-6}/K$)	cat. number
20	2,5	0	2222 809 07004
40	4	0	2222 809 07008
60	5	0	2222 809 07011
80	6	0	2222 809 07013
100	7	0	2222 809 07015

General data

Capacitance values	40 and 60 pF
Dimensions	10 x 11 x 11 mm
Rated voltage	300 V
Basic specifications	IEC 418-1 and 2
Climatic category, IEC 68	40/125/21

For detailed information see Data Handbook C7

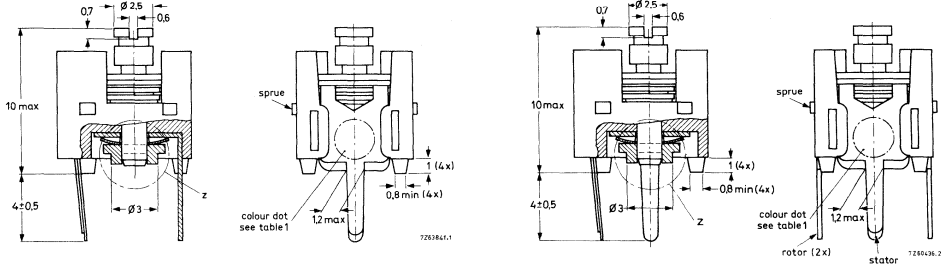


C_{max} (pF)	C_{max} (pF)	temperature coefficient ($10^{-6}/K$)	cat. number
40	4	-250	2222 809 08002
60	5	-250	2222 809 08003

General data

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 2
Climatic category, IEC 68	40/125/21

For detailed information see Data Handbook C7



2 solder tags

3 solder tags

C_{max} (pF)	C_{min} (pF)	temperature coefficient (10 ⁻⁶ /K)	2 solder tags cat. number	3 solder tags cat. number
5,5	1,4	-250	2222 809 09004	2222 809 09001
9	2	-250	2222 809 09005	2222 809 09002
18	2	-250	2222 809 09006	2222 809 09003

CERAMIC MULTILAYER CHIP CAPACITORS

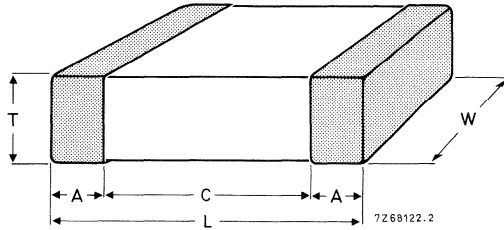
General data

Capacitance range	
class 1 (NP0, N220, N750 dielectric)	0,47 to 10 000 pF (E12 series)
X7R dielectric	180 to 4700 000 pF (E12 series)
Z5U (Y5V) dielectric	2200 to 1 000 000 pF (E6 series)
Rated d.c. voltage	50 V (EIA), 63 V (IEC)
Tolerance on capacitance	
NP0, N220, N750	± 5%
X7R	± 10%
Z5U (Y5V)	-20 + 80%
Basic specification	IEC 384-10 (EIA RS198/B)
Climatic category (IEC 68)	
NP0, N220, N750	55/125/58
X7R	55/125/56
Z5U, incl. Y5V	30//085/56

Additional information

- Wider tolerances for capacitor values available.
- Sizes 0805 and 1206 also available on tape/reel.

For detailed information see Data Handbook C15



Dimensions in mm

size	L	W	T		A		C min.
			min.	max.	min.	max.	
0805	2,0 ± 0,15	1,25 ± 0,15	0,51	1,27	0,25	0,75	0,4
1206	3,2 ± 0,15	1,6 ± 0,15	0,51	1,60	0,25	0,75	
1210	3,2 ± 0,2	2,5 ± 0,2	0,51	1,90	0,3	1,0	
1808	4,5 ± 0,2	2,0 ± 0,2	0,51	1,90	0,3	1,0	
1812	4,5 ± 0,3	3,2 ± 0,3	0,51	1,90	0,3	1,0	
2220	5,7 ± 0,4	5,0 ± 0,4	0,51	1,90	0,3	1,0	

CERAMIC MULTILAYER CHIP CAPACITORS

Composition of catalogue number:
2222 followed by codes in tables

NPO dielectric

rated cap. (pF)	size					
	0805	1206	1210	1808	1812	2220
0,47	851 12477	853 12477				
0,56	851 12567	853 12567				
0,68	851 12687	853 12687				
0,82	851 12827	853 12827				
1,0	851 12108	853 12108				
1,2	851 12128	853 12128				
1,5	851 12158	853 12158				
1,8	851 12188	853 12188				
2,2	851 12228	853 12228				
2,7	851 12278	853 12278				
3,3	851 12338	853 12338				
3,9	851 12398	853 12398				
4,7	851 12478	853 12478				
5,6	851 12568	853 12568				
6,8	851 12688	853 12688				
8,2	851 12828	853 12828				
10	851 12109	853 12109				
12	851 12129	853 12129				
15	851 12159	853 12159				
18	851 12189	853 12189				
22	851 12229	853 12229				
27	851 12279	853 12279				
33	851 12339	853 12339				
39	851 12399	853 12399				
47	851 12479	853 12479	852 12479			
56	851 12569	853 12569	852 12569			
68	851 12689	853 12689	852 12689			
82	851 12829	853 12829	852 12829			
100	851 12101	853 12101	852 12101	854 12101		
120	851 12121	853 12121	852 12121	854 12121		
150	851 12151	853 12151	852 12151	854 12151		
180	851 12181	853 12181	852 12181	854 12181		
220	851 12221	853 12221	852 12221	854 12221		
270	851 12271	853 12271	852 12271	854 12271		
330	851 12331	853 12331	852 12331	854 12331	855 12331	
390	851 12391	853 12391	852 12391	854 12391	855 12391	
470	851 12471	853 12471	852 12471	854 12471	855 12471	856 12471
560	851 12561	853 12561	852 12561	854 12561	855 12561	856 12561
680	851 12681	853 12681	852 12681	854 12681	855 12681	856 12681
820	851 12821	853 12821	852 12821	854 12821	855 12821	856 12821
1000	851 12102	853 12102	852 12102	854 12102	855 12102	856 12102
1200		853 12122	852 12122	854 12122	855 12122	856 12122
1500		853 12152	852 12152	854 12152	855 12152	856 12152
1800		853 12182	852 12182	854 12182	855 12182	856 12182
2200		853 12222	852 12222	854 12222	855 12222	856 12222
2700		853 12272	852 12272	854 12272	855 12272	856 12172
3300		853 12332	852 12332	854 12332	855 12332	856 12332
3900			852 12392	854 12392	855 12392	856 12392
4700			852 12472	854 12472	855 12472	856 12472
5600				854 12562	855 12562	856 12562



CERAMIC MULTILAYER CHIP CAPACITORS

Composition of catalogue number:
 2222 followed by codes in tables

NPO dielectric

rated cap. (pF)	size					
	0805	1206	1210	1808	1812	2220
6800						856 12682
8200						856 12822
10000						856 12103



CERAMIC MULTILAYER CHIP CAPACITORS

Composition of catalogue number:
2222 followed by codes in tables

N220 dielectric

rated cap. (pF)	size	
	0805	1206
4,7	590 02475	
5,6	590 02477	
6,8	590 02479	
8,2	590 02482	591 02482
10	590 02484	591 02484
12	590 02486	591 02486
15	590 02488	591 02488
18	590 02491	591 02491
22	590 02493	591 02493
27	590 02495	591 02495
33	590 02497	591 02497
39	590 02499	591 02499
47	590 02502	591 02502
56	590 02504	591 02504
68	590 02506	591 02506
82	590 02508	591 02508
100	590 02511	591 02511
120	590 02513	591 02513
150	590 02515	591 02515
180	590 02517	591 02517
220	590 02519	591 02519
270	590 02522	591 02522
330		591 02524
390		591 02526
470		591 02528
560		591 02531
680		591 02533
820		591 02535

N750 dielectric

rated cap. (pF)	size	
	0805	1206
6,8	590 04099	591 04099
8,2	590 04102	591 04102
10	590 04104	591 04104
12	590 04106	591 04106
15	590 04108	591 04108
18	590 04111	591 04111
22	590 04113	591 04113
27	590 04115	591 04115
33	590 04117	591 04117
39	590 04119	591 04119
47	590 04122	591 04122
56	590 04124	591 04124
68	590 04126	591 04126
82	590 04128	591 04128
100	590 04131	591 04131
120	590 04133	591 04133
150	590 04135	591 04135
180	590 04137	591 04137
220	590 04139	591 04139
270	590 04142	591 04142
330	590 04144	591 04144
390	590 04146	591 04146
470		591 04148
560		591 04151
680		591 04153
820		591 04155
1000		591 04157
1200		591 04159

CERAMIC MULTILAYER CHIP CAPACITORS

Composition of catalogue number:
2222 followed by codes in tables

X7R dielectric

rated cap. (pF)	size					
	0805	1206	1210	1808	1812	2220
180	851 47181					
220	851 47221					
270	851 47271					
330	851 47331					
390	851 47391					
470	851 47471					
560	851 47561					
680	851 47681	853 47681				
820	851 47821	853 47821				
1000	851 47102	853 47102				
1200	851 47122	853 47122				
1500	851 47152	853 47152				
1800	851 47182	853 47182				
2200	851 47222	853 47222	852 47222	854 47222		
2700	851 47272	853 47272	852 47272	854 47272		
3300	851 47332	853 47332	852 47332	854 47332		
3900	851 47392	853 47392	852 47392	854 47392		
4700	851 47472	853 47472	852 47472	854 47472	855 47472	
5600	851 47562	853 47562	852 47562	854 47562	855 47562	
6800	851 47682	853 47682	852 47682	854 47682	855 47682	
8200	851 47822	853 47822	852 47822	854 47822	855 47822	
10000	851 47103	853 47103	852 47103	854 47103	855 47103	
12000	851 47123	853 47123	852 47123	854 47123	855 47123	856 47123
15000	851 47153	853 47153	852 47153	854 47153	855 47153	856 47153
18000	851 47183	853 47183	852 47183	854 47183	855 47183	856 47183
22000	851 47223	853 47223	852 47223	854 47223	855 47223	856 47223
27000		853 47273	852 47273	854 47273	855 47273	856 47273
33000		853 47333	852 47333	854 47333	855 47333	856 47333
39000		853 47393	852 47393	854 47393	855 47393	856 47393
47000		853 47473	852 47473	854 47473	855 47473	856 47473
56000		853 47563	852 47563	854 47563	855 47563	856 47563
68000			852 47683	854 47683	855 47683	856 47683
82000			852 47823	854 47823	855 47823	856 47823
100000			852 47104	854 47104	855 47104	856 47104
120000				854 47124	855 47124	856 47124
150000				854 47154	855 47154	856 47154
180000					855 47184	856 47184
220000					855 47274	856 47274
330000						856 47334
390000						856 47394
470000						856 47474
560000						
680000						
820000						
1000000						



CERAMIC MULTILAYER CHIP CAPACITORS

Composition of catalogue number:
 2222 followed by codes in tables

Z5U dielectric

rated cap. (pF)	size					
	0805	1206	1210	1808	1812	2220
2200	851 59222					
3300	851 59332					
4700	851 59472					
6800	851 59682					
10000	851 59103	853 59103				
15000	851 59153	853 59153				
22000	851 59223	853 59223				
33000	851 59333	853 59333				
47000		853 59473				
68000		853 59683				
100000		853 59104	852 59104*	854 59104*	855 59104*	856 59104*
150000			852 59154*	854 59154*	855 59154*	856 59154*
220000			852 59224*	854 59224*	855 59224*	856 59224*
330000				854 59334*	855 59334*	856 59334*
470000					855 59474*	856 59474*
680000						856 59684*
1000000						856 59105*

* tentative



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PTC Thermistors (overload protection) 2322 66. 1...1	R52
PTC Thermistors (overload protection) 2322 66. 1...3	R53
PTC Thermistors for heating 2322 663 9....	R54
Humidity sensor 2322 691 90001	R55

PHILIPS HANDBOOKS

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:

type	title
C11	Non-linear resistors
C12	Variable resistors and test switches
C13	Fixed resistors

Loose Handbooks can be ordered directly from all organisations mentioned on the back cover.



STANDARD PACKAGING

As an example details of standard packaging of SFR resistors are given here. Complete details of packaging of all resistor ranges are given in the relevant part C13 of the "Data Handbook System".

Standard film resistors

SFR16, SFR25, SFR30

STANDARD PACKAGING

Resistors having axial leads are supplied on tape. These tapes, or bandoliers, are either reeled or concertinaed in a cardboard box ("ammopack").

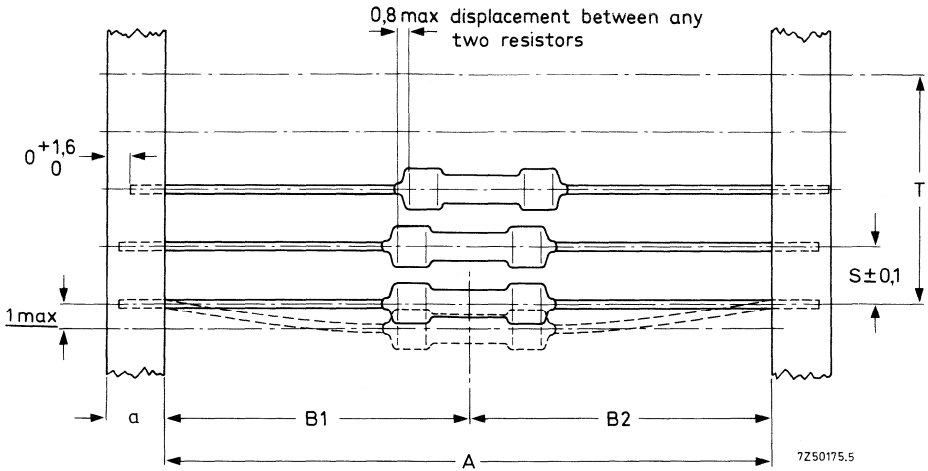


Fig.1 Configuration of bandolier (dimensions in mm) S = spacing; T = maximum deviation of spacing: 1 mm per 10 spacings or 0,5 mm per 5 spacings.

- a = tape width
- A = tape distance
- B1 - B2 = centricity

Table a (see Fig. 1).

type	A (mm)	B (mm)
SFR 16	52,5 ± 1,5	26 ± 1,2
SFR 25	52,5 ± 1,5	26 ± 1,2
SFR 30	52,5 ± 1,5	26 ± 1,2

Standard packaging quantities are given in table b, the dimensions of the ammopack are in table c.

STANDARD PACKAGING

Table b

type	quantity per box	
	bandolier ammopack	bandolier reeled
SFR 16	1000	5000
SFR 25	1000/5000	5000
SFR 30	1000	5000

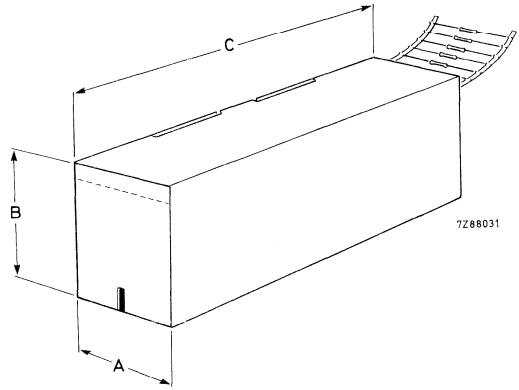


Table c

type	quan- tity	A (mm)	B (mm)	C (mm)
SFR 16	1000	75	25	155
SFR 25	1000	82	30	265
SFR 25	5000	78	49	270
SFR 30	1000	82	29	262

Fig. 2 Dimensions of the ammpack, see Table c.

"Ampopack" is an abbreviation of "ammunition packing". It is a cardboard box; dimensions A-B-C vary per type and quantity. The bandolier is zig-zag folded in the box.

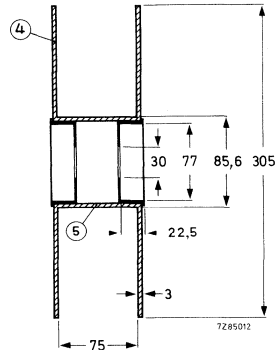
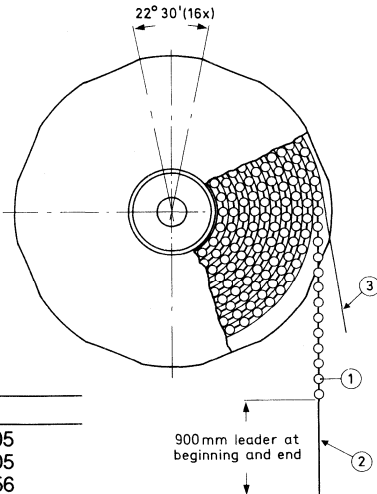


Table d

type	A
SFR 16	305
SFR 25	305
SFR 30	356

Fig. 3 Reel dimensions (mm), see table d

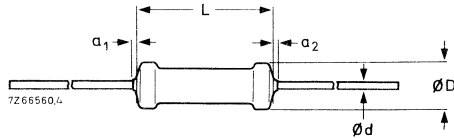
General data

Resistance range
 Max. dissipation at $T_{amb} = 70\text{ }^{\circ}\text{C}$
 Limiting voltage, r.m.s.

1 Ω to 1 M Ω , tol. $\pm 5\%$, E 12-series
 0,33 W
 250 V

For detailed information see Data Handbook C12.

D_{max} (mm)	L_{max} (mm)	d (mm)	$a_1 + a_2$ (mm)
2,5	6,5	0,6	< 1



R_N (Ω)	catalogue number	R_N (Ω)	catalogue number	R_N (Ω)	catalogue number
1	2322 211 73108	47	2322 211 73479	2,2 k	2322 211 73222
1,2	2322 211 73128	56	2322 211 73569	2,7 k	2322 211 73272
1,5	2322 211 73158	68	2322 211 73689	3,3 k	2322 211 73332
1,8	2322 211 73188	82	2322 211 73829	3,9 k	2322 211 73392
2,2	2322 211 73228	100	2322 211 73101	4,7 k	2322 211 73472
2,7	2322 211 73278	120	2322 211 73121	5,6 k	2322 211 73562
3,3	2322 211 73338	150	2322 211 73151	6,8 k	2322 211 73682
3,9	2322 211 73398	180	2322 211 73181	8,2 k	2322 211 73822
4,7	2322 211 73478	220	2322 211 73221	10 k	2322 211 73103
5,6	2322 211 73568	270	2322 211 73271	12 k	2322 211 73123
6,8	2322 211 73688	330	2322 211 73331	15 k	2322 211 73153
8,2	2322 211 73828	390	2322 211 73391	18 k	2322 211 73183
10	2322 211 73109	470	2322 211 73471	22 k	2322 211 73223
12	2322 211 73129	560	2322 211 73561	27 k	2322 211 73273
15	2322 211 73159	680	2322 211 73681	33 k	2322 211 73333
18	2322 211 73189	820	2322 211 73821	39 k	2322 211 73393
22	2322 211 73229	1 k	2322 211 73102	47 k	2322 211 73473
27	2322 211 73279	1,2 k	2322 211 73122	56 k	2322 211 73563
33	2322 211 73339	1,5 k	2322 211 73152	68 k	2322 211 73683
39	2322 211 73399	1,8 k	2322 211 73182	82 k	2322 211 73823

R_N (Ω)	catalogue number	R_N (Ω)	catalogue number	R_N (Ω)	catalogue number
100 k	2322 211 73104				
120 k	2322 211 73124				
150 k	2322 211 73154				
180 k	2322 211 73184				
220 k	2322 211 73224				
270 k	2322 211 73274				
330 k	2322 211 73334				
390 k	2322 211 73394				
470 k	2322 211 73474				
560 k	2322 211 73564				
680 k	2322 211 73684				
820 k	2322 211 73824				
1 M	2322 211 73105				

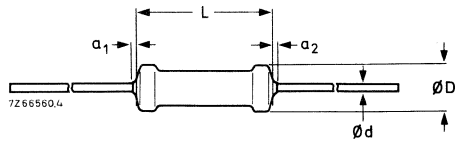
General data

Resistance range
 Max. dissipation at $T_{amb} = 70\text{ }^{\circ}\text{C}$
 Limiting voltage, r.m.s.

1 Ω to 1 M Ω , tol. $\pm 5\%$, E 12-series
 0,67 W
 500 V

For detailed information see Data Handbook C12.

D_{max} (mm)	L_{max} (mm)	d (mm)	$a_1 + a_2$ (mm)
5,2	16,5	0,8	< 2



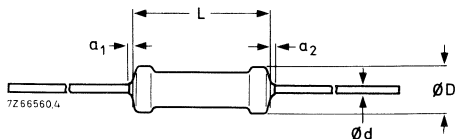
R_N (Ω)	catalogue number	R_N (Ω)	catalogue number	R_N (Ω)	catalogue number
1,0	2322 213 13108	470	2322 213 13471	22 k	2322 213 13223
1,5	2322 213 13158	560	2322 213 13561	27 k	2322 213 13273
2,2	2322 213 13228	680	2322 213 13681	33 k	2322 213 13333
3,3	2322 213 13338	820	2322 213 13821	39 k	2322 213 13393
4,7	2322 213 13478	1 k	2322 213 13102	47 k	2322 213 13473
6,8	2322 213 13688	1,2 k	2322 213 13122	56 k	2322 213 13563
10	2322 213 13109	1,5 k	2322 213 13152	68 k	2322 213 13683
15	2322 213 13159	1,8 k	2322 213 13182	82 k	2322 213 13823
22	2322 213 13229	2,2 k	2322 213 13222	100 k	2322 213 13104
33	2322 213 13339	2,7 k	2322 213 13272	120 k	2322 213 13124
47	2322 213 13479	3,3 k	2322 213 13332	150 k	2322 213 13154
68	2322 213 13689	3,9 k	2322 213 13392	180 k	2322 213 13184
100	2322 213 13101	4,7 k	2322 213 13472	220 k	2322 213 13224
120	2322 213 13121	5,6 k	2322 213 13562	270 k	2322 213 13274
150	2322 213 13151	6,8 k	2322 213 13682	330 k	2322 213 13334
180	2322 213 13181	8,2 k	2322 213 13822	390 k	2322 213 13394
220	2322 213 13221	10 k	2322 213 13103	470 k	2322 213 13474
270	2322 213 13271	12 k	2322 213 13123	680 k	2322 213 13684
330	2322 213 13331	15 k	2322 213 13153	1 M	2322 213 13105
390	2322 213 13391	18 k	2322 213 13183		

General data

Resistance range 1 Ω to 1 M Ω , tol. \pm 5%, E 12-series
 Max. dissipation at $T_{amb} = 70^\circ\text{C}$ 1,15 W
 Limiting voltage, r.m.s. 750 V

For detailed information see Data Handbook C12.

D_{max} (mm)	L_{max} (mm)	d (mm)	$a_1 + a_2$ (mm)
6,8	18	0,8	< 2



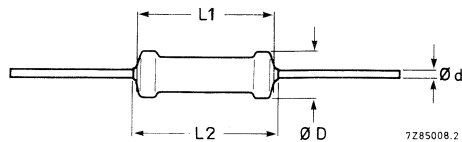
R_N (Ω)	catalogue number	R_N (Ω)	catalogue number	R_N (Ω)	catalogue number
1	2322 214 13108	470	2322 214 13471	22 k	2322 214 13223
1,5	2322 214 13158	560	2322 214 13561	27 k	2322 214 13273
2,2	2322 214 13228	680	2322 214 13681	33 k	2322 214 13333
3,3	2322 214 13338	820	2322 214 13821	39 k	2322 214 13393
4,7	2322 214 13478	1 k	2322 214 13102	47 k	2322 214 13473
6,8	2322 214 13688	1,2 k	2322 214 13122	56 k	2322 214 13563
10	2322 214 13109	1,5 k	2322 214 13152	68 k	2322 214 13683
15	2322 214 13159	1,8 k	2322 214 13182	82 k	2322 214 13823
22	2322 214 13229	2,2 k	2322 214 13222	100 k	2322 214 13104
33	2322 214 13339	2,7 k	2322 214 13272	120 k	2322 214 13124
47	2322 214 13479	3,3 k	2322 214 13332	150 k	2322 214 13154
68	2322 214 13689	3,9 k	2322 214 13392	180 k	2322 214 13184
100	2322 214 13101	4,7 k	2322 214 13472	220 k	2322 214 13224
120	2322 214 13121	5,6 k	2322 214 13562	270 k	2322 214 13274
150	2322 214 13151	6,8 k	2322 214 13682	330 k	2322 214 13334
180	2322 214 13181	8,2 k	2322 214 13822	390 k	2322 214 13394
220	2322 214 13221	10 k	2322 214 13103	470 k	2322 214 13474
270	2322 214 13271	12 k	2322 214 13123	680 k	2322 214 13684
330	2322 214 13331	15 k	2322 214 13153	1 M	2322 214 13105
390	2322 214 13391	18 k	2322 214 13183		

General Data

Resistance range	10 Ω to 1 M Ω , tol. \pm 5%, E 12-series
Temperature coefficient	R < 100 k Ω : < \pm 100.10 ⁻⁶ /K R > 100 k Ω : < \pm 250.10 ⁻⁶ /K
Max. dissipation to T _{amb} = 70 °C	0,5 W
Noise	R < 68 k Ω : max. 0,1 μ V/V R > 68 k Ω < 100 k Ω : max. 0,5 μ V/V R > 100 k Ω : max. 1,5 μ V/V
Limiting voltage, r.m.s.	150 V

For detailed information see Data Handbook C12.

D _{max} (mm)	L1 _{max} (mm)	L2 _{max} (mm)	d _{max} (mm)
2,5	6,5	8,5	0,6



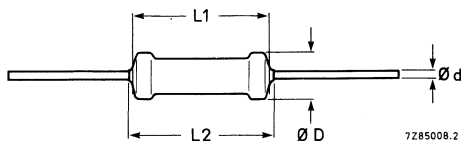
R _N (Ω)	catalogue number	R _N (Ω)	catalogue number	R _N (Ω)	catalogue number
10	2322 180 73109	560	2322 180 73561	33 k	2322 180 73333
12	2322 180 73129	680	2322 180 73681	39 k	2322 180 73393
15	2322 180 73159	820	2322 180 73821	47 k	2322 180 73473
18	2322 180 73189	1 k	2322 180 73102	56 k	2322 180 73563
22	2322 180 73229	1,2 k	2322 180 73122	68 k	2322 180 73683
27	2322 180 73279	1,5 k	2322 180 73152	82 k	2322 180 73823
33	2322 180 73339	1,8 k	2322 180 73182	100 k	2322 180 73104
39	2322 180 73399	2,2 k	2322 180 73222	120 k	2322 180 73124
47	2322 180 73479	2,7 k	2322 180 73272	130 k	2322 180 73134
56	2322 180 73569	3,3 k	2322 180 73332	160 k	2322 180 73164
68	2322 180 73689	3,9 k	2322 180 73392	200 k	2322 180 73204
82	2322 180 73829	4,7 k	2322 180 73472	220 k	2322 180 73224
100	2322 180 73101	5,6 k	2322 180 73562	270 k	2322 180 73274
120	2322 180 73121	6,8 k	2322 180 73682	330 k	2322 180 73334
150	2322 180 73151	8,2 k	2322 180 73822	390 k	2322 180 73394
180	2322 180 73181	10 k	2322 180 73103	470 k	2322 180 73474
220	2322 180 73221	12 k	2322 180 73123	560 k	2322 180 73564
270	2322 180 73271	15 k	2322 180 73153	680 k	2322 180 73684
330	2322 180 73331	18 k	2322 180 73183	820 k	2322 180 73824
390	2322 180 73391	22 k	2322 180 73223	1 M	2322 180 73105
470	2322 180 73471	27 k	2322 180 73273		

General data

Resistance range	10 Ω to 10 M Ω , tol. \pm 5%, E 12-series
Temperature coefficient	< 250. 10 ⁻⁶ /K
Max. dissipation at T _{amb} = 70 °C	0,33 W
Noise	< 0,1 μ V/V
Limiting voltage, r.m.s.	250 V

For detailed information see Data Handbook C12.

D _{max} (mm)	L1 _{max} (mm)	L2 _{max} (mm)	d _{max} (mm)
2,5	6,5	7,0	0,6



R _N (Ω)	catalogue number	R _N (Ω)	catalogue number	R _N (Ω)	catalogue number
10	2322 181 43109	470	2322 181 43471	22 k	2322 181 43223
12	2322 181 43129	560	2322 181 43561	27 k	2322 181 43273
15	2322 181 43159	680	2322 181 43681	33 k	2322 181 43333
18	2322 181 43189	820	2322 181 43821	39 k	2322 181 43393
22	2322 181 43229	1 k	2322 181 43102	47 k	2322 181 43473
27	2322 181 43279	1,2 k	2322 181 43122	56 k	2322 181 43563
33	2322 181 43339	1,5 k	2322 181 43152	68 k	2322 181 43683
39	2322 181 43399	1,8 k	2322 181 43182	82 k	2322 181 43823
47	2322 181 43479	2,2 k	2322 181 43222	100 k	2322 181 43104
56	2322 181 43569	2,7 k	2322 181 43272	120 k	2322 181 43124
68	2322 181 43689	3,3 k	2322 181 43332	150 k	2322 181 43154
82	2322 181 43829	3,9 k	2322 181 43392	180 k	2322 181 43184
100	2322 181 43101	4,7 k	2322 181 43472	220 k	2322 181 43224
120	2322 181 43121	5,6 k	2322 181 43562	270 k	2322 181 43274
150	2322 181 43151	6,8 k	2322 181 43682	330 k	2322 181 43334
180	2322 181 43181	8,2 k	2322 181 43822	390 k	2322 181 43394
220	2322 181 43221	10 k	2322 181 43101	470 k	2322 181 43474
270	2322 181 43271	12 k	2322 181 43123	560 k	2322 181 43564
330	2322 181 43331	15 k	2322 181 43153	680 k	2322 181 43684
390	2322 181 43391	18 k	2322 181 43183	820 k	2322 181 43824

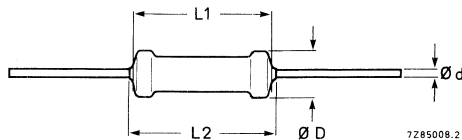
R_N (Ω)	catalogue number	R_N (Ω)	catalogue number	R_N (Ω)	catalogue number
1 M	2322 181 43105				
1,2 M	2322 181 43125				
1,5 M	2322 181 43155				
1,8 M	2322 181 43185				
2,2 M	2322 181 43225				
2,7 M	2322 181 43275				
3,3 M	2322 181 43335				
3,9 M	2322 181 43395				
4,7 M	2322 181 43475				
5,6 M	2322 181 43565				
6,8 M	2322 181 43685				
8,2 M	2322 181 43825				
10 M	2322 181 43106				

General data

Resistance range	1 Ω to 10 MΩ, tol. ± 5%, E 24-series
Temperature coefficient	0-Ohm jumper
Max. dissipation at T _{amb} = 70 °C	< 250 · 10 ⁻⁶ /K
Noise	0,33 W
Limiting voltage, r.m.s.	< 0,1 μV/V
	250 V

For detailed information see Data Handbook C12.

D _{max} (mm)	L1 _{max} (mm)	L2 _{max} (mm)	d _{max} (mm)
2,5	6,5	7,0	0,6



R _N (Ω)	catalogue number	R _N (Ω)	catalogue number	R _N (Ω)	catalogue number
0-Ohm	2322 181 90018	33	2322 181 53339	1,5 k	2322 181 53152
1	2322 181 53108	39	2322 181 53399	1,8 k	2322 181 53182
1,2	2322 181 53128	47	2322 181 53479	2,2 k	2322 181 53222
1,5	2322 181 53158	56	2322 181 53569	2,7 k	2322 181 53272
		68	2322 181 53689	3,3 k	2322 181 53332
1,8	2322 181 53188	82	2322 181 53829	3,9 k	2322 181 53392
2,2	2322 181 53228	100	2322 181 53101	4,7 k	2322 181 53472
2,7	2322 181 53278	120	2322 181 53121	5,6 k	2322 181 53562
3,3	2322 181 53338	150	2322 181 53151	6,8 k	2322 181 53682
3,9	2322 181 53398	180	2322 181 53181	8,2 k	2322 181 53822
4,7	2322 181 53478	220	2322 181 53221	10 k	2322 181 53103
5,6	2322 181 53568	270	2322 181 53271	12 k	2322 181 53123
6,8	2322 181 53688	330	2322 181 53331	15 k	2322 181 53153
8,2	2322 181 53828	390	2322 181 53391	18 k	2322 181 53183
10	2322 181 53109	470	2322 181 53471	22 k	2322 181 53223
12	2322 181 53129	560	2322 181 53561	27 k	2322 181 53273
15	2322 181 53159	680	2322 181 53681	33 k	2322 181 53333
18	2322 181 53189	820	2322 181 53821	39 k	2322 181 53393
22	2322 181 53229	1 k	2322 181 53102	47 k	2322 181 53473
27	2322 181 53279	1,2 k	2322 181 53122	56 k	2322 181 53563

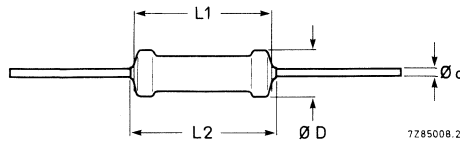
R_N (Ω)	catalogue number	R_N (Ω)	catalogue number	R_N (Ω)	catalogue number
68 k	2322 181 53683				
82 k	2322 181 53823				
100 k	2322 181 53104				
120 k	2322 181 53124				
150 k	2322 181 53154				
180 k	2322 181 53184				
220 k	2322 181 53224				
270 k	2322 181 53274				
330 k	2322 181 53334				
390 k	2322 181 53394				
470 k	2322 181 53474				
560 k	2322 181 53564				
680 k	2322 181 53684				
820 k	2322 181 53824				
1 M	2322 181 53105				
1,2 M	2322 181 53122				
1,5 M	2322 181 53152				
1,8 M	2322 181 53182				
2,2 M	2322 181 53222				
2,7 M	2322 181 53272				
3,3 M	2322 181 53332				
3,9 M	2322 181 53392				
4,7 M	2322 181 53472				
5,6 M	2322 181 53562				
6,8 M	2322 181 53682				
8,2 M	2322 181 53822				
10 M	2322 181 53103				

General data

Resistance range	10Ω to 1 MΩ, tol. ± 5%, E 12-series
Temperature coefficient	< 250. 10 ⁻⁶ /K
Max. dissipation at T _{amb} = 70 °C	0,5 W
Noise	< 0,1 μV/V
Limiting voltage, r.m.s.	350 V

For detailed information see Data Handbook C12

D _{max} (mm)	L1 _{max} (mm)	L2 _{max} (mm)	d _{max} (mm)
3,0	8,5	9,5	0,7



R _N (Ω)	cat. number in box	cat. number on reel	R _N (Ω)	cat. number in box	cat. number on reel
10	2322 182 13109	2322 182 23109	470	2322 182 13471	2322 182 23471
12	2322 182 13129	2322 182 23129	560	2322 182 13561	2322 182 23561
15	2322 182 13159	2322 182 23159	680	2322 182 13681	2322 182 23681
18	2322 182 13189	2322 182 23189	820	2322 182 13821	2322 182 23821
22	2322 182 13229	2322 182 23229	1 k	2322 182 13102	2322 182 23102
27	2322 182 13279	2322 182 23279	1,2 k	2322 182 13122	2322 182 23122
33	2322 182 13339	2322 182 23339	1,5 k	2322 182 13152	2322 182 23152
39	2322 182 13399	2322 182 23399	1,8 k	2322 182 13182	2322 182 23182
47	2322 182 13479	2322 182 23479	2,2 k	2322 182 13222	2322 182 23222
56	2322 182 13569	2322 182 23569	2,7 k	2322 182 13272	2322 182 23272
68	2322 182 13689	2322 182 23689	3,3 k	2322 182 13332	2322 182 23332
82	2322 182 13829	2322 182 23829	3,9 k	2322 182 13392	2322 182 23392
100	2322 182 13101	2322 182 23101	4,7 k	2322 182 13472	2322 182 23472
120	2322 182 13121	2322 182 23121	5,6 k	2322 182 13562	2322 182 23562
150	2322 182 13151	2322 182 23151	6,8 k	2322 182 13682	2322 182 23682
180	2322 182 13181	2322 182 23181	8,2 k	2322 182 13822	2322 182 23822
220	2322 182 13221	2322 182 23221	10 k	2322 182 13101	2322 182 23103
270	2322 182 13271	2322 182 23271	12 k	2322 182 13123	2322 182 23123
330	2322 182 13331	2322 182 23331	15 k	2322 182 13153	2322 182 23153
390	2322 182 13391	2322 182 23391	18 k	2322 182 13183	2322 182 23183

R_N (Ω)	cat. number in box	cat. number on reel	R_N (Ω)	cat. number in box	cat. number on reel
22 k	2322 182 13223	2322 182 23223			
27 k	2322 182 13273	2322 182 23273			
33 k	2322 182 13333	2322 182 23333			
39 k	2322 182 13393	2322 182 23393			
47 k	2322 182 13473	2322 182 23473			
56 k	2322 182 13563	2322 182 23563			
68 k	2322 182 13683	2322 182 23683			
82 k	2322 182 13823	2322 182 23823			
100 k	2322 182 13104	2322 182 23104			
120 k	2322 182 13124	2322 182 23124			
150 k	2322 182 13154	2322 182 23154			
180 k	2322 182 13184	2322 182 23184			
220 k	2322 182 13224	2322 182 23224			
270 k	2322 182 13274	2322 182 23274			
330 k	2322 182 13334	2322 182 23334			
390 k	2322 182 13394	2322 182 23394			
470 k	2322 182 13474	2322 182 23474			
560 k	2322 182 13564	2322 182 23564			
680 k	2322 182 13684	2322 182 23684			
820 k	2322 182 13824	2322 182 23824			
1 M	2322 182 13105	2322 182 23105			
1,2 M	2322 182 13125	2322 182 23125			
1,5 M	2322 182 13155	2322 182 23155			
1,8 M	2322 182 13185	2322 182 23185			
2,2 M	2322 182 13225	2322 182 23225			
2,7 M	2322 182 13275	2322 182 23275			
3,3 M	2322 182 13335	2322 182 23335			
3,9 M	2322 182 13395	2322 182 23395			
4,7 M	2322 182 13475	2322 182 23475			
5,6 M	2322 182 13565	2322 182 23565			
6,8 M	2322 182 13685	2322 182 23685			
8,2 M	2322 182 13825	2322 182 23825			
10 M	2322 182 13106	2322 182 23106			

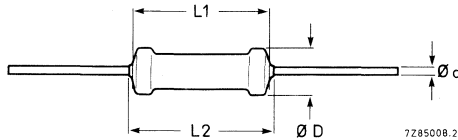


General data

Resistance range	1 Ω to 1 M Ω , tol. \pm 1%, E 96-series
Temperature coefficient	\pm 50. 10 ⁻⁶ /K
Max. dissipation at T _{amb} = 70 °C	0,4 W
Limiting voltage, r.m.s.	250 V

For detailed information see Data Handbook C12

D _{max} (mm)	L1 _{max} (mm)	L2 _{max} (mm)	d (mm)
2,5	6,5	7,5	0,6



R _N (Ω)	catalogue number	R _N (Ω)	catalogue number	R _N (Ω)	catalogue number
1,00	2322 151 51008	1,62	2322 151 51628	2,61	2322 151 52618
1,03	2322 151 51038	1,65	2322 151 51658	2,67	2322 151 52678
1,05	2322 151 51058	1,69	2322 151 51698	2,74	2322 151 52748
1,07	2322 151 51078	1,74	2322 151 51748	2,80	2322 151 52808
1,10	2322 151 51108	1,78	2322 151 51788	2,87	2322 151 52878
1,13	2322 151 51138	1,82	2322 151 51828	2,94	2322 151 52948
1,15	2322 151 51158	1,87	2322 151 51878	3,01	2322 151 53018
1,18	2322 151 51188	1,91	2322 151 51918	3,09	2322 151 53098
1,21	2322 151 51218	1,96	2322 151 51968	3,16	2322 151 53168
1,24	2322 151 51248	2,00	2322 151 52008	3,24	2322 151 53248
1,27	2322 151 51278	2,05	2322 151 52058	3,32	2322 151 53328
1,30	2322 151 51308	2,10	2322 151 52108	3,40	2322 151 53408
1,33	2322 151 51338	2,15	2322 151 52158	3,48	2322 151 53488
1,37	2322 151 51378	2,21	2322 151 52218	3,57	2322 151 53578
1,40	2322 151 51408	2,26	2322 151 52268	3,65	2322 151 53658
1,43	2322 151 51438	2,32	2322 151 52328	3,74	2322 151 53748
1,47	2322 151 51478	2,37	2322 151 52378	3,83	2322 151 53838
1,50	2322 151 51508	2,43	2322 151 52438	3,92	2322 151 53928
1,54	2322 151 51548	2,49	2322 151 52498	4,02	2322 151 54028
1,58	2322 151 51588	2,55	2322 151 52558	4,12	2322 151 54128

R_N (Ω)	catalogue number	R_N (Ω)	catalogue number	R_N (Ω)	catalogue number
4,22	2322 151 54228	12,4	2322 151 51249	36,5	2322 151 53659
4,32	2322 151 54328	12,7	2322 151 51279	37,4	2322 151 53749
4,42	2322 151 54428	13,0	2322 151 51309	38,3	2322 151 53839
4,53	2322 151 54538	13,3	2322 151 51339	39,2	2322 151 53929
4,64	2322 151 54648	13,7	2322 151 51379	40,2	2322 151 54029
4,75	2322 151 54758	14,0	2322 151 51409	41,2	2322 151 54129
4,87	2322 151 54878	14,3	2322 151 51439	42,2	2322 151 54229
4,99	2322 151 54998	14,7	2322 151 51479	43,2	2322 151 54329
5,11	2322 151 55118	15,0	2322 151 51509	44,2	2322 151 54429
5,23	2322 151 55238	15,4	2322 151 51549	45,3	2322 151 54539
5,36	2322 151 55368	15,8	2322 151 51589	46,4	2322 151 54649
5,49	2322 151 55498	16,2	2322 151 51629	47,5	2322 151 54759
5,62	2322 151 55628	16,5	2322 151 51659	48,7	2322 151 54879
5,76	2322 151 55768	16,9	2322 151 51699	49,9	2322 151 90144
5,90	2322 151 55908	17,4	2322 151 51749	51,1	2322 151 55119
6,04	2322 151 56048	17,8	2322 151 51789	52,3	2322 151 55239
6,19	2322 151 56198	18,2	2322 151 51829	53,6	2322 151 55369
6,34	2322 151 56348	18,7	2322 151 51879	54,9	2322 151 55499
6,49	2322 151 56498	19,1	2322 151 51919	56,2	2322 151 55629
6,55	2322 151 56658	19,6	2322 151 51969	57,6	2322 151 55769
6,81	2322 151 56818	20,0	2322 151 52009	59,0	2322 151 55909
6,98	2322 151 56988	20,5	2322 151 52059	60,4	2322 151 56049
7,15	2322 151 57158	21,0	2322 151 52109	61,9	2322 151 56199
7,32	2322 151 57328	21,5	2322 151 52159	63,4	2322 151 56349
7,50	2322 151 57508	22,1	2322 151 52219	64,9	2322 151 56499
7,68	2322 151 57688	22,6	2322 151 52269	66,5	2322 151 56659
7,87	2322 151 57878	23,2	2322 151 52329	68,1	2322 151 56819
8,06	2322 151 58068	23,7	2322 151 52379	69,8	2322 151 56989
8,25	2322 151 58258	24,3	2322 151 52439	71,5	2322 151 57159
8,45	2322 151 58458	24,9	2322 151 52499	73,2	2322 151 57329
8,66	2322 151 58688	25,5	2322 151 52559	75,0	2322 151 57509
8,87	2322 151 58878	26,1	2322 151 52619	76,8	2322 151 57689
9,09	2322 151 59098	26,7	2322 151 52679	78,7	2322 151 57879
9,31	2322 151 59318	27,4	2322 151 52749	80,6	2322 151 58069
9,53	2322 151 59538	28,0	2322 151 52809	82,5	2322 151 58259
9,76	2322 151 59768	28,7	2322 151 52879	84,5	2322 151 58459
10,0	2322 151 51009	29,4	2322 151 52949	86,6	2322 151 58669
10,2	2322 151 51029	30,1	2322 151 53019	88,7	2322 151 58879
10,5	2322 151 51059	30,9	2322 151 53099	90,9	2322 151 59099
10,7	2322 151 51079	31,6	2322 151 53169	93,1	2322 151 59319
11,0	2322 151 51109	32,4	2322 151 53249	95,3	2322 151 59539
11,3	2322 151 51139	33,2	2322 151 53329	97,6	2322 151 59769
11,5	2322 151 51159	34,0	2322 151 53409	100	2322 151 51001
11,8	2322 151 51189	34,8	2322 151 53489	102	2322 151 51021
12,1	2322 151 51219	35,7	2322 151 53579	105	2322 151 51051

R_N (Ω)	catalogue number	R_N (Ω)	catalogue number	R_N (Ω)	catalogue number
107	2322 151 51071	316	2322 151 53161	931	2322 151 59311
110	2322 151 51101	324	2322 151 53241	953	2322 151 59531
113	2322 151 51131	332	2322 151 53321	976	2322 151 59761
115	2322 151 51151	340	2322 151 53401	1,00 k	2322 151 51002
118	2322 151 51181	348	2322 151 53481	1,02 k	2322 151 51022
121	2322 151 51211	357	2322 151 53571	1,05 k	2322 151 51052
124	2322 151 51241	365	2322 151 53651	1,07 k	2322 151 51072
127	2322 151 51271	374	2322 151 53741	1,10 k	2322 151 51102
130	2322 151 51301	383	2322 151 53831	1,13 k	2322 151 51132
133	2322 151 51331	392	2322 151 53921	1,15 k	2322 151 51152
137	2322 151 51371	402	2322 151 54021	1,18 k	2322 151 51182
140	2322 151 51401	412	2322 151 54121	1,21 k	2322 151 51212
143	2322 151 51431	422	2322 151 54221	1,24 k	2322 151 51242
147	2322 151 51471	432	2322 151 54321	1,27 k	2322 151 51272
150	2322 151 51501	442	2322 151 54421	1,30 k	2322 151 51302
154	2322 151 51541	453	2322 151 54531	1,33 k	2322 151 51332
158	2322 151 51581	464	2322 151 54641	1,37 k	2322 151 51372
162	2322 151 51621	475	2322 151 54751	1,40 k	2322 151 51402
165	2322 151 51651	487	2322 151 54871	1,43 k	2322 151 51432
169	2322 151 51691	499	2322 151 54991	1,47 k	2322 151 51472
174	2322 151 51741	511	2322 151 55111	1,50 k	2322 151 51502
178	2322 151 51781	523	2322 151 55231	1,54 k	2322 151 51542
182	2322 151 51821	536	2322 151 55361	1,58 k	2322 151 51582
187	2322 151 51871	549	2322 151 55491	1,62 k	2322 151 51622
191	2322 151 51911	562	2322 151 55621	1,65 k	2322 151 51652
196	2322 151 51961	576	2322 151 55761	1,69 k	2322 151 51692
200	2322 151 52001	590	2322 151 55901	1,74 k	2322 151 51742
205	2322 151 52051	604	2322 151 56041	1,78 k	2322 151 51782
210	2322 151 52101	619	2322 151 56191	1,82 k	2322 151 51822
215	2322 151 52151	634	2322 151 56341	1,87 k	2322 151 51872
221	2322 151 52211	649	2322 151 56491	1,91 k	2322 151 51912
226	2322 151 52261	665	2322 151 56651	1,96 k	2322 151 51962
232	2322 151 52321	681	2322 151 56811	2,00 k	2322 151 52002
237	2322 151 52371	698	2322 151 56981	2,05 k	2322 151 52052
243	2322 151 52431	715	2322 151 57151	2,10 k	2322 151 52102
249	2322 151 52491	732	2322 151 57321	2,15 k	2322 151 52152
255	2322 151 52551	750	2322 151 57501	2,21 k	2322 151 52212
261	2322 151 52611	768	2322 151 57681	2,26 k	2322 151 52262
267	2322 151 52671	787	2322 151 57871	2,32 k	2322 151 52322
274	2322 151 52741	806	2322 151 58061	2,37 k	2322 151 52372
280	2322 151 52801	825	2322 151 58251	2,43 k	2322 151 52432
287	2322 151 52871	845	2322 151 58451	2,49 k	2322 151 52492
294	2322 151 52941	866	2322 151 58661	2,55 k	2322 151 52552
301	2322 151 53011	887	2322 151 58871	2,61 k	2322 151 52612
309	2322 151 53091	909	2322 151 59091	2,67 k	2322 151 52672

R _N (Ω)	catalogue number	R _N (Ω)	catalogue number	R _N (Ω)	catalogue number
2,74 k	2322 151 52742	8,06 k	2322 151 58062	23,7 k	2322 151 52373
2,80 k	2322 151 52802	8,25 k	2322 151 58252	24,3 k	2322 151 52433
2,87 k	2322 151 52872	8,45 k	2322 151 58452	24,9 k	2322 151 52493
2,94 k	2322 151 52942	8,66 k	2322 151 58662	25,5 k	2322 151 52553
3,01 k	2322 151 53012	8,87 k	2322 151 58872	26,1 k	2322 151 52613
3,09 k	2322 151 53092	9,09 k	2322 151 59092	26,7 k	2322 151 52673
3,16 k	2322 151 53162	9,31 k	2322 151 59312	27,4 k	2322 151 52743
3,24 k	2322 151 53242	9,53 k	2322 151 59532	28,0 k	2322 151 52803
3,32 k	2322 151 53322	9,76 k	2322 151 59762	28,7 k	2322 151 52873
3,40 k	2322 151 53402	10,0 k	2322 151 51003	29,4 k	2322 151 52943
3,48 k	2322 151 53482	10,2 k	2322 151 51023	30,1 k	2322 151 53013
3,57 k	2322 151 53572	10,5 k	2322 151 51053	30,9 k	2322 151 53093
3,65 k	2322 151 53652	10,7 k	2322 151 51073	31,6 k	2322 151 53163
3,74 k	2322 151 53742	11,0 k	2322 151 51103	32,4 k	2322 151 53243
3,83 k	2322 151 53832	11,3 k	2322 151 51133	33,2 k	2322 151 53323
3,92 k	2322 151 53922	11,5 k	2322 151 51153	34,0 k	2322 151 53403
4,02 k	2322 151 54022	11,8 k	2322 151 51183	34,8 k	2322 151 53483
4,12 k	2322 151 54122	12,1 k	2322 151 51213	35,7 k	2322 151 53573
4,22 k	2322 151 54222	12,4 k	2322 151 51243	36,5 k	2322 151 53653
4,32 k	2322 151 54322	12,7 k	2322 151 51273	37,4 k	2322 151 53743
4,42 k	2322 151 54422	13,0 k	2322 151 51303	38,3 k	2322 151 53833
4,53 k	2322 151 54532	13,3 k	2322 151 51333	39,2 k	2322 151 53923
4,64 k	2322 151 54642	13,7 k	2322 151 51373	40,2 k	2322 151 54023
4,75 k	2322 151 54752	14,0 k	2322 151 51403	41,2 k	2322 151 54123
4,87 k	2322 151 54872	14,3 k	2322 151 51433	42,2 k	2322 151 54223
4,99 k	2322 151 54992	14,7 k	2322 151 51473	43,2 k	2322 151 54323
5,11 k	2322 151 55112	15,0 k	2322 151 51503	44,2 k	2322 151 54423
5,23 k	2322 151 55232	15,4 k	2322 151 51543	45,3 k	2322 151 54533
5,36 k	2322 151 55362	15,8 k	2322 151 51583	46,4 k	2322 151 54643
5,49 k	2322 151 55492	16,2 k	2322 151 51623	47,5 k	2322 151 54753
5,62 k	2322 151 55622	16,5 k	2322 151 51653	48,7 k	2322 151 54873
5,76 k	2322 151 55762	16,9 k	2322 151 51693	49,9 k	2322 151 54993
5,90 k	2322 151 55902	17,4 k	2322 151 51743	51,1 k	2322 151 55113
6,04 k	2322 151 56042	17,8 k	2322 151 51783	52,3 k	2322 151 55233
6,19 k	2322 151 56192	18,2 k	2322 151 51823	53,6 k	2322 151 55363
6,34 k	2322 151 56342	18,7 k	2322 151 51873	54,9 k	2322 151 55493
6,49 k	2322 151 56492	19,1 k	2322 151 51913	56,2 k	2322 151 55623
6,65 k	2322 151 56652	19,6 k	2322 151 51963	57,6 k	2322 151 55763
6,81 k	2322 151 56812	20,0 k	2322 151 52003	59,0 k	2322 151 55903
6,98 k	2322 151 56982	20,5 k	2322 151 52053	60,4 k	2322 151 56043
7,15 k	2322 151 57152	21,0 k	2322 151 52103	61,9 k	2322 151 56193
7,32 k	2322 151 57322	21,5 k	2322 151 52153	63,4 k	2322 151 56343
7,50 k	2322 151 57502	22,1 k	2322 151 52213	64,9 k	2322 151 56493
7,68 k	2322 151 57682	22,6 k	2322 151 52263	66,5 k	2322 151 56653
7,87 k	2322 151 57872	23,2 k	2322 151 52323	68,1 k	2322 151 56813

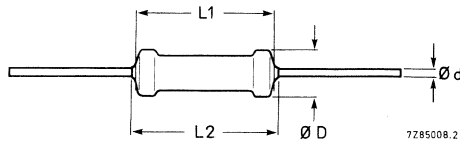
R_N (Ω)	catalogue number	R_N (Ω)	catalogue number	R_N (Ω)	catalogue number
69,8 k	2322 151 56983	205 k	2322 151 52054	604 k	2322 151 56044
71,5 k	2322 151 57153	210 k	2322 151 52104	619 k	2322 151 56194
73,2 k	2322 151 57323	215 k	2322 151 52154	634 k	2322 151 56344
75,0 k	2322 151 57503	221 k	2322 151 52214	649 k	2322 151 56494
76,8 k	2322 151 57683	226 k	2322 151 52264	665 k	2322 151 56654
78,7 k	2322 151 57873	232 k	2322 151 52324	681 k	2322 151 56814
80,6 k	2322 151 58063	237 k	2322 151 52374	698 k	2322 151 56984
82,5 k	2322 151 58253	243 k	2322 151 52434	715 k	2322 151 57154
84,5 k	2322 151 58453	249 k	2322 151 52494	732 k	2322 151 57324
86,6 k	2322 151 58663	255 k	2322 151 52554	750 k	2322 151 57504
88,7 k	2322 151 58873	261 k	2322 151 52614	768 k	2322 151 57684
90,9 k	2322 151 59093	267 k	2322 151 52674	787 k	2322 151 57874
93,1 k	2322 151 59313	274 k	2322 151 52744	806 k	2322 151 58064
95,3 k	2322 151 59533	280 k	2322 151 52804	825 k	2322 151 58254
97,6 k	2322 151 59763	287 k	2322 151 52874	845 k	2322 151 58454
100 k	2322 151 51004	294 k	2322 151 52944	866 k	2322 151 58664
102 k	2322 151 51024	301 k	2322 151 53014	887 k	2322 151 58874
105 k	2322 151 51054	309 k	2322 151 53094	909 k	2322 151 59094
107 k	2322 151 51074	316 k	2322 151 53164	931 k	2322 151 59314
110 k	2322 151 51104	324 k	2322 151 53244	953 k	2322 151 59534
113 k	2322 151 51134	332 k	2322 151 53324	976 k	2322 151 59764
115 k	2322 151 51154	340 k	2322 151 53404	1,00 M	2322 151 51005
118 k	2322 151 51184	348 k	2322 151 53484		
121 k	2322 151 51214	357 k	2322 151 53574		
124 k	2322 151 51244	365 k	2322 151 53654		
127 k	2322 151 51274	374 k	2322 151 53744		
130 k	2322 151 51304	383 k	2322 151 53834		
133 k	2322 151 51334	392 k	2322 151 53924		
137 k	2322 151 51374	402 k	2322 151 54024		
140 k	2322 151 51404	412 k	2322 151 54124		
143 k	2322 151 51434	422 k	2322 151 54224		
147 k	2322 151 51474	432 k	2322 151 54324		
150 k	2322 151 51504	442 k	2322 151 54424		
154 k	2322 151 51544	453 k	2322 151 54534		
158 k	2322 151 51584	464 k	2322 151 54644		
162 k	2322 151 51624	475 k	2322 151 54754		
165 k	2322 151 51654	487 k	2322 151 54874		
169 k	2322 151 51694	499 k	2322 151 54994		
174 k	2322 151 51744	511 k	2322 151 55114		
178 k	2322 151 51784	523 k	2322 151 55234		
182 k	2322 151 51824	536 k	2322 151 55364		
187 k	2322 151 51874	549 k	2322 151 55494		
191 k	2322 151 51914	562 k	2322 151 55624		
196 k	2322 151 51964	576 k	2322 151 55764		
200 k	2322 151 52004	590 k	2322 151 55904		

General data

Resistance range	220 k Ω to 10 M Ω , tol. \pm 5%, E 12-series 12 M Ω to 22 M Ω , tol. \pm 10%, E 12-series
Max. body temperature (hot spot)	155 °C
Temperature coefficient	\pm 200. 10 ⁻⁶ /K
Dissipation at T _{amb} = 70 °C	0,25 W
Limiting voltage	1600 V(d.c) or 1150 V (r.m.s.)

For detailed information see Data Handbook C12

D _{max} (mm)	L1 _{max} (mm)	L2 _{max} (mm)	d (mm)
2,5	6,5	7,5	0,6



R _N (Ω)	tolerance (%)	catalogue number in box	catalogue number on reel
220 k	5	2322 241 13224	2322 241 23224
270 k	5	2322 241 13274	2322 241 23274
330 k	5	2322 241 13334	2322 241 23334
390 k	5	2322 241 13394	2322 241 23394
470 k	5	2322 241 13474	2322 241 23474
560 k	5	2322 241 13564	2322 241 23564
680 k	5	2322 241 13684	2322 241 23684
820 k	5	2322 241 13824	2322 241 23824
1 M	5	2322 241 13105	2322 241 23105
1,2 M	5	2322 241 13125	2322 241 23125
1,5 M	5	2322 241 13155	2322 241 23155
1,8 M	5	2322 241 13185	2322 241 23185
2,2 M	5	2322 241 13225	2322 241 23225
2,7 M	5	2322 241 13275	2322 241 23275
3,3 M	5	2322 241 13335	2322 241 23335
3,9 M	5	2322 241 13395	2322 241 23395
4,7 M	5	2322 241 13475	2322 241 23475
5,6 M	5	2322 241 13565	2322 241 23565
6,8 M	5	2322 241 13685	2322 241 23685
8,2 M	5	2322 241 13825	2322 241 23825

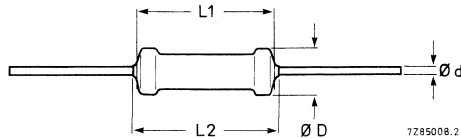
R _N (Ω)	tolerance (%)	catalogue number in box	catalogue number on reel
10 M	5	2322 241 13106	2322 241 23106
12 M	10	2322 241 12126	2322 241 22126
15 M	10	2322 241 12156	2322 241 22156
18 M	10	2322 241 12186	2322 241 22186
22 M	10	2322 241 12226	2322 241 22226

General data

Resistance range	220 k Ω to 33 M Ω , tol. \pm 5%, E 12-series
Max. body temperature (hot spot)	155 $^{\circ}$ C
Temperature coefficient	\pm 200. 10 ⁻⁶ /K
Dissipation at T _{amb} = 70 $^{\circ}$ C	0,5 W
Limiting voltage	3500 V(d.c.) or 2500 V(r.m.s.)

For detailed information see Data Handbook C12

D _{max} (mm)	L1 _{max} (mm)	L2 _{max} (mm)	d (mm)
3,7	9,0	10,0	0,7



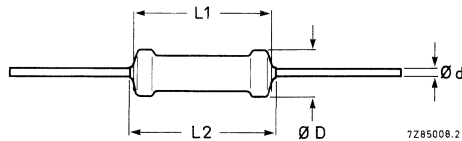
R _N (Ω)	cat. number	R _N (Ω)	cat. number	R _N (Ω)	cat. number
220 k	2322 242 13224	10 M	2322 242 13106		
270 k	2322 242 13274	12 M	2322 242 13126		
330 k	2322 242 13334	15 M	2322 242 13156		
390 k	2322 242 13394	18 M	2322 242 13186		
470 k	2322 242 13474	22 M	2322 242 13226		
560 k	2322 242 13564	27 M	2322 242 13276		
680 k	2322 242 13684	33 M	2322 242 13336		
820 k	2322 242 13824				
1,0 M	2322 242 13105				
1,2 M	2322 242 13125				
1,5 M	2322 242 13155				
1,8 M	2322 242 13185				
2,2 M	2322 242 13225				
2,7 M	2322 242 13275				
3,3 M	2322 242 13335				
3,9 M	2322 242 13395				
4,7 M	2322 242 13475				
5,6 M	2322 242 13565				
6,8 M	2322 242 13685				
8,2 M	2322 242 13825				

General data

Resistance range	100 k Ω to 68 M Ω , tol. \pm 5%, E 6-series
Max. body temperature (hot spot)	155 $^{\circ}$ C
Temperature coefficient	\pm 200. 10 ⁻⁶ /K
Dissipation at T _{amb} = 70 $^{\circ}$ C .	1,0 W
Limiting voltage	10000 V(d.c.) or 7000 V(r.m.s)

For detailed information see Data Handbook C12

D _{max} (mm)	L1 _{max} (mm)	L2 _{max} (mm)	d (mm)
6,8	16,5	19,0	0,8



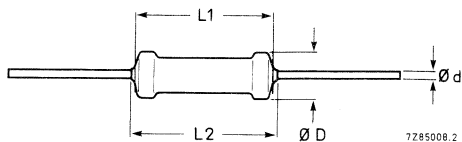
R _N (Ω)	cat. number	R _N (Ω)	cat. number	R _N (Ω)	cat. number
100 k	2322 244 13104	15 M	2322 244 13156		
150 k	2322 244 13154	18 M	2322 244 13186		
220 k	2322 244 13224	22 M	2322 244 13226		
330 k	2322 244 13334	27 M	2322 244 13276		
470 k	2322 244 13474	33 M	2322 244 13336		
680 k	2322 244 13684	39 M	2322 244 13396		
1,0 M	2322 244 13105	47 M	2322 244 13476		
1,2 M	2322 244 13125	56 M	2322 244 13566		
1,5 M	2322 244 13155	68 M	2322 244 13686		
1,8 M	2322 244 13185				
2,2 M	2322 244 13225				
2,7 M	2322 244 13275				
3,3 M	2322 244 13335				
3,9 M	2322 244 13395				
4,7 M	2322 244 13475				
5,6 M	2322 244 13565				
6,8 M	2322 244 13685				
8,2 M	2322 244 13825				
10 M	2322 244 13106				
12 M	2322 244 13126				

General data

Resistance range	2,2 Ω to 27 k Ω , tol. \pm 5%, E 12-series
Max. body temperature (hot spot)	300 $^{\circ}$ C
Dissipation at $T_{amb} = 70$ $^{\circ}$ C	1,6 W
Limiting voltage, r.m.s.	500 V

For detailed information see Data Handbook C12

D_{max} (mm)	$L1_{max}$ (mm)	$L2_{max}$ (mm)	d (mm)
3,9	10	11	0,6



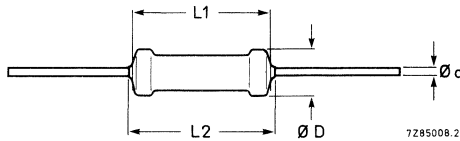
R_N (Ω)	cat. number	R_N (Ω)	cat. number	R_N (Ω)	cat. number
2,2	2322 191 32208	100	2322 191 31001	4,7 k	2322 191 34702
2,7	2322 191 32708	120	2322 191 31201	5,6 k	2322 191 35602
3,3	2322 191 33308	150	2322 191 31501	6,8 k	2322 191 36802
3,9	2322 191 33908	180	2322 191 31801	8,2 k	2322 191 38202
4,7	2322 191 34708	220	2322 191 32201	10 k	2322 191 31003
5,6	2322 191 35608	270	2322 191 32701	12 k	2322 191 31203
6,8	2322 191 36808	330	2322 191 33301	15 k	2322 191 31503
8,2	2322 191 38208	390	2322 191 33901	18 k	2322 191 31803
10	2322 191 31009	470	2322 191 34701	22 k	2322 191 32203
12	2322 191 31209	560	2322 191 35601	27 k	2322 191 32703
15	2322 191 31509	680	2322 191 36801		
18	2322 191 31809	820	2322 191 38201		
22	2322 191 32209	1 k	2322 191 31002		
27	2322 191 32709	1,2 k	2322 191 31202		
33	2322 191 33309	1,5 k	2322 191 31502		
39	2322 191 33909	1,8 k	2322 191 31802		
47	2322 191 34709	2,2 k	2322 191 32202		
56	2322 191 35609	2,7 k	2322 191 32702		
68	2322 191 36809	3,3 k	2322 191 33302		
82	2322 191 38209	3,9 k	2322 191 33902		

General data

Resistance range	2,2 Ω to 47 k Ω , tol. \pm 5%, E 12-series
Max. body temperature (hot spot)	300 $^{\circ}$ C
Dissipation at $T_{amb} = 70$ $^{\circ}$ C	2,5 W
Limiting voltage, r.m.s.	500 V

For detailed information see Data Handbook C12

D_{max} (mm)	$L1_{max}$ (mm)	$L2_{max}$ (mm)	d (mm)
5,2	16,7	17,9	0,6



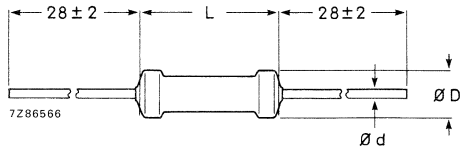
R_N (Ω)	cat. number	R_N (Ω)	cat. number	R_N (Ω)	cat. number
2,2	2322 192 32208	100	2322 192 31001	4,7 k	2322 192 34702
2,7	2322 192 32708	120	2322 192 31201	5,6 k	2322 192 35602
3,3	2322 192 33308	150	2322 192 31501	6,8 k	2322 192 36802
3,9	2322 192 33908	180	2322 192 31801	8,2 k	2322 192 38202
4,7	2322 192 34708	220	2322 192 32201	10 k	2322 192 31003
5,6	2322 192 35608	270	2322 192 32701	12 k	2322 192 31203
6,8	2322 192 36808	330	2322 192 33301	15 k	2322 192 31503
8,2	2322 192 38208	390	2322 192 33901	18 k	2322 192 31803
10	2322 192 31009	470	2322 192 34701	22 k	2322 192 32203
12	2322 192 31209	560	2322 192 35601	27 k	2322 192 32703
15	2322 192 31509	680	2322 192 36801	33 k	2322 192 33303
18	2322 192 31809	820	2322 192 38201	39 k	2322 192 33903
22	2322 192 32209	1 k	2322 192 31002	47 k	2322 192 34703
27	2322 192 32709	1,2 k	2322 192 31202		
33	2322 192 33309	1,5 k	2322 192 31502		
39	2322 192 33909	1,8 k	2322 192 31802		
47	2322 192 34709	2,2 k	2322 192 32202		
56	2322 192 35609	2,7 k	2322 192 32702		
68	2322 192 36809	3,3 k	2322 192 33302		
82	2322 192 38209	3,9 k	2322 192 33902		

General data

Resistance range	0,1 Ω to 8,2 Ω , tol. \pm 10%, E 6-series 10 Ω to 10 k Ω , tol. \pm 5%, E 6-series
Max. body temperature	350 °C
Dissipation at T _{amb} = 40 °C	AC 04 4 W AC 07 7 W

For detailed information see Data Handbook C12

Type	D _{max} (mm)	L _{max} (mm)	d (mm)
AC 04	6	19	0,6
AC 07	8	27	0,8



R _N (Ω)	tolerance (%)	AC 04 cat. number	AC 07 cat. number
0,1	10	2322 329 34107	2322 329 37107
0,15	10	2322 329 34157	2322 329 37157
0,22	10	2322 329 34227	2322 329 37227
0,33	10	2322 329 34337	2322 329 37337
0,47	10	2322 329 34477	2322 329 37477
0,68	10	2322 329 34687	2322 329 37687
1	10	2322 329 34108	2322 329 37108
1,5	10	2322 329 34158	2322 329 37158
2,2	10	2322 329 34228	2322 329 37228
3,3	10	2322 329 34338	2322 329 37338
4,7	10	2322 329 34478	2322 329 37478
6,8	10	2322 329 34688	2322 329 37688
10	5	2322 329 04109	2322 329 07109
15	5	2322 329 04159	2322 329 07159
22	5	2322 329 04229	2322 329 07229
33	5	2322 329 04339	2322 329 07339
47	5	2322 329 04479	2322 329 07479
68	5	2322 329 04689	2322 329 07689
100	5	2322 329 04101	2322 329 07101
150	5	2322 329 04151	2322 329 07151

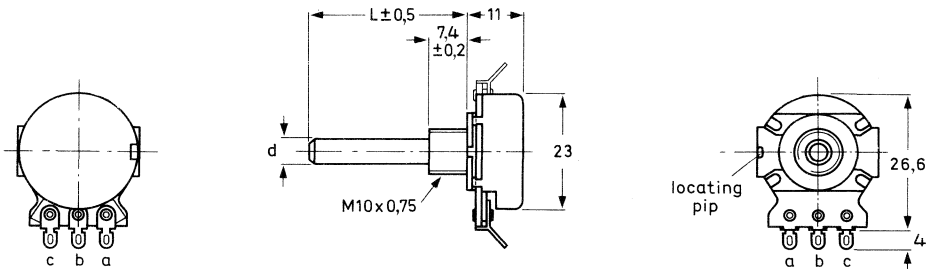
R_N (Ω)	tolerance (%)	AC 04 cat. number	AC 07 cat. number
220	5	2322 329 04221	2322 329 07221
330	5	2322 329 04331	2322 329 07331
470	5	2322 329 04471	2322 329 07471
680	5	2322 329 04681	2322 329 07681
1 k	5	2322 329 04102	2322 329 07102
1,5 k	5	2322 329 04152	2322 329 07152
2,2 k	5	2322 329 04222	2322 329 07222
3,3 k	5	2322 329 04332	2322 329 07332
4,7 k	5	2322 329 04472	2322 329 07472
6,8 k	5		2322 329 07682
10 k	5		2322 329 07103

General data

Resistance range	
linear law	220 Ω - 4,7 MΩ
logarithmic law	1 kΩ - 4,7 MΩ
Maximum dissipation at $T_{amb} = 40\text{ °C}$	
linear law	0,25 W
logarithmic law	0,125 W
Climatic catagoty (IEC 68)	10/070/21

For detailed information see Data Handbook C12

L	d
(mm)	(mm)
60	6



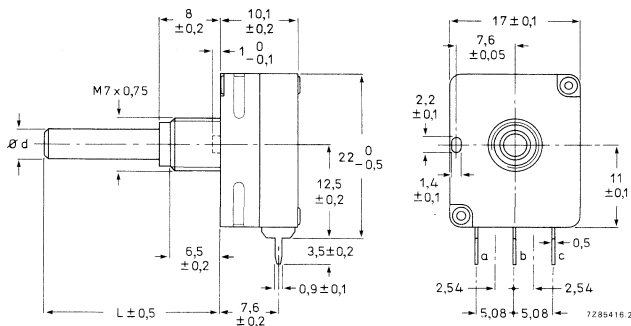
nominal resistance R_N	catalogue number	catalogue number
	linear law	logarithmic law
220 Ω	2322 350 70702	
330 Ω	2322 350 70719	
470 Ω	2322 350 70703	2322 350 70723
1 kΩ	2322 350 70704	2322 350 70724
2,2 kΩ	2322 350 70705	2322 350 70725
4,7 kΩ	2322 350 70706	2322 350 70726
10 kΩ	2322 350 70707	2322 350 70727
22 kΩ	2322 350 70708	2322 350 70728
47 kΩ	2322 350 70709	2322 350 70729
100 kΩ	2322 350 70711	2322 350 70731
220 kΩ	2322 350 70712	2322 350 70732
470 kΩ	2322 350 70713	2322 350 70733
1 MΩ	2322 350 70714	2322 350 70734
2,2 MΩ	2322 350 70715	2322 350 70735
4,7 MΩ	2322 350 70716	

General data

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

For detailed information see Data Handbook C12

L (mm)	d (mm)
30	4
40	6



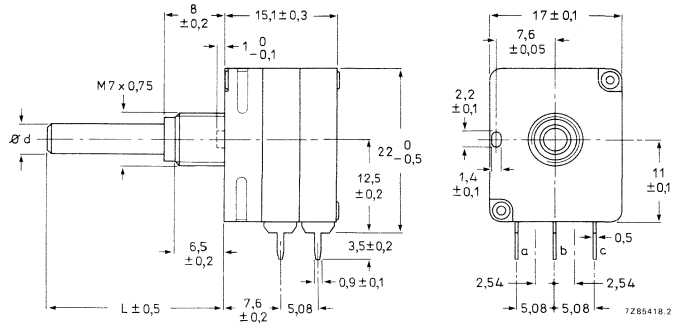
nominal resistance R_N	catalogue number spindle \varnothing 4 x 30		catalogue number spindle \varnothing 6 x 40	
	linear law	logarithmic law	linear law	logarithmic law
470 Ω	2322 501 02103		2322 501 90001	
1 kΩ	2322 501 02104		2322 501 90002	
2,2 kΩ	2322 501 02105		2322 501 90003	
4,7 kΩ	2322 501 02106	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

General data

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
Ganging tolerance	
	2 dB

For detailed information see Data Handbook C12

L (mm)	L1 (mm)	d (mm)
30	8	4



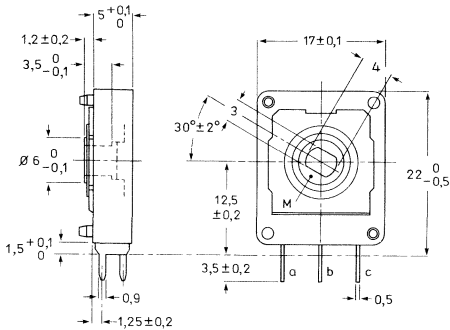
nominal resistance	catalogue number	
	linear law	logarithmic law
R_N		
470 Ω	2322 502 02103	
1 kΩ	2322 502 02104	
2,2 kΩ	2322 502 02105	
4,7 kΩ	2322 502 02106	2322 502 02126
10 kΩ	2322 502 02107	2322 502 02127
22 kΩ	2322 502 02108	2322 502 02128
47 kΩ	2322 502 02109	2322 502 02129
100 kΩ	2322 502 02111	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

CARBON POTENTIOMETERS, plug spindle POTPACK PP17M

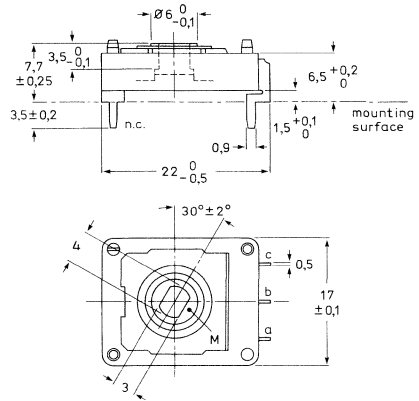
General data

Resistance range (E3-series) linear law
 Maximum dissipation at $T_{amb} = 40\text{ }^{\circ}\text{C}$
 Climatic category (IEC 68)

470 Ω to 1 M Ω
 0,2 W
 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 k Ω	2322 500 00104	2322 500 00504		
2,2 k Ω	2322 500 00105	2322 500 00505		
4,7 k Ω	2322 500 00106	2322 500 00506		
10 k Ω	2322 500 00107	2322 500 00507		
22 k Ω	2322 500 00108	2322 500 00508		
47 k Ω	2322 500 00109	2322 500 00509		
100 k Ω	2322 500 00111	2322 500 00511		
220 k Ω	2322 500 00112	2322 500 00512		
470 k Ω	2322 500 00113	2322 500 00513		
1 M Ω	2322 500 00114	2322 500 00514		

CARBON PRESET POTENTIOMETERS (10 mm)

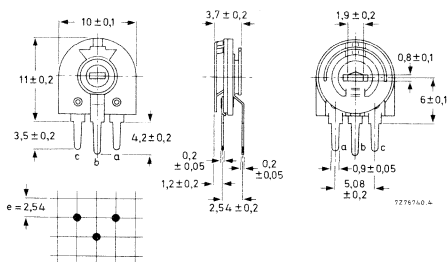
CPT 10

General data

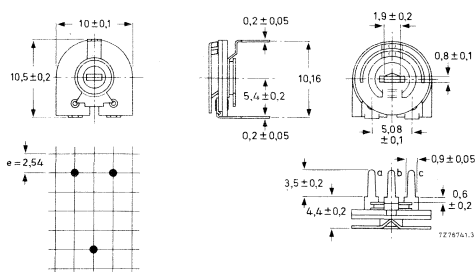
Resistance range
 Maximum dissipation at $T_{amb} = 40\text{ }^{\circ}\text{C}$
 Climatic category, IEC 68

47 Ω to 4,7 M Ω , E 3-series
 0,1 W
 25/070/21

For detailed information see Data Handbook C12



version V



version H

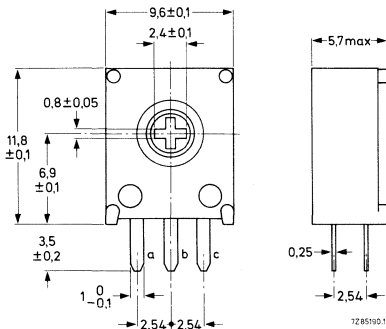
nominal resistance R_N (Ω)	catalogue number	catalogue number	
	version V	version H	
47	2322 410 01191	2322 410 03391	
100	2322 410 01151	2322 410 03351	
200	2322 410 01152	2322 410 03352	
330	2322 410 01169	2322 410 03369	
470	2322 410 01153	2322 410 03353	
1 k	2322 410 01154	2322 410 03354	
2,2 k	2322 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	

General data

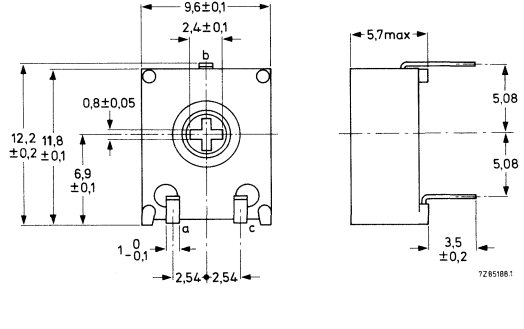
Resistance range, linear law
 Max. dissipation at $T_{amb} = 40\text{ }^\circ\text{C}$
 Tolerance
 Temperature coefficient
 Climatic category, IEC 68

47 Ω to 4,7 M Ω , E 3-series
 0,1 W
 $\pm 10\%$
 $\pm 300 \cdot 10^{-6}/\text{K}$
 55/100/10

For detailed information see Data Handbook C12



version V



version H

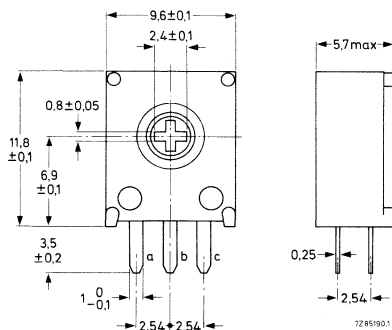
nominal resistance R_N (Ω)	catalogue number	catalogue number	
	version V	version H	
47	2322 483 00479	2322 483 50479	
100	2322 483 00101	2322 483 50101	
220	2322 483 00221	2322 483 50221	
470	2322 483 00471	2322 483 50471	
1 k	2322 483 00102	2322 483 50102	
2,2 k	2322 483 00222	2322 483 50222	
4,7 k	2322 483 00472	2322 483 50472	
10 k	2322 483 00103	2322 483 50103	
22 k	2322 483 00223	2322 483 50223	
47 k	2322 483 00473	2322 483 50473	
100 k	2322 483 00104	2322 483 50104	
220 k	2322 483 00224	2322 483 50224	
470 k	2322 483 00474	2322 483 50474	
1 M	2322 483 00105	2322 483 50105	
2,2 M	2322 483 00225	2322 483 50225	
4,7 M	2322 483 00475	2322 483 50475	

General data

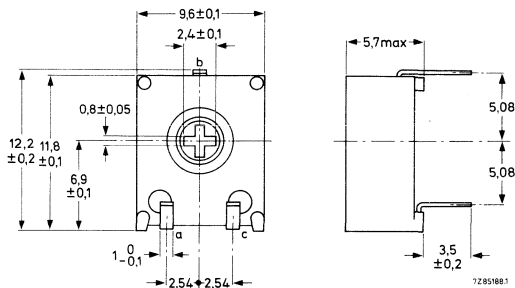
Resistance range, linear
 Max. dissipation at $T_{amb} = 40\text{ }^{\circ}\text{C}$
 Tolerance
 Temperature coefficient
 Climatic category IEC 68

47 Ω to 10 M Ω , E 3-series
 0,5 W
 $\pm 10\%$
 $\pm 300 \cdot 10^{-6}/\text{K}$
 55/125/56

For detailed information see Data Handbook C12



version V



version H

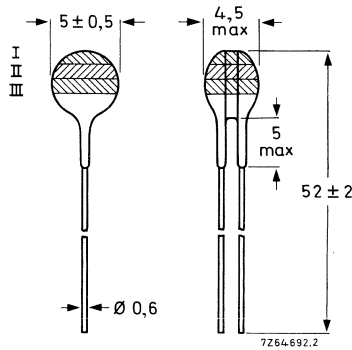
nominal resistance R_N (Ω)	catalogue number	catalogue number	
	version V	version H	
47	2322 484 21479	2322 484 71479	
100	2322 484 21101	2322 484 71101	
220	2322 484 21221	2322 484 71221	
470	2322 484 21471	2322 484 71471	
1 k	2322 484 21102	2322 484 71102	
2,2 k	2322 484 21222	2322 484 71222	
4,7 k	2322 484 21472	2322 484 71472	
10 k	2322 484 21103	2322 484 71103	
22 k	2322 484 21223	2322 484 71223	
47 k	2322 484 21473	2322 484 71473	
100 k	2322 484 21104	2322 484 71104	
220 k	2322 484 21224	2322 484 71224	
470 k	2322 484 21474	2322 484 71474	
1 M	2322 484 21105	2322 484 71105	
2,2 M	2322 484 21225	2322 484 71225	
4,7 M	2322 484 21475	2322 484 71475	
10 M	2322 484 21106	2322 484 71106	

General data

Voltage at 1 mA d.c.
 β between 1 mA en 10 mA
 Max. dissipation
 Temperature range

2,7 to 68 V
 max. 0,20 to 0,28 V
 0,25 W
 -25 to +85 °C

For detailed information see Data Handbook C11



catalogue number	d.c. at 1 mA	max β between 1 and 10 mA
	(V)	
2322 581 03082	3,9	0,28
2322 581 03102	4,7	0,25
2322 581 03182	10	0,22
2322 581 03222	15	0,22
2322 581 03262	22	0,20
2322 581 03302	33	0,20
2322 581 03342	47	0,20
2322 581 03382	68	0,20

General data

Max. a.c. voltage, r.m.s.

60 to 460 V

Max. d.c. voltage

85 to 615 V

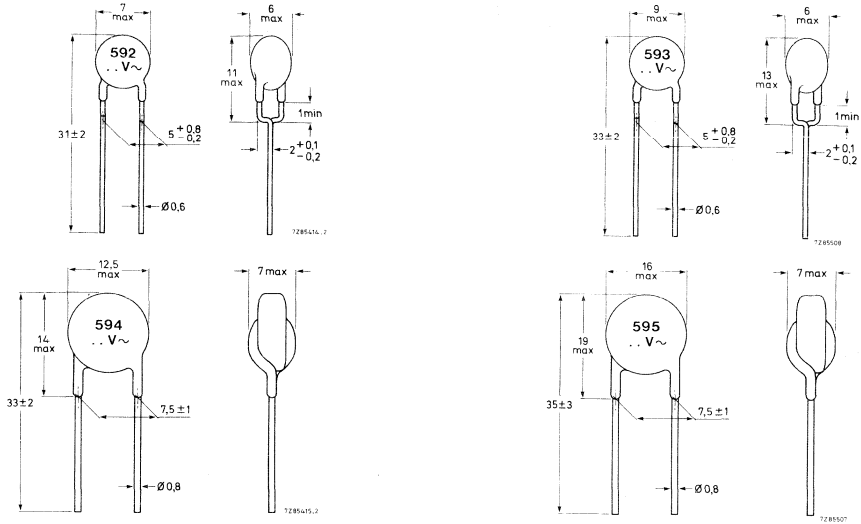
Max. non-repetitive transient current (8/20 μ s)

400 to 4000 A

Climatic category, IEC 68

40/125/56

For detailed information see Data Handbook C11

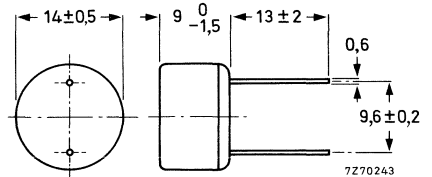
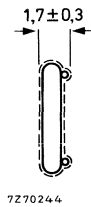
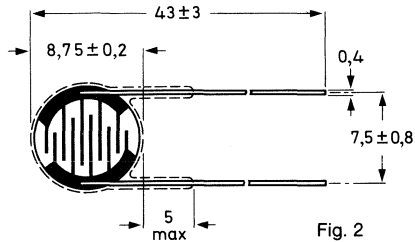
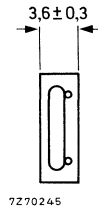
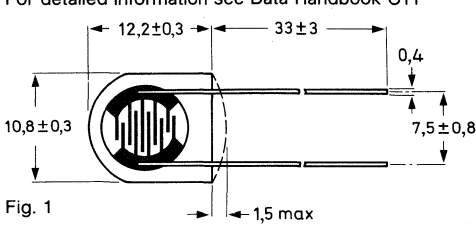


cat. number	max. working voltage (V _{r.m.s.}) (V)	max. working voltage (V _{d.c.}) (V)	max. transient current (8/20 μ s) (A)	transient energie (8/20 μ s) (J)	max. clamping voltage at 50 A (V)
2322 592 61512	150	200	400	5	470
2322 592 62512	250	320	400	7,5	745
2322 592 62712	275	350	400	8,5	820
2322 592 64212	420	560	400	14	1340
2322 593 61512	150	200	1200	8,5	485
2322 593 62512	250	320	1200	13	780
2322 593 62712	275	350	1200	14	850
2322 593 64212	420	560	1200	22	1350
2322 594 61512	150	200	2500	15	455
2322 594 62512	250	320	2500	23	740
2322 594 62712	275	350	2500	25	815
2322 594 64212	420	560	2500	39	1310
2322 595 61512	150	200	4500	24	216
2322 595 62512	250	320	4500	39	351
2322 595 62712	275	350	4500	43	387
2322 595 64212	420	560	4500	64	1225

General data

Dark resistance R_D	> 10 M Ω
Light resistance R_L	30 to 300 Ω
Recovery rate	> 200 k Ω /s
Max. dissipation at 40 °C	0,2 W
Temperature range	-20 to +60 °C

For detailed information see Data Handbook C11



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 tot 300	> 200	1	0,1
2322 600 94001	min. 10 M	75 tot 300	> 200	2	0,1
2322 600 95001	min. 10 M	75 tot 300	> 200	3	0,2
2322 600 95003	min. 10 M	max. 250	> 200	3	0,2

General data

Resistance at +25 °C	10-22-47-100 kΩ
B _{25/85}	3560 to 3900 K
Max. dissipation	25 mW
Dissipation factor	0,8/1,2 mW/K
Thermal time constant	7,5 to 10 s
Tolerance	± 5%, ± 10%

For detailed information see Data Handbook C11

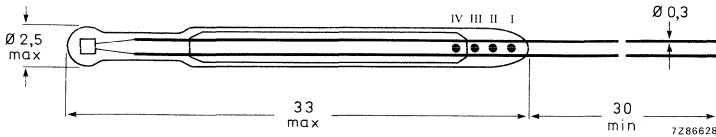


Fig. 1. 2322 626 1...

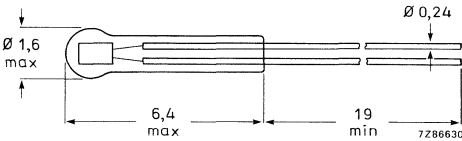


Fig. 2. 2322 626 2...

cat. number	R ₂₅ (kΩ)	tolerance (%)	thermal time constant (s)	B _{25/85} (K)	temperature coefficient at 25 °C (%/K)
2322 626 13103	10	± 5	10	3750	-4,2
2322 626 13223	22	± 5	10	3560	-4,0
2322 626 13473	47	± 5	10	3750	-4,2
2322 626 13104	100	± 5	10	3900	-4,4
2322 626 12103	10	± 10	10	3750	-4,2
2322 626 12223	22	± 10	10	3560	-4,0
2322 626 12473	47	± 10	10	3750	-4,2
2322 626 12104	100	± 10	10	3900	-4,4
2322 626 23103	10	± 5	7,5	3750	-4,2
2322 626 23223	22	± 5	7,5	3560	-4,0
2322 626 23473	47	± 5	7,5	3750	-4,2
2322 626 23104	100	± 5	7,5	3900	-4,4
2322 626 22103	10	± 10	7,5	3750	-4,2
2322 626 22223	22	± 10	7,5	3560	-4,0
2322 626 22473	47	± 10	7,5	3750	-4,2
2322 626 22104	100	± 10	7,5	3900	-4,4

General data

Resistance at +25 °C

10-22-47-100 kΩ

B_{25/85}

3560 to 3900 K

For detailed information see Data Handbook C11

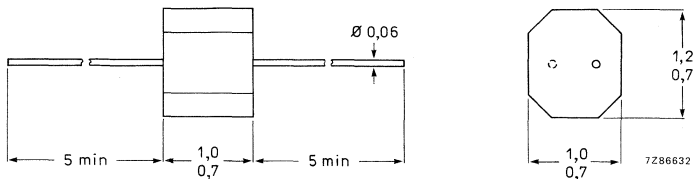


Fig. 1. 2322 633 0....

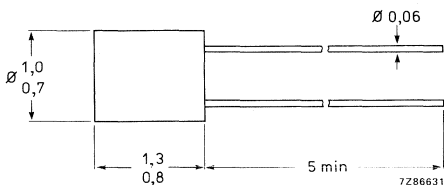


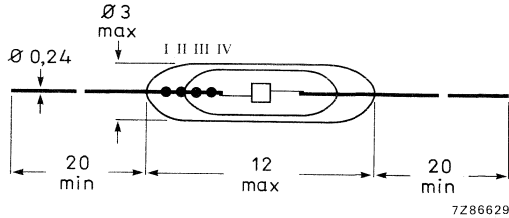
Fig. 2. 2322 633 1....

cat. number	R ₂₅ (kΩ)	tolerance (%)	fig.	B _{25/85} 5% (K)	temperature coefficient at 25 °C (%/K)
2322 633 03103	10	± 5	1	3750	-4,2
2322 633 03223	22	± 5	1	3560	-4,0
2322 633 03473	47	± 5	1	3750	-4,2
2322 633 03104	100	± 5	1	3900	-4,4
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 13103	10	± 5	2	3750	-4,2
2322 633 13223	22	± 5	2	3560	-4,0
2322 633 13473	47	± 5	2	3750	-4,2
2322 633 13104	100	± 5	2	3900	-4,4
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

General data

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

For detailed information see Data Handbook C11

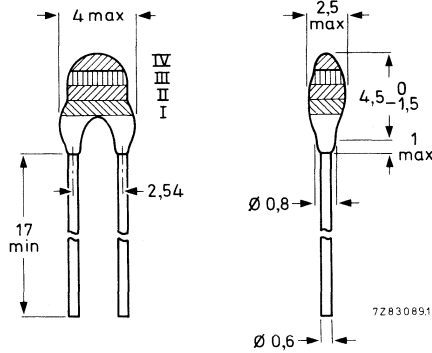


cat. number	R ₂₅ (kΩ)	tolerance (%)	B _{25/85} ± 5% (K)	temperature coefficient at 25°C (%/K)
2322 633 23103	10	± 5	3750	-4,2
2322 633 23223	20	± 5	3560	-4,0
2322 633 23473	47	± 5	3750	-4,2
2322 633 23104	100	± 5	3900	-4,4
2322 633 22103	10	± 10	3570	-4,2
2322 633 22223	20	± 10	3560	-4,0
2322 633 22473	47	± 10	3750	-4,2
2322 633 22104	100	± 10	3900	-4,4

General data

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	7,5 mW/K
Thermal time constant	19 s

For detailed information see Data Handbook C11



cat. number $R_{25} \pm 5\%$	cat. number $R_{25} \pm 10\%$	R_{25} (kΩ)	$B_{25/85}$ $\pm 5\%$ (K)	temperature coefficient at +25°C (%/K)
2322 640 13272	2322 640 12272	2,7	4000	-4,50
2322 640 13472	2322 640 12472	4,2	3660	-4,12
2322 640 13682	2322 640 12682	6,8		
2322 640 13103	2322 640 12103	10		
2322 640 13153	2322 640 12153	15		
2322 640 13223	2322 640 12223	22	3700	-4,17
2322 640 13333	2322 640 12333	33		
2322 640 13473	2322 640 12473	47	3850	-4,33
2322 640 13683	2322 640 12683	68	3880	-4,37
2322 640 13104	2322 640 12104	100		
2322 640 13154	2322 640 12154	150	4050	-4,56
2322 640 13224	2322 640 12224	220		
2322 640 13334	2322 640 12334	330	4150	-4,67

General data

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

For detailed information see Data Handbook C11

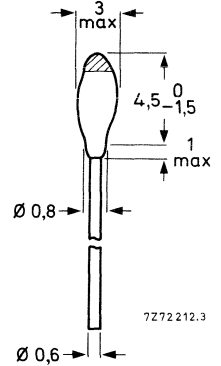
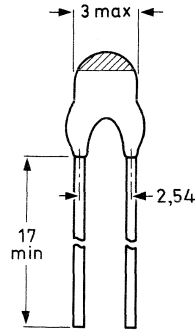
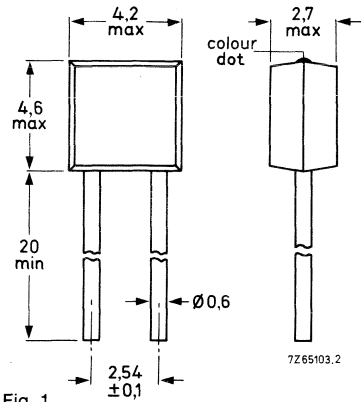


Fig. 1

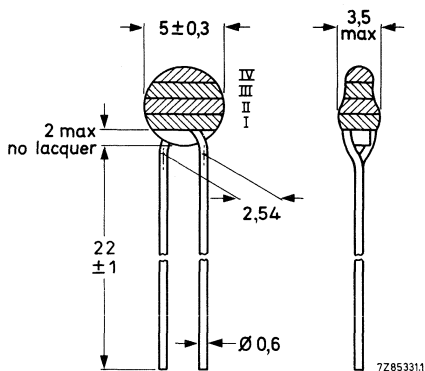
Fig. 2

cat. number	resistance in k Ω at temperature in $^{\circ}\text{C}$		$B_{25/85}$ (K)	thermal time constant (s)	fig.
	R_{25}	R_{100}			
2322 640 90004	12	0,95	3750	19	1
2322 640 90005	R_{100} 16,7	R_{200} 1,12	4300	19	1
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

General data

Resistance range at +25 °C	3,3 Ω to 470 kΩ, E 6-series
Tolerance	± 10%
B _{25/85}	2600 to 4800 K
Max. dissipation	0,5 W
Dissipation factor	8,5 mW/K
Thermal time constant	± 17 s
Temperature range	-25 to + 125 °C

For detailed information see Data Handbook C11



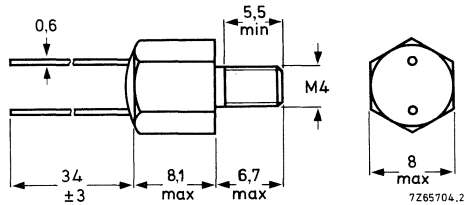
cat. number	R ₂₅ (Ω)	B _{25/85} (K)	temperature coefficient (%/K)
2322 642 62338	3,3	2675	-3,0
2322 642 62478	4,7	2750	-3,1
2322 642 62688	6,8	2800	-3,2
2322 642 62109	10	2875	-3,2
2322 642 62159	15	2950	-3,3
2322 642 62229	22	3025	-3,4
2322 642 62339	33	3100	-3,5
2322 642 62479	47	3150	-3,5
2322 642 62689	68	3225	-3,6
2322 642 62101	100	3300	-3,7
2322 642 62151	150	3375	-3,8
2322 642 62221	220	3475	-3,9
2322 642 62331	330	3575	-4,0
2322 642 62471	470	3650	-4,1
2322 642 62681	680	3725	-4,2
2322 642 62102	1,0 k	3825	-4,2
2322 642 62152	1,5 k	3975	-4,5
2322 642 62222	2,2 k	4125	-4,6

cat. number	R_{25} (Ω)	$B_{25/85}$ (K)	temperature coefficient (%/K)
2322 642 62332	3,3 k	4250	-4,8
2322 642 62472	4,7 k	4350	-4,9
2322 642 62682	6,8 k	4400	-5,0
2322 642 62103	10 k	4275	-4,8
2322 642 62153	15 k	4200	-4,7
2322 642 62223	22 k	4275	-4,8
2322 642 62333	33 k	4350	-4,9
2322 642 62473	47 k	4400	-5,0
2322 642 62683	68 k	4450	-5,1
2322 642 62104	100 k	4500	-5,2
2322 642 62154	150 k	4550	-5,2
2322 642 62224	220 k	4600	-5,3
2322 642 62334	330 k	4625	-5,3
2322 642 62474	470 k	4650	-5,4

General data

Resistance at +25 °C	1 kΩ to 100 kΩ, E 3-series
B _{25/85}	3825 to 4500 K
Max. dissipation	0,5 W
Dissipation factor	25 mW/K
Thermal time constant	20 s
Temperature range	-25 to + 100 °C

For detailed information see Data Handbook C11

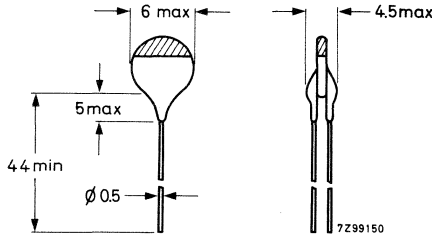


cat. number	R ₂₅ (Ω)	tolerance (%)	B _{25/85} ± 5% (K)	temperature coefficient at 25°C (%/K)
2322 642 73102	1 k	± 5	3825	-4,1
2322 642 73222	2,2 k	± 5	4125	-4,4
2322 642 73472	4,7 k	± 5	4350	-4,7
2322 642 73103	10 k	± 5	4275	-5,0
2322 642 73223	22 k	± 5	4275	-4,7
2322 642 73473	47 k	± 5	4400	-4,9
2322 642 73104	100 k	± 5	4500	-5,0

General data

Resistance at 25 °C	50 to 60 Ω
Switch temperature	+ 30 to + 105 °C
Temperature coefficient	7 to 40 %/K
Thermal time constante	18 to 20 s
Temperature range	-10 to + 125 °C

For detailed information see Data Handbook C11

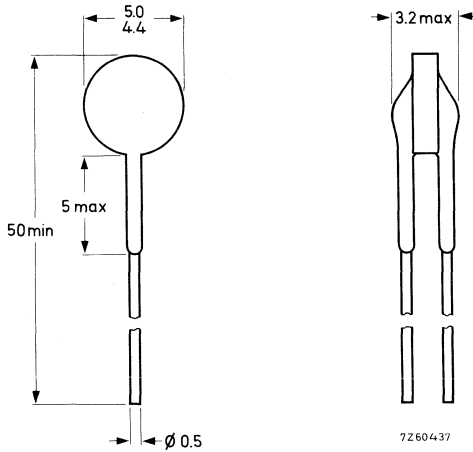


cat. number	resistance at 25 °C (Ω)	resistance at 125 °C (Ω)	switch temperature (°C)	temperature coefficient (%/K)
2322 660 91006	60	3 to 15 k	30	7
2322 660 91007	50	100 to 500 k	50	16
2322 660 91008	50	50 to 500 k	80	23
2322 660 91009	50	0,1 to 1,2 M	105	40

General data

Resistance at +25 °C	250 Ω ± 25%
Switch temperature	+6 °C
Temperature coefficient	+5 %/K
Dissipation factor	±6 mW/K
Temperature range	0 to +55 °C

For detailed information see Data Handbook C11.



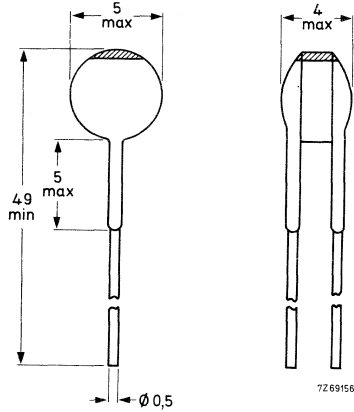
catalogue number

2322 660 91001

General data

Resistance at +25 °C	750 to 1500Ω
Resistance at +175 °C	
$V_{\text{pulse}} = 345 \text{ V}$	70000 Ω
Switch temperature	+ 115 °C
Temperature coefficient	+ 26 %/K
Maximum voltage (r.m.s.)	245 V
Dissipation factor	7 mW/K
Operating temperature range	-25 to +155 °C

For detailed information see Data Handbook C11.



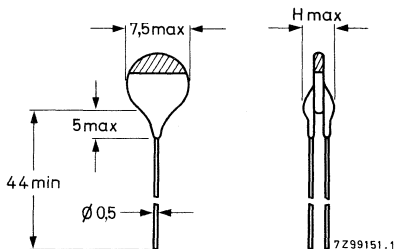
catalogue number

2322 660 93001

General data

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

For detailed information see Data Handbook C11.

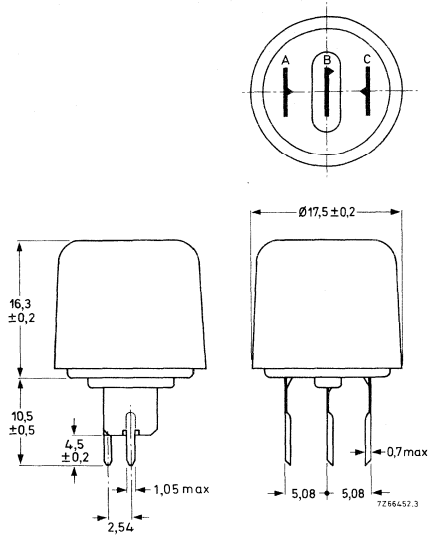


cat. number	resistance in Ω at temperature in °C		V_{max} ($V_{d.c.}$)
2322 661 91002	$R_{60} < 100$	$R_{100} > 1 \text{ k}$	50
2322 661 91003	$R_{95} < 80$	$R_{130} > 10 \text{ k}$	50
2322 661 91004	$R_{40} < 90$	$R_{100} > 10 \text{ k}$	50
2322 661 91005	$R_{100} \text{ 3-20 k}$		40

General data

Min. peak current	5
Max. r.m.s. voltage	265 V
Temperature range	0 to +60 °C

For detailed information see Data Handbook C11.

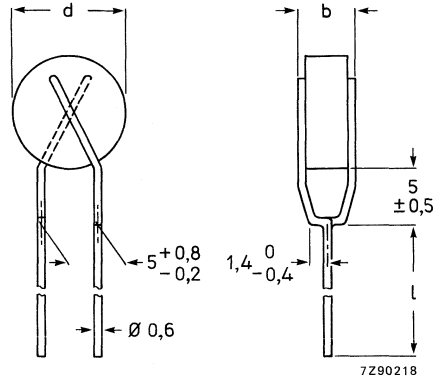


cat. number	min. current at 200 V (A)	max. current after 5 s at 200 V (mA)	max. current after 30 s at 200 V (mA)	max. current after 3 min. at 200 V (mA)	version
2322 662 98001	5	70	5	2	double PTC
2322 662 98003	5	70	5	2	double PTC
2322 662 98009	5	70	5	2	parallel-series PTC

General data

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

For detailed information see Data Handbook C11

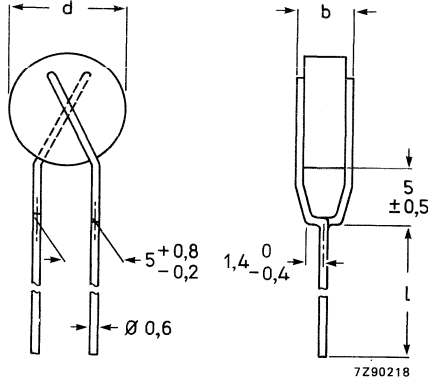


catalogue number	I_{nt} at 55 °C (mA)	I_t at 10 °C (mA)	R_{25} approx. (Ω)	I_{max} at 0 °C (mA)	$I_{res max}$ at 10 °C (mA)	R_s ± 5% (Ω)	D approx. (mW/K)	H approx. (J/K)	d (mm)	b max. (mm)	l ± 3 (mm)
2322 660 15691	56	112	90	460	30	56	6	0,08	4,5	4	20
2322 660 16891	68	136	60	600	30	51	6	0,08	4,5	4	20
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	940	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

General data

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

For detailed information see Data Handbook C11

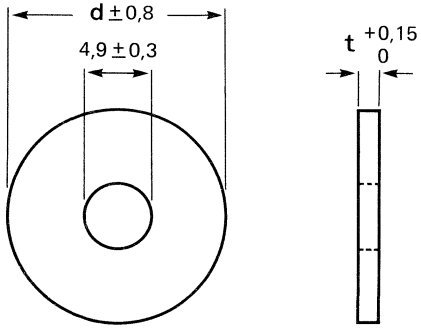


catalogue number	I _{nt} at 55 °C (mA)	I _t at 10 °C (mA)	R ₂₅ approx. (Ω)	I _{max} at 0 °C (mA)	I _{res max} at 10 °C (mA)	R _s ±5% (Ω)	D approx. (mW/K)	H approx. (J/K)	d (mm)	b max. (mm)	l ±3 (mm)
2322 660 11293	12	24	1900	110	5	1100	6	0,12	4,5	5	20
2322 660 11593	15	30	1200	135	5	1100	6	0,12	4,5	5	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

General data

Voltage range	256 V (r.m.s.) and 16 V (d.c.)
Resistance at 25 °C	2,5 Ω to 2700 Ω
Switching temperature	120 to 200

For detailed information see Data Handbook C11



7Z89642

For dimensions d and t see table

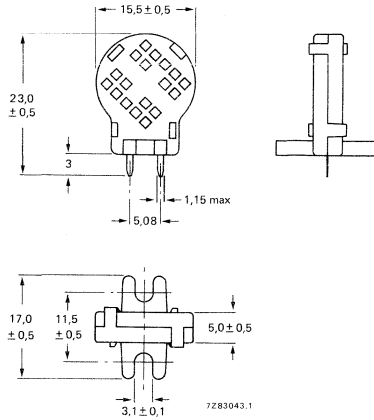
catalogue number	$T_s \pm 4\%$ (°C)	$R_{25} \pm 30\%$ (Ω)	R_{min} (Ω)	diameter d (mm)	thickness t (mm)	dissipation			
						P_1 (W)	P_2 (W)	P_3 (W)	T_h (°C)
Mains voltage types									
265 V r.m.s. max.									
2322 663 94005	120	470	90	13	1,6	28	82	8	125
2322 663 94001	120	270	50	16	1,6	39	120	8,6	135
2322 663 94006	160	1500	180	13	1,6	30	105	11	150
2322 663 94002	160	820	100	16	1,6	45	140	12,5	168
2322 663 94007	200	2700	180	13	1,6	39	95	13,5	172
2322 663 94003	200	1500	100	16	1,6	53	180	15,7	192
Low voltage types									
16 V d.c. max.									
2322 663 95005	120	3,5	1,5	13	1,0	39	40	8,7	121
2322 663 95002	120	2,5	1,2	16	1,0	45	58	9,7	126
2322 663 95006	160	3,5	1,5	13	1,0	44	39	13,9	160
2322 663 95003	160	2,5	1,2	16	1,0	65	58	14,4	168
2322 663 95007	200	3,5	1,2	13	1,0	65	45	17,5	187
2322 663 95004	200	2,5	1,0	16	1,0	86	60	17,2	195



General data

Humidity range	10 tot 90% R.H.
Capacitance at +25 °C, 43% R.H. and 100 kHz	122 pF ± 15%
Sensitivity between 33 and 43% R.H.	0,4 ± 0,05 pF/% R.H.
Frequency range	1 kHz to 1 MHz
Maximum a.c. or d.c. voltage	15 V
Storage humidity range	0 to 100% R.H.
Ambient temperature range	0 to +85 °C

For detailed information see Data Handbook C11



catalogue number

2322 691 90001

Contents	M 1
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DATA HANDBOOK SYSTEM

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

type	titel
C1	Assemblies
C3	Loudspeakers
C4	Ferroxcube potcores, square cores & cross cores
C5	Ferroxcube for power, audio/video and accelerators
C6	Electric motors
C9	Piezo-electric quartz devices
C16	Piezo-electric ceramics, permanent magnet materials
S4	L.F. power transistors and modules
T7	Gasfilled tubes



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 23 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 scale.

A laboratory model is a bench model with a handle, a 3-core input cable (including earth) with plug and a fused outlet socket; the plug and socket have side-contact earth connections.

The transformers with separate windings are available as a panel model or a laboratory model.

The laboratory model has 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 side-to-side spindle position;
- low winding resistance;
- high overload capability.

All 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 are 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 must be used, which are supplied 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 supplied for this purpose.

Instructions for assembling come with all kits.

General data

- The 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 $> 5 \text{ M}\Omega$.
- All transformers are tested for 1 min 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 $\geq 4 \text{ mm}$.
- The leakage path between live and non-live parts is $\geq 5 \text{ mm}$.
- The total angle of rotation is $\approx 320^\circ$.
- The guaranteed life of the carbon brushes, if used within the ratings, is > 100000 two-way turns, however, the life expectancy is ≥ 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.

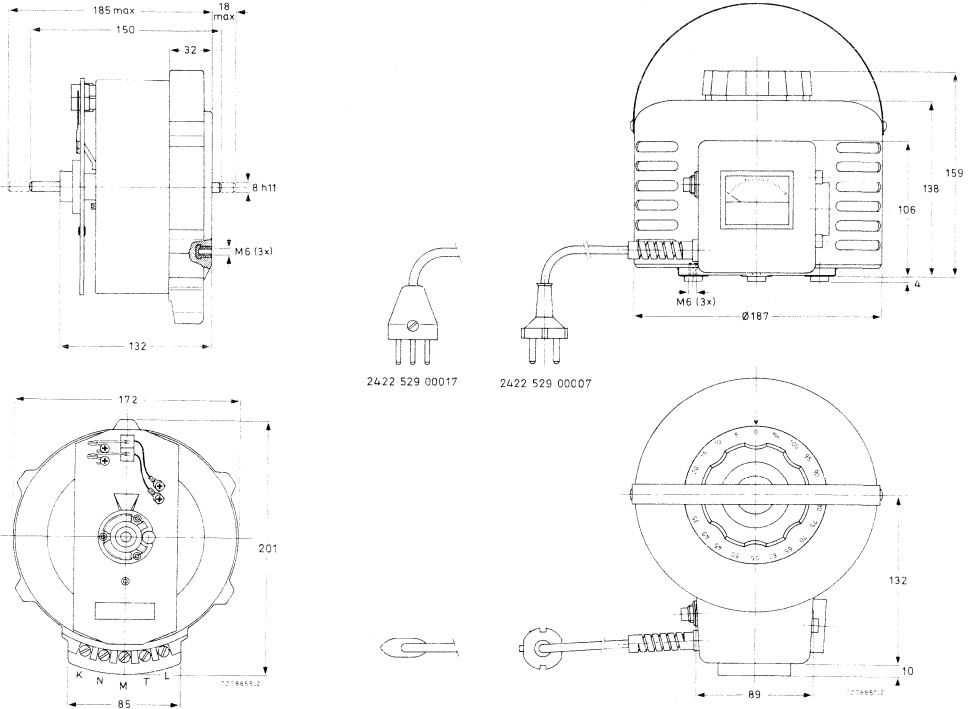
TRANSFORMERS (separate windings)

SIZE CODE E7.1

General data

Description	partly moulded
Test voltage (for 1 min.)	5000 V, 50 Hz
Tolerance on input voltage	+ 10%
Max. angle of rotation	320°
Life of carbon brushes	250 000 two-way turns
Spare carbon brushes	cat. number 5322 362 40044 (2x)

For detailed information see Data Handbook C8



panel model

lab. model

input voltage (V)	output current (A)	output voltage (V)	spindle dia. (mm)	cat. number	version
220	3	0-262	8	2422 529 00007	lab. model**
220	3	0-262	8	2422 529 00008	panel model*
220	3	0-262	8	2422 529 00017	lab. model*

* Approved by SEV.

** Approved by SEV + TUV.

PHILIPS

M 5



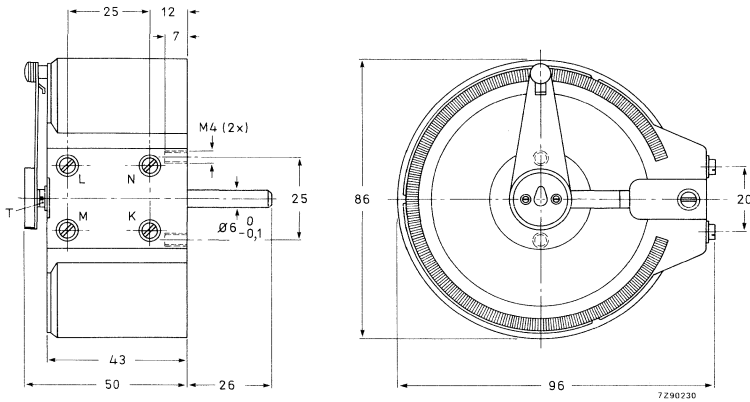
TRANSFORMERS (separate windings)

SIZE CODE E2.1

General data

Description	moulded
Test voltage (for 1 min.)	2000 V, 50 Hz
Tolerance on input voltage	+ 10%
Max. angle of rotation	320°
Life of carbon brushes	250.000 two-way turns
Spare carbon brushes	cat. number 5322 362 44027

For detailed information see Data Handbook C8



input voltage (V)	output current (A)	output voltage (V)	spindle dia. (mm)	cat. number	version
220	3	0-16	6	2422 529 00009	panel model

General data

Description

Test voltage (for 1 min.)

Tolerance on input voltage

Max. angle of rotation

Life of carbon brushes

Spare carbon brushes

not moulded

2000 V, 50 Hz

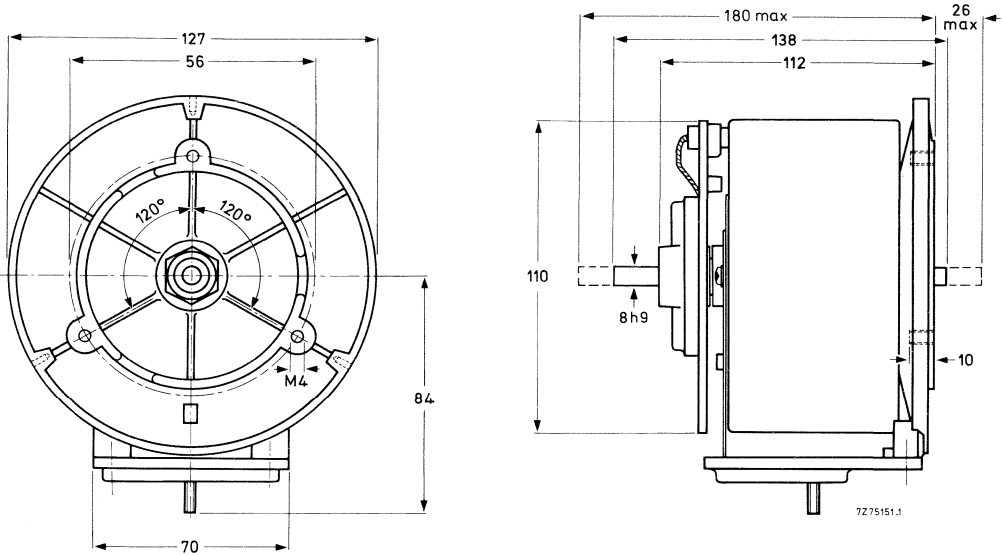
+ 10%

320°

250.000 two-way turns

cat. number 5322 362 40044

For detailed information see Data Handbook C8



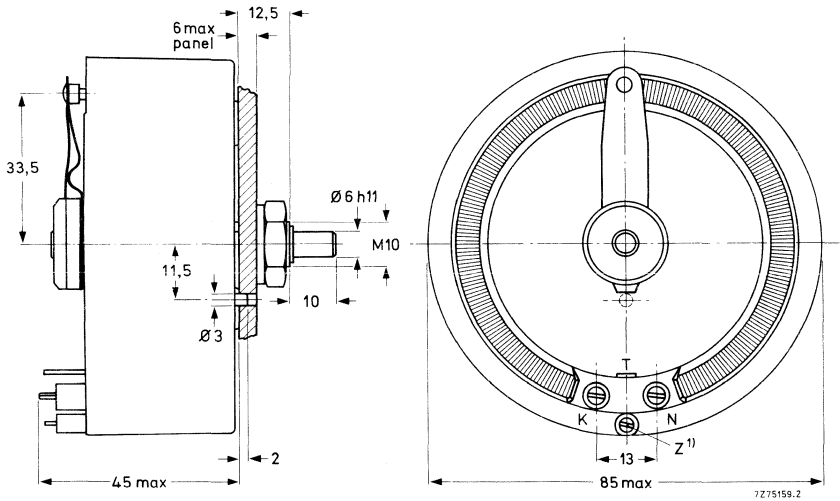
input voltage (V)	output current (A)	output voltage (V)	spindle dia. (mm)	cat. number	version
127/150	5	0-150	8	2422 530 03306	panel model*

* Approved by SEV.

General data

Description	moulded
Test voltage (for 1 min.)	2000 V, 50 Hz
Tolerance on input voltage	+ 10%
Max. angle of rotation	320°
Life of carbon brushes	250.000 two-way turns
Spare carbon brushes	cat. number 5322 362 40038

For detailed information see Data Handbook C8



¹⁾ only for 24.22 530 90004

input voltage (V)	output current (A)	output voltage (V)	spindle dia. (mm)	cat. number	version
240	0,5	120-0/120-240	6	2422 530 00407	panel model*
120/240	0,25/0,5	120-0/120-240	6	2422 530 90004	panel model*
240	0,5	0-120/240-120	6	2422 530 90011	panel model*
110	0,6	0-110	6	2422 530 00107	panel model*
60	1,2	0-60	6	2422 530 00007	panel model*

* Approval by SEV.

General data

Description

Test voltage (for 1 min.)

Tolerance on input voltage

Max. angle of rotation

Life of carbon brushes

Spare carbon brush assemblies for

2422 530 10107 and 2422 530 10407

2422 530 10007 and 2422 530 90032

2422 530 90033

moulded

2000 V, 50 Hz

+ 10%

320°

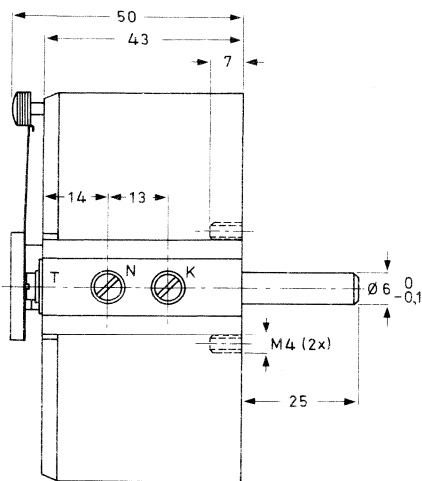
250.000 two-way turns

cat. number 5322 362 44025

cat. number 5322 362 44027

cat. number 5322 362 40185

For detailed information see Data Handbook C8



input voltage (V)	output current (A)	output voltage (V)	spindle dia. (mm)	cat. number	version
220	0,5	0-220	6	2422 530 10407	panel model*
110	1,4	0-110	6	2422 530 10107	panel model**
42	2,5	0-42	6	2422 530 90032	panel model*
60	3,15	0-60	6	2422 530 10007	panel model**
32	7	0-32	6,35	2422 530 90033	panel model

* Approved by SEV.

** SEV approval applied for.

General Data

Description

Test voltage (for 1 min.)

Tolerance on input voltage

Max. angle of rotation

Life of carbon brushes

Spare carbon brush (2422 530 90031)

Spare carbon brush (all other types)

moulded

2000 V, 50 Hz

+ 10%

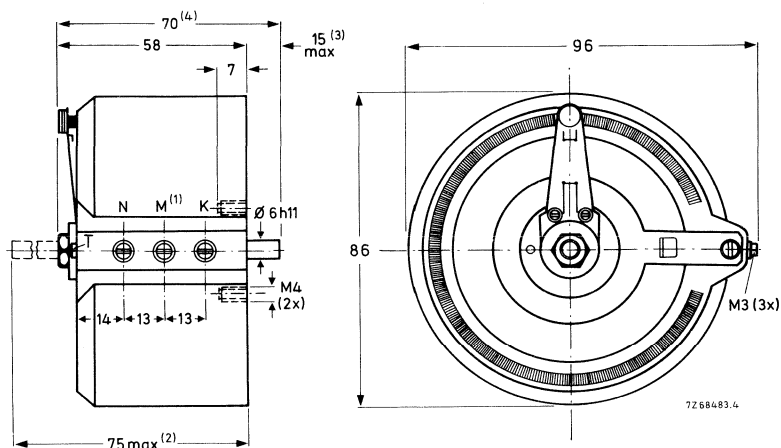
320°

250.000 two-way turns

cat. number 5322 362 44015

cat. number 5322 362 40054

For detailed information see Data Handbook C8



(1) for 2422 530 01407 and 01607

(2) 105 for 2422 530 90031

(3) 37 for 2422 530 90031

(4) 95 for 2422 530 90031

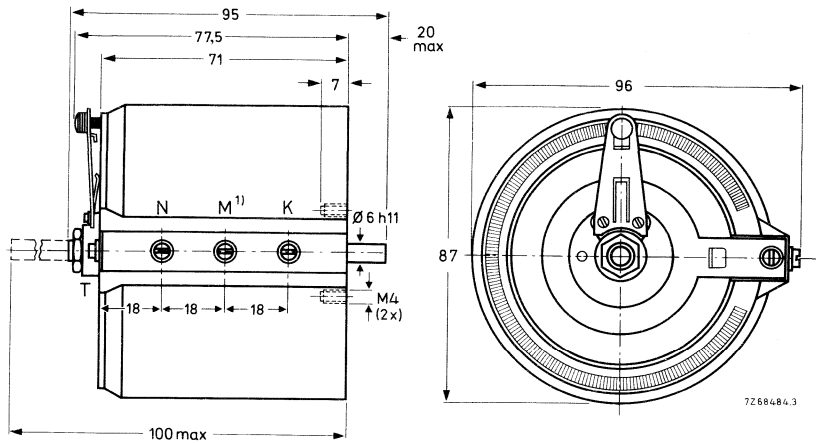
input voltage (V)	output current (A)	output voltage (V)	spindle dia. (mm)	cat. number	version
220/240	0,7	0-240	6	2422 530 01407	panel model*
220	0,83	0-220	6	2422 530 11407	panel model*
115/130	1,2	0-130	6	2422 530 01607	panel model*
115	1,4	0-115	6	2422 530 11607	panel model*
42	4	0-42	6	2422 530 90031	panel model*

* Approved by SEV

General data

Description	partly moulded
Test voltage (for 1 min.)	2000 V, 50 Hz
Tolerance on input voltage	+ 10%
Max. angle of rotation	320°
Life of carbon brushes	250.000 two-way turns
Spare carbon brushes	cat. number 5322 362 40054

For detailed information see Data Handbook C8



¹) only for 2422 530 08407

input voltage (V)	output current (A)	output voltage (V)	spindle dia. (mm)	cat. number	version
220/260	1,2	0-260	6	2422 530 08407	panel model*
220	1,4	0-220	6	2422 530 18407	panel model*

* Approved by SEV

General data

Description

Test voltage (for 1 min.)

Tolerance on input voltage

Max. angle of rotation

Life of carbon brushes

Spare carbon brushes (2422 530 22307)

Spare carbon brushes (all other types)

moulded

2000 V, 50 Hz

+ 10%

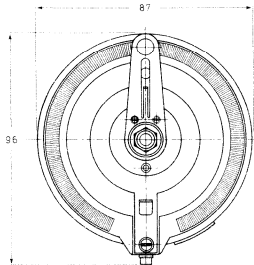
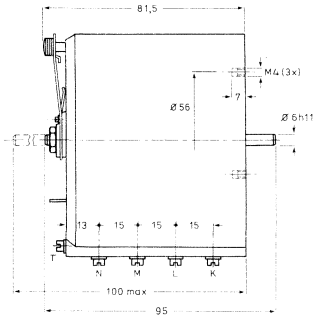
320°

250.000 two-way turns

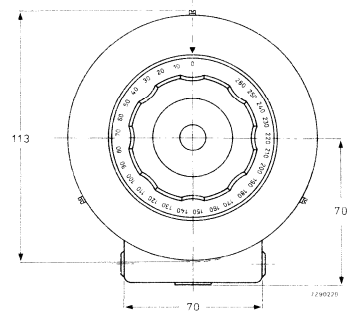
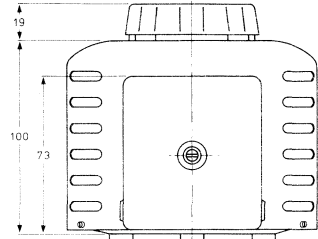
cat. number 4322 028 07660

cat. number 5322 362 40054

For detailed information see Data Handbook C8



panel model



bench model

input voltage (V)	output current (A)	output voltage (V)	spindle dia. (mm)	cat. number	version
220/260	1	0-260	6	2422 530 22407	panel model*
220/260	1	0-260	6	2422 530 22411	bench model*
240/270	1	0-270	6	2422 530 22507	panel model*
240/270	1	0-270	6	2422 530 22511	bench model*
127/150	2,5	0-150	6	2422 530 22307	panel model*

* SEV approval applied for.

General data

Description

Test voltage (for 1 min.)

Tolerance on input voltage

Max. angle of rotation

Life of carbon brushes

Spare carbon brushes (2422 530 22307)

Spare carbon brushes (all other types)

partly moulded

2000 V, 50 Hz

+ 10%

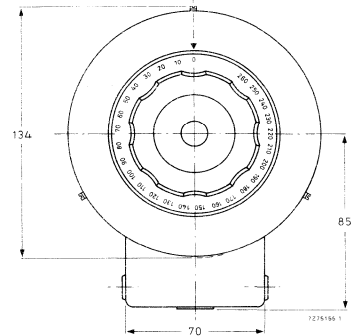
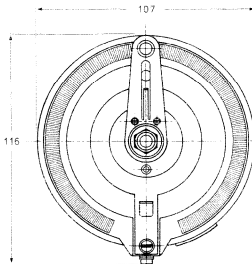
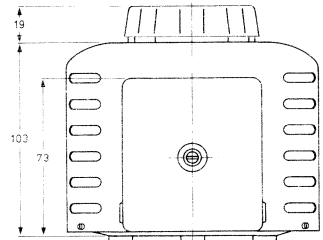
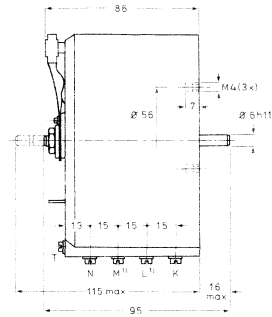
320°

250.000 two-way turns

cat. number 4322 028 07670

cat. number 5322 362 40079

For detailed information see Data Handbook C8



panel model

bench model

input voltage (V)	output current (A)	output voltage (V)	spindle dia. (mm)	cat. number	version
220/260	2	0-260	6	2422 530 03407	panel model*
240/260	2	0-260	6	2422 530 03507	panel model*
220	2,5	0-220	6	2422 530 13407	panel model*
220/260	2,5	0-260	6	2422 530 23407	panel model**
220/260	2,5	0-260	6	2422 530 23411	bench model**
240/270	2,5	0-270	6	2422 530 23507	panel model**
240/270	2,5	0-270	6	2422 530 23511	bench model**
127/150	5	0-150	6	2422 530 23307	panel model**

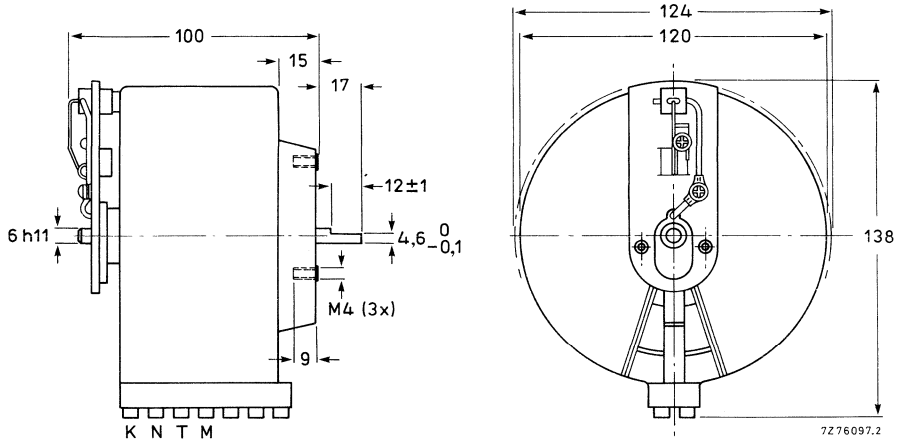
* Approved by SEV.

** SEV approval applied for.

General data

Description	moulded
Test voltage (for 1 min.)	2000 V, 50 Hz
Tolerance on input voltage	+ 10%
Max. angle of rotation	320°
Life of carbon brushes	250.000 two-way turns
Spare carbon brushes	cat. number 5322 362 44012

For detailed information see Data Handbook C8



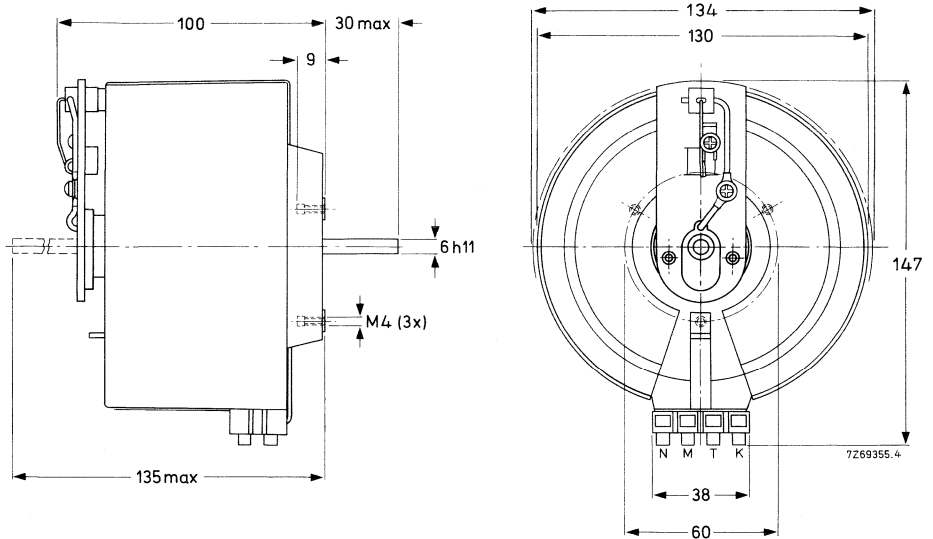
input voltage (V)	output current (A)	output voltage (V)	spindle dia. (mm)	cat. number	version
220	4	110-220	6	2422 530 90023	panel model*
220	4	0-220	6	2422 530 90024	panel model*

* Approved by SEV.

General data

Description	moulded
Test voltage (for 1 min.)	2000 V, 50 Hz
Tolerance on input voltage	+ 10%
Max. angle of rotation	320°
Life of carbon brushes	250.000 two-way turns
Spare carbon brushes	cat. number 5322 362 44012

For detailed information see Data Handbook C8



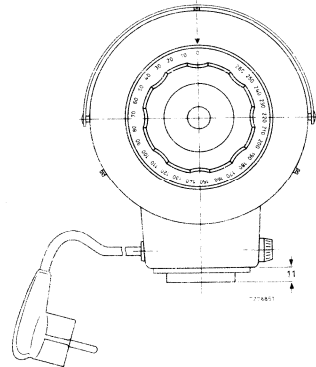
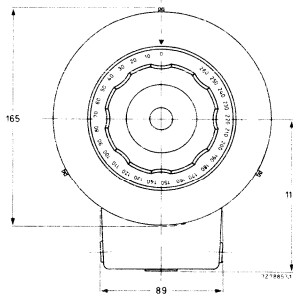
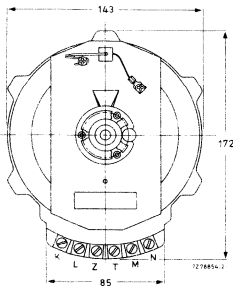
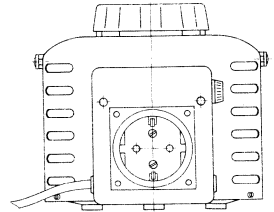
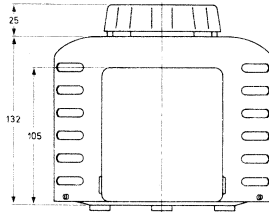
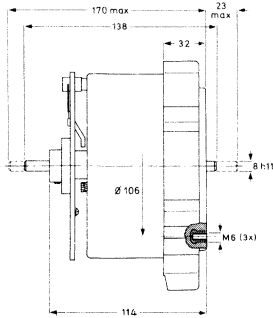
input voltage (V)	output current (A)	output voltage (V)	spindle dia. (mm)	cat. number	version
220/240/276	4,5	0-253/0-276	6	2422 530 90028	panel model*
220	5	0-220	6	2422 530 90027	panel model*
110	10	0-130	6	2422 530 90034	panel model

* Approved by SEV.

General data

Description	partly moulded
Test voltage (for 1 min.)	2000 V, 50 Hz
Tolerance on input voltage	+ 10%
Max. angle of rotation	320°
Life of carbon brushes	250.000 two-way turns
Spare carbon brushes	cat. number 5322 362 40044

For detailed information see Data Handbook C8



panel model

bench model

lab. model

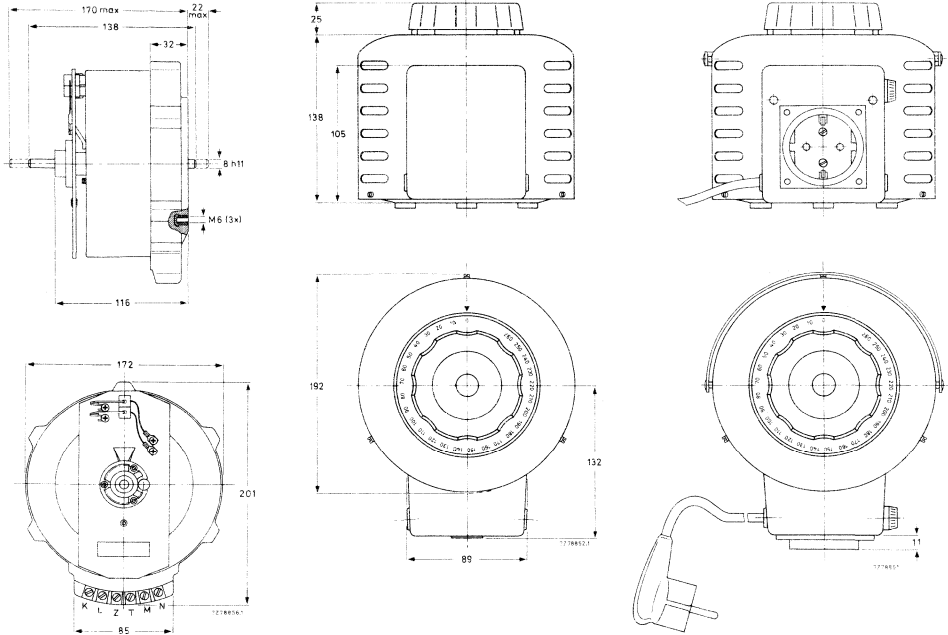
input voltage (V)	output current (A)	output voltage (V)	spindle dia. (mm)	cat. number	version
127/150	10	0-150	8	2422 530 04307	panel model*
220/260	5	0-260	8	2422 530 04407	panel model*
220/260	5	0-260	8	2422 530 04411	bench model*
240/270	5	0-270	8	2422 530 04507	panel model*
240/270	5	0-270	8	2422 530 04511	bench model*
220	5	0-260	8	2422 530 04415	laboratory model

* Approved by SEV.

General data

Description	partly moulded
Test voltage (for 1 min.)	2000 V, 50 Hz
Tolerance on input voltage	+ 10%
Max. angle of rotation	320°
Life of carbon brushes	250.000 two-way turns
Spare carbon brushes	cat. number 5322 362 40044 (2x)

For detailed information see Data Handbook C8



panel model

bench model

lab. model

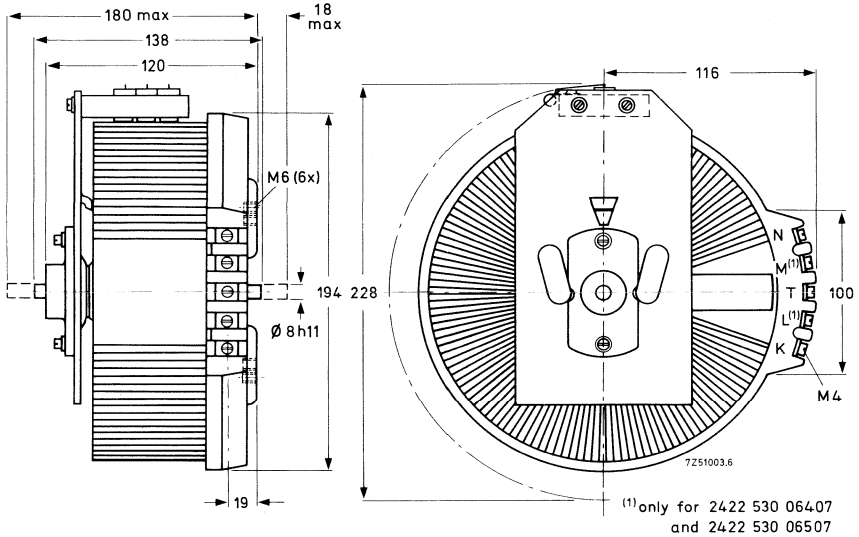
input voltage (V)	output current (A)	output voltage (V)	spindle dia. (mm)	cat. number	version
220	10	0-220	8	2422 530 15407	panel model*
220/260	8,5	0-260	8	2422 530 05407	panel model*
220/260	8,5	0-260	8	2422 530 05411	bench model*
240/270	8,5	0-270	8	2422 530 05507	panel model*
240/270	8,5	0-270	8	2422 530 05511	bench model*
220	8,5	0-260	8	2422 530 05415	lab. model

* Approved by SEV.

General data

Description	partly moulded
Test voltage (for 1 min.)	2000 V, 50 Hz
Tolerance on input voltage	+ 10%
Max. angle of rotation	320°
Life of carbon brushes	250.000 two-way turns
Spare carbon brushes	cat. number 5322 362 44016 (3x)

For detailed information see Data Handbook C8



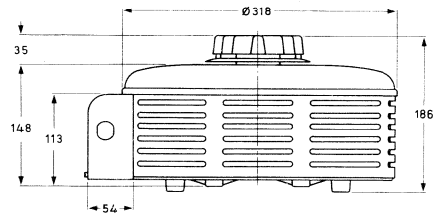
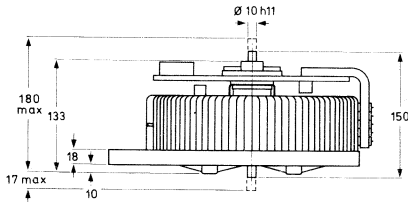
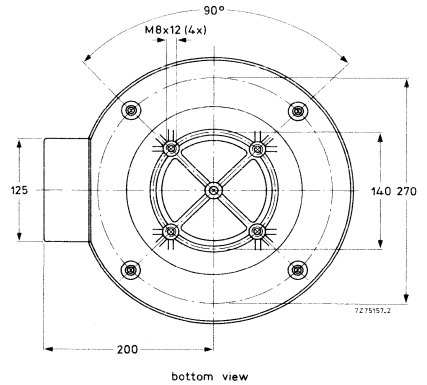
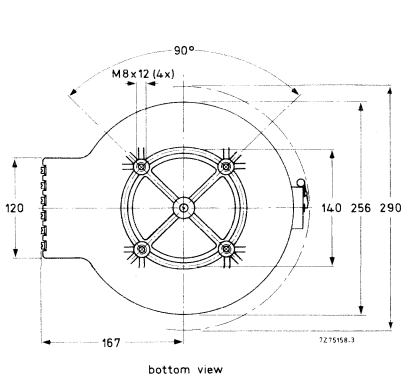
input voltage (V)	output current (A)	output voltage (V)	spindle dia. (mm)	cat. number	version
220/260	12	0-260	8	2422 530 06407	panel model
240/260	12	0-260	8	2422 530 06507	panel model
220	15	0-220	8	2422 530 16407	panel model

General data

Description
 Test voltage (for 1 min.)
 Tolerance on input voltage
 Max. angle of rotation
 Life of carbon brushes
 Spare carbon brushes

partly moulded
 2000 V, 50 Hz
 + 10%
 320°
 250.000 two-way turns
 cat. number 5322 362 40016 (5x)

For detailed information see Data Handbook C8



panel model

bench model

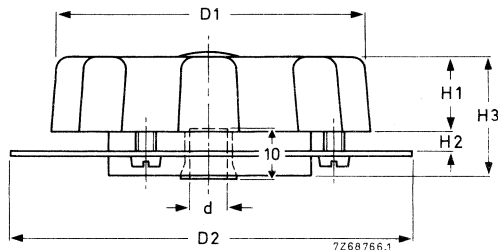
input voltage (V)	output current (A)	output voltage (V)	spindle dia. (mm)	cat. number	version
220/260	23	0-260	10	2422 530 07407	panel model
220/260	23	0-260	10	2422 530 07411	bench model
240/260	23	0-260	10	2422 530 07507	panel model
240/260	23	0-260	10	2422 530 07511	bench model

CONTROL KNOBS FOR VARIABLE TRANSFORMERS

General data

These knobs with scales are for panel model transformers. They have a clamping collet enabling them to be locked in any position on the spindle. The range includes knobs with large diameter scales which allow transformer mounting screws to be concealed.

For detailed information see Data Handbook C8



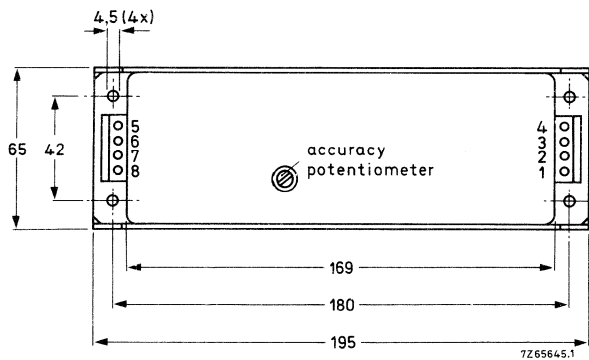
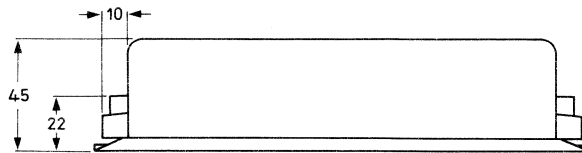
scale calibration	d (mm)	D ₁ (mm)	D ₂ (mm)	H ₁ (mm)	H ₂ (mm)	H ₃ (mm)	cat. number
0-260 V	6	60	78	15	4	24	2922 511 90043
0-270 V	6	60	78	15	4	24	2922 511 90045
0-100%	6	60	78	15	4	24	2922 511 90046
0-100%	8	60	78	15	4	24	2922 511 90047
0-260 V	8	60	78	15	4	24	2922 511 90049
0-270 V	8	60	78	15	4	24	2922 511 90051
0-100%	8	80	106	19	4	28	2922 511 90052
0-260 V	8	80	106	19	4	28	2922 511 90054
0-270 V	8	80	106	19	4	28	2922 511 90055
0-100%	8	80	125	19	4	28	2922 511 90056
0-260 V	8	80	125	19	4	28	2922 511 90058
0-270 V	8	80	125	19	4	28	2922 511 90059
0-260 V	10	100	155	22	5	44	2922 511 90071

A.C. STABILIZER MODULE

General data

Input voltage	220 V, +10%, -15%
Frequency range	50-60 Hz
Stabilized output voltage of the controlled transformer	5 to 115% of input voltage
Maximum stabilization accuracy	$\pm 0,5$ V
Ambient temperature range	-10 to +45 °C

For detailed information see Data Handbook C8



cat. number

2422 532 00071

PHILIPS

M 21

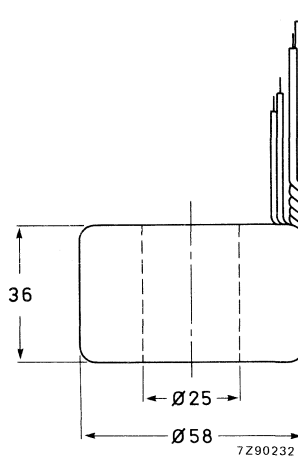


ANNULAR FIXED TRANSFORMERS

General data

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

For detailed information see Data Handbook C8



input voltage (V)	frequency (Hz)	output power (W)	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 PCL 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.

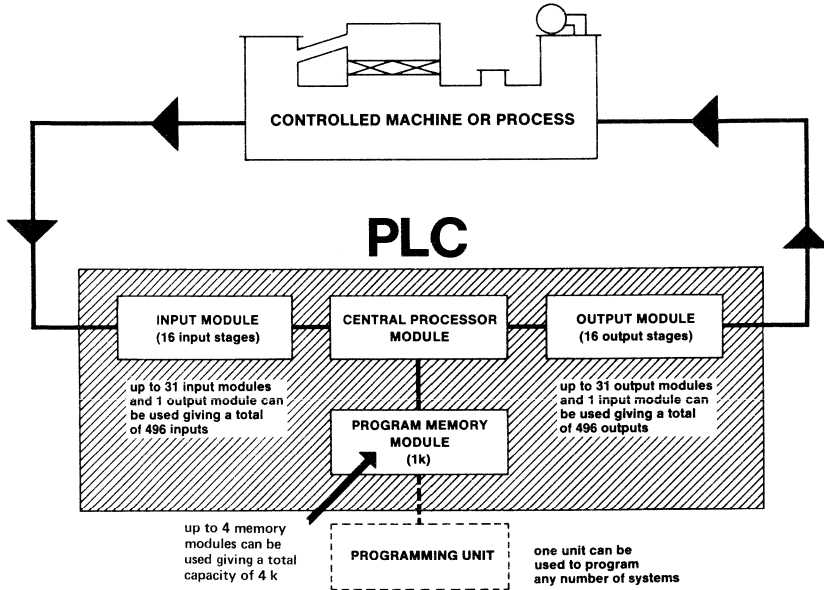
The PLC modules are formed on standard double Eurocards. Optically coupled interface circuits, specifically designed for an industrial environment, provide excellent noise immunity and a high degree of isolation. The internationally accepted machine signal level of 24 V is used and generous tolerances on operational margins and thresholds ensure good compatibility. Besides the PLC modules, the PLC comprises back panels, a frame (19 in 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.

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
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.

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
AI20	analogue input module	9360 023 90112
AO20	analogue output module	9360 024 00112
CP20	central processor with program memory (2 k (E) PROM)	4322 027 92040
CP21	central processor with program memory (1 k RAM)	4322 027 92050
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
IM20	input module (16 inputs)	4322 027 92000
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
OM20	output module (16 x 0,5 A)	4322 027 92010
OM21	output module (8 x 2 A)	4322 027 92020
OM22	output module (32 x 0,1 A)	4322 027 94100
RP20	bidirectional parallel interface	4322 027 92170
RS20	bidirectional serial interface	4322 027 92180
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

* Except programming unit PU20, which is a desk-top apparatus.

** Different from standard Eurocards.

For detailed information see Data Handbook C1

Table 2 Programming aids

type	description	cat. number
MI20	microcontroller interface for MC20	4322 027 94190
PU20	programming unit for PC20 and MC20	4322 027 92090
PU21	programming unit interface for PC20	4322 027 92100
PU23	programming unit interface for PC20 and MC20	4322 027 94180

Table 3 Accessories

type	description	cat. number
BI20	bus interface	4322 027 94170
BP22	terminal strip for inputs/outputs in controller cabinet SC20	4322 027 92140
BP23	back panel for 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 10000
RA25	half extension rack assembly (for 15 I/O modules)	9390 294 20000
RA26	full extension rack assembly (for 21 I/O modules)	9390 294 30000
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
	AI/AO front panel kit (double width; no holes)	4322 027 91460

Table 4 Cables

type	description	cat. number
BC21	bus extension cable for one extension rack	9390 293 90000
BC22	bus extension cable for two extension racks	9390 294 00000
BC23	bus extension cable for three extension racks	9390 298 90000
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



For detailed information see Data Handbook C1

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
PV16	arithmetic program	4322 027 99061
PV17	communication program C	4322 027 99071
PV18	PID control loop	4322 027 99081
PDS1	program documentation system	4322 027 99911
PDS2	program development system	4322 027 99921

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.

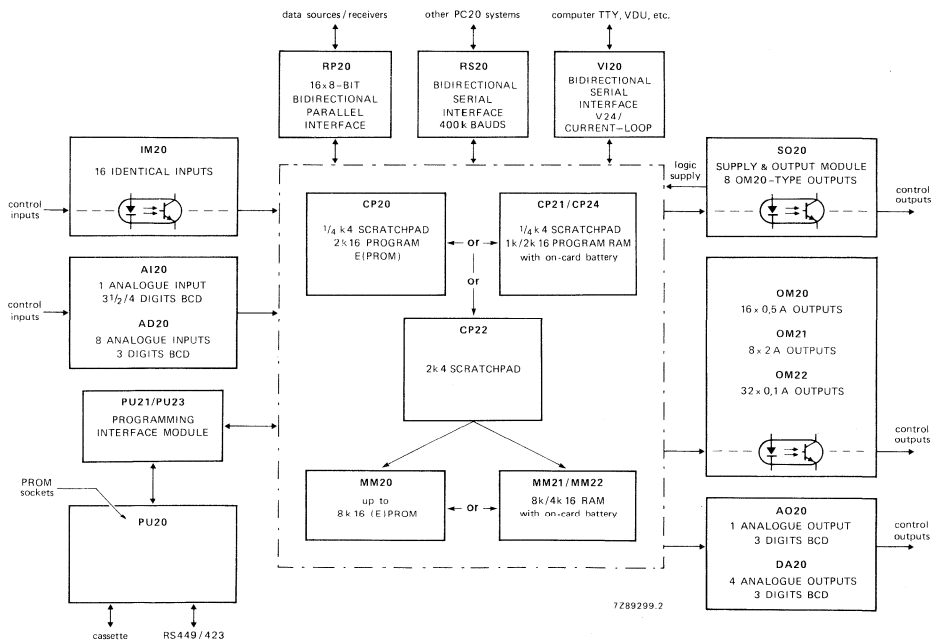


Fig. 1 Diagram of PC20 system.



For detailed information see Data Handbook C1

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 PU21 or PU23, which is not too expensive to leave in the PC20 system.

For programming and monitoring the MC20 system, 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.

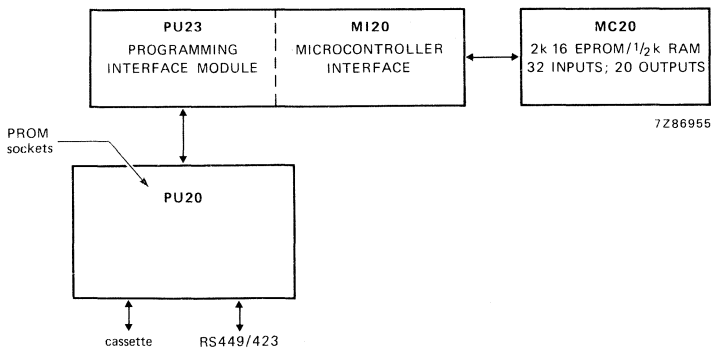


Fig. 2 Diagram of MC20 system.

General Data

A comprehensive range of logic elements in 14-16-20 lead plastic dual in-line encapsulations specially designed for low speed digital applications in industrial control, computer periphery equipment and data processing.

For detailed information see Data Handbook C1

- quadruple 2-input NAND gate
- dual 5-input NAND gate
- dual 5-input power NAND gate
- dual AND-AND-OR gate
- quadruple logic interface gain
- dual 4-input NAND gate
- triple 3-input NAND gate
- sextuple inverter with strobe input
- dual 4-input NAND Schmitt trigger
- quadruple 2-input AND gate
- dual NAND gate/quadruple inverter
- quadruple EXCLUSIVE-OR gate
- quadruple NOR gate
- quadruple OR gate
- single JK master-slave flip-flop
- dual JK master-slave flip-flop
- quadruple D-type latch flip-flop
- decimal counter
- 4-bit binary counter
- single synchronous 4-bit shift register
- monostable multivibrator
- single BCD-decimal decoder NIT-driver
- BCD 7-segment decoder driver
- dual lamp/relay driver
- timer unit
- short-circuit-proof power stages

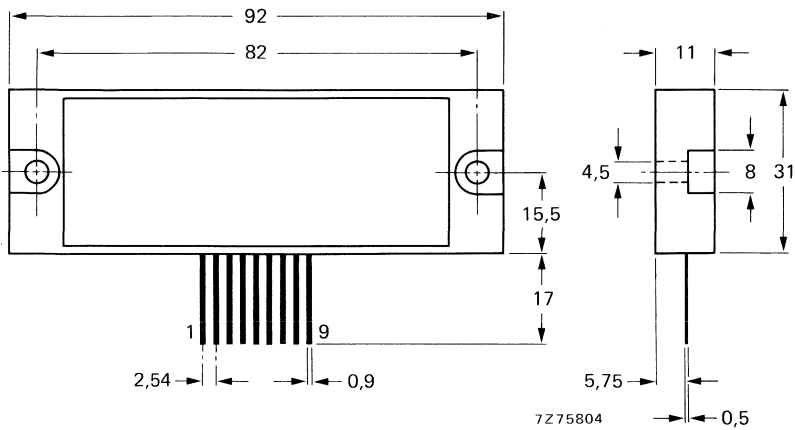
Accessories for FZ/30, and 60/61/90 series

Comprise printer-circuit boards, stickers, power supply units, empty case assemblies, mounting accessories, flexible printed wiring, breadboard blocks, logic supply units, thyristor trigger transformers, and logic simulators.

HYBRID INTEGRATED CIRCUITS

General data I.f. power modules

For detailed information see Data Handbook S4



type number	P_o at $d_{tot} < 0,2\%$		d_{tot} at
	$R_L = 4 \Omega$	$R_L = 8 \Omega$	$D_o = 1 W; f = 1 kHz$
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%

HYBRID INTEGRATED CIRCUITS

General data wideband modules

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

For detailed information see Data Handbook S10

Conversion table for 75 Ω impedance

dB μ V	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	V_o (rms)*	supply	noise	max VSWR		dimensions	
	sf ² (dB)	(dB μ V)	current (mA)	figure (dB)	typical values 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

* Minimum output voltage at -60 dB intermodulation distortion (DIN 45004, par. 6.3: 3-tone, $f = 470$ MHz).

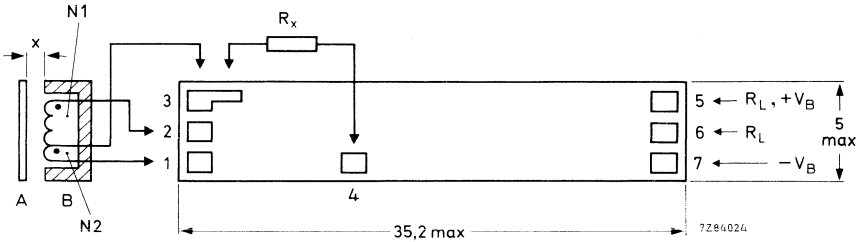
** The OM323A and OM337A need an external collector-coil and output capacitor, the OM323 and OM337 have these built-in.

HYBRID INTEGRATED CIRCUITS

General data inductive proximity detectors

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%
Switching frequency	< 5 kHz
Operating ambient temperature range	-40 to +85 °C

For detailed information see Data Handbook C1



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: $+V_B$.
x is the switching distance. The maximum height of the circuits including the substrate thickness is 1,7 mm.

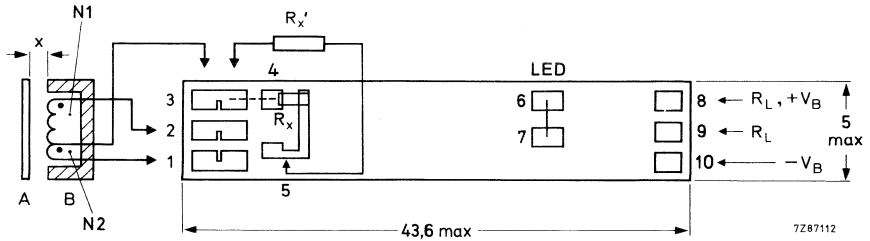
type number	supply voltage
OM286	positive
OM287	negative

HYBRID INTEGRATED CIRCUITS

General data inductive proximity detectors

D.C. supply voltage range	10 to 30 V
Output current at $V_B = 10$ to 30 V	max. 400 mA
Switching distance; depends on R_x and oscillator coil	typ. 1 to 5 mm
Hysteresis in switching distance	3 to 10%
Switching frequency	< 5 kHz
Operating ambient temperature range	-40 to +75 °C

For detailed information see Data Handbook C1



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: $+V_B$.
x is the switching distance. The maximum height of the circuits including the substrate thickness is 1,7 mm.

type number	supply voltage
OM386	positive
OM387	negative

HYBRID INTEGRATED CIRCUITS

Custom Capabilities

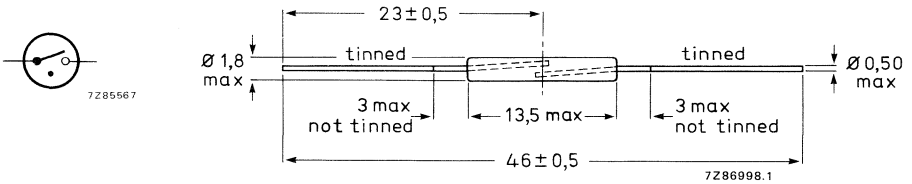
- Impartial advice for customers to choose between:
pcb - Hybrid ICs - gate arrays or fully monolithic ICs
- Basic factory load guaranteed by standard catalogue hybrid modules
- Wide range of in-house surface mounted components and naked crystals
- Wide variety of application know-how
- Various factories with local or international approvals
(e.g. CNET, CECC, AQUAP)
- Regular innovation of new technologies:
High density with naked crystals
Naked crystals in conformal coating
Metallized via-holes
Polyimide technology
Full double-sided modules

DRY REED SWITCHES

General data

Single pde, single throw, dry reed switches for relays, push buttons, level detectors, etc.

For detailed information see Data Handbook T7.



type series	max. dimensions			max. switched		
	a (mm)	b (mm)	c (mm)	power (W)	voltage (V)	current (mA)
RI-22	15	2,8	0,65	10	500	200
RI-23	15	2,54	0,60	10	500	200
RI-45	21,5	2,8	0,65	20	250	500
RI-27	13	1,8	0,50	10	200	500

PIEZOELECTRIC QUARTZ DEVICES

General data

For detailed information see Data Handbook C9

mode of vibration	frequency range (MHz)	holder		basic catalogue number	
		type	housing connections		
fundamental	33 to 10	RW-36	resistance welded	pins	4322 148 5
		RW-10	resistance welded	flying leads	4322 148 6
	1,8 to 25 1 to 25 1,8 to 25 4,5 to 25	RW-36	resistance welded	pins	4322 149 5
		HC-6/U	solder sealed	pins	4322 152 5
		HC-27/U	all-glass	pins	4322 154 5
		HC-26/U	all-glass	flying leads	4322 155 5
		HC-29/U	all-glass	pins	4322 155 6
		RW-43	resistance welded	flying leads	4322 156 5
RW-42	resistance welded	pins	4322 156 6		
third overtone	10 to 75	HC-6/U	solder sealed	pins	4322 157 5
		HC-27/U	all-glass	pins	4322 159 5
		RW-36	resistance welded	pins	4322 162 5
	17 to 75	RW-43	resistance welded	flying leads	4322 161 5
		RW-42	resistance welded	pins	4322 161 6
	20 to 75	HC-26/U	all-glass	flying leads	4322 160 5
		HC-29/U	all-glass	pins	4322 160 6
		fifth overtone	50 to 125	HC-6/U	solder sealed
HC-27/U	all-glass			pins	4322 165 5
HC-26/U	all-glass			flying leads	4322 166 5
HC-29/U	all-glass			pins	4322 166 6
RW-43	resistance welded			flying leads	4322 167 5
RW-42	resistance welded			pins	4322 167 6
RW-36	resistance welded			pins	4322 168 5

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

PIEZOELECTRIC QUARTZ DEVICES

General data

For detailed information see Data Handbook C9

TCXO, temperature compensated quartz oscillators

frequency range (MHz)	type	temperature range (°C)	frequency tolerance (x 10 ⁻⁶)	supply voltage 12 V ± ..%	basic catalogue number
4,5 to 15	A	0 to +50	±1	20	4322 190
	B	-10 to +60	±1,5	20	
	C	-20 to +70	±2	20	
4,5 to 15	A	0 to +50	±1	20	4322 191
	B	-10 to +60	±1,5	20	
	C	-20 to +70	±2	20	
20 to 50	A	0 to +50	±1	2	4322 195
	B	-20 to +70	±2	2	
	C	0 to 50	±2	10	
	D	-20 to +70	±3	10	

Quartz crystals for temperature measurement

frequency range (MHz)	selectivity (Hz/K)	
1 to 25	20 to 2000	

CIO, compact integrated oscillators

frequency range	1,5 to 20 MHz
frequency tolerance at +25 °C	±50 x 10 ⁻⁶
frequency stability	±20 x 10 ⁻⁶
operating temperature range	0 to +70 °C
supply voltage	5 V ± 10%
fan-out	max. 10 standard TTL
catalogue number	4322 199 00060

LOUDSPEAKERS

For detailed information see Data Handbook C3

CONE TWEETER LOUDSPEAKERS

basic part of type number	impedance (Ω)	resonance frequency (Hz)	magnet		power handling capacity (W)	max. dimensions		mounting depth (mm)
			mat.	core dia. (mm)		flange		
						(inch)	(mm)	
AD2000/TP	-	-	PXE	-	-	2	50,3 ∅	22,7
AD2200/TP	-	-	PXE	-	-	2	53 □	22,7
AD2096/T.	4/8/15	1300	TiC	14,5	6	2	50,3 ∅	26,8
AD2296/T.	4/8/15	1300	TiC	14,5	6	2	53 □	26,8
AD2273/T.	4/8	1000	cer	10	10	2½	58 □	27
AD2274/T.	4/8	1000	cer	10	10	2½	58 □	37
AD20302/T.	4/8/15	2000	cer	14,5	4	2	55 ∅	23,7
AD22302/T.	4/8/15	2000	cer	14,5	4	2	66 □	26,8
AD20310/T.	4/8/15	2000	cer	14,5	4	2	55 ∅	30,4
AD22310/T.	4/8/15	2000	cer	14,5	4	2	66 □	34
AD20850/T.	4/8/15	1910	cer	14,5	4	2	55 ∅	26,7
AD22850/T.	4/8/15	1910	cer	14,5	4	2	66 □	29,8

DOME TWEETER LOUDSPEAKERS

AD00900/T.	4/8	1900	cer	18	6	¾	58 □	33,9
AD0140/T.	4/8	1200	cer	25	5	1	94,2 ∅	24,5
AD0141/T.	4/8	1450	cer	25	6	1	94,2 ∅	24,5
AD0162/T.	4/8/15	1000	cer	25	6	1	94,2 ∅	32,4
AD0163/T.	8/15	1300	cer	25	6	1	94,2 ∅	32,4
AD11400/T.	4/8	1500	cer	25	6	1	82,2 □	27,7
AD11410/T.	4/8	1500	cer	25	6	1	82,2 □	27,7
AD11430/T.	4/8	1000	cer	25	3,5	1	82,2 □	40,1
AD11600/T.	4/8	1300	cer	25	6	1	96,2 □	33,6
AD11610/T.	4/8	1300	cer	25	6	1	96,2 □	33,6
AD11810/T.	4/8	1700	cer	25	4	1	75,2 □	25
AD11810/T.	4/8	1600	cer	25	4	1	75,2 □	25
AD11830/T.	4/8	1000	cer	25	4	1	75,2 □	37,4

SQUAWKER LOUDSPEAKERS

AD02110/Sq.	4/8	340/360	cer	50	30	2	134,2 □	103
AD02150/Sq.	4/8	340/360	cer	50	30	2	134,2 □	98,2
AD33801/Sq.	4/8/15	470	cer	18	10	3	97,2 □	42,5
AD50600/Sq.	4/8	260	cer	25	20	5	129 x 115	107
AD50800/Sq.	4/8	280	cer	18	15	5	129 x 115	107

PXE = piezoelectric

TiC = steel alloy

cer = ceramic

LOUDSPEAKERS

AUDIO WOOFER LOUDSPEAKERS

basic part of type number	impedance (Ω)	resonance frequency (Hz)	magnet		power handling capacity (W)	max. dimensions flange		mounting depth (mm)
			mat.	core dia. (mm)		(inch)	(mm)	
AD4060/W.	4/8	68	cer	25	30	4	101,9 \emptyset	51,9
AD5062/W.	4/8	65	cer	25	20	5	129 *	55
AD10200/W8	8	24/26	cer	50	80	10	259 \emptyset	116
AD10250/W8	8	26/28	cer	50	100	10	259 \emptyset	118,5
AD10600/W8	8	39	cer	25	40	10	259 \emptyset	105,3
AD10650/W8	8	26/27	cer	35	60	10	259 \emptyset	109,5
AD12200/W.	4/8	22/24	cer	50	80	12	311 \emptyset	118,6
AD12250/W.	4/8	25/27	cer	50	100	12	311 \emptyset	120,8
AD12650/W.	4/8	25/26	cer	35	60	12	311 \emptyset	114,5
AD51610/W.	4/8	62	cer	25	30	5 $\frac{1}{4}$	130,5 \square	57,7
AD70602/W.	4/8	42	cer	25	30	7	166 \emptyset	67,5
AD70612/W8	8	50	cer	25	40	7	166 \emptyset	67,5
AD80110/W.	6/8	40	cer	35	60	8	204 \emptyset	94
AD80405/W8	8	50	cer	25	35	8	204 \emptyset	81
AD80602/W.	4/8	42	cer	25	50	8	204 \emptyset	85,6
AD80605/W6	6	50	cer	25	40	8	204 \emptyset	79
AD80606/W.	4/8	36/38	cer	25	50	8	204 \emptyset	84
AD80652/W.	4/8	39	cer	25	50	8	204 \emptyset	87,6
AD80680/W8	8	35	cer	35	55	8	204 \emptyset	91

VIDEO WOOFER LOUDSPEAKERS

AD36510/W4	4	68	cer	18	15	3 x 6	85 x 100	62,4
AD36900/P.	4/8/15	95	cer	18	8	3 x 6	80 x 160	57,6
AD38901/P.	4/8/15	95	cer	18	8	3 x 8	82 x 205	59
AD38902/P.	4/8/15	95	cer	18	13	3 x 8	82 x 205	59
AD40501/W.	4/8	72	cer	25	20	4	101,9 \emptyset	59,5
AD44900/W4	4	65	cer	18	8	4	102 \square	56
AD44901/W4	4	65	cer	18	8	4	102 \square	56
AD44900/P.	4/8/15	110	cer	18	8	4	102 \square	56
AD51501/W4	4	62	cer	25	20	5 $\frac{1}{4}$	130,5 \square	67

* = octagonal
cer = ceramic

LOUDSPEAKERS

FULL-RANGE, ROUND LOUDSPEAKERS

basic part of type number	impedance (Ω)	resonance frequency (Hz)	magnet		power handling capacity (W)	max. dimensions		mounting depth (mm)
			mat.	core dia. (mm)		flange		
						(inch)	(mm)	
AD0198/Z.	8/15/25	500	TIC	10	0,3	1¼	31 \emptyset	14,3
AD01980/Z.	8/15/25	600	R.E.	14,5	0,3	1½	34 \emptyset	4
AD01985/z.	8/15/25	600	R.E.	14,4	0,3	1½	38 \emptyset	5
AD1065/M.	4/8	55	cer	25	10	10	261,1	113
AD1265/M	4/8	45	cer	25	20	12	311,2 \emptyset	134
AD2071/Z.	4/8/15/25/50/150	360	cer	10	0,55	2½	64 \emptyset	19,7
AD2099/Z.	8/15/25	420	TIC	10	0,5	2	50 \emptyset	18
AD3071/Y.	4/8/15/25/50/150	250	cer	10	0,6	3	81 \emptyset	13
AD3371/Y.	4/8/15/25/50/150	250	cer	10	0,6	3	81 \emptyset	13
AD3080/M4	4	170	cer	18	6	3	87,2 \emptyset	36,5
AD3380/M4	4	170	cer	18	6	3	87,2 \emptyset	36,5
AD3080/X4	4	85	cer	18	6	3	87,2 \emptyset	36,5
AD4060/M.	4/8	100	cer	25	20	4	101,9 \emptyset	51,9
AD4072/X.	4/8/15/25	170	cer	10	3	4	105 \emptyset	30,5
AD4472/X.	4/8/15/25	170	cer	10	3	4	105 \emptyset	30,5
AD4074/Y.	4/8/15/25	170	cer	10	2,5	4	105 \emptyset	44
AD4474/Y.	4/8/15/25	170	cer	10	2,5	4	105 \emptyset	44
AD5061/M.	4/8	85	cer	25	10	5	128,3*	54,6
9710/M8	8	50	cer	34	20	8½	217 \emptyset	93,9
AD12100/HP.	4/8	60	cer	50	50	12	311 \emptyset	151,4
AD12100/M.	4/8/15	45/55/45	cer	35	25	12	311 \emptyset	151,4
AD33910/X4	4	55	cer	18	12	3	87,2 \emptyset	43,4
AD40880/X.	4/8	150	cer	14,5	6	4	102 \emptyset	40,5
AD44400/M4	4	110	cer	18	15	4	102 \square	52,2
AD44401/M4	4	110	cer	18	15	4	102 \square	52,2
AD44830/X.	4/8	140	cer	18	8	4	102 \square	42,7
AD44860/X.	8/15	175	cer	14,5	4	4	102 \square	39,1
AD44861/X.	8/15	175	cer	14,5	4	4	102 \square	39,1
AD44880/X.	4/8	150	cer	14,5	6	4	102 \square	40,5
AD44900/M.	4/8/15/25	90	cer	18	8	4	102 \square	56
AD44901/M.	4/8/15/25	90	cer	18	8	4	102 \emptyset	56
AD50400/M4	4	115	cer	18	15	5	120 \emptyset	50,5
AD50720/X.	4/8/15/25	130	cer	10	3	5¼	131 \emptyset	44,3
AD50740/X.	4/8/15/25	130	cer	10	3	5¼	131 \emptyset	58
AD50800/M.	4/8	140	cer	18	6	5	120 \emptyset	48,5
AD50800/X.	4/8	140	cer	18	6	5	120 \emptyset	48,5
Ad51600/P4	4	78	cer	25	20	5¼	130,5	57,7
AD55720/Y.	4/8/15/25	130	cer	10	3	5¼	131 \emptyset	44,3
AD55740/Y.	4/8/15/25	130	cer	10	3	5¼	131 \emptyset	58
AD70630/M.	4/8	70	cer	25	20	7	165,5 \emptyset	69
AD70720/X.	4/8/15/25	100	cer	10	5	7	160 \emptyset	46,3
AD70740/X.	4/8/15/25	100	cer	10	5	7	160 \emptyset	60
AD70800/M.	4/8	100/105	cer	18	12	7	165,2*	63,5
AD70800/X.	4/8	105	cer	18	12	7	165,2*	63,5

* = octagonal TIC = steel alloy R.E. = rare earth cer = ceramic

LOUDSPEAKERS

FULL RANGE ROUND (continued)

basic part of type number	impedance (Ω)	resonance frequency (Hz)	magnet		power handling capacity (W)	max. dimensions flange		mounting depth (mm)
			mat.	core dia. (mm)		(inch)	(mm)	
AD70850/M.	4/8	105	cer	14,5	7	7	165,2*	61,5
AD70850/X.	4/8	105	cer	14,5	7	7	165,2*	61,5
AD77720/X.	4/8/15/25	100	cer	10	5	7	160 \varnothing	46,3
AD77740/X.	4/8/15/25	100	cer	10	5	7	160 \varnothing	60
AD80800/M.	4/8	85	cer	18	15	8	204,6*	73,6
AD80800/X.	4/8	85/95	cer	18	13	8	204,6*	73,6

FULL RANGE, OVAL LOUDSPEAKERS

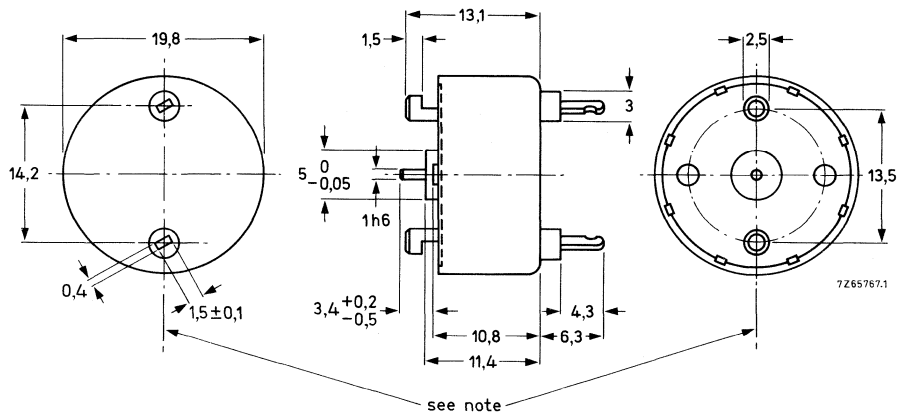
AD3595/X.	4/8/15/25	180	TIC	14,5	3	3x5	75,9x130,9	40,2
AD26921/X.	4/8/15/25	115	cer	14,5	5	2x6	57x160	50
AD35720/X.	4/8/15/25	160	cer	10	3	3x5	75x130	35
AD35740/X.	4/8/15/25	160	cer	10	3	3x5	75x130	47
AD35721/X.	4/8/15/25	160	cer	10	3	3x5	75x130	35
AD35741/X.	4/8/15/25	160	cer	10	3	3x5	75x130	47
AD35722/X.	4/8/15/25	160	cer	10	3	3x5	75x130	35
AD35742/X.	4/8/15/25	160	cer	10	3	3x5	75x130	47
AD36901/X.	8/15	95	cer	18	8	3x6	80x160	57,6
AD38901/X.	4/8/15	95	cer	18	8	3x8	82x205	59
AD46720/X.	4/8/15/25	130	cer	10	5	4x6	102x154	44
AD46740/X.	4/8/15/25	130	cer	10	5	4x6	102x154	56
AD46721/X.	4/8/15/25	130	cer	10	5	4x6	102x154	44
AD46741/X.	4/8/15/25	130	cer	10	5	4x6	102x154	56
AD46722/X.	4/8/15/25	130	cer	10	5	4x6	102x154	44
AD46742/X.	4/8/15/25	130	cer	10	5	4x6	102x154	56
AD46800/M8	8	150	cer	18	6	4x6	102x154	47,5
AD46801/M4	4	120	cer	18	8	3 1/2x6	95,6x155,6	49,8
AD46810/X4	4	140	cer	18	6	3 1/2x6	95,6x155,6	38
AD46860/X.	4/8/15/25	1440	cer	14,5	4	4x6	102x154	45
AD46960/M8	8	120	cer	14,5	4	4x6	102x154	45
AD46861/X8	8	140	cer	14,5	4	4x6	102x154	45
AD46900/M.	4/8/15	150	cer	18	6	4x6	102x154	54
AD46951/X.	8/15/25	130	cer	14,5	6	4x6	102x154	52
AD48901/X.	4/8/15/25	110	cer	18	10	4x8	96x210	62,9
AD57900/M.	4/8	100	cer	18	10	5x7	132,5x182,5	65,3
AD57900/X.	4/8	100/105	cer	18	10	5x7	132,5x182,5	65,3

* = octagonal TIC = steel alloy cer = ceramic

UNIDIRECTIONAL SYNCHRONOUS MOTORS

General data

For detailed information see Data Handbook C6



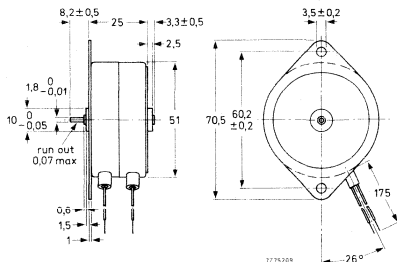
type 9904 110 09601

catalogue number	voltage (V)	speed (rev/min)	input power (W)	torque (mNm)	direction of rotation
9904 110 02101	220	250	1,6	3	c.w.
9904 110 02301	110	250	1,6	3	c.w.
9904 110 05112	220	250	1,8	0,5	c.c.w.
9904 110 05301	110	250	0,5	0,5	c.w.
9904 110 05311	110	250	0,5	0,5	c.c.w.
9904 110 09601	24	375	0,2	0,08	c.w.

REVERSIBLE SYNCHRONOUS MOTORS

General data

For detailed information see Data Handbook C6



type 9904 111 31..1

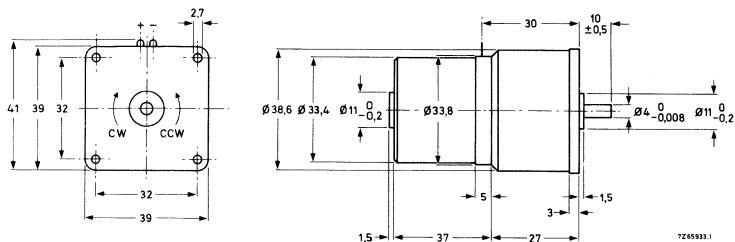
catalogue number	voltage	speed	input power	torque	spindle dia	C value	
	(V)	(rev/min)	(W)	(mNm)	(mm)	(μ F)	
9904 111 06111	220	250	5	30	4	0,18	(330 V)
9904 111 06511	24	250	5	30	4	14	(160 V)
9904 111 27101	220	250	6	60	3	0,22	(330 V)
9904 111 27111	220	250	6	60	6	0,22	(330 V)
9904 111 27501	24	250	6	60	3	0,22	(330 V)
9904 111 28101	220	500	15*	70	3	0,56	(330 V)
9904 111 28111	220	500	15*	70	6	0,56	(330 V)
9904 111 30112	220	500	25*	130	6	0,82	(400 V)
9904 111 31101	220	250	3,5	20	3	0,1	(330 V)
9904 111 31111	220	250	3,5	20	1,8	0,1	(330 V)
9904 111 31104	220	250	3,5	20	3	0,1	(330 V)
9904 111 31114	220	250	3,5	20	1,8	0,1	(330 V)
9904 111 31304	110	250	3,5	20	3	0,39	(350 V)
9904 111 31314	110	250	3,5	20	1,8	0,39	(350 V)
9904 111 31404	48	250	3,5	20	3	2,2	(160 V)
9904 111 31414	48	250	3,5	20	1,8	2,2	(160 V)
9904 111 31504	24	250	3,5	20	3	8	(63 V)
9904 111 31514	24	250	3,5	20	1,8	8	(63 V)
9904 111 32311	220/110	250	1,7	7	2	0,22	(250 V)
9904 111 32511	48/24	250	1,7	7	2	4,7	(160 V)
9904 111 32314	220/110	250	1,7	6	2	0,22	(250 V)
9904 111 32414	48/110	250	0,8	3,2	2	0,56	(160 V)
9904 111 32514	24/48	250	0,8	3,2	2	2,2	(63 V)
9904 111 33104	220	250	6	70	3	0,22	(330 V)
9904 111 33114	220	250	6	70	6	0,22	(330 V)
9904 111 34104	220	500	14*	70	3	0,47	(330 V)
9904 111 34114	220	500	14*	70	6	0,47	(330 V)
9904 111 35104	220	250	3,5	33	3	0,12	(330 V)
9904 111 35114	220	250	3,5	33	4	0,12	(330 V)
9904 111 36104	220	500	6*	33	3	0,22	(330 V)
9904 111 36114	220	500	6*	33	4	0,22	(330 V)
9904 116 23101	220	60	6	220	6,35	0,22	(330 V)
9904 116 23501	24	60	6	220	6,35	18	(100 V)

* 50% duty cycle

D.C. MOTORS

General data

For detailed information see Data Handbook C6



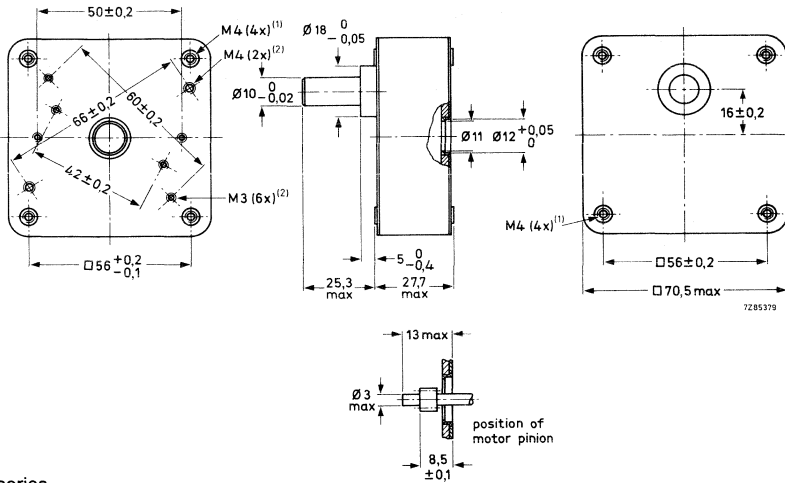
type 9904 120 52...

catalogue number	voltage (V)	speed (rev/min)	starting torque (mNm)	nominal torque (mNm)
9904 120 09601	12	5900	30	5
9904 120 52405	6	60	> 250	125
9904 120 52602	12	330	> 50	25
9904 120 52605	12	60	> 250	125
9904 120 52607	12	23	> 250	125
9904 120 52609	12	8,2	> 250	125
9904 120 52702	24	330	> 250	25
9904 120 52705	24	60	> 250	125
9904 120 52707	24	23	> 250	125
9904 120 52709	24	8,2	> 250	125
4322 010 75060	24	2815	70	10
4322 010 75110	12	2815	70	10
4322 010 75130	13	3000	70	22
4322 010 75300	30	3000	70	22
4322 010 75140	24	2800	70	10
4322 010 75180	24	2800	70	10
4322 010 76000	12	3200	30	5
4322 010 76030	12	3010	30	5
4322 010 76150	24	3000	30	5
4322 010 76130	12	3000	28	5
4322 010 76200	9	3500	30	5
4322 010 76340	12	3000	30	5
4322 010 78010	30	2150	310	100

GEARBOXES

General data

For detailed information see Data Handbook C6



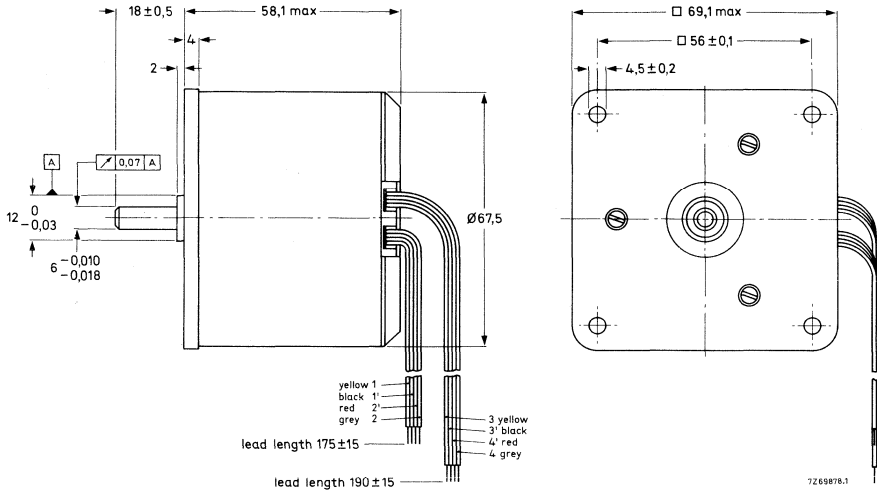
G15 series

gear ratio	cat. no. 130 series	cat. no. G1 series	cat. no. G5 series	cat. no. G15 series
25 : 6	9904 130 01001	9912 200 01001	9912 200 00001	-
25 : 4	9904 130 01003	9912 200 01003	9912 200 00003	-
25 : 3	9904 130 01004	9912 200 01004	9912 200 00004	-
10 : 1	9904 130 01005	9912 200 01005	9912 200 00005	-
25 : 2	9904 130 01006	9912 200 01006	9912 200 00006	-
50 : 3	9904 130 01008	9912 200 01008	9912 200 00008	-
20 : 1	9904 130 01009	9912 200 01009	9912 200 00009	-
25 : 1	9904 130 01011	9912 200 01011	9912 200 00011	9912 200 02011
100 : 3	9904 130 01014	9912 200 01014	9912 200 00014	-
125 : 3	9904 130 01016	9912 200 01016	9912 200 00016	-
50 : 1	9904 130 01017	9912 200 01017	9912 200 00017	9912 200 02017
125 : 2	9904 130 01019	9912 200 01019	9912 200 00019	-
250 : 3	9904 130 01021	9912 200 01021	9912 200 00021	-
100 : 1	-	-	-	9912 200 02022
125 : 1	9904 130 01023	9912 200 01023	9912 200 00023	9912 200 02023
500 : 3 Ed	9912 200 01025	-	-	-
250 : 1	9904 130 01027	9912 200 01027	9912 200 00027	9912 200 02027
375 : 1	-	9912 200 01031	-	-
500 : 1	9904 130 01034	9912 200 01034	9912 200 00034	9912 200 02034
625 : 1	-	-	-	9912 200 02036
750 : 1	9904 130 01037	9912 200 01037	9912 200 00037	-
1000 : 1	-	9912 200 01039	9912 200 00039	-
1250 : 1	9904 130 01041	9912 200 01041	9912 200 00041	-
5000 : 1	-	9912 200 01054	9912 200 00054	9912 200 02054
5000 : 1	9904 130 01062	9912 200 01062	9912 200 00062	-

STEPPING MOTORS

General data

For detailed information see Data Handbook C6



type 9904 112 27/28...

catalogue number	step angle (°)	drive/ current (mA)	working torque (mNm)	max. pull-in (Hz)	max. pull-out (Hz)
9904 112 06001	7°30'	12 V 250	40	110	-
9904 112 06101	7°30'	5 V 400	50	200	320
9904 112 27001	7°30'	12 V 290	100	80	-
9904 112 27101	7°30'	5 V 580	110	275	275
9904 112 27201	7°30'	-500 c.c.	130	450	5000
9904 112 28001	15°	12 V 290	60	90	-
9904 112 28101	15°	5 V 580	65	200	250
9904 112 28201	15°	-500 c.c.	90	275	3200
9904 112 29201	3°45'	-500 c.c.	280	900	12000
9904 112 30201	7°30'	-500 c.c.	190	520	7000
9904 112 31001	7°30'	12 V - 190	22	180	-
9904 112 31101	7°30'	5 V 325	24	400	400
9904 112 31004	7°30'	12 V 175	20	240	-
9904 112 31104	7°30'	5 V 400	22	400	500
9904 112 31006	7°30'	12 V 175	30	245	-
9904 112 31106	7°30'	5 V 400	33	450	620
9904 112 31206	7°30'	-500 c.c.	45	620	6000

STEPPING MOTORS

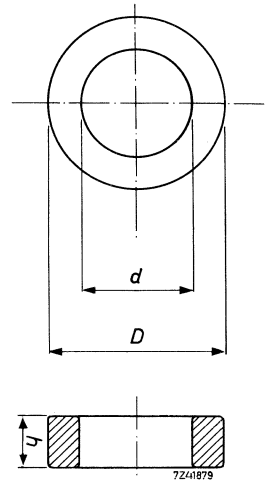
catalogue number	step angle (°)	drive/ current (mA)	working torque (mNm)	max. pull-in (Hz)	max. pull-out (Hz)
9904 112 32001	7°30'	12 V 100	6	350	-
9904 112 32101	7°30'	5 V 220	7,5	550	850
9904 112 32204	7°30'	-360 c.c.	8,5	800	2500
9904 112 33004	7°30'	12 V 300	90	100	-
9904 112 33104	7°30'	5 V 615	90	130	275
9904 112 34004	15°	12 V 300	55	100	-
9904 112 34104	15°	5 V 615	60	190	240
9904 112 35014	7°30'	12 V 240	57	130	-
9904 112 35016	7°30'	12 V 240	68	150	-
9904 112 35114	7°30'	5 V 575	65	300	350
9904 112 35116	7°30'	5 V 575	70	360	380
9904 112 35216	7°30'	-500 c.c.	95	570	4000
9904 112 36014	15°	12 V 240	32	110	-
9904 112 36114	15°	5 V 575	37	200	350
9904 112 36214	15°	-500 c.c.	48	220	4000
9904 115 23101	1,8°	-1000 c.c.	380	300	7000
9904 115 23102	1,8°	-1000 c.c.	380	300	7000
9904 115 23301	18°	3800 c.c.	380	300	7000

General data

Nominal dimensions

size	D x d x h of coated toroids (mm)	D x d x h of non-coated toroids (mm)
a	4,3 x 1,9 x 1,4	4 x 2,2 x 1,1
b	6,3 x 3,7 x 2,3	6 x 4 x 2
c	9,4 x 5,6 x 3,4	9 x 6 x 3
d	14,5 x 8,5 x 5,5	14 x 9 x 5
e	23,6 x 13,4 x 7,6	23 x 14 x 7
f	29,6 x 18,4 x 8,1	29 x 19 x 7,5
g	36,6 x 22,4 x 10,6	36 x 23 x 10
h	36,6 x 22,4 x 15,6	36 x 23 x 15
k		19 x 10,6 x 15
l		26 x 14,5 x 10
m		26 x 14,5 x 20

For detailed information see Data Handbook C5



μ_{tor}	at temperature (°C)	mat. grade	colour	size, see table	cat. number nylon coated	cat. number non-coated
2700 ± 20%	+ 25	3E1	green	f	4322 020 97000	4322 020 31310
				g	4322 020 97010	4322 020 31320
				h	4322 020 97020	4322 020 31330
> 5000	+ 25 to + 70	3E2	blue	a	4322 020 97030	4322 020 31420
				b	4322 020 97040	4322 020 31430
				c	4322 020 97050	4322 020 31440
				d	4322 020 97060	4322 020 31450
				e	4322 020 97070	4322 020 31460
> 2300 < 3210	+ 25	3H2	grey	a	4322 020 97110	4322 020 31350
				b	4322 020 97120	4322 020 31370
				c	4322 020 97130	4322 020 31380
				d	4322 020 97140	4322 020 31390
				e	4322 020 97150	4322 020 31400
> 100	+ 5 to 55	4C6	violet	b	4322 020 97160	4322 020 90750
				c	4322 020 97170	4322 020 90760
				d	4322 020 97180	4322 020 90770
				e	4322 020 97190	4322 020 90860
				h	4322 020 97200	4322 020 90870
4000 ± 25%	25	3C11	none	k		4312 020 36300
				l		4312 020 36280
				m		4312 020 36250
				h		4312 020 36310

General data

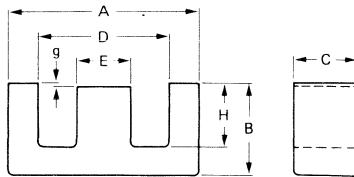
FXC grade 3E1 - for wideband and pulse transformers

FXC grades 3C8 - for power application (high magnetic saturation and low losses).

Cores with air gap Δ available on request.

Coil formers are available for most current EE combinations.

For detailed information see Data Handbook C5



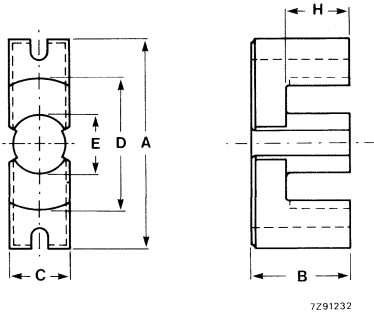
type	dimensions (mm)						catalogue number grade 3E1	catalogue number grade 3C8
	A max	B max	C max	D min	E max	H min		
E20/10/5	20,7	10,2	5,3	12,8	5,2	6,3	4322 020 34830	4312 020 34070
E25/13/7	25,8	12,9	7,5	17,25	7,65	8,7	-	4312 020 34020
E30/15/7	30,8	15,2	7,3	19,5	7,2	9,7	4322 020 34840	4312 020 34550
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	4422 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

General data

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 IEC 65 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.

Coil formers are available for horizontal and vertical mounting.

For detailed information see Data Handbook C5



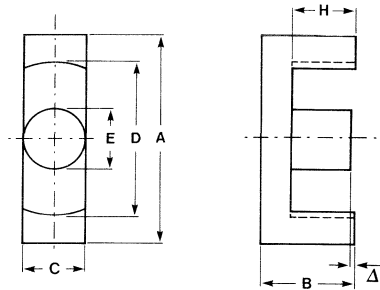
type	dimensions (mm)						catalogue number grade 3C8
	A max	B max	C max	D min	E max	H min	
EC35/17/10	35,3	17,45	9,8	22,2	9,8	11,9	4322 020 52500
EC41/19/12	41,6	19,65	11,9	26,3	11,9	13,5	4322 020 52510
E52/24/14	53,5	24,35	13,75	32,1	13,75	15,5	4322 020 52520
EC70/34/17	71,7	34,65	16,8	43,3	16,8	22,3	4322 020 52530

General data

The ETD series of high frequency cores in Ferroxcube 3C8 meets current requirements of switched-mode power supplies.

- 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 and proper choice of transition frequency
- Winding space sufficient for full IEC mains isolation in specified configurations
- Sufficient winding height for minimum loss windings
- Coil formers and clips are available.

For detailed information see Data Handbook C5



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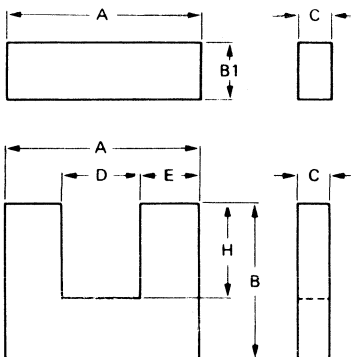
type	dimensions (mm)						cat. number grade 3C8 gap = 0*
	A max	B max	C max	D min	E max	H min	
ETD34/17/11	35,3	17,5	11,1	25,6	11,1	11,8	4312 020 37000
ETD39/20/13	40	20	12,8	29,3	12,8	14,2	4312 020 37050
ETD44/22/15	45	22,5	15,2	32,5	15,2	16,1	4312 020 37100
ETD49/25/16	49,8	24,9	16,7	36,1	16,7	17,7	4312 020 37150

* Cores with air-gaps are available.

General data

These 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 and I cores are ideal in suppression applications. In case of premagnetisation, the influence of the choke can be reduced by using cores in combination with spacers to get an airgap. The Ferroxcube grade is 3C8. Coil formers are available for U10-U15-U20.

For detailed information see Data Handbook C5



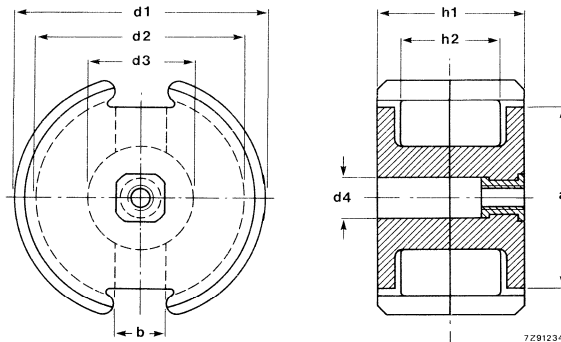
type	dimensions (mm)							cat. number grade 3C8
	A max	B max	B1 max	C max	D min	E max	H min	
U10/8/3	10,2	8,2		2,9	4	2,9	5,1	3122 134 91160
U15/11/6	15,9	11,65		6,25	5	4,8	5,57	3122 134 90690
U20/16/7	21,6	15,8		7,5	6	7,2	8	3122 134 90200
U25/20/13	25,5	20		12,5	8	8	11	3122 134 90460
U30/25/16	32	25,5		16	10	9,8	14,5	3122 134 90760
U93/52/30	94,8	52,5		30	36,2	28	23,5	4312 020 33580
I93/28/30	94,8		28	30				4312 020 33590
U93/76/16	94,8	76,5		16	36,2	28	47	4312 020 33550
I93/28/16	94,8		28	16				4312 020 33560
U93/76/30	94,8	76,5		30	36,2	28	47	4312 020 33570
I93/28/30	94,8		28	30				4312 020 33590
U100/57/25	103,6	57,5		25,4	47	25,4	30,3	4312 020 33600
I100/25/25	103,6		26,2	25,4				4312 020 33610
I15/3/3	15,3		2,9	2,9				3122 134 90730
I20/6/5	20,1		5,3	6,55				3122 134 90720
I25/8/8	25,5		7,75	7,75				3122 134 90620

General data

For detailed information 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, 3H3, 3D3, 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	$810 \pm 25\%$	4322 020 54400	
P7,4/4,2	3H1	$970 \pm 25\%$	4322 020 54600	
type	grade	A_L	cat. number core sets with nut	cat. number core sets without nut
P9/5	4C6	$25 \pm 1\%$	4322 022 61810	4322 022 01900
	3H1	$100 \pm 1,5\%$	4322 022 61240	
	3H1	$160 \pm 2\%$	4322 022 61250	
P11/7	4C6	$25 \pm 1\%$	4322 022 21810	
	3D3	$40 \pm 1\%$	4322 022 21420	
	3B8	$100 \pm 1\%$		
	3H1	$100 \pm 1\%$	4322 022 21240	
P14/8	3H1	$160 \pm 1,5\%$	4322 022 21250	
	3B8	$250 \pm 3\%$		
	3H1	$250 \pm 3\%$	4322 022 21260	
	4C6	$40 \pm 1\%$	4322 022 23820	
	3D3	$63 \pm 1\%$	4322 022 23430	
	3H1	$160 \pm 1,5\%$	4322 022 23250	
	3B8	$250 \pm 2\%$		
	3H1	$250 \pm 2\%$	4322 022 23260	
	3B8	$400 \pm 2\%$		4322 022 03860
				4322 022 03880

type	grade	A _L	cat. number core sets with nut	cat. number core sets without nut
P18/11	4C6	40 ± 1%	4322 022 25820	4322 022 05940
	3D3	63 ± 1%	4322 022 25430	
	3D3	100 ± 1%	4322 022 25440	
	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%		
	P22/13	4C6	40 ± 1%	
3D3		63 ± 1%	4322 022 27430	
4C6		63 ± 1%	4322 022 27830	
3D3		160 ± 1%	4322 022 27450	
3H1		250 ± 1,5%	4322 022 27260	
3H1		315 ± 2%	4322 022 27270	
3B8		400 ± 2%		
3H1		400 ± 2%	4322 022 27280	
3E4		10.000 ± 25%	4322 022 07900	
P26/16	3D3	100 ± 1%	4322 022 29440	4322 022 09860
	4C6	100 ± 1%	4322 022 29840	
	3B8	250 ± 1%		
	3D3	250 ± 1%	4322 022 29460	
	3H1	315 ± 1,5%	4322 022 29270	
	3B8	400 ± 2%		
	3H1	400 ± 2%	4322 022 29280	
	3B8	630 ± 3%		
	3H1	630 ± 3%	4322 022 29300	
P30/19	3D3	160 ± 1%	4322 022 31450	4322 022 11870
	3H1	400 ± 1,5%	4322 022 31280	
	3B8	630 ± 2%		
	3H1	630 ± 2%	4322 022 31300	
	3H1	160 ± 1%		
P36/22	3B8	400 ± 1,5%		4322 022 13800 4322 022 13830
	3B8	400 ± 1,5%		
	3H1	400 ± 1,5%	4322 022 33280	
	3H1	630 ± 2%	4322 022 33300	
P42/29	3H1	400 ± 1%	4322 022 35280	
	3H1	630 ± 2%	4322 022 35300	
	3H1	1000 ± 3%	4322 022 35310	
	3H1	1000 ± 3%		

General data

For detailed information 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	31250							
40	3D3		31250							
	4C6			30940	32160	31060				
63	3D3			30750	32160	31040				
	4C6					31000				
100	3D3				32160		30780			
	3H1	31270	31270							
	4C6						30790			
160	3D3					31000		30800		
	3H1	31540	31540	30950						
250	3D3						30980			
	3H1		31280	31070	32130	31020				
	3H3				32130					
315	3H1				32140	31020	30980			
	3H3				32140					
400	3H1					31100	30810	30980	30810	30810
630	3H1						30810	30810	30810	30810
1000	3H1									31090

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

General data

For detailed information see Data Handbook C4

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).

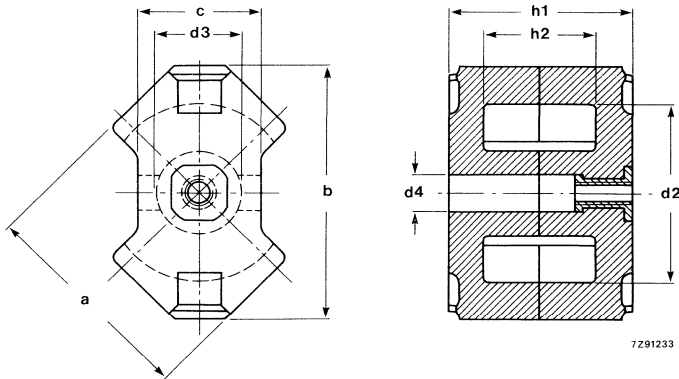
Ferroxcube potcore halves without ground mating faces in material grades 3D3 and 3H1 are used in inductive proximity detectors.

General data

For detailed information see Data Handbook C4

Ferroxcube RM cores in material grades 3H1, 3H3, 3D3, 4C6 are used for stable low loss filter cores; in 3B8 and 3C8 grades for power applications.

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



RM cores in grades 3E4, 3E5, 3B8 and 3C8 for transformers have no centerhole d4 and, consequently, no adjuster nut

type	grade	A_L	cat. number core sets with nut	cat. number core sets without nut
RM4	3H1	$100 \pm 2\%$	4322 022 77240	4322 022 57900
	3E4	$2790 \pm 25\%$		
RM5	3D3	$25 \pm 1\%$	4322 022 79410	4322 022 59470
	4C6	$25 \pm 1\%$	4322 022 79810	
	4C6	$40 \pm 1\%$	4322 022 79820	
	3D3	$63 \pm 1\%$	4322 022 79430	
	3B8	$100 \pm 1\%$		
	3H1	$100 \pm 1\%$	4322 022 79240	
	3H3	$100 \pm 1\%$	4322 022 79540	
	3H1	$160 \pm 2\%$	4322 022 79250	
	3H3	$160 \pm 2\%$	4322 022 79550	
	3H1	$250 \pm 3\%$	4322 022 79260	
	3H3	$250 \pm 3\%$	4322 022 79560	
		3E4	$4975 \pm 25\%$	

FERROXCUBE

RM CORES

type	grade	A _L	cat. number core sets with nut	cat. number core sets without nut		
RM6R	3D3	40 ± 1%	4322 022 75420	4322 022 55500		
	4C6	40 ± 1%	4322 022 75820			
	4C6	63 ± 1%	4322 022 75830			
	3D3	100 ± 2%	4322 022 75440			
	3B8	160 ± 2%				
	3H1	160 ± 2%	4322 022 75250			
	3H3	160 ± 2%	4322 022 75550			
	3H1	200 ± 2%	4322 022 75370			
	3H3	200 ± 2%	4322 022 75680			
	3H1	250 ± 2%	4322 022 75260			
	3H3	250 ± 2%	4322 022 75560			
	3E4	6710 ± 25%				
	3D3	40 ± 1%	4322 022 67420			
	4C6	40 ± 1%	4322 022 67820			
RM6S	4C6	63 ± 1%	4322 022 67830	4322 022 47740		
	3B8	100 ± 2%				
	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%				
	RM8	3D3	63 ± 1%		4322 022 71430	4322 022 47920
		4C6	63 ± 1%		4322 022 71830	
		4C6	100 ± 1%		4322 022 71840	
		3B8	160 ± 3%			
		3C8	160 ± 3%			
3H1		160 ± 1,5%	4322 022 71250			
3B8		250 ± 3%				
3C8		250 ± 3%				
3H1		250 ± 2%	4322 022 71260			
3H1		315 ± 2%	4322 022 71270			
3E4		8000 ± 25%				
RM10		3B8	250 ± 2%		4322 022 51900 4322 022 50480 4322 022 50660	
		3C8	250 ± 2%			
		3H1	250 ± 2%	4322 022 70260		
	3H1	315 ± 2%	4322 022 70270			
	3B8	400 ± 3%				
	3C8	400 ± 3%				
	3H1	400 ± 3%	4322 022 70280			
	3E4	11000 ± 25%				
	RM14	3B8	250 ± 2%			4322 022 50500 4322 022 50680 4322 022 50910 4322 022 56950 4322 025 03260 4322 022 55890 4322 025 03300
		3C8	250 ± 2%			
		3B8	630 ± 3%			
		3C8	630 ± 3%			

For detailed information see Data Handbook C4

Coilformers - 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
RM14		4322 021 32460	

Inductance adjusters, catalogue number 4322 021

A _L	mat	RM4	RM5	RM6R + S	RM8	RM10
25	3D3 4C6		31250 31250			
40	3D3 4C6			32160 32160		
63	3D3 4C6		31250 31260		31060 31060	
100	3D3 3H1/3H3 4C6	31270	31270	32170		
160	3H1/3H3		31540	32130	31060 31000	
200	3H1/3H3			32130		
250	3H1/3H3		31280	32130	31020	30810
315	3H1				32190	30810
400	3H1					30810

Mouning parts, catalogue numbers

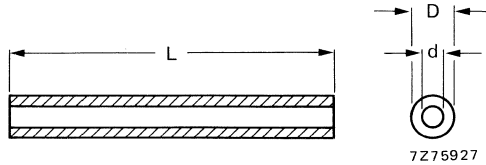
	RM4	RM5	RM6R + S	RM8	RM10	RM14
clip (2x core set)	4322 021 31900	4322 021 31900	4322 021 31780	4322 021 31840	4313 021 04120	4322 021 33690



General data

For detailed information see Data Handbook C5

Tubes

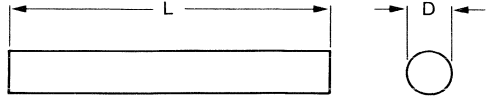


grade	D (mm)	d (mm)	l (mm)	cat. number
4E1	2,2 -0,4	0,6 +0,2	3,25 -0,5	4330 030 32670
3B	2,8 -0,05	1,2 +0,1	8,2 -0,4	4322 020 34340
4E1	3,7 -0,4	1,0 +0,4	5,5 -1,0	4330 030 32660
4D1	3,7 -0,4	1,0 +0,4	5,5 -1,0	4330 030 32630
3B	3,7 -0,4	1,5 +0,2	8,0 -0,5	4330 030 32650
4A1	4,15 -0,05	2 +0,2	7,2 -0,4	4322 020 34440
4B1	4,15 -0,05	2 +0,2	12,2 -0,4	4322 020 34450
4B1	4,15 -0,05	2 +0,2	15,2 -0,4	4322 020 34380
3C6	4,15 -0,3	2 +0,2	36,6 -1,2	4312 020 31450
3D3	4,2 -0,1	2 +0,2	7,2 -0,4	4312 020 31220
3D3	4,2 -0,1	2 +0,2	11,2 -0,4	4312 020 31250
3B	4,2 -0,1	2 +0,2	20,2 -0,4	4312 020 31030
3B	4,3 -0,2	2 +0,2	7,2 -0,4	3122 104 92900
3B	4,3 -0,2	2 +0,2	15,2 -0,4	4322 020 36750
3B	4,3 -0,2	2 +0,2	25,5 -1	4322 020 36780
4B1	4,3 -0,2	2 +0,2	25,5 -1	3122 104 90810
3C6	4,95 -0,1	2,9 +0,2	36,0 -0,5	3122 104 93760
3B	5,3 -0,2	2,8 +0,2	22,4 -0,8	4322 020 36810
3B	8 -0,4	4,2 +0,6	51,4 -2,8	4322 020 31310
4B1	8,5 -0,5	3,5 +0,3	15,3 -0,6	4312 020 31200
3B	9,8 -0,6	6,3 +0,4	17,5 -0,5	4313 020 15180

General data

For detailed information see Data Handbook C5

Rods



7275926

grade	D (mm)	l (mm)	cat. number	
3D3	1,65 -0,05	9,2 -0,4	4312 020 30160	
3B	1,65 -0,05	12,2 -0,4	3122 104 91100	
4B1	1,65 -0,05	12,2 -0,4	3122 104 91110	
3B	1,65 -0,05	25,2 -0,4	3122 104 91170	
4D1	1,78 -0,03	8,25 -0,3	4330 030 30300	
4B1	1,75 -0,2	14,2 -0,4	4312 020 30560	
4B1	1,75 -0,2	18,5 -1,0	3122 104 91150	
3D3	1,78 -0,05	9,0 -0,5	4322 020 39480	
4D1	2,1 -0,2	9,4 -0,8	4330 030 30140	
4B1	2,1 -0,2	12,5 -1,0	4330 030 30130	
4C6	2,0 -0,2	12,0 -0,7	4330 030 30320	
4B1	2,0 -0,2	16,5 -1,0	4330 030 30360	
3D3	2,3 -0,05	10,2 -0,4	4312 020 30030	
4B1	2,4 -0,4	16,5 -1,0	4312 020 30460	
4B1	2,5 -0,25	20,0 -1,0	4312 020 30510	
4B1	3,0 -0,1	14,0 -0,5	4330 030 30060	
4C6	3,05 -0,1	16,5 -1,0	4330 030 30390	
4B1	3 -0,25	20 -0,6	4330 030 30220	
4B	3,15 -0,3	24,35 -0,7	4312 020 30520	
3B	3,5 -0,3	17 -0,5	4330 030 30400	
3C6	4 -0,3	20 -0,6	4312 020 30320	
4B1	4,1 -0,2	21 -1,0	4330 030 30120	
3C6	4 -0,05	25,5 -1	4312 020 30290	
4B1	4,0 -0,3	25 -1,0	4330 030 30250	
4B1	5,3 -0,6	18,3 -0,6	4312 020 30490	
4B1	5 -0,3	20,5 -1	4312 020 30570	
3D3	5 -0,3	24,5 -1	4312 020 30190	
3B	5 -0,2	25,5 -1	4322 020 39150	
4B1	5 -0,3	25 -1	4330 030 30080	
4B1	5 -0,3	30 -1,2	4330 030 30030	
3D	5 -0,2	41 -2	4322 020 39470	
3C6	10,0 -0,5	20,5 -1,0	4330 030 30380	

PERMANENT MAGNET MATERIALS

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**
segments: in motors, magnetos
rings: in loudspeakers, motors, magnetos
disc and blocks: in metal separators, chucks, clamping rings
- **Isotropic ceramic Ferroxdure**
segments: in small d.c. motors
rings: in synchronous motors, alternators, dynamos
blocks: in microphones, telephones, pick-ups, watches, reed switches
tubes and rods: in tv convergence units, linearity controls
- **Anisotropic plastic-bonded Ferroxdure**
wide range of shapes
- **Isotropic plastic-bonded Ferroxdure**
wide range of shapes: where flexible products and/or complex magnetizing patterns are required
- **Anisotropic metal alloy Ticonal**
rods, rings, discs, blocks and slugs: in watches, loudspeakers, microphones, telephones, meters, magnetos, motors, eddy-current brakes
- **Anisotropic sintered Cobalt Samarium magnets (RES)**
blocks, slugs, segments: in applications requiring highest magnetic energies

PERMANENT MAGNET MATERIALS

For detailed information see Data Handbook C16

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)
typ	min	typ	min	typ	min	typ	min	typ	typ	min

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 375	27,0	25,5	380	370	265	250	275	260	185	145	955
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	255	340	325	175	140	1115
FXD 410	27,0	25,5	380	370	280	270	320	305	190	145	1115

Isotropic ceramic Ferroxdure, BaFe₁₂O₁₉

Magnets are pressed or extruded, sintered and may be ground.

FXD 100	7,6	7,2	220	210	135	130	220				typ 800
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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; the suffix "F" denotes flame-retardant material to UL94 V-1.

FXD SP5F	0,7	max	65	60	50	45	190				typ 800
FXD SP10/SP10F	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/P40F	3,6	3,2	145	135	96	88	190				typ 800
FXD SP50	4,4	4	155	150	104	100	190				typ 800

Anisotropic metal alloy Ticonal

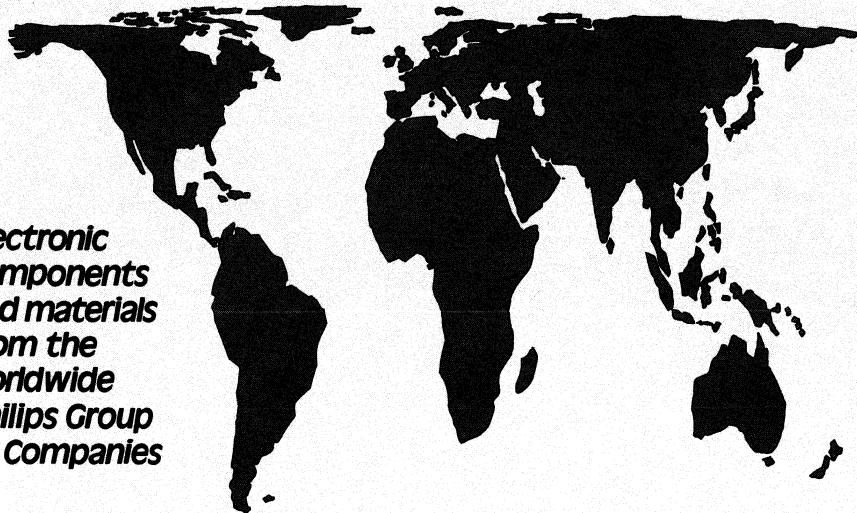
Magnets are cast and may be ground.

Ticonal 500	40,6	37,4	1250	1200	52,5	50,1		1000	40,6		min 239
Ticonal 550	43,8	39,8	900	850	123	115		550	79,6		min 478
Ticonal 570	45,4	42,2	1320	1260	51,7	49,4		1070	42,2		min 239
Ticonal 600	47,8	43,8	1310	1260	54,1	51,7		1090	43,8		min 239
Ticonal 900	79,6	67,7	1100	1000	115	111		900	79,6		min 478

Anisotropic sintered Cobalt Samarium 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

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