PHILIPS

Semiconductors and integrated circuits

Part 1b July 1974

SEMICONDUCTORS AND INTEGRATED CIRCUITS

Part 1b **July 1974**

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March 1974

DATA HANDBOOK SYSTEM

Our Data Handbook System is a comprehensive source of information on electronic components, subassemblies and materials; it is made up of three series of handbooks each comprising several parts.

ELECTRON TUBES	**BLUE**
SEMICONDUCTORS AND INTEGRATED CIRCUITS	**RED**
COMPONENTS AND MATERIALS	**GREEN**

The several parts contain all pertinent data available at the time of publication, and each is revised and reissued periodically.

Where ratings or specifications differ from those published in the preceding edition they are pointed out by arrows. Where application information is given it is advisory and does not form part of the product specification.

If you need confirmation that the published data about any of our products are the latest available, please contact our representative. He is at your service and will be glad to answer your inquiries.

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ELECTRON TUBES (BLUE SERIES)

This series consists of the following parts, issued on the dates indicated.

Part 1a Transmitting tubes for communications **April 1973**
and Tubes for r.f. heating Types PB2/500 ÷ TBW15/125

Part 1b Transmitting tubes for communication **May 1973**
Tubes for r.f. heating
Amplifier circuit assemblies

Part 2 Microwave products **August 1973**

Communication magnetrons
Magnetrons for micro-wave heating
Klystrons
Traveling-wave tubes
Diodes
Triodes
T-R Switches
Microwave Semiconductor devices
Isolators Circulators

Part 3 Special Quality tubes; **March 1972**
Miscellaneous devices

Part 4 Receiving tubes **September 1973**

Part 5a Cathode-ray tubes **November 1973**

Part 5b Camera tubes; Image intensifier tubes **December 1973**

Part 6 Products for nuclear technology **January 1974**
Photodiodes

Photomultiplier tubes
Channel electron multipliers
Geiger-Mueller tubes
Neutron tubes
Photo diodes

Part 7 Gas-filled tubes **February 1974**

Voltage stabilizing and reference tubes
Counter, selector, and indicator tubes
Trigger tubes
Switching diodes
Thyratrons
Ignitrons
Industrial rectifying tubes
High-voltage rectifying tubes

Part 8 T.V. Picture tubes **May 1974**

SEMICONDUCTORS AND INTEGRATED CIRCUITS (RED SERIES)

This series consists of the following parts, issued on the dates indicated.

Part 1a Rectifier diodes and thyristors — **June 1974**

Rectifier diodes
Voltage regulator diodes
Transient suppressor diodes
Thyristors, diacs, triacs
Rectifier stacks

Part 1b Diodes — **July 1974**

Small signal germanium diodes
Small signal silicon diodes
Special diodes
Voltage regulator diodes
Voltage reference diodes
Tuner diodes

Part 2 Low frequency and deflection transistors — **January 1973**

Part 3 High frequency and switching transistors — **February 1973**

Part 4a Special semiconductors — **March 1973**

Transmitting transistors
Microwave devices
Field effect transistors
Dual transistors
Microminiature devices for thick- and thin-film circuits

Part 4b Devices for opto-electronics — **March 1973**

Photosensitive diodes and transistors
Light emitting diodes
Infra-red sensitive devices
Photocouplers
Photoconductive devices

Part 5 Linear integrated circuits — **July 1973**

Part 6 Digital integrated circuits — **April 1974**

DTL (FC family)
CML (GX family)
MOS (FD family)
MOS (FE family)

COMPONENTS AND MATERIALS (GREEN SERIES)

These series consists of the following parts, issued on the dates indicated.

Part 1 **Circuit Blocks, Input/Output Devices, Electro-mechanical Components, Peripheral Devices** **June 1974**

High noise immunity logic FZ/30-Series
Circuit blocks 40-Series and CSA70
Counter modules 50-Series
Norbits 60-Series, 61-Series
Circuit blocks 90-Series
Input/output devices
Electro-mechanical components
Peripheral devices

Part 2 **Resistors, Capacitors** **April 1973**

Electrolytic capacitors
Paper capacitors and film capacitors
Ceramic capacitors
Variable capacitors
Fixed resistors
Variable resistors
Non-linear resistors
(VDR, LDR, NTC, PTC)

Part 3 **Radio, Audio, Television** **June 1973**

FM tuners
Loudspeakers
Television tuners, aerial input assemblies
Components for black and white TV
Components for colour television
Deflection assemblies for camera tubes

Part 4a **Soft ferrites** **October 1973**

Ferrites for radio, audio and television
Small coils
Ferroxcube potcores and square cores
Ferroxcube transformer cores

Part 4b **Piezoelectric Ceramics, Permanent magnet materials** **October 1973**

Part 5 **Ferrite core memory products** **January 1974**

Ferroxcube memory cores
Matrix planes and stacks
Core memory systems

Part 6 **Electric Motors and Accessories** **March 1974**

Small synchronous motors
Stepper motors
Miniature direct current motors

Part 7 **Circuit Blocks** **September 1971**

Circuit blocks 100 kHz -Series
Circuit blocks-1-Series
Circuit blocks 10-Series
Circuit blocks for ferrite core memory drive

General

Type designation

Colour codes

Rating systems

Letter symbols

PRO ELECTRON TYPE DESIGNATION CODE

FOR SEMICONDUCTOR DEVICES

This type designation code applies to discrete devices and to multiple devices [1])

The type designation consists of:

TWO LETTERS FOLLOWED BY A SERIAL NUMBER

The first letter gives an indication of the material

A Material with a band gap of 0.6 to 1.0 eV, such as germanium

B Material with a band gap of 1.0 to 1.3 eV, such as silicon

C Material with a band gap of 1.3 eV and more, such as gallium arsenide

D Material with a band gap of less than 0.6 eV, such as indium antimonide

R Compound material as employed in Hall generators and photoconductive cells

---

[1]) A multiple device is defined as a combination of similar or dissimilar active devices, contained in a common encapsulation that cannot be dismantled, and of which all electrodes of the individual devices are accessible from the outside.

Multiples of similar devices as well as multiples consisting of a main device and an auxiliary device are designated according to the code for discrete devices described above.
Multiples of dissimilar devices of other nature are designated by the second letter G.

The second letter indicates primarily the main application respectively main application and construction if a further differentiation is essential

A	Detection diode, switching diode, mixer diode
B	Variable capacitance diode
C	Transistor for a.f. applications ($R_{th\ j\text{-}mb} > 15\ ^oC/W$)
D	Power transistor for a.f. applications ($R_{th\ j\text{-}mb} \leq 15\ ^oC/W$)
E	Tunnel diode
F	Transistor for h.f. applications ($R_{th\ j\text{-}mb} > 15\ ^oC/W$)
G	Multiple of dissimilar devices (see note on page 1); Miscellaneous
H	Magnetic sensitive diode; Field probe
K	Hall generator in an open magnetic circuit, e.g. magnetogram or signal probe
L	Power transistor for h.f. applications ($R_{th\ j\text{-}mb} \leq 15\ ^oC/W$)
M	Hall generator in a closed electrically energised magnetic circuit, e.g. Hall modulator or multiplier
N	Photocoupler
P	Radiation sensitive device [1]
Q	Radiation generating device
R	Electrically triggered controlling and switching device having a breakdown characteristic ($R_{th\ j\text{-}mb} > 15\ ^oC/W$)
S	Transistor for switching applications ($R_{th\ j\text{-}mb} > 15\ ^oC/W$)
T	Electrically, or by means of light, triggered controlling and switching power device having a breakdown characteristic ($R_{th\ j\text{-}mb} \leq 15\ ^oC/W$) [1]
U	Power transistor for switching applications ($R_{th\ j\text{-}mb} \leq 15\ ^oC/W$)
X	Multiplier diode, e.g. varactor, step recovery diode
Y	Rectifying diode, booster diode, efficiency diode [1]
Z	Voltage reference or voltage regulator diode [1]

[1]) For the type designation of a range see page 4.

The serial number consists of:

Three figures for semiconductor devices designed primarily for use in domestic equipment

One letter and two figures for semiconductor devices designed primarily for use in professional equipment

VERSION LETTER

A version letter can be used, for instance, for a diode with up-rated voltage, for a sub-division of a transistor type in different gain ranges, a low noise version of an existing transistor and for a diode, transistor, or thyristor with minor mechanical differences, such as finish of the leads, length of the leads etc. The letters never have a fixed meaning, the only exception being the letter R.

TYPE DESIGNATION FOR A RANGE OF SEMICONDUCTOR DEVICES

The type designation of a range of variants of:

a) voltage reference or voltage regulator diodes (second letter Z)

b) rectifier diodes (second letter Y)

c) thyristors (second letter T)

d) radiation detectors

distinctly belonging to one basic type may be qualified by a suffix part which is clearly separated from the basic part by a hyphen (-)

THE BASIC PART being the same for the whole range, is in accordance with the designation code for discrete devices.

THE SUFFIX PART consists of:

a) **for voltage reference or voltage regulator diodes**

one letter followed by the typical working voltage and where appropriate the letter R [1])
The first letter indicates the nominal tolerance of the working voltage in %.

A	1%
B	2%
C	5%
D	10%
E	15%

The typical working voltage is related to the nominal current rating for the whole range. The letter V is used to denote the decimal comma when this occurs.

b) **for rectifier diodes**

a number and where appropriate the letter R [1])
The number generally indicates the maximum repetitive peak reverse voltage.
For controlled avalanche types it indicates the maximum crest working reverse voltage.

c) **for thyristors**

a number and where appropriate the letter R [1])
The number generally indicates either the maximum repetitive peak reverse voltage or the maximum repetitive peak off-state voltage, whichever is lower.
For controlled avalanche types it indicates the maximum crest working reverse voltage.

d) **for radiation detectors**

a figure giving the depth of the depletion layer in μm and where appropriate a version letter if there are differences in resolution.

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[1]) The letter R indicates reverse polarity (anode to stud). The normal polarity (cathode to stud) and symmetrical versions are not specially indicated.

PRO-ELECTRON COLOUR CODING SYSTEM FOR PROFESSIONAL SMALL SIGNAL DIODES

Letter combination-background colour

BAV - green
BAW - blue
BAX - black

Figure combination-colour bands

0 - black
1 - brown
2 - red
3 - orange
4 - yellow
5 - green
6 - blue
7 - violet
8 - grey
9 - white

The cathode side is indicated by a broad band which is at the same time the first digit of the figure combination.

Note: For BA types see individual type publications.

JEDEC assigned type numbers

(EIA-standard RS-236-B; June, 1963)

1. Prefix identification

The prefix identification consisting of a first number symbol and the letter "N" shall not be indicated in the coding.

2. Banding systems

The sequence number consisting of a two, three, or four digit number after the letter "N" may be coded as follows:

2.1 Two-digit sequence numbers shall consist of a first black band and the sequence number in second and third bands of the colours indicated in Table 1. If a suffix letter is required, it shall be indicated with a fourth band as indicated in Table 1.

2.2 Three-digit sequence numbers shall consist of the sequence number in first, second, and third bands of the colours indicated in Table 1. If a suffix letter is required, it shall be indicated with a fourth band as indicated in Table 1.

2.3 Four-digit sequence numbers shall consist of the sequence number in four bands of the colours indicated in Table 1.

If a suffix letter is required it shall be indicated as the fifth band.

3. Cathode identification and reading sequence

3.1 A double-width band shall be used as the first band reading from cathode to anode ends.

3.2 An alternative method is provided where equal width bands may be used. The bands shall be clearly grouped toward the cathode end, and shall be read from cathode to anode ends.

3.3 Either of the above colour banding methods may be used in stead of the cathode designating symbol or other marking.

4. Colour bands

The sequence numbers of the type numbers and suffix letters shall be indicated by the colours in Table 1.

TABLE 1

NUMBER	COLOUR	SUFFIX LETTER
0	black	not applicable
1	brown	A
2	red	B
3	orange	C
4	yellow	D
5	green	E
6	blue	F
7	violet	G
8	grey	H
9	white	J

RATING SYSTEMS

ACCORDING TO I.E.C. PUBLICATION 134

1. DEFINITIONS OF TERMS USED

1.1 Electronic device. An electronic tube or valve, transistor or other semiconductor device.
Note: This definition excludes inductors, capacitors, resistors and similar components.

1.2 Characteristic. A characteristic is an inherent and measurable property of a device. Such a property may be electrical, mechanical, thermal, hydraulic, electro-magnetic, or nuclear, and can be expressed as a value for stated or recognized conditions. A characteristic may also be a set of related values, usually shown in graphical form.

1.3 Bogey electronic device. An electronic device whose characteristics have the published nominal values for the type. A bogey electronic device for any particular application can be obtained by considering only those characteristics which are directly related to the application.

1.4 Rating. A value which establishes either a limiting capability or a limiting condition for an electronic device. It is determined for specified values of environment and operation, and may be stated in any suitable terms.
Note: Limiting conditions may be either maxima or minima.

1.5 Rating system. The set of principles upon which ratings are established and which determine their interpretation.
Note: The rating system indicates the division of responsibility between the device manufacturer and the circuit designer, with the object of ensuring that the working conditions do not exceed the ratings.

2. ABSOLUTE MAXIMUM RATING SYSTEM

Absolute maximum ratings are limiting values of operating and environmental conditions applicable to any electronic device of a specified type as defined by its published data, which should not be exceeded under the worst probable conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device, taking no responsibility for equipment variations, environmental variations, and the effects of changes in operating conditions due to variations in the characteristics of the device under consideration and of all other electronic devices in the equipment.

p.t.o.

The equipment manufacturer should design so that, initially and throughout life, no absolute maximum value for the intended service is exceeded with any device under the worst probable operating conditions with respect to supply voltage variation, equipment component variation, equipment control adjustment, load variations, signal variation, environmental conditions, and variations in characteristics of the device under consideration and of all other electronic devices in the equipment.

3. DESIGN MAXIMUM RATING SYSTEM

Design maximum ratings are limiting values of operating and environmental conditions applicable to a bogey electronic device of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device, taking responsibility for the effects of changes in operating conditions due to variations in the characteristics of the electronic device under consideration.

The equipment manufacturer should design so that, initially and throughout life, no design maximum value for the intended service is exceeded with a bogey device under the worst probable operating conditions with respect to supply voltage variation, equipment component variation, variation in characteristics of all other devices in the equipment, equipment control adjustment, load variation, signal variation and environmental conditions.

4. DESIGN CENTRE RATING SYSTEM

Design centre ratings are limiting values of operating and environmental conditions applicable to a bogey electronic device of a specified type as defined by its published data, and should not be exceeded under normal conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device in average applications, taking responsibility for normal changes in operating conditions due to rated supply voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of all electronic devices.

The equipment manufacturer should design so that, initially, no design centre value for the intended service is exceeded with a bogey electronic device in equipment operating at the stated normal supply voltage.

NOTE

It is common use to apply the Absolute Maximum System in semiconductor published data.

LETTER SYMBOLS FOR TRANSISTORS AND SIGNAL DIODES

based on IEC Publication 148

LETTER SYMBOLS FOR CURRENTS, VOLTAGES AND POWERS

Basic letters

The basic letters to be used are:

I, i = current
V, v = voltage
P, p = power.

Lower-case basic letters shall be used for the representation of instantaneous values which vary with time.
In all other instances upper-case basic letters shall be used.

Subscripts

A, a	Anode terminal
(AV), (av)	Average value
B, b	Base terminal, for MOS devices: Substrate
(BR)	Breakdown
C, c	Collector terminal
D, d	Drain terminal
E, e	Emitter terminal
F, f	Forward
G, g	Gate terminal
K, k	Cathode terminal
M, m	Peak value
O, o	As third subscript: The terminal not mentioned is open circuited
R, r	As first subscript: Reverse. As second subscript: Repetitive. As third subscript: With a specified resistance between the terminal not mentioned and the reference terminal.
(RMS), (rms)	R.M.S. value
S, s	As first or second subscript: Source terminal (for FETS only) As second subscript: Non-repetitive (not for FETS) As third subscript: Short circuit between the terminal not mentioned and the reference terminal
X, x	Specified circuit
Z, z	Replaces R to indicate the actual working voltage, current or power of voltage reference and voltage regulator diodes.

Note: No additional subscript is used for d.c. values.

Upper-case subscripts shall be used for the indication of:

a) continuous (d.c.) values (without signal)

Example I_B

b) instantaneous total values

Example i_B

c) average total values

Example $I_{B(AV)}$

d) peak total values

Example I_{BM}

e) root-mean-square total values

Example $I_{B(RMS)}$

Lower-case subscripts shall be used for the indication of values applying to the varying component alone:

a) instantaneous values

Example i_b

b) root-mean-square values

Example $I_{b(rms)}$

c) peak values

Example I_{bm}

d) average values

Example $I_{b(av)}$

Note: If more than one subscript is used, subscript for which both styles exist shall either be all upper-case or all lower-case.

Additional rules for subscripts

Subscripts for currents

Transistors: If it is necessary to indicate the terminal carrying the current, this should be done by the first subscript (conventional current flow from the external circuit into the terminal is positive).

Examples: I_B, i_B, i_b, I_{bm}

Diodes: To indicate a forward current (conventional current flow into the anode terminal) the subscript F or f should be used; for a reverse current (conventional current flow out of the anode terminal) the subscript R or r should be used.

Examples: I_F, I_R, i_F, $I_{f(rms)}$

Subscripts for voltages

Transistors: If it is necessary to indicate the points between which a voltage is measured, this should be done by the first two subscripts. The first subscript indicates the terminal at which the voltage is measured and the second the reference terminal or the circuit node. Where there is no possibility of confusion, the second subscript may be omitted.

Examples: V_{BE}, v_{BE}, v_{be}, V_{bem}

Diodes: To indicate a forward voltage (anode positive with respect to cathode), the subscript F or f should be used; for a reverse voltage (anode negative with respect to cathode) the subscript R or r should be used.

Examples: V_F, V_R, v_F, V_{rm}

Subscripts for supply voltages or supply currents

Supply voltages or supply currents shall be indicated by repeating the appropriate terminal subscript.

Examples: V_{CC}, I_{EE}

Note: If it is necessary to indicate a reference terminal, this should be done by a third subscript

Example : V_{CCE}

Subscripts for devices having more than one terminal of the same kind

If a device has more than one terminal of the same kind, the subscript is formed by the appropriate letter for the terminal followed by a number; in the case of multiple subscripts, hyphens may be necessary to avoid misunderstanding.

Examples: I_{B2} = continuous (d.c.) current flowing into the second base terminal

V_{B2-E} = continuous (d.c.) voltage between the terminals of second base and emitter

Subscripts for multiple devices

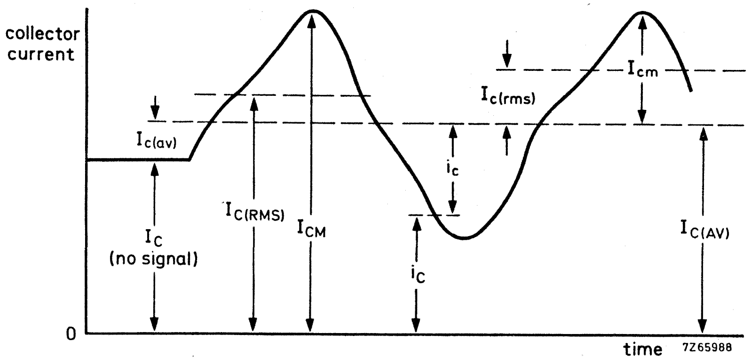
For multiple unit devices, the subscripts are modified by a number preceding the letter subscript; in the case of multiple subscripts, hyphens may be necessary to avoid misunderstanding.

Examples: I_{2C} = continuous (d.c.) current flowing into the collector terminal of the second unit

V_{1C-2C} = continuous (d.c.) voltage between the collector terminals of the first and the second unit.

Application of the rules

The figure below represents a transistor collector current as a function of time. It consists of a continuous (d.c.) current and a varying component.



LETTER SYMBOLS FOR ELECTRICAL PARAMETERS

Definition

For the purpose of this Publication, the term "electrical parameter" applies to four-pole matrix parameters, elements of electrical equivalent circuits, electrical impedances and admittances, inductances and capacitances.

Basic letters

The following is a list of the most important basic letters used for electrical parameters of semiconductor devices.

B, b = susceptance; imaginary part of an admittance

C = capacitance

G, g = conductance; real part of an admittance

H, h = hybrid parameter

L = inductance

R, r = resistance; real part of an impedance

X, x = reactance; imaginary part of an impedance

Y, y = admittance;

Z, z = impedance;

Upper-case letters shall be used for the representation of:

a) electrical parameters of external circuits and of circuits in which the device forms only a part;

b) all inductances and capacitances.

Lower-case letters shall be used for the representation of electrical parameters inherent in the device (with the exception of inductances and capacitances).

Subscripts

General subscripts

The following is a list of the most important general subscripts used for electrical parameters of semiconductor devices:

F, f = forward; forward transfer
I, i (or 1) = input
L, 1 = load
O, o (or 2) = output
R, r = reverse; reverse transfer
S, s = source

Examples: Z_S, h_f, h_F

The upper-case variant of a subscript shall be used for the designation of static (d.c.) values.

Examples : h_{FE} = static value of forward current transfer ratio in common-emitter configuration (d.c. current gain)
R_E = d.c. value of the external emitter resistance.

Note: The static value is the slope of the line from the origin to the operating point on the appropriate characteristic curve, i.e. the quotient of the appropriate electrical quantities at the operating point.

The lower-case variant of a subscript shall be used for the designation of small-signal values.

Examples: h_{fe} = small-signal value of the short-circuit forward current transfer ratio in common-emitter configuration

$Z_e = R_e + jX_e$ = small-signal value of the external impedance

Note: If more than one subscript is used, subscripts for which both styles exist shall either be all upper-case or all lower-case

Examples: h_{FE}, y_{RE}, h_{fe}

Subscripts for four-pole matrix parameters

The first letter subscript (or double numeric subscript) indicates input, output, forward transfer or reverse transfer

Examples: h_i (or h_{11})
h_o (or h_{22})
h_f (or h_{21})
h_r (or h_{12})

A further subscript is used for the identification of the circuit configuration. When no confusion is possible, this further subscript may be omitted.

Examples: h_{fe} (or h_{21e}), h_{FE} (or h_{21E})

Distinction between real and imaginary parts

If it is necessary to distinguish between real and imaginary parts of electrical parameters, no additional subscripts should be used. If basic symbols for the real and imaginary parts exist, these may be used.

Examples: $Z_i = R_i + jX_i$
$y_{fe} = g_{fe} + jb_{fe}$

If such symbols do not exist or if they are not suitable, the following notation shall be used:

Examples: Re (h_{ib}) etc. for the real part of h_{ib}
Im (h_{ib}) etc. for the imaginary part of h_{ib}

Germanium small signal diodes

Point contact

POINT CONTACT DIODES

Germanium diodes in DO-7 envelope

Quoted values are max.

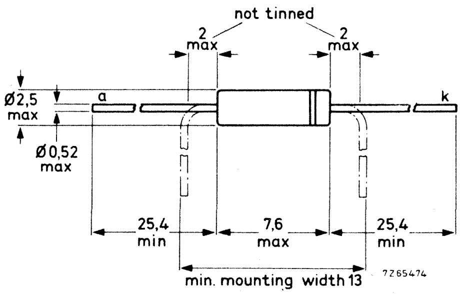
	type	V_R (V)	I_F (mA)	I_{FRM} (mA)	t_{rr} (ns)	C_d (pF)	V_F (V)	at I_F (mA)
general purpose	OA90	20	8	45	–	–	1,5	10
	OA91	90	50	150	–	–	1,9	10
	OA95	90	50	150	–	–	1,5	10
switching	AAY21	15	20	50 *)	12	1,2	0,8	10
a.m. and f.m. detection	AA119 ; 2-AA119	30	35	100	–	–	2,2	10

*) I_{FM}

MECHANICAL DATA

Dimensions in mm

DO-7



Cathode indicated by coloured band

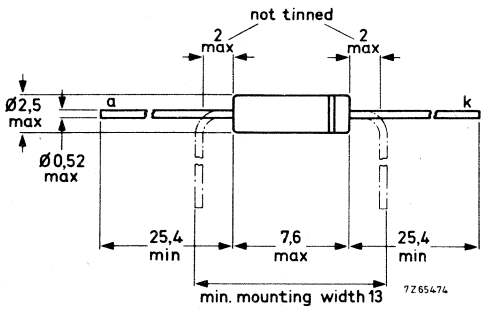
POINT CONTACT DIODE

Germanium diode in all-glass DO-7 envelope primarily intended for use in a.m. detector and ratio detector circuits.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	30	V
Repetitive peak reverse voltage	V_{RRM}	max.	45	V
Forward current (d.c.)	I_F	max.	35	mA
Repetitive peak forward current	I_{FRM}	max.	100	mA
Operating ambient temperature	T_{amb}	max.	60	°C
Forward voltage at I_F = 10 mA	V_F	<	2.2	V

MECHANICAL DATA Dimensions in mm

DO-7



The coloured band indicates the cathode

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

Voltages

Continuous reverse voltage	V_R	max.	30	V
Repetitive peak reverse voltage	V_{RRM}	max.	45	V

Currents

Forward current (d.c.)	I_F	max.	35	mA
Average rectified forward current (averaged over any 50 ms period)	$I_{F(AV)}$	max.	35	mA
Repetitive peak forward current	I_{FRM}	max.	100	mA
Non-repetitive peak forward current ($t < 1$ s)	I_{FSM}	max.	200	mA

Temperatures

Storage temperature	T_{stg}		−55 to +75	°C
Operating ambient temperature	T_{amb}	max.	60	°C

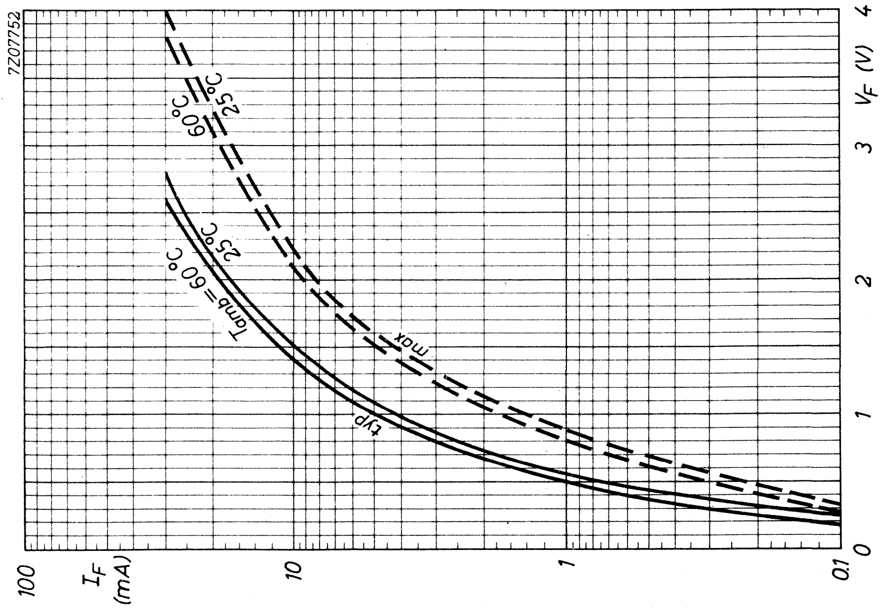
THERMAL RESISTANCE

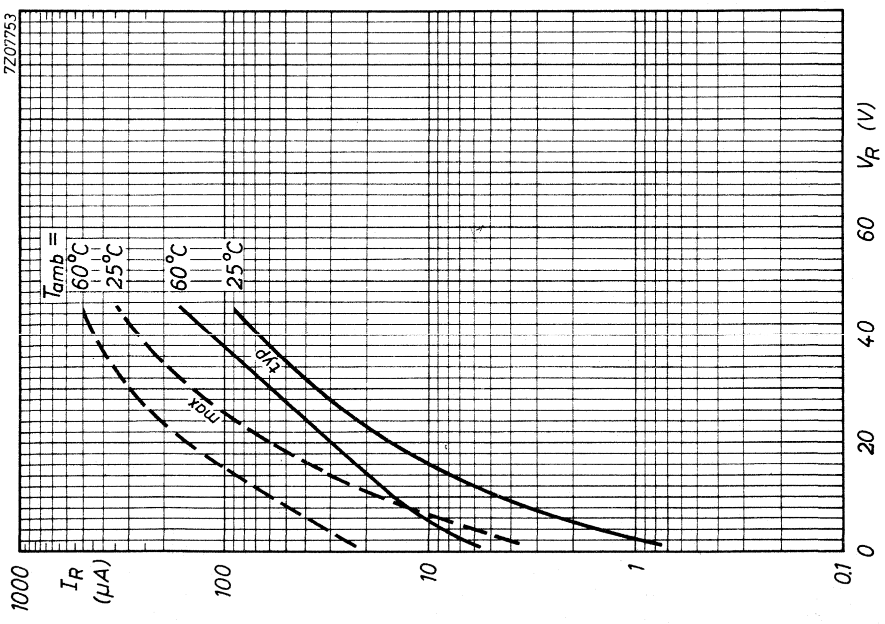
From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.65	°C/mW

CHARACTERISTICS

Forward voltage at T_{amb} = 25 °C				
I_F = 0.1 mA	V_F	typ.	0.23	V
		<	0.30	V
I_F = 1 mA	V_F	typ.	0.56	V
		<	0.88	V
I_F = 10 mA	V_F	typ.	1.5	V
		<	2.2	V
I_F = 30 mA [1]	V_F	typ.	2.8	V
		<	4.0	V
Forward voltage at T_{amb} = 60 °C				
I_F = 0.1 mA	V_F	typ.	0.16	V
		<	0.25	V
I_F = 1 mA	V_F	typ.	0.50	V
		<	0.80	V
I_F = 10 mA	V_F	typ.	1.4	V
		<	2.1	V
I_F = 30 mA [1]	V_F	typ.	2.6	V
		<	3.8	V
Reverse current at T_{amb} = 25 °C				
V_R = 0.1 V	I_R	typ.	0.35	μA
		<	1.0	μA
V_R = 1.5 V	I_R	typ.	0.8	μA
		<	2.8	μA
V_R = 10 v	I_R	typ.	4.5	μA
		<	18	μA
V_R = 30 V	I_R	typ.	35	μA
		<	150	μA
V_R = 45 V	I_R	typ.	90	μA
		<	350	μA
Reverse current at T_{amb} = 60 °C				
V_R = 0.1 V	I_R	typ.	4.5	μA
		<	12	μA
V_R = 1.5 V	I_R	typ.	6	μA
		<	25	μA
V_R = 10 V	I_R	typ.	16	μA
		<	60	μA
V_R = 30 V	I_R	typ.	60	μA
		<	300	μA
V_R = 45 V	I_R	typ.	170	μA
		<	500	μA

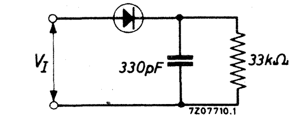
[1]) Measured under pulsed conditions to prevent excessive dissipation.


7Z07752
I_F (mA)
100
10
1
0.1
0
1
2
3
4
V_F (V)
T_{amb} = 60 °C
25 °C
60 °C
25 °C
typ
max


7Z07753
I_R (μA)
1000
100
10
1
0.1
0
20
40
60
V_R (V)
T_{amb} =
60°C
25°C
60°C
25°C
max
typ

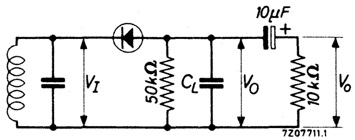
APPLICATION INFORMATION

Measuring circuit at T_{amb} = 25 °C



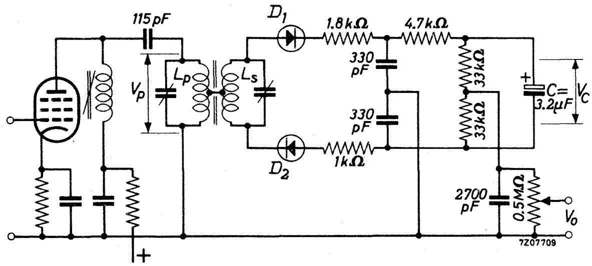
$V_{I(RMS)}$	= 3 V	η	typ.	85	%
f	= 10.7 MHz	R_d	typ.	15	kΩ
				13.5 to 19	kΩ

Diode in an a.m. detector circuit at T_{amb} = 25 °C



$V_{I(RMS)}$	= 0.1 V	V_O	typ. 55 mV
f	= 0.5 MHz	$V_{o(rms)}$	typ. 4.5 mV [1]
		R	typ. 40 kΩ [2]

Matched pair in a ratio detector circuit



L_p	=	7.4	μH
Q_0	=	80	unloaded
R	=	40	kΩ unloaded
Tap	=	0.5	
L_s	=	4.4	μH
Q_0	=	150	unloaded
R	=	45	kΩ unloaded
kQ	=	0.8 [3]	
f_0	=	10.7	MHz
Δf	=	15	kHz
m	=	0.3	

a.m. suppression factor at V_C = 2 to 20 V

$f = f_0$	α	≥ 30
$f = f_0 \pm 25$ kHz	α	≥ 15

For optimum a.m. suppression D_1 must be that diode of the matched pair which has the better dynamic forward characteristic.

[1]) Modulation factor m = 0.3

[2]) Modulation factor m = 0

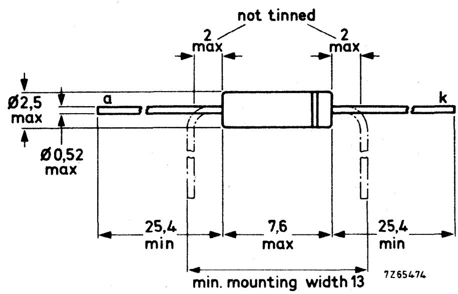
[3]) Measured in the circuit with V_p = 350 mV

POINT CONTACT DIODE

Germanium diode in all-glass DO-7 envelope primarily intended for computer applications.

MECHANICAL DATA Dimensions in mm

DO-7



The coloured band indicates the cathode

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

Voltage				
Continuous reverse voltage	V_R	max.	15	V
Currents				
Forward current (d.c.)	I_F	max.	20	mA
Peak forward current	I_{FM}	max.	50	mA
Temperatures				
Storage temperature	T_{stg}	-65 to +75		^oC
Junction temperature	T_j	max.	75	^oC
Operating ambient temperature	T_{amb}	max.	60	^oC

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	0.75	$^oC/mW$

CHARACTERISTICS $T_j = 25\ ^oC$ unless otherwise specified

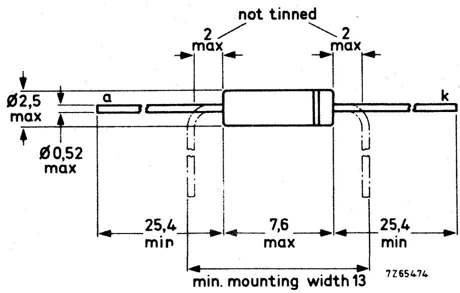
Forward voltage			
$I_F = 2$ mA	V_F	0.25 to 0.45	V
$I_F = 2$ mA; $T_j = 60\ ^oC$	V_F	0.19 to 0.39	V
$I_F = 10$ mA	V_F	0.40 to 0.80	V
$I_F = 10$ mA; $T_j = 60\ ^oC$	V_F	0.34 to 0.74	V
$I_F = 50$ mA	V_F	0.60 to 1.5	V
$I_F = 50$ mA; $T_j = 60\ ^oC$	V_F	0.54 to 1.44	V
Reverse current			
$V_R = 5$ V; $T_{amb} = 60\ ^oC$	I_R	< 30	μA
$V_R = 5$ V; $T_{amb} = 25\ ^oC$	I_R	< 10	μA
$V_R = 15$ V; $T_{amb} = 60\ ^oC$	I_R	< 100	μA
$V_R = 15$ V; $T_{amb} = 25\ ^oC$	I_R	< 60	μA
Diode capacitance			
$V_R = 1$ V; f = 0.5 MHz	C_d	< 1.2	pF
Reverse recovery current when switched from			
$I_F = 3$ mA to $V_R = 5$ V; $R_L = 0.5$ kΩ measured at $t_{rr} = 50$ ns	I_R	< 0.5	mA
Reverse recovery time when switched from			
$I_D = 3$ mA to $V_R = 1$ V; $R_L = 100\ \Omega$ measured at $I_R = 1$ mA	t_{rr}	typ. 5	ns
		< 12	ns

POINT CONTACT DIODE

Germanium diode in all-glass DO-7 envelope for use as video detector and for general purposes.

MECHANICAL DATA Dimensions in mm

DO-7



The coloured band indicates the cathode

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

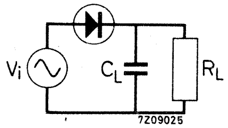
Average reverse voltage (averaged over any 50 ms period)	V_R	max.	20	V
Repetitive peak reverse voltage	V_{RRM}	max.	30	V
Non-repetitive peak reverse voltage	V_{RSM}	max.	40	V
Average forward current (averaged over any 50 ms period)	I_F	max.	8	mA
Repetitive peak forward current	I_{FRM}	max.	45	mA
Non-repetitive peak forward current ($t < 1$ s)	I_{FSM}	max.	200	mA
Storage temperature	T_{stg}		−55 to +90	°C
Operating ambient temperature	T_{amb}		−55 to +75	°C

CHARACTERISTICS

		T_{amb} = 25 °C	60 °C	
Forward voltage				
I_F = 0.1 mA	V_F	typ. 0.18	typ. 0.12	V
		0.1 to 0.25	< 0.20	V
I_F = 10 mA	V_F	typ. 1.0	typ. 0.95	V
		0.5 to 1.5	0.4 to 1.4	V
I_F = 30 mA	V_F	typ. 2.0	typ. 1.95	V
		1.1 to 3.2	1.0 to 3.1	V
Reverse current				
V_R = 1.5 V	I_R	typ. 2.4	typ. 11	μA
		< 10	< 40	μA
V_R = 10 V	I_R	typ. 20	typ. 45	μA
		< 135	< 270	μA
V_R = 20 V	I_R	typ. 90	typ. 140	μA
		< 450	< 650	μA
V_R = 30 V	I_R	typ. 300	typ. 400	μA
		< 1100	< 1500	μA

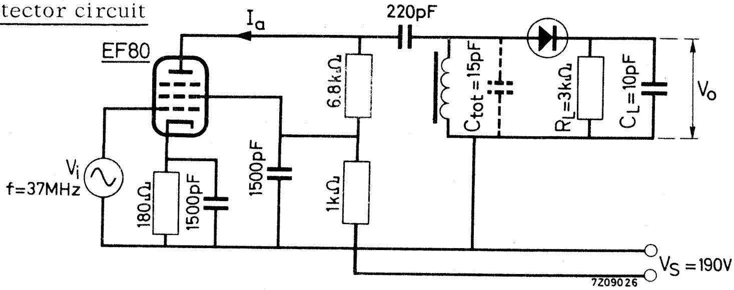
APPLICATION INFORMATION

Measuring circuit



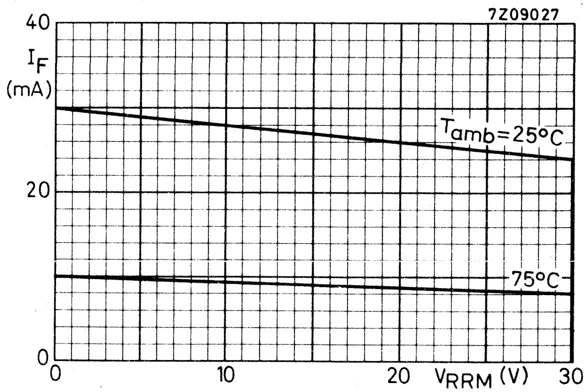
V_{im}	=	5	1.4	0.5	5	V
f	=	40	40	40	30	MHz
C_L	=	10	10	10	10	pF
R_L	=	3	3	3	3.9	kΩ
η	typ.	63	54	34	>60	%
R_d	typ.	2.4	2.8	3.7	>2.9	kΩ

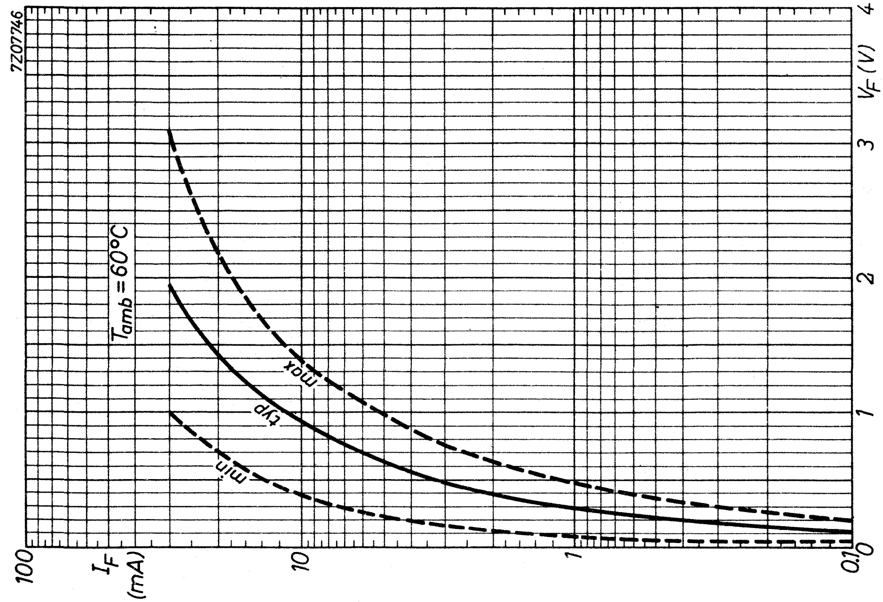
Video detector circuit

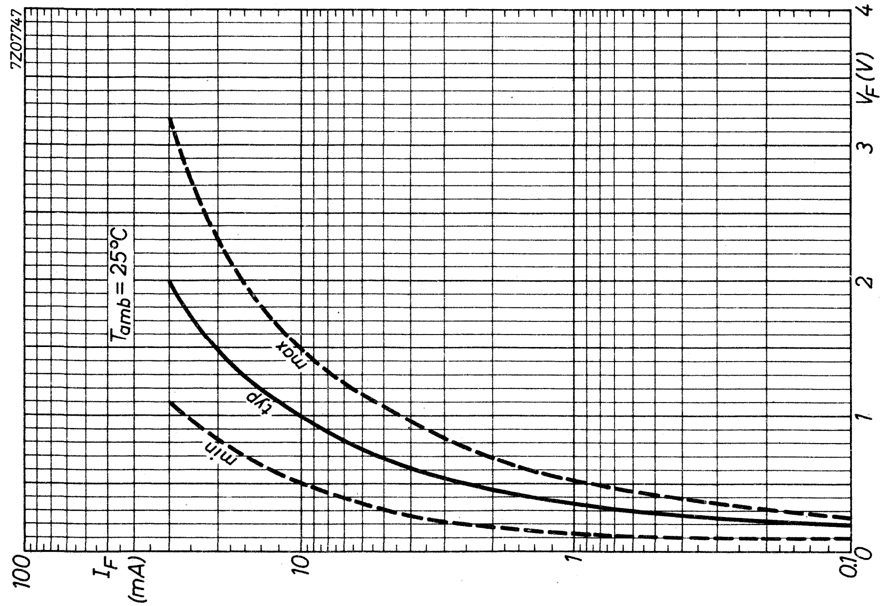


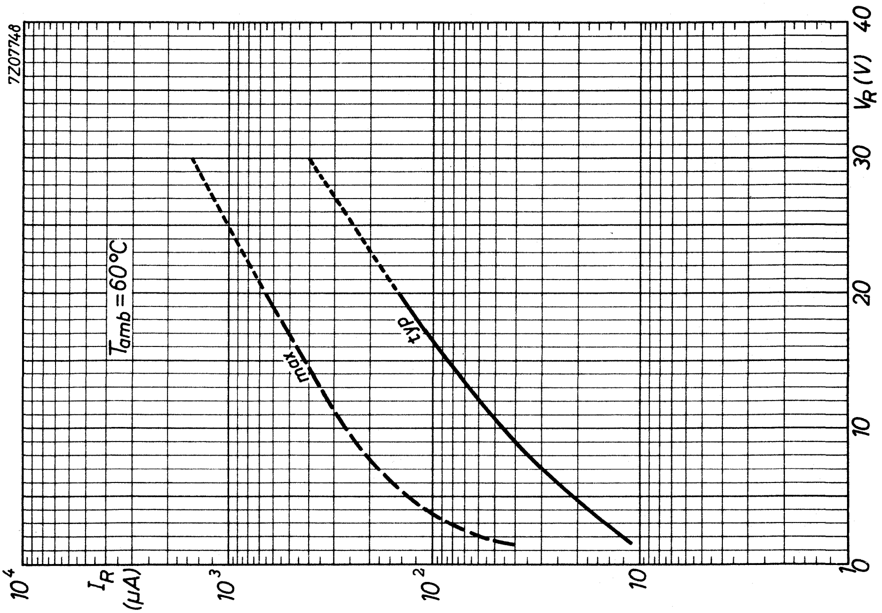
Q of the tuned circuit with removed diode: Q = 19

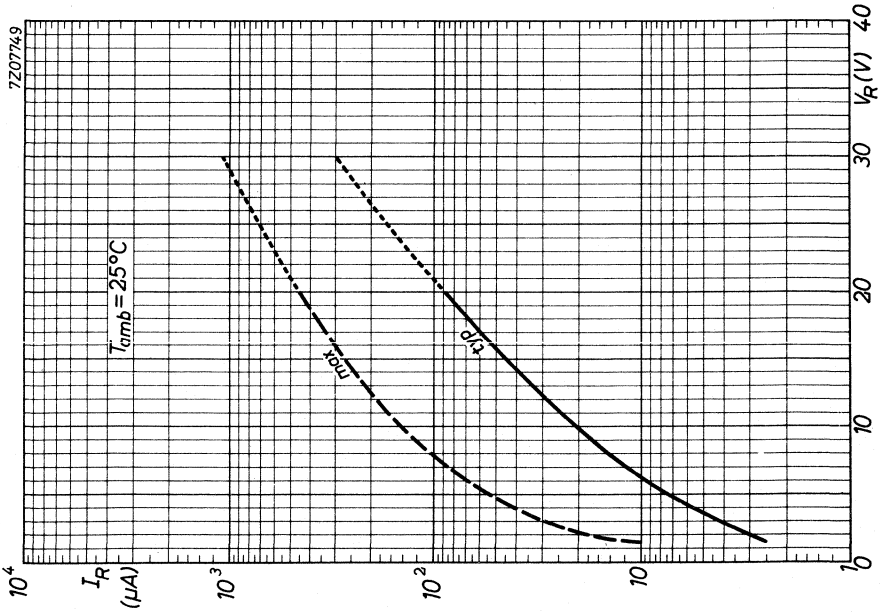
I_{am}	=	2.5	0.25	mA
B	=	4.7	4.1	MHz
V_o	typ.	2.7	0.20	V

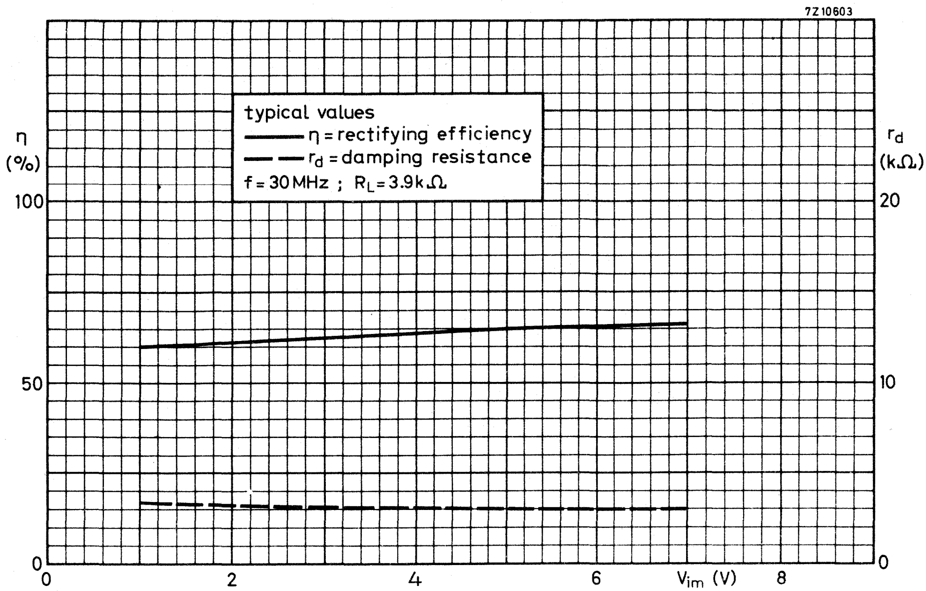



7Z07746
Tamb = 60°C
max
typ
min
100
IF (mA)
10
1
0.1
0
1
2
3
4
VF (V)


7Z07747
Tamb = 25°C
max
typ
min
100
IF (mA)
10
1
0.1
0
1
2
3
4
VF (V)


7Z07748
T_{amb} = 60°C
max
typ
I_R (μA)
10^4
10^3
10^2
10
1
0
10
20
30
40
V_R (V)


7Z07749
T_{amb} = 25°C
max
typ
I_R (μA)
10^4
10^3
10^2
10
1
0
10
20
30
40
V_R (V)

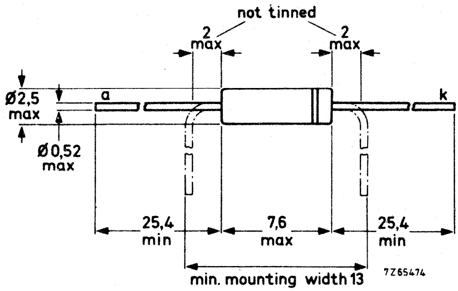

7Z10603
typical values
η = rectifying efficiency
r_d = damping resistance
f = 30 MHz ; R_L = 3.9 kΩ
η
(%)
100
50
0
r_d
(kΩ)
20
10
0
0
2
4
6
8
V_im (V)

POINT CONTACT DIODE

Germanium diode in all-glass DO-7 envelope intended for general purposes.

MECHANICAL DATA Dimensions in mm

DO-7



The coloured band indicates the cathode

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

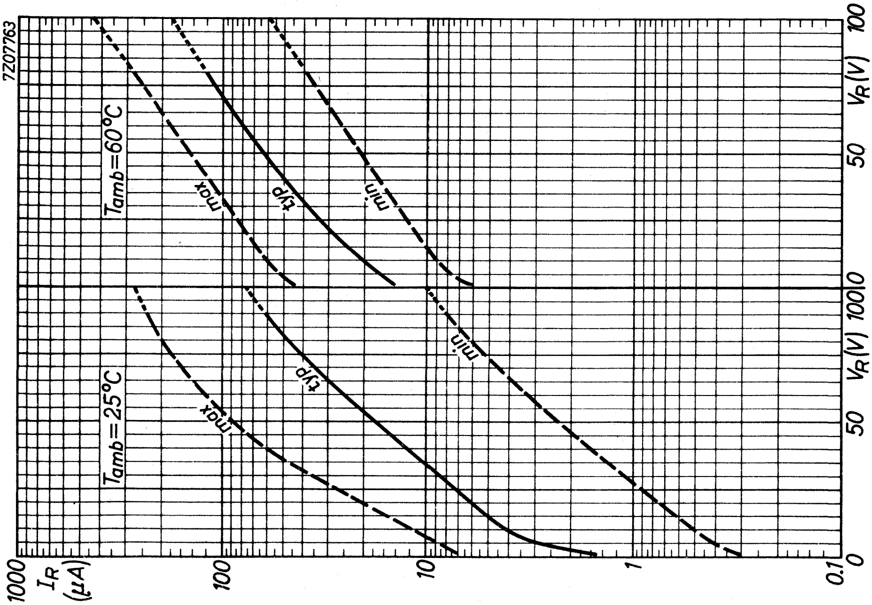
Average reverse voltage (averaged over any 50 ms period)	V_R	max.	90	V
Repetitive peak reverse voltage	V_{RRM}	max.	115	V
Average forward current (averaged over any 50 ms period)	I_F	max.	50	mA
Repetitive peak forward current	I_{FRM}	max.	150	mA
Non-repetitive peak forward current ($t < 1$ s)	I_{FSM}	max.	500	mA
Storage temperature	T_{stg}		−55 to +75	°C
Operating ambient temperature	T_{amb}		−55 to +75	°C

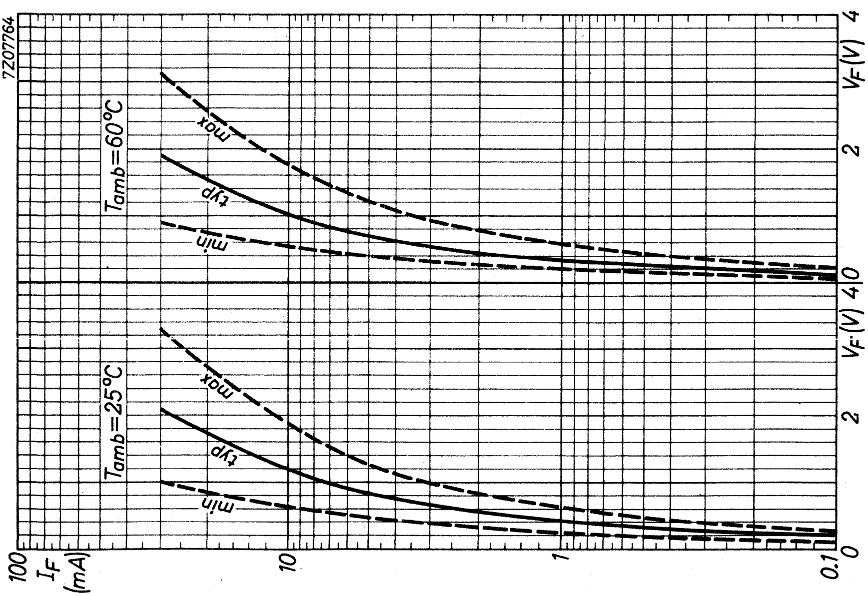
THERMAL RESISTANCE

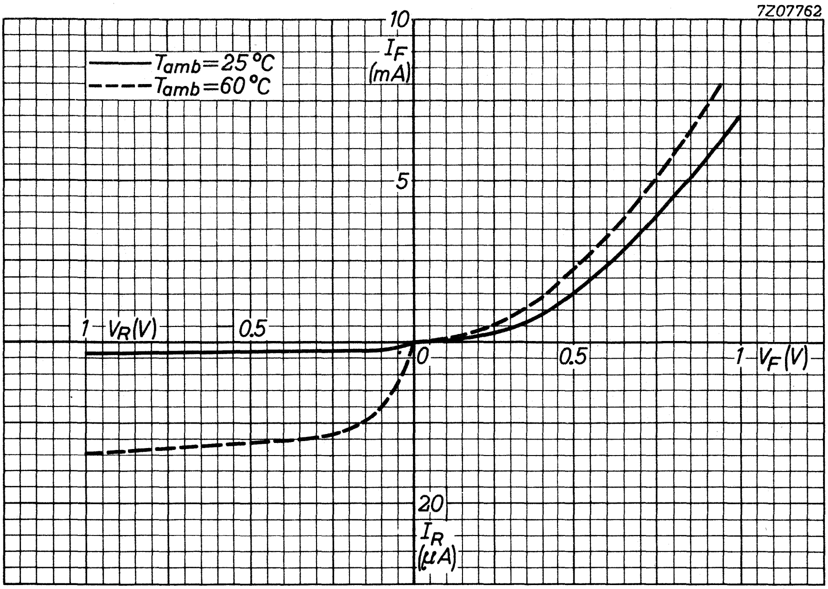
From junction to ambient in free air $R_{th\ j\text{-}a}$ = 0.55 °C/mW

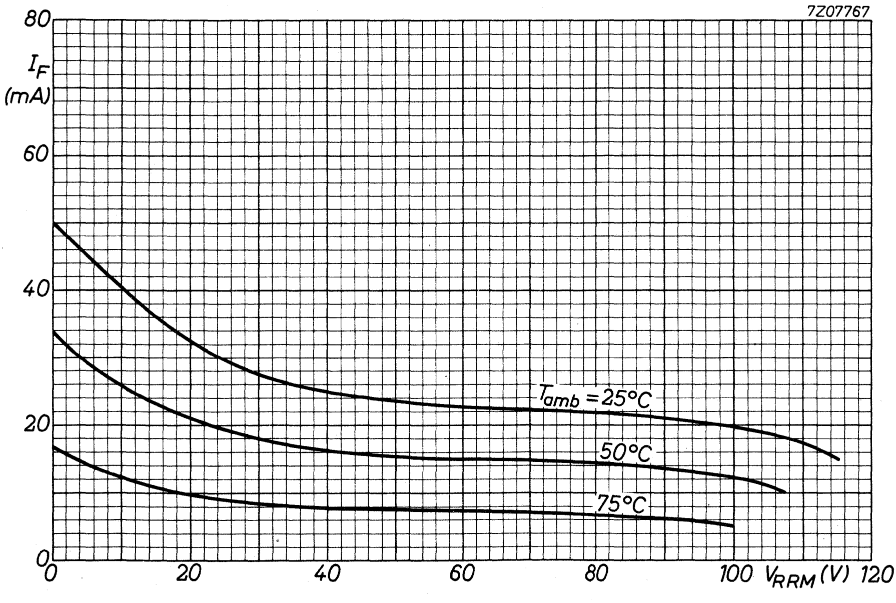
CHARACTERISTICS

		T_{amb} = 25 °C	T_{amb} = 60 °C	
Forward voltage				
I_F = 0.1 mA	V_F	typ. 0.18 0.1 to 0.25	typ. 0.1 0.05 to 0.2	V V
I_F = 10 mA	V_F	typ. 1.2 0.65 to 1.9	typ. 1.05 0.55 to 1.8	V V
I_F = 30 mA	V_F	typ. 2.1 1.0 to 3.3	typ. 1.9 0.9 to 3.15	V V
Reverse current				
V_R = 1.5 V	I_R	typ. 1.5 0.3 to 7	typ. 15 6 to 45	μA μA
V_R = 10 V	I_R	typ. 4 0.5 to 11	typ. 20 9 to 60	μA μA
V_R = 75 V	I_R	typ. 40 5.5 to 180	typ. 115 35 to 260	μA μA
V_R = 100 V	I_R	typ. 75 10 to 275	typ. 190 60 to 450	μA μA


7Z07763
Tamb=60°C
Tamb=25°C
max
typ
min
IR (μA)
VR (V)


7Z07764
Tamb=60°C
Tamb=25°C
max
typ
min
IF (mA)
VF (V)

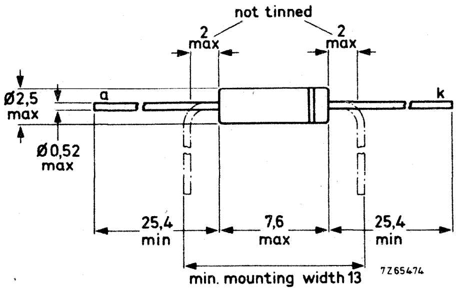

7Z07762
10
I_F (mA)
T_{amb}=25 °C
T_{amb}=60 °C
5
1 V_R(V) 0.5
0
0.5
1 V_F(V)
20
I_R (μA)


7Z07767
80
I_F (mA)
60
40
20
0
T_{amb} =25°C
50°C
75°C
0 20 40 60 80 100 V_{RRM} (V) 120

POINT CONTACT DIODE

Germanium diode in all-glass DO-7 envelope intended for general purposes.

MECHANICAL DATA Dimensions in mm



The coloured band indicates the cathode

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

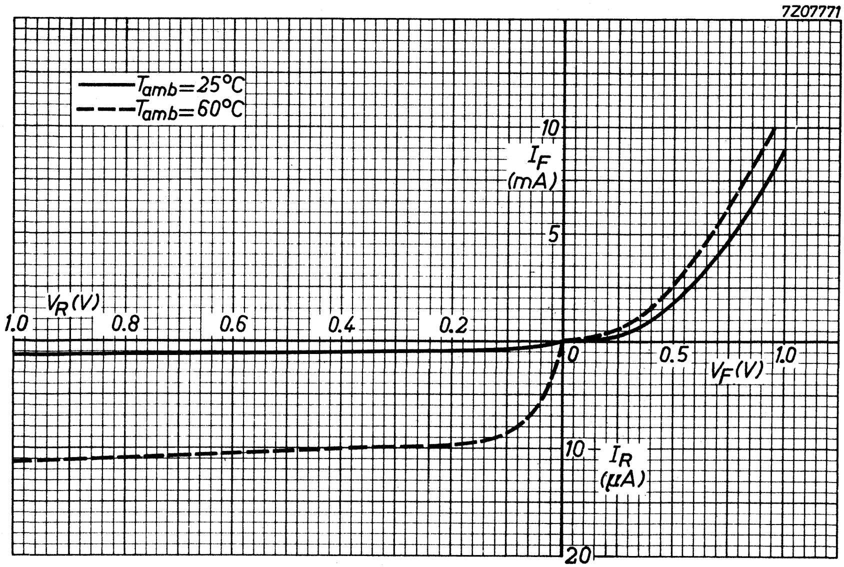
Average reverse voltage (averaged over any 50 ms period)	V_R	max.	90	V
Repetitive peak reverse voltage	V_{RRM}	max.	115	V
Average forward current (averaged over any 50 ms period)	I_F	max.	50	mA
Repetitive peak forward current	I_{FRM}	max.	150	mA
Non-repetitive peak forward current ($t < 1$ s)	I_{FSM}	max.	500	mA
Storage temperature	T_{stg}	−55 to +75		°C
Operating ambient temperature	T_{amb}	−55 to +75		°C

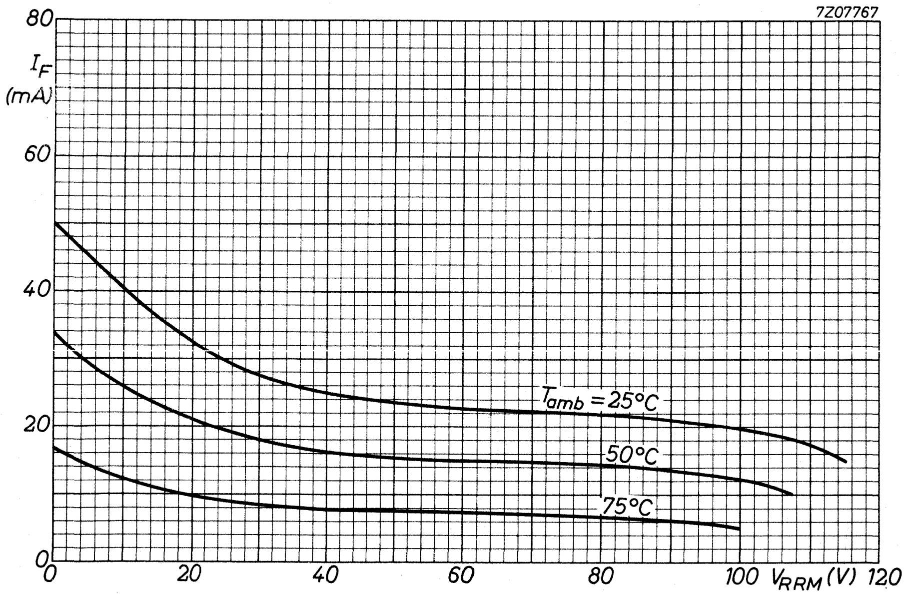
THERMAL RESISTANCE

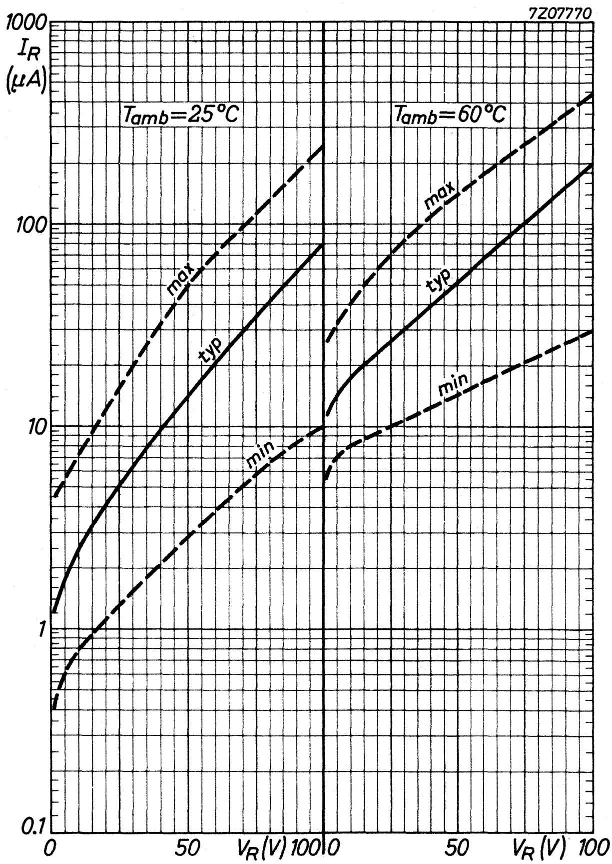
From junction to ambient in free air $R_{th\ j\text{-}a}$ = 0.55 °C/mW

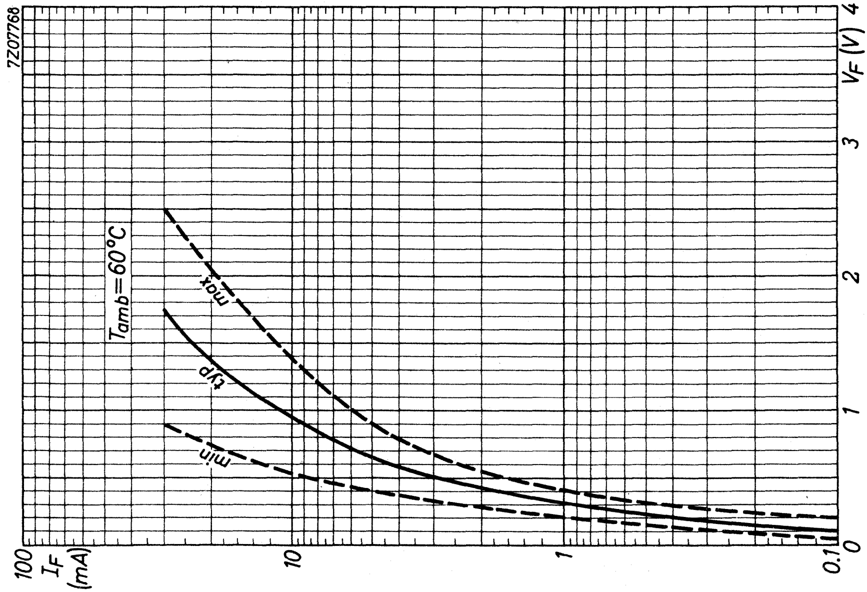
CHARACTERISTICS

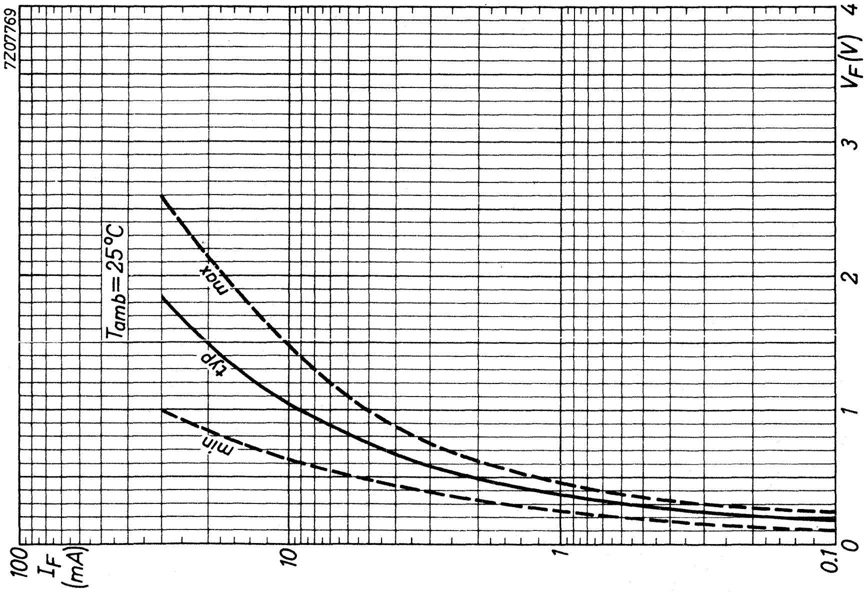
		T_{amb} = 25 °C	T_{amb} = 60 °C	
Forward voltage				
I_F = 0.1 mA	V_F	typ. 0.18	typ. 0.1	V
		0.1 to 0.25	0.05 to 0.2	V
I_F = 10 mA	V_F	typ. 1.05	typ. 0.95	V
		0.65 to 1.5	0.55 to 1.4	V
I_F = 30 mA	V_F	typ. 1.85	typ. 1.75	V
		1.0 to 2.6	0.9 to 2.5	V
Reverse current				
V_R = 1.5 V	I_R	typ. 1.2	typ. 12	µA
		0.4 to 4.5	5.5 to 26	µA
V_R = 10 V	I_R	typ. 2.5	typ. 17	µA
		0.8 to 7	8 to 40	µA
V_R = 75 V	I_R	typ. 35	typ. 100	µA
		5.7 to 110	20 to 250	µA
V_R = 100 V	I_R	typ. 80	typ. 200	µA
		10 to 250	30 to 430	µA


7Z07771
T_{amb} = 25°C
T_{amb} = 60°C
10
I_F (mA)
5
V_R (V)
1.0
0.8
0.6
0.4
0.2
0
0.5
1.0
V_F (V)
10
I_R (μA)
20


7Z07767
80
I_F (mA)
60
40
20
0
T_{amb} = 25°C
50°C
75°C
0
20
40
60
80
100
V_{RRM} (V)
120


7Z07770
1000
I_R
(μA)
100
10
1
0.1
T_{amb}=25°C
T_{amb}=60°C
max
typ
min
max
typ
min
0
50
V_R(V)
100
0
50
V_R(V)
100


7Z07768
T_{amb}=60°C
max
typ
min
V_F (V)
0
1
2
3
4
I_F (mA)
100
10
1
0.1


7Z07769
T_{amb}=25°C
max
typ
min
V_F (V)
0
1
2
3
4
I_F (mA)
100
10
1
0.1

Germanium small signal diodes

Gold bonded

GOLD BONDED DIODES

Germanium diodes in DO-7 envelope

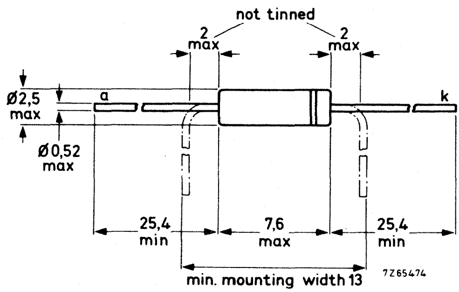
Quoted values are max.

	type	V_R (V)	I_F (mA)	I_{FRM} (mA)	t_{rr} (ns)	C_d (pF)	V_F (V)	at I_F (mA)
general purpose	AAZ15	75	140	250	–	2	1,1	250
	AAZ17	50	140	250	–	2	1,1	250
general purpose and switching	AAY30	30	110	400	150	2,0	1,0	150
	AAY32	30	110	150	50	1,5	1,0	150
	AAZ13	8	30	100	–	2,0	1,0	30
	AAZ18	20	130	300	70	2,5	1,0	300
	OA47	25	110	150	70	3,5	1,1	150

MECHANICAL DATA

Dimensions in mm

DO-7



Cathode indicated by coloured band

GOLD BONDED DIODES

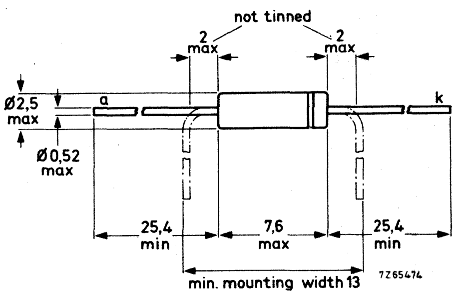
Germanium diodes in all-glass DO-7 envelope, intended for switching applications and general purposes.

QUICK REFERENCE DATA					
			AAY30	AAY32	
Continuous reverse voltage	V_R	max.	30	30	V
Repetitive peak reverse voltage	V_{RRM}	max.	50	30	V
Forward current (d.c.)	I_F	max.	110	110	mA
Repetitive peak forward current	I_{FRM}	max.	400	150	mA
Junction temperature	T_j	max.	75	85	^oC
Forward voltage at I_F = 150 mA	V_F	<	1,0	1,0	V
Recovered charge when switched from I_F = 10 mA to V_R = 10 V	Q_s	<	500	150	pC

MECHANICAL DATA

Dimensions in mm

DO-7



The coloured band indicates the cathode

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

Voltages			AAY30	AAY32	
Continuous reverse voltage	V_R	max.	30	30	V
Repetitive peak reverse voltage	V_{RRM}	max.	50	30	V
Non-repetitive peak reverse voltage ($t < 1$ s)	V_{RSM}	max.	50	30	V
Currents					
Forward current (d.c.)	I_F	max.	110	110	mA
Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	110	110	mA
Repetitive peak forward current	I_{FRM}	max.	400	150	mA
Non-repetitive peak forward current ($t < 1$ s)	I_{FSM}	max.	500	200	mA

Temperatures

Storage temperature	AAY30	T_{stg}	−65 to +75	°C
	AAY32	T_{stg}	−65 to +85	°C
Junction temperature	AAY30	T_j	max. 75	°C
	AAY32	T_j	max. 85	°C

THERMAL RESISTANCE

From junction to ambient in free air $R_{th\,j\text{-}a}$ = 0.55 °C/mW

CHARACTERISTICS

Forward voltage at T_j = 25 °C

I_F = 0.1 mA	V_F	<	0.20	V
I_F = 1.0 mA	V_F	<	0.31	V
I_F = 10 mA	V_F	<	0.45	V
I_F = 30 mA	V_F	<	0.60	V
I_F = 150 mA	V_F	<	1.0	V

Forward voltage at T_j = 60 °C

I_F = 0.1 mA	V_F	<	0.14	V
I_F = 1.0 mA	V_F	<	0.26	V
I_F = 10 mA	V_F	<	0.41	V
I_F = 30 mA	V_F	<	0.57	V
I_F = 150 mA	V_F	<	0.99	V

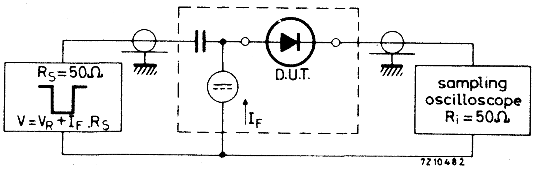
			AAY30	AAY32	
Reverse current at T_j = 25 °C					
V_R = 1.5 V	I_R	<	9	2.5	μA
V_R = 10 V	I_R	<	15	8	μA
V_R = 20 V	I_R	<	25	25	μA
V_R = 25 V	I_R	<	35	35	μA
V_R = 30 V	I_R	<	50	70	μA
V_R = 50 V	I_R	<	200	–	μA
Reverse current at T_j = 60 °C					
V_R = 1.5 V	I_R	<	40	15	μA
V_R = 10 V	I_R	<	60	30	μA
V_R = 20 V	I_R	<	120	60	μA
V_R = 25 V	I_R	<	150	100	μA
V_R = 30 V	I_R	<	200	200	μA
V_R = 50 V	I_R	<	500	–	μA
Diode capacitance					
V_R = 1 V; f = 1 MHz	C_d	<	2.0	1.5	pF

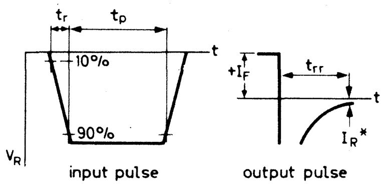
CHARACTERISTICS (continued) $T_j = 25\ ^oC$

Reverse recovery time when switched
from $I_F = 10$ mA to $V_R = 1$ V; $R_L = 100\ \Omega$

Measured at $I_R = 10\ \%$ of $\frac{V_R}{R_L}$	AAY30	t_{rr}	< 150	ns
	AAY32	t_{rr}	< 50	ns

Test circuit:





*) $I_R = 10\ \%$ of $\frac{V_R}{R_L}$

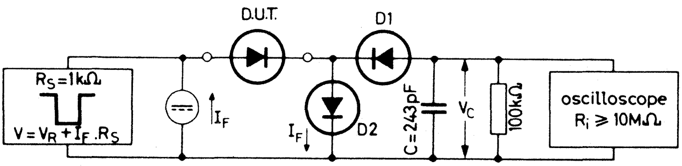
Reverse pulse:	Rise time	t_r	= 0.6	ns
	Pulse duration	t_p	= 100	ns
	Duty cycle	δ	= 0.05	

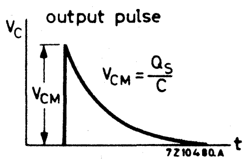
Circuit capacitance C < 1 pF (C = Oscilloscope + parasitical capacitance)

Recovered charge when switched
from $I_F = 10$ mA to $V_R = 10$ V; $R_L = 1$ kΩ

AAY30	Q_s	< 500	pC
AAY32	Q_s	< 150	pC

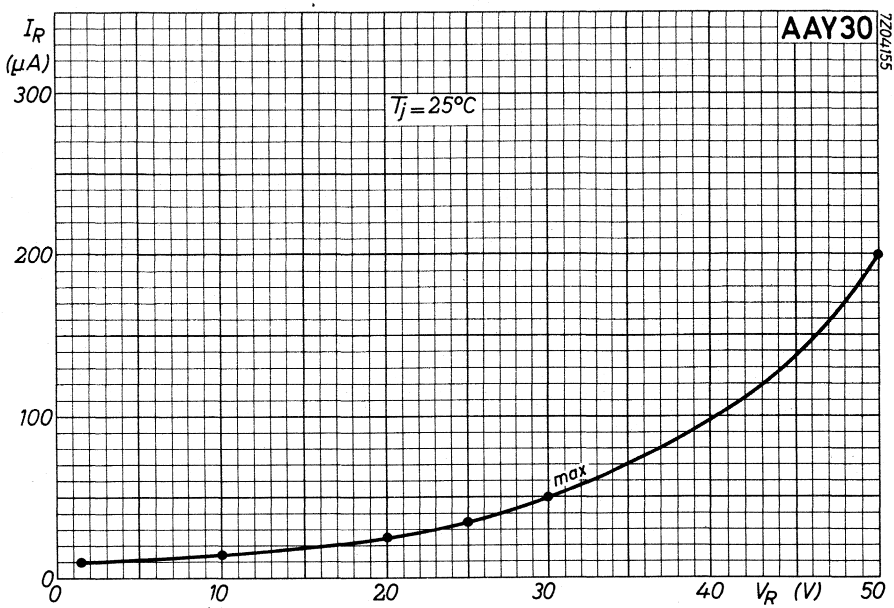
Test circuit:

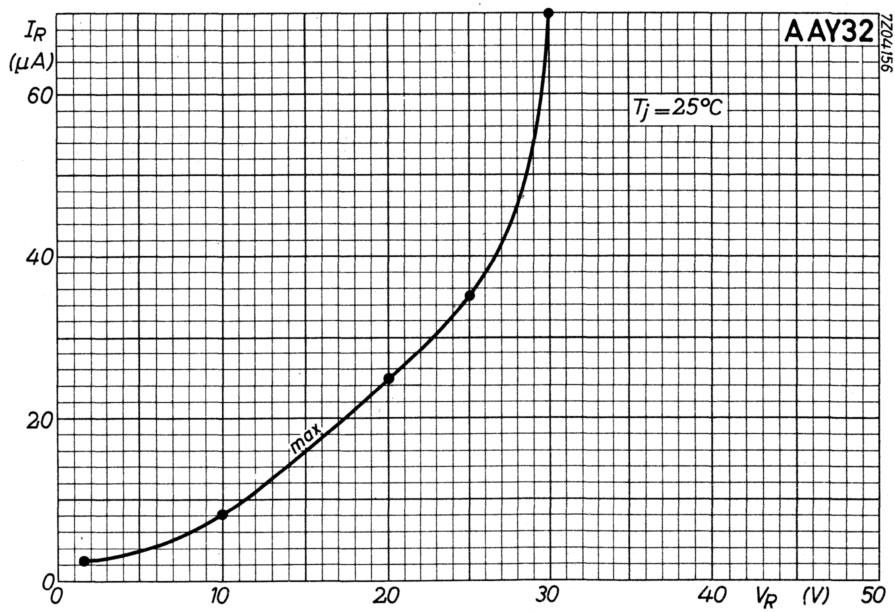


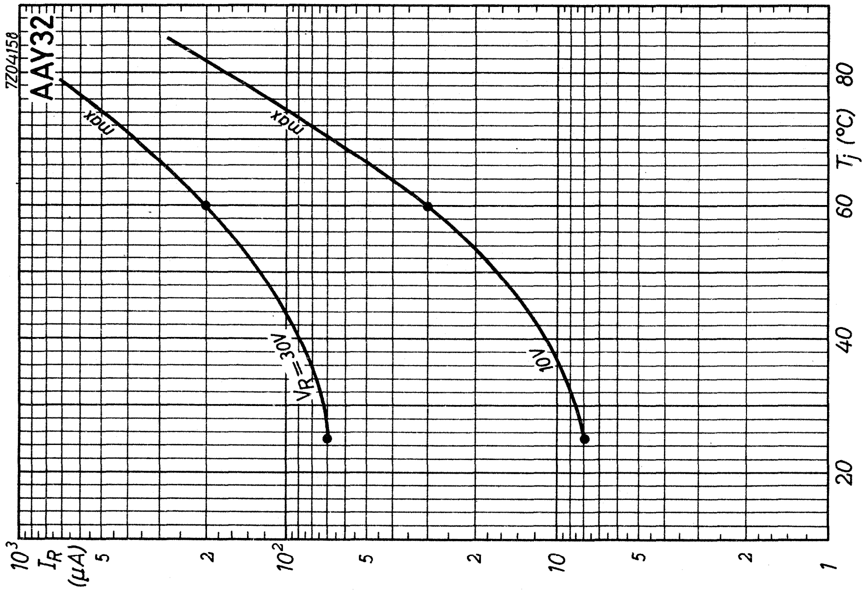


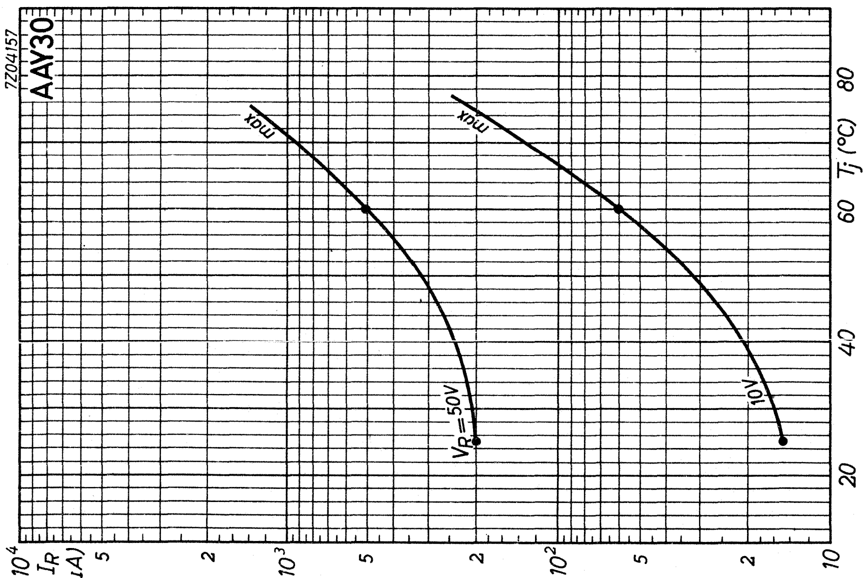
D1 = D2 = BAW62

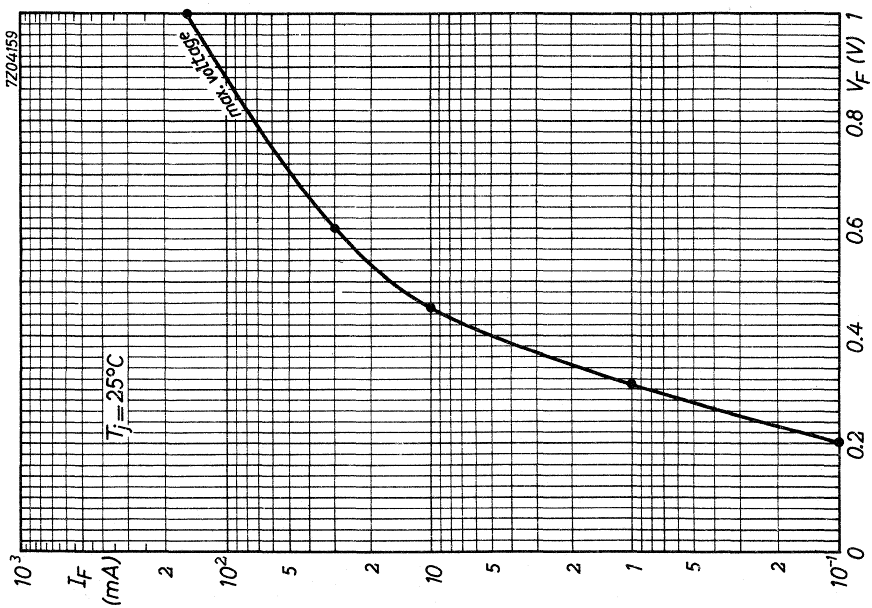
Reverse pulse:	Rise time	t_r	= 2	ns
	Pulse duration	t_p	= 0.4	μs
	Duty cycle	δ	= 0.02	

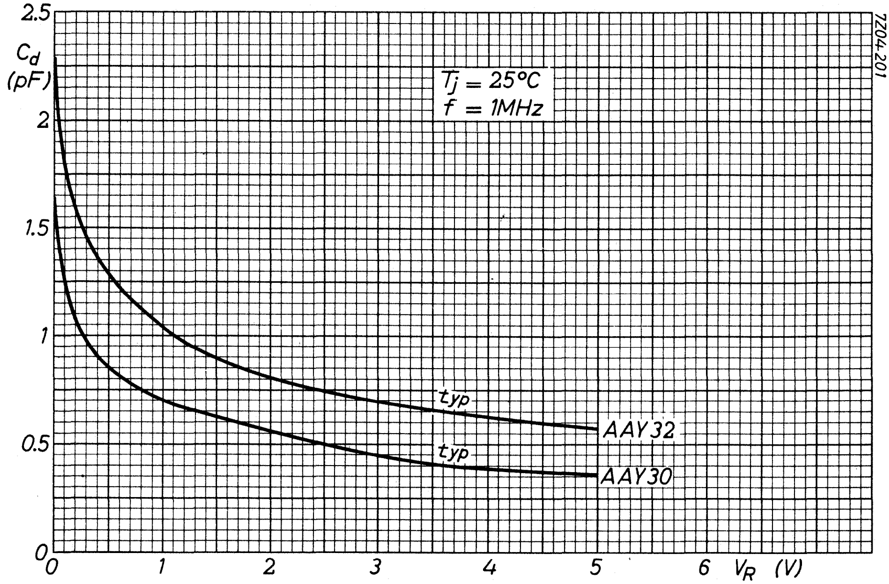

I_R
(μA)
300
200
100
0
0
10
20
30
40
V_R (V)
50
AAY30
7Z04155
$T_j = 25°C$
max

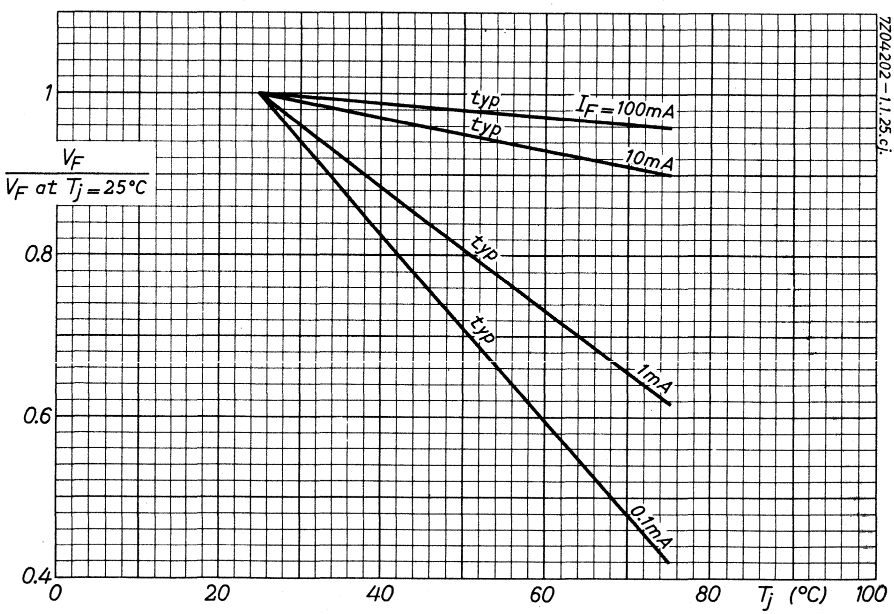

I_R
(μA)
60
40
20
0
0
10
20
30
40
V_R (V)
50
AAY32
7Z04156
$T_j = 25°C$
max

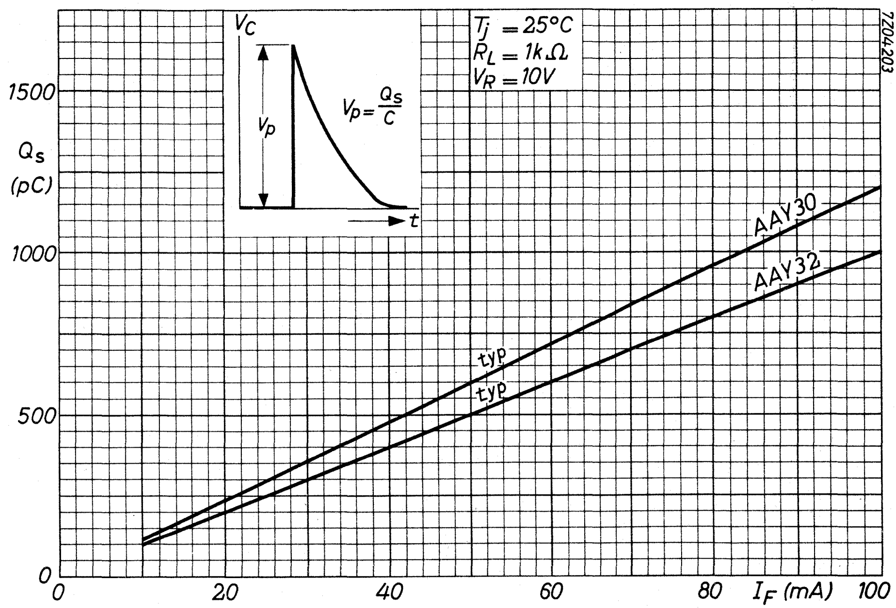

7Z04158
AAY32
max
max
$V_R = 30V$
10V
I_R (μA)
10^3
5
2
10^2
5
2
10
5
2
1
20
40
60
80
T_j (°C)

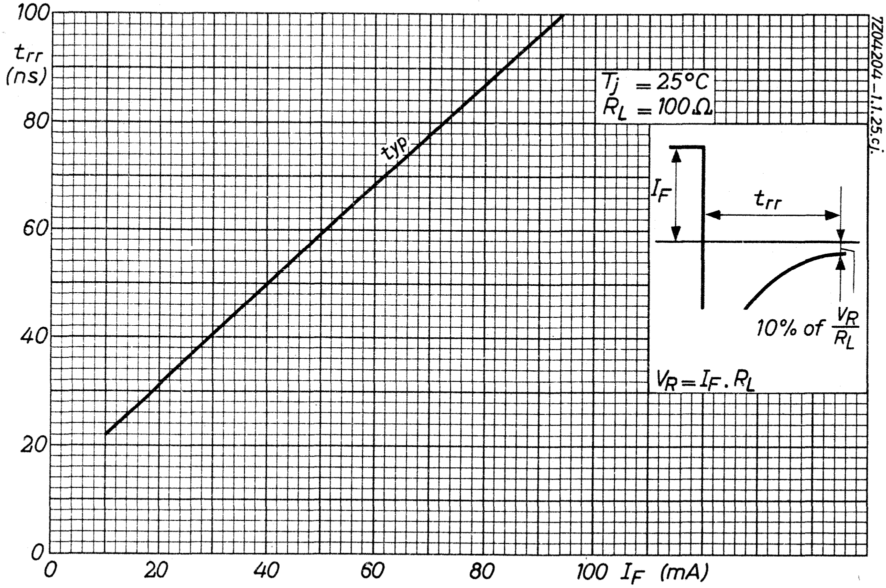

7Z04157
AAY30
max
max
$V_R = 50V$
10V
I_R (μA)
10^4
5
2
10^3
5
2
10^2
5
2
10
20
40
60
80
T_j (°C)

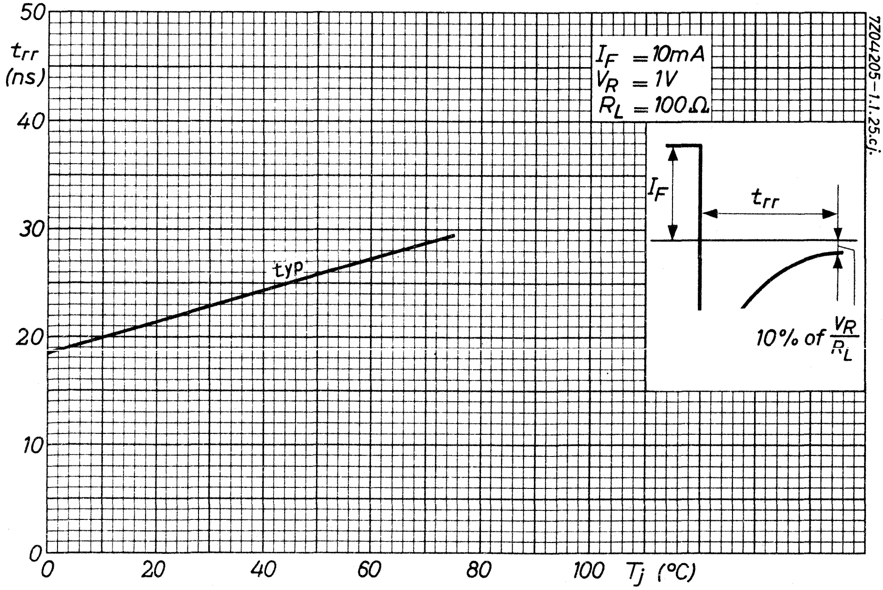

7204159
max. voltage
Tj = 25°C
IF (mA)
VF (V)
10^3
2
10^2
5
2
10
5
2
1
5
2
10^-1
0
0.2
0.4
0.6
0.8
1


2.5
C_d
(pF)
2
1.5
1
0.5
0
0
1
2
3
4
5
6
V_R (V)
T_j = 25°C
f = 1MHz
typ
AAY32
typ
AAY30
7Z04201


1
$\frac{V_F}{V_F \text{ at } T_j = 25°C}$
0.8
0.6
0.4
0
20
40
60
80
T_j (°C)
100
typ
I_F=100mA
typ
10mA
typ
1mA
typ
0.1mA
7Z04202-1.1.25.cj.


7Z04203
V_C
V_p
$V_p = \frac{Q_s}{C}$
t
$T_j = 25°C$
$R_L = 1k\Omega$
$V_R = 10V$
1500
Q_s
(pC)
1000
500
0
0
20
40
60
80
I_F (mA)
100
AAY30
AAY32
typ
typ


100
t_{rr} (ns)
80
60
40
20
0
0
20
40
60
80
100 I_F (mA)
typ
T_j = 25°C
R_L = 100 Ω
I_F
t_{rr}
10% of $\frac{V_R}{R_L}$
$V_R = I_F . R_L$
7Z04204-1.1.25.ci.


50
t_{rr} (ns)
40
30
20
10
0
0
20
40
60
80
100 T_j (°C)
typ
I_F = 10mA
V_R = 1V
R_L = 100 Ω
I_F
t_{rr}
10% of $\frac{V_R}{R_L}$
7Z04205-1.1.25.ci.

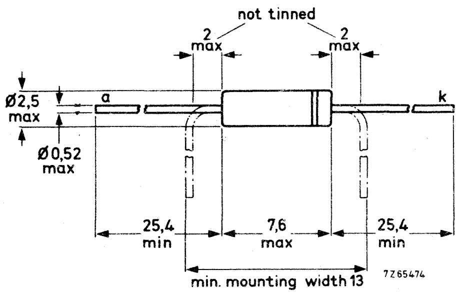
GOLD BONDED DIODE

Germanium diode in all-glass DO-7 envelope, intended for high speed switching applications.

MECHANICAL DATA

Dimensions in mm

DO-7



The coloured band indicates the cathode

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

Voltage

Continuous reverse voltage	V_R	max.	8	V

Currents

Forward current (d.c. or average over any 50 ms period)	I_F	max.	30	mA
Repetitive peak forward current ($t < 5$ ms)	I_{FRM}	max.	100	mA

Temperatures

Storage temperature	T_{stg}	-55 to +75		^oC
Junction temperature	T_j	max.	75	^oC

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.55	$^oC/mW$

CHARACTERISTICS T_{amb} = 25 °C unless otherwise specified

Forward voltage

I_F = 1 mA	V_F	typ.	0.27	V
		<	0.32	V
I_F = 10 mA	V_F	typ.	0.50	V
		<	0.60	V
I_F = 30 mA	V_F	typ.	0.60	V
		<	1.00	V

Reverse current

			T_{amb} = 25	60 °C	
V_R = 3 V	I_R	typ.	5	30	µA
		<	25	85	µA
V_R = 8 V	I_R	typ.	30	190	µA
		<	150		µA

Diode capacitance

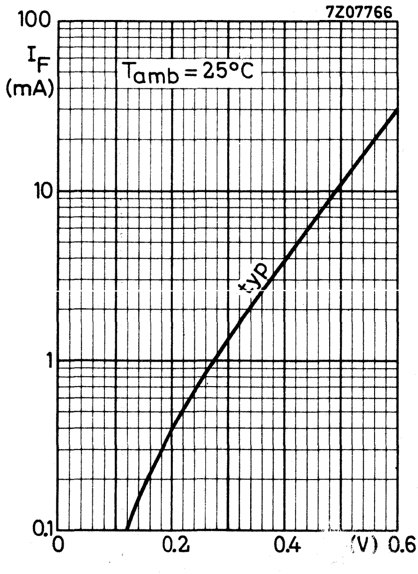
V_R = 1 V	C_d	typ.	3.3	pF
V_R = 3 V	C_d	typ.	1.3	pF
		<	2.0	pF

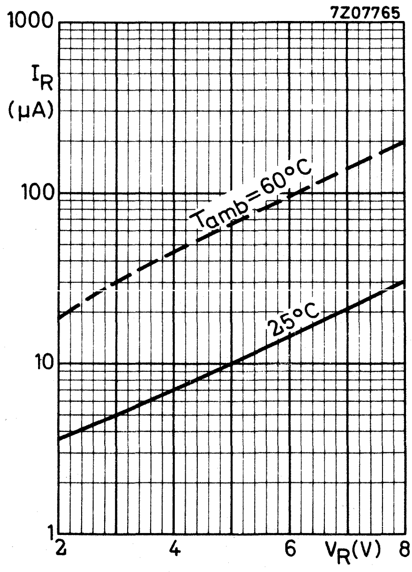
Forward recovery voltage

I_F = 20 mA; t_r = 5 ns	V_{FM}	typ.	0.7	V
		<	1.5	V

Recovered charge when switched from

I_F = 10 mA to V_R = 5 V; R_L = 0.5 kΩ; t_f = 5 ns	Q_s	typ.	20	pC
		<	30	pC





GOLD BONDED DIODES

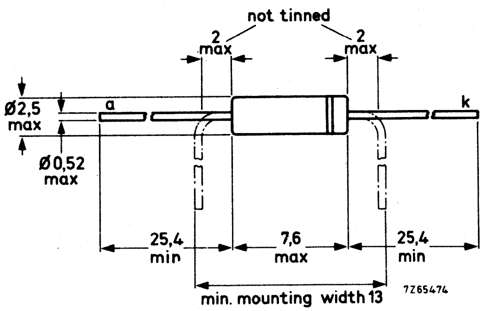
Germanium diodes in all-glass DO-7 envelope, intended for switching applications and general purposes.

QUICK REFERENCE DATA

			AAZ15	AAZ17	
Continuous reverse voltage	V_R	max.	75	50	V
Repetitive peak reverse voltage	V_{RRM}	max.	100	75	V
Forward current (d.c.)	I_F	max.	140	140	mA
Repetitive peak forward current	I_{FRM}	max.	250	250	mA
Junction temperature	T_j	max.	85	85	°C
Forward voltage at I_F = 250 mA	V_F	<	1.1	1.1	V
Recovered charge when switched from I_F = 10 mA to V_R = 10 V	Q_s	<	1800	900	pC

MECHANICAL DATA Dimensions in mm

DO-7



The coloured band indicates the cathode

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

Voltages			AAZ15	AAZ17	
Continuous reverse voltage	V_R	max.	75	50	V
Repetitive peak reverse voltage	V_{RRM}	max.	100	75	V
Non-repetitive peak reverse voltage ($t < 1$ s)	V_{RSM}	max.	115	75	V

Currents				
Forward current (d.c.)	I_F	max.	140	mA
Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	140	mA
Repetitive peak forward current	I_{FRM}	max.	250	mA
Non-repetitive peak forward current ($t < 1$ s)	I_{FSM}	max.	500	mA

Temperatures				
Storage temperature	T_{stg}		−65 to +85	^oC
Junction temperature	T_j	max.	85	^oC

THERMAL RESISTANCE

From junction to ambient in free air $R_{th\,j\text{-}a}$ = 0.55 $^oC/mW$

CHARACTERISTICS

Forward voltage at T_j = 25 °C

I_F = 0.1 mA	V_F < 0.20 V
I_F = 10 mA	V_F < 0.45 V
I_F = 250 mA	V_F < 1.10 V

Forward voltage at T_j = 60 °C

I_F = 0.1 mA	V_F < 0.15 V
I_F = 10 mA	V_F < 0.40 V
I_F = 250 mA	V_F < 1.07 V

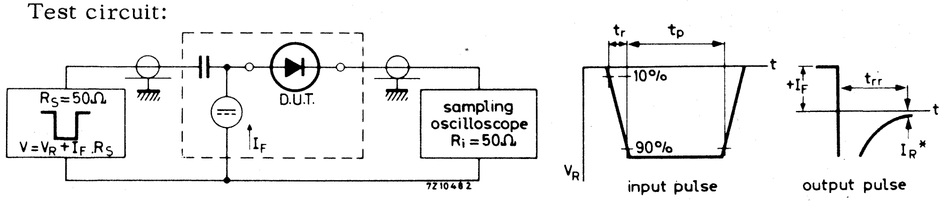
			AAZ15	AAZ17	
Reverse current at T_j = 25 °C					
V_R = 1.5 V	I_R	<	2.5	2.5	μA
V_R = 10 V	I_R	<	4	15	μA
V_R = 50 V	I_R	<	15	150	μA
V_R = 75 V	I_R	<	25	300	μA
V_R = 100 V	I_R	<	100	–	μA
Reverse current at T_j = 60 °C					
V_R = 1.5 V	I_R	<	30	30	μA
V_R = 10 V	I_R	<	40	60	μA
V_R = 50 V	I_R	<	80	300	μA
V_R = 75 V	I_R	<	120	500	μA
V_R = 100 V	I_R	<	300	–	μA
Diode capacitance					
V_R = 1 V; f = 1 MHz	C_d	<	2	2	pF

CHARACTERISTICS (continued) T_j = 25 °C

Reverse recovery time when switched
from I_F = 10 mA to V_R = 1 V; R_L = 100 Ω

Measured at I_R = 10 % of $\frac{V_R}{R_L}$	AAZ15	t_{rr}	typ.	350	ns
	AAZ17	t_{rr}	<	350	ns

Test circuit:



*) I_R = 10 % of $\frac{V_R}{R_L}$

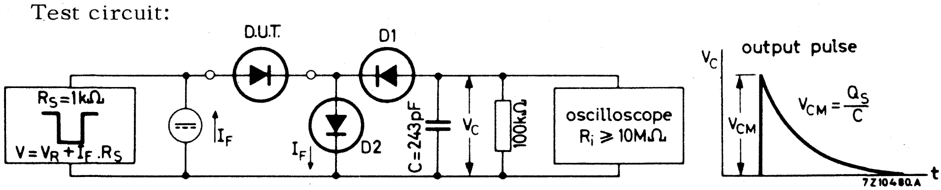
Reverse pulse: Rise time	t_r	=	0.6	ns
Pulse duration	t_p	=	100	ns
Duty cycle	δ	=	0.05	

Circuit capacitance C < 1 pF (C = Oscilloscope + parasitical capacitance)

Recovered charge when switched
from I_F = 10 mA to V_R = 10 V; R_L = 1 kΩ

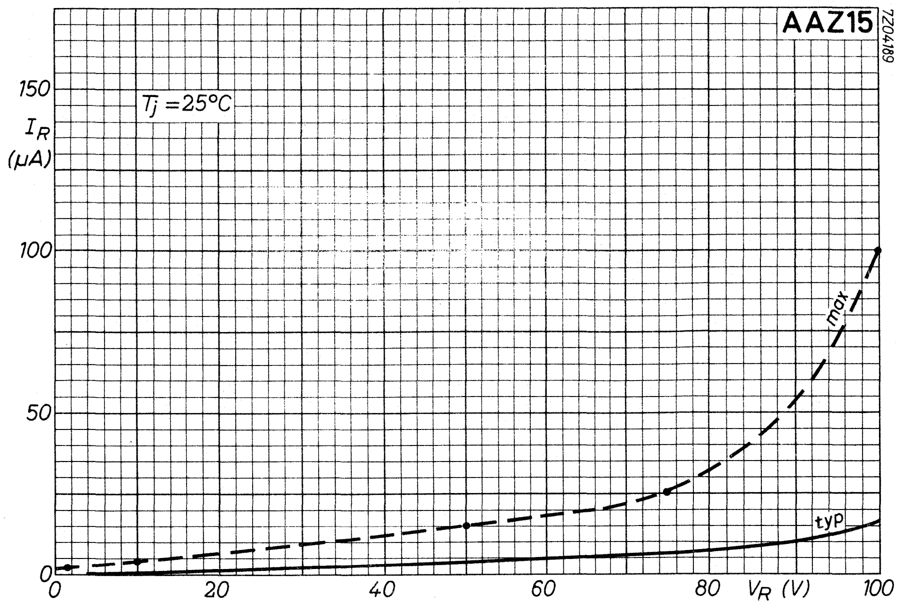
AAZ15	Q_s	<	1800	pC
AAZ17	Q_s	<	900	pC

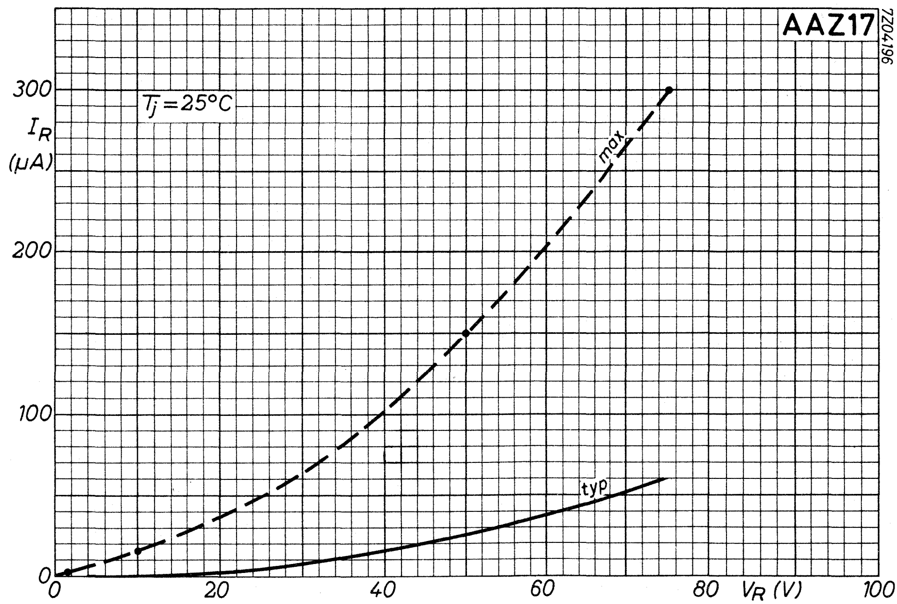
Test circuit:

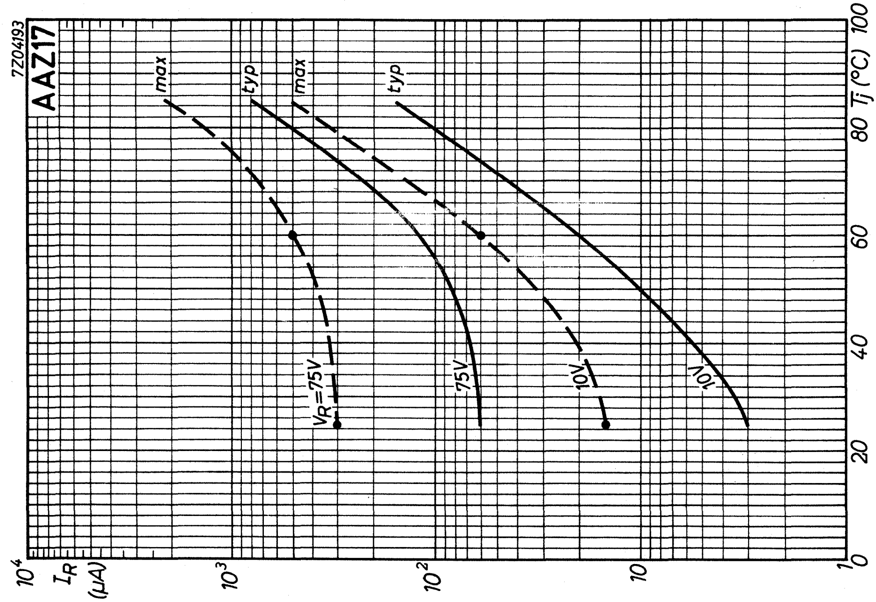


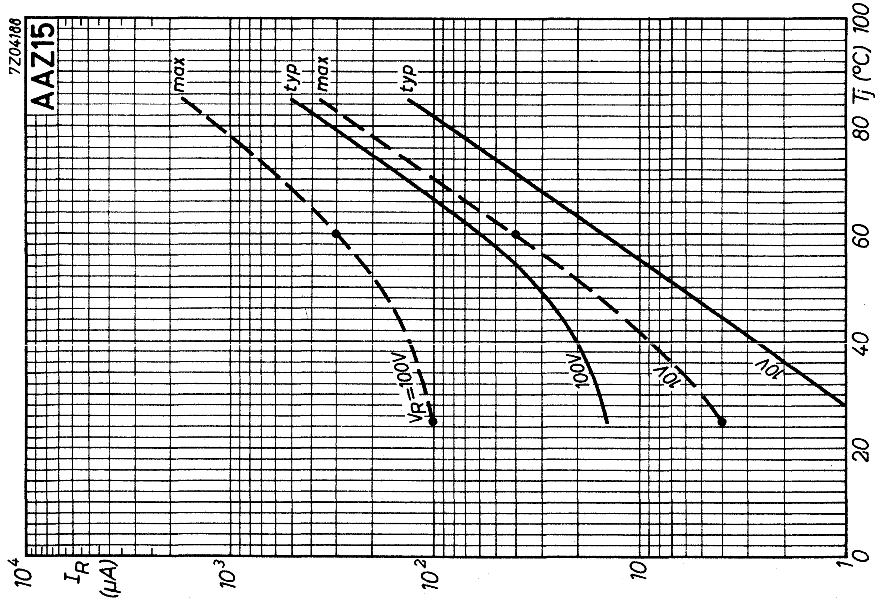
D1 = D2 = BAW62

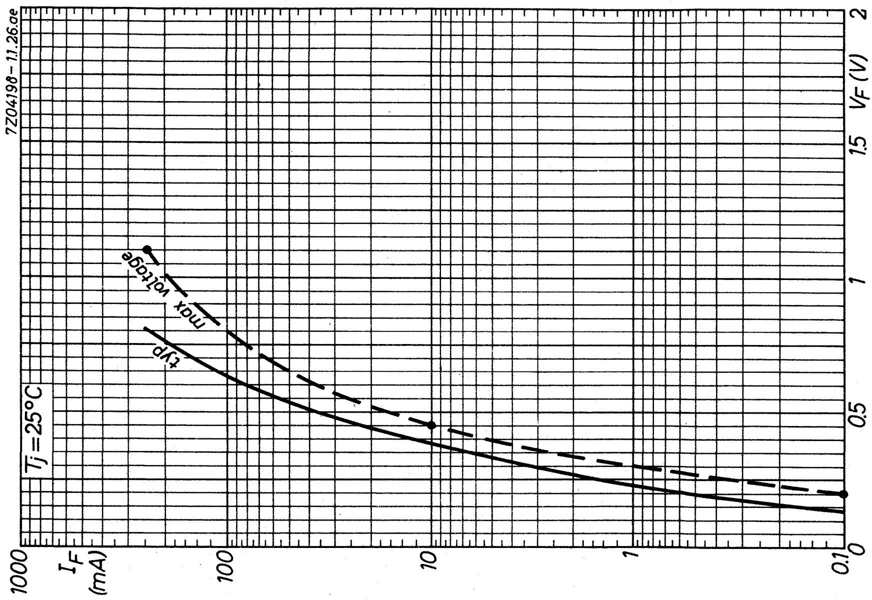
Reverse pulse: Rise time	t_r	=	2	ns
Pulse duration	t_p	=	0.4	μs
Duty cycle	δ	=	0.02	

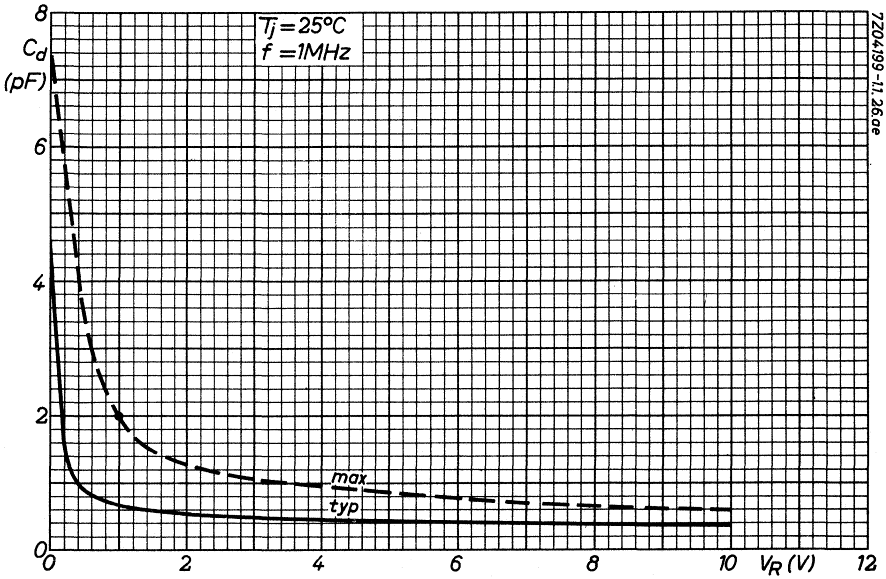

AAZ15
7Z04189
$T_j = 25°C$
150
I_R
(µA)
100
50
0
max
typ
0
20
40
60
80
V_R (V)
100

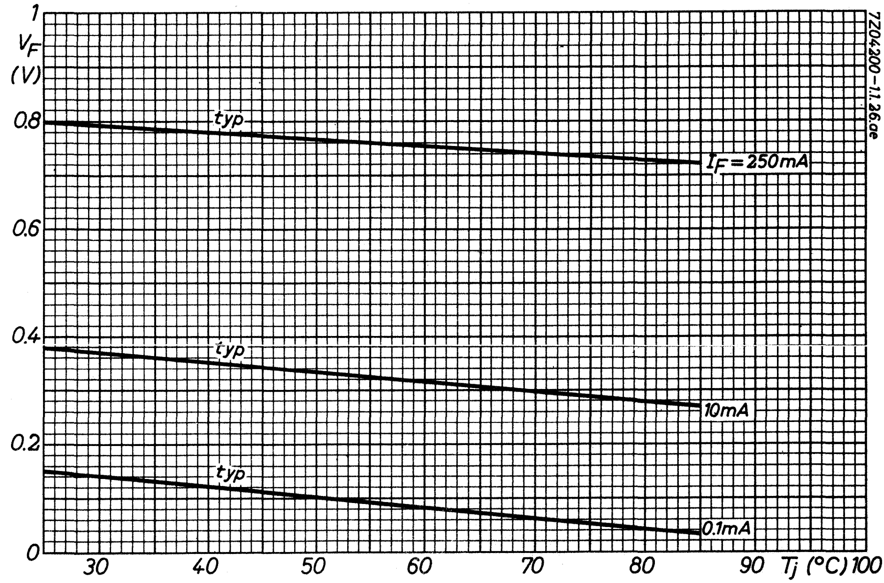

AAZ17
7Z04196
$T_j = 25°C$
300
I_R
(µA)
200
100
0
max
typ
0
20
40
60
80
V_R (V)
100

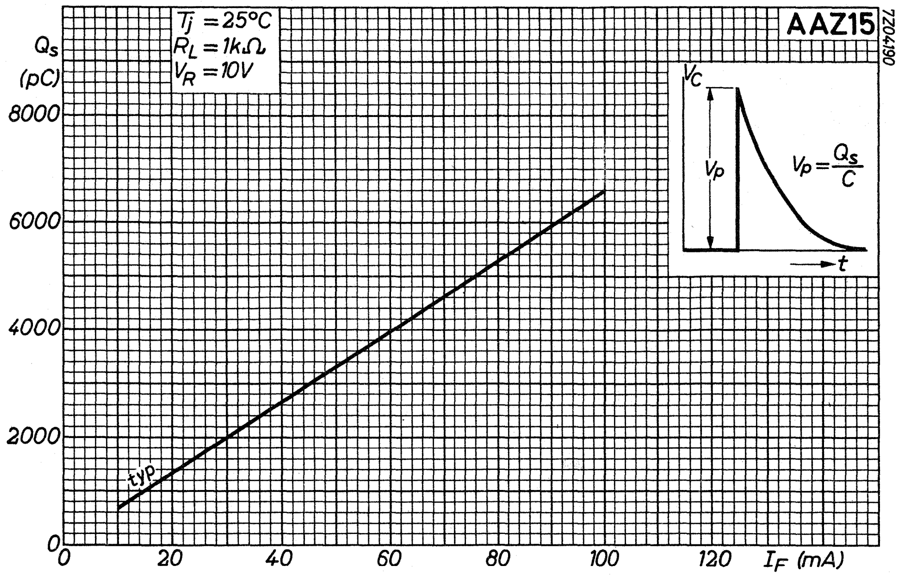

7Z04193
AAZ17
max
typ
max
typ
V_R=75V
75V
10V
10V
10^4
I_R
(μA)
10^3
10^2
10
1
0
20
40
60
80 Tj (°C)
100

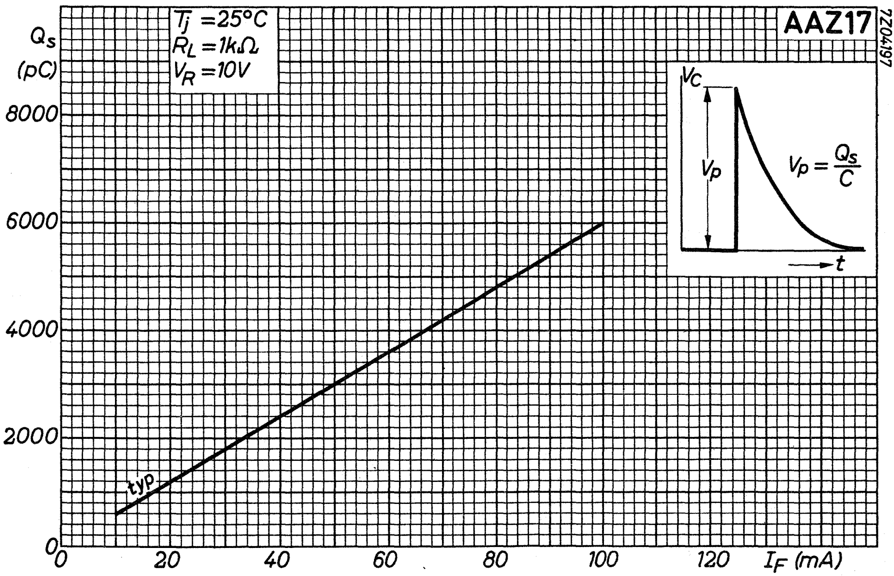

7Z04188
AAZ15
max
typ
max
typ
V_R=100V
100V
10V
10V
10^4
I_R
(μA)
10^3
10^2
10
1
0
20
40
60
80 Tj (°C)
100

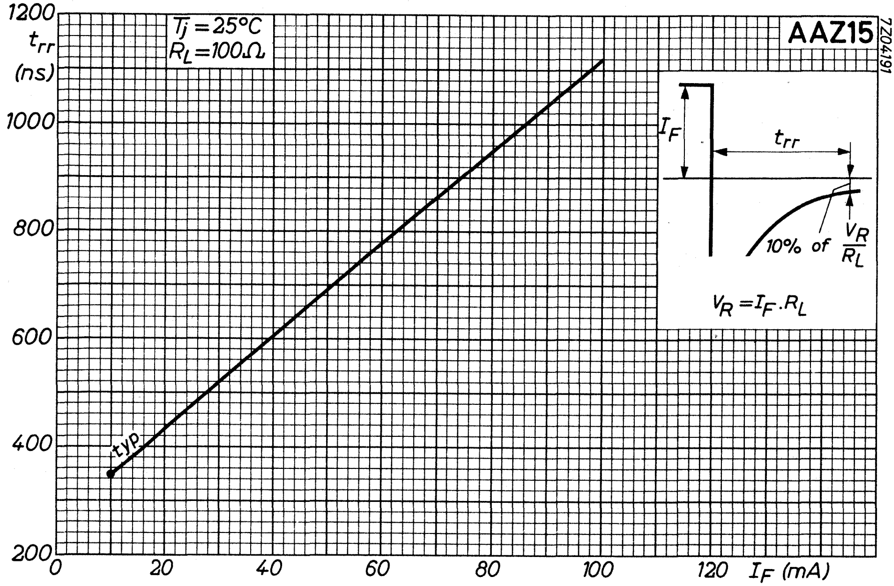

7Z04198-1.1.26.ae
$T_j = 25°C$
max voltage
typ
I_F (mA)
1000
100
10
1
0.1
V_F (V)
0
0.5
1
1.5
2

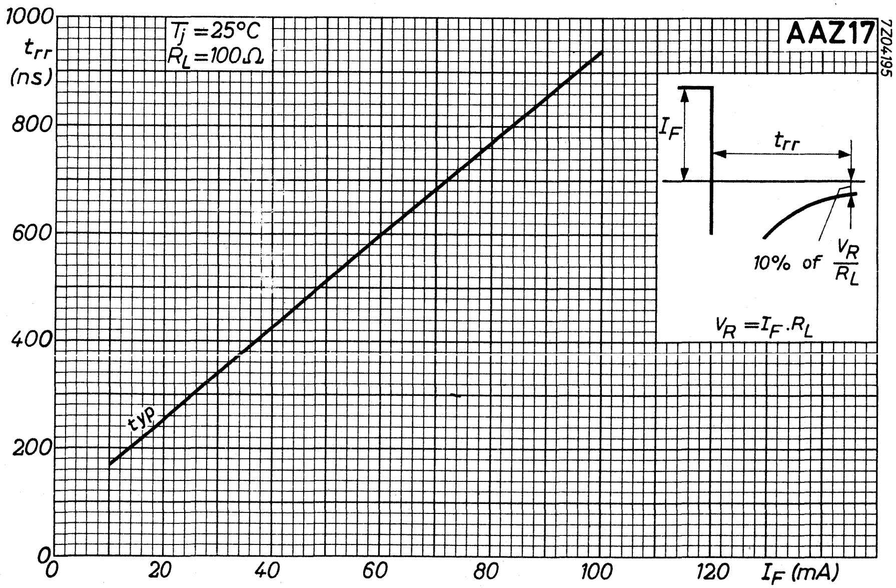

$T_j = 25°C$
$f = 1MHz$
C_d
(pF)
max
typ
V_R (V)
7Z04199-11.26.ae
0
2
4
6
8
10
12

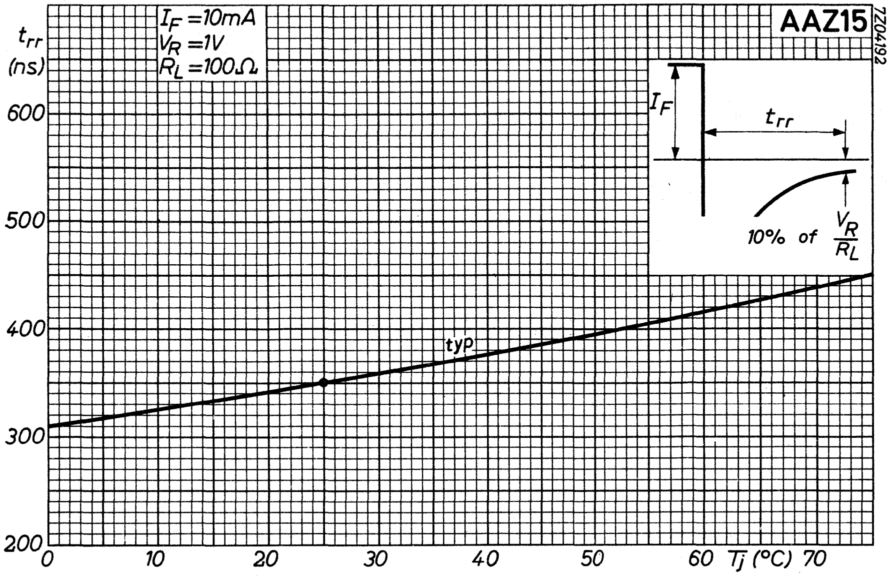

V_F
(V)
typ
$I_F = 250mA$
10mA
0.1mA
T_j (°C)
7Z04200-11.26.ae
0
0.2
0.4
0.6
0.8
1
30
40
50
60
70
80
90
100

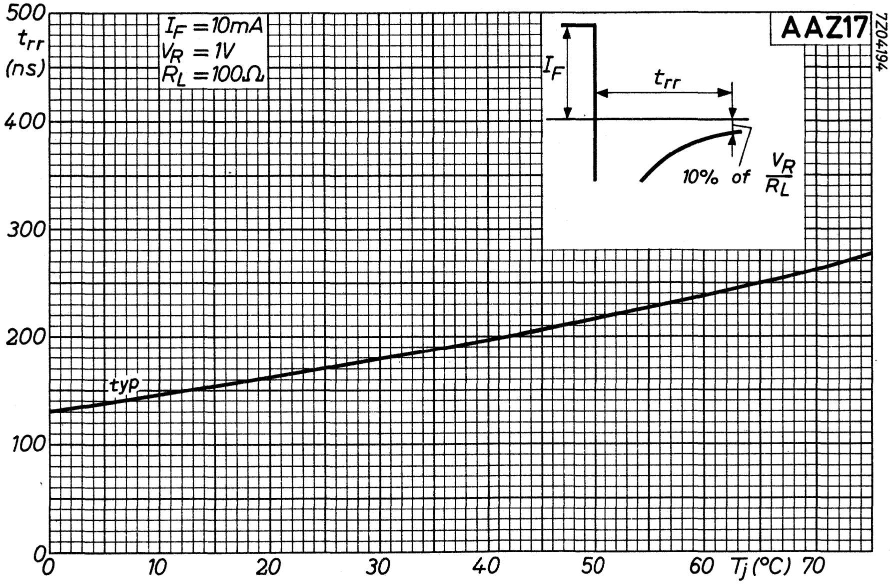

T_j = 25°C
R_L = 1kΩ
V_R = 10V
AAZ15
7Z04190
Q_s
(pC)
8000
6000
4000
2000
0
typ
0
20
40
60
80
100
120
I_F (mA)
V_C
V_p
$V_p = \frac{Q_s}{C}$
t


T_j = 25°C
R_L = 1kΩ
V_R = 10V
AAZ17
7Z04197
Q_s
(pC)
8000
6000
4000
2000
0
typ
0
20
40
60
80
100
120
I_F (mA)
V_C
V_p
$V_p = \frac{Q_s}{C}$
t


1200
t_{rr}
(ns)
1000
800
600
400
200
0
20
40
60
80
100
120
I_F (mA)
$T_j = 25°C$
$R_L = 100 \Omega$
AAZ15
7Z04191
typ
I_F
t_{rr}
10% of $\frac{V_R}{R_L}$
$V_R = I_F . R_L$


1000
t_{rr}
(ns)
800
600
400
200
0
0
20
40
60
80
100
120
I_F (mA)
$T_j = 25°C$
$R_L = 100 \Omega$
AAZ17
7Z04195
typ
I_F
t_{rr}
10% of $\frac{V_R}{R_L}$
$V_R = I_F . R_L$


AAZ15
7Z04192
I_F = 10mA
V_R = 1V
R_L = 100Ω
t_{rr} (ns)
600
500
400
300
200
typ
I_F
t_{rr}
10% of $\frac{V_R}{R_L}$
0
10
20
30
40
50
60
70
T_j (°C)


AAZ17
7Z04194
I_F = 10mA
V_R = 1V
R_L = 100Ω
t_{rr} (ns)
500
400
300
200
100
0
typ
I_F
t_{rr}
10% of $\frac{V_R}{R_L}$
0
10
20
30
40
50
60
70
T_j (°C)

GOLD BONDED DIODE

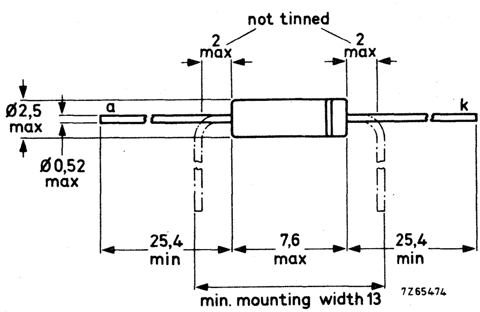
Germanium diode in all-glass DO-7 envelope, intended for switching applications and general purposes.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	20	V
Repetitive peak reverse voltage	V_{RRM}	max.	20	V
Forward current (d.c.)	I_F	max.	130	mA
Repetitive peak forward current	I_{FRM}	max.	300	mA
Junction temperature	T_j	max.	75	°C
Forward voltage at I_F = 300 mA	V_F	<	1.0	V

MECHANICAL DATA

Dimensions in mm

DO-7



The coloured band indicates the cathode

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

Voltages

Continuous reverse voltage	V_R	max.	20	V
Repetitive peak reverse voltage	V_{RRM}	max.	20	V
Non repetitive peak reverse voltage ($t < 1$ s)	V_{RSM}	max.	30	V

Currents

Forward current (d.c.)	I_F	max.	130	mA
Average rectified forward current (averaged over any 20 ms period)	I_{FAV}	max.	130	mA
Repetitive peak forward current	I_{FRM}	max.	300	mA
Non repetitive peak forward current ($t < 1$ s)	I_{FSM}	max.	400	mA

Temperatures

Storage temperature	T_{stg}	-65 to +75		^{o}C
Junction temperature	T_j	max.	75	^{o}C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\,j\text{-}a}$	=	0.55	$^{o}C/mW$

CHARACTERISTICS

Forward voltage at T_j = 25 °C

I_F = 0.1 mA	V_F < 0.20 V
I_F = 1.0 mA	V_F < 0.30 V
I_F = 10 mA	V_F < 0.42 V
I_F = 30 mA	V_F < 0.50 V
I_F = 150 mA [1]	V_F < 0.75 V
I_F = 300 mA [1]	V_F < 1.00 V

Forward voltage at T_j = 60 °C

I_F = 0.1 mA	V_F < 0.14 V
I_F = 1.0 mA	V_F < 0.25 V
I_F = 10 mA	V_F < 0.38 V
I_F = 30 mA	V_F < 0.48 V
I_F = 150 mA [1]	V_F < 0.75 V

Reverse current at T_j = 25 °C

V_R = 1.5 V	I_R < 3.5 µA
V_R = 10 V	I_R < 15 µA
V_R = 20 V	I_R < 50 µA

Reverse current at T_j = 60 °C

V_R = 1.5 V	I_R < 30 µA
V_R = 10 V	I_R < 45 µA
V_R = 20 V	I_R < 100 µA

Diode capacitance

V_R = 1 V; f = 1 MHz	C_d < 2.5 pF

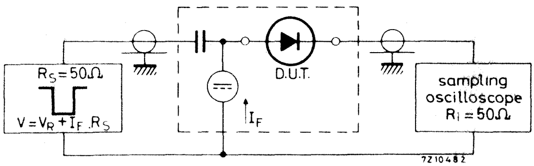
[1] Measured under pulsed conditions to avoid excessive dissipation

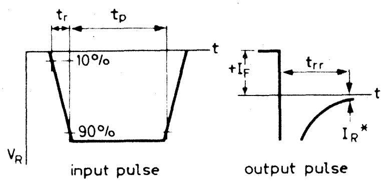
CHARACTERISTICS (continued) $T_j = 25\ ^oC$

Reverse recovery time when switched
from $I_F = 10$ mA to $V_R = 1$ V; $R_L = 100\ \Omega$ $t_{rr} < 70$ ns

Measured at $I_R = 10\ \%$ of $\frac{V_R}{R_L}$

Test circuit:





*) $I_R = 10\ \%$ of $\frac{V_R}{R_L}$

Reverse pulse:	Rise time	t_r =	0.6 ns
	Pulse duration	t_p =	100 ns
	Duty cycle	δ =	0.05

Circuit capacitance C < 1 pF (C = Oscilloscope + parasitical capacitance)

GOLD BONDED DIODE

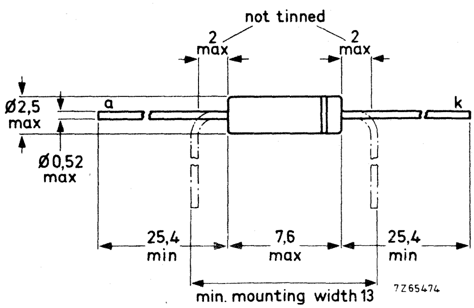
Germanium diode in all-glass DO-7 envelope, intended for switching applications and general purposes.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	25	V
Repetitive peak reverse voltage	V_{RRM}	max.	25	V
Forward current (d.c.)	I_F	max.	110	mA
Repetitive peak forward current	I_{FRM}	max.	150	mA
Junction temperature	T_j	max.	75	°C
Forward voltage at I_F = 150 mA	V_F	<	1.1	V
Recovered charge when switched from I_F = 10 mA to V_R = 10 V	Q_s	<	600	pC

MECHANICAL DATA

Dimensions in mm

DO-7



The coloured band indicates the cathode

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

Voltages

Continuous reverse voltage	V_R	max.	25	V
Repetitive peak reverse voltage	V_{RRM}	max.	25	V
Non-repetitive peak reverse voltage ($t < 1$ s)	V_{RSM}	max.	30	V

Currents

Forward current (d.c.)	I_F	max.	110	mA
Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	110	mA
Repetitive peak forward current	I_{FRM}	max.	150	mA
Non-repetitive peak forward current ($t < 1$ s)	I_{FSM}	max.	200	mA

Temperatures

Storage temperature	T_{stg}		-65 to +75	^oC
Junction temperature	T_j	max.	75	^oC

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	0.55	$^oC/mW$

CHARACTERISTICS

Forward voltage at $T_j = 25\ ^oC$

$I_F = 0.1$ mA	$V_F < 0.20$ V
$I_F = 1.0$ mA	$V_F < 0.31$ V
$I_F = 10$ mA	$V_F < 0.45$ V
$I_F = 30$ mA	$V_F < 0.65$ V
$I_F = 150$ mA	$V_F < 1.10$ V

Forward voltage at $T_j = 60\ ^oC$

$I_F = 0.1$ mA	$V_F < 0.14$ V
$I_F = 1.0$ mA	$V_F < 0.28$ V
$I_F = 10$ mA	$V_F < 0.43$ V
$I_F = 30$ mA	$V_F < 0.62$ V
$I_F = 150$ mA	$V_F < 1.10$ V

Reverse current at $T_j = 25\ ^oC$

$V_R = 1.5$ V	$I_R < 3.5$ μA
$V_R = 10$ V	$I_R < 15$ μA
$V_R = 20$ V	$I_R < 50$ μA
$V_R = 25$ V	$I_R < 100$ μA

Reverse current at $T_j = 60\ ^oC$

$V_R = 1.5$ V	$I_R < 20$ μA
$V_R = 10$ V	$I_R < 40$ μA
$V_R = 20$ V	$I_R < 90$ μA
$V_R = 25$ V	$I_R < 160$ μA

Diode capacitance

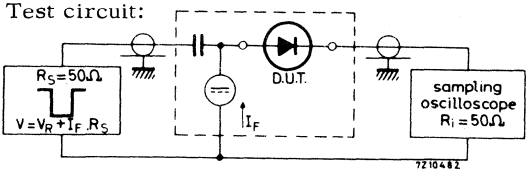
$V_R = 1$ V; f = 1 MHz	$C_d < 3.5$ pF

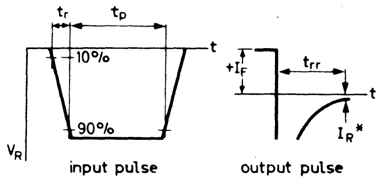
CHARACTERISTICS (continued) $T_j = 25\ ^oC$

Reverse recovery time when switched
from I_F = 10 mA to V_R = 1 V; R_L = 100 Ω

Measured at $I_R = 10\ \%$ of $\frac{V_R}{R_L}$ t_{rr} < 70 ns

Test circuit:





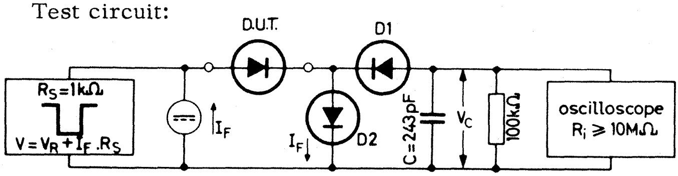
*) $I_R = 10\ \%$ of $\frac{V_R}{R_L}$

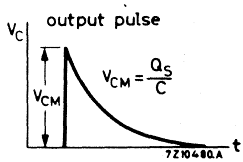
Reverse pulse: Rise time	t_r =	0.6	ns
Pulse duration	t_p =	100	ns
Duty cycle	δ =	0.05	

Circuit capacitance C < 1 pF (C = Oscilloscope + parasitical capacitance)

Recovered charge when switched
from I_F = 10 mA to V_R = 10 V; R_L = 1 kΩ Q_s < 600 pC

Test circuit:





D1 = D2 = BAW62

Reverse pulse: Rise time	t_r =	2	ns
Pulse duration	t_p =	0.4	μs
Duty cycle	δ =	0.02	

Silicon small signal diodes

Alloyed

ALLOYED DIODES

Silicon diodes in DO-7 envelope

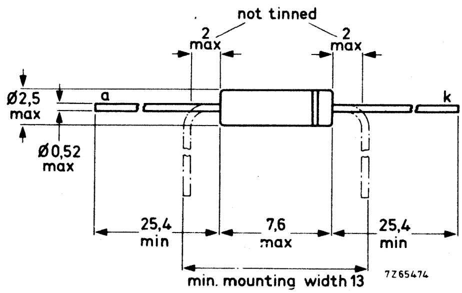
Quoted values are max.

	type	V_R (V)	I_F (mA)	I_{FRM} (mA)	C_d (pF)	V_F (V)	at I_F (mA)
general purpose	BA100	60	90	100	–	1,5	30
	OA200	50	160	250	25	1,15	30
	OA202	150	160	250	25	1,15	30

MECHANICAL DATA

Dimensions in mm

DO-7



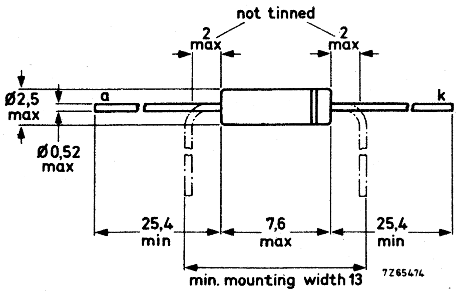
Cathode indicated by coloured band

SILICON DIODE

General purpose diode in all-glass DO-7 envelope.

MECHANICAL DATA Dimensions in mm

DO-7



The coloured band indicates the cathode

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

Voltage

Continuous reverse voltage	V_R	max.	60	V

Currents

Forward current (d.c.)	I_F	max.	90	mA
Repetitive peak forward current	I_{FRM}	max.	100	mA
Non-repetitive peak forward current ($t \leq 1$ s)	I_{FSM}	max.	200	mA

Temperatures

Storage temperature	T_{stg}		−55 to +90	°C
Junction temperature	T_j	max.	90	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.4	°C/mW

CHARACTERISTICS

Forward voltage

		T_{amb} = 25 °C	T_{amb} = 60 °C	
I_F = 0.1 mA	V_F	typ. 0.55	typ. 0.5	V
		< 0.75		V
I_F = 1.0 mA	V_F	typ. 0.65	typ. 0.6	V
		0.5 to 1.0	0.4 to 0.9	V
I_F = 30 mA	V_F	typ. 0.9	typ. 0.85	V
		< 1.5	< 1.5	V

Reverse current

		T_{amb} = 60 °C	T_{amb} = 75 °C	
V_R = 10 V	I_R	typ. 5.0	< 10	μA
V_R = 60 V	I_R	typ. 10	< 20	μA

SILICON DIODES

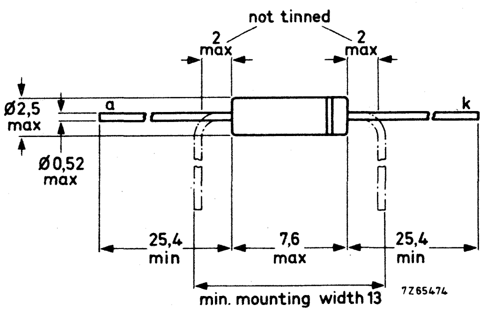
Silicon alloyed general purpose diodes in all-glass DO-7 envelope.

QUICK REFERENCE DATA

			OA200	OA202	
Continuous reverse voltage	V_R	max.	50	150	V
Repetitive peak forward current	I_{FRM}	max.	250		mA
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0.4		°C/mW
Forward voltage I_F = 30 mA; T_{amb} = 25 °C	V_F	typ.	0.9		V
Reverse recovery time when switched from I_F = 30 mA to V_R = 35 V; R_L = 2.5 kΩ measured at I_R = 4 mA	t_{rr}	typ.	3.5		µs

MECHANICAL DATA Dimensions in mm

DO-7



The coloured band indicates the cathode

RATINGS (Limiting values) [1]

Voltage

Continuous reverse voltage	OA200	V_R	max.	50	V
	OA202	V_R	max.	150	V

Currents

		T_{amb} = 25 °C		T_{amb} = 125 °C	
Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	160	48	mA
Average forward current for sinusoidal operation	$I_{F(AV)}$	max.	80	40	mA
Forward current (d.c.; see page 4)	I_F	max.	160	48	mA
Repetitive peak forward current	I_{FRM}	max.	250	125	mA

Temperatures

Storage temperature	T_{stg}	-55 °C to +125	°C
Operating ambient	T_{amb}	max. 125	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\,j\text{-}a}$	=	0.4	°C/mW

CHARACTERISTICS

Forward voltage

			T_{amb} = 25 °C		T_{amb} = 125 °C	
I_F = 0.1 mA		V_F	typ.	0.52	–	V
			<	0.62	0.30	V
I_F = 10 mA		V_F	typ.	0.80	–	V
			<	0.96	0.65	V
I_F = 30 mA		V_F	typ.	0.90	–	V
			<	1.15	0.80	V

Reverse current

$V_R = V_{Rmax}$	OA200	I_R	typ.	0.02	1	μA
			<	0.10	10	μA
	OA202	I_R	typ.	0.01	0.5	μA
			<	0.10	10	μA

Diode capacitance

V_R = 0.75 V; f = 0.5 MHz	C_d	typ.	10	pF
		<	25	pF

[1] Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

CHARACTERISTICS (continued) T_{amb} = 25 °C

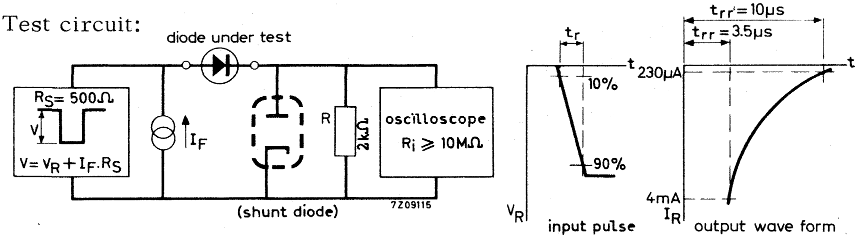
Reverse recovery current when switched from

I_F = 5 mA to V_R = 5 V; R_L = 2 .5 kΩ				
measured at t_{rr} = 3.5 μs	I_R	typ.	1.2	mA
t_{rr} = 10 μs	I_R	typ.	35	μA

Reverse recovery current when switched from

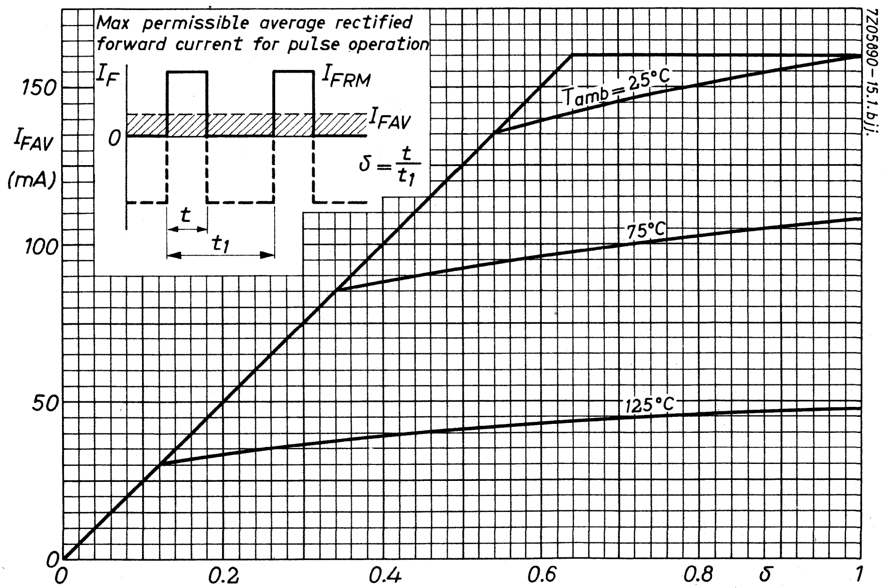
I_F = 30 mA to V_R = 35 V; R_L = 2.5 kΩ				
measured at t_{rr} = 3.5 μs	I_R	typ.	4	mA
t_{rr} = 10 μs	I_R	typ.	230	μA

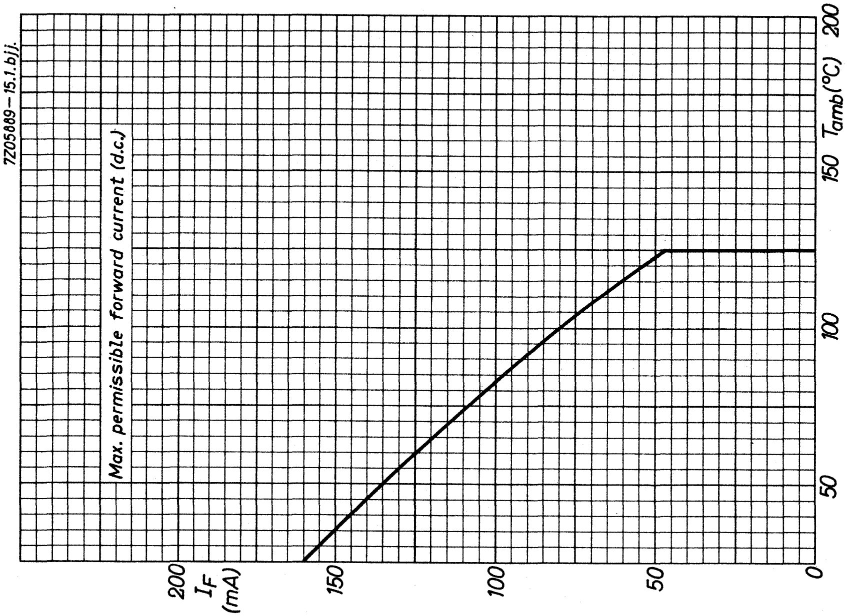
Test circuit:

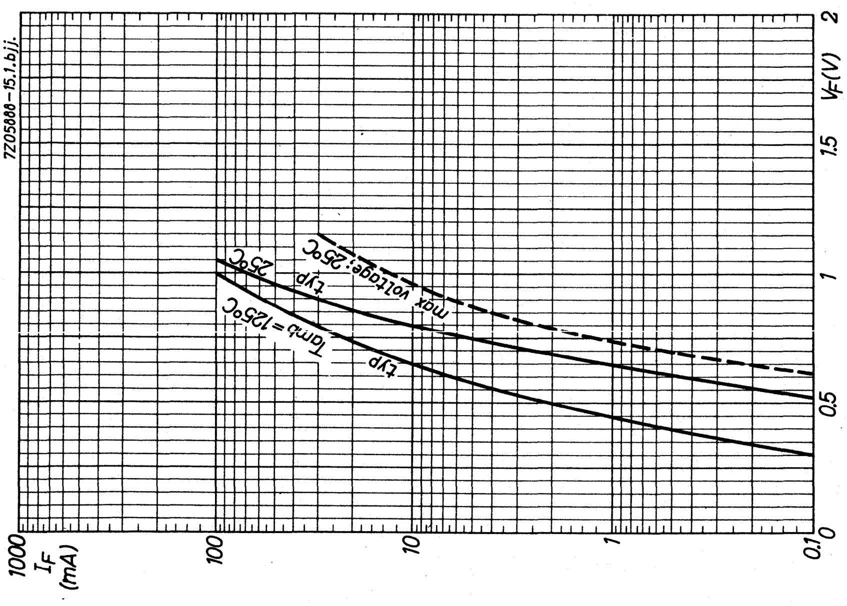


Reverse pulse: Rise time $t_r \leq 0.1$ μs
Duty cycle δ = 0.5
Frequency f = 50 kHz

Oscilloscope: Capacitance C = 40 pF
Rise time t_r = 25 ns




7Z05889-15.1.bjj.
Max. permissible forward current (d.c.)
I_F (mA)
0
50
100
150
200
T_{amb} (°C)
0
50
100
150
200


7Z05888-15.1.bjj.
max voltage; 25°C
typ 25°C
typ T_{amb} = 125°C
I_F (mA)
1000
100
10
1
0.1
V_F (V)
0
0.5
1
1.5
2

Silicon small signal diodes

Whiskerless

WHISKERLESS DIODES

Silicon diodes in DO-35 envelope

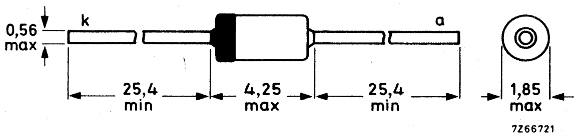
Quoted values are max.

	type	V_R (V)	I_F (mA)	I_{FRM} (mA)	t_{rr} (ns)	C_d (pF)	V_F (V)	at I_F (mA)
general purpose	BA220	–	200	400	4	2, 5	0, 95	100
	BA221	30	200	400	4	2, 5	1, 05	200
	BA222	50	75	150	4	2	1, 1	50
	BA316	10	100	225	4	3	1, 1	100
	BA317	30	100	225	4	3	1, 1	100
	BA318	50	100	225	4	3	1, 1	100
low voltage stabistor	BA314	–	–	250	–	140	0, 96	100
	BA315	–	–	225	–	3, 0	1, 05	100
high speed switching general purpose	BAW62	75	100	225	4	2	1	100
	1N4009	25	–	–	2	4	1	30
	1N4148	75	75	225	4	4	1	10
	1N4151	50	200	450	2	2	1	50
	1N4154	25	200	450	2	4	1	30
	1N4446	75	200	450	4	4	1	20
	1N4448	75	200	450	4	4	1	100
high speed core-gating	BAV10	60	300	600	6	2, 5	1, 25	500
	1N4150	50	300	600	6	2, 5	1	200
high speed, high voltage	BAV18	50	250	625	50	5, 0	1, 25	200
	BAV19	100	250	625	50	5, 0	1, 25	200
	BAV20	150	250	625	50	5, 0	1, 25	200
	BAV21	200	250	625	50	5, 0	1, 25	200

MECHANICAL DATA

Dimensions in mm

DO-35



WHISKERLESS DIODES

Silicon diodes in SOD-17 envelope

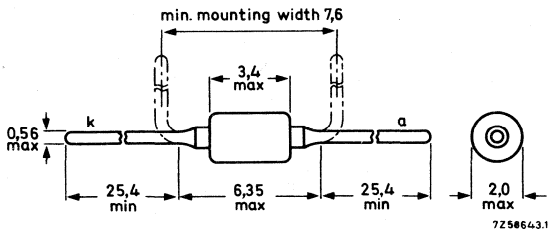
Quoted values are max.

	type	V_R (V)	I_F (mA)	I_{FRM} (mA)	t_{rr} (ns)	C_d (pF)	V_F (V)	at I_F (mA)
general purpose	BA216	–	75	150	4	3	1	15
	BA217	30	75	150	4	3	1,5	50
	BA218	50	75	150	4	3	1,5	50
	BA219	100	100	300	120	5	1,4	100
general industrial	BAX13	50	75	150	4	3	1,53	75
	BAX14	20	300	600	50	35	1,1	300
	BAX15	150	250	500	300	20	1,35	250
	BAX16	150	200	300	120	10	1,5	200
	BAX17	200	200	300	120	10	1,2	200
	BAX18	75	500	2000	–	–	1,2	500
switching	1N914	75	75	225	4	4	1	10
	1N914A	75	75	225	4	4	1	20
	1N916	75	75	225	4	2	1	10
	1N916A	75	75	225	4	2	1	20
	1N916B	75	75	225	4	2	1	30
avalanche for telephony	BAX12	90	400	800	50	35	1,25	400

MECHANICAL DATA

Dimensions in mm

SOD-17



Cathode indicated by broad band
of colour code

SILICON OXIDE PASSIVATED DIODE

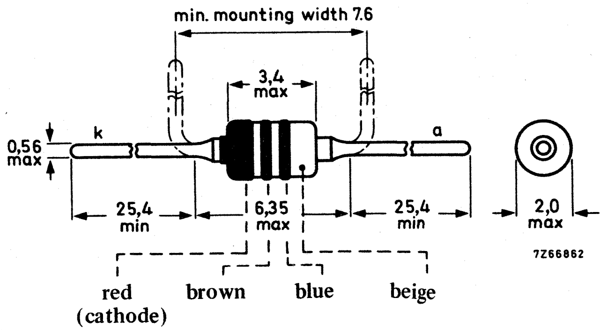
Whiskerless diode in a hardglass subminiature envelope. The diode is intended for low voltage regulation such as bias stabilizer in class B output stages, clipping, clamping and meter protection.

QUICK REFERENCE DATA				
Repetitive peak reverse voltage	V_{RRM}	max.	10	V
Repetitive peak forward current	I_{FRM}	max.	150	mA
Storage temperature	T_{stg}		−65 to +200	^{o}C
Junction temperature	T_j	max.	200	^{o}C
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0.60	$^{o}C/mW$
Forward voltage at I_F = 0.2 mA	V_F		500 to 620	mV
I_F = 3.0 mA	V_F		600 to 800	mV
I_F = 15 mA	V_F		700 to 1000	mV
Temperature coefficient at I_F = 3 mA	S_F	typ.	−2	$mV/^{o}C$
Reverse recovery time when switched from I_F = 10 mA to V_R = 6 V; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	4	ns

MECHANICAL DATA

Dimensions in mm

SOD-17



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

<u>Voltages</u>				
Repetitive peak reverse voltage	V_{RRM}	max	10	V
<u>Currents</u>				
Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	75	mA [1]
Forward current (d. c.)	I_F	max.	75	mA
Repetitive peak forward current	I_{FRM}	max.	150	mA
Non-repetitive peak forward current t = 1 μs	I_{FSM}	max.	1000	mA
t = 1 s	I_{FSM}	max.	250	mA
<u>Temperatures</u>				
Storage temperature	T_{stg}	-65 to	+200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	0.60	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

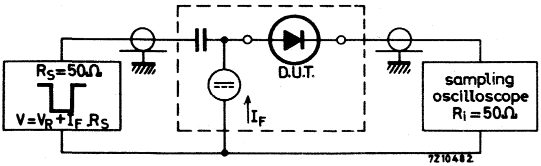
<u>Forward voltage</u>				
I_F = 0.2 mA	V_F	500 to	620	mV
I_F = 3.0 mA	V_F	600 to	800	mV
I_F = 15 mA	V_F	700 to	1000	mV
<u>Reverse current</u>				
V_R = 10 V	I_R	<	1500	nA
<u>Diode capacitance</u>				
V_R = 0; f = 1 MHz	C_d	<	3	pF
→ <u>Temperature coefficient</u> at I_F = 3 mA	S_F	typ.	-2	mV/°C

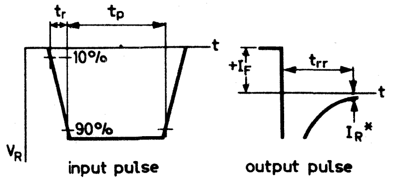
[1]) For sinusoidal operation $I_{F(AV)}$ = 48 mA

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified ←

Reverse recovery time when switched from
I_F = 10 mA to V_R = 6 V; R_L = 100 Ω
measured at I_R = 1 mA t_{rr} < 4 ns

Test circuit:

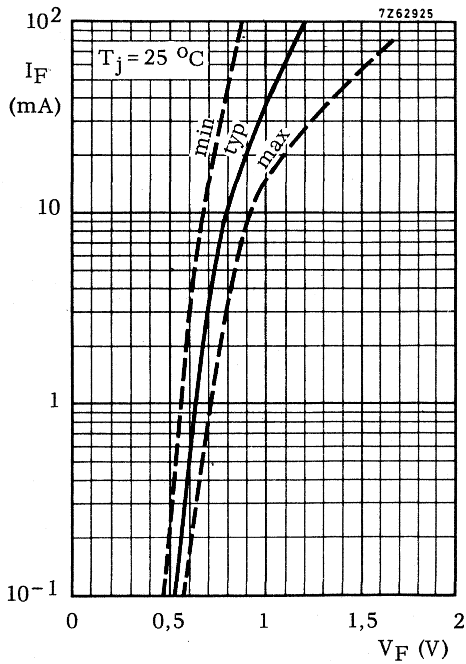




Reverse pulse: Rise time t_r = 0.6 ns
Pulse duration t_p = 100 ns
Duty cycle δ = 0.05

Oscilloscope: *) I_R = 1 mA
Rise time t_r = 0.35 ns

Circuit capacitance C ≤ 1 pF (C = Oscilloscope + parasitical capacitance)



SILICON OXIDE PASSIVATED DIODE

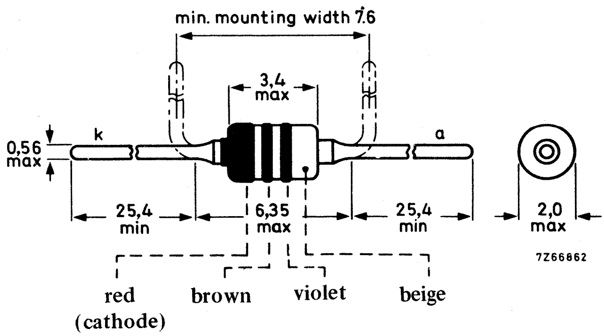
Whiskerless diode in a hardglass subminiature envelope. This diode is intended for general purpose consumer applications.

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	30	V
Repetitive peak forward current	I_{FRM}	max.	150	mA
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0.60	°C/mW
Forward voltage at I_F = 1 mA	V_F	<	0.7	V
I_F = 10 mA	V_F	<	1.0	V
I_F = 50 mA	V_F	<	1.5	V
Reverse recovery time when switched from I_F = 10 mA to V_R = 6 V; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	4	ns

MECHANICAL DATA Dimensions in mm

SOD-17



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

Voltages

Continuous reverse voltage	V_R	max.	30	V
Repetitive peak reverse voltage	V_{RRM}	max.	30	V

Currents

Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	75	mA [1]
Forward current (d. c.)	I_F	max.	75	mA
Repetitive peak forward current	I_{FRM}	max.	150	mA
Non repetitive peak forward current t = 1 μs	I_{FSM}	max.	2000	mA
t = 1 s	I_{FSM}	max.	500	mA

Temperatures

Storage temperature	T_{stg}		-65 to +200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	0.60	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltage

I_F = 1 mA	V_F	<	0.7	V
I_F = 10 mA	V_F	<	1.0	V
I_F = 50 mA	V_F	<	1.5	V

Reverse current

V_R = 10 V	I_R	<	50	nA
V_R = 30 V	I_R	<	200	nA

Diode capacitance

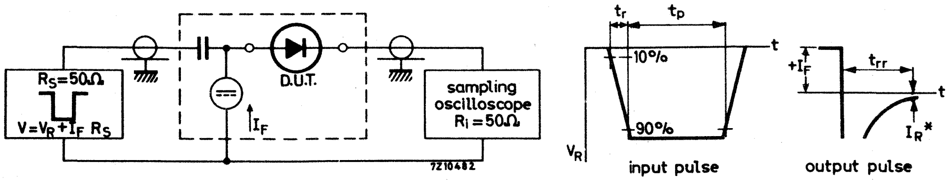
V_R = 0; f = 1 MHz	C_d	<	3	pF

[1]) For sinusoidal operation $I_{F(AV)}$ = 48 mA

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

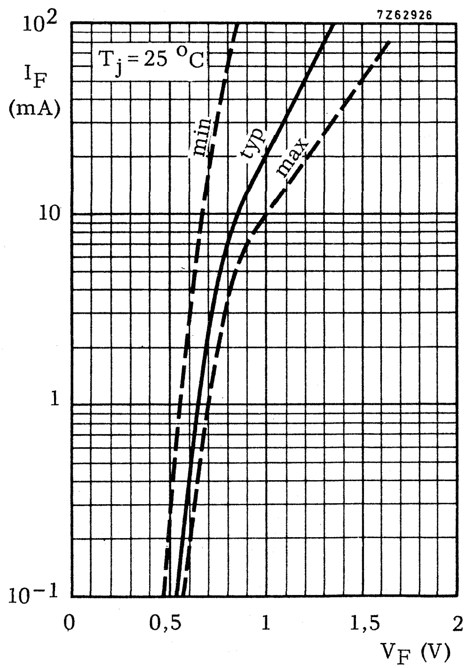
Reverse recovery time when switched from
I_F = 10 mA to V_R = 6 V; R_L = 100 Ω
measured at I_R = 1 mA t_{rr} < 4 ns

Test circuit:



Reverse pulse:	Rise time	t_r = 0.6 ns		Oscilloscope:		*) I_R = 1 mA
	Pulse duration	t_p = 100 ns		Rise time	t_r = 0.35 ns	
	Duty cycle	δ = 0.05				

Circuit capacitance C ≤ 1 pF (C = Oscilloscope + parasitical capacitance)



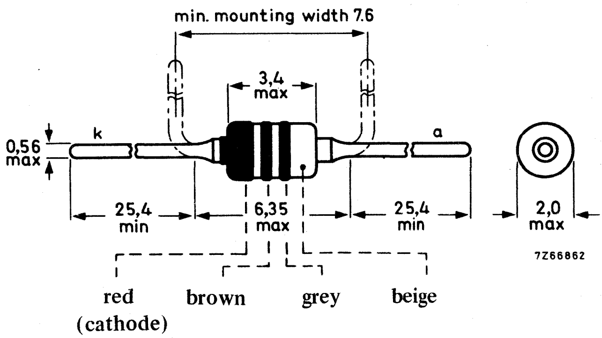
SILICON OXIDE PASSIVATED DIODE

Whiskerless diode in a hardglass subminiature envelope. The diode is intended for general purpose consumer applications.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	50	V
Repetitive peak forward current	I_{FRM}	max.	150	mA
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0.60	°C/mW
Forward voltage at I_F = 1 mA	V_F	<	0.7	V
I_F = 10 mA	V_F	<	1.0	V
I_F = 50 mA	V_F	<	1.5	V
Reverse recovery time when switched from I_F = 10 mA to V_R = 6 V; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	4	ns

MECHANICAL DATA Dimensions in mm

SOD-17



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

Voltages				
Continuous reverse voltage	V_R	max.	50	V
Repetitive peak reverse voltage	V_{RRM}	max.	50	V
Currents				
Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	75	mA [1]
Forward current (d. c.)	I_F	max.	75	mA
Repetitive peak forward current	I_{FRM}	max.	150	mA
Non repetitive peak forward current t = 1 µs	I_{FSM}	max.	2000	mA
t = 1 s	I_{FSM}	max.	500	mA
Temperatures				
Storage temperature	T_{stg}	-65 to	+200	^oC
Junction temperature	T_j	max.	200	^oC

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.60	$^oC/mW$

CHARACTERISTICS T_j = 25 ^oC unless otherwise specified

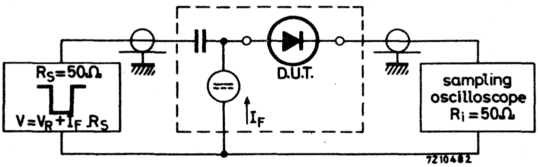
Forward voltage				
I_F = 1 mA	V_F	<	0.7	V
I_F = 10 mA	V_F	<	1.0	V
I_F = 50 mA	V_F	<	1.5	V
Reverse current				
V_R = 25 V	I_R	<	50	nA
V_R = 50 V	I_R	<	200	nA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	3	pF

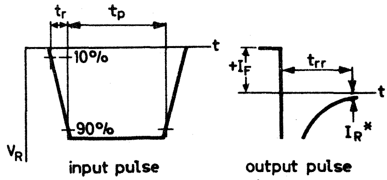
[1]) For sinusoidal operation $I_{F(AV)}$ = 48 mA

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

Reverse recovery time when switched from
I_F = 10 mA to V_R = 6 V; R_L = 100 Ω
measured at I_R = 1 mA t_{rr} < 4 ns

Test circuit:



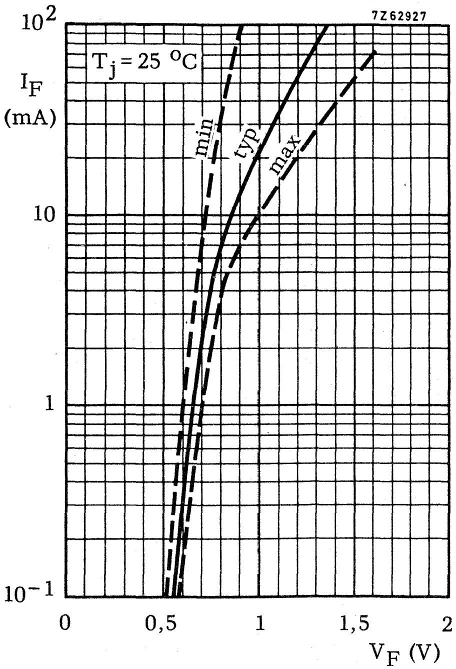


*) I_R = 1 mA

Reverse pulse: Rise time t_r = 0.6 ns
Pulse duration t_p = 100 ns
Duty cycle δ = 0.05

Oscilloscope:
Rise time t_r = 0.35 ns

Circuit capacitance $C \leq$ 1 pF (C = Oscilloscope + parasitical capacitance)



SILICON OXIDE PASSIVATED DIODE

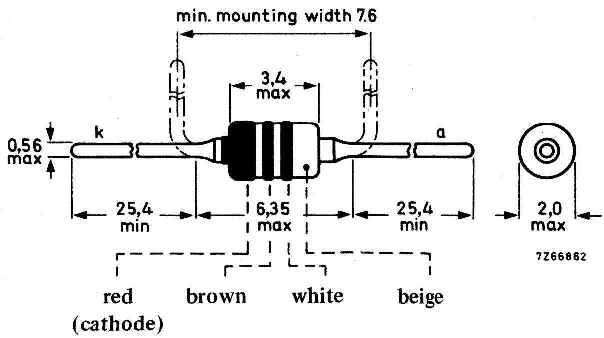
Whiskerless diode in a hardglass subminiature envelope. The diode is intended for general purpose consumer applications.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	100	V
Repetitive peak forward current	I_{FRM}	max.	300	mA
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0.60	°C/W
Forward voltage at I_F = 1 mA	V_F	<	0.65	V
I_F = 10 mA	V_F	<	0.85	V
I_F = 100 mA	V_F	<	1.40	V
Reverse recovery time when switched from I_F = 30 mA to V_R = 3 V; R_L = 100 Ω; measured at I_R = 3 mA	t_{rr}	<	120	ns

MECHANICAL DATA

Dimensions in mm

SOD-17



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

Voltages				
Continuous reverse voltage	V_R	max.	100	V
Repetitive peak reverse voltage	V_{RRM}	max.	100	V
Currents				
Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	100	mA
Forward current (d. c.)	I_F	max.	100	mA
Repetitive peak forward current	I_{FRM}	max.	300	mA
Non repetitive peak forward current t = 1 μs	I_{FSM}	max.	2000	mA
t = 1 s	I_{FSM}	max.	500	mA
Temperatures				
Storage temperature	T_{stg}	-65 to	+200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	0.60	°C/mW

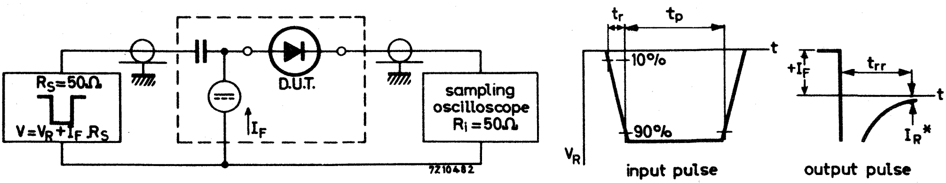
CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltage				
I_F = 1 mA	V_F	<	0.65	V
I_F = 10 mA	V_F	<	0.85	V
I_F = 100 mA	V_F	<	1.40	V
Reverse current				
V_R = 50 V	I_R	<	200	nA
V_R = 100 V	I_R	<	500	nA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	5	pF

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

Reverse recovery time when switched from
I_F = 30 mA to V_R = 3 V; R_L = 100 Ω
measured at I_R = 3 mA t_{rr} < 120 ns

Test circuit:

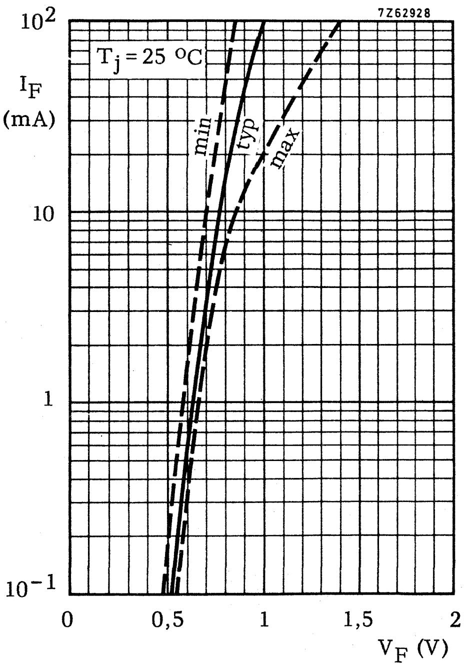


*) I_R = 3 mA

Reverse pulse: Rise time t_r = 0.6 ns
Pulse duration t_p = 100 ns
Duty cycle δ = 0.05

Oscilloscope:
Rise time t_r = 0.35 ns

Circuit capacitance C ≤ 1 pF (C = Oscilloscope + parasitical capacitance)



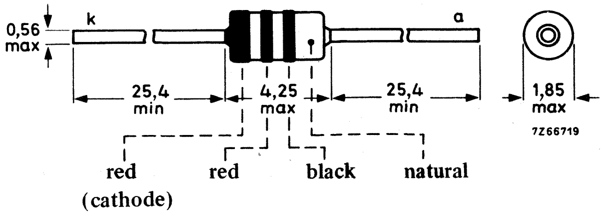
GENERAL PURPOSE DIODE

Silicon planar epitaxial diode in a DO-35 envelope; intended for general purpose and can also be used as regulator.

QUICK REFERENCE DATA				
Repetitive peak reverse voltage	V_{RRM}	max.	10	V
Repetitive peak forward current	I_{FRM}	max.	400	mA
Storage temperature	T_{stg}		−65 to +200	^oC
Junction temperature	T_j	max.	200	^oC
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0.50	$^oC/mW$
Forward voltage at I_F = 0.1 mA	V_F		460 to 520	mV
I_F = 1.0 mA	V_F		560 to 620	mV
I_F = 10 mA	V_F		680 to 750	mV
I_F = 100 mA	V_F		825 to 950	mV
Diode capacitance at V_R = 0; f = 1 MHz	C_d	<	2.5	pF
Reverse recovery time when switched from I_F = 10 mA to V_R = 6 V; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	4	ns

MECHANICAL DATA Dimensions in mm

DO-35



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

Voltages

Repetitive peak reverse voltage	V_{RRM}	max.	10	V

Currents

Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	200	mA [1]
Forward current (d.c.)	I_F	max.	200	mA
Repetitive peak forward current	I_{FRM}	max.	400	mA
Non repetitive peak forward current t = 1 μs	I_{FSM}	max.	4000	mA
t = 1 s	I_{FSM}	max.	1000	mA

Temperatures

Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\,j\text{-}a}$	=	0.50	°C/mW

→ **CHARACTERISTICS** T_j = 25 °C unless otherwise specified

Forward voltage

I_F = 0.1 mA	V_F	460	to	520	mV
I_F = 1.0 mA	V_F	560	to	620	mV
I_F = 5.0 mA	V_F	640	to	700	mV
I_F = 10 mA	V_F	680	to	750	mV
I_F = 100 mA	V_F	825	to	950	mV

Reverse current

V_R = 10 V	I_R	<	1500	nA

Diode capacitance

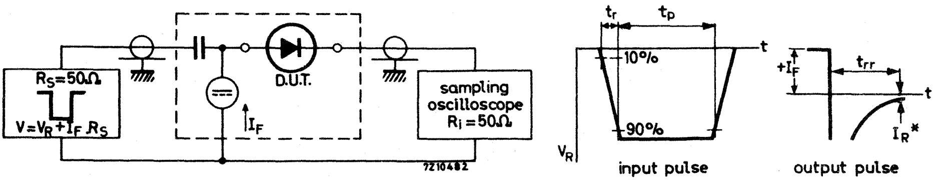
V_R = 0; f = 1 MHz	C_d	<	2.5	pF

[1]) For sinusoidal operation $I_{F(AV)}$ = 130 mA

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

Reverse recovery time when switched from
I_F = 10 mA to V_R = 6 V; R_L = 100 Ω
measured at I_R = 1 mA — t_{rr} < 4 ns

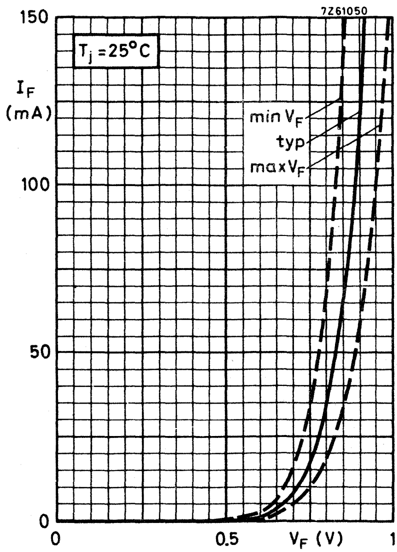
Test circuit:



*) I_R = 1 mA

Reverse pulse:	Rise time	t_r	= 0.6 ns	Oscilloscope:			
	Pulse duration	t_p	= 100 ns	Rise time	t_r	=	0.35 ns
	Duty cycle	δ	= 0.05				

Circuit capacitance C ≤ 1 pF (C = Oscilloscope + parasitical capacitance)



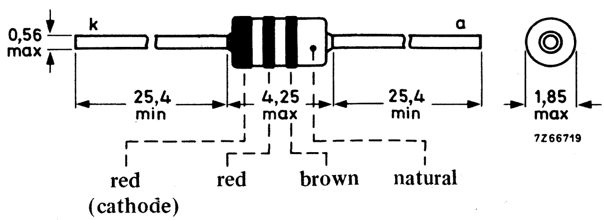
GENERAL PURPOSE DIODE

Silicon planar epitaxial diode in a DO-35 envelope; intended for general purposes.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	30	V
Repetitive peak forward current	I_{FRM}	max.	400	mA
Storage temperature	T_{stg}		−65 to 200	^oC
Junction temperature	T_j	max.	200	^oC
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0.50	$^oC/mW$
Forward voltage at I_F = 1 mA	V_F	<	625	mV
I_F = 100 mA	V_F	<	950	mV
I_F = 200 mA	V_F	<	1050	mV
Diode capacitance at V_R = 0; f = 1 MHz	C_d	<	2.5	pF
Reverse recovery time when switched from I_F = 10 mA to V_R = 6 V; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	4	ns

MECHANICAL DATA Dimensions in mm

DO-35



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

Voltages

Continuous reverse voltage	V_R	max.	30	V
Repetitive peak reverse voltage	V_{RRM}	max.	30	V

Currents

Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	200	mA [1]
Forward current (d.c.)	I_F	max.	200	mA
Repetitive peak forward current	I_{FRM}	max.	400	mA
Non repetitive peak forward current t = 1 μs	I_{FSM}	max.	4000	mA
t = 1 s	I_{FSM}	max.	1000	mA

Temperatures

Storage temperature	T_{stg}	−65 to	+200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.50	°C/mW

CHARACTERISTICS $T_j = 25\ ^oC$ unless otherwise specified

Forward voltage

I_F = 1 mA	V_F	<	625	mV
I_F = 100 mA	V_F	<	950	mV
I_F = 200 mA	V_F	<	1050	mV

Reverse current

V_R = 10 V	I_R	<	25	nA
V_R = 30 V	I_R	<	200	nA

Diode capacitance

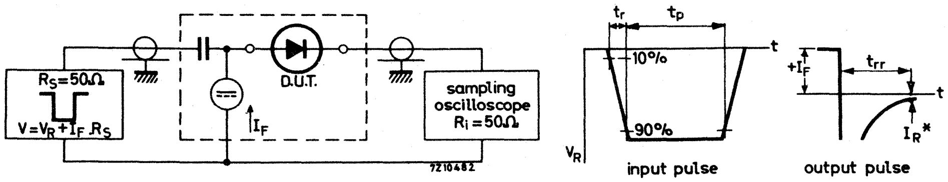
V_R = 0; f = 1 MHz	C_d	<	2.5	pF

[1]) For sinusoidal operation $I_{F(AV)}$ = 130 mA

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified ←

Reverse recovery time when switched from
I_F = 10 mA to V_R = 6 V; R_L = 100 Ω
measured at I_R = 1 mA t_{rr} < 4 ns

Test circuit:



*) I_R = 1 mA

Reverse pulse: Rise time t_r = 0.6 ns

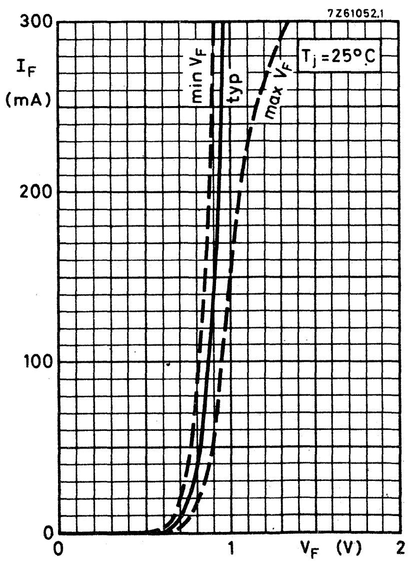
Pulse duration t_p = 100 ns

Duty cycle δ = 0.05

Oscilloscope:

Rise time t_r = 0.35 ns

Circuit capacitance C ≤ 1 pF (C = Oscilloscope + parasitical capacitance)



GENERAL PURPOSE DIODE

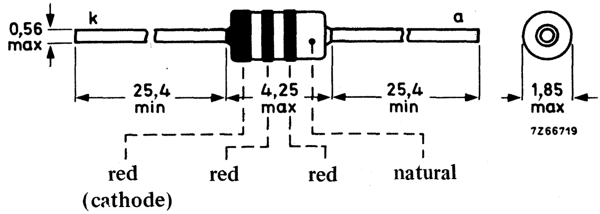
Silicon planar epitaxial diode in a DO-35 envelope; intended for general purposes.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	50	V
Repetitive peak forward current	I_{FRM}	max.	150	mA
Storage temperature	T_{stg}		−65 to +200	^oC
Junction temperature	T_j	max.	200	^oC
Thermal resistance from junction to ambient	$R_{th\ j-a}$	=	0.60	$^oC/mW$
Forward voltage at I_F = 1 mA	V_F	<	700	mV
I_F = 10 mA	V_F	<	900	mV
I_F = 50 mA	V_F	<	1100	mV
Diode capacitance at V_R = 0; f = 1 MHz	C_d	<	2.0	pF
Reverse recovery time when switched from I_F = 10 mA to V_R = 6 V R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	4	ns

MECHANICAL DATA

DO-35

Dimensions in mm



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

Voltages

Continuous reverse voltage	V_R	max.	50	V
Repetitive peak reverse voltage	V_{RRM}	max.	50	V

Currents

Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	75	mA [1]
Forward current (d.c.)	I_F	max.	75	mA
Repetitive peak forward current	I_{FRM}	max.	150	mA
Non repetitive peak forward current t = 1 μs	I_{FSM}	max.	2000	mA
t = 1 s	I_{FSM}	max.	500	mA

Temperatures

Storage temperature	T_{stg}	-65 to	+200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.60	°C/mW

→ **CHARACTERISTICS** T_j = 25 °C unless otherwise specified

Forward voltage

I_F = 1 mA	V_F	<	700	mV
I_F = 10 mA	V_F	<	900	mV
I_F = 50 mA	V_F	<	1100	mV

Reverse current

V_R = 25 V	I_R	<	50	nA
V_R = 50 V	I_R	<	200	nA

Diode capacitance

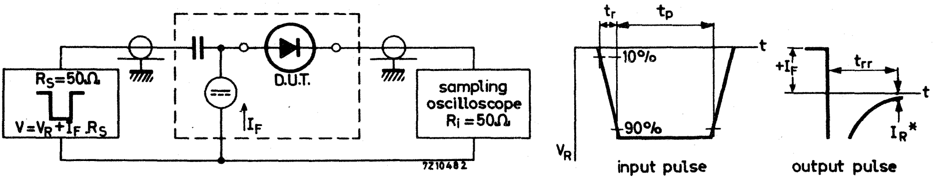
V_R = 0; f = 1 MHz	C_d	<	2	pF

[1]) For sinusoidal operation $I_{F(AV)}$ = 48 mA

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified ←

Reverse recovery time when switched from
I_F = 10 mA to V_R = 6 V; R_L = 100 Ω
measured at I_R = 1 mA t_{rr} < 4 ns

Test circuit:

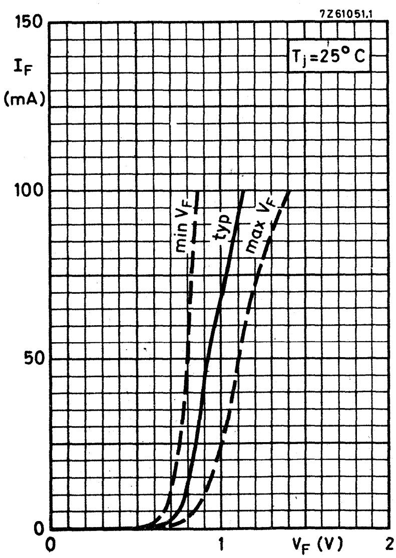


*) I_R = 1 mA

Reverse pulse: Rise time t_r = 0.6 ns
Pulse duration t_p = 100 ns
Duty cycle δ = 0.05

Oscilloscope:
Rise time t_r = 0.35 ns

Circuit capacitance C ≤ 1 pF (C = Oscilloscope + parasitical capacitance)



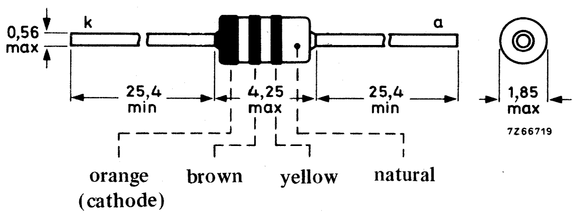
LOW VOLTAGE STABISTOR

Silicon planar epitaxial diode in a DO-35 envelope. The diode is intended for low voltage stabilizing e.g. bias stabilizer in class-B output stages, clipping, clamping and meter protection.

QUICK REFERENCE DATA				
Repetitive peak forward current	I_{FRM}	max.	250	mA
Storage temperature	T_{stg}		−65 to +200	^oC
Junction temperature	T_j	max.	200	^oC
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0,38	$^oC/mW$
Forward voltage at I_F = 0,1 mA	V_F		610 to 690	mV
I_F = 1,0 mA	V_F		680 to 760	mV
I_F = 10 mA	V_F		750 to 830	mV
I_F = 100 mA	V_F		870 to 960	mV
Diode capacitance at V_R = 0; f = 1 MHz	C_d	<	140	pF

MECHANICAL DATA Dimensions in mm

DO-35



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

Current

Repetitive peak forward current	I_{FRM}	max.	250	mA

Temperatures

Storage temperature	T_{stg}		−65 to +200	^oC
Junction temperature	T_j	max.	200	^oC

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0, 38	$^oC/mW$

CHARACTERISTICS $T_j = 25\ ^oC$ unless otherwise specified

Forward voltage

$I_F = 0,1$ mA	V_F		610 to 690	mV
$I_F = 1,0$ mA	V_F		680 to 760	mV
$I_F = 5,0$ mA	V_F		730 to 810	mV
$I_F = 10$ mA	V_F		750 to 830	mV
$I_F = 100$ mA	V_F		870 to 960	mV

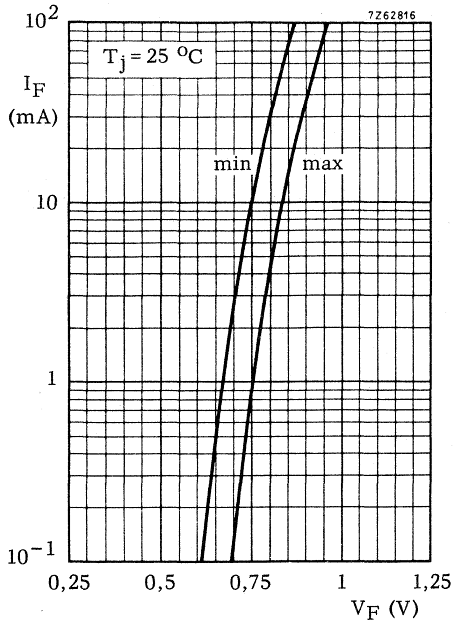
Reverse current

$V_R = 4$ V	I_R	<	5	µA

Diode capacitance

$V_R = 0$; f = 1 MHz	C_d	<	140	pF

Temperature coefficient at $I_F = 1$ mA	S_F	typ.	−1, 8	$mV/^oC$


7Z62816
10^2
$T_j = 25\ ^oC$
I_F
(mA)
min
max
10
1
10^{-1}
0,25
0,5
0,75
1
1,25
V_F (V)

LOW VOLTAGE STABISTOR

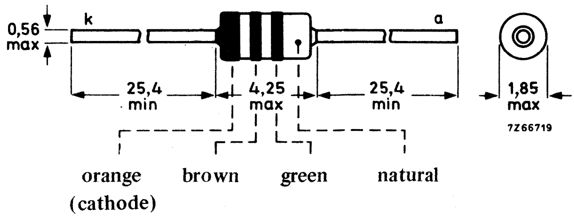
Silicon planar epitaxial diode in a DO-35 envelope primarily intended for low voltage stabilizing.

QUICK REFERENCE DATA				
Repetitive peak reverse voltage	V_{RRM}	max.	5	V
Repetitive peak forward current	I_{FRM}	max.	225	mA
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0,60	°C/mW
Forward voltage at I_F = 0,1 mA	V_F		480 to 540	mV
I_F = 1,0 mA	V_F		590 to 660	mV
I_F = 10 mA	V_F		710 to 790	mV
I_F = 100 mA	V_F		875 to 1050	mV
Diode capacitance at V_R = 0; f = 1 MHz	C_d	<	3,0	pF

MECHANICAL DATA

Dimensions in mm

DO-35



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

Voltages

Repetitive peak reverse voltage	V_{RRM}	max.	5	V	

Currents

Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	100	mA	1)
Forward current (d.c.)	I_F	max.	100	mA	
Repetitive peak forward current	I_{FRM}	max.	225	mA	
Non repetitive peak forward current t = 1 μs	I_{FSM}	max.	2000	mA	
t = 1 s	I_{FSM}	max.	500	mA	

Temperatures

Storage temperature	T_{stg}	−65 to +200		°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,60	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltage

I_F = 0,1 mA	V_F	480 to	540	mV
I_F = 1,0 mA	V_F	590 to	660	mV
I_F = 5,0 mA	V_F	670 to	740	mV
I_F = 10 mA	V_F	710 to	790	mV
→ I_F = 100 mA	V_F	875 to	1050	mV

Reverse current

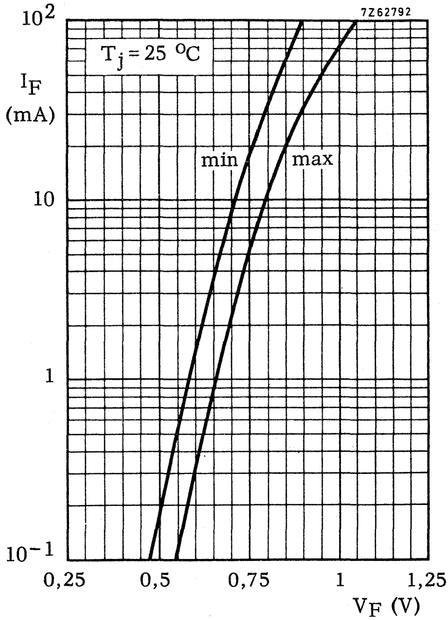
V_R = 5 V	I_R	<	1500	nA

Diode capacitance

V_R = 0; f = 1 MHz	C_d	<	3,0	pF

Temperature coefficient at I_F = 1 mA	S_F	typ.	−2,1	mV/°C

1) For sinusoidal operation $I_{F(AV)}$ = 130 mA.


7Z62792
$T_j = 25\ ^oC$
I_F
(mA)
10^2
10
1
10^{-1}
min
max
0,25
0,5
0,75
1
1,25
V_F (V)

10 V, 30 V and 50 V GENERAL PURPOSE DIODES

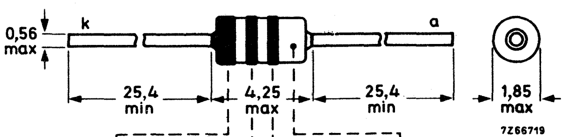
Silicon planar epitaxial diodes in DO-35 envelopes intended for general purpose applications.
They have reverse voltages up to 10 V for BA316, 30 V for BA317 and 50 V for BA318.

QUICK REFERENCE DATA

			BA316	BA317	BA318	
Continuous reverse voltage	V_R	max.	10	30	50	V
Repetitive peak forward current	I_{FRM}	max.		225		mA
Storage temperature	T_{stg}			−65 to +200		°C
Junction temperature	T_j	max.		200		°C
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=		0,60		°C/mW
Forward voltage at I_F = 1,0 mA	V_F	<		700		mV
I_F = 10 mA	V_F	<		850		mV
I_F = 100 mA	V_F	<		1100		mV
Diode capacitance at V_R = 0; f = 1 MHz	C_d	<		3		pF
Reverse recovery time when switched from I_F = 10 mA to V_R = 6 V; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<		4		ns

MECHANICAL DATA Dimensions in mm

DO-35



BA316 :	orange	brown	blue	natural
BA317 :	orange	brown	violet	natural
BA318 :	orange (cathode)	brown	grey	natural

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

Voltage

			BA316	BA317	BA318	
Continuous reverse voltage	V_R	max.	10	30	50	V

Currents

Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	100	mA	1)
Forward current (d.c.)	I_F	max.	100	mA	
Repetitive peak forward current	I_{FRM}	max.	225	mA	
Non-repetitive peak forward current t = 1 μs	I_{FSM}	max.	2000	mA	
t = 1 s	I_{FSM}	max.	500	mA	

Temperatures

Storage temperature	T_{stg}		−65 to +200	^oC
Junction temperature	T_j	max.	200	^oC

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\,j\text{-}a}$	=	0,60	^oC/mW

CHARACTERISTICS $T_j = 25\ ^oC$ unless otherwise specified

Forward voltage

I_F = 1,0 mA	V_F	<	700	mV
I_F = 10 mA	V_F	<	850	mV
I_F = 100 mA	V_F	<	1100	mV

Reverse current

			BA316	BA317	BA318	
V_R = 10 V	I_R	<	200	50	–	nA
V_R = 30 V	I_R	<	–	200	50	nA
V_R = 50 V	I_R	<	–	–	200	nA

Diode capacitance

V_R = 0; f = 1 MHz	C_d	<	3	pF

1) For sinusoidal operation $I_{F(AV)}$ = 130 mA.

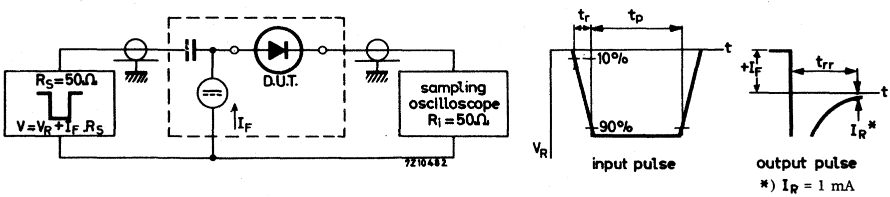
CHARACTERISTICS (continued)

T_j = 25 °C unless otherwise specified

Reverse recovery time when switched from

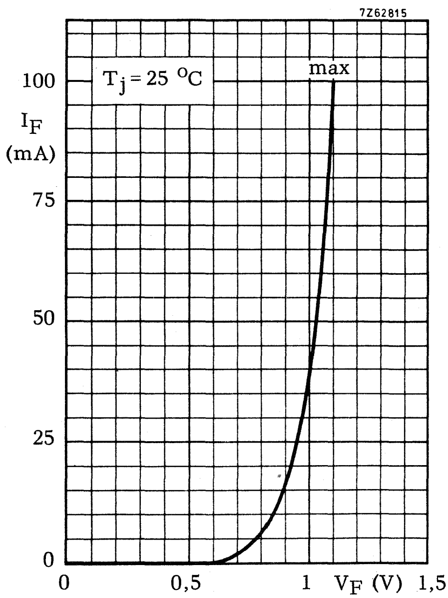
I_F = 10 mA to V_R = 6 V; R_L = 100 Ω
measured at I_R = 1 mA — t_{rr} < 4 ns

Test circuit:



Reverse pulse :	Rise time	t_r = 0,6 ns	Oscilloscope:	
	Pulse duration	t_p = 100 ns	Rise time	t_r = 0,35 ns
	Duty cycle	δ = 0,05		

Circuit capacitance C ≤ 1 pF (C = Oscilloscope + parasitical capacitance)



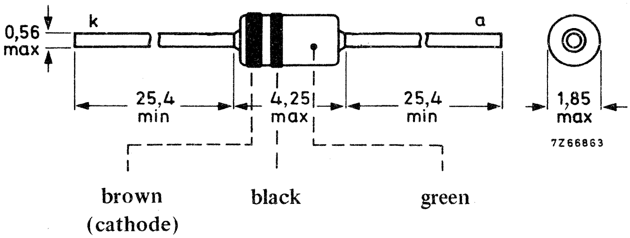
ULTRA HIGH SPEED DIODE

Silicon planar epitaxial ultra high speed high conductance diode in a DO-35 envelope.
The BAV10 is primarily intended for core gating in very fast memories.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	60	V
Repetitive peak reverse voltage	V_{RRM}	max.	60	V
Repetitive peak forward current	I_{FRM}	max.	600	mA
Junction temperature	T_j	max.	200	°C
Forward voltage at I_F = 200 mA	V_F	<	1.0	V
Reverse recovery time when switched from I_F = 400 mA to I_R = 400 mA; R_L = 100 Ω measured at I_R = 40 mA	t_{rr}	<	6	ns
Recovered charge when switched from I_F = 10 mA to V_R = 5 V; R_L = 500 Ω	Q_s	<	50	pC

MECHANICAL DATA Dimensions in mm

DO-35



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

Voltages				
Continuous reverse voltage	V_R	max.	60	V
Repetitive peak reverse voltage	V_{RRM}	max.	60	V [1]
Currents				
Average rectified forward current	I_{FAV}	max.	300	mA [2]
Forward current (d.c.)	I_F	max.	300	mA
Repetitive peak forward current	I_{FRM}	max.	600	mA
Non repetitive peak forward current t = 1 μs	I_{FSM}	max.	4000	mA
t = 1 s	I_{FSM}	max.	1000	mA
Temperatures				
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air at maximum lead length	$R_{th\ j\text{-}a}$	=	0.5	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltages				
I_F = 10 mA	V_F	<	750	mV
I_F = 200 mA	V_F	<	1.0	V
I_F = 200 mA; T_j = 100 °C	V_F	<	0.95	V
I_F = 500 mA	V_F	<	1.25	V
Reverse currents				
V_R = 60 V	I_R	<	100	nA
V_R = 60 V; T_j = 150 °C	I_R	<	100	μA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	2.5	pF

[1]) Measured at zero lifetime at I_R = 10 μA; V_R = 75 V.

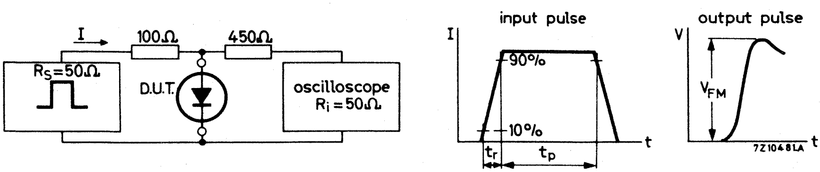
[2]) For sinusoidal operation see page 6. For pulse operation see page 5.

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

Forward recovery voltage when switched to

I_F = 400 mA; t_r = 30 ns	V_{FM}	< 2.0 V
I_F = 400 mA; t_r = 100 ns	V_{FM}	< 1.5 V

Test circuit:



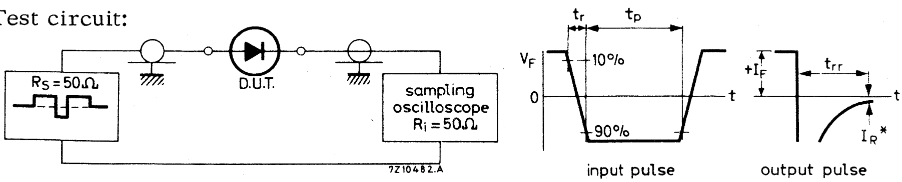
Current pulse: Rise time	t_{r1}	= 30 ns	Oscilloscope:			
Rise time	t_{r2}	= 100 ns				
Pulse duration	t_p	= 300 ns	Rise time	t_r	=	0.35 ns
Duty cycle	δ	= 0.01	Input capacitance	C_i	≤	1 pF

Circuit capacitance $C \leq 20$ pF (C = Oscilloscope + parasitical capacitance)

Reverse recovery time when switched from

I_F = 400 mA to I_{RM} = 400 mA; R_L = 100 Ω
measured at I_R = 40 mA t_{rr} < 6 ns

Test circuit:



*) I_R = 40 mA

Reverse pulse: Rise time	t_r	= 0.6 ns	Oscilloscope:		
Pulse duration	t_p	= 100 ns	Rise time	t_r	= 0.35 ns
Duty cycle	δ	= 0.05			

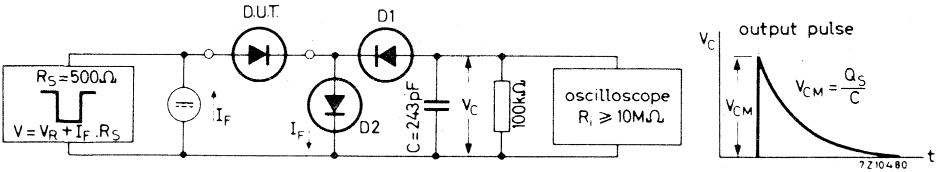
Circuit capacitance $C \leq 1$ pF (C = Oscilloscope + parasitical capacitance)

CHARACTERISTICS (continued)

Recovered charge when switched from

I_F = 10 mA to V_R = 5 V; R_L = 500 Ω — Q_s < 50 pC

Test circuit:



D1 = BAW62

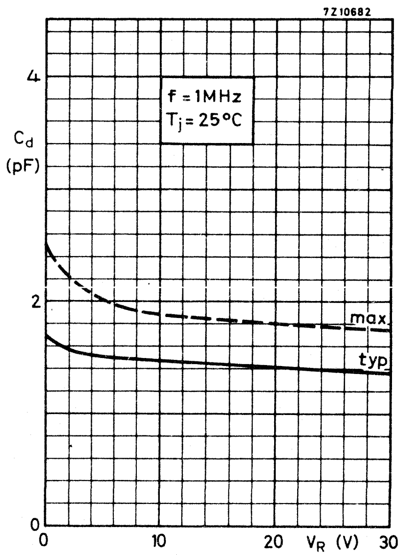
D2 = diode with minority carrier lifetime at 10 mA: < 200 ps

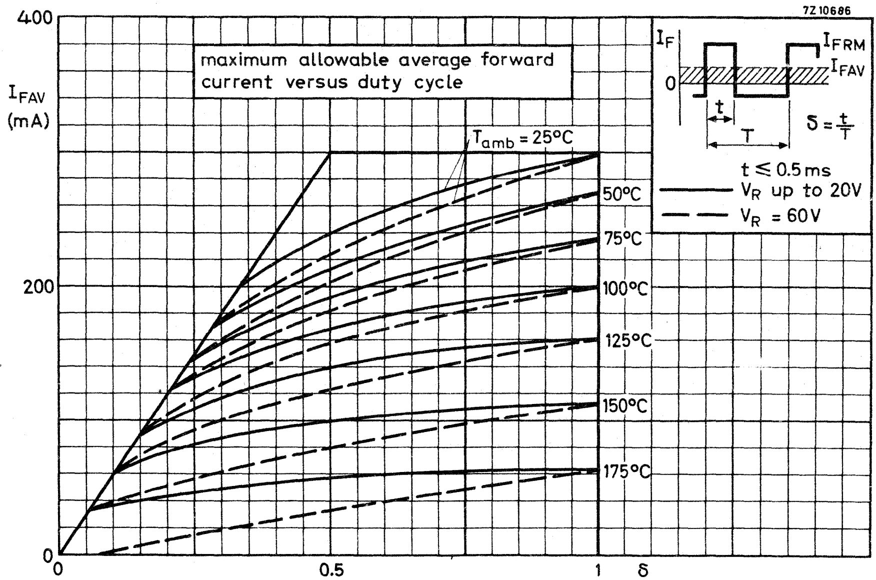
Reverse pulse : Rise time t_r = 2 ns

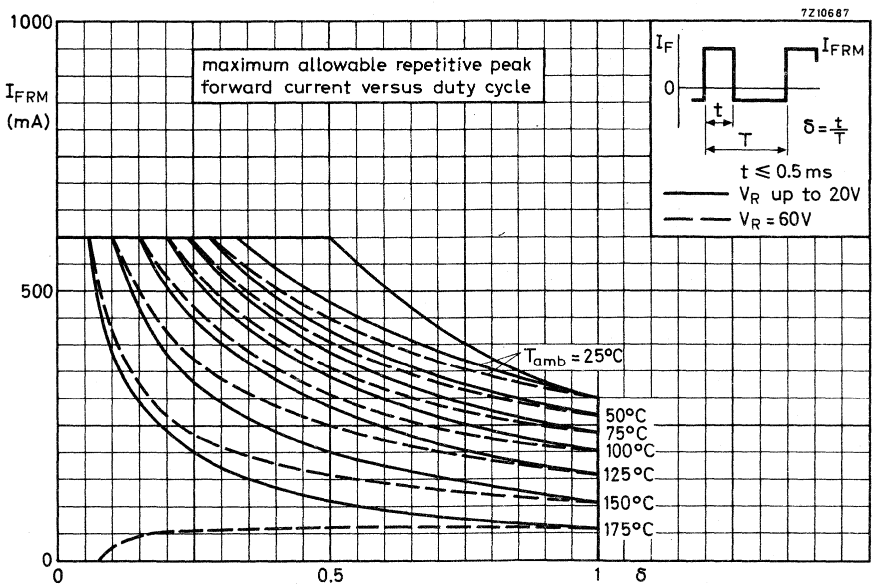
Pulse duration t_p = 400 ns

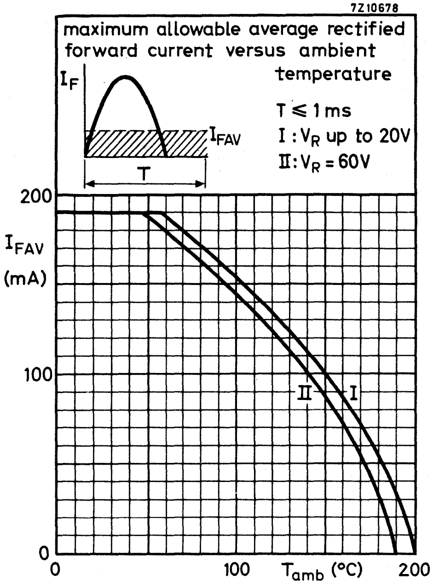
Duty cycle δ = 0.02

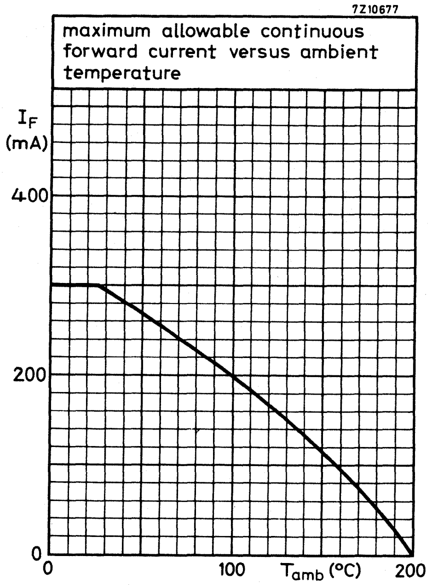
Circuit capacitance C ≤ 7 pF (C = Oscilloscope + parasitical capacitance)

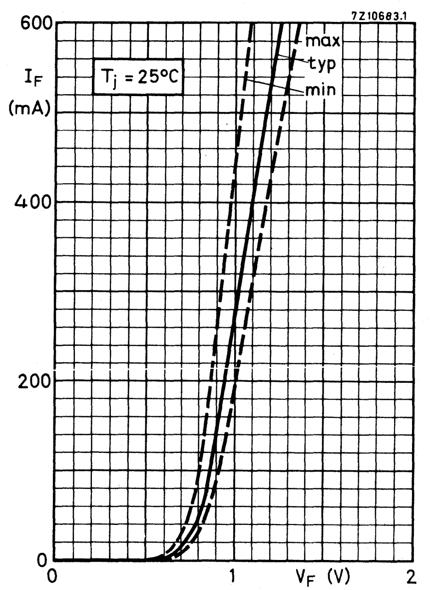


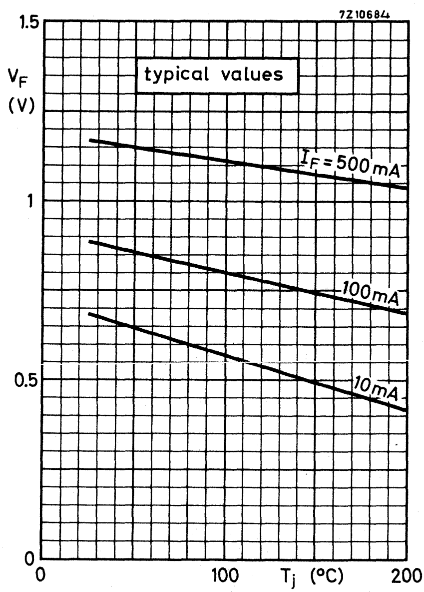

7Z10686
400
200
0
I_{FAV}
(mA)
maximum allowable average forward current versus duty cycle
T_{amb} = 25°C
50°C
75°C
100°C
125°C
150°C
175°C
0
0.5
1
δ
I_F
I_{FRM}
I_{FAV}
t
T
δ = t/T
t ≤ 0.5 ms
V_R up to 20V
V_R = 60V

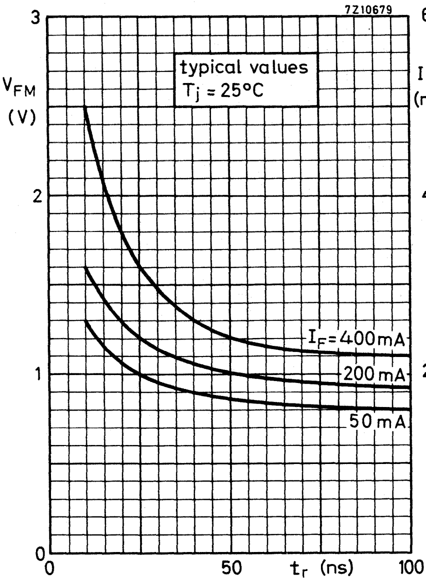

7Z10687
1000
500
0
I_{FRM}
(mA)
maximum allowable repetitive peak forward current versus duty cycle
T_{amb} = 25°C
50°C
75°C
100°C
125°C
150°C
175°C
0
0.5
1
δ
I_F
I_{FRM}
t
T
δ = t/T
t ≤ 0.5 ms
V_R up to 20V
V_R = 60V

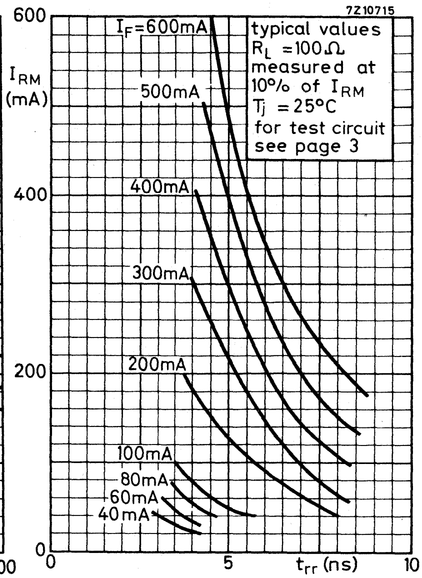

7Z10678
maximum allowable average rectified forward current versus ambient temperature
T ⩽ 1 ms
I : V_R up to 20V
II: V_R = 60V
I_F
I_{FAV}
T
200
I_{FAV}
(mA)
100
0
II
I
0
100
T_{amb} (°C)
200

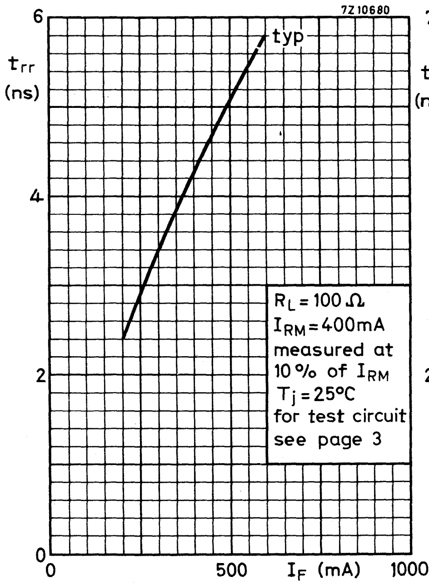

7Z10677
maximum allowable continuous forward current versus ambient temperature
I_F
(mA)
400
200
0
0
100
T_{amb} (°C)
200

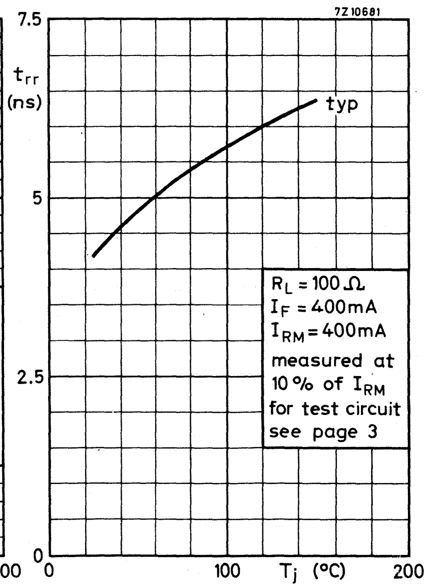

7Z10683.1
600
I_F
(mA)
T_j = 25°C
max
typ
min
400
200
0
0
1
V_F (V)
2

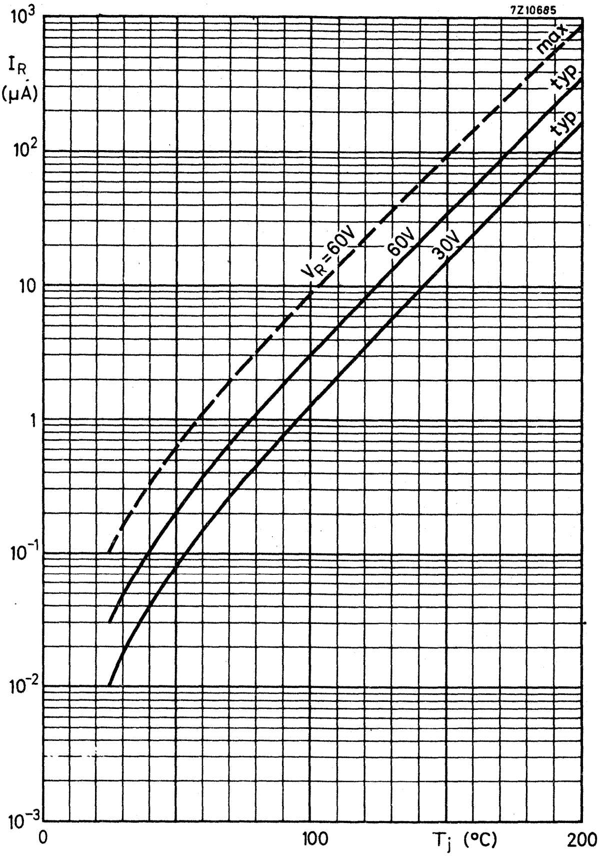

7Z10684
1.5
V_F
(V)
typical values
I_F = 500 mA
1
100 mA
0.5
10 mA
0
0
100
T_j (°C)
200


7Z10679
typical values
T_j = 25°C
V_{FM}
(V)
I_F=400mA
200 mA
50 mA
t_r (ns)
0
50
100
1
2
3


7Z10715
I_F=600mA
typical values
R_L =100 Ω
measured at
10% of I_{RM}
T_j =25°C
for test circuit
see page 3
I_{RM}
(mA)
500mA
400mA
300mA
200mA
100mA
80mA
60mA
40mA
t_{rr} (ns)
0
5
10
200
400
600


7Z10680
typ
t_{rr}
(ns)
R_L = 100 Ω
I_{RM}=400mA
measured at
10 % of I_{RM}
T_j=25°C
for test circuit
see page 3
I_F (mA)
0
500
1000
2
4
6


7Z10681
typ
t_{rr}
(ns)
R_L = 100 Ω
I_F = 400mA
I_{RM}=400mA
measured at
10 % of I_{RM}
for test circuit
see page 3
T_j (°C)
0
100
200
2.5
5
7.5


7Z10685
I_R (μA)
10^3
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
0
100
200
T_j (°C)
max
typ
typ
$V_R = 60V$
60V
30V

GENERAL PURPOSE DIODES

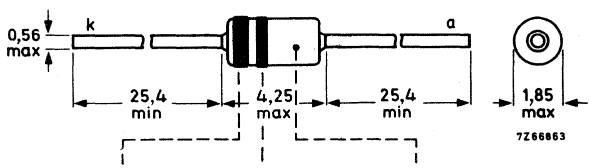
Silicon planar epitaxial diodes in a DO-35 envelope; intended for switching and general purposes in industrial equipment e.g. oscilloscopes, digital voltmeters and video output stages in colour television.

QUICK REFERENCE DATA

			BAV18	BAV19	BAV20	BAV21	
Continuous reverse voltage	V_R	max.	50	100	150	200	V
Forward current (d.c.)	I_F	max.	250	250	250	250	mA
Junction temperature	T_j	max.	175	175	175	175	^oC
Thermal resistance from junction to ambient	$R_{th\ j-a}$	=	0,375	0,375	0,375	0,375	$^oC/mW$
Forward voltage at I_F = 100 mA	V_F	<	1,0	1,0	1,0	1,0	V
Reverse current at							
V_R = 50 V	I_R	<	100	–	–	–	nA
V_R = 100 V	I_R	<	–	100	–	–	nA
V_R = 150 V	I_R	<	–	–	100	–	nA
V_R = 200 V	I_R	<	–	–	–	100	nA
Diode capacitance at V_R = 0; f = 1 MHz	C_d	typ.	1,5	1,5	1,5	1,5	pF
		<	5,0	5,0	5,0	5,0	pF
Reverse recovery time when switched from I_F = 30 mA to I_R = 30 mA; measured at I_R = 3 mA	t_{rr}	<	50	50	50	50	ns

MECHANICAL DATA Dimensions in mm

DO-35



BAV18:	brown	grey	green
BAV19:	brown	white	green
BAV20:	red	black	green
BAV21:	red	brown	green
	(cathode)		

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

Voltage

			BAV18	BAV19	BAV20	BAV21	
Continuous reverse voltage	V_R	max.	50	100	150	200	V
Repetitive peak reverse voltage	V_{RRM}	max.	60	120	200	250	V

Current

Average forward current (averaged over any 20 ms period) with R load	$I_{F(AV)}$	max.	200	mA
Forward current (d.c.)	I_F	max.	250	mA
Repetitive peak forward current	I_{FRM}	max.	625	mA
Non-repetitive peak forward current $t < 1$ s; $T_j = 25\ ^oC$	I_{FSM}	max.	1	A
Total power dissipation up to $T_{amb} = 25\ ^oC$	P_{tot}	max.	400	mW

Temperatures

Storage temperature	T_{stg}		-65 to +175	^oC
Junction temperature	T_j	max.	175	^oC

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	0,375	$^oC/mW$

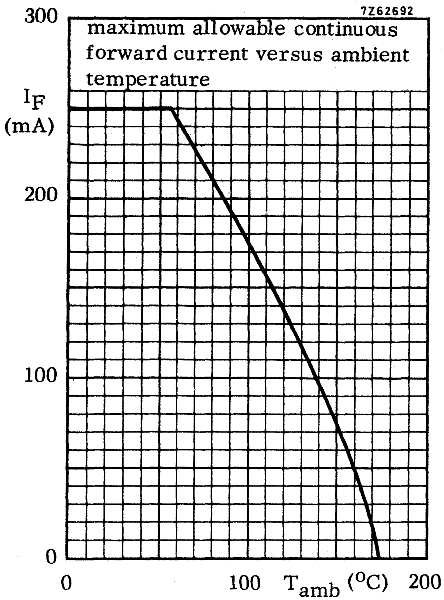
CHARACTERISTICS

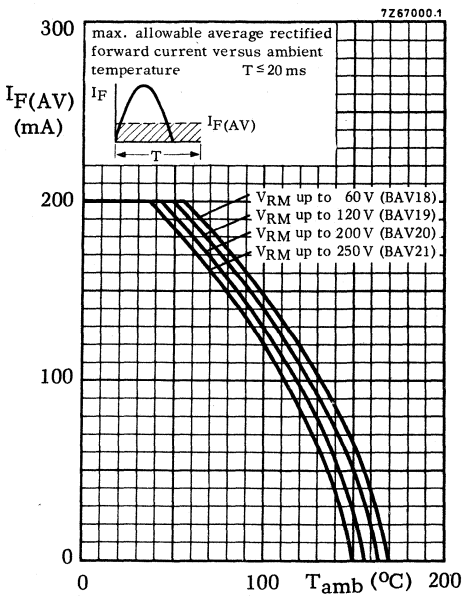
T_j = 25 °C unless otherwise specified

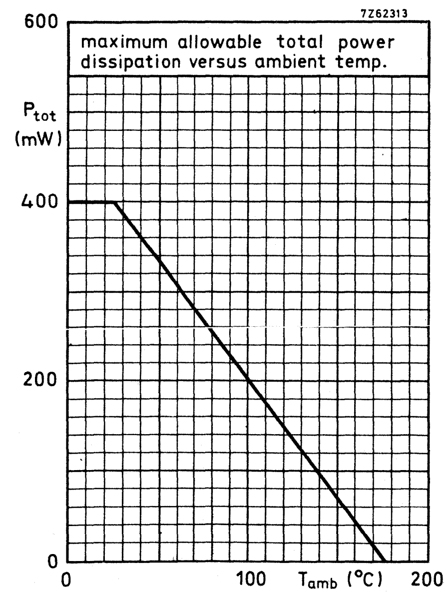
			BAV18	BAV19	BAV20	BAV21	
Forward voltage at I_F = 100 mA	V_F	<	1,0				V
at I_F = 200 mA	V_F	<	1,25				V
Reverse breakdown voltage at I_R = 100 μA	$V_{(BR)R}$	>	60	120	200	250	V[1]
Reverse current at:							
V_R = 50 V	I_R	<	100	–	–	–	nA
V_R = 100 V	I_R	<	–	100	–	–	nA
V_R = 150 V	I_R	<	–	–	100	–	nA
V_R = 200 V	I_R	<	–	–	–	100	nA
V_R = 50 V; T_j = 150 °C	I_R	<	100	–	–	–	μA
V_R = 100 V; T_j = 150 °C	I_R	<	–	100	–	–	μA ←
V_R = 150 V; T_j = 150 °C	I_R	<	–	–	100	–	μA
V_R = 200 V; T_j = 150 °C	I_R	<	–	–	–	100	μA

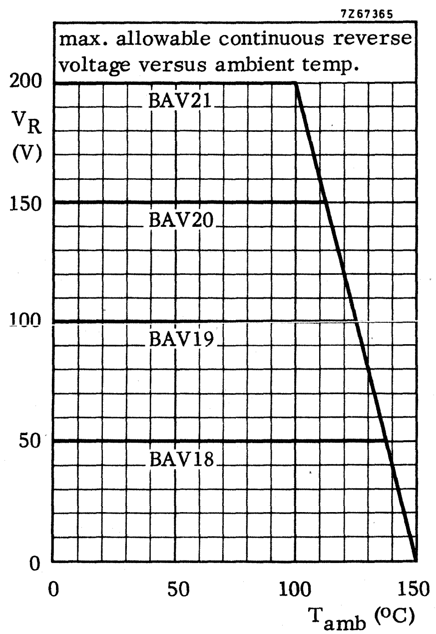
Series resistance at I_F = 10 mA	r_D	typ.	5	Ω
Diode capacitance V_R = 0; f = 1 MHz	C_d	typ.	1,5	pF
		<	5,0	pF
Reverse recovery time when switched from I_F = 30 mA to I_R = 30 mA; R_L = 100 Ω measured at I_R = 3 mA	t_{rr}	<	50	ns

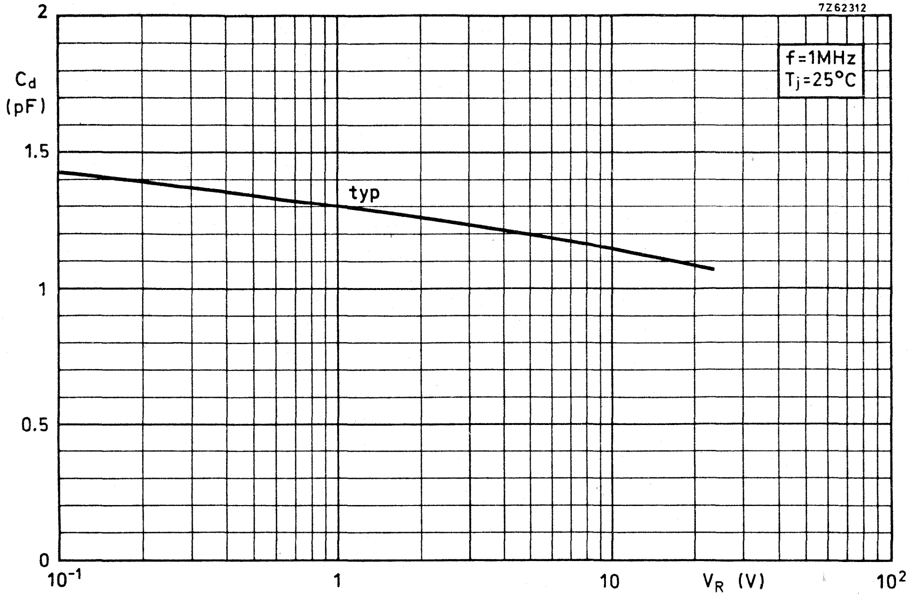
1) At zero life time, measured under pulse conditions to avoid excessive dissipation and voltage limited at 275 V. ←

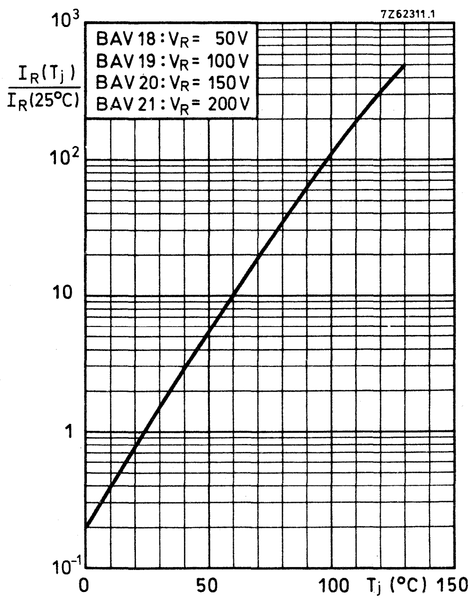

7Z62692
maximum allowable continuous forward current versus ambient temperature
I_F (mA)
300
200
100
0
0
100
200
T_{amb} (°C)

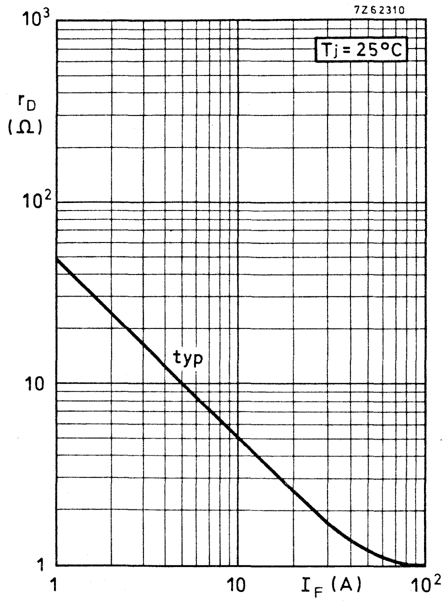

7Z67000.1
max. allowable average rectified forward current versus ambient temperature
T ≤ 20 ms
I_F
$I_{F(AV)}$
T
$I_{F(AV)}$ (mA)
V_{RM} up to 60 V (BAV18)
V_{RM} up to 120 V (BAV19)
V_{RM} up to 200 V (BAV20)
V_{RM} up to 250 V (BAV21)
300
200
100
0
0
100
200
T_{amb} (°C)

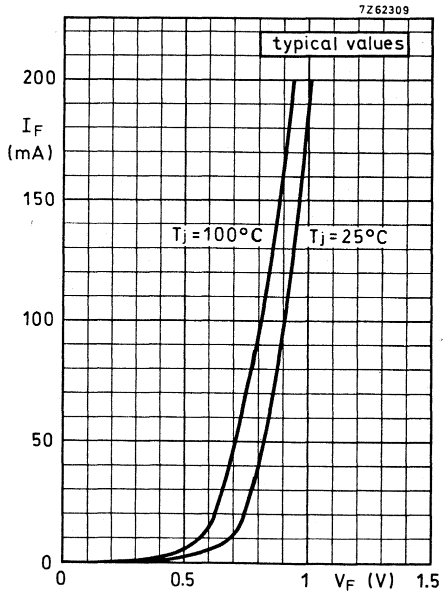

7Z62313
maximum allowable total power dissipation versus ambient temp.
P_{tot} (mW)
600
400
200
0
0
100
200
T_{amb} (°C)


7Z67365
max. allowable continuous reverse voltage versus ambient temp.
V_R (V)
BAV21
BAV20
BAV19
BAV18
200
150
100
50
0
0
50
100
150
T_{amb} (°C)


7Z62312
f = 1MHz
T_j = 25°C
C_d (pF)
typ
V_R (V)


7Z62311.1
BAV18 : V_R = 50V
BAV19 : V_R = 100V
BAV20 : V_R = 150V
BAV21 : V_R = 200V
$\frac{I_R(T_j)}{I_R(25°C)}$
T_j (°C)


7Z62310
T_j = 25°C
r_D (Ω)
typ
I_F (A)


7Z62309
typical values
200
I_F
(mA)
150
100
50
0
Tj = 100°C
Tj = 25°C
0
0.5
1
V_F (V)
1.5

HIGH SPEED SILICON DIODE

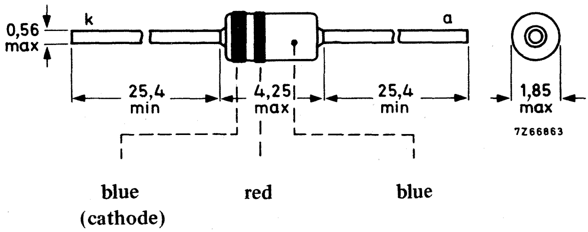
Planar epitaxial high speed diode in a DO-35 envelope.
The BAW62 is primarily intended for fast logic applications.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	75	V
Repetitive peak forward current	I_{FRM}	max.	225	mA
Junction temperature	T_j	max.	200	^oC
Forward voltage at I_F = 100 mA	V_F	<	1	V
Reverse recovery time when switched from I_F = 10 mA to V_R = 1 V; R_L = 100 Ω measured at I_R = 1 mA	t_{rr}	<	4	ns

MECHANICAL DATA

Dimensions in mm

DO-35



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

Voltages

Continuous reverse voltage	V_R	max.	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	75	V [1]

Currents

Average rectified forward current	I_{FAV}	max.	100	mA [2]
Forward current (d.c.)	I_F	max.	100	mA
Repetitive peak forward current	I_{FRM}	max.	225	mA
Non repetitive peak forward current $t = 1\ \mu s$	I_{FSM}	max.	2000	mA
$t = 1\ s$	I_{FSM}	max.	500	mA

Temperatures

Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air at maximum lead length	$R_{th\ j\text{-}a}$	=	0.6	°C/mW

CHARACTERISTICS $T_j = 25$ °C unless otherwise specified

Forward voltages

$I_F = 5$ mA	V_F		0.62 to 0.75	V
$I_F = 100$ mA	V_F	<	1	V
$I_F = 100$ mA; $T_j = 100$ °C	V_F	<	0.93	V

Reverse currents

$V_R = 20$ V	I_R	<	25	nA
$V_R = 20$ V; $T_j = 150$ °C	I_R	<	50	µA
$V_R = 75$ V	I_R	<	5	µA
$V_R = 75$ V; $T_j = 150$ °C	I_R	<	100	µA

Diode capacitance

$V_R = 0$; f = 1 MHz	C_d	<	2	pF

[1]) Measured at zero lifetime at $I_R = 100\ \mu A$; $V_R > 100$ V.

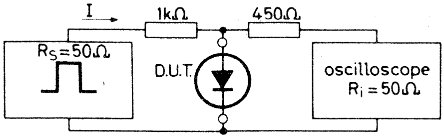
[2]) For sinusoidal operation see page 6. For pulse operation see page 5.

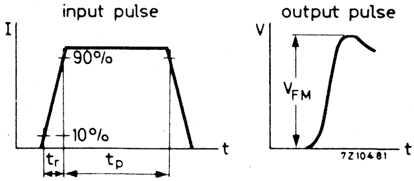
CHARACTERISTICS (continued) $T_j = 25\ ^oC$ unless otherwise specified

Forward recovery voltage when switched to

$I_F = 50$ mA; $t_r = 20$ ns V_{FM} < 2.5 V

Test circuit:





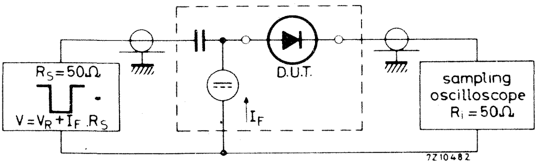
Current pulse: Rise time	t_r	= 20 ns	Oscilloscope:		
Pulse duration	t_p	= 120 ns	Rise time	t_r	= 0.35 ns
Duty cycle	δ	= 0.01			

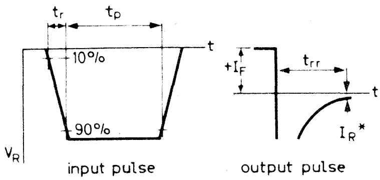
Circuit capacitance $C \leq 1$ pF (C = Oscilloscope + parasitical capacitance)

Reverse recovery time when switched from

$I_F = 10$ mA to $V_R = 1$ V; $R_L = 100\ \Omega$
measured at $I_R = 1$ mA t_{rr} < 4 ns

Test circuit:





*) $I_R = 1$ mA

Reverse pulse: Rise time	t_r	= 0.6 ns	Oscilloscope:		
Pulse duration	t_p	= 100 ns	Rise time	t_r	= 0.35 ns
Duty cycle	δ	= 0.05			

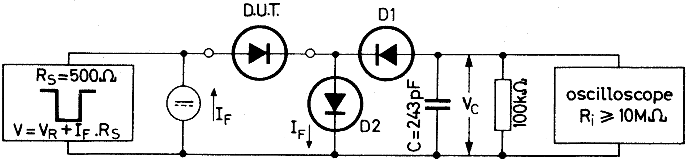
Circuit capacitance $C \leq 1$ pF (C = Oscilloscope + parasitical capacitance)

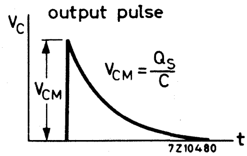
CHARACTERISTICS (continued)

Recovered charge when switched from

I_F = 10 mA to V_R = 5 V; R_L = 500 Ω | Q_s | typ. 50 pC

Test circuit





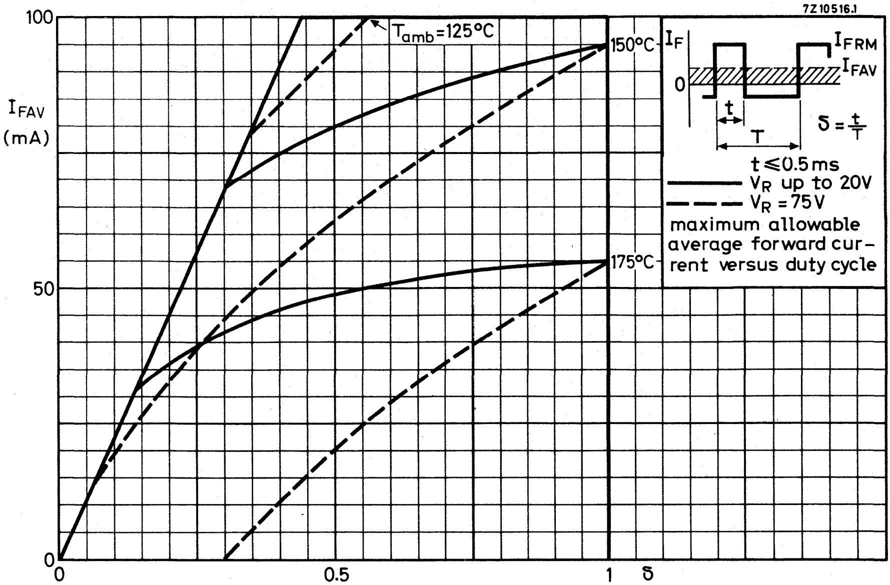
D1 = D2 = BAW62

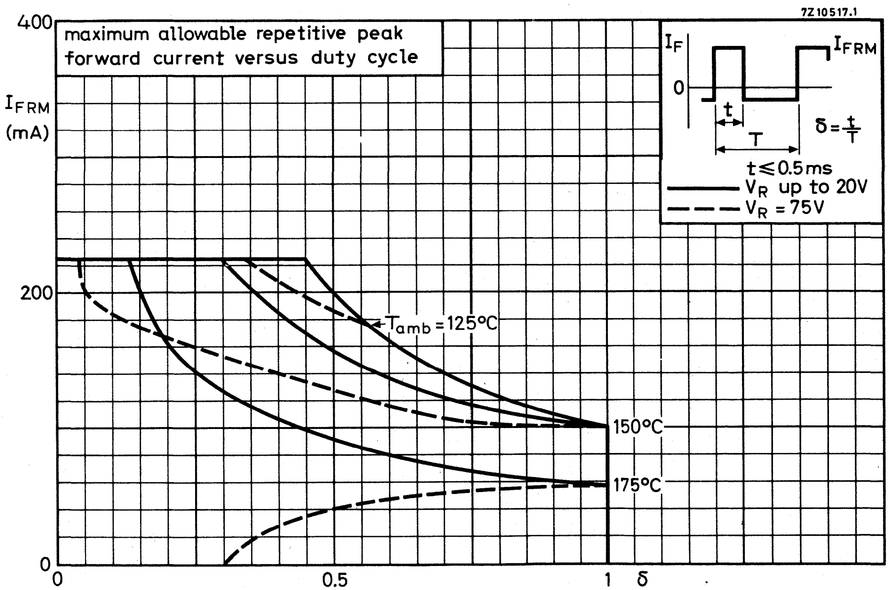
Reverse pulse: Rise time t_r = 2 ns

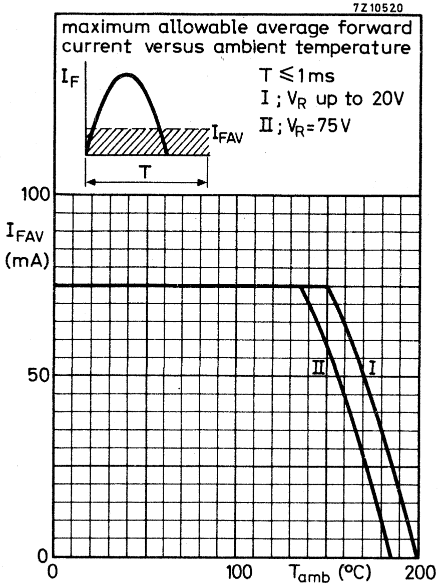
Pulse duration t_p = 400 ns

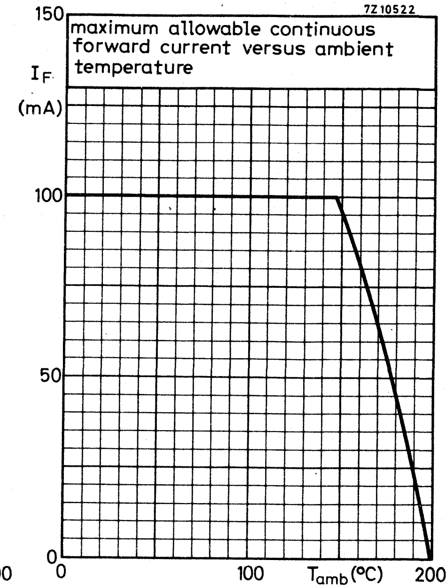
Duty cycle δ = 0.02

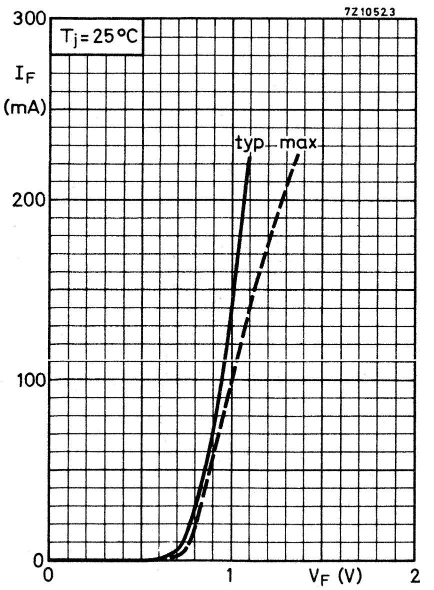
Circuit capacitance $C \leq 7$ pF (C = Oscilloscope + parasitical capacitance)

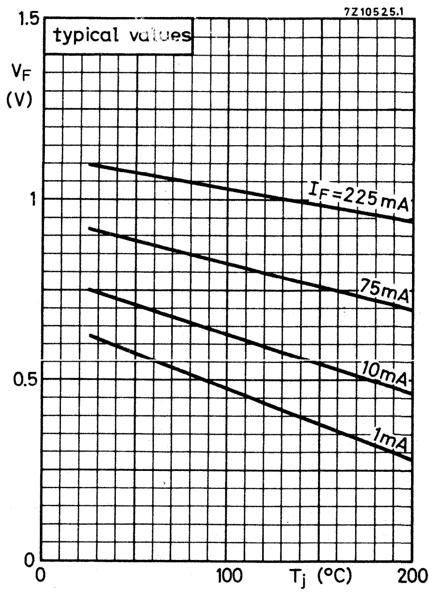

7Z10516.1
100
50
0
IFAV
(mA)
0
0.5
1
δ
Tamb=125°C
150°C
175°C
IF
IFRM
IFAV
0
t
T
δ = t/T
t ≤ 0.5 ms
VR up to 20V
VR = 75V
maximum allowable
average forward cur-
rent versus duty cycle

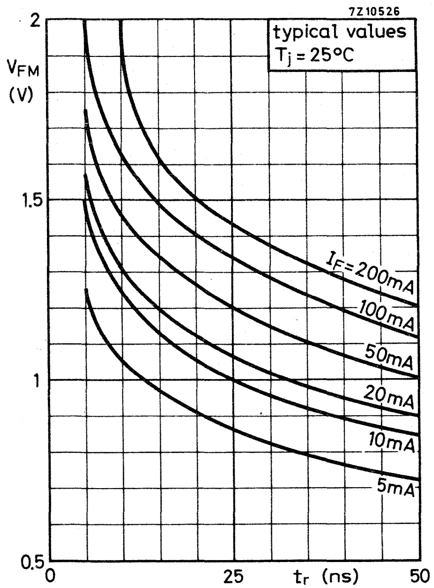

7Z10517.1
400
200
0
IFRM
(mA)
0
0.5
1
δ
maximum allowable repetitive peak
forward current versus duty cycle
Tamb = 125°C
150°C
175°C
IF
IFRM
0
t
T
δ = t/T
t ≤ 0.5 ms
VR up to 20V
VR = 75V

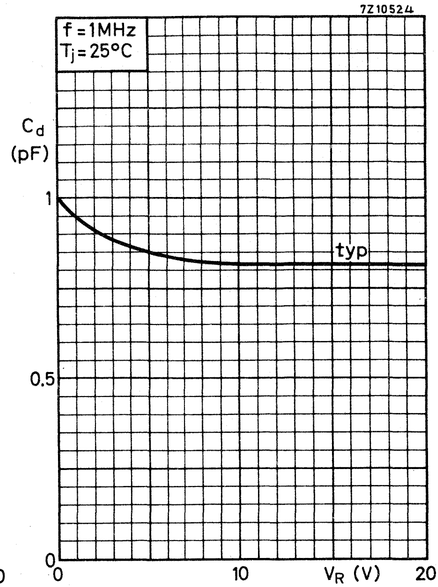

7Z10520
maximum allowable average forward current versus ambient temperature
I_F
I_FAV
T
T ≤ 1 ms
I ; V_R up to 20V
II ; V_R = 75 V
100
I_FAV
(mA)
50
0
0
100
T_amb (°C)
200
II
I

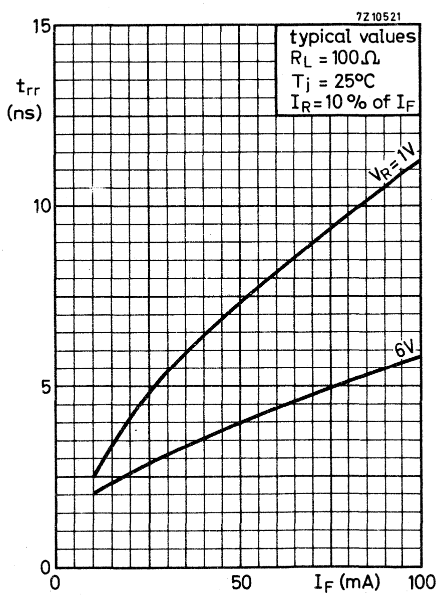

7Z10522
150
maximum allowable continuous forward current versus ambient temperature
I_F
(mA)
100
50
0
0
100
T_amb (°C)
200

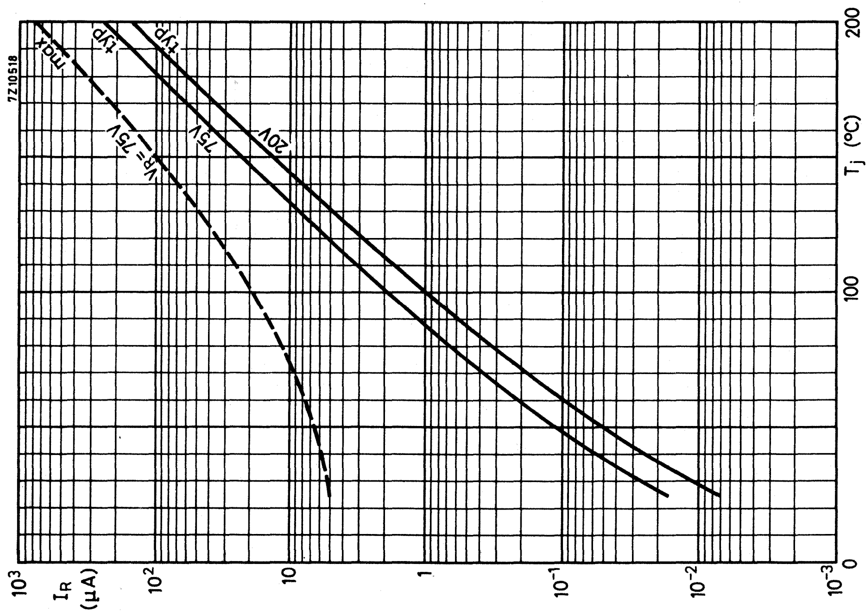

7Z10523
300
T_j = 25 °C
I_F
(mA)
typ
max
200
100
0
0
1
V_F (V)
2

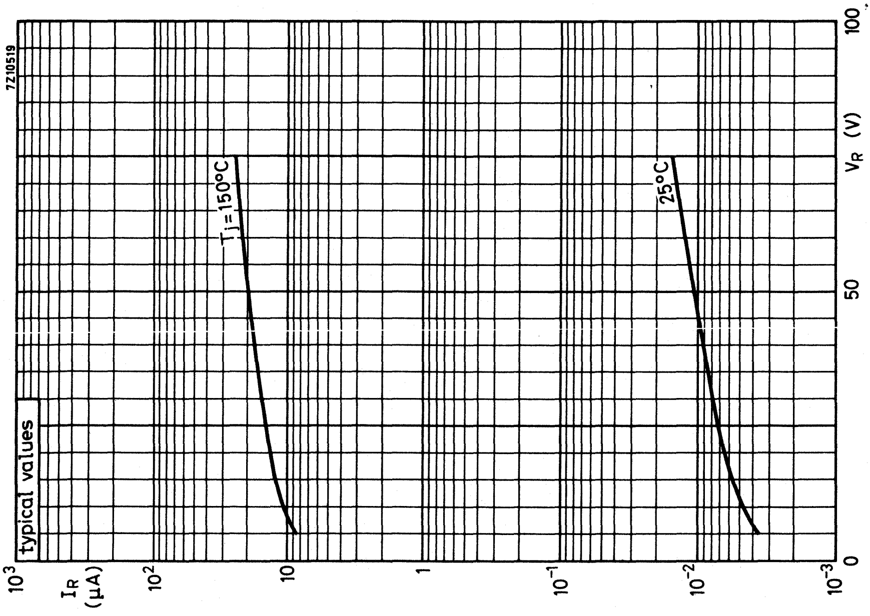

7Z10525.1
1.5
typical values
V_F
(V)
1
I_F = 225 mA
75 mA
10 mA
1 mA
0.5
0
0
100
T_j (°C)
200


7Z10526
typical values
$T_j = 25°C$
V_{FM}
(V)
2
1.5
1
0.5
$I_F = 200mA$
100mA
50mA
20mA
10mA
5mA
0
25
t_r (ns)
50


7Z10524
f = 1MHz
$T_j = 25°C$
C_d
(pF)
1
0.5
0
typ
0
10
V_R (V)
20


7Z10521
typical values
$R_L = 100 \Omega$
$T_j = 25°C$
$I_R = 10\%$ of I_F
t_{rr}
(ns)
15
10
5
0
$V_R = 1V$
6V
0
50
I_F (mA)
100


7Z10518
I_R (μA)
10^3
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
0
100
200
T_j (°C)
max
typ
typ
V_R = 75V
75V
20V


7Z10519
typical values
I_R (μA)
10^3
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
0
50
100
V_R (V)
T_j = 150°C
25°C

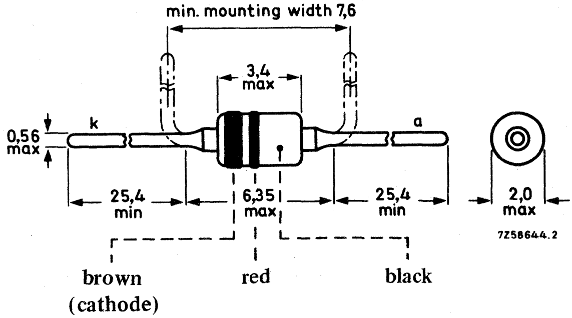
SILICON OXIDE PASSIVATED AVALANCHE DIODE

Whiskerless diffused diode in a molybdenum hard glass subminiature envelope, capable of absorbing transients repetitively. It is a fast high conductance diode, primarily intended for switching inductive loads in semi-electronic telephone exchanges.

QUICK REFERENCE DATA				
Repetitive peak forward current	I_{FRM}	max.	800	mA
Thermal resistance from junction to ambient	$R_{th\ j-a}$	=	0.3	°C/mW
Forward voltage at I_F = 200 mA	V_F	<	1.0	V
Reverse breakdown voltage I_R = 1 mA	$V_{(BR)R}$	120 to	175	V
Reverse current V_R = 90 V; T_j = 150 °C	I_R	<	100	μA
Reverse recovery time when switched from I_F = 30 mA to V_R = 3 V; R_L = 100 Ω measured at I_R = 3 mA	t_{rr}	<	50	ns
Recovered charge when switched from I_F = 10 mA to V_R = 5 V R_L = 500 Ω	Q_s	<	0.5	nC

MECHANICAL DATA Dimensions in mm

SOD-17



RATINGS (Limiting values) [1]

Voltage

Continuous reverse voltage	V_R	max.	90	V [2]

Currents

Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	400	mA
Forward current (d.c.)	I_F	max.	400	mA
Repetitive peak forward current	I_{FRM}	max.	800	mA
Non repetitive peak forward current				
t = 1 μs	I_{FSM}	max.	6000	mA
t = 1 s	I_{FSM}	max.	1500	mA
Repetitive peak reverse current	I_{RRM}	max.	600	mA

Temperatures

Storage temperature	T_{stg}		-65 to +200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.3	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltage

I_F = 10 mA	V_F	<	0.75	V
I_F = 50 mA	V_F	<	0.84	V
I_F = 100 mA	V_F	<	0.90	V
I_F = 200 mA	V_F	<	1.0	V
I_F = 400 mA	V_F	<	1.25	V

Reverse breakdown voltage

I_R = 1 mA	$V_{(BR)R}$	120 to	175	V

Reverse current

V_R = 90 V; T_j = 150 °C	I_R	<	100	μA

Diode capacitance

V_R = 0; f = 1 MHz	C_d	typ.	25	pF
		<	35	pF

1) Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

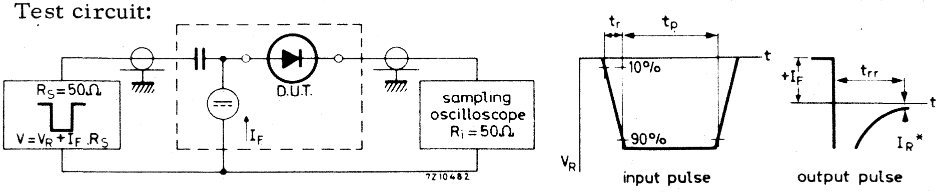
2) It is allowed to exceed this value as described on page 4. Care should be taken not to exceed the I_{RRM} rating.

CHARACTERISTICS (continued) $T_j = 25\ ^oC$ unless otherwise specified

Reverse recovery time when switched from

$I_F = 30$ mA to $V_R = 3$ V; $R_L = 100\ \Omega$ measured at $I_R = 1$ mA	t_{rr}	typ.	37	ns
		<	60	ns
measured at $I_R = 3$ mA	t_{rr}	typ.	30	ns
		<	50	ns

Test circuit:



*) $I_R = 1$ mA (resp. 3 mA)

Reverse pulse: Rise time $t_r = 0.6$ ns

Pulse duration $t_p = 100$ ns

Duty cycle $\delta = 0.05$

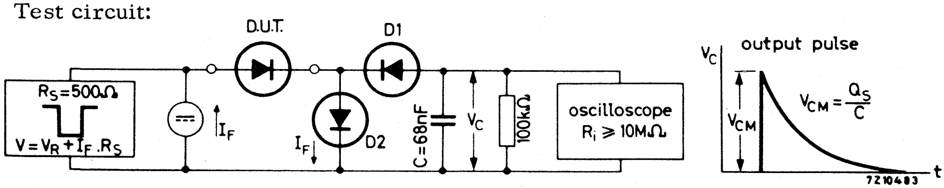
Oscilloscope: Rise time $t_r = 0.35$ ns

Circuit capacitance $C \leq 1$ pF (C = Oscilloscope + parasitical capacitance)

Recovered charge when switched from

$I_F = 10$ mA to $V_R = 5$ V; $R_L = 500\ \Omega$ Q_s < 0.5 nC

Test circuit:



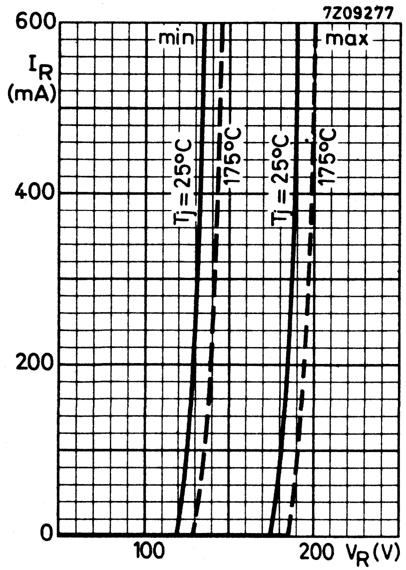
D1 = D2 = BAW62

Reverse pulse: Rise time $t_r = 15$ ns

Pulse duration $t_p = 35\ \mu s$

Frequency $f = 25$ kHz

Circuit capacitance $C < 30$ pF (C = Oscilloscope + parasitical capacitance)



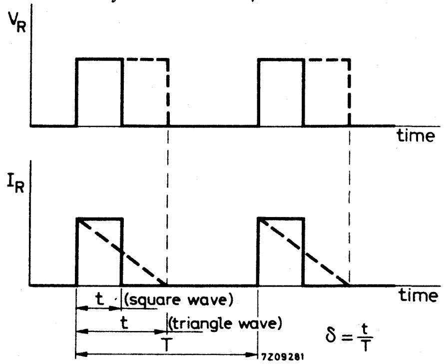
Reverse voltages higher than the V_R ratings are allowed, provided

a. the transient energy ≤ 5 mWs at T_j = 25 °C

b. T ≥ 50 ms: $\delta \leq 0.01$ (square wave pulse)

$\delta \leq 0.02$ (triangle wave pulse)

With increasing temperature, the maximum allowable transient energy must be decreased by 0.015 mWs/°C.



EXAMPLE for calculating the maximum allowable drive current and the maximum turn off time in a practical circuit (see fig. 1)

1. Maximum allowable drive current

For the circuit shown it can be calculated with $E = \frac{1}{2} LI^2$

$$I_{drive\ max.} = \sqrt{\frac{5 \times 10^{-3}}{\frac{1}{2} \times 0.6}} = 130 \text{ mA}$$

2. Maximum turn off time

Immediately after opening switch S the reverse current of the diode is $I_R = I_{drive}$

The turn off time $t_{off} = \frac{E}{\frac{1}{2} \times I_R \times V_{(BR)R}}$. It will be maximum for devices with minimum breakdown voltage if the maximum drive current is applied.

Hence $t_{off\ max.} = \frac{5 \times 10^{-3}}{\frac{1}{2} \times 130 \times 10^{-3} \times 120} = 0.6$ ms

For I_{drive} = 100 mA: $t_{off\ max} = \frac{\frac{1}{2} \times 0.6 \times 10^{-2}}{\frac{1}{2} \times 100 \times 10^{-3} \times 120} = 0.5$ ms

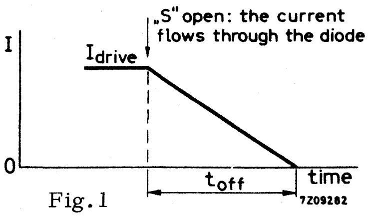


Fig. 1

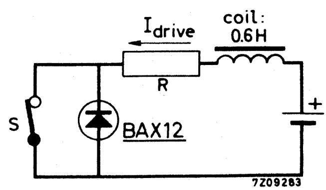
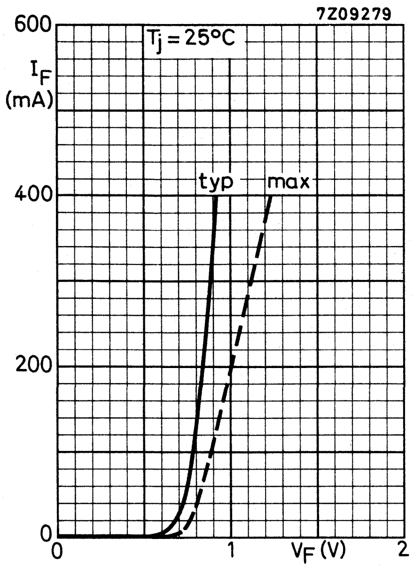
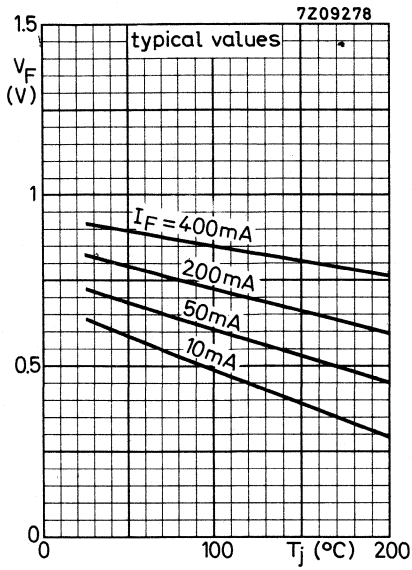
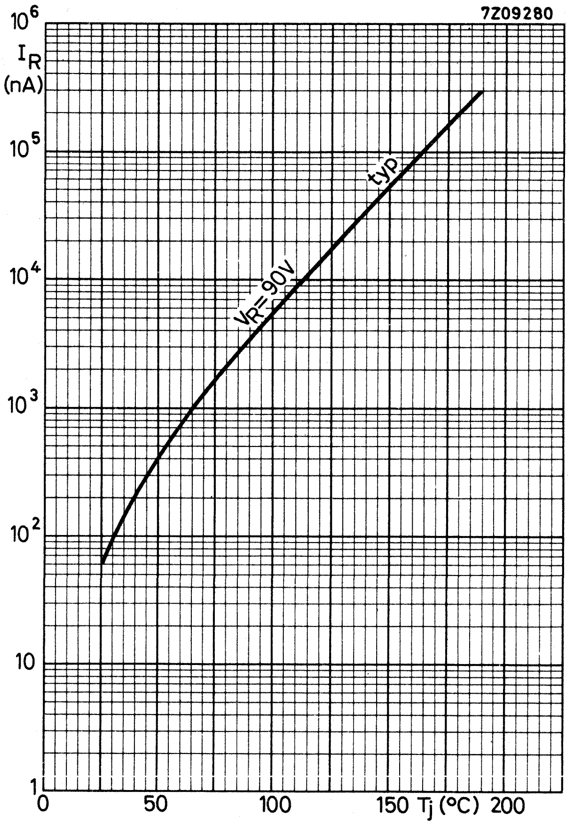


Fig. 2


7Z09279
600
400
200
0
I_F
(mA)
$T_j = 25°C$
typ
max
0
1
V_F (V)
2


7Z09278
1.5
1
0.5
0
V_F
(V)
typical values
$I_F = 400mA$
200mA
50mA
10mA
0
100
T_j (°C)
200


7Z09280
10^6
I_R
(nA)
10^5
10^4
10^3
10^2
10
1
0
50
100
150
200
T_j (°C)
typ
V_R=90V

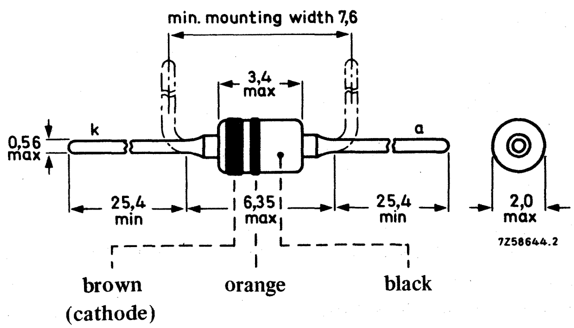
SILICON OXIDE PASSIVATED DIODE

Whiskerless diode in a hardglass subminiature envelope.
The BAX13 is primarily intended for general purpose applications.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	50	V
Repetitive peak reverse voltage	V_{RRM}	max.	50	V
Repetitive peak forward current	I_{FRM}	max.	150	mA
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0.60	°C/mW
Forward voltage at I_F = 20 mA	V_F	<	1.0	V
Reverse recovery time when switched from I_F = 10 mA to V_R = 6 V; R_L = 100 Ω measured at I_R = 1 mA	t_{rr}	<	4	ns
Recovered charge when switched from I_F = 10 mA to V_R = 5 V R_L = 500 Ω	Q_s	<	45	pC

MECHANICAL DATA Dimensions in mm

SOD-17



RATINGS (Limiting values) [1])

Voltages

Continuous reverse voltage	V_R	max.	50	V
Repetitive peak reverse voltage	V_{RRM}	max.	50	V

Currents

Average rectified forward current (averaged over any 20 ms period)	I_{FAV}	max.	75	mA [2])
Forward current (d.c.)	I_F	max.	75	mA
Repetitive peak forward current	I_{FRM}	max.	150	mA
Non repetitive peak forward current t = 1 μs	I_{FSM}	max.	2000	mA
t = 1 s	I_{FSM}	max.	500	mA

Temperatures

Storage temperature	T_{stg}		−65 to +200	^oC
Junction temperature	T_j	max.	200	^oC

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	0.60	$^oC/mW$

CHARACTERISTICS T_j = 25 ^oC unless otherwise specified

Forward voltage

I_F = 2 mA	V_F	<	0.7	V
I_F = 10 mA; T_j = 100 ^oC	V_F	<	0.8	V
I_F = 20 mA	V_F	<	1.0	V [3])
I_F = 75 mA	V_F	<	1.53	V [3])

Reverse current

V_R = 10 V	I_R	<	25	nA
V_R = 10 V; T_j = 150 ^oC	I_R	<	10	μA
V_R = 25 V	I_R	<	50	nA
V_R = 50 V	I_R	<	200	nA
V_R = 50 V; T_j = 150 ^oC	I_R	<	25	μA

Diode capacitance (see also page 7)

V_R = 0; f = 1 MHz	C_d	<	3	pF

[1]) Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

[2]) For sinusoidal operation see page 5.
For pulse operation see page 6.

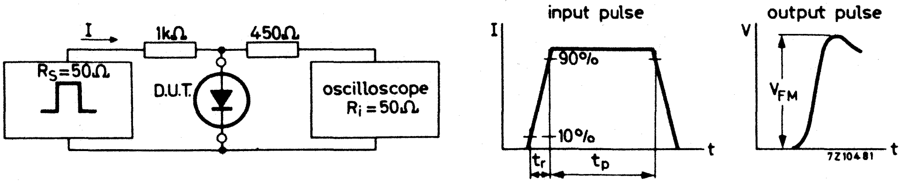
[3]) Measured under pulsed conditions to prevent excessive dissipation.

CHARACTERISTICS (continued) $T_j = 25\ ^oC$ unless otherwise specified

Forward recovery voltage (see also page 7)

At $t_r > 20$ ns, V_{FM} will not exceed V_F corresponding to $I_F = 1$ to 75 mA

Test circuit:



Current pulse: Rise time	t_r	=	20 ns	Oscilloscope:		
Pulse duration	t_p	=	120 ns	Rise time	t_r	= 0.35 ns
Duty cycle	δ	=	0.01			

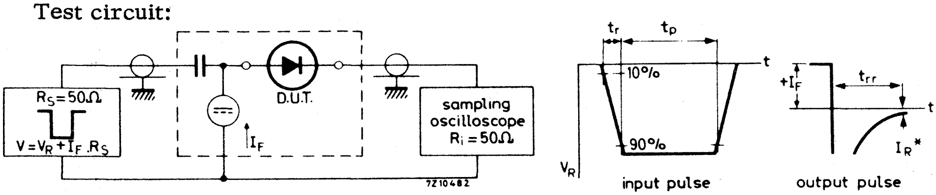
Circuit capacitance C < 1 pF (C = Oscilloscope + parasitical capacitance)

Reverse recovery time when switched from

$I_F = 10$ mA to V_R ; $R_L = 100\ \Omega$ (see also page 8)
measured at $I_R = 1$ mA; switched to

$V_R = 1$ V	t_{rr}	<	6 ns
$V_R = 6$ V	t_{rr}	<	4 ns

Test circuit:



*) $I_R = 1$ mA

Reverse pulse: Rise time	t_r	=	0.6 ns	Oscilloscope:		
Pulse duration	t_p	=	100 ns	Rise time	t_r	= 0.35 ns
Duty cycle	δ	=	0.05			

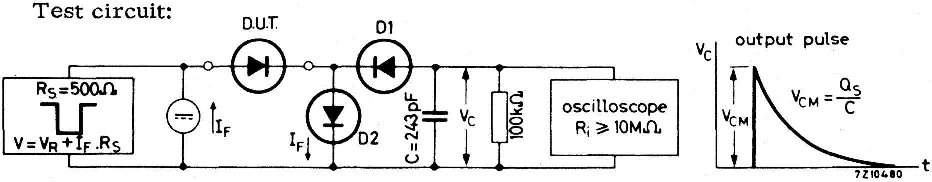
Circuit capacitance C $\leq$ 1 pF (C = Oscilloscope + parasitical capacitance)

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

Recovered charge when switched from

I_F = 10 mA to V_R = 5 V; R_L = 500 Ω Q_s < 45 pC

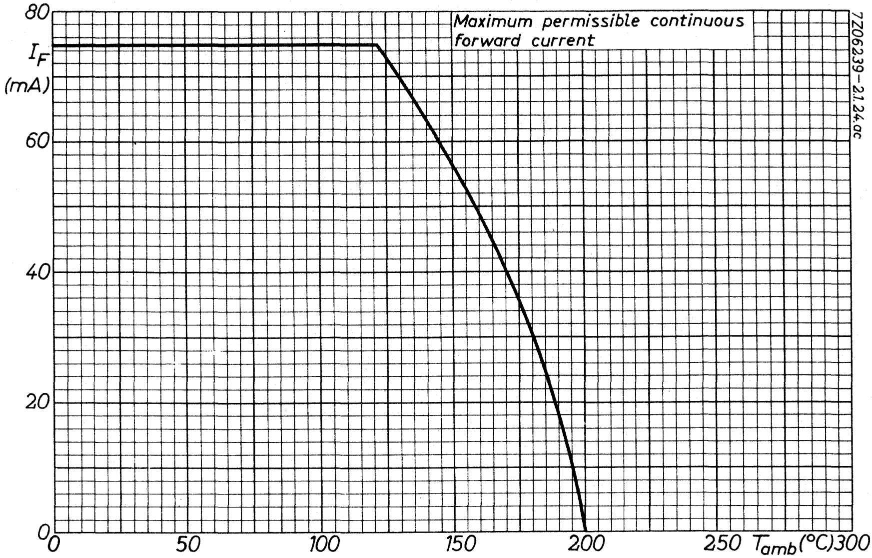
Test circuit:

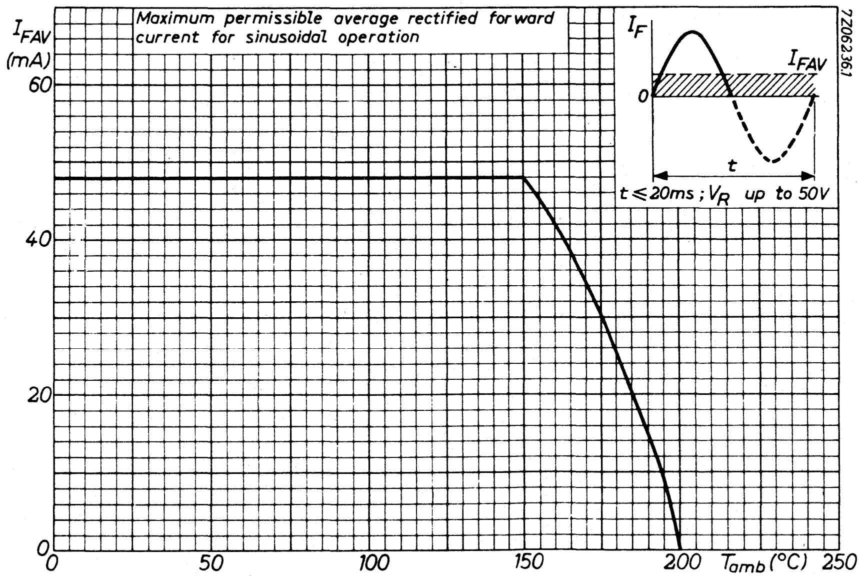


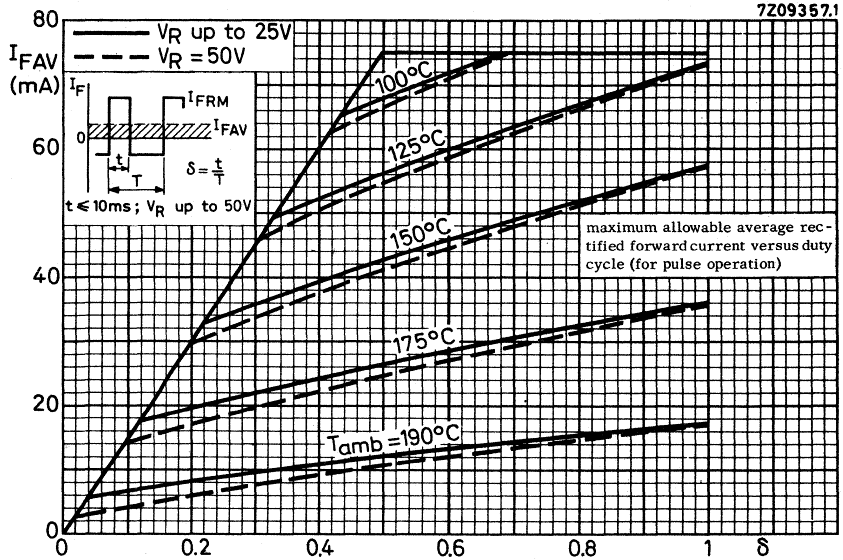
D1 = D2 = BAW62

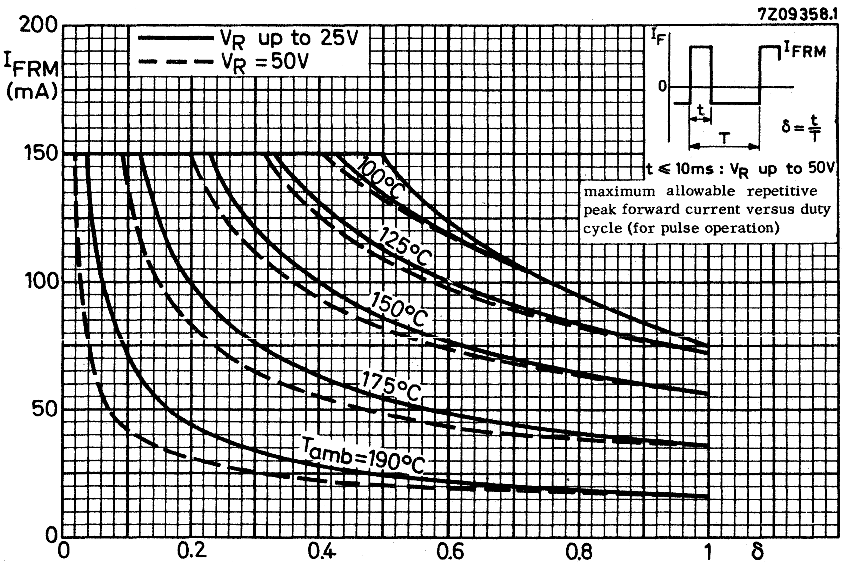
Reverse pulse:	Rise time	t_r	=	2 ns
	Pulse duration	t_p	=	400 ns
	Duty cycle	δ	=	0.02

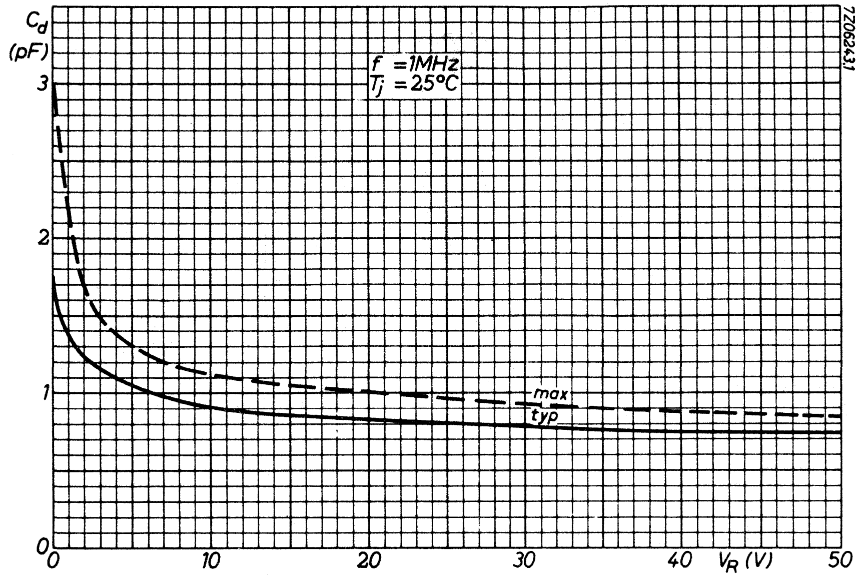
Circuit capacitance C < 7 pF (C = Oscilloscope + parasitical capacitance)

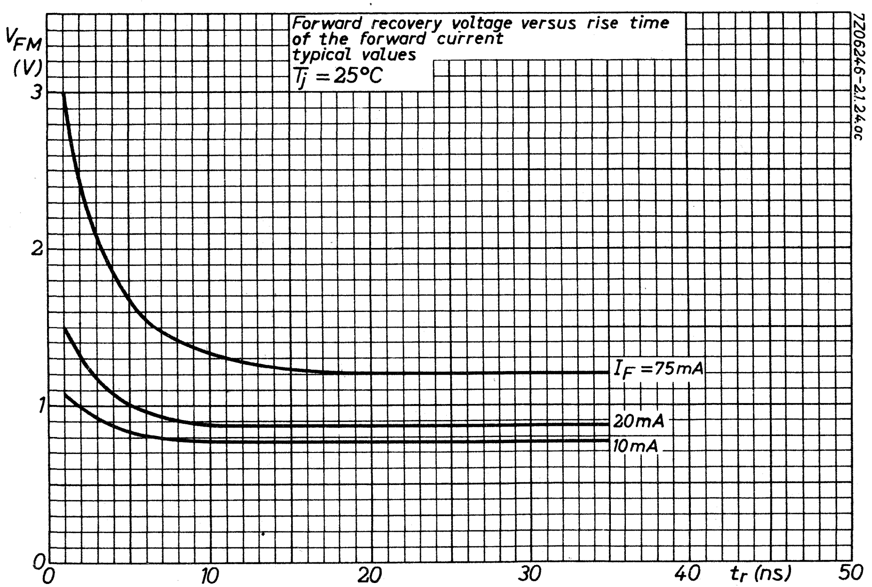

Maximum permissible continuous forward current
I_F (mA)
80
60
40
20
0
0
50
100
150
200
250
T_{amb} (°C)
300
7Z06239-2.1.24.ac

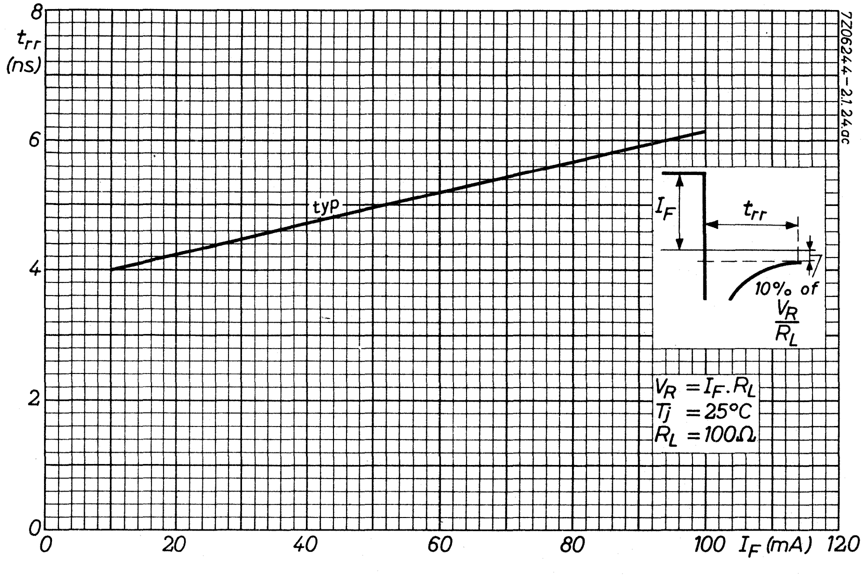

Maximum permissible average rectified forward current for sinusoidal operation
I_{FAV} (mA)
60
40
20
0
0
50
100
150
200
T_{amb} (°C)
250
I_F
I_{FAV}
0
t
$t \leq 20ms$; V_R up to 50V
7Z06236.1

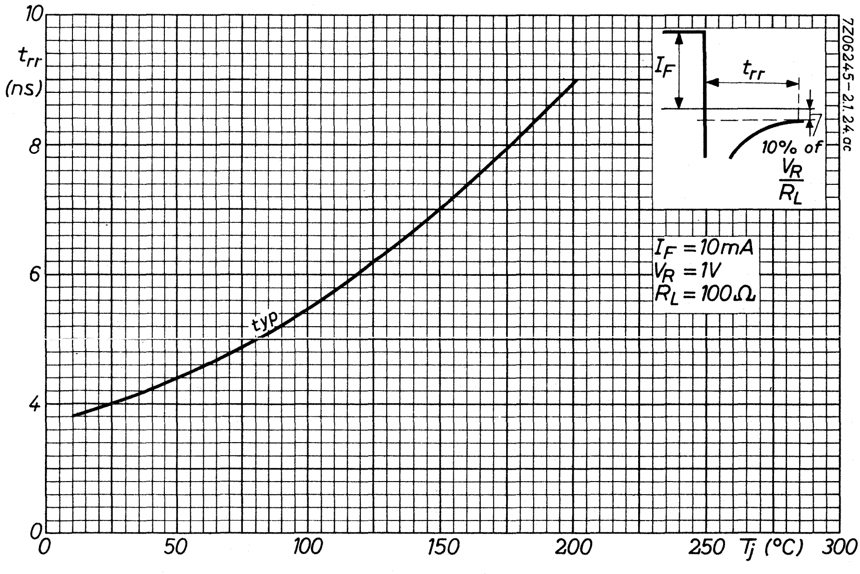

7Z09357.1
80
I_{FAV}
(mA)
60
40
20
0
0
0.2
0.4
0.6
0.8
1
δ
V_R up to 25V
V_R = 50V
I_F
I_{FRM}
0
I_{FAV}
t
T
δ = t/T
t ≤ 10ms; V_R up to 50V
100°C
125°C
150°C
175°C
T_{amb} = 190°C
maximum allowable average rectified forward current versus duty cycle (for pulse operation)

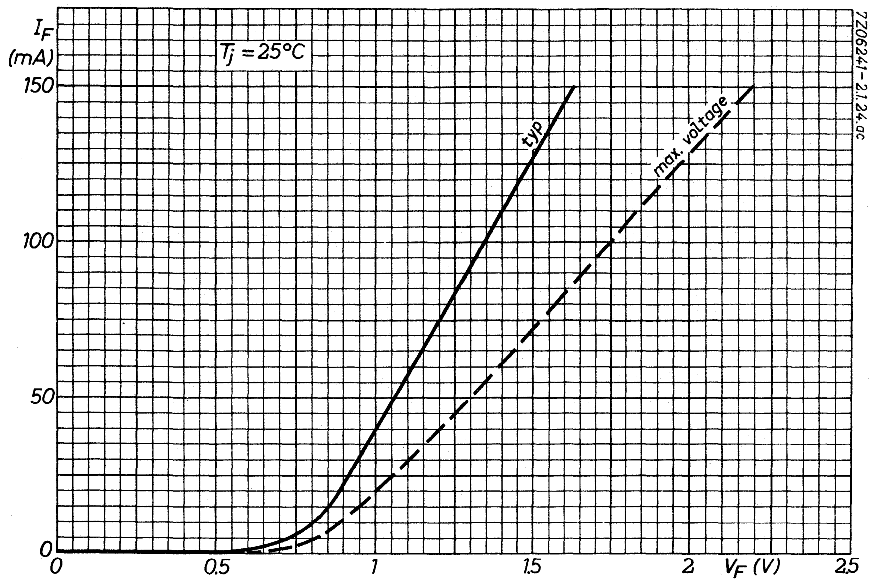

7Z09358.1
200
I_{FRM}
(mA)
150
100
50
0
0
0.2
0.4
0.6
0.8
1
δ
V_R up to 25V
V_R = 50V
I_F
I_{FRM}
0
t
T
δ = t/T
t ≤ 10ms : V_R up to 50V
100°C
125°C
150°C
175°C
T_{amb} = 190°C
maximum allowable repetitive peak forward current versus duty cycle (for pulse operation)

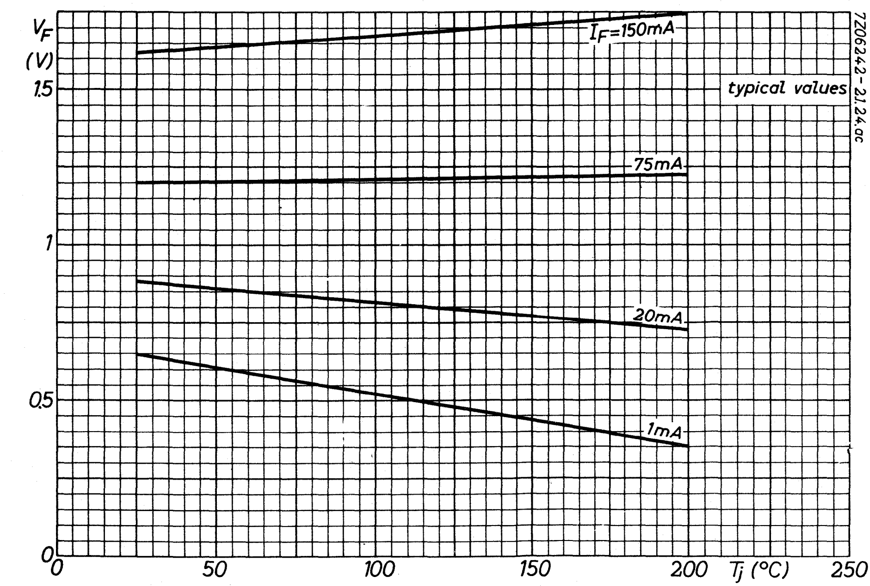

7Z06243.1
C_d
(pF)
f = 1MHz
T_j = 25°C
max
typ
V_R (V)
0
1
2
3
0
10
20
30
40
50

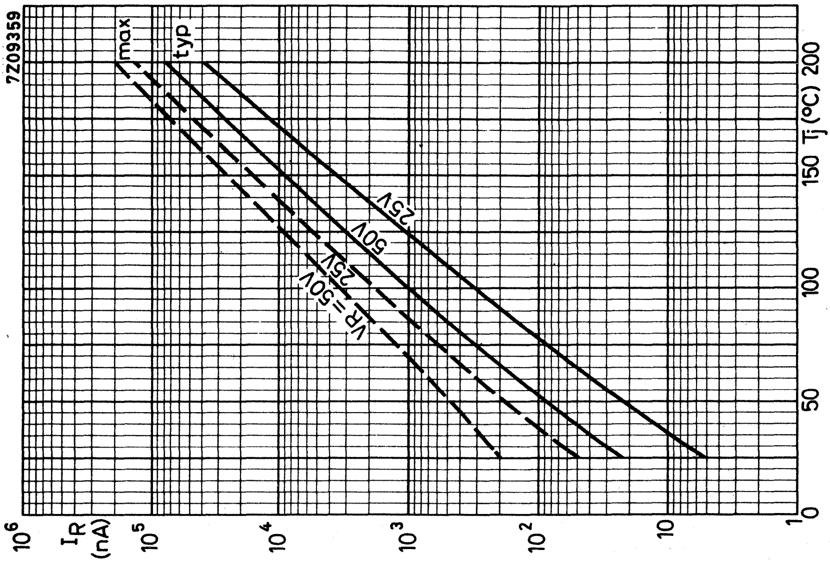

7Z06246-2.1.24.oc
Forward recovery voltage versus rise time
of the forward current
typical values
T_j = 25°C
V_{FM}
(V)
I_F = 75mA
20mA
10mA
t_r (ns)
0
1
2
3
0
10
20
30
40
50

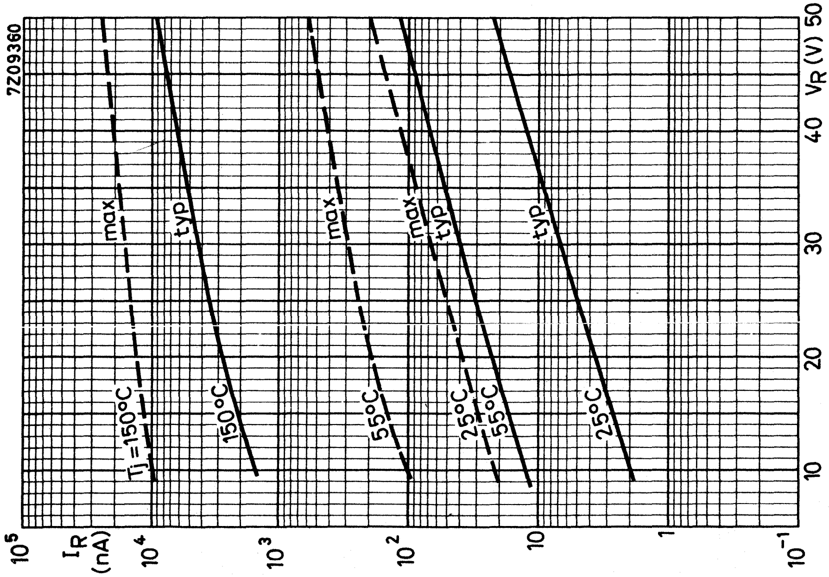

7Z06244-2.1.24.ac
t_{rr} (ns)
typ
I_F
t_{rr}
10% of $\frac{V_R}{R_L}$
$V_R = I_F.R_L$
$T_j = 25°C$
$R_L = 100\Omega$
I_F (mA)
0
2
4
6
8
0
20
40
60
80
100
120


7Z06245-2.1.24.ac
t_{rr} (ns)
typ
I_F
t_{rr}
10% of $\frac{V_R}{R_L}$
$I_F = 10mA$
$V_R = 1V$
$R_L = 100\Omega$
T_j (°C)
0
4
6
8
10
0
50
100
150
200
250
300


I_F (mA)
$T_j = 25°C$
150
100
50
0
0
0.5
1
1.5
2
V_F (V)
2.5
typ
max. voltage
7Z06241-2.1.24.ac


V_F (V)
1.5
1
0.5
0
0
50
100
150
200
T_j (°C)
250
I_F=150mA
typical values
75mA
20mA
1mA
7Z06242-2.1.24.ac


7Z09359
I_R (nA)
10^6
10^5
10^4
10^3
10^2
10
1
0
50
100
150
200
T_j (°C)
max
typ
25V
50V
25V
V_R = 50V


7Z09360
I_R (nA)
10^5
10^4
10^3
10^2
10
1
10^{-1}
10
20
30
40
50
V_R (V)
max
typ
T_j = 150°C
150°C
max
55°C
max
typ
25°C
55°C
typ
25°C

SILICON OXIDE PASSIVATED DIODE

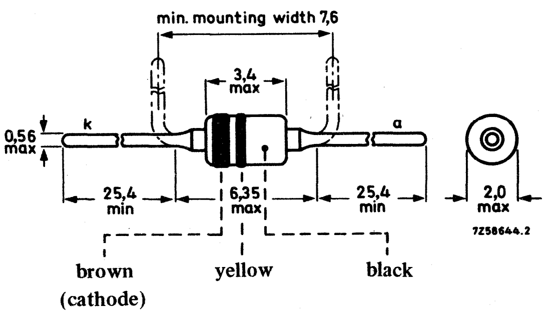
Whiskerless diffused diode in a hard glass subminiature envelope, primarily intended for general purpose applications.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	20	V
Repetitive peak reverse voltage	V_{RRM}	max.	40	V
Forward current (d.c.)	I_F	max.	300	mA
Repetitive peak forward current	I_{FRM}	max.	600	mA
Junction temperature	T_j	max.	200	^oC
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0.4	$^oC/mW$
Forward voltage at I_F = 1 mA	V_F	<	0.6	V
I_F = 300 mA	V_F	<	1.1	V
Reverse recovery time when switched from I_F = 30 mA to V_R = 3 V; R_L = 100 Ω measured at I_R = 3 mA	t_{rr}	<	50	ns
Diode capacitance at V_R = 0; f = 1 MHz	C_d	typ.	25	pF

MECHANICAL DATA

Dimensions in mm

SOD-17



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

Voltages

Continuous reverse voltage	V_R	max.	20	V
Repetitive peak reverse voltage	V_{RRM}	max.	40	V

Currents

Forward current (d.c.)	I_F	max.	300	mA
Repetitive peak reverse current	I_{FRM}	max.	600	mA
Non-repetitive peak forward current				
t = 1 μs	I_{FSM}	max.	6	A
t = 1 s	I_{FSM}	max.	1.5	A

Temperatures

Storage temperature	T_{stg}		−65 to +200	^oC
Junction temperature	T_j	max.	200	^oC

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.4	$^oC/mW$

CHARACTERISTICS T_j = 25 ^oC unless otherwise specified

Forward voltage

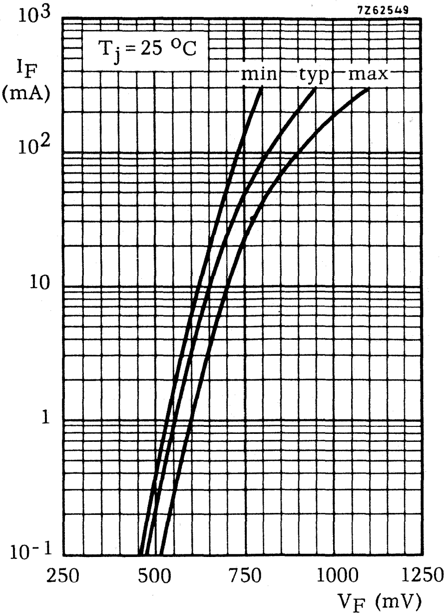
I_F = 1 mA	V_F	540 to 600	mV
I_F = 300 mA	V_F	800 to 1100	mV

Reverse current

V_R = 20 V	I_R	<	100	nA

Diode capacitance

V_R = 0; f = 1 MHz	C_d	typ.	25	pF
		<	35	pF


7Z62549
$T_j = 25\ ^oC$
I_F
(mA)
10^3
10^2
10
1
10^{-1}
min
typ
max
250
500
750
1000
1250
V_F (mV)

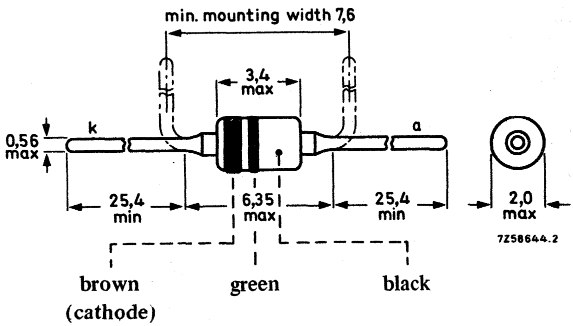
SILICON OXIDE PASSIVATED DIODE

Whiskerless diode in a subminiature envelope. The BAX15 is primarily intended for general purpose industrial applications.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	150	V
Repetitive peak reverse voltage	V_{RRM}	max.	180	V
Repetitive peak forward current	I_{FRM}	max.	500	mA
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0.4	$^oC/mW$
Forward voltage at I_F = 100 mA	V_F	<	1.0	V
Reverse recovery time when switched from I_F = 30 mA to V_R = 3 V; R_L = 100 Ω measured at I_R = 1 mA	t_{rr}	<	300	ns
Recovered charge when switched from I_F = 10 mA to V_R = 5 V R_L = 500 Ω	Q_s	typ.	1	nC

MECHANICAL DATA Dimensions in mm

SOD-17



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

Voltages				
Continuous reverse voltage	V_R	max.	150	V
Repetitive peak reverse voltage	V_{RRM}	max.	180	V
Currents				
Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	250	mA [1]
Forward current (d.c.)	I_F	max.	250	mA
Repetitive peak forward current	I_{FRM}	max.	500	mA
Non repetitive peak forward current; $t \leq 10\ \mu s$	I_{FSM}	max.	30	A
Temperatures				
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.4	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltage				
I_F = 100 mA	V_F	<	1.0	V
I_F = 100 mA; T_j = 100 °C	V_F	<	0.92	V
I_F = 250 mA	V_F	<	1.35	V
Reverse current				
V_R = 150 V	I_R	<	200	nA
V_R = 150 V; T_j = 100 °C	I_R	<	10	μA
Diode capacitance (see also page 7)				
V_R = 0; f = 1 MHz	C_d	<	20	pF

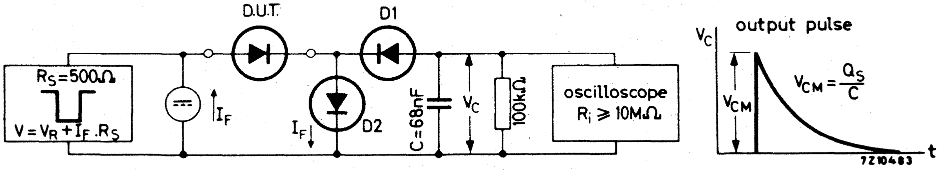
[1] For sinusoidal operation see page 5.
→ For pulse operation see page 4.

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

Recovered charge when switched from

I_F = 10 mA to V_R = 5 V; R_L = 500 Ω Q_s typ. 1 nC

Test circuit:



D1 = D2 = BAW62

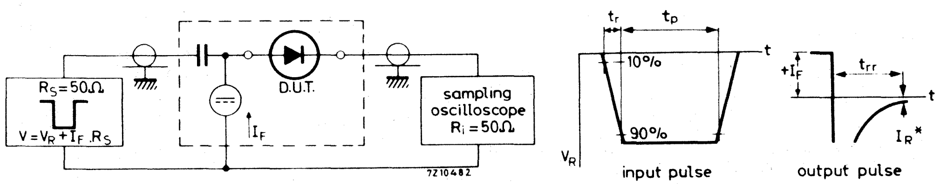
Reverse pulse:	Rise time	t_r	=	15 ns
	Pulse duration	t_p	=	35 μs
	Frequency	f	=	25 kHz

Circuit capacitance C < 30 pF (C = Oscilloscope + parasitical capacitance)

Reverse recovery time when switched from

I_F = 30 mA to V_R = 3 V; R_L = 100 Ω
measured at I_R = 3 mA t_{rr} < 300 ns

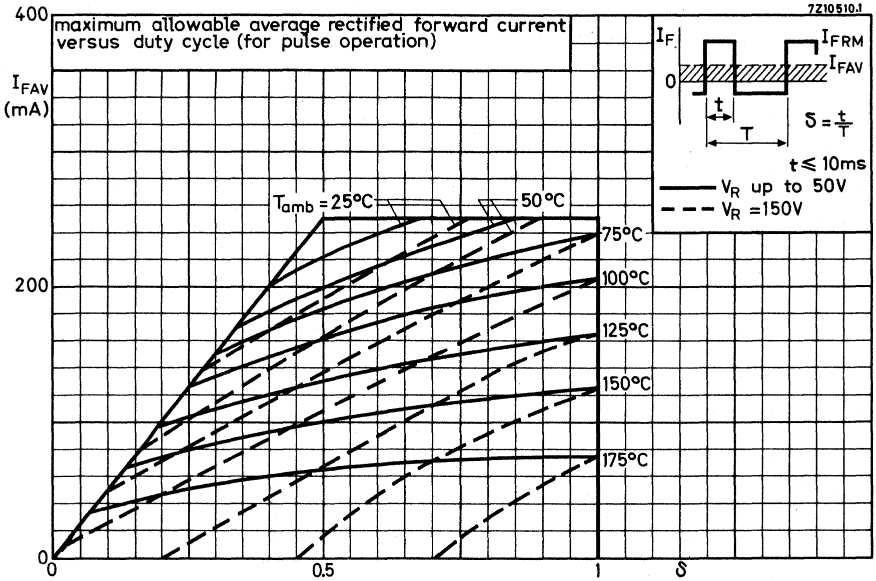
Test circuit:

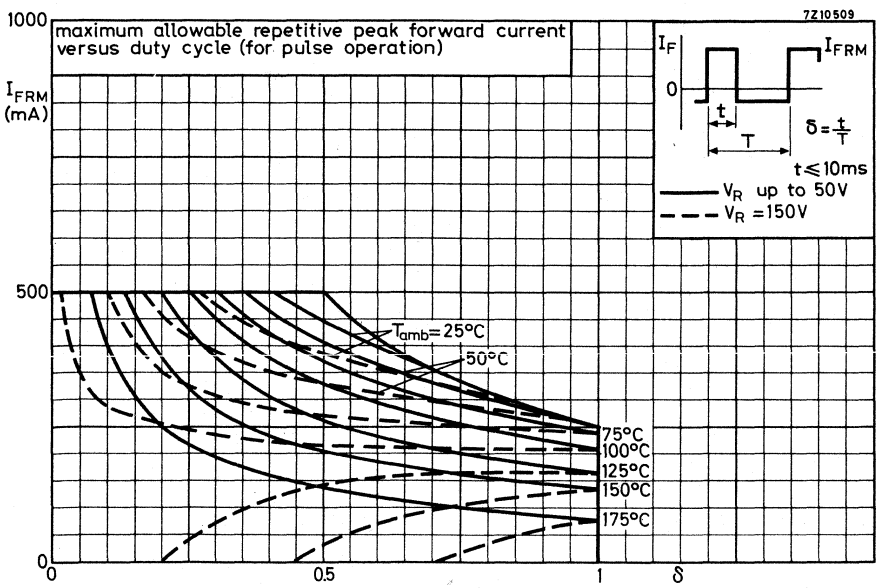


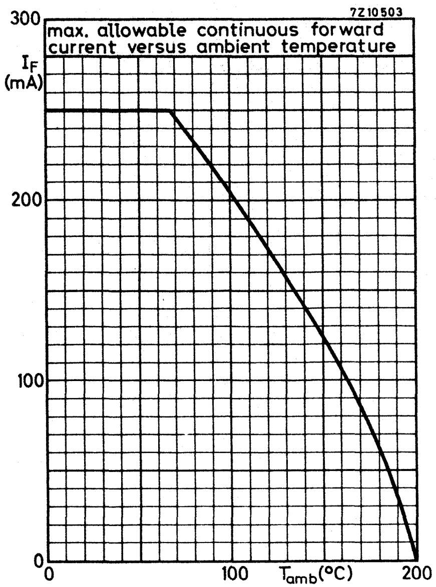
*) I_R = 3 mA

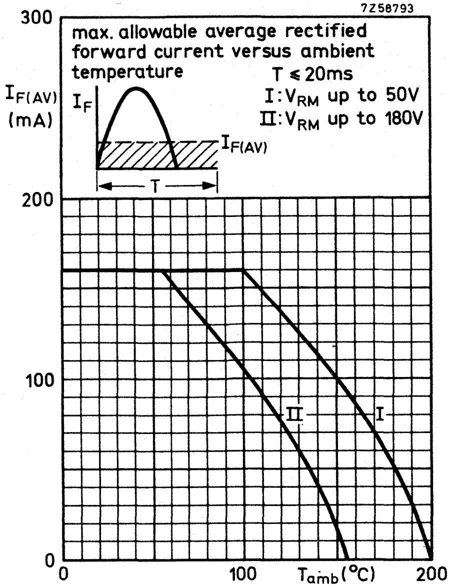
Reverse pulse:	Rise time	t_r	=	0.6 ns	Oscilloscope:	
	Pulse duration	t_p	=	100 ns	Rise time	t_r = 0.35 ns
	Duty cycle	δ	=	0.05		

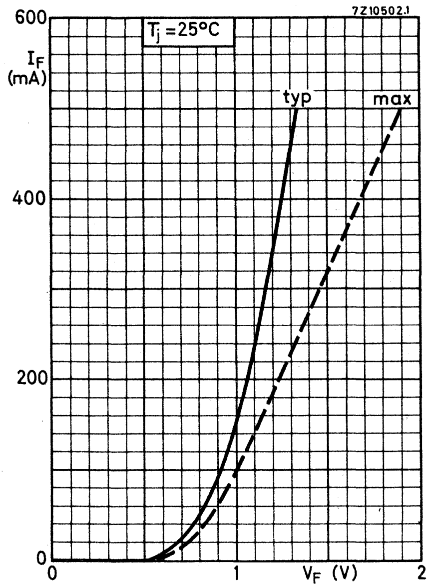
Circuit capacitance C ≤ 1 pF (C = Oscilloscope + parasitical capacitance)

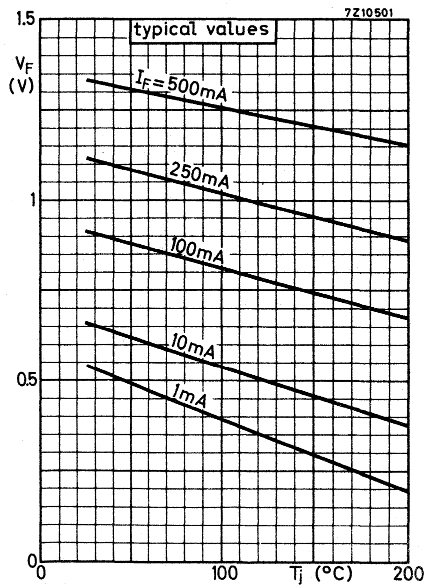

7Z10510.1
maximum allowable average rectified forward current versus duty cycle (for pulse operation)
I_{FAV} (mA)
400
200
0
0
0.5
1
δ
T_{amb} = 25°C
50°C
75°C
100°C
125°C
150°C
175°C
I_F
I_{FRM}
I_{FAV}
0
t
T
δ = t/T
t ≤ 10ms
V_R up to 50V
V_R = 150V

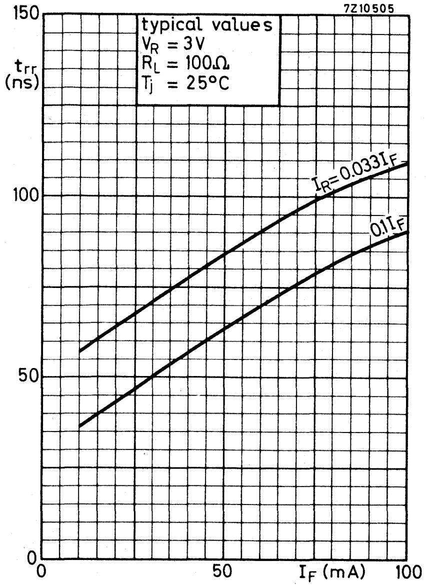

7Z10509
maximum allowable repetitive peak forward current versus duty cycle (for pulse operation)
I_{FRM} (mA)
1000
500
0
0
0.5
1
δ
T_{amb} = 25°C
50°C
75°C
100°C
125°C
150°C
175°C
I_F
I_{FRM}
0
t
T
δ = t/T
t ≤ 10ms
V_R up to 50V
V_R = 150V

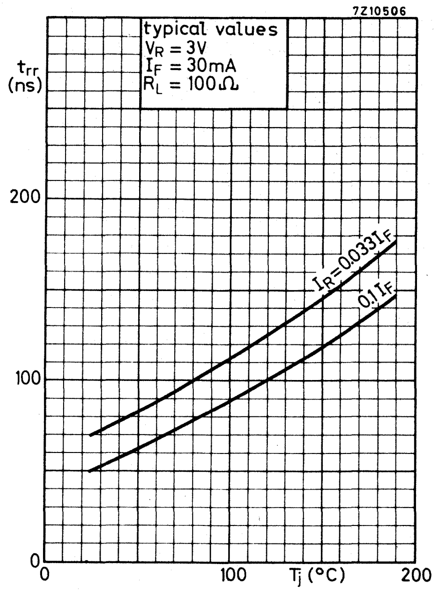

7Z10503
max. allowable continuous forward current versus ambient temperature
300
I_F (mA)
200
100
0
0
100
T_{amb} (°C)
200

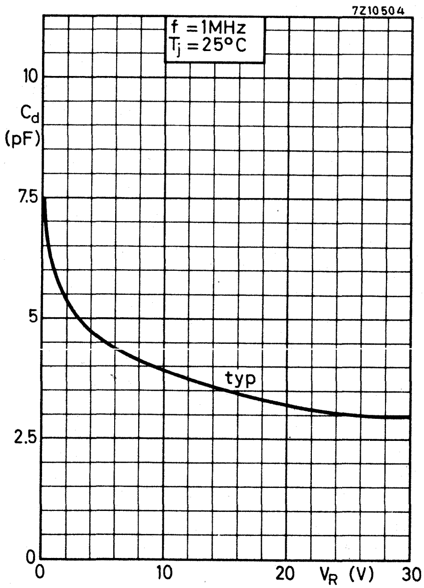

7Z58793
max. allowable average rectified forward current versus ambient temperature
T ≤ 20ms
I: V_{RM} up to 50V
II: V_{RM} up to 180V
I_F
$I_{F(AV)}$
T
300
$I_{F(AV)}$ (mA)
200
100
0
II
I
0
100
T_{amb} (°C)
200

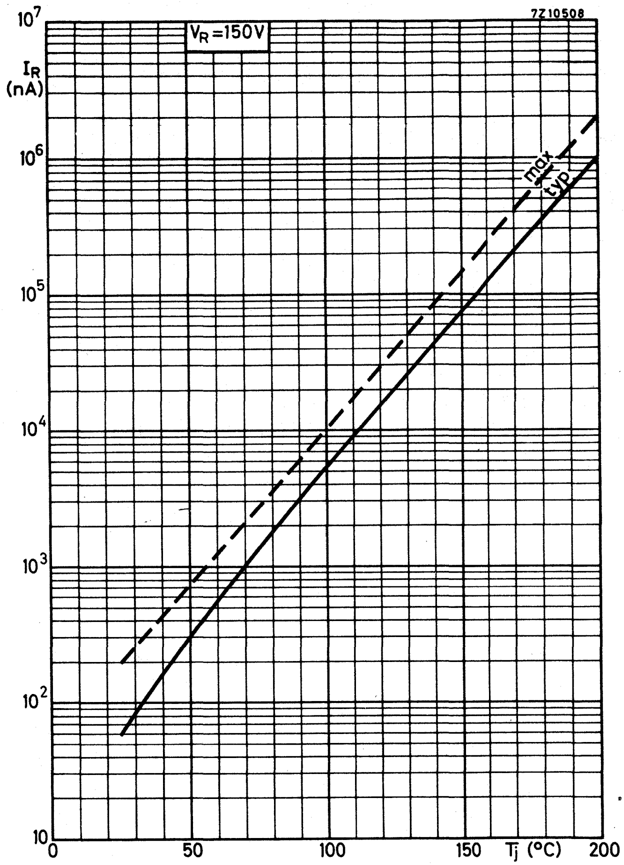

7Z10502.1
T_j = 25°C
600
I_F (mA)
400
200
0
typ
max
0
1
V_F (V)
2


7Z10501
typical values
1.5
V_F (V)
1
0.5
0
I_F = 500mA
250mA
100mA
10mA
1mA
0
100
T_j (°C)
200


7Z10505
typical values
V_R = 3 V
R_L = 100 Ω
T_j = 25 °C
t_{rr} (ns)
I_R = 0.033 I_F
0.1 I_F
I_F (mA)
150
100
50
0
0
50
100


7Z10506
typical values
V_R = 3 V
I_F = 30 mA
R_L = 100 Ω
t_{rr} (ns)
I_R = 0.033 I_F
0.1 I_F
T_j (°C)
200
100
0
0
100
200


7Z10504
f = 1 MHz
T_j = 25 °C
C_d (pF)
typ
V_R (V)
10
7.5
5
2.5
0
0
10
20
30


7Z10508
$V_R = 150V$
I_R (nA)
10^7
10^6
10^5
10^4
10^3
10^2
10
max
typ
0
50
100
150
T_j (°C)
200

SILICON OXIDE PASSIVATED DIODE

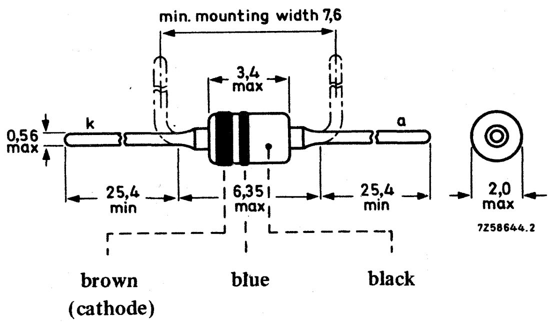
Whiskerless diffused diode in a hard glass subminiature envelope.
The BAX16 is primarily intended for general purpose industrial applications.

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	150	V
Repetitive peak forward current	I_{FRM}	max.	300	mA
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0,50	°C/mW
Forward voltage at I_F = 100 mA	V_F	<	1,3	V
Reverse recovery time when switched from I_F = 30 mA to V_R = 3 V; R_L = 100 Ω measured at I_R = 3 mA	t_{rr}	<	120	ns
Recovered charge when switched from I_F = 10 mA to V_R = 5 V R_L = 500 Ω	Q_s	<	0,7	nC

MECHANICAL DATA Dimensions in mm

SOD-17



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

Voltages

Continuous reverse voltage	V_R	max.	150	V
Repetitive peak reverse voltage	V_{RRM}	max.	150	V

Currents

Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	200	mA [1]
Forward current (d. c.)	I_F	max.	200	mA
Repetitive peak forward current	I_{FRM}	max.	300	mA
Non-repetitive peak forward current t = 1 μs	I_{FSM}	max.	2500	mA
t = 1 s	I_{FSM}	max.	500	mA

Temperatures

Storage temperature	T_{stg}	−65 to +200		°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

→ From junction to ambient in free air	$R_{th\ j-a}$	=	0, 50	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltage

I_F = 1 mA	V_F	<	0, 65	V
I_F = 10 mA; T_j = 100 °C	V_F	<	0, 85	V
I_F = 100 mA	V_F	<	1, 3	V [2]
I_F = 200 mA	V_F	<	1, 5	V [2]
I_F = 200 mA; T_j = 175 °C	V_F	<	1, 4	V [2]

Reverse current

V_R = 50 V	I_R	<	25	nA
V_R = 50 V; T_j = 150 °C	I_R	<	25	μA
V_R = 150 V	I_R	<	100	nA
V_R = 150 V; T_j = 150 °C	I_R	<	100	μA

→ Diode capacitance (see also page 6)

V_R = 0; f = 1 MHz	C_d	<	10	pF

[1] For sinusoidal operation see page 5. For pulse operation see page 4.

[2] Measured under pulse conditions to avoid excessive dissipation.

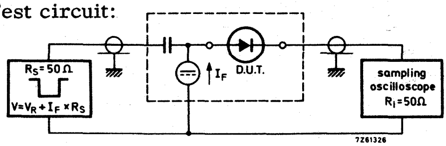
CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

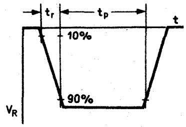
Reverse recovery time when switched from

I_F = 30 mA to V_R = 3 V; R_L = 100 Ω
(see also page 6) measured at I_R = 3 mA

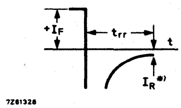
t_{rr}	typ.	70	ns
	<	120	ns

Test circuit:





input pulse



output pulse

*) I_R = 3 mA

Reverse pulse: Rise time t_r = 0,6 ns

Pulse duration t_p = 100 ns

Duty cycle δ = 0,05

Oscilloscope:

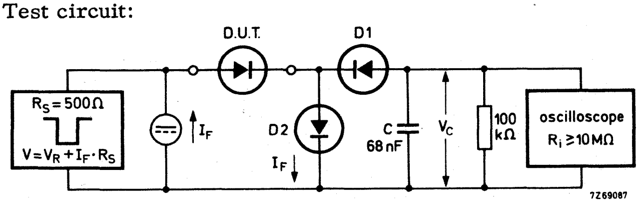
Rise time t_r = 0,35 ns

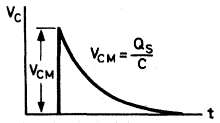
Circuit capacitance C ≤ 1 pF (C = Oscilloscope + parasitical capacitance)

Recovered charge when switched from

I_F = 10 mA to V_R = 5 V; R_L = 500 Ω Q_s < 0,7 nC

Test circuit:





output pulse 7Z69086

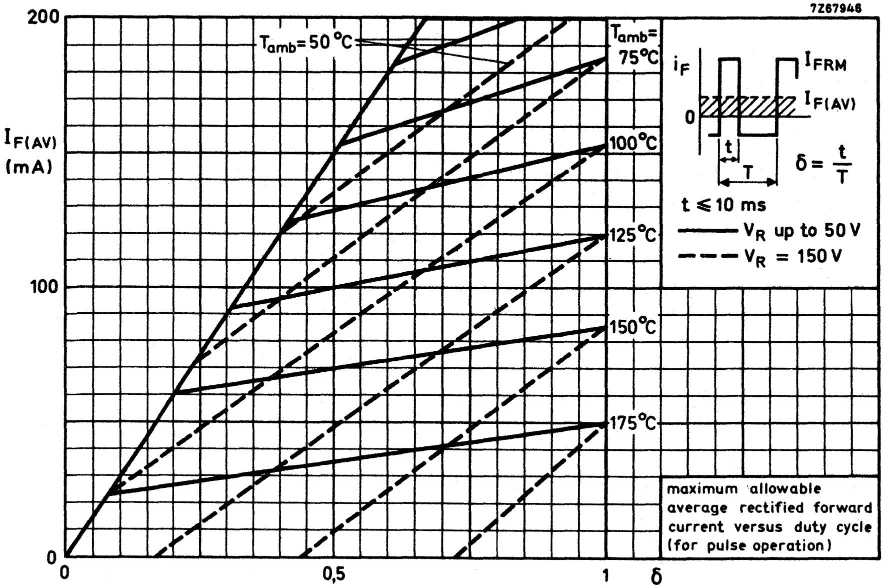
D1 = D2 = BAW62

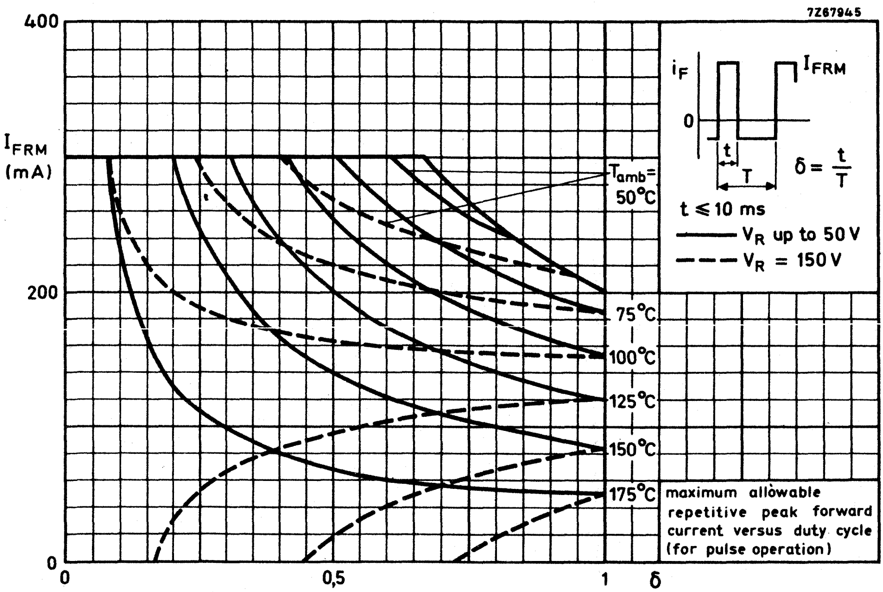
Reverse pulse: Rise time t_r = 15 ns

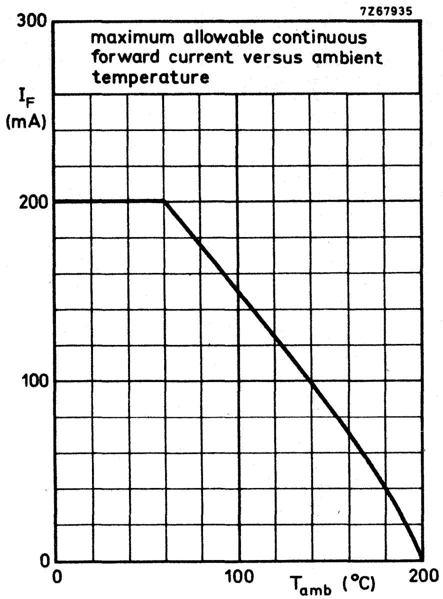
Pulse duration t_p = 35 μs

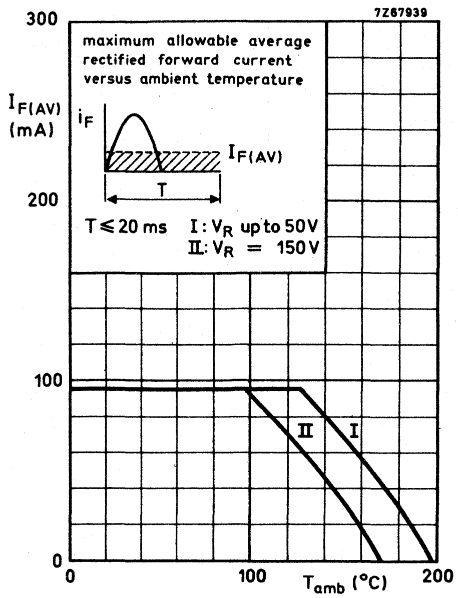
Frequency f = 25 kHz

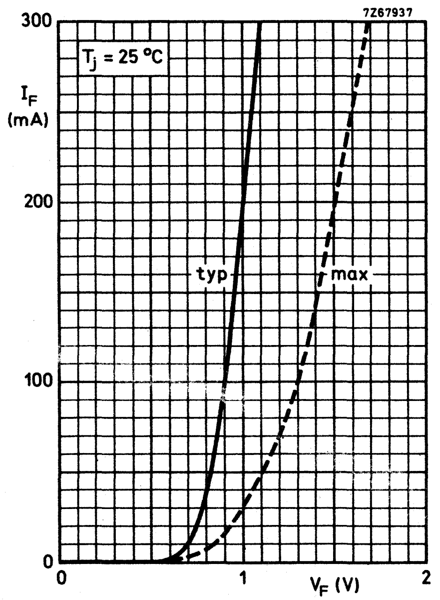
Circuit capacitance C < 30 pF (C = Oscilloscope + parasitical capacitance)

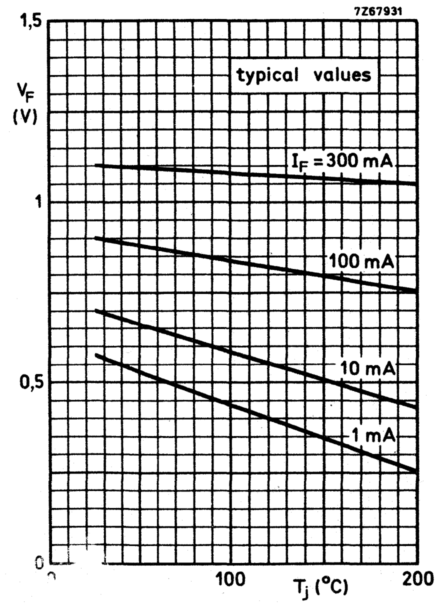

7Z67946
200
100
0
$I_{F(AV)}$ (mA)
T_{amb} = 50 °C
T_{amb} = 75 °C
100 °C
125 °C
150 °C
175 °C
0
0,5
1
δ
i_F
I_{FRM}
$I_{F(AV)}$
0
t
T
δ = t/T
t ≤ 10 ms
V_R up to 50 V
V_R = 150 V
maximum allowable average rectified forward current versus duty cycle (for pulse operation)

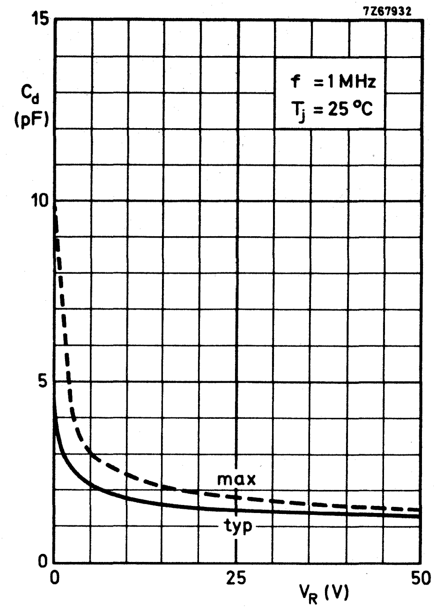

7Z67945
400
200
0
I_{FRM} (mA)
T_{amb} = 50 °C
75 °C
100 °C
125 °C
150 °C
175 °C
0
0,5
1
δ
i_F
I_{FRM}
0
t
T
δ = t/T
t ≤ 10 ms
V_R up to 50 V
V_R = 150 V
maximum allowable repetitive peak forward current versus duty cycle (for pulse operation)

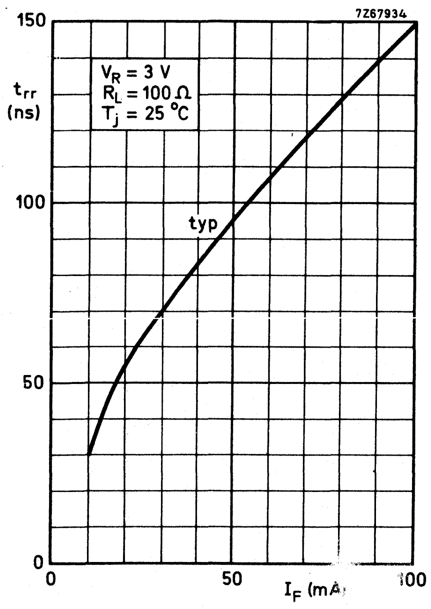

7Z67935
maximum allowable continuous forward current versus ambient temperature
I_F (mA)
300
200
100
0
0
100
200
T_amb (°C)

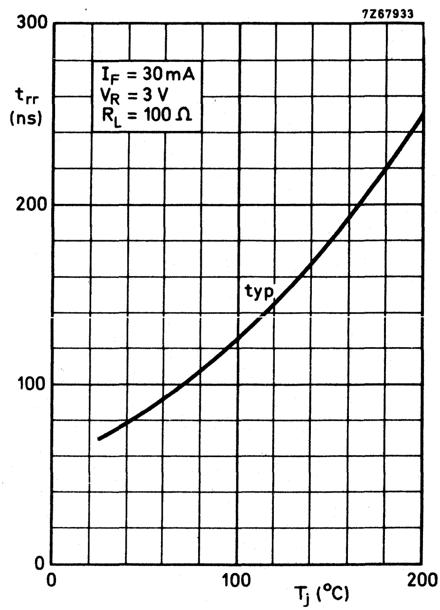

7Z67939
maximum allowable average rectified forward current versus ambient temperature
I_F(AV) (mA)
i_F
I_F(AV)
T
T ≤ 20 ms
I: V_R up to 50V
II: V_R = 150V
I
II
300
200
100
0
0
100
200
T_amb (°C)

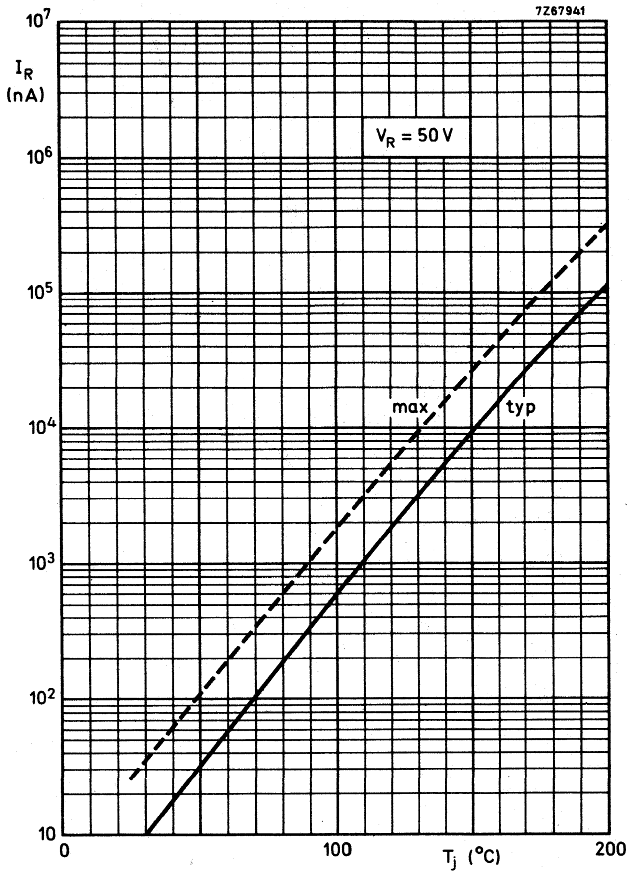

7Z67937
T_j = 25 °C
I_F (mA)
typ
max
300
200
100
0
0
1
2
V_F (V)

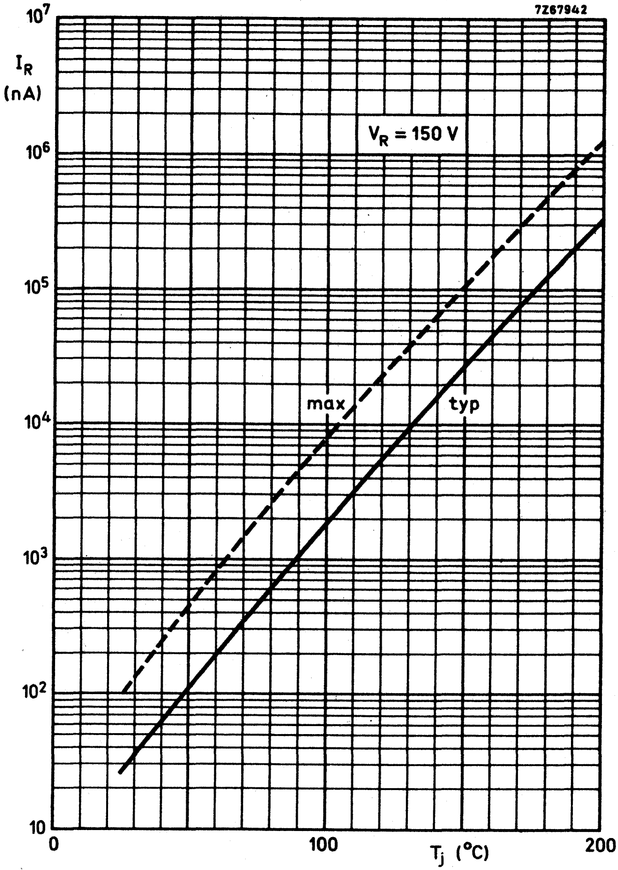

7Z67931
typical values
V_F (V)
I_F = 300 mA
100 mA
10 mA
1 mA
1,5
1
0,5
0
100
200
T_j (°C)


7Z67932
f = 1 MHz
Tj = 25 °C
Cd
(pF)
15
10
5
0
max
typ
0
25
50
VR (V)


7Z67934
VR = 3 V
RL = 100 Ω
Tj = 25 °C
trr
(ns)
150
100
50
0
typ
0
50
100


7Z67933
IF = 30 mA
VR = 3 V
RL = 100 Ω
trr
(ns)
300
200
100
0
typ
0
100
200
Tj (°C)


7Z67941
10^7
I_R
(nA)
V_R = 50 V
10^6
10^5
max
typ
10^4
10^3
10^2
10
0
100
T_j (°C)
200


7Z67942
I_R (nA)
V_R = 150 V
max
typ
10^7
10^6
10^5
10^4
10^3
10^2
10
0
100
200
T_j (°C)

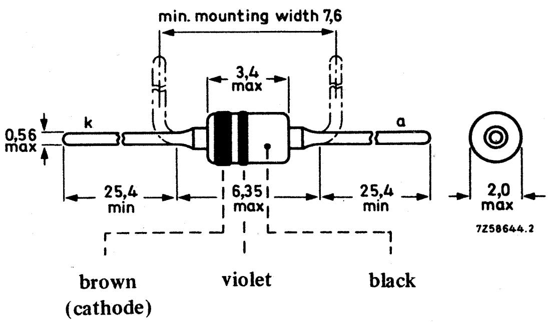
SILICON OXIDE PASSIVATED DIODE

Whiskerless diffused diode in a hard glass subminiature envelope.
The BAX 17 is primarily intended for general purpose industrial applications.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	200	V
Repetitive peak forward current	I_{FRM}	max.	300	mA
Thermal resistance from junction to ambient	$R_{th\ j-a}$	=	0,50	$^oC/mW$
Forward voltage at I_F = 200 mA	V_F	<	1,2	V
Reverse recovery time when switched from I_F = 30 mA to V_R = 3 V; R_L = 100 Ω measured at I_R = 3 mA	t_{rr}	<	120	ns
Recovered charge when switched from I_F = 10 mA to V_R = 5 V R_L = 500 Ω	Q_s	<	0,7	nC

MECHANICAL DATA Dimensions in mm

SOD-17



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

Voltages

Continuous reverse voltage	V_R	max.	200	V
Repetitive peak reverse voltage	V_{RRM}	max.	200	V

Currents

Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	200	mA [1]
Forward current (d.c.)	I_F	max.	200	mA
Repetitive peak forward current	I_{FRM}	max.	300	mA
Non-repetitive peak forward current t = 1 µs	I_{FSM}	max.	2500	mA
t = 1 s	I_{FSM}	max.	500	mA

Temperatures

Storage temperature	T_{stg}	−65 to +200		°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

→ From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,50	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltage

I_F = 1 mA	V_F	<	0,65	V
I_F = 10 mA; T_j = 100 °C	V_F	<	0,75	V
I_F = 100 mA	V_F	<	1,1	V [2]
I_F = 200 mA	V_F	<	1,2	V [2]
I_F = 200 mA; T_j = 175 °C	V_F	<	1,2	V [2]

Reverse current

V_R = 50 V	I_R	<	25	nA
V_R = 50 V; T_j = 150 °C	I_R	<	25	µA
V_R = 150 V	I_R	<	100	nA
V_R = 200 V; T_j = 150 °C	I_R	<	100	µA

→ Diode capacitance (see also page 6)

V_R = 0; f = 1 MHz	C_d	<	10	pF

[1] For sinusoidal operation see page 5. For pulse operation see page 4.

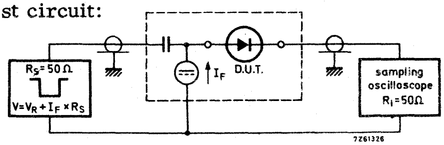
[2] Measured under pulse conditions to avoid excessive dissipation.

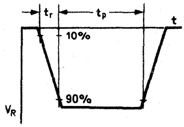
CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

Reverse recovery time when switched from

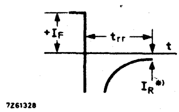
I_F = 30 mA to V_R = 3 V; R_L = 100 Ω (see also page 6) measured at I_R = 3 mA	t_{rr}	typ.	70	ns
		<	120	ns

Test circuit:





input pulse



output pulse

*) I_R = 3 mA

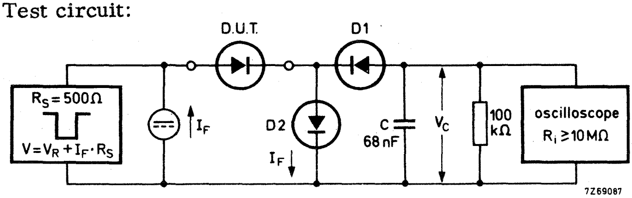
Reverse pulse: Rise time	t_r = 0,6 ns	Oscilloscope:		
Pulse duration	t_p = 100 ns	Rise time	t_r = 0,35 ns	
Duty cycle	δ = 0,05			

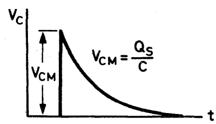
Circuit capacitance C ≤ 1 pF (C = Oscilloscope + parasitical capacitance)

Recovered charge when switched from

I_F = 10 mA to V_R = 5 V; R_L = 500 Ω Q_s < 0,7 nC

Test circuit:



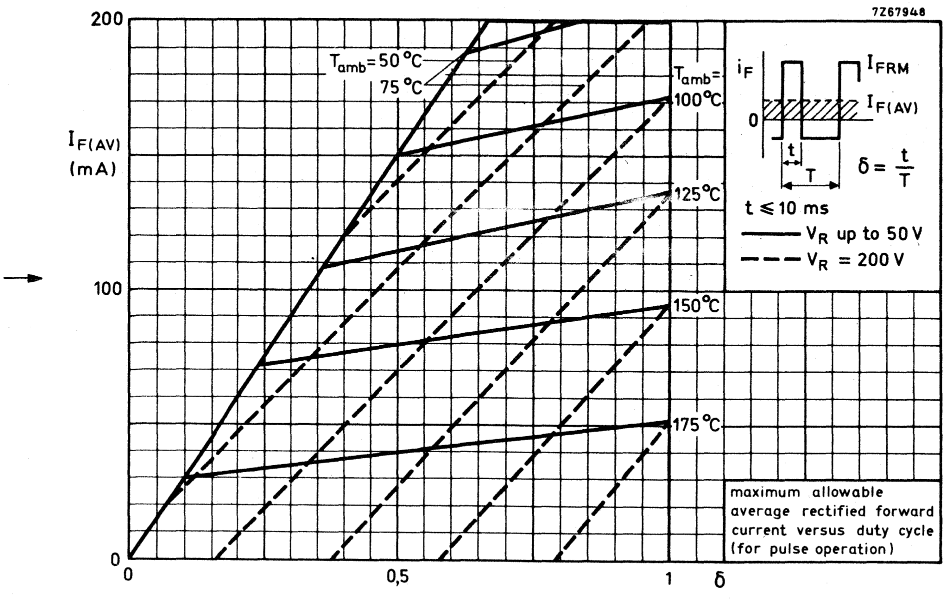


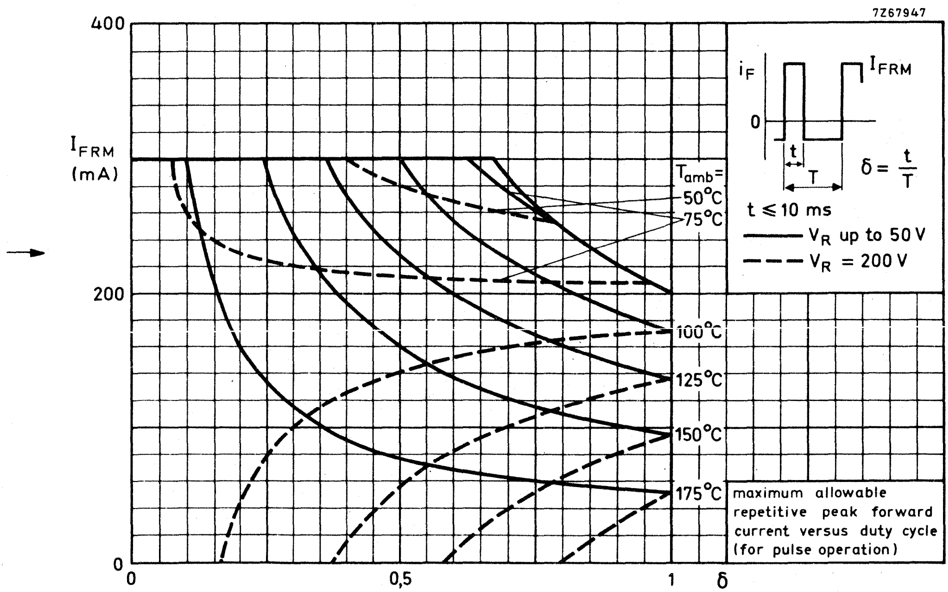
output pulse 7Z69086

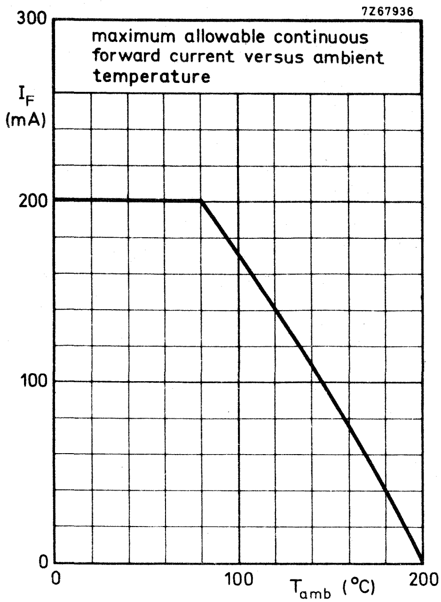
D1 = D2 = BAW62

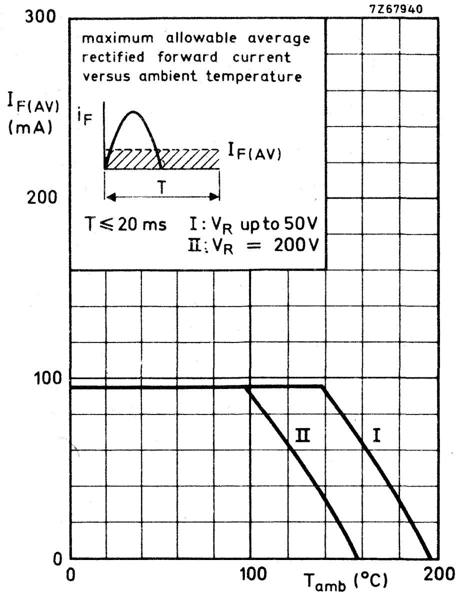
Reverse pulse: Rise time	t_r = 15 ns
Pulse duration	t_p = 35 μs
Frequency	f = 25 kHz

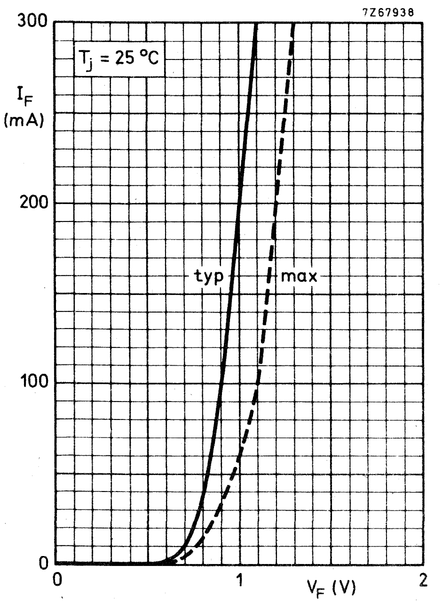
Circuit capacitance C < 30 pF (C = Oscilloscope + parasitical capacitance)

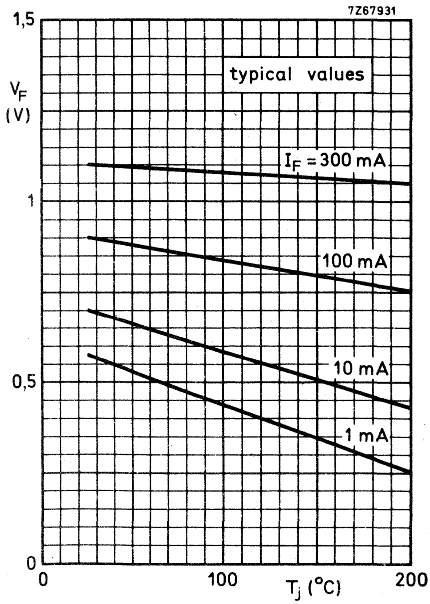

7Z67948
200
100
0
$I_{F(AV)}$
(mA)
0
0,5
1
δ
T_{amb} = 50 °C
75 °C
T_{amb} =
100 °C
125 °C
150 °C
175 °C
i_F
I_{FRM}
$I_{F(AV)}$
0
t
T
$\delta = \frac{t}{T}$
t ≤ 10 ms
V_R up to 50 V
V_R = 200 V
maximum allowable
average rectified forward
current versus duty cycle
(for pulse operation)

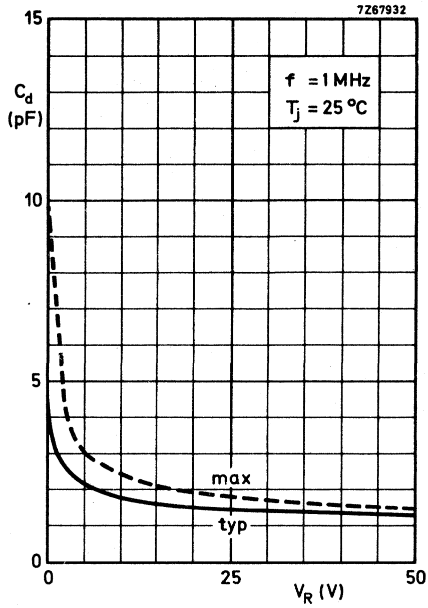

7Z67947
400
200
0
I_{FRM}
(mA)
0
0,5
1
δ
T_{amb} =
50 °C
75 °C
100 °C
125 °C
150 °C
175 °C
i_F
I_{FRM}
0
t
T
$\delta = \frac{t}{T}$
t ≤ 10 ms
V_R up to 50 V
V_R = 200 V
maximum allowable
repetitive peak forward
current versus duty cycle
(for pulse operation)

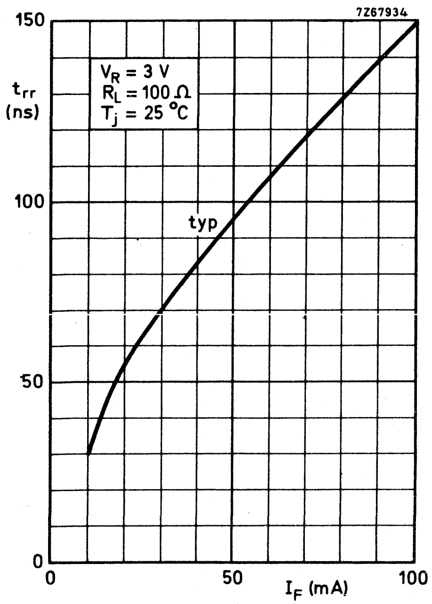

7Z67936
maximum allowable continuous forward current versus ambient temperature
I_F (mA)
300
200
100
0
0
100
200
T_amb (°C)

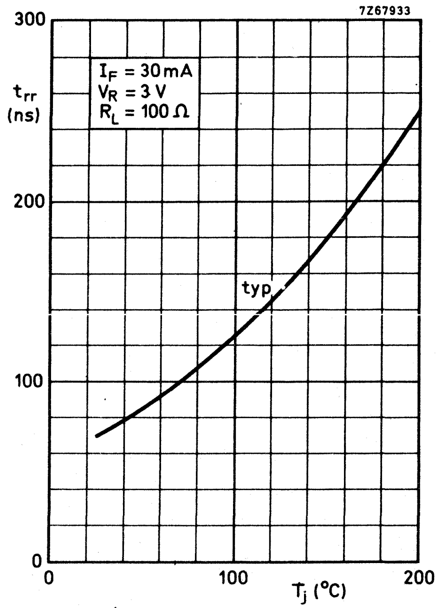

7Z67940
maximum allowable average rectified forward current versus ambient temperature
I_F(AV) (mA)
i_F
I_F(AV)
T
T ≤ 20 ms
I : V_R up to 50 V
II : V_R = 200 V
II
I
300
200
100
0
0
100
200
T_amb (°C)

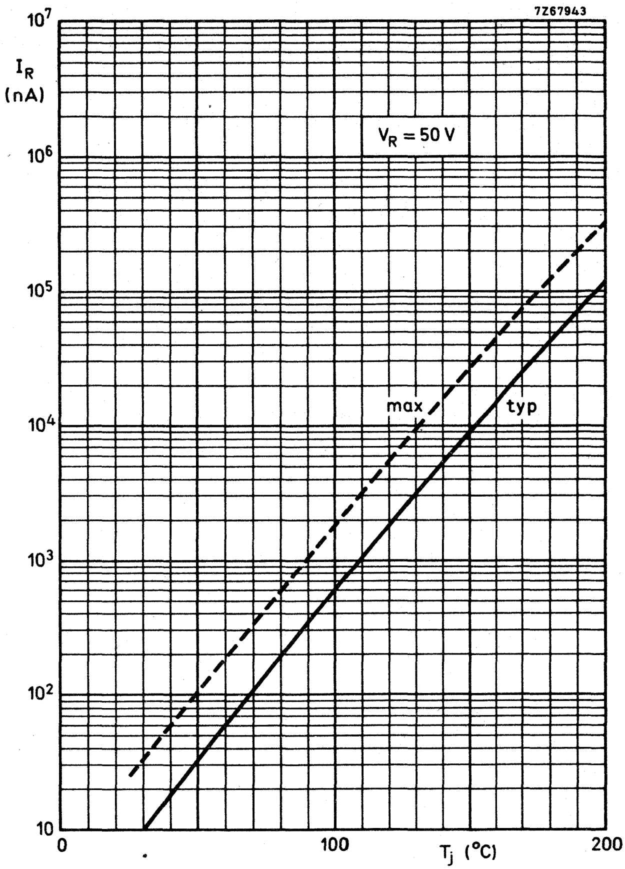

7Z67938
T_j = 25 °C
I_F (mA)
typ
max
300
200
100
0
0
1
2
V_F (V)

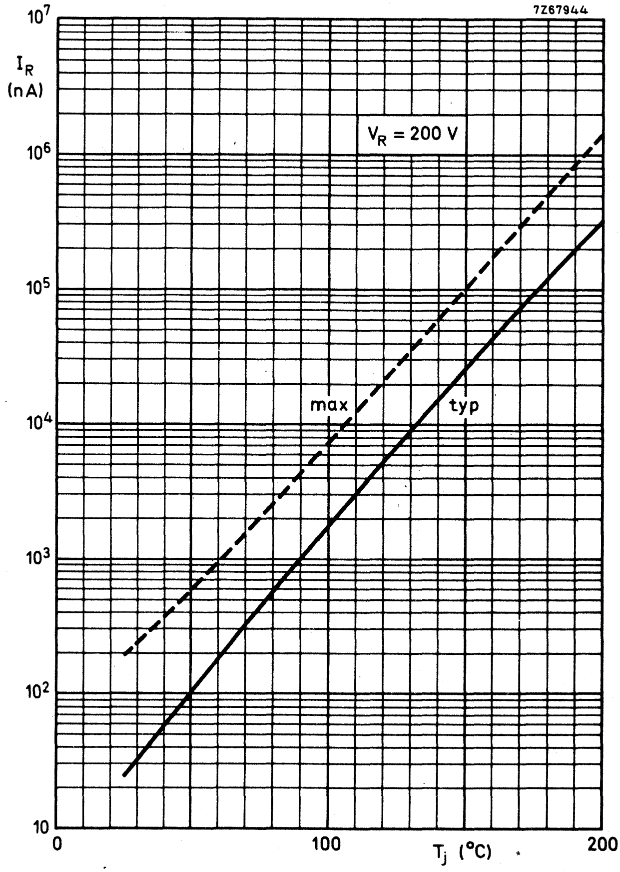

7Z67931
typical values
V_F (V)
I_F = 300 mA
100 mA
10 mA
1 mA
1,5
1
0,5
0
0
100
200
T_j (°C)


7Z67932
15
10
5
0
C_d
(pF)
f = 1 MHz
T_j = 25 °C
max
typ
0
25
50
V_R (V)


7Z67934
150
100
50
0
t_{rr}
(ns)
V_R = 3 V
R_L = 100 Ω
T_j = 25 °C
typ
0
50
100
I_F (mA)


7Z67933
300
200
100
0
t_{rr}
(ns)
I_F = 30 mA
V_R = 3 V
R_L = 100 Ω
typ
0
100
200
T_j (°C)


7Z67943
I_R
(nA)
$V_R = 50$ V
max
typ
10^7
10^6
10^5
10^4
10^3
10^2
10
0
100
200
T_j (°C)


7Z67944
10^7
I_R
(nA)
V_R = 200 V
10^6
10^5
max
typ
10^4
10^3
10^2
10
0
100
T_j (°C)
200

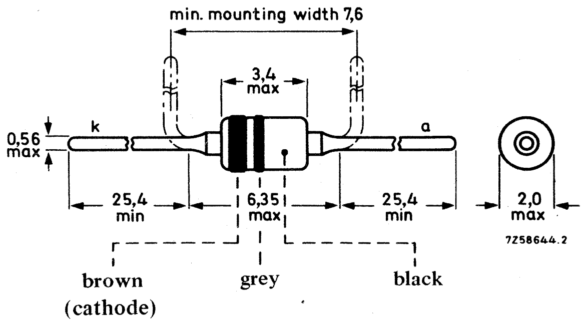
SILICON OXIDE PASSIVATED DIODE

Whiskerless diffused diode in a hard glass subminiature envelope.
The BAX18 is a general purpose diode primarily intended for rectifier applications.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	75	V
Average forward current	$I_{F(AV)}$	max.	350	mA
Junction temperature	T_j	max.	200	°C
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0.3	°C/mW

MECHANICAL DATA Dimensions in mm

SOD-17



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

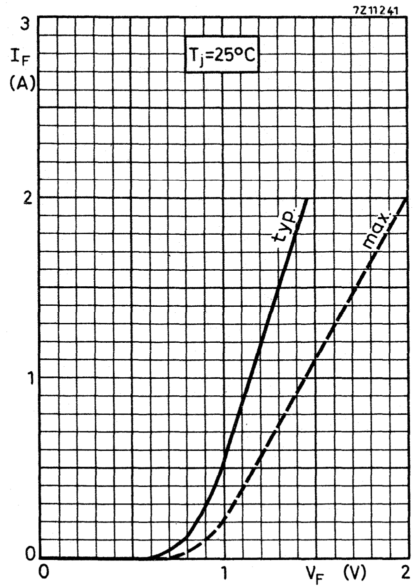
Voltages				
Continuous reverse voltage	V_R	max.	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	75	V
Currents				
Average rectified forward current (see page 5)	I_{FAV}	max.	350	mA
Forward current (d.c.)	I_F	max.	500	mA
Repetitive peak forward current	I_{FRM}	max.	2.0	A
Non repetitive peak forward current t = 10 ms; half sine wave	I_{FSM}	max.	6.0	A
Temperatures				
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C

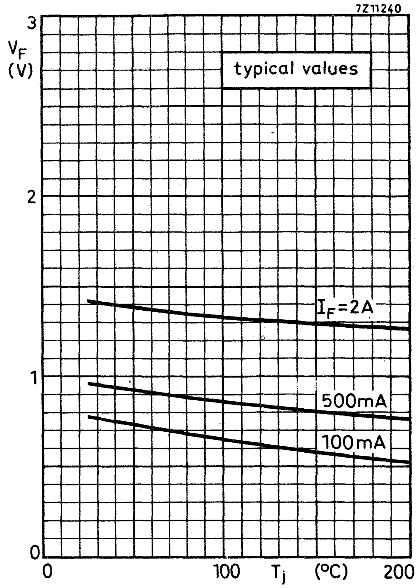
THERMAL RESISTANCE

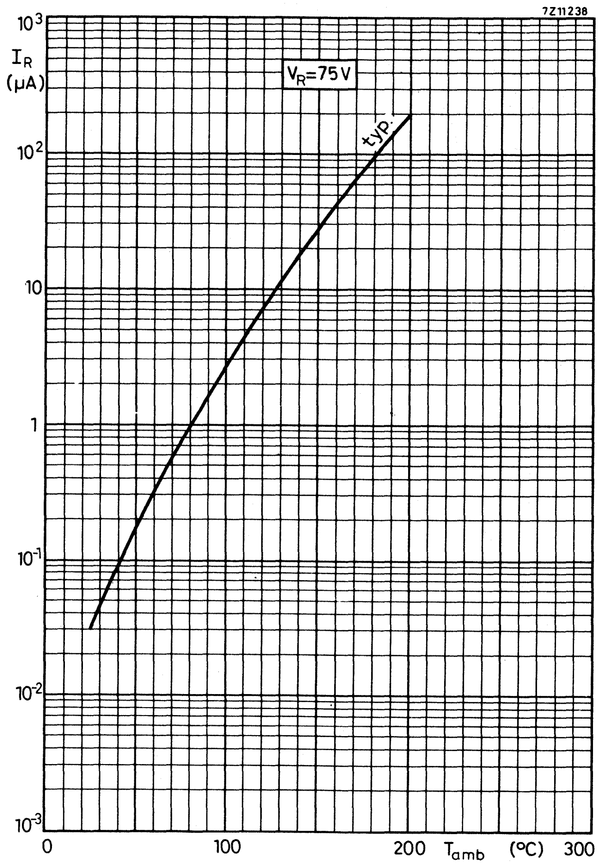
From junction to ambient in free air at maximum lead length	$R_{th\ j\text{-}a}$	=	0.3	°C/mW

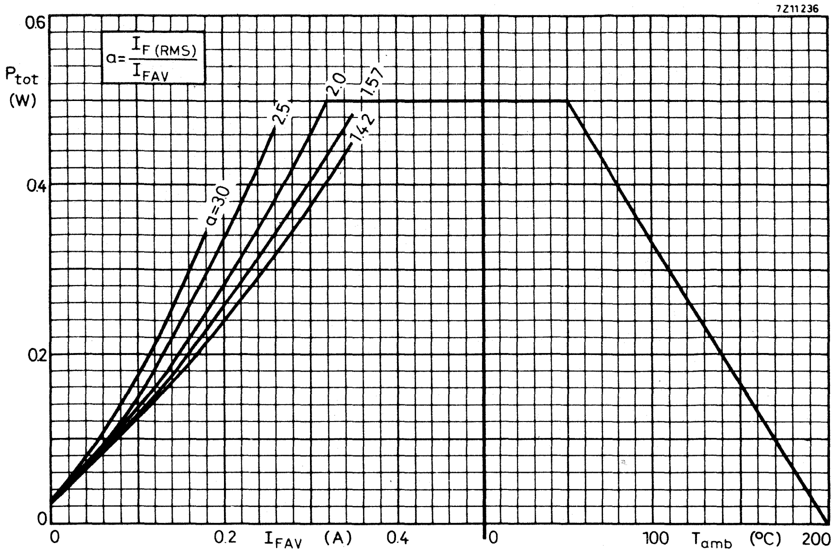
CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltage				
I_F = 2 A; T_j = 150 °C	V_F	<	2.0	V
Reverse current				
V_R = 75 V; T_j = 150 °C	I_R	<	100	μA


7Z11241
3
I_F
(A)
T_j=25°C
2
typ.
max.
1
0
0
1
V_F (V)
2


7Z11240
3
V_F
(V)
typical values
2
I_F=2A
1
500mA
100mA
0
0
100
T_j (°C)
200


7Z11238
10^3
I_R (μA)
V_R=75 V
typ.
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
0
100
200
T_{amb} (°C)
300

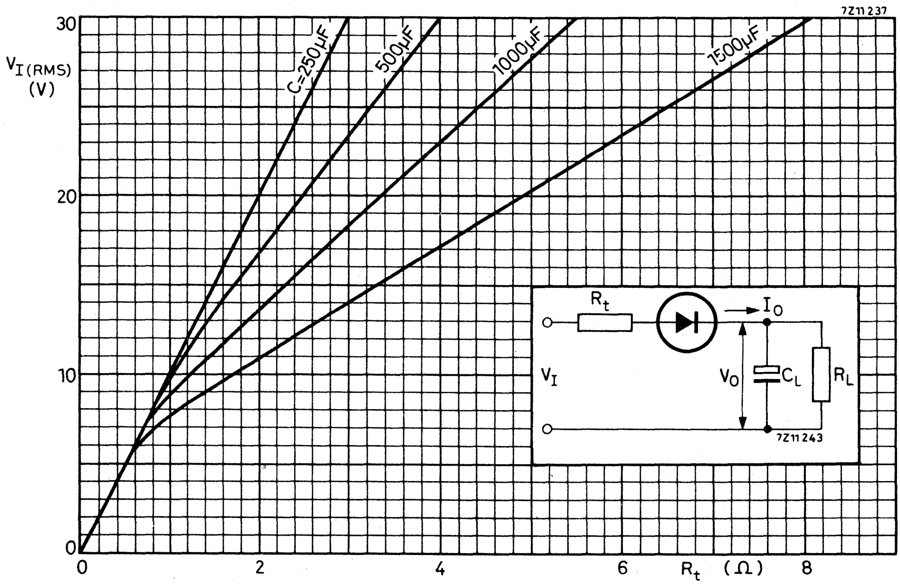


From the left hand graph the total power dissipation can be found as a function of the average output current.

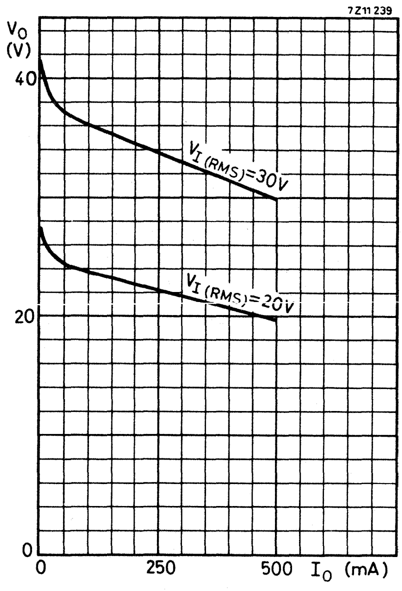
The parameter $a = \frac{I_{F(RMS)} \text{ per diode}}{I_{FAV} \text{ per diode}}$ depends on $n\omega R_L C_L$ and $\frac{R_t + R_{diff}}{nR_L}$ and can be found from existing graphs.

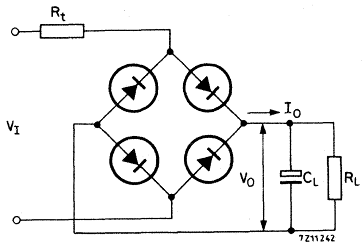
See Application Book: RECTIFIER DIODES.
Once the power dissipation is known, the max. permissible ambient temperature follows from the right hand graph.
For the series resistance, added to limit the initial peak rectifier current, the required minimum value can be found from the upper graph on page 6.
R_{diff} can be found from the left hand graph on the upper half of page 3.

Required minimum value of R_t. R_t includes the transformer resistance.



V_O, I_O characteristics for the circuit shown.





V_I (V)	R_t (Ω)	C_L (μF)
30	5,6	1000
20	3,4	1000

SILICON OXIDE PASSIVATED DIODES

Whiskerless diodes in a hard glass subminiature envelope.
These high speed diodes are primarily intended for fast logic applications.

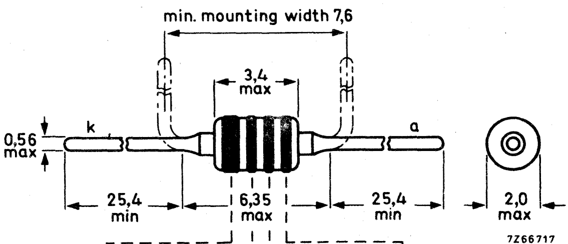
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	100	V
Repetitive peak forward current	I_{FRM}	max.	225	mA
Forward voltage 1N914 : I_F = 10 mA 1N914A: I_F = 20 mA	V_F	<	1	V
Reverse recovery time when switched from I_F = 10 mA to V_R = 6 V; R_L = 100 Ω measured at I_R = 1 mA	t_{rr}	<	4	ns

MECHANICAL DATA

Dimensions in mm

SOD-17



1N914 :	white	brown	yellow	not coloured
1N914A:	white (cathode)	brown	yellow	brown

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

Voltages

Continuous reverse voltage		V_R	max.	75	V
Repetitive peak reverse voltage		V_{RRM}	max.	100	V
Currents					
Average rectified forward current (averaged over any 20 ms period)	T_{amb} = 25 °C	$I_{F(AV)}$	max.	75	mA
	T_{amb} = 150 °C	$I_{F(AV)}$	max.	10	mA
Forward current (d.c.)		I_F	max.	75	mA
Repetitive peak forward current		I_{FRM}	max.	225	mA
Non-repetitive peak forward current (t = 1 s)		I_{FSM}	max.	500	mA
Total power dissipation		P_{tot}	max.	250	mW
Temperatures					
Storage temperature		T_{stg}		−65 to +200	°C
Operating ambient temperature		T_{amb}		−65 to +175	°C

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltages

1N914 : I_F = 10 mA; 1N914A: I_F = 20 mA	V_F	<	1	V

Reverse breakdown voltage

I_R = 100 μA	$V_{(BR)R}$	>	100	V

Reverse currents

V_R = 20 V	I_R	<	25	nA
V_R = 75 V	I_R	<	5	μA
V_R = 20 V; T_j = 150 °C	I_R	<	50	μA

Diode capacitance

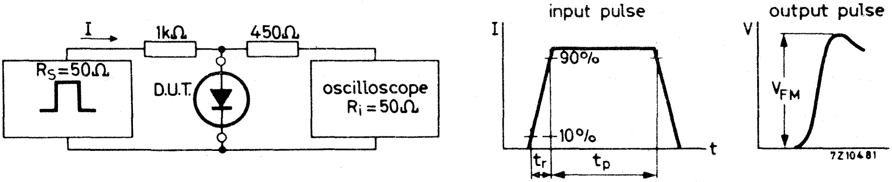
V_R = 0; f = 1 MHz	C_d	<	4	pF

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

Forward recovery voltage when switched to

I_F = 50 mA; t_r = 30 ns V_{FM} < 2.5 V

Test circuit:



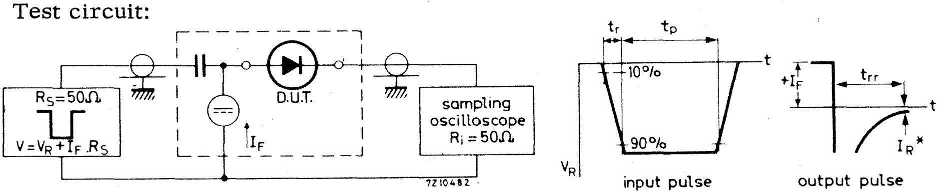
Current pulse:	Rise time	t_r	= 20 ns	Oscilloscope:		
	Pulse duration	t_p	= 120 ns	Rise time	t_r = 0.35	ns
	Duty cycle	δ	= 0.01			

Circuit capacitance C < 1 pF (C = Oscilloscope + parasitical capacitance)

Reverse recovery time when switched from

I_F = 10 mA to V_R; R_L = 100 Ω
measured at I_R = 1 mA; switched to V_R = 1 V t_{rr} < 8 ns
V_R = 6 V t_{rr} < 4 ns

Test circuit:



*) I_R = 1 mA

Reverse pulse:	Rise time	t_r	= 0.6 ns	Oscilloscope:		
	Pulse duration	t_p	= 100 ns	Rise time	t_r = 0.35	ns
	Duty cycle	δ	= 0.05			

Circuit capacitance C $\leq$ 1 pF (C = Oscilloscope + parasitical capacitance)

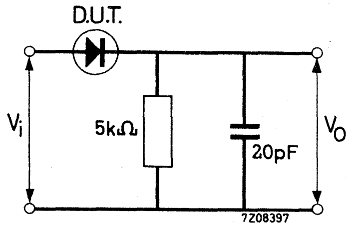
CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

Rectifying efficiency

$$\eta = \frac{V_O}{V_{i(rms)}\sqrt{2}}$$

f = 100 MHz; $V_{i(rms)}$ = 2 V	η	>	45	%

Test circuit:



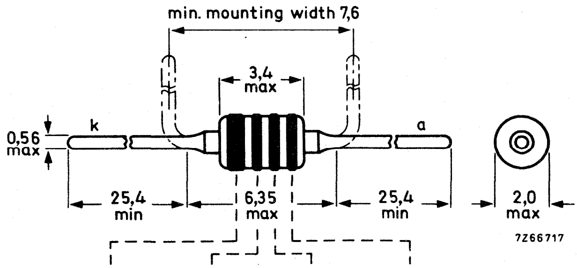
SILICON OXIDE PASSIVATED DIODES

Whiskerless diodes in a hard glass subminiature envelope.
These high speed diodes are primarily intended for fast logic applications.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	100	V
Repetitive peak forward current	I_{FRM}	max.	225	mA
Forward voltage 1N916 : I_F = 10 mA 1N916A: I_F = 20 mA 1N916B: I_F = 30 mA	V_F	<	1	V
Reverse recovery time when switched from I_F = 10 mA to V_R = 6 V; R_L = 100 Ω measured at I_R = 1 mA	t_{rr}	<	4	ns

MECHANICAL DATA Dimensions in mm

SOD-17



1N916 :	white	brown	blue	not coloured
1N916A:	white	brown	blue	brown
1N916B:	white	brown	blue	red
	(cathode)			

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

Voltages

Continuous reverse voltage	V_R	max.	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	100	V

Currents

Average rectified forward current (averaged over any 20 ms period) T_{amb} = 25 °C	I_{FAV}	max.	75	mA
T_{amb} = 150 °C	I_{FAV}	max.	10	mA
Forward current (d.c.)	I_F	max.	75	mA
Repetitive peak forward current	I_{FRM}	max.	225	mA
Non repetitive peak forward current (t = 1 s)	I_{FSM}	max.	500	mA
Total power dissipation	P_{tot}	max.	250	mW

Temperatures

Storage temperature	T_{stg}	-65 to +200	°C
Operating ambient temperature	T_{amb}	-65 to +175	°C

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltages

1N916 : I_F = 10 mA; 1N916A: I_F = 20 mA; 1N916B: I_F = 30 mA	V_F	<	1	V
1N916B: I_F = 5 mA	V_F		0.63 to 0.73	V

Reverse breakdown voltage

I_R = 100 μA	$V_{(BR)R}$	>	100	V

Reverse currents

V_R = 20 V	I_R	<	25	nA
V_R = 75 V	I_R	<	5	μA
V_R = 20 V; T_j = 150 °C	I_R	<	50	μA

Diode capacitance

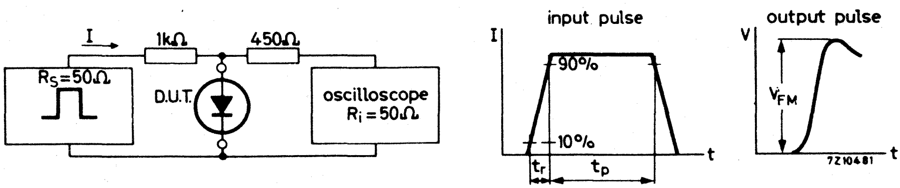
V_R = 0; f = 1 MHz	C_d	<	2	pF

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

Forward recovery voltage when switched to

I_F = 50 mA; t_r = 20 ns V_{FM} < 2.5 V

Test circuit:



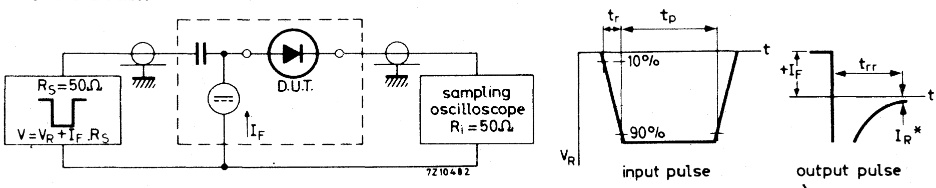
Current pulse:	Rise time	t_r = 20 ns	Oscilloscope:	
	Pulse duration	t_p = 120 ns	Rise time	t_r = 0.35 ns
	Duty cycle	δ = 0.01		

Circuit capacitance C < 1 pF (C = Oscilloscope + parasitical capacitance)

Reverse recovery time when switched from

I_F = 10 mA to V_R = 6 V; R_L = 100 Ω
measured at I_R = 1 mA t_{rr} < 4 ns

Test circuit:



*) I_R = 1 mA

Reverse pulse:	Rise time	t_r = 0.6 ns	Oscilloscope:	
	Pulse duration	t_p = 100 ns	Rise time	t_r = 0.35 ns
	Duty cycle	δ = 0.05		

Circuit capacitance C ≤ 1 pF (C = Oscilloscope + parasitical capacitance)

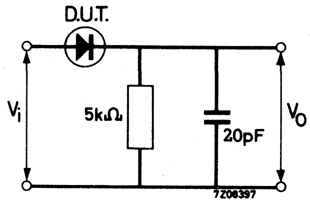
CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

Rectifying efficiency

$$\eta = \frac{V_O}{V_{i(rms)}\sqrt{2}}$$

f = 100 MHz; $V_{i(rms)}$ = 2 V η > 45 %

Test circuit:



ULTRA HIGH SPEED SILICON DIODE

General purpose diode for military and industrial applications.

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

Voltage				
Continuous reverse voltage at T_{amb} = 25 °C	V_R	max.	25	V
Power dissipation				
Total power dissipation at T_{amb} = 25 °C	P_{tot}	max.	250	mW
Temperature				
Storage temperature	T_{stg}	−65 to +200		°C

THERMAL RESISTANCE

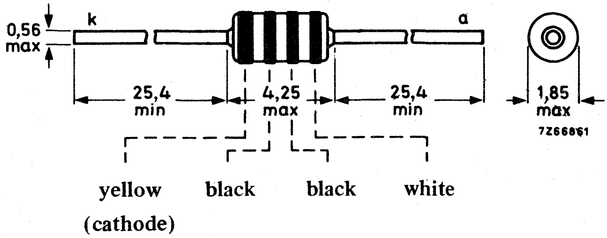
From junction to ambient in free air	$R_{th\ j-a}$	=	0.6	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltage				
I_F = 30 mA	V_F	<	1	V
Reverse breakdown voltage				
I_R = 5 μA	$V_{(BR)R}$	>	35	V
Reverse currents				
V_R = 25 V	I_R	<	0.1	μA
V_R = 25 V; T_{amb} = 150 °C	I_R	<	100	μA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	4	pF

MECHANICAL DATA Dimensions in mm

DO-35

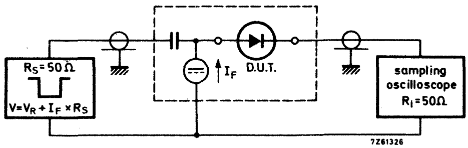


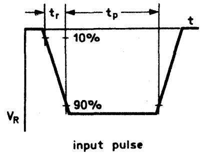
→ **CHARACTERISTICS** (continued) T_j = 25 °C unless otherwise specified

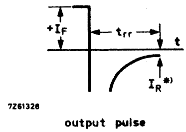
Reverse recovery time when switched from

I_F = 10 mA to V_R; R_L = 100 Ω				
measured at I_R = 1 mA; switched to V_R = 1 V	t_{rr}	<	4	ns
V_R = 6 V	t_{rr}	<	2	ns

Test circuit:







*) I_R = 1 mA

Reverse pulse:

Rise time t_r ≤ 0.5 ns

Oscilloscope:

Rise time t_r ≤ 0.6 ns

ULTRA HIGH SPEED SILICON DIODES

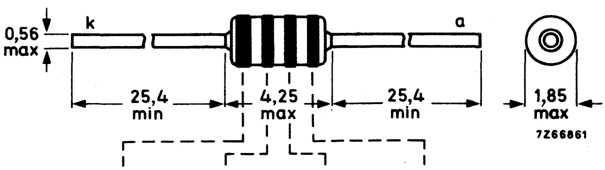
Whiskerless diodes in a subminiature DO-35 envelope.
These high speed diodes are primarily intended for fast logic applications.

QUICK REFERENCE DATA					
Continuous reverse voltage		V_R	max.	75	V
Repetitive peak reverse voltage		V_{RRM}	max.	75	V
Repetitive peak forward current	1N4148	I_{FRM}	max.	225	mA
	1N4446; 1N4448	I_{FRM}	max.	450	mA
Forward voltage					
1N4148: I_F = 10 mA					
1N4446: I_F = 20 mA		V_F	<	1	V
1N4448: I_F = 100 mA					
Reverse recovery time when switched from I_F = 10 mA to V_R = 6 V; R_L = 100 Ω measured at I_R = 1 mA		t_{rr}	<	4	ns

MECHANICAL DATA

Dimensions in mm

DO-35



1N4148:	yellow	brown	yellow	grey
1N4446:	yellow	yellow	yellow	blue
1N4448:	yellow	yellow	yellow	grey
	(cathode)			

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

			1N4148	1N4446 1N4448	
Voltages					
Continuous reverse voltage	V_R	max.	75	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	75	75	V
Currents					
Average rectified forward current	I_{FAV}	max.	75	150	mA
Forward current (d.c.)	I_F	max.	75	200	mA
Repetitive peak forward current	I_{FRM}	max.	225	450	mA
Non repetitive peak forward current t = 1 μs	I_{FSM}	max.	2000	2000	mA
t = 1 s	I_{FSM}	max.	500	500	mA

Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	500	mW
Derating factor			2.85	mW/°C
Temperatures				
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C

CHARACTERISTICS T_j = 25 °C unless otherwise specified

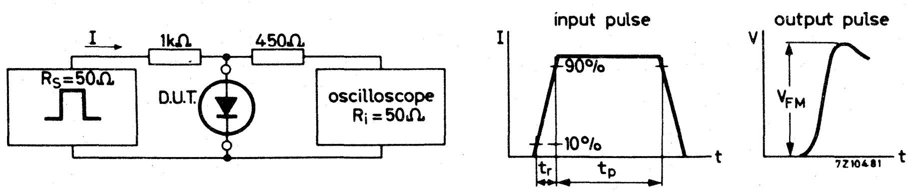
Forward voltages					
1N4148: I_F = 10 mA; 1N4446: I_F = 20 mA; 1N4448: I_F = 100 mA		V_F	<	1	V
1N4448: I_F = 5 mA		V_F		0.62 to 0.72	V
Reverse breakdown voltage					
I_R = 100 μA		$V_{(BR)R}$	>	100	V
I_R = 5 μA		$V_{(BR)R}$	>	75	V
Reverse currents					
V_R = 20 V		I_R	<	25	nA
V_R = 20 V; T_j = 100 °C	1N4448	I_R	<	3	μA
V_R = 20 V; T_j = 150 °C		I_R	<	50	μA
Diode capacitance					
V_R = 0; f = 1 MHz		C_d	<	4	pF

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

Forward recovery voltage when switched to

I_F = 50 mA; t_r = 20 ns | 1N4448 | V_{FM} | < 2.5 V

Test circuit:



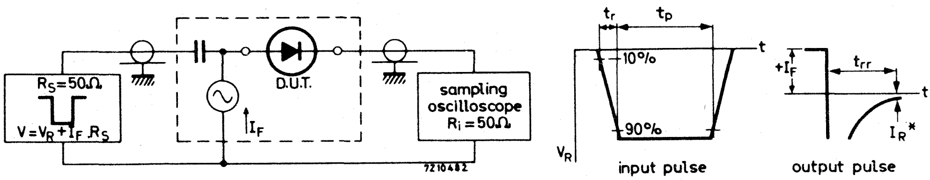
Current pulse:	Rise time	t_r =	20 ns	Oscilloscope:		
	Pulse duration	t_p =	120 ns	Rise time	t_r	= 0.35 ns
	Duty cycle	δ	= 0.01			

Circuit capacitance C < 1 pF (C = Oscilloscope + parasitical capacitance)

Reverse recovery time when switched from

I_F = 10 mA to V_R = 6 V; R_L = 100 Ω
measured at I_R = 1 mA t_{rr} < 4 ns

Test circuit:



*) I_R = 1 mA

Reverse pulse:	Rise time	t_r =	0.6 ns	Oscilloscope:		
	Pulse duration	t_p =	100 μs	Rise time	t_r	= 0.35 ns
	Duty cycle	δ	= 0.05			

Circuit capacitance C ≤ 1 pF (C = Oscilloscope + parasitical capacitance)

ULTRA HIGH SPEED SILICON DIODES

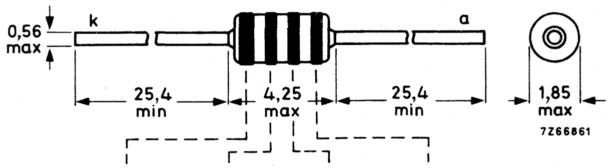
Whiskerless diodes in a subminiature DO-35 envelope.
The 1N4150 is primarily intended for general purpose use in computer and industrial applications. The 1N4151 and 1N4154 are intended for military and industrial applications.

QUICK REFERENCE DATA

			1N4150	1N4151	1N4154	
Continuous reverse voltage	V_R	max.	50	50	25	V
Repetitive peak reverse voltage	V_{RRM}	max.	–	75	–	V
Repetitive peak forward current	I_{FRM}	max.	0.60	0.45	0.45	A
Non repetitive peak forward current						
t = 1 μs	I_{FSM}	max.	4	–	–	A
t = 1 s	I_{FSM}	max.	0.5	–	–	A
Forward voltage						
I_F = 30 mA	V_F	<	–	–	1	V
I_F = 50 mA	V_F	<	–	1	–	V
I_F = 200 mA	V_F	<	1	–	–	V
Reverse recovery time when switched from: I_F = 400 mA to I_R = 400 mA measured at I_R = 40 mA	t_{rr}	<	6	–	–	ns
I_F = 10 mA to I_R = 10 mA measured at I_R = 1 mA	t_{rr}	<	–	4	4	ns

MECHANICAL DATA Dimensions in mm

DO-35



1N4150:	yellow	brown	green	black
1N4151:	yellow	brown	green	brown
1N4154:	yellow	brown	green	yellow
	(cathode)			

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

			1N4150	1N4151	1N4154	
Voltages						
Continuous reverse voltage	V_R	max.	50	50	25	V
Repetitive peak reverse voltage	V_{RRM}	max.	–	75	–	V
Currents						
Forward current (d.c.)	I_F	max.	0.3	0.2	0.2	A
Repetitive peak forward current	I_{FRM}	max.	0.60	0.45	0.45	A
Non repetitive peak forward current						
t = 1 μs	I_{FSM}	max.	4	–	–	A
t = 1 s	I_{FSM}	max.	0.5	–	–	A

Total power dissipation up to T_{amb} = 25 ^oC	P_{tot}	max.	500	mW
Derating factor			2.85	mW/^oC
Temperatures				
Storage temperature	T_{stg}		−65 to +200	^oC
Junction temperature	T_j	max.	200	^oC

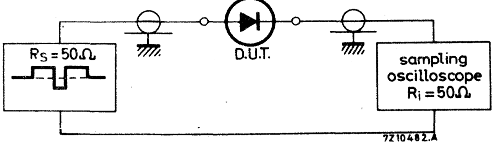
CHARACTERISTICS T_j = 25 ^oC unless otherwise specified

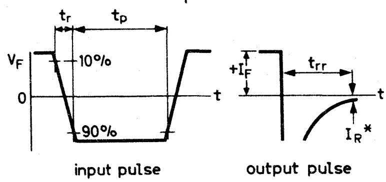
			1N4150	1N4151	1N4154	
Forward voltages						
I_F = 1 mA	V_F	>	0.54	–	–	V
		<	0.62	–	–	V
I_F = 10 mA	V_F	>	0.66	–	–	V
		<	0.74	–	–	V
I_F = 30 mA	V_F	<	–	–	1	V
I_F = 50 mA	V_F	>	0.76	–	–	V
		<	0.86	1	–	V
I_F = 100 mA	V_F	>	0.82	–	–	V
		<	0.92	–	–	V
I_F = 200 mA	V_F	>	0.87	–	–	V
		<	1	–	–	V
Reverse breakdown voltage						
I_R = 5 μA	$V_{(BR)R}$	>	–	75	35	V
Reverse currents						
V_R = 25 V	I_R	<	–	–	0.1	μA
V_R = 25 V; T_{amb} = 150 ^oC	I_R	<	–	–	100	μA
V_R = 50 V	I_R	<	0.1	0.05	–	μA
V_R = 50 V; T_{amb} = 150 ^oC	I_R	<	100	50	–	μA

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

			1N4150	1N4151	1N4154	
Diode capacitance						
V_R = 0; f = 1 MHz	C_d	<	2.5	2	4	pF
Reverse recovery time when switched from:						
I_F = 10 to 200 mA to I_R = 10 to 200 mA measured at I_R = 0.1 x I_F	t_{rr}	<	4	–	–	ns
I_F = 200 to 400 mA to I_R = 200 to 400 mA measured at I_R = 0.1 x I_F	t_{rr}	<	6	–	–	ns
I_F = 10 mA to I_R = 1 mA measured at I_R = 0.1 mA	t_{rr}	<	6	–	–	ns
I_F = 10 mA to I_R = 10 mA measured at I_R = 1 mA	t_{rr}	<	–	4	4	ns
I_F = 10 mA to V_R = 6 V; R_L = 100 Ω measured at I_R = 1 mA	t_{rr}	<	–	2	2	ns

Test circuit:





* value at which t_{rr} is measured

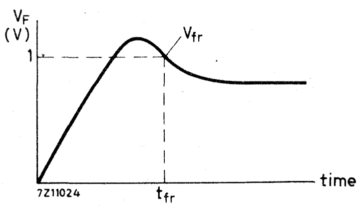
Reverse pulse: Rise time t_r = 0.5 ns
Pulse duration t_p = 100 μs
Duty cycle δ = 0.05

Oscilloscope:
Rise time t_r = 0.6 ns

Circuit capacitance C ≤ 1 pF (C = Oscilloscope + parasitical capacitance)

Forward recovery time when switched from

I = 0 to I_F = 200 mA
t_r = 0.4 ns; t_p = 100 ns
δ < 0.01; measured at V_{fr} = 1 V   1N4150 t_{fr} < 10 ns



Special diodes

PICOAMPERE DIODE

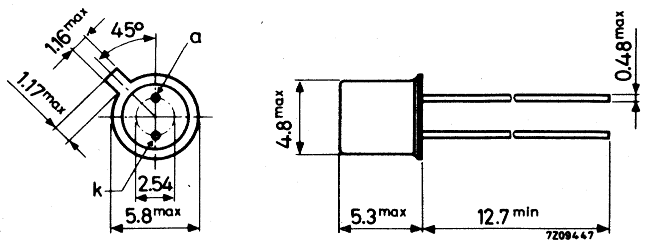
Silicon diode in a metal envelope. It has an extremely low leakage current over a wide temperature range combined with a low capacitance and is not sensitive for light. It is intended for clamping, holding, peak follower, time delay circuits as well as for logarithmic amplifiers and protection of insulated gate field-effect transistors.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	20	V
Forward current (d.c.)	I_F	max.	50	mA
Forward voltage at I_F = 10 mA	V_F	<	1.0	V
Reverse current				
V_R = 5 V; T_j = 25 °C	I_R	<	5	pA
V_R = 20 V; T_j = 25 °C	I_R	<	10	pA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	1.3	pF

MECHANICAL DATA

Dimensions in mm

TO-18 (except for the two leads)



Handle the device with care during soldering into the circuit. The extremely low leakage current can only be guaranteed when the bottom is free from solder flux or other contaminations.

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

Voltages				
Continuous reverse voltage	V_R	max.	20	V
Repetitive peak reverse voltage	V_{RRM}	max.	35	V
Currents				
Forward current (d.c. or average)	I_F	max.	50	mA
Repetitive peak forward current	I_{FRM}	max.	100	mA
Temperatures				
Storage temperature	T_{stg}	−65 to	+125	°C
Junction temperature	T_j	max.	125	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.5	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

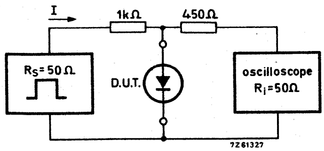
Forward voltage				
I_F = 10 mA	V_F	<	1.0	V
Reverse currents				
V_R = 5 V	I_R	<	5	pA
V_R = 5 V; T_j = 80 °C	I_R	<	250	pA
V_R = 20 V	I_R	<	10	pA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	1.3	pF

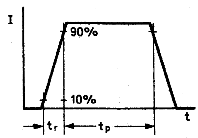
CHARACTERISTICS (continued) $T_j = 25\ ^{o}C$ unless otherwise specified

Forward recovery voltage when switched to

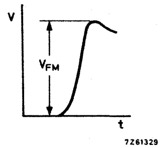
$I_F = 10$ mA	V_{FM}	<	1.25	V

Test circuit:





input pulse



output pulse

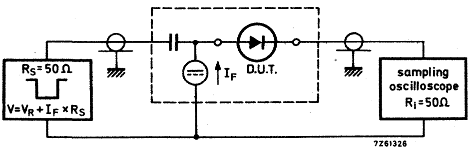
Current pulse:	Rise time	$t_r \leq$	20 ns	Oscilloscope:			
	Pulse duration	t_p =	300 ns	Rise time	t_r	=	0.35 ns
	Duty cycle	δ =	0.01	Input capacitance	C_i	≤	1 pF

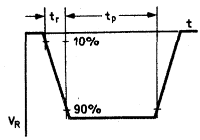
Circuit capacitance $C \leq 20$ pF (C = Oscilloscope + parasitical capacitance)

Reverse recovery time when switched from

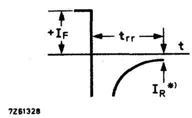
$I_F = 10$ mA to $V_R = 1$ V; $R_L = 100\ \Omega$; $I_{RM} = 10$ mA measured at $I_R = 1$ mA	t_{rr}	<	350	ns

Test circuit:





input pulse

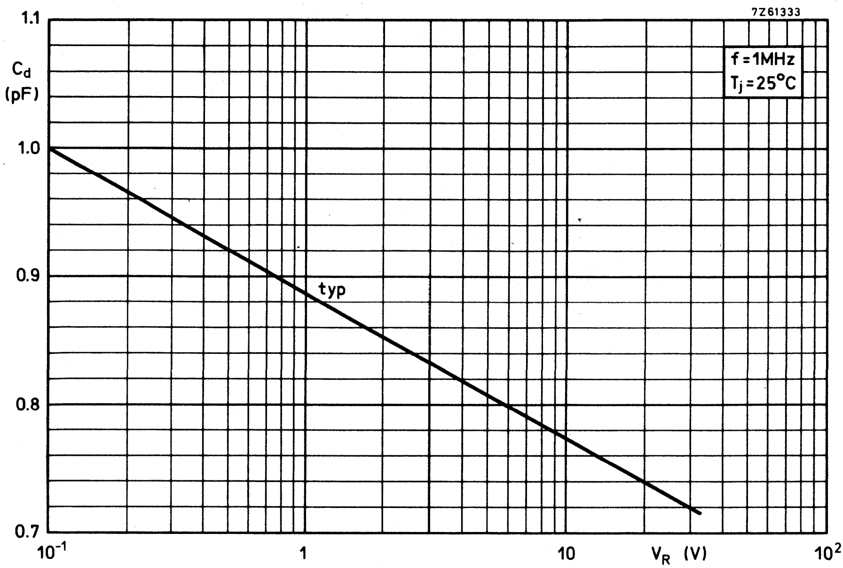


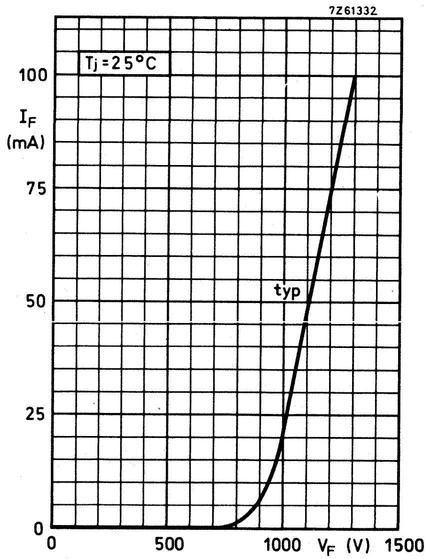
output pulse

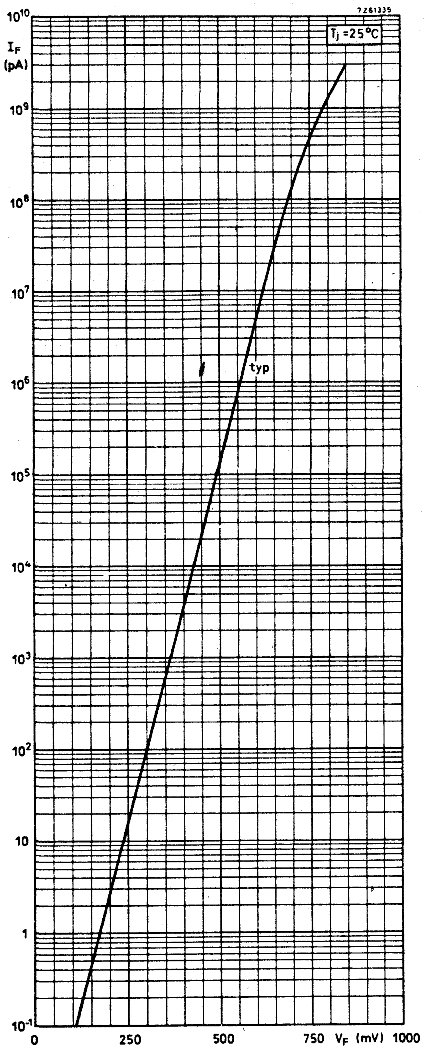
Reverse pulse:	Rise time	$t_r \leq$	20 ns	Oscilloscope:			
	Pulse duration	t_p =	500 ns	Rise time	t_r	=	0.35 ns
	Duty cycle	δ =	0.05				

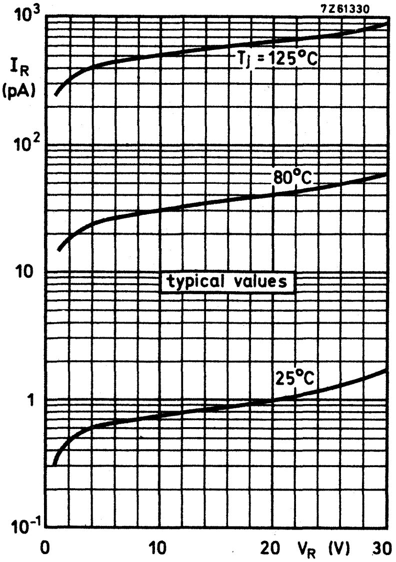
*) $I_R = 1$ mA

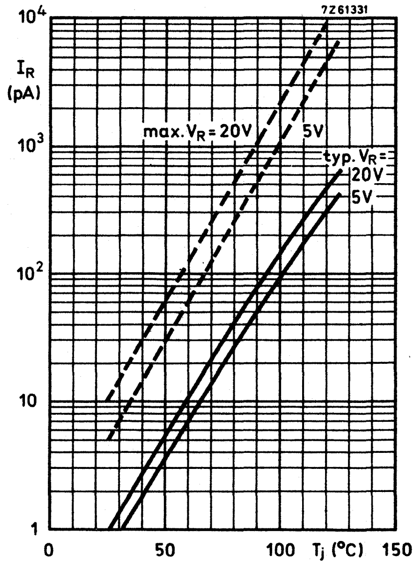
Circuit capacitance $C \leq 1$ pF (C = Oscilloscope + parasitical capacitance)


7Z61333
1.1
C_d
(pF)
1.0
0.9
0.8
0.7
f = 1MHz
T_j = 25°C
typ
10^{-1}
1
10
V_R (V)
10^2


7Z61332
T_j = 25°C
100
I_F
(mA)
75
50
25
0
typ
0
500
1000
V_F (V)
1500


7Z61335
I_F (pA)
10^{10}
10^9
10^8
10^7
10^6
10^5
10^4
10^3
10^2
10
1
10^{-1}
$T_j = 25\,°C$
typ
0
250
500
750
V_F (mV)
1000


7Z61330
I_R (pA)
T_j = 125°C
80°C
typical values
25°C
V_R (V)
10^3
10^2
10
1
10^{-1}
0
10
20
30


7Z61331
I_R (pA)
max. V_R = 20V
5V
typ. V_R =
20V
5V
T_j (°C)
10^4
10^3
10^2
10
1
0
50
100
150

Voltage regulator diodes

VOLTAGE REGULATOR DIODES

Nom. working voltage V_Z (V)	400 mW DO-7 glass 1)	400 mW DO-35 glass 2)		400 mW DO-7 glass	400 mW DO-35 glass 3)	1,3 W SOD-22 plastic	1,3 W SOD-51 glass
	BZX75						
1,4	-C1V4						
2,1	-C2V1						
2,8	-C2V8						
3,3	–			-C3V3			
3,6	-C3V6						
3,9							
4,3							
4,7		-C4V7	-B4V7				
5,1					1N5729B		-C5V1
5,6					1N5730B		
6,2					1N5731B		
6,8					1N5732B		
7,5					1N5733B	-C7V5	
8,2					1N5734B		
9,1					1N5735B		
10				BZY88 series	1N5736B		
11					1N5737B		
12					1N5738B		
13					1N5739B		
15					1N5740B		
16					1N5741B		
18		BZX79 series	BZX79 series		1N5742B	BZX61 series	BZX87 series
20					1N5743B		
22					1N5744B		
24					1N5745B		
27					1N5746B		
30				-C30	1N5747B		
33					1N5748B		
36					1N5749B		
39					1N5750B		
43					1N5751B		
47					1N5752B		
51					1N5753B		
56					1N5754B		
62					1N5755B		
68					1N5756B		
75		-C75	-B75		1N5757B	-C75	-C75

1) Stabistors.

2) For Pro-Electron types: C = 5% range (E24); B = 2% range.

3) Note well: in Jedec code B = 5% range.

VOLTAGE TOLERANCES

The following tables give the voltage tolerances that belong to a specified type.

E24 (±5 %) range

nom.	min.	max.	
2.7	2.5	2.9	V
3.0	2.8	3.2	V
3.3	3.1	3.5	V
3.6	3.4	3.8	V
3.9	3.7	4.1	V
4.3	4.0	4.6	V
4.7	4.4	5.0	V
5.1	4.8	5.4	V
5.6	5.2	6.0	V
6.2	5.8	6.6	V
6.8	6.4	7.2	V
7.5	7.0	7.9	V
8.2	7.7	8.7	V
9.1	8.5	9.6	V
10.0	9.4	10.6	V
11.0	10.4	11.6	V
12.0	11.4	12.7	V
13.0	12.4	14.1	V
15.0	13.8	15.6	V
16.0	15.3	17.1	V
18.0	16.8	19.1	V
20.0	18.8	21.2	V
22.0	20.8	23.3	V
24.0	22.8	25.6	V
27.0	25.1	28.9	V

±2 % range

nom.	min.	max.	
2.7	2.65	2.75	V
3.0	2.94	3.06	V
3.3	3.23	3.37	V
3.6	3.53	3.67	V
3.9	3.82	3.98	V
4.3	4.21	4.39	V
4.7	4.61	4.79	V
5.1	5.00	5.20	V
5.6	5.49	5.71	V
6.2	6.08	6.32	V
6.8	6.66	6.94	V
7.5	7.35	7.65	V
8.2	8.04	8.36	V
9.1	8.92	9.28	V
10.0	9.8	10.2	V
11.0	10.8	11.2	V
12.0	11.8	12.2	V
13.0	12.7	13.3	V
15.0	14.7	15.3	V
16.0	15.7	16.3	V
18.0	17.6	18.4	V
20.0	19.6	20.4	V
22.0	21.6	22.4	V
24.0	23.5	24.5	V
27.0	26.5	27.5	V

The values in tables above multiplied by 10 will be the values for higher voltages.

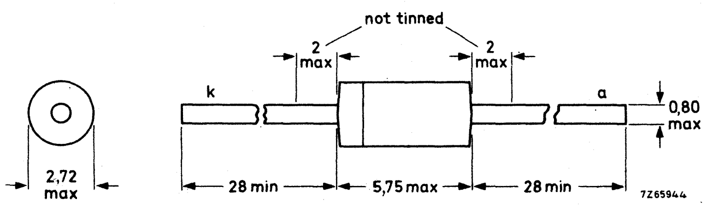
VOLTAGE REGULATOR DIODES

Silicon diodes in a SOD-22 plastic envelope intended as general purpose medium power voltage regulators.
The series consists of 25 types with nominal working voltages ranging from 7,5 V to 75 V with a tolerance of ±5% (E24).

QUICK REFERENCE DATA				
Working voltage range		nom.	7,5 to 75	V
Working voltage tolerance (E24)			±5	%
Peak working current	I_{ZM}	max.	3,0	A
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	1,3	W
Repetitive peak reverse power dissipation	P_{ZRM}	max.	6,0	W
Junction temperature	T_j	max.	175	°C

MECHANICAL DATA Dimensions in mm

SOD-22



Cathode indicated by white band

The sealing of the plastic envelope withstands the accelerated damp heat test of IEC recommendation 68-2 (test D, severity IV, 6 cycles).

SOLDERING AND MOUNTING NOTES

1. Soldered joints must be at least 5 mm from the seal.
2. The maximum permissible temperature of the soldering iron or bath is 245 °C; it must be in contact with the joint for no more than 5 seconds.
3. Avoid hot spots due to handling or mounting; the body of the device must not come into contact with or be exposed to a temperature higher than 175 °C.

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

Currents

Peak working current	I_{ZM}	max.	3,0	A
Repetitive peak forward current	I_{FRM}	max.	1,0	A

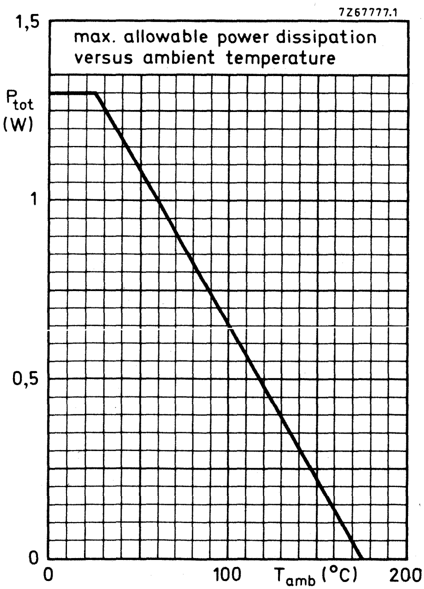
Power dissipation (see graphs on pages 2 and 3)

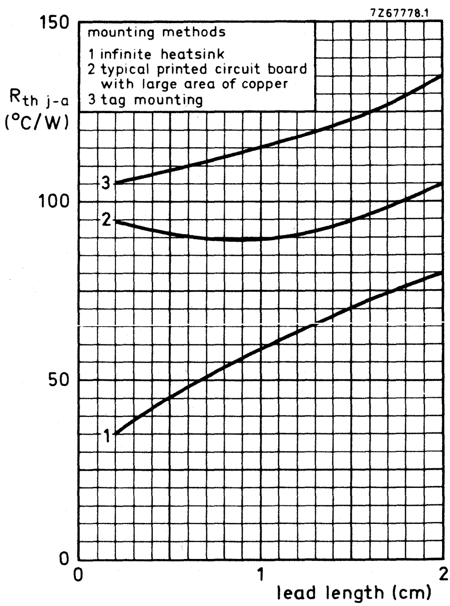
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	1,3	W
Repetitive peak reverse power dissipation	P_{ZRM}	max.	6,0	W
Non-repetitive peak reverse power dissipation t_p = 100 μs; T_{amb} = −55 to +25 °C	P_{ZSM}	max.	300	W

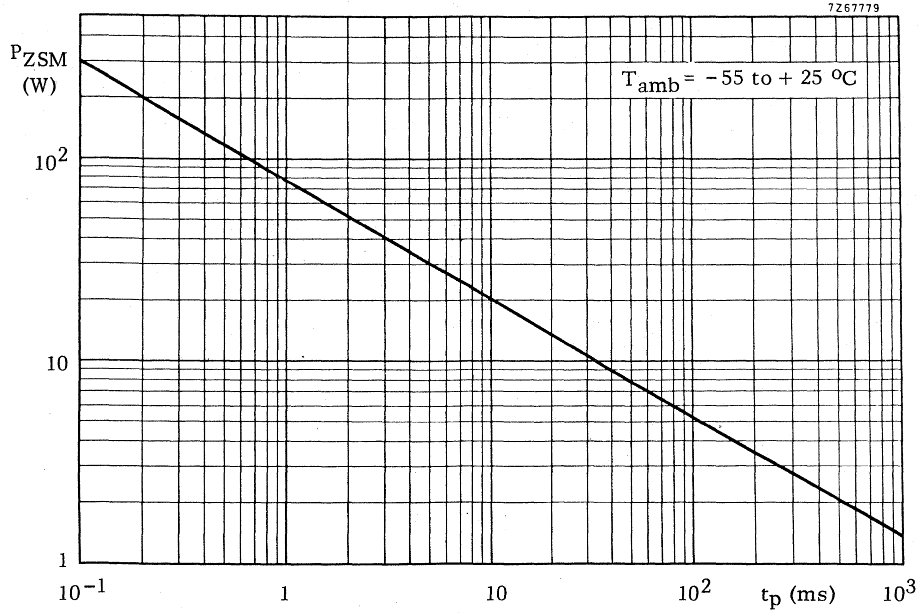
Temperatures

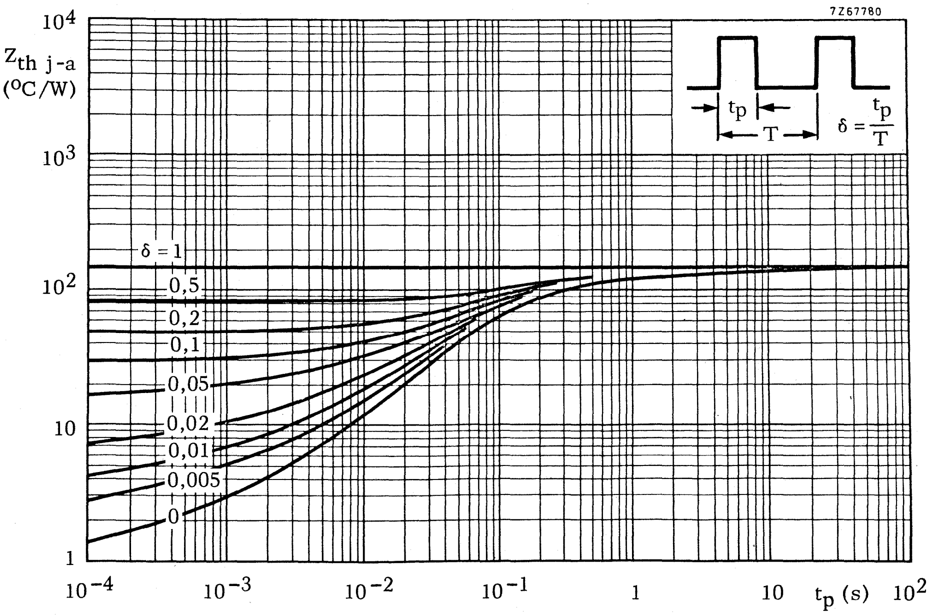
Storage temperature	T_{stg}	−65 to +175		°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE see graphs on pages 2 and 3






7Z67779
P_{ZSM} (W)
T_{amb} = −55 to + 25 °C
10^2
10
1
10^{-1}
1
10
10^2
t_p (ms)
10^3


7Z67780
$Z_{th\ j\text{-}a}$ (°C/W)
10^4
10^3
10^2
10
1
δ = 1
0,5
0,2
0,1
0,05
0,02
0,01
0,005
0
t_p
T
$\delta = \frac{t_p}{T}$
10^{-4}
10^{-3}
10^{-2}
10^{-1}
1
10
t_p (s)
10^2

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage

I_F = 100 mA; T_{amb} = 25 °C — V_F typ. 0,86 V; < 1,50 V

BZX61-...	Working voltage V_Z (V)			Temperature coefficient S_Z (mV/°C)	Differential resistance r_{diff} (Ω)	Reverse current I_R (μA)	at	Reverse voltage V_R (V)
	at I_Z = 20 mA			at I_Z = 20 mA	at I_Z = 20 mA			
	min.	nom.	max.	typ.	max.	max.		
C7V5	7,0	7,5	7,9	+3,0	5,0	5		3
C8V2	7,7	8,2	8,7	+3,3	7,5	5		3
C9V1	8,5	9,1	9,6	+4,6	8,0	5		5
C10	9,4	10,0	10,6	+5,0	8,5	5		7
C11	10,4	11,0	11,6	+5,5	9,0	5		7
C12	11,4	12,0	12,7	+6,0	9,0	5		8
C13	12,4	13,0	14,1	+6,5	10,0	5		9
C15	13,8	15,0	15,6	+9,0	14,0	5		10
	at I_Z = 10 mA			at I_Z = 10 mA	at I_Z = 10 mA			
	min.	nom.	max.	typ.	max.	max.		
C16	15,3	16	17,1	+10	16	5		11
C18	16,8	18	19,1	+11	20	5		13
C20	18,8	20	21,2	+12	22	5		14
C22	20,8	22	23,3	+13	23	5		15
C24	22,7	24	25,9	+14	25	5		17
C27	25,1	27	28,9	+16	35	5		19
C30	28	30	32	+21	40	5		21
C33	31	33	35	+23	45	5		23
C36	34	36	38	+25	50	5		25
	at I_Z = 5 mA			at I_Z = 5 mA	at I_Z = 5 mA			
C39	37	39	41	+27	60	5		27
C43	40	43	46	+30	70	5		30
C47	44	47	50	+38	80	5		33
C51	48	51	54	+41	95	5		36
C56	52	56	60	+45	105	5		39
C62	58	62	66	+50	110	5		43
C68	64	68	72	+54	120	5		48
C75	70	75	79	+60	135	5		52

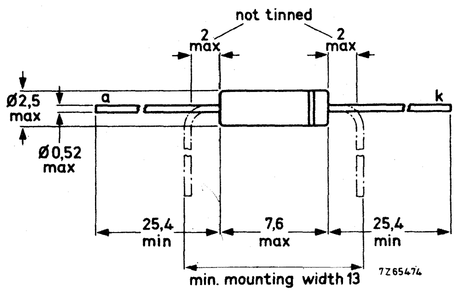
STABISTORS

Diodes with controlled conductance in a all-glass DO-7 envelope intended for low voltage regulation in circuits for clipping, coupling, clamping, meter protection, bias regulation and in many applications which require tight tolerances and low voltage levels.
The series consists of 4 types with nominal voltages ranging from 1,4 to 3,6 V with a tolerance of ±5%.

QUICK REFERENCE DATA				
Regulation voltage range	V_F	nom.	1, 4 to 3, 6	V
Regulation voltage tolerance			±5	%
Continuous reverse voltage	V_R	max.	10	V
Repetitive peak reverse voltage	V_{RRM}	max.	10	V
Repetitive peak forward current	I_{FRM}	max.	250	mA
Total power dissipation up to T_{amb} = 32 °C	P_{tot}	max.	400	mW
Operating junction temperature	T_j	max.	200	°C

MECHANICAL DATA Dimensions in mm

DO-7



Cathode indicated by coloured band

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

Voltages

Continuous reverse voltage	V_R	max.	10	V
Repetitive peak reverse voltage	V_{RRM}	max.	10	V

Current

Repetitive peak forward current	I_{FRM}	max.	250	mA

Power dissipation

→ Total power dissipation up to T_{amb} = 32 °C	P_{tot}	max.	400	mW

Temperatures

Storage temperature	T_{stg}	-65 to +175		°C
Operating junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

→ From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0, 42	°C/mW

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

BZX75-....	Regulation voltage V_F (V) at I_F = 1 mA min.		max.	Temperature coefficient S_F (mV/°C) at I_F = 1 mA typ.	Differential resistance r_{diff} (Ω); f = 1 kHz at I_F = 1 mA typ.	
C1V4	1,16		1,34	-4	60	
C2V1	1,75		2,05	-6	90	
C2V8	2,33		2,70	-8	120	
C3V6	3,02		3,45	-10	150	
	at I_F = 10 mA			at I_F = 10 mA	at I_F = 10 mA	
	min.	nom.	max.	typ.	typ.	max.
C1V4	1,33	1,40	1,47	-3,3	6	10
C2V1	1,99	2,10	2,21	-5,0	9	15
C2V8	2,66	2,80	2,94	-6,6	12	20
C3V6	3,42	3,60	3,78	-8,2	15	25

Reverse current

V_R = 5 V

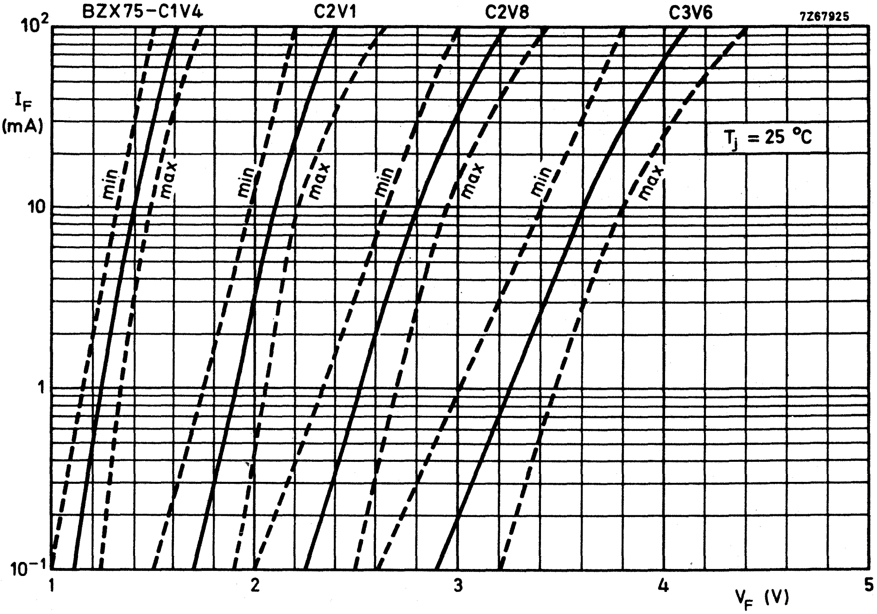
BZX75-C1V4, BZX75-C2V1	I_R	<	500	nA
BZX75-C2V8, BZX75-C3V6	I_R	<	200	nA

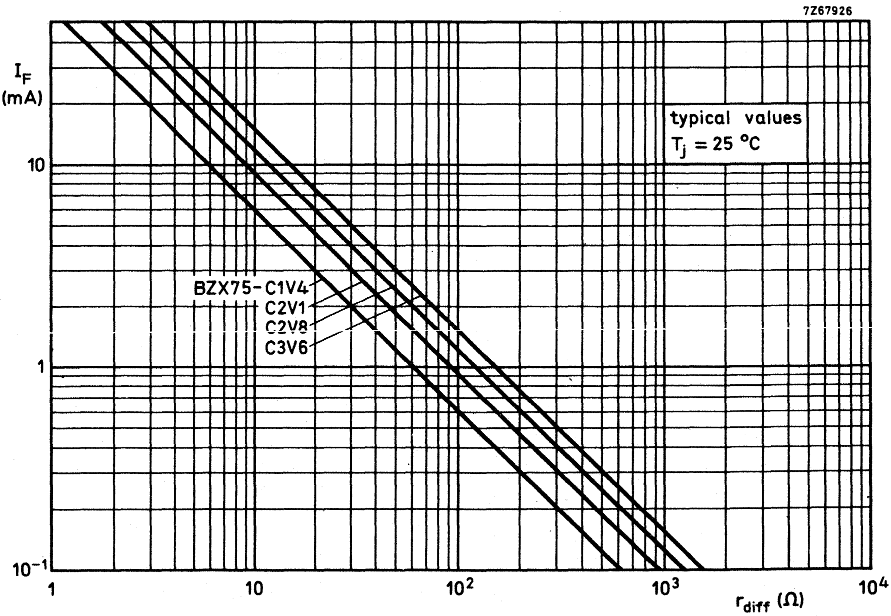
Recovered charge when switched from

I_F = 10 mA to V_R = 5 V; R_L = 500 Ω — Q_s > 600 pC

Diode capacitance

V_R = 0; f = 1 MHz — C_d < 250 pF


7Z67925
BZX75-C1V4
C2V1
C2V8
C3V6
I_F (mA)
10^2
10
1
10^{-1}
min
max
min
max
min
max
min
max
$T_j = 25\ °C$
1
2
3
4
5
V_F (V)


7Z67926
I_F (mA)
10
1
10^{-1}
typical values
$T_j = 25\ °C$
BZX75-C1V4
C2V1
C2V8
C3V6
1
10
10^2
10^3
10^4
r_{diff} (Ω)

VOLTAGE REGULATOR DIODES

Silicon planar diodes in a DO-35 envelope intended for use as low voltage stabilisers or voltage references.
Available in two series; one to the international standardized E24 (±5%) range and the other with ±2% tolerance on working voltage.
Each series consists of 30 types with nominal working voltages ranging from 4,7 V to 75 V.

QUICK REFERENCE DATA					
Working voltage range	V_Z	nom.	4,7 to 75	V	
Total power dissipation	P_{tot}	max.	400	mW	1)
		max.	500	mW	2)
Non-repetitive peak reverse power dissipation	P_{ZSM}	max.	30	W	
Junction temperature	T_j	max.	200	^oC	
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0,38	$^oC/mW$	3)

1) In still air at maximum lead length up to T_{amb} = 50 ^oC

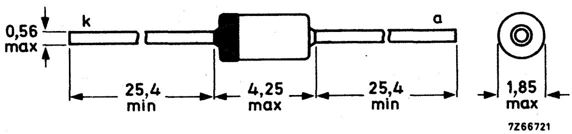
2) If leads are kept at T_{amb} = 25 ^oC at 8 mm from body.

3) Measured in still air at maximum lead length.

MECHANICAL DATA

Dimensions in mm

DO-35



Cathode indicated by coloured band

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

Currents

Average forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	250	mA	
Repetitive peak forward current	I_{FRM}	max.	250	mA	

Power dissipation

Total power dissipation	P_{tot}	max.	400	mW	1)
		max.	500	mW	2)
Non-repetitive peak reverse power dissipation $t = 100\ \mu s$; $T_j = 150\ ^oC$	P_{ZSM}	max.	30	W	

Temperatures

Storage temperature	T_{stg}	−65 to +200		^oC
Junction temperature	T_j	max.	200	^oC

THERMAL RESISTANCE

From junction to ambient in free air at maximum lead length	$R_{th\ j-a}$	=	0,38	$^oC/mW$	3)

CHARACTERISTICS $T_j = 25\ ^oC$ unless otherwise specified

Forward voltage

$I_F = 10$ mA; $T_{amb} = 25\ ^oC$	V_F	<	0,9	V

Reverse current

BZX79-.4V7	$V_R = 2$ V	I_R	<	3000	nA
.5V1	$V_R = 2$ V	I_R	<	2000	nA
.5V6	$V_R = 2$ V	I_R	<	1000	nA
.6V2	$V_R = 4$ V	I_R	<	3000	nA
.6V8	$V_R = 4$ V	I_R	<	2000	nA
.7V5	$V_R = 5$ V	I_R	<	1000	nA
.8V2	$V_R = 5$ V	I_R	<	700	nA
.9V1	$V_R = 6$ V	I_R	<	500	nA
.10	$V_R = 7$ V	I_R	<	200	nA
.11 to .13	$V_R = 8$ V	I_R	<	100	nA
.15 to .75	$V_R = 0,7\ V_{Znom}$	I_R	<	50	nA

. = B for 2% tolerance
. = C for E24 (5%) tolerance

1) In still air at maximum lead length up to $T_{amb} = 50\ ^oC$.
2) If leads are kept at $T_{amb} = 25\ ^oC$ at 8 mm from body.
3) Measured in still air at maximum lead length.

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

E24 (±5%) logerithmic range (for ±2% tolerance range see page 5).

BZX79-...	Operating voltage V_Z (V) at I_Z = 5 mA		Differential resistance r_{diff} (Ω) at I_Z = 5 mA		Temperature coefficient S_Z (mV/°C) at I_Z = 5 mA			Diode capacitance C_d (pF); f = 1 MHz V_R = 0	
	min.	max.	typ.	max.	min.	typ.	max.	typ.	max.
C4V7	4,4	5,0	50	80	−3,5	−1,4	0,2	130	180
C5V1	4,8	5,4	40	60	−2,7	−0,8	1,2	110	160
C5V6	5,2	6,0	15	40	−2,0	1,2	2,5	95	140
C6V2	5,8	6,6	6	10	0,4	2,3	3,7	90	130
C6V8	6,4	7,2	6	15	1,2	3,0	4,5	85	110
C7V5	7,0	7,9	6	15	2,5	4,0	5,3	80	100
C8V2	7,7	8,7	6	15	3,2	4,6	6,2	75	95
C9V1	8,5	9,6	6	15	3,8	5,5	7,0	70	90
C10	9,4	10,6	8	20	4,5	6,4	8,0	70	90
C11	10,4	11,6	10	20	5,4	7,4	9,0	65	85
C12	11,4	12,7	10	25	6,0	8,4	10,0	65	85
C13	12,4	14,1	10	30	7,0	9,4	11,0	60	80
C15	13,8	15,6	10	30	9,2	11,4	13,0	55	75
C16	15,3	17,1	10	40	10,4	12,4	14,0	52	75
C18	16,8	19,1	10	45	12,4	14,4	16,0	47	70
C20	18,8	21,2	15	55	14,4	16,4	18,0	36	60
C22	20,8	23,3	20	55	16,4	18,4	20,0	34	60
C24	22,8	25,6	25	70	18,4	20,4	22,0	33	55
	at I_Z = 2 mA		at I_Z = 2 mA		at I_Z = 2 mA				
	min.	max.		max.		typ.		typ.	max.
C27	25,1	28,9		80		23,5		30	50
C30	28,0	32,0		80		26,0		27	50
C33	31,0	35,0		80		29,0		25	45
C36	34,0	38,0		90		31,0		23	45
C39	37,0	41,0		130		34,0		21	45
C43	40,0	46,0		150		37,0		21	40
C47	44,0	50,0		170		40,0		19	40
C51	48,0	54,0		180		44,0		19	40
C56	52,0	60,0		200		47,0		18	40
C62	58,0	66,0		215		51,0		17	35
C68	64,0	72,0		240		56,0		17	35
C75	70,0	79,0		255		60,0		16,5	35

Note

Typical values on differential resistance, and min. and max. values on temperature coefficient for types C27 to C75, will be supplied on request.

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

E24 (±5%) logarithmic range (for ±2% tolerance range see page 6).

BZX79-...	Operating voltage V_Z (V) at I_Z = 1 mA			Differential resistance r_{diff} (Ω) at I_Z = 1 mA		Operating voltage V_Z (V) at I_Z = 20 mA			Differential resistance r_{diff} (Ω) at I_Z = 20 mA	
	min.	nom.	max.	typ.	max.	min.	nom.	max.	typ.	max.
C4V7	3,7	4,2	4,7	425	500	4,5	5,0	5,4	8	20
C5V1	4,2	4,7	5,3	400	480	5,0	5,4	5,9	6	20
C5V6	4,8	5,4	6,0	80	400	5,2	5,7	6,3	4	20
C6V2	5,6	6,1	6,6	40	150	5,8	6,3	6,8	3	10
C6V8	6,3	6,7	7,2	30	80	6,4	6,9	7,4	2,5	10
C7V5	6,9	7,4	7,9	30	80	7,0	7,6	8,0	2,5	8
C8V2	7,6	8,1	8,7	40	80	7,7	8,3	8,8	3	8
C9V1	8,4	9,0	9,6	40	100	8,5	9,2	9,7	4	8
C10	9,3	9,9	10,6	50	150	9,4	10,1	10,7	4	10
C11	10,2	10,9	11,6	50	150	10,5	11,1	11,8	5	10
C12	11,2	11,9	12,7	50	150	11,5	12,1	12,9	5	10
C13	12,3	12,9	14,0	50	170	12,5	13,1	14,2	5	15
C15	13,7	14,9	15,5	50	200	13,9	15,1	15,7	6	20
C16	15,2	15,9	17,0	50	200	15,4	16,1	17,2	6	20
C18	16,7	17,9	19,0	50	225	16,9	18,1	19,2	6	20
C20	18,7	19,9	21,1	60	225	18,9	20,1	21,4	7	20
C22	20,7	21,9	23,2	60	250	20,9	22,1	23,4	7	25
C24	22,7	23,9	25,5	60	250	22,9	24,1	25,7	7	25

Note

Extended information for types C27 to C75 will be supplied on request.

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

±2% tolerance range.

BZX79-...	Operating voltage V_Z (V) at I_Z = 5 mA		Differential resistance r_{diff} (Ω) at I_Z = 5 mA		Temperature coefficient S_Z (mV/°C) at I_Z = 5 mA	Diode capacitance C_d (pF); f = 1 MHz V_R = 0	
	min.	max.	typ.	max.	typ.	typ.	max.
B4V7	4,61	4,79	50	80	-1,4	130	180
B5V1	5,00	5,20	40	60	-0,8	110	160
B5V6	5,49	5,71	15	40	1,2	95	140
B6V2	6,08	6,32	6	10	2,3	90	130
B6V8	6,66	6,94	6	15	3,0	85	110
B7V5	7,35	7,65	6	15	4,0	80	100
B8V2	8,04	8,36	6	15	4,6	75	95
B9V1	8,92	9,28	6	15	5,5	70	90
B10	9,80	10,20	8	20	6,4	70	90
B11	10,80	11,20	10	20	7,4	65	85
B12	11,80	12,20	10	25	8,4	65	85
B13	12,70	13,30	10	30	9,4	60	80
B15	14,70	15,30	10	30	11,4	55	75
B16	15,70	16,30	10	40	12,4	52	75
B18	17,60	18,40	10	45	14,4	47	70
B20	19,60	20,40	15	55	16,4	36	60
B22	21,60	22,40	20	55	18,4	34	60
B24	23,50	24,50	25	70	20,4	33	55
	at I_Z = 2 mA		at I_Z = 2 mA		at I_Z = 2 mA		
	min.	max.		max.	typ.	typ.	max.
B27	26,50	27,50		80	23,5	30	50
B30	29,40	30,60		80	26,0	27	50
B33	32,30	33,70		80	29,0	25	45
B36	35,30	36,70		90	31,0	23	45
B39	38,20	39,80		130	34,0	21	45
B43	42,10	43,90		150	37,0	21	40
B47	46,10	47,90		170	40,0	19	40
B51	50,00	52,00		180	44,0	19	40
B56	54,90	57,10		200	47,0	18	40
B62	60,80	63,20		215	51,0	17	35
B68	66,60	69,40		240	56,0	17	35
B75	73,50	76,50		255	60,0	16,5	35

Note

Typical values on differential resistance for types B27 to B75 and min. and max. values on temperature coefficient will be supplied on request.

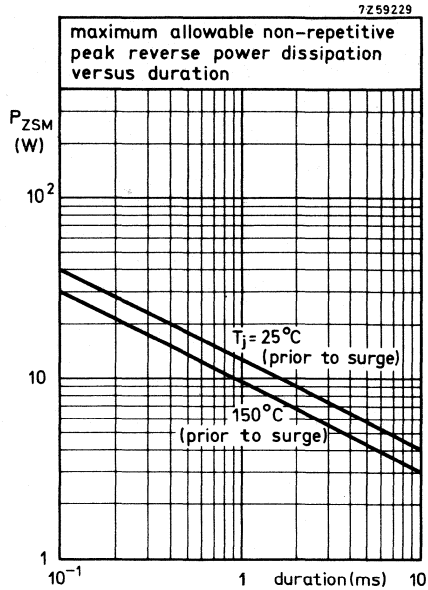
→ **CHARACTERISTICS** (continued) T_j = 25 °C unless otherwise specified

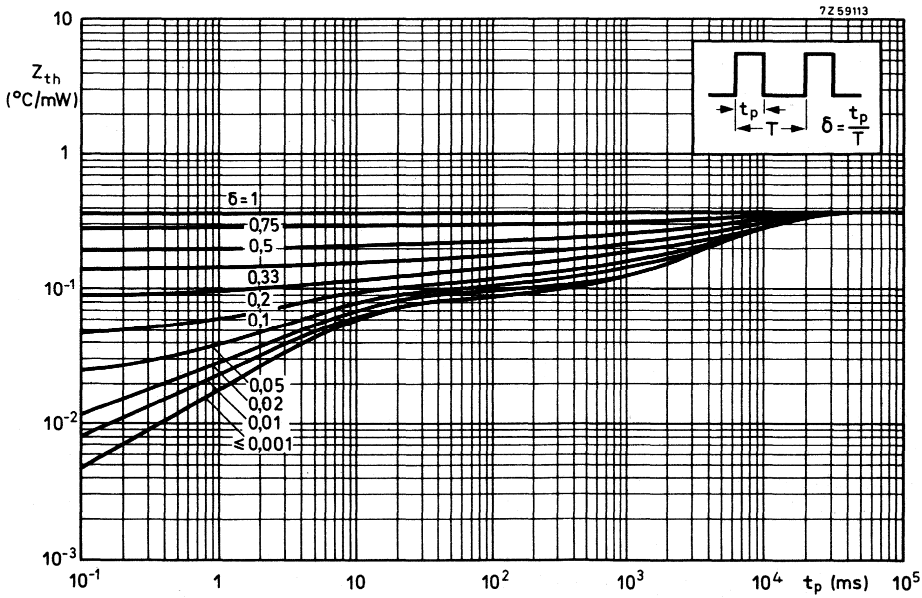
±2% tolerance range.

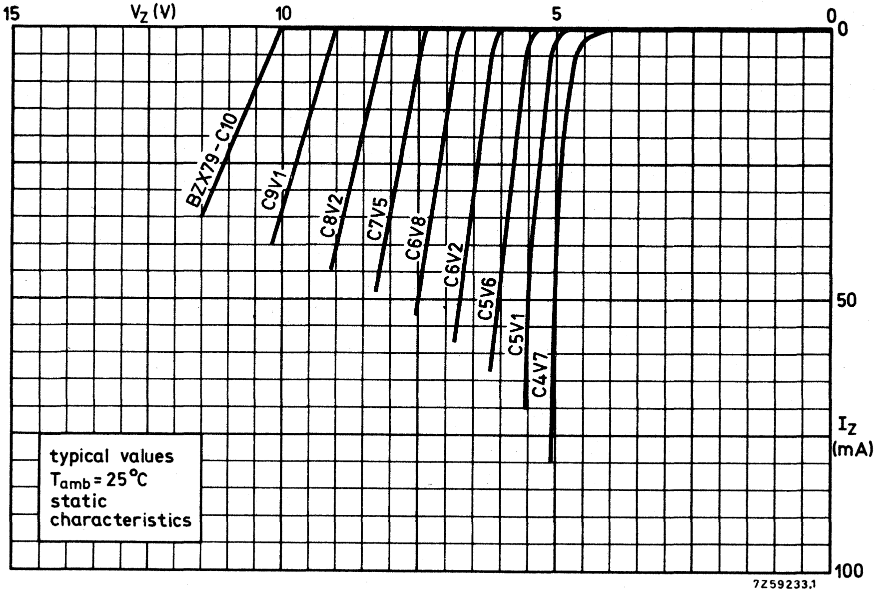
BZX79-...	Operating voltage V_Z (V) at I_Z = 1 mA	Differential resistance r_{diff} (Ω) at I_Z = 1 mA		Operating voltage V_Z (V) at I_Z = 20 mA	Differential resistance r_{diff} (Ω) at I_Z = 20 mA	
	nom.	typ.	max.	nom.	typ.	max.
B4V7	4, 2	425	500	5, 0	8	20
B5V1	4, 7	400	480	5, 4	6	20
B5V6	5, 4	80	400	5, 7	4	20
B6V2	6, 1	40	150	6, 3	3	10
B6V8	6, 7	30	80	6, 9	2, 5	10
B7V5	7, 4	30	80	7, 6	2, 5	8
B8V2	8, 1	40	80	8, 3	3	8
B9V1	9, 0	40	100	9, 2	4	8
B10	9, 9	50	150	10, 1	4	10
B11	10, 9	50	150	11, 1	5	10
B12	11, 9	50	150	12, 1	5	10
B13	12, 9	50	170	13, 1	5	15
B15	14, 9	50	200	15, 1	6	20
B16	15, 9	50	200	16, 1	6	20
B18	17, 9	50	225	18, 1	6	20
B20	19, 9	60	225	20, 1	7	20
B22	21, 9	60	250	22, 1	7	25
B24	23, 9	60	250	24, 1	7	25

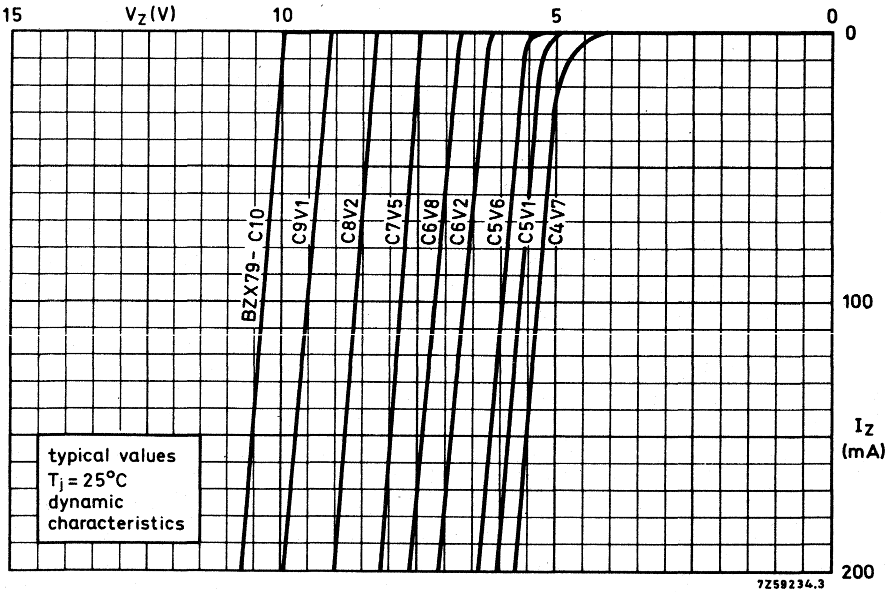
Note

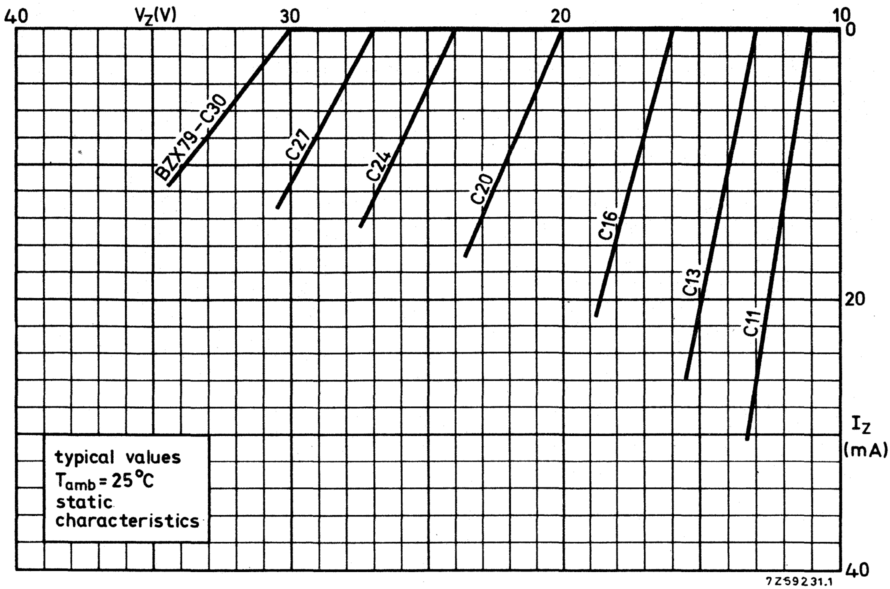
Extended information for types B27 to B75 will be supplied on request.

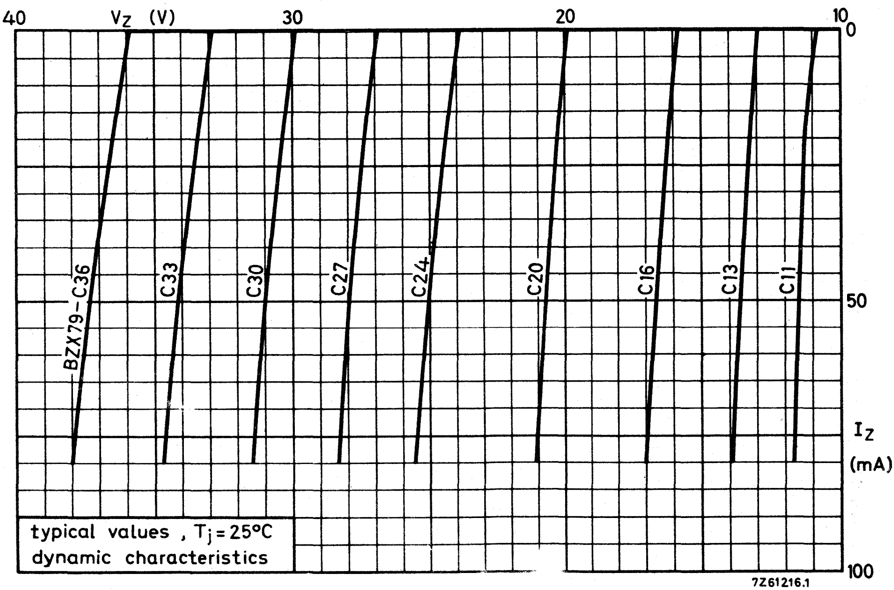

7Z59229
maximum allowable non-repetitive peak reverse power dissipation versus duration
P_{ZSM} (W)
10^2
10
1
10^{-1}
1
duration (ms)
10
T_j = 25 °C (prior to surge)
150 °C (prior to surge)

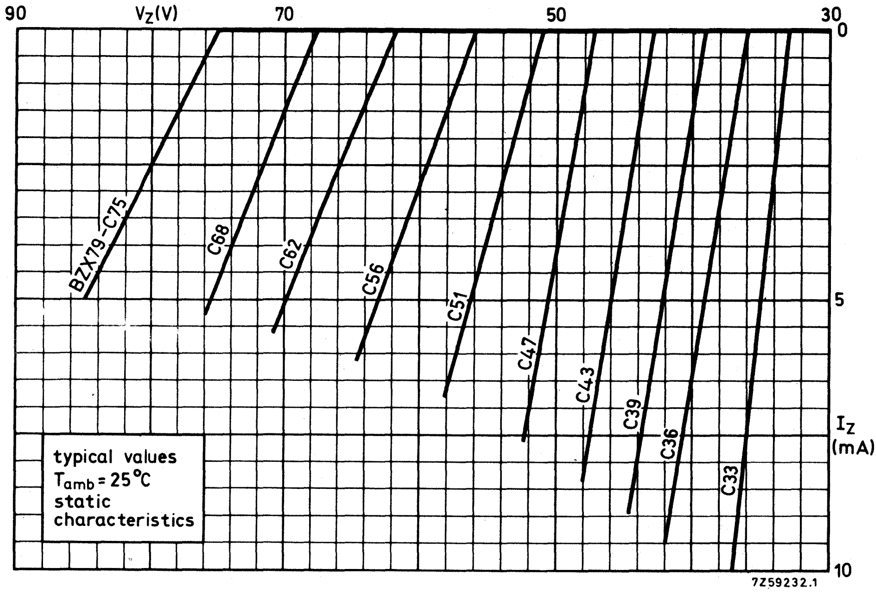

7Z59113
Z_{th} (°C/mW)
10
1
10^{-1}
10^{-2}
10^{-3}
t_p
T
$\delta = \frac{t_p}{T}$
δ = 1
0,75
0,5
0,33
0,2
0,1
0,05
0,02
0,01
≤ 0,001
10^{-1}
1
10
10^2
10^3
10^4
t_p (ms)
10^5

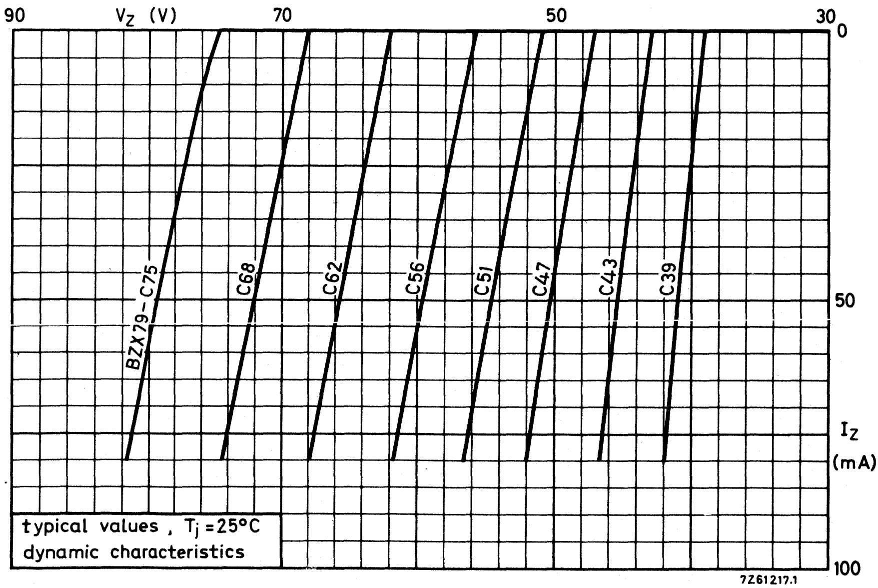

15
V_Z (V)
10
5
0
0
50
100
I_Z (mA)
BZX79-C10
C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C5V1
C4V7
typical values
T_{amb} = 25 °C
static
characteristics
7Z59233.1

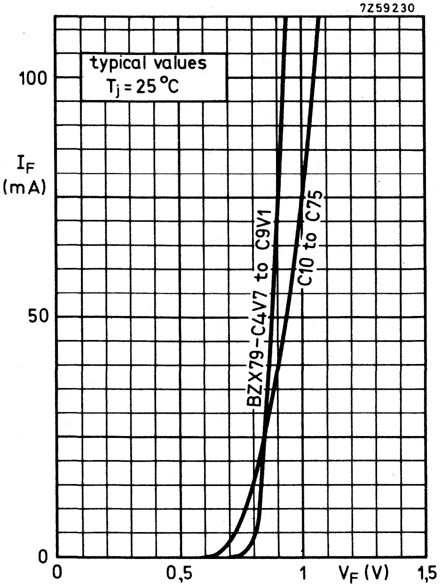

15
V_Z (V)
10
5
0
0
100
200
I_Z (mA)
BZX79-C10
C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C5V1
C4V7
typical values
T_j = 25 °C
dynamic
characteristics
7Z59234.3

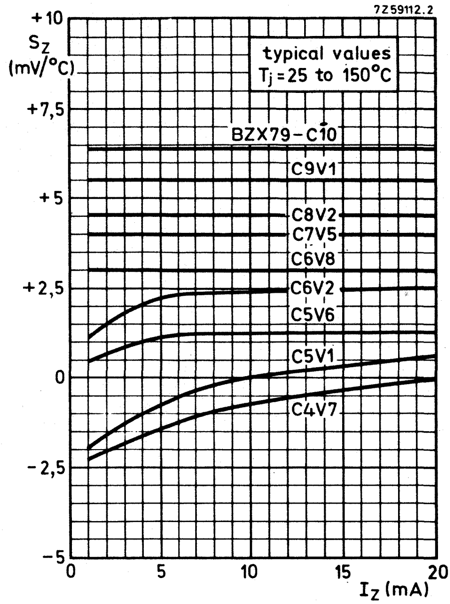

40
V_Z(V)
30
20
10
0
20
40
I_Z
(mA)
BZX79–C30
C27
C24
C20
C16
C13
C11
typical values
T_{amb} = 25 °C
static
characteristics
7Z59231.1

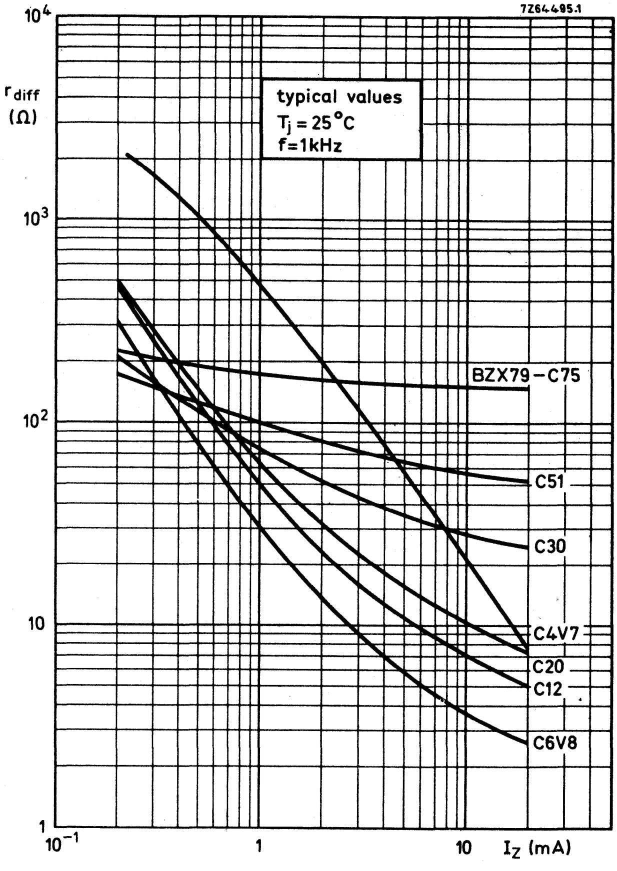

40
V_Z (V)
30
20
10
0
50
100
I_Z
(mA)
BZX79–C36
C33
C30
C27
C24
C20
C16
C13
C11
typical values , T_j = 25 °C
dynamic characteristics
7Z61216.1


90
V_Z(V)
70
50
30
0
5
10
I_Z
(mA)
BZX79–C75
C68
C62
C56
C51
C47
C43
C39
C36
C33
typical values
T_{amb} = 25°C
static
characteristics
7Z59232.1


90
V_Z (V)
70
50
30
0
50
100
I_Z
(mA)
BZX79–C75
C68
C62
C56
C51
C47
C43
C39
typical values, T_j = 25°C
dynamic characteristics
7Z61217.1


7Z59230
typical values
$T_j = 25\ ^\circ C$
I_F (mA)
100
50
0
BZX79-C4V7 to C9V1
C10 to C75
0
0,5
1
V_F (V)
1,5


7Z59112.2
S_Z (mV/°C)
+10
+7,5
+5
+2,5
0
−2,5
−5
typical values
$T_j = 25$ to $150\ ^\circ C$
BZX79−C10
C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C5V1
C4V7
0
5
10
15
20
I_Z (mA)


7Z64495.1
typical values
$T_j = 25\,^\circ C$
f = 1 kHz
r_{diff}
(Ω)
10^4
10^3
10^2
10
1
10^{-1}
1
10
I_Z (mA)
BZX79 – C75
C51
C30
C4V7
C20
C12
C6V8

SILICON PLANAR VOLTAGE REGULATOR DIODES

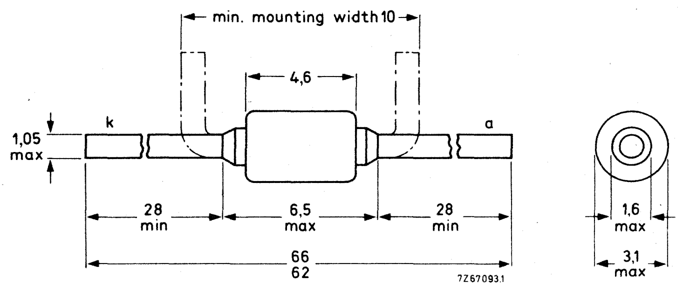
Silicon planar voltage regulator diodes in a hermetically sealed glass envelope intended for stabilization purposes.
The series covers the normalized range of nominal working voltages from 5,1 V to 75 V with a tolerance of ±5% (international standard E24).

QUICK REFERENCE DATA				
Working voltage range	V_Z	nom.	5,1 to 75	V
Working voltage tolerance	E24		±5	%
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	1,3	W
Junction temperature	T_j	max.	200	°C
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	134	°C/W

MECHANICAL DATA

Dimensions in mm

SOD-51



Cathode indicated by coloured band

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

Currents

Working current (d.c.)	I_Z	limited by $P_{tot\ max}$		
Repetitive peak working current	I_{ZRM}	limited by $P_{ZRM\ max}$		
Repetitive peak forward current	I_{FRM}	max.	400	mA

Power dissipation

Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	1,3	W
Repetitive peak reverse power dissipation up to T_{amb} = 25 °C; t_p = 100 µs; δ = 0,001	P_{ZRM}	max.	7,5	W
Non-repetitive peak reverse power dissipation up to T_{amb} = 25 °C; t_p = 100 µs	P_{ZSM}	max.	100	W

Temperatures

Storage temperature	T_{stg}	−65 to +200		°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air, tag mounting max. lead length of 28 mm	$R_{th\ j\text{-}a}$	=	134	°C/W

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltage at I_F = 0,2 A V_F < 1 V

Reverse current at

			BZX87-C5V1 C5V6	C6V2	C6V8	C7V5 C8V2	C9V1	C10 to C75	
V_R = 2 V	I_R	<	10	5	–	–	–	–	µA
V_R = 3 V	I_R	<	–	–	3	1	–	–	µA
V_R = 5 V	I_R	<	–	–	–	–	1	–	µA
$V_R = \frac{2}{3} V_{Znom}$	I_R	<	–	–	–	–	–	1	µA

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

	Working voltage V_Z (V)		Temperature coefficient S_Z (mV/°C)	Differential resistance r_{diff} (Ω)	Diode capacitance C_d (pF) at f = 1 MHz
	at I_Z = 50 mA		**at I_Z = 50 mA**	**at I_Z = 50 mA**	V_R = 0
BZX87-....	min.	max.	typ.	max.	typ.
C5V1	4,8	5,4	+0,2	10	220
C5V6	5,2	6,0	+1,4	5	200
C6V2	5,8	6,6	+2	3	350
	at I_Z = 20 mA		**at I_Z = 20 mA**	**at I_Z = 20 mA**	
C6V8	6,4	7,2	2,5	3	310
C7V5	7,0	7,9	3,0	3	280
C8V2	7,7	8,7	3,5	4	250
C9V1	8,5	9,6	4,5	4	225
C10	9,4	10,6	5,5	5	200
C11	10,4	11,6	6,2	5	180
C12	11,4	12,7	7,5	6	165
C13	12,4	14,1	8,5	7	200
C15	13,8	15,6	10,5	10	170
	at I_Z = 10 mA		**at I_Z = 10 mA**	**at I_Z = 10 mA**	
C16	15,3	17,1	12	10	160
C18	16,8	19,1	14	15	140
C20	18,8	21,2	16	15	120
C22	20,8	23,3	18	20	113
C24	22,8	25,6	20	20	108
C27	25,1	28,9	23	25	100
C30	28	32	26	25	97
C33	31	35	30	30	85
C36	34	38	33	35	80
	at I_Z = 5 mA		**at I_Z = 5 mA**	**at I_Z = 5 mA**	
C39	37	41	36	40	74
C43	40	46	40	50	69
C47	44	50	44	60	64
C51	48	54	48	70	60
C56	52	60	53	80	56
C62	58	66	60	90	52
C68	64	72	67	110	50
C75	70	79	73	125	48

VOLTAGE REGULATOR DIODES

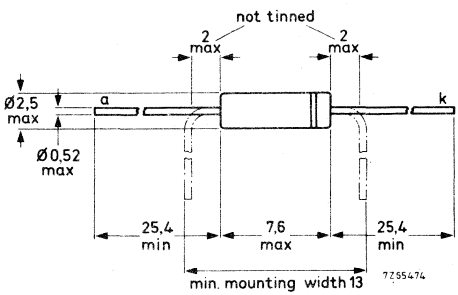
Silicon diodes in all-glass DO-7 envelope for use as low current voltage stabilizers or voltage references.
The series consists of 24 types with nominal working voltages ranging from 3,3 V to 30 V with a tolerance of ±5%.

QUICK REFERENCE DATA

Working voltage range	V_Z	nom.	3,3 to 30	V
Working voltage tolerance			±5	%
Repetitive peak working current	I_{ZRM}	max.	250	mA
Total power dissipation up to T_{amb} = 50 °C	P_{tot}	max.	400	mW
Non-repetitive peak reverse power dissipation T_j = 150 °C; t = 100 µs	P_{ZSM}	max.	15	W
Operating junction temperature	T_j	max.	200	°C
Thermal resistance from junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,37	°C/mW

MECHANICAL DATA Dimensions in mm

DO-7



Cathode indicated by coloured band

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

Currents

Forward current (d.c.)	I_F	max.	250	mA
Repetitive peak forward current	I_{FRM}	max.	250	mA
Repetitive peak working current	I_{ZRM}	max.	250	mA

Power dissipation

Total power dissipation up to T_{amb} = 50 °C	P_{tot}	max.	400	mW
Non-repetitive peak reverse power dissipation T_j = 150 °C; t = 100 μs	P_{ZSM}	max.	15	W

Temperatures

Storage temperature	T_{stg}		-65 to +175	°C
→ Operating junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

→ From junction to ambient in free air	$R_{th\ j-a}$	=	0,37	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltage

I_F = 10 mA V_F < 0.9 V

BZY88-...	Working voltage V_Z at I_Z = 1 mA				Temperature coefficient S_Z at I_Z = 1 mA				Differential resistance r_{diff} at I_Z = 1 mA			
	min.	nom.	max.		min.	typ.	max.		min.	typ.	max.	
C3V3	2.4	2.75	3.0	V	−4.5	−1.9	−0.5	mV/°C	380	410	440	Ω
C3V6	2.7	3.0	3.3	V	−4.5	−2.05	−0.5	mV/°C	380	410	430	Ω
C3V9	3.0	3.3	3.6	V	−3.5	−2.4	−0.5	mV/°C	380	410	430	Ω
C4V3	3.3	3.6	3.9	V	−2.7	−2.25	−0.5	mV/°C	340	410	430	Ω
C4V7	3.7	4.1	4.3	V	−2.5	−2.0	−0.3	mV/°C	360	390	420	Ω
C5V1	4.3	4.65	5.0	V	−2.1	−1.9	−0.3	mV/°C	300	340	370	Ω
C5V6	4.8	5.3	5.7	V	−1.8	−1.4	0	mV/°C	160	310	350	Ω
C6V2	5.7	5.9	6.5	V	0	+1.6	+3.0	mV/°C	10	100	250	Ω
C6V8	6.3	6.7	6.9	V	+2	+3.2	+3.7	mV/°C	5.0	15	70	Ω
C7V5	7.0	7.45	7.8	V	+3	+4.2	+5.9	mV/°C	4.0	8.6	20	Ω
C8V2	7.8	8.1	8.5	V	+4.3	+5.0	+6.0	mV/°C	4.0	10	20	Ω
C9V1	8.55	9.0	9.5	V	+4.5	+6.0	+7.0	mV/°C	7.0	12	24	Ω
C10	9.3	9.9	10.5	V	+6.0	+6.6	+7.0	mV/°C	5.0	20	50	Ω
C11	10.3	10.9	11.5	V	+7.1	+8.3	+9.0	mV/°C	5.0	25	70	Ω
C12	11.3	11.9	12.5	V	+7.6	+8.7	+9.2	mV/°C	10	25	80	Ω
C13	12.3	12.9	13.0	V	+9.1	+10.1	+11.1	mV/°C	10	25	90	Ω
C15	13.8	14.9	15.5	V	+11	+12.5	+13	mV/°C	19	35	95	Ω
C16	15.3	15.8	16.9	V	+12	+13	+14	mV/°C	20	45	100	Ω
C18	16.7	17.8	18.9	V	+14	+15	+16.5	mV/°C	20	50	120	Ω
C20	18.7	19.8	21.0	V	+16	+17	+18.5	mV/°C	20	60	140	Ω
C22	20.6	21.8	23.1	V	+17	+19	+21	mV/°C	25	70	150	Ω
C24	22.5	23.8	25.7	V	+19	+21	+23	mV/°C	30	85	200	Ω
C27	24.7	26.6	28.5	V	+21	+22.5	+25	mV/°C	35	90	300	Ω
C30	27.5	29.5	31.5	V	+22	+24	+29	mV/°C	50	180	350	Ω

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

→ BZY88-...	Working voltage V_Z at I_Z = 5 mA			Temperature coefficient S_Z at I_Z = 5 mA			Differential resistance r_{diff} at I_Z = 5 mA		
	min.	nom.	max.	min.	typ.	max.	min.	typ.	max.
C3V3	3.1	3.3	3.5 V	−4.0	−2.3	−0.5 mV/°C	70	83.5	110 Ω
C3V6	3.4	3.6	3.8 V	−3.5	−2.0	−0.5 mV/°C	65	76	105 Ω
C3V9	3.7	3.9	4.1 V	−2.5	−2.05	−0.5 mV/°C	60	76	100 Ω
C4V3	4.0	4.3	4.5 V	−2.5	−1.8	−0.5 mV/°C	55	70	90 Ω
C4V7	4.4	4.7	5.0 V	−2.0	−1.55	0 mV/°C	49	62	85 Ω
C5V1	4.8	5.1	5.4 V	−1.75	−1.2	0 mV/°C	34	46	75 Ω
C5V6	5.3	5.6	6.0 V	−1.5	−0.2	+1.0 mV/°C	10	22	55 Ω
C6V2	5.8	6.2	6.6 V	+0.5	+2.0	+3.5 mV/°C	1.0	7.0	27 Ω
C6V8	6.4	6.8	7.2 V	+2.3	+3.2	+3.8 mV/°C	0.5	3.0	15 Ω
C7V5	7.1	7.5	7.9 V	+3.1	+4.2	+5.9 mV/°C	0.5	3.0	15 Ω
C8V2	7.8	8.2	8.7 V	+4.2	+5.0	+6.0 mV/°C	0.9	3.5	20 Ω
C9V1	8.6	9.1	9.6 V	+4.8	+6.0	+7.0 mV/°C	1.0	4.75	25 Ω
C10	9.4	10	10.6 V	+6.0	+7.0	+7.5 mV/°C	2.0	5.0	25 Ω
C11	10.4	11	11.6 V	+7.0	+8.7	+9.1 mV/°C	3.0	7.0	25 Ω
C12	11.4	12	12.6 V	+8.5	+9.0	+9.6 mV/°C	4.0	8.0	35 Ω
C13	12.4	13	14.1 V	+10	+10.5	+11.5 mV/°C	4.0	10	35 Ω
C15	13.9	15	15.6 V	+12	+12.5	+14 mV/°C	4.0	15	35 Ω
C16	15.4	16	17.1 V	+12	+13	+14 mV/°C	5.0	20	40 Ω
C18	16.9	18	19.1 V	+14	+15	+18 mV/°C	7.0	25	45 Ω
C20	18.9	20	21.2 V	+16	+17	+19 mV/°C	10	30	50 Ω
C22	20.8	22	23.3 V	+17	+19	+21 mV/°C	15	35	60 Ω
C24	22.7	24	25.9 V	+20	+21	+24 mV/°C	20	40	75 Ω
C27	25.1	27	28.9 V	+22	+23.5	+27 mV/°C	25	50	85 Ω
C30	28	30	32 V	+25	+26	+29 mV/°C	30	60	95 Ω

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

BZY88-...	Working voltage V_Z at I_Z = 20 mA				Temperature coefficient S_Z at I_Z = 20 mA				Differential resistance r_{diff} at I_Z = 20 mA			
	min.	nom.	max.		min.	typ.	max.		min.	typ.	max.	
C3V3	3.5	4	4.2	V	−3.3	−2.4	−0.5	mV/°C	16.0	19.5	22	Ω
C3V6	3.9	4.2	4.4	V	−2.5	−1.55	−0.5	mV/°C	16	18	20	Ω
C3V9	4.2	4.45	4.65	V	−2.4	−1.55	−0.5	mV/°C	14	16	18	Ω
C4V3	4.45	4.7	4.95	V	−2.0	−1.5	−0.5	mV/°C	13	15	17	Ω
C4V7	4.9	5.1	5.3	V	−1.5	−0.85	0	mV/°C	12	15	17	Ω
C5V1	5.1	5.35	5.7	V	−1.5	−0.8	0	mV/°C	4.0	7.0	11	Ω
C5V6	5.45	5.75	6.1	V	−1.0	+1.0	+3.0	mV/°C	1.5	4.0	8.0	Ω
C6V2	5.95	6.4	6.7	V	+1.0	+2.2	+4.0	mV/°C	0.8	1.4	3.1	Ω
C6V8	6.6	6.9	7.25	V	+2.8	+3.2	+3.8	mV/°C	0.7	1.3	3.0	Ω
C7V5	7.2	7.65	7.95	V	+2.5	+4.2	+5.9	mV/°C	0.5	1.6	5.0	Ω
C8V2	7.9	8.4	8.75	V	+4.0	+5.0	+6.0	mV/°C	0.9	1.8	6.0	Ω
C9V1	8.7	9.4	9.7	V	+5.0	+6.0	+7.0	mV/°C	1.0	1.85	7.0	Ω
C10	9.5	10.1	10.8	V	+7.0	+7.3	+7.5	mV/°C	1.0	2.0	8.0	Ω
C11	10.5	11.1	11.8	V	+8.5	+9.1	+9.5	mV/°C	1.0	3.0	10	Ω
C12	11.6	12.2	12.8	V	+8.9	+9.6	+10.3	mV/°C	2.0	3.5	25	Ω
C13	12.6	13.2	14.3	V	+11	+11.5	+12.5	mV/°C	2.0	4.5	25	Ω
C15	14.1	15.3	15.9	V	+12	+13.5	+14.5	mV/°C	2.0	6.0	25	Ω
C16	15.6	16.3	17.4	V	+13	+14	+15	mV/°C	5.0	10	30	Ω
C18	17.2	18.4	19.6	V	+15	+16	+18	mV/°C	5.0	12	30	Ω
C20	19.3	20.5	21.9	V	+17.5	+18.5	+20.5	mV/°C	5.0	15	35	Ω
C22	21.3	22.6	24.1	V	+19	+20.5	+22.5	mV/°C	10	18	35	Ω
C24	23.3	24.7	26.7	V	+20	+23	+25	mV/°C	10	20	40	Ω
C27	25.8	28.1	30.1	V	+23	+25.5	+28	mV/°C	10	25	45	Ω
C30	29.0	31.3	33.4	V	+25	+28	+32	mV/°C	10	35	50	Ω

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

BZY88-...	Diode capacitance C_d at V_R = 3 V (typ.)	Reverse current I_R at V_R =	typ.	max.
C3V3	395 pF	1 V	0.54	3.0 μA
C3V6	370 pF	1 V	0.25	3.0 μA
C3V9	335 pF	1 V	0.11	3.0 μA
C4V3	270 pF	1 V	0.1	3.0 μA
C4V7	290 pF	2 V	0.25	3.0 μA
C5V1	275 pF	2 V	0.15	1.0 μA
C5V6	260 pF	2 V	0.6	1.0 μA
C6V2	240 pF	2 V	0.1	1.0 μA
C6V8	220 pF	3 V	0.025	1.0 μA
C7V5	190 pF	3 V	15	500 nA
C8V2	150 pF	3 V	11	400 nA
C9V1	140 pF	5 V	8	400 nA
C10	110 pF	7 V	-	2.5 μA
C11	90 pF	7 V	-	2.5 μA
C12	80 pF	8 V	-	2.5 μA
C13	65 pF	9 V	-	2.5 μA
C15	60 pF	10 V	-	2.5 μA
C16	55 pF	10 V	-	2.5 μA
C18	50 pF	13 V	-	2.5 μA
C20	45 pF	14 V	-	2.5 μA
C22	43 pF	15 V	-	2.5 μA
C24	42 pF	17 V	-	2.5 μA
C27	40 pF	19 V	-	2.5 μA
C30	35 pF	21 V	-	2.5 μA

OPERATING NOTES

1. Dissipation and heatsink considerations

a. Steady-state conditions

The maximum allowable steady-state dissipation $P_{s\,max}$ is given by the relationship

$$P_{s\,max} = \frac{T_{j\,max} - T_{amb}}{R_{th\,j\text{-}a}}$$

where $T_{j\,max}$ is the maximum permissible operating junction temperature,
T_{amb} is the ambient temperature,
$R_{th\,j\text{-}a}$ is the total thermal resistance from junction to ambient

b. Pulse conditions (see fig. below)

The maximum allowable additional pulse power $P_{m\,max}$ is given by the formula

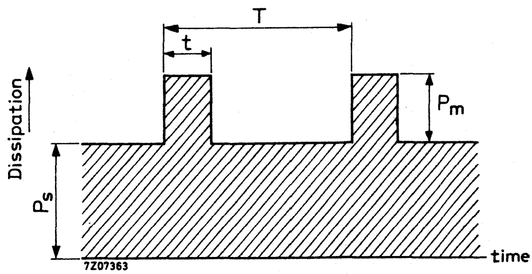
$$P_{m\,max} = \frac{(T_{j\,max} - T_{amb}) - (P_s \cdot R_{th\,j\text{-}a})}{Z_{th}}$$

where P_s is the steady-state dissipation, excluding that in the pulses,

Z_{th} is the effective transient thermal resistance of the device from junction to ambient. It is a function of the pulse duration t and duty cycle δ (see page 11, lower figure).

δ is the duty cycle and is equal to the pulse duration t divided by the period duration T.

The steady-state power P_s when biased in the zener direction at a given zener current can be found from page 15, upper figure. With the additional pulsed power dissipation $P_{m\,max}$ calculated from the above expression, the total repetitive peak zener power dissipation $P_{ZRM} = P_s + P_{m\,max}$. From page 15, upper figure the corresponding maximum repetitive peak zener current at P_{ZRM} can now be read. This repetitive peak zener current is subject to the absolute maximum rating. For pulse durations longer than the temperature stabilization time of the diode t_{stab}, the maximum allowable repetitive peak dissipation P_{ZRM} is equal to the maximum steady-state power $P_{s\,max}$. The temperature stabilization time for the BZY88 series is 100 s (see page 11, lower figure).



OPERATING NOTES (continued)

Example

The following example illustrates how to calculate the maximum permissible repetitive peak zener current of a BZY88-C7V5 zener diode mounted in free air at a maximum ambient temperature of 60 °C. The steady-state zener current is 10 mA, the duty cycle δ = 0.1 and the pulse duration t = 1 ms.

The steady-state dissipation P_S at a zener current of 10 mA (from page 15, upper figure) = 76 mW.
The thermal resistance from junction to ambient $R_{th\ j\text{-}a}$ = 0.31 °C/mW.
The thermal impedance Z_{th} with a duty cycle δ = 0.1 and a pulse duration t = 1 ms (from page 11, lower figure).

$$Z_{th} = 41.5\ ^{o}\mathrm{C/W}$$

The maximum additional pulse power dissipation

$$P_{m\,max} = \frac{(T_{j\,max} - T_{amb}) - P_S \cdot R_{th\ j\text{-}a}}{Z_{th}}$$

If P_S = 76 mW, Z_{th} = 41.5 °C/W,

$$P_{m\,max} = \frac{(175-60)-(0.076 \times 310)}{41.5} = 2.2\,\mathrm{W}$$

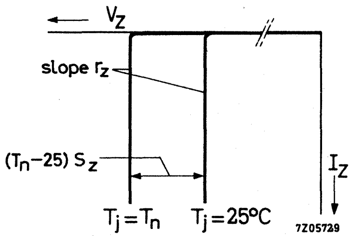
therefore, the total repetitive peak power dissiaption,

$$P_{ZRM} = 0.076 + 2.2 = 2.28\,\mathrm{W}$$

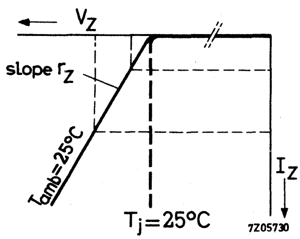
From page 15, upper figure, the corresponding repetitive peak zener current is 250 mA. This is within the rating of the BZY88-C7V5 and is therefore permissible.

2. Zener characteristics

The basic characteristic of a zener diode is the dynamic zener characteristic, that is, the variation of zener voltage when a current pulse is applied in the reverse direction. The slope of this characteristic is r_Z. Typical dynamic characteristics at T_j = 25 and 150 °C are given on pages 12 and 13 for each type of diode. Because of the temperature sensitivity of the zener characteristics, the dynamic characteristics at any other operating temperature will be displaced from those at T_j = 25 °C by a voltage corresponding to S_Z x $(T_n - 25)$ °C, where S_Z is the temperature coefficient of the diode and T_n is a nominal operating temperature. This is illustrated below.



Dynamic characteristics



Static characteristic

OPERATING NOTES (continued)

The static characteristic of the diode is obtained by connecting the steady-state zener voltages at various direct zener currents and may, therefore, be used to determine the operating point at any zener current. This is shown above. The slope of the static characteristic will depend on

(1) the differential resistance, r_z

(2) the rise in junction temperature due to internal dissipation and the thermal resistance from junction to ambient, $V_Z . I_Z . R_{th\ j\text{-}a}$

(3) the temperature coefficient of the diode, S_Z

From the above, the static slope resistance r_Z is found to be

$$r_Z = r_z + V_Z . R_{th\ j\text{-}a} . S_Z$$

where r_z is the differential resistance, V_Z is the steady-state zener voltage and is equal to

$$\frac{V_Z'}{1 - I_Z . R_{th\ j\text{-}a} . S_Z}$$

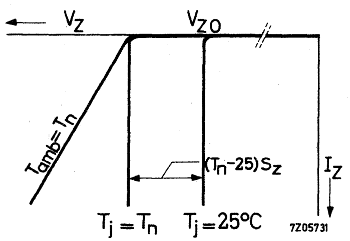
V_Z' being the zener voltage at $T_j = T_n$ at the working current I_Z.

The position of this static characteristic in relation to the dynamic characteristic at $T_j = 25\ ^oC$ is dependent on the ambient temperature and the temperature coefficient, the low-current voltage being displaced by

$$S_Z \times (T_n - 25)\ ^oC$$

from the low current voltage, V_{ZO} on the dynamic characteristic at $T_j = 25\ ^oC$ (See figure below)

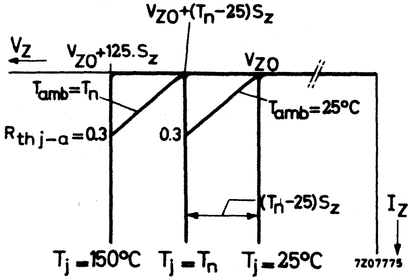
Example for positive S_Z



OPERATING NOTES (continued)

Next figure shows typical dynamic characteristics at T_j = 25, 150 and a nominal temperature, T_n °C. It also shows static characteristics at ambient temperatures of 25 and T_n °C.

Example for positive S_Z



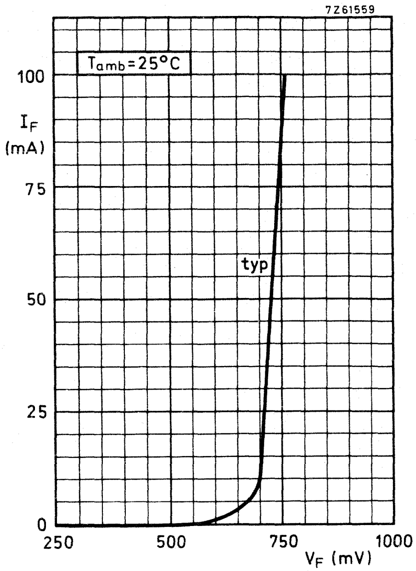
Typical static characteristics for each type of diode are given on page 14. These curves were obtained with the device mounted in free air at an ambient temperature of 25 °C.

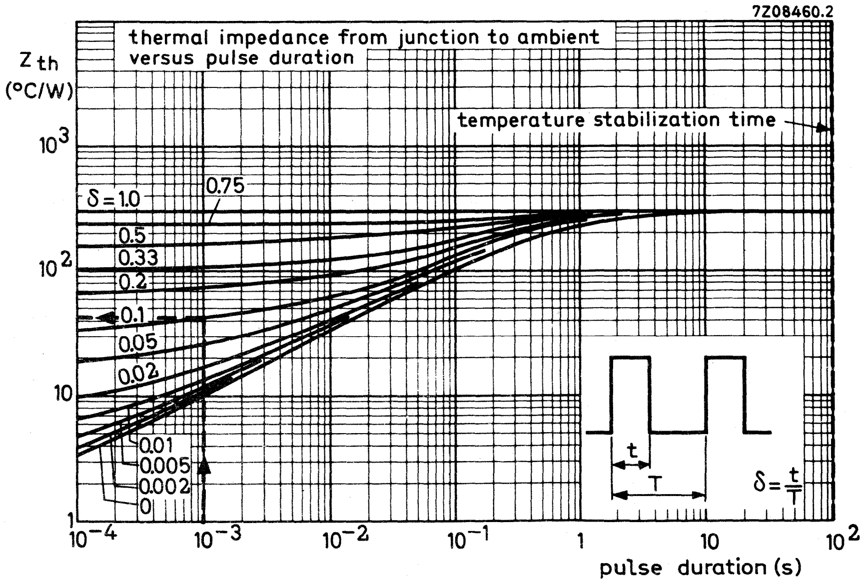
The slope resistance for pulse operation can be calculated by incorporating the thermal impedance Z_{th} into the formula for r_Z. Curves of Z_{th} plotted against pulse duration and duty cycle are given in the lower figure on page 11.

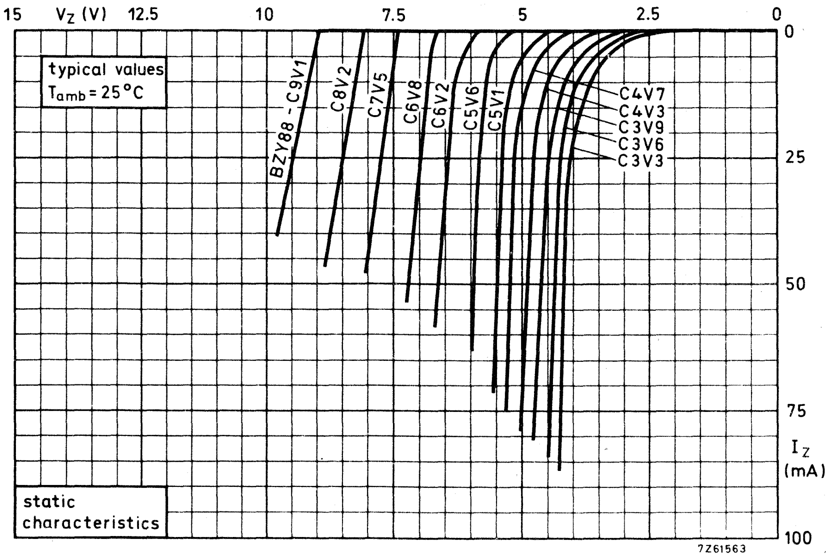
3. When using a soldering iron, the diode may be soldered directly into a circuit, but heat conducted to the junction should be kept to a minimum by use of a thermal shunt.

4. Diodes may be dip soldered at a solder temperature of 245 °C for a maximum soldering time of 5 seconds. The case temperature during dip soldering must not at any time exceed the maximum storage temperature. These recommendations apply to a diode with the anode end mounted flush on the board with punched-through holes. For mounting the cathode end onto the board the diode must be spaced 5 mm from the underside of the printed circuit board in the case of punched-through holes or 5 mm from the top of the board for plated-through holes.

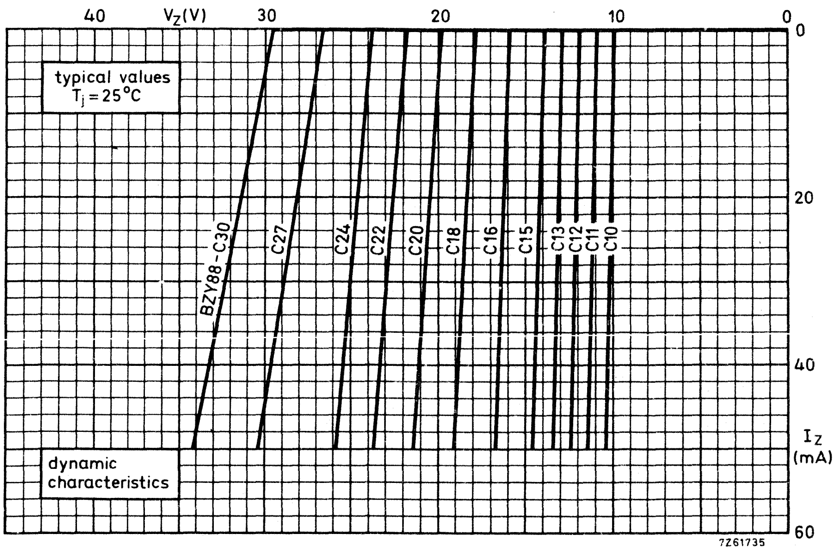
5. Care should be taken not to bend the leads nearer than 1.5 mm from the seals.


7Z61559
T_{amb} = 25°C
I_F
(mA)
100
75
50
25
0
typ
250
500
750
1000
V_F (mV)

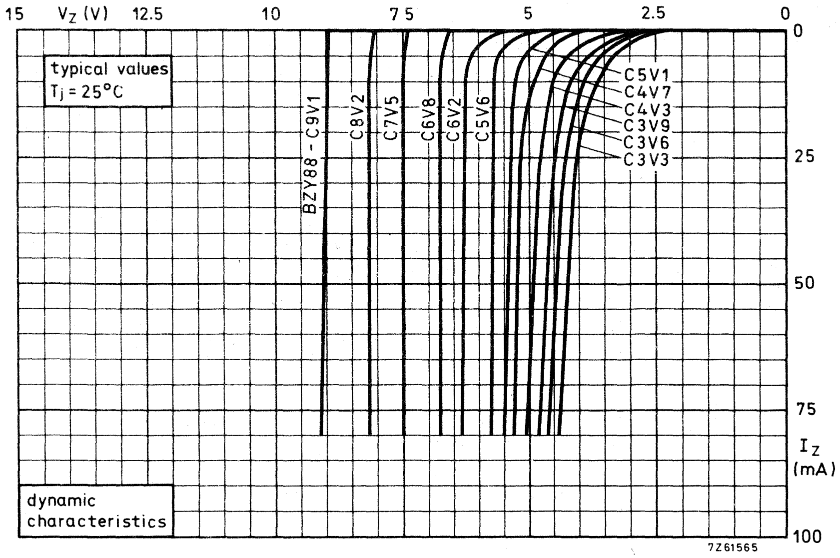

7Z08460.2
thermal impedance from junction to ambient versus pulse duration
Z_{th}
(°C/W)
10^3
10^2
10
1
temperature stabilization time
δ = 1.0
0.75
0.5
0.33
0.2
0.1
0.05
0.02
0.01
0.005
0.002
0
t
T
$\delta = \frac{t}{T}$
10^{-4}
10^{-3}
10^{-2}
10^{-1}
1
10
10^2
pulse duration (s)

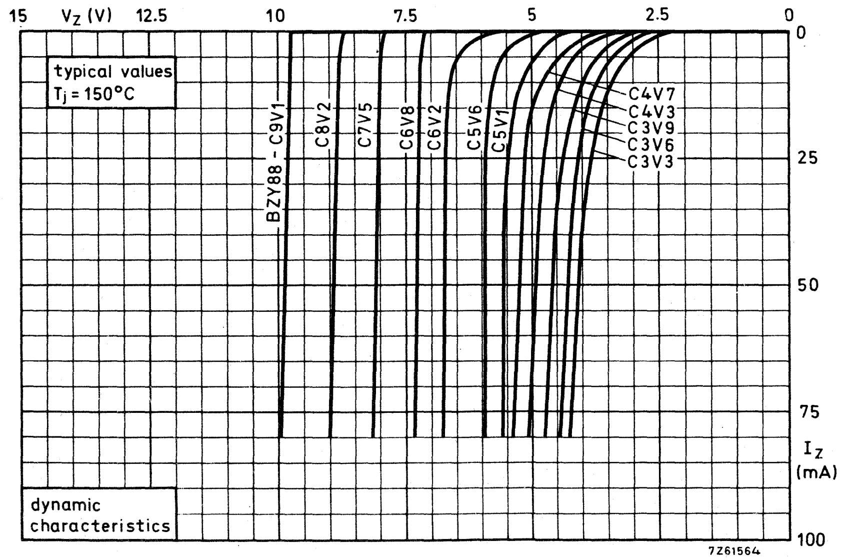


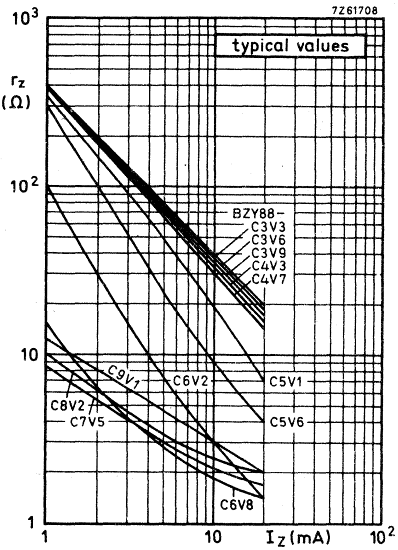
15
V_Z (V)
12.5
10
7.5
5
2.5
0
typical values
T_{amb} = 25 °C
BZY88 - C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C5V1
C4V7
C4V3
C3V9
C3V6
C3V3
25
50
75
I_Z
(mA)
100
static
characteristics
7Z61563

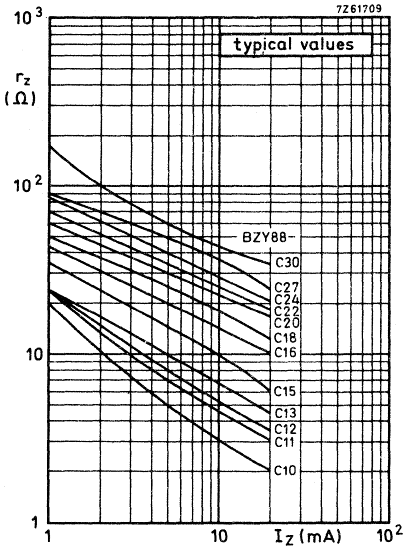


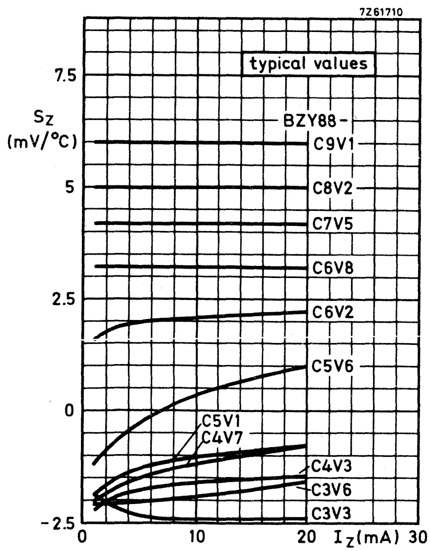
40
V_Z(V)
30
20
10
0
typical values
T_j = 25 °C
BZY88-C30
C27
C24
C22
C20
C18
C16
C15
C13
C12
C11
C10
20
40
I_Z
(mA)
60
dynamic
characteristics
7Z61735

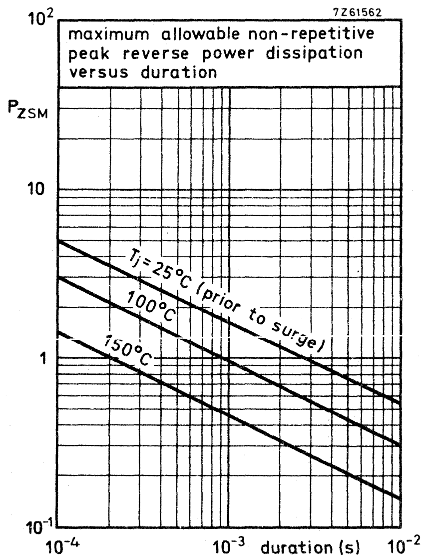

15
V_Z (V)
12.5
10
7 5
5
2.5
0
typical values
$T_j = 25°C$
BZY88 - C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C5V1
C4V7
C4V3
C3V9
C3V6
C3V3
0
25
50
75
I_Z (mA)
100
dynamic characteristics
7Z61565

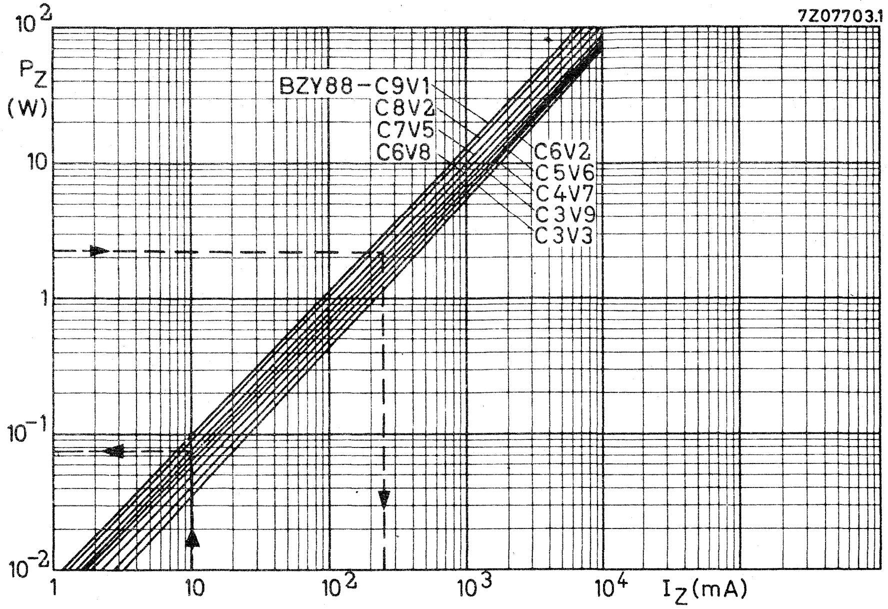

15
V_Z (V)
12.5
10
7.5
5
2.5
0
typical values
$T_j = 150°C$
BZY88 - C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C5V1
C4V7
C4V3
C3V9
C3V6
C3V3
0
25
50
75
I_Z (mA)
100
dynamic characteristics
7Z61564

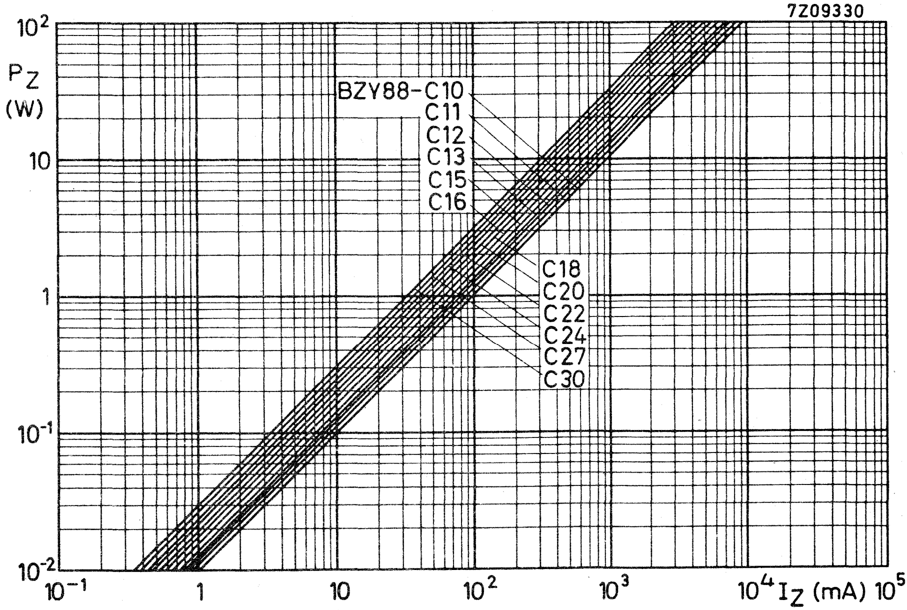

7Z61708
typical values
r_z (Ω)
BZY88-
C3V3
C3V6
C3V9
C4V3
C4V7
C9V1
C6V2
C5V1
C8V2
C7V5
C5V6
C6V8
I_Z (mA)


7Z61709
typical values
r_z (Ω)
BZY88-
C30
C27
C24
C22
C20
C18
C16
C15
C13
C12
C11
C10
I_Z (mA)


7Z61710
typical values
S_Z (mV/°C)
BZY88-
C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C5V1
C4V7
C4V3
C3V6
C3V3
I_Z (mA)


7Z61562
maximum allowable non-repetitive peak reverse power dissipation versus duration
P_{ZSM}
T_j = 25°C (prior to surge)
100°C
150°C
duration (s)


7Z07703.1
P_Z (W)
BZY88-C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C4V7
C3V9
C3V3
I_Z (mA)


7Z09330
P_Z (W)
BZY88-C10
C11
C12
C13
C15
C16
C18
C20
C22
C24
C27
C30
I_Z (mA)

VOLTAGE REGULATOR DIODES

Silicon planar diodes in a DO-35 envelope intended for use as low power voltage stabilizers or voltage references.
The series consists of 29 types with nominal voltages ranging from 5,1 to 75 V with tolerances to the international standardized E24 (±5%) range.

QUICK REFERENCE DATA

Working voltage range (E24; ±5%)	V_Z	nom.	5,1 to 75	V	
Total power dissipation	P_{tot}	max.	400	mW	1)
		max.	500	mW	2)
Non-repetitive peak reverse power dissipation $t = 100\ \mu s$; $T_j = 150\ ^oC$	P_{ZSM}	max.	30	W	
Junction temperature	T_j	max.	200	^oC	
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0,38	^oC/mW	3)

1) In still air at maximum lead length up to $T_{amb} = 50\ ^oC$.

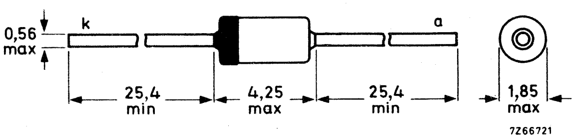
2) If leads are kept at $T_{amb} = 25\ ^oC$ at 8 mm from body.

3) Measured in still air at maximum lead length.

MECHANICAL DATA

Dimensions in mm

DO-35



Cathode indicated by coloured band

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

Currents

Type	Steady-state working current at T_{amb} = 25 °C				Non-repetitive peak working current			
1N5729B	I_Z	max.	65	mA	I_{ZSM}	max.	2,90	A
1N5730B	I_Z	max.	60	mA	I_{ZSM}	max.	2,60	A
1N5731B	I_Z	max.	55	mA	I_{ZSM}	max.	2,40	A
1N5732B	I_Z	max.	50	mA	I_{ZSM}	max.	2,30	A
1N5733B	I_Z	max.	45	mA	I_{ZSM}	max.	2,10	A
1N5734B	I_Z	max.	40	mA	I_{ZSM}	max.	1,95	A
1N5735B	I_Z	max.	40	mA	I_{ZSM}	max.	1,80	A
1N5736B	I_Z	max.	35	mA	I_{ZSM}	max.	1,65	A
1N5737B	I_Z	max.	30	mA	I_{ZSM}	max.	1,50	A
1N5738B	I_Z	max.	30	mA	I_{ZSM}	max.	1,40	A
1N5739B	I_Z	max.	25	mA	I_{ZSM}	max.	1,28	A
1N5740B	I_Z	max.	25	mA	I_{ZSM}	max.	1,20	A
1N5741B	I_Z	max.	20	mA	I_{ZSM}	max.	1,13	A
1N5742B	I_Z	max.	20	mA	I_{ZSM}	max.	1,05	A
1N5743B	I_Z	max.	15	mA	I_{ZSM}	max.	0,98	A
1N5744B	I_Z	max.	15	mA	I_{ZSM}	max.	0,90	A
1N5745B	I_Z	max.	15	mA	I_{ZSM}	max.	0,83	A
1N5746B	I_Z	max.	10	mA	I_{ZSM}	max.	0,75	A
1N5747B	I_Z	max.	10	mA	I_{ZSM}	max.	0,68	A
1N5748B	I_Z	max.	10	mA	I_{ZSM}	max.	0,64	A
1N5749B	I_Z	max.	10	mA	I_{ZSM}	max.	0,60	A
1N5750B	I_Z	max.	9	mA	I_{ZSM}	max.	0,57	A
1N5751B	I_Z	max.	9	mA	I_{ZSM}	max.	0,53	A
1N5752B	I_Z	max.	8	mA	I_{ZSM}	max.	0,49	A
1N5753B	I_Z	max.	7	mA	I_{ZSM}	max.	0,45	A
1N5754B	I_Z	max.	6	mA	I_{ZSM}	max.	0,42	A
1N5755B	I_Z	max.	6	mA	I_{ZSM}	max.	0,38	A
1N5756B	I_Z	max.	5	mA	I_{ZSM}	max.	0,34	A
1N5757B	I_Z	max.	5	mA	I_{ZSM}	max.	0,30	A

Power dissipation

→ Total power dissipation	P_{tot}	max.	400	mW	1)
		max.	500	mW	2)
Non-repetitive peak reverse power dissipation $t = 100\ \mu s$; $T_j = 150\ ^oC$; square wave	P_{ZSM}	max.	30	W	

Temperatures

Storage temperature	T_{stg}	−65 to +200		°C
Junction temperature	T_j	max.	200	°C

→ 1) In still air at maximum lead length up to T_{amb} = 50 °C
2) If leads are kept at T_{amb} = 25 °C at 8 mm from body.

THERMAL RESISTANCE

From junction to ambient in still air at maximum lead length $R_{th\ j-a}$ = 0,38 °C/mW 1)

CHARACTERISTICS E24 (±5 %) logarithmic range T_j = 25 °C unless otherwise specified

	Working voltage V_Z (V)			Temperature coefficient S_Z (mV/°C)	Differential impedance z_{diff} (Ω)
	at I_Z = 10 mA			**at I_Z = 10 mA**	**at I_Z = 10 mA f = 1 kHz**
	min.	nom.	max.	typ.	max.
1N5729B	4,8	5,1	5,4	−0,2	50
1N5730B	5,2	5,6	6,0	+1,2	25
1N5731B	5,8	6,2	6,6	+2,3	10
1N5732B	6,4	6,8	7,2	+3,0	10
1N5733B	7,0	7,5	7,9	+4,0	10
1N5734B	7,7	8,2	8,7	+5,0	15
1N5735B	8,5	9,1	9,6	+6,0	15
1N5736B	9,4	10,0	10,6	+7,0	20
	at I_Z = 5 mA			**at I_Z = 5 mA**	**at I_Z = 5 mA** ←
1N5737B	10,4	11,0	11,6	+8,0	20
1N5738B	11,4	12,0	12,7	+9,0	25
1N5739B	12,4	13,0	14,1	+10,5	30
1N5740B	13,8	15,0	15,6	+12,5	30
1N5741B	15,3	16,0	17,1	+13,0	40
1N5742B	16,8	18,0	19,1	+15,0	45
1N5743B	18,8	20,0	21,2	+17,0	55
1N5744B	20,8	22,0	23,3	+19,0	55
1N5745B	22,8	24,0	25,6	+21,0	70
	at I_Z = 2 mA			**at I_Z = 2 mA**	**at I_Z = 2 mA** ←
1N5746B	25,1	27,0	28,9	+23,5	80
1N5747B	28,0	30,0	32,0	+26	80
1N5748B	31,0	33,0	35,0	+29	90
1N5749B	34,0	36,0	38,0	+31	90
1N5750B	37,0	39,0	41,0	+34	130
1N5751B	40,0	43,0	46,0	+37	150
1N5752B	44,0	47,0	50,0	+40	170
1N5753B	48,0	51,0	54,0	+44	180
1N5754B	52,0	56,0	60,0	+47	200
1N5755B	58,0	62,0	66,0	+51	215
1N5756B	64,0	68,0	72,0	+56	240
1N5757B	70,0	75,0	79,0	+60	255

1) Measured in still air at maximum lead length.

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltage

I_F = 10 mA; T_{amb} = 25 °C	V_F	<	0,9	V

Reverse current

1N5729B	V_R = 2 V	I_R	<	2000	nA
1N5730B	V_R = 2 V	I_R	<	1000	nA
1N5731B	V_R = 4 V	I_R	<	3000	nA
1N5732B	V_R = 4 V	I_R	<	2000	nA
1N5733B	V_R = 5 V	I_R	<	1000	nA
1N5734B	V_R = 5 V	I_R	<	700	nA
1N5735B	V_R = 6 V	I_R	<	500	nA
1N5736B	V_R = 7 V	I_R	<	200	nA
1N5737B	V_R = 8 V	I_R	<	100	nA
1N5738B to 1N5757B	V_R = 0,7 x V_{Znom}	I_R	<	50	nA

Voltage reference diodes

VOLTAGE REFERENCE DIODES

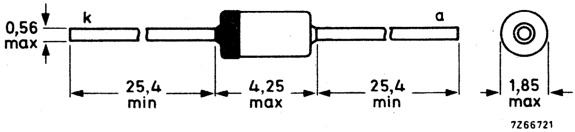
The BZV10 to 14 are temperature compensated voltage reference diodes in a DO-35 envelope. They are primarily intended for use as voltage reference sources in measuring instruments such as digital voltmeters.

QUICK REFERENCE DATA

			min.	nom.	max.	
Reference voltage at I_Z = 2,0 mA		V_{ref}	6,175	6,5	6,825	V
Reference voltage excursion at I_Z = 2,0 mA						
Ambient temperature test points: 0; +25 °C and +70 °C	BZV10	$\|\Delta V_{ref}\|$	<	46,0		mV
	BZV11	$\|\Delta V_{ref}\|$	<	23,0		mV
(see notes 1 and 2 on page 3 and the graph on page 4)	BZV12	$\|\Delta V_{ref}\|$	<	9,0		mV
	BZV13	$\|\Delta V_{ref}\|$	<	4,6		mV
	BZV14	$\|\Delta V_{ref}\|$	<	2,3		mV
Operating ambient temperature		T_{amb}	0 to +70			°C

MECHANICAL DATA Dimensions in mm

DO-35



Cathode indicated by coloured band

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

Currents

Working current (d.c.)	I_Z	max.	50	mA
Working current (peak value)	I_{ZM}	max.	50	mA

Power dissipation

Total power dissipation up to T_{amb} = 50 °C	P_{tot}	max.	400	mW

Temperatures

Storage temperature	T_{stg}	-65 to +200	°C
Operating ambient temperature	T_{amb}	0 to +70	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	0,375	°C/mW

CHARACTERISTICS T_{amb} = 25 °C unless otherwise specified

		min.	nom.	max.	
Reference voltage at I_Z = 2,0 mA	V_{ref}	6,175	6,5	6,825	V

Reference voltage excursion at I_Z = 2,0 mA

Ambient temperature test points: 0; +25 °C and +70 °C

(see notes 1 and 2 on the next page and the graph on page 4)

BZV10	$\|\Delta V_{ref}\|$	<	46,0	mV
BZV11	$\|\Delta V_{ref}\|$	<	23,0	mV
BZV12	$\|\Delta V_{ref}\|$	<	9,0	mV
BZV13	$\|\Delta V_{ref}\|$	<	4,6	mV
BZV14	$\|\Delta V_{ref}\|$	<	2,3	mV

Temperature coefficient at I_Z = 2,0 mA

(see notes 1 and 2 on the next page and the graph on page 4)

BZV10	S_Z	±0,01	%/°C
BZV11	S_Z	±0,005	%/°C
BZV12	S_Z	±0,002	%/°C
BZV13	S_Z	±0,001	%/°C
BZV14	S_Z	±0,0005	%/°C

Differential resistance at I_Z = 2,0 mA	r_{diff}	typ.	30	Ω
		<	50	Ω

Note 1 I_Z tolerance and stability of I_Z.

The quoted values of ΔV_{ref} are based on a constant current I_Z. Two factors can cause V_{ref} to change, namely the differential resistance r_{diff} and the temperature coefficient S_Z.

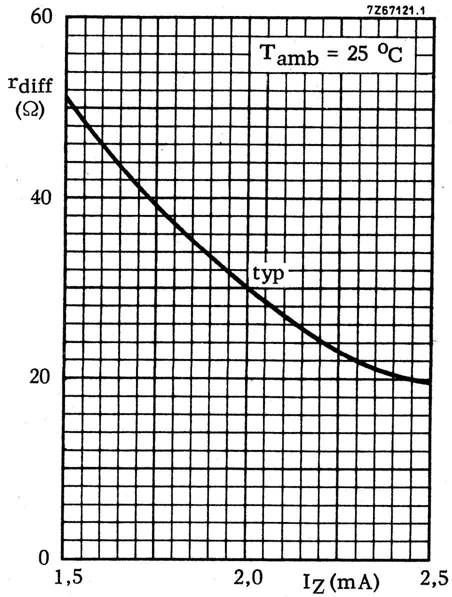
a As the max. r_{diff} of the device can be 50 Ω, a change of 0,01 mA in the current through the reference diode will result in a ΔV_{ref} of 0,01 mA x 50 Ω = 0,5 mV. This level of ΔV_{ref} is not significant on a BZV10 ($\Delta V_{ref} < 46$ mV), it is however very significant on a BZV14 ($\Delta V_{ref} < 2,3$ mV).

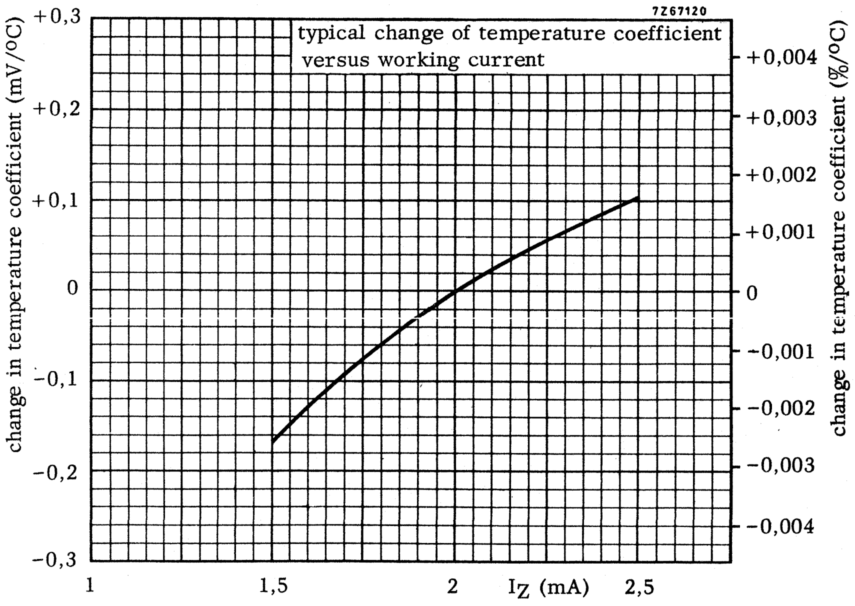
b The temperature coefficient of the reference voltage S_Z is a function of I_Z. Reference diodes are classified at the specified test current and the S_Z of the reference diode will be different at different levels of I_Z. The absolute value of I_Z is important, however, the stability of I_Z, once the level has been set, is far more significant. This applies particularly to the BZV13 and BZV14.
The effect of I_Z stability on S_Z is shown in the graph on page 4.

Note 2 Voltage excursion (ΔV_{ref} and temperature coefficient).

All reference diodes are characterized by the 'box method'. This guarantees a maximum voltage excursion (ΔV_{ref}) over the specified temperature range, at the specified test current (I_Z), verified by tests at indicated temperature points within the range. V_Z is measured and recorded at each temperature specified. The ΔV_{ref} between the highest and lowest values must not exceed the maximum ΔV_{ref} given. The temperature coefficient, therefore is given only as a reference; but may be derived from:

$$S_Z = \frac{(V_{ref\,1} - V_{ref\,2}) \times 100}{(T_{amb\,2} - T_{amb\,1}) \times V_{ref\,nom}} \ \%/^oC$$


7Z67121.1
60
40
20
0
r_{diff} (Ω)
T_{amb} = 25 °C
typ
1,5
2,0
I_Z (mA)
2,5


7Z67120
typical change of temperature coefficient versus working current
+0,3
+0,2
+0,1
0
−0,1
−0,2
−0,3
change in temperature coefficient (mV/°C)
+0,004
+0,003
+0,002
+0,001
0
−0,001
−0,002
−0,003
−0,004
change in temperature coefficient (%/°C)
1
1,5
2
I_Z (mA)
2,5

VOLTAGE REFERENCE DIODES

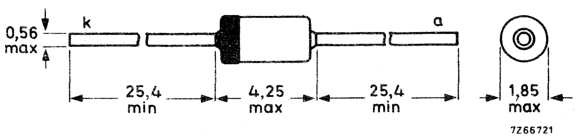
Voltage reference diodes in a DO-35 envelope. They have a very low temperature coefficient and are primarily intended for use as reference sources.

QUICK REFERENCE DATA

				min.	nom.	max.	
Reference voltage at I_Z = 7,5 mA		V_{ref}		6,2	6,5	6,8	V
Temperature coefficient at I_Z = 7,5 mA [1]							
	BZX90:	$\|S_Z\|$	<		0,01		%/°C
	BZX91:	$\|S_Z\|$	<		0,005		%/°C
	BZX92:	$\|S_Z\|$	<		0,002		%/°C
	BZX93:	$\|S_Z\|$	<		0,001		%/°C
Operating ambient temperature		T_{amb}		−55 to +100			°C

MECHANICAL DATA Dimensions in mm

DO-35



Cathode indicated by coloured band

[1] For accuracy of I_Z see graphs on page 5.

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

Currents

Working current (d.c.)	I_Z	max.	50	mA
Working current (peak value)	I_{ZM}	max.	50	mA

Power dissipation

Total power dissipation up to T_{amb} = 50 °C	P_{tot}	max.	400	mW

Temperatures

Storage temperature	T_{stg}	−65 to +200	°C
Operating ambient temperature	T_{amb}	−55 to +100	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,375	°C/mW

CHARACTERISTICS T_{amb} = 25 °C unless otherwise specified

		min.	nom.	max.	
Reference voltage at I_Z = 7,5 mA	V_{ref}	6,2	6,5	6,8	V

Reference voltage excursion at I_Z = 7,5 mA [1]

T_{amb} = −55 to +25 °C	BZX90:	$\|\Delta V_{ref}\|$	<	52	mV
	BZX91:	$\|\Delta V_{ref}\|$	<	26	mV
	BZX92:	$\|\Delta V_{ref}\|$	<	10,4	mV
	BZX93:	$\|\Delta V_{ref}\|$	<	5,2	mV
T_{amb} = +25 to +100 °C	BZX90:	$\|\Delta V_{ref}\|$	<	48	mV
	BZX91:	$\|\Delta V_{ref}\|$	<	24	mV
	BZX92:	$\|\Delta V_{ref}\|$	<	9,6	mV
	BZX93:	$\|\Delta V_{ref}\|$	<	4,8	mV

Temperature coefficient at I_Z = 7,5 mA [1]

T_{amb} = −55 to +100 °C	BZX90:	$\|S_Z\|$	<	0,01	%/°C
	BZX91:	$\|S_Z\|$	<	0,005	%/°C
	BZX92:	$\|S_Z\|$	<	0,002	%/°C
	BZX93:	$\|S_Z\|$	<	0,001	%/°C

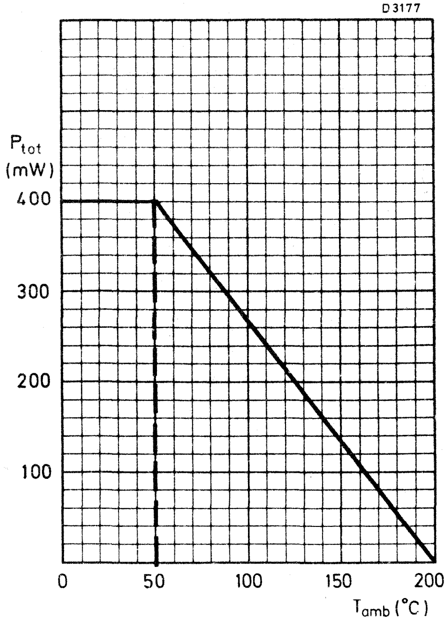
Differential resistance at I_Z = 7,5 mA	r_{diff}	<	15	Ω

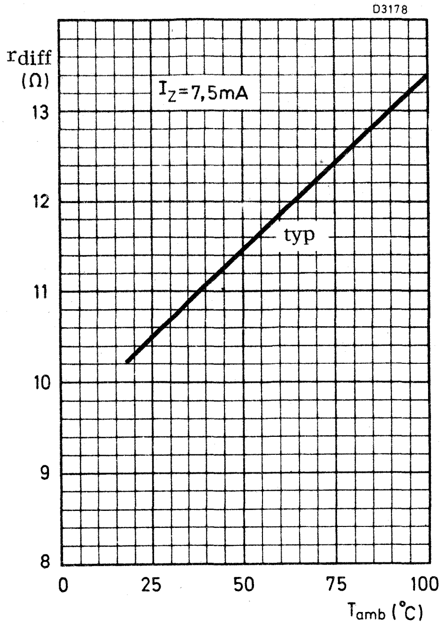
[1]) For accuracy of I_Z see graphs on page 5.

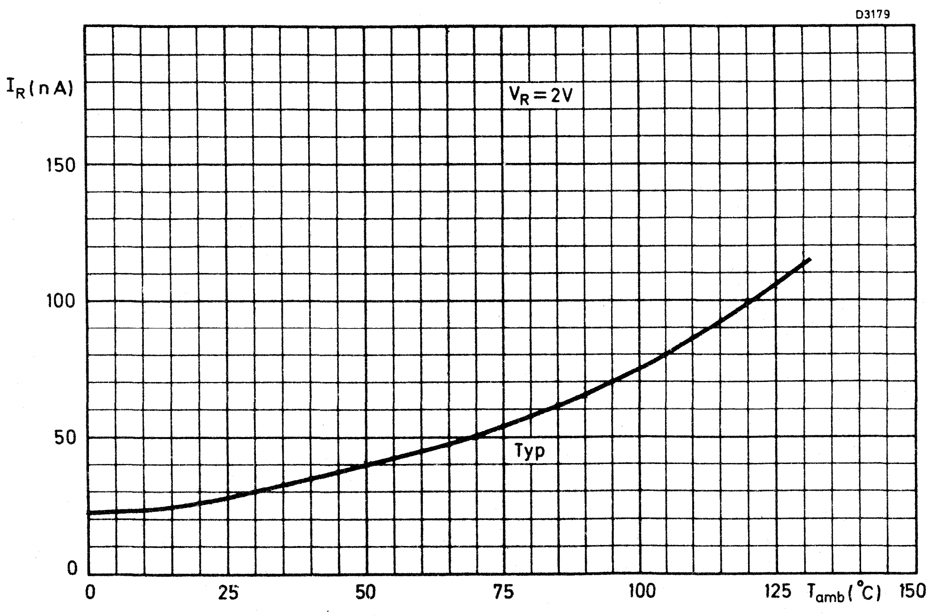
NOTE

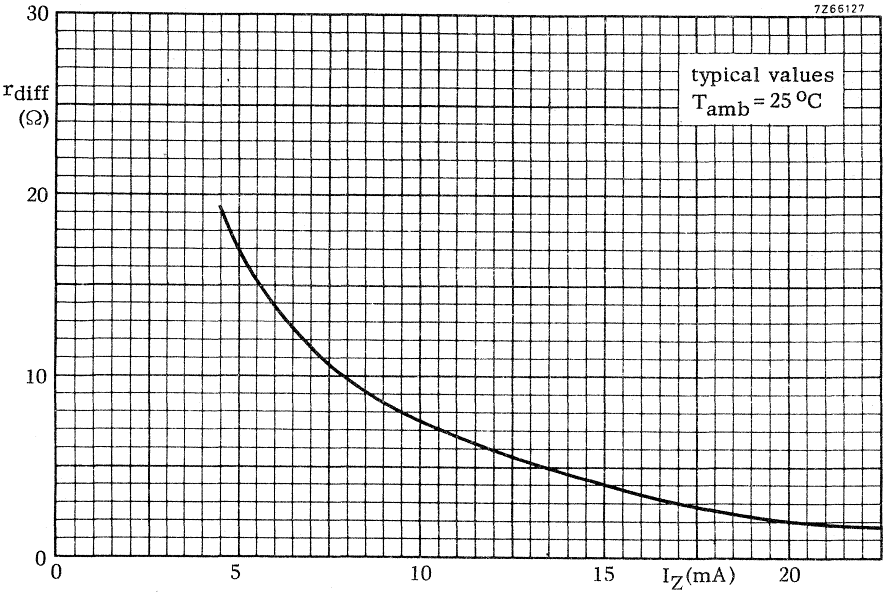
The temperature coefficient (S_Z) of the reference voltage (V_{ref}) is obtained from the following equation:

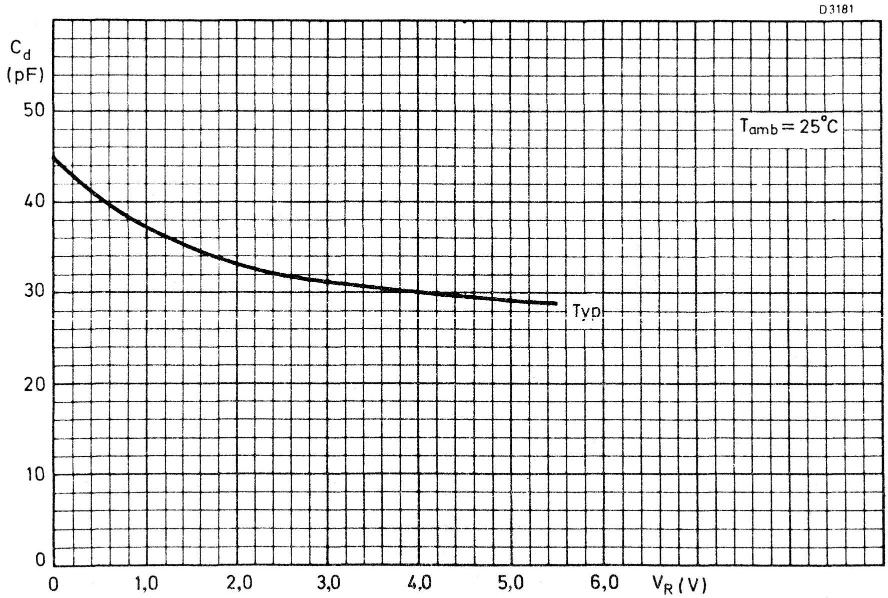
$$S_Z = \frac{V_{ref1} - V_{ref2}}{(T_{amb2} - T_{amb1}) \times V_{ref\,nom}} \times 100\ \%/^{o}C$$

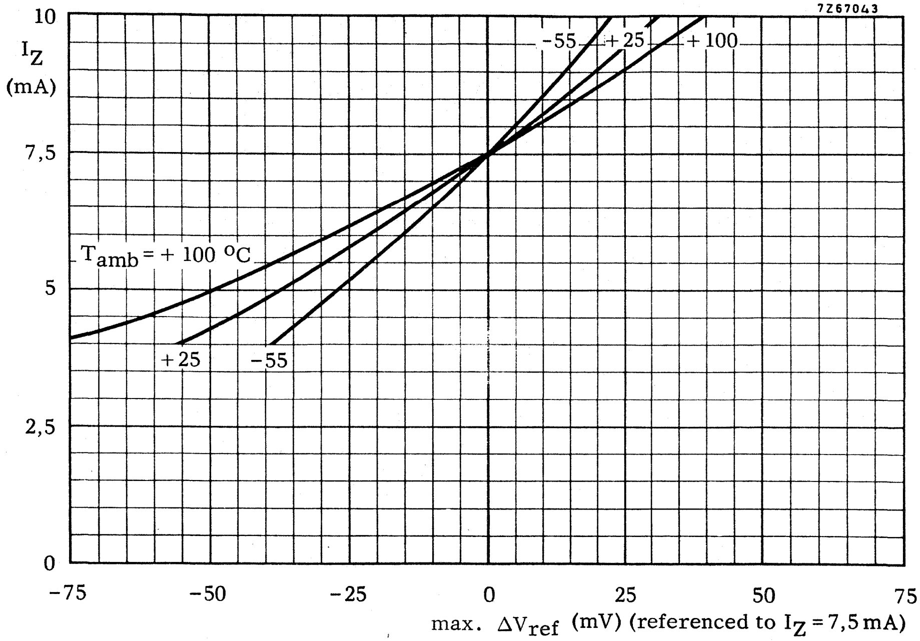

D3177
P_{tot} (mW)
400
300
200
100
0
50
100
150
200
T_{amb} (°C)

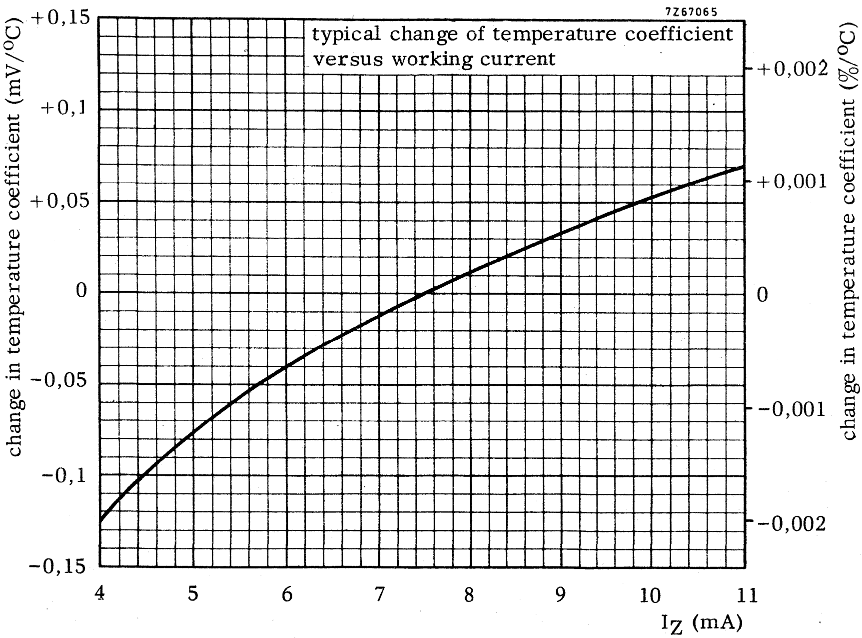

D3178
r_{diff} (Ω)
I_Z=7,5mA
13
12
11
10
9
8
typ
0
25
50
75
100
T_{amb} (°C)


D3179
I_R (nA)
V_R = 2V
150
100
50
0
Typ
0
25
50
75
100
125
T_{amb} (°C)
150


7Z66127
typical values
$T_{amb} = 25\,^oC$
r_{diff} (Ω)
30
20
10
0
0
5
10
15
I_Z(mA)
20


D3181
C_d (pF)
$T_{amb} = 25\,^\circ C$
Typ
50
40
30
20
10
0
0
1,0
2,0
3,0
4,0
5,0
6,0
V_R (V)


7Z67043
10
I_Z
(mA)
7,5
5
2,5
0
−55
+25
+100
T_{amb} = + 100 °C
+25
−55
−75
−50
−25
0
25
50
75
max. ΔV_{ref} (mV) (referenced to I_Z = 7,5 mA)


7Z67065
typical change of temperature coefficient versus working current
change in temperature coefficient (mV/°C)
+0,15
+0,1
+0,05
0
−0,05
−0,1
−0,15
change in temperature coefficient (%/°C)
+0,002
+0,001
0
−0,001
−0,002
4
5
6
7
8
9
10
11
I_Z (mA)

VOLTAGE REFERENCE DIODE

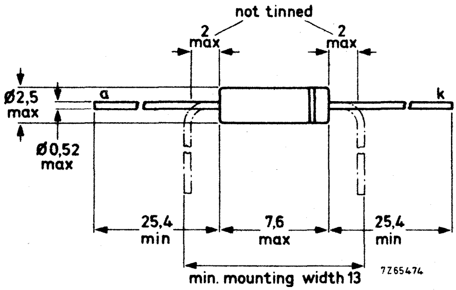
Silicon diode in a DO-7 envelope intended for use as a voltage reference diode in general industrial applications.
The BZY78 has an extremely high voltage stability (±1% at a working current of 11,5 mA).

QUICK REFERENCE DATA

Working voltage at I_Z = 11,5 mA	V_Z	nom.	5,3	V
			5,1 to 5,6	V
Voltage stability at T_{amb} from −50 to 100 °C I_Z = 11,5 mA (±10%)	$\frac{\Delta V_Z}{V_Z}$		−1 to +1	%
Repetitive peak working current	I_{ZRM}	max.	25	mA
Total power dissipation up to T_{amb} = 50 °C	P_{tot}	max.	400	mW
Operating junction temperature	T_j	max.	200	°C
Thermal resistance	$R_{th\ j\text{-}a}$	=	0,37	°C/mW

MECHANICAL DATA Dimensions in mm

DO-7



Cathode indicated by coloured band

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

Currents

Average forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	50	mA
Repetitive peak forward current	I_{FRM}	max.	50	mA
Working current (d.c. or averaged over any 20 ms period)	I_Z	max.	25	mA
Repetitive peak working current	I_{ZRM}	max.	25	mA

Power dissipation

→ Total power dissipation up to T_{amb} = 50 °C	P_{tot}	max.	400	mW

→ Temperatures

Storage temperature	T_{stg}		−65 to +175	°C
Operating junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

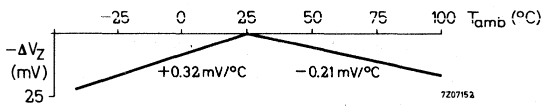
→ From junction to ambient	$R_{th\ j-a}$	=	0,37	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Working voltage at I_Z = 11,5 mA	V_Z	nom.	5,3	V
		5,1 to	5,6	V
Forward voltage at I_F = 1 mA	V_F		0,65 to 0,75	V
Reverse current at V_R = 2 V	I_R	<	1,0	μA

Temperature coefficient

I_Z = 11,5 mA (±10%); T_j = −40 to +25 °C	S_Z	typ.	+0,32	mV/°C
T_j = +25 to +100 °C	S_Z	typ.	−0,21	mV/°C



Differential resistance at I_Z = 11,5 mA	r_{diff}	typ.	18	Ω
			15 to 20	Ω
Voltage stability at T_{amb} = −50 to +100 °C, I_Z = 11,5 mA (±10%)	$\frac{\Delta V_Z}{V_Z}$		−1 to +1	%

MOUNTING INSTRUCTIONS

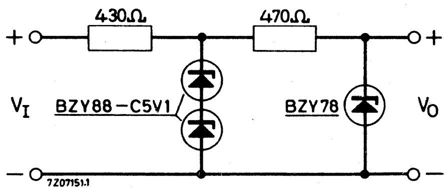
1. When using a soldering iron, the diode may be soldered directly into a circuit, but heat conducted to the junction should be kept to a minimum by use of a thermal shunt.

2. Diodes may be dip soldered at a solder temperature of 245 °C for a maximum soldering time of 5 seconds. The case temperature during dip soldering may exceed the maximum storage temperature for a period not greater than 2 minutes, provided that it at no time exceeds 115 °C. These recommendations apply to a diode with the anode end mounted flush on the board with punched-through holes or spaced at least 1.5 mm above a board with plated-through holes. For mounting the cathode end onto the board the diode must be spaced at least 5 mm from the underside of the printed circuit board in the case of punched-through holes or 5 mm from the top of the board for plated-through holes.

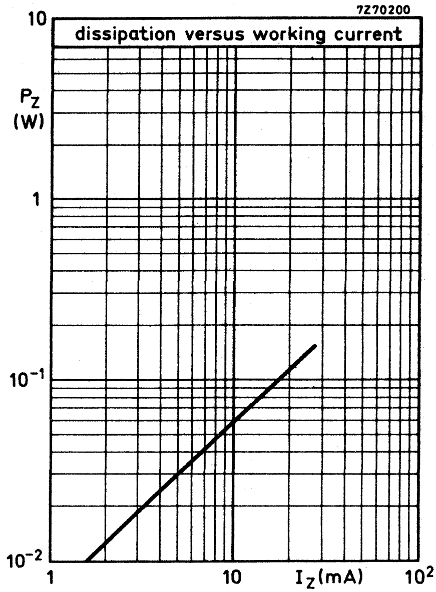
3. Care should be taken not to bend the leads nearer than 1.5 mm from the seals.

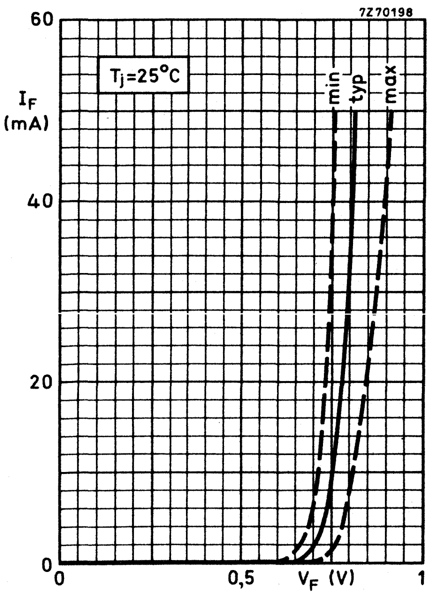
APPLICATION INFORMATION

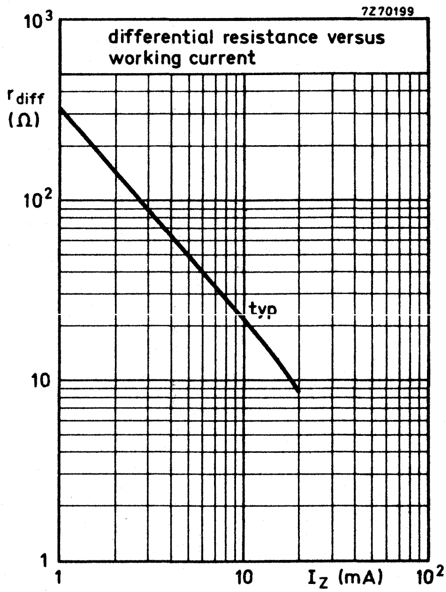
Typical reference-voltage circuit



Temperature range	T_{amb}	0 to +50 °C	
Input voltage	V_I	24 V	± 10%
Output voltage	V_O	5.1 to 5.6 V	±0.3%


7Z70200
dissipation versus working current
P_Z (W)
10
1
10^{-1}
10^{-2}
1
10
I_Z (mA)
10^2


7Z70198
T_j=25°C
I_F (mA)
60
40
20
0
min
typ
max
0
0,5
V_F (V)
1


7Z70199
differential resistance versus working current
r_{diff} (Ω)
10^3
10^2
10
1
typ
1
10
I_Z (mA)
10^2

VOLTAGE REFERENCE DIODES

Voltage reference diodes in a DO-35 envelope. They have a very low temperature coefficient and are primarily intended for use as voltage reference sources in measuring instruments such as digital voltmeters.

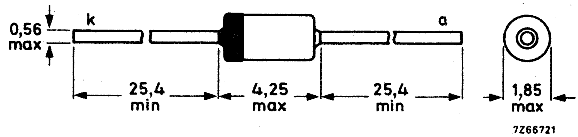
QUICK REFERENCE DATA

				min.	nom.	max.	
Reference voltage at I_Z = 7,5 mA		V_{ref}		5,89	6,20	6,51	V
Reference voltage excursion at I_Z = 7,5 mA [1]							
(see notes 1 and 2 on page 3 and the graphs on pages 4 and 5)	1N821	$\lvert\Delta V_{ref}\rvert$	<		96		mV
	1N823	$\lvert\Delta V_{ref}\rvert$	<		48		mV
	1N825	$\lvert\Delta V_{ref}\rvert$	<		19		mV
	1N827	$\lvert\Delta V_{ref}\rvert$	<		9		mV
	1N829	$\lvert\Delta V_{ref}\rvert$	<		5		mV
Operating ambient temperature		T_{amb}		-55 to +100			°C

MECHANICAL DATA

Dimensions in mm

DO-35



Cathode indicated by coloured band

1) For accuracy of I_Z see graphs on pages 4 and 5.

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

Currents

Working current (d.c.)	I_Z	max.	50	mA
Working current (peak value)	I_{ZM}	max.	50	mA

Power dissipation

Total power dissipation up to T_{amb} = 50 °C	P_{tot}	max.	400	mW

Temperatures

Storage temperature	T_{stg}	−65 to +200	°C
Operating ambient temperature	T_{amb}	−55 to +100	°C

THERMAL RESISTANCE

→ From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0, 375	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

		min.	nom.	max.	
Reference voltage at I_Z = 7, 5 mA	V_{ref}	5, 89	6, 20	6, 51	V

Reference voltage excursion at I_Z = 7, 5 mA 1)

ambient temperature test points: −55; +25; +75; +100 °C (see notes 1 and 2 on the next page and the graphs on pages 4 and 5)

1N821	$\|\Delta V_{ref}\| <$	96	mV
1N823	$\|\Delta V_{ref}\| <$	48	mV
1N825	$\|\Delta V_{ref}\| <$	19	mV
1N827	$\|\Delta V_{ref}\| <$	9	mV
1N829	$\|\Delta V_{ref}\| <$	5	mV

Effective temperature coefficient at I_Z = 7, 5 mA 1)

(see notes 1 and 2 on the next page and the graphs on pages 4 and 5)

1N821	S_Z	±0, 01	%/°C
1N823	S_Z	±0, 005	%/°C
1N825	S_Z	±0, 002	%/°C
1N827	S_Z	±0, 001	%/°C
1N829	S_Z	±0, 0005	%/°C

Differential resistance at I_Z = 7, 5 mA	r_{diff}	<	15	Ω

1) For accuracy of I_Z see graphs on pages 4 and 5.

Note 1 I_Z tolerance and stability of I_Z.

The quoted values of ΔV_{ref} are based on a constant current I_Z. Two factors can cause V_{ref} to change, namely the differential resistance r_{diff} and the temperature coefficient S_Z.

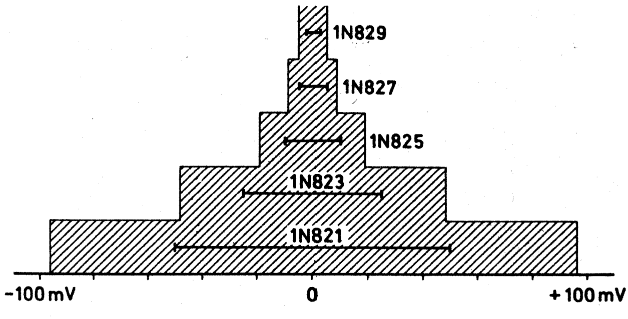
a As the max. r_{diff} of the device can be 15 Ω, a change of 0,01 mA in the current through the reference diode will result in a ΔV_{ref} of 0,01 mA x 15 Ω = 0,15 mV. This level of ΔV_{ref} is not significant on a 1N821 ($\Delta V_{ref} < 96$ mV), it is however very significant on a 1N829 ($\Delta V_{ref} < 5$ mV).

b The temperature coefficient of the reference voltage S_Z is a function of I_Z. Reference diodes are classified at the specified test current and the S_Z of the reference diode will be different at different levels of I_Z. The absolute value of I_Z is important, however, the stability of I_Z, once the level has been set, is far more significant. This applies particularly to the 1N829.
The effect of I_Z stability on S_Z is shown in the graph on page 5.

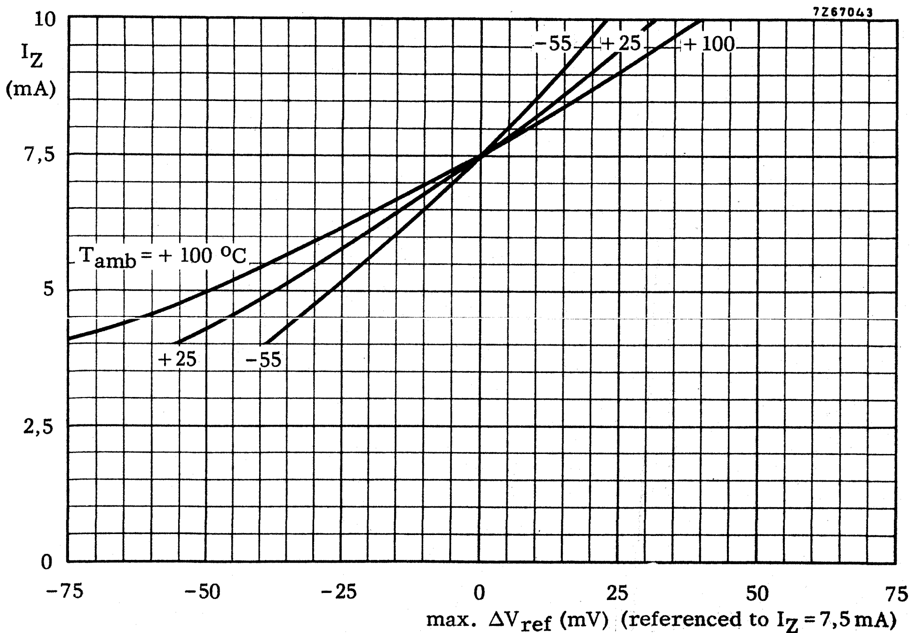
Note 2 Voltage excursion (ΔV_{ref} and temperature coefficient).

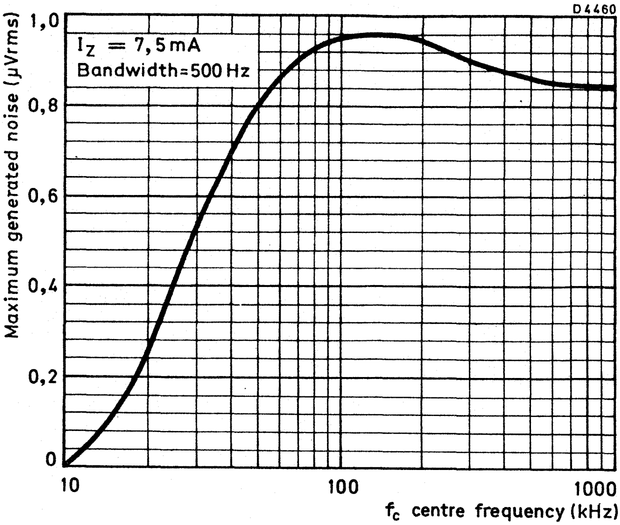
All reference diodes are characterized by the 'box method'. This guarantees a maximum voltage excursion (ΔV_{ref}) over the specified temperature range, at the specified test current (I_Z), verified by tests at indicated temperature points within the range. V_Z is measured and recorded at each temperature specified. The ΔV_{ref} between the highest and lowest values must not exceed the maximum ΔV_{ref} given. The temperature coefficient, therefore is given only as a reference; but may be derived from:

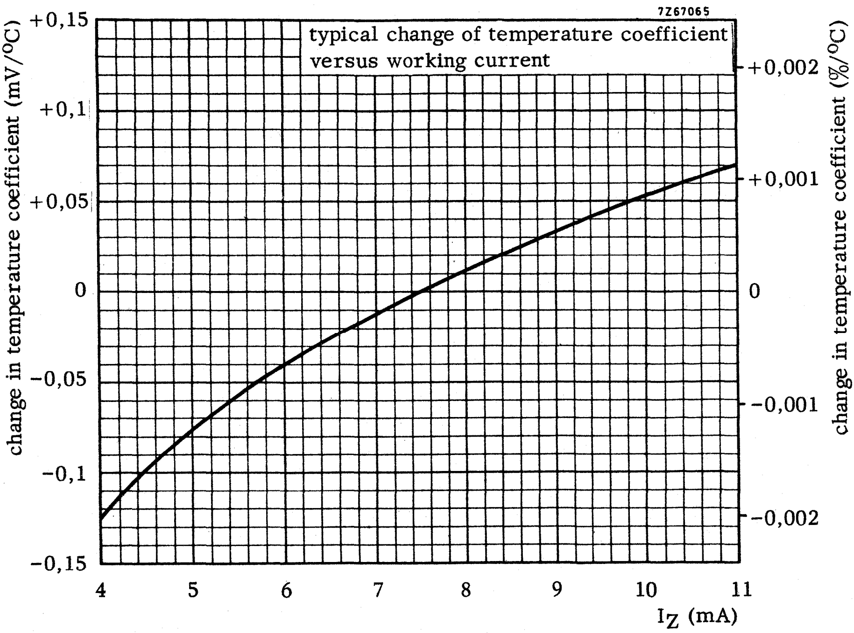
$$S_Z = \frac{(V_{ref\,1} - V_{ref\,2}) \times 100}{(T_{amb\,2} - T_{amb\,1}) \times V_{ref\,nom}} \ \%/^{o}C$$

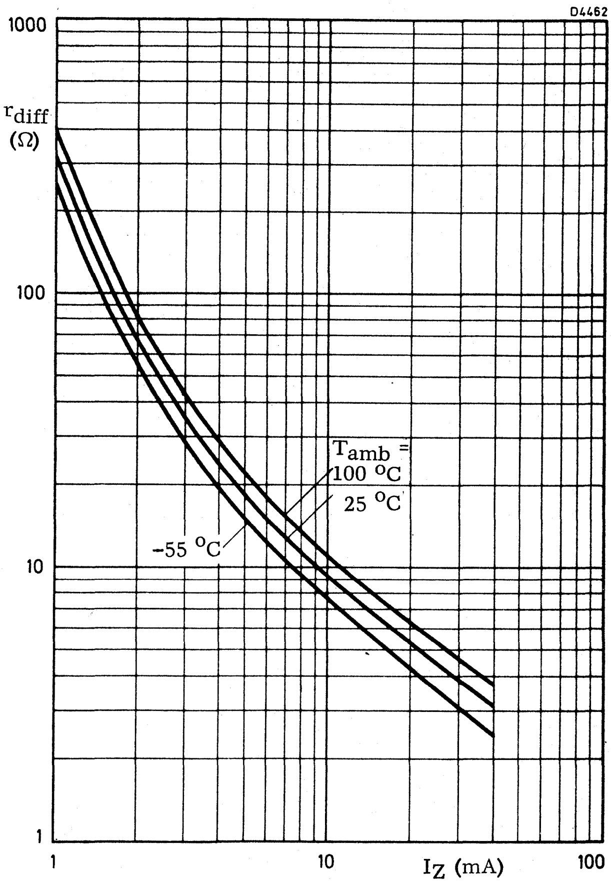


Maximum reference voltage variation (line section) caused by temperature variations within the range from −55 °C to +100 °C at a constant working current of 7,5 mA. The voltage variations may shift horizontally within the shaded area. The zero point may vary from 5890 mV to 6510 mV and differs from diode to diode.




D4460
I_Z = 7,5 mA
Bandwidth = 500 Hz
Maximum generated noise (μVrms)
1,0
0,8
0,6
0,4
0,2
0
10
100
1000
f_c centre frequency (kHz)


7Z67065
typical change of temperature coefficient versus working current
change in temperature coefficient (mV/°C)
+0,15
+0,1
+0,05
0
−0,05
−0,1
−0,15
change in temperature coefficient (%/°C)
+0,002
+0,001
0
−0,001
−0,002
4
5
6
7
8
9
10
11
I_Z (mA)


D4462
1000
100
10
1
r_{diff} (Ω)
T_{amb} =
100 °C
25 °C
-55 °C
1
10
100
I_Z (mA)

Tuner diodes

Variable capacitance diodes

Band switching diodes

TUNER DIODES

Variable capacitance diodes	type	envelope	V_R (V)	C_d (pF)	at V_R (V)	C_d ratio (pF)	at V_R (.V/..V)
a.f.c. in radio and television	BB117	SOD-23	20	2,2-4,0	15	> 2,0	4/15
	BA102	DO-7	20	20 - 45	4	> 1,4	4/10
radio a.m. long, medium and short wave	BB113 (triple)	SOT-60	32	< 13	30	> 17,5	1/30
radio f.m. band II	BB104B	SOT-33	30	37 - 42	3	= 2,65	3/30
	BB104G	SOT-33	30	34 - 39	3	= 2,65	3/30
	BB110B	SOD-23	30	29 - 33	3	= 2,65	3/30
	BB110G	SOD-23	30	27 - 31	3	= 2,65	3/30
television v.h.f.							
Band I to 88 MHz Band III to 230 MHz	3-BB106 4-BB106	SOD-23	28	4,0-5,6	25	> 4,5	3/25
Band I to 88 MHz Band III to 230 MHz	12-BB105G	SOD-23	28	1,8-2,8	25	> 4,0	3/25
television u.h.f.							
Band IV and V to 790 MHz	12-BB105A	SOD-23	28	2,3-2,8	25	> 4,0	3/25
Band IV and V to 860 MHz	12-BB105B	SOD-23	28	2,0-2,3	25	> 4,5	3/25

Band switching diodes	type	envelope	V_R (V)	C_d (pF)	at V_R (V)	r_D (Ω)	at I_F (mA)
switching	BA182	SOD-23	35	< 1,0	20	< 0,7	5
switching	BA243	DO-35	20	< 2,0	15	< 1,0	10
switching	BA244	DO-35	20	< 2,0	15	< 0,5	10
attenuator (p-i-n diode)	BA379		30	= 0,3	0	< 6,5	10

Note:

Matched diodes

12-BB105: unit of 12 matched diodes; can be used as 4 triplets or 3 quadruplets.
3-BB106: unit of 3 matched diodes
4-BB106: unit of 4 matched diodes

Over the voltage range 0,5 V to 28 V the diodes in a unit are capacitance matched to within 3%: BB106; BB105A; BB105B
6%: BB105G

SILICON VARIABLE CAPACITANCE DIODE

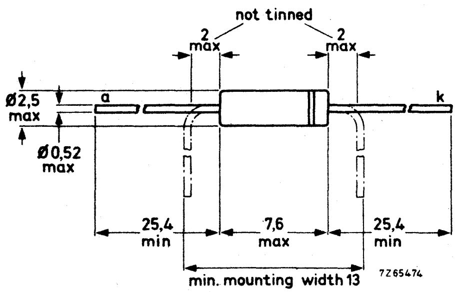
Diode in all-glass DO-7 envelope intended for automatic frequency control in radio and television receivers.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	20	V
Reverse current at V_R = 20 V; T_j = 80 °C	I_R	<	5	μA
Junction temperature	T_j	max.	90	°C
Diode capacitance at f = 0,5 MHz; V_R = 4 V (for selections see page 2)	C_d		20 to 45	pF
Capacitance ratio at f < 300 MHz	$\frac{C_d\ (V_R = 4\ V)}{C_d\ (V_R = 10\ V)}$	>	1,4	
Series resistance at V_R = 4 V	r_D	<	3	Ω

MECHANICAL DATA

Dimensions in mm

DO-7



Cathode indicated by white band

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

Voltage				
Continuous reverse voltage	V_R	max.	20	V
Current				
Forward current (d.c.)	I_F	max.	50	mA
Temperatures				
Storage temperature	T_{stg}		−55 to +90	°C
Junction temperature	T_j	max.	90	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	0,5	°C/mW

CHARACTERISTICS $T_j = 25\ ^oC$ unless otherwise specified

Reverse current at $T_j = 80\ ^oC$

$V_R = 20$ V	I_R	<	5	μA

Diode capacitance at f = 0,5 MHz

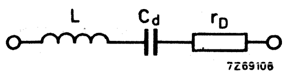
$V_R = 4$ V	BA102	C_d	20 to 45	pF
Selections:	BA102A (white)	C_d	20 to 25	pF
	BA102B (yellow)	C_d	23 to 31	pF
	BA102C (blue)	C_d	29 to 38	pF
	BA102D (green)	C_d	36 to 45	pF

Capacitance ratio at f < 300 MHz $\frac{C_d\ (V_R = 4\ V)}{C_d\ (V_R = 10\ V)}$ > 1,4

Series resistance

$V_R = 4$ V	r_D	typ.	1,7	Ω
		<	3	Ω

Simplified equivalent circuit:



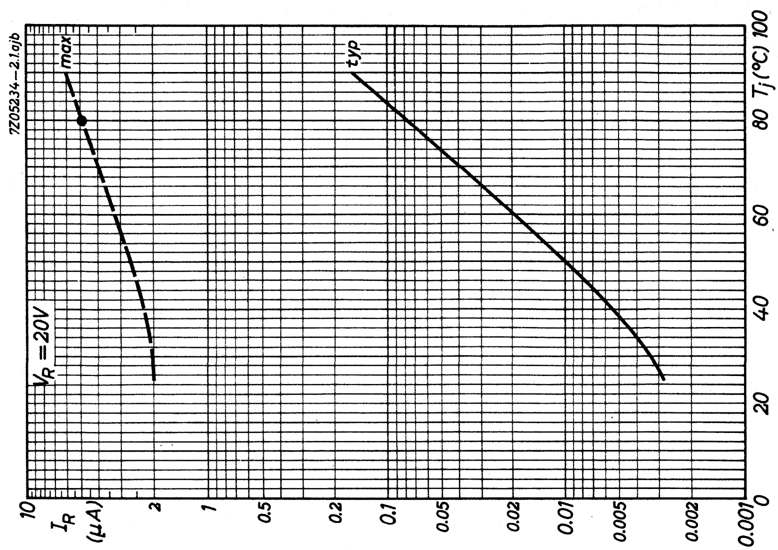
L ≐ lead inductance ≈ 6 nH
r_D = series resistance
C_d = diode capacitance (see page 3)

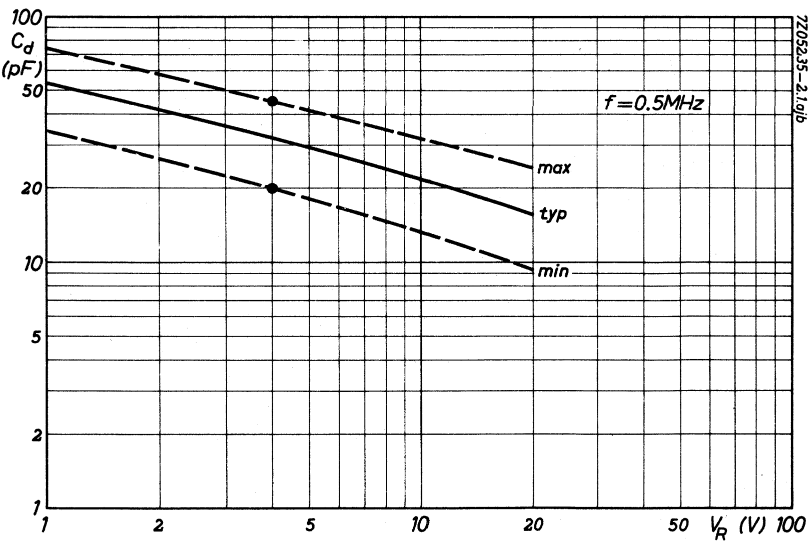
frequency independent up to f = 300 MHz

These data apply for a distance of 10 mm between the two measuring points.

APPLICATION INFORMATION

Application information available on request.


7Z05234–2.1ajb
max
typ
V_R = 20V
T_j (°C)
I_R (μA)
10
2
1
0.5
0.2
0.1
0.05
0.02
0.01
0.005
0.002
0.001
0
20
40
60
80
100


7Z05235–2.1ajb
C_d (pF)
f = 0.5MHz
max
typ
min
V_R (V)
100
50
20
10
5
2
1
1
2
5
10
20
50
100

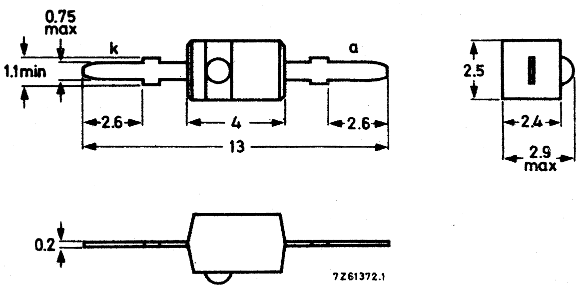
SILICON PLANAR DIODE

The BA182 is a switching diode in a plastic envelope. It is intended for band switching in v.h.f. television tuners.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	35	V
Forward current (d.c.)	I_F	max.	100	mA
Junction temperature	T_j	max.	100	^oC
Diode capacitance at f = 1 MHz V_R = 20 V	C_d	typ. <	0,8 1,0	pF pF
Series resistance at f = 200 MHz I_F = 5 mA	r_D	typ. <	0,5 0,7	Ω Ω

MECHANICAL DATA Dimensions in mm

SOD-23



Cathode indicated by blue band

The sealing of the plastic envelope withstands the accelerated damp heat test of IEC recommendation 68 - 2 (test D, severity IV, 6 cycles).

RATINGS (Limiting values) [1])

Voltage

Continuous reverse voltage	V_R	max.	35	V

Current

Forward current (d.c.)	I_F	max.	100	mA

Temperatures

Storage temperature	T_{stg}	-55 to +100		°C
Junction temperature	T_j	max.	100	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.4	°C/mW

CHARACTERISTICS

Forward voltage at I_F = 100 mA	V_F	<	1.2	V
Reverse current				
V_R = 20 V	I_R	<	100	nA
V_R = 20 V; T_j = 60 °C	I_R	<	1	μA
Diode capacitance at f = 1 MHz				
V_R = 20 V	C_d	typ.	0.8	pF
		<	1	pF
Series resistance at f = 200 MHz				
I_F = 5 mA	r_D	typ.	0.5	Ω
		<	0.7	Ω

MOUNTING AND SOLDERING INSTRUCTIONS

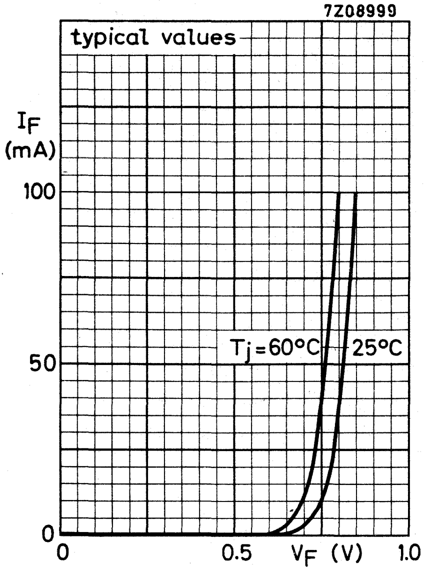
Mounting

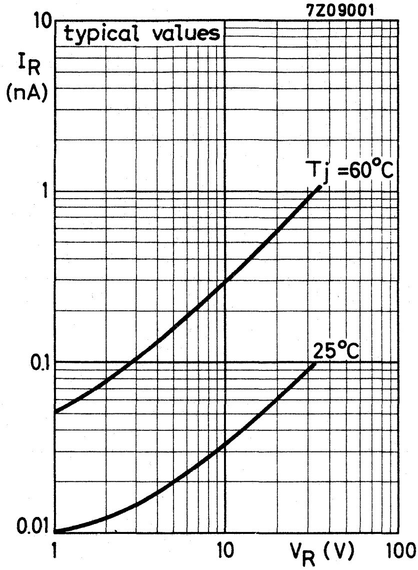
The leads must be bent with a radius of not less than 0.5 mm near the seal. (This can be done by hand if care is taken to exert no pulling force).

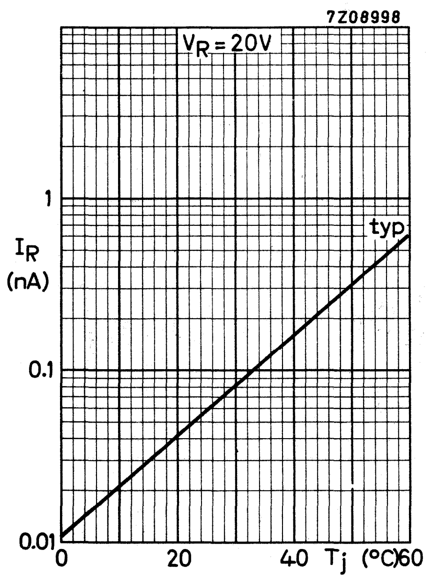
Soldering

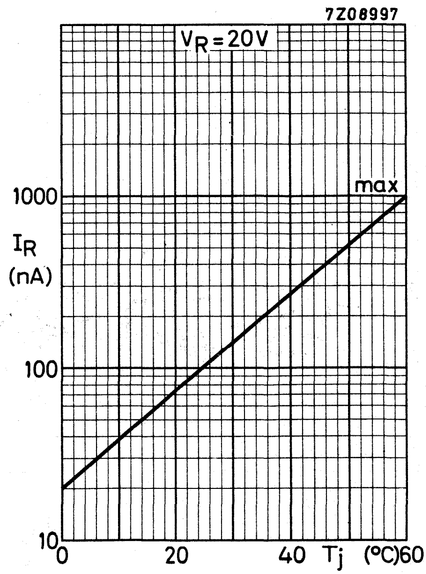
At a maximum iron or solder temperature of 300 °C, the maximum permissible soldering time is 3 seconds. The soldering spot may be at any distance from the seal. During soldering, care must be taken that the plastic body does not come into contact with any temperature higher than 125 °C.

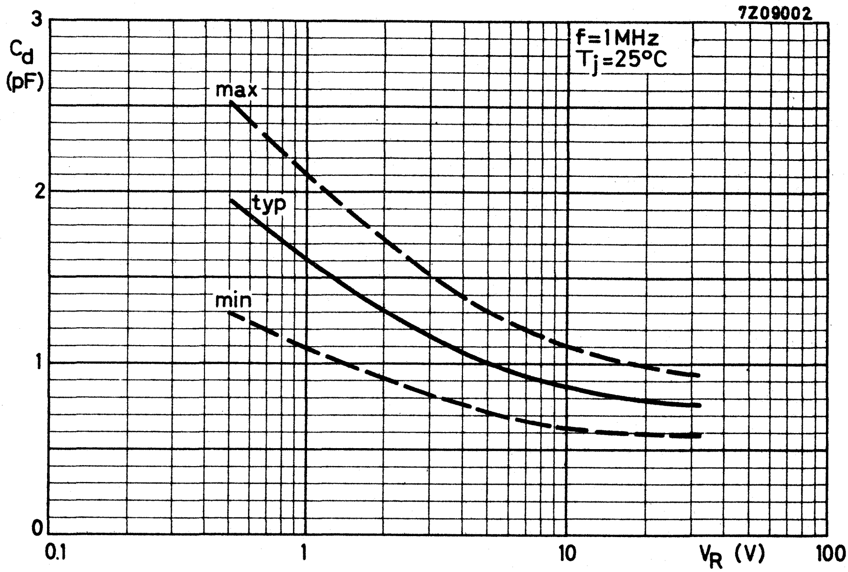
[1]) Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

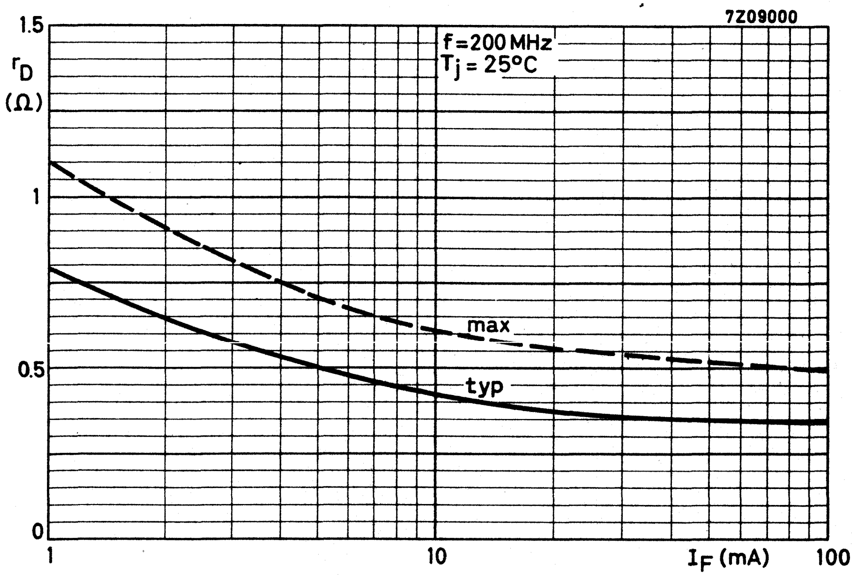

7Z08999
typical values
I_F (mA)
100
50
0
T_j = 60°C
25°C
0
0.5
V_F (V)
1.0


7Z09001
typical values
I_R (nA)
10
1
0.1
0.01
T_j = 60°C
25°C
1
10
V_R (V)
100


7Z08998
V_R = 20V
I_R (nA)
1
0.1
0.01
typ
0
20
40
T_j (°C)
60


7Z08997
V_R = 20V
I_R (nA)
1000
100
10
max
0
20
40
T_j (°C)
60


7Z09002
C_d (pF)
3
2
1
0
f=1MHz
T_j=25°C
max
typ
min
0.1
1
10
V_R (V)
100


7Z09000
r_D (Ω)
1.5
1
0.5
0
f=200 MHz
T_j = 25°C
max
typ
1
10
I_F (mA)
100

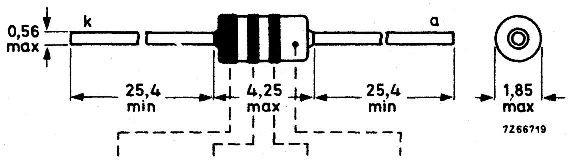
SILICON PLANAR DIODES

Switching diodes in a DO-35 envelope, intended for band switching in v.h.f. television tuners.

QUICK REFERENCE DATA						
Continuous reverse voltage	V_R		max.	20		V
Forward current (d.c.)	I_F		max.	100		mA
Junction temperature	T_j		max.	150		°C
Diode capacitance at f = 1 to 100 MHz V_R = 15 V	C_d		typ. <	1,1 2		pF pF
			BA243	BA244		
Series resistance at f = 200 MHz I_F = 10 mA	r_D	typ <	0,7 1	0,4 0,5		Ω Ω

MECHANICAL DATA Dimensions in mm

DO-35



BA243:	**red (cathode)**	**yellow**	**orange**	**natural**
BA244:	**red (cathode)**	**yellow**	**yellow**	**natural**

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

Voltage

Continuous reverse voltage	V_R	max.	20	V

Current

Forward current (d.c.)	I_F	max.	100	mA

Temperatures

Storage temperature	T_{stg}		−55 to +150	°C
Junction temperature	T_j	max.	150	°C

THERMAL RESISTANCE

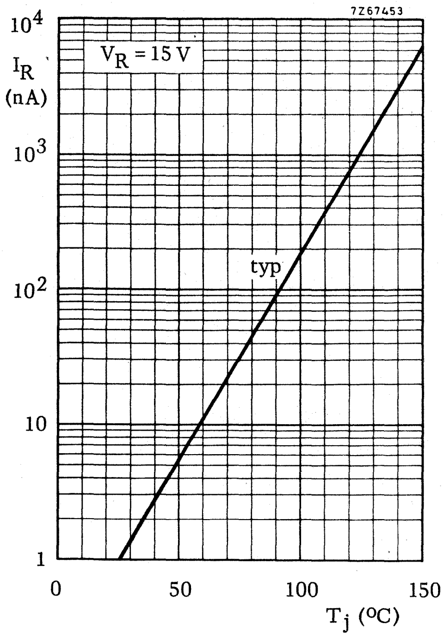
From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,6	°C/mW

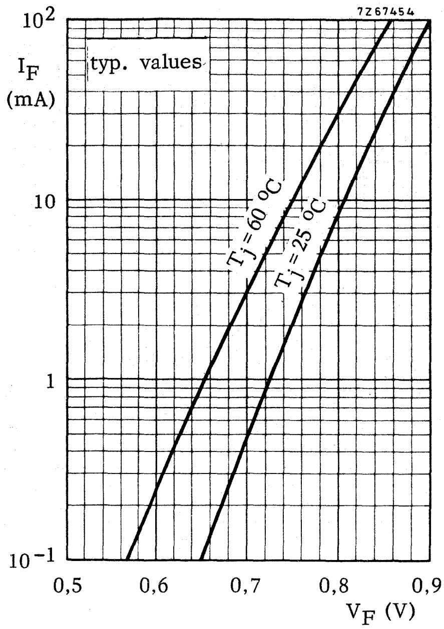
CHARACTERISTICS T_j = 25 °C unless otherwise specified

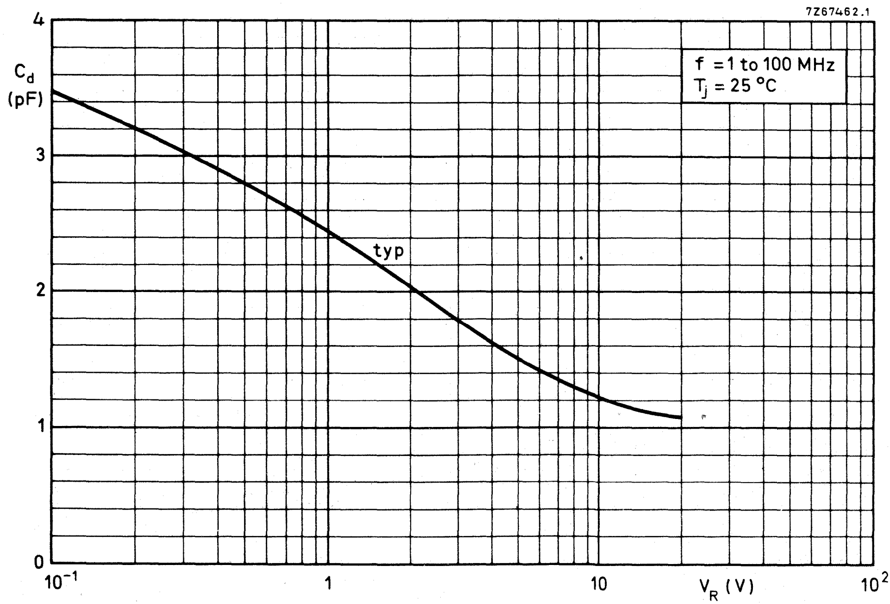
Forward voltage at I_F = 100 mA	V_F	<	1	V
Reverse current at V_R = 15 V	I_R	<	100	nA
V_R = 15 V; T_{amb} = 60 °C	I_R	<	1	µA
Diode capacitance at f = 1 to 100 MHz, V_R = 15 V	C_d	typ.	1,1	pF
		<	2	pF
Relative capacitance variation due to reverse voltage variation at V_R = 7 to 20 V; f = 1 to 100 MHz related to V_R = 7 V	$\frac{\Delta C_d}{C_d \cdot \Delta V_R}$	typ.	1	%/V

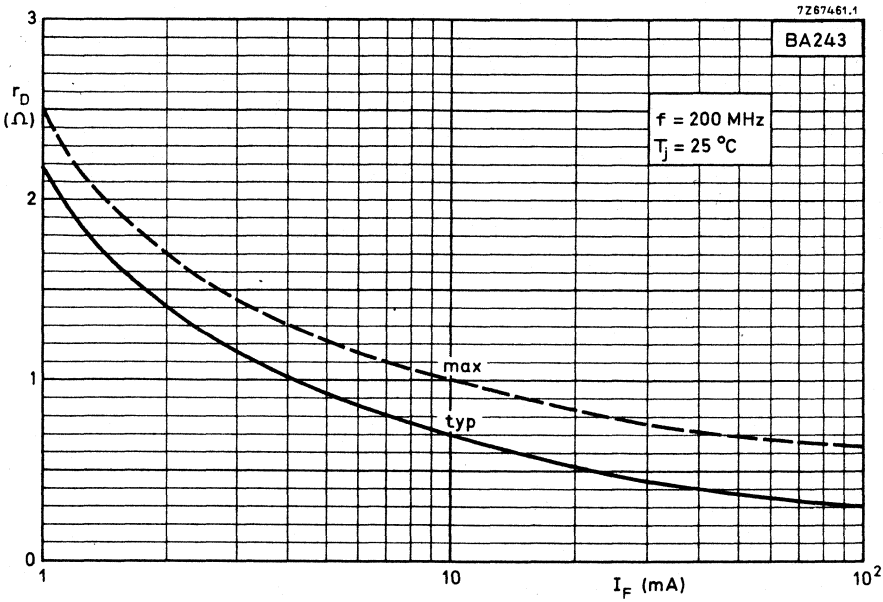
			BA243	BA244	
Series resistance at f = 200 MHz, I_F = 10 mA	r_D	typ.	0,7	0,4	Ω
		<	1	0,5	Ω

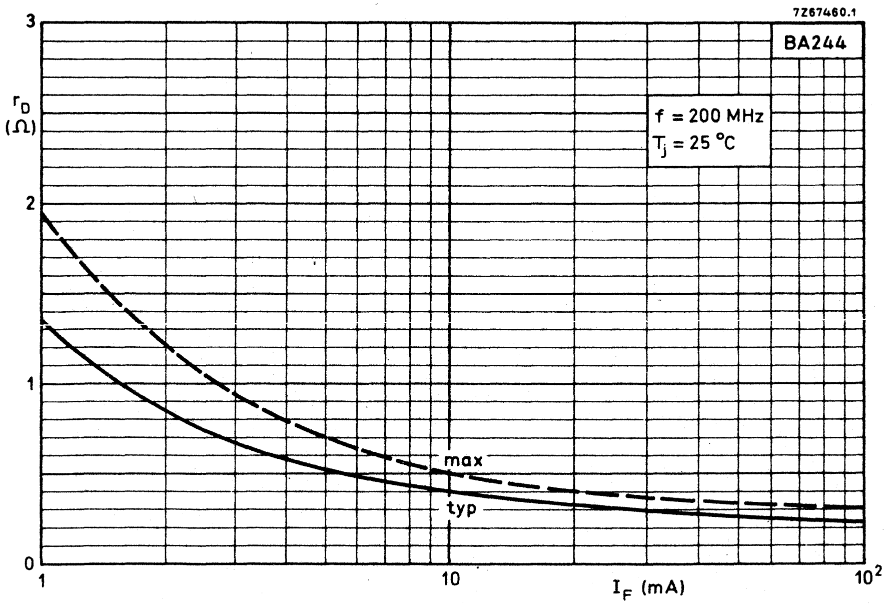
Relative series resistance variation due to forward current variation at I_F = 2 to 40 mA; f = 200 MHz related to I_F = 2 mA	$\frac{\Delta r_D}{r_D \cdot \Delta I_F}$	typ.	2	%/mA
Series inductance (measured on envelope)	L_s	typ.	2,5	nH


7Z67453
10^4
I_R
(nA)
$V_R = 15$ V
10^3
typ
10^2
10
1
0
50
100
150
T_j (°C)


7Z67454
10^2
I_F
(mA)
typ. values
10
$T_j = 60$ °C
$T_j = 25$ °C
1
10^{-1}
0,5
0,6
0,7
0,8
0,9
V_F (V)


7Z67462.1
4
C_d
(pF)
f = 1 to 100 MHz
T_j = 25 °C
3
typ
2
1
0
10^{-1}
1
10
V_R (V)
10^2


7Z67461.1
BA243
r_D (Ω)
f = 200 MHz
T_j = 25 °C
max
typ
0
1
2
3
1
10
10^2
I_F (mA)


7Z67460.1
BA244
r_D (Ω)
f = 200 MHz
T_j = 25 °C
max
typ
0
1
2
3
1
10
10^2
I_F (mA)

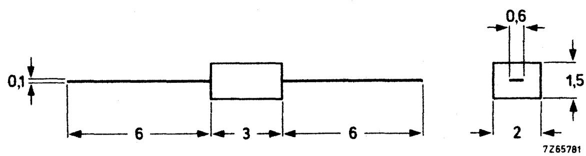
SILICON P-I-N DIODE

Primarily for use in attenuators in v.h.f. and u.h.f. television tuners.

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	30	V
Forward current (d.c.)	I_F	max.	20	mA
Operating ambient temperature	T_{amb}	max.	60	^oC
Diode capacitance V_R = 0; f = 900 MHz	C_d	typ.	0,3	pF
R.F. forward resistance I_F = 10 μA ; f = 35 MHz	r_D	typ.	1,7	kΩ
I_F = 10 mA; f = 35 MHz	r_D	typ.	4,5	Ω

MECHANICAL DATA Dimensions in mm



Cathode indicated by coloured band

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

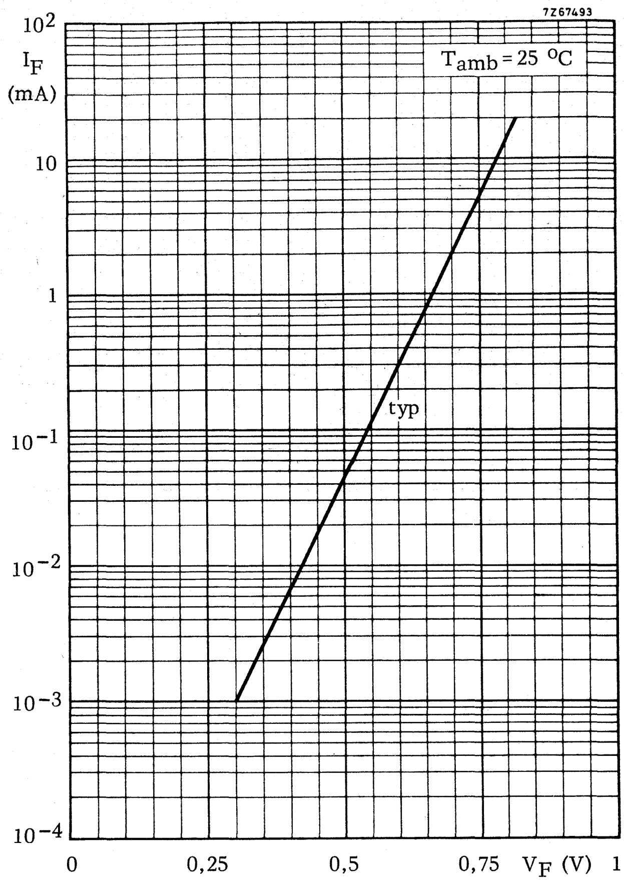
Voltage				
Continuous reverse voltage	V_R	max.	30	V
Current				
Forward current (d.c.)	I_F	max.	20	mA
Temperatures				
Storage temperature	T_{stg}	−55 to +100		^oC
Operating ambient temperature	T_{amb}	max.	60	^oC

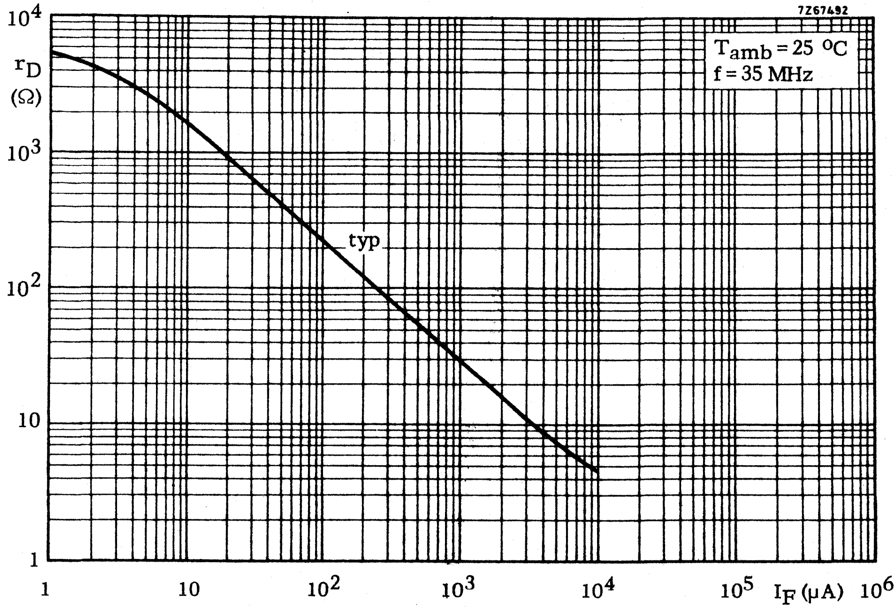
CHARACTERISTICS at T_{amb} = 25 ^oC

Forward voltage				
I_F = 20 mA	V_F	<	1	V
Reverse current				
V_R = 10 V	I_R	<	1	µA
Diode capacitance				
V_R = 1 V; f = 100 MHz	C_d	typ.	0,34	pF
V_R = 0 ; f = 900 MHz	C_d	typ.	0,30	pF
R.F. forward resistance				
I_F = 10 µA ; f = 35 MHz	r_D	typ.	1,7	kΩ
I_F = 10 mA; f = 35 MHz	r_D	typ. <	4,5 6,5	Ω Ω
Series inductance [1]	L_S	typ.	2	nH
Cross modulation [2]				
f_o = 55 MHz; f_{int} = 50 MHz				
I_F = 50 µA	V_{int}	typ.	0,5	V

1) Measured directly to the envelope.

2) Cross modulation is defined as the interfering voltage with 80 % modulation depth over the p-i-n diode, causing 0,8 % modulation depth on the wanted signal. (K = 1%)


7Z67493
10^2
I_F
(mA)
$T_{amb} = 25\ ^oC$
10
1
typ
10^{-1}
10^{-2}
10^{-3}
10^{-4}
0
0,25
0,5
0,75
V_F (V)
1


7Z67492
T_{amb} = 25 °C
f = 35 MHz
r_D
(Ω)
typ
I_F (μA)
1
10
10^2
10^3
10^4
10^5
10^6

SILICON PLANAR
VARIABLE CAPACITANCE DOUBLE DIODES

The BB104B and BB104G are variable capacitance double diodes with common cathode in a plastic envelope, primarily intended for electronic tuning in band II (f.m.).
They are recommended for stages where large signals occur (e.g. oscillator circuits).

QUICK REFERENCE DATA

For each diode:				
Continuous reverse voltage	V_R	max.	30	V
Junction temperature	T_j	max.	100	^oC
Reverse current at V_R = 30 V	I_R	<	20	nA
		BB104G	BB104B	
Diode capacitance at f = 1 MHz V_R = 3 V	C_d	34-39	37-42	pF
Capacitance ratio	$\frac{C_d\ (V_R = 3\ V)}{C_d\ (V_R = 30\ V)}$	typ.	2,65	
Series resistance at f = 100 MHz V_R is that value at which C_d = 38 pF	r_D	typ. <	0,3 0,4	Ω Ω

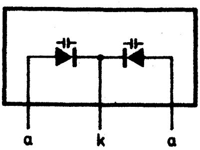
MECHANICAL DATA

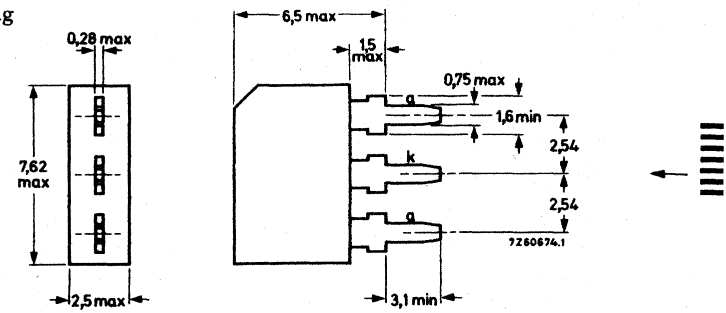
Dimensions in mm

SOT-33

BB104B: blue type marking
BB104G: green type marking

7Z60675





The sealing of the plastic envelope withstands the accelerated damp heat test of IEC recommendation 68-2 (test D, severity IV, 6 cycles).

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

FOR EACH DIODE

Voltage				
Continuous reverse voltage	V_R	max.	30	V
Current				
Forward current (d.c.)	I_F	max.	100	mA
Temperatures				
Junction temperature	T_j	max.	100	°C
Storage temperature	T_{stg}		−55 to +100	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.6	°C/mW

CHARACTERISTICS

Reverse current at V_R = 30 V	I_R	typ.	1		nA
		<	20		nA
V_R = 30 V; T_j = 60 °C	I_R	typ.	5		nA
		<	200		nA
Diode capacitance at f = 1 MHz		BB104G	BB104B		
V_R = 3 V	C_d	34-39	37-42		pF
V_R = 30 V	C_d	typ.	14		pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 3\ V)}{C_d\ (V_R = 30\ V)}$	typ.	2.65		
Series resistance at f = 100 MHz					
V_R is that value at which C_d = 38 pF	r_D	typ.	0.3		Ω
		<	0.4		Ω
Temperature coefficient of the diode capacitance					
V_R = 3 V	η	typ.	0.04		%/°C

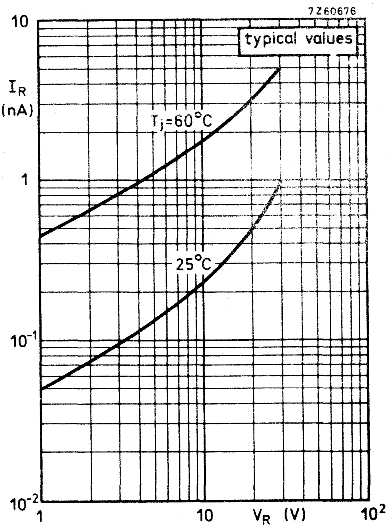
MOUNTING AND SOLDERING INSTRUCTIONS

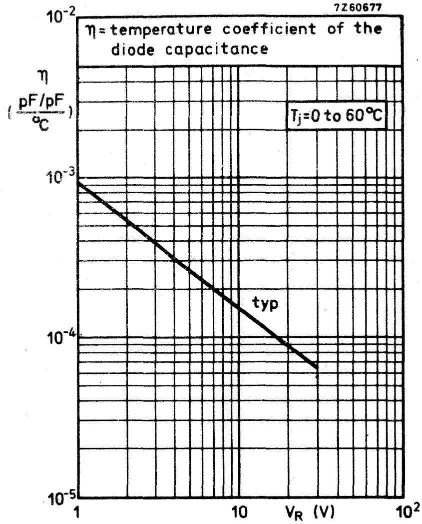
Mounting

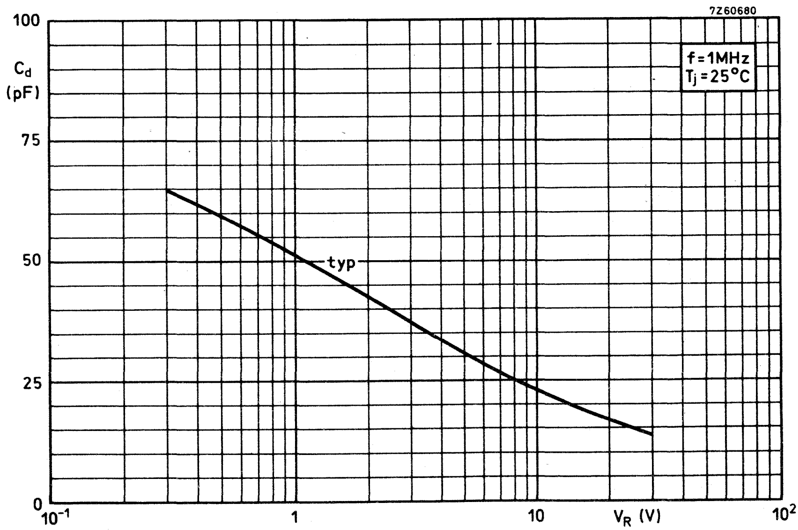
The leads must not be bent with a radius of less than 0.5 mm near the seal. (This can be done by hand if care is taken to exert no pulling force).

Soldering

At a maxium iron or solder temperature of 300 °C, the maximum permissible soldering time is 3 seconds. The soldering spot may be at any distance from the seal. During soldering, care must be taken that the plastic body does not come into contact with any temperature higher than 125 °C.


7Z60676
typical values
I_R (nA)
10
1
10^{-1}
10^{-2}
T_j = 60 °C
25 °C
1
10
V_R (V)
10^2


7Z60677
η = temperature coefficient of the diode capacitance
η (pF/pF / °C)
T_j = 0 to 60 °C
typ
10^{-2}
10^{-3}
10^{-4}
10^{-5}
1
10
V_R (V)
10^2


7Z60680
C_d (pF)
f = 1 MHz
T_j = 25 °C
typ
100
75
50
25
0
10^{-1}
1
10
V_R (V)
10^2

SILICON PLANAR VARIABLE CAPACITANCE DIODES

The BB105A is intended for use in u.h.f. tuners up to frequencies of 790 MHz.
The BB105B is meant for u.h.f. tuners up to frequencies of 860 MHz.
The BB105G is meant for v.h.f. tuners.
Each type number (12-BB105.) represents twelve matched diodes; 4 triplets or 3 quadruplets.
The capacitance difference between any two of the twelve diodes is less than 3% for the BB105A and BB105B and less than 6% for the BB105G over the voltage range from 0,5 V to 28 V.

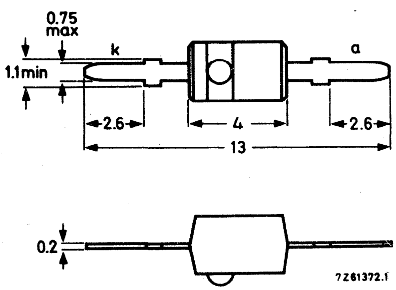
QUICK REFERENCE DATA

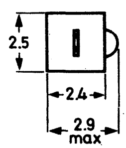
			BB105A	BB105B	BB105G	
Continuous reverse voltage	V_R	max.	28			V
Reverse current at V_R = 28 V	I_R	<	100			nA
Diode capacitance at f = 1 MHz, V_R = 25 V	C_d	>	2,3	2,0	1,8	pF
		<	2,8	2,3	2,8	pF
Capacitance ratio	$\frac{C_d (V_R = 3\ V)}{C_d (V_R = 25\ V)}$	>	4	4,5	4	
		<	5	6	6	
Series resistance at f = 470 MHz, V_R is that value at which C_d = 9 pF	r_D	typ.	0,6	0,7	0,9	Ω
		<	0,8	0,8	1,2	Ω

MECHANICAL DATA Dimensions in mm

SOD-23

12-BB105A and B: marked on packing
12-BB105G : green dot on the envelope





The white band indicates the cathode side.

The sealing of the plastic envelope withstands the accelerated damp heat test of IEC recommendation 68-2 (test D, severity IV, 6 cycles).

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

Continuous reverse voltage	V_R	max. 28	V
Reverse voltage (peak value)	V_{RM}	max. 30	V
Forward current (d.c.)	I_F	max. 20	mA
Storage temperature	T_{stg}	−55 to +100	°C
Junction temperature	T_j	max. 60	°C

THERMAL RESISTANCE

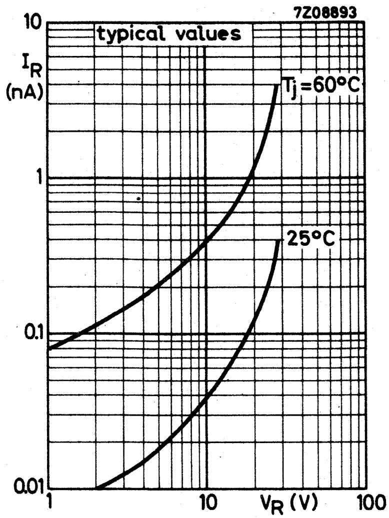
From junction to ambient in free air	$R_{th\ j\text{-}a}$	= 0.4	°C/mW

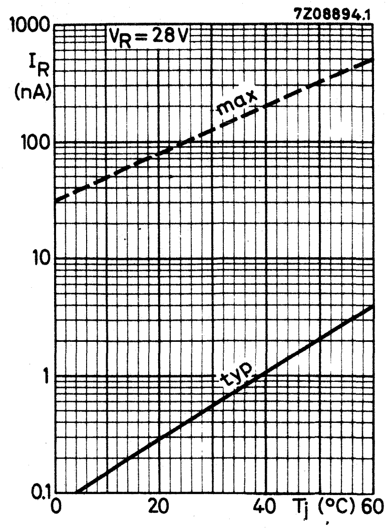
CHARACTERISTICS T_j = 25 °C unless otherwise specified

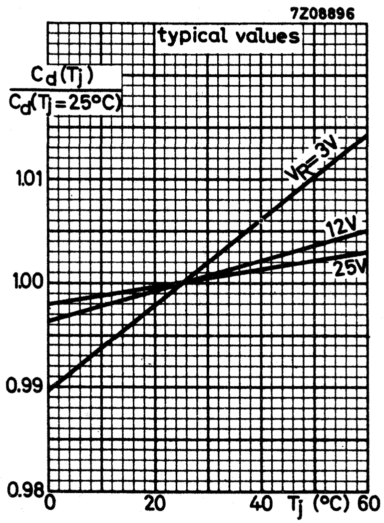
			BB105A	BB105B	BB105G	
Reverse current						
V_R = 28 V	I_R	<	100	100	100	nA
V_R = 28 V; T_j = 60 °C	I_R	<	0.5	0.5	0.5	μA
Diode capacitance at f = 1 MHz						
V_R = 1 V	C_d	typ.	17	17.5	17.5	pF
V_R = 3 V	C_d	typ.	11.5	11.5	11.5	pF
V_R = 25 V	C_d	>	2.3	2.0	1.8	pF
		<	2.8	2.3	2.8	pF
Capacitance ratio at f = 1 MHz	$\frac{C_d(V_R = 3\ V)}{C_d(V_R = 25\ V)}$	>	4	4.5	4	
		<	5	6	6	
Series resistance						
at f = 470 MHz and at that value of V_R at which C_d = 9 pF	r_D	typ.	0.6	0.7	0.9	Ω
		<	0.8	0.8	1.2	Ω
at f = 200 MHz and I_F = 5 mA	r_D	typ.	0.4	0.4	0.4	Ω

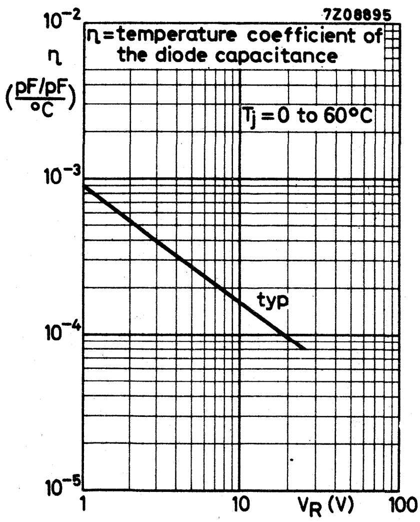
SOLDERING AND MOUNTING NOTES

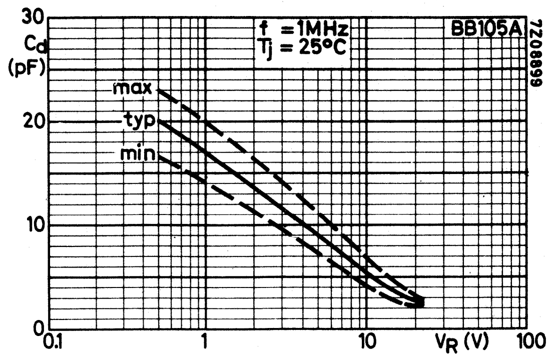
1. Soldered joints may be at any distance from the seal.
2. The maximum permissible temperature of the soldering iron or bath is 300 °C; it must be in contact with the joint for no more than 3 seconds.
3. Avoid hot spots due to handling or mounting; the body of the device must not come into contact with or be exposed to a temperature higher than 125 °C.
4. Leads should not be bent less than 0.5 mm from the seal; exert no axial pull when bending.

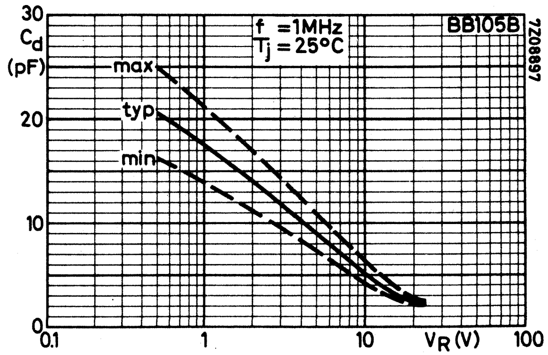

7Z08893
typical values
I_R (nA)
T_j = 60°C
25°C
V_R (V)
10
1
0.1
0.01
1
10
100

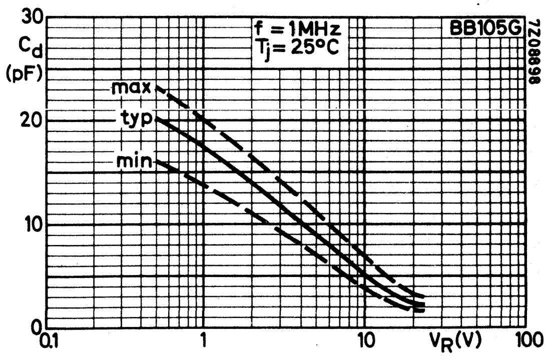

7Z08894.1
V_R = 28 V
I_R (nA)
max
typ
T_j (°C)
1000
100
10
1
0.1
0
20
40
60


7Z08896
typical values
$\frac{C_d(T_j)}{C_d(T_j = 25°C)}$
V_R = 3V
12V
25V
T_j (°C)
1.01
1.00
0.99
0.98
0
20
40
60


7Z08895
η = temperature coefficient of the diode capacitance
η $(\frac{pF/pF}{°C})$
T_j = 0 to 60°C
typ
V_R (V)
10^{-2}
10^{-3}
10^{-4}
10^{-5}
1
10
100


30
Cd
(pF)
20
10
0
0.1
1
10
VR (V)
100
max
typ
min
f = 1MHz
Tj = 25°C
BB105A
7208899


30
Cd
(pF)
20
10
0
0.1
1
10
VR (V)
100
max
typ
min
f = 1MHz
Tj = 25°C
BB105B
7208897


30
Cd
(pF)
20
10
0
0.1
1
10
VR (V)
100
max
typ
min
f = 1MHz
Tj = 25°C
BB105G
7208898

SILICON PLANAR VARIABLE CAPACITANCE DIODE

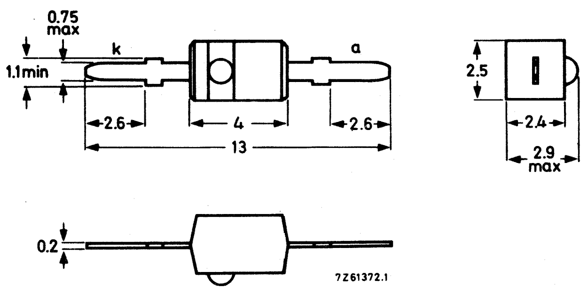
The BB106 is a variable capacitance diode in a plastic envelope. The diode is primarily intended for electronic tuning in v.h.f. tuners with extended Band I (FCC norm). The type number 3-BB106 represents three matched diodes, the type number 4-BB106 represents four matched diodes. The matching is done at different voltages from 0.5 to 28 V. In this range the capacitance difference between any two diodes of one group is less than 3%.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	28	V
Diode capacitance at f = 0.5 MHz				
V_R = 3 V	C_d	>	20	pF
V_R = 25 V	C_d		4 to 5.6	pF
Reverse current at V_R = 28 V	I_R	<	50	nA
Capacitance ratio	$\frac{C_d (V_R = 3\ V)}{C_d (V_R = 25\ V)}$		4.5 to 6.0	
Series resistance at f = 200 MHz V_R is that value at which C_d = 25 pF	r_D	typ. <	0.4 0.6	Ω Ω

MECHANICAL DATA

Dimensions in mm

SOD-23



The red band indicates the cathode

The sealing of the plastic envelope withstands the accelerated damp heat test of IEC recommendation 68-2 (test D, severity IV, 6 cycles).

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

Voltages

Continuous reverse voltage	V_R	max.	28	V
Reverse voltage (peak value)	V_{RM}	max.	30	V

Current

Forward current (d.c.)	I_F	max.	20	mA

Temperatures

Storage temperature	T_{stg}	−55 to +100		^oC
Junction temperature	T_j	max.	60	^oC

THERMAL RESISTANCE

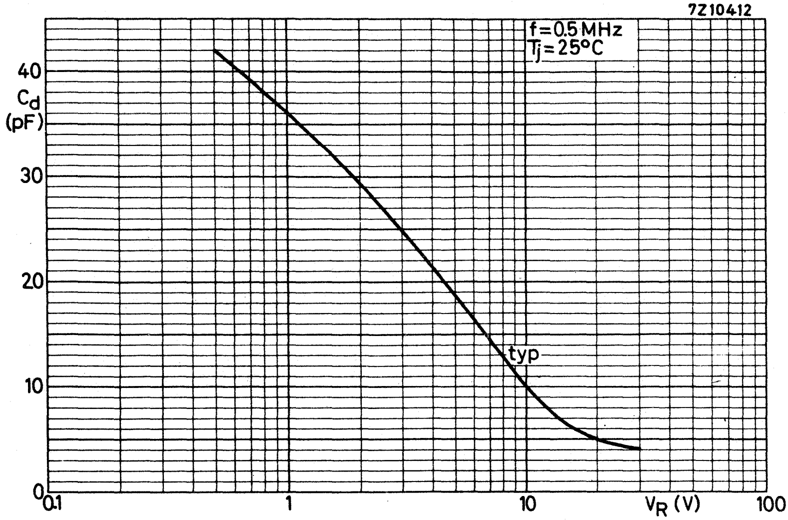
From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	400	$^oC/W$

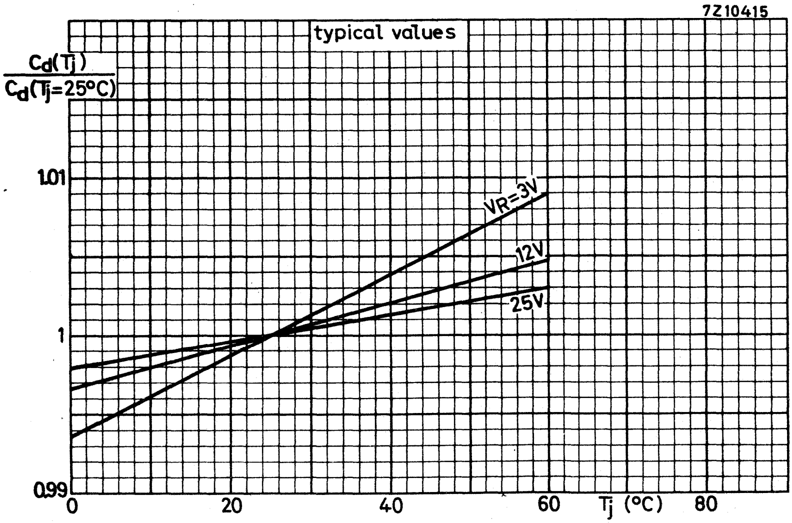
CHARACTERISTICS

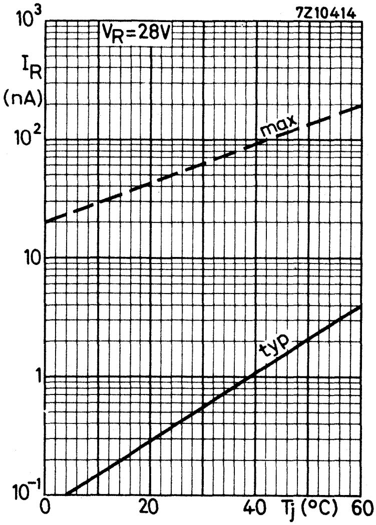
Reverse current at V_R = 28 V; T_j = 25 ^oC	I_R	<	50	nA
V_R = 28 V; T_j = 60 ^oC	I_R	<	200	nA
Series resistance at f = 200 MHz				
V_R = that value at which C_d = 25 pF	r_D	typ.	0.4	Ω
		<	0.6	Ω
Diode capacitance at f = 0.5 MHz				
V_R = 3 V	C_d	>	20	pF
V_R = 25 V	C_d	4 to 5.6		pF
Capacitance ratio at f = 0.5 MHz	$\frac{C_d(V_R = 3\ V)}{C_d(V_R = 25\ V)}$	4.5 to 6.0		

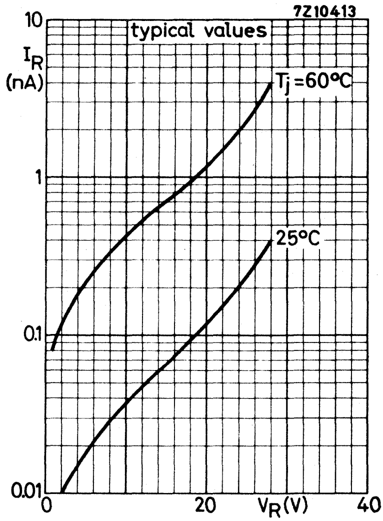
SOLDERING AND MOUNTING NOTES

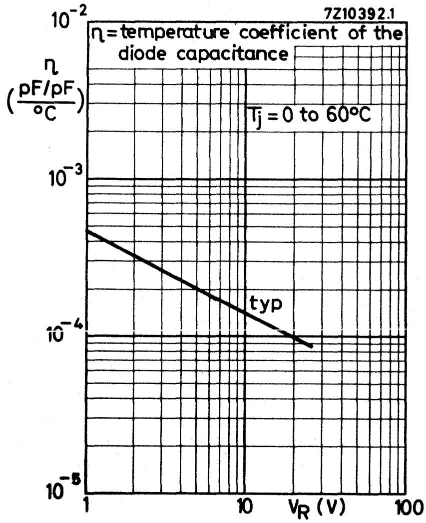
1. Soldered joints may be at any distance from the seal.
2. The maximum permissible temperature of the soldering iron or bath is 300 ^oC; it must be in contact with the joint for no more than 3 seconds.
3. Avoid hot spots due to handling or mounting; the body of the device must not come into contact with or be exposed to a temperature higher than 125 ^oC.
4. Leads should not be bent less than 0.5 mm from the seal; exert no axial pull when bending.


7Z10412
f = 0.5 MHz
Tj = 25°C
40
Cd
(pF)
30
20
10
0
typ
0.1
1
10
VR (V)
100


7Z10415
typical values
Cd(Tj)
Cd(Tj=25°C)
1.01
1
0.99
VR=3V
12V
25V
0
20
40
60
Tj (°C)
80


7Z10414
V_R=28V
I_R (nA)
10^3
10^2
10
1
10^{-1}
max
typ
0
20
40
60
T_j (°C)


7Z10413
typical values
I_R (nA)
10
1
0.1
0.01
T_j =60°C
25°C
0
20
40
V_R(V)


7Z10392.1
η = temperature coefficient of the diode capacitance
η (pF/pF / °C)
10^{-2}
10^{-3}
10^{-4}
10^{-5}
T_j = 0 to 60°C
typ
1
10
100
V_R (V)

SILICON PLANAR VARIABLE CAPACITANCE DIODES

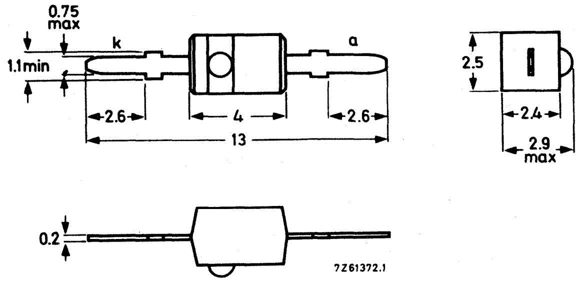
The BB110B and BB110G are variable capacitance diodes in a plastic envelope primarily intended for electronic tuning in band II (f.m.). They are recommended for r.f. and interstage circuits.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	30	V
Junction temperature	T_j	max.	100	^oC
Reverse current at V_R = 30 V	I_R	<	20	nA
Diode capacitance at f = 1 MHz V_R = 3 V	C_d		BB110G: 27 - 31; BB110B: 29 - 33	pF
Capacitance ratio	$\frac{C_d\ (V_R = 3V)}{C_d\ (V_R = 30\ V)}$	typ.	2, 65	
Series resistance at f = 100 MHz V_R is that value at which C_d = 30 pF	r_D	typ. / <	0, 3 / 0, 4	Ω / Ω

MECHANICAL DATA Dimensions in mm

SOD-23

BB110B: blue dot
BB110G: green dot



The yellow band indicates the cathode side.

The sealing of the plastic envelope withstands the accelerated damp heat test of IEC recommendation 68-2 (test D, severity IV, 6 cycles).

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

Voltage				
Continuous reverse voltage	V_R	max.	30	V
Current				
Forward current (d.c.)	I_F	max.	100	mA
Temperatures				
Storage temperature	T_{stg}		−55 to +100	°C
Junction temperature	T_j	max.	100	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.4	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Reverse current at V_R = 30 V	I_R	typ.	1		nA
		<	20		nA
V_R = 30 V; T_j = 60 °C	I_R	typ.	5		nA
		<	200		nA
Diode capacitance at f = 1 MHz		BB110G	BB110B		
V_R = 3 V	C_d	27 - 31	29 - 33		pF
V_R = 30 V	C_d	typ.	11		pF
Capacitance ratio at f = 1 MHz	$\frac{C_d(V_R = 3\ V)}{C_d(V_R = 30\ V)}$	typ.	2.65		
Series resistance at f = 100 MHz					
V_R is that value at which C_d = 30 pF	r_D	typ.	0.3		Ω
		<	0.4		Ω
Temperature coefficient of the diode capacitance					
V_R = 3 V	η	typ.	0.04		%/°C

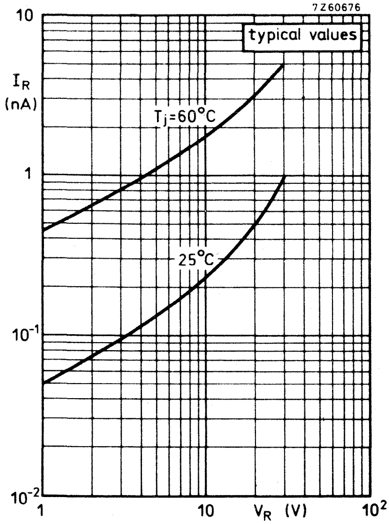
MOUNTING AND SOLDERING INSTRUCTIONS

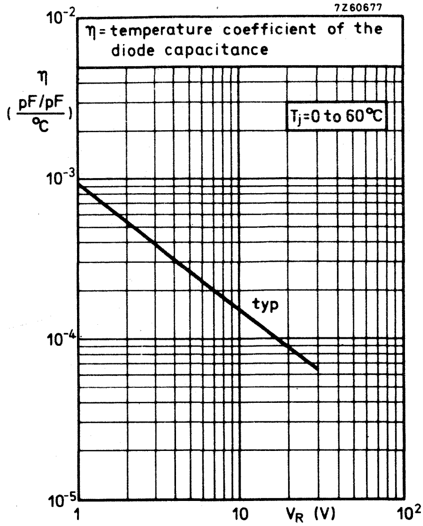
Mounting

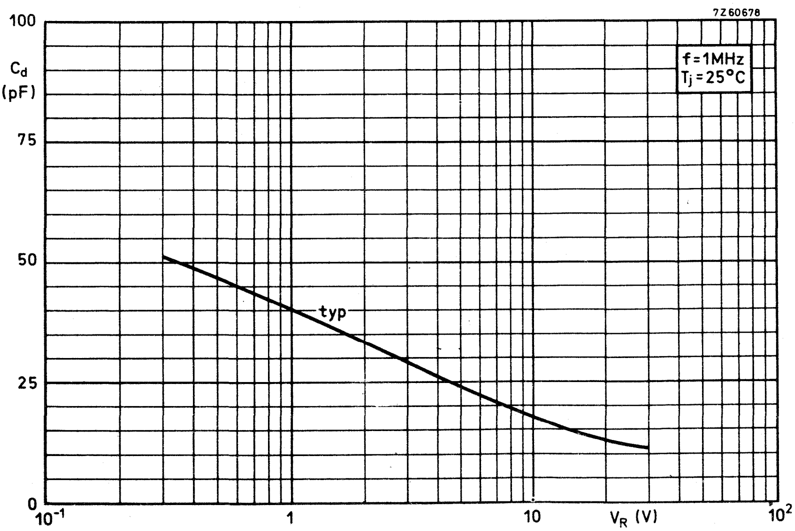
The leads must not be bent with a radius of less than 0.5 mm near the seal. (This can be done by hand if care is taken to exert no pulling force).

Soldering

At a maximum iron or solder temperature of 300 °C, the maximum permissible soldering time is 3 seconds. The soldering spot may be at any distance from the seal. During soldering, care must be taken that the plastic body does not come into contact with any temperature higher than 125 °C.


7Z60676
typical values
I_R (nA)
T_j=60°C
25°C
10
1
10^{-1}
10^{-2}
1
10
V_R (V)
10^2


7Z60677
η = temperature coefficient of the diode capacitance
η (pF/pF / °C)
T_j=0 to 60°C
typ
10^{-2}
10^{-3}
10^{-4}
10^{-5}
1
10
V_R (V)
10^2


7Z60678
f = 1MHz
T_j = 25°C
C_d (pF)
typ
100
75
50
25
0
10^{-1}
1
10
V_R (V)
10^2

TRIPLE DIODE FOR A.M. RADIOS

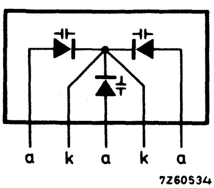
Triple silicon planar variable capacitance diode in a plastic envelope.
It is intended for electronic tuning of LW, MW and SW-band of a.m. radio receivers.

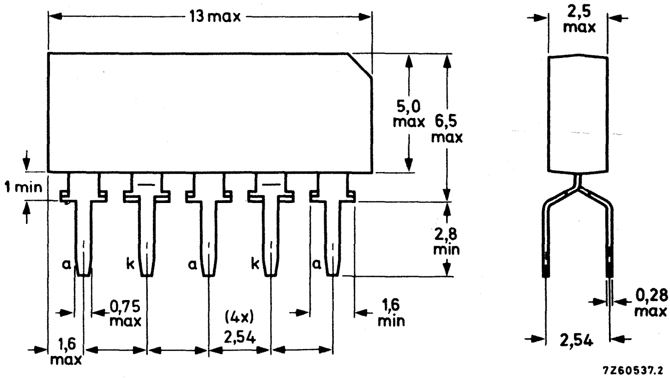
QUICK REFERENCE DATA

Each diode				
Continuous reverse voltage	V_R	max.	32	V
Forward current (d.c.)	I_F	max.	50	mA
Junction temperature	T_j	max.	80	^oC
Reverse current at V_R = 32 V	I_R	<	50	nA
Diode capacitance at f = 0.5 MHz				
V_R = 1 V	C_d	230 to	280	pF
V_R = 30 V	C_d	<	13	pF
Series resistance at f = 0.5 MHz				
C_d = 200 pF	r_D	<	4	Ω

MECHANICAL DATA Dimensions in mm

SOT-60





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

These ratings hold for each diode

Voltage				
Continuous reverse voltage	V_R	max.	32	V
Current				
Forward current (d.c.)	I_F	max.	50	mA
→ Temperatures				
Storage temperature	T_{stg}	-55 to +80		^oC
Junction temperature	T_j	max.	80	^oC

CHARACTERISTICS for each diode T_{amb} = 25 ^oC unless otherwise specified

Reverse current				
V_R = 32 V	I_R	<	50	nA
V_R = 32 V; T_{amb} = 60 ^oC	I_R	<	200	nA
Diode capacitance				
V_R = 0.5 V	C_d	typ.	290	pF
V_R = 1 V	C_d	230 to 280		pF
V_R = 10 V	C_d	>	55	pF
V_R = 20 V	C_d	>	16	pF
V_R = 30 V	C_d	<	13	pF
Anode - anode capacitance				
C_{a1-a2} or C_{a1-a3} or C_{a2-a3}	C_{a-a}	typ.	20	fF
Series resistance at f = 0.5 MHz				
C_d = 200 pF	r_D	<	4	Ω

MATCHING PROPERTIES

The capacitances of the three diodes in their common envelope may differ within certain limits. The total, relative capacitance differences between any two diodes m and n in the triplet (where m and n may be 1, 2 or 3) may be regarded as being built up of a basic part k, and an additional part s.

Basic part

Expressed as a percentage for the reverse voltage range $1\ V \leq V_R \leq 30\ V$, k is a constant, obeying the following equation:

$$k = \left| \frac{C_m - C_n}{C_n} \right|_{V_R = 1\ V} \times 100\% \leq 6\%$$

It may be compensated by means of the coil.

Additional part

Again expressed as a percentage this is a variable difference over the above voltage range:

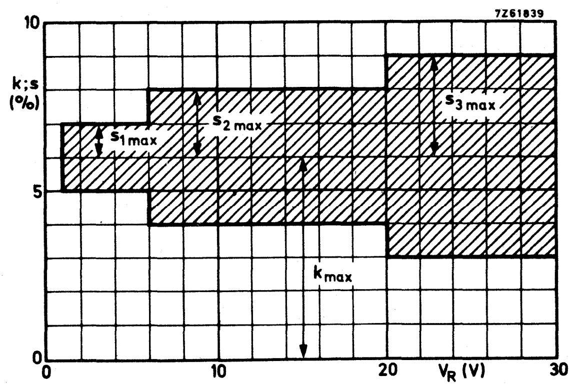
$$s = \left| \frac{C_m - C_n}{C_n} \right|_{V_R} \times 100\% - k$$

with the following values:

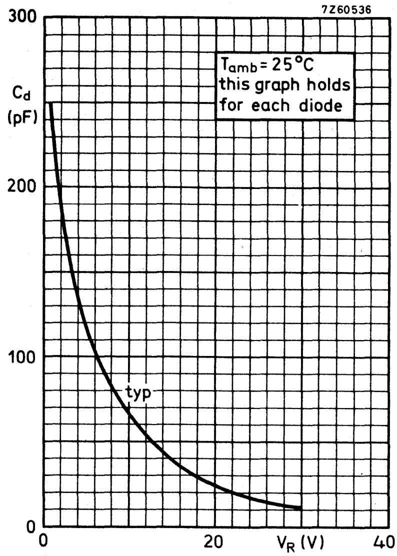
$|s_1| \leq 1\%$ at $1\ V < V_R \leq 6\ V$

$|s_2| \leq 2\%$ at $6\ V < V_R \leq 20\ V$

$|s_3| \leq 3\%$ at $20\ V < V_R \leq 30\ V$



The shaded area represents the maximum possible deviation in capacitance at k max for any two individual diodes in one envelope versus reverse voltage.


7Z60536
T_{amb} = 25 °C
this graph holds for each diode
C_d (pF)
300
200
100
0
typ
0
20
V_R (V)
40

SILICON PLANAR VARIABLE CAPACITANCE DIODE

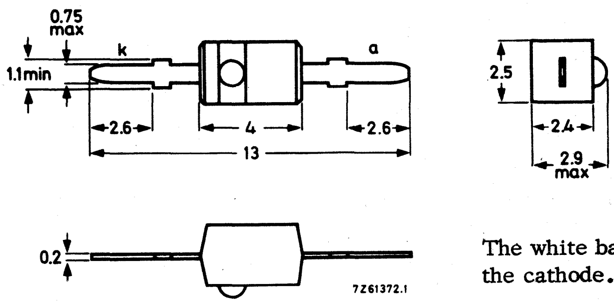
The BB117 is a variable capacitance diode in a plastic envelope. The diode is primarily intended for automatic frequency control in television receivers.

QUICK REFERENCE DATA				
Reverse voltage	V_R	max.	20	V
Reverse current at V_R = 20 V	I_R	<	100	nA
Diode capacitance at f = 0.5 MHz V_R = 15 V	C_d		2.2 to 4.0	pF
Capacitance ratio	$\frac{C_d(V_R = 4\ V)}{C_d(V_R = 15\ V)}$		2.0 to 5.0	
Series resistance at f = 470 MHz V_R is that value at which C_d = 9 pF	r_D	<	1.2	Ω

MECHANICAL DATA

Dimensions in mm

SOD-23



The white band indicates the cathode.

The sealing of the plastic envelope withstands the accelerated damp heat test of IEC recommendation 68-2 (test D, severity IV, 6 cycles).

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

Continuous reverse voltage	V_R	max.	**20**	V
Forward current (d.c.)	I_F	max.	20	mA
Storage temperature	T_{stg}	−55 to +100		°C
Junction temperature	T_j	max.	60	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.4	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Reverse current

V_R = 20 V	I_R	<	100	nA
V_R = 20 V; T_j = 60 °C	I_R	<	500	nA

Diode capacitance at f = 0.5 MHz

V_R = 4 V	C_d	8 to 11	pF
V_R = 15 V	C_d	2.2 to 4.0	pF

Capacitance ratio at f = 0.5 MHz $\dfrac{C_d(V_R = 4\ V)}{C_d(V_R = 15\ V)}$ 2 to 5

Series resistance

at f = 470 MHz and at that value of V_R at which C_d = 9 pF r_D < 1.2 Ω

MOUNTING AND SOLDERING INSTRUCTIONS

Mounting

The leads must not be bent with a radius of less than 0.5 mm near the seal. (This can be done by hand if care is taken to exert no pulling force).

Soldering

At a maximum iron or solder temperature of 300 °C, the maximum permissible soldering time is 3 seconds. The soldering spot may be at any distance from the seal.
During soldering, care must be taken that the plastic body does not come into contact with any temperature higher than 125 °C.

MAINTENANCE TYPE LIST

The type numbers listed below are not included in this handbook.

Detailed information will be supplied on request.

AAY11
BA114
BZY56 to 63
OA92
OAZ200 to 207

INDEX OF TYPE NUMBERS

The inclusion of a type number in this publication does not necessarily imply its availability.

AD = Silicon alloyed diodes
GB = Germanium gold bonded diodes
HF = High frequency transistors
LF = Low frequency transistors
Mm = Microminiature devices for thick-and thin-film circuits
Mw = Microwave devices
P = Low frequency power transistors
PC = Germanium point contact diodes
R = Rectifier diodes
Sp = Special diodes
Sw = Switching transistors
T = Tuner diodes
WD = Silicon whiskerless diodes

DT = Dual transistors
FET = Field-effect transistors
LF = Low frequency transistors
Mm = Microminiature devices for thick-and thin-film circuits
Mw = Microwave devices
T = Tuner diodes
WD = Silicon whiskerless diodes

FET = Field-effect transistors
HF = High frequency transistors
LF = Low frequency transistors
Mm = Microminiature devices for thick-and thin-film circuits
P = Low frequency power transistors

Def = Deflection transistors
FET = Field-effect transistors
HF = High frequency transistors
Mm = Microminiature devices for thick- and thin-film circuits

PDT = Photodiodes or transistors
R = Rectifier diodes
Sw = Switching transistors
Th = Thyristors, diacs, triacs
Tr = Transmitting transistors

Def = Deflection transistors
Mm = Microminiature devices for thick-and thin-film circuits
Mw = Microwave devices
P = Low frequency power transistors
R = Rectifier diodes
Sw = Switching transistors
Th = Thyristors, diacs, triacs
TS = Transient suppressor diodes
Vrf = Voltage reference diodes
Vrg = Voltage regulator diodes

INDEX

AD = Silicon alloyed diodes
GB = Germanium gold bonded diodes
I = Infrared devices
LED = Light emitting diodes
Mw = Microwave devices
PC = Germanium point contact diodes
Ph = Photoconductive devices
St = Rectifier stacks
Sw = Switching transistors
Vrf = Voltage reference diodes
Vrg = Voltage regulator diodes
WD = Silicon whiskerless diodes

A = Accessories
FET = Field-effect transistors
HF = High frequency transistors
I = Infrared devices
LF = Low frequency transistors
P = Low frequency power transistors
Sw = Switching transistors
Tr = Transmitting transistors
Vrg = Voltage regulator diodes

A = Accessories
DH = Diecast heatsinks
HE = Heatsink extrusions

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