Semiconductors and integrated circuits

Part 1b December 1972

Small signal germanium diodes

Small signal silicon diodes

Special diodes

Voltage regulator diodes

Voltage reference diodes

Tuner diodes

SEMICONDUCTORS AND INTEGRATED CIRCUITS

Part 1b **December 1972**

Index and maintenance type list at the back

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September 1972

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.

December 1972

ELECTRON TUBES (BLUE SERIES)

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

Part 1	**Transmitting tubes (Tetrodes, Pentodes); Amplifier circuit assemblies**	**January 1972**
Part 2	**Tubes for microwave equipment**	**February 1972**
Part 3	**Special Quality tubes; Miscellaneous devices**	**March 1972**
Part 4	**Receiving tubes**	**June 1972**
Part 5	**Cathode-ray tubes; Photo tubes; Camera tubes**	**July 1972**
Part 6	**Devices for nuclear equipment** Photomultiplier tubes Channel electron multipliers Scintillators Photoscintillators Radiation counter tubes Semicinductor radiation detectors Neutron generator tubes Photo diodes	**September 1972**
Part 7	**Gas-filled tubes** Voltage stabilizing and reference tubes Counter, selector, and indicator tubes Trigger tubes Switching diodes Thyratrons Ignitrons Industrial rectifying tubes High-voltage rectifying tubes	**October 1972**
Part 8	**T.V.Picture tubes**	**November 1972**
Part 9	**Transmitting tubes (Triodes); Tubes for r.f. heating (Triodes)**	**December 1971**

SEMICONDUCTORS AND INTEGRATED CIRCUITS (RED SERIES)

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

Part 1a Rectifier diodes and thyristors — **December 1972**

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

Part 1b Diodes — **December 1972**

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 — **October 1971**

Part 3 High frequency and switching transistors — **November 1971**

Part 4 Special types — **December 1971**

Transmitting transistors
Microwave devices
Field effect transistors
Dual transistors
Microminiature devices for thick- and thin-film circuits
Photoconductive devices
Photodiodes
Phototransistors
Light emitting diodes
Infra-red sensitive devices

Part 5 Linear integrated circuits — **February 1972**

Part 6 Digital integrated circuits — **March 1972**

DTL (FC family)
DTL/HNIL (FZ family)
TTL (FJ family)
TTL (GJ family)
CML (GH family)
MOS (FD family)

COMPONENTS AND MATERIALS (GREEN SERIES)

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

Part 1 Circuit Blocks, Input/Output Devices, Electro-mechanical Components, Peripheral Devices — **October 1971**

Circuit blocks 40-Series
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 — **December 1971**

Fixed resistors
Variable resistors
Non-linear resistors
Ceramic capacitors
Paper capacitors and film capacitors
Electrolytic capacitors
Variable capacitors

Part 3 Radio, Audio, Television — **February 1972**

FM tuners
Coil assemblies
Piezoelectric ceramic resonators and filters
Loudspeakers
Audio and mains transformers
Television tuners, aerial input assemblies
Components for black and white television
Components for colour television
Deflection assemblies for camera tubes

Part 4 Magnetic Materials, Piezoelectric Ceramics, Ni Cd cells — **May 1972**

Ferrites for radio, audio and television
Small coils and assembling parts
Ferroxcube potcores and square cores
Ferroxcube transformer cores
Piezoelectric ceramics
Permanent magnet materials
Cylindrical nickel cadmium cells *)

Part 5 Memory Products, Magnetic Heads, Quartz Crystals, Microwave Devices, Variable Transformers — **August 1972**

Ferrite memory cores
Matrix planes, matrix stacks
Complete memories
Magnetic heads
Quartz crystal units, crystal filters
Isolators, circulators
Variable mains transformers

Part 6 Electric Motors and Accessories, Timing and Control Devices — **October 1972**

Small synchronous motors
Stepper motors
D.C. motors
D.C. tachogenerators
Asynchronous motors
Indicators for built-in test equipment
Time indicators, timers, timing motors
Aircraft electronic clock system

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

*) These items have been discontinued

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 ($R_{th\ j\text{-}mb} > 15\ ^{o}C/W$)
- D Power transistor for a.f. applications ($R_{th\ j\text{-}mb} \leq 15\ ^{o}C/W$)
- E Tunnel diode
- F Transistor for h.f. applications ($R_{th\ j\text{-}mb} > 15\ ^{o}C/W$)
- 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 ($R_{th\ j\text{-}mb} \leq 15\ ^{o}C/W$)
- 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 ($R_{th\ j\text{-}mb} > 15\ ^{o}C/W$)
- S Transistor for switching applications ($R_{th\ j\text{-}mb} > 15\ ^{o}C/W$)
- T Electrically, or by means of light, triggered controlling and switching power device having a breakdown characteristic ($R_{th\ j\text{-}mb} \leq 15\ ^{o}C/W$) [1]
- U Power transistor for switching applications ($R_{th\ j\text{-}mb} \leq 15\ ^{o}C/W$)
- 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) rectifying 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 dash (-)
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 zener voltage and where appropriate the letter R [1])
The first letter indicates the nominal tolerance of the zener voltage in %

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

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

b) for rectifying 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.

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

Pro-Electron type numbers of whiskerless diodes

Letter combination-background colour

BA - beige
BAV - light green
BAW - light blue
BAX - black
BAY - light red

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.

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

LETTER SYMBOLS FOR SEMICONDUCTOR DEVICES
excluding rectifier diodes, thyristors and integrated circuits

This system is based on the Recommendations of the INTERNATIONAL ELECTROTECHNICAL COMMISSION as published in I.E.C. Publication 148.

QUANTITY SYMBOLS

1. Instantaneous values of current, voltage and power, which vary with time are represented by the appropriate lower case letter.

   Examples: i, v, p

2. Maximum (peak), average, d.c. and root-mean-square values are represented by the appropriate upper case letter.

   Examples: I, V, P

SUBSCRIPTS FOR QUANTITY SYMBOLS

1. Total values are indicated by upper case subscripts.

   Examples: I_C, I_{CM}, $I_{C(AV)}$, i_C, V_{EB}

2. Values of varying components are indicated by lower case subscripts.

   Examples: i_c, I_c, v_{eb}, V_{eb}

3. To distinguish between maximum (peak), average, d.c. and root-mean-square values, the following subscripts are added:

   For maximum (peak) values : M or m

   For average values : (AV) or (av) (only if it is necessary to distinguish between d.c. and average)

   For d.c. values : no additional subscript

   For root-mean-square values : (RMS) or (rms)

   Examples: I_C, I_{cm}, $I_{C(AV)}$, $I_{c(rms)}$, $I_{C(RMS)}$

4. List of subscripts (examples, see figure 1)

A, a	= Anode terminal
K, k	= Cathode terminal
E, e	= Emitter terminal
B, b	= Base terminal or Substrate for MOS devices
C, c	= Collector terminal
D, d	= Drain terminal
(BR)	= Break-down
X, x	= Specified circuit
M, m	= Maximum (peak) value
(AV), (av)	= Average value
(RMS), (rms)	= R.M.S. value
F, f	= Forward
G, g	= Gate terminal
R, r	= As first subscript: Reverse. As second subscript: Repetitive
O, o	= As third subscript: The terminal not mentioned is open circuited
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
Z, z	= Zener. (Replaces R to indicate the actual zener voltage, current or power of voltage reference or voltage regulator diodes)

5. Examples of the application of the rules:
Figure 1 represents a transistor collector current, consisting of a direct current and a signal, as a function of time.

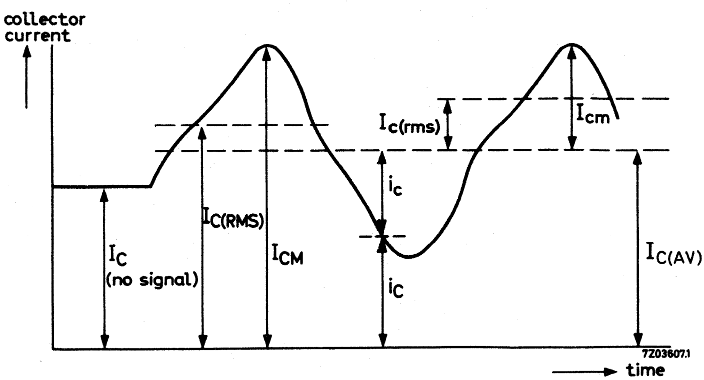


Fig.1

CONVENTIONS FOR SUBSCRIPT SEQUENCE

1. Currents

For transistors: the first subscript indicates the terminal carrying the current (conventional current flow from the external circuit into the terminal is positive)

For diodes: a forward current (conventional current flow into the anode terminal) is represented by the subscript F or f; a reverse current (conventional current flow out of the anode terminal) is represented by the subscript R or r.

2. Voltages

For transistors: normally, two subscripts are used to indicate the points between which the voltage is measured. The first subscript indicates one terminal point and the second the reference terminal.
Where there is no possibility of confusion, the second subscript may be omitted.

For diodes: a forward voltage (anode positive with respect to cathode) is represented by the subscript F or f and a reverse voltage (anode negative with respect to cathode) by the subscript R or r.

3. Supply voltages

Supply voltages may be indicated by repeating the terminal subscript.

Examples: V_{EE}, V_{CC}, V_{BB}

The reference terminal may then be indicated by a third subscript.

Examples: V_{EEB}, V_{CCB}, V_{BBC}

4. In devices having more than one terminal of the same type, the terminal subscripts are modified by adding a number following the subscript and on the same line.

Example: V_{B2-E} voltage between second base and emitter

In multiple unit devices, the terminal subscripts are modified by a number preceding the terminal subscripts:

Example: V_{1B-2B} voltage between the base of the first unit and that of the second one.

ELECTRICAL PARAMETER SYMBOLS

1. The values of four pole matrix parameters or other resistances, impedances admittances, etc... inherent in the device, are represented by the lower case symbol with the appropriate subscripts.

   Examples: h_{ib}, z_{fb}, y_{oc}, h_{FE}

2. The four pole matrix parameters of external circuits and of circuits in which the device forms only a part are represented by the upper case symbols with the appropriate subscripts.

   Examples: H_i, Z_o, H_F, Y_R

SUBSCRIPTS FOR PARAMETER SYMBOLS

1. The static values of parameters are indicated by upper case subscripts.

   Examples: h_{IB}, h_{FE}

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.

2. The small-signal values of parameters are indicated by lower case subscripts.

   Examples: h_{ib}, z_{ob}

3. The first subscript, in matrix notation identifies the element of the four pole matrix.

   i (for 11) = input
   o (for 22) = output
   f (for 21) = forward transfer
   r (for 12) = reverse transfer

   Examples:
   $$V_1 = h_i I_1 + h_r V_2$$
   $$I_2 = h_f I_1 + h_o V_2$$

Notes 1) The voltage and current symbols in matrix notation are indicated by a single digit subscript.
The subscript 1 = input; the subscript 2 = output

2) The voltages and currents in these equations may be complex quantities.

4. The second subscript identifies the circuit configuration.

e = common emitter
b = common base
c = common collector
j = common terminal, general

Examples: (common base)

$$I_1 = y_{ib} V_{1b} + y_{rb} V_{2b}$$
$$I_2 = y_{fb} V_{1b} + y_{ob} V_{2b}$$

When the common terminal is understood, the second subscript may be omitted.

5. If it is necessary to distinguish between real and imaginary parts of the four pole parameters, the following notations may be used.

$Re(h_{ib})$ etc.. for the real part

$Im(h_{ib})$ etc.. for the imaginary part

LIST OF LETTER SYMBOLS IN ALPHABETICAL ORDER

Letter symbol	Definition
B	Bandwidth
b_{ib}, b_{ie}, b_{is}, b_{fb}, b_{fe}, b_{fs}, b_{ob}, b_{oe}, b_{os}, b_{rb}, b_{re}, b_{rs}.	See y parameters
C_c [1]	Collector capacitance (emitter open-circuited to a.c. and d.c.)
C_d [1]	Diode capacitance
C_e [1]	Emitter capacitance (collector open-circuited to a.c. and d.c.)
C_{ib}, C_{ie}, C_{is}, C_{fb} C_{fe}, C_{fs}, C_{ob}, C_{oe} C_{os}, C_{rb}, C_{re}, C_{rs}	See y parameters
d	Distortion
F	Noise figure
f	Frequency
f_{hfb}, f_{hfe}, f_{yfe}	Cut-off frequency (frequency at which the parameter indicated by the subscript is 0.7 of its low frequency value)
f_T	Transition frequency (Gain-bandwidth product)
g_{ie}, g_{ib}, g_{oe}, g_{ob}	See y parameters
G_p	Power gain
G_S	Source conductance
G_{tr}	Transducer gain
G_{UM}	Maximum unilateralised power gain
G_v	Voltage gain

1) As an exception to the general rule for electrical parameters capacitances are represented by the upper-case letter.

Letter symbol	Definition
h_{FB}, h_{FC}, h_{FE}	D.C. current gain (static value of the forward current transfer ratio; output voltage held constant)
h_{fb}, h_{fc}, h_{fe}	Small-signal current gain (small-signal value of the forward current transfer ratio; output short-circuited to a.c.)
h_{IB}, h_{IC}, h_{IE}	Static value of the input resistance (output voltage held constant)
h_{ib}, h_{ic}, h_{ie}	Small-signal value of the input impedance (output short-circuited to a.c.)
h_{OB}, h_{OC}, h_{OE}	Static value of the output conductance (input current held constant)
h_{ob}, h_{oc}, h_{oe}	Small-signal value of the output admittance (input open-circuited to a.c.)
h_{RB}, h_{RC}, h_{RE}	Static value of the reverse voltage transfer ratio (input current held constant)
h_{rb}, h_{rc}, h_{re}	Small-signal value of the reverse voltage transfer ratio (input open-circuited to a.c.)
I_B, I_C, I_D, I_E, I_G, I_S	Total d.c. (or average) current
I_b, I_c, I_d, I_e, I_g, I_s	Varying component of the current
i_B, i_C, i_D, i_E, i_G, i_S	Instantaneous total value of the current
i_b, i_c, i_d, i_e, i_g, i_s	Instantaneous value of the varying component of the current
$I_{B(AV)}$, $I_{C(AV)}$, $I_{E(AV)}$	Total average current (to distinguish between average and d.c. if necessary)
I_{BEX}, I_{CEX}	Total base, respectively collector current under specified conditions. These symbols are commonly used in case of a reverse biased emitter junction
I_{BM}, I_{CM}, I_{EM}	Maximum (peak) value of the total current
I_{bm}, I_{cm}, I_{em}	Maximum (peak) value of the varying component of the current
I_{CBO}	Collector cut-off current (open emitter)
I_{CEO}	Collector cut-off current (open base)
I_{CBS} or I_{CES}	Collector cut-off current (emitter short-circuited to base)

Letter symbol	Definition
I_{DSS}	Drain current (source short-circuited to gate)
I_{EBO}	Emitter cut-off current (open collector)
I_F	Total forward current of a diode (d.c. or average)
i_F	Instantaneous total value of the forward current of a diode
$I_{F(AV)}$	Total average forward current of a diode (to distinguish between average and d.c. if necessary)
I_{FM}	Peak forward current of a diode
I_{GSS}	Gate cut-off current (source short-circuited to drain)
I_i, I_o	Input, respectively output current of a specified circuit
I_R	Total reverse (cut-off) current of a diode
i_R	Instantaneous total value of the reverse current of a diode
I_{RRM}	Repetitive peak reverse current of a diode
I_{RSM}	Non-repetitive peak reverse current of a diode
I_{SDS}	Source cut-off current (drain short-circuited to gate)
I_Z	Zener current (d.c. or average)
I_{ZM}	Peak zener current
I_{ZS}	Non-repetitive zener current
P_i, P_o	Input, respectively output power of a specified circuit
P_{tot}	Total power dissipation in the device
P_Z	Zener power dissipation
P_{ZM}	Peak zener power dissipation
P_{ZSM}	Non-repetitive peak zener power dissipation
Q_s	Reverse recovery charge

Letter symbol	Definition
r_D	Diode (internal) series resistance
r_{DS}	Drain-source resistance
r_{GS}	Gate-source resistance
R_L	Load resistance
R_S	Source resistance
R_{th}	Thermal resistance
$R_{th\ j\text{-}a}$	Thermal resistance from junction to ambient
$R_{th\ j\text{-}mb}$	Thermal resistance from junction to mounting base
$R_{th\ j\text{-}c}$	Thermal resistance from junction to case
$R_{th\ mb\text{-}h}$	Thermal resistance from mounting base to heatsink (contact thermal resistance)
r_Z	Dynamic-slope resistance of a zener diode
S_Z	Temperature coefficient of the operating voltage of a zener diode
T_{amb}	Ambient temperature
T_{case}	Case temperature
t_d ; t_f	Delay time; fall time
t_{fr}	Forward recovery time of a diode
T_j	Junction temperature
t_{off}	Turn-off time ($t_{off} = t_s + t_f$)
t_{on}	Turn-on time ($t_{on} = t_d + t_r$)
t_r	Rise time
t_{rr}	Reverse recovery time of a diode
t_s	Storage time
T_{stg}	Storage temperature
V_{BB}, V_{CC}, V_{EE}	Supply voltage
V_{BE}, V_{CB}, V_{CE}, V_{EB}	Total value of the voltage (d.c. or average)
V_{be}, V_{cb}, V_{ce}, V_{eb}	Varying component of the voltage
v_{BE}, v_{CB}, v_{CE}, v_{EB}	Instantaneous value of the total voltage
v_{be}, v_{cb}, v_{ce}, v_{eb}	Instantaneous value of the varying component of the voltage

Letter symbols	Definition
V_{BEfl}	Base-emitter floating voltage (open base)
V_{BEsat}	Saturation voltage at specified bottoming conditions
$V_{(BR)}$	Breakdown voltage
$V_{(BR)CBO}$, $V_{(BR)CEO}$, $V_{(BR)EBO}$	Breakdown voltage between the terminal indicated by the first subscript and the reference terminal (second subscript) when the third terminal is open circuited
$V_{(BR)CER}$	Collector-emitter breakdown voltage with a specified resistance between emitter and base
$V_{(BR)CES}$	Collector-emitter breakdown voltage with the emitter short circuited to the base
V_{CBO}, V_{CEO}, V_{DGO}, V_{EBO}, V_{GSO}	Voltage of the terminal indicated by the first subscript w.r.t. the reference terminal (second subscript) with the third terminal open circuited
V_{CBOM}, V_{CEOM}	Peak value of V_{CBO}, V_{CEO}
V_{CEK}	Knee voltage at specified conditions
V_{CER}	Collector-emitter voltage with a specified resistance between emitter and base
V_{CERM}	Peak value of V_{CER}
V_{CES}	Collector-emitter voltage with the emitter short circuited to the base
V_{CEsat}	Saturation voltage at specified bottoming conditions
$V_{CE.sust}$	Collector-emitter sustaining voltage under the condition, indicated by the third subscript
V_{CEX}	Collector-emitter voltage in a specified circuit. This symbol is commonly used to indicate a reverse biased emitter junction
V_{DSS}	Drain-source voltage with the source short-circuited to the gate
V_{EBfl}	Emitter-base floating voltage (open emitter)
V_F	Continuous forward voltage of a diode
V_{FM}	Peak forward voltage of a diode

Letter symbol	Definition	
V_i, V_o	Input, respectively output voltage of a specified circuit	
$V_{(P)GS}$	Gate-source cut-off voltage	
V_R	Continuous reverse voltage of a diode	
V_{RM}	Peak reverse voltage of a diode	
V_{RSM}	Non-repetitive peak reverse voltage of a diode	
V_Z	Operating voltage (zener voltage) of a zener diode	
y_{ib}, y_{ie}, y_{is}	Input admittance	Output short circuited to a.c.
b_{ib}, b_{ie}, b_{is}	Input susceptance	
g_{ib}, g_{ie}, g_{is}	Input conductance	
C_{ib}, C_{ie}, C_{is}	Input capacitance	
φ_{ib}, φ_{ie}, φ_{is}	Phase angle of input admittance	
y_{fb}, y_{fe}, y_{fs}	Transfer admittance	Output short circuited to a.c.
b_{fb}, b_{fe}, b_{fs}	Transfer susceptance	
g_{fb}, g_{fe}, g_{fs}	Transfer conductance	
C_{fb}, C_{fe}, C_{fs}	Transfer capacitance	
φ_{fb}, φ_{fe}, φ_{fs}	Phase angle of transfer admittance	
y_{ob}, y_{oe}, y_{os}	Output admittance	Input short circuited to a.c.
b_{ob}, b_{oe}, b_{os}	Output susceptance	
g_{ob}, g_{oe}, g_{os}	Output conductance	
C_{ob}, C_{oe}, C_{os}	Output capacitance	
φ_{ob}, φ_{oe}, φ_{os}	Phase angle of output admittance	
y_{rb}, y_{re}, y_{rs}	Feedback admittance	Input short circuited to a.c.
b_{rb}, b_{re}, b_{rs}	Feedback susceptance	
g_{rb}, g_{re}, g_{rs}	Feedback conductance	
C_{rb}, C_{re}, C_{rs}	Feedback capacitance	
φ_{rb}, φ_{re}, φ_{rs}	Phase angle of feedback admittance	
Z_{th}	Transient thermal impedance	

Germanium small signal diodes

Point contact

TYPE SELECTION

Germanium point contact diodes

Quoted values are max.

	type	case	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	DO-7	20	8	45	–	–	1,5	10
	OA91	DO-7	90	50	150	–	–	1,9	10
	OA95	DO-7	90	50	150	–	–	1,5	10
switching	AAY21	DO-7	15	20	50*)	1,2	1,2	0,8	10
a.m. and f.m. detection	AA119 2–AA119	DO-7	30	35	100	–	–	2,2	10

*) I_{FM}

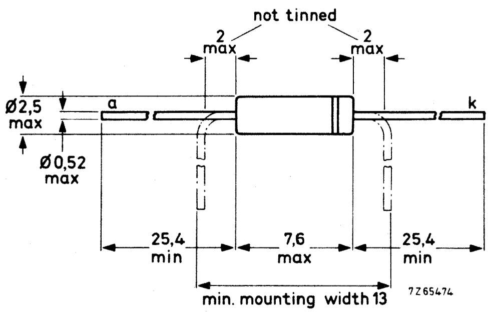
POINT CONTACT DIODE

Germanium point contact diode in a subminiature 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

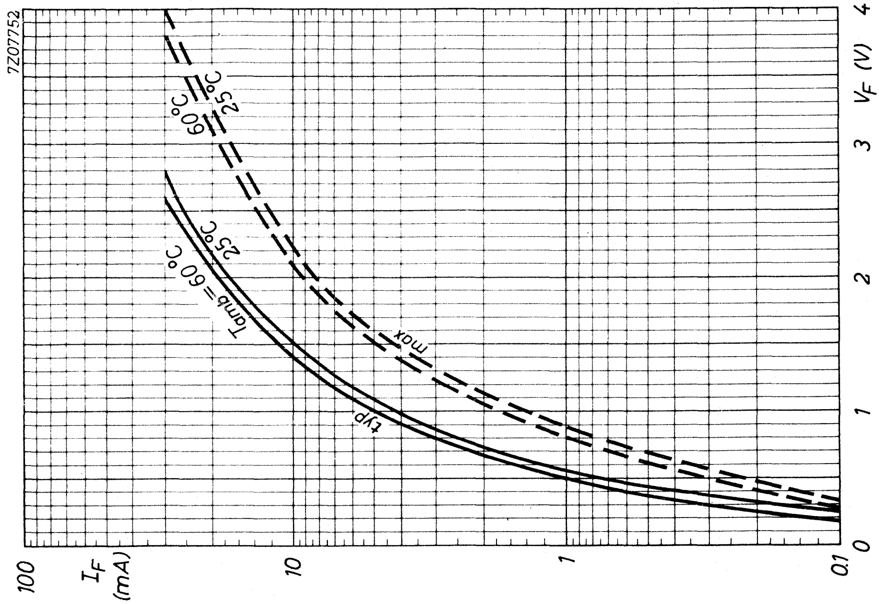
Reverse current at T_{amb} = 25 °C

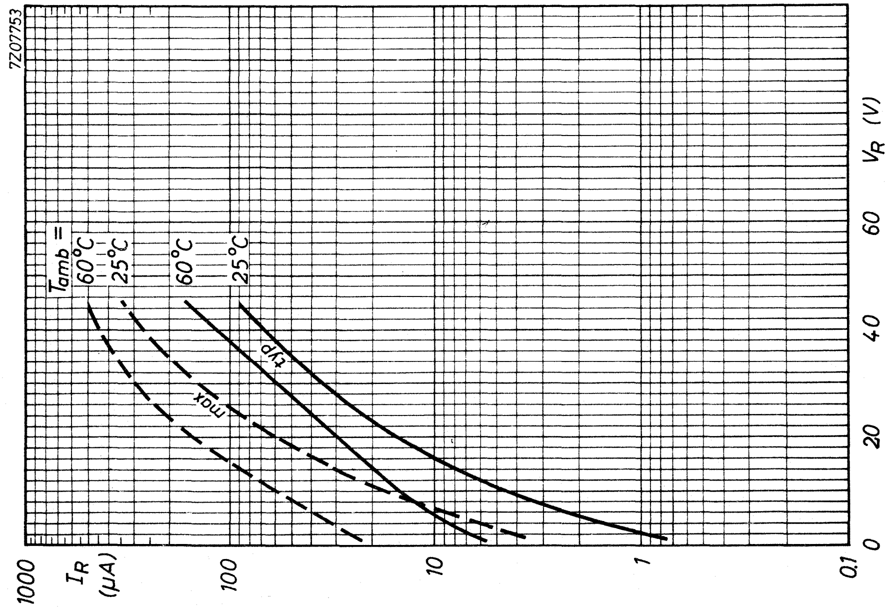
V_R = 0.1 V	I_R	typ.	0.35	μA
		<	1.0	μA
V_R = 1.5 V	I_R	typ.	0.8	μA
		<	2.8	μA
V_R = 10 v	I_R	typ.	4.5	μA
		<	18	μA
V_R = 30 V	I_R	typ.	35	μA
		<	150	μA
V_R = 45 V	I_R	typ.	90	μA
		<	350	μA

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

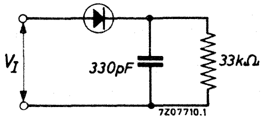
[1]) Measured under pulsed conditions to prevent excessive dissipation.


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


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

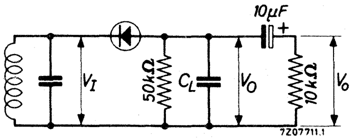
APPLICATION INFORMATION

Measuring circuit at T_{amb} = 25 °C



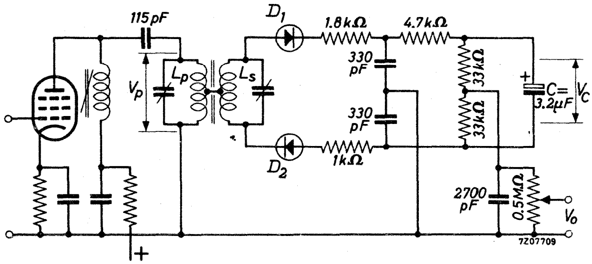
$V_{I(RMS)}$ = 3 V		η	typ.	85	%
f = 10.7 MHz		R_d	typ.	15	kΩ
			13.5 to 19		kΩ

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

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

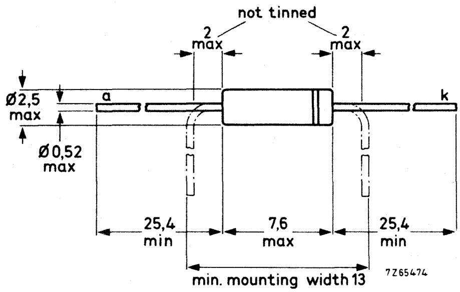
[1]) Modulation factor m = 0.3
[2]) Modulation factor m = 0
[3]) Measured in the circuit with V_p = 350 mV

POINT CONTACT DIODE

Germanium point contact diode in a subminiature 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 °C unless otherwise specified

Forward voltage			
I_F = 2 mA	V_F	0.25 to 0.45	V
I_F = 2 mA; T_j = 60 °C	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 °C	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 °C	V_F	0.54 to 1.44	V
Reverse current			
V_R = 5 V; T_{amb} = 60 °C	I_R	< 30	μA
V_R = 5 V; T_{amb} = 25 °C	I_R	< 10	μA
V_R = 15 V; T_{amb} = 60 °C	I_R	< 100	μA
V_R = 15 V; T_{amb} = 25 °C	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 Ω			
measured at I_R = 1 mA	t_{rr}	typ. 5	ns
		< 12	ns

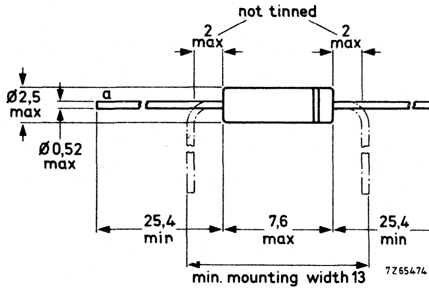
POINT CONTACT DIODE

Germanium diode in subminiature all glass DO-7 construction for use as video detector and general purpose.

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)

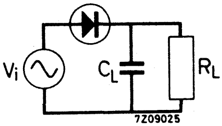
Average reverse voltage (averaged over any 50 ms period)	V_R	max.	20	V
Repetitive peak reverse voltage	V_{RRM}	max.	30	V
Non-repetitive peak reverse voltage	V_{RSM}	max.	40	V
Average forward current (averaged over any 50 ms period)	I_F	max.	8	mA
Repetitive peak forward current	I_{FRM}	max.	45	mA
Non-repetitive 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

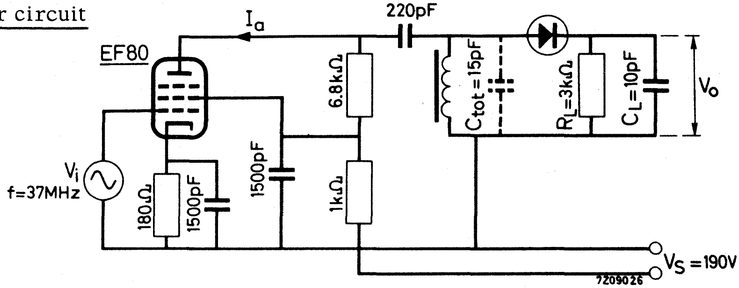
APPLICATION INFORMATION

Measuring circuit



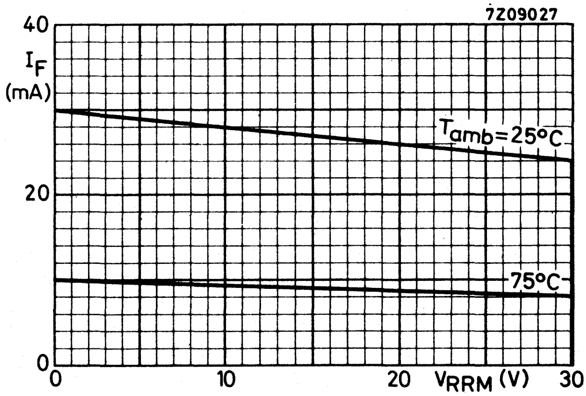
V_{im}	=	5	1.4	0.5	5	V
f	=	40	40	40	30	MHz
C_L	=	10	10	10	10	pF
R_L	=	3	3	3	3.9	kΩ
η	typ.	63	54	34	>60	%
R_d	typ.	2.4	2.8	3.7	>2.9	kΩ

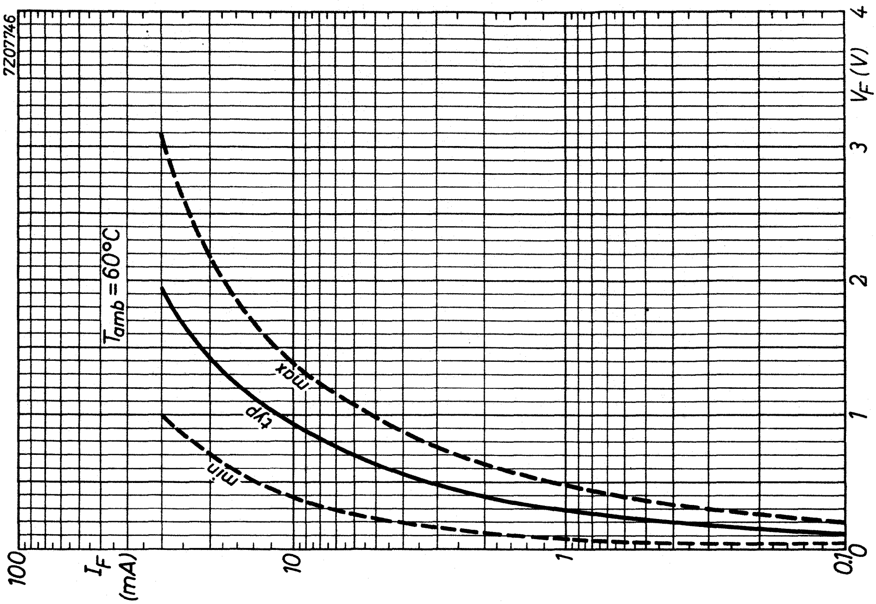
Video detector circuit

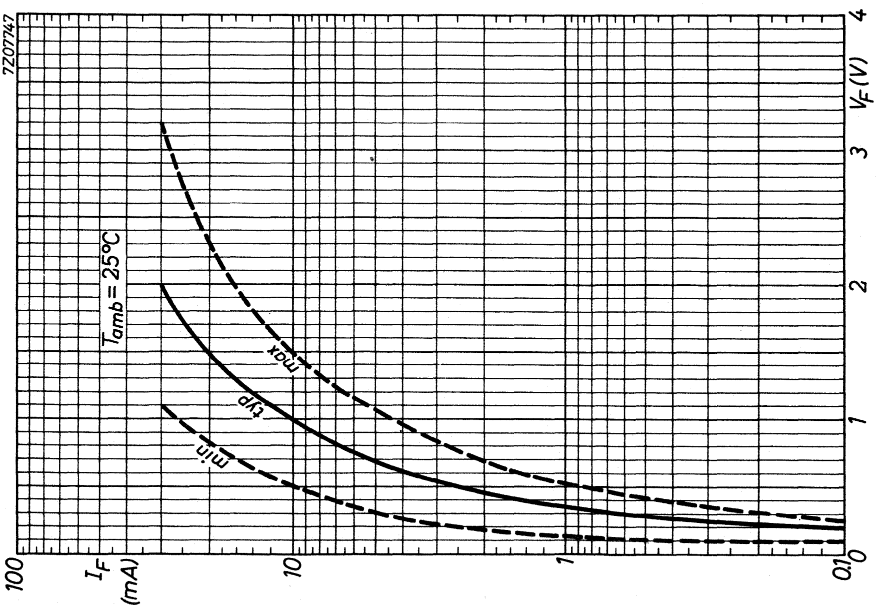


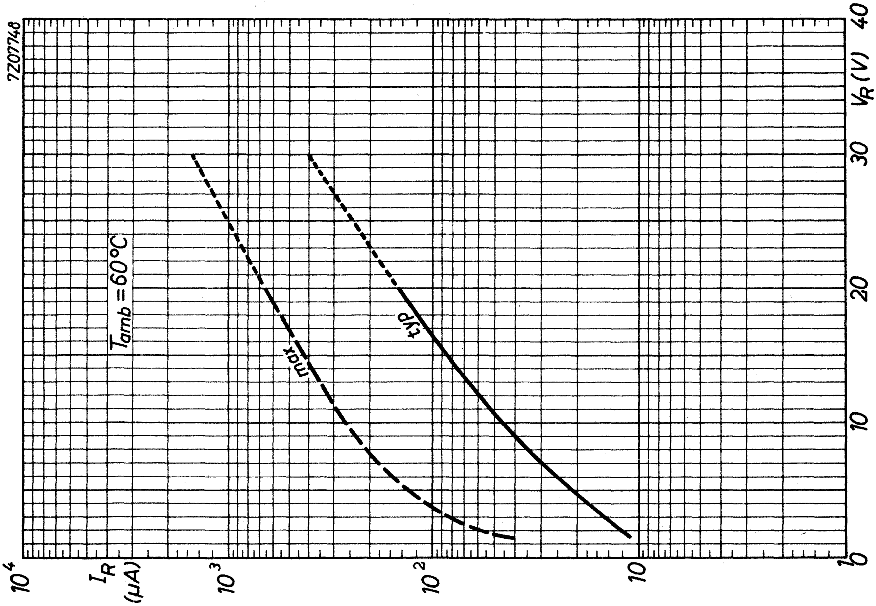
Q of the tuned circuit with removed diode: Q = 19

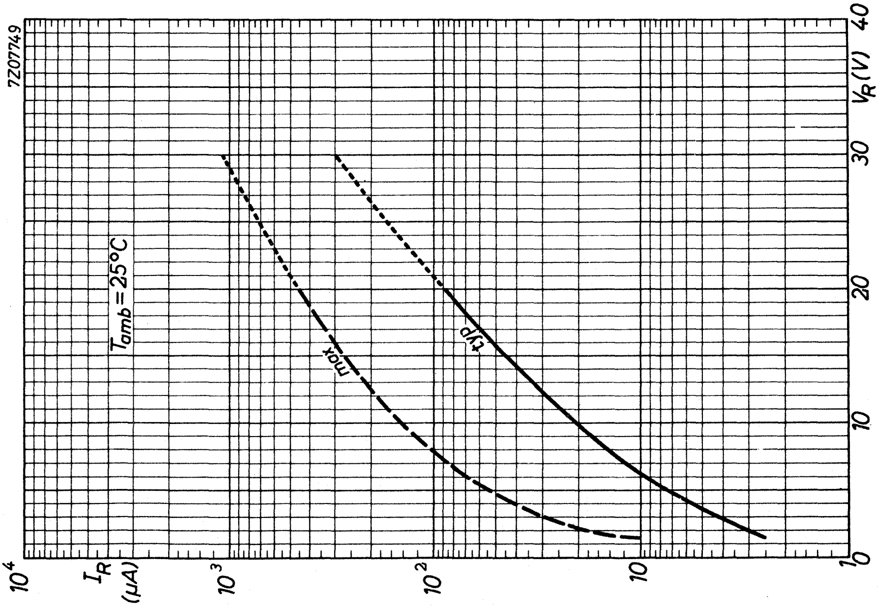
I_{am}	=	2.5	0.25	mA
B	=	4.7	4.1	MHz
V_o	typ.	2.7	0.20	V

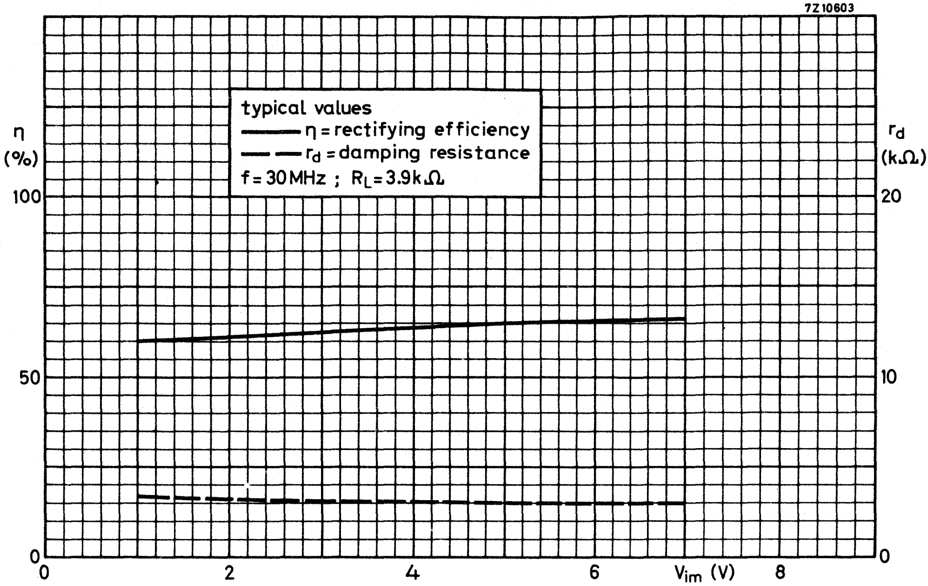



7Z07746
Tamb = 60°C
max
typ
min
IF (mA)
100
10
1
0.1
VF (V)
0
1
2
3
4


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


7Z07748
Tamb = 60°C
max
typ
VR (V)
IR (μA)
10^4
10^3
10^2
10
1
0
10
20
30
40


7Z07749
Tamb = 25°C
max
typ
VR (V)
IR (μA)
10^4
10^3
10^2
10
1
0
10
20
30
40

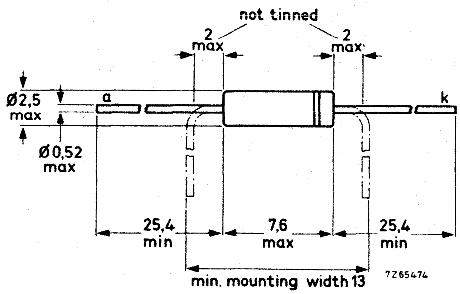

7Z10603
typical values
η = rectifying efficiency
r_d = damping resistance
f = 30 MHz ; R_L = 3.9 kΩ
η
(%)
100
50
0
r_d
(kΩ)
20
10
0
0
2
4
6
V_{im} (V)
8

POINT CONTACT DIODE

Germanium diode in subminiature all glass DO-7 construction 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)

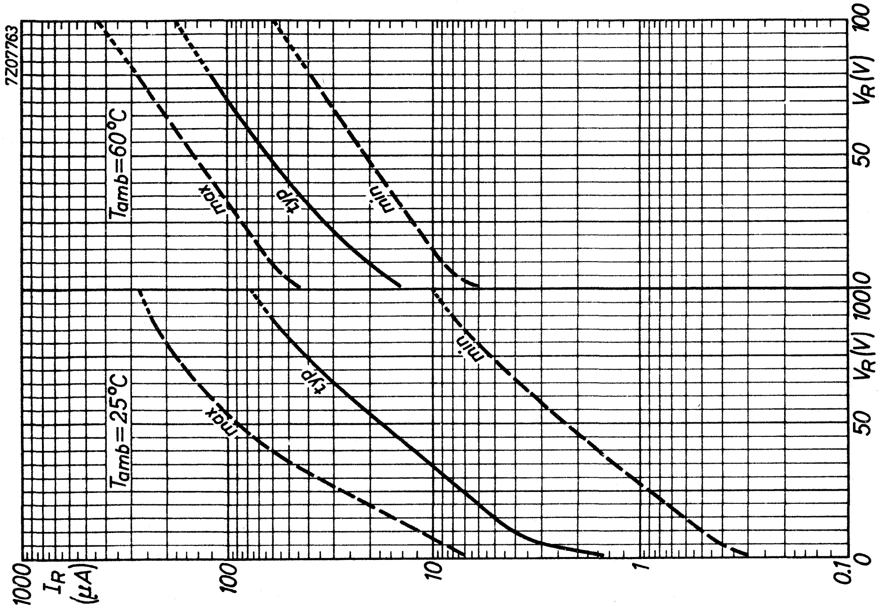
Average reverse voltage (averaged over any 50 ms period)	V_R	max.	90	V
Repetitive peak reverse voltage	V_{RRM}	max.	115	V
Average forward current (averaged over any 50 ms period)	I_F	max.	50	mA
Repetitive peak forward current	I_{FRM}	max.	150	mA
Non-repetitive peak forward current ($t < 1$ s)	I_{FSM}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

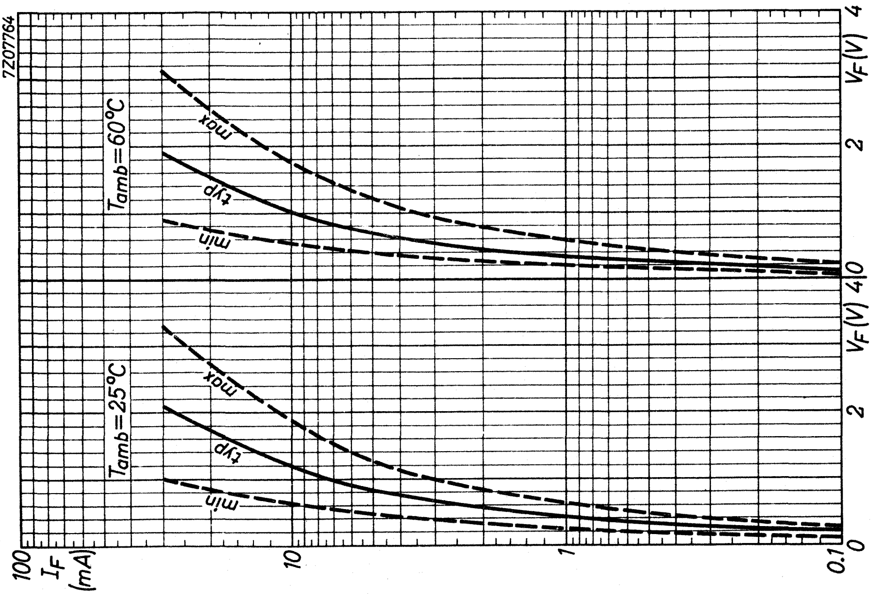
THERMAL RESISTANCE

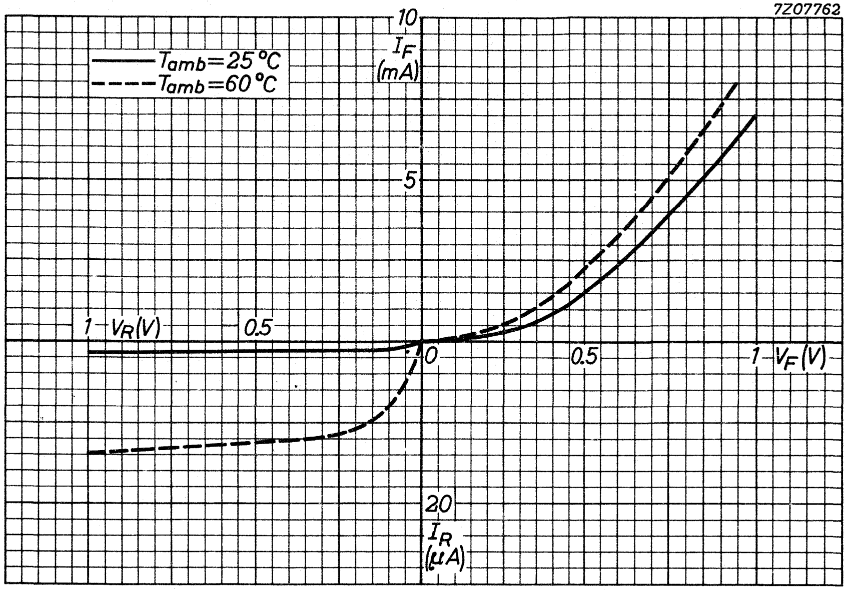
From junction to ambient in free air $R_{th\ j\text{-}a}$ = 0.55 °C/mW

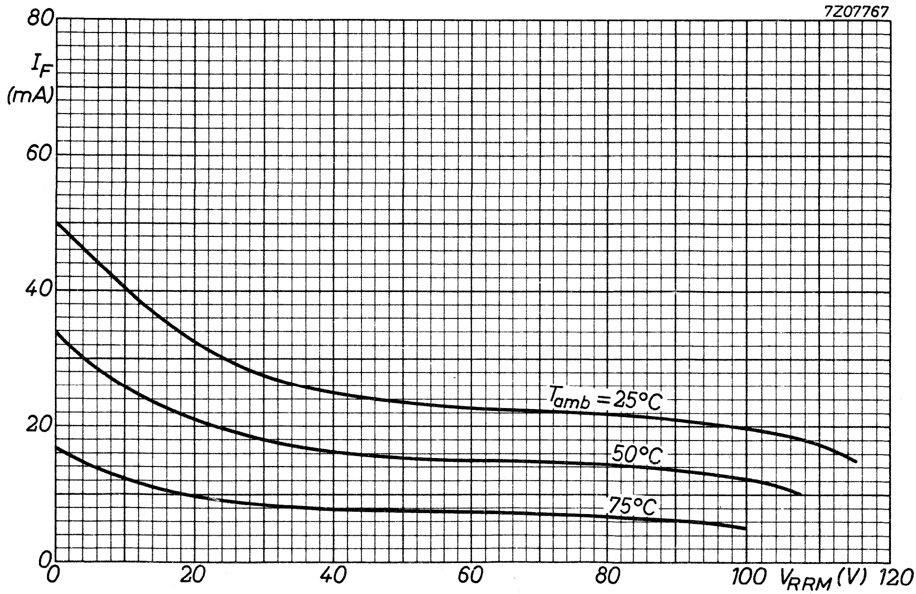
CHARACTERISTICS

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


7Z07763
Tamb=60°C
Tamb=25°C
max
typ
min
VR(V)
IR (μA)
1000
100
10
1
0.1
0
50
100


7Z07764
Tamb=60°C
Tamb=25°C
max
typ
min
VF(V)
IF (mA)
100
10
1
0.1
0
2
4


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)

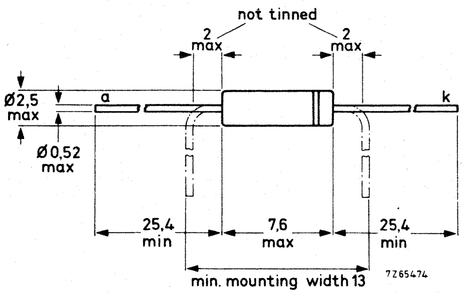

7Z07767
80
I_F
(mA)
60
40
20
0
T_{amb} =25°C
50°C
75°C
0
20
40
60
80
100 V_{RRM} (V) 120

POINT CONTACT DIODE

Germanium diode in subminiature all glass DO-7 construction 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)

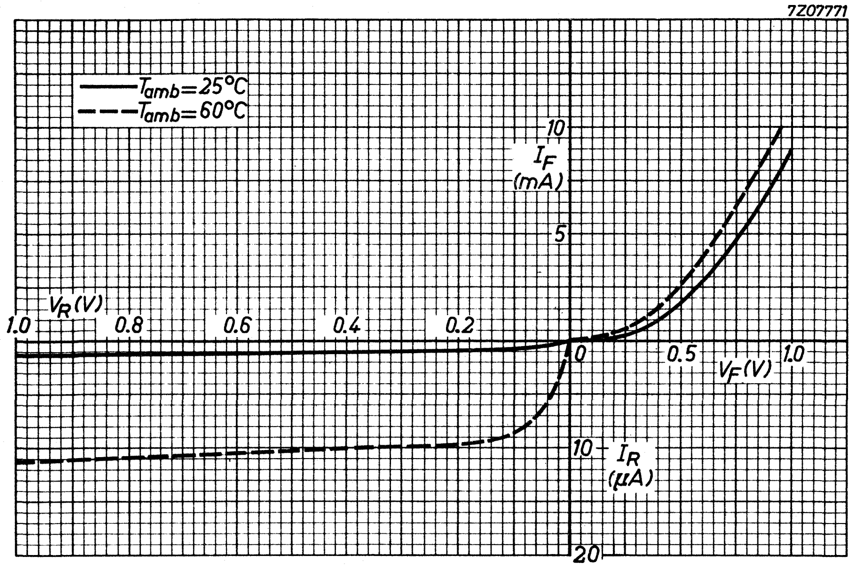
Average reverse voltage (averaged over any 50 ms period)	V_R	max.	90	V
Repetitive peak reverse voltage	V_{RRM}	max.	115	V
Average forward current (averaged over any 50 ms period)	I_F	max.	50	mA
Repetitive peak forward current	I_{FRM}	max.	150	mA
Non-repetitive peak forward current ($t < 1$ s)	I_{FSM}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

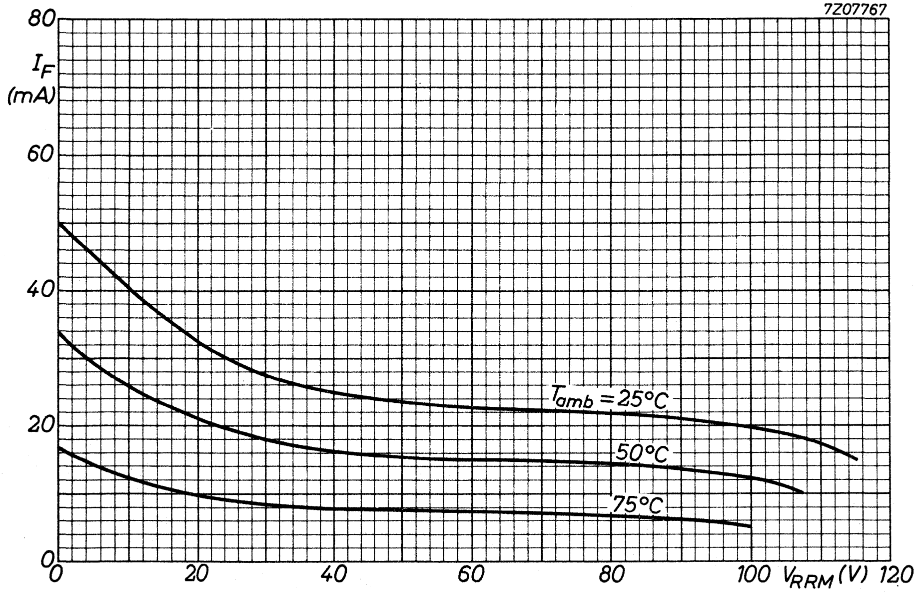
THERMAL RESISTANCE

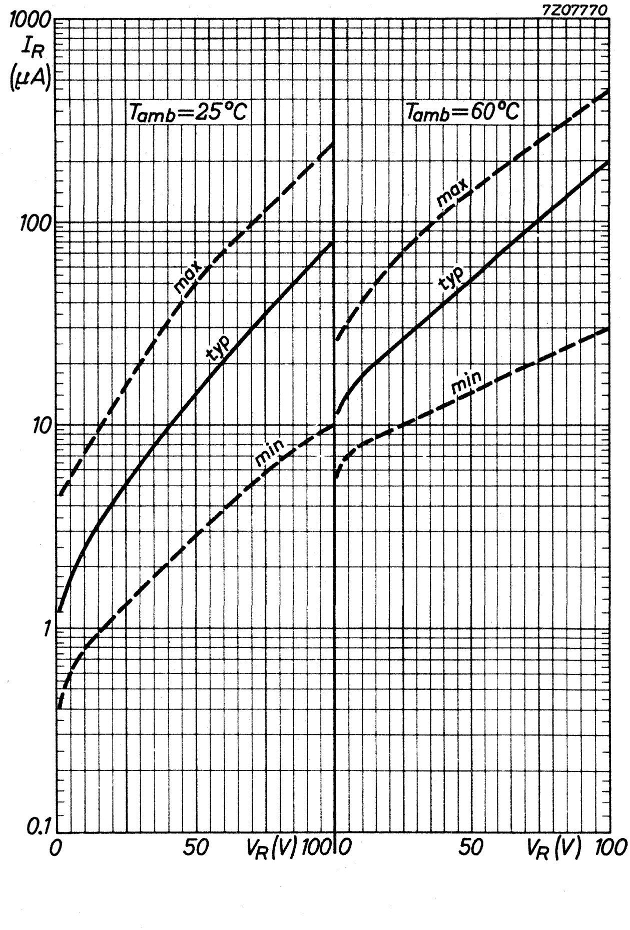
From junction to ambient in free air $R_{th\ j\text{-}a}$ = 0.55 °C/mW

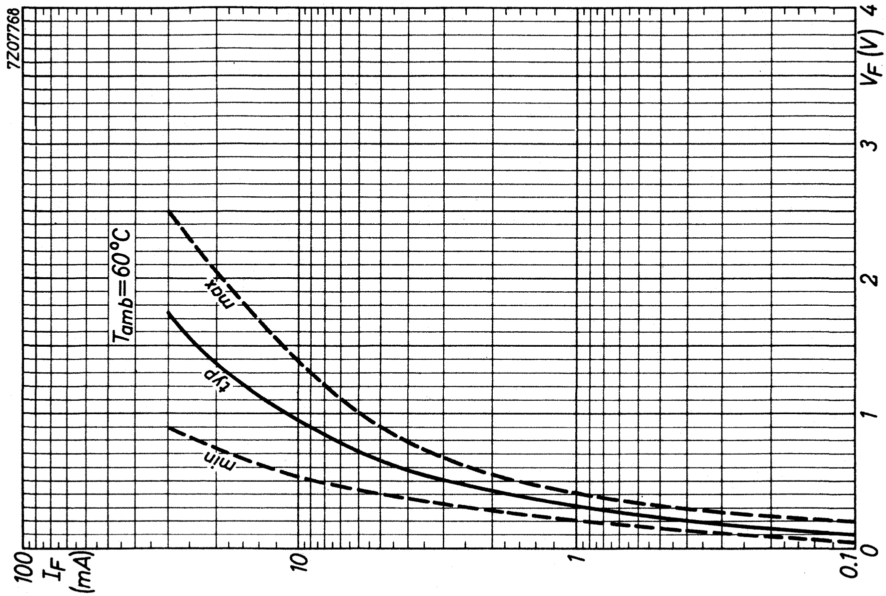
CHARACTERISTICS

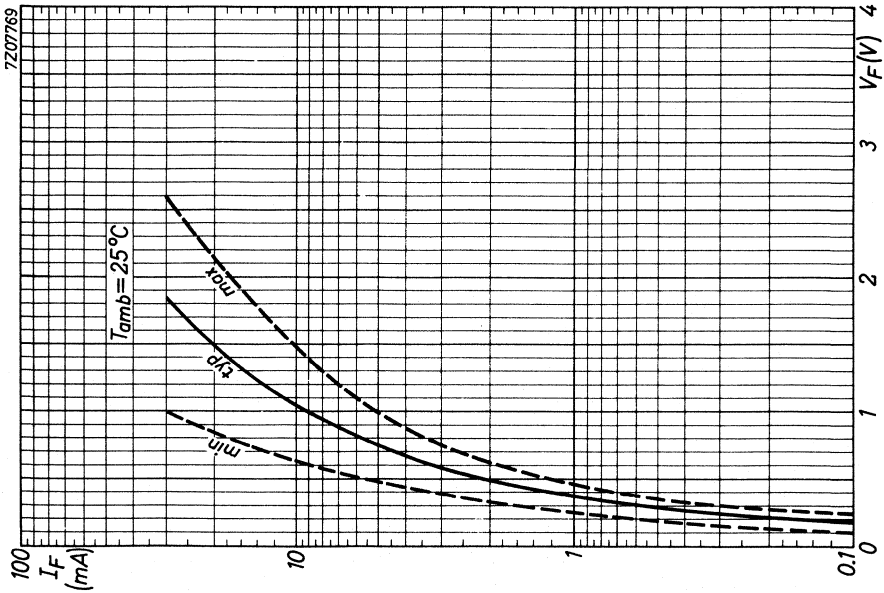
		T_{amb} = 25 °C	T_{amb} = 60 °C	
Forward voltage				
I_F = 0.1 mA	V_F	typ. 0.18	typ. 0.1	V
		0.1 to 0.25	0.05 to 0.2	V
I_F = 10 mA	V_F	typ. 1.05	typ. 0.95	V
		0.65 to 1.5	0.55 to 1.4	V
I_F = 30 mA	V_F	typ. 1.85	typ. 1.75	V
		1.0 to 2.6	0.9 to 2.5	V
Reverse current				
V_R = 1.5 V	I_R	typ. 1.2	typ. 12	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)
T_{amb}=25°C
T_{amb}=60°C
max
typ
min
max
typ
min
100
10
1
0.1
0
50
V_R(V) 100
0
50
V_R(V) 100


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


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

Germanium small signal diodes

Gold bonded

TYPE SELECTION

Germanium gold bonded diodes

Quoted values are max.

	type	case	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	DO-7	75	140	250	–	2	1, 1	250
	AAZ17	DO-7	50	140	250	–	2	1, 1	250
general purpose and switching	AAY30	DO-7	30	110	400	150	1	1	150
	AAY32	DO-7	30	110	150	50	1, 5	1	150
	AAZ13	DO-7	8	30	100	–	2	1	30
	AAZ18	DO-7	20	130	300	70	2, 5	1	300
	OA47	DO-7	25	110	150	70	3, 5	1, 1	150

GOLD BONDED DIODES

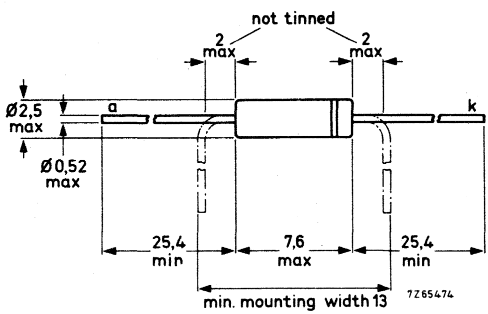
Gold bonded germanium diodes in subminiature all glass DO-7 envelope, intended for switching applications and general purposes.

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	°C
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 $R_{th\,j-a}$ = 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

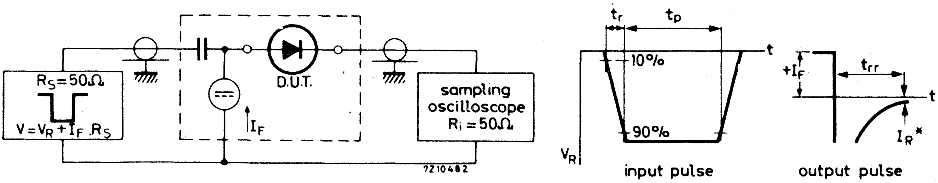
			AAY30	AAY32	
Reverse current at T_j = 25 °C					
V_R = 1.5 V	I_R	<	9	2.5	μA
V_R = 10 V	I_R	<	15	8	μA
V_R = 20 V	I_R	<	25	25	μA
V_R = 25 V	I_R	<	35	35	μA
V_R = 30 V	I_R	<	50	70	μA
V_R = 50 V	I_R	<	200	–	μA
Reverse current at T_j = 60 °C					
V_R = 1.5 V	I_R	<	40	15	μA
V_R = 10 V	I_R	<	60	30	μA
V_R = 20 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 Ω

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

Test circuit:



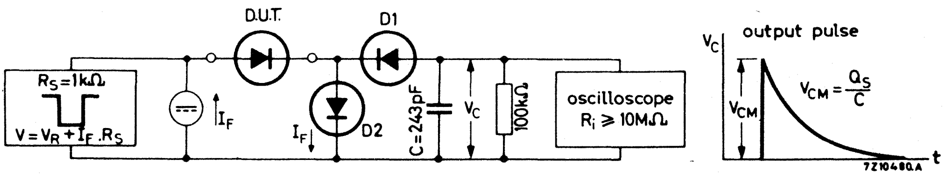
*) I_R = 10 % of $\frac{V_R}{R_L}$

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)

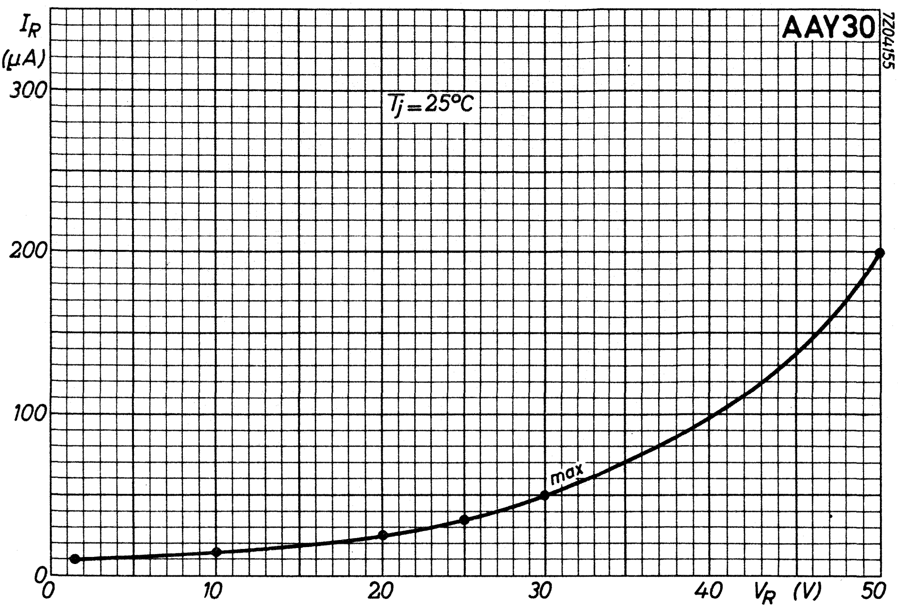
Recovered charge when switched from I_F = 10 mA to V_R = 10 V; R_L = 1 kΩ	AAY30	Q_s	<	500	pC
	AAY32	Q_s	<	150	pC

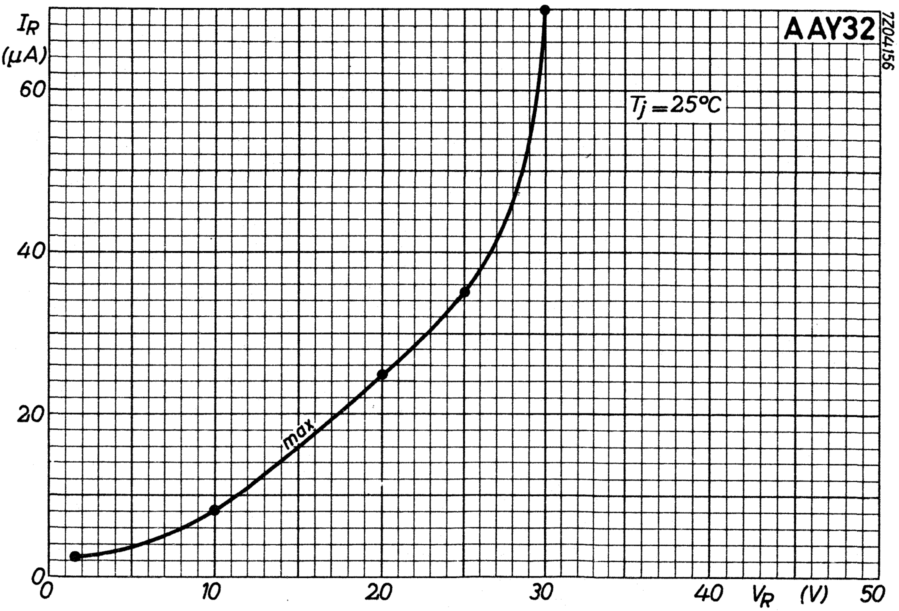
Test circuit:

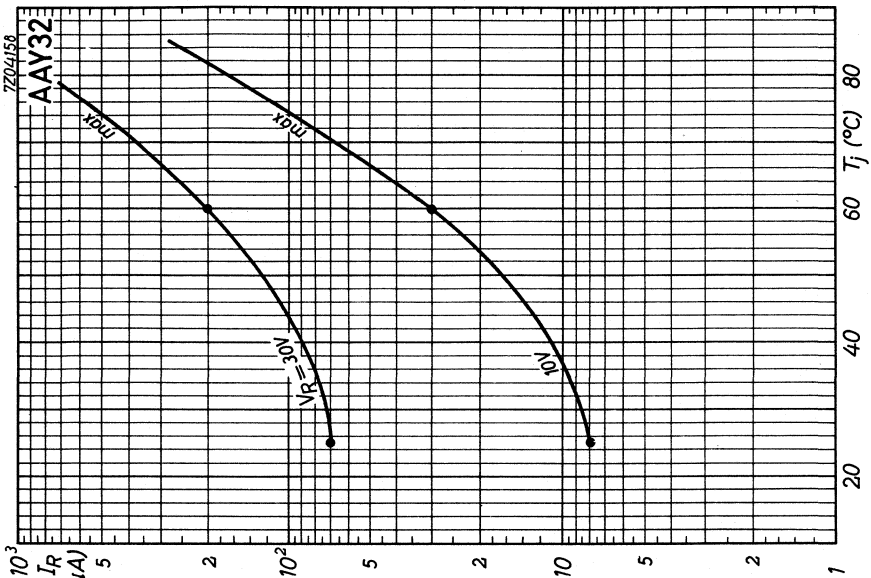


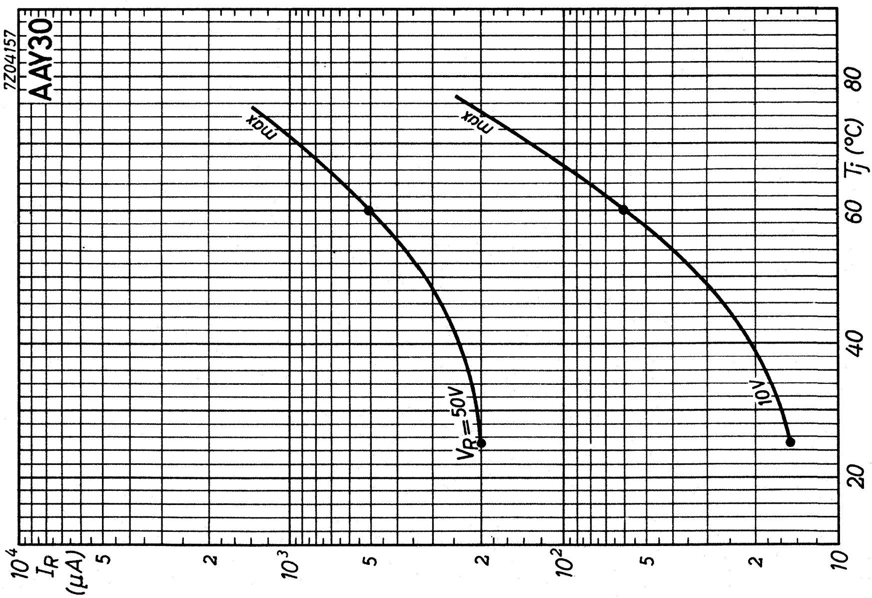
D1 = D2 = BAW62

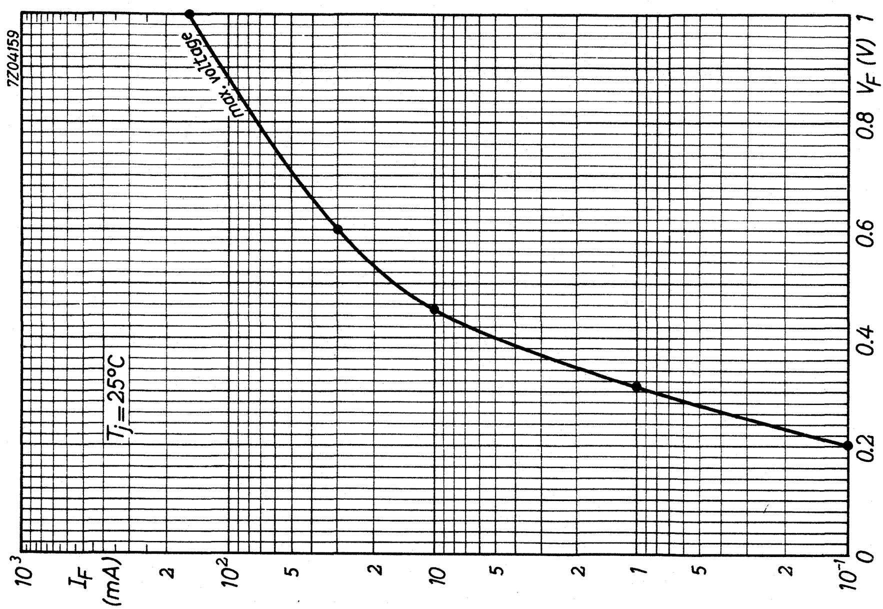
Reverse pulse: Rise time	t_r	= 2	ns
Pulse duration	t_p	= 0.4	μs
Duty cycle	δ	= 0.02	

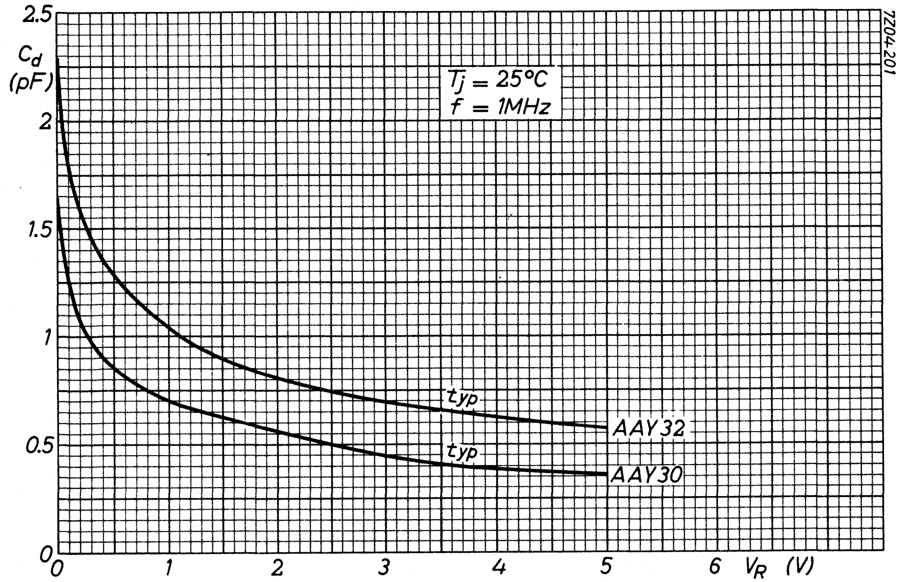

I_R
(µA)
300
200
100
0
AAY30
7Z04155
$T_j = 25°C$
max
0
10
20
30
40
V_R (V)
50

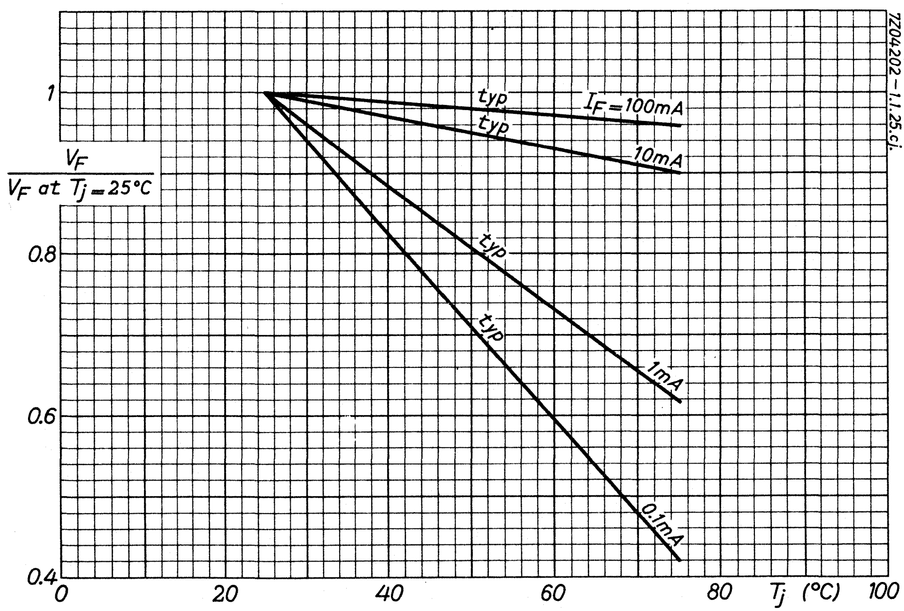

I_R
(µA)
60
40
20
0
AAY32
7Z04156
$T_j = 25°C$
max
0
10
20
30
40
V_R (V)
50

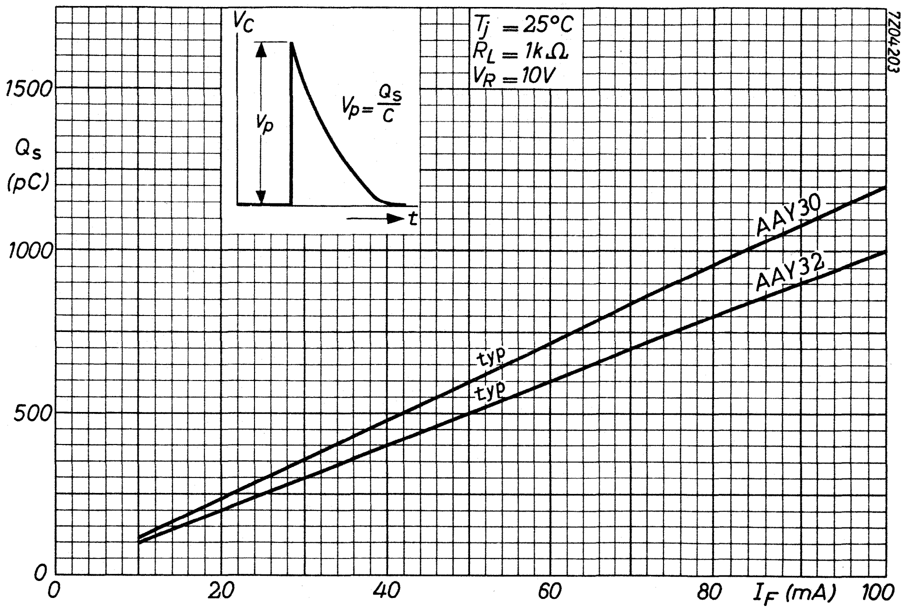

7Z04158
AAY32
max
max
$V_R = 30V$
10V
10^3
I_R (μA)
5
2
10^2
5
2
10
5
2
1
20
40
60
80
T_j (°C)

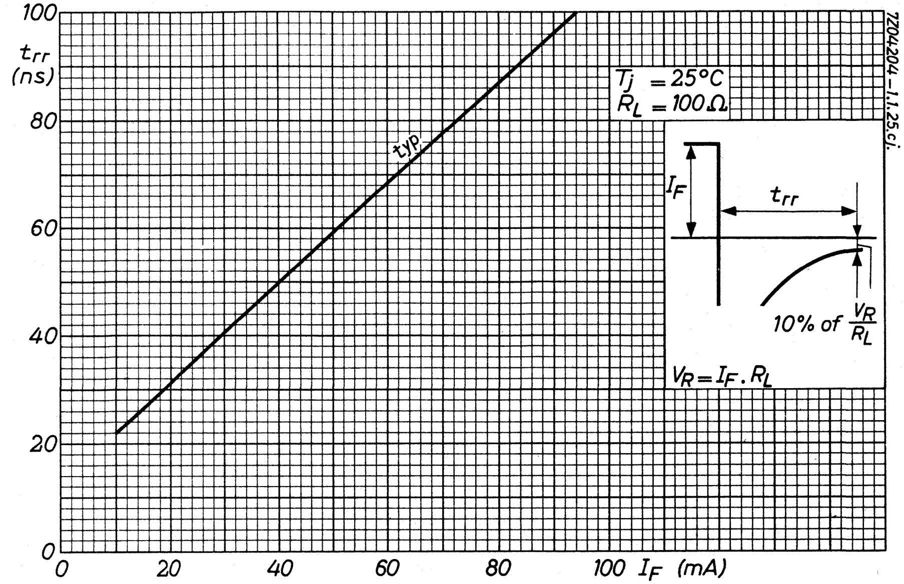

7Z04157
AAY30
max
max
$V_R = 50V$
10V
10^4
I_R (μA)
5
2
10^3
5
2
10^2
5
2
10
20
40
60
80
T_j (°C)

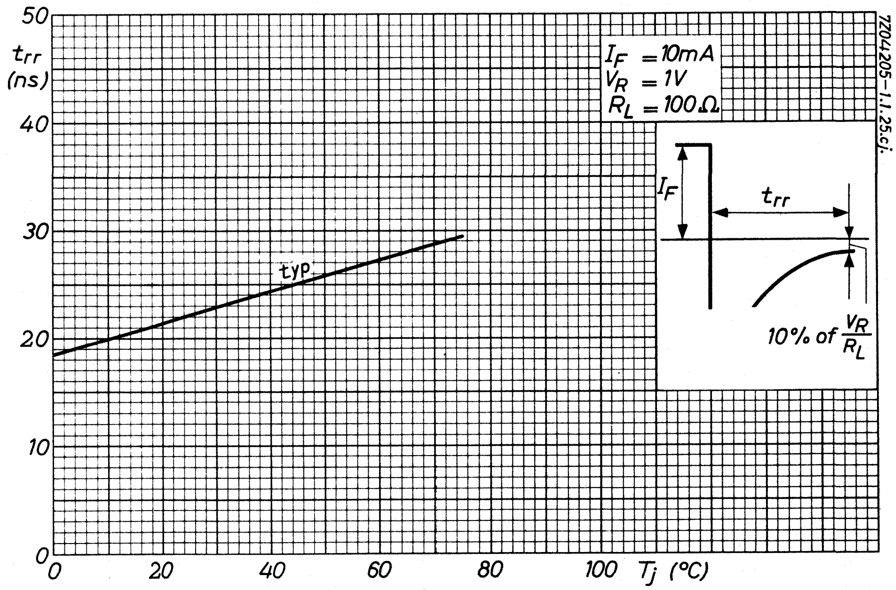

7Z04159
max. voltage
Tj = 25°C
IF (mA)
10^3
2
10^2
5
2
10
5
2
1
5
2
10^-1
VF (V)
0
0.2
0.4
0.6
0.8
1


2.5
C_d
(pF)
2
1.5
1
0.5
0
0
1
2
3
4
5
6
V_R (V)
7Z04 201
T_j = 25°C
f = 1MHz
typ
AAY32
typ
AAY30


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


7Z04203
$T_j = 25°C$
$R_L = 1k\Omega$
$V_R = 10V$
V_C
V_p
$V_p = \frac{Q_s}{C}$
t
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
typ
T_j = 25°C
R_L = 100Ω
I_F
t_{rr}
10% of $\frac{V_R}{R_L}$
$V_R = I_F . R_L$
0
20
40
60
80
100 I_F (mA)
7Z04204-1.1.25.ci.


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

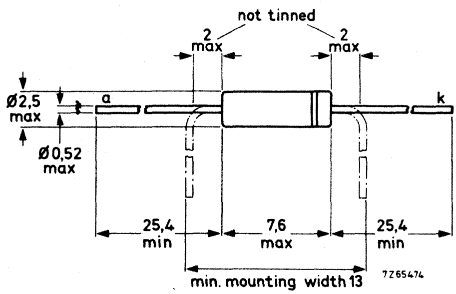
GOLD BONDED DIODE

Gold bonded germanium diode in subminiature 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	°C
Junction temperature	T_j	max.	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 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

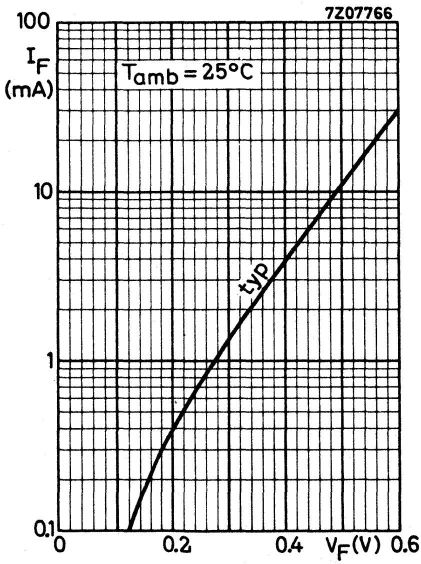
V_R = 1 V	C_d	typ.	3.3	pF
V_R = 3 V	C_d	typ.	1.3	pF
		<	2.0	pF

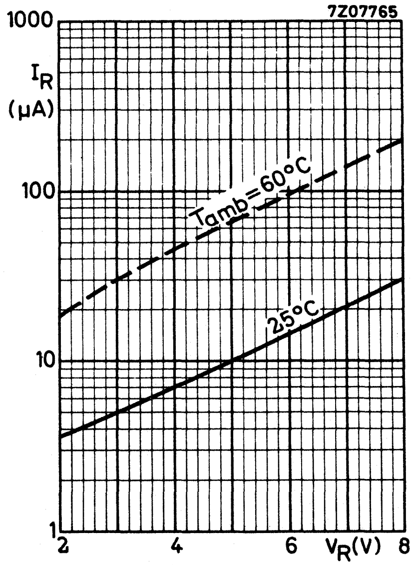
Forward recovery voltage

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

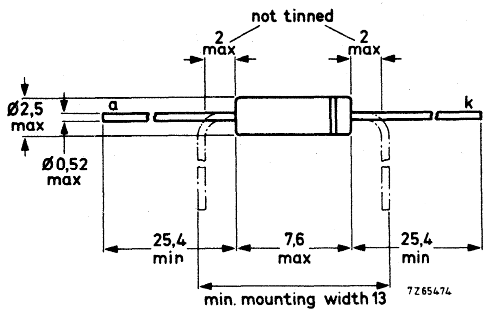
Gold bonded germanium diodes in subminiature all glass DO-7 envelope, intended for switching applications and general purposes.

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	^oC
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	°C
Junction temperature	T_j	max.	85	°C

THERMAL RESISTANCE

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

CHARACTERISTICS

Forward voltage at T_j = 25 °C

I_F = 0.1 mA	V_F < 0.20	V
I_F = 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

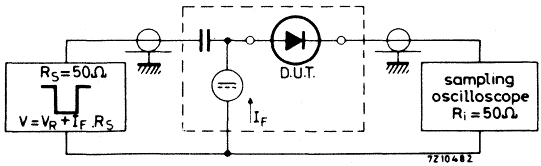
		AAZ15	AAZ17	
Reverse current at T_j = 25 °C				
V_R = 1.5 V	I_R <	2.5	2.5	μA
V_R = 10 V	I_R <	4	15	μA
V_R = 50 V	I_R <	15	150	μA
V_R = 75 V	I_R <	25	300	μA
V_R = 100 V	I_R <	100	–	μA
Reverse current at T_j = 60 °C				
V_R = 1.5 V	I_R <	30	30	μA
V_R = 10 V	I_R <	40	60	μA
V_R = 50 V	I_R <	80	300	μA
V_R = 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

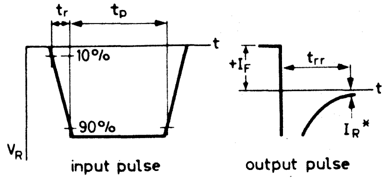
CHARACTERISTICS (continued) T_j = 25 °C

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 $\frac{V_R}{R_L}$

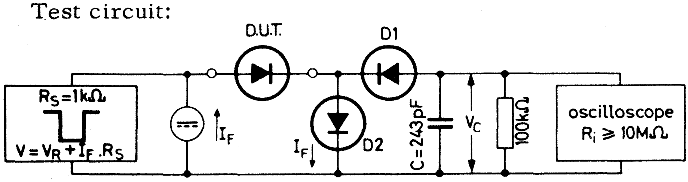
Reverse pulse:	Rise time	t_r =	0.6	ns
	Pulse duration	t_p =	100	ns
	Duty cycle	δ =	0.05	

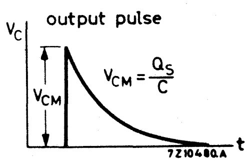
Circuit capacitance C < 1 pF (C = Oscilloscope + parasitical capacitance)

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

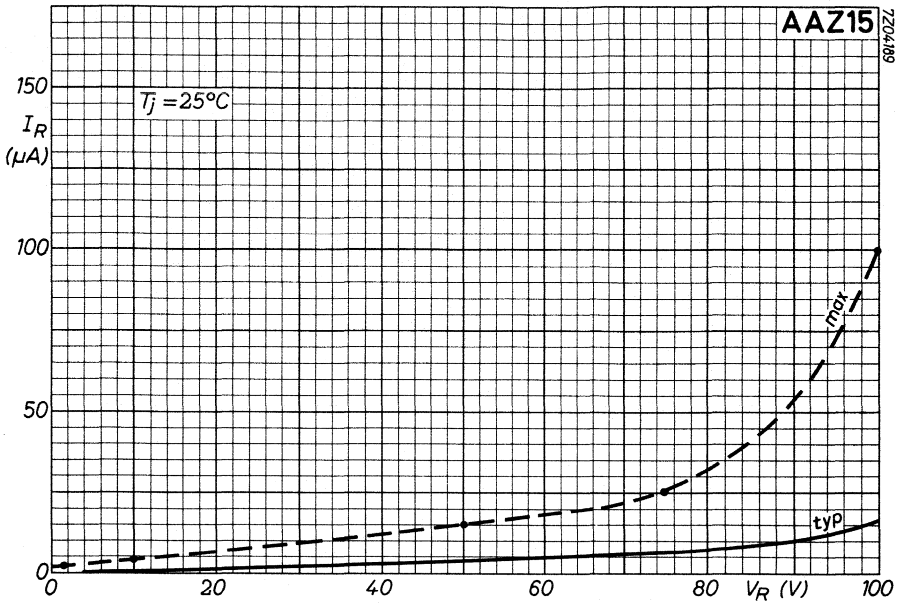
Test circuit:

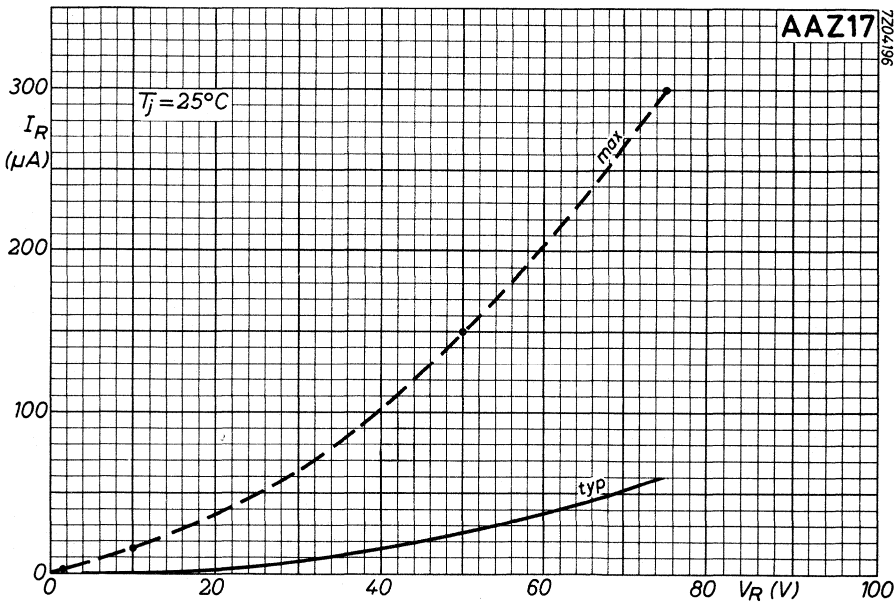


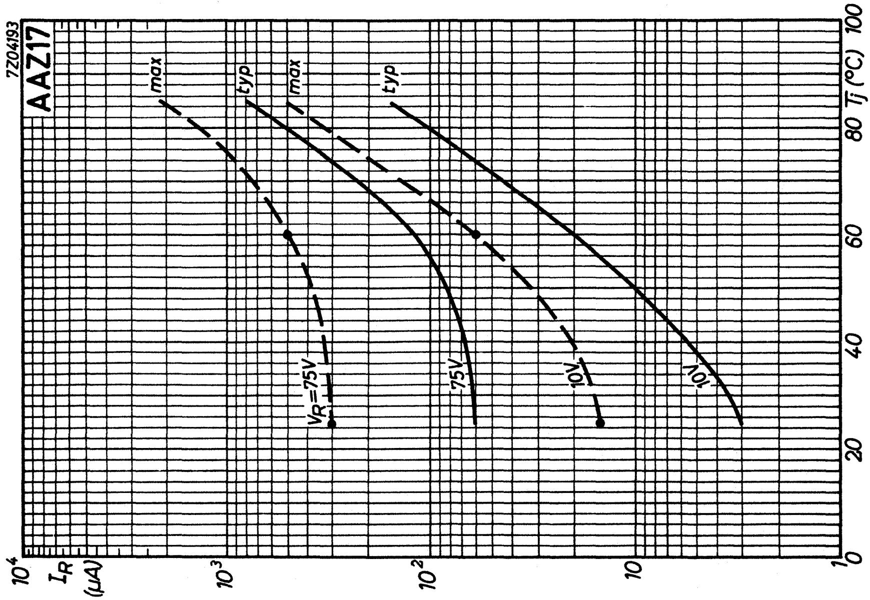


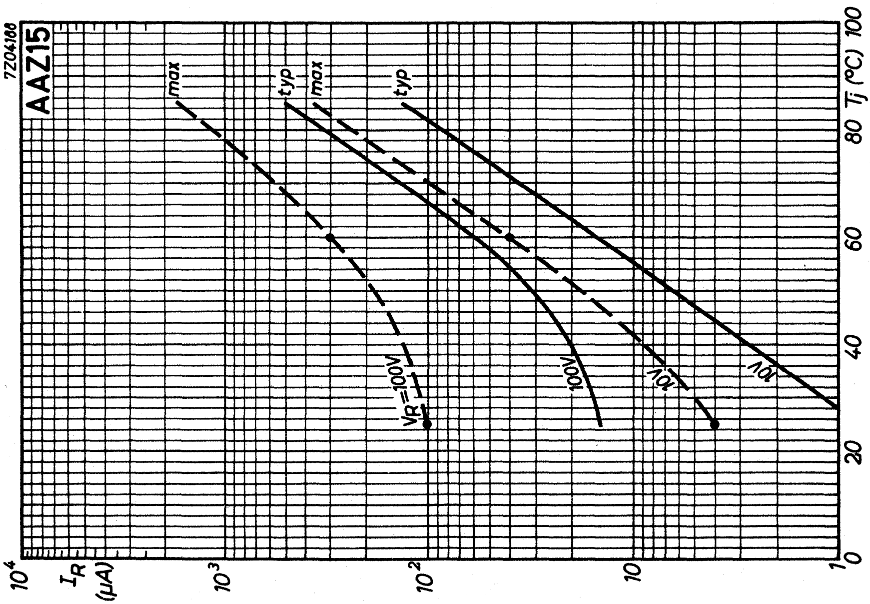
D1 = D2 = BAW62

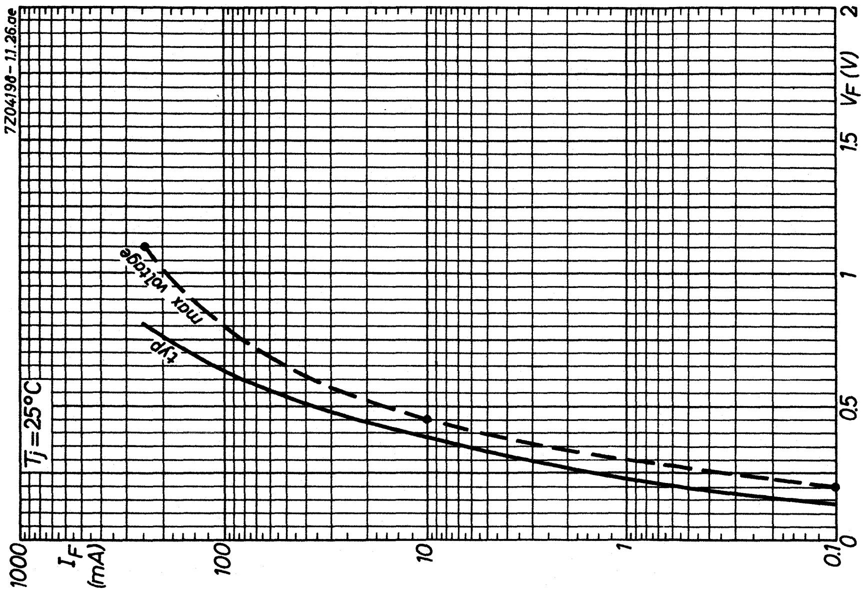
Reverse pulse:	Rise time	t_r =	2	ns
	Pulse duration	t_p =	0.4	μs
	Duty cycle	δ =	0.02	

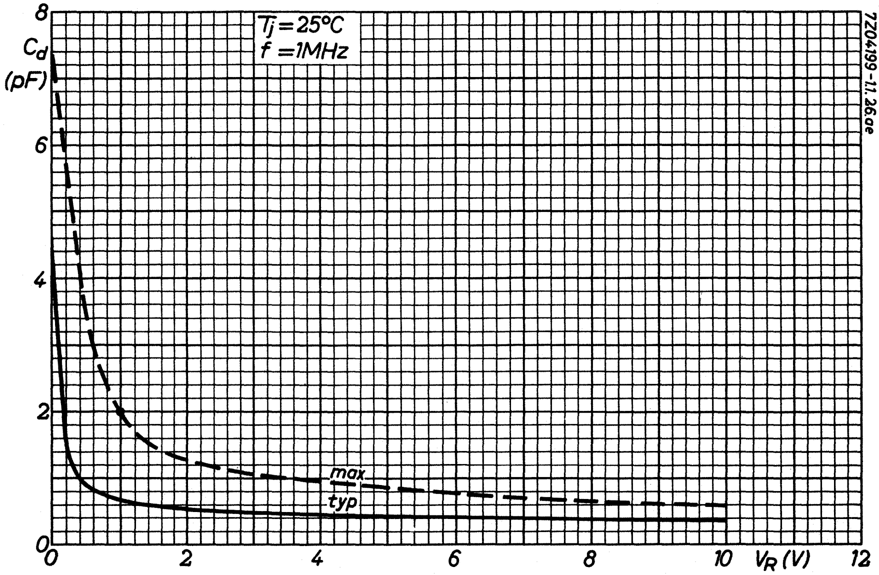

AAZ15
7Z04189
150
100
50
0
I_R
(μA)
$T_j = 25°C$
max
typ
0
20
40
60
80
V_R (V)
100

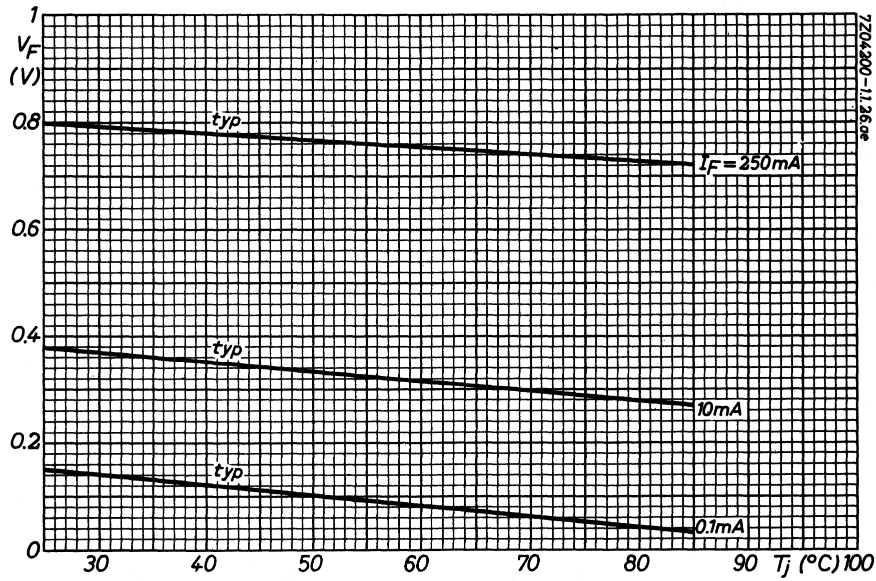

AAZ17
7Z04196
300
200
100
0
I_R
(μA)
$T_j = 25°C$
max
typ
0
20
40
60
80
V_R (V)
100

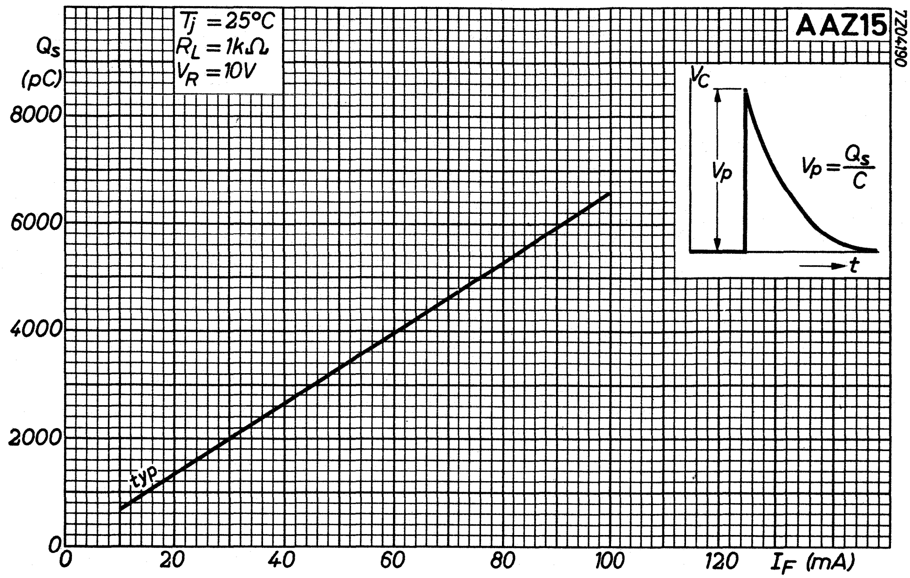

7Z04193
AAZ17
max
typ
max
typ
V_R=75V
75V
10V
10V
10^4
I_R
(µA)
10^3
10^2
10
1
0
20
40
60
80
100
T_j (°C)

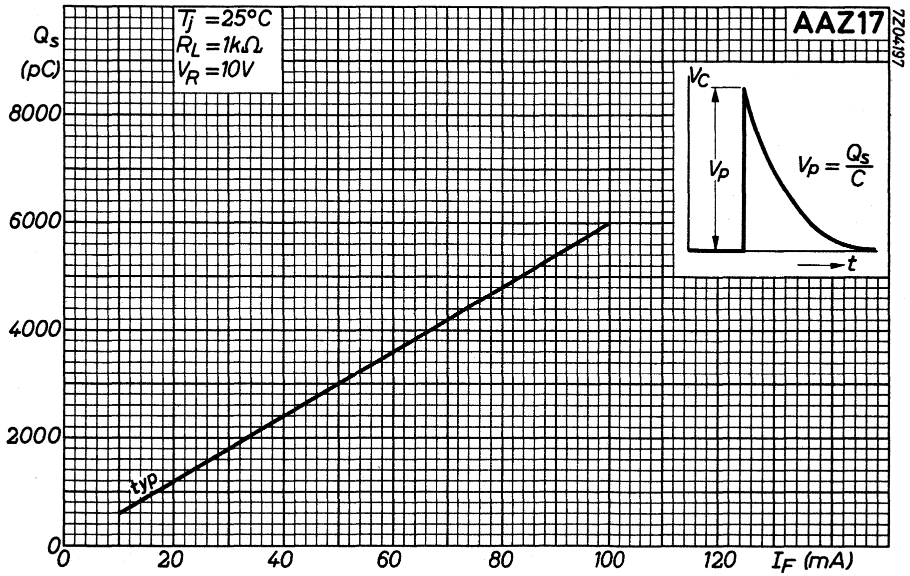

7Z04188
AAZ15
max
typ
max
typ
V_R=100V
100V
10V
10V
10^4
I_R
(µA)
10^3
10^2
10
1
0
20
40
60
80
100
T_j (°C)

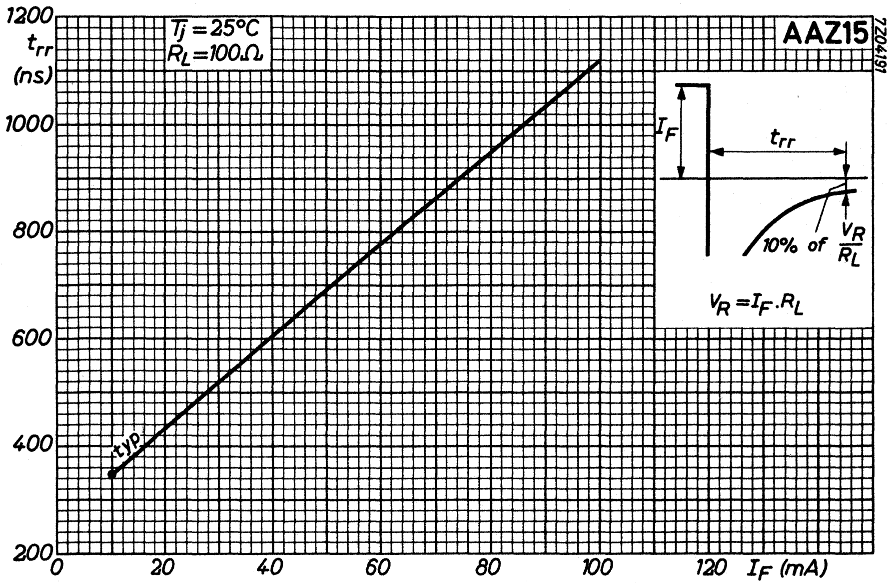

7Z04198-1.1.26.ae
V_F (V)
2
1.5
1
0.5
0
1000
I_F
(mA)
100
10
1
0.1
T_j=25°C
max. voltage
typ

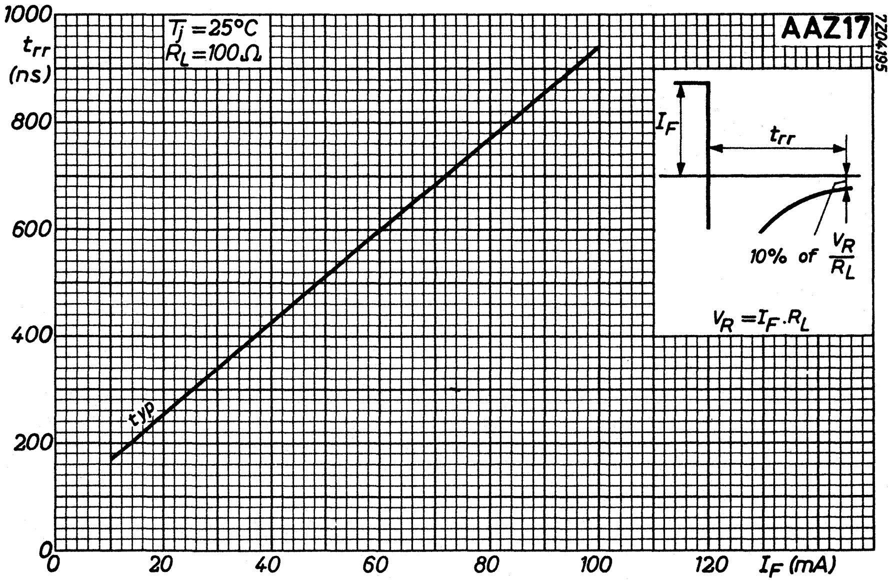

$T_j = 25°C$
f = 1MHz
C_d
(pF)
max
typ
V_R (V)
0
2
4
6
8
10
12
7Z04199-1.1.26ae

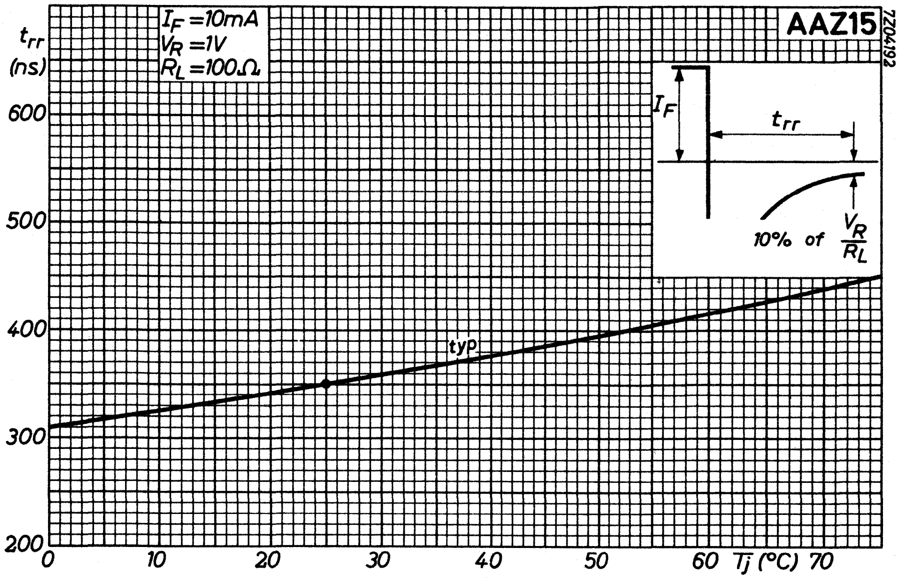

V_F
(V)
typ
I_F = 250mA
10mA
0.1mA
T_j (°C)
0
0.2
0.4
0.6
0.8
1
30
40
50
60
70
80
90
100
7Z04200-1.1.26ae

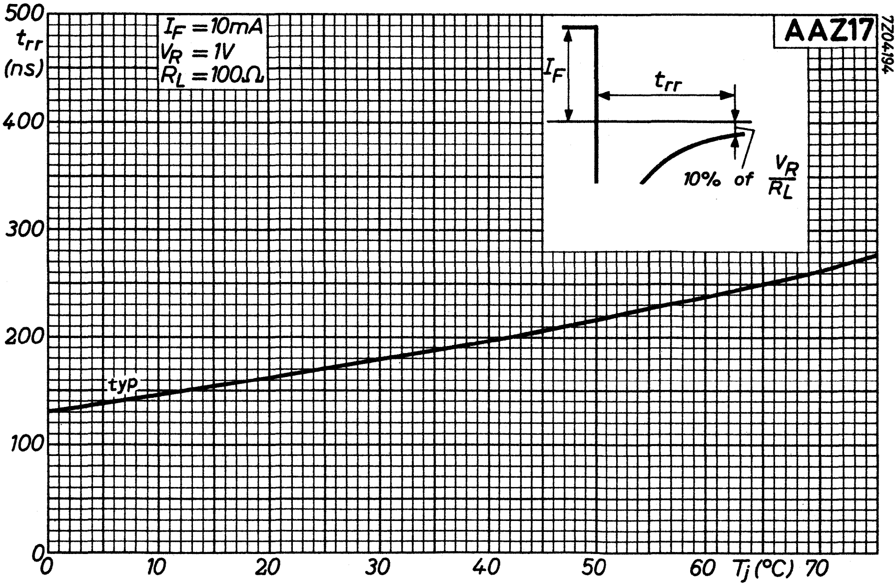

$T_j = 25°C$
$R_L = 1 k\Omega$
$V_R = 10 V$
AAZ15
7Z04190
Q_s (pC)
8000
6000
4000
2000
0
typ
0
20
40
60
80
100
120
I_F (mA)
V_C
V_p
$V_p = \frac{Q_s}{C}$
t


$T_j = 25°C$
$R_L = 1 k\Omega$
$V_R = 10 V$
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 $\frac{V_R}{R_L}$
$V_R = I_F . R_L$


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


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

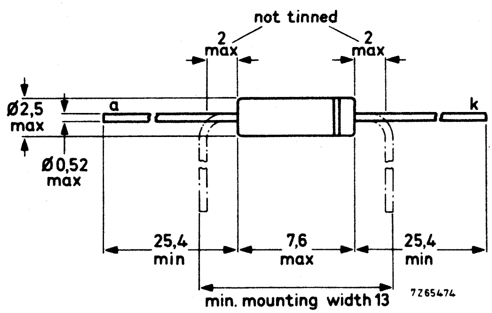
GOLD BONDED DIODE

Gold bonded germanium diode in subminiature 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	^oC
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		^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

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

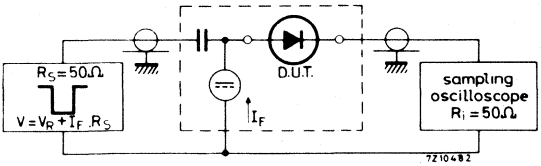
1) Measured under pulsed conditions to avoid excessive dissipation

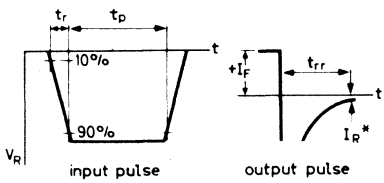
CHARACTERISTICS (continued) $T_j = 25\ ^oC$

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

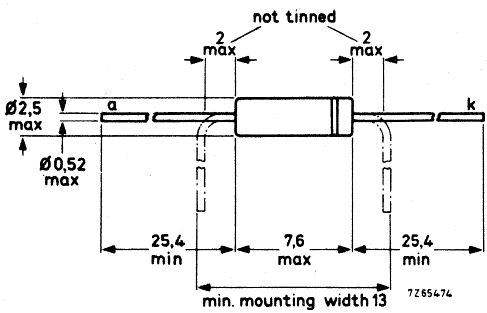
Gold bonded germanium diode in subminiature all glass DO-7 envelope, intended for switching applications and general purposes.

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	$R_{th\,j\text{-}a}$	=	0.55	$^oC/mW$

CHARACTERISTICS

Forward voltage at T_j = 25 °C

I_F = 0.1 mA	V_F < 0.20 V
I_F = 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 °C

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 °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
V_R = 25 V	I_R < 100 μA

Reverse current at T_j = 60 °C

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

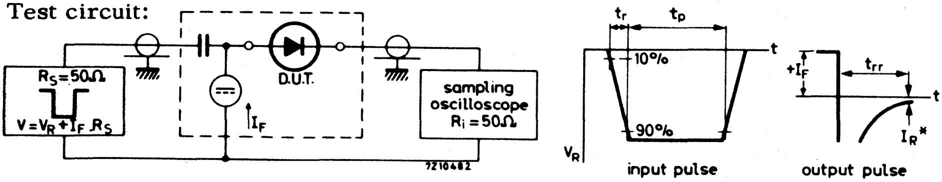
V_R = 1 V; f = 1 MHz	C_d < 3.5 pF

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

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

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

Test circuit:



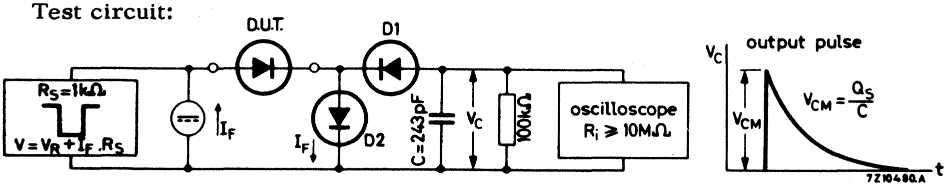
*) $I_R = 10\ \%$ of $\frac{V_R}{R_L}$

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

TYPE SELECTION

Silicon alloyed diodes

Quoted values are max.

	type	case	V_R (V)	I_F (mA)	I_{FRM} (mA)	C_d (pF)	V_F at (V)	I_F (mA)
general purpose	BA100	DO-7	60	90	100	–	1,5	30
	OA200	DO-7	50	160	250	25	1,15	30
	OA202	DO-7	150	160	250	25	1,15	30
low voltage stabilizer	BA114 *)	DO-7	–	20	–	–	0,8	3

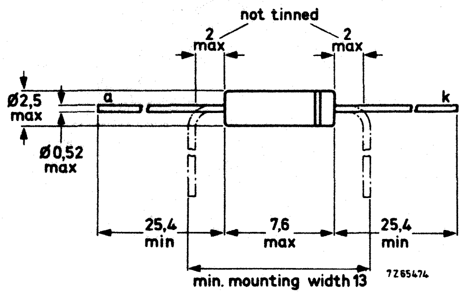
*) Maintenance type

SILICON DIODE

General purpose silicon diode in a subminiature 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

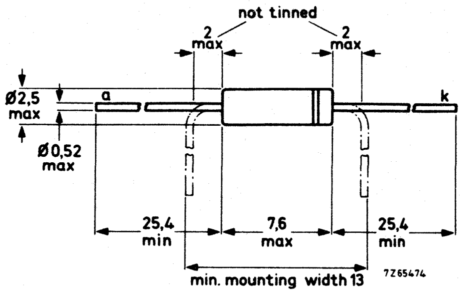
		T_{amb} = 60 °C	T_{amb} = 75 °C	
V_R = 10 V	I_R	typ. 5.0	< 10	μA
V_R = 60 V	I_R	typ. 10	< 20	μA

SILICON ALLOYED JUNCTION DIODE

Silicon alloyed junction diode in subminiature all-glass DO-7 envelope intended for use as low voltage stabilizer.

MECHANICAL DATA Dimensions in mm

DO-7



The coloured band indicates the cathode

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

Current

Forward current (d.c.)	I_F	max.	20	mA

Temperatures

Storage temperature	T_{stg}	−55 to +90	°C
Operating ambient temperature	T_{amb}	−55 to +90	°C

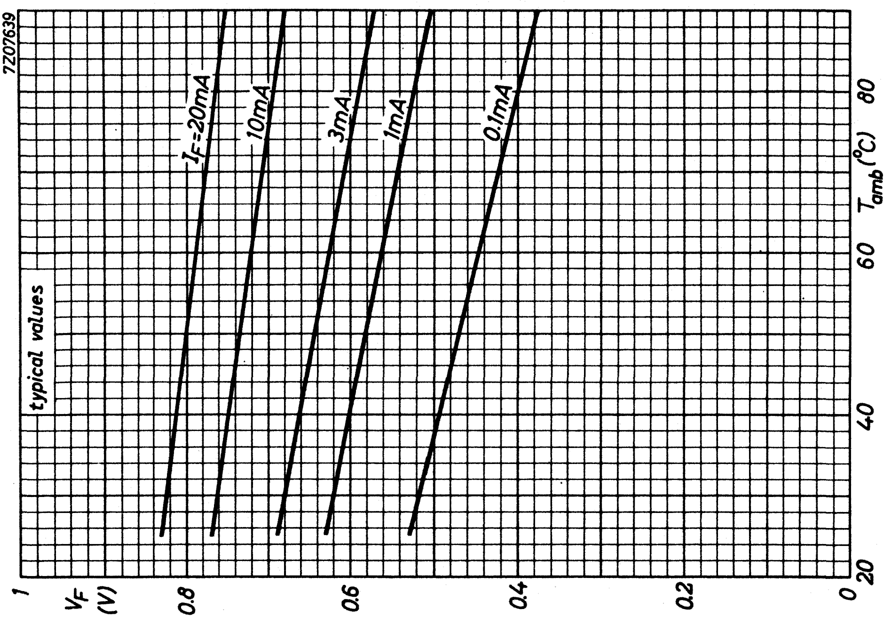
THERMAL RESISTANCE

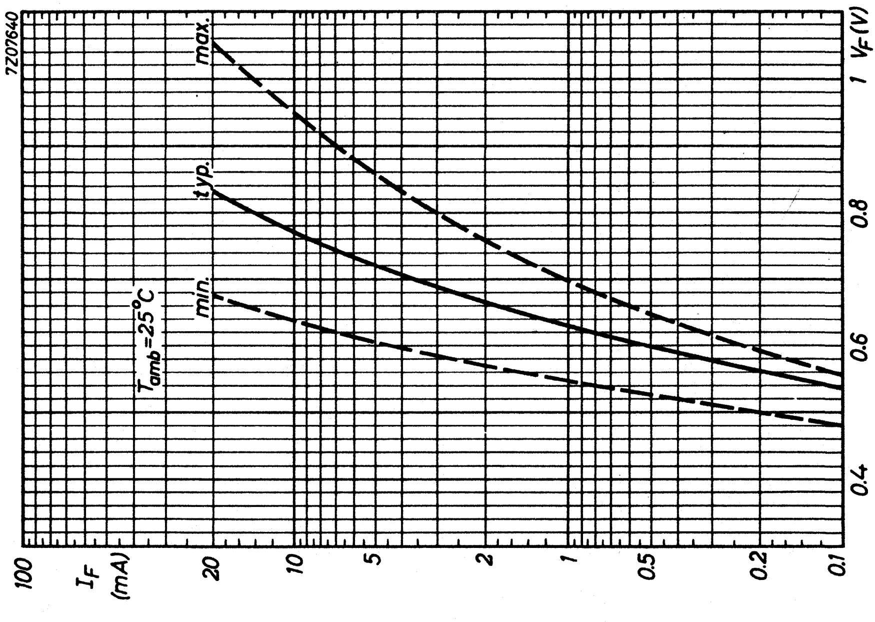
From junction to ambient in free air	$R_{th\,j\text{-}a}$	=	0.4	°C/mW

CHARACTERISTICS T_{amb} = 25 °C

Forward voltage

I_F = 0.2 mA	V_F	>	0.5	V
I_F = 3 mA	V_F	<	0.8	V


7Z07639
typical values
I_F=20mA
10mA
3mA
1mA
0.1mA
T_{amb} (°C)
20
40
60
80
V_F (V)
1
0.8
0.6
0.4
0.2
0


7Z07640
T_{amb}=25°C
max.
typ.
min.
V_F (V)
1
0.8
0.6
0.4
I_F (mA)
100
20
10
5
2
1
0.5
0.2
0.1

SILICON DIODES

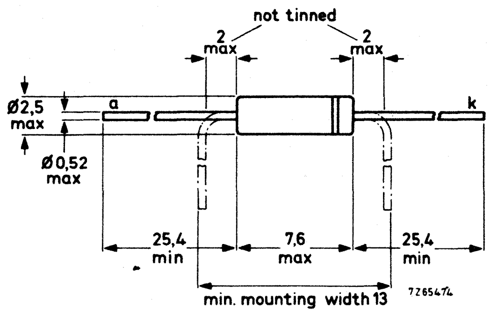
Silicon alloyed general purpose diodes in a subminiature all glass DO-7 envelope.

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		$^oC/mW$
Forward voltage I_F = 30 mA; T_{amb} = 25 ^oC	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_{FAV}	max.	160	48	mA
Average forward current for sinusoidal operation	I_{FAV}	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

				T_{amb} = 25 °C	T_{amb} = 125 °C	
Forward voltage						
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

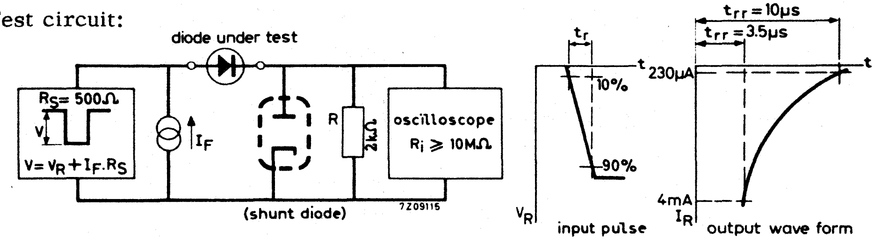
measured at t_{rr} = 3.5 μs	I_R	typ.	1.2	mA
t_{rr} = 10 μs	I_R	typ.	35	μA

Reverse recovery current when switched from

I_F = 30 mA to V_R = 35 V; R_L = 2.5 kΩ

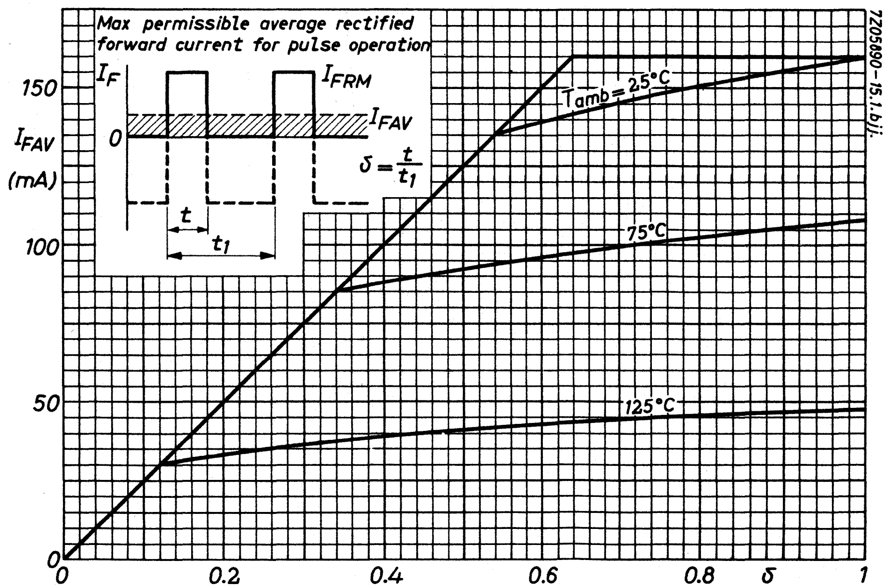
measured at t_{rr} = 3.5 μs	I_R	typ.	4	mA
t_{rr} = 10 μs	I_R	typ.	230	μA

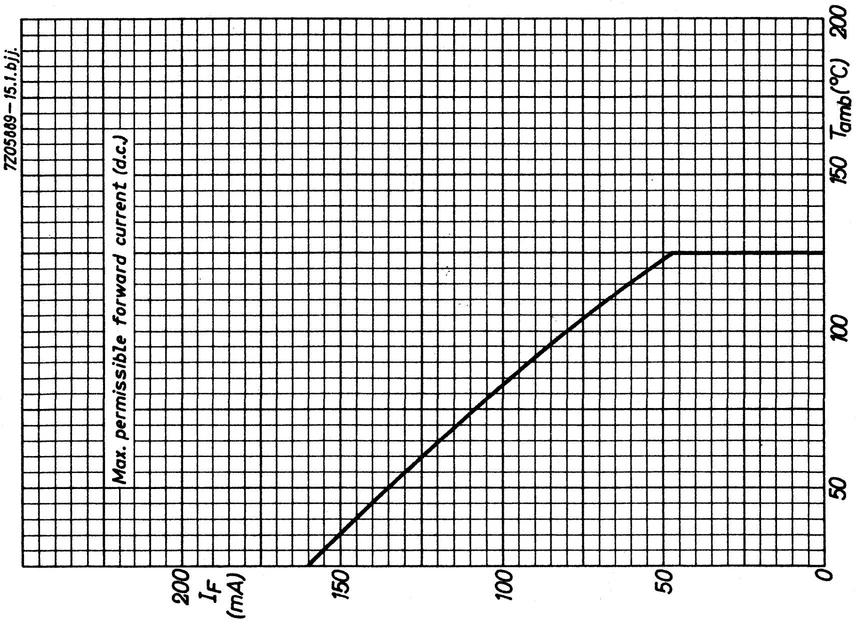
Test circuit:

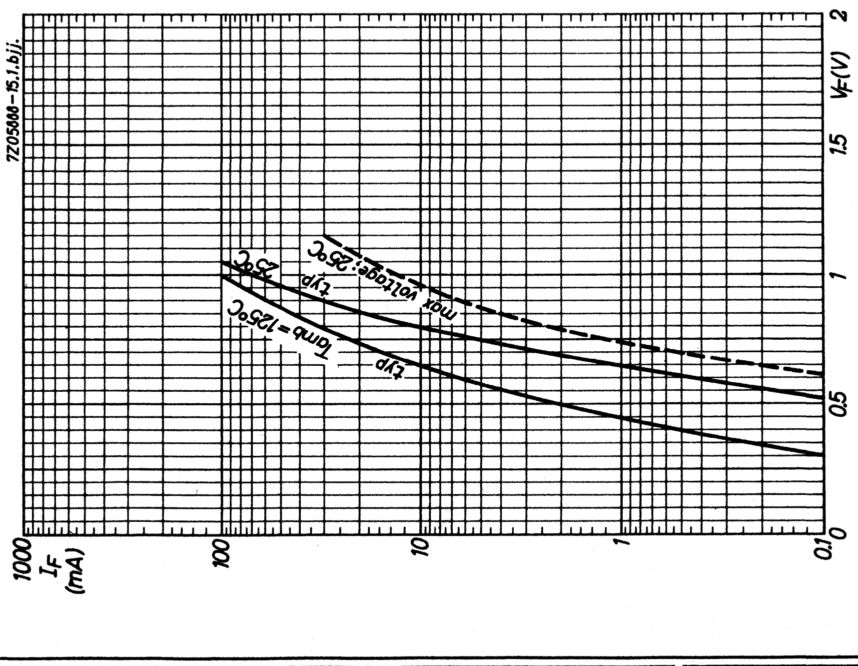


Reverse pulse: Rise time $t_r \leq 0.1$ μs
Duty cycle δ = 0.5
Frequency f = 50 kHz

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




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


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

Silicon small signal diodes

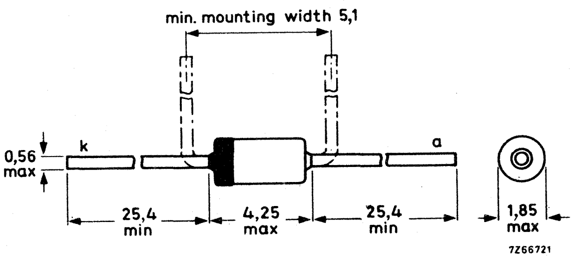
Whiskerless

TYPE SELECTION

Silicon whiskerless diodes in DO-35 case (except for 1N4009) Quoted values are max.

	type	case	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	DO-35	–	200	400	4	2,5	0,95	100
	BA221	DO-35	30	200	400	4	2,5	1,05	200
	BA222	DO-35	50	75	150	4	2	1,1	50
	BA316	DO-35	10	100	225	4	3	1,1	100
	BA317	DO-35	30	100	225	4	3	1,1	100
	BA318	DO-35	50	100	225	4	3	1,1	100
low voltage stabistor	BA314	DO-35	–	–	250	–	140	0,96	100
	BA315	DO-35	–	–	225	–	3	1,05	100
high speed switching	BAW62	DO-35	75	100	225	4	2	1	100
	1N4009	SOD-17	25	–	–	2	4	1	30
	1N4148	DO-35	75	75	225	4	4	1	10
	1N4151	DO-35	50	200	450	2	2	1	50
	1N4154	DO-35	25	200	450	2	4	1	30
	1N4446	DO-35	75	200	450	4	4	1	20
	1N4448	DO-35	75	200	450	4	4	1	100
high speed core-gating	BAV10	DO-35	60	300	600	6	2,5	1,25	500
	1N4150	DO-35	50	300	600	6	2,5	1	200
high speed, high voltage	BAV18	DO-35	50	250	625	50	5	1,25	200
	BAV19	DO-35	100	250	625	50	5	1,25	200
	BAV20	DO-35	150	250	625	50	5	1,25	200
	BAV21	DO-35	200	250	625	50	5	1,25	200

DO-35 case



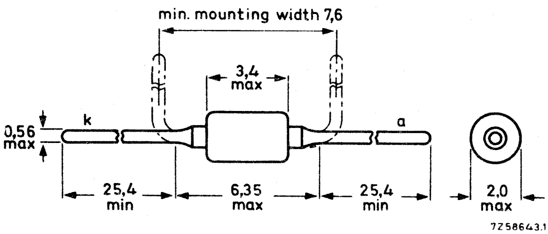
TYPE SELECTION (continued)

Silicon whiskerless diodes in SOD-17 case

Quoted values are max.

	type	case	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	SOD-17	–	75	150	4	3	1	15
	BA217	SOD-17	30	75	150	4	3	1,5	50
	BA218	SOD-17	50	75	150	4	3	1,5	50
	BA219	SOD-17	100	100	300	120	5	1,4	100
general industrial	BAX13	SOD-17	50	75	150	4	3	1	20
	BAX14	SOD-17	20	300	600	50	25	1,1	300
	BAX15	SOD-17	150	250	500	300	20	1,35	250
	BAX16	SOD-17	150	200	300	120	10	1,5	200
	BAX17	SOD-17	200	200	300	120	10	1,2	200
	BAX18	SOD-17	75	500	2000	–	–	1,2	500
switching	1N914	SOD-17	75	75	225	4	4	1	10
	1N914A	SOD-17	75	75	225	4	4	1	20
	1N916	SOD-17	75	75	225	4	2	1	10
	1N916A	SOD-17	75	75	225	4	2	1	20
	1N916B	SOD-17	75	75	225	4	2	1	30
avalanche for telephony	BAX12	SOD-17	90	400	800	50	35	1,25	400

SOD-17 case



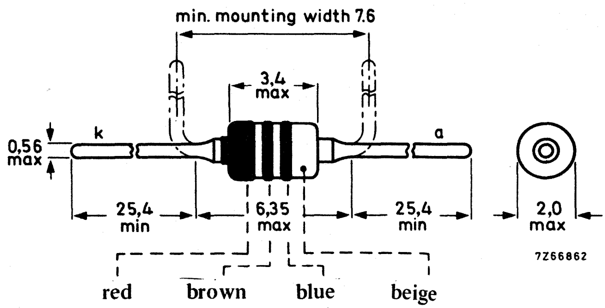
SILICON OXIDE PASSIVATED DIODE

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		°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 = 0.2 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_z	typ.	−2	mV/°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



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.	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
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

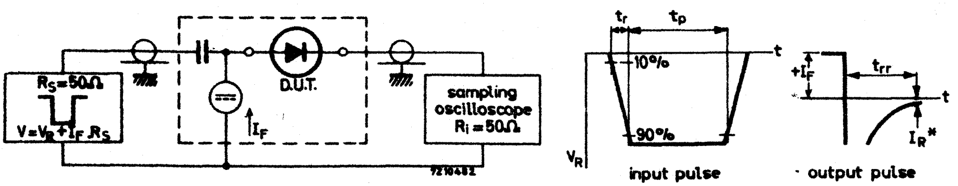
Forward voltage				
I_F = 0.2 mA	V_F	500 to	620	mV
→ I_F = 3.0 mA	V_F	600 to	800	mV
I_F = 15 mA	V_F	700 to	1000	mV
Reverse current				
V_R = 10 V	I_R	<	1500	nA
→ Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	3	pF
→ Temperature coefficient at I_F = 3 mA	S_z	typ.	−2	mV/°C

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

CHARACTERISTICS (continued)

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

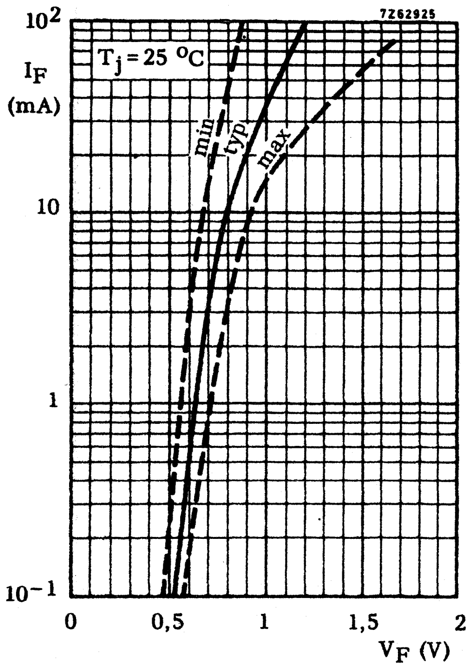
Test circuit:



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)



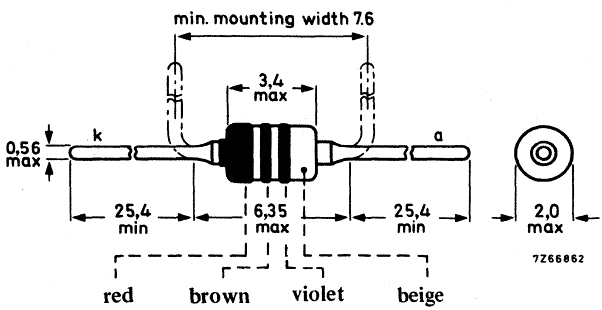
SILICON OXIDE PASSIVATED DIODE

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



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	$R_{th\ j\text{-}a}$	=	0.60	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

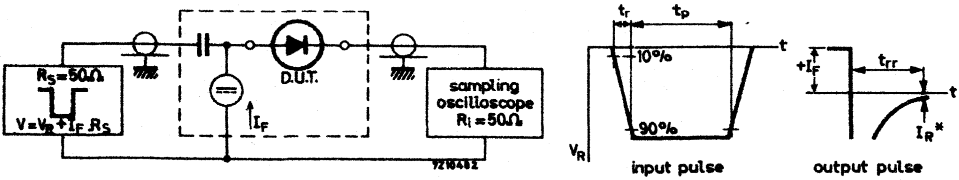
Forward voltage				
I_F = 1 mA	V_F	<	0.7	V
I_F = 10 mA	V_F	<	1.0	V
I_F = 50 mA	V_F	<	1.5	V
Reverse current				
V_R = 10 V	I_R	<	50	nA
V_R = 30 V	I_R	<	200	nA
Diode capacitance				
→ V_R = 0; f = 1 MHz	C_d	<	3	pF

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

CHARACTERISTICS (continued)

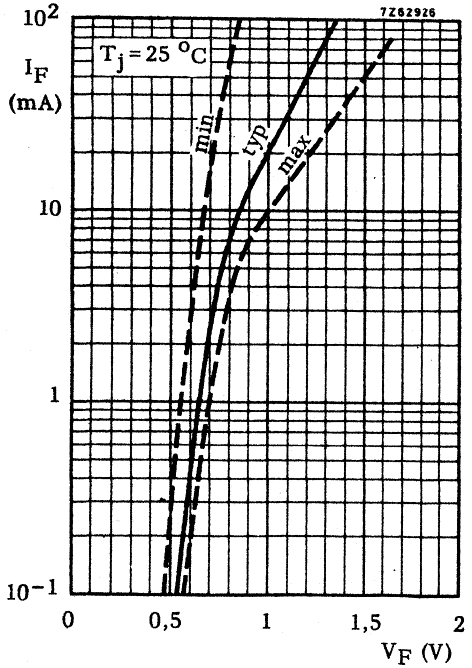
Reverse recovery time when switched from
I_F = 10 mA to V_R = 6 V; R_L = 100 Ω
measured at I_R = 1 mA — t_{rr} < 4 ns ←

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)

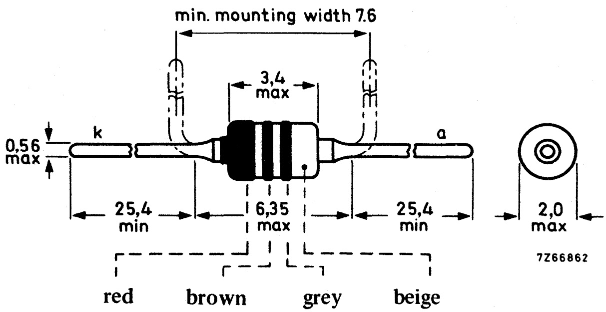


SILICON OXIDE PASSIVATED DIODE

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



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	$R_{th\ j-a}$	=	0.60	°C/mW

CHARACTERISTICS

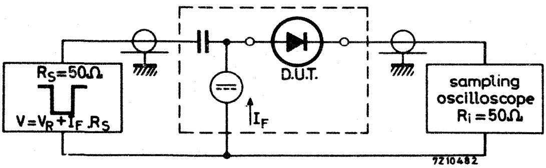
Forward voltage				
I_F = 1 mA	V_F	<	0.7	V
I_F = 10 mA	V_F	<	1.0	V
I_F = 50 mA	V_F	<	1.5	V
Reverse current				
V_R = 25 V	I_R	<	50	nA
V_R = 50 V	I_R	<	200	nA
Diode capacitance				
→ V_R = 0; f = 1 MHz	C_d	<	3	pF

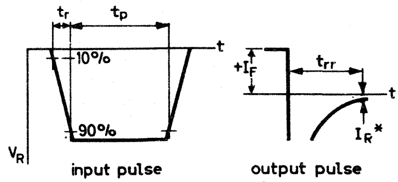
[1]) For sinusoidal operation $I_{F(AV)}$ = 48 mA

CHARACTERISTICS (continued)

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:



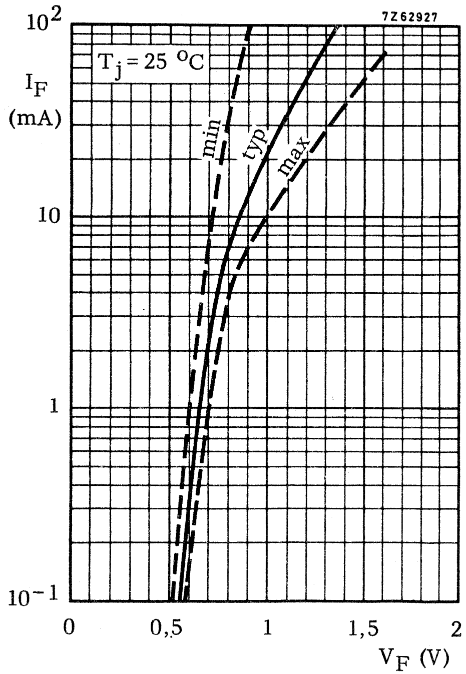


*) I_R = 1 mA

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)



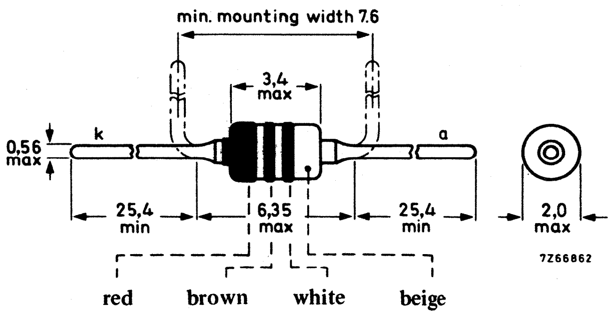
SILICON OXIDE PASSIVATED DIODE

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



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	^{o}C
Junction temperature	T_j	max.	200	^{o}C

THERMAL RESISTANCE

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

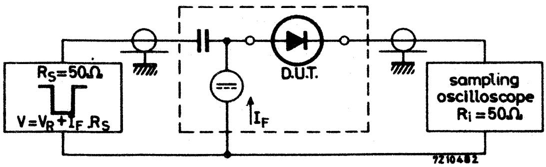
CHARACTERISTICS T_j = 25 ^{o}C unless otherwise specified

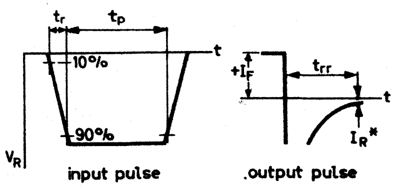
Forward voltage				
I_F = 1 mA	V_F	<	0.65	V
I_F = 10 mA	V_F	<	0.85	V
→ I_F = 100 mA	V_F	<	1.40	V
Reverse current				
V_R = 50 V	I_R	<	200	nA
V_R = 100 V	I_R	<	500	nA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	5	pF

CHARACTERISTICS (continued)

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:

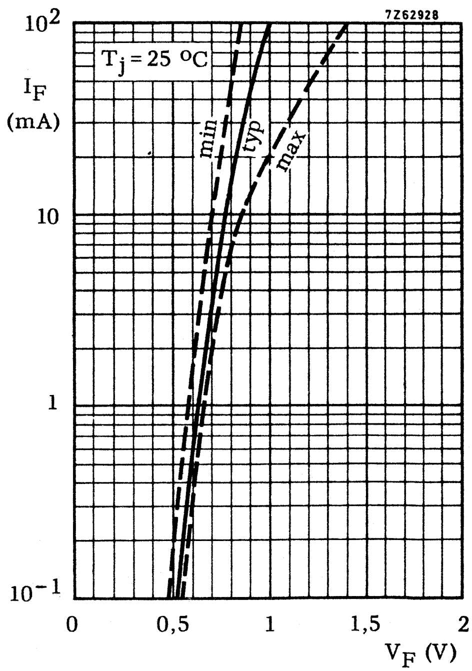




*) I_R = 3 mA

Reverse pulse:	Rise time	t_r	= 0.6 ns	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)



GENERAL PURPOSE DIODE

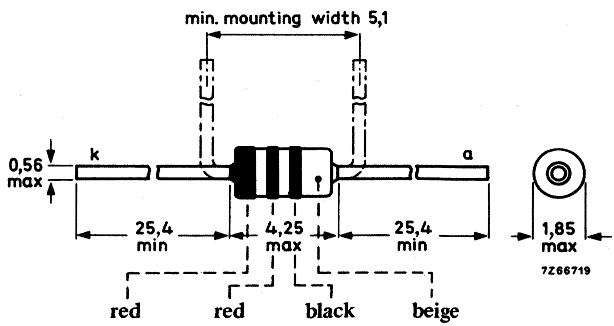
Silicon planar epitaxial diode in a DO-35 envelope; intended for general purpose and can also be used as regulator.

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	$R_{th\ j-a}$	=	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

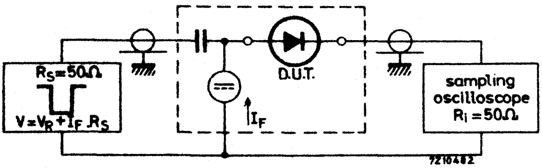
Forward voltage				
I_F = 0.1 mA	V_F	460 to	520	mV
I_F = 1.0 mA	V_F	560 to	620	mV
I_F = 5.0 mA	V_F	640 to	700	mV
I_F = 10 mA	V_F	680 to	750	mV
I_F = 100 mA	V_F	825 to	950	mV
Reverse current				
V_R = 10 V	I_R	<	1500	nA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	2.5	pF

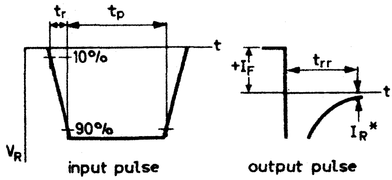
[1]) For sinusoidal operation $I_{F(AV)}$ = 130 mA

CHARACTERISTICS (continued)

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:



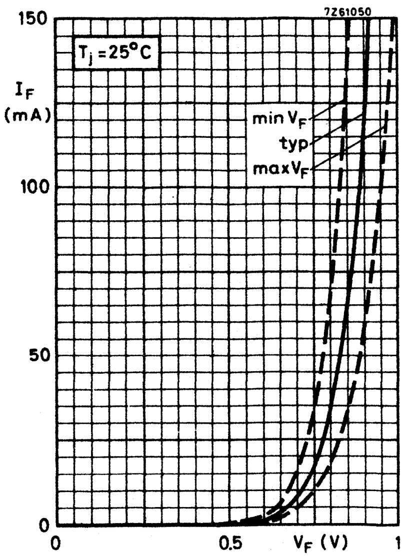


*) I_R = 1 mA

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

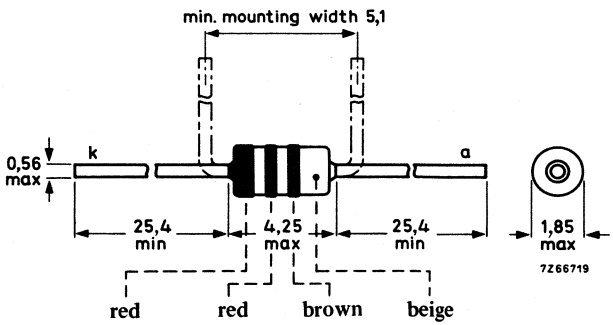
Silicon planar epitaxial diode in a DO-35 envelope; intended for general purposes.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	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	$R_{th\ j-a}$	=	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 $T_j = 25\ ^{\circ}C$ unless otherwise specified

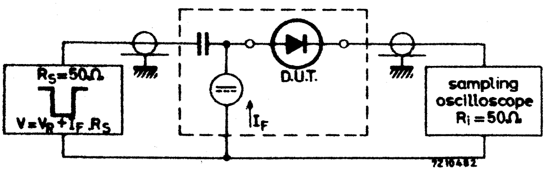
Forward voltage				
I_F = 1 mA	V_F	<	625	mV
I_F = 100 mA	V_F	<	950	mV
I_F = 200 mA	V_F	<	1050	mV
Reverse current				
V_R = 10 V	I_R	<	25	nA
V_R = 30 V	I_R	<	200	nA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	2.5	pF

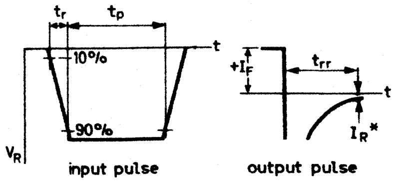
[1] For sinusoidal operation $I_{F(AV)}$ = 130 mA

CHARACTERISTICS (continued)

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:



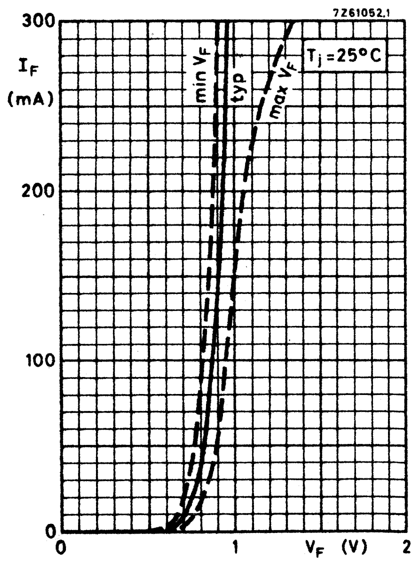


*) I_R = 1 mA

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

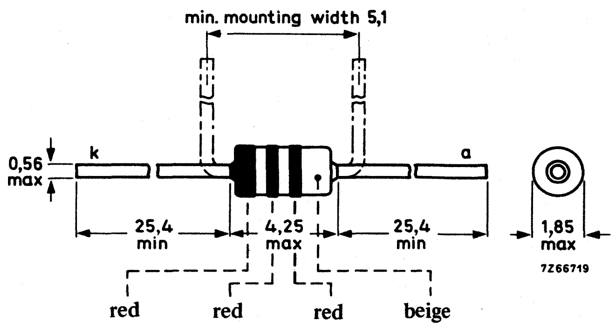
Silicon planar epitaxial diode in a DO-35 envelope; intended for general purposes.

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	°C
Junction temperature	T_j	max.	200	°C
Thermal resistance from junction to ambient	$R_{th\ j-a}$	=	0.60	°C/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

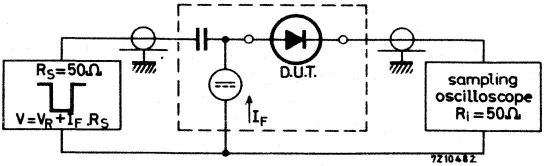
Forward voltage				
I_F = 1 mA	V_F	<	700	mV
I_F = 10 mA	V_F	<	900	mV
I_F = 50 mA	V_F	<	1100	mV
Reverse current				
V_R = 25 V	I_R	<	50	nA
V_R = 50 V	I_R	<	200	nA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	2	pF

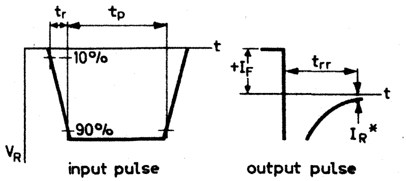
[1]) For sinusoidal operation $I_{F(AV)}$ = 48 mA

CHARACTERISTICS (continued)

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:



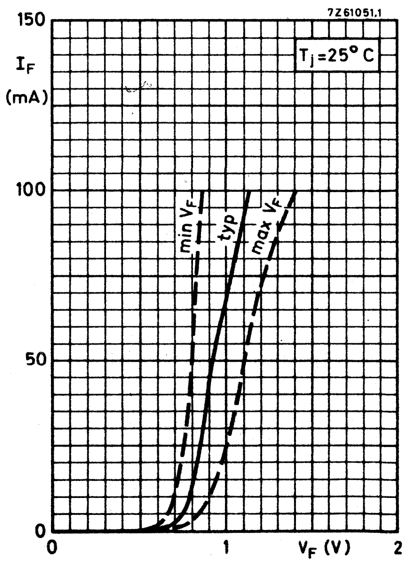


*) I_R = 1 mA

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)



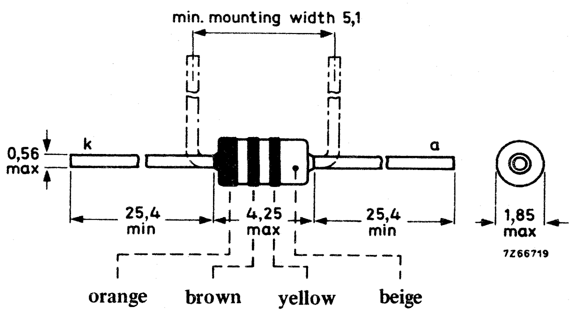
LOW VOLTAGE STABISTOR

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

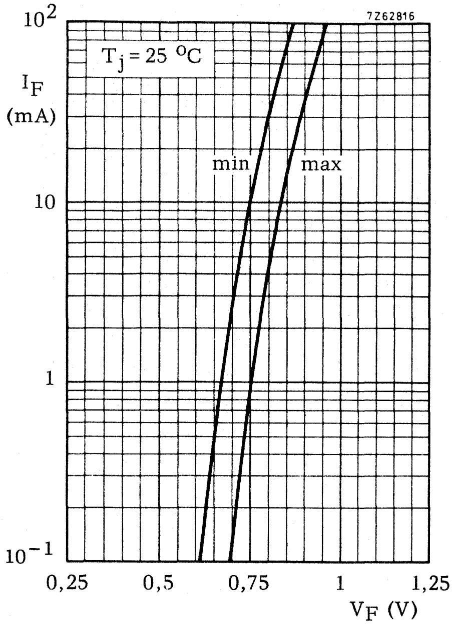
Reverse current

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

LOW VOLTAGE STABISTOR

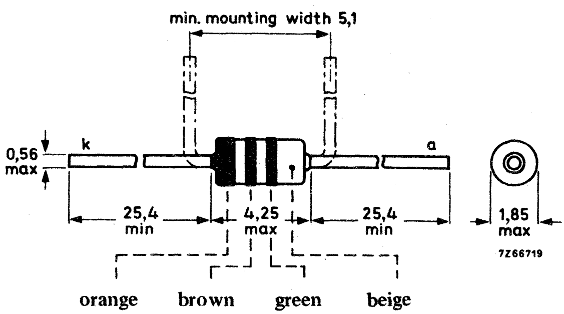
Silicon planar epitaxial diode in a DO-35 envelope primarily intended for low voltage stabilizing.

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		900 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	900 to 1050	mV

Reverse current

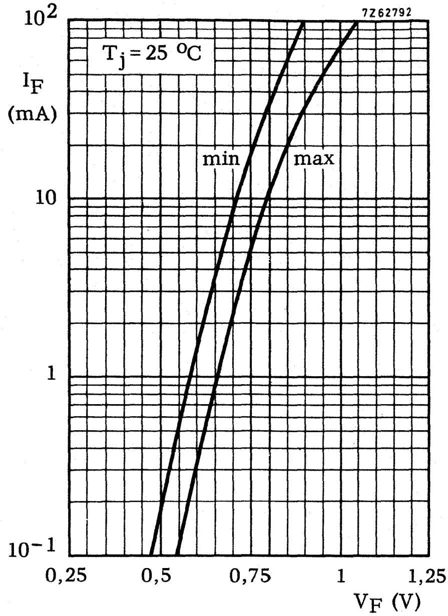
V_R = 5 V	I_R	<	1500	nA

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

10 V, 30 V and 50 V GENERAL PURPOSE DIODES

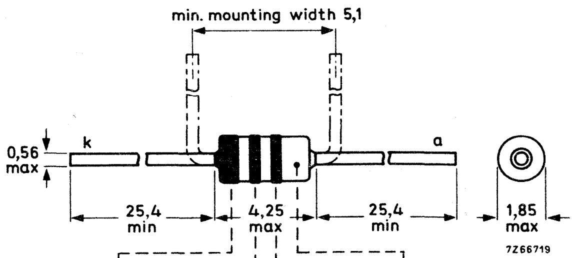
Silicon planar epitaxial diodes in DO-35 envelopes intended for general purpose applications.
They have reverse voltages up to 10 V for BA316, 30 V for BA317 and 50 V for BA318.

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	beige
BA317:	orange	brown	violet	beige
BA318:	orange	brown	grey	beige

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	°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 $T_j = 25\ ^oC$ 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

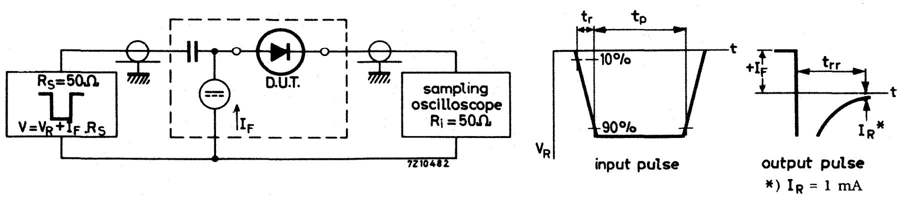
1) For sinusoidal operation $I_{F(AV)}$ = 130 mA.

CHARACTERISTICS (continued)

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

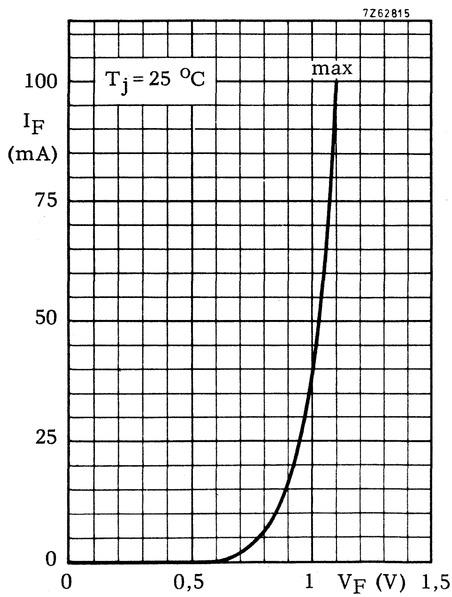
Test circuit:



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

Oscilloscope:
Rise time t_r = 0,35 ns

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



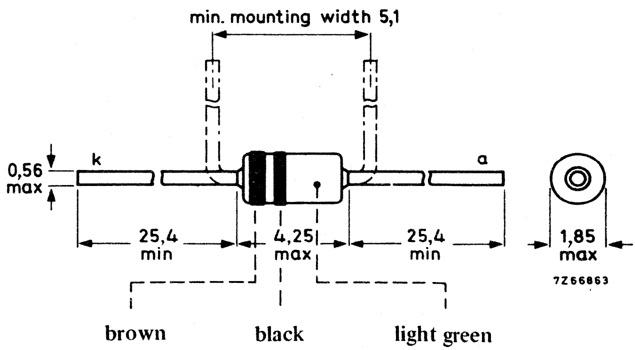
ULTRA HIGH SPEED DIODE

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	^oC
Junction temperature	T_j	max.	200	^oC

THERMAL RESISTANCE

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

CHARACTERISTICS T_j = 25 ^oC 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 ^oC	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 ^oC	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.

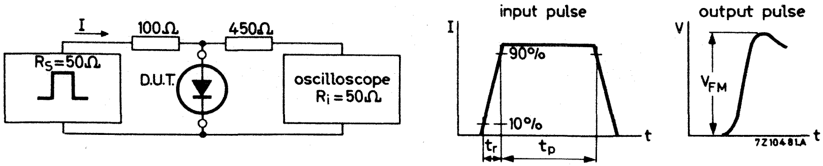
2) For sinusoidal operation see page 6. For pulse operation see page 5.

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:



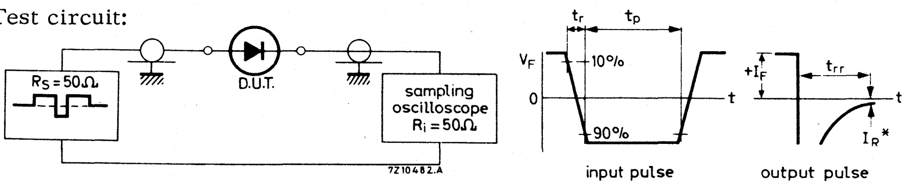
Current pulse: Rise time	t_{r1} = 30 ns	Oscilloscope:			
Rise time	t_{r2} = 100 ns				
Pulse duration	t_p = 300 ns	Rise time	t_r	=	0.35 ns
Duty cycle	δ = 0.01	Input capacitance	C_i	≤	1 pF

Circuit capacitance C ≤ 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			

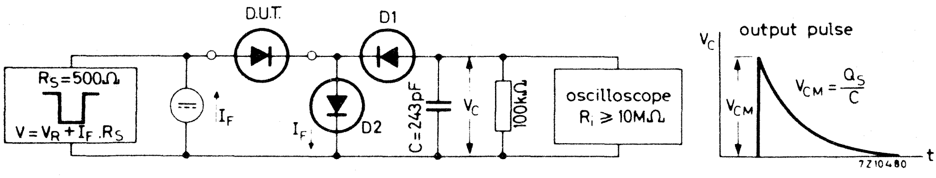
Circuit capacitance C ≤ 1 pF (C = Oscilloscope + parasitical capacitance)

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

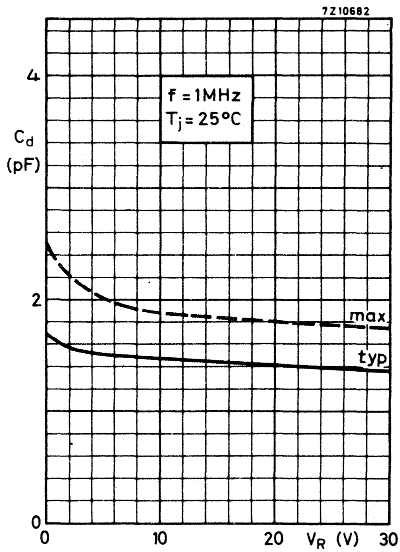
D2 = diode with minority carrier lifetime at 10 mA: < 200 ps

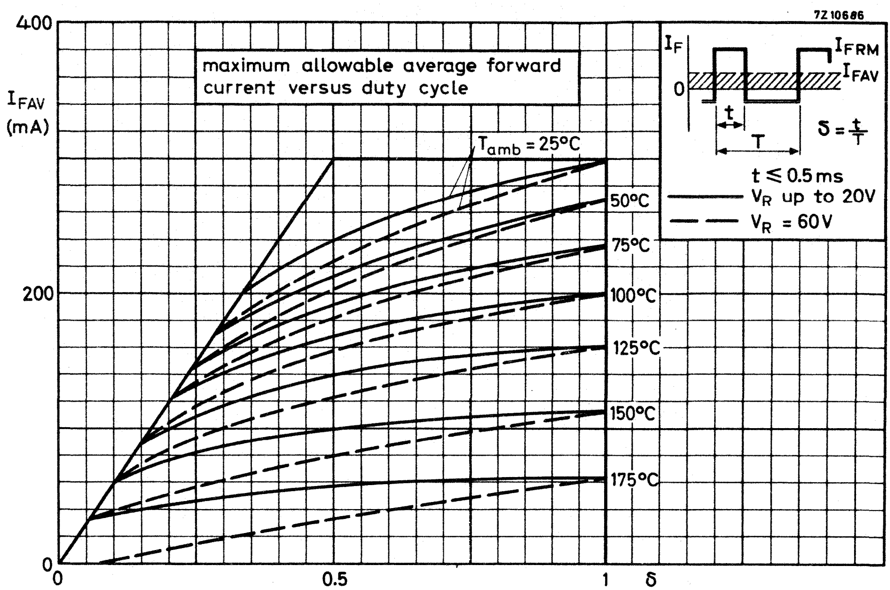
Reverse pulse : Rise time t_r = 2 ns

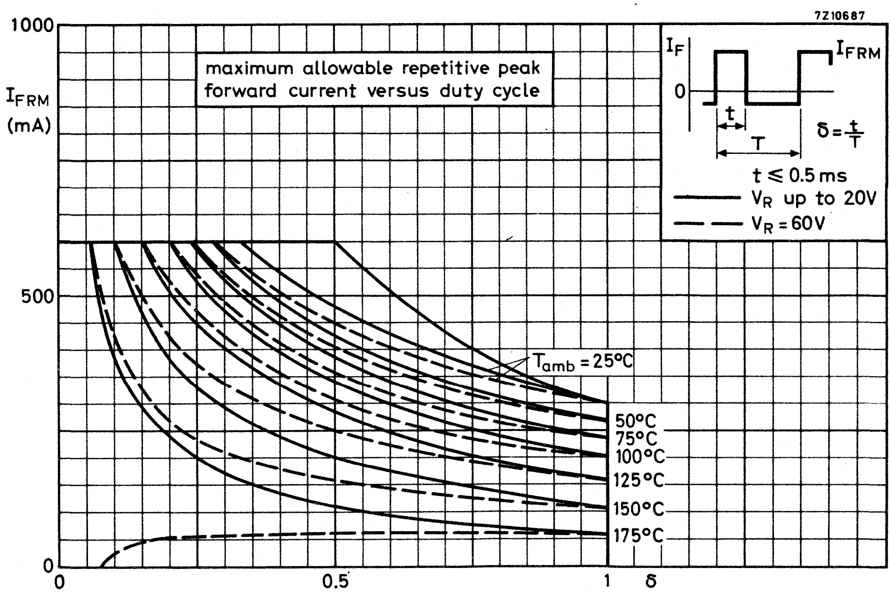
Pulse duration t_p = 400 ns

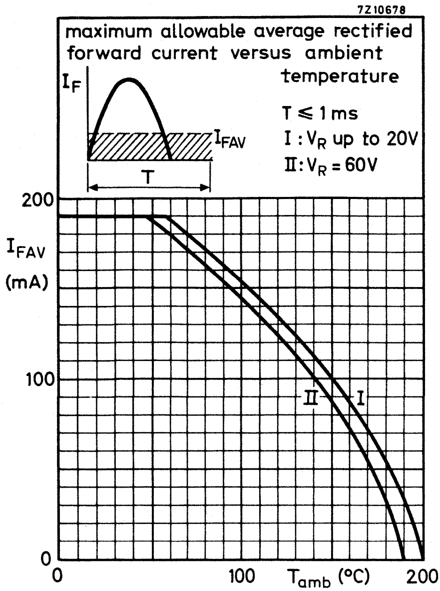
Duty cycle δ = 0.02

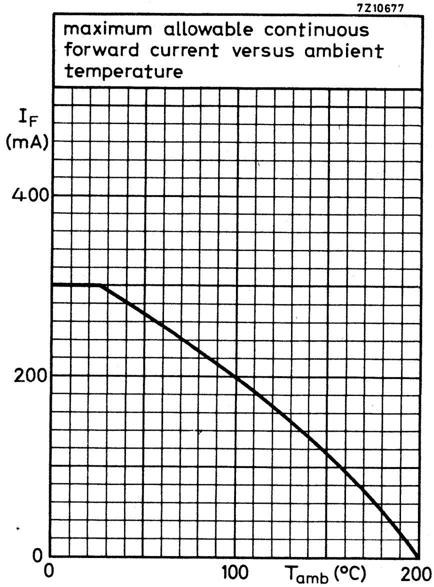
Circuit capacitance C ≤ 7 pF (C = Oscilloscope + parasitical capacitance)

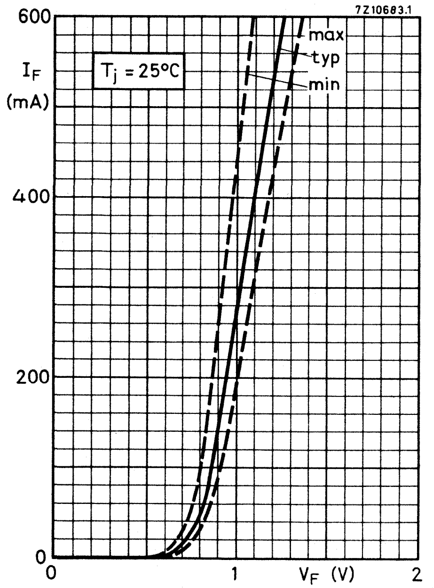


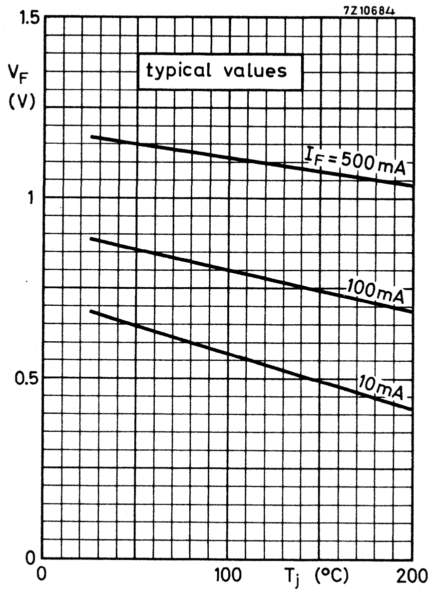

7Z10686
400
200
0
I_{FAV} (mA)
maximum allowable average forward current versus duty cycle
T_{amb} = 25°C
50°C
75°C
100°C
125°C
150°C
175°C
0
0.5
1
δ
I_F
I_{FRM}
I_{FAV}
0
t
T
δ = t/T
t ≤ 0.5 ms
V_R up to 20V
V_R = 60V

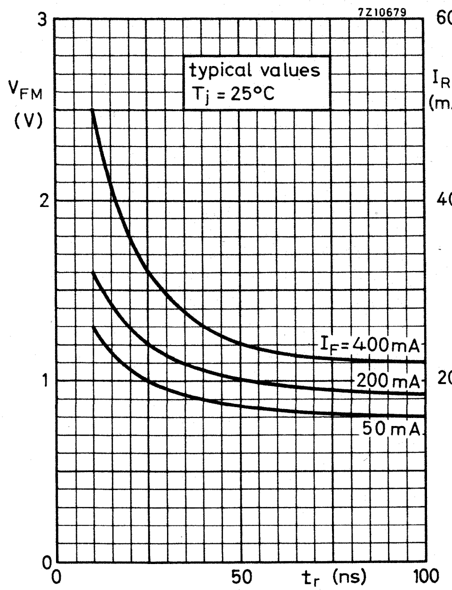

7Z10687
1000
500
0
I_{FRM} (mA)
maximum allowable repetitive peak forward current versus duty cycle
T_{amb} = 25°C
50°C
75°C
100°C
125°C
150°C
175°C
0
0.5
1
δ
I_F
I_{FRM}
0
t
T
δ = t/T
t ≤ 0.5 ms
V_R up to 20V
V_R = 60V

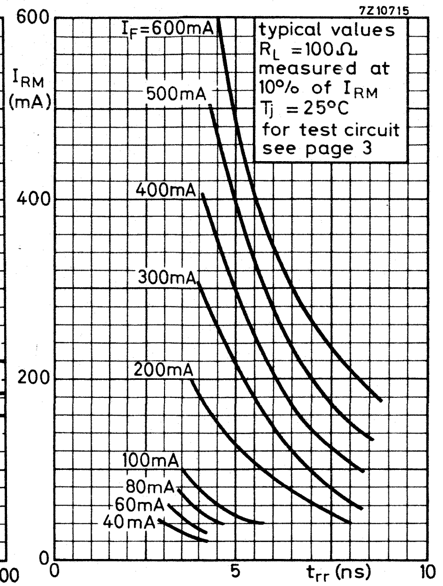

7Z10678
maximum allowable average rectified forward current versus ambient temperature
IF
IFAV
T
T ≤ 1 ms
I : VR up to 20V
II: VR = 60V
200
IFAV
(mA)
100
0
0
100
Tamb (°C)
200
II
I

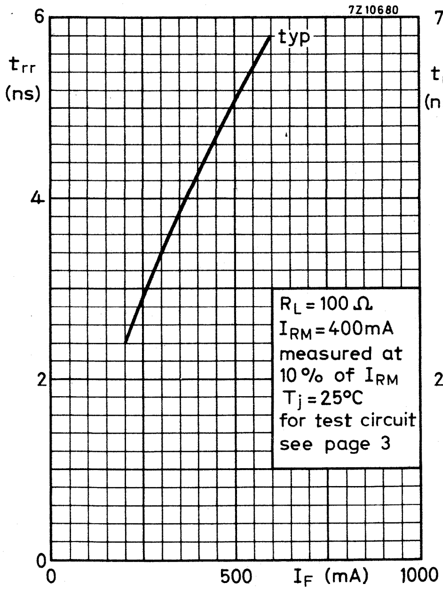

7Z10677
maximum allowable continuous forward current versus ambient temperature
IF
(mA)
400
200
0
0
100
Tamb (°C)
200

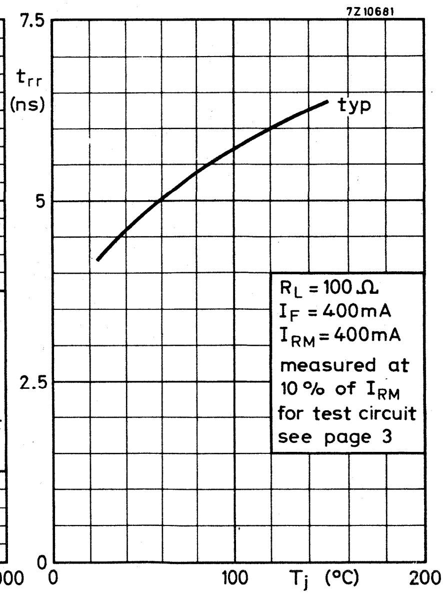

7Z10683.1
600
IF
(mA)
Tj = 25°C
max
typ
min
400
200
0
0
1
VF (V)
2

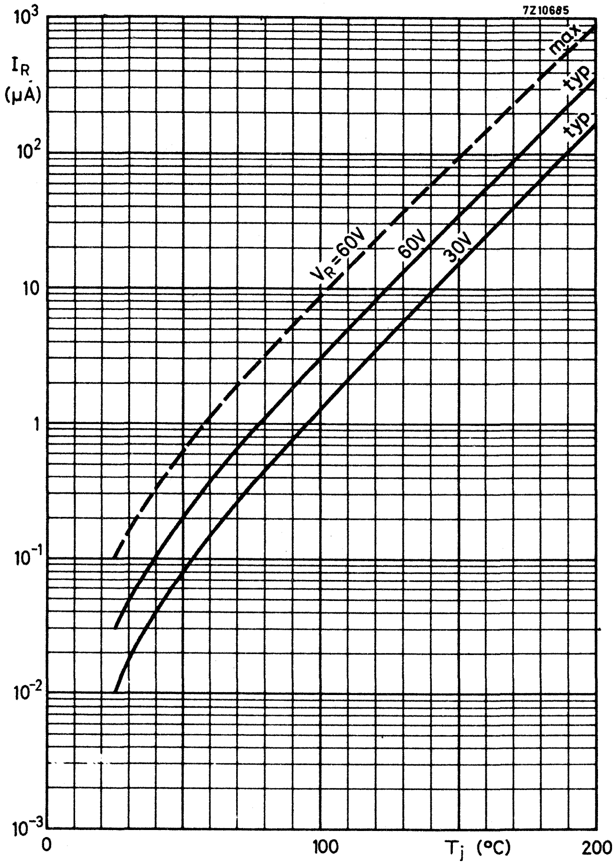

7Z10684
1.5
VF
(V)
typical values
IF = 500 mA
1
100 mA
0.5
10 mA
0
0
100
Tj (°C)
200


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


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


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


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


7Z10685
I_R (μA)
10^3
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
0
100
T_j (°C)
200
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.

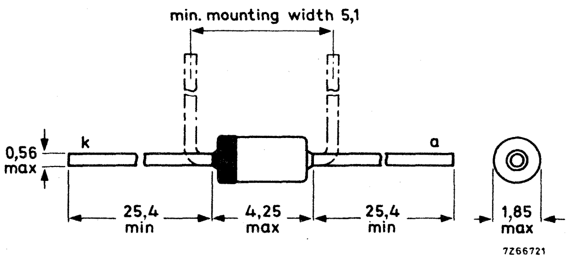
QUICK REFERENCE DATA

			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	$R_{th\text{-}ja}$	=	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	C_d	typ.	1,5	1,5	1,5	1,5	pF
f = 1 MHz		<	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



Cathode indicated by coloured band or by broad band if colour coded (see General Section)

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	$R_{th\ j\text{-}a}$	=	0,375	$^oC/mW$

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltage at I_F = 100 mA — V_F < 1,0 V

at I_F = 200 mA — V_F < 1,25 V

			BAV18	BAV19	BAV20	BAV21	
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_{amb} = 150 °C	I_R	<	100	–	–	–	μA
V_R = 100 V; T_{amb} = 150 °C	I_R	<	–	100	–	–	μA
V_R = 150 V; T_{amb} = 150 °C	I_R	<	–	–	100	–	μA
V_R = 200 V; T_{amb} = 150 °C	I_R	<	–	–	–	100	μA

Series resistance at I_F = 10 mA — r_D typ. 5 Ω

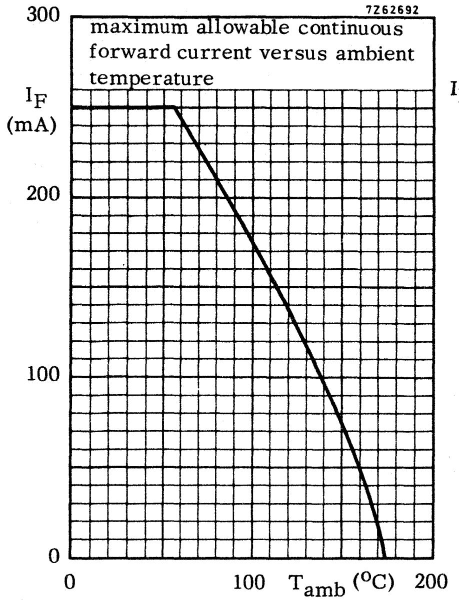
Diode capacitance

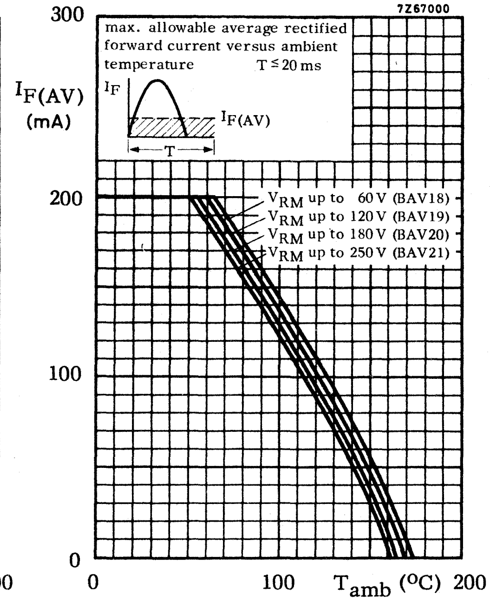
V_R = 0; f = 1 MHz — C_d typ. 1,5 pF; < 5,0 pF

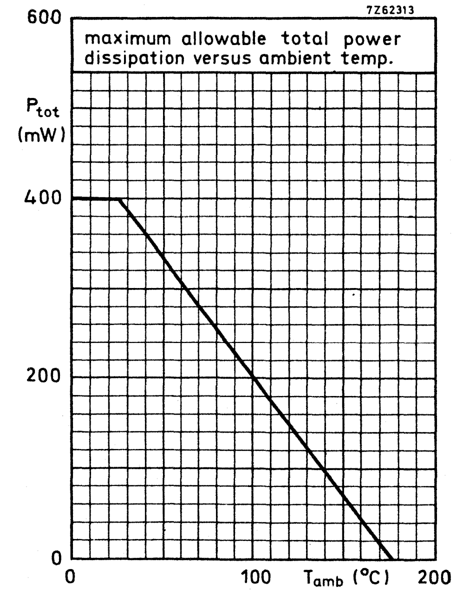
Reverse recovery time when switched from

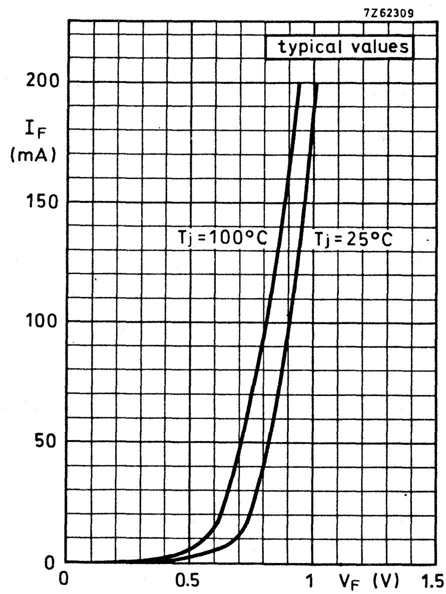
I_F = 30 mA to I_R = 30 mA; R_L = 100 Ω
measured at I_R = 3 mA — t_{rr} < 50 ns

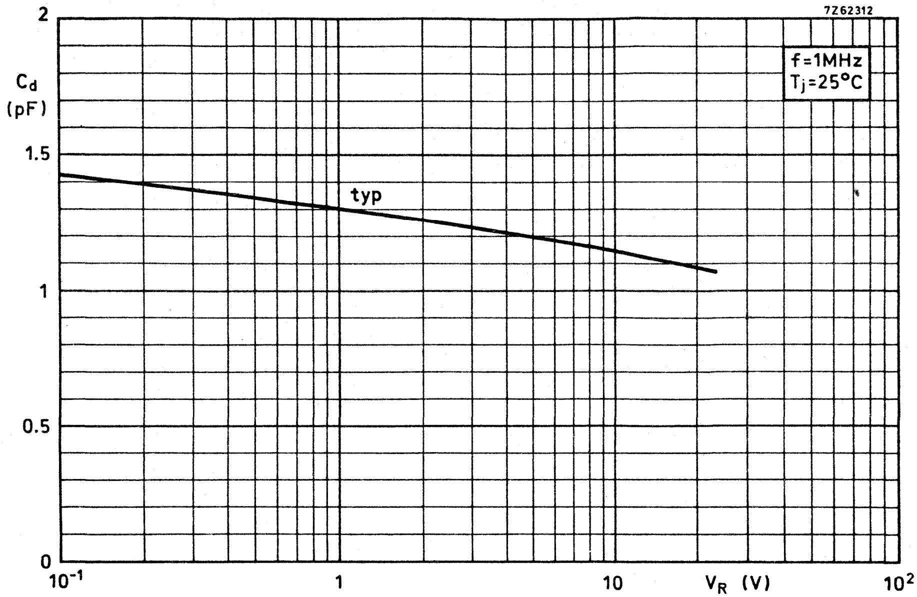
1) Measured under pulse conditions to avoid excessive dissipation.

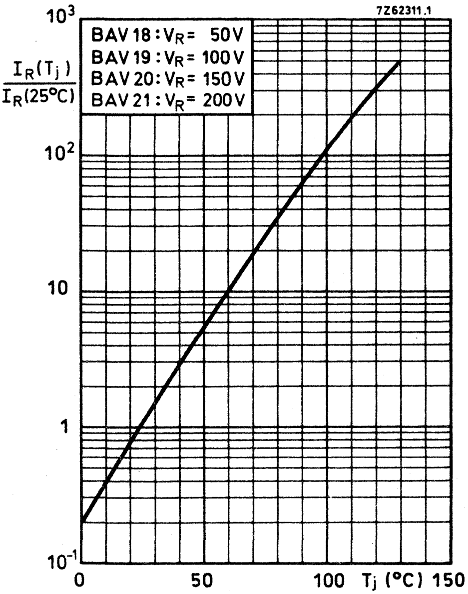

7Z62692
maximum allowable continuous forward current versus ambient temperature
300
200
100
0
I_F (mA)
0
100
T_{amb} (°C)
200

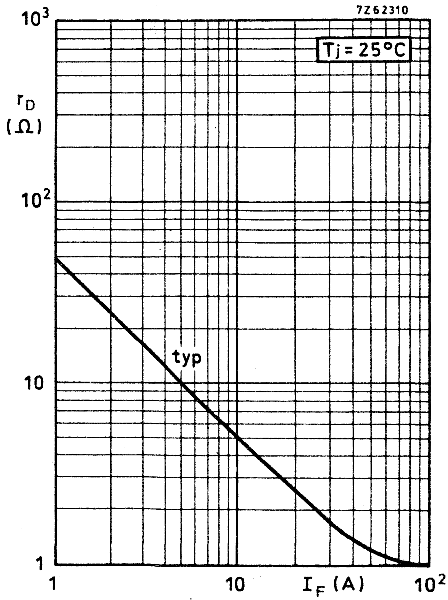

7Z67000
max. allowable average rectified forward current versus ambient temperature
T ≤ 20 ms
I_F
$I_{F(AV)}$
T
V_{RM} up to 60 V (BAV18)
V_{RM} up to 120 V (BAV19)
V_{RM} up to 180 V (BAV20)
V_{RM} up to 250 V (BAV21)
300
200
100
0
$I_{F(AV)}$ (mA)
0
100
T_{amb} (°C)
200


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


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


7Z62312
f = 1MHz
Tj = 25°C
Cd
(pF)
2
1.5
1
0.5
0
typ
10⁻¹
1
10
VR (V)
10²


7Z62311.1
BAV 18 : VR = 50 V
BAV 19 : VR = 100 V
BAV 20 : VR = 150 V
BAV 21 : VR = 200 V
IR(Tj) / IR(25°C)
10³
10²
10
1
10⁻¹
0
50
100
Tj (°C)
150


7Z62310
Tj = 25°C
rD
(Ω)
10³
10²
10
1
typ
1
10
IF (A)
10²

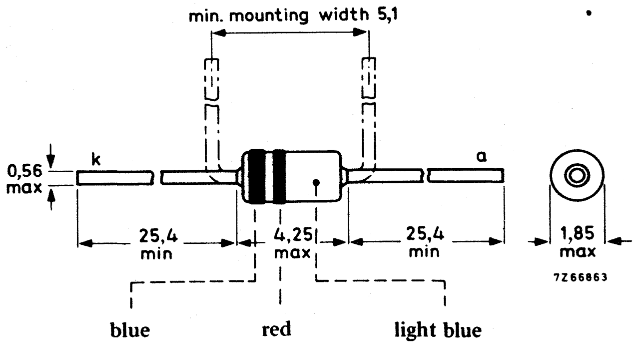
HIGH SPEED SILICON DIODES

Silicon 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 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 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 μA; V_R > 100 V.

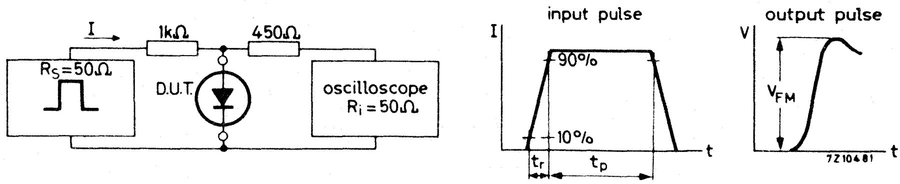
[2]) For sinusoidal operation see page 6. For pulse operation see page 5.

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

Forward recovery voltage when switched to

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

Test circuit:



Current pulse: Rise time t_r = 20 ns

Pulse duration t_p = 120 ns

Duty cycle δ = 0.01

Oscilloscope:

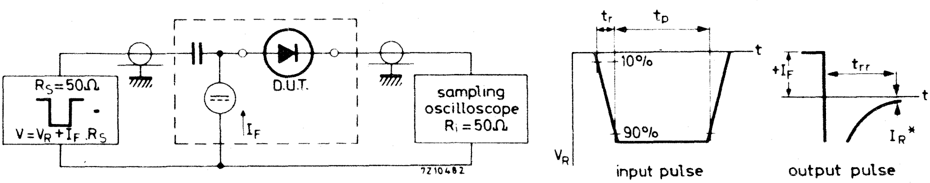
Rise time t_r = 0.35 ns

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

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

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

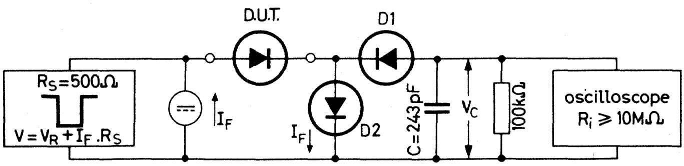
Circuit capacitance C ≤ 1 pF (C = Oscilloscope + parasitical capacitance)

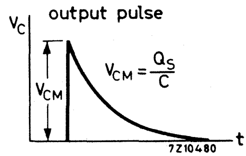
CHARACTERISTICS (continued)

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





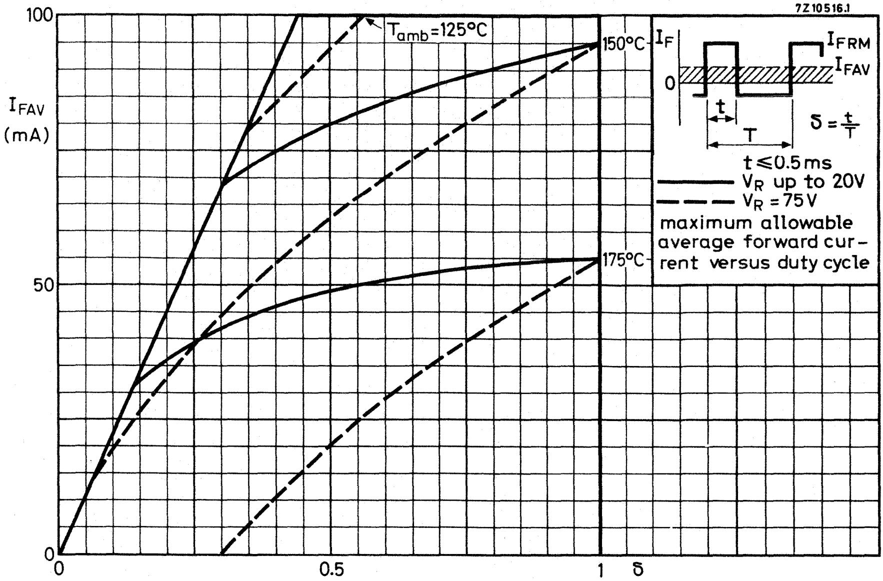
D1 = D2 = BAW62

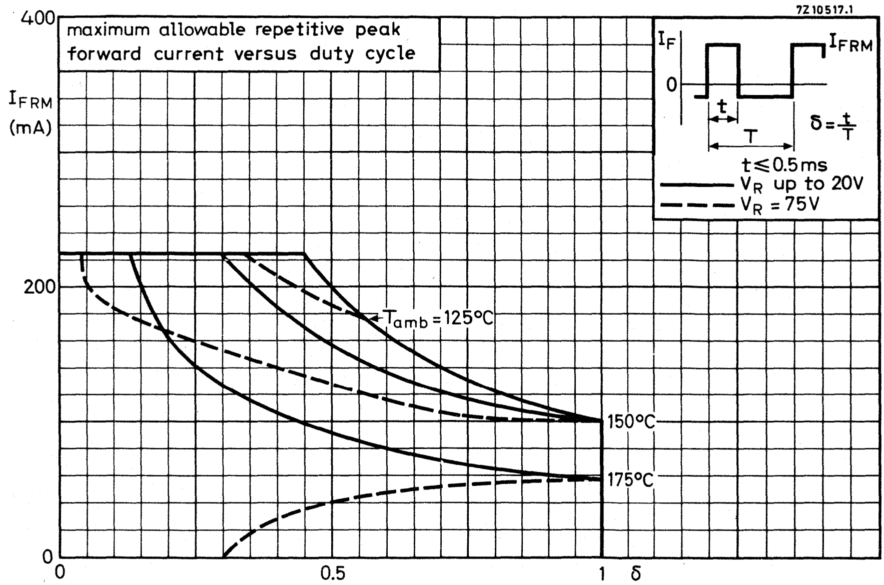
Reverse pulse: Rise time t_r = 2 ns

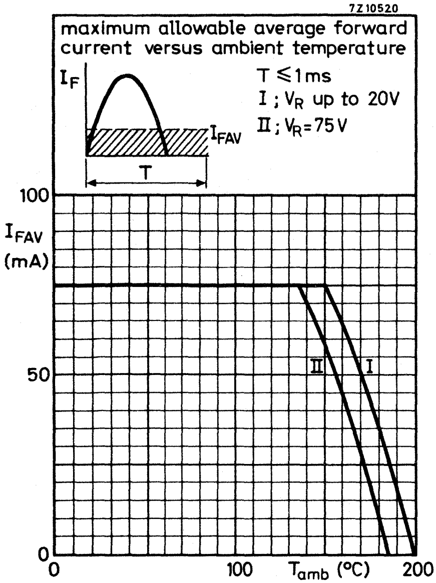
Pulse duration t_p = 400 ns

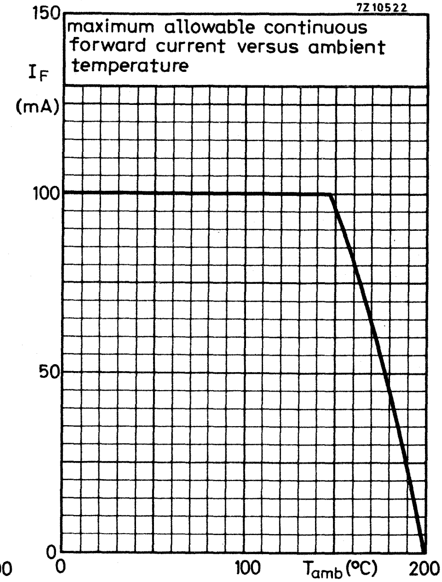
Duty cycle δ = 0.02

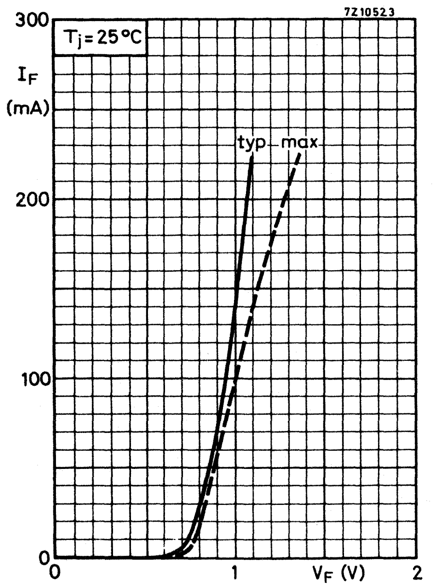
Circuit capacitance $C \leq 7$ pF (C = Oscilloscope + parasitical capacitance)

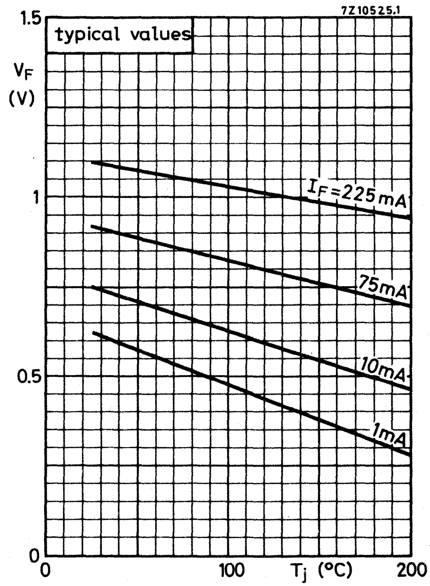

7Z10516.1
100
50
0
I_{FAV}
(mA)
0
0.5
1
δ
T_{amb} = 125°C
150°C
175°C
I_F
I_{FRM}
I_{FAV}
0
t
T
δ = t/T
t ≤ 0.5 ms
V_R up to 20V
V_R = 75V
maximum allowable average forward current versus duty cycle

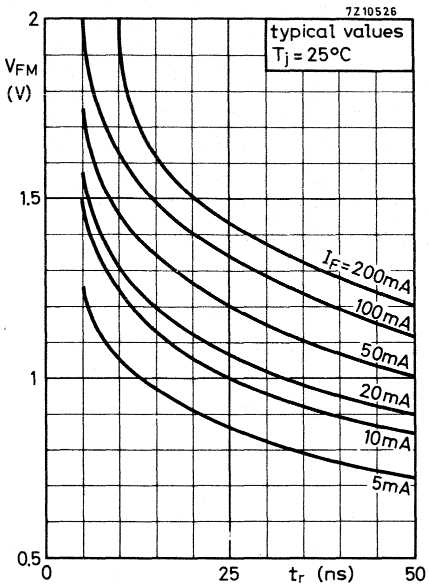

7Z10517.1
400
200
0
I_{FRM}
(mA)
0
0.5
1
δ
maximum allowable repetitive peak forward current versus duty cycle
T_{amb} = 125°C
150°C
175°C
I_F
I_{FRM}
0
t
T
δ = t/T
t ≤ 0.5 ms
V_R up to 20V
V_R = 75V

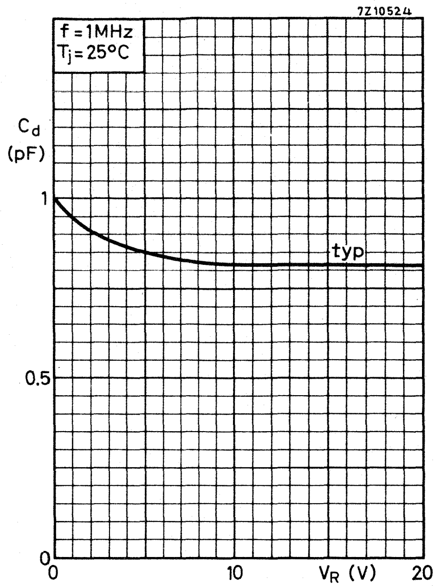

7Z10520
maximum allowable average forward current versus ambient temperature
I_F
I_FAV
T
T ≤ 1 ms
I ; V_R up to 20V
II ; V_R = 75 V
100
I_FAV
(mA)
50
0
0
100
T_amb (°C)
200
II
I

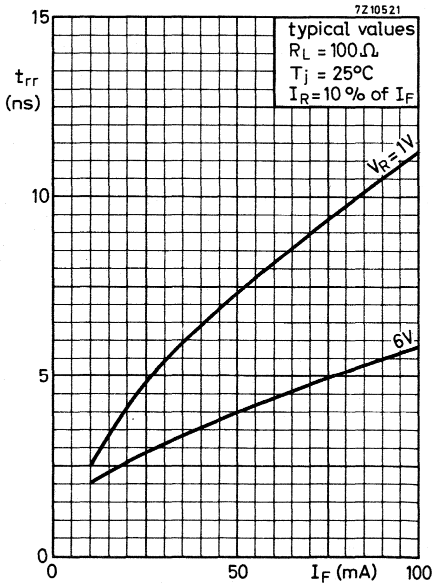

7Z10522
maximum allowable continuous forward current versus ambient temperature
150
I_F
(mA)
100
50
0
0
100
T_amb (°C)
200

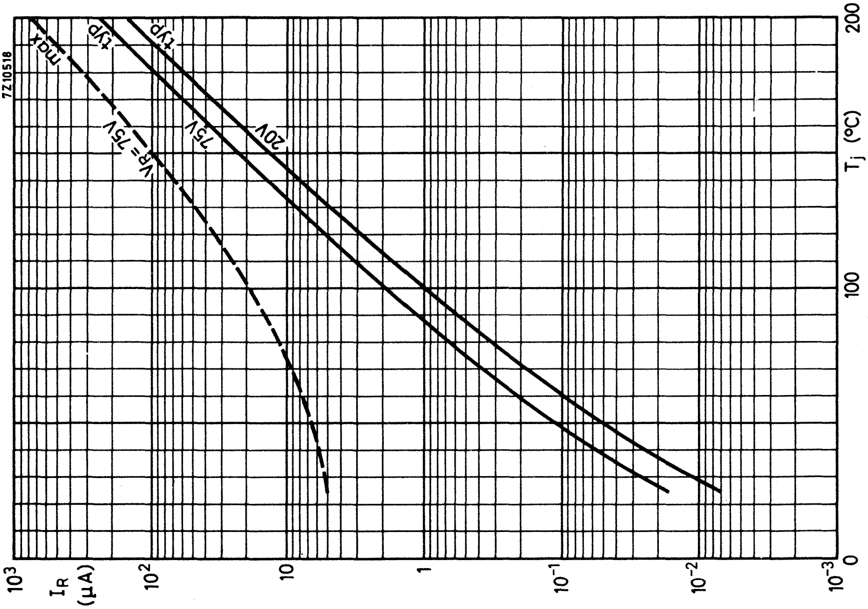

7Z10523
T_j = 25 °C
300
I_F
(mA)
200
100
0
0
1
V_F (V)
2
typ
max

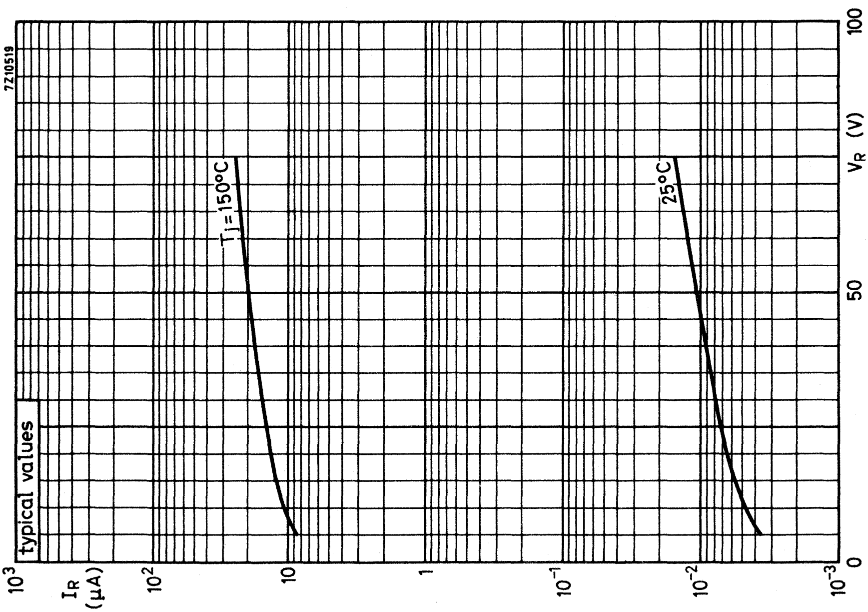

7Z10525.1
typical values
1.5
V_F
(V)
1
0.5
0
0
100
T_j (°C)
200
I_F = 225 mA
75mA
10mA
1mA


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


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


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


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


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

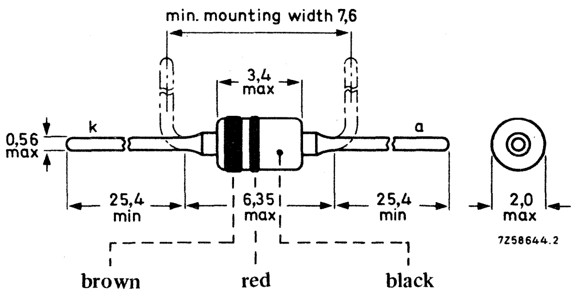
SILICON OXIDE PASSIVATED AVALANCHE DIODE

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	$^{o}C/mW$
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 ^{o}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



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_{FAV}	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.

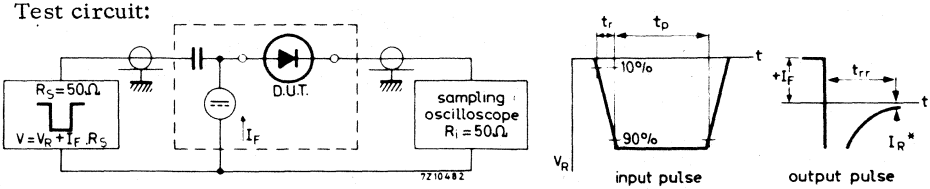
[2] It is allowed to exceed this value as described on page 4. Care should be taken not to exceed the I_{RRM} rating.

CHARACTERISTICS (continued) T_j = 25 °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 = 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 δ = 0.05

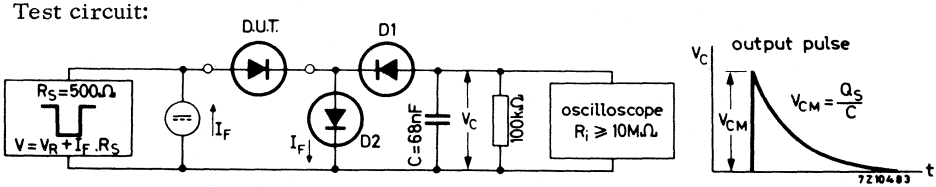
Oscilloscope: Rise time t_r = 0.35 ns

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 < 0.5 nC

Test circuit:



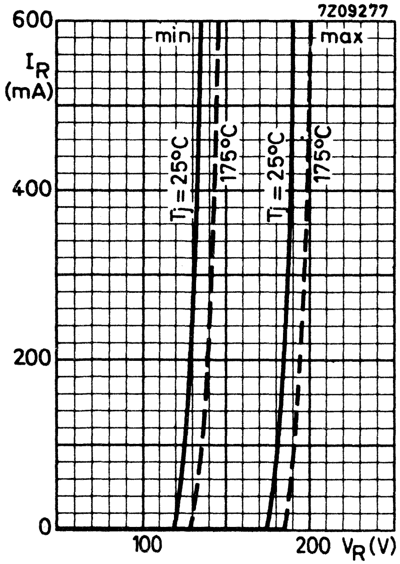
D1 = D2 = BAW62

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)



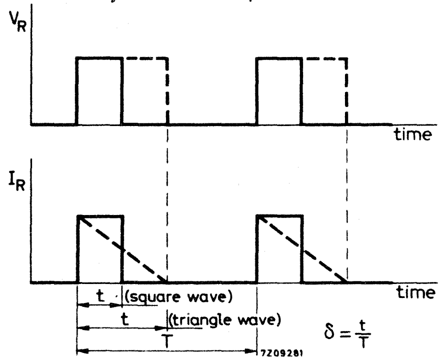
Reverse voltages higher than the V_R ratings are allowed, provided

a. the transient energy $\leq$ 5 mWs at T_j = 25 °C

b. T $\geq$ 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 minmum 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

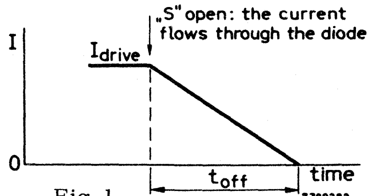


Fig. 1

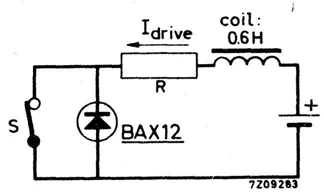
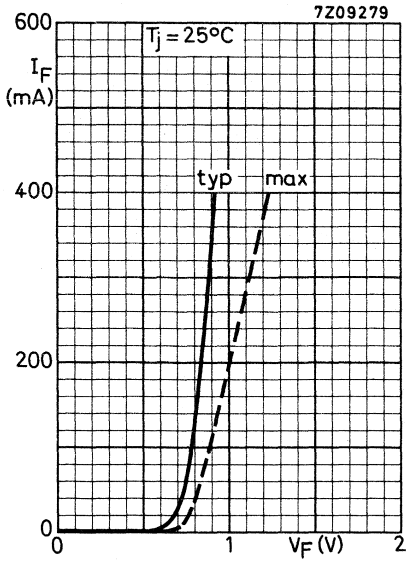
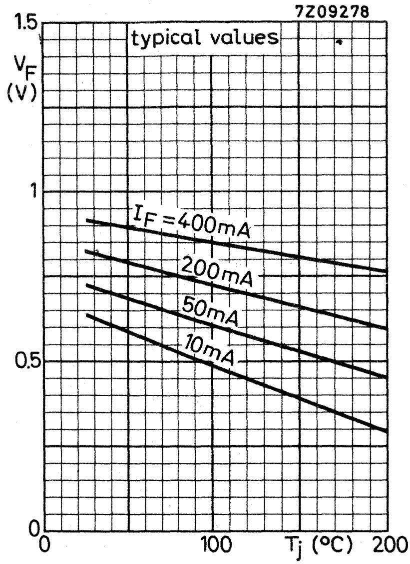
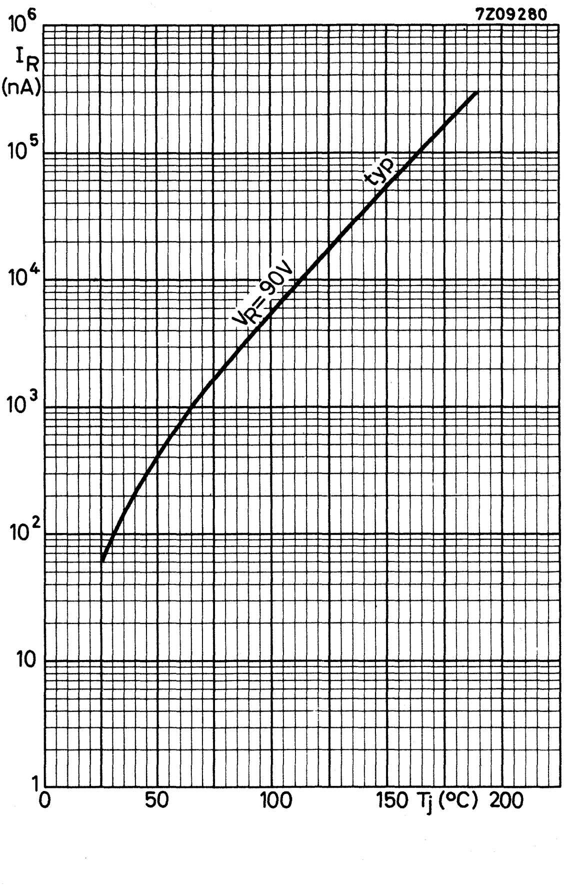


Fig. 2


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


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

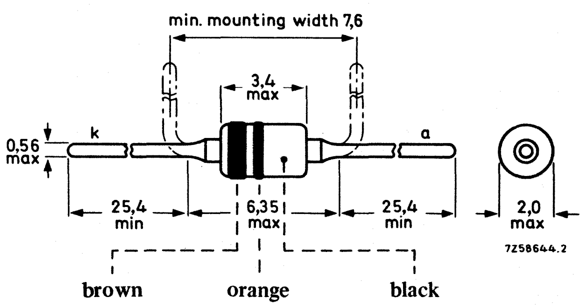

7Z09280
10^6
I_R
(nA)
10^5
10^4
10^3
10^2
10
1
0
50
100
150
200
T_j (°C)
typ
V_R=90V

SILICON OXIDE PASSIVATED DIODE

Whiskerless diode in a hardglass subminiature envelope.
The BAX13 is primarily intended for fast logic 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	$R_{th\ j-a}$	=	0.60	$^oC/mW$
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



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	^{o}C
Junction temperature	T_j	max.	200	^{o}C

THERMAL RESISTANCE

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

CHARACTERISTICS T_j = 25 ^{o}C unless otherwise specified

Forward voltage

I_F = 2 mA	V_F	<	0.7	V
I_F = 10 mA; T_j = 100 ^{o}C	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 ^{o}C	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 ^{o}C	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.

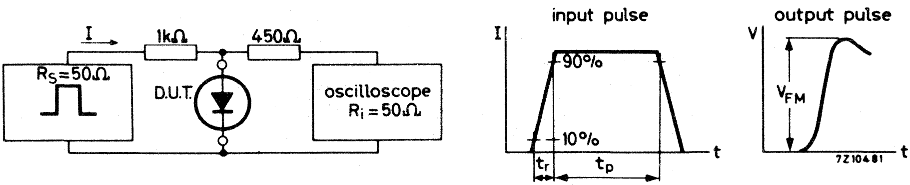
[3] Measured under pulsed conditions to prevent excessive dissipation.

CHARACTERISTICS (continued) T_j = 25 °C 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			

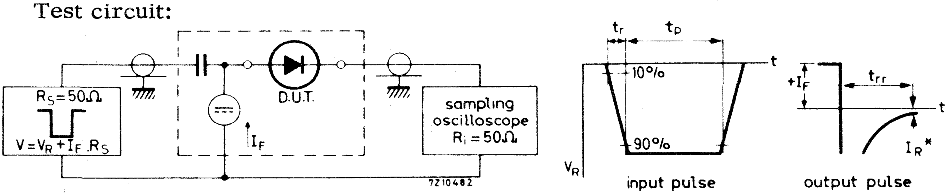
Circuit capacitance C < 1 pF (C = Oscilloscope + parasitical capacitance)

Reverse recovery time when switched from

I_F = 10 mA to V_R ; R_L = 100 Ω (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			

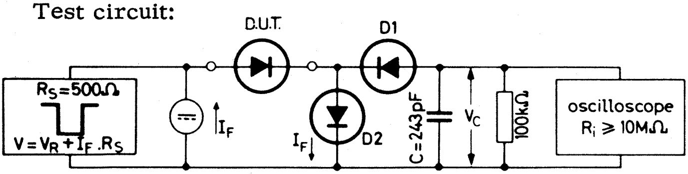
Circuit capacitance C ≤ 1 pF (C = Oscilloscope + parasitical capacitance)

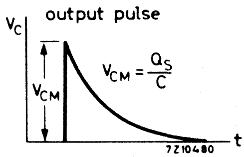
CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

Recovered charge when switched from

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

Test circuit:





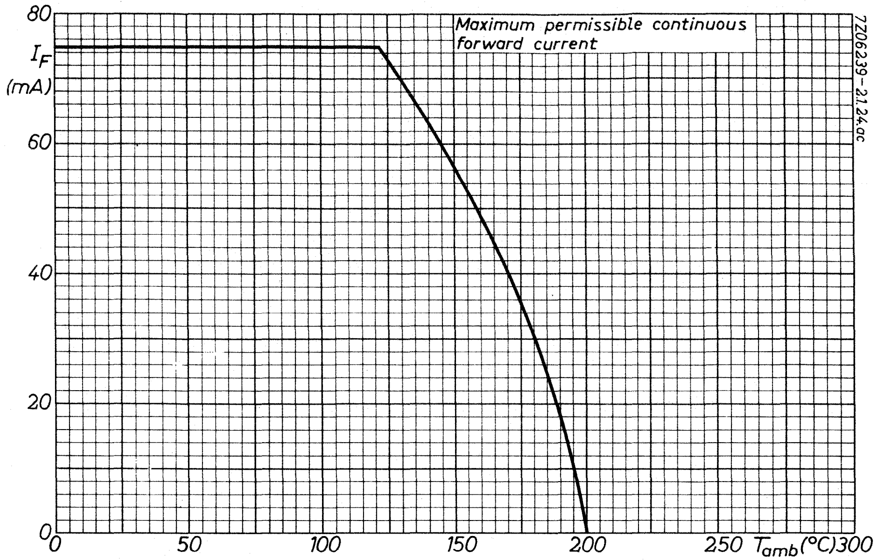
D1 = D2 = BAW62

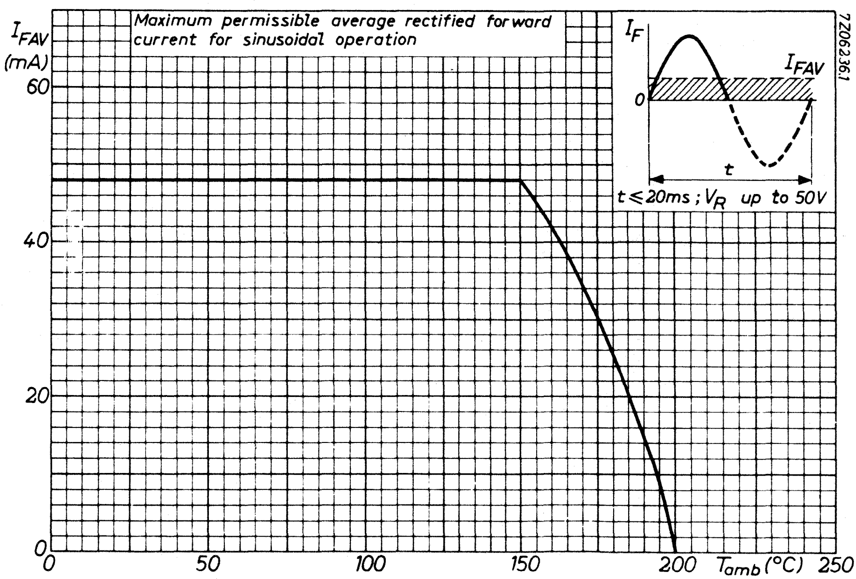
Reverse pulse: Rise time t_r = 2 ns

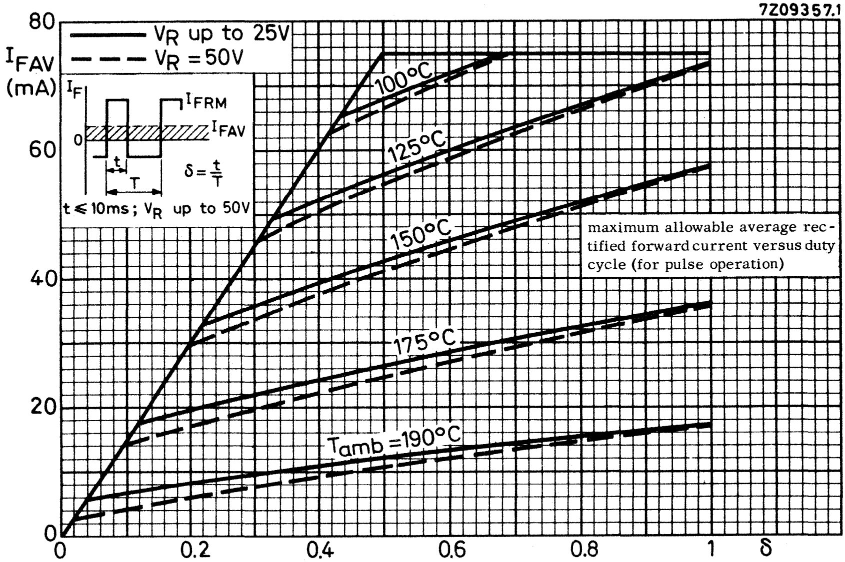
Pulse duration t_p = 400 ns

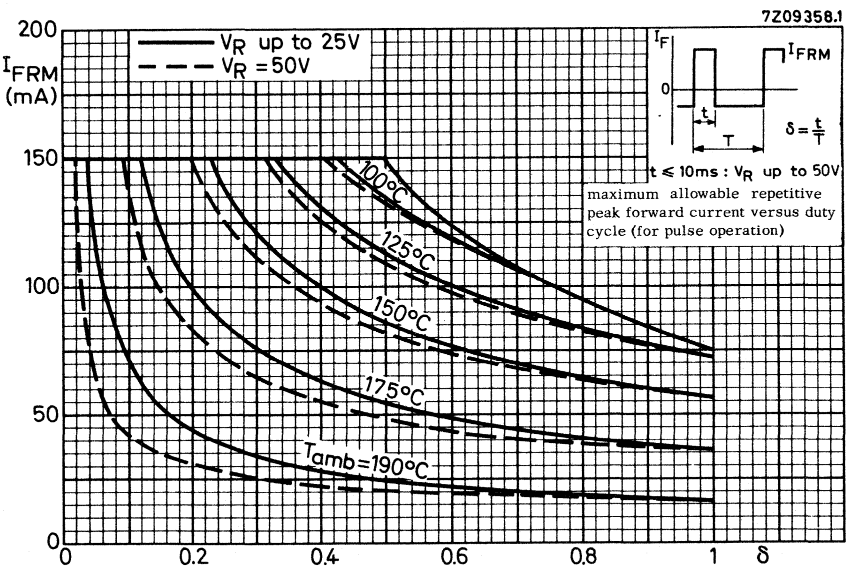
Duty cycle δ = 0.02

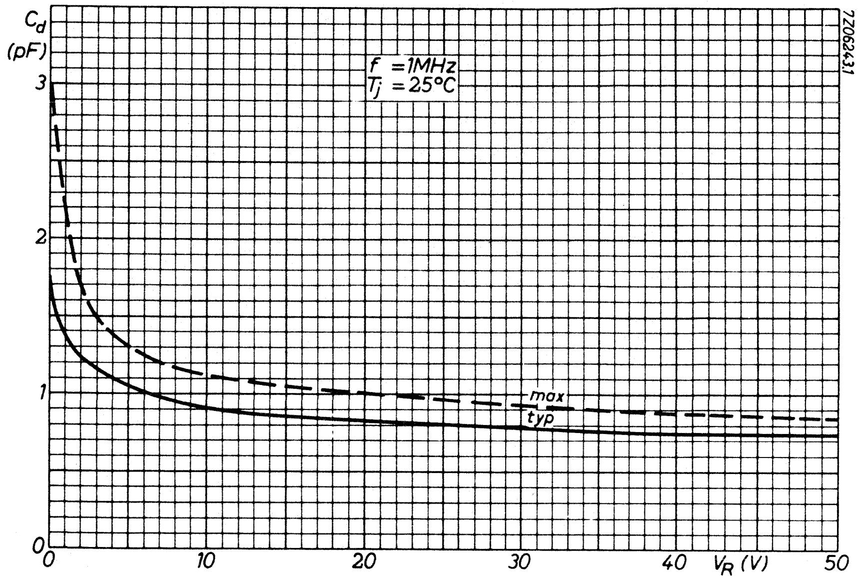
Circuit capacitance C < 7 pF (C = Oscilloscope + parasitical capacitance)

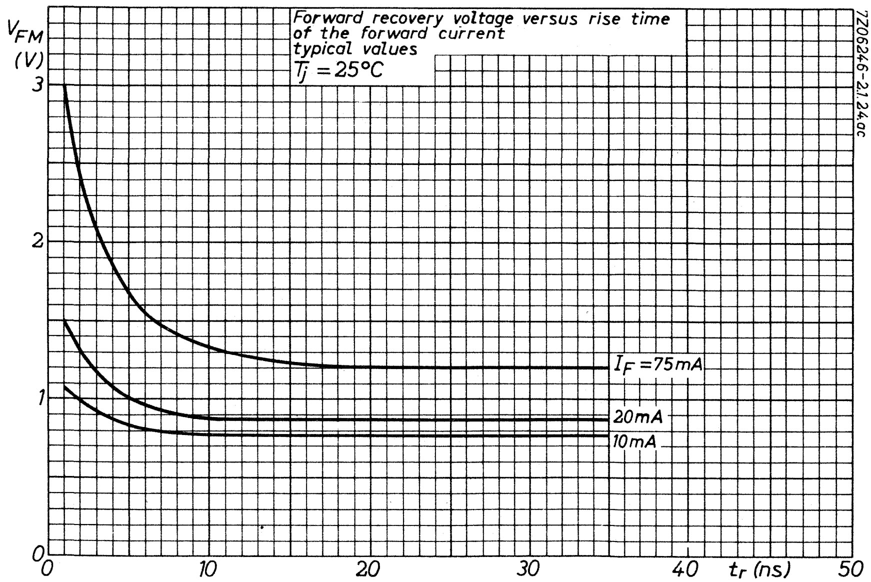

80
I_F
(mA)
60
40
20
0
0
50
100
150
200
250
T_{amb} (°C)
300
Maximum permissible continuous forward current
7Z06239-2.1.24.ac

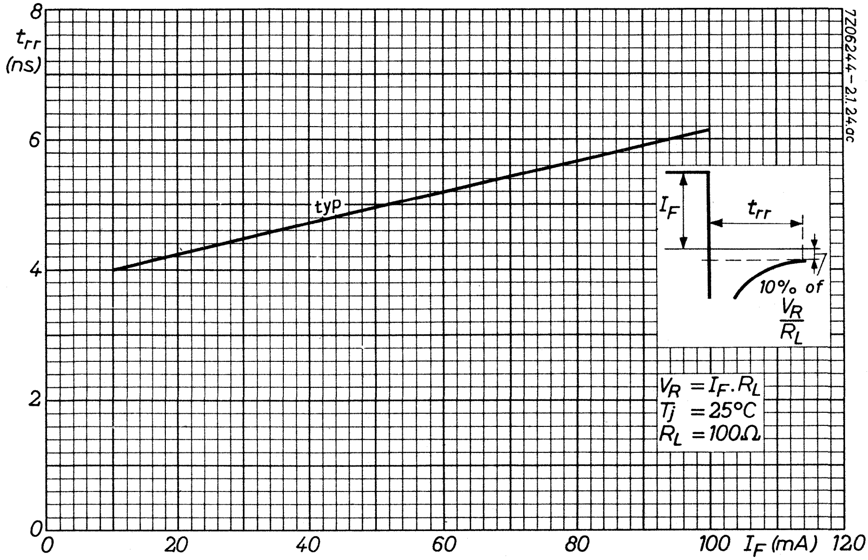

I_{FAV}
(mA)
60
40
20
0
0
50
100
150
200
T_{amb} (°C)
250
Maximum permissible average rectified forward current for sinusoidal operation
I_F
I_{FAV}
0
t
$t \leq 20ms$; V_R up to 50V
7Z06236.1

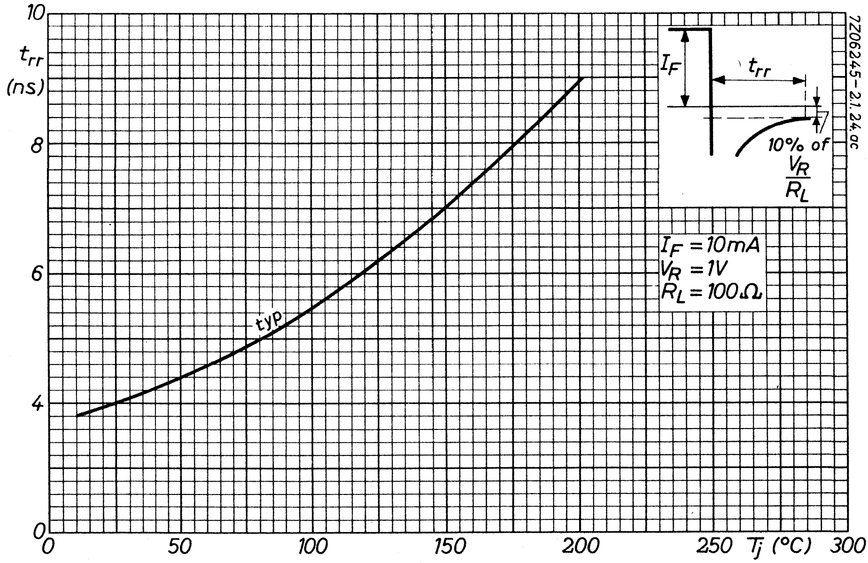

7Z09357.1
80
I_{FAV}
(mA)
60
40
20
0
0
0.2
0.4
0.6
0.8
1
δ
V_R up to 25V
V_R = 50V
I_F
I_{FRM}
0
I_{FAV}
t
T
δ = t/T
t ≤ 10ms ; V_R up to 50V
100°C
125°C
150°C
175°C
T_{amb}=190°C
maximum allowable average rectified forward current versus duty cycle (for pulse operation)

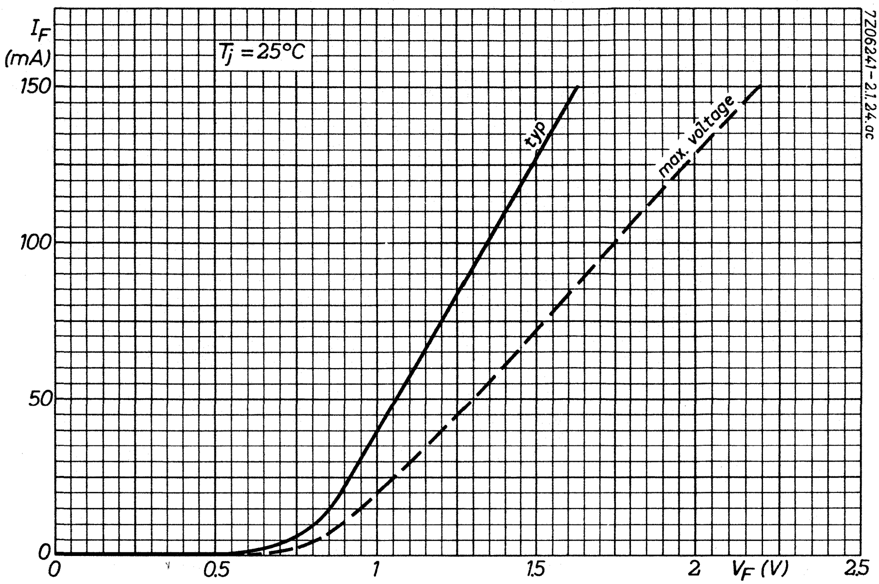

7Z09358.1
200
I_{FRM}
(mA)
150
100
50
0
0
0.2
0.4
0.6
0.8
1
δ
V_R up to 25V
V_R = 50V
I_F
I_{FRM}
0
t
T
δ = t/T
t ≤ 10ms : V_R up to 50V
100°C
125°C
150°C
175°C
T_{amb}=190°C
maximum allowable repetitive peak forward current versus duty cycle (for pulse operation)

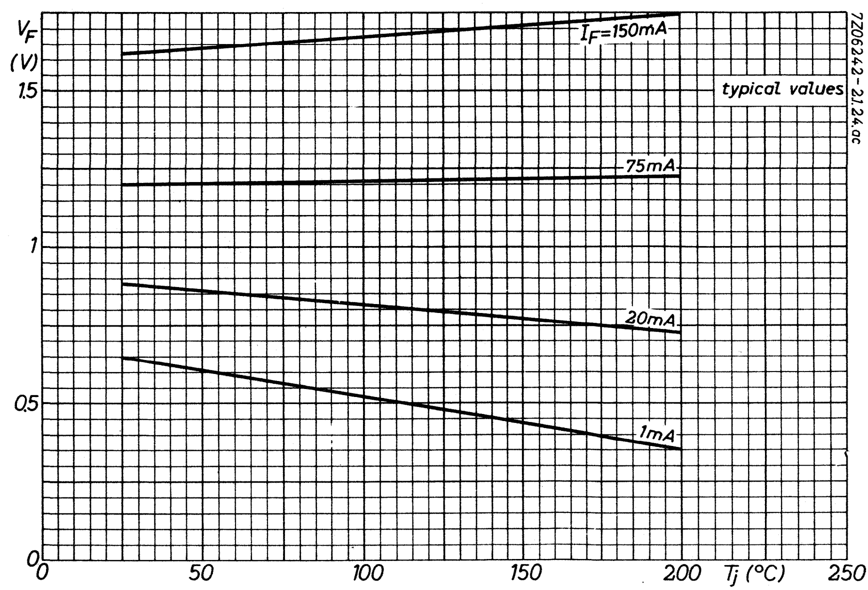

C_d
(pF)
f = 1MHz
T_j = 25°C
max
typ
V_R (V)
7Z06243.1

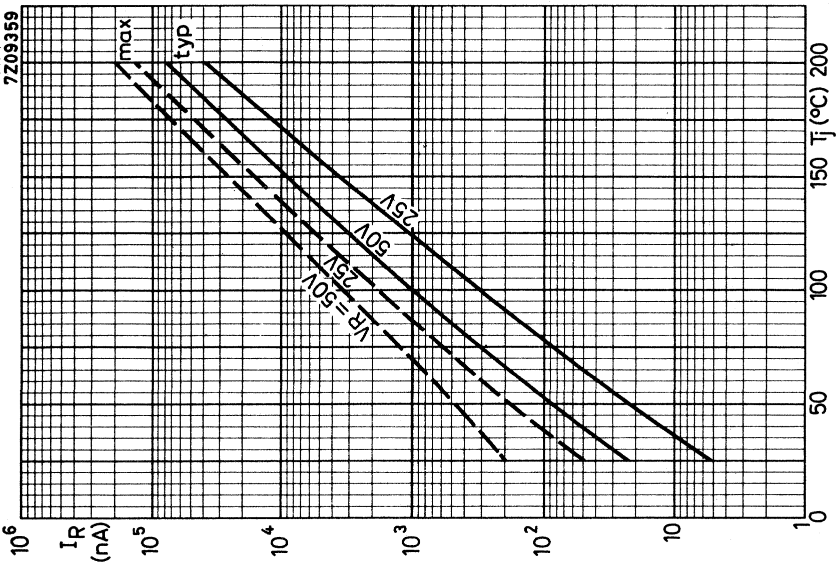

V_{FM}
(V)
Forward recovery voltage versus rise time
of the forward current
typical values
T_j = 25°C
I_F = 75mA
20mA
10mA
t_r (ns)
7Z06246-2.1.24.ac

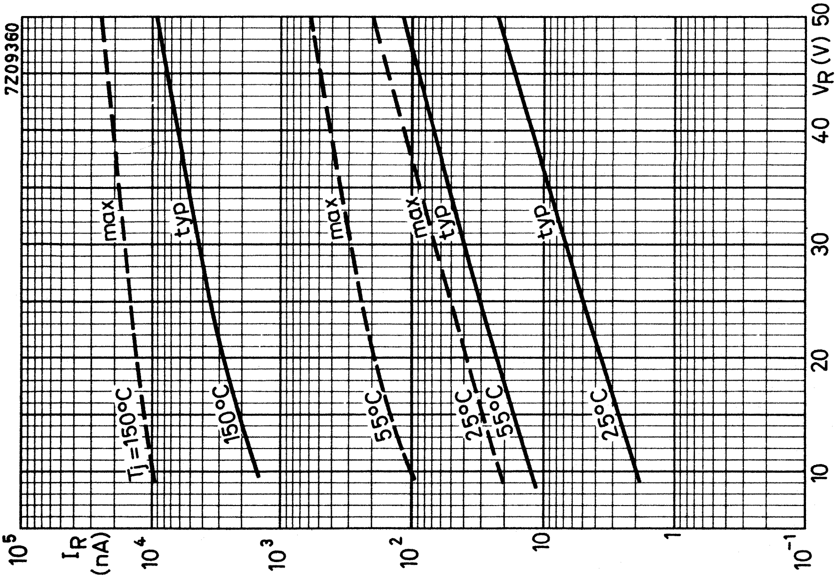

8
t_{rr}
(ns)
6
4
2
0
0
20
40
60
80
100
I_F (mA)
120
typ
I_F
t_{rr}
10% of
$\frac{V_R}{R_L}$
$V_R = I_F . R_L$
$T_j = 25°C$
$R_L = 100 \Omega$
7Z06244-2.1.24.ac


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


I_F (mA)
$T_j = 25°C$
150
100
50
0
typ
max. voltage
0
0.5
1
1.5
2
V_F (V)
2.5
7Z06241-21.24.ac


V_F (V)
1.5
1
0.5
0
I_F=150mA
typical values
75mA
20mA
1mA
0
50
100
150
200
T_j (°C)
250
7Z06242-21.24.ac


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


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

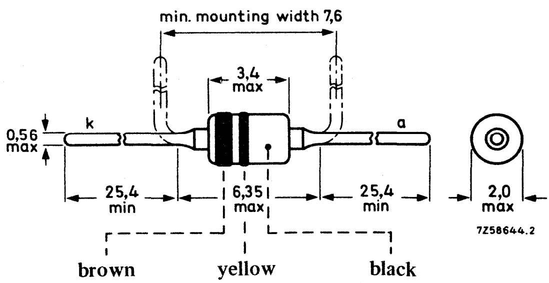
SILICON OXIDE PASSIVATED DIODE

Wiskerless diffused diode in a molybdenum 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



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

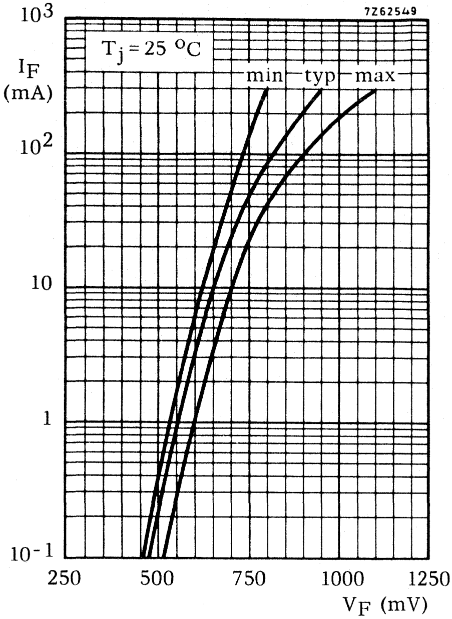
I_F = 1 mA	V_F	540 to 600	mV
I_F = 300 mA	V_F	800 to 1100	mV

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)

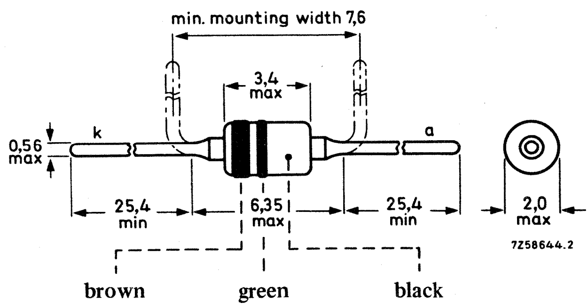
SILICON OXIDE PASSIVATED DIODE

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	°C/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



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_{FAV}	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	^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

$I_F = 100$ mA	V_F	<	1.0	V
$I_F = 100$ mA; $T_j = 100\ ^oC$	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; $T_j = 100\ ^oC$	I_R	<	10	μA

Diode capacitance (see also page 7)

$V_R = 0$; f = 1 MHz	C_d	<	20	pF

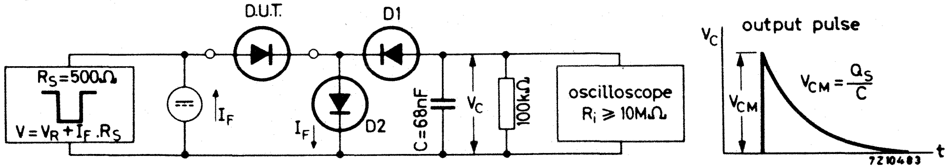
[1]) For sinusoidal operation see page 5.
For pulse operation see page 6.

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

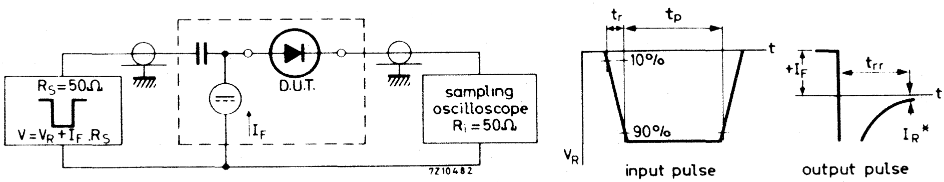
Reverse pulse:	Rise time	t_r	=	15 ns
	Pulse duration	t_p	=	35 μs
	Frequency	f	=	25 kHz

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

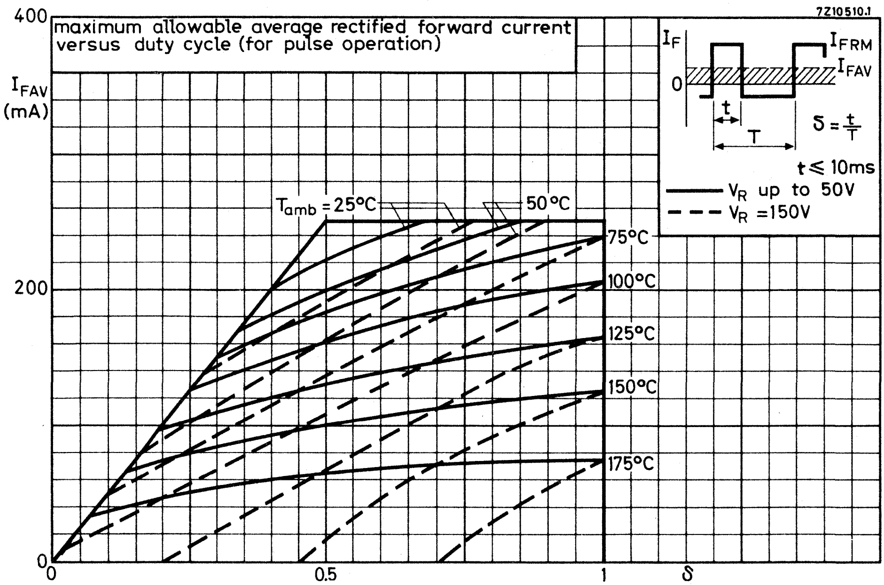
Test circuit:

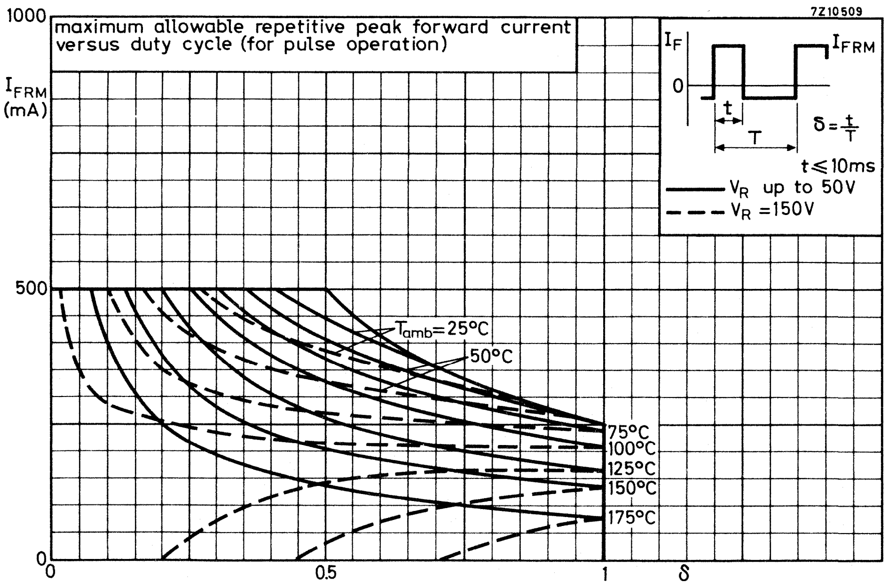


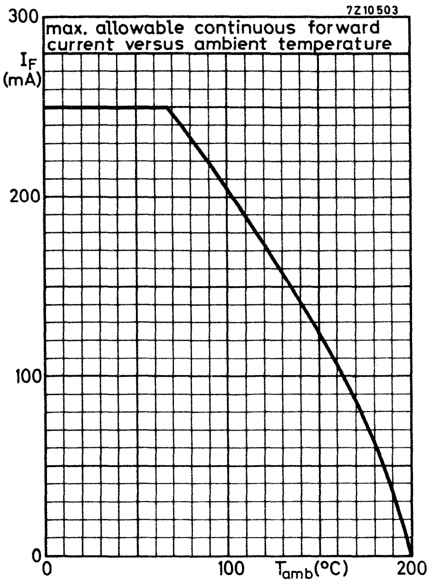
*) I_R = 3 mA

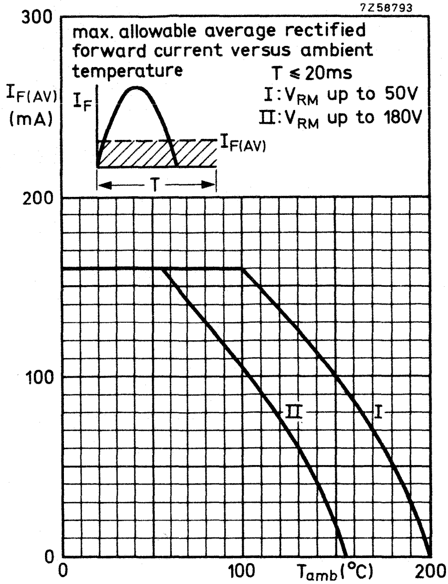
Reverse pulse:	Rise time	t_r	=	0.6 ns	Oscilloscope:				
	Pulse duration	t_p	=	100 ns	Rise time	t_r	=	0.35	ns
	Duty cycle	δ	=	0.05					

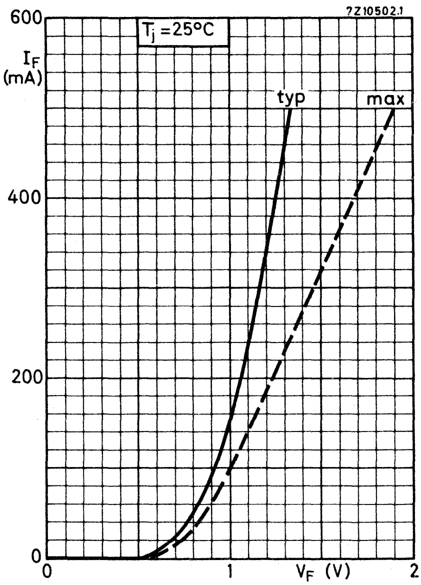
Circuit capacitance $C \leq 1$ pF (C = Oscilloscope + parasitical capacitance)

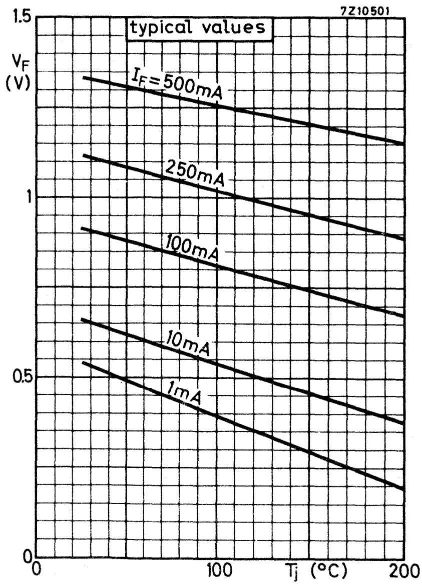

7Z10510.1
maximum allowable average rectified forward current versus duty cycle (for pulse operation)
400
200
0
I_{FAV} (mA)
0
0.5
1
δ
T_{amb} = 25 °C
50 °C
75 °C
100 °C
125 °C
150 °C
175 °C
I_F
I_{FRM}
I_{FAV}
t
T
δ = t/T
t ≤ 10 ms
V_R up to 50 V
V_R = 150 V

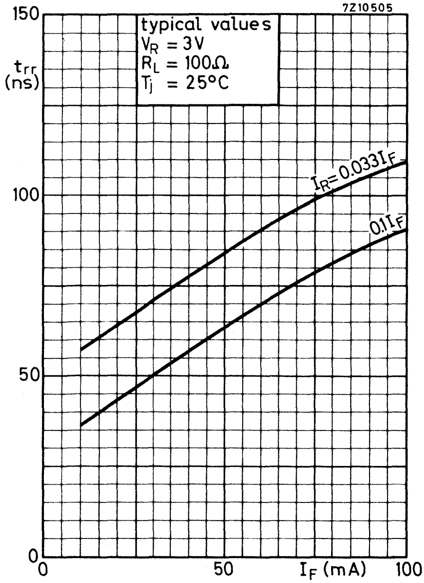

7Z10509
maximum allowable repetitive peak forward current versus duty cycle (for pulse operation)
1000
500
0
I_{FRM} (mA)
0
0.5
1
δ
T_{amb} = 25 °C
50 °C
75 °C
100 °C
125 °C
150 °C
175 °C
I_F
I_{FRM}
t
T
δ = t/T
t ≤ 10 ms
V_R up to 50 V
V_R = 150 V

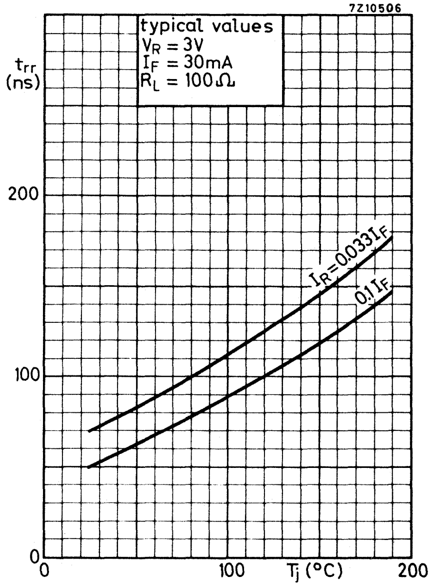

7Z10503
max. allowable continuous forward current versus ambient temperature
300
IF (mA)
200
100
0
0
100
Tamb(°C)
200

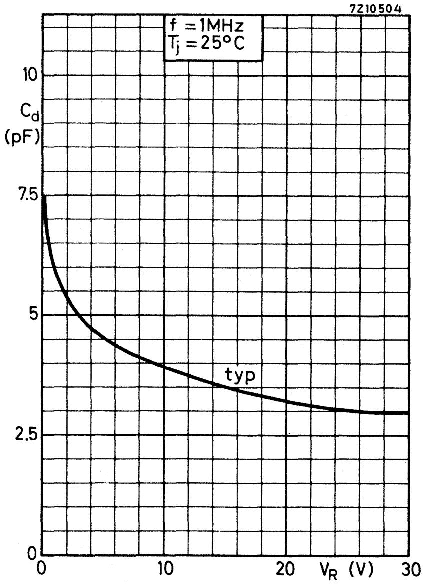

7Z58793
max. allowable average rectified forward current versus ambient temperature
T ≤ 20ms
I: VRM up to 50V
II: VRM up to 180V
IF(AV) (mA)
IF
IF(AV)
T
300
200
100
0
II
I
0
100
Tamb(°C)
200

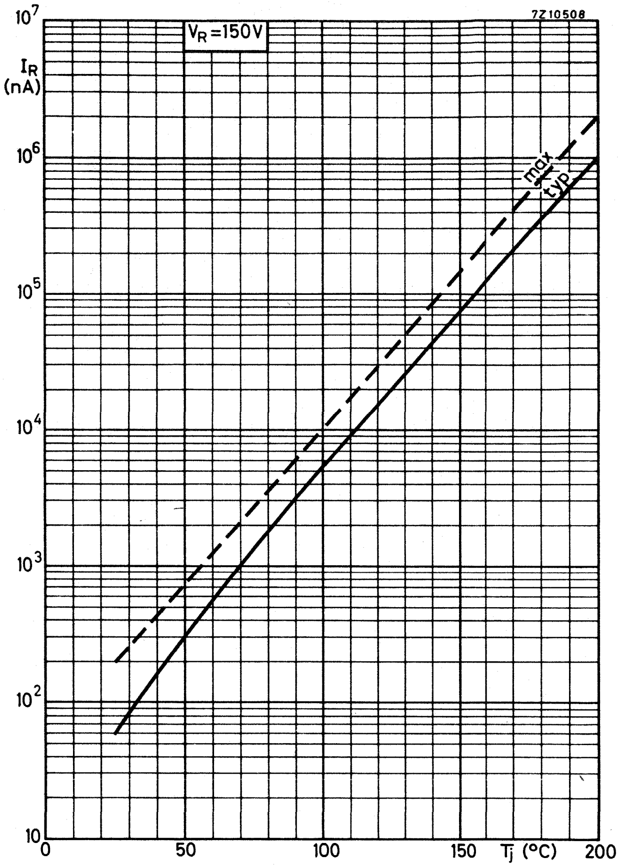

7Z10502.1
Tj = 25°C
600
IF (mA)
typ
max
400
200
0
0
1
VF (V)
2


7Z10501
typical values
1.5
VF (V)
IF = 500mA
250mA
1
100mA
10mA
0.5
1mA
0
0
100
Tj (°C)
200


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


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


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

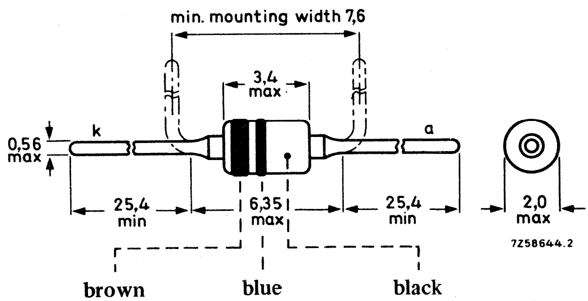

7Z10508
V_R =150V
I_R (nA)
10^7
10^6
10^5
10^4
10^3
10^2
10
max
typ
0
50
100
150
T_j (°C)
200

SILICON OXIDE PASSIVATED DIODE

Whiskerless diffused diode in a molybdenum hard glass subminature 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	$R_{th\ j\text{-}a}$	=	0.40	$^oC/mW$
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



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.	150	V

Currents

Average rectified forward current (averaged over any 20 ms period)	I_{FAV}	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		^oC
Junction temperature	T_j	max.	200	^oC

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	0.40	$^oC/mW$

CHARACTERISTICS T_j = 25 ^oC unless otherwise specified

Forward voltage

I_F = 1 mA	V_F	<	0.65	V
I_F = 10 mA; T_j = 100 ^oC	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 ^oC	V_F	<	1.4	V 2)

Reverse current

V_R = 50 V	I_R	<	25	nA
V_R = 50 V; T_j = 150 ^oC	I_R	<	25	μA
V_R = 150 V	I_R	<	100	nA
V_R = 150 V; T_j = 150 ^oC	I_R	<	100	μA

Diode capacitance (see also page 5)

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

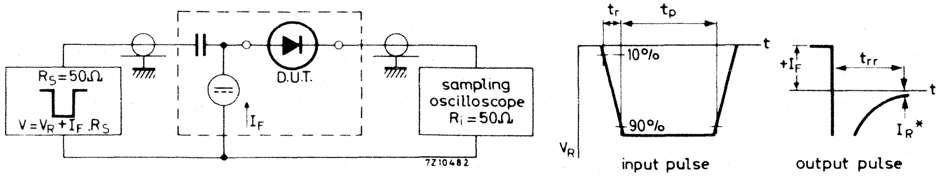
1) For sinusoidal operation see page 5. For pulse operation see page 4.
2) Measured under pulse conditions to prevent excessive dissipation.

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:



*) I_R = 3 mA

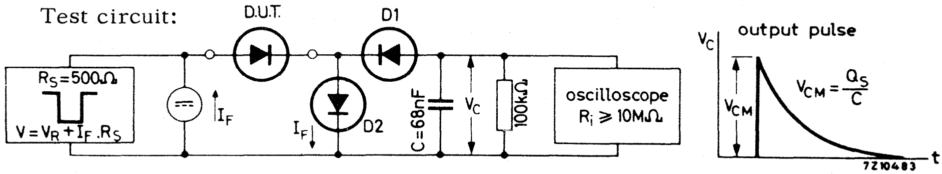
Reverse pulse:	Rise time	t_r = 0.6 ns	Oscilloscope:	
	Pulse duration	t_p = 100 ns	Rise time	t_r = 0.35 ns
	Duty cycle	δ = 0.05		

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

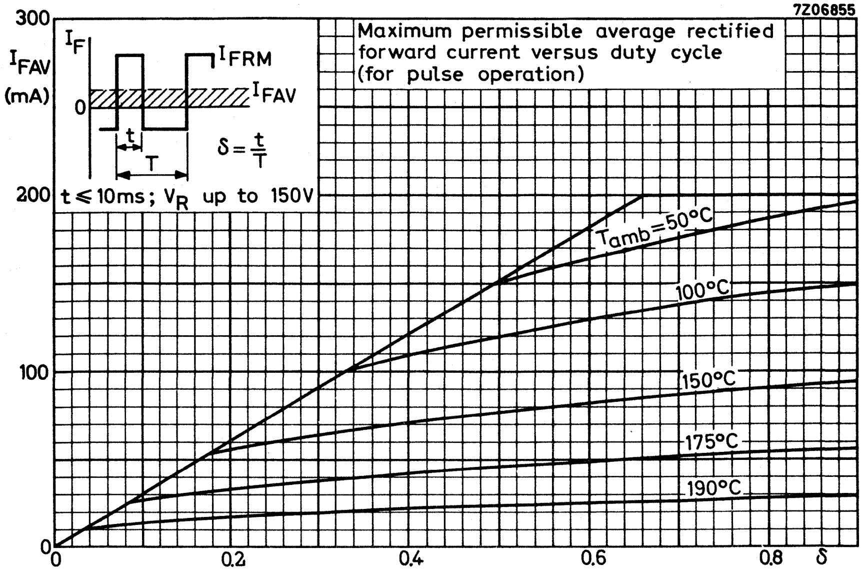
Test circuit:

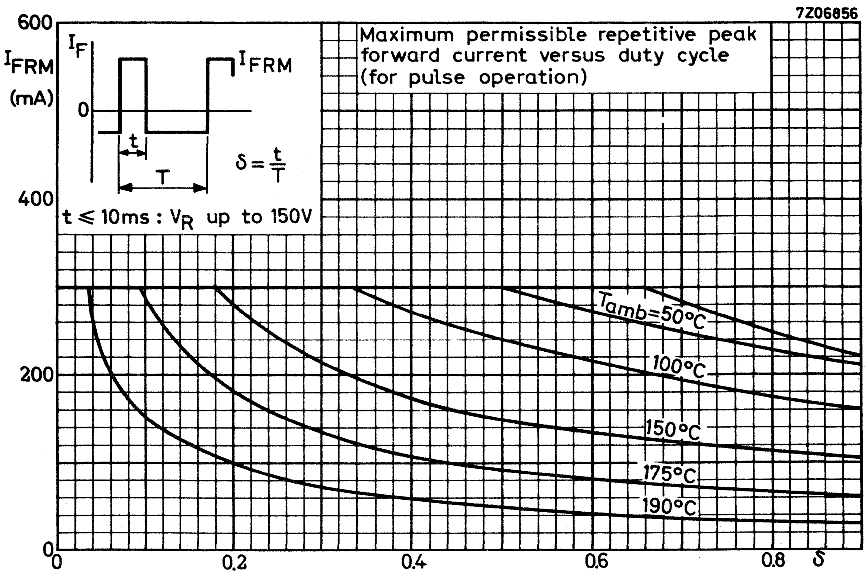


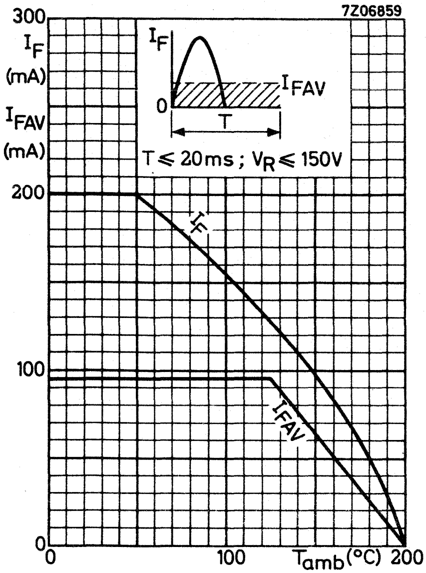
D1 = D2 = BAW62

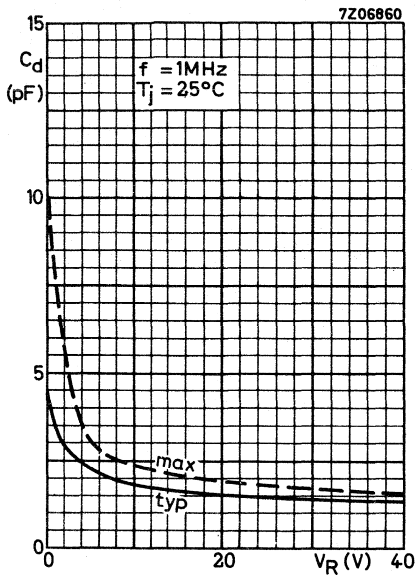
Reverse pulse:	Rise time	t_r = 15 ns
	Pulse duration	t_p = 35 μs
	Frequency	f = 25 kHz

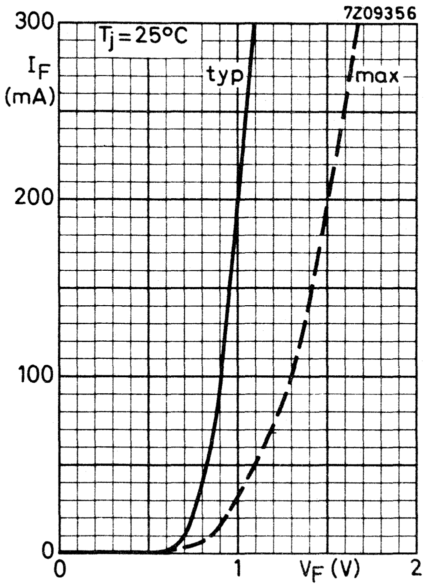
Circuit capacitance C < 30 pF (C = Oscilloscope + parasitical capacitance)

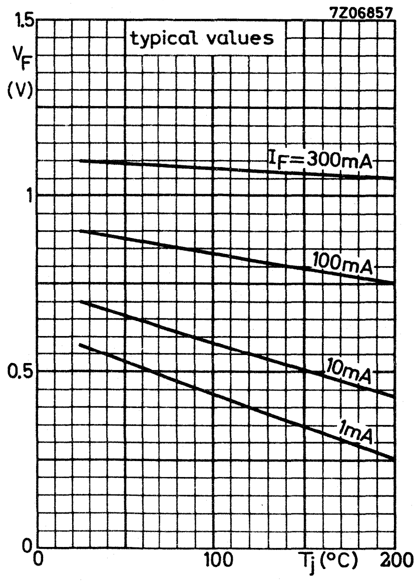

7Z06855
Maximum permissible average rectified forward current versus duty cycle (for pulse operation)
I_{FAV} (mA)
300
200
100
0
I_F
I_{FRM}
I_{FAV}
0
t
T
$\delta = \frac{t}{T}$
$t \leq 10ms$; V_R up to 150V
T_{amb}=50°C
100°C
150°C
175°C
190°C
0
0.2
0.4
0.6
0.8
δ

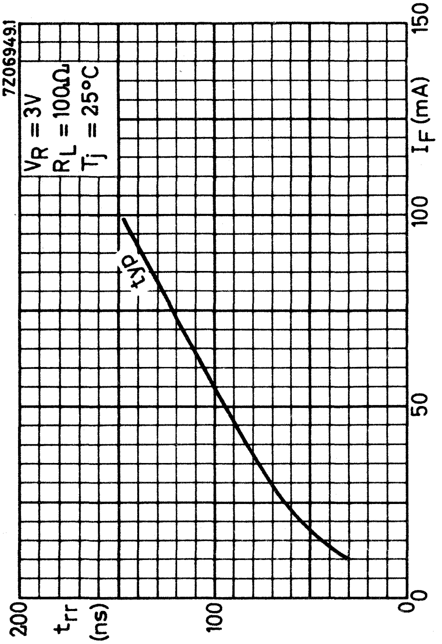

7Z06856
Maximum permissible repetitive peak forward current versus duty cycle (for pulse operation)
I_{FRM} (mA)
600
400
200
0
I_F
I_{FRM}
0
t
T
$\delta = \frac{t}{T}$
$t \leq 10ms$: V_R up to 150V
T_{amb}=50°C
100°C
150°C
175°C
190°C
0
0.2
0.4
0.6
0.8
δ

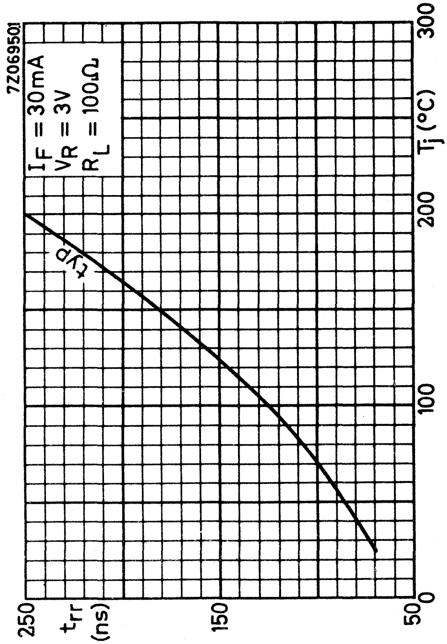

7Z06859
300
I_F
(mA)
I_{FAV}
(mA)
200
100
0
0
100
T_{amb} (°C)
200
I_F
I_{FAV}
0
T
$T \leqslant 20ms$; $V_R \leqslant 150V$

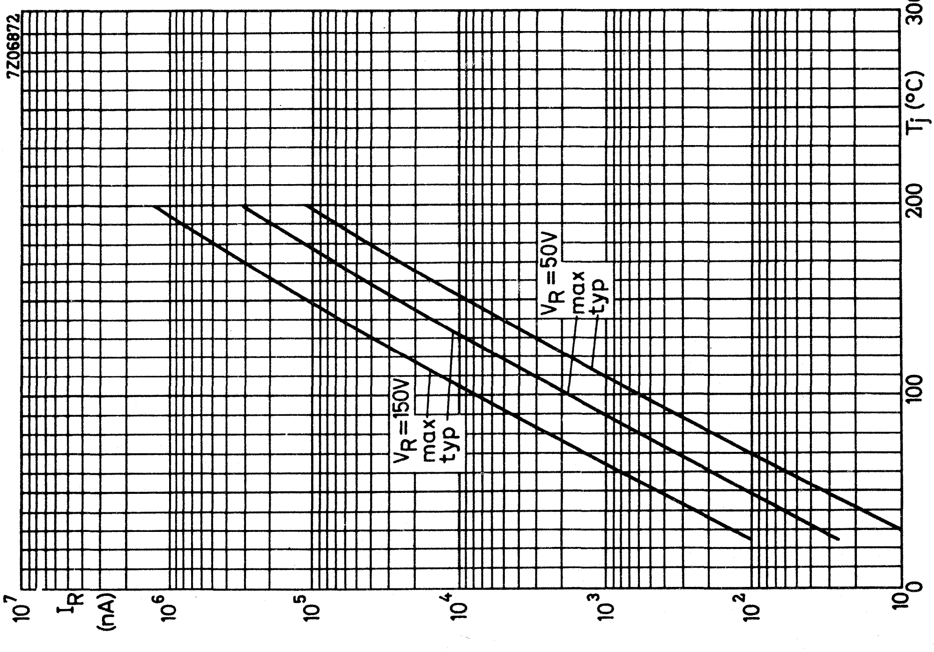

7Z06860
15
C_d
(pF)
10
5
0
0
20
V_R (V)
40
f = 1MHz
$T_j = 25°C$
max
typ


7Z09356
300
I_F
(mA)
200
100
0
0
1
V_F (V)
2
$T_j = 25°C$
typ
max


7Z06857
1.5
V_F
(V)
1
0.5
0
0
100
T_j (°C)
200
typical values
I_F=300mA
100mA
10mA
1mA


7Z06949.1
V_R = 3V
R_L = 100Ω
T_j = 25°C
t_{rr} (ns)
200
100
0
I_F (mA)
0
50
100
150
typ


7Z06950.1
I_F = 30 mA
V_R = 3V
R_L = 100Ω
t_{rr} (ns)
250
150
50
T_j (°C)
0
100
200
300
typ

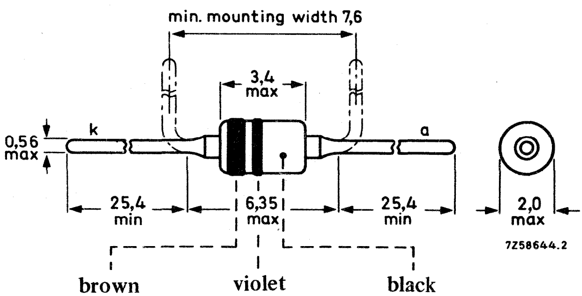

7Z06872
I_R (nA)
10^7
10^6
10^5
10^4
10^3
10^2
10
T_j (°C)
0
100
200
300
V_R = 150V
max
typ
V_R = 50V
max
typ

SILICON OXIDE PASSIVATED DIODE

Whiskerless diffused diode in a molybdenum hard glass subminiature envelope. The BAX17 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	$R_{th\ j\text{-}a}$	=	0.40	°C/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



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

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_{FAV}	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	$R_{th\ j-a}$	=	0.40	°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 5)

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 prevent excessive dissipation.

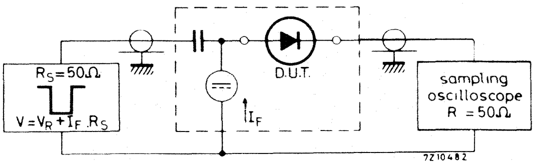
CHARACTERISTICS (continued) T_j = 25 ^oC unless otherwise specified

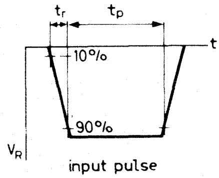
Reverse recovery time when switched from

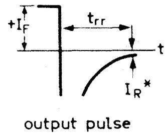
I_F = 30 mA to V_R = 3 V; R_L = 100 Ω
(see also page 6) measured at I_R = 3 mA

t_{rr}	typ.	70	ns
	<	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

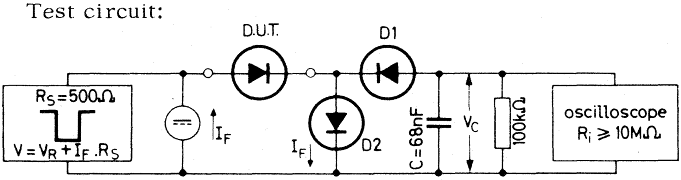
Oscilloscope:
Rise time t_r = 0.35 ns

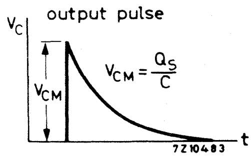
Circuit capacitance C ≤ 1 pF (C = Oscilloscope + parasitical capacitance)

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:

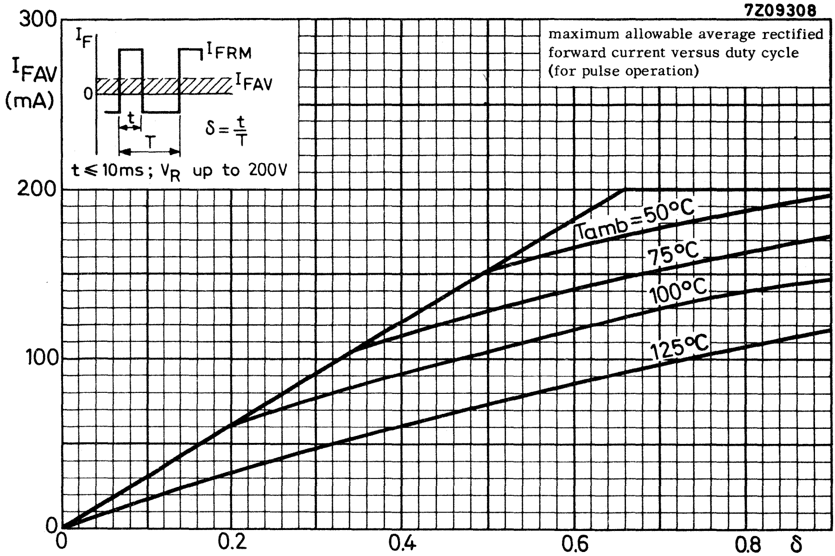


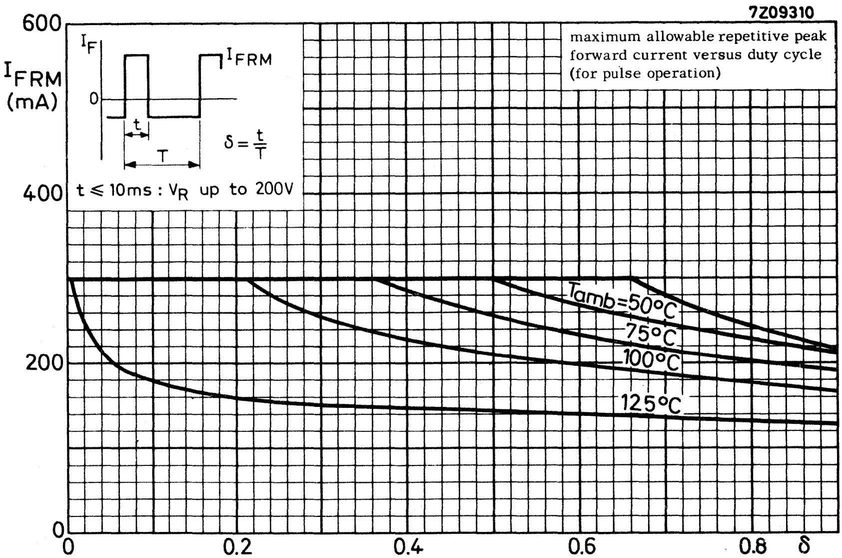


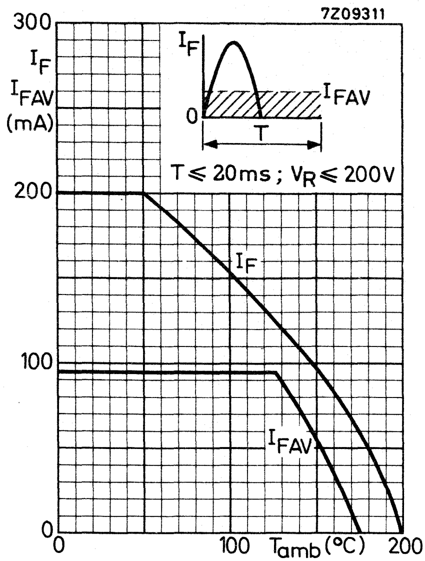
D1 = D2 = BAW62

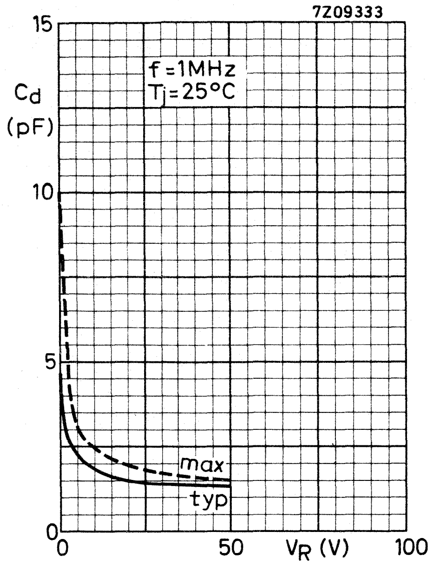
Reverse pulse: Rise time t_r = 15 ns
Pulse duration t_p = 35 μs
Frequency f = 25 kHz

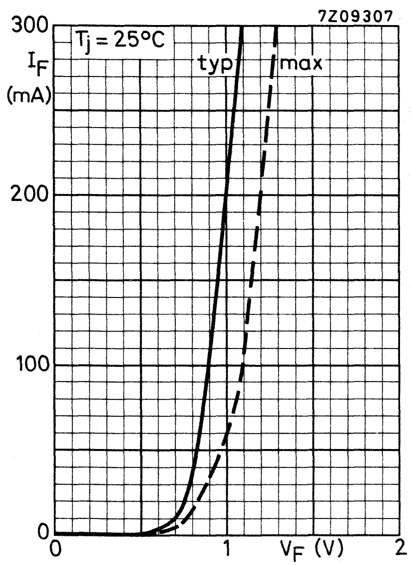
Circuit capacitance C < 30 pF (C = Oscilloscope + parasitical capacitance)

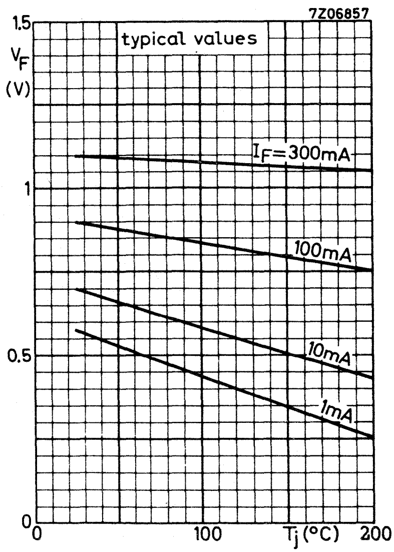

7Z09308
maximum allowable average rectified forward current versus duty cycle (for pulse operation)
I_{FAV} (mA)
300
200
100
0
I_F
I_{FRM}
I_{FAV}
t
T
$\delta = \frac{t}{T}$
t ≤ 10ms ; V_R up to 200V
Tamb=50°C
75°C
100°C
125°C
0.2
0.4
0.6
0.8
δ

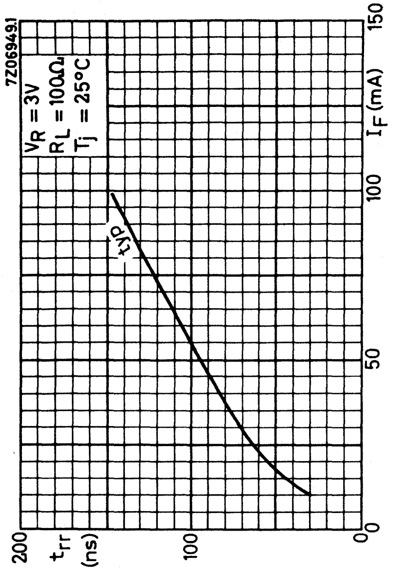

7Z09310
maximum allowable repetitive peak forward current versus duty cycle (for pulse operation)
I_{FRM} (mA)
600
400
200
0
I_F
I_{FRM}
t
T
$\delta = \frac{t}{T}$
t ≤ 10ms : V_R up to 200V
Tamb=50°C
75°C
100°C
125°C
0.2
0.4
0.6
0.8
δ

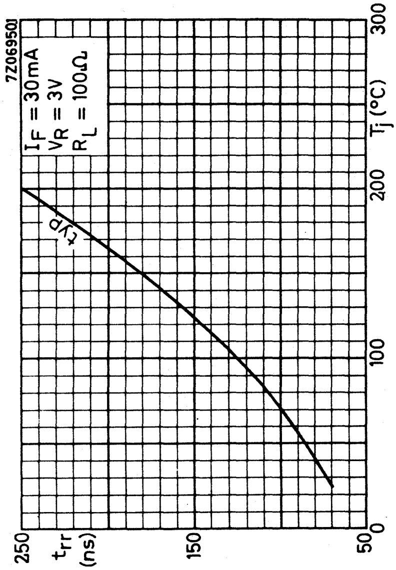

7Z09311
300
I_F
I_FAV
(mA)
200
100
0
I_F
I_FAV
0
T
T ≤ 20ms ; V_R ≤ 200V
I_F
I_FAV
0
100
T_amb (°C)
200

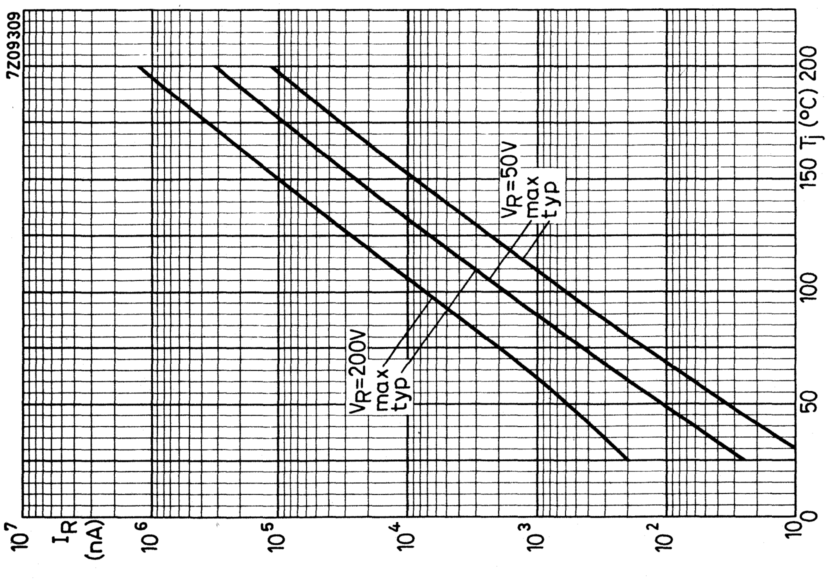

7Z09333
15
C_d
(pF)
10
5
0
f = 1MHz
T_j = 25°C
max
typ
0
50
V_R (V)
100


7Z09307
300
I_F
(mA)
200
100
0
T_j = 25°C
typ
max
0
1
V_F (V)
2


7Z06857
1.5
V_F
(V)
1
0.5
0
typical values
I_F=300mA
100mA
10mA
1mA
0
100
T_j (°C)
200


7Z06949.1
V_R = 3V
R_L = 100Ω
T_j = 25°C
typ
t_rr (ns)
200
100
0
I_F (mA)
0
50
100
150


7Z06950
I_F = 30mA
V_R = 3V
R_L = 100Ω
typ
t_rr (ns)
250
150
50
T_j (°C)
0
100
200
300


7Z09309
10^7
I_R (nA)
10^6
10^5
10^4
10^3
10^2
10
V_R=200V
max
typ
V_R=50V
max
typ
0
50
100
150
200
T_j (°C)

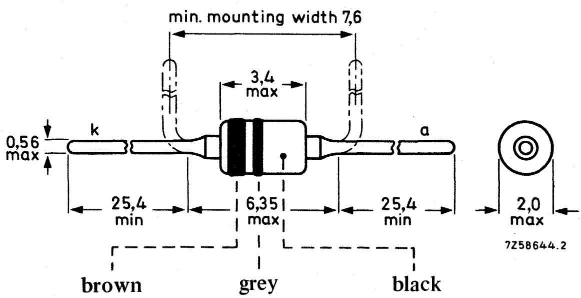
SILICON OXIDE PASSIVATED DIODE

Whiskerless diffused diode in a molybdenum 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_{FAV}	max.	350	mA
Junction temperature	T_j	max.	200	^oC
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0.3	$^oC/mW$

MECHANICAL DATA Dimensions in mm



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

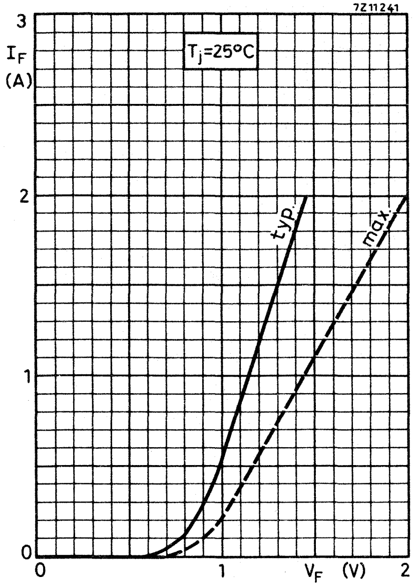
Voltages				
Continuous reverse voltage	V_R	max.	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	75	V
Currents				
Average rectified forward current (see page 5)	I_{FAV}	max.	350	mA
Forward current (d.c.)	I_F	max.	500	mA
Repetitive peak forward current	I_{FRM}	max.	2.0	A
Non repetitive peak forward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

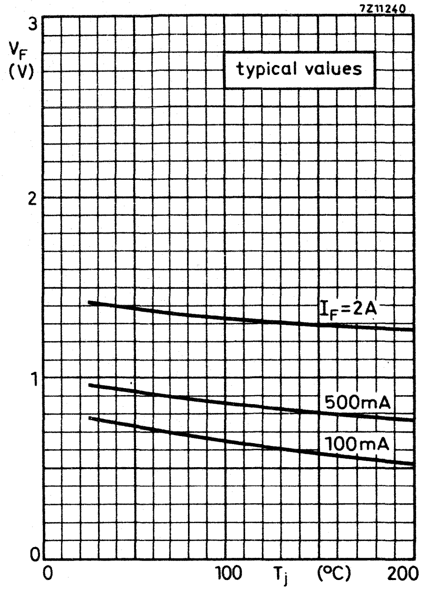
THERMAL RESISTANCE

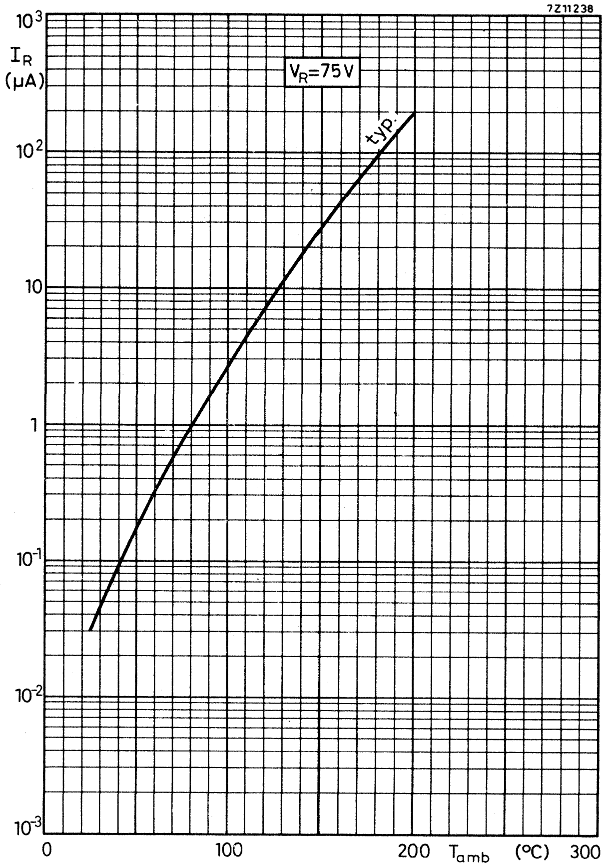
From junction to ambient in free air at maximum lead length	$R_{th\ j\text{-}a}$	=	0.3	^oC/mW

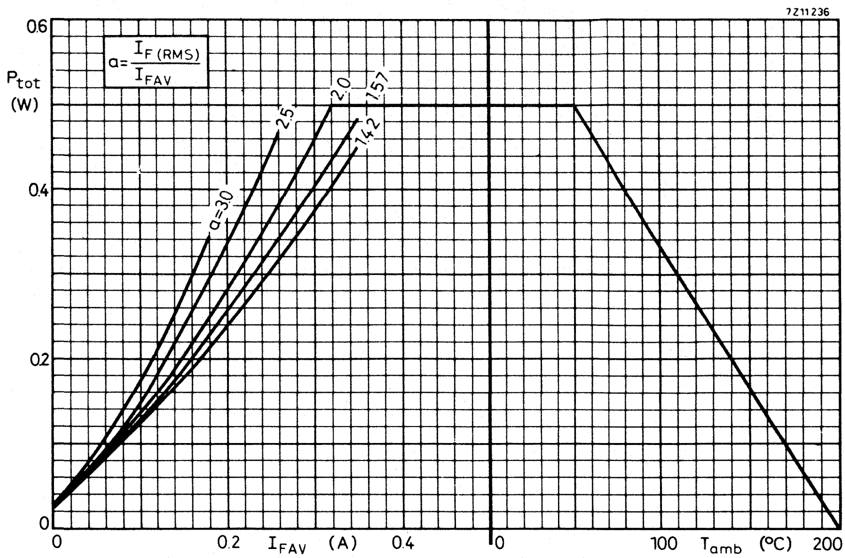
CHARACTERISTICS T_j = 25 ^oC unless otherwise specified

Forward voltage				
I_F = 2 A; T_j = 150 ^oC	V_F	<	2.0	V
Reverse current				
V_R = 75 V; T_j = 150 ^oC	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
I_R (μA)
V_R=75V
typ.
10^3
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
0
100
200
T_{amb} (°C)
300

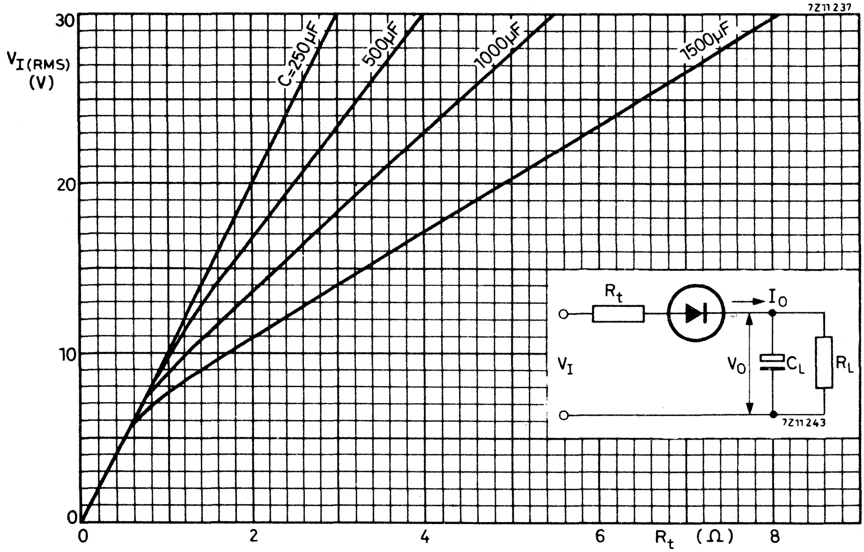


From the left hand graph the total power dissipation can be found as a function of the average output current.

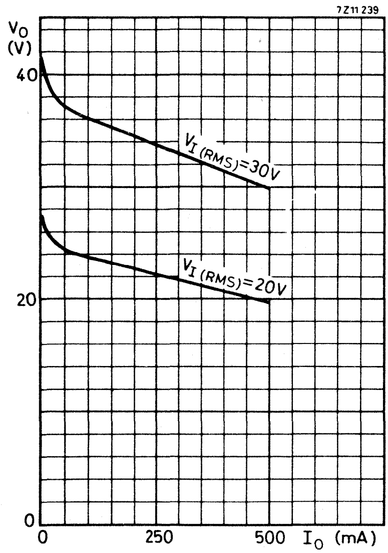
The parameter $a = \frac{I_{F(RMS)} \text{ per diode}}{I_{FAV} \text{ per diode}}$ depends on $n\omega R_L C_L$ and $\frac{R_t + R_{diff}}{nR_L}$ and can be found from existing graphs.

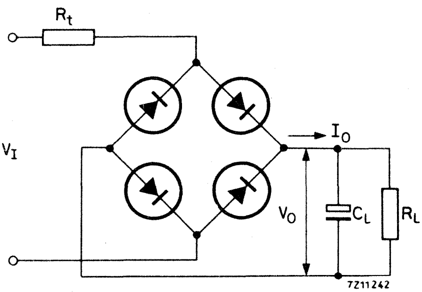
See Application Book: RECTIFIER DIODES.
Once the power dissipation is known, the max. permissible ambient temperature follows from the right hand graph.
For the series resistance, added to limit the initial peak rectifier current, the required minimum value can be found from the upper graph on page 6.
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	R_t	C_L
30 V	5.6 Ω	1000 µF
20 V	3.4 Ω	1000 µF

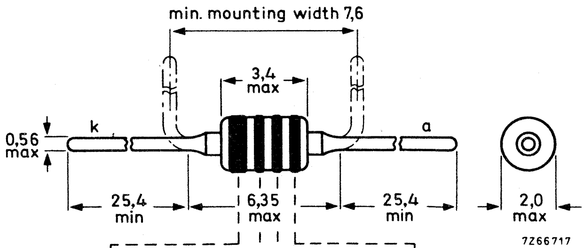
SILICON OXIDE PASSIVATED DIODES

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



1N914 :	white	brown	yellow	not coloured
1N914A:	white	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

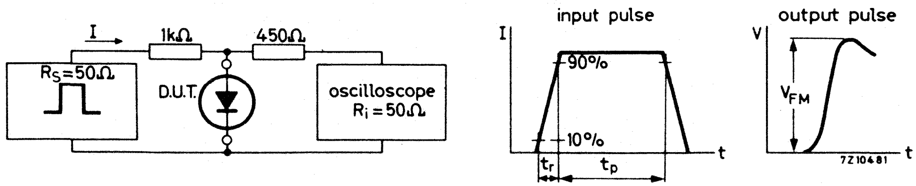
Forward voltages				
1N914 : I_F = 10 mA; 1N914A: I_F = 20 mA	V_F	<	1	V
Reverse breakdown voltage				
I_R = 100 μA	$V_{(BR)R}$	>	100	V
Reverse currents				
V_R = 20 V	I_R	<	25	nA
V_R = 75 V	I_R	<	5	μA
V_R = 20 V; T_j = 150 °C	I_R	<	50	μA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	4	pF

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:



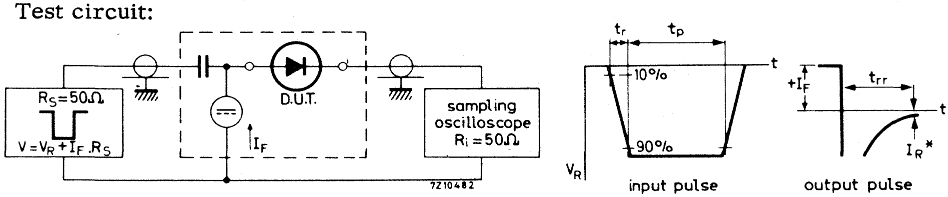
Current pulse:	Rise time	t_r	=	20	ns	Oscilloscope:		
	Pulse duration	t_p	=	120	ns	Rise time	t_r = 0.35	ns
	Duty cycle	δ	=	0.01				

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 ≤ 1 pF (C = Oscilloscope + parasitical capacitance)

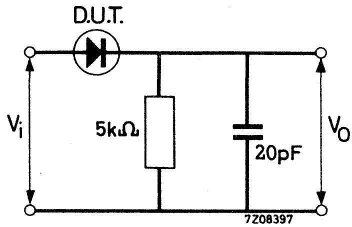
CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

Rectifying efficiency

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

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

Test circuit:

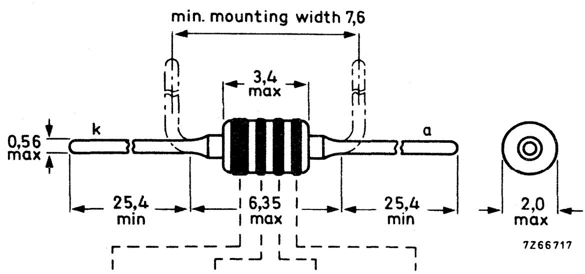


SILICON OXIDE PASSIVATED DIODES

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



1N916 :	white	brown	blue	not coloured
1N916A:	white	brown	blue	brown
1N916B:	white	brown	blue	red

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

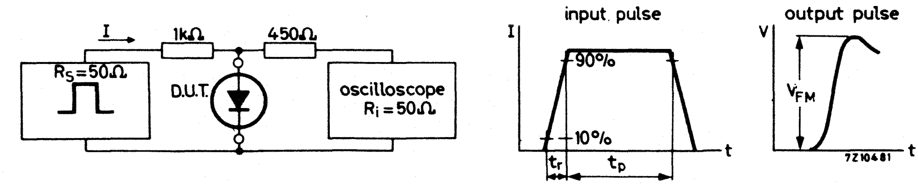
V_R = 0; f = 1 MHz	C_d	<	2	pF

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:



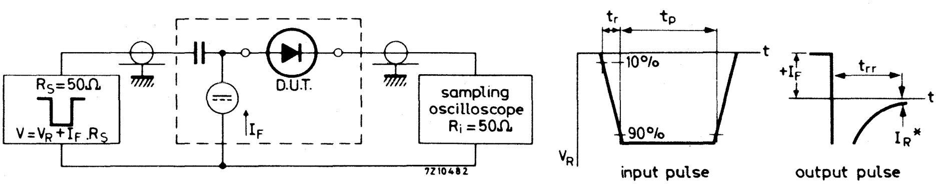
Current pulse:	Rise time	t_r = 20 ns	Oscilloscope:	
	Pulse duration	t_p = 120 ns	Rise time	t_r = 0.35 ns
	Duty cycle	δ = 0.01		

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)

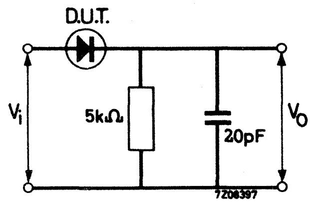
CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

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

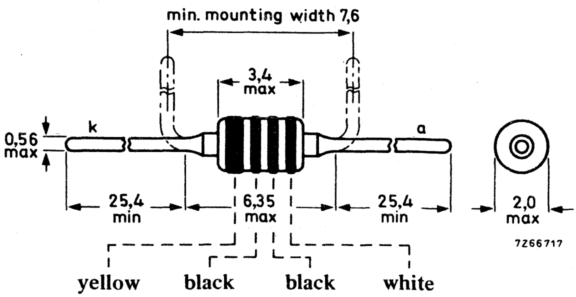
THERMAL RESISTANCE

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

CHARACTERISTICS T_{amb} = 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

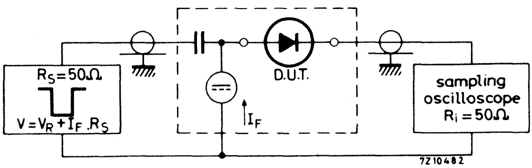


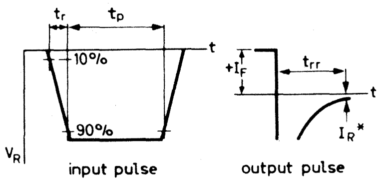
CHARACTERISTICS (continued) T_{amb} = 25 °C unless otherwise specified

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:					Oscilloscope:				
Rise time	t_r	≤	0.5	ns	Rise time	t_r	≤	0.6	ns

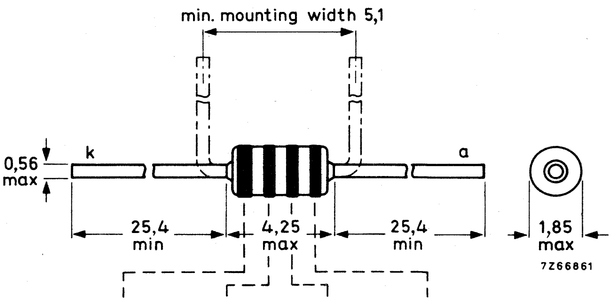
ULTRA HIGH SPEED SILICON DIODES

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; 1N4448: I_F = 100 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

DO-35



1N4148:	yellow	brown	yellow	grey
1N4446:	yellow	yellow	yellow	blue
1N4448:	yellow	yellow	yellow	grey

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

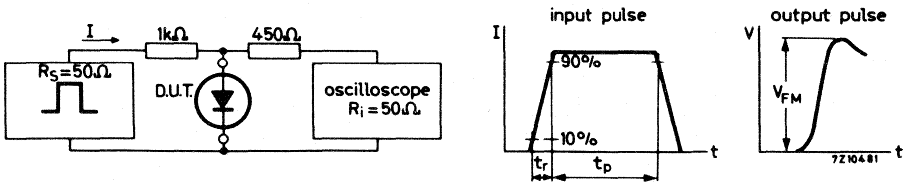
Forward voltages				
1N4148: I_F = 10 mA; 1N4446: I_F = 20 mA; 1N4448: I_F = 100 mA	V_F	<	1	V
1N4448: I_F = 5 mA	V_F		0.62 to 0.72	V
Reverse breakdown voltage				
I_R = 100 μA	$V_{(BR)R}$	>	100	V
I_R = 5 μA	$V_{(BR)R}$	>	75	V
Reverse currents				
V_R = 20 V	I_R	<	25	nA
V_R = 20 V; T_j = 100 °C	I_R	<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

Pulse duration t_p = 120 ns

Duty cycle δ = 0.01

Oscilloscope:

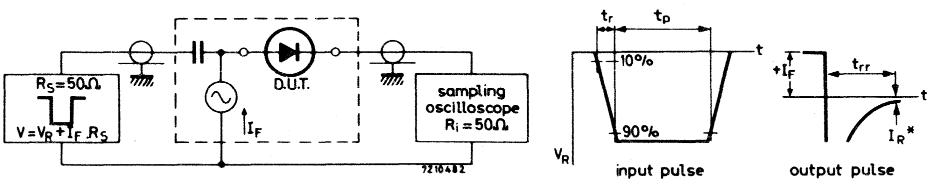
Rise time t_r = 0.35 ns

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

Pulse duration t_p = 100 µs

Duty cycle δ = 0.05

Oscilloscope:

Rise time t_r = 0.35 ns

Circuit capacitance $C \leq 1$ 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.

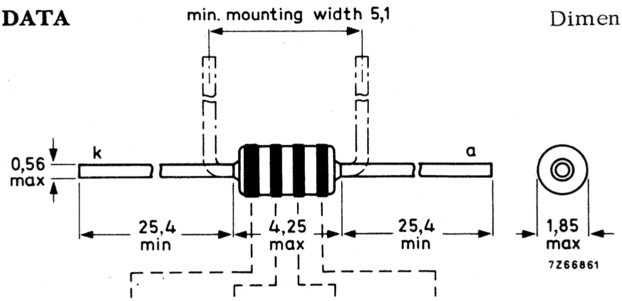
QUICK REFERENCE DATA

			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

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 °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

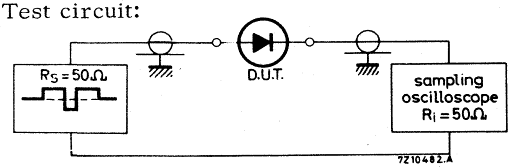
CHARACTERISTICS T_{amb} = 25 °C unless otherwise specified

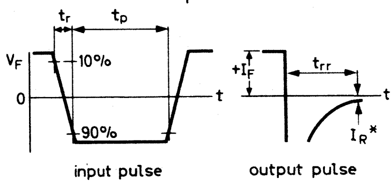
			1N4150	1N4151	1N4154	
Forward voltages						
I_F = 1 mA	V_F	>	0.54	–	–	V
		<	0.62	–	–	V
I_F = 10 mA	V_F	>	0.66	–	–	V
		<	0.74	–	–	V
I_F = 30 mA	V_F	<	–	–	1	V
I_F = 50 mA	V_F	>	0.76	–	–	V
		<	0.86	1	–	V
I_F = 100 mA	V_F	>	0.82	–	–	V
		<	0.92	–	–	V
I_F = 200 mA	V_F	>	0.87	–	–	V
		<	1	–	–	V
Reverse breakdown 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 °C	I_R	<	–	–	100	μA
V_R = 50 V	I_R	<	0.1	0.05	–	μA
V_R = 50 V; T_{amb} = 150 °C	I_R	<	100	50	–	μA

CHARACTERISTICS (continued)

			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 100 mA to I_R = 10 to 100 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

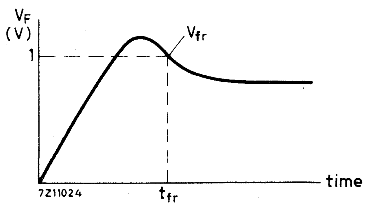
Oscilloscope:

Rise time t_r = 0.6 ns

Circuit capacitance $C \leq 1$ 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
$\delta < 0.01$; measured at V_{fr} = 1 V — 1N4150 — t_{fr} < 10 ns



Special diodes

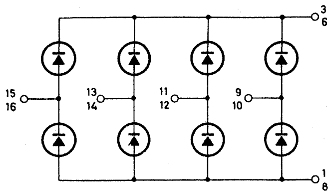
TYPE SELECTION

Special diodes

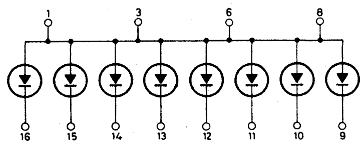
Quoted values are max.

		total device		each diode						
	type	I_F (A)	I_{FRM} (A)	V_R (V)	I_F (mA)	I_{FRM} (mA)	t_{rr} (ns)	C_d (pF)	V_F (V)	at I_F (mA)
multiple devices for core-gating in dual in-line package	BAV40	1	2, 7	60	300	900	6	3	1, 3	500
	BAV41	1	2, 7	60	300	900	6	3	1, 3	500
	BAV42	1	2, 7	60	300	900	6	3	1, 3	500
	BAV43	1	2, 7	60	300	900	6	3	1, 3	500

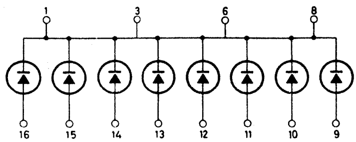
BAV40



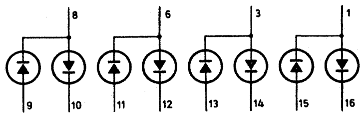
BAV41



BAV42



BAV43



	type	case	V_R (V)	I_F (mA)	I_R (pA)	at V_R (V)	C_d (pF)	V_F (V)	at I_F (mA)
low leakage diode for clamping, holding, peak followers, time delay circuits	BAV45	TO-18 2-leads	20	50	5	5	1, 3	1	10

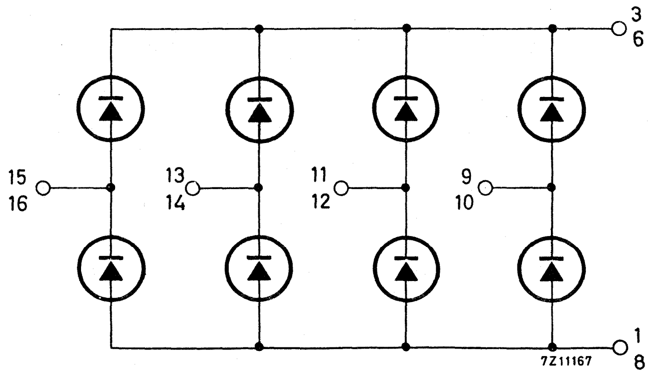
MULTIPLE DIODE

Diode array consisting of 8 silicon planar epitaxial diodes in a plastic DIL envelope. It is intended for core-gating in very fast memories.

QUICK REFERENCE DATA

			Each diode	Total device	
Reverse voltage	V_R	max.	60		V
Repetitive peak reverse voltage	V_{RRM}	max.	60		V
Forward current (d.c.)	I_F	max.	300	1000	mA
Repetitive peak forward current	I_{FRM}	max.	900	2700	mA
Junction temperature	T_j	max.	150	150	°C
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

PACKAGE OUTLINE see page 4



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

INDIVIDUAL DIODE

Voltages

Continuous reverse voltage	V_R	max.	60	V
Repetitive peak reverse voltage	V_{RRM}	max.	60	V

Currents

Forward current (d.c.)	I_F	max.	300	mA
Repetitive peak forward current f > 1 MHz	I_{FRM}	max.	600	mA
Repetitive peak forward current pulse repetition frequency (p.r.f.) = 4 MHz $\delta < 0.3$	I_{FRM}	max.	900	mA
Non repetitive peak forward current t < 1 s	I_{FSM}	max.	1000	mA
t < 1 μs	I_{FSM}	max.	4000	mA

Temperatures

Storage temperature	T_{stg}	−55 to	+150	°C
Junction temperature	T_j	max.	150	°C

TOTAL DEVICE Take care not to exceed the individual ratings

Currents

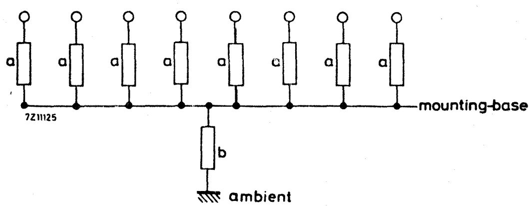
Forward current (d.c.)	I_F	max.	1000	mA
Repetitive peak forward current f > 1 MHz	I_{FRM}	max.	2000	mA
Repetitive peak forward current pulse repetition frequency (p.r.f.) = 4MHz $\delta < 0.3$	I_{FRM}	max.	2700	mA
Non repetitive peak forward current t < 1 s	I_{FSM}	max.	4000	mA

THERMAL RESISTANCE

From junction to ambient

1 diode dissipating	$R_{th\ j\text{-}a}$	=	280	°C/W
all diodes dissipating	$R_{th\ j\text{-}a}$	=	80	°C/W

The thermal resistance can be replaced by the following equivalent circuit:



The temperature difference between junction and ambient can be found from the relation: $\Delta T_{j\text{-}amb} = P_{sd} \cdot a + P_{tot} \cdot b$

where: P_{sd} = dissipation of a single diode a = 220 °C/W

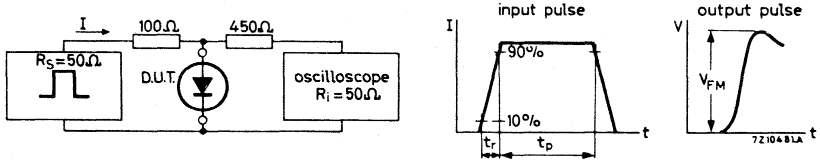
P_{tot} = dissipation of total device b = 55 °C/W

CHARACTERISTICS

$T_j = 25\,^{\circ}C$ unless otherwise specified

Reverse current				
$V_R = 60$ V	I_R	<	400	nA
$V_R = 60$ V; $T_j = 150\,^{\circ}C$	I_R	<	400	µA
Reverse breakdown voltage; $I_R = 10$ µA	$V_{(BR)R}$	>	75	V
Forward voltage				
$I_F = 10$ mA	V_F	<	750	mV
$I_F = 200$ mA	V_F	<	1050	mV
$I_F = 500$ mA	V_F	>	1035	mV
		<	1300	mV
$I_F = 800$ mA	V_F	<	1600	mV
Diode capacitance				
$V_R = 0$; f = 1 MHz	C_d	<	3	pF ←
Forward recovery voltage				
$I_F = 400$ 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:



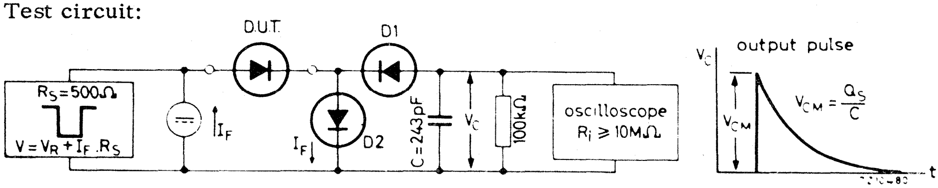
Current pulse: Rise time $t_{r1} = 30$ ns
Rise time $t_{r2} = 100$ ns
Pulse duration $t_p = 300$ ns
Duty cycle $\delta = 0.01$

Oscilloscope:
Rise time $t_r = 0.35$ ns
Input capacitance $C_i \leq 1$ pF

Circuit capacitance C < 20 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	<	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 $\delta = 0.02$

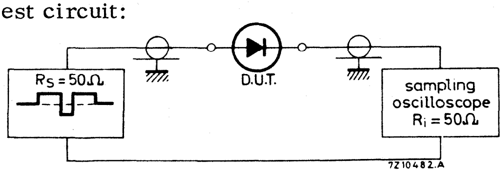
Circuit capacitance C < 7 pF (C = Oscilloscope + parasitical capacitance)

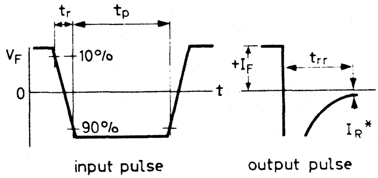
CHARACTERISTICS (continued) $T_j = 25\,^{o}C$ unless otherwise specified

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:

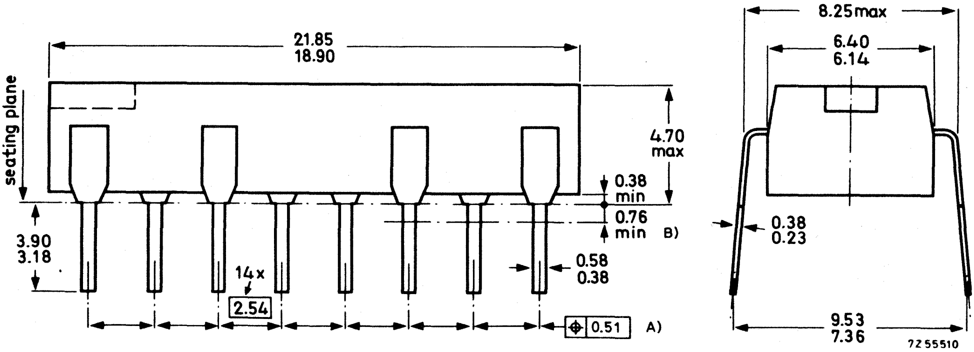


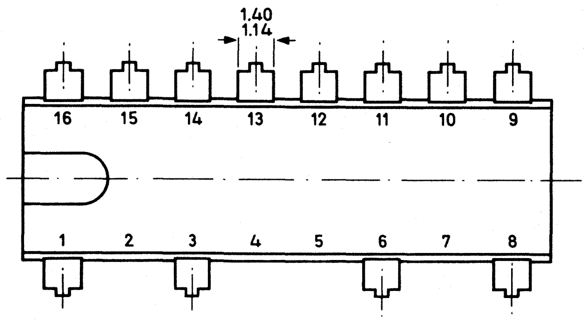


*) I_R = 40 mA

Reverse pulse:	Rise time	t_r = 0.6 ns	Oscilloscope:		
	Pulse diration	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)

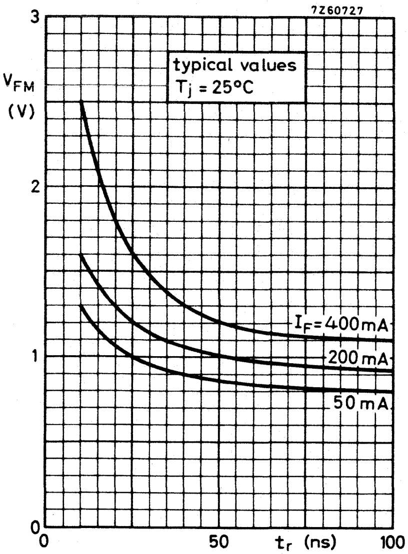


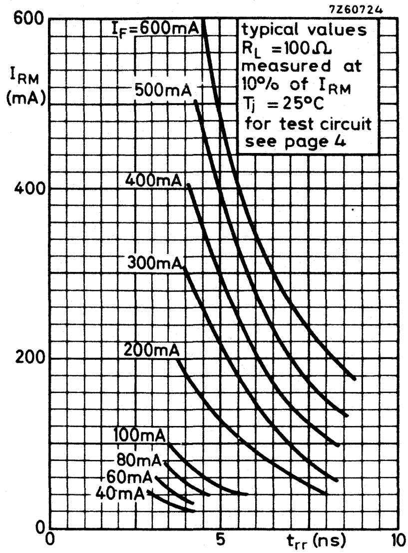


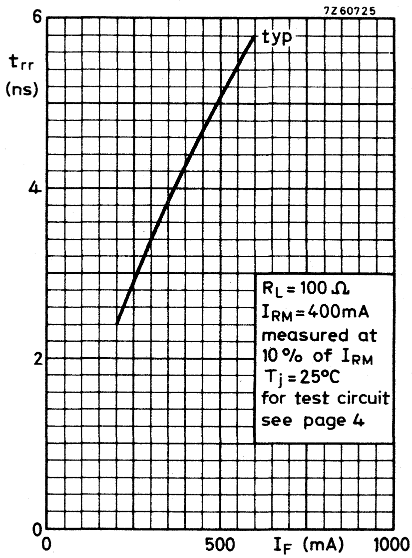
top view

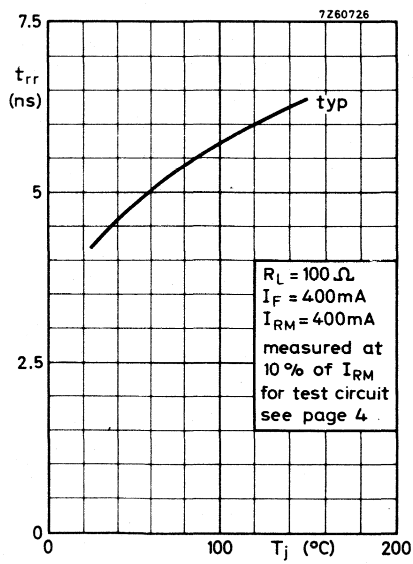
A) Centre-lines of all leads are within ± 0.254 mm of the nominal positions shown; in the worst case, the spacing between any two leads may deviate from nominal by ± 0.51 mm.

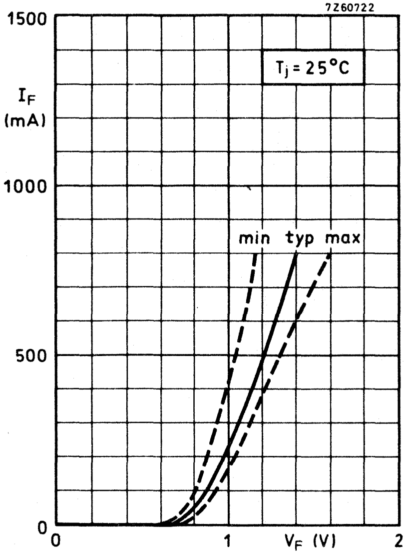
B) Lead spacing tolerances apply from seating plane to the line indicated.

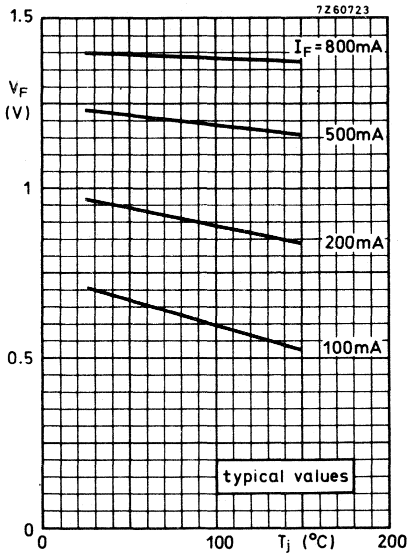

7Z60727
typical values
$T_j = 25°C$
V_{FM} (V)
$I_F = 400mA$
200 mA
50 mA
t_r (ns)
0
1
2
3
50
100

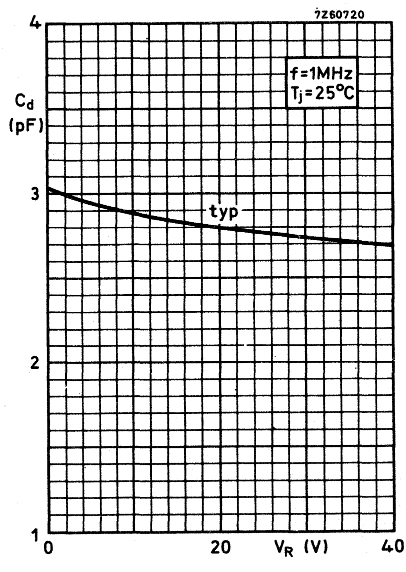

7Z60724
typical values
$R_L = 100\Omega$
measured at 10% of I_{RM}
$T_j = 25°C$
for test circuit see page 4
I_{RM} (mA)
$I_F = 600mA$
500mA
400mA
300mA
200mA
100mA
80mA
60mA
40mA
t_{rr} (ns)
0
200
400
600
5
10

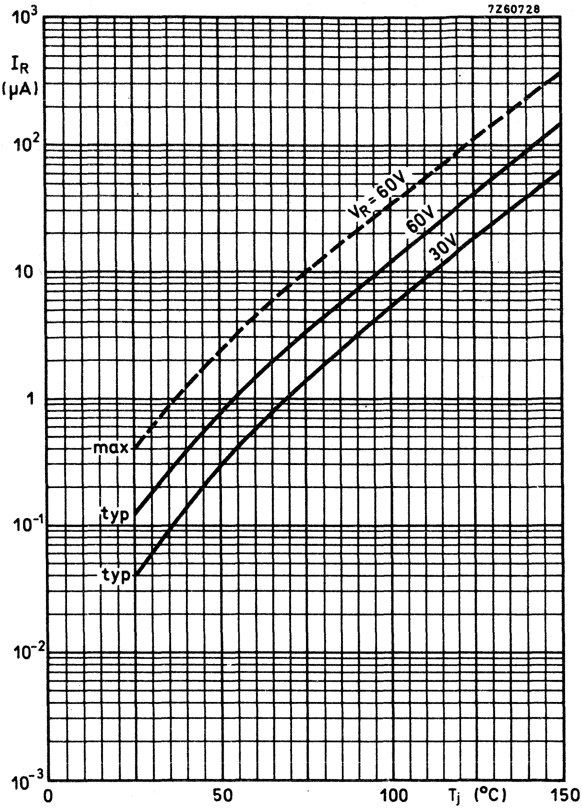

7Z60725
typ
t_{rr} (ns)
$R_L = 100\Omega$
$I_{RM} = 400mA$
measured at 10 % of I_{RM}
$T_j = 25°C$
for test circuit see page 4
I_F (mA)
0
2
4
6
500
1000


7Z60726
typ
t_{rr} (ns)
$R_L = 100\Omega$
$I_F = 400mA$
$I_{RM} = 400mA$
measured at 10 % of I_{RM}
for test circuit see page 4
T_j (°C)
0
2.5
5
7.5
100
200


7Z60722
$T_j = 25^\circ C$
I_F (mA)
1500
1000
500
0
min typ max
0
1
V_F (V)
2


7Z60723
1.5
V_F (V)
1
0.5
0
$I_F = 800mA$
500mA
200mA
100mA
typical values
0
100
T_j (°C)
200


7Z60720
f = 1MHz
$T_j = 25^\circ C$
C_d (pF)
4
3
2
1
typ
0
20
V_R (V)
40


7Z60728
I_R (μA)
10^3
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
max
typ
typ
$V_R = 60V$
60V
30V
0
50
100
T_j (°C)
150

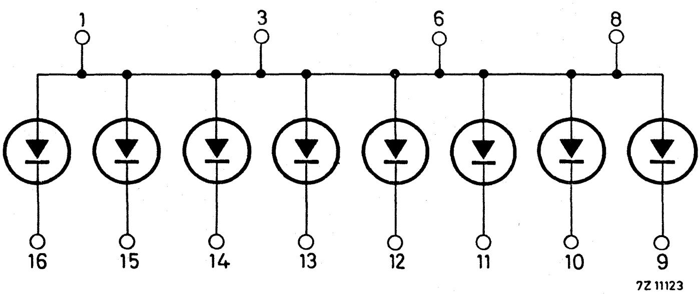
MULTIPLE DIODE

Diode array consisting of 8 silicon planar epitaxial diodes in a plastic DIL envelope. It is intended for core-gating in very fast memories.

QUICK REFERENCE DATA

			Each diode	Total device	
Reverse voltage	V_R	max.	60		V
Repetitive peak reverse voltage	V_{RRM}	max.	60		V
Forward current (d.c.)	I_F	max.	300	1000	mA
Repetitive peak forward current	I_{FRM}	max.	900	2700	mA
Junction temperature	T_j	max.	150	150	^oC
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

PACKAGE OUTLINE see page 4



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

INDIVIDUAL DIODE

Voltages

Continuous reverse voltage	V_R	max.	60	V
Repetitive peak reverse voltage	V_{RRM}	max.	60	V

Currents

Forward current (d.c.)	I_F	max.	300	mA
Repetitive peak forward current f > 1 MHz	I_{FRM}	max.	600	mA
Repetitive peak forward current pulse repetition frequency (p.r.f.) = 4 MHz $\delta < 0.3$	I_{FRM}	max.	900	mA
Non repetitive peak forward current t < 1 s	I_{FSM}	max.	1000	mA
t < 1 µs	I_{FSM}	max.	4000	mA

Temperatures

Storage temperature	T_{stg}	−55 to	+150	°C
Junction temperature	T_j	max.	150	°C

TOTAL DEVICE Take care not to exceed the individual ratings

Currents

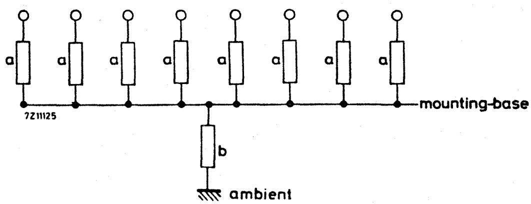
Forward current (d.c.)	I_F	max.	1000	mA
Repetitive peak forward current f > 1 MHz	I_{FRM}	max.	2000	mA
Repetitive peak forward current pulse repetition frequency (p.r.f.) = 4 MHz $\delta < 0.3$	I_{FRM}	max.	2700	mA
Non repetitive peak forward current t < 1 s	I_{FSM}	max.	4000	mA

THERMAL RESISTANCE

From junction to ambient

1 diode dissipating	$R_{th\ j\text{-}a}$	=	280	°C/W
all diodes dissipating	$R_{th\ j\text{-}a}$	=	80	°C/W

The thermal resistance can be replaced by the following equivalent circuit:



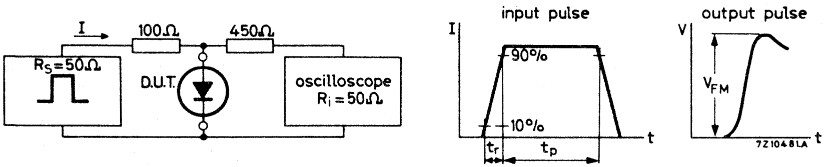
The temperature difference between junction and ambient can be found from the relation: $\Delta T_{j\text{-}amb} = P_{sd} \cdot a + P_{tot} \cdot b$

where: P_{sd} = dissipation of a single diode a = 220 °C/W
P_{tot} = dissipation of total device b = 55 °C/W

CHARACTERISTICS $T_j = 25\,^{o}C$ unless otherwise specified

Reverse current				
$V_R = 60$ V	I_R	<	100	nA
$V_R = 60$ V; $T_j = 150\,^{o}C$	I_R	<	100	μA
Reverse breakdown voltage; $I_R = 10$ μA	$V_{(BR)R}$	>	75	V
Forward voltage				
$I_F = 10$ mA	V_F	<	750	mV
$I_F = 200$ mA	V_F	<	1050	mV
$I_F = 500$ mA	V_F	>	1035	mV
		<	1300	mV
$I_F = 800$ mA	V_F	<	1600	mV
Diode capacitance				
$V_R = 0$; f = 1 MHz	C_d	<	3	pF
Forward recovery voltage				
$I_F = 400$ 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:



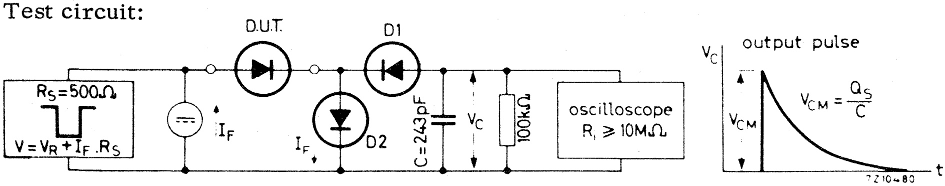
Current pulse: Rise time t_{r1} = 30 ns
Rise time t_{r2} = 100 ns
Pulse duration t_p = 300 ns
Duty cycle δ = 0.01

Oscilloscope:
Rise time $t_r = 0.35$ ns
Input capacitance $C_i \leq 1$ pF

Circuit capacitance C < 20 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	<	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

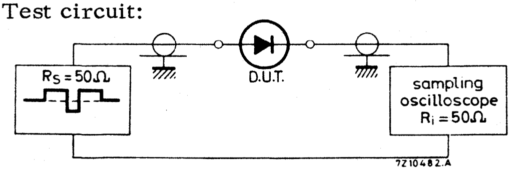
Circuit capacitance C < 7 pF (C = Oscilloscope + parasitical capacitance)

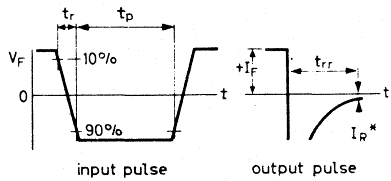
CHARACTERISTICS (continued) $T_j = 25\,^{o}C$ unless otherwise specified

Reverse recovery time when switched from

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

Test circuit:



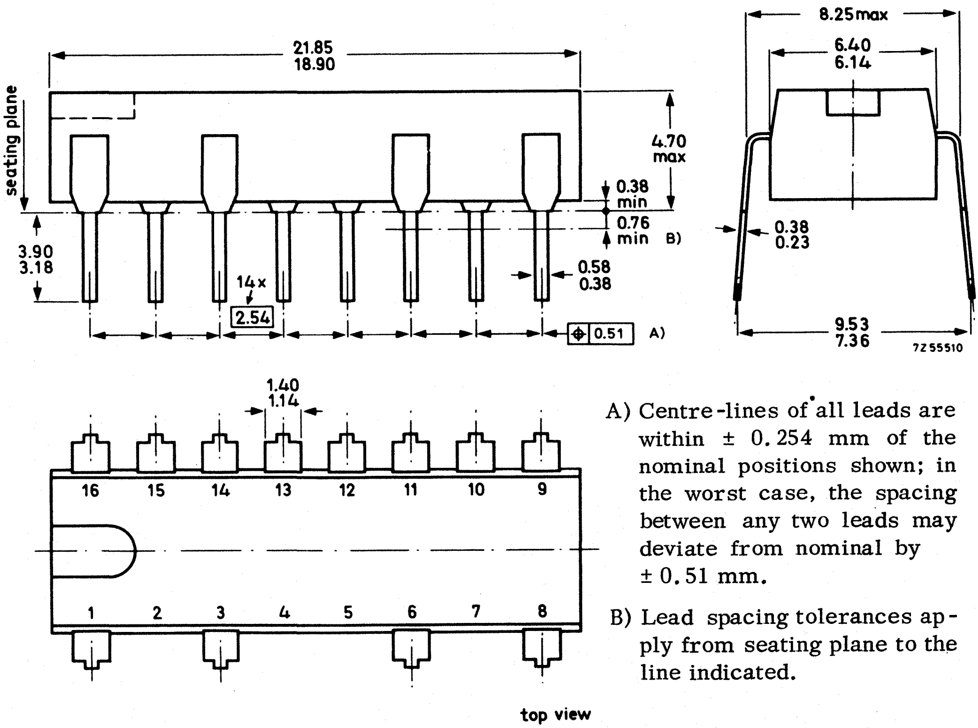


*) $I_R = 40$ mA

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

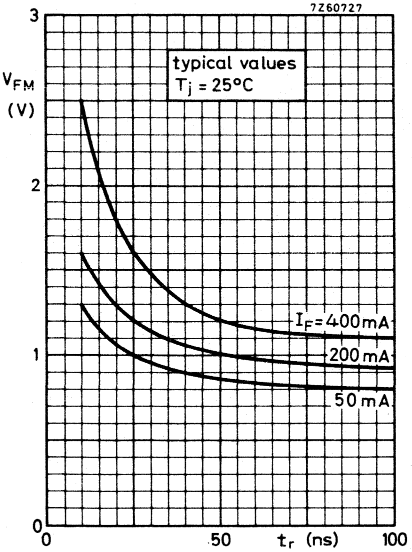
Oscilloscope:
Rise time t_r = 0.35 ns

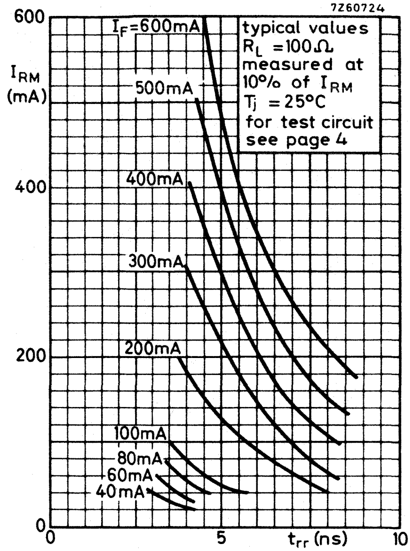
Circuit capacitance $C \leq 1$ pF (C = Oscilloscope + parasitical capacitance)

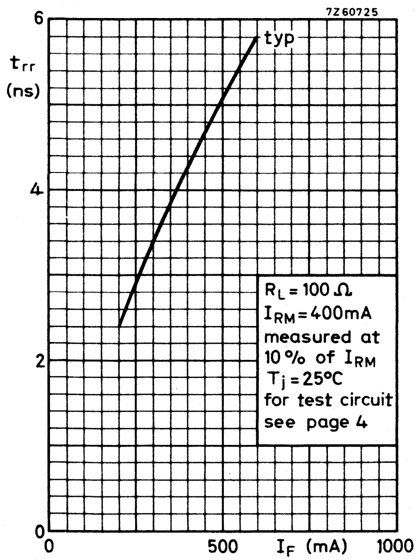


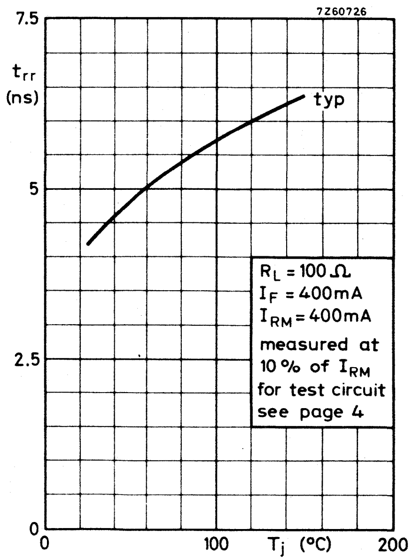
A) Centre-lines of all leads are within ± 0.254 mm of the nominal positions shown; in the worst case, the spacing between any two leads may deviate from nominal by ± 0.51 mm.

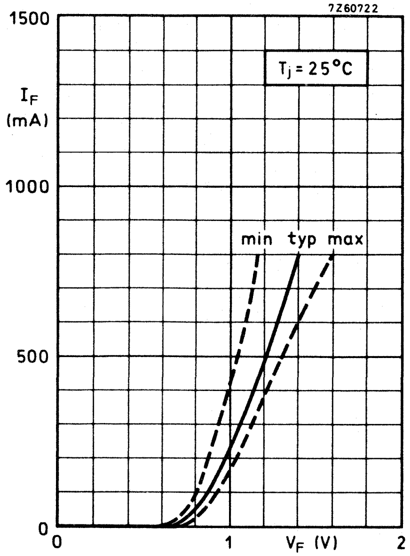
B) Lead spacing tolerances apply from seating plane to the line indicated.

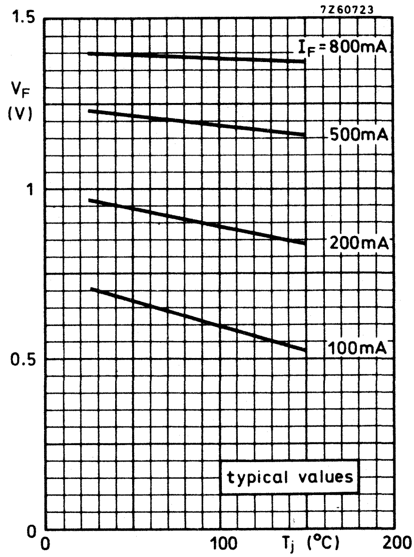

7Z60727
typical values
T_j = 25°C
V_{FM}
(V)
I_F = 400mA
200 mA
50 mA
0
1
2
3
0
50
100
t_r (ns)

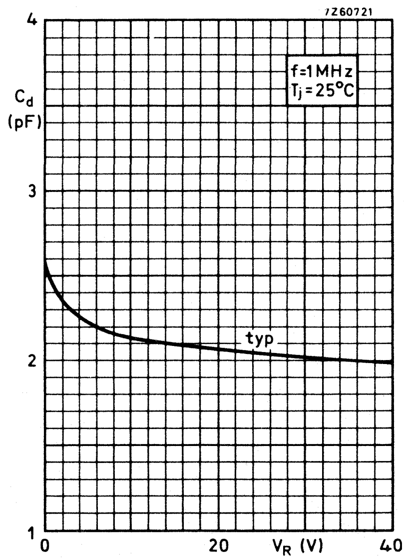

7Z60724
typical values
R_L = 100 Ω
measured at
10% of I_{RM}
T_j = 25°C
for test circuit
see page 4
I_{RM}
(mA)
I_F = 600mA
500mA
400mA
300mA
200mA
100mA
80mA
60mA
40mA
0
200
400
600
0
5
10
t_{rr} (ns)

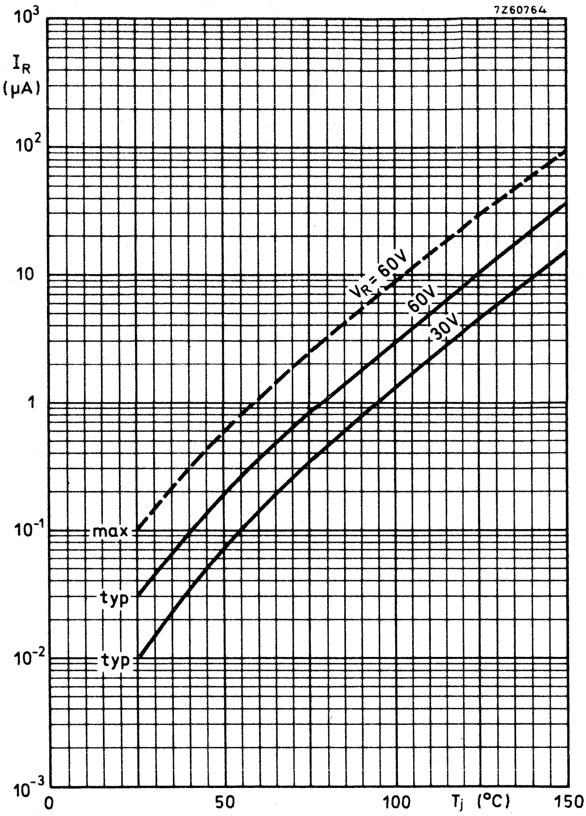

7Z60725
t_{rr}
(ns)
typ
R_L = 100 Ω
I_{RM} = 400mA
measured at
10 % of I_{RM}
T_j = 25°C
for test circuit
see page 4
0
2
4
6
0
500
1000
I_F (mA)


7Z60726
t_{rr}
(ns)
typ
R_L = 100 Ω
I_F = 400mA
I_{RM} = 400mA
measured at
10 % of I_{RM}
for test circuit
see page 4
0
2.5
5
7.5
0
100
200
T_j (°C)


7Z60722
1500
1000
500
0
I_F (mA)
$T_j = 25°C$
min
typ
max
0
1
V_F (V)
2


7Z60723
1.5
1
0.5
0
V_F (V)
$I_F = 800mA$
500mA
200mA
100mA
typical values
0
100
T_j (°C)
200


7Z60721
4
3
2
1
C_d (pF)
f=1MHz
$T_j = 25°C$
typ
0
20
V_R (V)
40


7Z60764
10^3
I_R (μA)
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
max
typ
typ
$V_R = 60V$
60V
30V
0
50
100
T_j (°C)
150

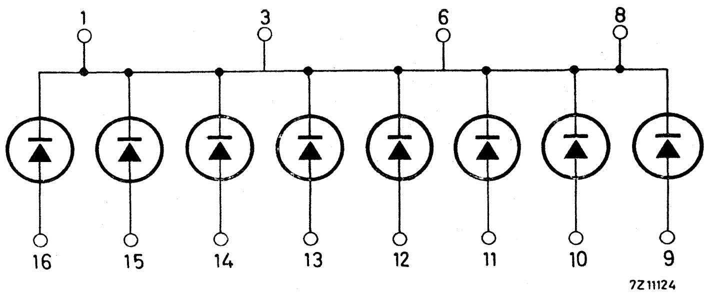
MULTIPLE DIODE

Diode array consisting of 8 silicon planar epitaxial diodes in a plastic DIL envelope. It is intended for core-gating in very fast memories.

QUICK REFERENCE DATA

			Each diode	Total device	
Reverse voltage	V_R	max.	60		V
Repetitive peak reverse voltage	V_{RRM}	max.	60		V
Forward current (d.c.)	I_F	max.	300	1000	mA
Repetitive peak forward current	I_{FRM}	max.	900	2700	mA
Junction temperature	T_j	max.	150	150	^oC
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

PACKAGE OUTLINE see page 4



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

INDIVIDUAL DIODE

Voltages

Continuous reverse voltage	V_R	max.	60	V
Repetitive peak reverse voltage	V_{RRM}	max.	60	V

Currents

Forward current d.c.)	I_F	max.	300	mA
Repetitive peak forward current f > 1 MHz	I_{FRM}	max.	600	mA
Repetitive peak forward current pulse repetition frequency (p.r.f.) = 4MHz $\delta < 0.3$	I_{FRM}	max.	900	mA
Non repetitive peak forward current t < 1 s	I_{FSM}	max.	1000	mA
t < 1 μs	I_{FSM}	max.	4000	mA

Temperatures

Storage temperature	T_{stg}	−55 to	+150	°C
Junction temperature	T_j	max.	150	°C

TOTAL DEVICE Take care not to exceed the individual ratings

Currents

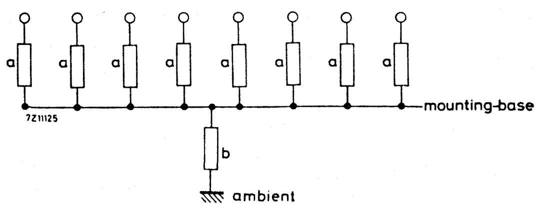
Forward current (d.c.)	I_F	max.	1000	mA
Repetitive peak forward current f > 1MHz	I_{FRM}	max.	2000	mA
Repetitive peak forward current pulse repetition frequency (p.r.f.) = 4MHz $\delta < 0.3$	I_{FRM}	max.	2700	mA
Non repetitive peak forward current t < 1 s	I_{FSM}	max.	4000	mA

THERMAL RESISTANCE

From junction to ambient

1 diode dissipating	$R_{th\ j\text{-}a}$	=	280	°C/W
all diodes dissipating	$R_{th\ j\text{-}a}$	=	80	°C/W

The thermal resistance can be replaced by the following equivalent circuit:



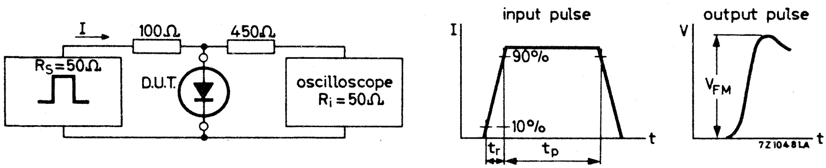
The temperature difference between junction and ambient can be found from the relation: $\Delta T_{j\text{-}amb} = P_{sd} \cdot a + P_{tot} \cdot b$

where: P_{sd} = dissipation of a single diode   a = 220 °C/W
P_{tot} = dissipating of total device   b = 55 °C/W

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

Reverse current				
$V_R = 60$ V	I_R	<	100	nA
$V_R = 60$ V; $T_j = 150\ ^oC$	I_R	<	100	μA
Reverse breakdown voltage; $I_R = 10$ μA	$V_{(BR)R}$	>	75	V
Forward voltage				
$I_F = 10$ mA	V_F	<	750	mV
$I_F = 200$ mA	V_F	<	1050	mV
$I_F = 500$ mA	V_F	>	1035	mV
		<	1300	mV
$I_F = 800$ mA	V_F	<	1600	mV
Diode capacitance				
$V_R = 0$; f = 1 MHz	C_d	<	3	pF
Forward recovery voltage				
$I_F = 400$ 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:



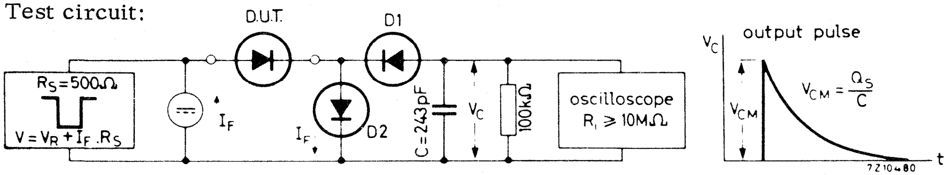
Current pulse: Rise time $t_{r1} = 30$ ns
Rise time $t_{r2} = 100$ ns
Pulse duration $t_p = 300$ ns
Duty cycle $\delta = 0.01$

Oscilloscope:
Rise time $t_r = 0.35$ ns
Input capacitance $C_i \leq 1$ pF

Circuit capacitance C < 20 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	<	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 $\delta = 0.02$

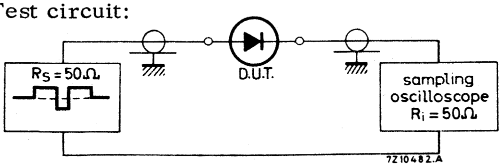
Circuit capacitance C < 7 pF (C = Oscilloscope + parasitical capacitance)

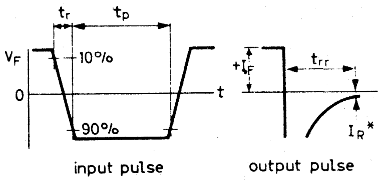
CHARACTERISTICS (continued) $T_j = 25\ ^oC$ unless otherwise specified

Reverse recovery time when switched from

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

Test circuit:



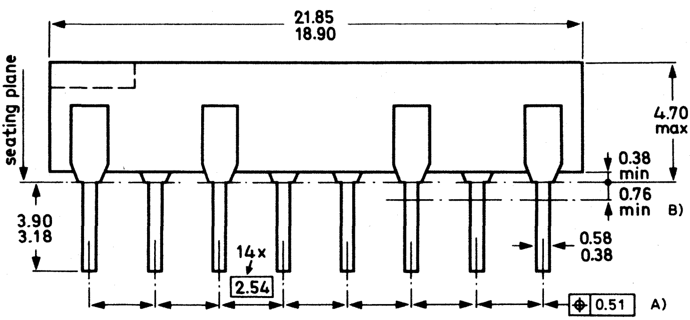


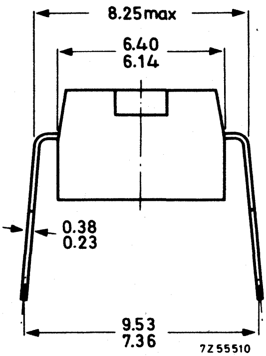
*) $I_R = 40$ mA

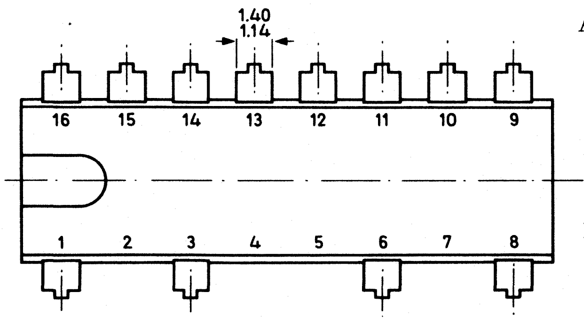
Reverse pulse: Rise time t_r = 0.6 ns
Pulse duration t_p = 100 ns
Duty cycle δ = 0.05

Oscilloscope:
Rise time t_r = 0.35 ns

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



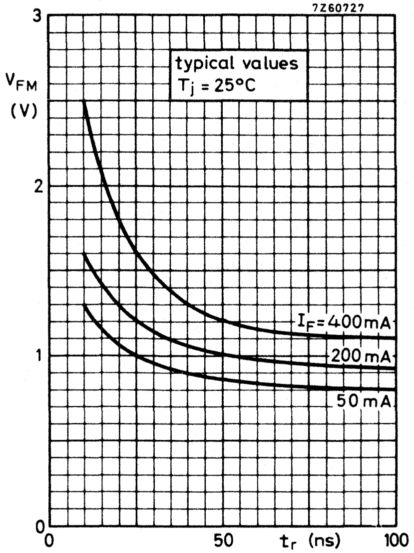


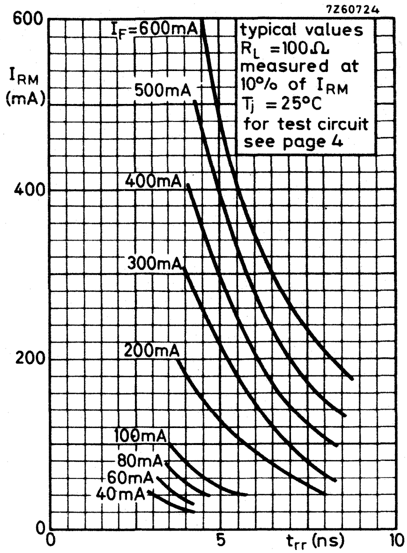


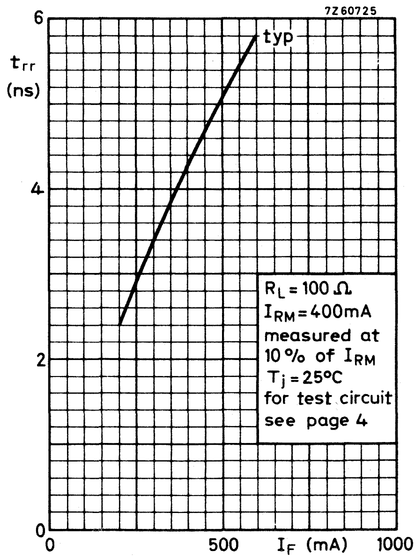
top view

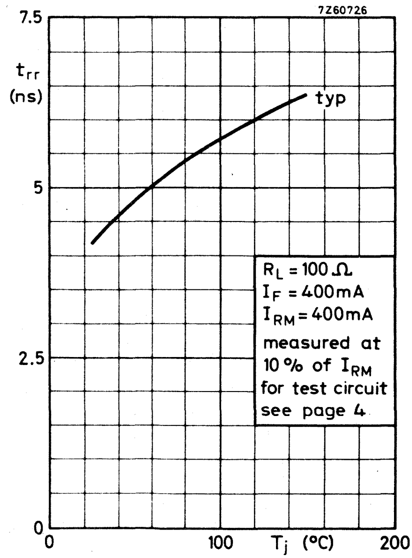
A) Centre-lines of all leads are within ± 0.254 mm of the nominal positions shown; in the worst case, the spacing between any two leads may deviate from nominal by ± 0.51 mm.

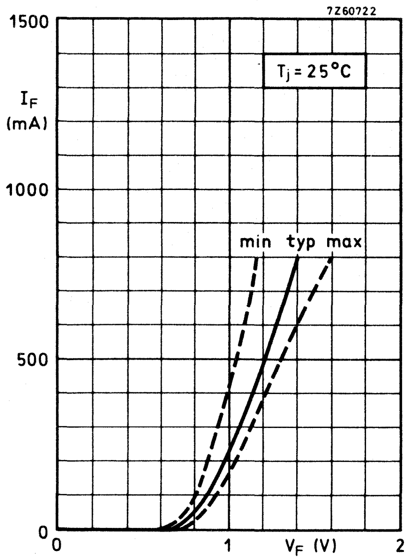
B) Lead spacing tolerances apply from seating plane to the line indicated.

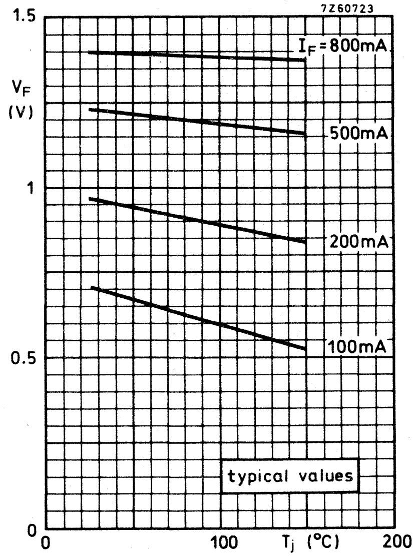

7Z60727
typical values
T_j = 25°C
V_{FM}
(V)
I_F=400mA
200 mA
50 mA
t_r (ns)
0
50
100
1
2
3

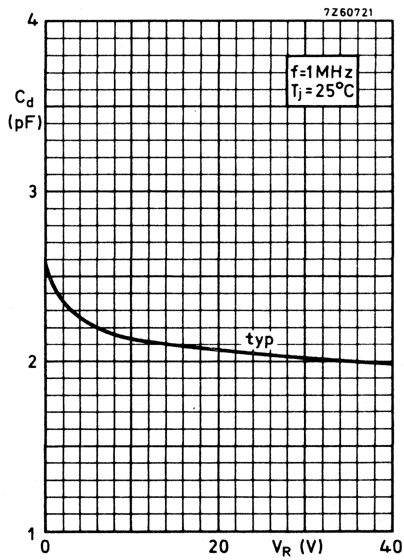

7Z60724
typical values
R_L =100Ω
measured at
10% of I_{RM}
T_j =25°C
for test circuit
see page 4
I_{RM}
(mA)
I_F=600mA
500mA
400mA
300mA
200mA
100mA
80mA
60mA
40mA
t_{rr} (ns)
0
5
10
200
400
600

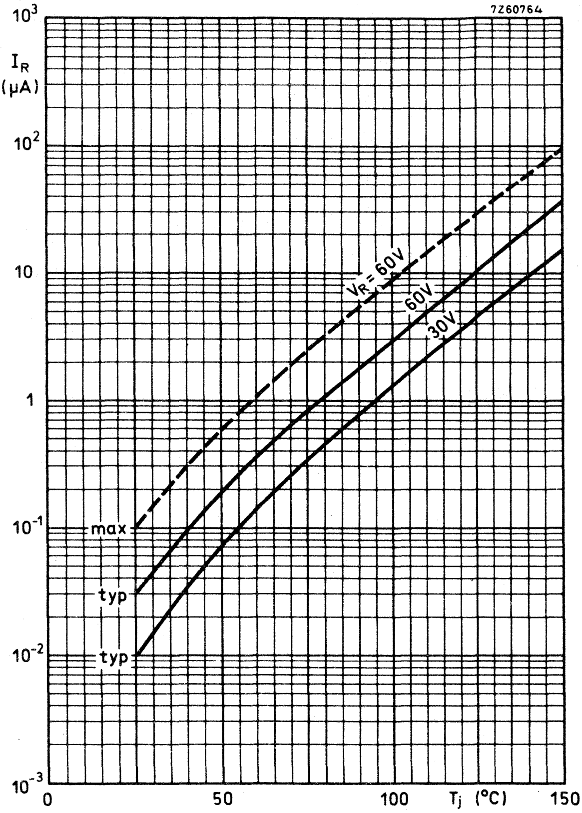

7Z60725
t_{rr}
(ns)
typ
R_L = 100 Ω
I_{RM} = 400mA
measured at
10 % of I_{RM}
T_j = 25°C
for test circuit
see page 4
I_F (mA)
0
500
1000
2
4
6


7Z60726
t_{rr}
(ns)
typ
R_L = 100 Ω
I_F = 400mA
I_{RM} = 400mA
measured at
10 % of I_{RM}
for test circuit
see page 4
T_j (°C)
0
100
200
2.5
5
7.5


7Z60722
1500
1000
500
0
I_F (mA)
T_j = 25 °C
min typ max
0
1
2
V_F (V)


7Z60723
1.5
1
0.5
0
V_F (V)
I_F = 800mA
500mA
200mA
100mA
typical values
0
100
T_j (°C)
200


7Z60721
4
3
2
1
C_d (pF)
f = 1 MHz
T_j = 25 °C
typ
0
20
V_R (V)
40


7Z60764
10^3
I_R (μA)
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
max
typ
typ
V_R = 60V
60V
30V
0
50
100
T_j (°C)
150

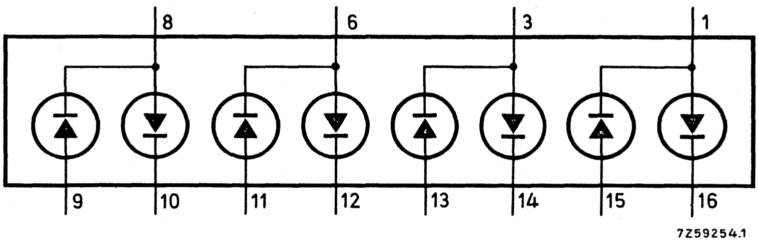
MULTIPLE DIODE

Diode array consisting of 8 silicon planar epitaxial diodes in a plastic DIL envelope. It is intended for core-gating in very fast memories.

QUICK REFERENCE DATA

			Each diode	Total device	
Reverse voltage	V_R	max.	60		V
Repetitive peak reverse voltage	V_{RRM}	max.	60		V
Forward current (d. c.)	I_F	max.	300	1000	mA
Repetitive peak forward current	I_{FRM}	max.	900	2700	mA
Junction temperature	T_j	max.	150	150	^oC
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

PACKAGE OUTLINE see page 4



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

INDIVIDUAL DIODE

Voltages

Continuous reverse voltage	V_R	max.	60	V
Repetitive peak reverse voltage	V_{RRM}	max.	60	V

Currents

Forward current (d.c.)	I_F	max.	300	mA
Repetitive peak forward current f > 1 MHz	I_{FRM}	max.	600	mA
Repetitive peak forward current pulse repetition frequency (p.r.f.) = 4 MHz $\delta < 0.3$	I_{FRM}	max.	900	mA
Non repetitive peak forward current t < 1 s	I_{FSM}	max.	1000	mA
t < 1 μs	I_{FSM}	max.	4000	mA

Temperatures

Storage temperature	T_{stg}	−55 to	+150	^oC
Junction temperature	T_j	max.	150	^oC

TOTAL DEVICE Take care not to exceed the individual ratings

Currents

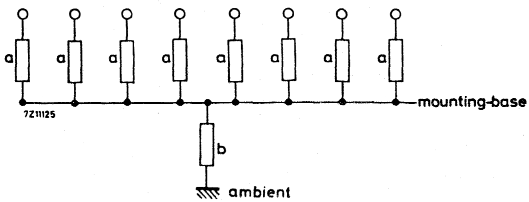
Forward current (d.c.)	I_F	max.	1000	mA
Repetitive peak forward current f > 1 MHz	I_{FRM}	max.	2000	mA
Repetitive peak forward current pulse repetition frequency (p.r.f.) = 4 MHz $\delta < 0.3$	I_{FRM}	max.	2700	mA
Non repetitive peak forward current t < 1 s	I_{FSM}	max.	4000	mA

THERMAL RESISTANCE

From junction to ambient

1 diode dissipating	$R_{th\ j\text{-}a}$	=	280	$^oC/W$
all diodes dissipating	$R_{th\ j\text{-}a}$	=	80	$^oC/W$

The thermal resistance can be replaced by the following equivalent circuit:



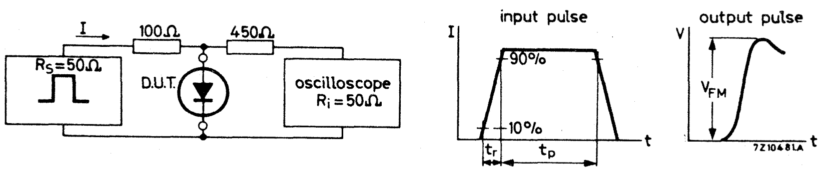
The temperature difference between junction and ambient can be found from the relation: $\Delta T_{j\text{-}amb} = P_{sd} . a + P_{tot} . b$

where: P_{sd} = dissipation of a single diode a = 220 $^oC/W$
P_{tot} = dissipation of total device b = 55 $^oC/W$

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

Reverse current				
$V_R = 60$ V	I_R	<	100	nA
$V_R = 60$ V; $T_j = 150\ ^oC$	I_R	<	100	μA
Reverse breakdown voltage; $I_R = 10$ μA	$V_{(BR)R}$	>	75	V
Forward voltage				
$I_F = 10$ mA	V_F	<	750	mV
$I_F = 200$ mA	V_F	<	1050	mV
$I_F = 500$ mA	V_F	>	1035	mV
		<	1300	mV
$I_F = 800$ mA	V_F	<	1600	mV
Diode capacitance				
$V_R = 0$; f = 1 MHz	C_d	<	3	pF
Forward recovery voltage				
$I_F = 400$ mA; $t_r = 30$ ns	V_{FM}	<	2.0	V
$I_F = 400$ mA; $t_r = 100$ ns	V_{FM}	<	1.5	V

Test circtuit:



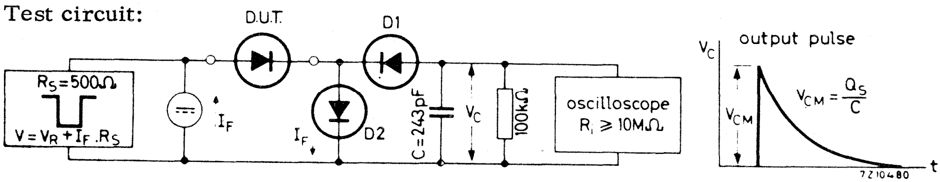
Current pulse: Rise time t_{r1} = 30 ns
Rise time t_{r2} = 100 ns
Pulse duration t_p = 300 ns
Duty cycle δ = 0.01

Oscilloscope:
Rise time $t_r = 0.35$ ns
Input capacitance $C_i \leq 1$ pF

Circuit capacitance C< 20 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 < 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

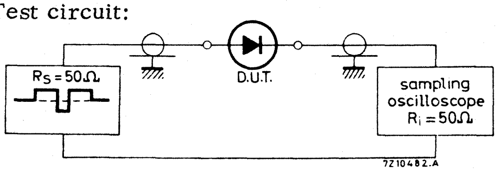
Circuit capacitance C< 7pF (C = Oscilloscope + parasitical capacitance)

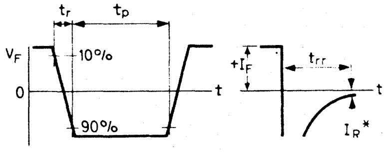
CHARACTERISTICS (continued) $T_j = 25\,^{o}C$ unless otherwise specified

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:



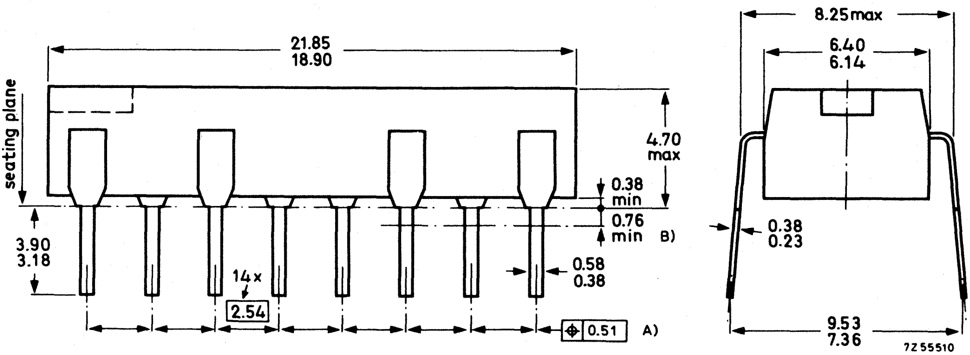


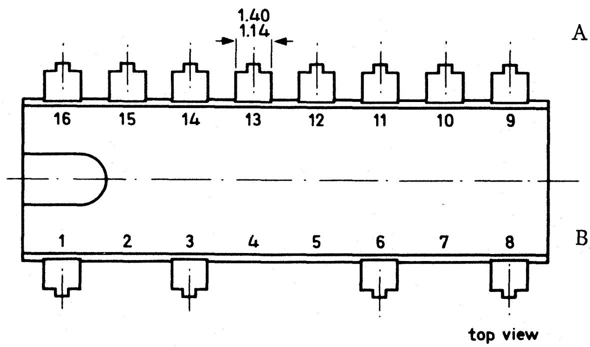
input pulse output pulse

*) 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			

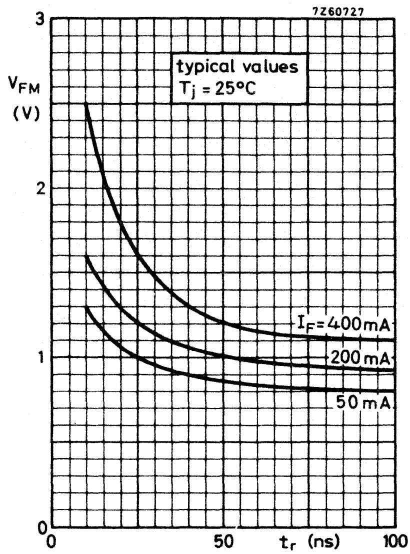
Circuit capacitance $C \leq 1$ pF (C = Oscilloscope + parasitical capacitance)

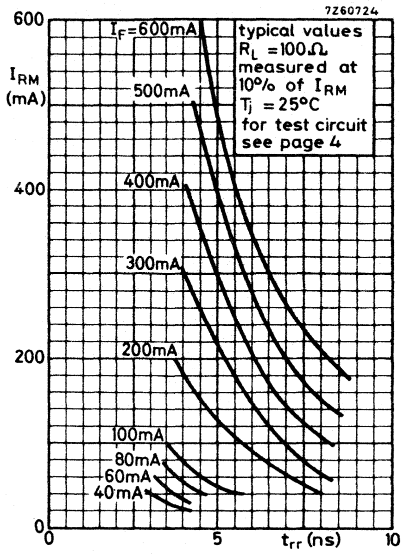


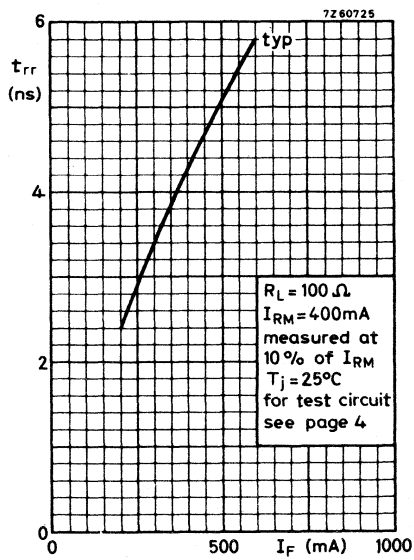


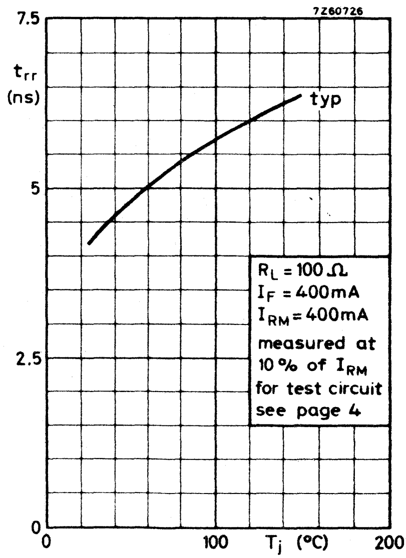
A) Centre-lines of all leads are within ± 0.254 mm of the nominal positions shown; in the worst case, the spacing between any two leads may deviate from nominal by ± 0.51 mm.

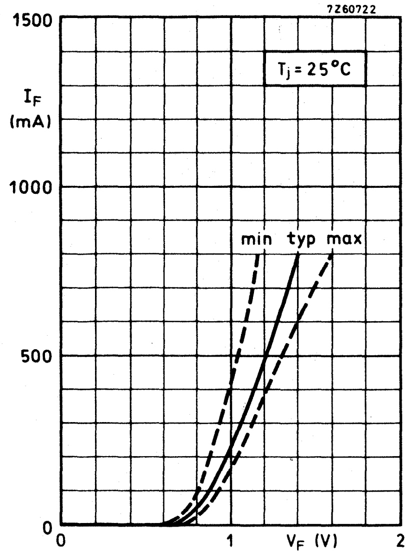
B) Lead spacing tolerances apply form seating plane to the line indicated.

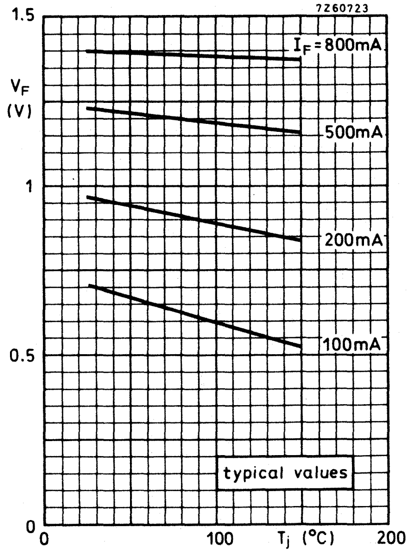

7Z60727
typical values
Tj = 25°C
VFM
(V)
3
2
1
0
IF = 400mA
200 mA
50 mA
0
50
tr (ns)
100

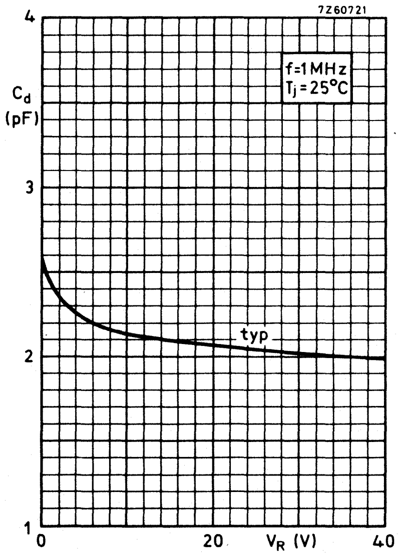

7Z60724
typical values
RL = 100 Ω
measured at
10% of IRM
Tj = 25°C
for test circuit
see page 4
IRM
(mA)
600
400
200
0
IF = 600mA
500mA
400mA
300mA
200mA
100mA
80mA
60mA
40mA
0
5
trr (ns)
10

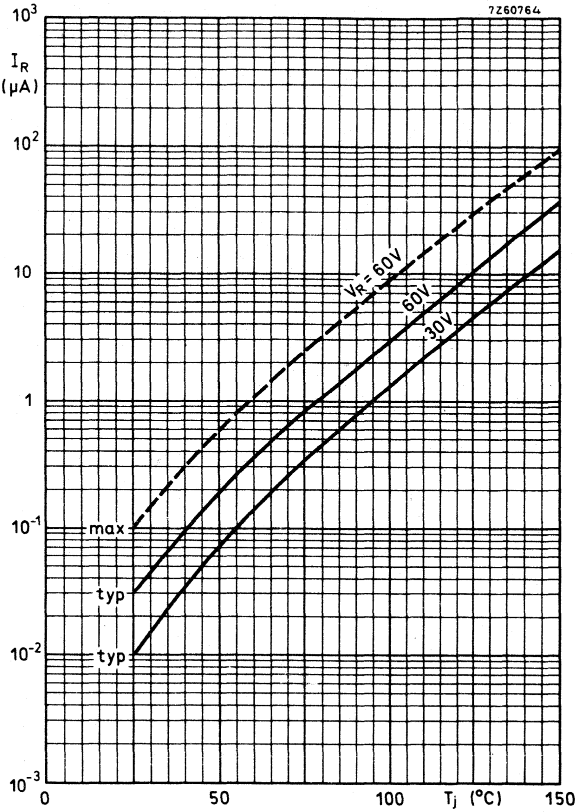

7Z60725
typ
trr
(ns)
6
4
2
0
RL = 100 Ω
IRM = 400mA
measured at
10 % of IRM
Tj = 25°C
for test circuit
see page 4
0
500
IF (mA)
1000


7Z60726
typ
trr
(ns)
7.5
5
2.5
0
RL = 100 Ω
IF = 400mA
IRM = 400mA
measured at
10 % of IRM
for test circuit
see page 4
0
100
Tj (°C)
200


7Z60722
1500
1000
500
0
IF
(mA)
Tj = 25°C
min typ max
0
1
VF (V)
2


7Z60723
1.5
1
0.5
0
VF
(V)
IF = 800mA
500mA
200mA
100mA
typical values
0
100
Tj (°C)
200


7Z60721
4
3
2
1
Cd
(pF)
f=1MHz
Tj = 25°C
typ
0
20
VR (V)
40

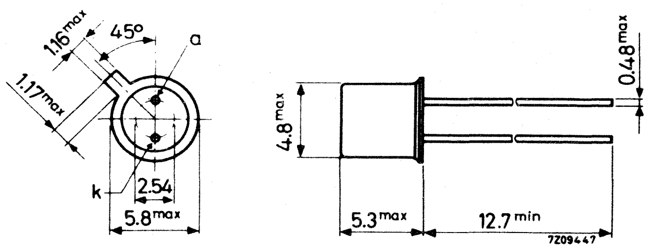

7Z60764
I_R (μA)
10^3
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
max
typ
typ
$V_R = 60V$
60V
30V
0
50
100
T_j (°C)
150

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



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

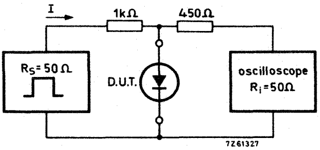
Forward voltage				
I_F = 10 mA	V_F	<	1.0	V
Reverse currents				
V_R = 5 V	I_R	<	5	pA
V_R = 5 V; T_j = 80 °C	I_R	<	250	pA
V_R = 20 V	I_R	<	10	pA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	1.3	pF

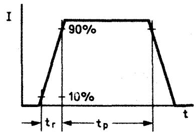
CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

Forward recovery voltage when switched to

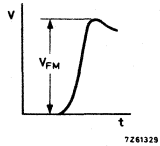
I_F = 10 mA	V_{FM}	<	1.25	V

Test circuit:





input pulse



output pulse

Current pulse: Rise time $t_r \leq$ 20 ns
Pulse duration t_p = 300 ns
Duty cycle δ = 0.01

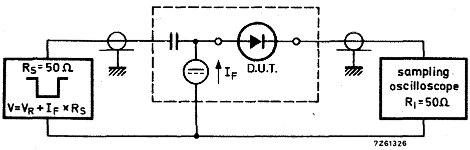
Oscilloscope:
Rise time t_r = 0.35 ns
Input capacitance $C_i \leq$ 1 pF

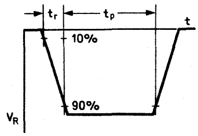
Circuit capacitance C ≤ 20 pF (C = Oscilloscope + parasitical capacitance)

Reverse recovery time when switched from

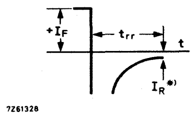
I_F = 10 mA to V_R = 1 V; R_L = 100 Ω; I_{RM} = 10 mA measured at I_R = 1 mA	t_{rr}	<	350	ns

Test circuit:





input pulse



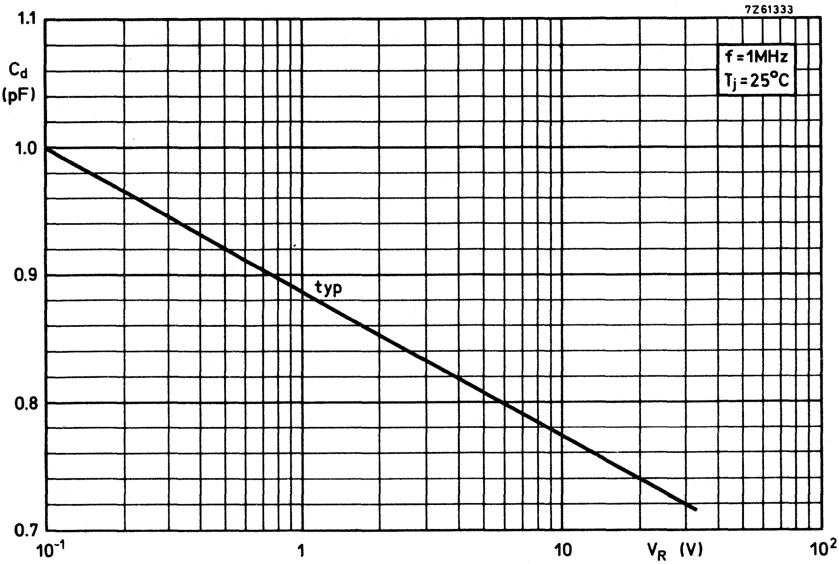
output pulse

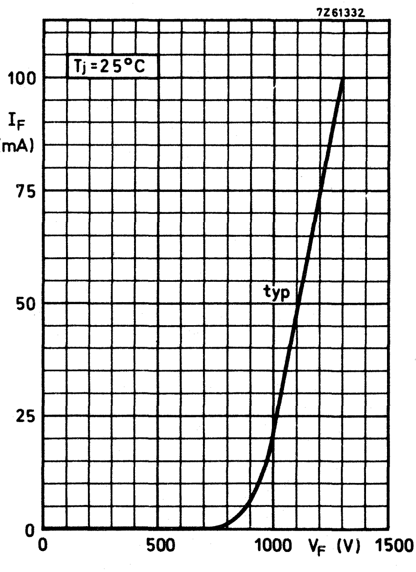
Reverse pulse: Rise time $t_r \leq$ 20 ns
Pulse duration t_p = 500 ns
Duty cycle δ = 0.05

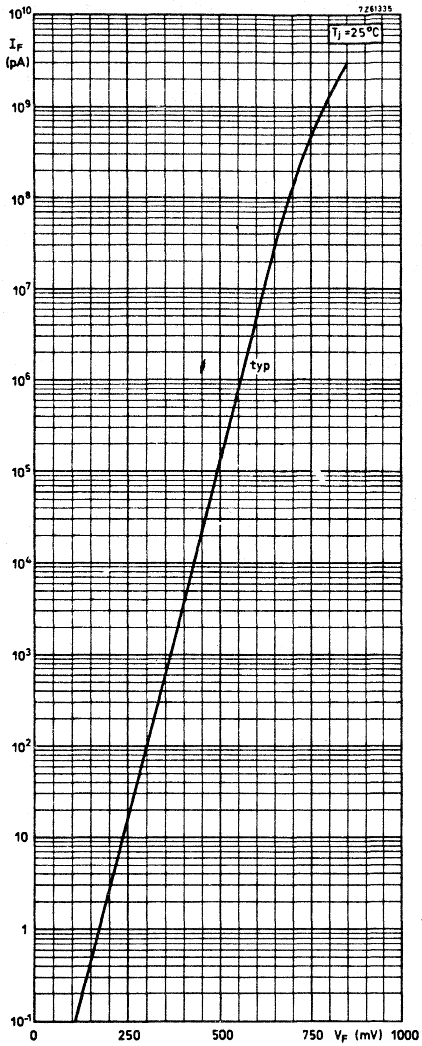
Oscilloscope:
Rise time t_r = 0.35 ns

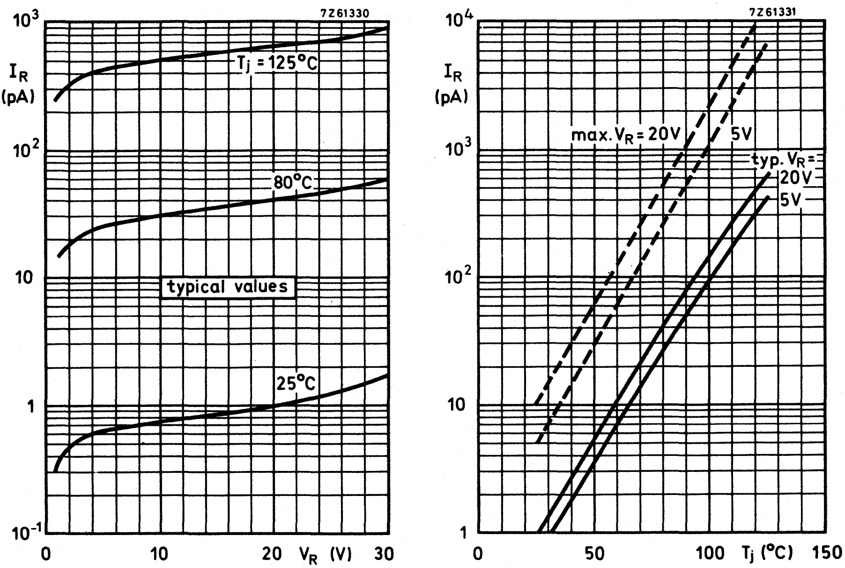
*) I_R = 1 mA

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


7Z61333
1.1
C_d
(pF)
f = 1MHz
T_j = 25°C
1.0
0.9
typ
0.8
0.7
10^{-1}
1
10
V_R (V)
10^2


7Z61332
T_j = 25°C
100
I_F
(mA)
75
typ
50
25
0
0
500
1000
V_F (V)
1500


7Z61335
$T_j = 25\,^{\circ}C$
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}
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)
7Z61331
I_R (pA)
max. V_R = 20V
5V
typ. V_R =
20V
5V
T_j (°C)

Voltage regulator diodes

TYPE SELECTION

Reference voltage E24 (±5%) V_Z (V)	400 mW DO-7 glass 1)	400 mW DO-35 glass 2)	400 mW DO-7 glass	400 mW DO-7 glass	400 mW DO-35 glass 3)	1,3 W DO-15 plastic
	BZX75					
1,4	–C1V4					
2,1	–C2V1					
2,8	–C2V8					
3,3	–		–C3V3			
3,6	–C3V6					
3,9				1N748A		
4,3				1N749A		
4,7		–C4V7		1N750A		
5,1				1N751A	1N5729B	
5,6				1N752A	1N5730B	
6,2				1N753A	1N5731B	
6,8				1N754A	1N5732B	
7,5				1N755A	1N5733B	–C7V5
8,2				1N756A	1N5734B	
9,1				1N757A	1N5735B	
10			**BZY88series**	1N758A	1N5736B	
11				–	1N5737B	
12				1N759A	1N5738B	
13					1N5739B	
15					1N5740B	
16					1N5741B	
18					1N5742B	
20		**BZX79series**			1N5743B	
22					1N5744B	
24					1N5745B	**BZX61series**
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			1N5757B	–C75

1) stabistors

2) ± 2 % range available

3) Note well: in Jedec code B = 5 %; C = 2 %

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.

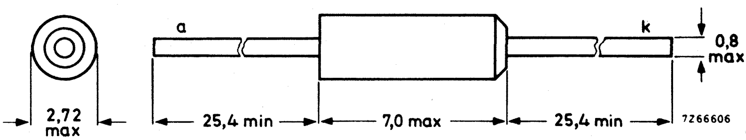
VOLTAGE REGULATOR DIODES

Silicon diodes in a DO-15 plastic envelope intended for general purpose use as low power voltage regulators.
The series consists of 26 types with nominal zener voltages ranging from 7.5 V to 75 V with a tolerance of ±5%.

QUICK REFERENCE DATA				
Zener voltage range		nom.	7.5 to 75	V
Zener voltage tolerance			±5	%
Peak zener current	I_{ZM}	max.	3	A
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	1.3	W
Junction temperature	T_j	max.	175	°C
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0.15	°C/mW

MECHANICAL DATA Dimensions in mm

DO-15



The coned end indicates the cathode

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

Currents

Average forward current (averaged over any 20 ms period)	I_{FAV}	max.	1	A
Peak zener current	I_{ZM}	max.	3	A

Power dissipation

Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	1.3	W ←

Temperatures

Storage temperature	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.15	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltage

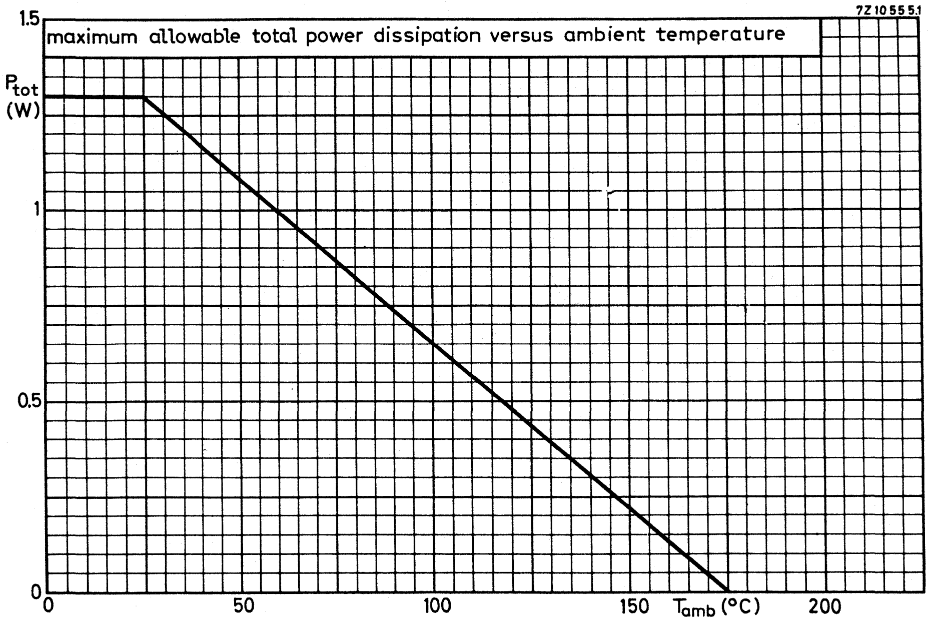
I_F = 100 mA; T_{amb} = 25 °C	V_F	typ.	0.86	V
		<	1.1	V

Reverse current

		BZX61-C7V5 to 8V2	C9V1	C10 to C75	
V_R = 3 V	I_R	< 10	-	-	μA
V_R = 5 V	I_R	< -	10	-	μA
$V_R = \frac{2}{3} \cdot V_{Z\ nom}$	I_R	< -	-	5	μA

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

BZX61-...	Zener voltage V_Z at I_Z = 20 mA min.	nom.	max.	Temperature coefficient at I_Z = 20 mA typ.	Differential resistance at I_Z = 20 mA max.
C7V5	7.1	7.5	7.9 V	+3.0 mV/°C	6.0 Ω
C8V2	7.8	8.2	8.7 V	+3.3 mV/°C	7.5 Ω
C9V1	8.6	9.1	9.6 V	+4.6 mV/°C	8.0 Ω
C10	9.4	10	10.6 V	+5.0 mV/°C	8.5 Ω
C11	10.4	11	11.6 V	+5.5 mV/°C	9.0 Ω
C12	11.4	12	12.6 V	+6.0 mV/°C	9.0 Ω
C13	12.4	13	14.1 V	+6.5 mV/°C	10 Ω
C15	13.9	15	15.6 V	+9.0 mV/°C	14 Ω
	at I_Z = 10 mA min.	nom.	max.	at I_Z = 10 mA typ.	at I_Z = 10 mA max.
C16	15.4	16	17.1 V	+10 mV/°C	16 Ω
C18	16.9	18	19.1 V	+11 mV/°C	20 Ω
C20	18.9	20	21.2 V	+12 mV/°C	22 Ω
C22	20.8	22	23.3 V	+13 mV/°C	23 Ω
C24	22.7	24	25.9 V	+14 mV/°C	25 Ω
C27	25.1	27	28.9 V	+16 mV/°C	35 Ω
C30	28	30	32 V	+21 mV/°C	40 Ω
C33	31	33	35 V	+23 mV/°C	45 Ω
C36	34	36	38 V	+25 mV/°C	50 Ω
	at I_Z = 5 mA min.	nom.	max.	at I_Z = 5 mA typ.	at I_Z = 5 mA max.
C39	37	39	41 V	+27 mV/°C	60 Ω
C43	40	43	45 V	+30 mV/°C	70 Ω
C47	44	47	50 V	+38 mV/°C	80 Ω
C51	48	51	54 V	+41 mV/°C	95 Ω
C56	53	56	60 V	+45 mV/°C	105 Ω
C62	58	62	66 V	+50 mV/°C	110 Ω
C68	64	68	72 V	+54 mV/°C	120 Ω
C75	71	75	79 V	+60 mV/°C	135 Ω



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.

STABISTORS

Diodes with controlled conductance in a subminiature 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%.

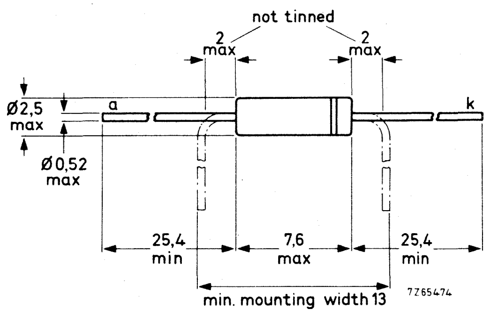
QUICK REFERENCE DATA

Regulation voltage (forward voltage)	V_F	nom.	1.4 to 3.6	V
Regulation voltage tolerance			± 5	%
Reverse voltage (d.c.)	V_R	max.	10	V
(repetitive peak)	V_{RRM}	max.	10	V
Repetitive peak forward current	I_{FRM}	max.	250	mA
Total power dissipation up to T_{amb} = 40 °C	P_{tot}	max.	400	mW
Junction temperature	T_j	max.	200	°C

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				
Reverse voltage (d.c.)	V_R	max.	10	V
(repetitive peak)	V_{RRM}	max.	10	V
Current				
Repetitive peak forward current	I_{FRM}	max.	250	mA
Power dissipation				
Total power dissipation up to T_{amb} = 40 °C	P_{tot}	max.	400	mW ←
Temperatures				
Storage temperature	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	200	°C

→ **THERMAL RESISTANCE**

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.40	°C/mW

CHARACTERISTICS

	Regulation voltage V_F (forward voltage) at I_F = 1 mA			Temperature coefficient S_F at I_F = 1 mA	Differential resistance r_d f = 1 kHz at I_F = 1 mA	
BZX75-...	min.		max.	typ.	typ.	
C1V4	1.16		1.34 V	-4 mV/°C	60 Ω	
C2V1	1.75		2.05 V	-6 mV/°C	90 Ω	
C2V8	2.33		2.70 V	-8 mV/°C	120 Ω	
C3V6	3.02		3.45 V	-10 mV/°C	150 Ω	
	at I_F = 10 mA			at I_F = 10 mA	at I_F = 10 mA	
	min.	nom.	max.	typ.	typ.	max.
C1V4	1.33	1.4	1.47 V	-3.3 mV/°C	6	10 Ω
C2V1	1.99	2.1	2.21 V	-5.0 mV/°C	9	15 Ω
C2V8	2.66	2.8	2.94 V	-6.6 mV/°C	12	20 Ω
C3V6	3.12	3.6	3.78 V	-8.2 mV/°C	15	25 Ω

Reverse current

V_R = 5 V

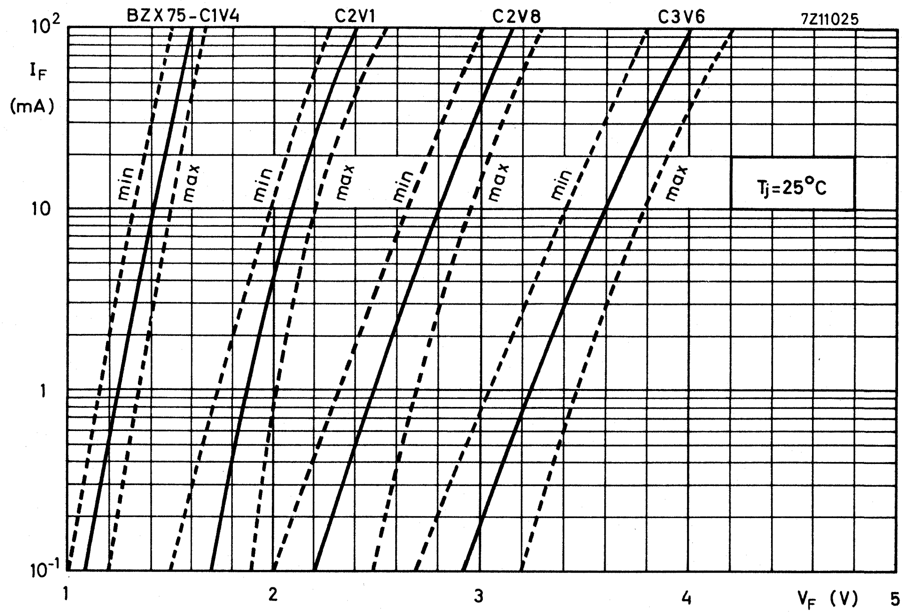
BZX75-C1V4, BZX75-C2V1	I_R	< 500	nA
BZX75-C2V8, BZX75-C3V6	I_R	< 200	nA

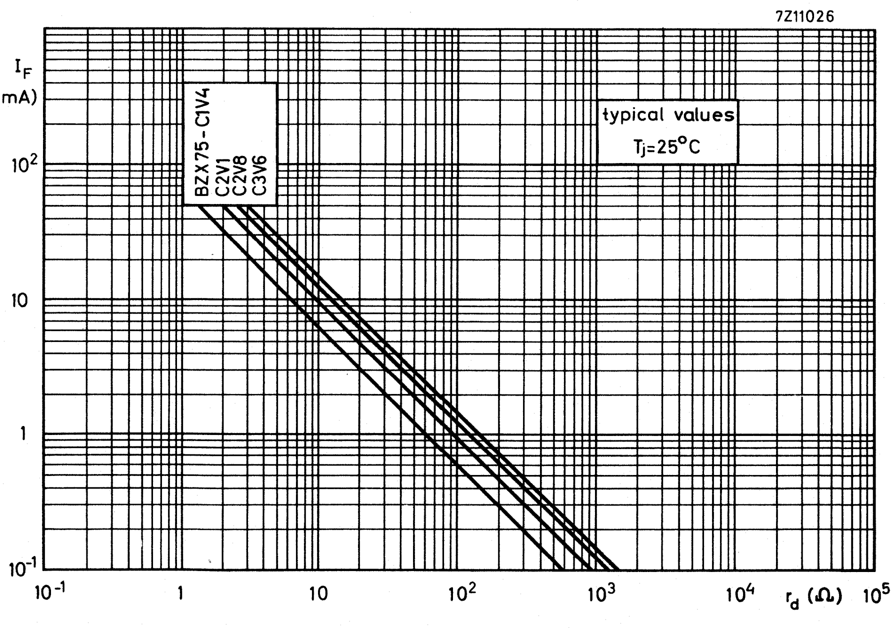
Recovered charge when switched from

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


7Z11025
BZX75-C1V4
C2V1
C2V8
C3V6
I_F
(mA)
10^2
10
1
10^{-1}
min
max
T_j=25°C
1
2
3
4
5
V_F (V)


7Z11026
I_F
(mA)
BZX75-C1V4
C2V1
C2V8
C3V6
typical values
T_j=25°C
10^2
10
1
10^{-1}
10^{-1}
1
10
10^2
10^3
10^4
10^5
r_d (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 standardised E24 (±5 %) range and the other with ± 2 % tolerance on operating voltage.
Each series consists of 30 types with nominal operating voltages ranging from 4,7 V to 75 V.

QUICK REFERENCE DATA

Operating 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	°C	
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0,38	°C/mW	3)

1) In still air at maximum lead length up to T_{amb} = 50 °C

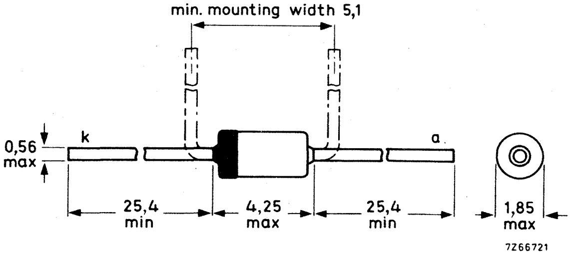
2) If leads are kept at T_{amb} = 25 °C at 8 mm from body.

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	$R_{th\ j\text{-}a}$	=	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%) logarithmic range (for ±2% tolerance range see general page at the beginning of this section)

BZX79-...	Operating voltage V_Z (V) at I_Z = 5 mA		Differential resistance r_{diff} (Ω) at I_Z = 5 mA		Temperature coefficient S (mV/°C) at I_Z = 5 mA			Diode capacitance C_d (pF) at 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.			max.	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 temperature coefficient for types C27 to C75 are available on request.

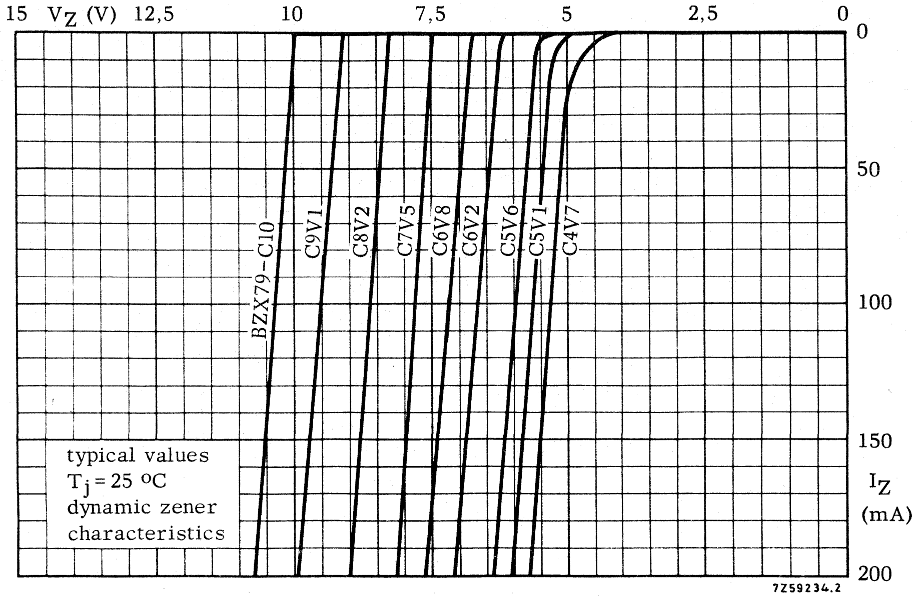
→ **CHARACTERISTICS** (continued) T_j = 25 °C unless otherwise specified

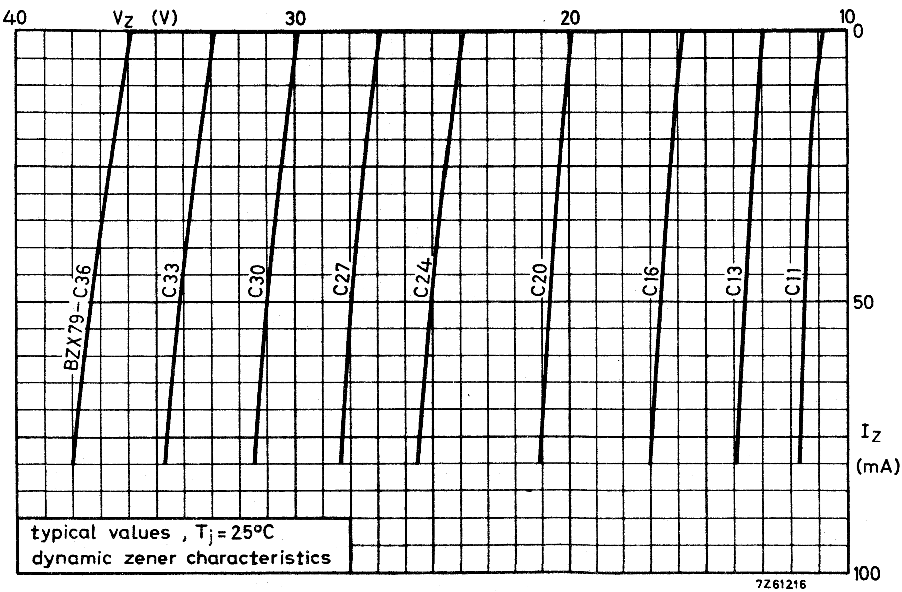
E24 (±5%) logarithmic range (for ±2% tolerance range see general page at the beginning of this section)

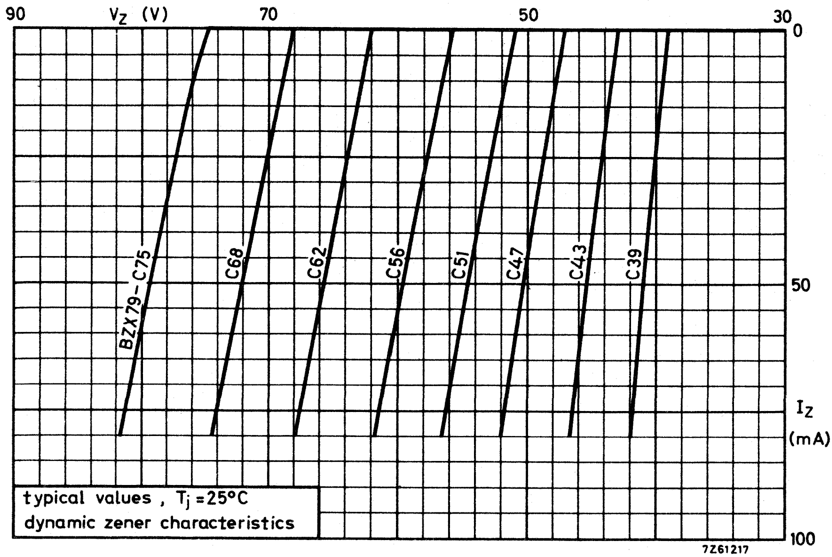
BZX79-...	Operating voltage V_Z (V) at I_Z = 1 mA			Differential resistance r_{diff} (Ω) at I_Z = 1 mA		Operating voltage V_Z (V) at I_Z = 20 mA			Differential resistance r_{diff} (Ω) at I_Z = 20 mA	
	min.	nom.	max.	typ.	max.	min.	typ.	max.	typ.	max.
C4V7	3,7	4,2	4,7	425	500	4,5	5,0	5,4	8	20
C5V1	4,2	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

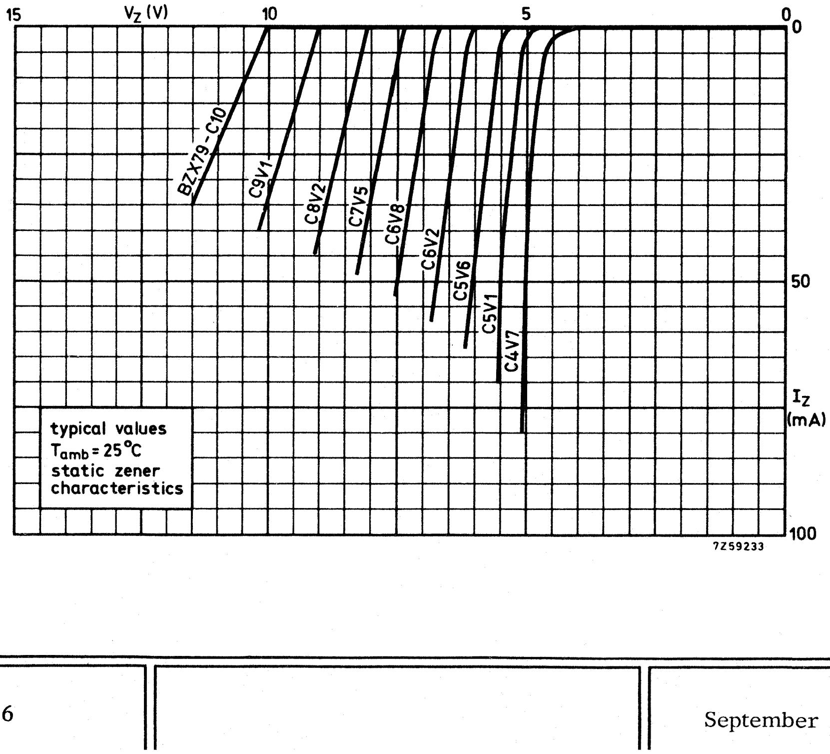
Note

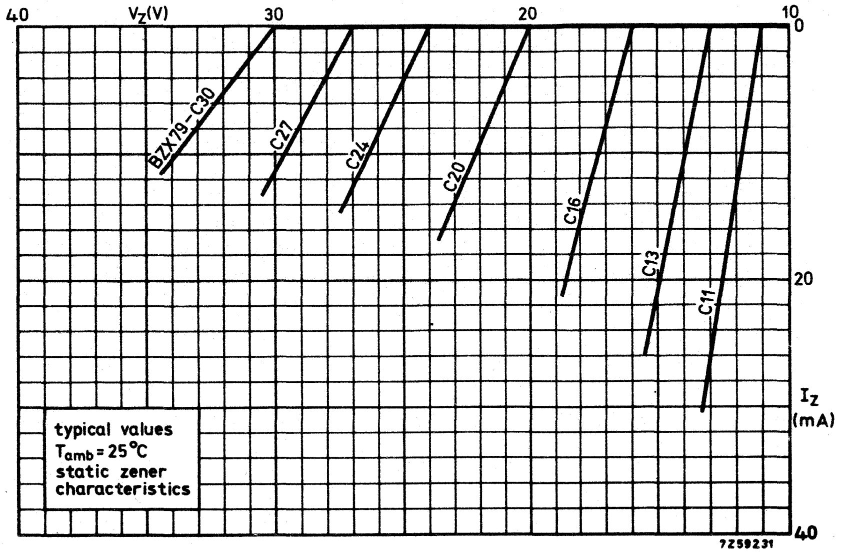
Extended information for types C27 to C75 is available on request.

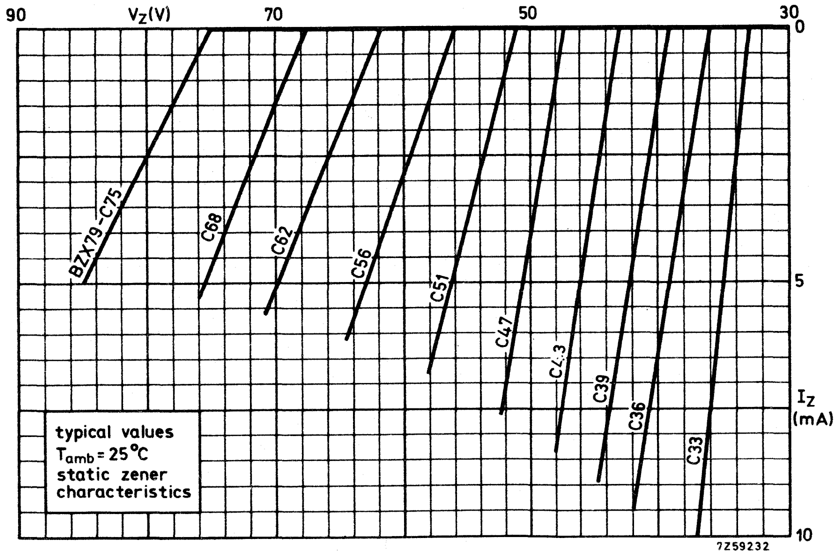

15 V_Z (V) 12,5 10 7,5 5 2,5 0
0
50
100
150
I_Z
(mA)
200
BZX79–C10
C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C5V1
C4V7
typical values
T_j = 25 °C
dynamic zener
characteristics
7Z59234.2

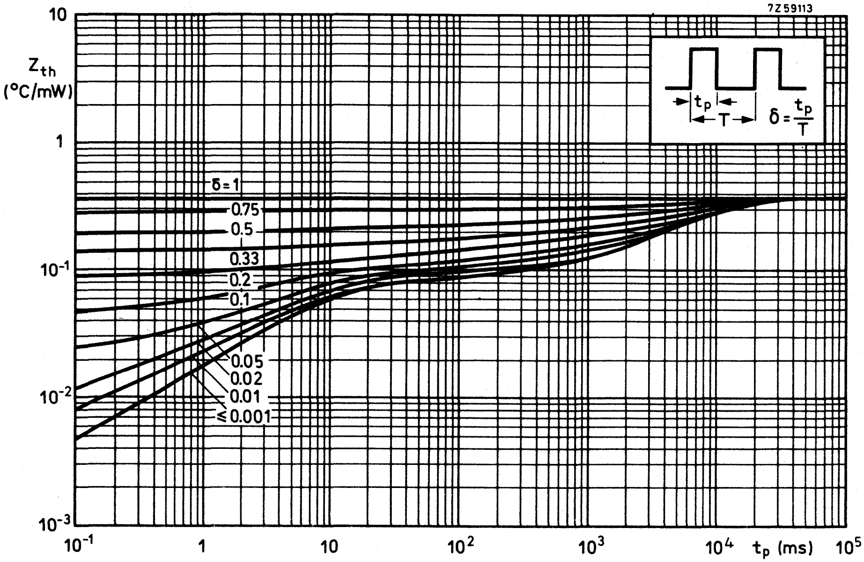

40 V_Z (V) 30 20 10
0
50
I_Z
(mA)
100
BZX79–C36
C33
C30
C27
C24
C20
C16
C13
C11
typical values , T_j = 25°C
dynamic zener characteristics
7Z61216

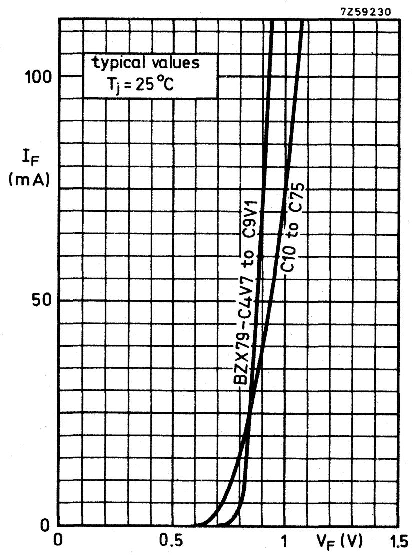

90
V_Z (V)
70
50
30
0
50
100
I_Z
(mA)
BZX79-C75
C68
C62
C56
C51
C47
C43
C39
typical values , T_j = 25°C
dynamic zener characteristics
7Z61217

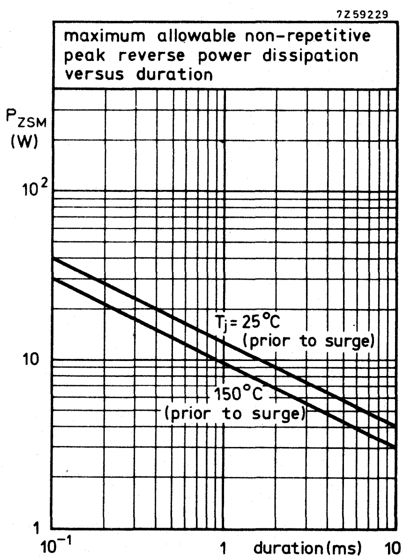

15
V_Z (V)
10
5
0
0
50
100
I_Z
(mA)
BZX79-C10
C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C5V1
C4V7
typical values
T_{amb} = 25°C
static zener
characteristics
7Z59233

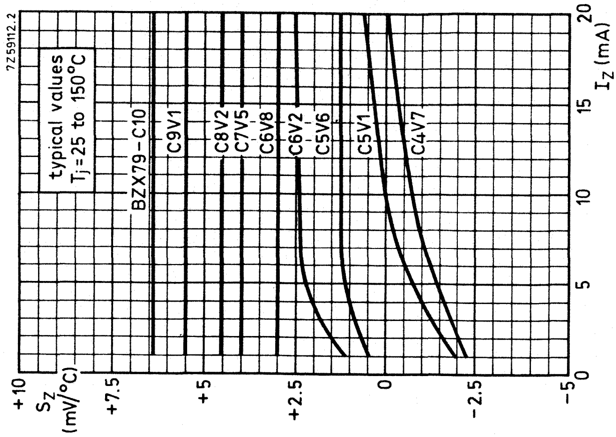

40
V_Z(V)
30
20
10
0
20
I_Z
(mA)
40
BZX79-C30
C27
C24
C20
C16
C13
C11
typical values
T_{amb} = 25 °C
static zener
characteristics
7Z59231


90
V_Z(V)
70
50
30
0
5
I_Z
(mA)
10
BZX79-C75
C68
C62
C56
C51
C47
C43
C39
C36
C33
typical values
T_{amb} = 25 °C
static zener
characteristics
7Z59232

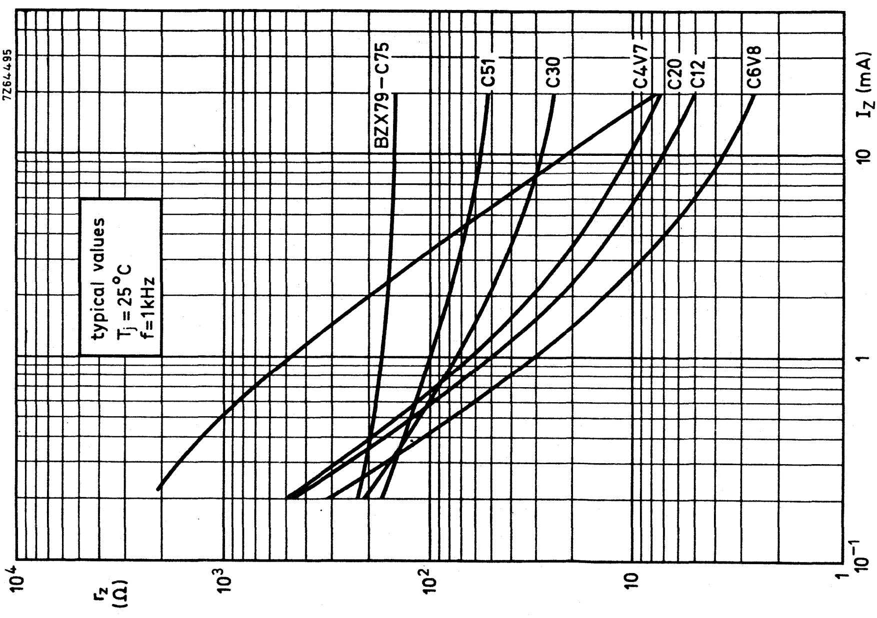

7Z59113
Z_{th} (°C/mW)
10
1
10^{-1}
10^{-2}
10^{-3}
δ = 1
0.75
0.5
0.33
0.2
0.1
0.05
0.02
0.01
≤ 0.001
t_p
T
$\delta = \frac{t_p}{T}$
10^{-1}
1
10
10^2
10^3
10^4
t_p (ms)
10^5


7Z59230
typical values
T_j = 25 °C
I_F (mA)
100
50
0
BZX79-C4V7 to C9V1
C10 to C75
0
0.5
1
V_F (V)
1.5


7Z59229
maximum allowable non-repetitive peak reverse power dissipation versus duration
P_{ZSM} (W)
10^2
10
1
T_j = 25 °C (prior to surge)
150 °C (prior to surge)
10^{-1}
1
duration (ms)
10



7Z59112.2
typical values
T_j = 25 to 150 °C
BZX79−C10
C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C5V1
C4V7
S_Z (mV/°C)
+10
+7.5
+5
+2.5
0
−2.5
−5
0
5
10
15
20
I_Z (mA)



7Z64495
typical values
T_j = 25 °C
f = 1kHz
BZX79−C75
C51
C30
C4V7
C20
C12
C6V8
r_z (Ω)
10^4
10^3
10^2
10
1
10^{-1}
1
10
I_Z (mA)

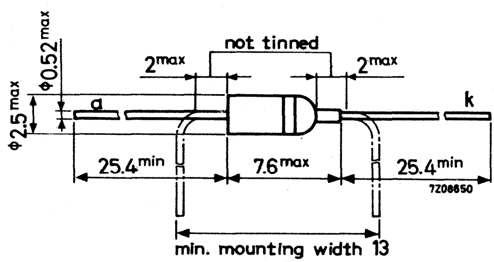
VOLTAGE REGULATOR DIODES

Silicon diodes in subminiature all glass DO-7 envelope for use as low current voltage stabilizers or voltage references.
The series consists of 24 types with nominal zener voltages ranging from 3.3 V to 30 V with a tolerance of ±5%.

QUICK REFERENCE DATA				
Zener voltage range		nom.	3.3 to 30	V
Zener voltage tolerance			±5	%
Repetitive peak zener 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 T_j = 150 °C; t = 100 μs	P_{ZSM}	max.	15	W
Junction temperature	T_j	max.	175	°C
Thermal resistance from junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.31	°C/mW

MECHANICAL DATA Dimensions in mm

DO-7



The band indicates the cathode side

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 zener 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 T_j = 150 °C; t = 100 μs	P_{ZSM}	max.	15	W

Temperatures

Storage temperature	T_{stg}		-65 to +175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.31	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltage

I_F = 10 mA [1]) V_F < 0.9 V

BZY88-...	Zener voltage V_Z at I_Z = 1 mA				Temperature coefficient S_Z at I_Z = 1 mA				Differential resistance r_Z 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

[1]) T_{amb} = 25 °C

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

BZY88-...	Zener voltage V_Z at I_Z = 5 mA 1)				Temperature coefficient S_Z at I_Z = 5 mA				Differential resistance r_Z 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

1) T_{amb} = 25 °C

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

BZY88-...	Zener voltage V_Z at I_Z = 20 mA [1]				Temperature coefficient S_Z at I_Z = 20 mA				Differential resistance r_Z 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

[1] T_{amb} = 25 °C

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

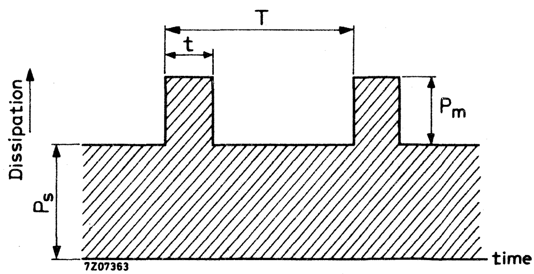
$$P_{m\ max} = \frac{(T_{j\ max} - T_{amb}) - (P_s \cdot R_{th\ j\text{-}a})}{Z_{th}}$$

   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 $\delta = 0.1$ 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 $R_{th\ j\text{-}a} = 0.31\ ^{\circ}C/mW$.
The thermal impedance Z_{th} with a duty cycle $\delta = 0.1$ and a pulse duration t = 1 ms (from page 11, lower figure).

$$Z_{th} = 41.5\ ^{\circ}C/W$$

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, $Z_{th} = 41.5\ ^{\circ}C/W$,

$$P_{m\,max} = \frac{(175-60)-(0.076 \times 310)}{41.5} = 2.2\,W$$

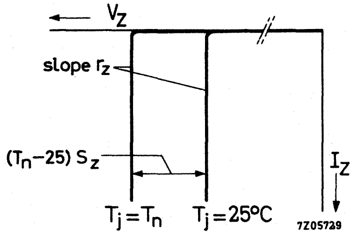
therefore, the total repetitive peak power dissiaption,

$$P_{ZRM} = 0.076 + 2.2 = 2.28\,W$$

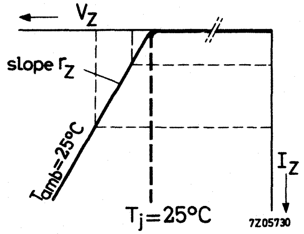
From page 15, upper figure, the corresponding repetitive peak zener current is 250 mA. This is within the rating of the BZY88-C7V5 and is therefore permissible.

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 $T_j = 25\ ^{\circ}C$ by a voltage corresponding to $S_Z \times (T_n - 25)\ ^{\circ}C$, 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

$$\frac{V_Z'}{1 - I_Z . R_{th\ j\text{-}a} . S_Z}$$

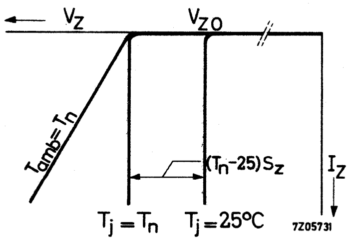
V_Z' being the zener voltage at $T_j = T_n$ at the working current I_Z.

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

$$S_Z \times (T_n - 25)\ ^oC$$

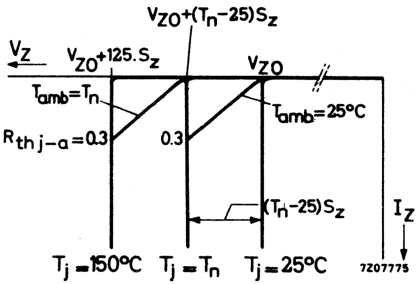
from the low current voltage, V_{ZO} on the dynamic characteristic at $T_j = 25\ ^oC$ (See figure below)

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

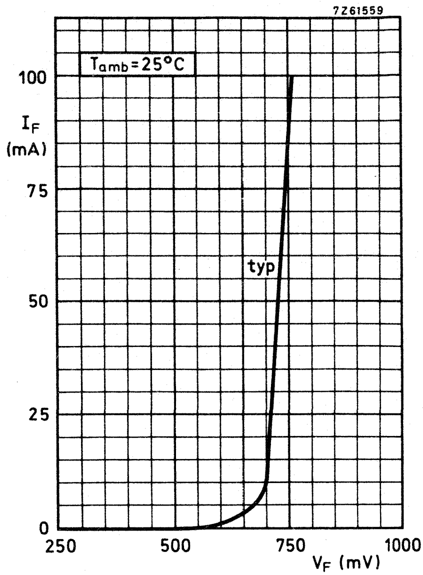
Typical static characteristics for each type of diode are given on page 14. These curves were obtained with the device mounted in free air at an ambient temperature of 25 °C.

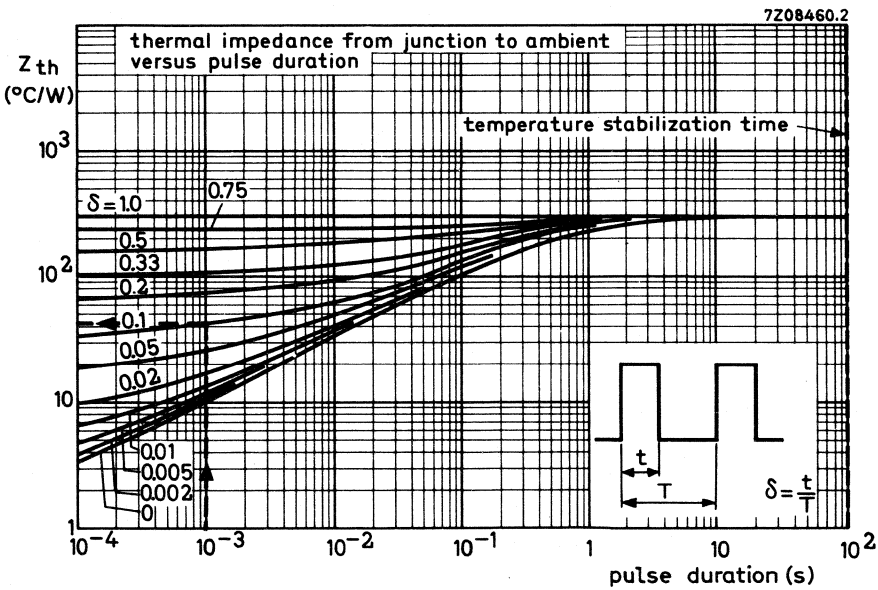
The slope resistance for pulse operation can be calculated by incorporating the thermal impedance Z_{th} into the formula for r_Z. Curves of Z_{th} plotted against pulse duration and duty cycle are given in the lower figure on page 11.

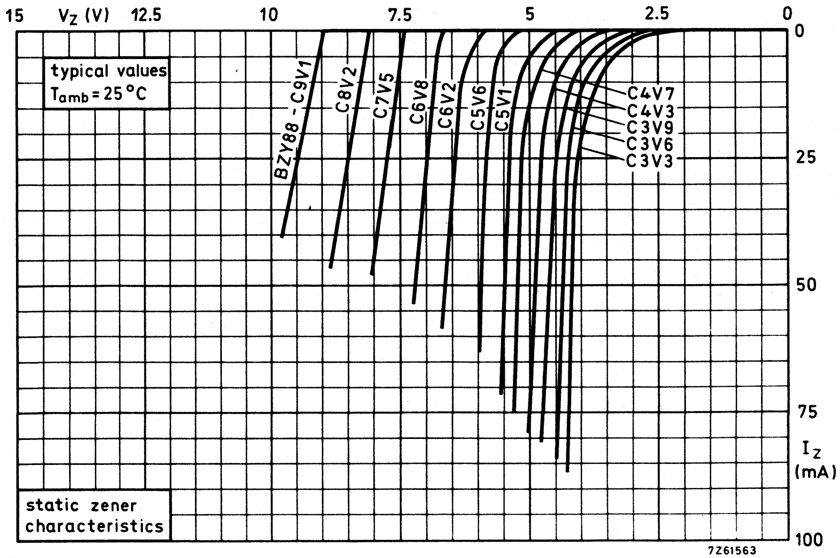
3. When using a soldering iron, the diode may be soldered directly into a circuit, but heat conducted to the junction should be kept to a minimum by use of a thermal shunt.

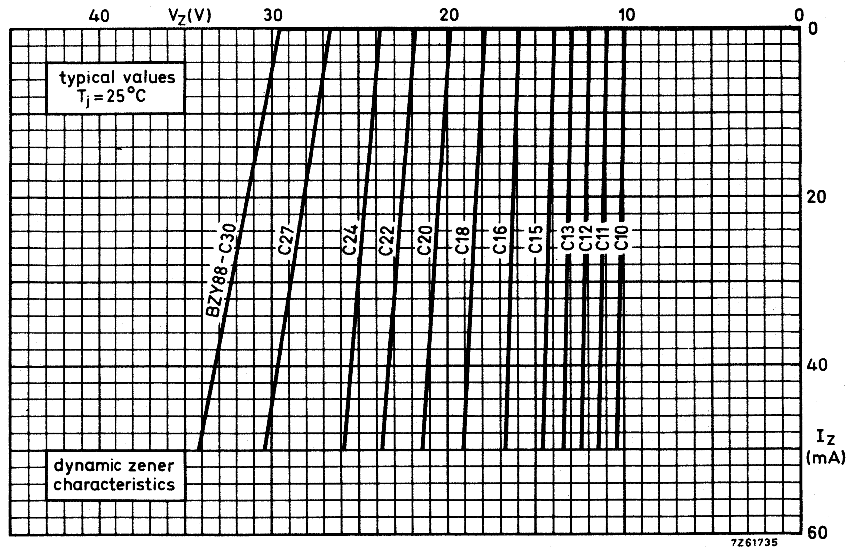
4. Diodes may be dip soldered at a solder temperature of 245 °C for a maximum soldering time of 5 seconds. The case temperature during dip soldering must not at any time exceed the maximum storage temperature. These recommendations apply to a diode with the anode end mounted flush on the board with punched-through 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.

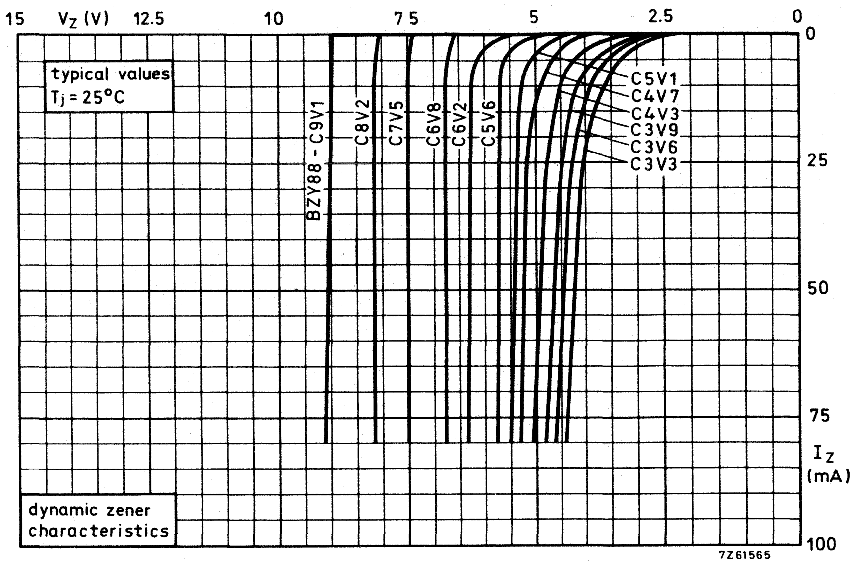
5. Care should be taken not to bend the leads nearer than 1.5 mm from the seals.

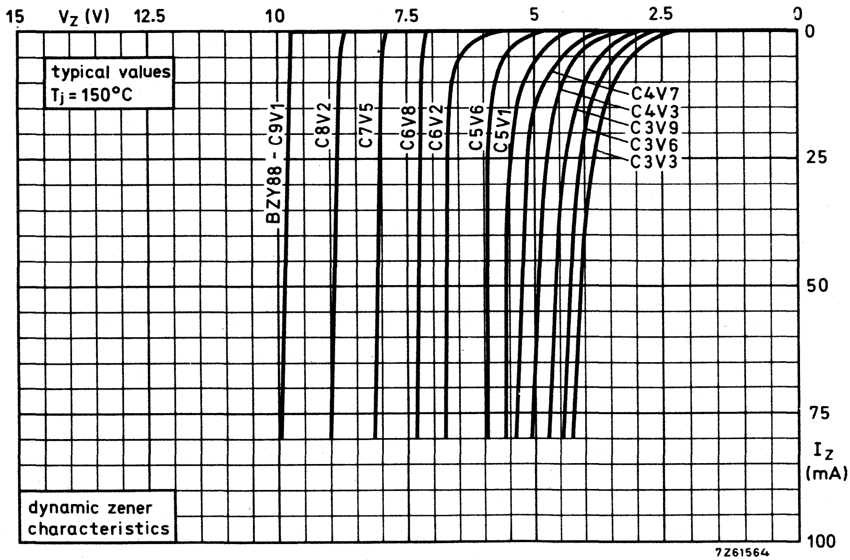

7Z61559
T_{amb} = 25°C
I_F (mA)
100
75
50
25
0
typ
250
500
750
1000
V_F (mV)

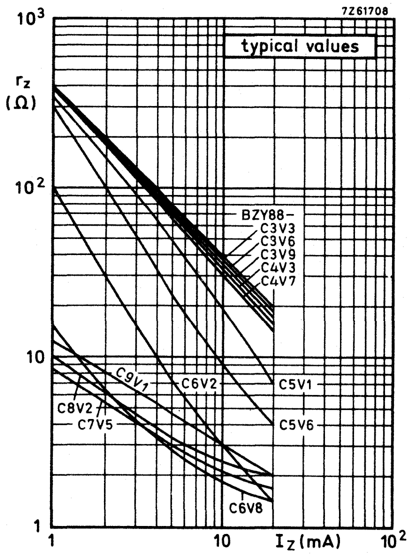

7Z08460.2
thermal impedance from junction to ambient versus pulse duration
Z_{th} (°C/W)
10^3
10^2
10
1
temperature stabilization time
δ = 1.0
0.75
0.5
0.33
0.2
0.1
0.05
0.02
0.01
0.005
0.002
0
t
T
$\delta = \frac{t}{T}$
10^{-4}
10^{-3}
10^{-2}
10^{-1}
1
10
10^2
pulse duration (s)

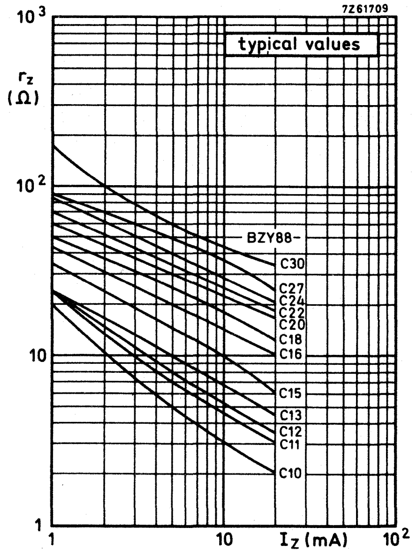

15
V_Z (V)
12.5
10
7.5
5
2.5
0
typical values
T_{amb} = 25 °C
BZY88 - C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C5V1
C4V7
C4V3
C3V9
C3V6
C3V3
0
25
50
75
100
I_Z
(mA)
static zener characteristics
7Z61563

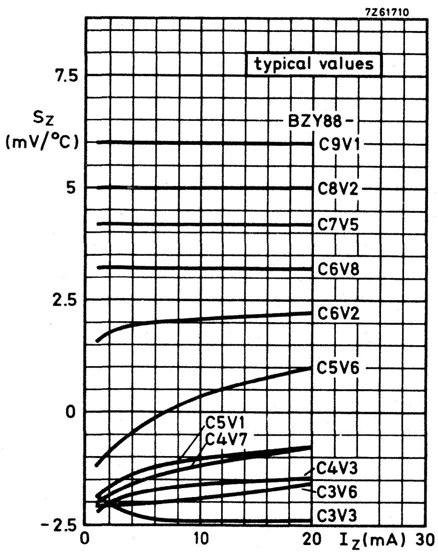

40
V_Z(V)
30
20
10
0
typical values
T_j = 25 °C
BZY88-C30
C27
C24
C22
C20
C18
C16
C15
C13
C12
C11
C10
0
20
40
60
I_Z
(mA)
dynamic zener characteristics
7Z61735

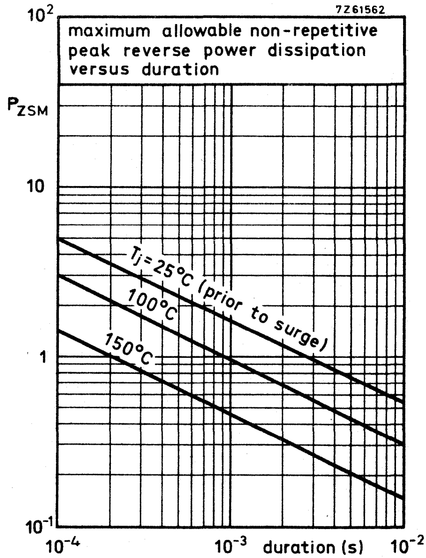

15
V_Z (V)
12.5
10
7.5
5
2.5
0
typical values
T_j = 25°C
BZY88 - C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C5V1
C4V7
C4V3
C3V9
C3V6
C3V3
25
50
75
100
I_Z (mA)
dynamic zener characteristics
7Z61565

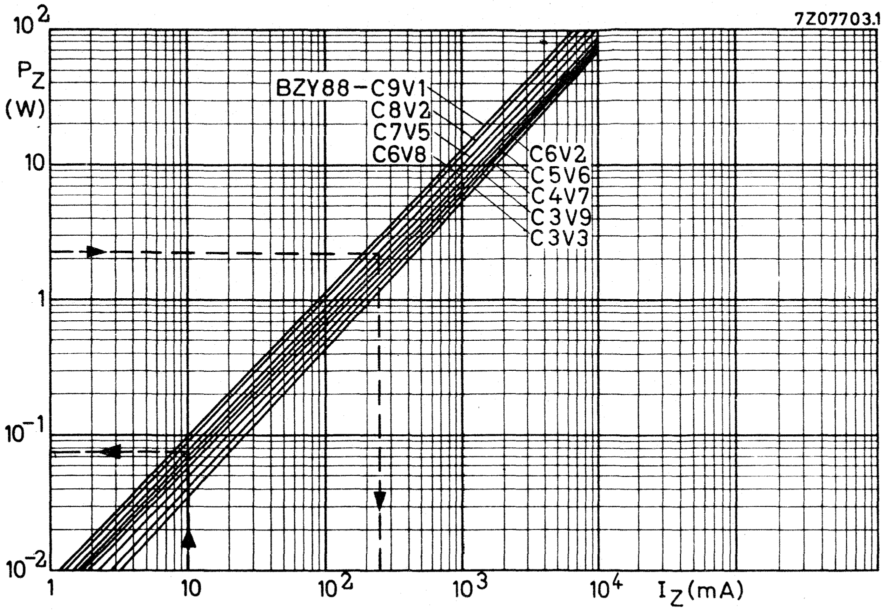

15
V_Z (V)
12.5
10
7.5
5
2.5
0
typical values
T_j = 150°C
BZY88 - C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C5V1
C4V7
C4V3
C3V9
C3V6
C3V3
25
50
75
100
I_Z (mA)
dynamic zener characteristics
7Z61564

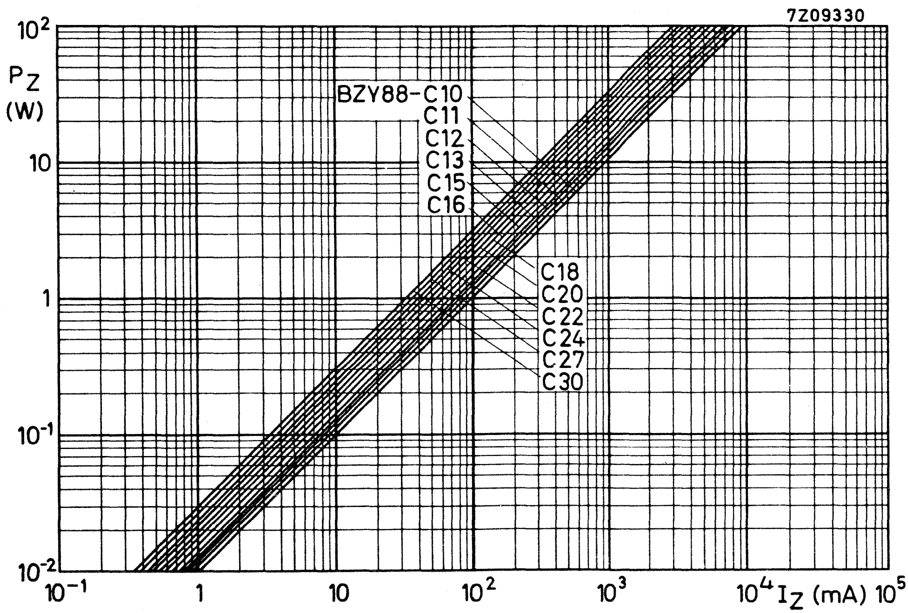

7Z61708
typical values
r_z (Ω)
10^3
10^2
10
1
BZY88-
C3V3
C3V6
C3V9
C4V3
C4V7
C5V1
C5V6
C6V2
C6V8
C7V5
C8V2
C9V1
1
10
I_Z (mA)
10^2


7Z61709
typical values
r_z (Ω)
10^3
10^2
10
1
BZY88-
C30
C27
C24
C22
C20
C18
C16
C15
C13
C12
C11
C10
1
10
I_Z (mA)
10^2


7Z61710
typical values
S_Z (mV/°C)
7.5
5
2.5
0
-2.5
BZY88-
C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C5V1
C4V7
C4V3
C3V6
C3V3
0
10
20
I_Z (mA)
30


7Z61562
maximum allowable non-repetitive peak reverse power dissipation versus duration
P_{ZSM}
10^2
10
1
10^{-1}
T_j = 25°C (prior to surge)
100°C
150°C
10^{-4}
10^{-3}
duration (s)
10^{-2}


7Z07703.1
P_Z (W)
10^2
10
1
10^{-1}
10^{-2}
BZY88-C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C4V7
C3V9
C3V3
1
10
10^2
10^3
10^4
I_Z (mA)

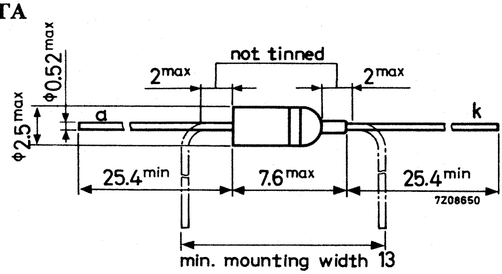

7Z09330
P_Z (W)
10^2
10
1
10^{-1}
10^{-2}
BZY88-C10
C11
C12
C13
C15
C16
C18
C20
C22
C24
C27
C30
10^{-1}
1
10
10^2
10^3
10^4
I_Z (mA)
10^5

VOLTAGE REGULATOR DIODES

Silicon alloyed diodes in subminiature all glass DO-7 envelope for use as low power voltage stabilisers or voltage references.
The series consists of 12 types with nominal zener voltages ranging from 3.9 to 12 V with a tolerance of ±5%.

MECHANICAL DATA Dimensions in mm

DO-7



The coloured band indicates the cathode

RATINGS (Limiting values) [1])

Currents

Repetitive peak zener current	I_{ZRM}	max.	250	mA
Average forward current (averaged over any 20 ms period)	I_{FAV}	max.	250	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
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.31	°C/mW

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

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

Forward voltage at I_F = 10 mA V_F < 900 mV

	Zener voltage 1) at I_Z = 20 mA			Temperature coefficient 1) at I_Z = 20 mA	Differential resistance 1) at I_Z = 20 mA	Reverse current at V_R = 1.0 V, T_{amb} =	
	min.	nom.	max.	typ.	max.	25 °C	150 °C
1N748A	3.705	3.9	4.095 V	-1.90 mV/°C	23 Ω	10	30 μA
1N749A	4.085	4.3	4.515 V	-1.55 mV/°C	22 Ω	2.0	30 μA
1N750A	4.465	4.7	4.935 V	-0.845 mV/°C	19 Ω	2.0	30 μA
1N751A	4.845	5.1	5.355 V	-0.405 mV/°C	17 Ω	1.0	20 μA
1N752A	5.320	5.6	5.880 V	+0.336 mV/°C	11 Ω	1.0	20 μA
1N753A	5.890	6.2	6.510 V	+1.36 mV/°C	7.0 Ω	0.1	20 μA
1N754A	6.460	6.8	7.140 V	+2.38 mV/°C	5.0 Ω	0.1	20 μA
1N755A	7.125	7.5	7.875 V	+3.37 mV/°C	6.0 Ω	0.1	20 μA
1N756A	7.790	8.2	8.610 V	+4.26 mV/°C	8.0 Ω	0.1	20 μA
1N757A	8.645	9.1	9.555 V	+5.10 mV/°C	10 Ω	0.1	20 μA
1N758A	9.500	10.0	10.500 V	+6.0 mV/°C	17 Ω	0.1	20 μA
1N759A	11.400	12.0	12.000 V	+7.2 mV/°C	30 Ω	0.1	20 μA

OPERATING NOTES

1. When using a soldering iron, the diodes 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 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.
3. Care should be taken not to bend the leads nearer than 1.5 mm from the seals.

1) Measured by a pulse method with $t_p \leq 100\ \mu s$, δ = 0.001, T_j = 25 °C.

VOLTAGE REFERENCE DIODES

Silicon planar diodes in a DO-35 enevelope intended for use as low power voltage stabilizers or voltage frequencies.
The series consist of 29 types with nominal voltages ranging from 5,1 V to 75 V with tolerances to the international standardised E24 (± 5%) range.

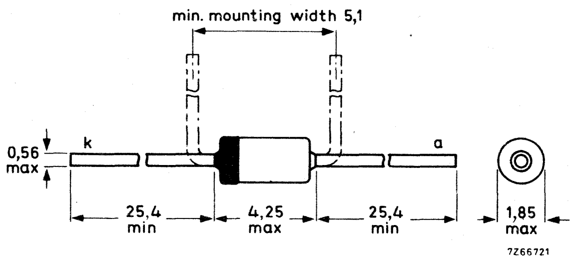
QUICK REFERENCE DATA

Operating voltage range (E24; ± 5%)	V_Z	nom.	5,1 to 75	V
Total power dissipation up to T_{amb} = 50 °C	P_{tot}	max.	400	mW
Non-repetitive peak reverse power t = 100 μs; T_j = 150 °C	P_{ZSM}	max.	30	W
Junction temperature	T_j	max.	200	°C
Thermal resistance from junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,38	°C/mW

MECHANICAL DATA

Dimensions in mm

DO-35



Cathode indicated by coloured band

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

Currents

Steady-state regulator current at T_{amb} = 25 °C | Non-repetitive peak reverse 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 up to T_{amb} = 50 °C	P_{tot}	max.	400	mW
Non-repetitive peak reverse power t = 100 μs; T_j = 150 °C; square wave	P_{ZSM}	max.	30	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
at maximum lead length $R_{th\ j-a}$ = 0,38 °C/mW

CHARACTERISTICS E24 (±5 %) logarithmic range T_j = 25 °C unless otherwise specified ←

	Operating voltage V_Z (V)			Temperature coefficient S_Z (mV/°C)	Differential impedance z_Z (Ω)
	at I_Z = 10 mA			at I_Z = 10 mA	at I_Z = 10 mA; I_z = 0,2 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	
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	
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

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

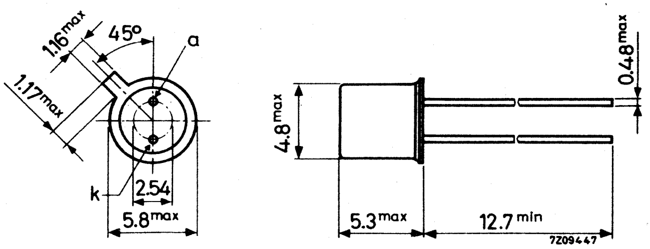
VOLTAGE REFERENCE DIODES

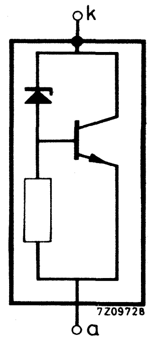
Silicon planar voltage reference diodes in a metal envelope. They have a very low temperature coefficient and are primarily intended for use as reference sources in in measurement equipment such as digital voltmeters.

QUICK REFERENCE DATA					
Zener voltage at I_Z = 2.0 mA		V_Z	nom.	6.5	V
Zener voltage tolerance				± 5	%
Temperature coefficient at I_Z = 2.0 mA	BZX48:	S_Z	<	+ 0.065	mV/°C
	BZX49:	S_Z	<	+ 0.13	mV/°C
	BZX50:	S_Z	<	+ 0.325	mV/°C
Recommended operating ambient temperature range		T_{amb}		0 to +70	°C

MECHANICAL DATA Dimensions in mm

Except for the two leads only, conforming to TO-18





Cathode connected to case

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

Currents

Zener current (d.c.)	I_Z	max.	10	mA
Zener current (peak value)	I_{ZM}	max.	10	mA

Temperatures

Storage temperature	T_{stg}	−65 to +150	°C
Operating ambient temperature	T_{amb}	−65 to +100	°C

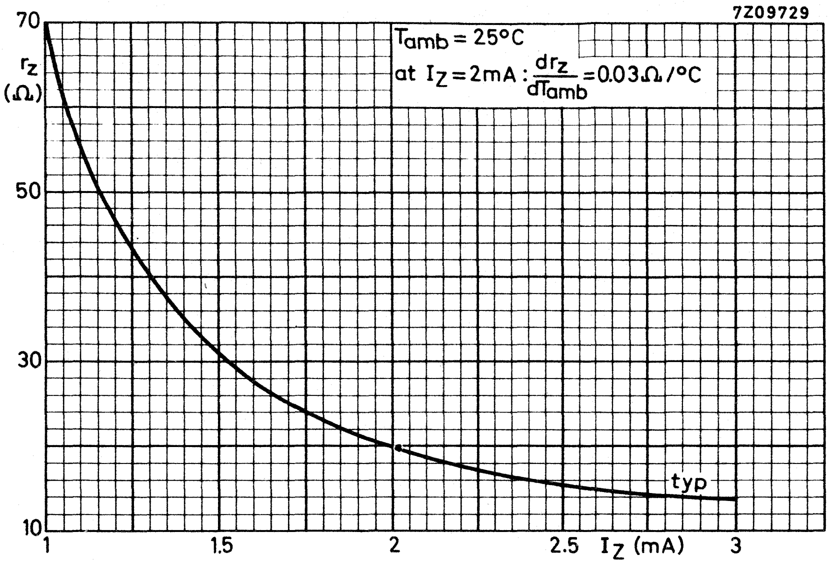
CHARACTERISTICS T_{amb} = 25 °C unless otherwise specified

Zener voltage at					
I_Z = 1.0 mA		V_Z	typ.	6.42	V
I_Z = 2.0 mA		V_Z	typ.	6.45	V
				6.1 to 6.9	V
I_Z = 3.0 mA		V_Z	typ.	6.47	V
Reverse current at V_R = 4.0 V		I_R	typ.	0.1	μA
			<	1.0	μA
Temperature coefficient at I_Z = 2.0 mA					
T_{amb} = 0 to 70 °C	BZX48:	S_z	<	+0.065	mV/°C
	BZX49:	S_z	<	+0.13	mV/°C
	BZX50:	S_z	<	+0.325	mV/°C
I_Z = 1 to 3 mA					
	BZX48:	S_z	<	+0.13	mV/°C
	BZX49:	S_z	<	+0.325	mV/°C
	BZX50:	S_z	<	+0.65	mV/°C
Differential resistance at I_Z = 1.0 mA		r_z	typ.	70	Ω
			<	125	Ω
I_Z = 2.0 mA		r_z	typ.	20	Ω
			10 to	50	Ω
I_Z = 3.0 mA		r_z	typ.	14	Ω
			<	25	Ω

OPERATING NOTES

Recommended operating temperature range T_{amb} = 0 to +70 °C
Optimum operating zener current $I_{Z\ opt}$ = 2.0 ± 5% mA.

The tolerance given is that which will not significantly affect the temperature coefficient. Changes due to differential resistance must still be taken into account.


7Z09729
$T_{amb} = 25°C$
at $I_Z = 2 mA : \frac{dr_Z}{dT_{amb}} = 0.03 \Omega/°C$
r_Z (Ω)
70
50
30
10
1
1.5
2
2.5
3
I_Z (mA)
typ

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.

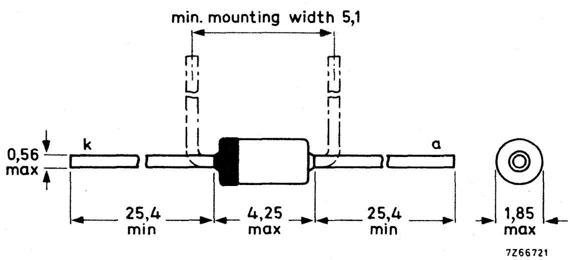
QUICK REFERENCE DATA

			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:	$\lvert S_Z \rvert$	<	0,01		%/°C
	BZX91:	$\lvert S_Z \rvert$	<	0,005		%/°C
	BZX92:	$\lvert S_Z \rvert$	<	0,002		%/°C
	BZX93:	$\lvert S_Z \rvert$	<	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

Operating current (d.c.)	I_Z	max.	50	mA
Operating 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	$R_{th\ j-a}$	=	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:	$\lvert\Delta V_{REF}\rvert$	<	52	mV
	BZX91:	$\lvert\Delta V_{REF}\rvert$	<	26	mV
	BZX92:	$\lvert\Delta V_{REF}\rvert$	<	10,4	mV
	BZX93:	$\lvert\Delta V_{REF}\rvert$	<	5,2	mV
T_{amb} = +25 to +100 °C	BZX90:	$\lvert\Delta V_{REF}\rvert$	<	48	mV
	BZX91:	$\lvert\Delta V_{REF}\rvert$	<	24	mV
	BZX92:	$\lvert\Delta V_{REF}\rvert$	<	9,6	mV
	BZX93:	$\lvert\Delta V_{REF}\rvert$	<	4,8	mV

→ Temperature coefficient at I_Z = 7,5 mA [1])

T_{amb} = −55 to +100 °C	BZX90:	$\lvert S_Z\rvert$	<	0,01	%/°C
	BZX91:	$\lvert S_Z\rvert$	<	0,005	%/°C
	BZX92:	$\lvert S_Z\rvert$	<	0,002	%/°C
	BZX93:	$\lvert S_Z\rvert$	<	0,001	%/°C

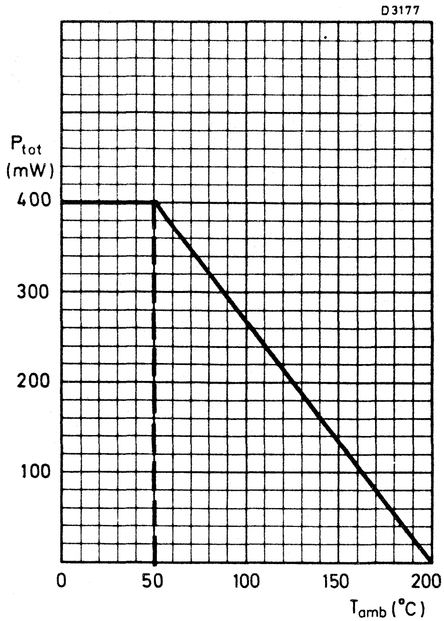
Differential resistance at I_Z = 7,5 mA	r_Z	<	15	Ω

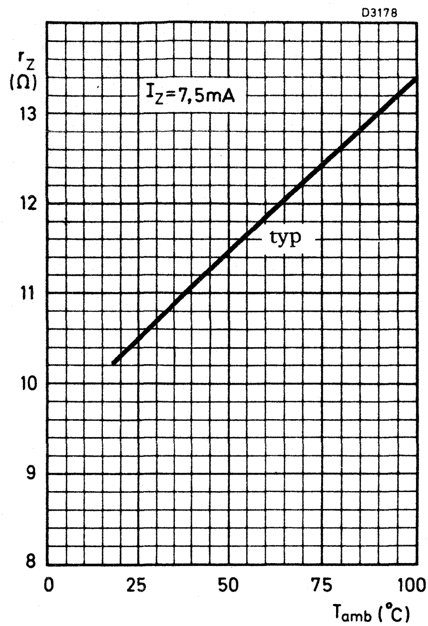
[1]) For accuracy of I_Z see graphs on page 5.

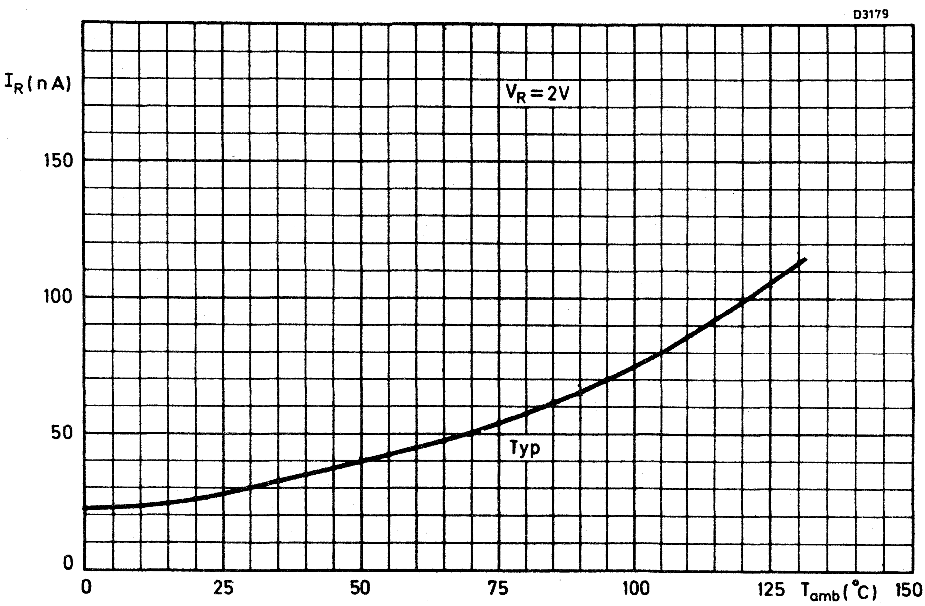
NOTE

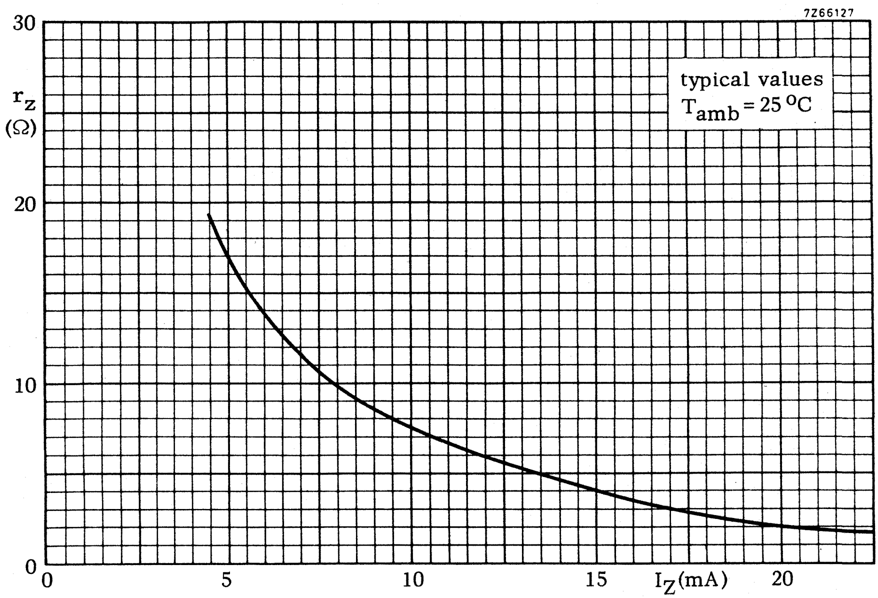
The temperature coefficient (S_Z) of the reference voltage (V_{REF}) is obtained from the following equation:

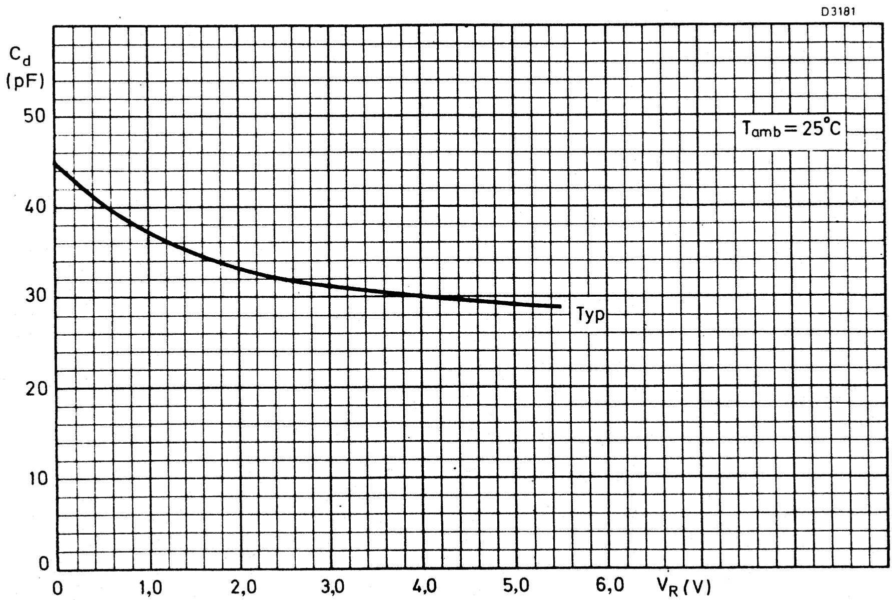
$$S_Z = \frac{V_{REF1} - V_{REF2}}{(T_{amb2} - T_{amb1}) \times V_{REFnom}} \times 100\ \%/^{o}C$$

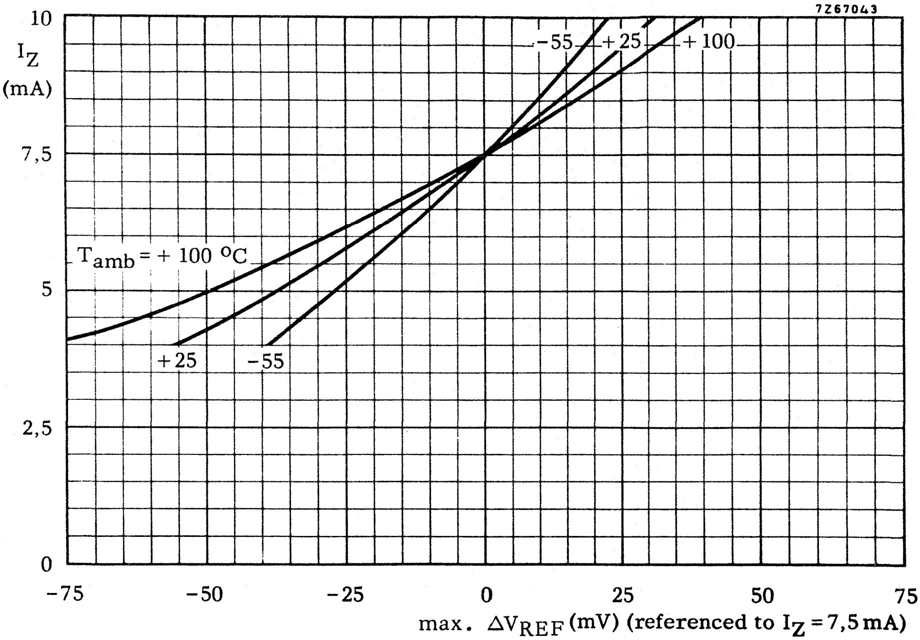

D3177
P_tot
(mW)
400
300
200
100
0
50
100
150
200
T_amb (°C)

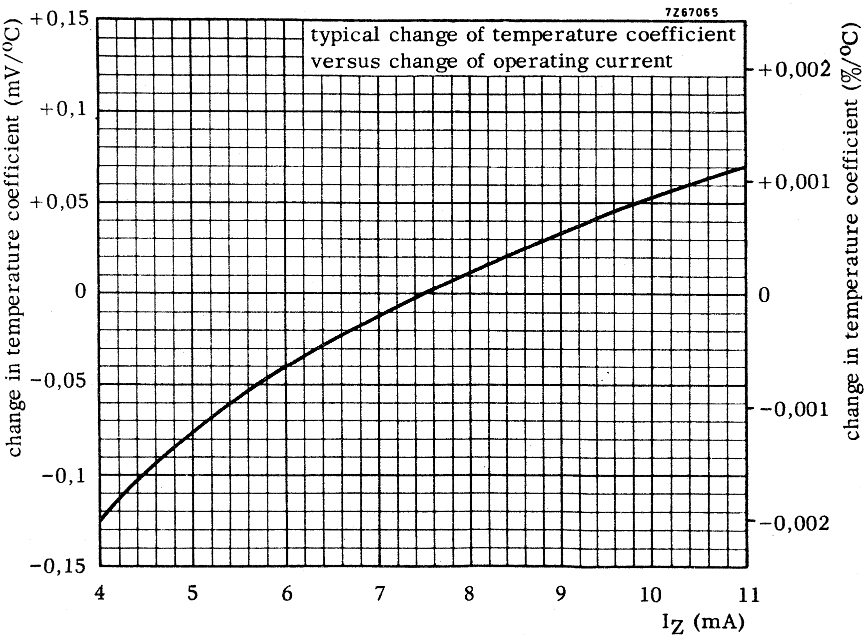

D3178
r_Z
(Ω)
I_Z=7,5mA
13
12
typ
11
10
9
8
0
25
50
75
100
T_amb (°C)


D3179
I_R (nA)
V_R = 2V
150
100
50
Typ
0
0
25
50
75
100
125
T_amb (°C)
150


7Z66127
typical values
Tamb = 25 °C
rZ
(Ω)
30
20
10
0
0
5
10
15
IZ(mA)
20


D3181
Cd
(pF)
50
40
30
20
10
0
Tamb = 25°C
Typ
0
1,0
2,0
3,0
4,0
5,0
6,0
VR (V)


7Z67043
10
I_Z
(mA)
7,5
5
2,5
0
−75
−50
−25
0
25
50
75
max. ΔV_{REF} (mV) (referenced to I_Z = 7,5 mA)
T_{amb} = + 100 °C
+25
−55
−55
+25
+100


7Z67065
typical change of temperature coefficient
versus change of operating 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

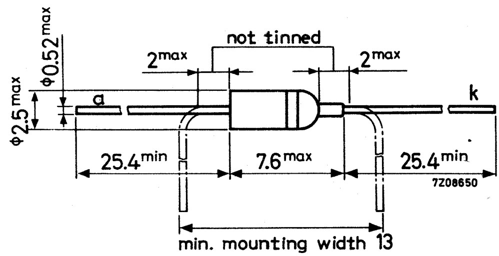
Silicon diode in a DO-7 envelope intended for use as a voltage reference diode in general industrial applications.
The BZY78 has an extremely high voltage stability (±1% at a zener current of 11.5 mA).

QUICK REFERENCE DATA

Zener 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 zener current	I_{ZRM}	max.	25	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	280	mW
Junction temperature	T_j	max.	150	°C
Thermal resistance	$R_{th\,j\text{-}a}$	=	0.45	°C/mW

MECHANICAL DATA Dimensions in mm

DO-7



The coloured band indicates the cathode

RATINGS (Limiting values) [1]

Currents

Average forward current (averaged over any 20 ms period)	I_{FAV}	max.	50	mA
Repetitive peak forward current	I_{FRM}	max.	50	mA
Zener current (d.c. or average over any 20 ms period)	I_Z	max.	25	mA
Repetitive peak zener current	I_{ZRM}	max.	25	mA

Power dissipation

Total power dissipation up to $T_{amb} = 25$ °C	P_{tot}	max.	280	mW

Temperatures

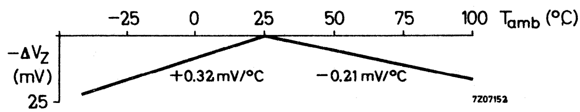
Storage temperature	T_{stg}		−55 to +150	°C
Junction temperature	T_j	max.	150	°C

THERMAL RESISTANCE

From junction to ambient	$R_{th\ j\text{-}a}$	=	0.45	°C/mW

CHARACTERISTICS $T_j = 25$ °C unless otherwise specified

Zener 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_z	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	%

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

MOUNTING INSTRUCTIONS

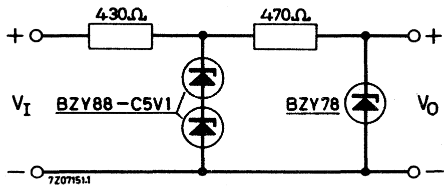
1. When using a soldering iron, the diode may be soldered directly into a circuit, but heat conducted to the junction should be kept to a minimum by use of a thermal shunt.

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.

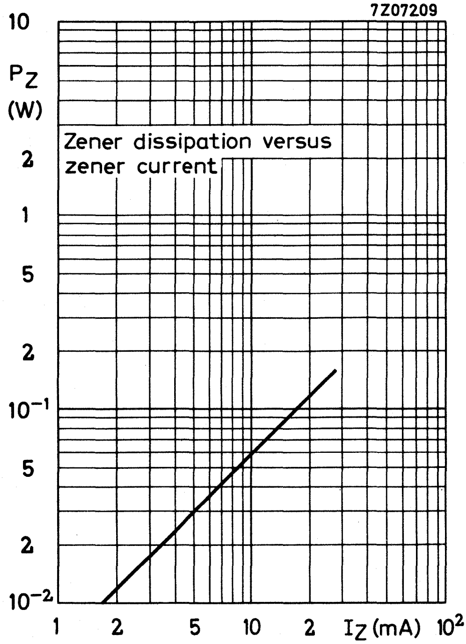
3. Care should be taken not to bend the leads nearer than 1.5 mm from the seals.

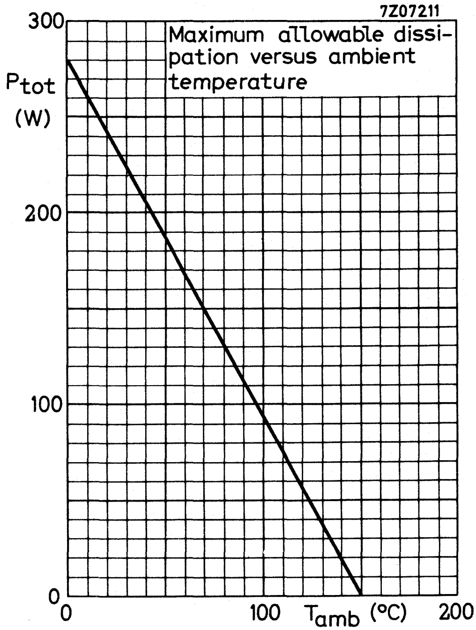
APPLICATION INFORMATION

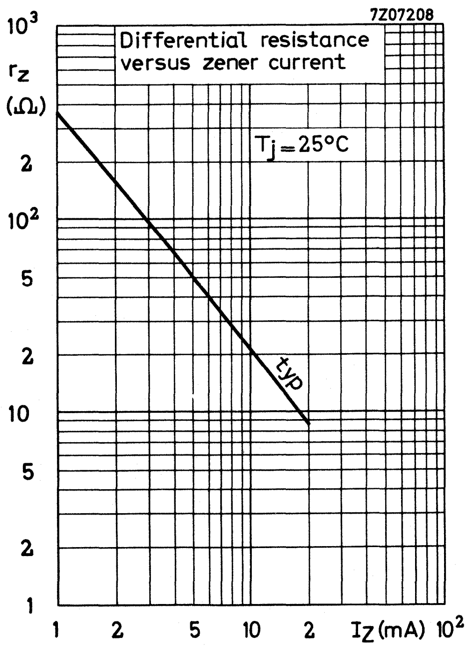
Typical reference-voltage circuit

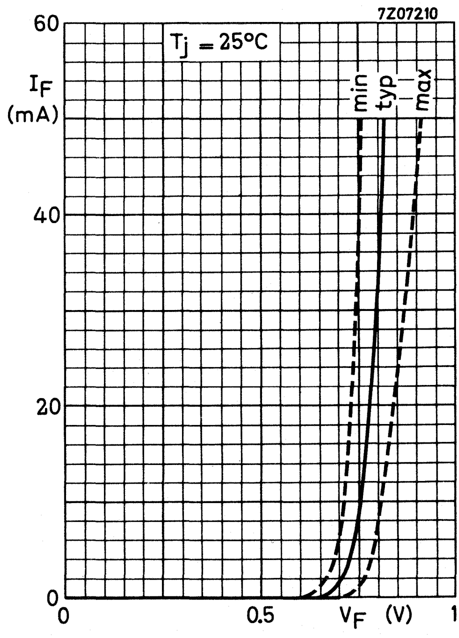


Temperature range	T_{amb}	0 to +50 °C	
Input voltage	V_I	24 V	± 10%
Output voltage	V_O	5.1 to 5.6 V	±0.3%


7Z07209
Zener dissipation versus zener current
P_Z (W)
10
2
1
5
2
10^{-1}
5
2
10^{-2}
1
2
5
10
2
I_Z (mA)
10^2


7Z07211
Maximum allowable dissipation versus ambient temperature
P_{tot} (W)
300
200
100
0
0
100
T_{amb} (°C)
200


7Z07208
Differential resistance versus zener current
r_Z (Ω)
$T_j = 25°C$
typ
10^3
2
10^2
5
2
10
5
2
1
1
2
5
10
2
I_Z (mA)
10^2


7Z07210
$T_j = 25°C$
I_F (mA)
min
typ
max
60
40
20
0
0
0.5
V_F (V)
1

VOLTAGE REFERENCE DIODES

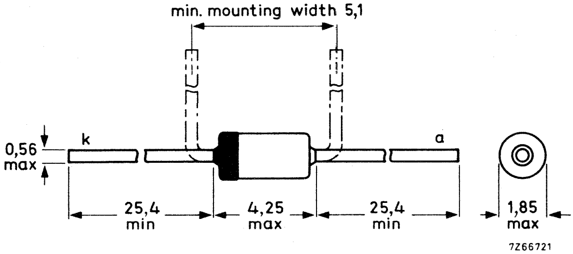
Voltage reference diodes in a DO-35 envelope. They have a very low temperature coefficient and are primarily intended for use as voltage reference sources in measuring instruments such as digital voltmeters.

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 also note 2 on page 2)	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
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 3 and 5.

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

Currents

Operating current (d.c.)	I_Z	max.	50	mA
Operating 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/W

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 also note 2)

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)]

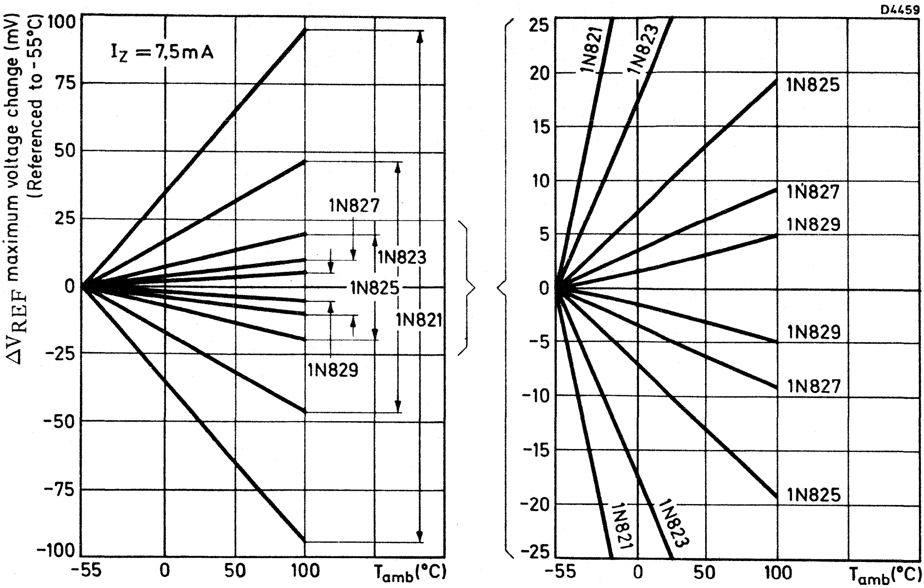
(see also note 2)

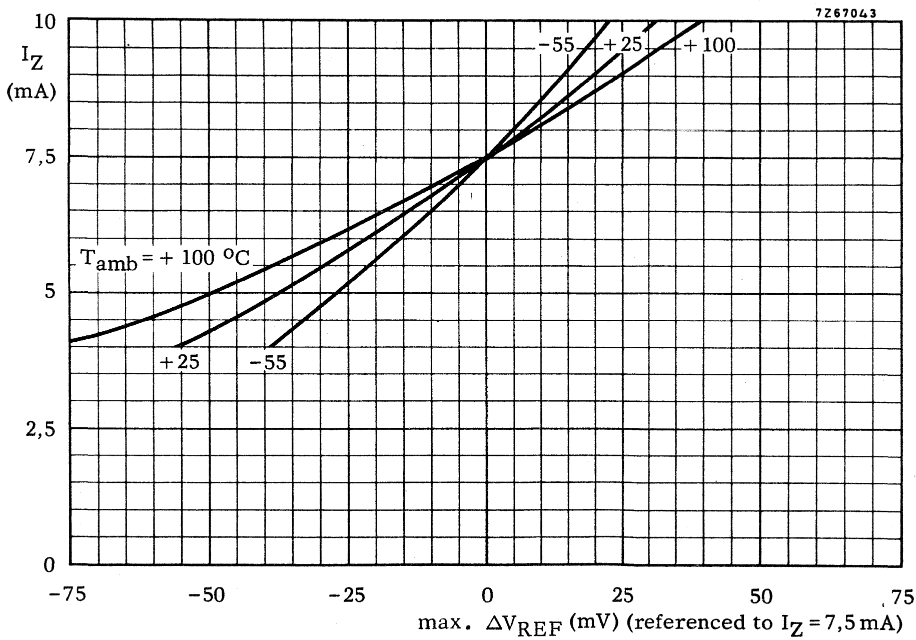
1N821	S_z	± 0,01	%/°C
1N823	S_z	± 0,005	%/°C
1N825	S_z	± 0,002	%/°C
1N827	S_z	± 0,001	%/°C
1N829	S_z	± 0,0005	%/°C

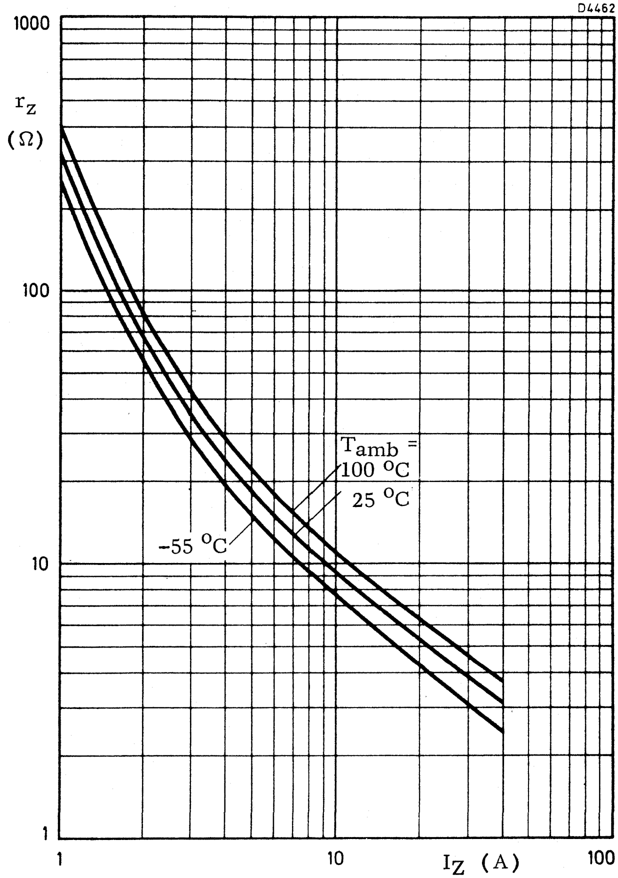
Differential resistance at I_Z = 7,5 mA	r_z	<	15	Ω

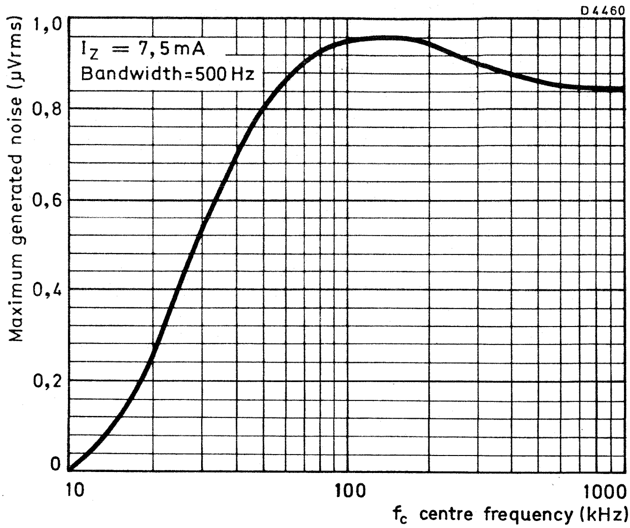
1) For accuracy of I_Z see graphs on pages 3 and 5.

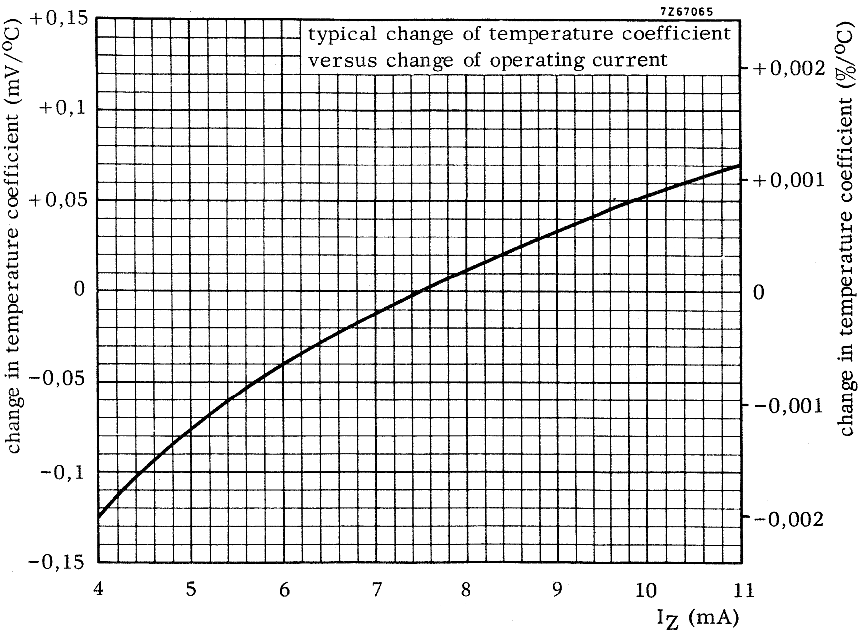
2) All reference diodes are characterised by the "box method". This guarantees a maximum voltage excursion (ΔV_{REF}) over the specified temperature range, at the specified test current (I_Z), verified by the tests at indicated ambient temperature points within the range. The temperature coefficient, therefore is given only as a reference.


D4459
ΔV_{REF} maximum voltage change (mV) (Referenced to −55°C)
I_Z = 7,5 mA
1N827
1N823
1N825
1N821
1N829
1N825
1N827
1N829
1N829
1N827
1N825
1N821
1N823
1N821
1N823
T_{amb}(°C)
T_{amb}(°C)


7Z67043
I_Z (mA)
−55
+25
+100
T_{amb} = + 100 °C
+25
−55
max. ΔV_{REF} (mV) (referenced to I_Z = 7,5 mA)


D4462
1000
r_Z
(Ω)
100
10
1
1
10
100
I_Z (A)
T_{amb} =
100 °C
25 °C
−55 °C


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 change of operating 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)

Tuner diodes

Variable capacitance diodes

Band switching diodes

TYPE SELECTION

Tuner diodes

Variable capacitance diodes	type	case	V_R (V)	C_d (pF)	at V_R (V)		r_D (Ω)	at C_d (pF)
a.f.c. in radio and television	BB117	SOD-23	20	>2,2 <4	15	$\frac{C_d(V_R = 4\ V)}{C_d(V_R = 15\ V)} > 2$	<1,2	9
	BA102	DO-7	20	>20 <45	4	$\frac{C_d(V_R = 4\ V)}{C_d(V_R = 10\ V)} > 1,4$	<3	[1]
radio a.m. long, medium and short wave	BB113 (triple)	SOT-60	32	<13	30	$\frac{C_d(V_R = 1\ V)}{C_d(V_R = 30\ V)} > 1,75$	<4	200
radio f.m.	BB104B	SOT-33	30	>37 <42	3	$\frac{C_d(V_R = 3\ V)}{C_d(V_R = 30\ V)} = 2,65$	<0,4	38
	BB104G	SOT-33	30	>34 <39	3	$\frac{C_d(V_R = 3\ V)}{C_d(V_R = 30\ V)} = 2,65$	<0,4	38
	BB110B	SOD-23	30	>29 <33	3	$\frac{C_d(V_R = 3\ V)}{C_d(V_R = 30\ V)} = 2,65$	<0,4	30
	BB110G	SOD-23	30	>27 <31	3	$\frac{C_d(V_R = 3\ V)}{C_d(V_R = 30\ V)} = 2,65$	<0,4	30
television v.h.f. band I to 88 MHz band III to 230 MHz	3-BB106 4-BB106	SOD-23	28	>4 <5,6	25	$\frac{C_d(V_R = 3\ V)}{C_d(V_R = 25\ V)} > 4,5$	<0,6	25
band I to 88 MHz band III to 230 MHz	12-BB105G	SOD-23	28	>1,8 <2,8	25	$\frac{C_d(V_R = 3\ V)}{C_d(V_R = 25\ V)} > 4$	<1,2	9
television u.h.f. band IV and V to 790 MHz	12-BB105A	SOD-23	28	>2,3 <2,8	25	$\frac{C_d(V_R = 3\ V)}{C_d(V_R = 25\ V)} > 4$	<0,8	9
band IV and V to 860 MHz	12-BB105B	SOD-23	28	>2,0 <2,3	25	$\frac{C_d(V_R = 3\ V)}{C_d(V_R = 25\ V)} > 4,5$	<0,8	9
Band switching diode							r_D (Ω)	at I_F (mA)
switching	BA182	SOD-23	35	<1	20	-	<0,7	5

[1] At V_R = 4 V

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

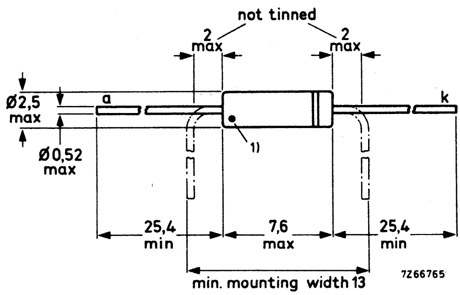
SILICON VARIABLE CAPACITANCE DIODE

Silicon variable capacitance diode in subminiature all-glass DO-7 construction 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
Capacitance ratio	$\frac{C_d\ (V_R = 4\ V)}{C_d\ (V_R = 10\ V)}$	>	1.4	
Diode capacitance at f = 0.5 MHz; $V_R = 4$ V	C_d		20 to 45	pF
Series resistance at $V_R = 4$ V	r_D	<	3	Ω

MECHANICAL DATA Dimensions in mm

DO-7



1) Coloured dot indicating selection on C_d.

The white band indicates the cathode side

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

THERMAL RESISTANCE

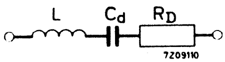
From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.5	°C/mW

→ CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Reverse current at T_j = 80 °C					
V_R = 20 V		I_R	<	5	μA
Diode capacitance					
V_R = 4 V; f = 0.5 MHz	BA102	C_d		20 to 45	pF
Selections :	BA102 white	C_d		20 to 25	pF
	BA102 yellow	C_d		23 to 31	pF
	BA102 blue	C_d		29 to 38	pF
	BA102 green	C_d		36 to 45	pF
Capacitance ratio at f ≤ 300 MHz		$\frac{C_d (V_R = 4\text{ V})}{C_d (V_R = 10\text{ V})}$	>	1.4	
Series resistance at V_R = 4 V		r_D	typ.	1.7	Ω
			<	3	Ω

Simplified equivalent circuit



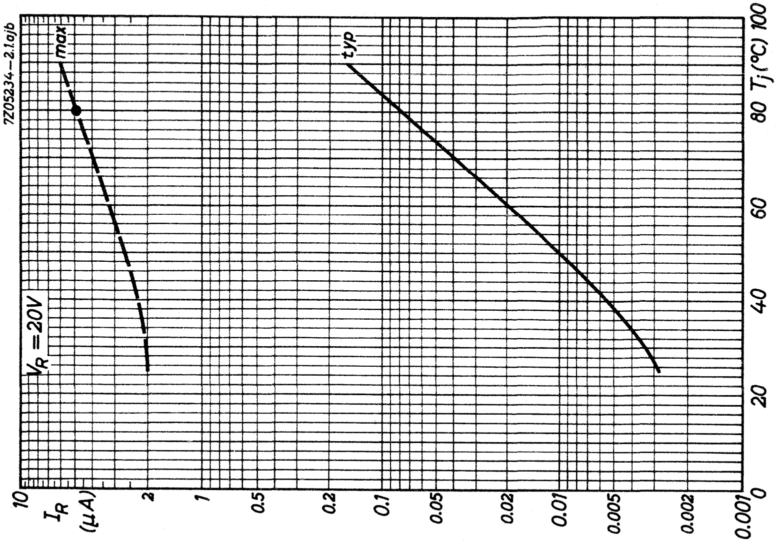
L = lead inductance ≈ 6 nH
r_D = series resistance
C_d = diode capacitance (see page 3)

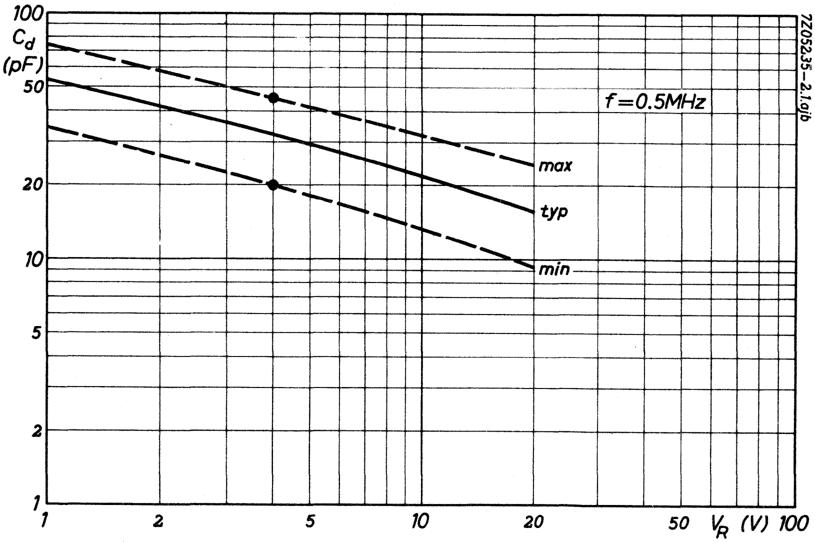
frequency independent up to f = 300 MHz

These data apply at a distance between the two measuring points of 10 mm.

APPLICATION INFORMATION

Application information available on request.


7Z05234-2.1.aib
max
typ
V_R = 20V
T_j (°C)
100
80
60
40
20
0
10
I_R (μA)
2
1
0.5
0.2
0.1
0.05
0.02
0.01
0.005
0.002
0.001

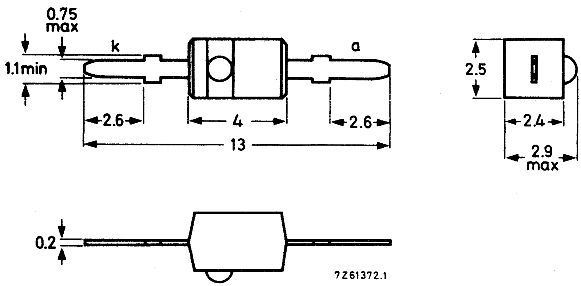

100
C_d (pF)
50
20
10
5
2
1
f = 0.5MHz
max
typ
min
7Z05235-2.1.aib
1
2
5
10
20
50
V_R (V)
100

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	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



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) [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

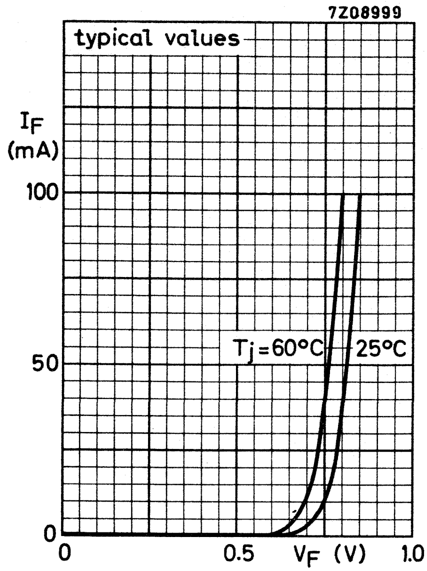
Mounting

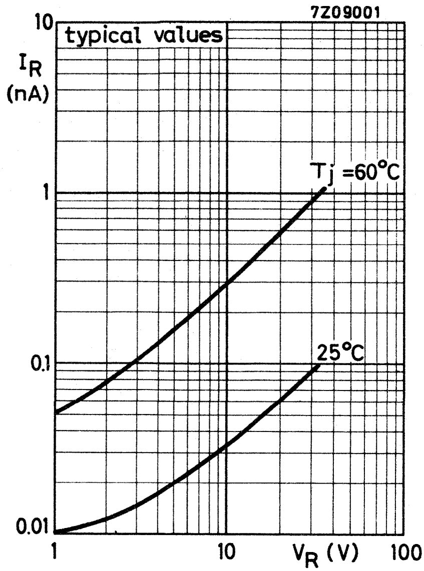
The leads must be bent with a radius of not less than 0.5 mm near the seal. (This can be done by hand if care is taken to exert no pulling force).

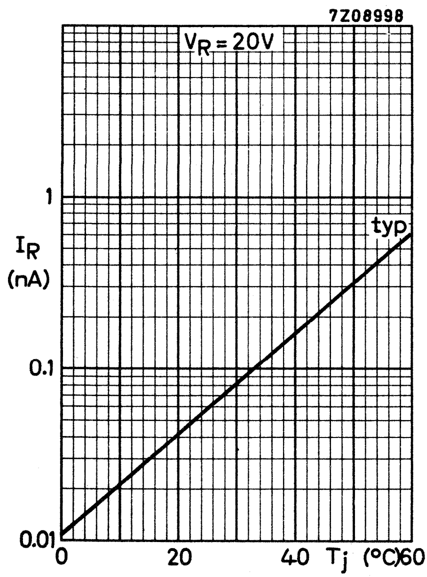
Soldering

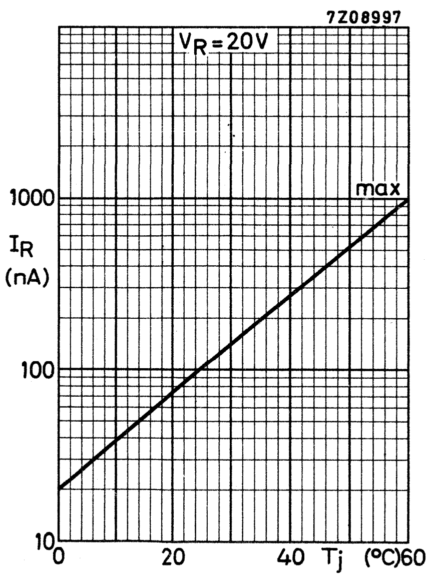
At a maximum iron or solder temperature of 300 °C, the maximum permissible soldering time is 3 seconds. The soldering spot may be at any distance from the seal. During soldering, care must be taken that the plastic body does not come into contact with any temperature higher than 125 °C.

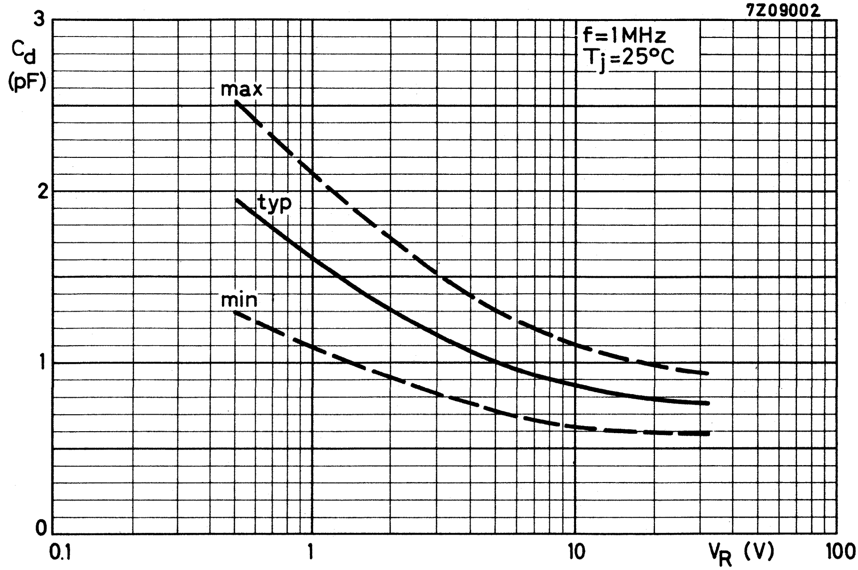
[1] Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

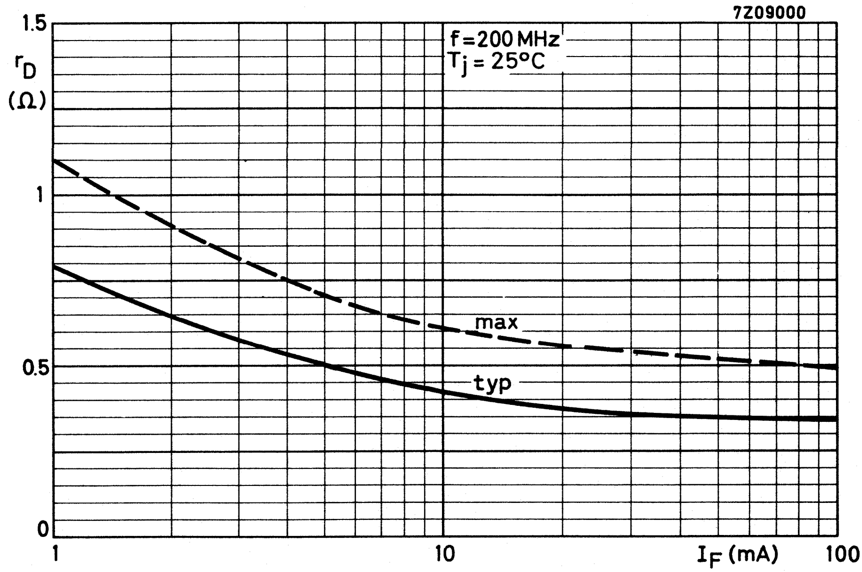

7Z08999
typical values
I_F (mA)
100
50
0
T_j = 60°C
25°C
0
0.5
V_F (V)
1.0


7Z09001
typical values
10
I_R (nA)
1
0.1
0.01
T_j = 60°C
25°C
1
10
V_R (V)
100


7Z08998
V_R = 20V
1
I_R (nA)
0.1
0.01
typ
0
20
40
T_j (°C)
60


7Z08997
V_R = 20V
1000
I_R (nA)
100
10
max
0
20
40
T_j (°C)
60


7Z09002
C_d (pF)
f=1MHz
T_j=25°C
max
typ
min
3
2
1
0
0.1
1
10
V_R (V)
100


7Z09000
r_D (Ω)
f=200 MHz
T_j = 25°C
max
typ
1.5
1
0.5
0
1
10
I_F (mA)
100

SILICON PLANAR
VARIABLE CAPACITANCE DOUBLE DIODES

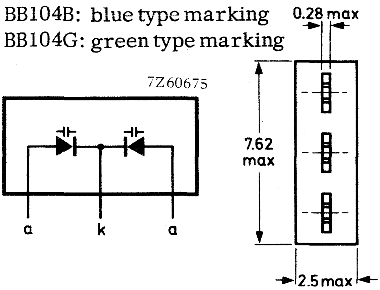
The BB104B and BB104G are variable capacitance double diodes with common cathode in a plastic envelope, primarily intended for electronic tuning in band II (f.m.). They are recommended for stages where large signals occur (e.g. oscillator circuits).

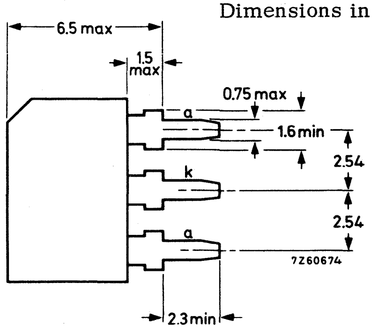
QUICK REFERENCE DATA				
FOR EACH DIODE				
Continuous reverse voltage	V_R	max.	30	V
Junction temperature	T_j	max.	100	°C
Reverse current at V_R = 30 V	I_R	<	20	nA
Diode capacitance at f = 1 MHz		BB104G	BB104B	
V_R = 3 V	C_d	34-39	37-42	pF
Capacitance ratio	$\frac{C_d\ (V_R = 3\ V)}{C_d\ (V_R = 30\ V)}$	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	Ω
		<	0.4	Ω

MECHANICAL DATA

Dimensions in mm

BB104B: blue type marking
BB104G: green type marking





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	^oC
Storage temperature	T_{stg}		-55 to +100	^oC

THERMAL RESISTANCE

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

CHARACTERISTICS

Reverse current at V_R = 30 V	I_R	typ.	1	nA
		<	20	nA
V_R = 30 V; T_j = 60 ^oC	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	%/^oC

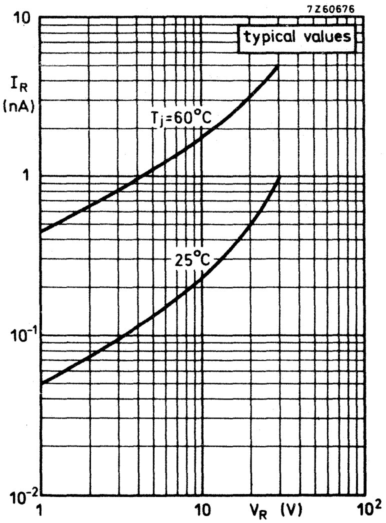
MOUNTING AND SOLDERING INSTRUCTIONS

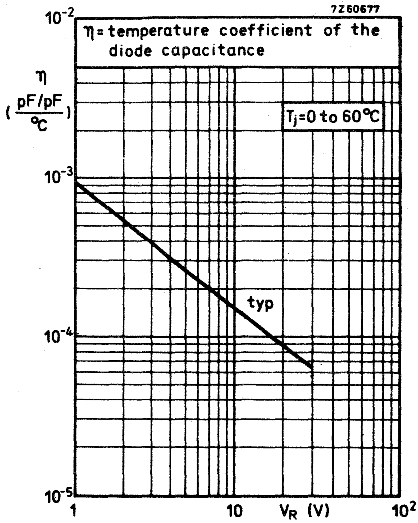
Mounting

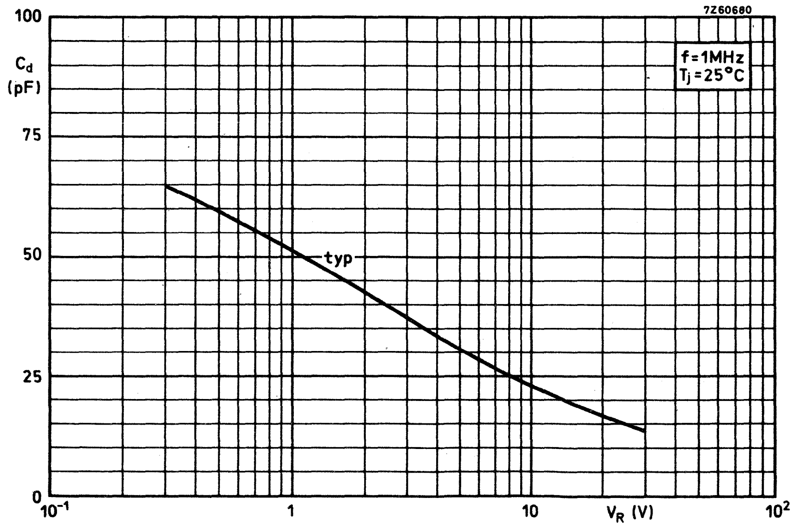
The leads must not be bent with a radius of less than 0.5 mm near the seal. (This can be done by hand if care is taken to exert no pulling force).

Soldering

At a maxium iron or solder temperature of 300 ^oC, 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 ^oC.


7Z60676
typical values
I_R (nA)
T_j=60°C
25°C
V_R (V)
10
1
10^{-1}
10^{-2}
1
10
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
f=1MHz
T_j=25°C
C_d (pF)
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 to 28 V.

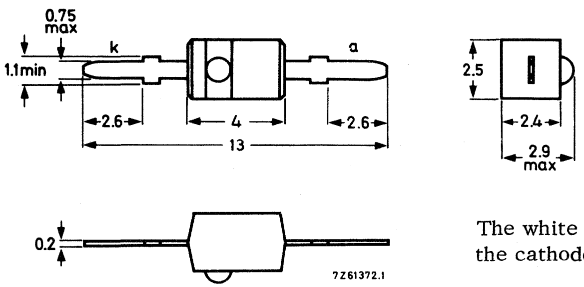
QUICK REFERENCE DATA

			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

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, serverity 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

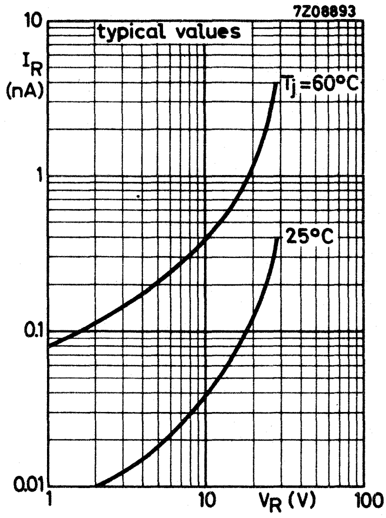
From junction to ambient in free air $R_{th\ j\text{-}a}$ = 0.4 °C/mW

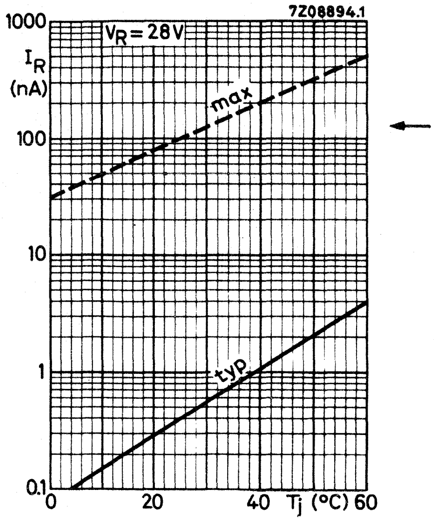
CHARACTERISTICS T_j = 25 °C unless otherwise specified

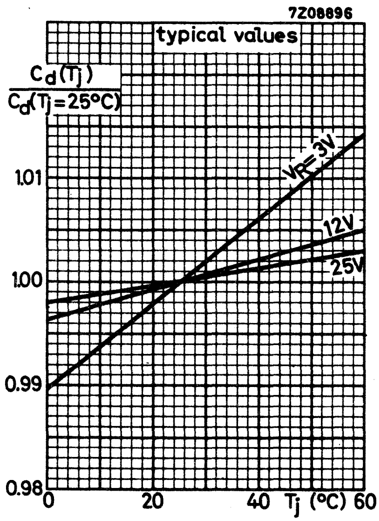
			BB105A	BB105B	BB105G	
Reverse current						
V_R = 28 V	I_R	<	100	100	100	nA
V_R = 28 V; T_j = 60 °C	I_R	<	0.5	0.5	0.5	μA
Diode capacitance at f = 1 MHz						
V_R = 1 V	C_d	typ.	17	17.5	17.5	pF
V_R = 3 V	C_d	typ.	11.5	11.5	11.5	pF
V_R = 25 V	C_d	>	2.3	2.0	1.8	pF
		<	2.8	2.3	2.8	pF
Capacitance ratio at 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

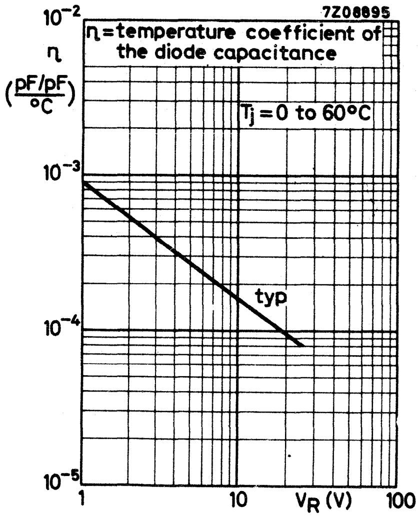
SOLDERING AND MOUNTING NOTES

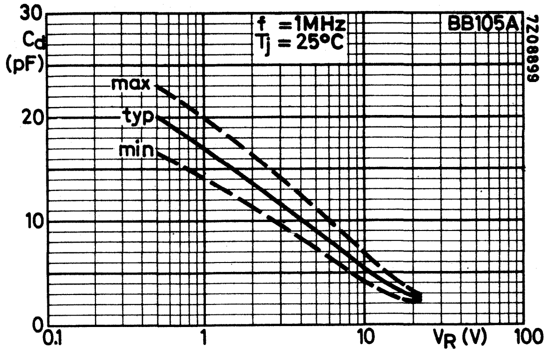
1. Soldered joints may be at any distance from the seal.
2. The maximum permissible temperature of the soldering iron or bath is 300 °C; it must be in contact with the joint for no more than 3 seconds.
3. Avoid hot spots due to handling or mounting; the body of the device must not come into contact with 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.

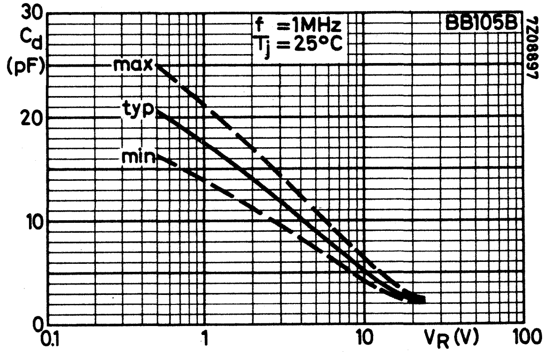

7Z08893
typical values
I_R (nA)
10
1
0.1
0.01
T_j=60°C
25°C
1
10
V_R (V)
100

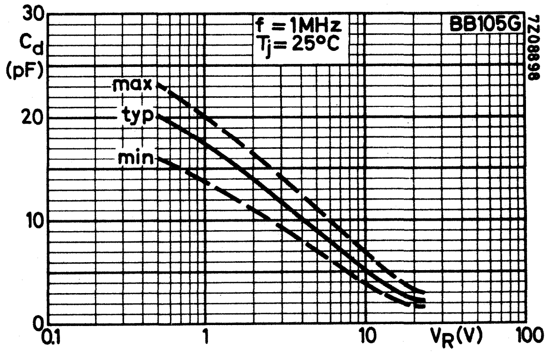

7Z08894.1
V_R=28V
I_R (nA)
1000
100
10
1
0.1
max
typ
0
20
40
T_j (°C)
60


7Z08896
typical values
$\frac{C_d(T_j)}{C_d(T_j=25°C)}$
1.01
1.00
0.99
0.98
V_R=3V
12V
25V
0
20
40
T_j (°C)
60


7Z08895
η=temperature coefficient of the diode capacitance
η ($\frac{pF/pF}{°C}$)
10^{-2}
10^{-3}
10^{-4}
10^{-5}
T_j=0 to 60°C
typ
1
10
V_R (V)
100


30
Cd
(pF)
20
10
0
max
typ
min
f = 1MHz
Tj = 25°C
BB105A
7208899
0.1
1
10
VR (V)
100


30
Cd
(pF)
20
10
0
max
typ
min
f = 1MHz
Tj = 25°C
BB105B
7208897
0.1
1
10
VR (V)
100


30
Cd
(pF)
20
10
0
max
typ
min
f = 1MHz
Tj = 25°C
BB105G
7208898
0.1
1
10
VR (V)
100

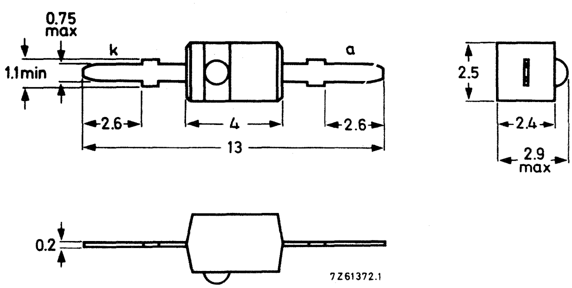
SILICON PLANAR VARIABLE CAPACITANCE DIODE

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	Ω
		<	0.6	Ω

MECHANICAL DATA Dimensions in mm



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	°C
Junction temperature	T_j	max.	60	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	400	°C/W

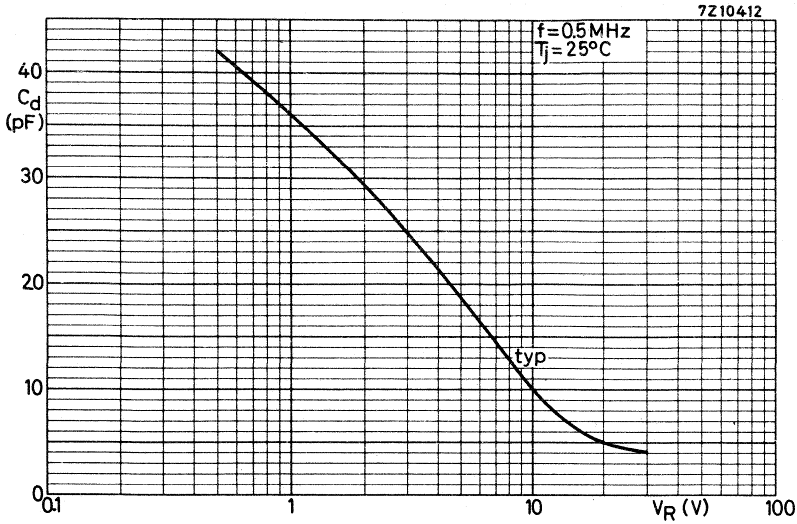
CHARACTERISTICS

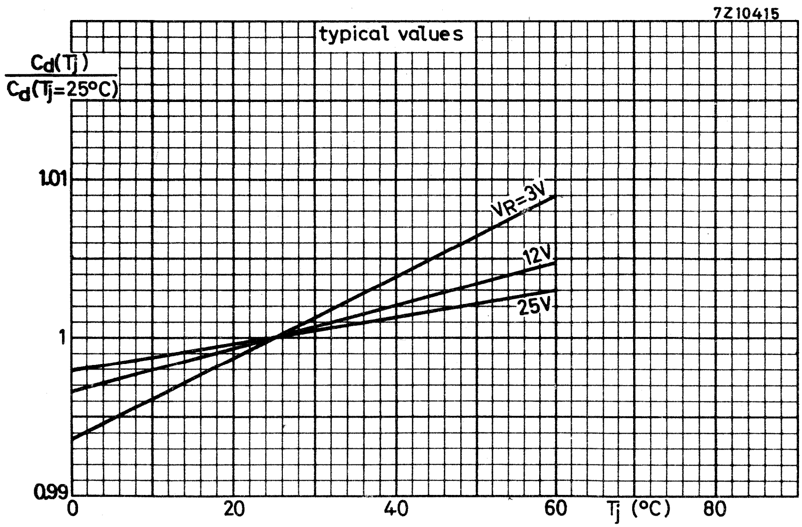
Reverse current at V_R = 28 V; T_j = 25 °C	I_R	<	50	nA
V_R = 28 V; T_j = 60 °C	I_R	<	200	nA
Series resistance at f = 200 MHz				
V_R = that value at which C_d = 25 pF	r_D	typ.	0.4	Ω
		<	0.6	Ω
Diode capacitance at f = 0.5 MHz				
V_R = 3 V	C_d	>	20	pF
V_R = 25 V	C_d		4 to 5.6	pF

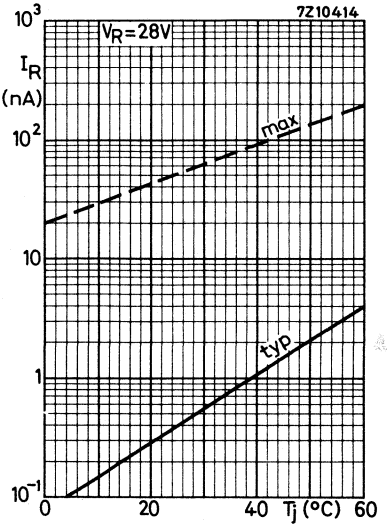
Capacitance ratio at f = 0.5 MHz $\frac{C_d(V_R = 3\ V)}{C_d(V_R = 25\ V)}$ 4.5 to 6.0

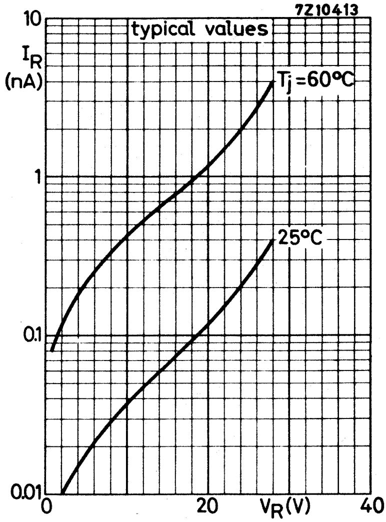
SOLDERING AND MOUNTING NOTES

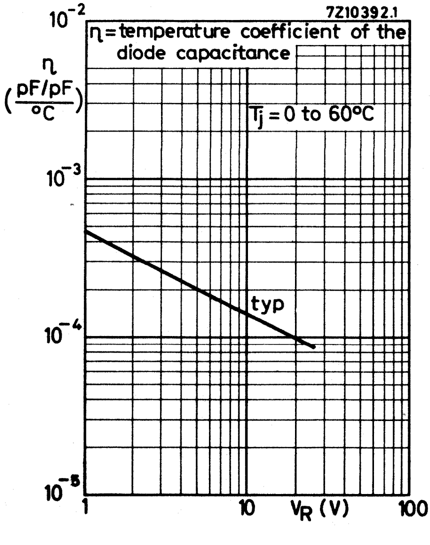
1. Soldered joints may be at any distance from the seal.
2. The maximum permissible temperature of the soldering iron or bath is 300 °C; it must be in contact with the joint for no more than 3 seconds.
3. Avoid hot spots due to handling or mounting; the body of the device must not come into contact with 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.


7Z10412
f=0.5MHz
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)
max
typ
T_j (°C)


7Z10413
typical values
I_R (nA)
T_j = 60°C
25°C
V_R(V)


7Z10392.1
η = temperature coefficient of the diode capacitance
η (pF/pF / °C)
T_j = 0 to 60°C
typ
V_R (V)

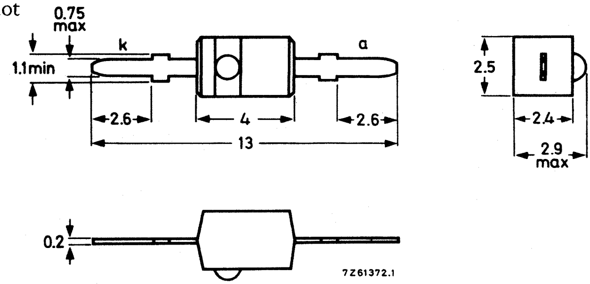
SILICON PLANAR VARIABLE CAPACITANCE DIODES

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		BB110G	BB110B	
V_R = 3 V	C_d	27 - 31	29 - 33	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		typ.	0.3	Ω
V_R is that value at which C_d = 30 pF	r_D	<	0.4	Ω

MECHANICAL DATA Dimensions in mm

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	^oC
Junction temperature	T_j	max.	100	^oC

THERMAL RESISTANCE

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

CHARACTERISTICS T_j = 25 ^oC unless otherwise specified

Reverse current at V_R = 30 V	I_R	typ.	1	nA
		<	20	nA
V_R = 30 V; T_j = 60 ^oC	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 = 30 V	η	typ.	0.04	$\%/^oC$

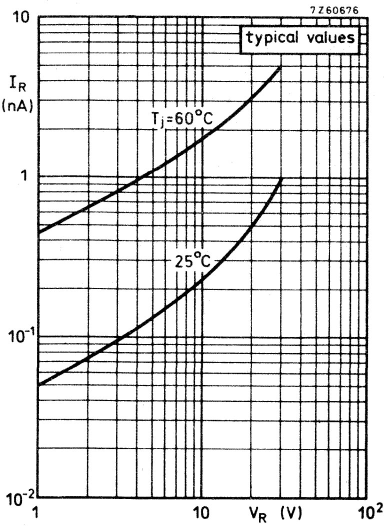
MOUNTING AND SOLDERING INSTRUCTIONS

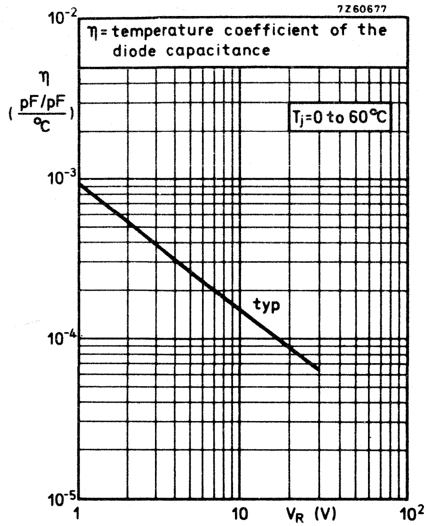
Mounting

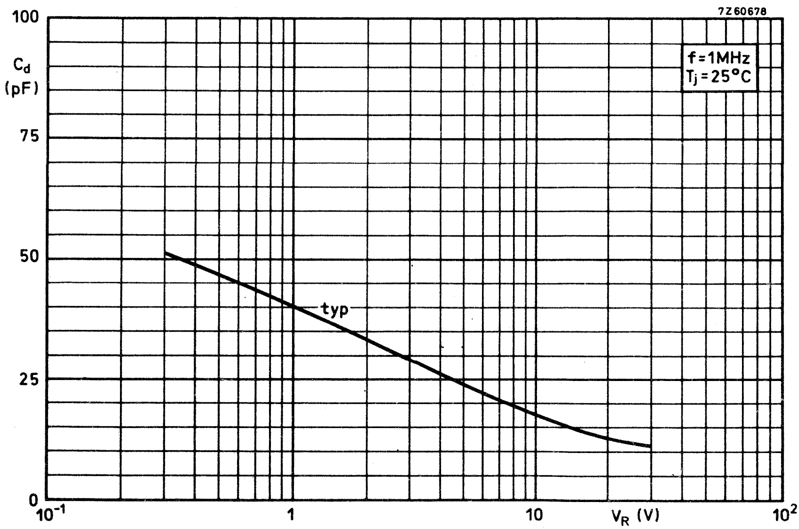
The leads must not be bent with a radius of less than 0.5 mm near the seal. (This can be done by hand if care is taken to exert no pulling force).

Soldering

At a maximum iron or solder temperature of 300 ^oC, 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 ^oC.


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

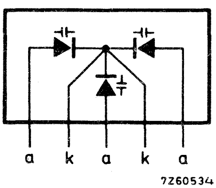
Silicon planar variable capacitance triple diode in a plastic envelope.
It is intended for electronic tuning of LW, MW and SW-band of a.m. radio receivers.

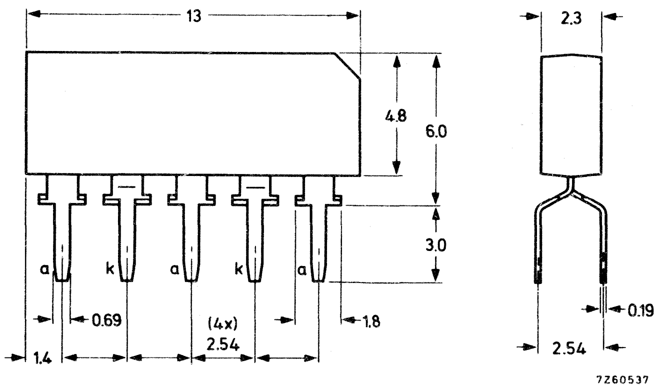
QUICK REFERENCE DATA

Each diode				
Continuous reverse voltage	V_R	max.	32	V
Forward current (d.c.)	I_F	max.	50	mA
Junction temperature	T_j	max.	85	°C
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_s	<	4	Ω

MECHANICAL DATA

Dimensions in mm





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 +85		^oC
Junction temperature	T_j	max.	85	^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:

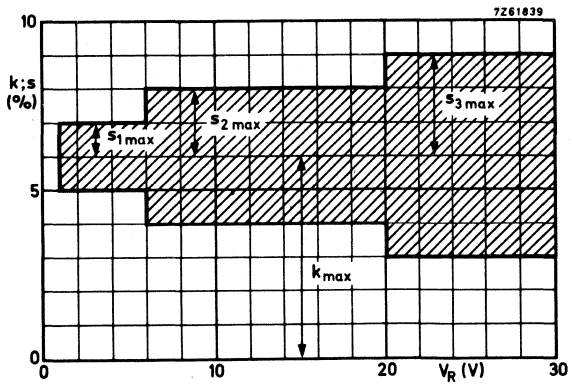
$$s = \left|\frac{C_m - C_n}{C_n}\right|_{V_R} \times 100\% - k$$

with the following values:

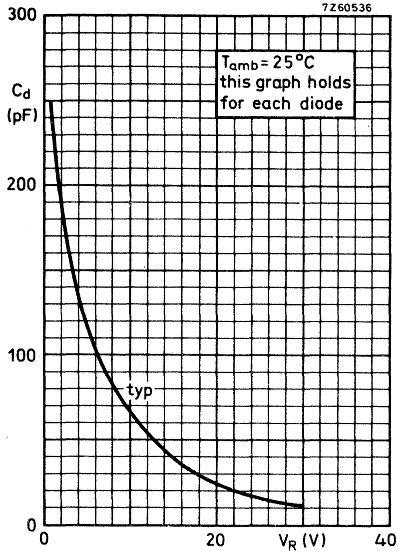
$|s_1| \leq 1\%$ at $1\ V < V_R \leq 6\ V$

$|s_2| \leq 2\%$ 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
300
200
100
0
C_d
(pF)
T_{amb} = 25°C
this graph holds
for each diode
typ
0
20
V_R (V)
40

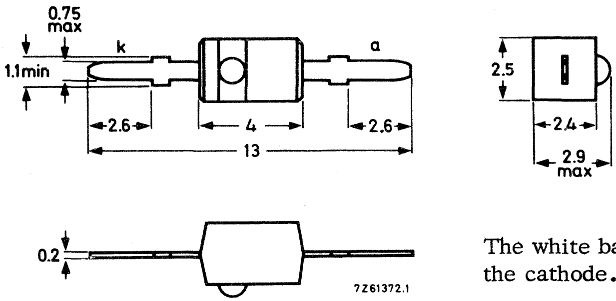
SILICON PLANAR VARIABLE CAPACITANCE DIODE

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	$\frac{C_d(V_R = 4\text{ V})}{C_d(V_R = 15\text{ V})}$		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



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 $\frac{C_d(V_R = 4\ V)}{C_d(V_R = 15\ V)}$ 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 except for those marked with an asterisk.

Detailed information will be supplied on request.

AAY11
*BA114
BZY56 to 63
OA70
OA72
OA73
OA79
OA81
OA85
OA92
OAZ200 to 207

INDEX OF TYPE NUMBERS

The inclusion of a type number in this publication does not necessarily imply its availability.

Type No.	Part	Section	Type No.	Part	Section	Type No.	Part	Section
AA119	1b	GePC	AF114	3	HF	ASZ15	2	P
AAY21	1b	GePC	AF115	3	HF	ASZ16	2	P
AAY30	1b	GeGB	AF116	3	HF	ASZ17	2	P
AAY32	1b	GeGB	AF117	3	HF	ASZ18	2	P
AAY39	4	Mw	AF118	3	HF	ASZ20	3	Sw
AAY39A	4	Mw	AF121	3	HF	ASZ21	3	Sw
AAY59	4	Mw	AF124	3	HF	BA100	1b	SiA
AAZ13	1b	GeGB	AF125	3	HF	BA102	1b	T
AAZ15	1b	GeGB	AF126	3	HF	BA114	1b	SiA
AAZ17	1b	GeGB	AF127	3	HF	BA145	1a	R
AAZ18	1b	GeGB	AF139	3	HF	BA148	1a	R
AC125	2	LF	AF178	3	HF	BA182	1b	T
AC126	2	LF	AF239	3	HF	BA216	1b	SiW
AC127	2	LF	AF239S	3	HF	BA217	1b	SiW
AC127/01	2	LF	AF240	3	HF	BA218	1b	SiW
AC128	2	LF	AF267	3	HF	BA219	1b	SiW
AC128/01	2	LF	AFY16	3	HF	BA220	1b	SiW
AC132	2	LF	AFY19	4	Tr	BA221	1b	SiW
AC132/01	2	LF	AFY40	3	HF	BA222	1b	SiW
AC172	2	LF	AFZ12	3	HF	BA314	1b	SiW
AC187	2	LF	ASY26	3	Sw	BA315	1b	SiW
AC187/01	2	LF	ASY27	3	Sw	BA316	1b	SiW
AC188	2	LF	ASY28	3	Sw	BA317	1b	SiW
AC188/01	2	LF	ASY29	3	Sw	BA318	1b	SiW
AD149	2	P	ASY73	3	Sw	BAV10	1b	SiW
AD161	2	P	ASY74	3	Sw	BAV18	1b	SiW
AD162	2	P	ASY75	3	Sw	BAV19	1b	SiW
AEY13	4	Mw	ASY76	3	Sw	BAV20	1b	SiW
AEY15	4	Mw	ASY77	3	Sw	BAV21	1b	SiW
AEY16	4	Mw	ASY80	3	Sw	BAV40	1b	Sp

GeGB = Germanium gold bonded diodes
GePC = Germanium point contact diodes
HF = High frequency transistors
LF = Low frequency transistors
Mw = Microwave devices
P = Low frequency power transistors
R = Rectifier diodes
SiA = Silicon alloyed diodes
SiW = Silicon whiskerless diodes
Sp = Special diodes
Sw = Switching transistors
T = Tuner diodes
Tr = Transmitting transistors

Type No.	Part	Section	Type No.	Part	Section	Type No.	Part	Section
BAV41	1b	Sp	BC149	2	LF	BCY10	2	LF
BAV42	1b	Sp	BC157	2	LF	BCY11	2	LF
BAV43	1b	Sp	BC158	2	LF	BCY12	2	LF
BAV45	1b	Sp	BC159	2	LF	BCY30	2	LF
BAW56	4	Mm	BC177	2	LF	BCY31	2	LF
BAW62	1b	SiW	BC178	2	LF	BCY32	2	LF
BAW95D	4	Mw	BC179	2	LF	BCY33	2	LF
BAW95E	4	Mw	BC200	2	LF	BCY34	2	LF
BAW95F	4	Mw	BC237	2	LF	BCY38	2	LF
BAX12	1b	SiW	BC238	2	LF	BCY39	2	LF
BAX13	1b	SiW	BC239	2	LF	BCY40	2	LF
BAX14	1b	SiW	BC307	2	LF	BCY54	2	LF
BAX15	1b	SiW	BC308	2	LF	BCY55	4	Dual
BAX16	1b	SiW	BC309	2	LF	BCY56	2	LF
BAX17	1b	SiW	BC327	2	LF	BCY57	2	LF
BAX18	1	SiW	BC328	2	LF	BCY58	2	LF
BAY66	4	Mw	BC337	2	LF	BCY59	2	LF
BAY96	4	Mw	BC338	2	LF	BCY70	2	LF
BB104B	1b	T	BCW29	4	Mm	BCY71	2	LF
BB104G	1b	T	BCW30	4	Mm	BCY72	2	LF
12-BB105A	1b	T	BCW31	4	Mm	BCY87	4	Dual
12-BB105B	1b	T	BCW32	4	Mm	BCY88	4	Dual
12-BB105G	1b	T	BCW33	4	Mm	BCY89	4	Dual
3-BB106	1b	T	BCW46	2	LF	BCZ10	2	LF
4-BB106	1b	T	BCW47	2	LF	BCZ11	2	LF
BB110B	1b	T	BCW48	2	LF	BCZ12	2	LF
BB110G	1b	T	BCW49	2	LF	BD115	2	P
BB113	1b	T	BCW56	2	LF	BD124	2	P
BB117	1b	T	BCW57	2	LF	BD131	2	P
BC107	2	LF	BCW58	2	LF	BD132	2	P
BC108	2	LF	BCW59	2	LF	BD133	2	P
BC109	2	LF	BCW69	4	Mm	BD135	2	P
BC146	2	LF	BCW70	4	Mm	BD136	2	P
BC147	2	LF	BCW71	4	Mm	BD137	2	P
BC148	2	LF	BCW72	4	Mm	BD138	2	P

Dual = Dual transistors
LF = Low frequency transistors
Mm = Microminiature devices for thick-and thin-film circuits
Mw = Microwave devices
P = Low frequency power transistors
SiW = Silicon whiskerless diodes
Sp = Special diodes
T = Tuner diodes

Defl = Deflection transistors
FET = Field effect transistors
HF = High frequency transistors
Mm = Microminiature devices for thick- and thin-film circuits
P = Low frequency power transistors
PhDT = Photodiodes and phototransistors
Sw = Switching transistors
Thyr = Thyristors, diacs, triacs
Tr = Transmitting transistors

Defl = Deflection transistors
FET = Field effect transistors
Mm = Microminature devices for thick- and thin-film circuits
Mw = Microwave devices
R = Rectifier diodes
Sw = Switching transistors
Thyr = Thyristors, diacs, triacs
TS = Transient suppressor diodes
Vref = Voltage reference diodes
Vreg = Voltage regulator diodes

GeGB = Germanium gold bonded diodes
GePC = Germanium point contact diodes
I = Infrared devices
Ign = Ignistors
L = Light emitting devices
Mw = Microwave devices
PhC = Photoconductive devices
PhDT = Photodiodes and phototransistors
SiA = Silicon alloyed diodes
SiW = Silicon whiskerless diodes
St = Rectifier stacks
Sw = Switching transistors
Vref = Voltage reference diodes
Vreg = Voltage regulator diodes

FET = Field effect transistors
HF = High frequency transistors
LF = Low frequency transistors
Mw = Microwave devices
P = Low frequency power transistors
SiW = Silicon whiskerless diodes
Sw = Switching transistors
Tr = Transmitting transistors
Vreg = Voltage regulator diodes

A = Accessories
DH = Diecast heatsinks
FET = Field effect transistors
HE = Heatsink extrusions
HF = High frequency transistors
I = Infrared devices
LF = Low frequency transistors
P = Low frequency power transistors
Tr = Transmitting transistors
WH = Water cooled heatsinks

General	
Germanium	small signal diodes (point contact)
	(gold bonded)
Silicon	small signal diodes (alloyed)
	(whiskerless)
	special diodes
	voltage regulator diodes
	voltage reference diodes
	tuner diodes

Printed in The Netherlands 9399 251 20301