

FAST SOFT-RECOVERY RECTIFIER DIODES

Silicon double-diffused rectifier diodes in plastic envelopes. They are intended for use in chopper applications as well as in switched-mode power supplies, as efficiency diodes and scan rectifiers in television receivers. The devices feature non-snap-off characteristics. Normal and reverse polarity types are available.

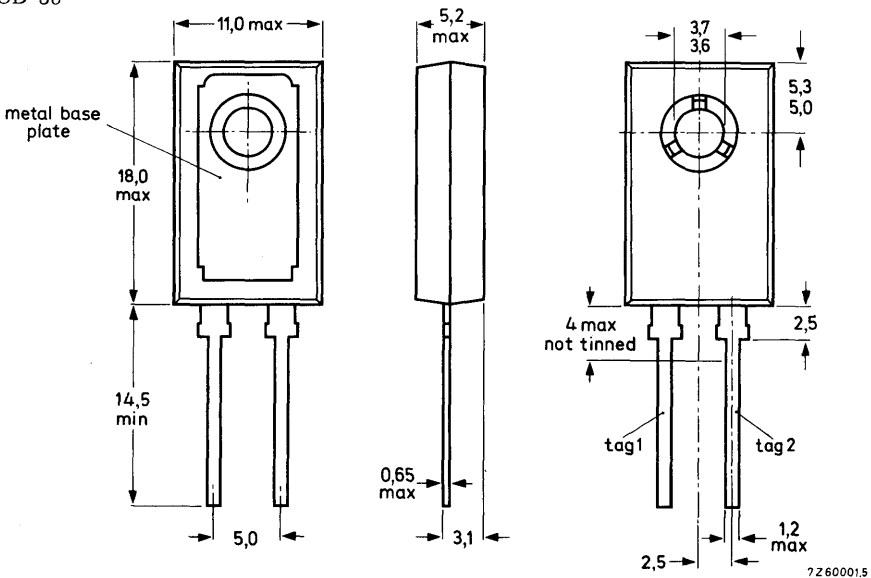
QUICK REFERENCE DATA

		BYX71-350(R)		600(R)	
		max.	350	600	
Repetitive peak reverse voltage	V_{RRM}				V
Average forward current	$I_{F(AV)}$	max.		7	A
Non-repetitive peak forward current	I_{FSM}	max.		60	A
Reverse recovery time	t_{rr}	<		450	ns

MECHANICAL DATA (see also page 2)

Dimensions in mm

SOD-38



The exposed metal base-plate is directly connected to tag 1.

MECHANICAL DATA (continued)

Net mass: 2,5 g

Recommended diameter of fixing screw: 3,5 mm

Torque on screw

when using washer and heatsink compound: min. 0,95 Nm (9,5 kg cm)

max. 1,5 Nm (15 kg cm)

Accessories:

supplied with the device: 56355 (washer)

available on request: 56316 (mica insulating washer)

POLARITY OF CONNECTIONS

	BYX71-350 and BYX71-600	BYX71-350R and BYX71-600R
Base-plate :	cathode	anode
Tag 1 :	cathode	anode
Tag 2 :	anode	cathode

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

<u>Voltages</u>		BYX71-350(R)		600(R)	
Continuous reverse voltage	V_R	max.	300	500	V
Working reverse voltage	V_{RW}	max.	300	500	V
Repetitive peak reverse voltage ($\delta \leq 0,01$)	V_{RRM}	max.	350	600	V
Non-repetitive peak reverse voltage ($t \leq 10$ ms)	V_{RSM}	max.	350	600	V
<u>Currents</u>					
Average on-state current assuming zero switching losses					
(averaged over any 20 ms period)					
square wave: $\delta = 0,5$; up to $T_{mb} = 85^\circ\text{C}$	$I_{F(AV)}$	max.	7	A	
without heatsink at $T_{amb} = 50^\circ\text{C}$	$I_{F(AV)}$	max.	1,4	A	
sinusoidal: at $T_{mb} = 85^\circ\text{C}$	$I_{F(AV)}$	max.	6,5	A	
R.M.S. forward current	$I_{F(RMS)}$	max.	10	A	
Repetitive peak forward current	I_{FRM}	max.	25	A	
Non-repetitive peak forward current					
half sine wave; $t = 10$ ms; $T_j = 150^\circ\text{C}$ prior to surge	I_{FSM}	max.	60	A	
square pulse; $t = 5$ ms; $T_j = 150^\circ\text{C}$ prior to surge	I_{FSM}	max.	60	A	
Rate of change of commutation current	$-\frac{dI}{dt}$	max.	50	A/ μs	
<u>Temperatures</u>					
Storage temperature	T_{stg}	-55 to +125		$^\circ\text{C}$	
Junction temperature	T_j	max.	150	$^\circ\text{C}$	

THERMAL RESISTANCE

From junction to mounting base

$$R_{th\ j-mb} = 6,5\ ^\circ C/W$$

Transient thermal impedance; $t = 1\ ms$

$$Z_{th\ j-mb} = 0,3\ ^\circ C/W$$

Influence of mounting method

1. Heatsink mounted

From mounting base to heatsink

- with heatsink compound
- with heatsink compound and 56316 mica washer
- without heatsink compound
- without heatsink compound; with 56316 mica washer

$$R_{th\ mb-h} = 1,5\ ^\circ C/W$$

$$R_{th\ mb-h} = 2,7\ ^\circ C/W$$

$$R_{th\ mb-h} = 2,7\ ^\circ C/W$$

$$R_{th\ mb-h} = 5\ ^\circ C/W$$

2. Free air operation

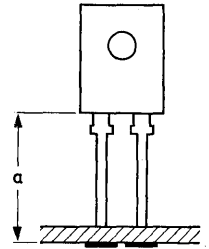
The quoted values of $R_{th\ j-a}$ should be used only when no other leads run to the tie-points.

From junction to ambient in free air
mounted on a printed circuit board
at a = maximum lead length
and with a copper laminate

- $> 1\ cm^2$
- $< 1\ cm^2$

$$R_{th\ j-a} = 50\ ^\circ C/W$$

$$R_{th\ j-a} = 55\ ^\circ C/W$$



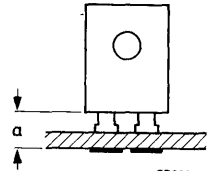
7Z62315.1

at a lead-length $a = 3\ mm$
and with a copper laminate

- $> 1\ cm^2$
- $< 1\ cm^2$

$$R_{th\ j-a} = 55\ ^\circ C/W$$

$$R_{th\ j-a} = 60\ ^\circ C/W$$



7Z62314

SOLDERING AND MOUNTING NOTES

1. Soldered joints must be at least 2,5 mm from the seal.
2. The maximum permissible temperature of the soldering iron or bath is 270 °C; contact with the joint must not exceed 3 seconds.
3. The device should not be immersed in oil, and few potting resins are suitable for re-encapsulation. Advice on these materials is available on request.
4. Leads should not be bent less than 2,5 mm from the seal; exert no axial pull when bending.
5. For good thermal contact heatsink compound should be used between base-plate and heatsink.

CHARACTERISTICS

Forward voltage

$$I_F = 5 \text{ A}; T_j = 25 \text{ }^{\circ}\text{C}$$

$$V_F < 1,25 \text{ V}^1)$$

Reverse current

$$V_R = V_{RW\max}; T_j = 125 \text{ }^{\circ}\text{C}$$

$$I_R < 0,4 \text{ mA}$$

Reverse recovery when switched from

$$I_F = 2 \text{ A to } V_R = 30 \text{ V with } -dI_F/dt = 20 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^{\circ}\text{C}$$

Recovery charge

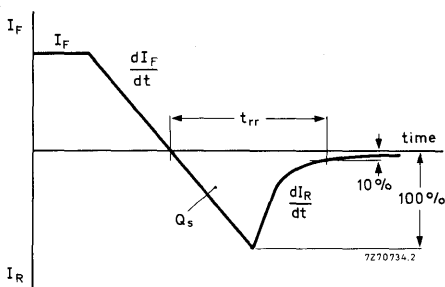
$$Q_S < 700 \text{ nC}$$

Recovery time

$$t_{rr} < 450 \text{ ns}$$

Max. slope of the reverse recovery current with $-dI_F/dt = 2 \text{ A}/\mu\text{s}$

$$|dI_R/dt| < 5 \text{ A}/\mu\text{s}$$



¹⁾ Measured under pulse conditions to avoid excessive dissipation.

CHARACTERISTICS (continued)

Forward recovery when switched to

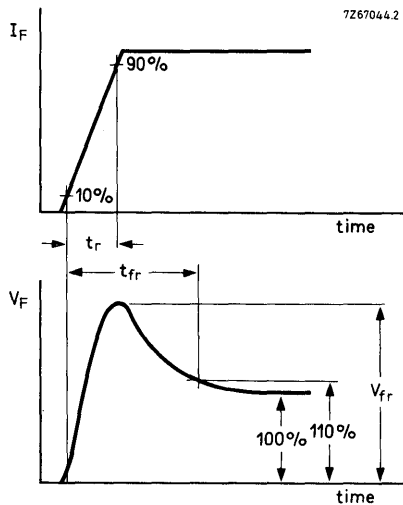
$I_F = 25 \text{ A}$ with $t_r = 0,5 \mu\text{s}$ at $T_j = 25 \text{ }^\circ\text{C}$

Recovery time

$t_{fr} < 0,8 \mu\text{s}$

Recovery voltage

$V_{fr} < 3,5 \text{ V}$

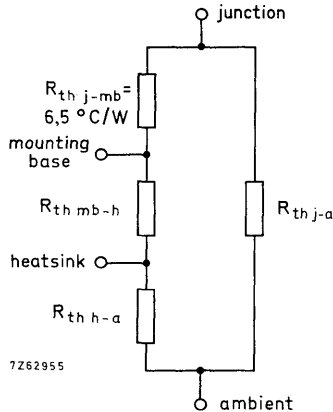


Forward output waveform

OPERATING NOTES

Dissipation and heatsink considerations:

- a. The various components of junction temperature rise above ambient are illustrated below:



- b. The method of using the graph on page 8 is as follows:
Starting with the curve of maximum dissipation as a function of $I_F(AV)$, for a particular current trace horizontally to meet the appropriate form factor; upwards to the operating duty cycle (δ) line; horizontally until the $R_{th\ mb-a}$ curve is reached. Finally trace upwards from the T_{amb} scale. The intersection determines the $R_{th\ mb-a}$ required.
The heatsink thermal resistance value ($R_{th\ h-a}$) can now be calculated from:

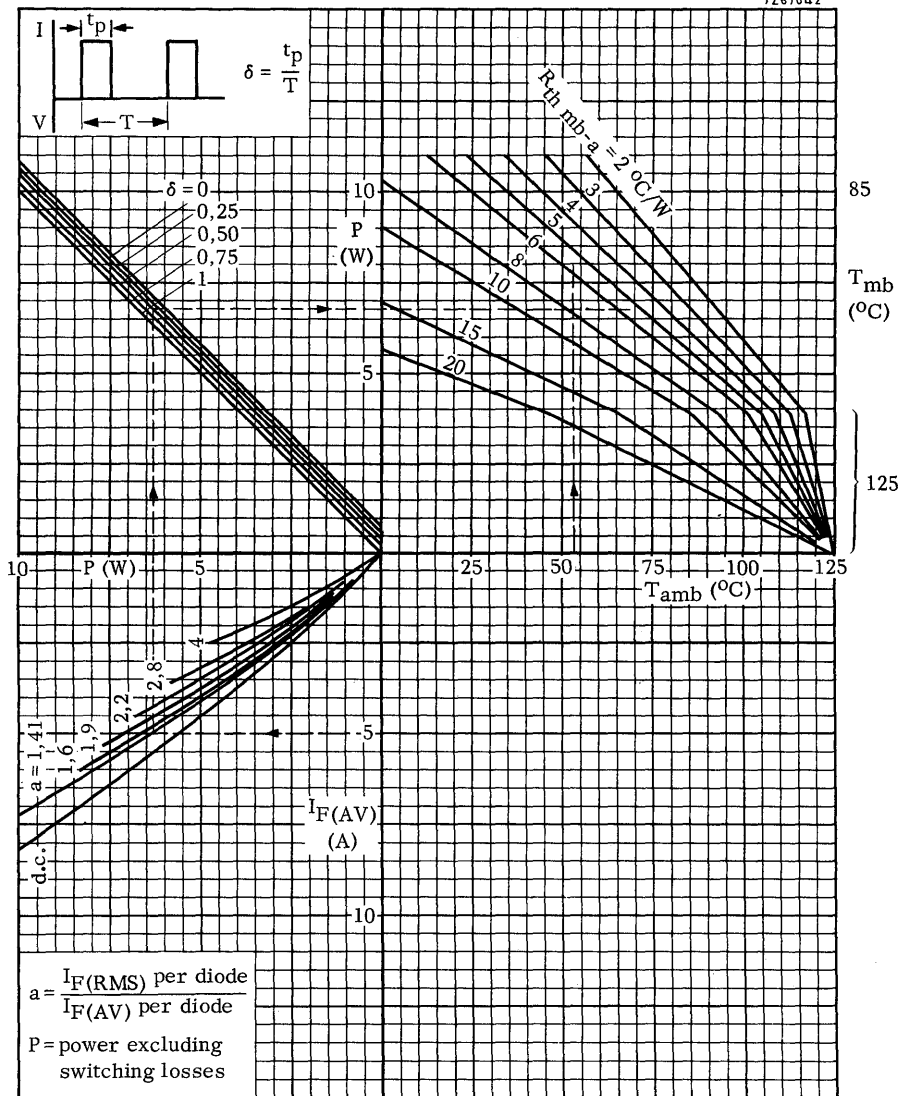
$$R_{th\ h-a} = R_{th\ mb-a} - R_{th\ mb-h}$$

Any measurement of heatsink temperature should be made immediately adjacent to the device.

- c. The heatsink curves are optimised to allow the junction temperature to run up to 150 °C ($T_{j\ max}$) whilst limiting T_{mb} to 125 °C (or less).

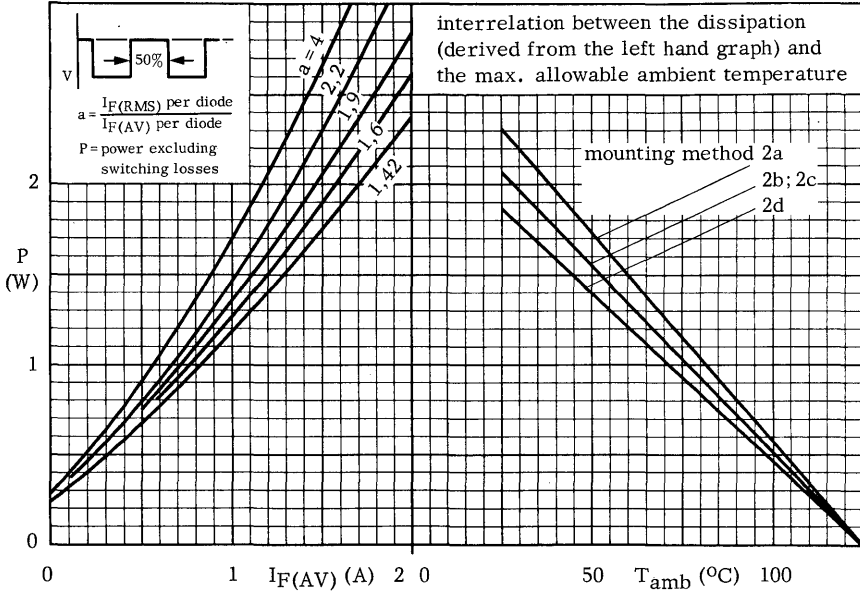
CHOPPER APPLICATIONS

7267042



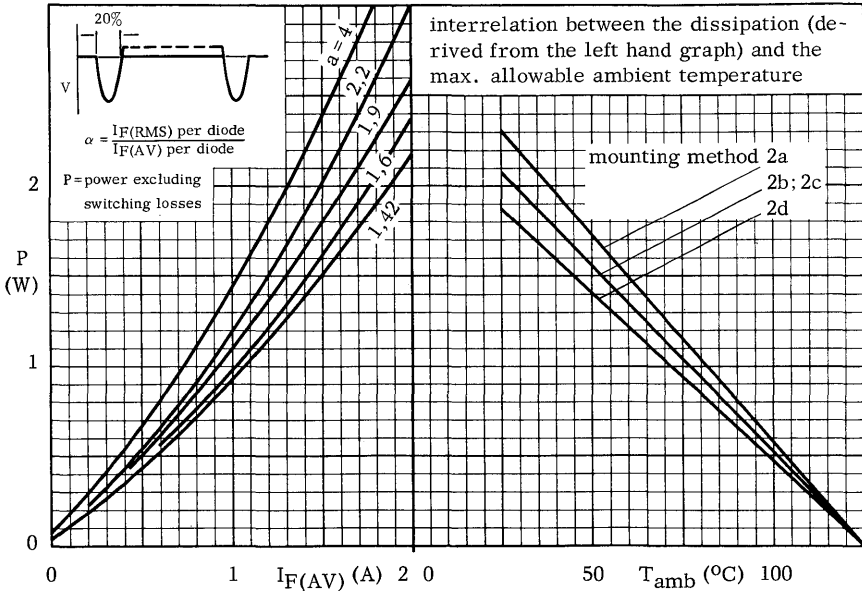
SWITCHED-MODE APPLICATION

7Z62958

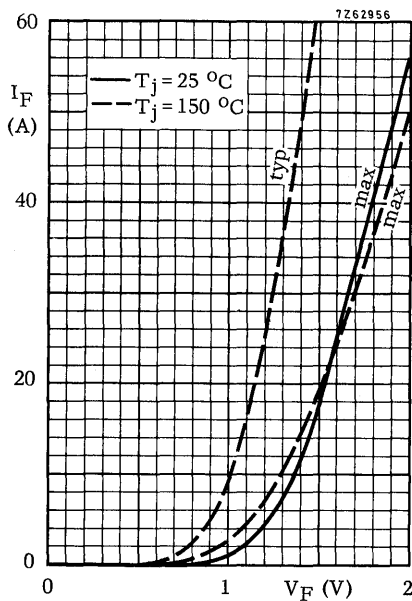
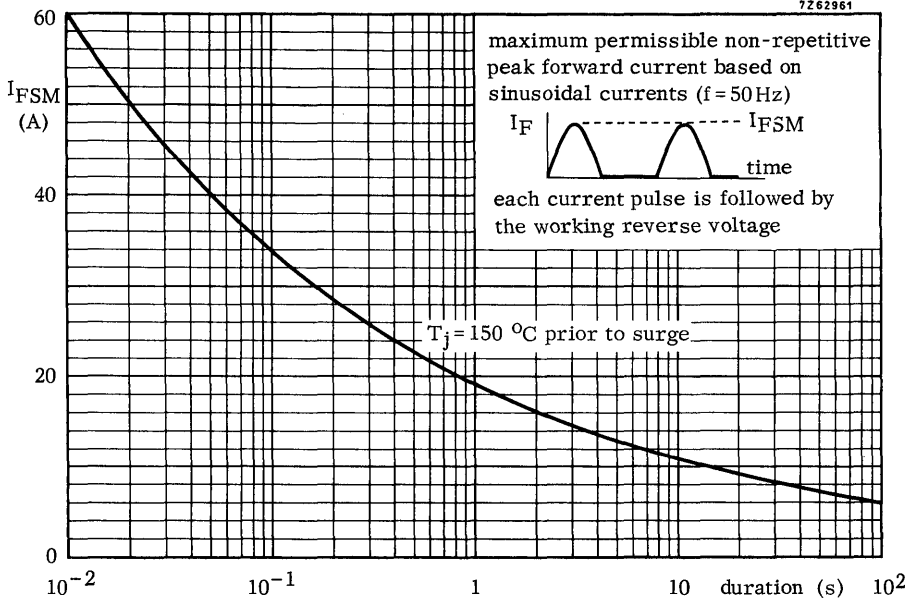


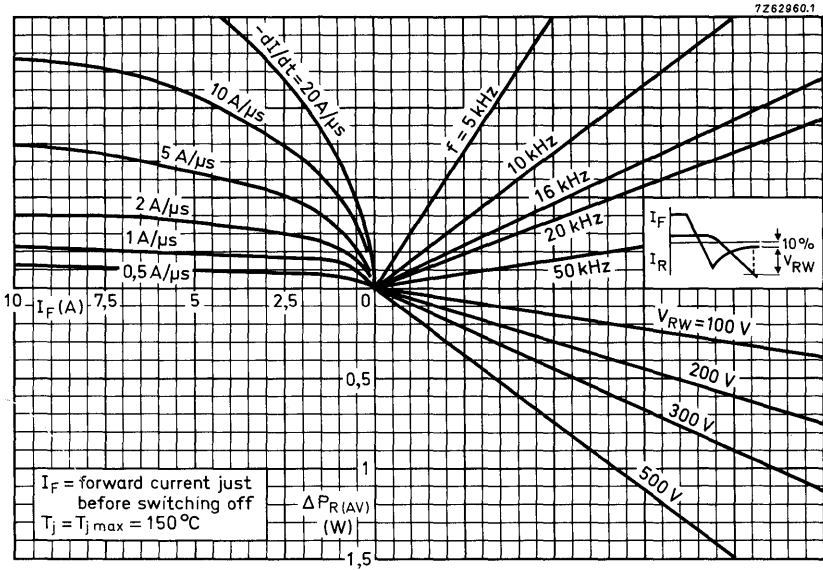
SCAN RECTIFICATION

7Z62957

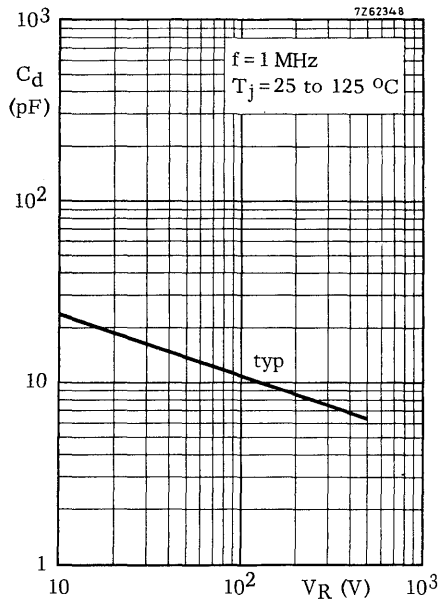
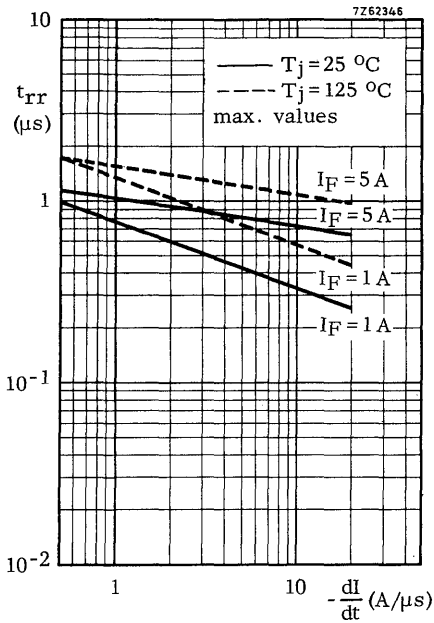


7Z62961





Nomogram: power loss $\Delta P_R(AV)$ due to switching only (to be added to forward and reverse power losses).



BYX71 SERIES

