CONTROLLED AVALANCHE RECTIFIER DIODES

Silicon diodes in a DO–5 metal envelope, capable of absorbing transients and intended for power rectifier applications.
The series consists of the following types:
Normal polarity (cathode to stud): BYX56–600 to BYX56–1400.
Reverse polarity (anode to stud): BYX56–600R to BYX56–1400R.

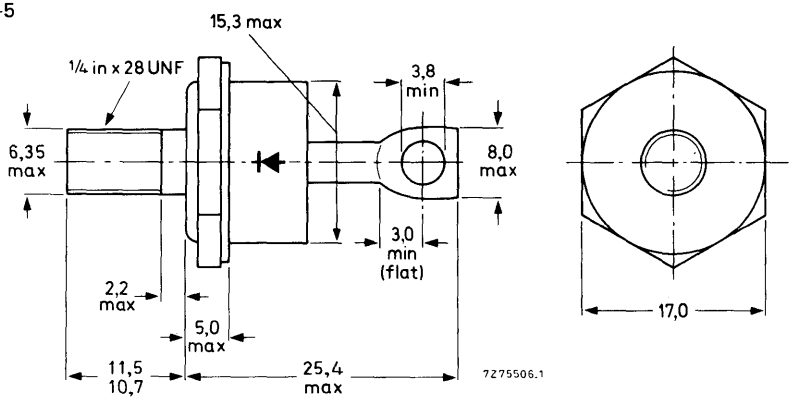
QUICK REFERENCE DATA

			BYX56–600(R)	800(R)	1000(R)	1200(R)	1400(R)	
Crest working reverse voltage	V_{RWM}	max.	600	800	1000	1200	1400	V
Reverse avalanche breakdown voltage	$V_{(BR)R}$	>	750	1000	1250	1450	1650	V
Average forward current	$I_{F(AV)}$	max.			48			A
Non-repetitive peak forward current	I_{FSM}	max.			800			A
Non-repetitive peak reverse power dissipation	P_{RSM}	max.			40			kW

MECHANICAL DATA

Dimensions in mm

Fig. 1 DO–5



Net mass: 22 g
Diameter of clearance hole: max. 6.5 mm
Accessories supplied on request:
56264A (mica washer, insulating ring, tag).

Supplied with device: 1 nut, 1 lock washer.

Nut dimensions across the flats: 11.1 mm.

The mark shown applies to normal polarity types.

Torque on nut:
min. 1.7 Nm (17 kg cm),
max. 2.5 Nm (25 kg cm).

RATINGS

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

→ **Voltages***

			BYX56–600(R)	800(R)	1000(R)	1200(R)	1400(R)	
Crest working reverse voltage	V_{RWM}	max.	600	800	1000	1200	1400	V
Continuous reverse voltage	V_R	max.	600	800	1000	1200	1400	V

Currents

Average forward current (averaged over any 20 ms period)				
up to T_{mb} = 112 °C	$I_{F(AV)}$	max.	48	A
at T_{mb} = 125 °C	$I_{F(AV)}$	max.	40	A
R.M.S. forward current	$I_{F(RMS)}$	max.	75	A
Repetitive peak forward current	I_{FRM}	max.	450	A
Non-repetitive peak forward current t = 10 ms (half sine-wave); T_j = 175 °C prior to surge; with reapplied V_{RWMmax}	I_{FSM}	max.	800	A
I^2t for fusing (t ≤ 10 ms)	I^2t	max.	3200	A^2s

Reverse power dissipation

Repetitive peak reverse power dissipation t = 10 μs (square-wave; f = 50 Hz); T_j = 175 °C	P_{RRM}	max.	6.5	kW
Non-repetitive peak reverse power dissipation t = 10 μs (square-wave)				
T_j = 25 °C prior to surge	P_{RSM}	max.	40	kW
T_j = 175 °C prior to surge	P_{RSM}	max.	6.5	kW

Temperatures

Storage temperature	T_{stg}		−55 to +175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	0.8	°C/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0.2	°C/W
Transient thermal impedance; t = 1 ms	$Z_{th\ j\text{-}h}$	=	0.03	°C/W

*To ensure thermal stability: $R_{th\ j\text{-}a} < 2.2$ °C/W (a.c.)

CHARACTERISTICS

			BYX56–600(R)	800(R)	1000(R)	1200(R)	1400(R)	
Forward voltage								
I_F = 150 A; T_j = 25 °C	V_F	<	1.8	1.8	1.8	1.8	1.8	V*
Reverse avalanche breakdown voltage		>	750	1000	1250	1450	1650	V
I_R = 5 mA; T_j = 25 °C	$V_{(BR)R}$	<	2000	2000	2000	2200	2400	V
Reverse current								
$V_R = V_{RWMmax}$; T_j = 125 °C	I_R	<	1.6	1.6	1.6	1.6	1.6	mA

OPERATING NOTES

The top connector should neither be bent nor twisted; it should be soldered into the circuit so that there is no strain on it.

During soldering the heat conduction to the junction should be kept to a minimum by using a thermal shunt.

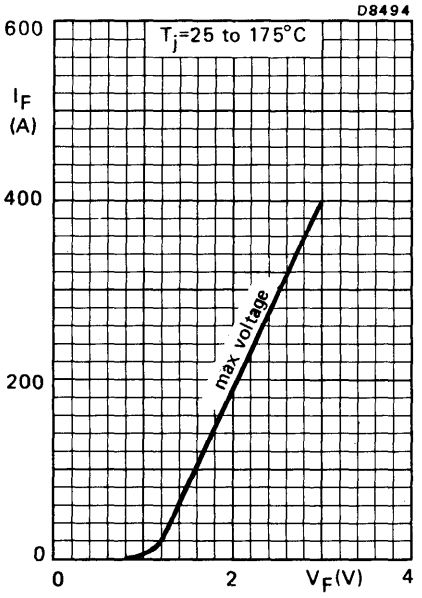


Fig.2

*Measured under pulsed conditions to avoid excessive dissipation.

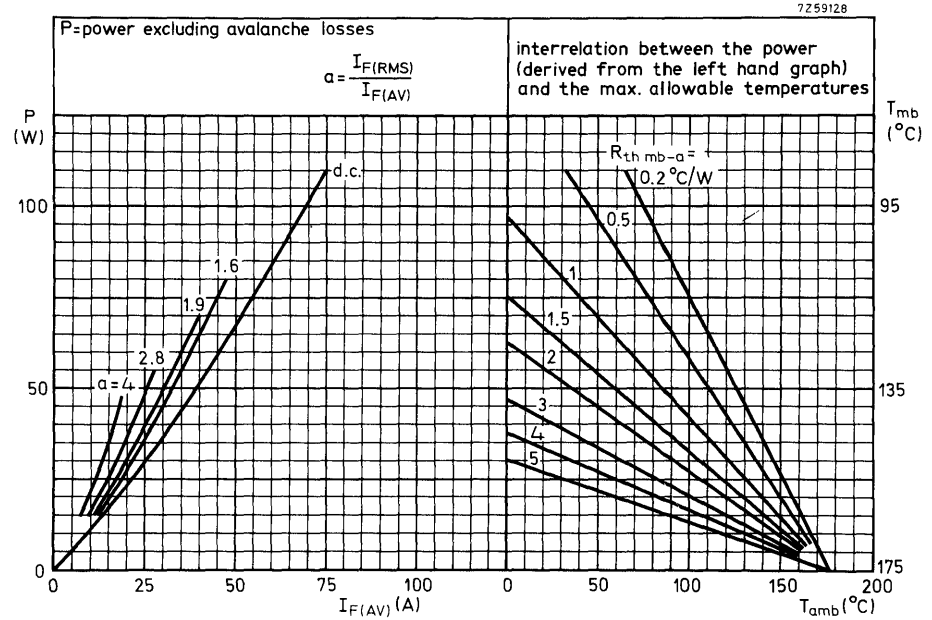

7Z59128
P=power excluding avalanche losses
$a=\frac{I_{F(RMS)}}{I_{F(AV)}}$
interrelation between the power (derived from the left hand graph) and the max. allowable temperatures
P (W)
T_{mb} (°C)
d.c.
1.6
1.9
2.8
a=4
$R_{th\ mb-a}$ = 0.2 °C/W
0.5
1
1.5
2
3
4
5
100
50
0
95
135
175
0
25
50
75
100
0
50
100
150
200
$I_{F(AV)}$ (A)
T_{amb} (°C)

Fig.3

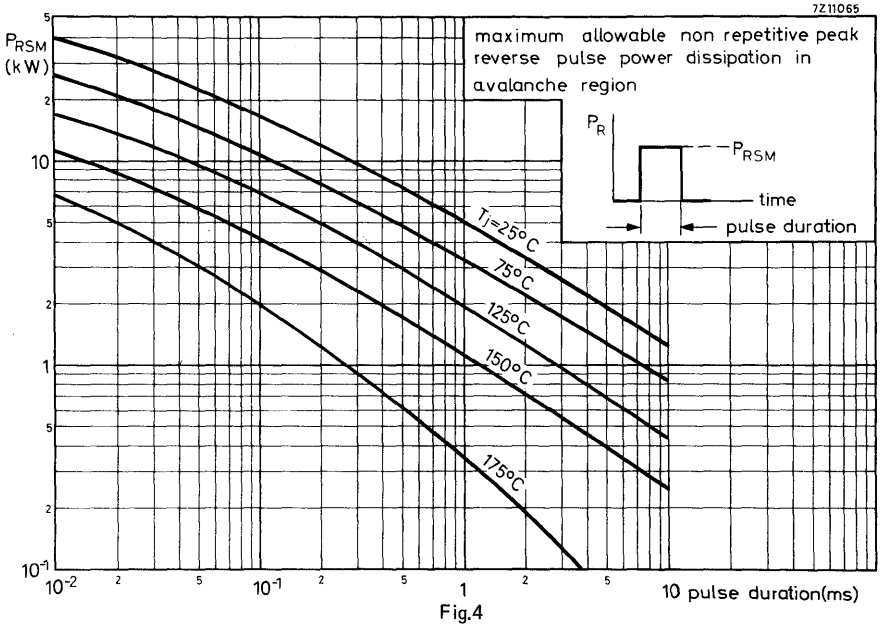

7Z11065
P_{RSM} (kW)
maximum allowable non repetitive peak reverse pulse power dissipation in avalanche region
P_R
P_{RSM}
time
pulse duration
T_j=25°C
75°C
125°C
150°C
175°C
5
2
10
5
2
1
5
2
10^{-1}
10^{-2}
2
5
10^{-1}
2
5
1
2
5
10 pulse duration(ms)

Fig.4

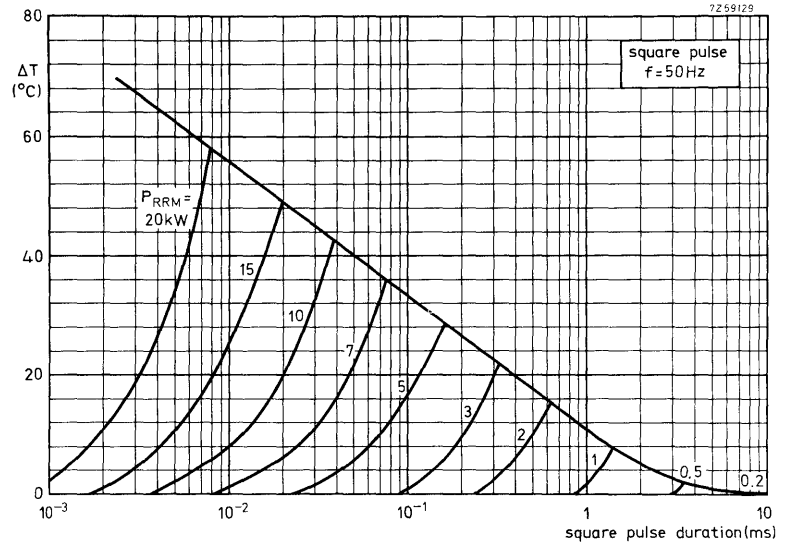


Fig.5

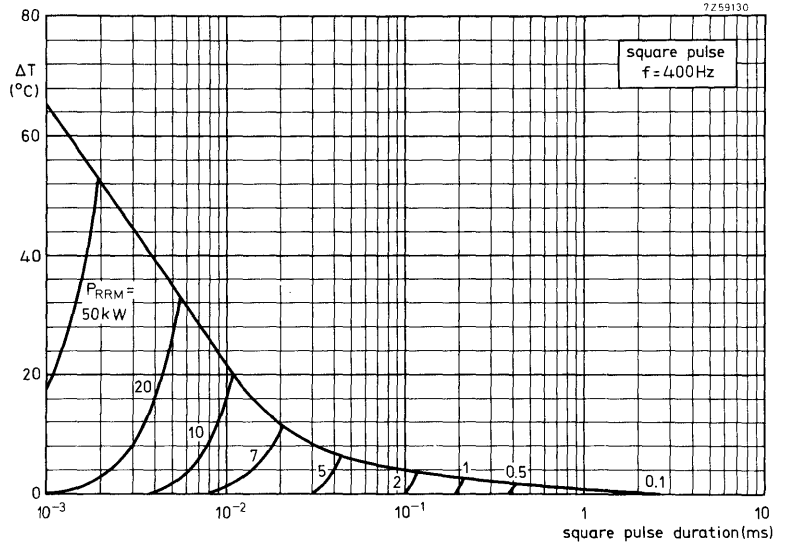


Fig.6

ΔT = neccessary derating of T_{jmax} to accommodate repetitive transients in the reverse direction. Allowance can be made for this by assuming the ambient temperature ΔT higher.

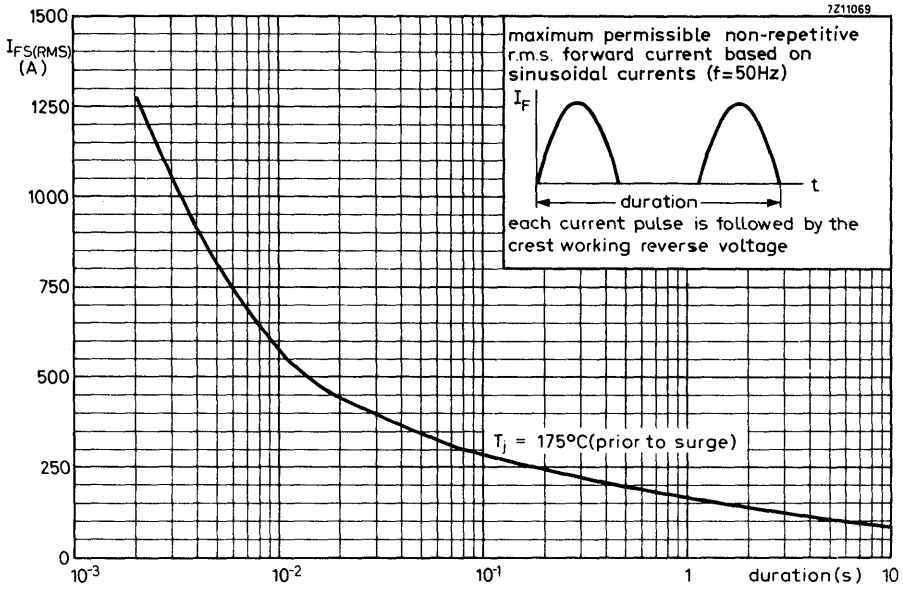

7Z11069
1500
$I_{FS(RMS)}$ (A)
1250
1000
750
500
250
0
maximum permissible non-repetitive r.m.s. forward current based on sinusoidal currents (f=50Hz)
I_F
t
duration
each current pulse is followed by the crest working reverse voltage
T_j = 175°C(prior to surge)
10^{-3}
10^{-2}
10^{-1}
1
duration(s)
10

Fig.7

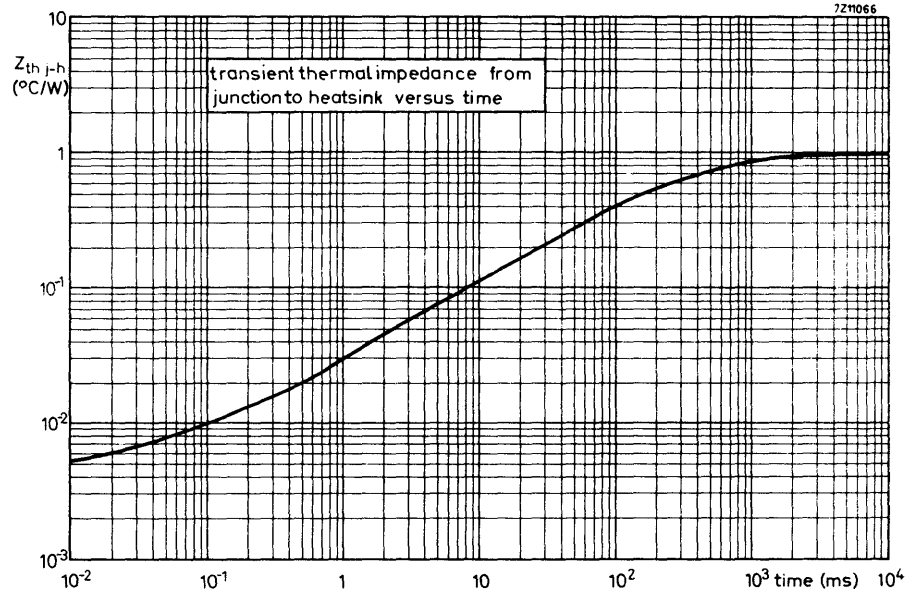

7Z11066
10
$Z_{th\ j\text{-}h}$ (°C/W)
transient thermal impedance from junction to heatsink versus time
1
10^{-1}
10^{-2}
10^{-3}
10^{-2}
10^{-1}
1
10
10^2
10^3 time (ms)
10^4

Fig.8