CONTROLLED AVALANCHE RECTIFIER DIODES

Also available to BS9333–F005

Silicon diodes in a DO–4 metal envelope, capable of absorbing transients and intended for use in power rectifier application.
The series consists of the following types:
Normal polarity (cathode to stud): BYX39–600 to BYX39–1400.
Reverse polarity (anode to stud): BYX39–600R to BYX39–1400R.

QUICK REFERENCE DATA

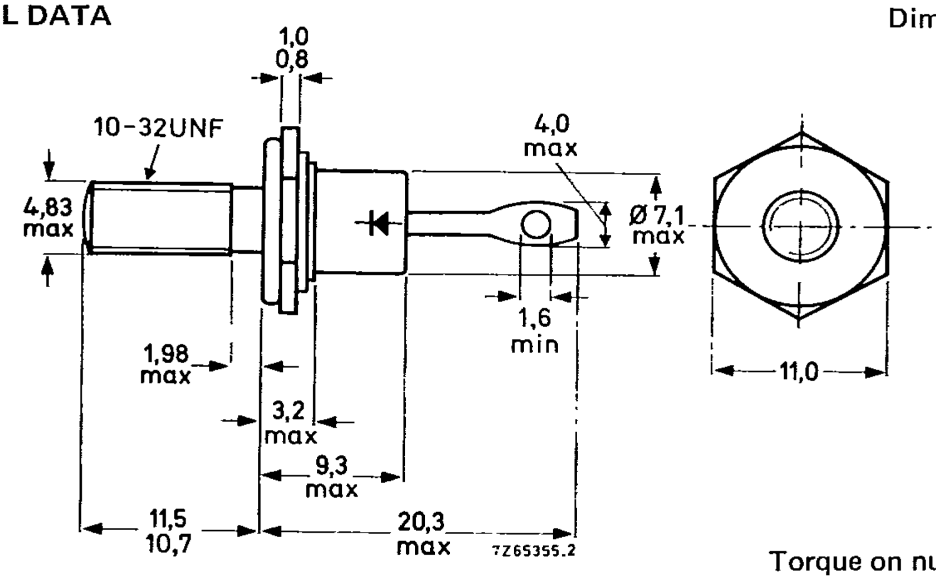
			BYX39–600(R)	800(R)	1000(R)	1200(R)	1400(R)	
Crest working reverse voltage	V_{RWM}	max.	600	800	1000	1200	1400	V
Reverse avalanche breakdown voltage	$V_{(BR)R}$	>	750	1000	1250	1450	1650	V

Average forward current	$I_{F(AV)}$	max.	9.5	A
Non-repetitive peak forward current	I_{FSM}	max.	125	A
Non-repetitive peak reverse power dissipation	P_{RSM}	max.	4	kW

MECHANICAL DATA

Dimensions in mm

Fig. 1 DO–4



Net mass: 6 g
Diameter of clearance hole: max. 5.2 mm
Accessories supplied on request:
see ACCESSORIES section

Torque on nut:
min. 0.9 Nm (9 kg cm),
max. 1.7 Nm (17 kg cm).

Supplied with device: 1 nut, 1 lock-washer.

Nut dimensions across the flats: 9.5 mm.

The mark shown applies to normal polarity types.

RATINGS

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

Voltages*			BYX39–600(R)	800(R)	1000(R)	1200(R)	1400(R)	
Continuous reverse voltage	V_R	max.	600	800	1000	1200	1400	V
Crest working reverse voltage	V_{RWM}	max.	600	800	1000	1200	1400	V

Currents

Average forward current (averaged over any 20 ms period) up to T_{mb} = 85 °C	$I_{F(AV)}$	max.	9.5	A
at T_{mb} = 125 °C	$I_{F(AV)}$	max.	6.0	A
R.M.S. forward current	$I_{F(RMS)}$	max.	15	A
Repetitive peak forward current	I_{FRM}	max.	100	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.	125	A
I^2t for fusing (t = 10 ms)	I^2t	max.	78	A^2s

Reverse power dissipation

Average reverse power dissipation (averaged over any 20 ms period); T_j = 125 °C	$P_{R(AV)}$	max.	10	W
Repetitive peak reverse power dissipation t = 10 μs (square-wave; f = 50 Hz); T_j = 125 °C	P_{RRM}	max.	2	kW
Non-repetitive peak reverse power dissipation t = 10 μs (square-wave) T_j = 25 °C prior to surge	P_{RSM}	max.	4	kW
T_j = 175 °C prior to surge	P_{RSM}	max.	0.8	kW

Temperatures

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

*To ensure thermal stability: $R_{th\ j\text{-}a} \leq 5$ °C/W (continuouse reverse voltage) or ≤ 20 °C/W (a.c.)

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	50	°C/W
From junction to mounting base	$R_{th\ j-mb}$	=	4.5	°C/W
From mounting base to heatsink				
without heatsink compound	$R_{th\ mb-h}$	=	1.0	°C/W
with heatsink compound	$R_{th\ mb-h}$	=	0.5	°C/W
with mica washer	$R_{th\ mb-h}$	=	2.0	°C/W
Transient thermal impedance; t = 1 ms	$Z_{th\ j-mb}$	=	0.35	°C/W

CHARACTERISTICS

			BYX39–600(R)	800(R)	1000(R)	1200(R)	1400(R)	
Forward voltage I_F = 20 A; T_j = 25 °C	V_F	<	1.7	1.7	1.7	1.7	1.7	V*
Reverse avalanche breakdown voltage I_R = 5 mA; T_j = 25 °C	$V_{(BR)R}$	>	750	1000	1250	1450	1650	V
		<	2400	2400	2400	2400	2400	V
Reverse current $V_R = V_{RWMmax}$; T_j = 125 °C	I_R	<	200	200	200	200	200	µA

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.

*Measured under pulse conditions to avoid excessive dissipation.

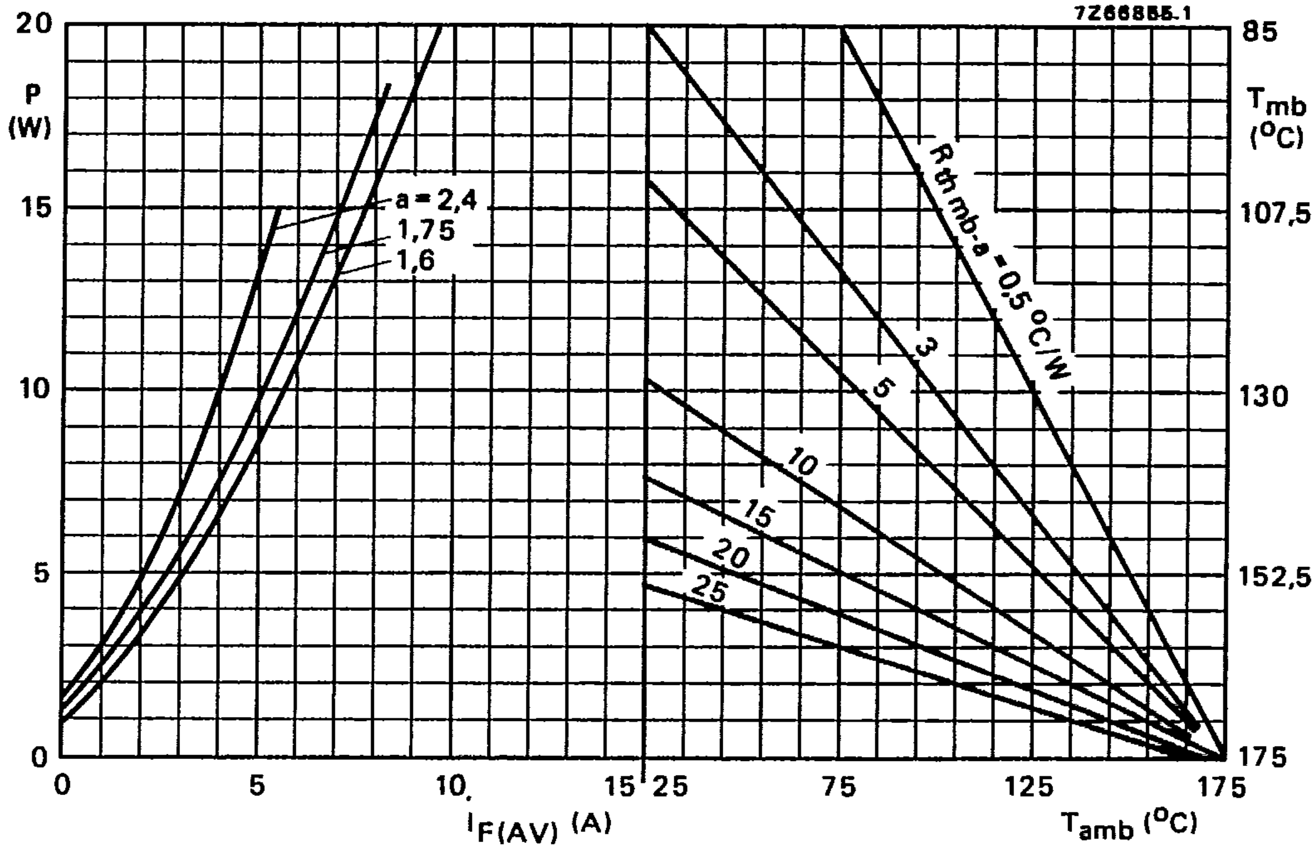


Fig.2

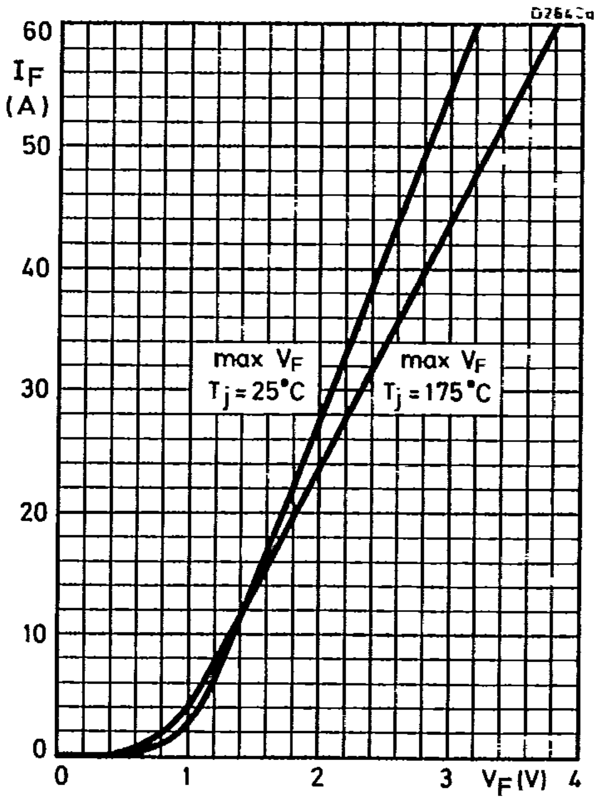


Fig.3

The right-hand part shows the interrelationship between the power (derived from the left-hand part) and the maximum permissible temperatures.
P = dissipation excluding power in the avalanche region.

single phase: a = 1.6
3-phase : a = 1.75
6-phase : a = 2.4

a = $I_{F(RMS)}/I_{F(AV)}$

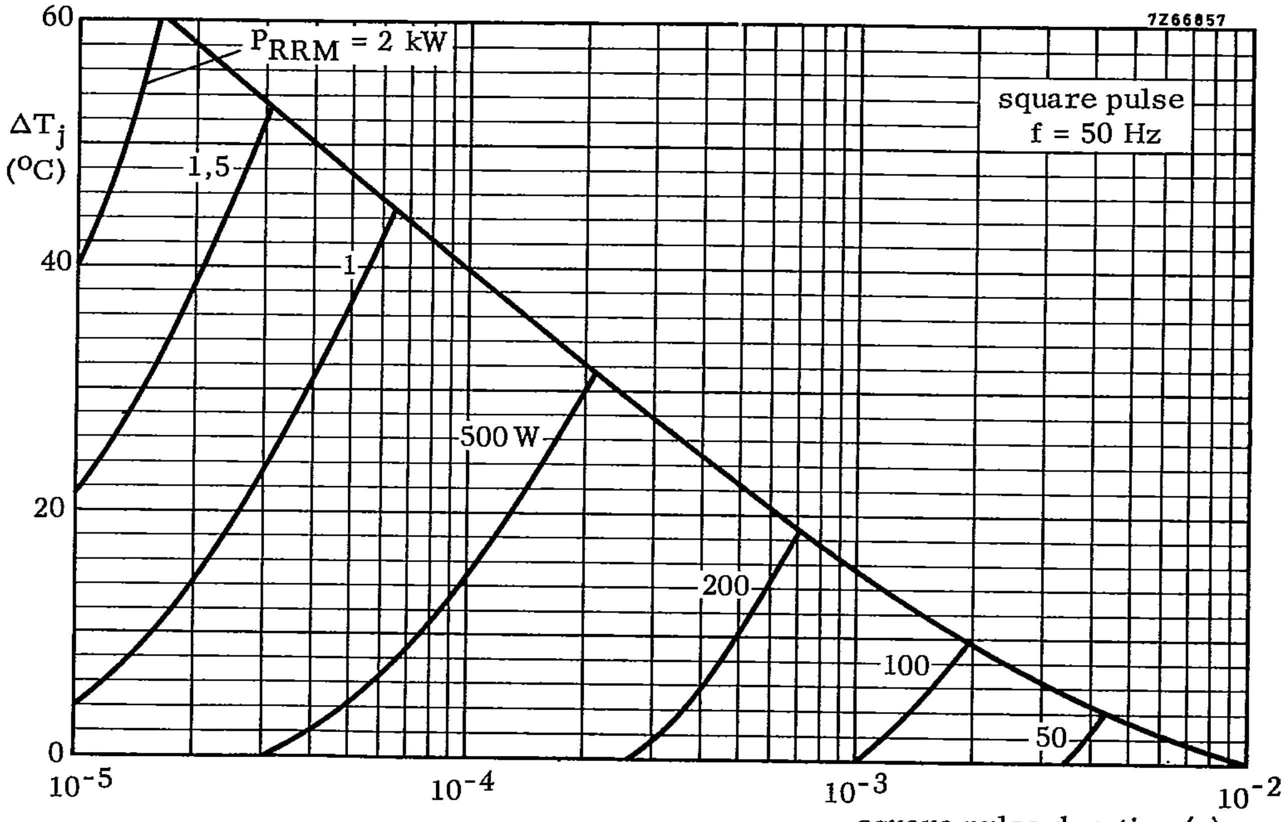

7Z66857
ΔT_j (°C)
60
40
20
0
P_{RRM} = 2 kW
1,5
1
500 W
200
100
50
square pulse
f = 50 Hz
10^{-5}
10^{-4}
10^{-3}
10^{-2}
square pulse duration (s)

Fig.4

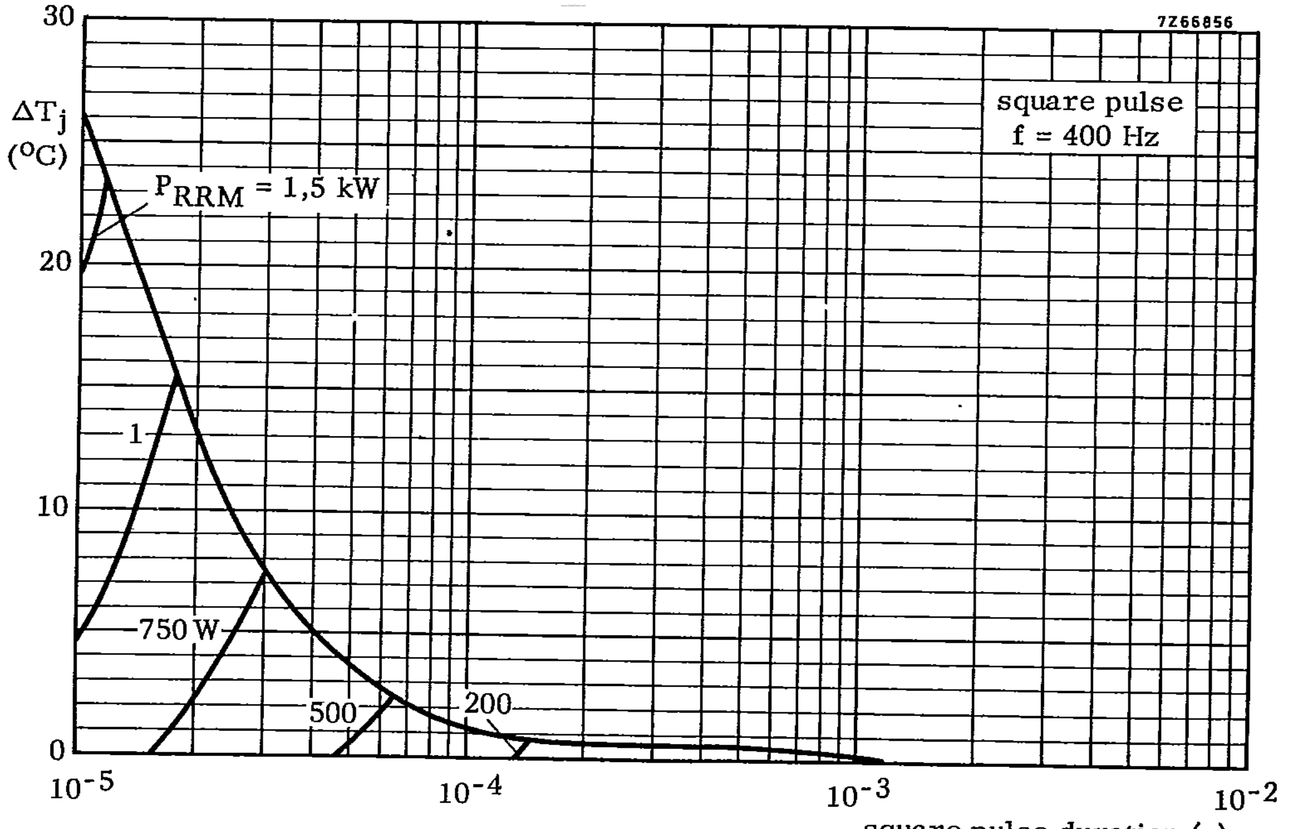

7Z66856
ΔT_j (°C)
30
20
10
0
P_{RRM} = 1,5 kW
1
750 W
500
200
square pulse
f = 400 Hz
10^{-5}
10^{-4}
10^{-3}
10^{-2}
square pulse duration (s)

Fig.5

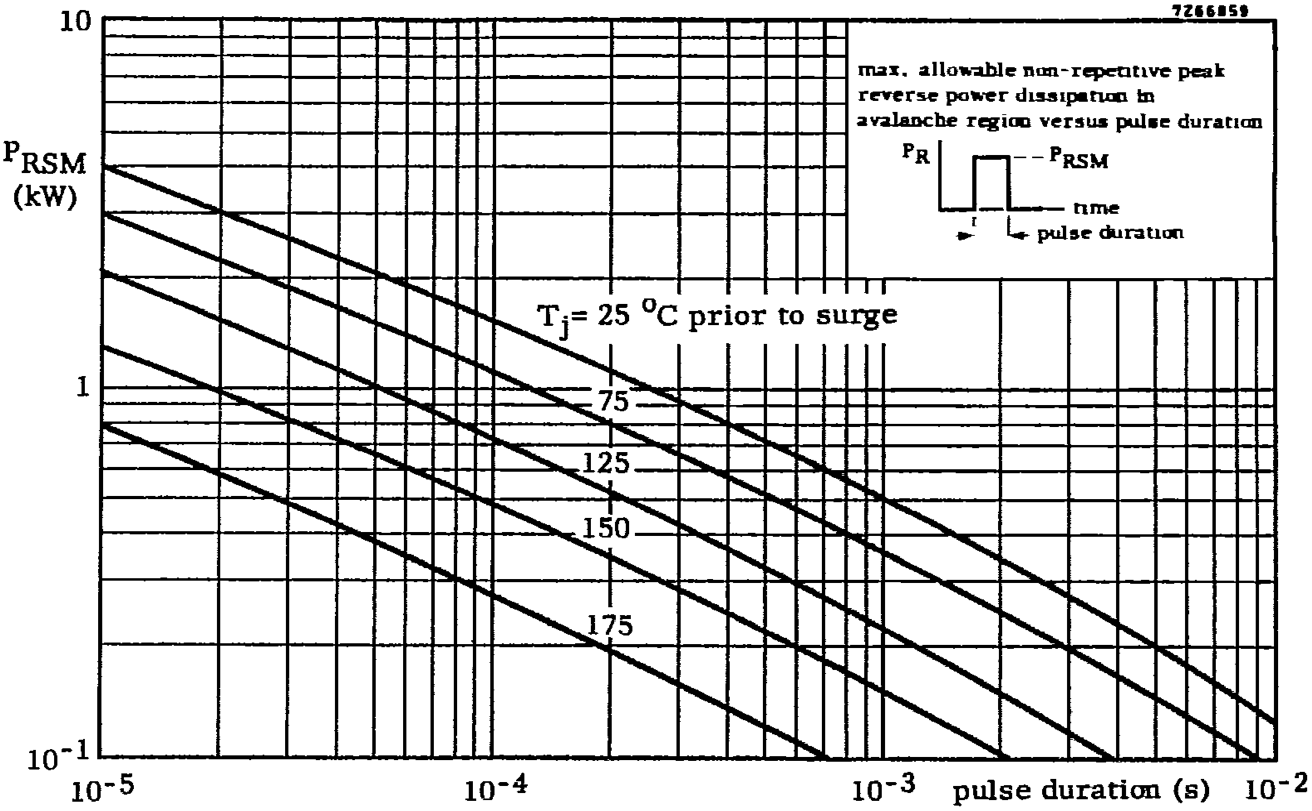

7Z66859
max. allowable non-repetitive peak reverse power dissipation in avalanche region versus pulse duration
P_R
P_{RSM}
time
pulse duration
T_j = 25 °C prior to surge
75
125
150
175
P_{RSM} (kW)
10
1
10^{-1}
10^{-5}
10^{-4}
10^{-3}
pulse duration (s)
10^{-2}

Fig.6

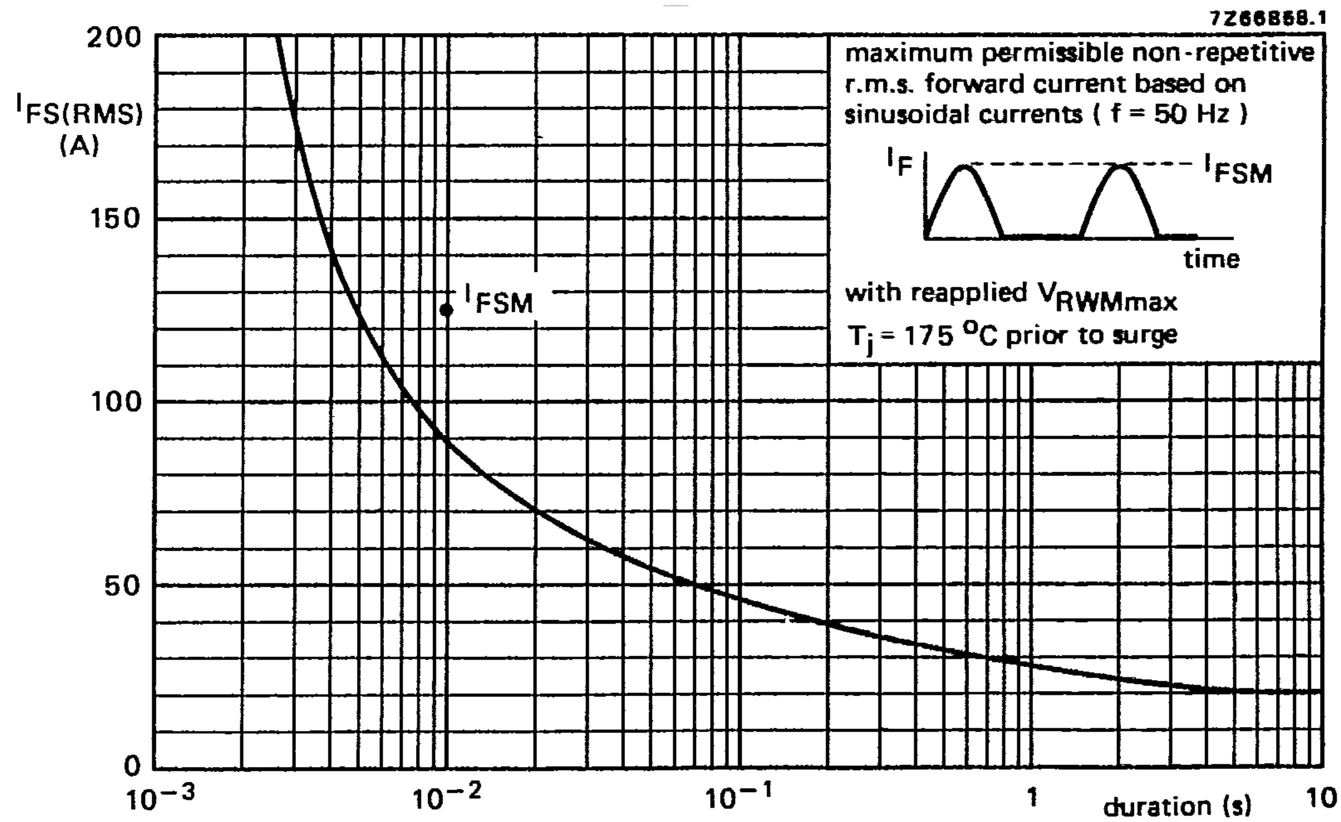

7Z66868.1
maximum permissible non-repetitive r.m.s. forward current based on sinusoidal currents (f = 50 Hz)
I_F
I_{FSM}
time
with reapplied V_{RWMmax}
T_j = 175 °C prior to surge
I_{FSM}
$I_{FS(RMS)}$ (A)
200
150
100
50
0
10^{-3}
10^{-2}
10^{-1}
1
duration (s)
10

Fig.7