FAST SOFT-RECOVERY RECTIFIER DIODES

Silicon diodes in DO–5 metal envelopes, featuring non-snap-off characteristics. They are intended for use in high-frequency power supplies, thyristor inverters and multi-phase power rectifier applications.
The series consists of the following types:
Normal polarity (cathode to stud): 1N3909, 1N3910, 1N3911, 1N3912, 1N3913.
Reverse polarity (anode to stud): 1N3909R, 1N3910R, 1N3911R, 1N3912R, 1N3913R.

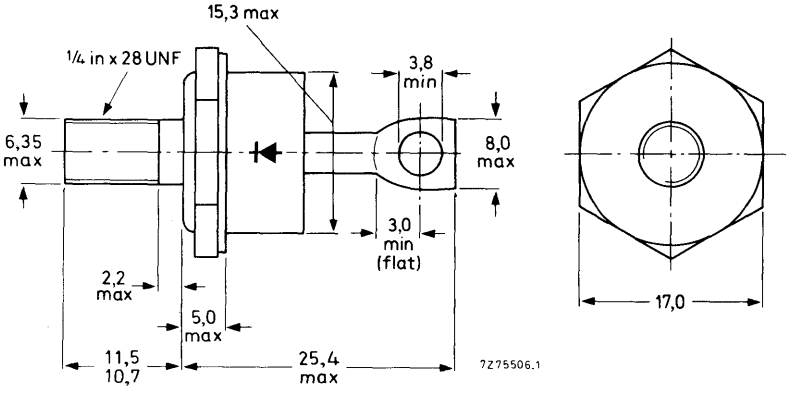
QUICK REFERENCE DATA

			1N3909(R)	3910(R)	3911(R)	3912(R)	3913(R)	
Repetitive peak reverse voltage	V_{RRM}	max.	50	100	200	300	400	V
Average forward current	$I_{F(AV)}$	max.			30			A
Non-repetitive peak forward current	I_{FSM}	max.			300			A
Reverse recovery time	t_{rr}	<			200			ns

MECHANICAL DATA

Dimensions in mm

Fig.1 DO–5; Supplied with device: 1 nut, 1 lock-washer
Nut dimensions across the flats: 11.1 mm



Net mass: 22 g
Diameter of clearance hole: max. 6.5 mm
Accessories supplied on request:
56264A (mica washer, insulating ring, tag)
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 (IEC 134)

Voltages

			1N3909(R)	3910(R)	3911(R)	3912(R)	3913(R)	
Non-repetitive peak reverse voltage (t = 10 ms)	V_{RSM}	max.	75	200	300	400	500	V
Repetitive peak reverse voltage ($\delta \leqslant 0.01$)	V_{RRM}	max.	50	100	200	300	400	V
Crest working voltage	V_{RWM}	max.	50	100	200	300	400	V

Currents

Average on-state current assuming zero switching losses (averaged over any 20 ms period)				
up to T_{mb} = 100 °C	$I_{F(AV)}$	max.	30	A
at T_{mb} = 125 °C	$I_{F(AV)}$	max.	15	A
R.M.S. forward current	$I_{F(RMS)}$	max.	45	A
Repetitive peak forward current	I_{FRM}	max.	125	A
Non-repetitive peak forward current T_j = 150 °C prior to surge; half sine-wave with reapplied V_{RWMmax};				
t = 10 ms	I_{FSM}	max.	275	A
t = 8.3 ms	I_{FSM}	max.	300	A
I^2t for fusing (t = 10 ms)	I^2t	max.	375	A^2s

Temperatures

Storage temperature	T_{stg}		−65 to 175	°C
Operating junction temperature	T_j	max.	150	°C

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	1.0	°C/W
From mounting base to heatsink with heatsink compound	$R_{th\ mb\text{-}h}$	=	0.3	°C/W
Transient thermal impedance; t = 1 ms	$Z_{th\ j\text{-}mb}$	=	0.2	°C/W

CHARACTERISTICS

Forward voltage I_F = 30 A; T_j = 25 °C	V_F	<	1.4	V*
Reverse current $V_R = V_{RWMmax}$; T_j = 100 °C	I_R	<	10	mA
Reverse recovery when switched from I_F = 1 A to $V_R \geqslant$ 30 V; $-dI_F/dt$ = 35 A/μs; T_j = 25 °C Recovery time	t_{rr}	<	200	ns
I_F = 2 A to $V_R \geqslant$ 30 V; $-dI_F/dt$ = 20 A/μs; T_j = 25 °C Recovered charge	Q_s	<	250	nC
Maximum slope of the reverse recovery current when switched from I_F = 1 A to $V_R \geqslant$ 30 V; $-dI_F/dt$ = 2 A/μs; T_j = 25 °C	$\lvert dI_R/dt \rvert$	<	5	A/μs

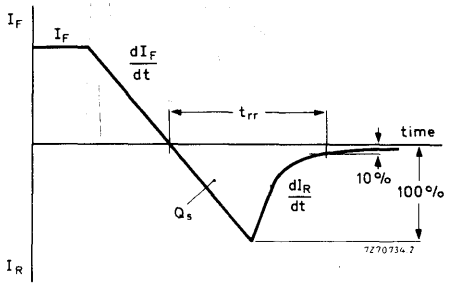


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Fig. 2 Definitions of t_{rr} and Q_s.

*Measured under pulse conditions to avoid excessive dissipation.

SINUSOIDAL OPERATION

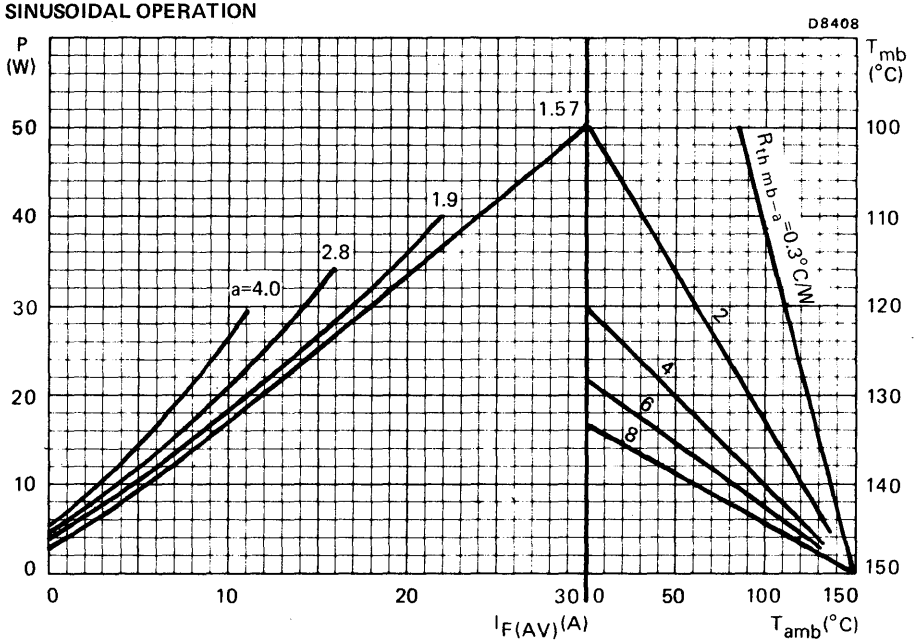


Fig. 3 The right-hand part shows the interrelationship between the power (derived from the left-hand part) and the maximum permissible temperatures.
P = power dissipation excluding switching losses.
a = form factor = $I_{F(RMS)}/I_{F(AV)}$.

SQUARE-WAVE OPERATION

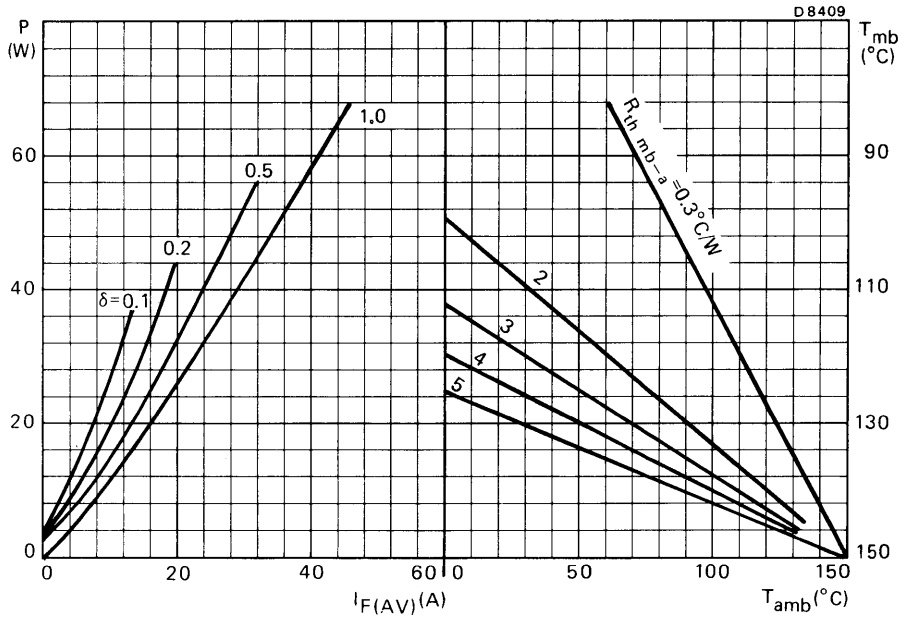
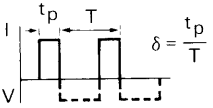


Fig. 4 The right-hand part shows the interrelationship between the power (derived from the left-hand part) and the maximum permissible temperatures.
P = power dissipation excluding switching losses.



$$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$$

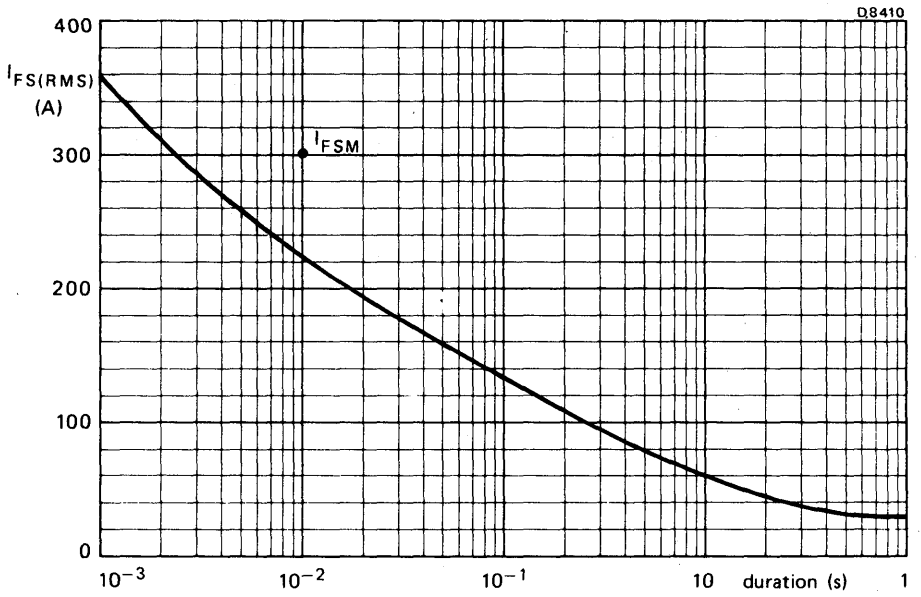
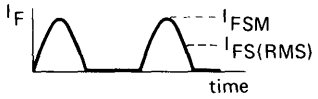


Fig.5 Maximum permissible non-repetitive r.m.s. forward current based on sinusoidal currents (f = 50 Hz); T_j = 150 °C prior to surge; with reapplied V_{RWMmax}.



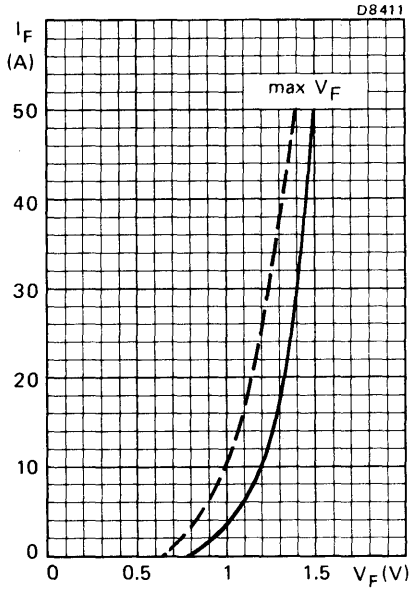


Fig. 6 —— T_j = 25 °C; – – – T_j = 150 °C

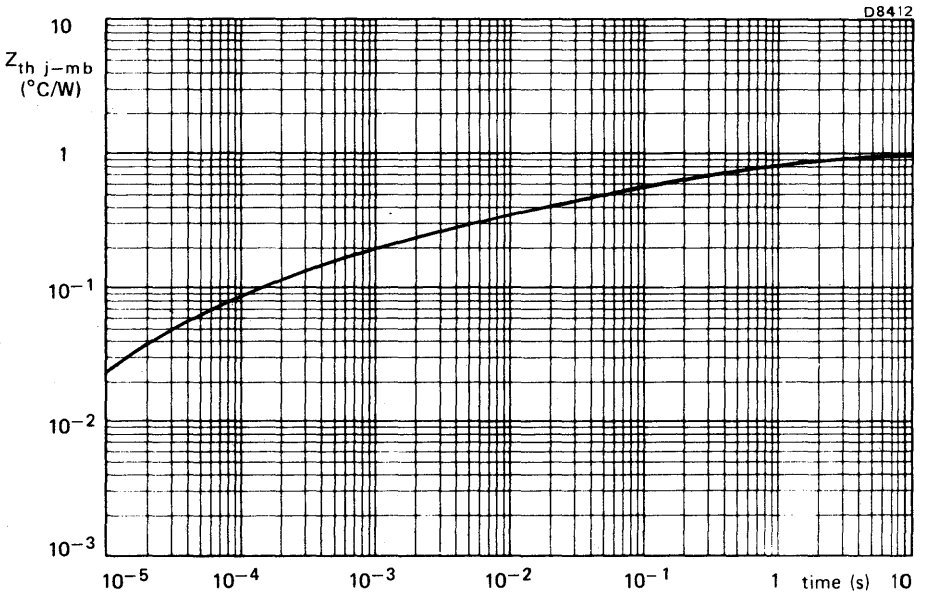


Fig. 7