PARALLEL-EFFICIENCY AND ENERGY-RECOVERY DIODE

Silicon double-diffused rectifier diode in a plastic envelope, intended for use as efficiency diode in transistorised horizontal deflection circuits of colour television receivers, and as an energy-recovery diode in thyristor commutation circuits such as 3-phase a.c. motor speed control inverters.

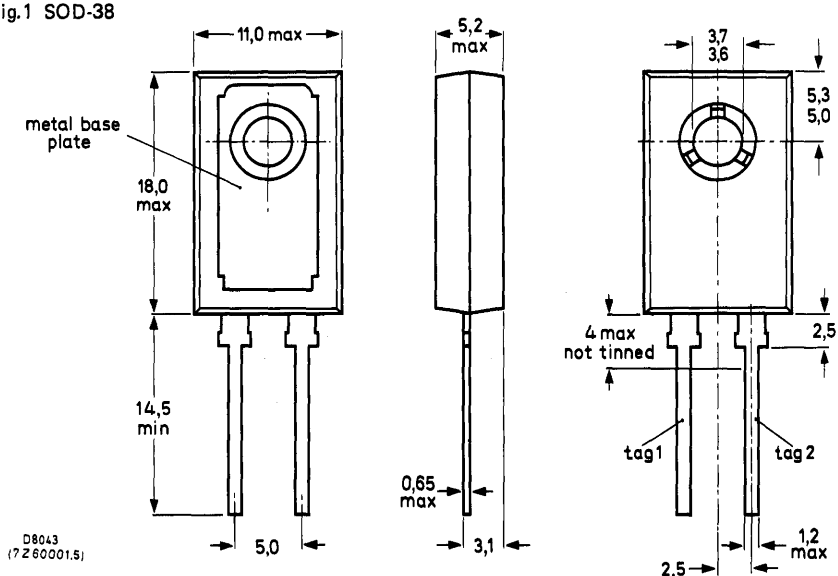
QUICK REFERENCE DATA

Repetitive peak reverse voltage	V_{RRM}	max.	1500	V
Average forward current	$I_{F(AV)}$	max.	4.5	A
Working peak forward current	I_{FWM}	max.	5	A
Repetitive peak forward current (t_p = 100 μs)	I_{FRM}	max.	200	A
Reverse recovery time	t_{rr}	<	1.0	μs

MECHANICAL DATA

Dimensions in mm

Fig.1 SOD-38



Polarity of connections: tag 1 = anode, tag 2 = cathode

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

Net mass: 2.5 g

Accessories:
supplied with the device: washer 56355
available on request: 56316 (mica insulating washer)

Torque on screw: min. 0.95 Nm (9.5 kg cm)
max. 1.5 Nm (15 kg cm)

RATINGS

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

Voltages

Transient rating (subsequent to flashover)	$V_{RM(flashover)}$	max.	1650	V
Non-repetitive peak reverse voltage ($t \leq 10$ ms)	V_{RSM}	max.	1500	V
Repetitive peak reverse voltage	V_{RRM}	max.	1500	V
Working reverse voltage*	V_{RW}	max.	1500	V
Continuous reverse voltage	V_R	max.	800	V

Currents

Average forward current (averaged over any 20 ms period) up to T_{mb} = 85 ^oC	$I_{F(AV)}$	max.	4.5	A
R.M.S. forward current	$I_{F(RMS)}$	max.	10	A
Working peak forward current (see Fig.8)	I_{FWM}	max.	5	A
Repetitive peak forward current (t_p = 100 μs)	I_{FRM}	max.	200	A
Repetitive peak forward current	I_{FRM}	max.	10	A
Non-repetitive peak forward current (t = 10 ms; half-sinewave) T_j = 125 ^oC prior to surge	I_{FSM}	max.	20	A

Temperatures

Storage temperature	T_{stg}		−40 to +125	^oC
Junction temperature	T_j	max.	125	^oC

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	4.5	$^oC/W$
Transient thermal impedance; t = 1 ms	$Z_{th\ j\text{-}mb}$	=	0.3	$^oC/W$

Influence of mounting method

1. *Heatsink mounted*

From mounting base to heatsink

a. with heatsink compound	$R_{th\ mb\text{-}h}$	=	1.5	$^oC/W$
b. with heatsink compound and 56316 mica washer	$R_{th\ mb\text{-}h}$	=	2.7	$^oC/W$
c. without heatsink compound	$R_{th\ mb\text{-}h}$	=	2.7	$^oC/W$
d. without heatsink compound; with 56316 mica washer	$R_{th\ mb\text{-}h}$	=	5	$^oC/W$

* At $t_p \leq 20\ \mu s$; $\delta = t_p/T \leq 0.25$; see Fig.8.

THERMAL RESISTANCE (continued)

2. *Free air operation*

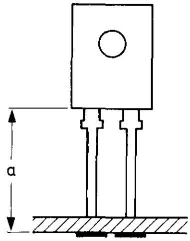
The quoted values of $R_{th\ j\text{-}a}$ should be used only when no leads of other dissipating components run to the same tie-points.

From junction to ambient in free air mounted on a printed circuit board

at a = maximum lead length and with a copper laminate

a. $> 1\ cm^2$ — $R_{th\ j\text{-}a} = 50\ ^oC/W$.

b. $< 1\ cm^2$ — $R_{th\ j\text{-}a} = 55\ ^oC/W$

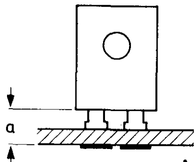


D8044 (7Z62315.1)

at a lead length a = 3 mm and with a copper laminate

c. $> 1\ cm^2$ — $R_{th\ j\text{-}a} = 55\ ^oC$

d. $< 1\ cm^2$ — $R_{th\ j\text{-}a} = 60\ ^oC$



D8045 (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 ^oC; 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 = 20 A; T_j = 25 °C	V_F	<	2.3	V*
Reverse current				
V_R = V_{RW} max; T_j = 125 °C	I_R	<	0.6	mA
Reverse recovery when switched from				
I_{FWM} = 4 A; $-dI_F/dt$ = 0.2 A/μs; T_j = 125 °C total recovery time	t_{tot}	<	20	μs
I_F = 2 A; $-dI_F/dt$ = 20 A/μs; T_j = 125 °C recovery time	t_{rr}	<	1.0	μs
Forward recovery time				
when switched to I_{FRM} = 5 A with t_r = 0.1 μs; T_j = 125 °C	t_{fr}	<	1.0	μs

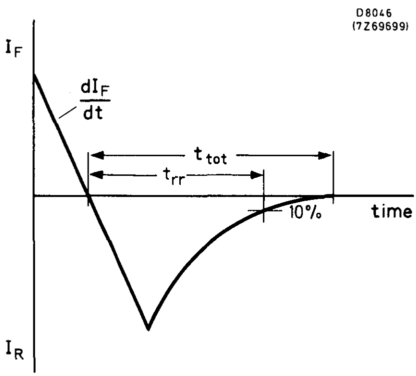


Fig.2 Definition of reverse recovery times.

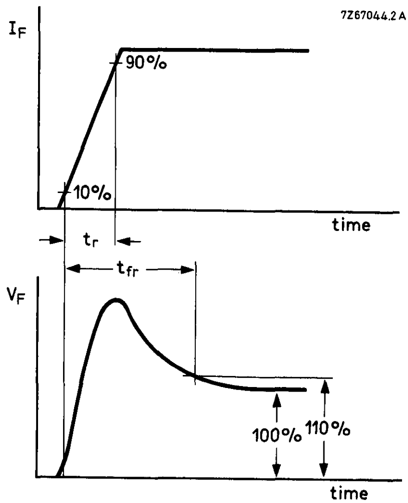


Fig.3 Definition of forward recovery time

* Measured under pulse conditions to avoid excessive dissipation.

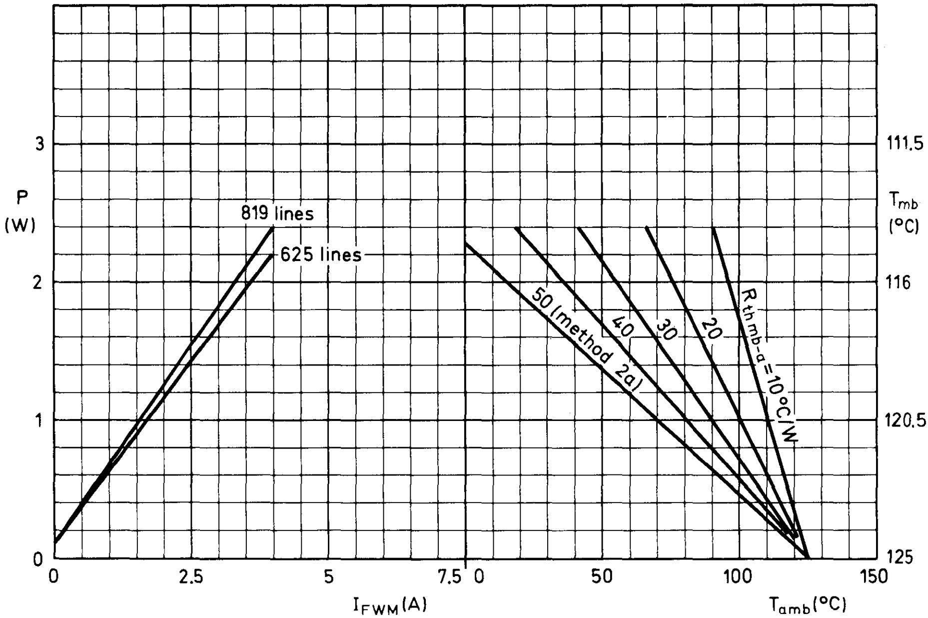


Fig.4 Interrelationship between the power dissipation (based on the waveforms shown in Fig.8) and the maximum permissible temperatures.
P = power dissipation including switching losses.

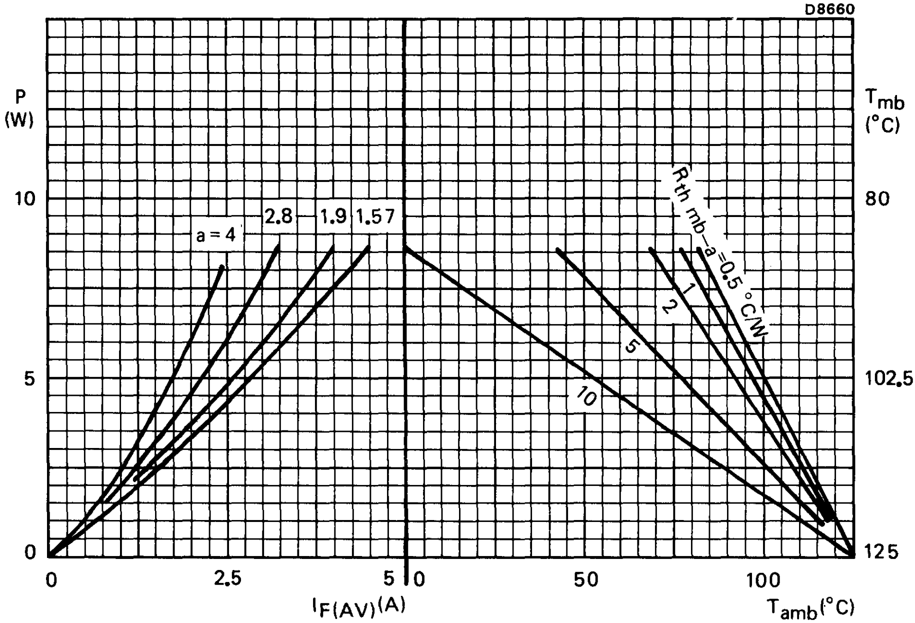


Fig.5 The right-hand part shows the interrelationship between the power dissipation (derived from the left-hand part) and the maximum permissible temperatures.
P = power dissipation including switching losses.
a = form factor = $I_{F(RMS)}/I_{F(AV)}$

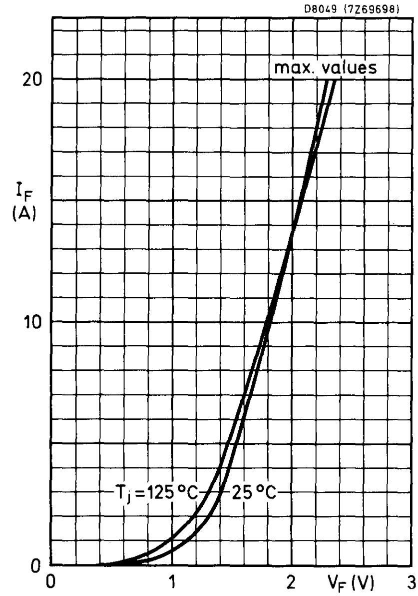

D8049 (7Z69698)
max. values
20
I_F
(A)
10
T_j = 125 °C
25 °C
0
0
1
2
V_F (V)
3

Fig.6

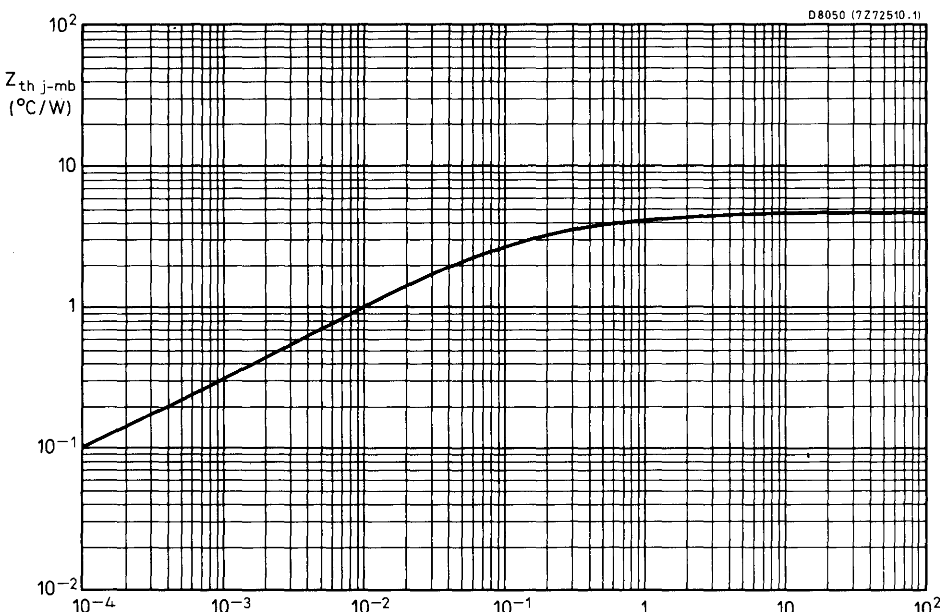
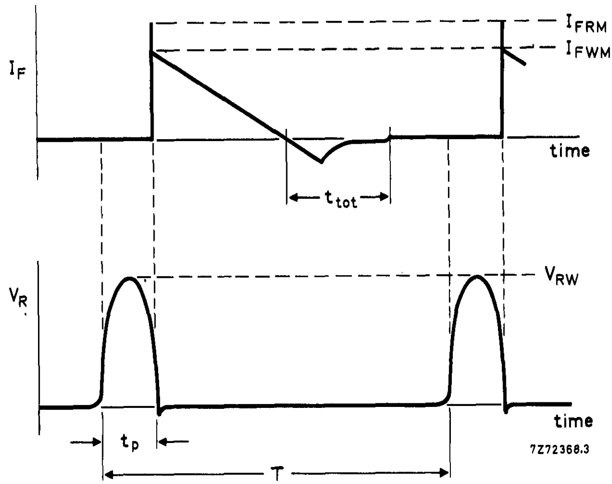

D8050 (7Z72510.1)
10^2
$Z_{th\ j\text{-}mb}$
(°C/W)
10
1
10^{-1}
10^{-2}
10^{-4}
10^{-3}
10^{-2}
10^{-1}
1
10
time (s)
10^2

Fig.7

APPLICATION INFORMATION



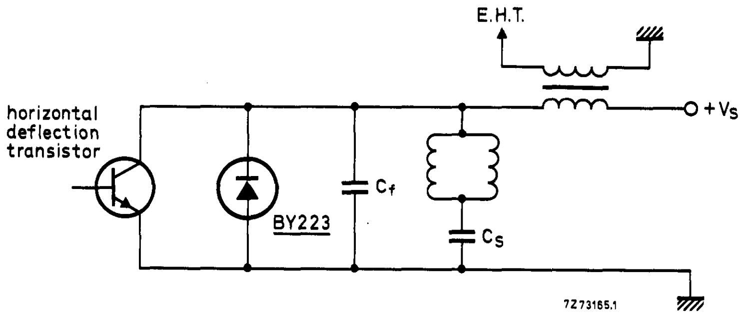


Fig.8 Basic circuit and waveforms