PARALLEL EFFICIENCY DIODES

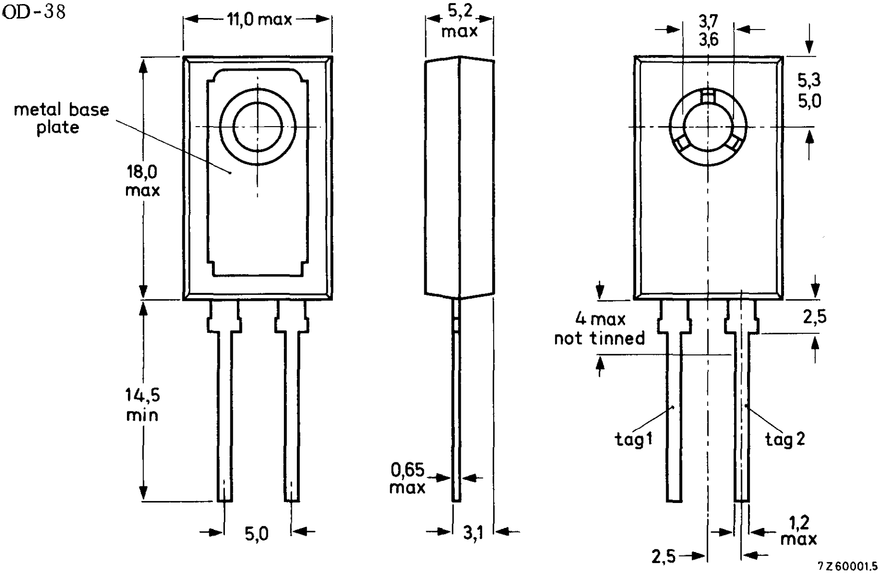
Silicon double-diffused rectifier diodes in plastic envelopes, intended for use as efficiency diode in thyristor horizontal deflection circuits of colour television receivers.
The devices feature low forward recovery voltage and non-snap-off characteristics which makes them particularly suitable for this application.

QUICK REFERENCE DATA

			BY277-600R	750R	
Repetitive peak reverse voltage	V_{RRM}	max.	600	750	V
Working peak forward current	I_{FWM}	max.	10		A
Repetitive peak forward current	I_{FRM}	max.	20		A
Reverse recovery time	t_{rr}	<	400		ns

MECHANICAL DATA (see also page 2) Dimensions in mm

SOD-38



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

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 device : washer
available on request : 56316 (mica insulating washer)

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

Voltages			BY277-600R	750R	
Non-repetitive peak reverse voltage	V_{RSM}	max.	600	800	V
Repetitive peak reverse voltage ($\delta \leq 0,01$)	V_{RRM}	max.	600	750	V
Working reverse voltage [1]	V_{RW}	max.	500	600	V

Currents

R.M.S. forward current	$I_{F(RMS)}$	max.	3	A
Working peak forward current up to T_{mb} = 112 °C	I_{FWM}	max.	10	A
Repetitive peak forward current	I_{FRM}	max.	20	A
Non-repetitive peak forward current	I_{FSM}	max.	50	A

Temperatures

Storage temperature	T_{stg}		−40 to +125	°C
Junction temperature	T_j	max.	125	°C

[1]) At $t_p \leq 20\ \mu s$; $\delta = t_p/T \leq 0,25$; see page 9.

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	4,5	°C/W
Transient thermal impedance (t = 1 ms)	$Z_{th\ j\text{-}mb}$	=	0,3	°C/W

Influence of mounting method

1. Heatsink mounted

From mounting base to heatsink

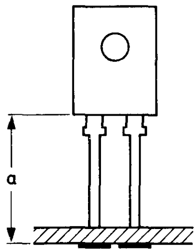
a. with heatsink compound	$R_{th\ mb\text{-}h}$	=	1,5	°C/W
b. with heatsink compound and 56316 mica washer	$R_{th\ mb\text{-}h}$	=	2,7	°C/W
c. without heatsink compound	$R_{th\ mb\text{-}h}$	=	2,7	°C/W
d. without heatsink compound; with 56316 mica washer	$R_{th\ mb\text{-}h}$	=	5	°C/W

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 cm² $R_{th\ j\text{-}a}$ = 50 °C/W
b. < 1 cm² $R_{th\ j\text{-}a}$ = 55 °C/W



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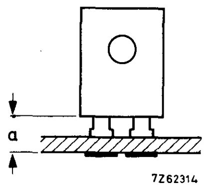
at a lead length a = 3 mm and with a copper laminate

c. > 1 cm² $R_{th\ j\text{-}a}$ = 55 °C
d. < 1 cm² $R_{th\ j\text{-}a}$ = 60 °C



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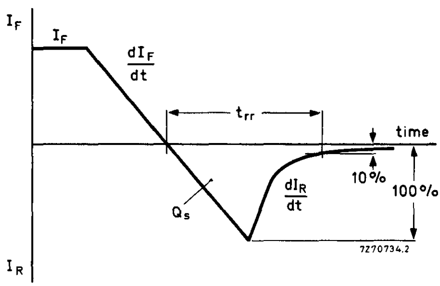
CHARACTERISTICS

Forward voltage				
I_F = 10 A; T_j = 25 °C	V_F	<	1,4	V 1)
Reverse current				
$V_R = V_{RWmax}$; T_j = 100 °C	I_R	<	0,2	mA
Reverse recovery when switched from				
I_F = 2 A to $V_R \geqslant$ 30 V; $-dI_F/dt$ = 20 A/µs; T_j = 25 °C Recovery charge	Q_s	<	0,9	µC
I_F = 1 A to $V_R \geqslant$ 30 V; $-dI_F/dt$ = 20 A/µs; T_j = 25 °C Recovery time	t_{rr}	<	400	ns
Maximum slope of the reverse recovery current				
(in horizontal deflection circuits) when switched from I_F = 5 A to $V_R \geqslant$ 30 V; with $-dI_F/dt$ = 1 A/µs; T_j = 25 °C	$\lvert dI_R/dt \rvert$	<	2	A/µs

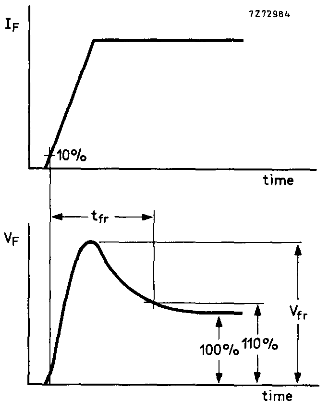


1) Measured under pulse conditions to avoid excessive dissipation.

CHARACTERISTICS (continued)

Forward recovery when switched to

I_F = 1 A; T_j = 25 °C				
Recovery time	t_{fr}	<	0,3	µs
Recovery voltage	V_{fr}	<	13	V
I_F = 20 mA; T_j = 25 °C				
Recovery time	t_{fr}	<	0,3	µs
Recovery voltage	V_{fr}	<	5	V



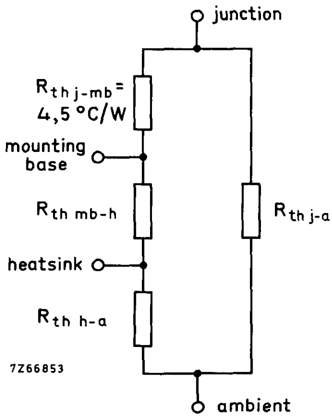
MOUNTING INSTRUCTIONS

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 devices 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.

OPERATING NOTES

Dissipation and heatsink considerations :

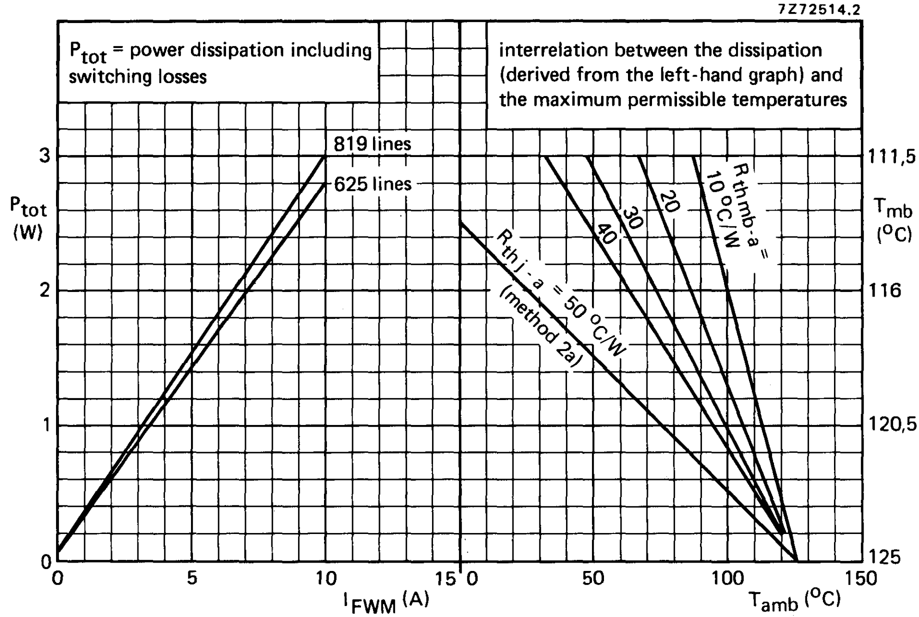
a. The various components of junction temperature rise above ambient are illustrated below :



b. The method of using the graph on page 7 is as follows :
Starting with the required current on the I_{FWM} axis, trace upwards to meet the appropriate 625/819-curve. Trace right horizontally and upwards from the appropriate value on the T_{amb} scale. The intersection determines the $R_{th\ mb-a}$.
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.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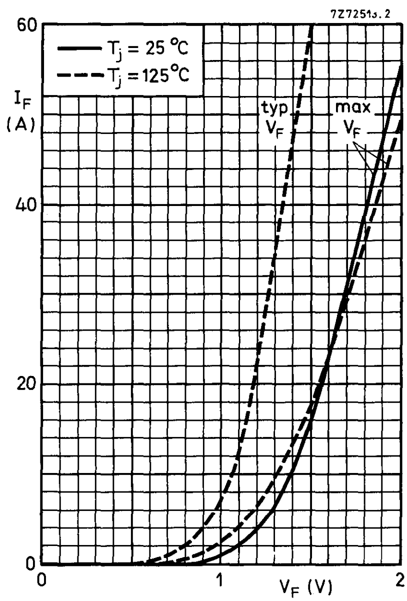
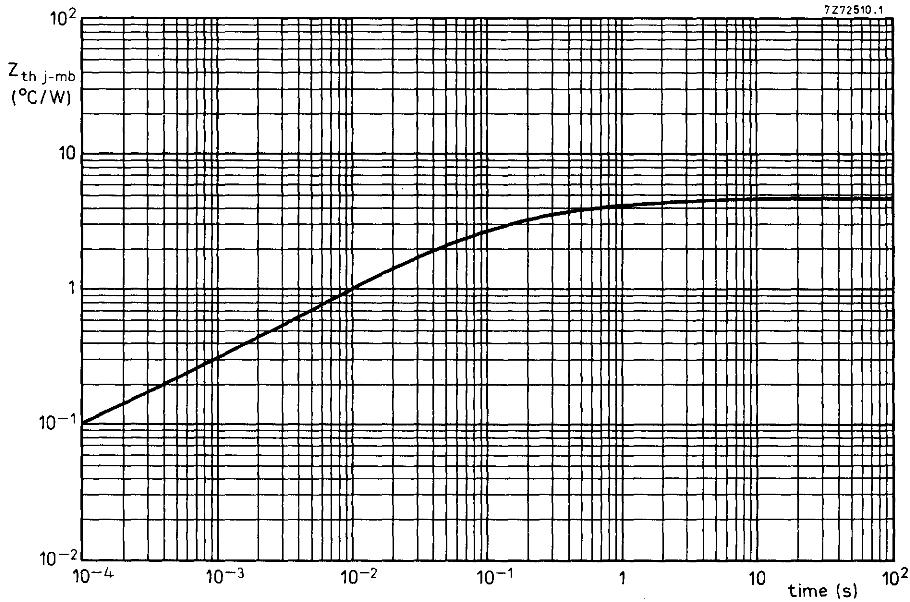
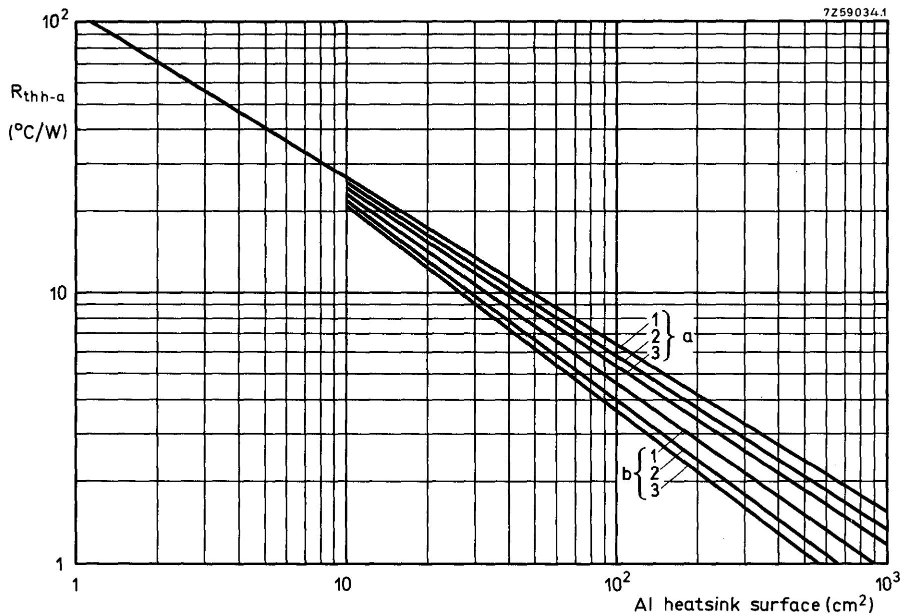
P_tot = power dissipation including switching losses
interrelation between the dissipation (derived from the left-hand graph) and the maximum permissible temperatures
819 lines
625 lines
P_tot (W)
I_FWM (A)
R_th j-a = 50 °C/W (method 2a)
40
30
20
R_th mb-a = 10 °C/W
T_mb (°C)
111,5
116
120,5
125
T_amb (°C)
0
50
100
150
0
5
10
15
1
2
3

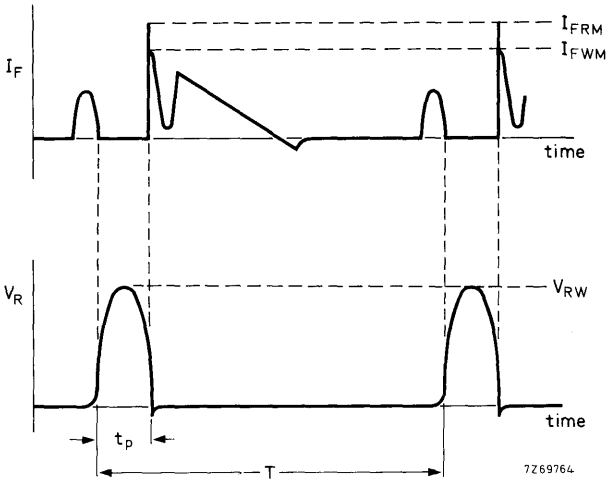

7Z72515.2
T_j = 25 °C
T_j = 125 °C
I_F (A)
typ V_F
max V_F
V_F (V)
0
20
40
60
1
2

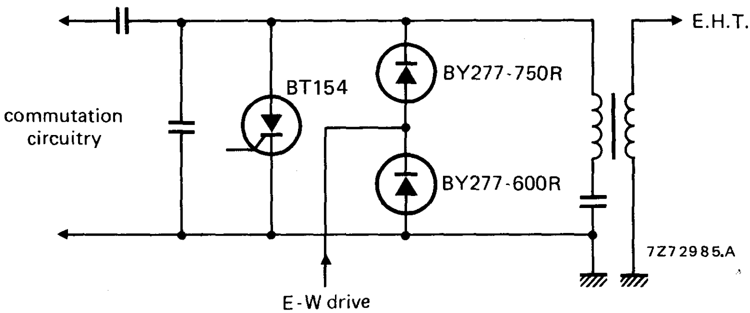




Thermal resistance $R_{th\,h-a}$ from aluminium heatsink to ambient (free air) versus heat-sink surface (one side). 1, 2 and 3 are thicknesses in mm, a is for a bright surface, b is for a black surface.

APPLICATION INFORMATION





Basic circuit and waveforms