
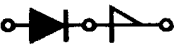


Breakover Diode Modules

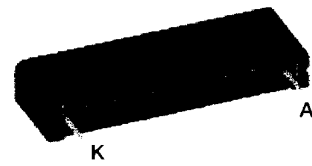
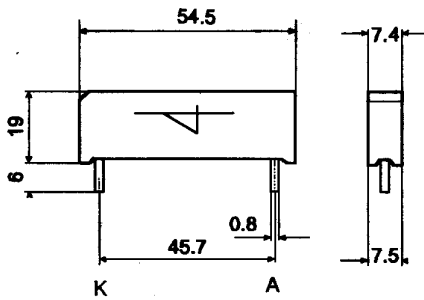
Version: R 

Version: RD 

V <sub>BO</sub> V	Standard Types	BOD - Elements	V <sub>BO</sub> V	Standard Types	BOD - Elements	V <sub>BO</sub> V	Standard Types	BOD - Elements
1200 ±50	IXBOD 1 -12R(D)	2	2200 ±50	IXBOD 1 -22R(D)	3	3400 ±100	IXBOD 1 -34R	4
1300 ±50	IXBOD 1 -13R(D)	2	2300 ±50	IXBOD 1 -23R(D)	3	3600 ±100	IXBOD 1 -36R	4
1400 ±50	IXBOD 1 -14R(D)	2	2400 ±50	IXBOD 1 -24R(D)	3	3800 ±100	IXBOD 1 -38R	4
1500 ±50	IXBOD 1 -15R(D)	2	2500 ±50	IXBOD 1 -25R(D)	3	4000 ±100	IXBOD 1 -40R	4
1600 ±50	IXBOD 1 -16R(D)	2	2600 ±100	IXBOD 1 -26R(D)	3	4200 ±100	IXBOD 1 -42R	4
1700 ±50	IXBOD 1 -17R(D)	2	2800 ±100	IXBOD 1 -28R(D)	3			
1800 ±50	IXBOD 1 -18R(D)	2	3000 ±100	IXBOD 1 -30R(D)	3			
1900 ±50	IXBOD 1 -19R(D)	2	3200 ±100	IXBOD 1 -32R(D)	3			
2000 ±50	IXBOD 1 -20R(D)	2						
2100 ±50	IXBOD 1 -21R(D)	2						

Symbol	Test Conditions	2 BODs	3 BODs	4 BODs	2-3 BODs D-Version	
I <sub>D</sub>	T <sub>(M)</sub> = 125°C; V = 0,8x V <sub>BO</sub>	100	100	100	100	µA
I <sub>RMS</sub>	f = 50 Hz; T <sub>amb</sub> = 50°C connection pins soldered to printed circuit (conductor 0,035x2mm)	2.0	1.4	1.1	0.3	A
I <sub>AVM</sub>		1.25	0.9	0.7	0.2	A
I <sub>SM</sub>	t <sub>p</sub> = 0.1 ms; T <sub>amb</sub> = 50°C non repetitive	200	200	200	50	A
I <sup>2</sup> t	t <sub>p</sub> = 0.1 ms; T <sub>amb</sub> = 50°C	2	2	2	0.125	A <sup>2</sup> s
V <sub>T</sub>	T <sub>(M)</sub> = 125°C; I <sub>T</sub> = 5A	3.4	5.1	6.8	27	V
V <sub>(TO)</sub>	For power-loss calculations only	2.2	3.3	4.4	17.5	V
r <sub>T</sub>	T <sub>(M)</sub> = 125°C	0.24	0.36	0.48	3	Ω
T <sub>amb</sub>		-40...+125	-40...+125	-40...+125	-40...+125	°C
T <sub>stg</sub>		-40...+125	-40...+125	-40...+125	-40...+125	°C
T <sub>(vj)m</sub>		125	125	125	125	°C
K <sub>T</sub>		2·10 <sup>-3</sup>	2·10 <sup>-3</sup>	2·10 <sup>-3</sup>	2·10 <sup>-3</sup>	K <sup>-1</sup>
K <sub>p</sub>		700	700	700	700	K/Ws
R <sub>thJA</sub>	- natural convection - with air speed 2 m/s	20 16	20 16	20 16	20 16	K/W K/W
Weight	typical	14	14	14	14	g

Symbol	Test Conditions	Characteristic Values both Versions R & RD	2 BODs	3 BODs	4 BODs	
I <sub>BO</sub>	T <sub>(M)</sub> = 25°C		15	15	15	mA
I <sub>H</sub>	T <sub>(M)</sub> = 25°C		30	30	30	mA
V <sub>H</sub>	T <sub>(M)</sub> = 25°C		4 - 8	4 - 8	4 - 8	V
(dv/dt) <sub>c</sub>	T <sub>(M)</sub> = 50°C; V <sub>D</sub> = 0.67·(V <sub>BO</sub> + 100V) - V <sub>BO</sub> bis 1500V - V <sub>BO</sub> 1600 - 2000V - V <sub>BO</sub> 2100 - 2500V - V <sub>BO</sub> 2600 - 3000V - V <sub>BO</sub> 3200 - 3400V - V <sub>BO</sub> 3600 - 4200V		> 1000 > 1500 - - -	- - > 2000 > 2500 -	- - - - > 3000 > 3500	V/µs V/µs V/µs V/µs V/µs V/µs
(di/dt) <sub>c</sub>	T <sub>(M)</sub> = 125°C; V <sub>D</sub> = V <sub>BO</sub> ; I <sub>T</sub> = 80A; f = 50 Hz		200	200	200	A/µs
t <sub>off</sub>	T <sub>(M)</sub> = 125°C V <sub>D</sub> = 0.67·V <sub>BO</sub> ; V <sub>R</sub> = 0V dv/dt <sub>(th.)</sub> = 200V/µs; I <sub>T</sub> = 80A; di/dt = -10A/µs		150	150	150	µs



Dimensions in mm (1 mm = 0.0394")

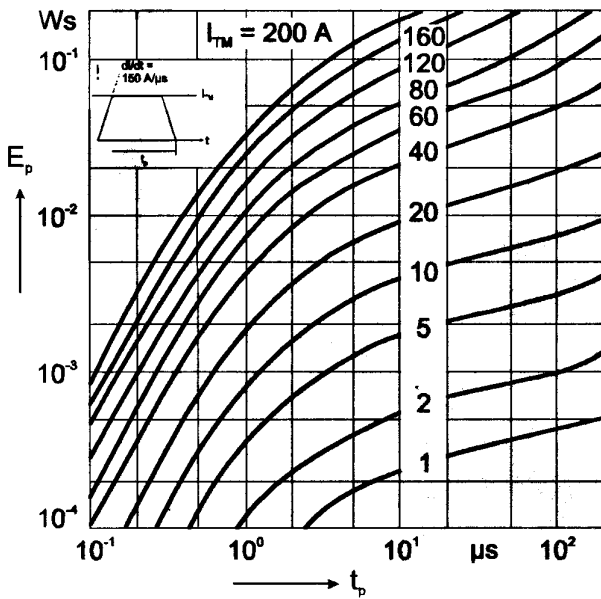


Fig. 5 Energy per pulse for single BOD element for trapezoidal wave current.  $E_p$  must be multiplied by number of elements for total energy.

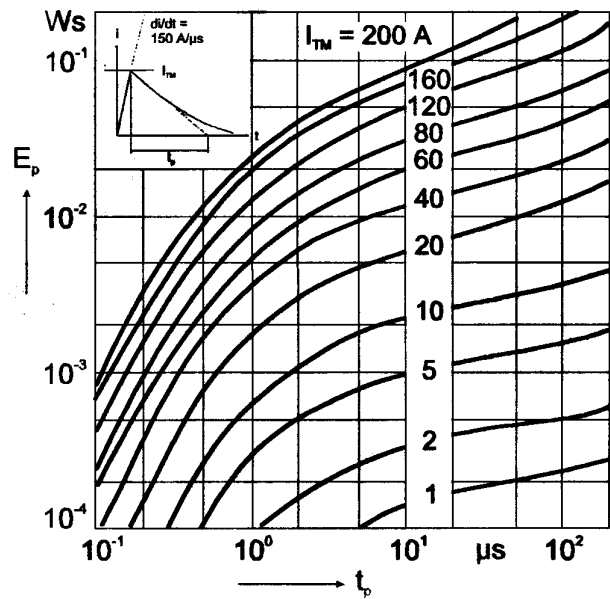


Fig. 6 Energy per pulse for single BOD element for exponentially decaying current pulse.  $E_p$  must be multiplied by number of elements for total energy.

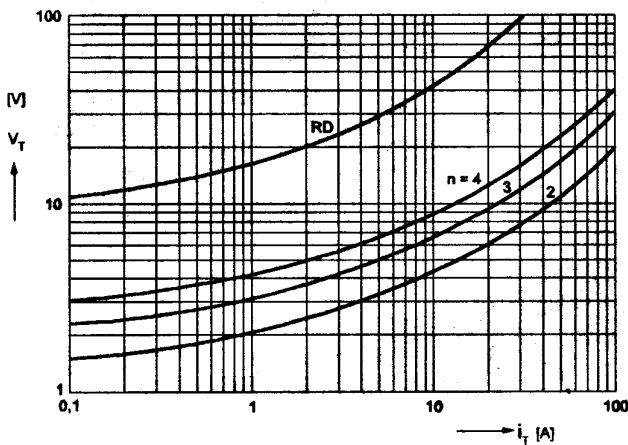


Fig. 7 On-state voltage at  $T_{(M)} = 125^\circ\text{C}$ .

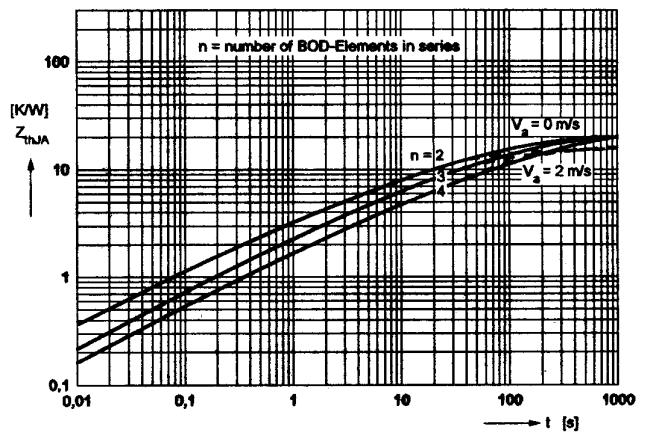
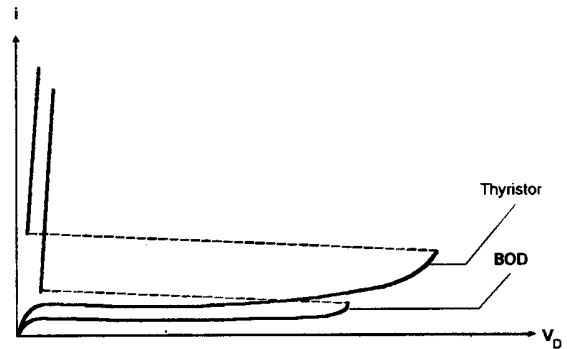


Fig. 8 Transient thermal resistance.

### Application

Protection of thyristors against overvoltages in forward direction.

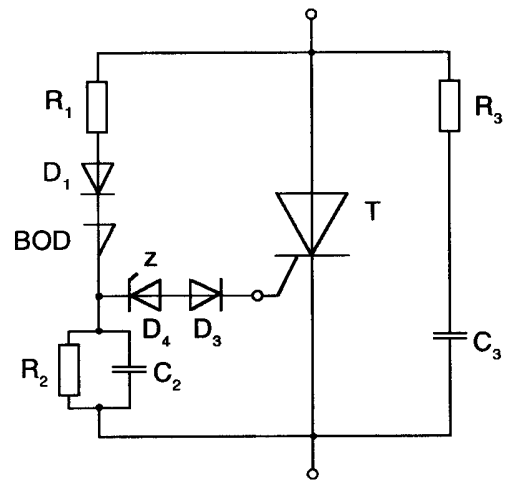
$$V_{BO}(T_{VJ}) = V_{BO,25^{\circ}C} [1 + KT(T_{VJ} - 25^{\circ}C)]$$



### Example of a circuit

A simple emergency triggering circuit.

- T : Thyristor
- R<sub>1</sub> : Current limiting resistance (0 - 200 Ω)
- D<sub>1</sub> : Series-diode (fast recovery diode)
- D<sub>3</sub> : Protection diode
- D<sub>4</sub> : Zener diode, typical V<sub>Z</sub> : 3-6 V
- R<sub>2</sub>, C<sub>2</sub> : Protection against parasitic triggering; recommended values:  
R<sub>2</sub> : 100 - 1000 Ω  
C<sub>2</sub> : 22 - 47 nF
- R<sub>3</sub>, C<sub>3</sub> : Snubber network of the thyristor



### Notice

1. A BOD element has a maximum reverse blocking voltage of 10V.
2. For higher reverse voltages a fast, soft recovery diode must be connected in series (Fig. 9). This diode must fulfill the conditions of Fig. 10.

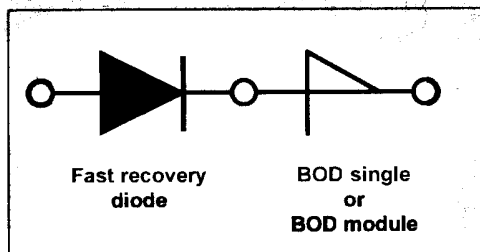


Fig. 9 BOD protection by a fast recovery diode.

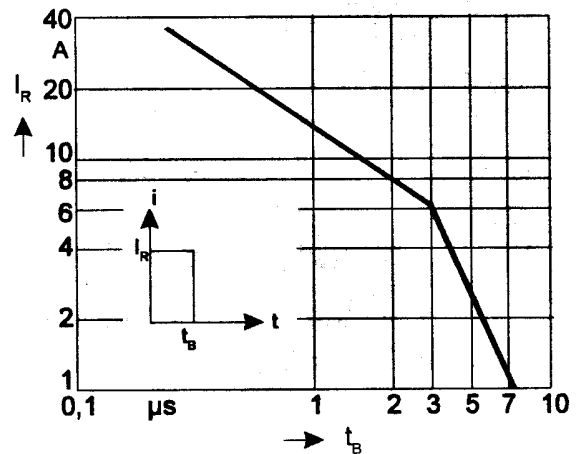


Fig. 10 Maximum peak value of the reverse current admissible for a given pulse-width t<sub>B</sub>, which is required for the suitable fast recovery series-diode.