Breakover diodes BR211 series

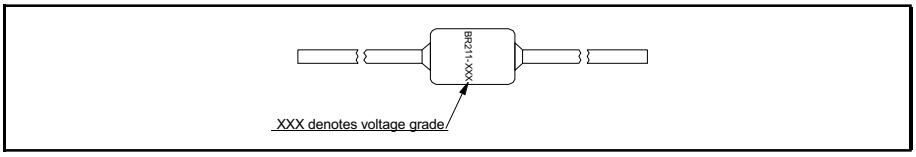
GENERAL DESCRIPTION

A range of bidirectional, breakover diodes in an axial, hermetically sealed, glass envelope. These devices feature controlled breakover voltage and high holding current together with high peak current handling capability. Typical applications include transient overvoltage protection in telecommunications equipment.

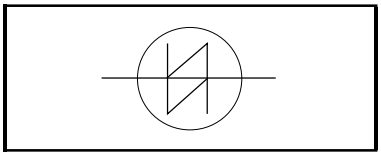
QUICK REFERENCE DATA

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
	BR211-140 to 280			
$V_{(BO)}$	Breakover voltage	140	280	V
I_H	Holding current	150	-	mA
I_{TSM}	Non-repetitive peak current	-	40	A

OUTLINE - SOD84



SYMBOL



LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_D	Continuous voltage		-	75% of $V_{(BO)typ}$	V
I_{TSM1}	Non repetitive peak current	10/320 µs impulse equivalent to 10/700 µs, 1.6 kV voltage impulse (CCITT K17)	-	40	A
I_{TSM2}	Non repetitive on-state current	half sine wave; t = 10 ms; T_j = 70 ˚C prior to surge	-	15	A
I^2t	I^2t for fusing	t_p = 10 ms	-	1.1	A^2s
dI_T/dt	Rate of rise of on-state current after $V_{(BO)}$ turn-on	t_p = 10 µs	-	50	A/µs
P_{tot}	Continuous dissipation	T_a = 25˚C	-	1.2	W
P_{TM}	Peak dissipation	t_p = 1 ms; T_a = 25˚C	-	50	W
T_{stg}	Storage temperature		-65	150	˚C
T_a	Operating ambient temperature	off-state	-	70	˚C
T_{vj}	Overload junction temperature	on-state	-	150	˚C

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j\text{-}e}$	Thermal resistance junction to envelope		-	22	-	K/W
$R_{th\ j\text{-}a}$	Thermal resistance junction to ambient	mounted as fig:12	-	105		K/W
$Z_{th\ j\text{-}a}$	Thermal impedance junction to ambient	t_p = 1 ms	-	2.62	-	K/W
$R_{th\ e\text{-}tp}$	Thermal resistance envelope to tie point	lead length = 5 mm	-	15	-	K/W
		lead length = 10 mm	-	30	-	K/W
$R_{th\ e\text{-}a}$	Thermal resistance envelope to ambient	lead length = 5 mm	-	440	-	K/W
		lead length = 10 mm	-	350	-	K/W
$R_{th\ tp\text{-}a}$	Thermal resistance tie point to ambient	mounted as fig:12	-	70	-	K/W
		mounted with 1 cm^2 copper laminate per lead.	-	55	-	K/W
		mounted with 2.25 cm2 copper laminate per lead	-	45	-	K/W

STATIC CHARACTERISTICS

T_j = 25 ˚C unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{TM} [1]	On-state voltage	I_{TM} = 2 A	-	-	2.5	V
$V_{(BR)}$	Avalanche voltage (min)	$I_{(BR)}$ = 10_{mA}				
$V_{(BO)}$	Breakover voltage (max)	$I \leq I_S$, t_p = 100 µs				
		BR211-140	123	140	157	V
		BR211-160	140	160	180	V
		BR211-180	158	180	202	V
		BR211-200	176	200	224	V
		BR211-220	193	220	247	V
		BR211-240	211	240	269	V
		BR211-260	228	260	292	V
		BR211-280	246	280	314	V
						V
						V
$S_{(br)}$	Temperature coefficient of $V_{(BR)}$		-	+0.1	-	%/K
I_H [2]	Holding current	T_j = 25˚C	150	-	-	mA
		T_j = 70˚C	100	-	-	mA
I_S [3]	Switching current	t_p = 100 µs	10	200	1000	mA
I_D [4]	Off-state current	V_D = 85% $V_{(BR)min}$, T_j = 70˚C	-	-	10	µA

1 Measured under pulsed conditions to avoid excessive dissipation

2 The minimum current at which the diode will remain in the on-state

3 The avalanche current required to switch the diode to the on-state

4 Measured at maximum recommended continuous voltage. Illuminance ≤ 500 lux (daylight); relative humidity < 65%.

DYNAMIC CHARACTERISTICS

T_j = 25 ˚C unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
dV_D/dt	Linear rate of rise of off-state voltage that will not trigger any device	$V_{(DM)}$ = 85% $V_{(BR)min}$; T_j = 70 ˚C	-	-	2000	V/µs
C_j	Off-state capacitance	V_D = 0 V; f = 1 kHz to 1 MHz	-	-	100	pF

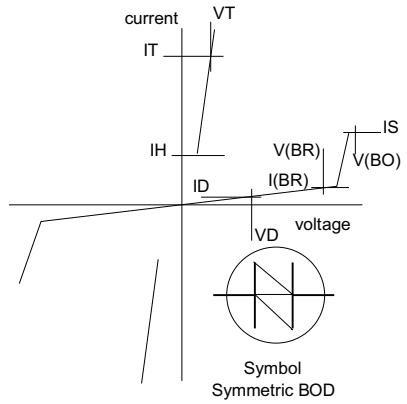


Fig.1. Definition of breakover diode characteristics.

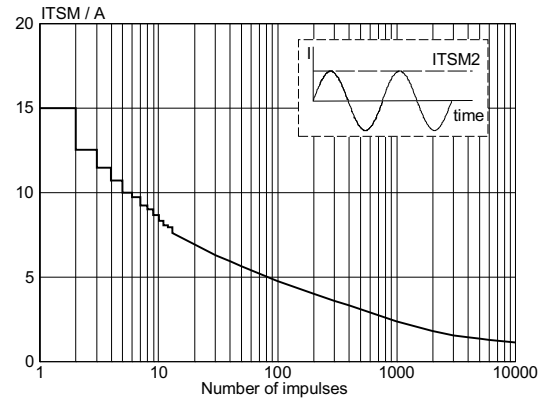


Fig.3. Maximum permissible non-repetitive on-state current based on sinusoidal currents; f = 50 Hz; device triggered at the start of each pulse; T_j = 70˚C prior to surge.

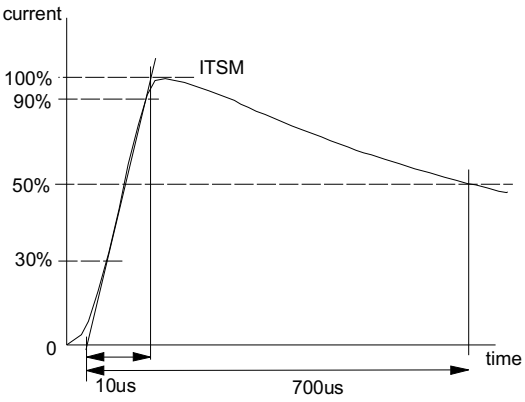


Fig.2. Test waveform for high voltage impulse (I_{TSM1}) according to CCITT vol IX-Rec K17.

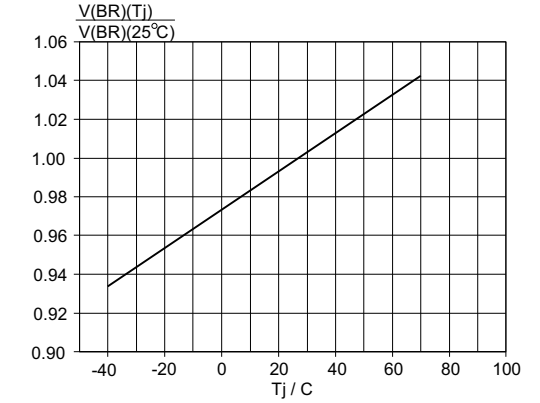


Fig.4. Normalised avalanche breakdown voltage $V_{(BR)}$ and $V_{(BO)}$ as a function of temperature.

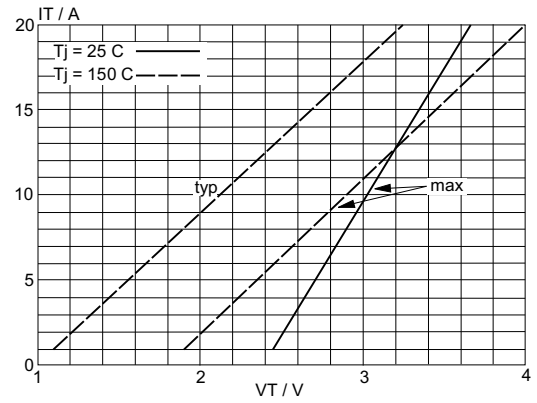


Fig.5. On-state current as a function of on-state voltage; t_p = 200 µs to avoid excessive dissipation.

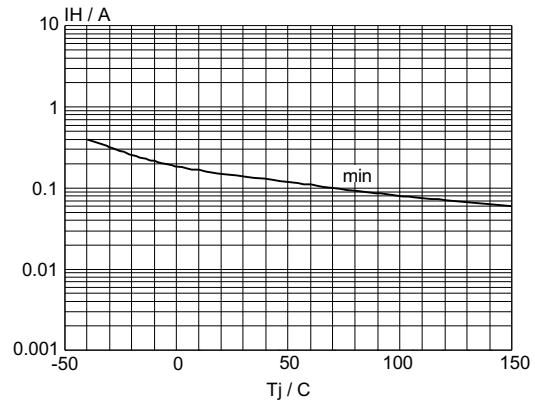


Fig.8. Minimum holding current as a function of temperature.

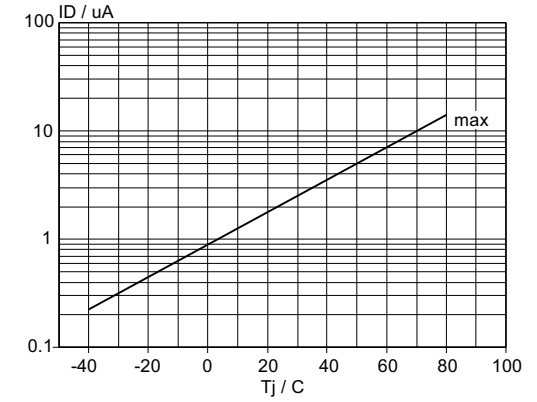


Fig.6. Maximum off-state current as a function of temperature.

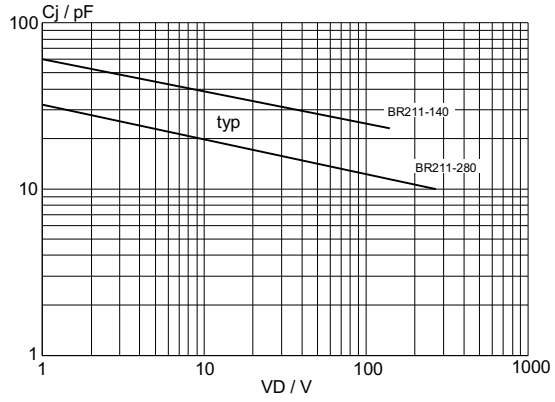


Fig.9. Typical junction capacitance as a function of off-state voltage, f = 1 MHz; T_j = 25˚C.

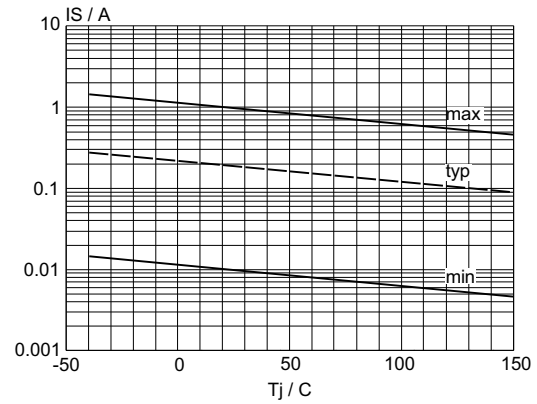


Fig.7. Switching current as a function of junction temperature.

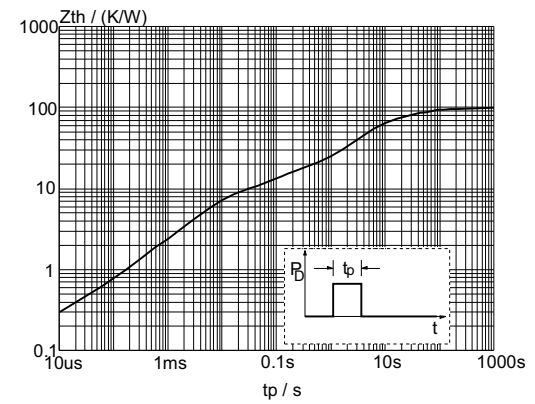


Fig.10. Transient thermal impedance. $Z_{th\ j\text{-}a}$ = f(t_p).

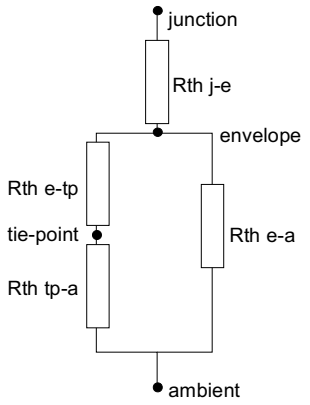


Fig.11. Components of thermal resistance,

$$Rthj-a = Rthj-e + \frac{Rthe-a.(Rthe-tp + Rthtp-a)}{(Rthe-a + Rthe-tp + Rthtp-a)}$$

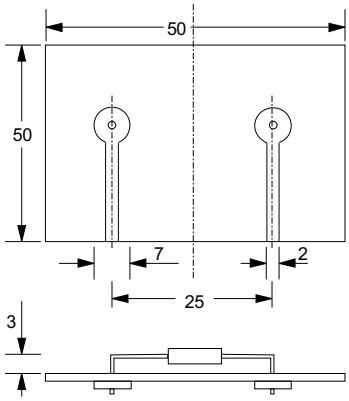


Fig.12. Mounting on pcb used for R_{th} measurement.

MECHANICAL DATA

Dimensions in mm

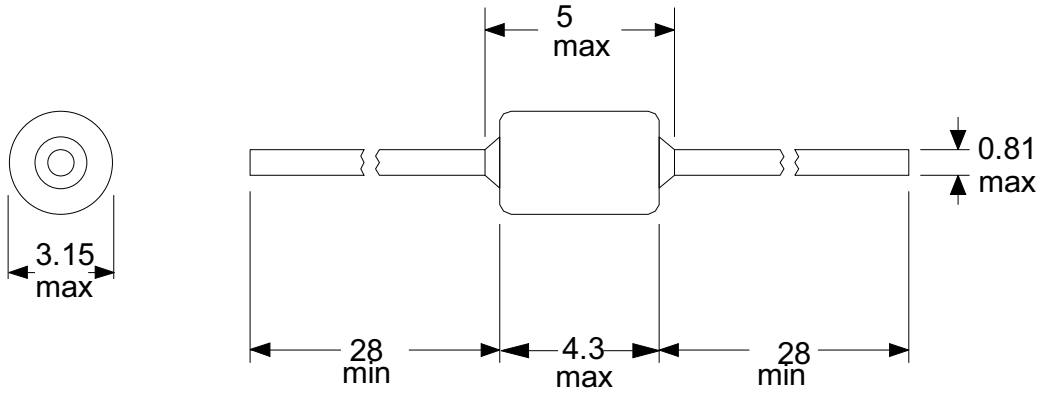


Fig.13. SOD84.

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values are given in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of this specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

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