TOSHIBA Schottky Barrier Diode

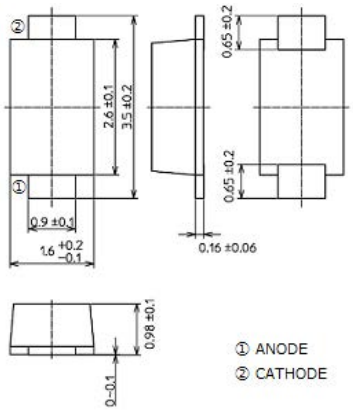
CRS12

Switching Mode Power Supply Applications
(Output voltage: ≤12 V)

DC/DC Converter Applications

- Repetitive peak reverse voltage : V_{RRM} = 60 V
- Average forward current : $I_{F\ (AV)}$ = 1 A
- Peak forward voltage : V_{FM} = 0.58 V (max)
- Small, thin package suitable for high-density board assembly
  Toshiba Nickname: "S-FLAT™"

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	3-2A1S

Weight: 0.013 g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Repetitive peak reverse voltage	V_{RRM}	60	V
Average forward current	$I_{F\ (AV)}$	1 (Note 1)	A
Non-repetitive peak forward surge current	I_{FSM}	20 (50 Hz)	A
Junction temperature	T_j	−40 to 150	°C
Storage temperature range	T_{stg}	−40 to 150	°C

Note 1: Ta = 73 °C Device mounted on a ceramic board
Board size : 50 mm × 50 mm
Soldering land size : 2 mm × 2 mm
Board thickness : 0.64 mm
Rectangular waveform (α = 180°), V_R = 30 V

Note 2: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

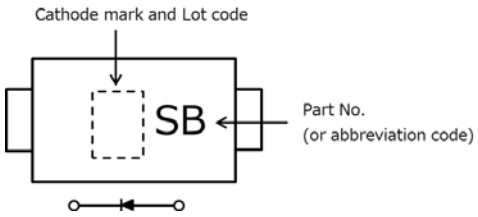
Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Peak forward voltage	$V_{FM\ (1)}$	I_{FM} = 0.7 A (pulse test)	—	0.48	—	V
	$V_{FM\ (2)}$	I_{FM} = 1 A (pulse test)	—	0.52	0.58	
Repetitive peak reverse current	$I_{RRM\ (1)}$	V_{RRM} = 5 V (pulse test)	—	0.4	—	μA
	$I_{RRM\ (2)}$	V_{RRM} = 60 V (pulse test)	—	4	100	
Junction capacitance	C_j	V_R = 10 V, f = 1 MHz	—	40	—	pF
Thermal resistance (junction to ambient)	$R_{th\ (j\text{-}a)}$	Device mounted on a ceramic board board size : 50 mm × 50 mm soldering land size : 2 mm × 2 mm board thickness : 0.64 mm	—	—	70	°C/W
		Device mounted on a glass-epoxy board board size : 50 mm × 50 mm soldering land size : 6 mm × 6 mm board thickness : 1.6 mm	—	—	140	
		Device mounted on a glass-epoxy board board size : 50 mm × 50 mm soldering land size : 1.2 mm × 1.2 mm board thickness : 1.6 mm	—	—	240	
Thermal resistance (junction to lead)	$R_{th\ (j\text{-}\ell)}$	—	—	—	20	°C/W

Start of commercial production
2002-12

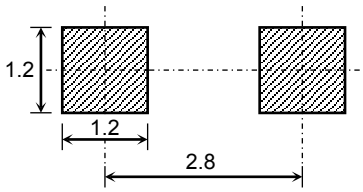
Marking

Abbreviation Code	Part No.
SB	CRS12



Land pattern dimensions for reference only

Unit: mm



Handling Precaution

1) Schottky barrier diodes (SBDs) have reverse current greater than other types of diodes. This makes SBDs more vulnerable to damage due to thermal runaway under high-temperature and high-voltage conditions. Thus, both forward and reverse power losses of SBDs should be considered for thermal and safety design.

2) The absolute maximum ratings denote the absolute maximum ratings, which are rated values that must not be exceeded during operation, even for an instant. The following are the general derating methods that we recommend for when designing a circuit incorporating this device.

   V_{RRM}: We recommend that the worst case voltage, including surge voltage, be no greater than 80% of the absolute maximum rating of V_{RRM} for a DC circuit and no greater than 50% of that of V_{RRM} for an AC circuit. V_{RRM} has a temperature coefficient of 0.1%/°C. Take this temperature account coefficient into when designing a device for operation at low temperatures.

   $I_{F(AV)}$: We recommend that the worst-case current be no greater than 80% of the absolute maximum rating of $I_{F(AV)}$ and that the worst-case junction temperature, T_j, be kept below 140°C. When using this device, allow margins, referring to the $T_{a(max)}$ - $I_{F(AV)}$ curve.

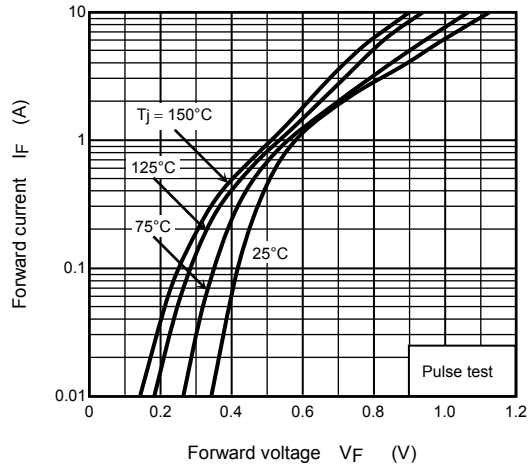
   I_{FSM}: This rating specifies peak non-repetitive forward surge current. This only applies to an abnormal operation, which seldom occurs during the lifespan of a device.

   T_j: Derate device parameters in proportion to this rating in order to ensure high reliability. We recommend that the junction temperature (T_j) of a device be kept below 140°C.

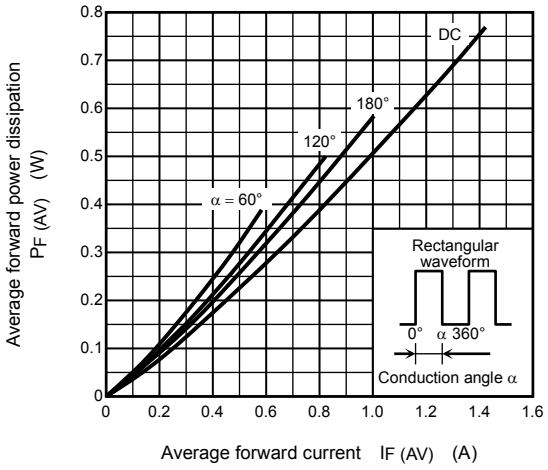
3) Thermal resistance (junction-to-ambient) varies with the mounting conditions of a device on a circuit board. An appropriate thermal resistance value should be used, considering the heat sink, circuit board design and soldering land size.

4) For other design considerations, see the Rectifiers databook or the Toshiba website.

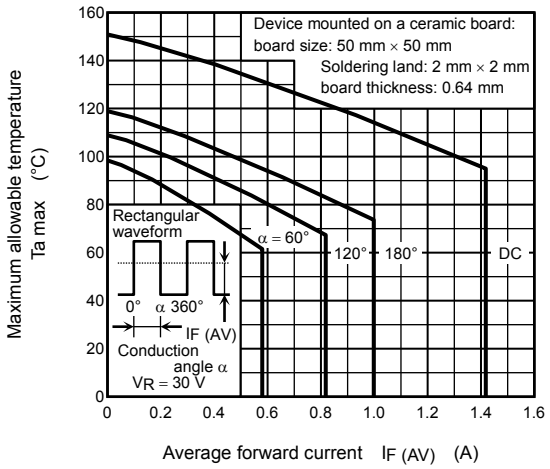
$I_F - V_F$



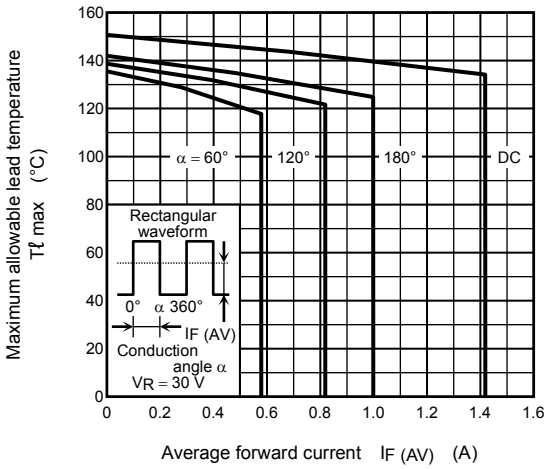
$P_{F\,(AV)} - I_{F\,(AV)}$



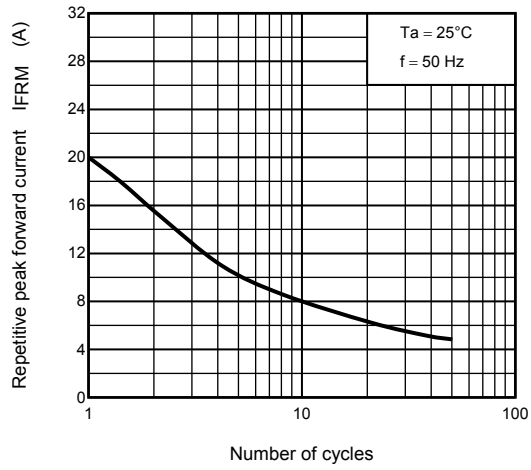
Ta max – IF (AV)



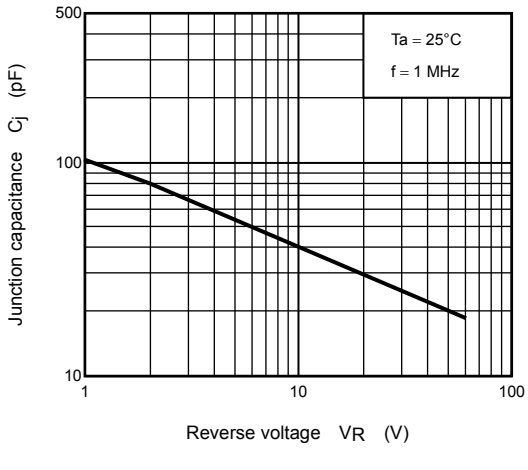
$T\ell$ max – $I_{F\,(AV)}$



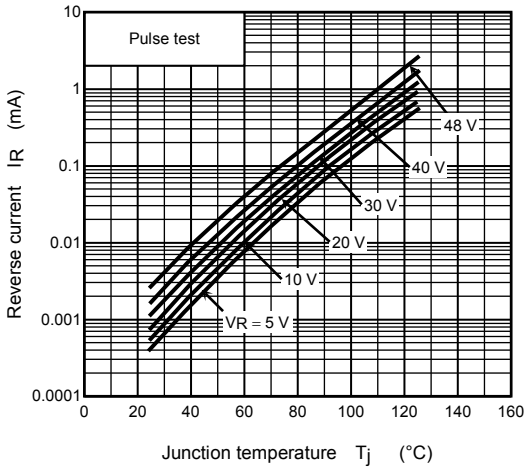
Repetitive peak forward current



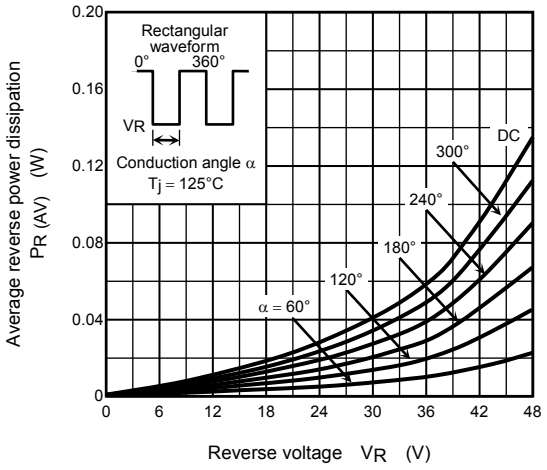
$C_j - V_R$ (typ.)



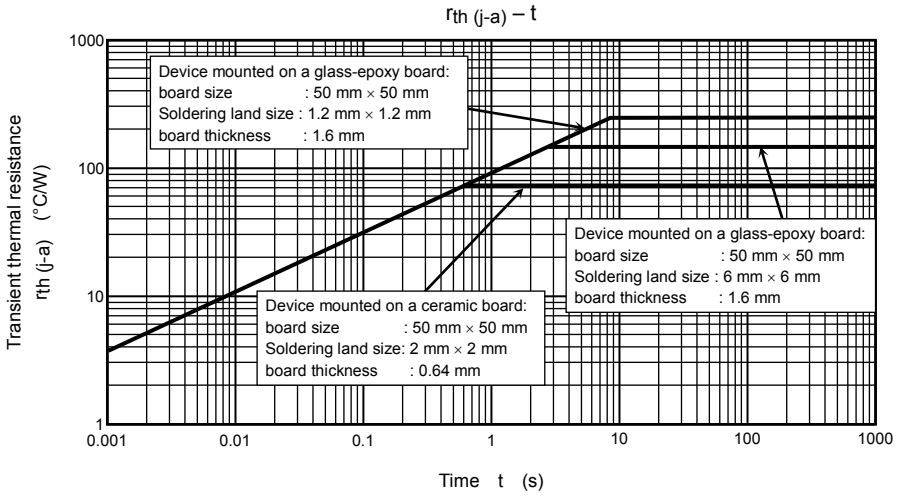
$I_R - T_j$ (typ.)



$P_{R\,(AV)} - V_R$ (typ.)



$r_{th\,(j-a)} - t$



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