TOSHIBA Schottky Barrier Diode

CMS01

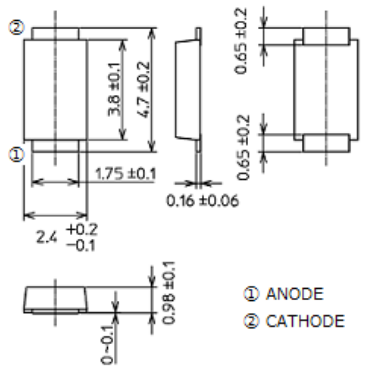
DC-DC Converters

Radio-Frequency Rectification in Switching Regulators

Reverse-Current Protection in Mobile Devices

- Repetitive peak reverse voltage : V_{RRM} = 30 V
- Average forward current : $I_{F\ (AV)}$ = 3.0 A
- Peak forward voltage : V_{FM} = 0.37 V (max)
- Suitable for high-density board assembly due to the use of a small
  Toshiba Nickname: M−FLAT™

Unit: mm



JEDEC	―
JEITA	―
TOSHIBA	3-4E1S

Weight: 0.023 g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Repetitive peak reverse voltage	V_{RRM}	30	V
Average forward current	$I_{F\ (AV)}$	3.0 (Note 1)	A
Non-repetitive peak forward surge current	I_{FSM}	40 (50 Hz)	A
Junction temperature	T_j	−40 to 125	°C
Storage temperature	T_{stg}	−40 to 150	°C

Note 1: T_ℓ = 68.6°C: Rectangular waveform (α = 180°), V_R = 15 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).

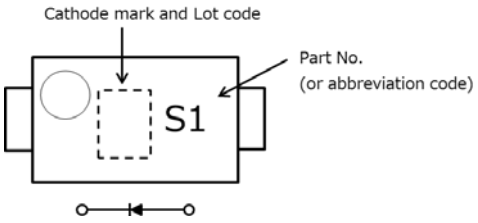
Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Peak forward voltage	$V_{FM\ (1)}$	I_{FM} = 0.5 A (pulse test)	―	0.25	―	V
	$V_{FM\ (2)}$	I_{FM} = 1.0 A (pulse test)	―	0.27	―	
	$V_{FM\ (3)}$	I_{FM} = 3.0 A (pulse test)	―	0.33	0.37	
Repetitive peak reverse current	$I_{RRM\ (1)}$	V_{RRM} = 5 V (pulse test)	―	0.15	―	mA
	$I_{RRM\ (2)}$	V_{RRM} = 30 V (pulse test)	―	1.8	5.0	
Junction capacitance	C_j	V_R = 10 V, f = 1 MHz	―	190	―	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	―	―	60	°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	―	―	135	
Thermal resistance (junction to lead)	$R_{th\ (j\text{-}\ell)}$	―	―	―	16	

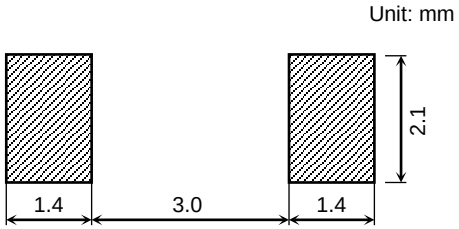
Start of commercial production
2000-07

Marking

Abbreviation Code	Part No.
S1	CMS01



Land pattern dimensions for reference only



Handling Precaution

1) Schottky barrier diodes have reverse current characteristic compared to the other diodes.
There is a possibility SBD may cause thermal runaway when it is used under high temperature or high voltage. This device is V_F-I_{RRM} trade-off type, lower V_F higher I_{RRM}; therefore, thermal runaway might occur when voltage is applied. Please take forward and reverse loss into consideration during design.

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

   V_{RRM}: Use this rating with reference to the above. V_{RRM} has a temperature coefficient of 0.1%/°C. Take this temperature coefficient into account designing a device at low temperature.

   $I_{F(AV)}$: We recommend that the worst case current be no greater than 80% of the absolute maximum rating of $I_{F(AV)}$ and T_j be below 100°C. When using this device, take the margin into consideration by using an allowable T_ℓ max - $I_{F(AV)}$ curve.

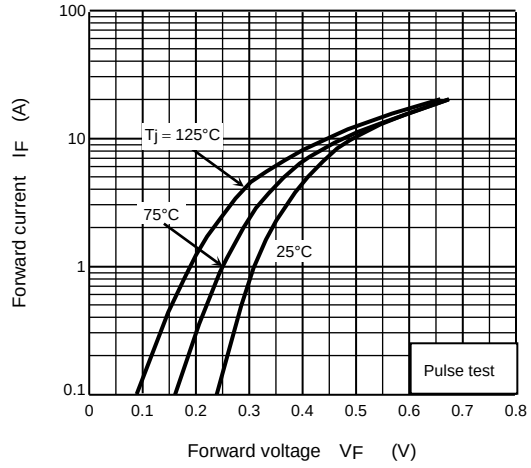
   I_{FSM}: This rating specifies the non-repetitive peak current. This is only applied for an abnormal operation, which seldom occurs during the lifespan of the device.

   T_j: Derate this rating when using a device in order to ensure high reliability. We recommend that the device be used at a T_j of below 100°C.

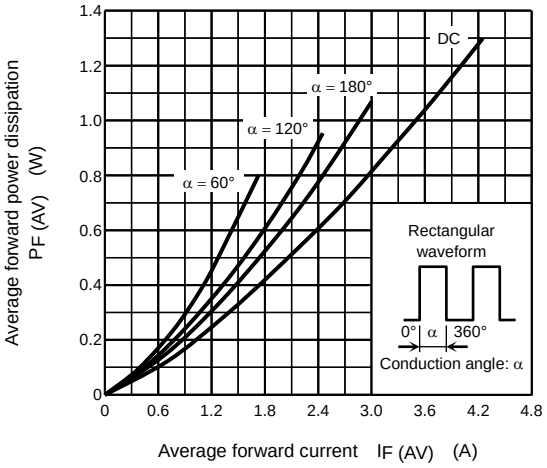
3) Thermal resistance between junction and ambient fluctuates depending on the device's mounting condition. When using a device, please design a circuit board and a soldering land size to match the appropriate thermal resistance value.

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

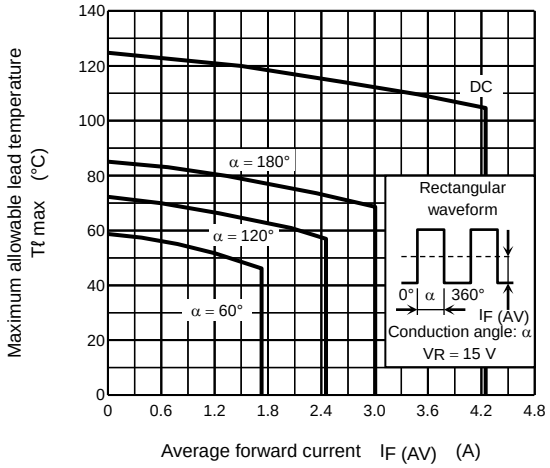
$I_F - V_F$



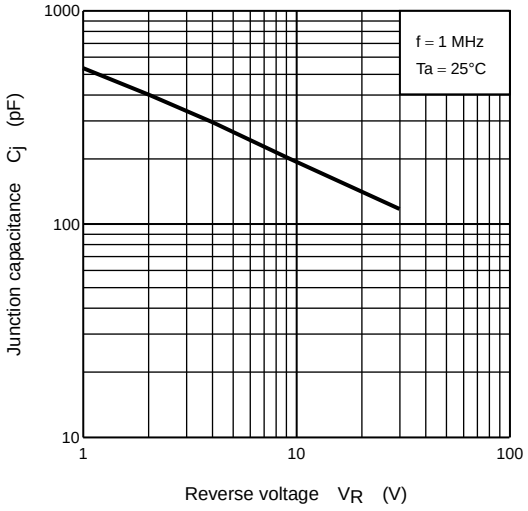
$P_{F\,(AV)} - I_{F\,(AV)}$



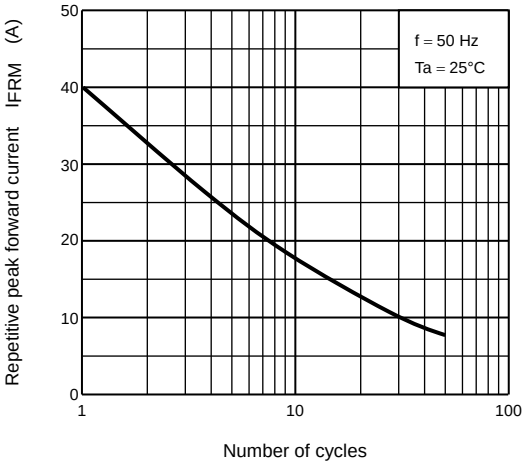
T_ℓ max – $I_{F\,(AV)}$



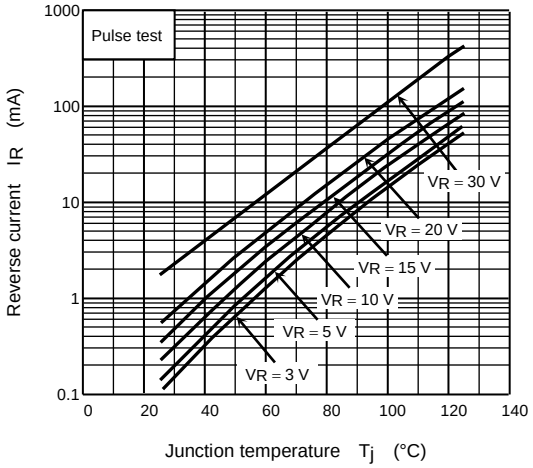
$C_j - V_R$ (typ.)



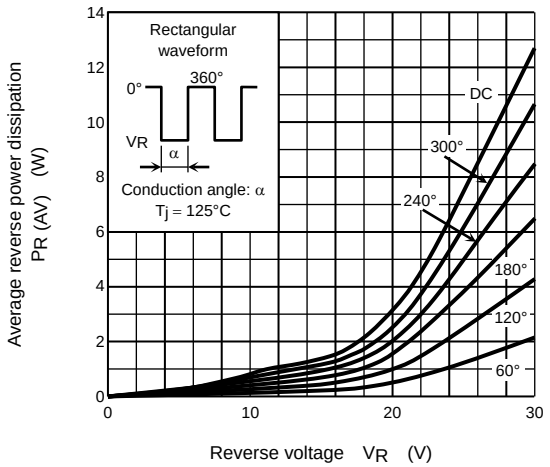
Repetitive peak forward current



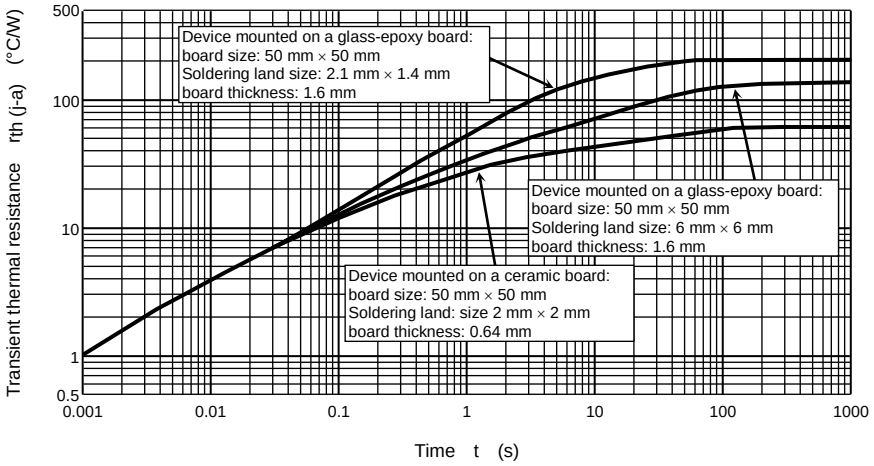
$I_R - T_j$ (typ.)



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



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



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