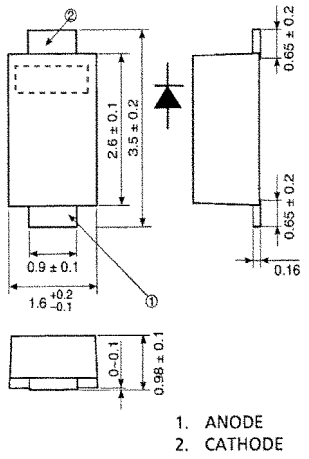
TOSHIBA Fast Recovery Diode Silicon Diffused Type

CRF03

Switching Mode Power Supply Applications

- Repetitive peak reverse voltage: V_{RRM} = 600 V
- Average forward current: $I_{F\ (AV)}$ = 0.7 A
- Low forward voltage: V_{FM} = 2.0 V (max.)
- Very fast reverse-recovery time: t_{rr} = 100 ns (max.)
- Suitable for compact assembly due to its small surface-mount package, the "S−FLAT™" (Toshiba package name)

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	3-2A1A

Weight: 0.013 g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Repetitive peak reverse voltage	V_{RRM}	600	V
Average forward current	$I_{F(AV)}$	0.7 (Note 1)	A
Peak one-cycle surge forward current (non-repetitive)	I_{FSM}	10 (50 Hz)	A
Junction temperature	T_j	−40~150	°C
Storage temperature range	T_{stg}	−40~150	°C

Note 1: Ta = 76°C: Device mounted on a ceramic board
Board size: 50 mm × 50 mm,
Soldering Land size: 2 mm × 2 mm
Board thickness: 0.64 t
Rectangular waveform (α = 180°)

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).

Start of commercial production
2003-12

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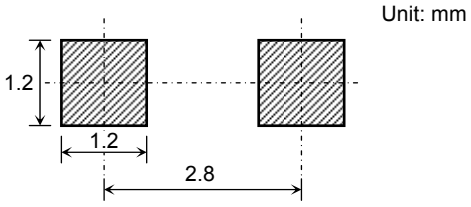
Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Peak forward voltage	V_{FM}	I_{FM} = 0.7 A	—	1.5	2.0	V
Repetitive peak reverse current	I_{RRM}	V_{RRM} = 600 V	—	—	50	μA
Reverse recovery time	t_{rr}	I_F = 1 A, di/dt = −30 A/μs	—	—	100	ns
Thermal resistance	$R_{th\ (j\text{-}a)}$	Device mounted on a ceramic board (board size: 50 mm × 50 mm) (soldering land: 2 mm × 2 mm) (board thickness: 0.64 t)	—	—	70	°C/W
		Device mounted on a glass-epoxy board (board size: 50 mm × 50 mm) (soldering land: 6 mm × 6 mm) (board thickness: 1.6 t)	—	—	140	
		Device mounted on a glass-epoxy board (board size: 50 mm × 50 mm) (soldering land: 1.2 mm × 1.2 mm) (board thickness: 1.6 t)	—	—	240	
Thermal resistance (junction to lead)	$R_{th\ (j\text{-}\ell)}$	—	—	—	20	°C/W

Marking

Abbreviation Code	Part No.
F3	CRF03

Standard Soldering Pad



Handling Precaution

The absolute maximum ratings mean the absolute maximum ratings, which are rated values and must not be exceeded during operation, even for an instant. The followings are the general derating method that we recommend for designing a circuit using this device.

VRRM: We recommend that the worst-case voltage, including surge voltage, be no greater than 80% of the absolute maximum rating of VRRM for a DC circuit; and no greater than 50% of that of VRRM for an AC circuit.
VRRM has a temperature coefficient (0.1%/℃). Be sure to take this temperature coefficient into account when designing a device at low temperature.

IF(AV): We recommend that the worst case current be no greater than 80% of the absolute maximum rating of IF(AV). Carry out sufficient heat design. If it is not possible to design a circuit with excellent heat radiation, set a margin by using an allowable Tamax-IF (AV) curve.

This rating specifies the non-repetitive peak current in one cycle of a 50-Hz sine wave, condition angle 180°. Therefore this applies only to abnormal operation, which seldom occurs during the lifespan of a device.

For this device, we recommend a Tj of below 120℃ under the worst load and heat radiation conditions.

Thermal resistance between junction and ambient fluctuates depending on the mounting condition of the device. When using the device, be sure to design the circuit board and soldering land size to match the appropriate thermal resistance value.

Refer to the Rectifier databook for further information.

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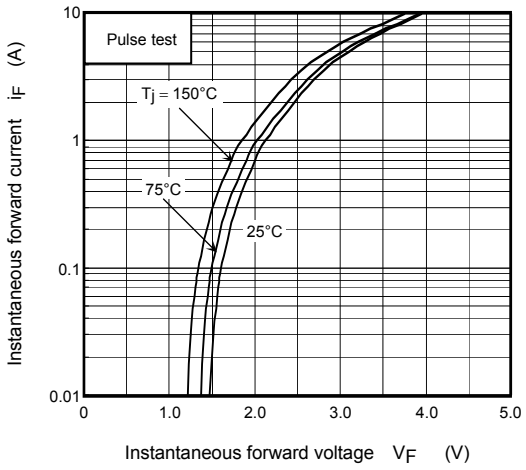
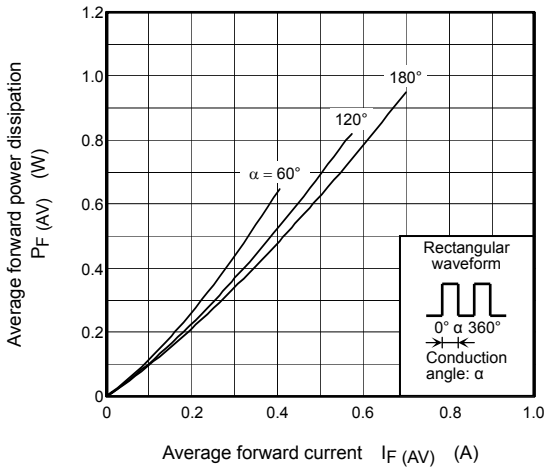
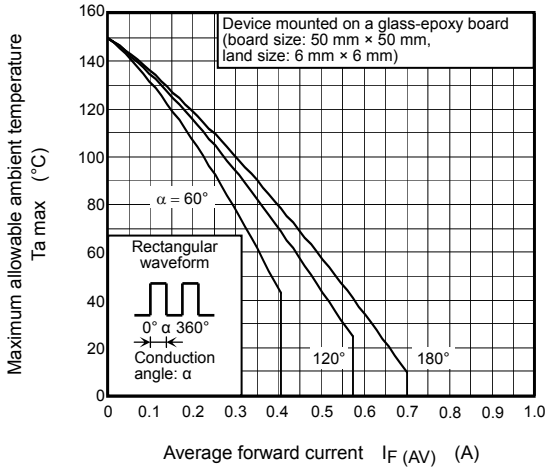
$i_F - v_F$



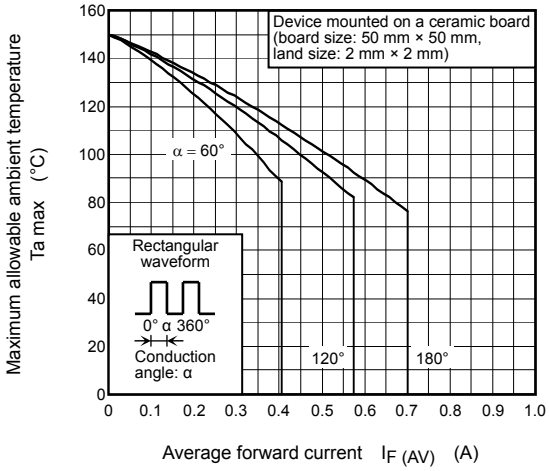
$P_{F\,(AV)} - I_{F\,(AV)}$



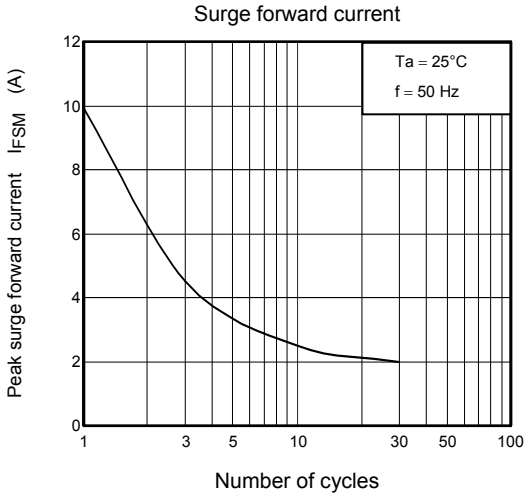
Ta max – $I_{F\,(AV)}$



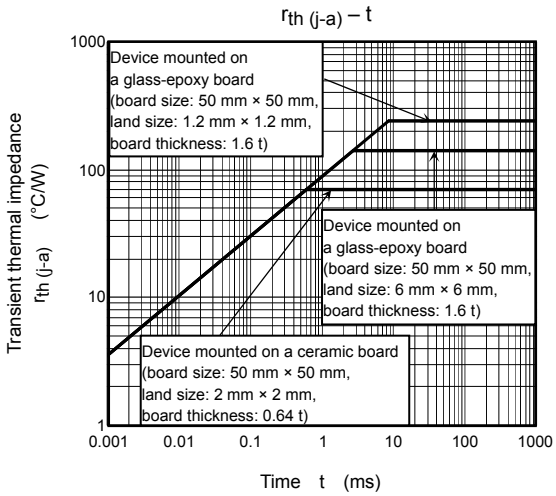
Ta max – $I_{F\,(AV)}$



Surge forward current



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



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