TOSHIBA Rectifier Silicon Diffused Type

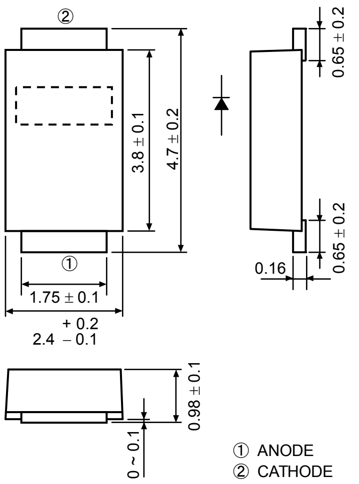
CMG05

○ General-Purpose Rectifier Applications

Unit: mm

- Repetitive peak reverse voltage: V_{RRM} = 400 V
- Average forward current: $I_{F\ (AV)}$ = 1.0 A
- Forward voltage: V_{FM} =1.1 V (max)

Suitable for high-density board assembly due to the use of a small surface-mount package, M−FLAT™



JEDEC	―
JEITA	―
TOSHIBA	3-4E1A

Weight: 0.023 g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Repetitive peak reverse voltage	V_{RRM}	400	V
Average forward current	$I_{F\ (AV)}$	1.0 (Note 1)	A
Non-repetitive peak surge current	I_{FSM}	15 (50 Hz)	A
Junction temperature	T_j	-40 to 150	°C
Storage temperature	T_{stg}	-40 to 150	°C

Note 1: Ta = 75°C
Device mounted on a ceramic board
board size: 50 mm × 50 mm
soldering land: 2 mm ×2 mm
board thickness:0.64 mm
Rectangular waveform:$\alpha = 180°$

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).

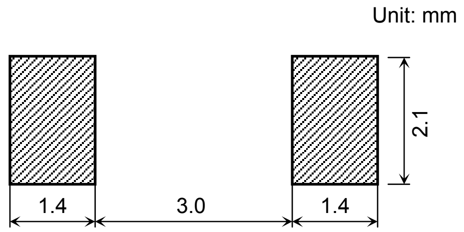
Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Peak forward voltage	$V_{FM(1)}$	I_{FM} = 0.1A (pulse test)	—	0.80	—	V
	$V_{FM(2)}$	I_{FM} = 0.7A (pulse test)	—	0.91	—	
	$V_{FM(3)}$	I_{FM} = 1.0A (pulse test)	—	0.94	1.1	
Peak repetitive reverse current	I_{RRM}	V_{RRM} = 400 V (pulse test)	—	—	10	μA
Thermal resistance (junction to ambient)	$R_{th\ (j\text{-}a)}$	Device mounted on a ceramic board (board size: 50 mm × 50 mm) (soldering land: 2 mm × 2 mm) (board thickness: 0.64 mm)	—	—	60	°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 mm)	—	—	135	
		Device mounted on a glass-epoxy board (board size: 50 mm × 50 mm) (soldering land: 2.1 mm × 1.4 mm) (board thickness: 1.6 mm)	—	—	210	
Thermal resistance (junction to lead)	$R_{th\ (j\text{-}\ell)}$	—	—	—	16	°C/W

Marking

Abbreviation Code	Part No.
G5	CMG05

Standard Soldering Pad



Handling Precaution

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

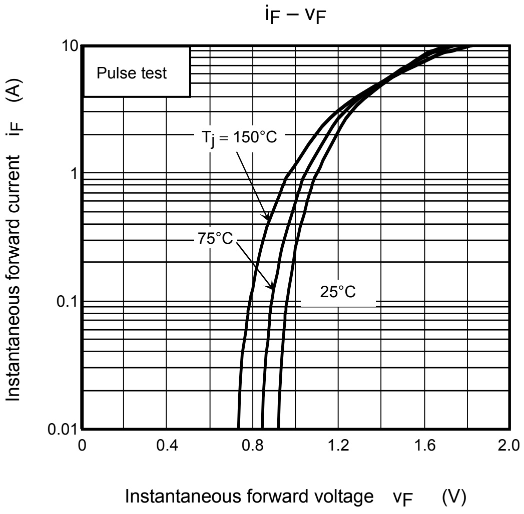
$I_{F(AV)}$: We recommend that the worst case current be no greater than 80% of the maximum rating of $I_{F(AV)}$. Carry out adequate heat design. If you can't design a circuit with excellent heat radiation, set the margin by using an allowable Ta max-$I_{F\ (AV)}$ curve.

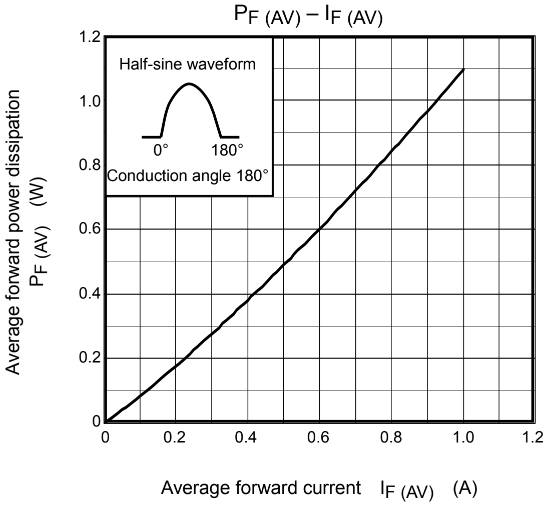
I_{FSM}: This rating specifies the non-repetitive peak current in one cycle of a 50-Hz sine wave, condition angle 180. Therefore, this is only applied for an abnormal operation, which seldom occurs during the lifespan of the device.

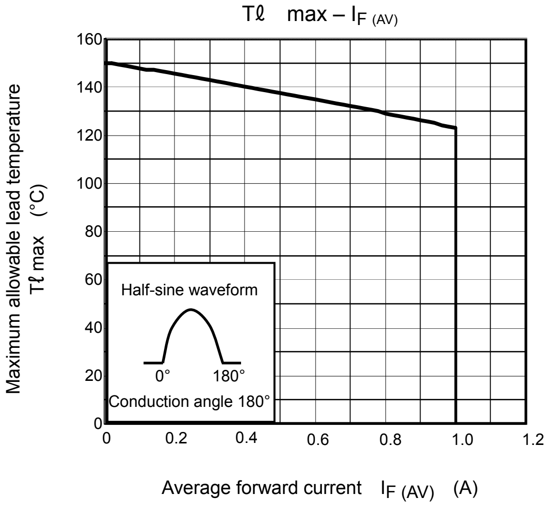
We recommend that a device be used at T_j below 120℃ under the worst load and heat radiation conditions.

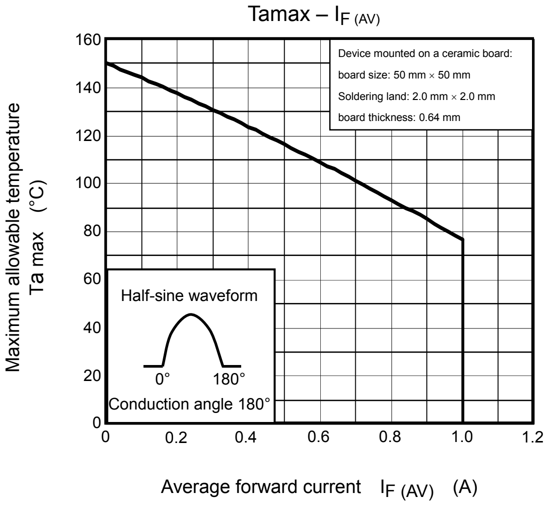
Thermal resistance between junction and ambient fluctuates depending on the device's mounting condition. When using a device, design a circuit board and a soldering land size to match the appropriate thermal resistance value.

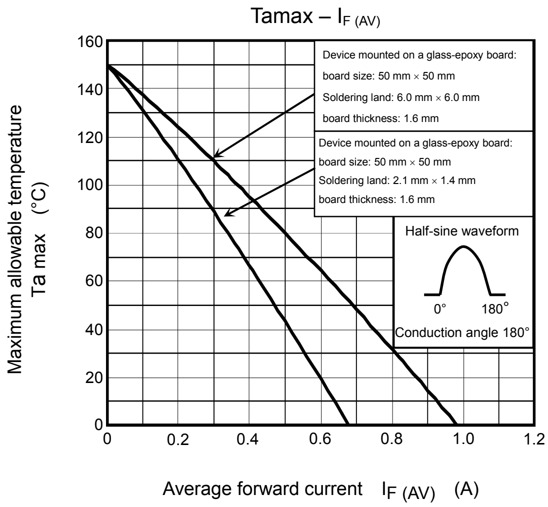
Please refer to the Rectifiers databook for further information

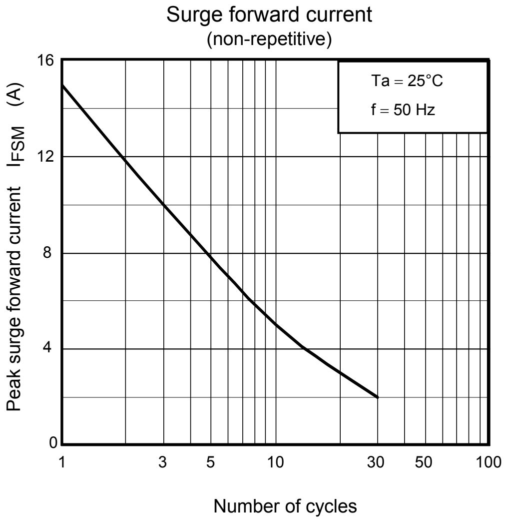

$i_F - v_F$
Pulse test
$T_j = 150°C$
75°C
25°C
Instantaneous forward current i_F (A)
10
1
0.1
0.01
0
0.4
0.8
1.2
1.6
2.0
Instantaneous forward voltage v_F (V)

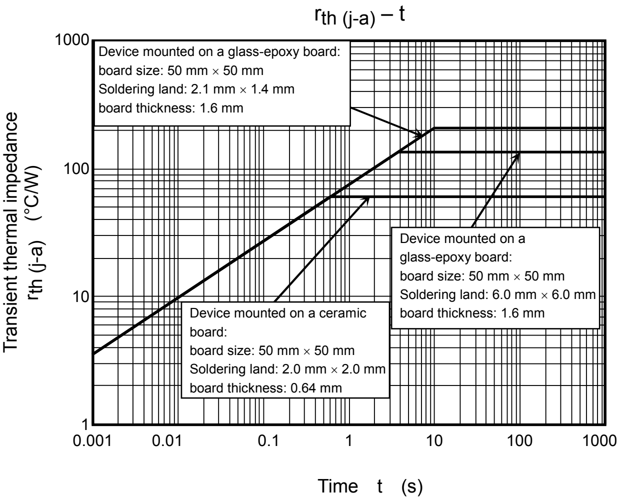

$P_{F\,(AV)} - I_{F\,(AV)}$
Half-sine waveform
0°
180°
Conduction angle 180°
Average forward power dissipation $P_{F\,(AV)}$ (W)
1.2
1.0
0.8
0.6
0.4
0.2
0
0
0.2
0.4
0.6
0.8
1.0
1.2
Average forward current $I_{F\,(AV)}$ (A)


$T\ell$ max – $I_{F\,(AV)}$
Half-sine waveform
0°
180°
Conduction angle 180°
Maximum allowable lead temperature $T\ell$ max (°C)
160
140
120
100
80
60
40
20
0
0
0.2
0.4
0.6
0.8
1.0
1.2
Average forward current $I_{F\,(AV)}$ (A)


Tamax – $I_{F\,(AV)}$
Device mounted on a ceramic board:
board size: 50 mm × 50 mm
Soldering land: 2.0 mm × 2.0 mm
board thickness: 0.64 mm
Half-sine waveform
0°
180°
Conduction angle 180°
Maximum allowable temperature Ta max (°C)
160
140
120
100
80
60
40
20
0
0
0.2
0.4
0.6
0.8
1.0
1.2
Average forward current $I_{F\,(AV)}$ (A)


Tamax – $I_{F\,(AV)}$
Device mounted on a glass-epoxy board:
board size: 50 mm × 50 mm
Soldering land: 6.0 mm × 6.0 mm
board thickness: 1.6 mm
Device mounted on a glass-epoxy board:
board size: 50 mm × 50 mm
Soldering land: 2.1 mm × 1.4 mm
board thickness: 1.6 mm
Half-sine waveform
0°
180°
Conduction angle 180°
Maximum allowable temperature Ta max (°C)
160
140
120
100
80
60
40
20
0
0
0.2
0.4
0.6
0.8
1.0
1.2
Average forward current $I_{F\,(AV)}$ (A)


Surge forward current
(non-repetitive)
Ta = 25°C
f = 50 Hz
Peak surge forward current I_{FSM} (A)
16
12
8
4
0
1
3
5
10
30
50
100
Number of cycles


$r_{th\ (j-a)}$ – t
Device mounted on a glass-epoxy board:
board size: 50 mm × 50 mm
Soldering land: 2.1 mm × 1.4 mm
board thickness: 1.6 mm
Device mounted on a glass-epoxy board:
board size: 50 mm × 50 mm
Soldering land: 6.0 mm × 6.0 mm
board thickness: 1.6 mm
Device mounted on a ceramic board:
board size: 50 mm × 50 mm
Soldering land: 2.0 mm × 2.0 mm
board thickness: 0.64 mm
Transient thermal impedance $r_{th\ (j-a)}$ (°C/W)
1000
100
10
1
0.001
0.01
0.1
1
10
100
1000
Time t (s)

RESTRICTIONS ON PRODUCT USE

20070701-EN GENERAL

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