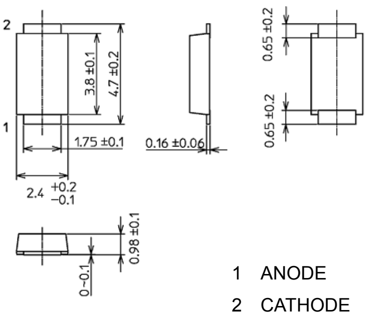
High-Efficiency Diode (HED) Silicon Epitaxial Type

CMH01

○ Radio-Frequency Rectification in Switching Regulators

- Repetitive peak reverse voltage : V_{RRM} = 200 V
- Average forward current : $I_{F\,(AV)}$ = 3.0 A
- Peak forward voltage : V_{FM} = 0.98 V (max)
- Very Fast Reverse-Recovery Time : trr = 35 ns (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}	200	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 150	°C
Storage temperature range	T_{stg}	−40 to 150	°C

Note 1: T_ℓ = 96°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

Note2: 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).

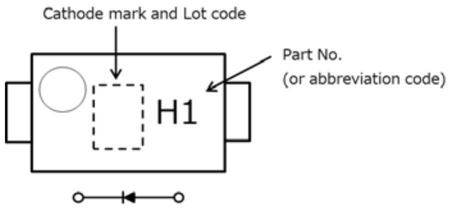
Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Peak forward voltage	$V_{FM\,(1)}$	I_{FM} = 0.1 A (pulse test)	―	0.64	―	V
	$V_{FM\,(2)}$	I_{FM} = 1.0 A (pulse test)	―	0.80	―	
	$V_{FM\,(3)}$	I_{FM} = 3.0 A (pulse test)	―	0.90	0.98	
Repetitive peak reverse current	I_{RRM}	V_{RRM} = 200 V (pulse test)	―	―	10	μA
Reverse recovery time	t_{rr}	I_F = 1 A, di/dt = −30 A/μs	―	―	35	ns
Forward recovery time	t_{fr}	I_F = 1 A	―	―	100	ns
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	
		Device mounted on a glass-epoxy board board size 50 mm × 50 mm soldering land size 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

Start of commercial production
2002-12

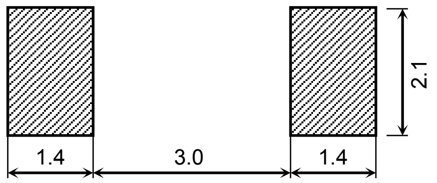
Marking

Abbreviation Code	Part No.
H1	CMH01



Land pattern dimensions for reference only

Unit: mm



Handling Precaution

1) 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}: 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 be 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 coefficient into account designing a device at low temperature.

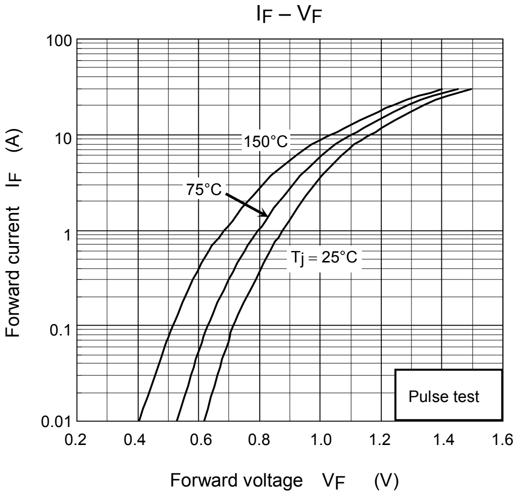
$I_{F(AV)}$: We recommend that the worst case current be no greater than 80% of the absolute maximum rating of $I_{F(AV)}$. Carry out adequate heat design. If you can't design a circuit with excellent heat radiation, set the margin by using an allowable Ta max - $I_{F(AV)}$ curve.

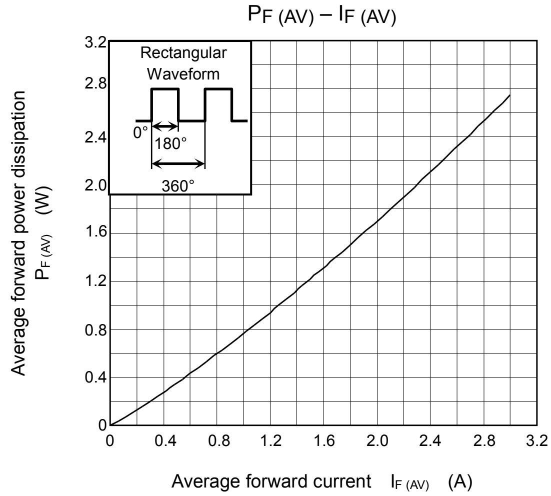
IFSM: This rating specifies the non-repetitive peak current in one cycle of a 50-Hz sine wave, condition angle 180. Therefore, this is only applied for an abnormal operation, which seldom occurs during the lifespan of the device.

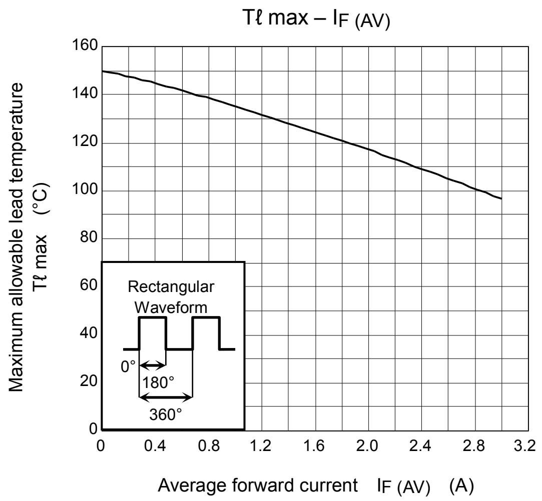
Tj : We recommend that a device be used at a T_j of below 120°C under the worst load and heat radiation conditions.

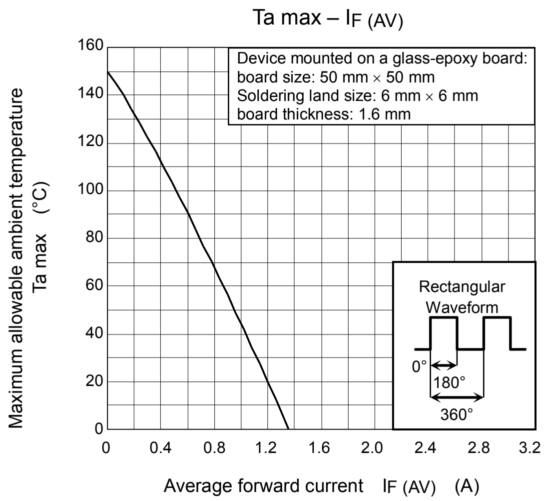
2) Thermal resistance between junction and ambient fluctuates depending on the device's mounting condition. When using a device, design a circuit board and a soldering land size to match the appropriate thermal resistance value.

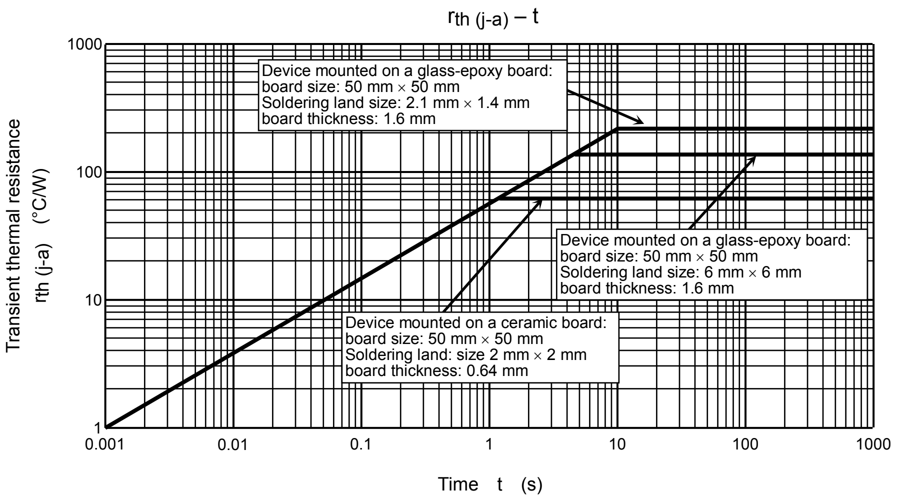
3) For other design considerations, see the Toshiba website.

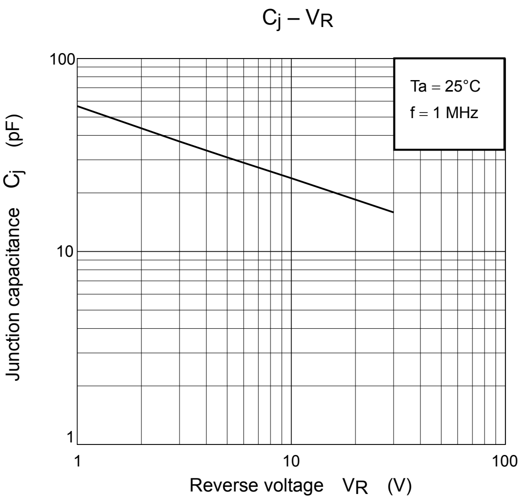

IF – VF
Forward current IF (A)
Forward voltage VF (V)
150°C
75°C
Tj = 25°C
Pulse test
100
10
1
0.1
0.01
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6

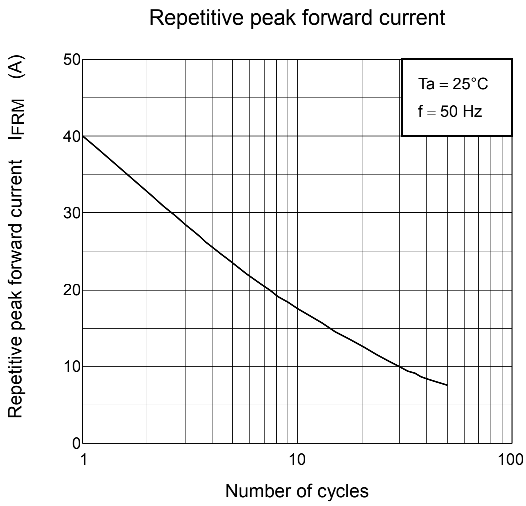

PF (AV) – IF (AV)
Average forward power dissipation PF (AV) (W)
Average forward current IF (AV) (A)
Rectangular Waveform
0°
180°
360°


Tℓ max – IF (AV)
Maximum allowable lead temperature Tℓ max (°C)
Average forward current IF (AV) (A)
Rectangular Waveform
0°
180°
360°


Ta max – IF (AV)
Maximum allowable ambient temperature Ta max (°C)
Average forward current IF (AV) (A)
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
Rectangular Waveform
0°
180°
360°


rth (j-a) – t
Transient thermal resistance rth (j-a) (°C/W)
Time t (s)
Device mounted on a glass-epoxy board:
board size: 50 mm × 50 mm
Soldering land size: 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 size: 6 mm × 6 mm
board thickness: 1.6 mm
Device mounted on a ceramic board:
board size: 50 mm × 50 mm
Soldering land: size 2 mm × 2 mm
board thickness: 0.64 mm
1000
100
10
1
0.001
0.01
0.1
1
10
100
1000


Cj – VR
Ta = 25°C
f = 1 MHz
Junction capacitance Cj (pF)
100
10
1
1
10
100
Reverse voltage VR (V)


Repetitive peak forward current
Ta = 25°C
f = 50 Hz
Repetitive peak forward current IFRM (A)
50
40
30
20
10
0
1
10
100
Number of cycles

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