TOSHIBA Schottky Barrier Diode

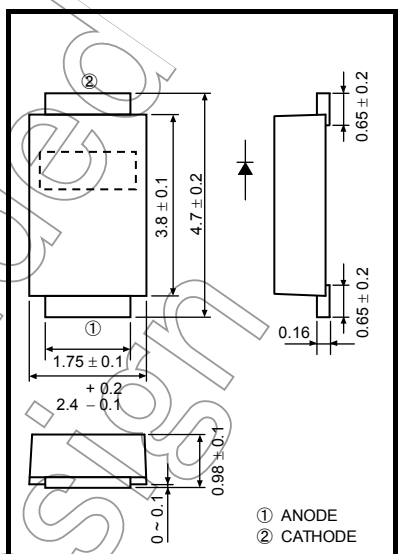
# CMS20

Switching Mode Power Supply Applications

Portable Equipment Battery Applications

- Forward voltage: $V_{FM}$ = 0.72 V (max) (@$I_{FM}$=3.0A)
- Average forward current: $I_{F\ (AV)}$ = 3.0 A
- Repetitive peak reverse voltage: $V_{RRM}$ = 60 V
- Suitable for compact assembly due to small surface-mount package "M−FLAT™" (Toshiba package name)

Unit: mm




| | |
|---|---|
| JEDEC | — |
| JEITA | — |
| TOSHIBA | 3-4E1A |

Weight: 0.023 g (typ.)

## Absolute Maximum Ratings (Ta = 25°C)

| Characteristics | Symbol | Rating | Unit |
|---|---|---|---|
| Repetitive peak reverse voltage | $V_{RRM}$ | 60 | V |
| Average forward current | $I_{F\ (AV)}$ | 3.0 (Note 1) | A |
| Non-repetitive peak surge current | $I_{FSM}$ | 40 (50Hz) | A |
| Junction temperature | $T_j$ | −40 to 150 | °C |
| Storage temperature range | $T_{stg}$ | −40 to 150 | °C |

Note 1: Ta = 28°C
Device mounted on a ceramic board
Board size: 50 mm × 50 mm
Soldering size: 2 mm × 2 mm
Board thickness: 0.64 mm
Rectangular waveform ($\alpha$ = 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).

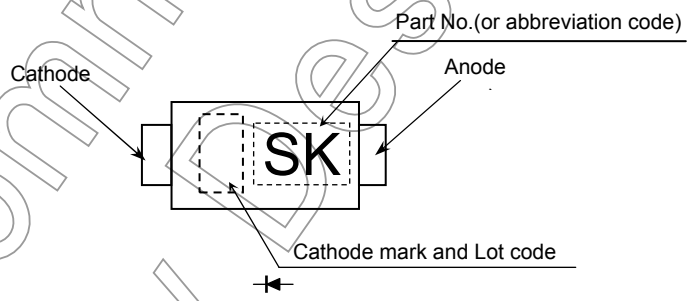
Not Recommended for New Design

## Electrical Characteristics (Ta = 25°C)

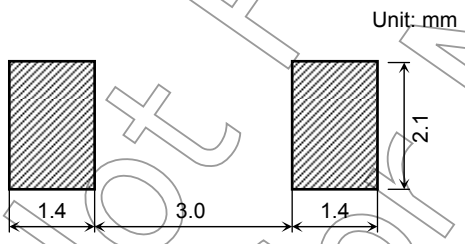
| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Peak forward voltage | $V_{FM\ (1)}$ | $I_{FM}$ = 1.0 A (pulse test) | — | 0.57 | — | V |
| | $V_{FM\ (2)}$ | $I_{FM}$ = 3.0 A (pulse test) | — | 0.67 | 0.72 | |
| Peak repetitive reverse current | $I_{RRM\ (1)}$ | $V_{RRM}$ = 30 V (pulse test) | — | 0.05 | — | μA |
| | $I_{RRM\ (2)}$ | $V_{RRM}$ = 60 V (pulse test) | — | 0.6 | 10 | |
| 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. |
|---|---|
| SK | CMS20 |




## Standard Soldering Pad

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## Handling Precaution

1) Schottky barrier diodes have reverse current characteristics compared to other diodes.
There is a possibility SBD may cause thermal runaway when it is used under high temperature or high voltage.
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 (1) 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 120°C. When using this device, take a margin into consideration by using an allowable Tamax-$I_{F\ (AV)}$ 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 120°C.

3) 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.

4) Please refer to the Rectifiers databook for further information.

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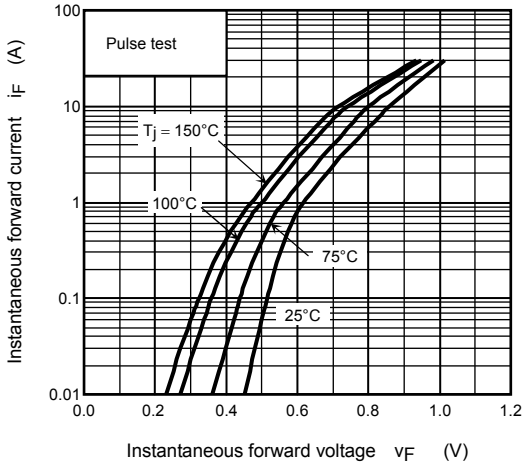
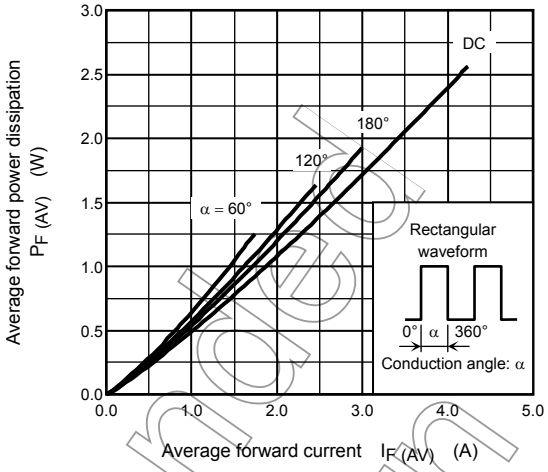
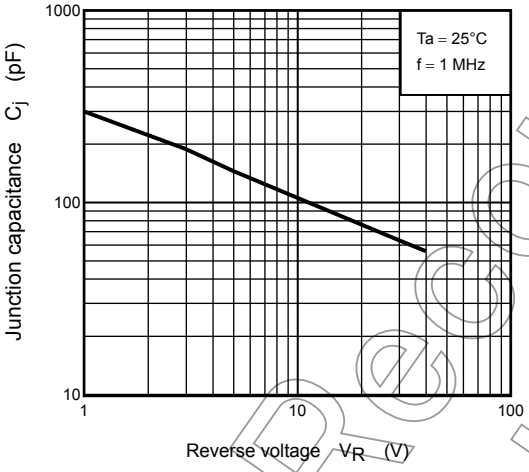
$i_F - v_F$



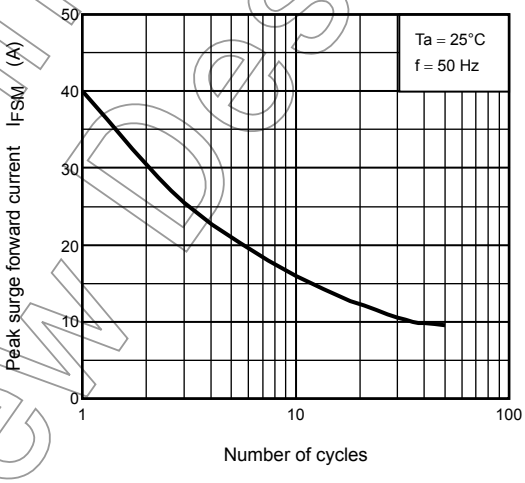

$P_{F\,(AV)} - I_{F\,(AV)}$



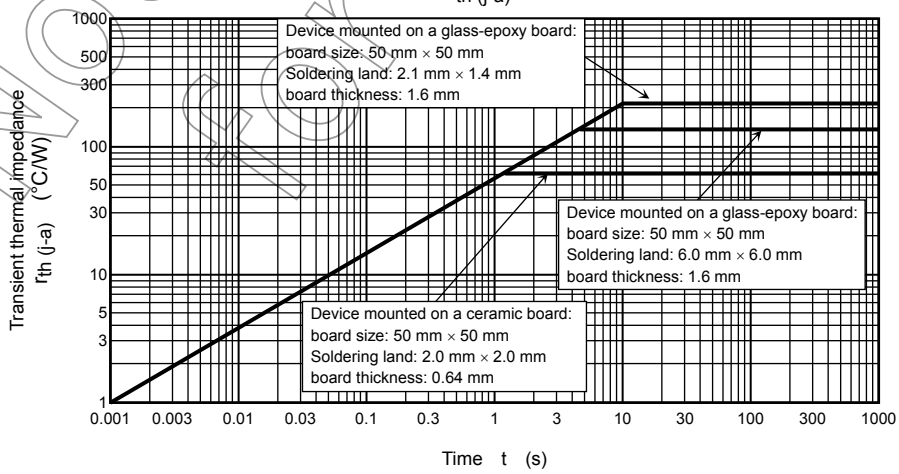

$C_j - V_R$ (typ.)




Surge forward current (non-repetitive)




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

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