

Schottky Barrier Diode

CMS30I30A

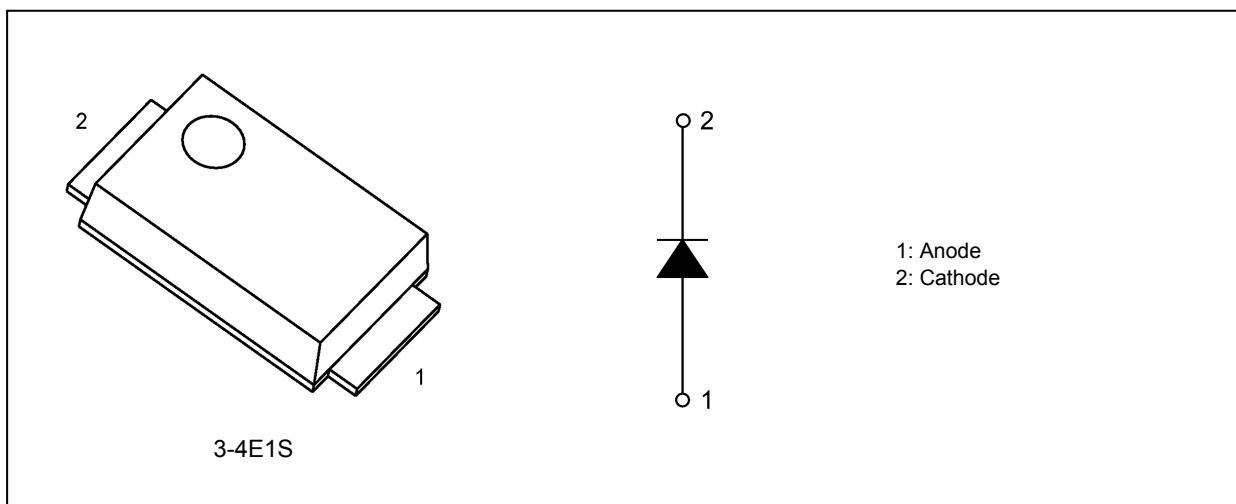
1. Applications

- Secondary Rectification in Switching Regulators
- Reverse-Current Protection in Mobile Devices

2. Features

- (1) Peak forward voltage: $V_{FM} = 0.49 \text{ V (max)@}I_F = 3.0 \text{ A}$
- (2) Average forward current: $I_{F(AV)} = 3.0 \text{ A}$
- (3) Repetitive peak reverse voltage: $V_{RRM} = 30 \text{ V}$
- (4) Small, thin package suitable for high-density board assembly
Toshiba Nickname: M-FLAT™

3. Packaging and Internal Circuit Pin Assignment



4. Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a = 25^\circ\text{C}$)

| Characteristics | Symbol | Note | Rating | Unit |
|---|-------------|----------|------------|------|
| Repetitive peak reverse voltage | V_{RRM} | — | 30 | V |
| Average forward current | $I_{F(AV)}$ | (Note 1) | 3.0 | A |
| Non-repetitive peak forward surge current | I_{FSM} | (Note 2) | 30 | |
| Junction temperature | T_j | — | 150 | °C |
| Storage temperature | T_{stg} | — | -55 to 150 | |

Note: 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).

Note 1: $T_t = 102^\circ\text{C}$, square wave ($\alpha = 180^\circ$), $V_R = 15 \text{ V}$

Note 2: $f = 50 \text{ Hz}$, half-sine wave

5. Thermal Characteristics

| Characteristics | Symbol | Note | Test Condition | Max | Unit |
|--|---------------|------|--|-----|------|
| Thermal resistance (junction-to-ambient) | $R_{th(j-a)}$ | — | Device mounted on ceramic pc board (soldering land size: 2 mm × 2 mm) | 60 | °C/W |
| | | — | Device mounted on glass-epoxy board (soldering land size: 6 mm × 6 mm) | 135 | |
| Thermal resistance (junction-to-lead) | $R_{th(j-l)}$ | — | Junction to cathode lead | 16 | |

6. Electrical Characteristics (Unless otherwise specified, $T_a = 25^\circ\text{C}$)

| Characteristics | Symbol | Note | Test Condition | Min | Typ. | Max | Unit |
|---------------------------------|--------------|------|--|-----|------|------|---------------|
| Peak forward voltage | $V_{FM(1)}$ | — | $I_{FM} = 0.5 \text{ A}$ (pulse measurement) | — | 0.30 | — | V |
| | $V_{FM(2)}$ | — | $I_{FM} = 1.0 \text{ A}$ (pulse measurement) | — | 0.33 | — | |
| | $V_{FM(3)}$ | — | $I_{FM} = 3.0 \text{ A}$ (pulse measurement) | — | 0.40 | 0.49 | |
| Repetitive peak reverse current | $I_{RRM(1)}$ | — | $V_{RRM} = 5 \text{ V}$ (pulse measurement) | — | 14 | — | μA |
| | $I_{RRM(2)}$ | — | $V_{RRM} = 30 \text{ V}$ (pulse measurement) | — | 28 | 100 | |
| Junction capacitance | C_j | — | $V_R = 10 \text{ V}$, $f = 1.0 \text{ MHz}$ | — | 82 | — | pF |

7. Marking

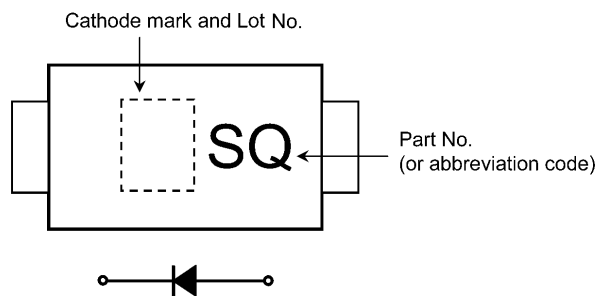
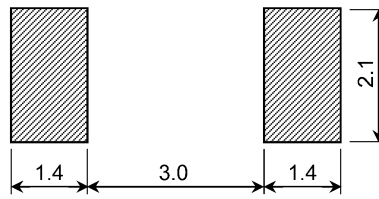


Fig. 7.1 Marking

| Marking Code | Part Number |
|--------------|-------------|
| SQ | CMS30I30A |

8. Usage Considerations

- (1) Schottky barrier diodes (SBDs) have reverse current greater than other types of diodes. This makes SBDs more vulnerable to damage due to thermal runaway under high-temperature and high-voltage conditions. Thus, both forward and reverse power losses of SBDs should be considered for thermal and safety design.
- (2) The absolute maximum ratings are rated values that must not be exceeded during operation, even for an instant. The following are the recommended general derating methods for designing a circuit board using this device.
 - V_{RRM} : Use this rating with reference to (1) above. V_{RRM} has a temperature coefficient of 0.1%/°C at low temperatures. Take this coefficient into account when designing a circuit board that will be operated in a low-temperature environment.
 - $I_{F(AV)}$: We recommend that the worst-case current be no greater than 80% of the absolute maximum rating of $I_{F(AV)}$ and that the worst-case junction temperature, T_j , be kept below 120°C. When using this device, allow margins, referring to the $T_{a(max)}-I_{F(AV)}$ curve.
 - I_{FSM} : This rating specifies peak non-repetitive forward surge current. This only applies to an abnormal operation, which seldom occurs during the lifespan of a device.
 - T_j : Derate device parameters in proportion to this rating in order to ensure high reliability. We recommend that the junction temperature (T_j) of a device be kept below 120°C.
- (3) Thermal resistance (junction-to-ambient) varies with the mounting conditions of a device on a circuit board. An appropriate thermal resistance value should be used, considering the heat sink, circuit board design and soldering land size.
- (4) For other design considerations, see the Rectifiers databook or the Toshiba Semiconductor website.

9. Land Pattern Dimensions for Reference Only**Fig. 9.1 Land Pattern Dimensions for Reference Only (Unit: mm)**

10. Characteristics Curves (Note)

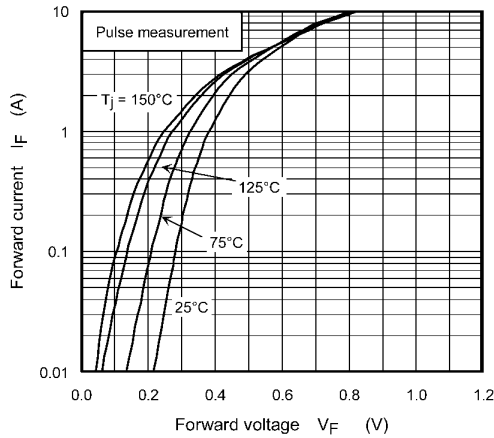


Fig. 10.1 $I_F - V_F$

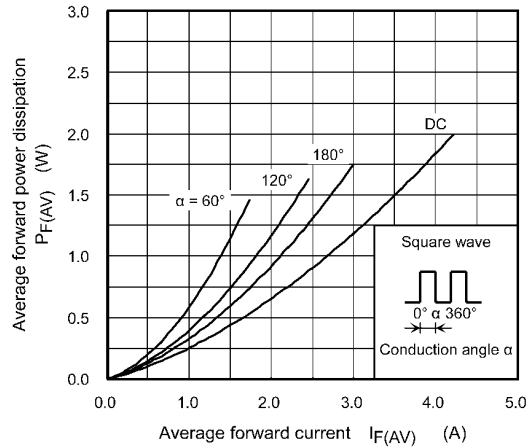


Fig. 10.2 $P_{F(AV)} - I_{F(AV)}$

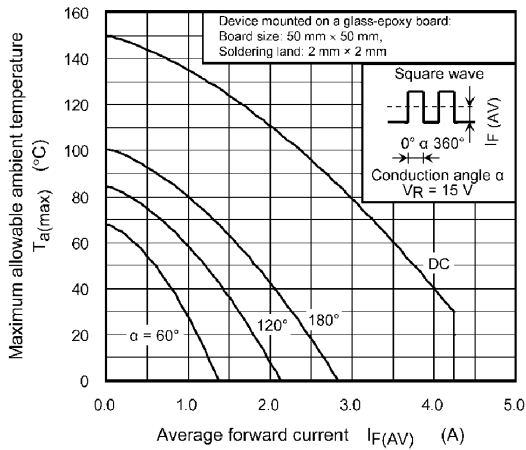


Fig. 10.3 $T_{a(max)} - I_{F(AV)}$

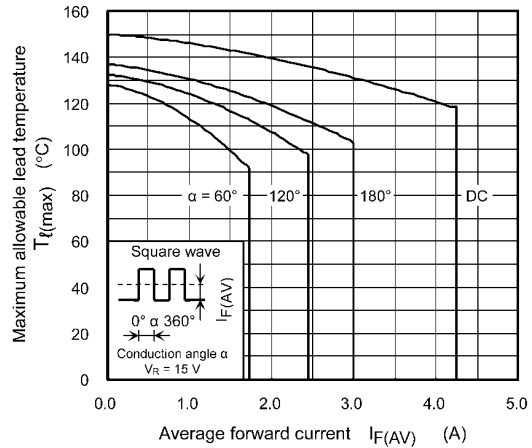


Fig. 10.4 $T_{l(max)} - I_{F(AV)}$

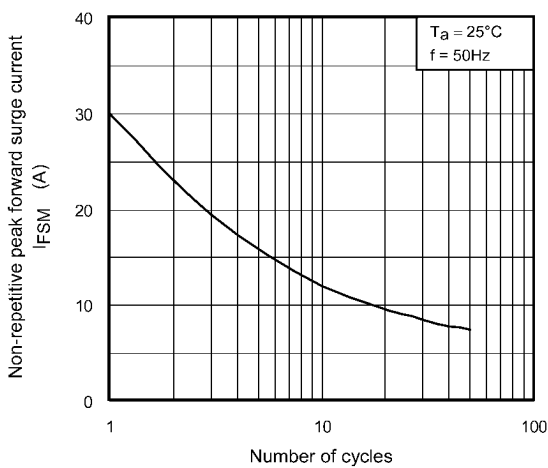


Fig. 10.5 Surge current

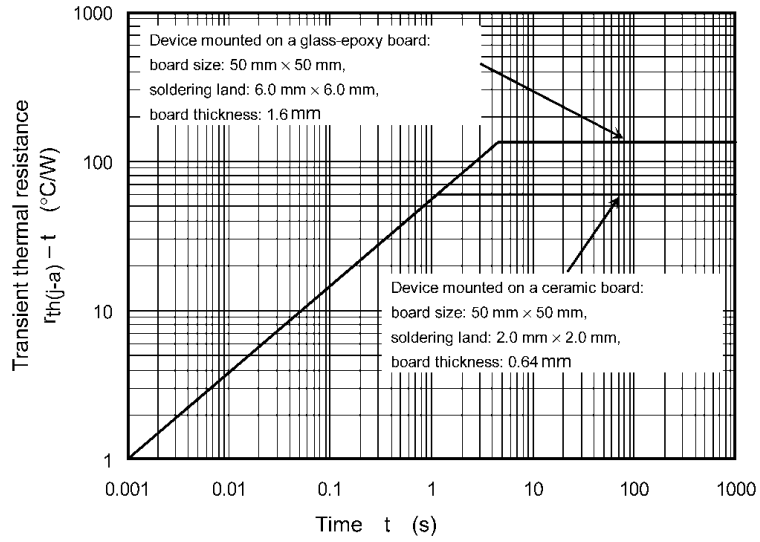


Fig. 10.6 $r_{th(j-a)} - t$

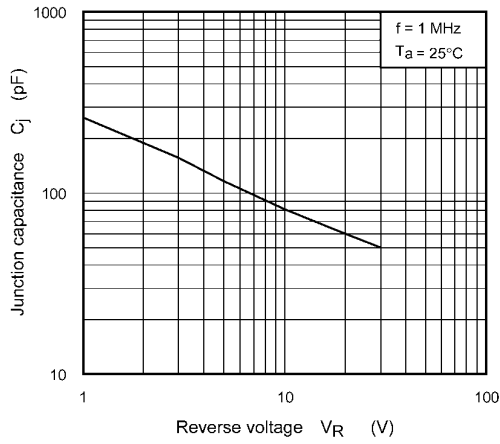


Fig. 10.7 $C_j - V_R$

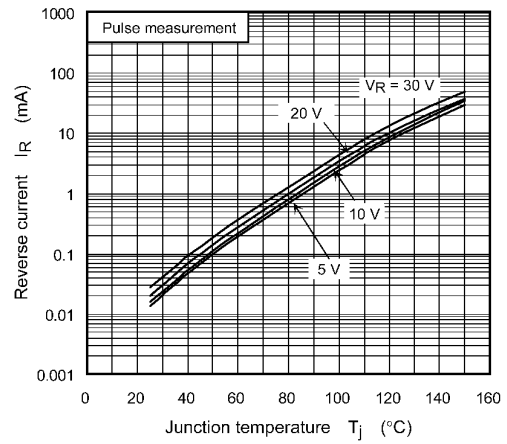
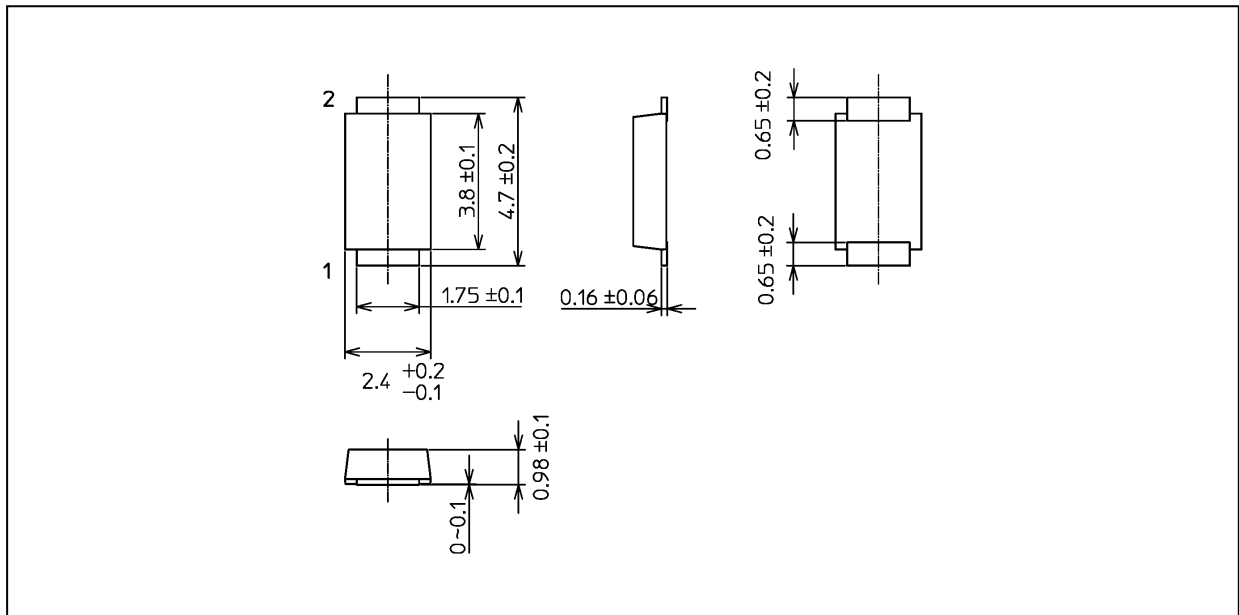


Fig. 10.8 $I_R - T_j$

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Package Dimensions

Unit: mm



Weight: 0.023 g (typ.)

| Package Name(s) |
|-----------------|
| TOSHIBA: 3-4E1S |

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