Schottky Barrier Diode

## **CRS10I40A**

#### 1. Applications

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

#### 2. Features

- (1) Peak forward voltage:  $V_{FM}$  = 0.49 V (max) @I<sub>FM</sub> = 0.7 A
- (2) Average forward current:  $I_{F(AV)} = 1 A$
- (3) Repetitive peak reverse voltage:  $V_{RRM} = 40 V$
- (4) Small, thin package suitable for high-density board assembly Toshiba Nickname: S-FLAT<sup>TM</sup>

#### 3. Packaging and Internal Circuit



#### 4. Absolute Maximum Ratings (Note) (Unless otherwise specified, T<sub>a</sub> = 25 °C)

Characteristics	Symbol	Note	Rating	Unit
Repetitive peak reverse voltage	V <sub>RRM</sub>		40	V
Average forward current	I <sub>F(AV)</sub>	(Note 1)	1	А
Non-repetitive peak forward surge current	I <sub>FSM</sub>	(Note 2)	20	
Junction temperature	Тj		150	°C
Storage temperature	T <sub>stg</sub>		-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:  $T_{\ell}$  = 127 °C, square wave ( $\alpha$  = 180°),  $V_R$  = 20 V

Note 2: f = 50 Hz, half-sine wave

#### 5. Thermal Characteristics

Characteristics	Symbol	Note	Test Condition	Max	Unit
Thermal resistance (junction-to-ambient)	R <sub>th(j-a)</sub>	Device mounted on a ceramic board (board size: 50 mm × 50 mm) (soldering land size: 2 mm × 2 mm) (board thickness: 0.64 mm)		70	°C/W
			Device mounted on a glass-epoxy board (board size: $50 \text{ mm} \times 50 \text{ mm}$ ) (soldering land size: $6 \text{ mm} \times 6 \text{ mm}$ ) (board thickness: $1.6 \text{ mm}$ )	140	
Thermal resistance (junction-to-lead)	R <sub>th(j-ℓ)</sub>		Junction to cathode lead	20	°C/W

### 6. Electrical Characteristics (Unless otherwise specified, $T_a = 25$ °C)

Characteristics	Symbol	Note	Test Condition	Min	Тур.	Max	Unit
Peak forward voltage	V <sub>FM(1)</sub>		I <sub>FM</sub> = 0.1 A (pulse measurement)		0.28	—	V
	V <sub>FM(2)</sub>		I <sub>FM</sub> = 0.7 A (pulse measurement)		0.39	0.49	
	V <sub>FM(3)</sub>		I <sub>FM</sub> = 1 A (pulse measurement)	_	0.42	—	
Repetitive peak reverse current	I <sub>RRM(1)</sub>		V <sub>RRM</sub> = 5 V (pulse measurement)		4	—	μA
	I <sub>RRM(2)</sub>		V <sub>RRM</sub> = 40 V (pulse measurement)		9	60	
Junction capacitance	Cj		V <sub>R</sub> = 10 V, f = 1 MHz		35	—	pF

#### 7. Marking



Marking Code	Part Number		
SK	CRS10I40A		

#### 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<sub>RRM</sub>:Use this rating with reference to (1) above. V<sub>RRM</sub> 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  $T_{a(max)}\mbox{-}I_{F(AV)}$  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.
- $\begin{array}{ll} T_j & \mbox{ Derate device parameters in proportion to this rating in order to ensure high reliability.} \\ & \mbox{ We recommend that the junction temperature } (T_j) \mbox{ of a device be kept below 120 °C.} \end{array}$
- (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 land pattern dimensions (provided for reference only).
- (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. 10.5 Peak Repetitive Forward Current



Fig. 10.6 r<sub>th(j-a)</sub> - t



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

### CRS10I40A

#### Package Dimensions

Unit: mm



#### Weight: 0.013 g (typ.)

Package Name(s)				
TOSHIBA: 3-2A1S				
Nickname: S-FLAT				

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