

SiC Schottky Barrier Diode

# TRS12N65D

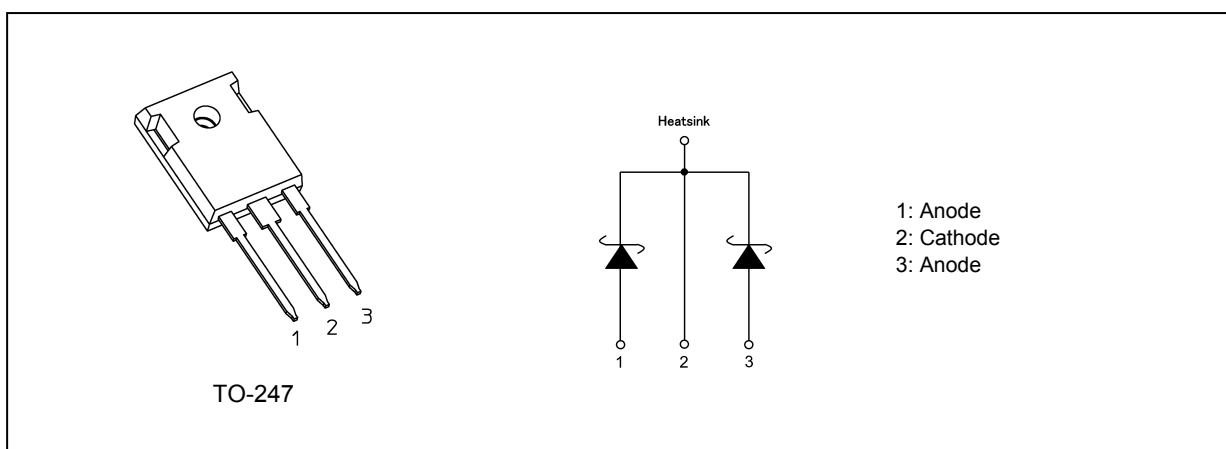
## 1. Applications

- Power Factor Correction
- Solar Inverters
- Uninterruptible Power Supplies
- DC-DC Converters

## 2. Features

- (1) Forward DC current(Per Leg/Both Legs)  $I_{F(DC)} = 6/12$  A
- (2) Repetitive peak reverse voltage  $V_{RRM} = 650$  V

## 3. Packaging and Internal Circuit Pin Assignment



## 4. Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a = 25$ °C)

Characteristics	Symbol	Note	Rating	Unit
Repetitive peak reverse voltage	$V_{RRM}$		650	V
Forward DC current	$I_{F(DC)}$		6	A
Forward DC current			12	
Forward pulse current	$I_{FP}$	(Note 1)	80	
Forward pulse current			160	
$I^2t$ limit value	$I^2t$	(Note 2)	4.5	A <sup>2</sup> s
$I^2t$ limit value			18.0	
Junction temperature	$T_j$		175	°C
Storage temperature	$T_{stg}$		-55 to 175	
Mounting torque	TOR		0.8	N · m

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:  $t = 100$   $\mu$ s

Note 2:  $f = 50$  Hz

Start of commercial production

2014-02

## 5. Thermal Characteristics

Characteristics	Symbol	Test Condition	Max	Unit
Thermal resistance (junction-to-case)	$R_{th(j-c)}$	Per Leg	2.3	°C/W
		Both Legs	1.15	
Thermal resistance (junction-to-ambient)	$R_{th(j-a)}$	—	50	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Peak forward voltage	$V_{FM(1)}$	$I_F = 3\text{ A}$ Per Leg (pulse measurement)	—	1.22	—	V
	$V_{FM(2)}$	$I_F = 6\text{ A}$ Per Leg (pulse measurement)	—	1.5	1.7	
	$V_{FM(3)}$	$I_F = 12\text{ A}$ Both Legs (pulse measurement)	—	1.5	1.7	
Repetitive peak reverse current	$I_{RRM}$	$V_{RRM} = 650\text{ V}$ Per Leg (pulse measurement)	—	0.30	90	μA
Junction capacitance	$C_j$	$V_R = 650\text{ V}$ , $f = 1\text{ MHz}$ Per Leg	—	35	—	pF

## 7. Marking

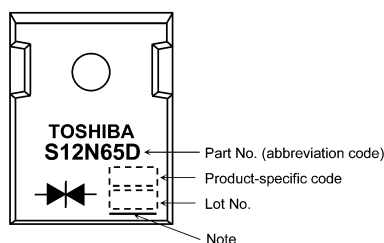


Fig. 7.1 Marking

Note: A line under a Lot No. identifies the indication of product Labels.

[[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product.

The RoHS is the Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Abbreviation Code	Part Number
S12N65D	TRS12N65D

## 8. Usage Considerations

- 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.

$V_{RRM}$ :  $V_{RRM}$  has a temperature coefficient of 0.1 %/°C.

Take this coefficient into account when designing a circuit board that will be operated in a low-temperature environment.

$I_{F(DC)}$ : We recommend that the worst-case current be no greater than 80 % of the absolute maximum rating of  $I_{F(DC)}$  and that the worst-case junction temperature,  $T_j$ , be kept below 140 °C.

$I_{FP}$ : We recommend that the worst-case current be no greater than 80 % of the absolute maximum rating of  $I_{FP}$  and that the worst-case junction temperature,  $T_j$ , be kept below 140 °C.

$I^2t$ : This rating specifies a non-repetitive limit value.

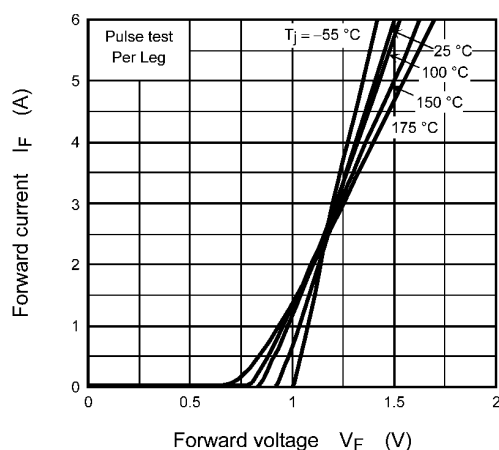
This only applies to an abnormal operation, which seldom occurs during the lifespan of a device.

$T_j$ : Derate device parameters in proportion to this rating in order to ensure high reliability.

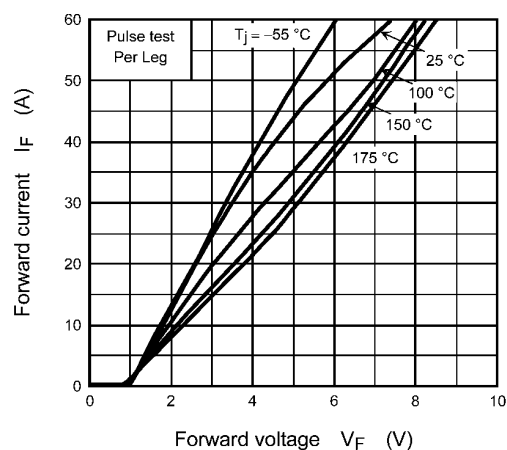
We recommend that the junction temperature ( $T_j$ ) of a device be kept below 140 °C.

- For other design considerations, see the Rectifiers databook or the Toshiba Semiconductor website.

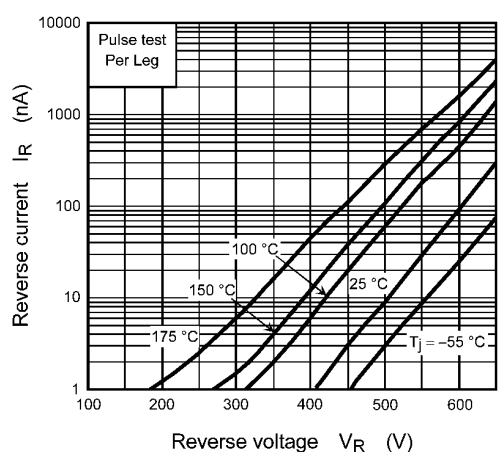
# 9. Characteristics Curves (Note)



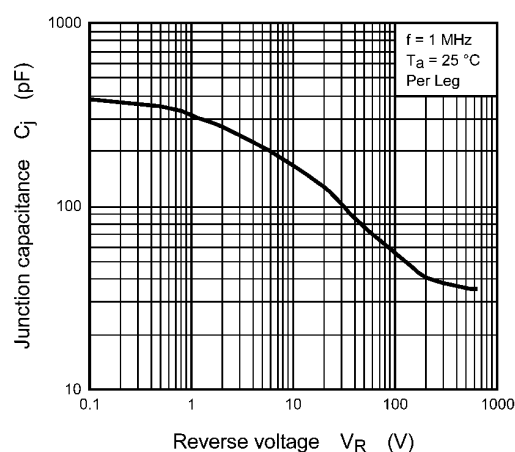
**Fig. 9.1  $I_F - V_F$**



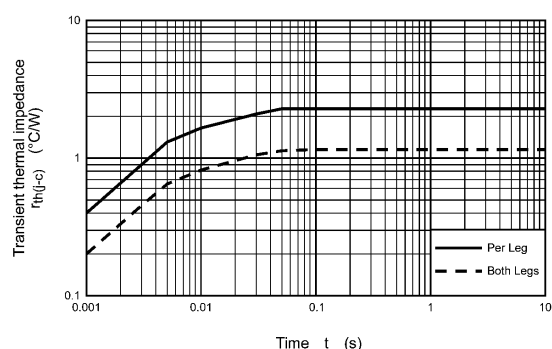
**Fig. 9.2  $I_F - V_F$**



**Fig. 9.3  $I_R - V_R$**



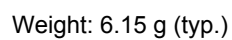
**Fig. 9.4  $C_j - V_R$**



**Fig. 9.5  $r_{th(j-c)} - t$   
(Guaranteed Maximum)**

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

Unit: mm



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