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SiC

Silicon Carbide Diode

thinQ!<sup>TM</sup> SiC Schottky Diode

1200V SiC Schottky Diode  
IDW10S120

Final Datasheet

Rev. 2.0,<2012-03-23>

Power Management & Multimarket



## thinQ!™ SiC Schottky Diode

### 1 Description

The 1200V family of Infineon SiC Schottky diodes has emerged over the years as the industry standard and is now being extended with the IDWxxS120 product family in the TO247 package.

The very good thermal characteristics of the TO247 in combination with the low  $V_f$  of the 1200V diodes make it particularly suitable in power applications where relatively high currents are demanded and utmost efficiency is required. With the introduction of this package, Infineon now offers a current capability of up to 30A in the 1200V range.

#### Features

- Revolutionary semiconductor material - Silicon Carbide
- Benchmark switching behavior
- No reverse recovery/ No forward recovery
- Temperature independent switching behavior
- High surge current capability
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC<sup>1)</sup> for target applications
- Optimized for high temperature operation

#### Benefits

- System efficiency improvement over Si diodes
- System cost / size savings due to reduced cooling requirements
- Enabling higher frequency / increased power density solutions
- Higher system reliability due to lower operating temperatures
- Reduced EMI

#### Applications

- SMPS; CCM PFC
- Solar applications; UPS; Motor Drives

**Table 1 Key Performance Parameters**

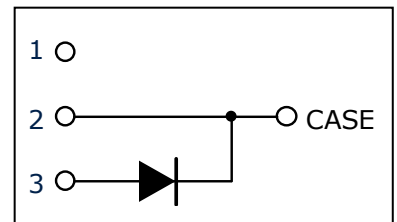
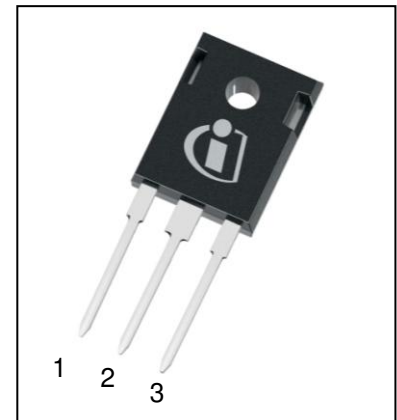
Parameter	Value	Unit
$V_{DC}$	1200	V
$Q_C @ V_R=400V$	36	nC
$I_F @ T_c < 140^\circ C$	10	A

**Table 2 Pin Definition**

Pin 1	Pin 2	Pin 3
n.c.	C	A

Type / ordering Code	Package	Marking	Related links
IDW10S120	PG-TO247-3	D10S120	<a href="http://www.infineon.com/sic">www.infineon.com/sic</a>

### IDW10S120



1) J-STD20 and JESD22

## Table of Contents

1	Description.....	2
2	Maximum ratings.....	4
3	Thermal characteristics.....	4
4	Electrical characteristics.....	5
5	Electrical characteristics diagrams.....	6
6	Package outlines.....	8
7	Revision History.....	9

## 2 Maximum ratings

**Table 3 Maximum ratings**

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Continuous forward current	$I_F$	–	–	10	A	$T_C < 140^\circ\text{C}$ , $D=1$
Surge non-repetitive forward current, sine halfwave	$I_{F,SM}$	–	–	53		$T_C = 25^\circ\text{C}$ , $t_p=10\text{ ms}$
		–	–	44		$T_C = 150^\circ\text{C}$ , $t_p=10\text{ ms}$
Non-repetitive peak forward current	$I_{F,max}$	–	–	266		$T_C = 25^\circ\text{C}$ , $t_p=10\text{ }\mu\text{s}$
$i^2t$ value	$\int i^2 dt$	–	–	14	A <sup>2</sup> s	$T_C = 25^\circ\text{C}$ , $t_p=10\text{ ms}$
		–	–	10		$T_C = 150^\circ\text{C}$ , $t_p=10\text{ ms}$
Repetitive peak reverse voltage	$V_{RRM}$	–	–	1200	V	
Diode dv/dt ruggedness	$dv/dt$	–	–	50	V/ns	$V_R=0..480\text{ V}$
Power dissipation	$P_{tot}$	–	–	115	W	$T_C = 25^\circ\text{C}$
Operating and storage temperature	$T_j; T_{stg}$	-55	–	175	°C	
Mounting torque		–	–	60	Ncm	M3 and M3.5 screws

## 3 Thermal characteristics

**Table 4 Thermal characteristics TO-247-3**

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction-case	$R_{thJC}$	–	–	1.30	K/W	
Thermal resistance, junction-ambient	$R_{thJA}$	–	–	62		leaded
Soldering temperature, wavesoldering only allowed at leads	$T_{sold}$	–	–	260	°C	1.6mm (0.063 in.) from case for 10 s

## 4 Electrical characteristics

**Table 5 Static characteristics**

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min.	Typ.	Max.		
DC blocking voltage	$V_{DC}$	1200	–	–	V	$I_R = 0.24 \text{ mA}, T_j = 25^\circ\text{C}$
Diode forward voltage	$V_F$	–	1.5	1.8		$I_F = 10 \text{ A}, T_j = 25^\circ\text{C}$
		–	2.4	–		$I_F = 10 \text{ A}, T_j = 150^\circ\text{C}$
Reverse current	$I_R$	–	5	240	$\mu\text{A}$	$V_R = 1200 \text{ V}, T_j = 25^\circ\text{C}$
		–	20	500		$V_R = 1200 \text{ V}, T_j = 150^\circ\text{C}$

**Table 6 AC characteristics**

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Total capacitive charge	$Q_c$	–	36	–	nC	$V_R = 400 \text{ V}, di/dt = 200 \text{ A}/\mu\text{s}, I_F \leq I_{F,MAX}, T_j = 150^\circ\text{C}.$
			55	–		$V_R = 1000 \text{ V}, di/dt = 200 \text{ A}/\mu\text{s}, I_F \leq I_{F,MAX}, T_j = 150^\circ\text{C}.$
Total Capacitance	$C$	–	580	–	pF	$V_R = 1 \text{ V}, f = 1 \text{ MHz}$
		–	50	–		$V_R = 300 \text{ V}, f = 1 \text{ MHz}$
		–	40	–		$V_R = 600 \text{ V}, f = 1 \text{ MHz}$

## 5 Electrical characteristics diagrams

Table 7

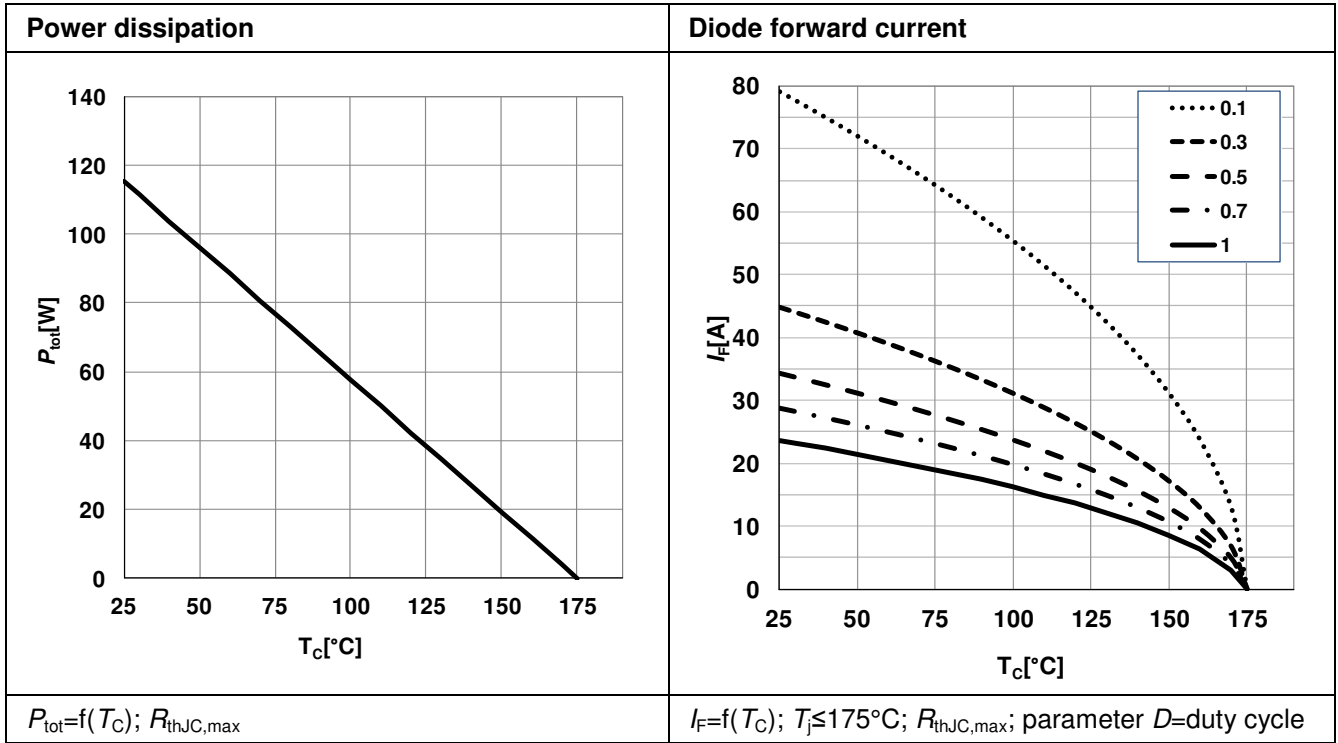


Table 8

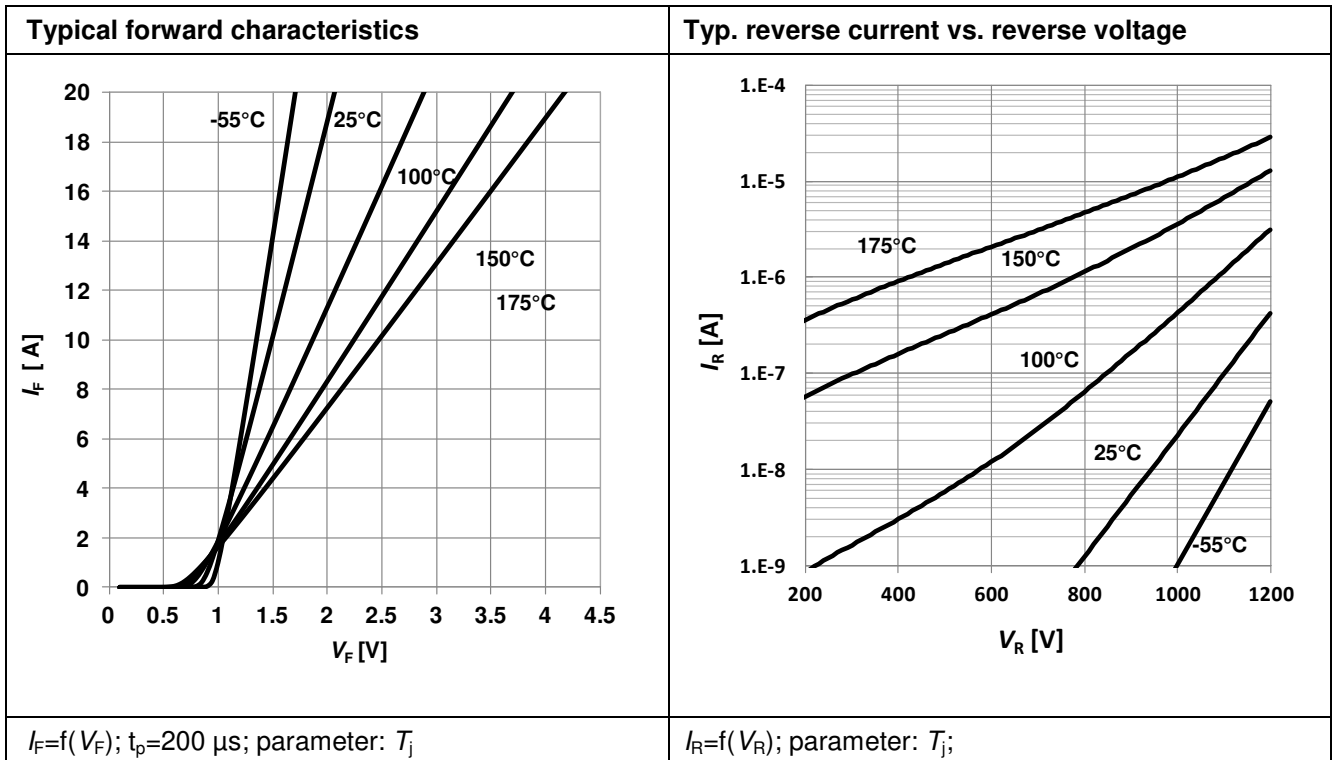


Table 9

Typ. capacitance charge vs. current slope <sup>1)</sup>	Max. transient thermal impedance
<p><math>Q_C=f(di_F/dt)</math>; <math>V_R=400V</math>; <math>T_j=150^\circ C</math>; <math>I_F \leq I_{F,max}</math></p>	<p><math>Z_{th,jc}=f(t_p)</math>; parameter: <math>D=t_p/T</math></p>

1) Only capacitive charge, guaranteed by design.

Table 10

Typ. capacitance stored energy	Typ. capacitance vs. reverse voltage
<p><math>E_C=f(V_R)</math></p>	<p><math>C=f(V_R)</math>; <math>T_j=25^\circ C</math>; <math>f=1\text{ MHz}</math></p>



## 6 Package outlines

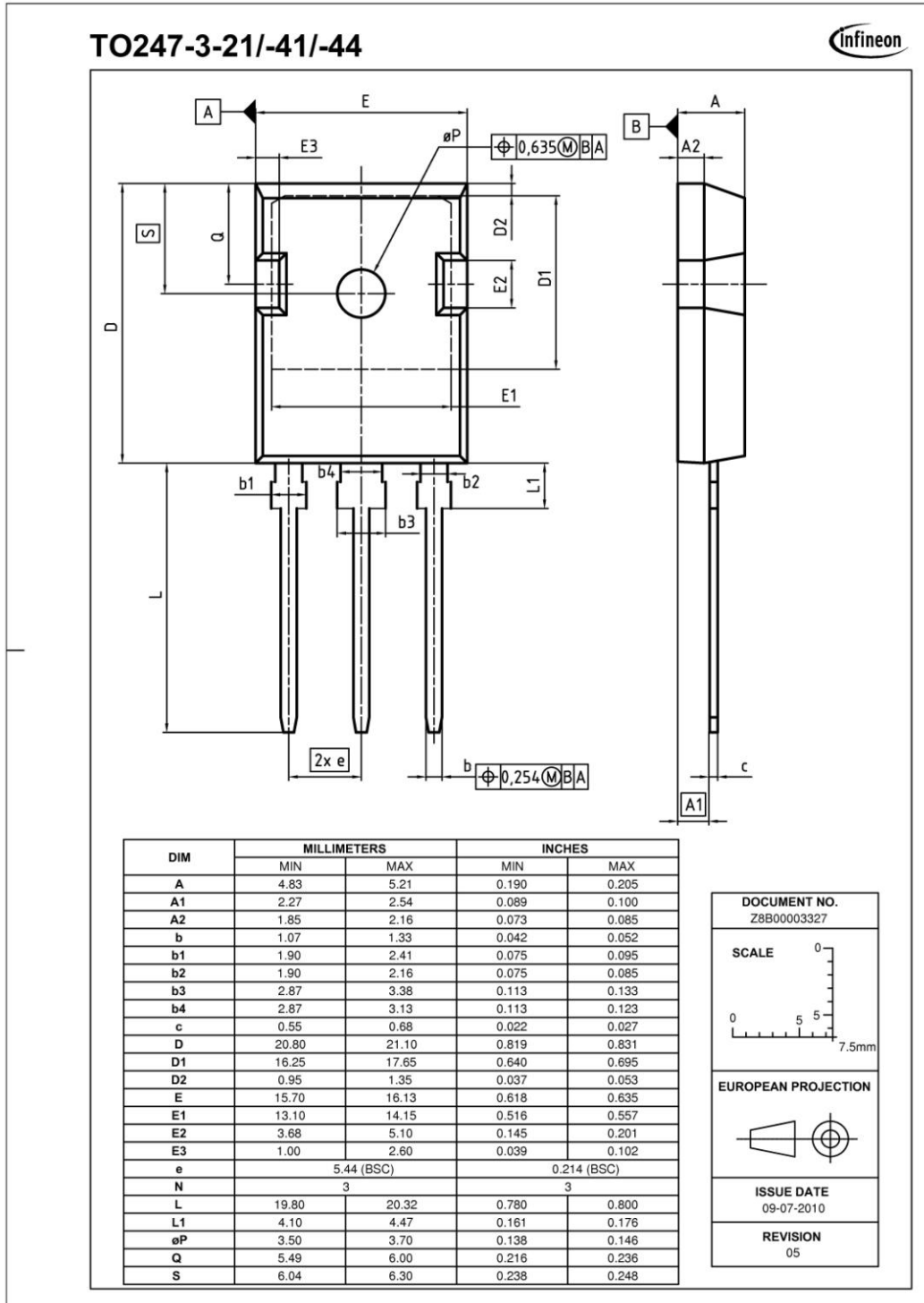


Figure 1 Outlines TO-247, dimensions in mm/inches

## 7 Revision History

thinQ!™ SiC Schottky Diode

Revision History: 2012-03-23, Rev. 2.0

Previous Revision:

Revision	Subjects (major changes since last version)

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