

SiC

Silicon Carbide Diode

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

1200V SiC Schottky Diode  
IDW30S120

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 e.g.; CCM PFC
- Solar applications; UPS; Motor Drives

**Table 1 Key Performance Parameters**

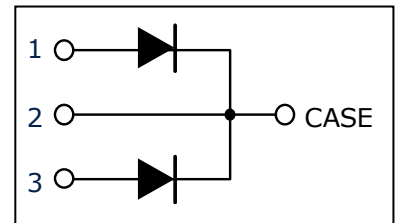
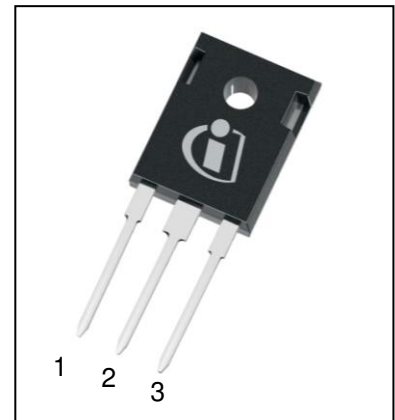
Parameter	Value (leg/device)	Unit
$V_{DC}$	1200	V
$Q_C @ V_R=400V$	55/110	nC
$I_F @ T_c < 135^\circ C$	15/30	A

**Table 2 Pin Definition**

Pin 1	Pin 2	Pin 3
A	C	A

Type / ordering Code	Package	Marking	Related links
IDW30S120	PG-TO247-3	D30S120	<a href="http://www.infineon.com/sic">www.infineon.com/sic</a>

### IDW30S120



1) J-STD20 and JEDEC22

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## 2 Maximum ratings

**Table 3 Maximum ratings**

Parameter	Symbol	Values (leg/device)			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Continuous forward current	$I_F$	–	–	15/30	A	$T_C < 135^\circ\text{C}$ , $D=1$
Surge non-repetitive forward current, sine halfwave	$I_{F,SM}$	–	–	73/146		$T_C = 25^\circ\text{C}$ , $t_p=10\text{ ms}$
		–	–	58/116		$T_C = 150^\circ\text{C}$ , $t_p=10\text{ ms}$
Non-repetitive peak forward current	$I_{F,max}$	–	–	389/778		$T_C = 25^\circ\text{C}$ , $t_p=10\ \mu\text{s}$
$i^2t$ value	$\int i^2 dt$	–	–	27/106	A <sup>2</sup> s	$T_C = 25^\circ\text{C}$ , $t_p=10\text{ ms}$
		–	–	17/68		$T_C = 150^\circ\text{C}$ , $t_p=10\text{ ms}$
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	$P_{tot}$	–	–	150/300	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 (leg/device)			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction-case	$R_{thJC}$	–	–	1.0/0.5	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 (leg/device)			Unit	Note/Test Condition
		Min.	Typ.	Max.		
DC blocking voltage	$V_{DC}$	1200	–	–	V	$I_R = 0.61 \text{ mA}, T_j = 25^\circ\text{C}$
Diode forward voltage	$V_F$	–	1.5	1.8		$I_F = 30 \text{ A}, T_j = 25^\circ\text{C}$
Reverse current	$I_R$	–	15/30	305/610	$\mu\text{A}$	$V_R = 1200 \text{ V}, T_j = 25^\circ\text{C}$
		–	30/60	1500/3000		$V_R = 1200 \text{ V}, T_j = 150^\circ\text{C}$

**Table 6 AC characteristics**

Parameter	Symbol	Values (leg/device)			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Total capacitive charge	$Q_c$	–	55/110	–	nC	$V_R = 400 \text{ V}, di/dt = 200 \text{ A}/\mu\text{s}, I_F \leq I_{F,MAX}, T_j = 150^\circ\text{C}.$
			84/168			$V_R = 1000 \text{ V}, di/dt = 200 \text{ A}/\mu\text{s}, I_F \leq I_{F,MAX}, T_j = 150^\circ\text{C}.$
Total Capacitance	$C$	–	870/1740	–	pF	$V_R = 1 \text{ V}, f = 1 \text{ MHz}$
		–	75/150	–		$V_R = 300 \text{ V}, f = 1 \text{ MHz}$
		–	60/120	–		$V_R = 600 \text{ V}, f = 1 \text{ MHz}$

## 5 Electrical characteristics diagrams

Table 7

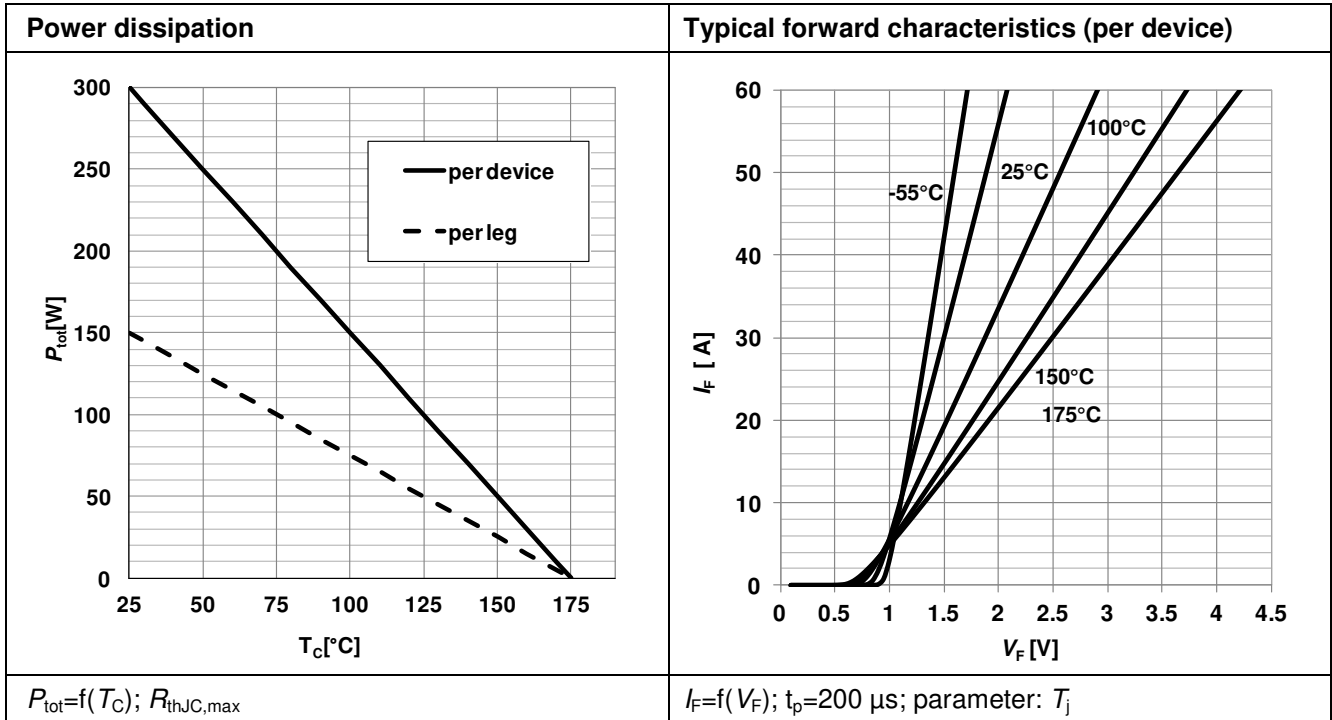


Table 8

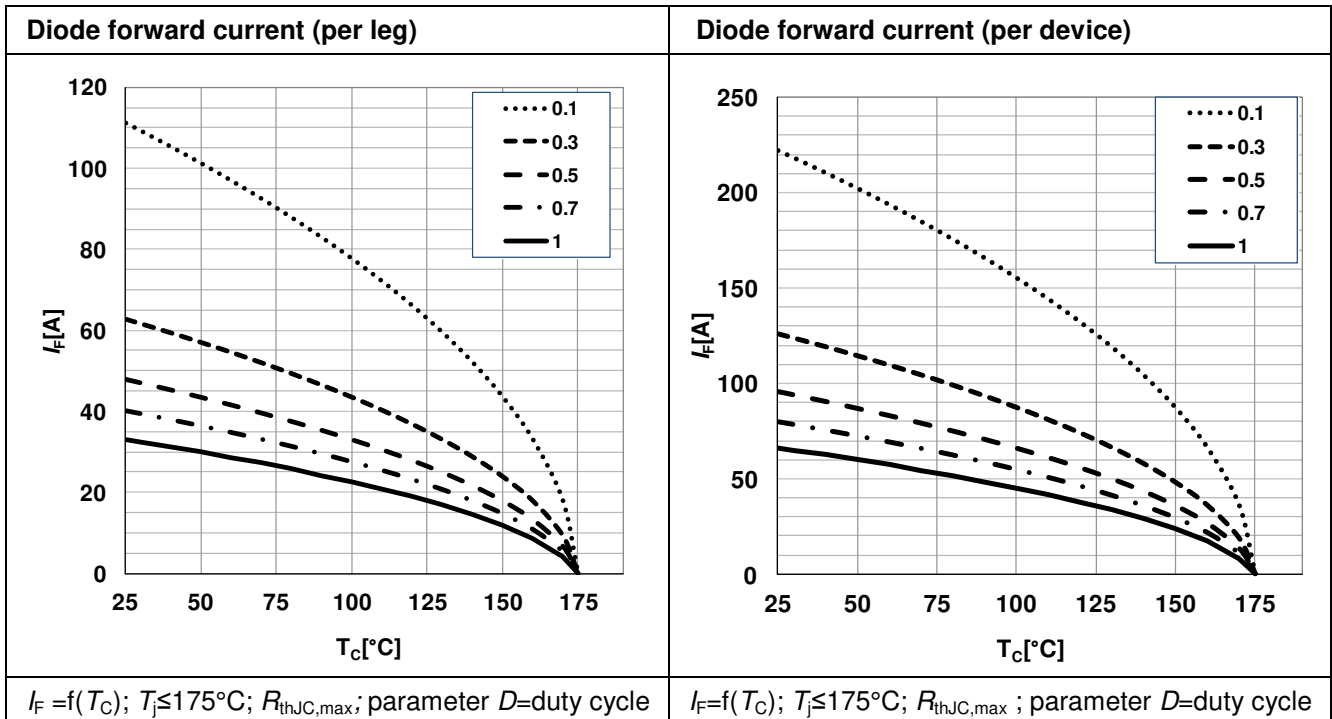


Table 9

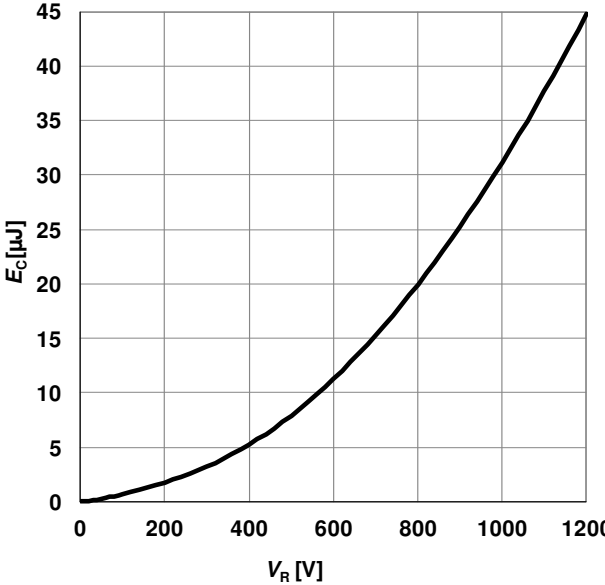
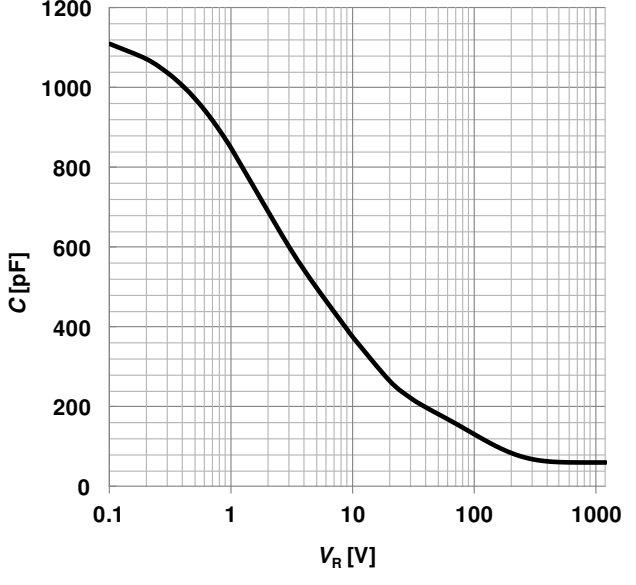
Typ. capacitance charge vs. current slope <sup>1)</sup> (per leg)	Typ. reverse current vs. reverse voltage (per leg)
$Q_C=f(di_F/dt)$ ; $V_R=400V$ ; $T_j=150^\circ C$ ; $I_F \leq I_{F,max}$ ; per device the values double	$I_R=f(V_R)$ ; parameter: $T_j$ ; per device the values double

1) Only capacitive charge, guaranteed by design.

Table 10

Max. transient thermal impedance (per leg)	Max. transient thermal impedance (per device)
$Z_{th,jc}=f(t_p)$ ; parameter: $D=t_p/T$	$Z_{th,jc}=f(t_p)$ ; parameter: $D=t_p/T$

Table 11

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



## 6 Package outlines

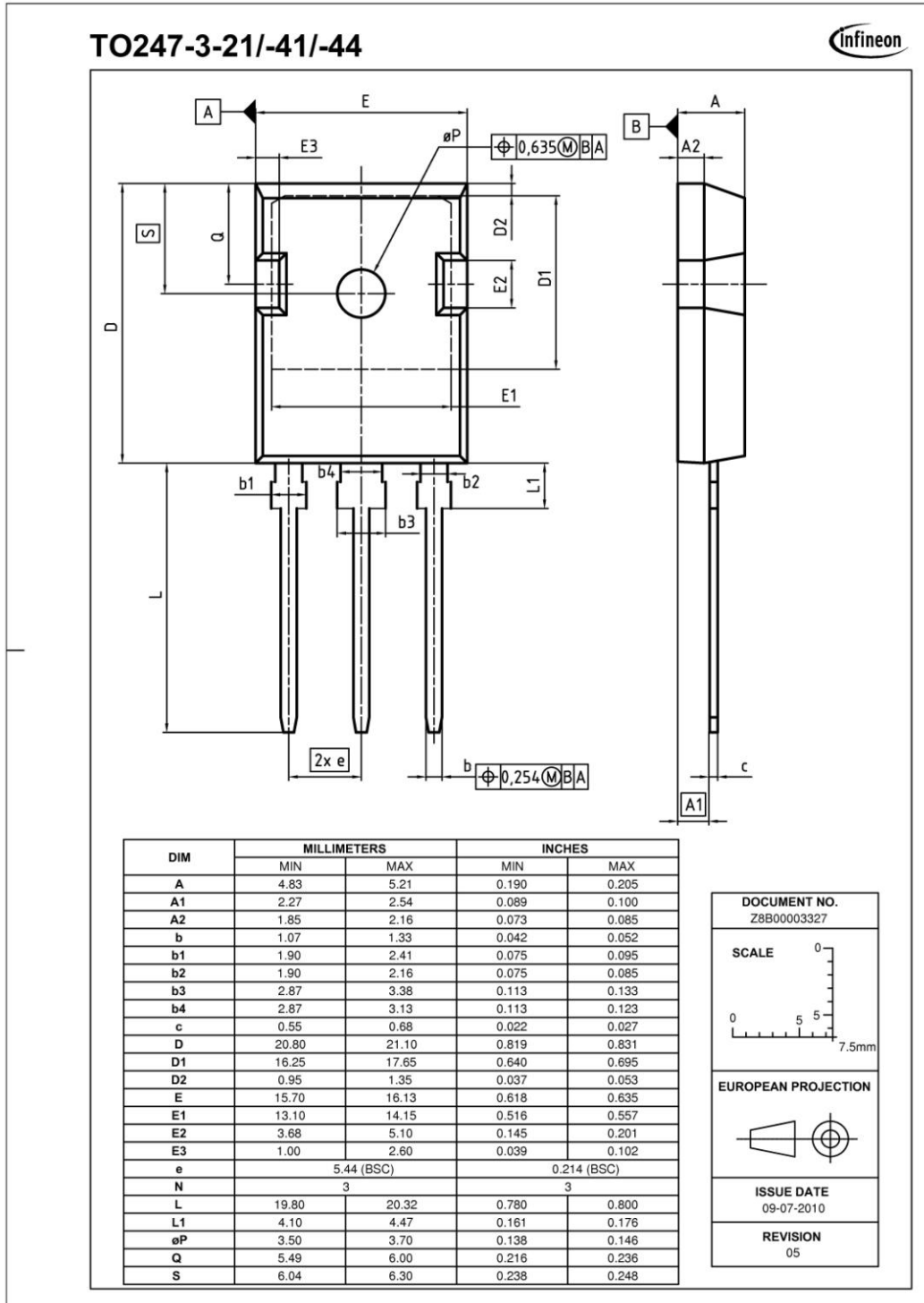


Figure 1 Outlines TO-247, dimensions in mm/inches

## 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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