

SiC

Silicon Carbide Diode

5th Generation thinQ!TM

650V SiC Schottky Diode
IDW16G65C5

Final Datasheet

Rev. 2.0 <2012-06-28>

Power Management & Multimarket

5th Generation thinQ!™ SiC Schottky Diode

1 Description

ThinQ!™ Generation 5 represents Infineon leading edge technology for the SiC Schottky Barrier diodes. Thanks to the more compact design and thin-wafer technology, the new family of products shows improved efficiency over all load conditions, resulting from both the improved thermal characteristics and a lower figure of merit ($Q_c \times V_f$).

The new thinQ!™ Generation 5 has been designed to complement our 650V CoolMOS™ families: this ensures meeting the most stringent application requirements in this voltage 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 JEDEC¹⁾ 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

- Switch mode power supply
- Power factor correction
- Solar inverter
- Uninterruptible power supply

Table 1 Key Performance Parameters

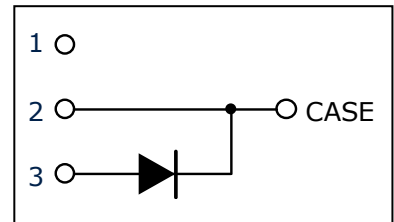
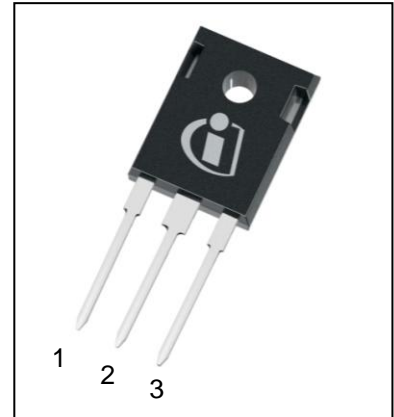
Parameter	Value	Unit
V_{DC}	650	V
$Q_C; V_R=400V$	23	nC
$E_C; V_R=400V$	5.6	μJ
$I_F @ T_C < 120^\circ C$	16	A

Table 2 Pin Definition

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

Type / ordering Code	Package	Marking	Related links
IDW16G65C5	PG-TO247-3	D1665C5	www.infineon.com/sic

IDW16G65C5



1) J-STD20 and JESD22

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2 Maximum ratings

Table 3 Maximum ratings

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Continuous forward current	I_F	–	–	16	A	$T_C < 120^\circ\text{C}$, $D=1$
Surge non-repetitive forward current, sine halfwave	$I_{F,SM}$	–	–	95		$T_C = 25^\circ\text{C}$, $t_p=10\text{ ms}$
		–	–	74		$T_C = 150^\circ\text{C}$, $t_p=10\text{ ms}$
Non-repetitive peak forward current	$I_{F,max}$	–	–	637		$T_C = 25^\circ\text{C}$, $t_p=10\ \mu\text{s}$
i ² t value	$\int i^2 dt$	–	–	45	A ² s	$T_C = 25^\circ\text{C}$, $t_p=10\text{ ms}$
		–	–	28		$T_C = 150^\circ\text{C}$, $t_p=10\text{ ms}$
Repetitive peak reverse voltage	V_{RRM}	–	–	650	V	
Diode dv/dt ruggedness	dv/dt	–	–	100	V/ns	$V_R=0..480\text{ V}$
Power dissipation	P_{tot}	–	–	94	W	$T_C = 25^\circ\text{C}$
Operating and storage temperature	$T_j; T_{stg}$	-55	–	175	°C	
Mounting torque		–	50	70	Ncm	M3 and M4 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}	–	1.2	1.6	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}	650	–	–	V	$I_R = 2.8 \text{ mA}, T_j = 25^\circ\text{C}$
Diode forward voltage	V_F	–	1.5	1.8		$I_F = 16 \text{ A}, T_j = 25^\circ\text{C}$
		–	1.8	2.2		$I_F = 16 \text{ A}, T_j = 150^\circ\text{C}$
Reverse current	I_R	–	0.8	2800	μA	$V_R = 650 \text{ V}, T_j = 25^\circ\text{C}$
		–	0.2	710		$V_R = 600 \text{ V}, T_j = 25^\circ\text{C}$
		–	3.2	10400		$V_R = 650 \text{ V}, T_j = 150^\circ\text{C}$

Table 6 AC characteristics

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Total capacitive charge	Q_c	–	23	–	nC	$V_R = 400 \text{ V}, di/dt = 200 \text{ A}/\mu\text{s}, I_F \leq I_{F,MAX}, T_j = 150^\circ\text{C}.$
Total Capacitance	C	–	490	–	pF	$V_R = 1 \text{ V}, f = 1 \text{ MHz}$
		–	63	–		$V_R = 300 \text{ V}, f = 1 \text{ MHz}$
		–	62	–		$V_R = 600 \text{ V}, f = 1 \text{ MHz}$

5 Electrical characteristics diagrams

Table 7

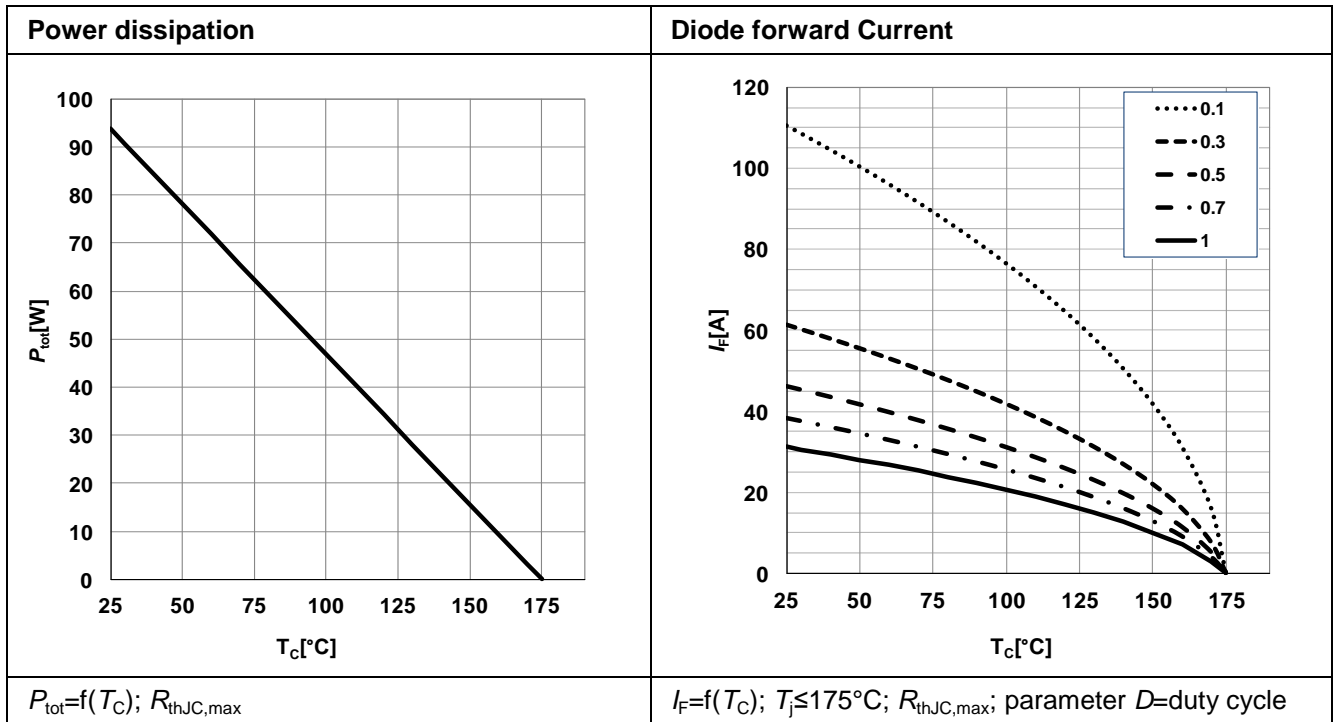


Table 8

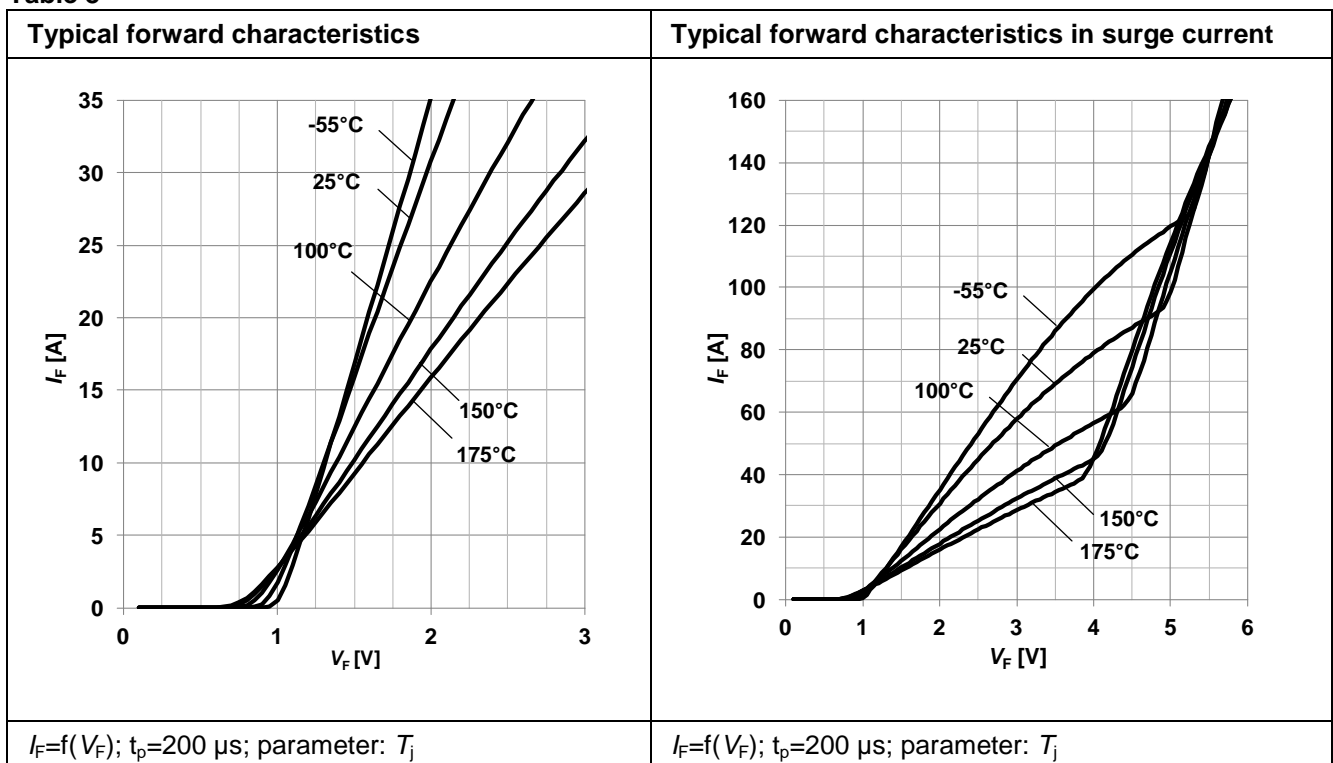
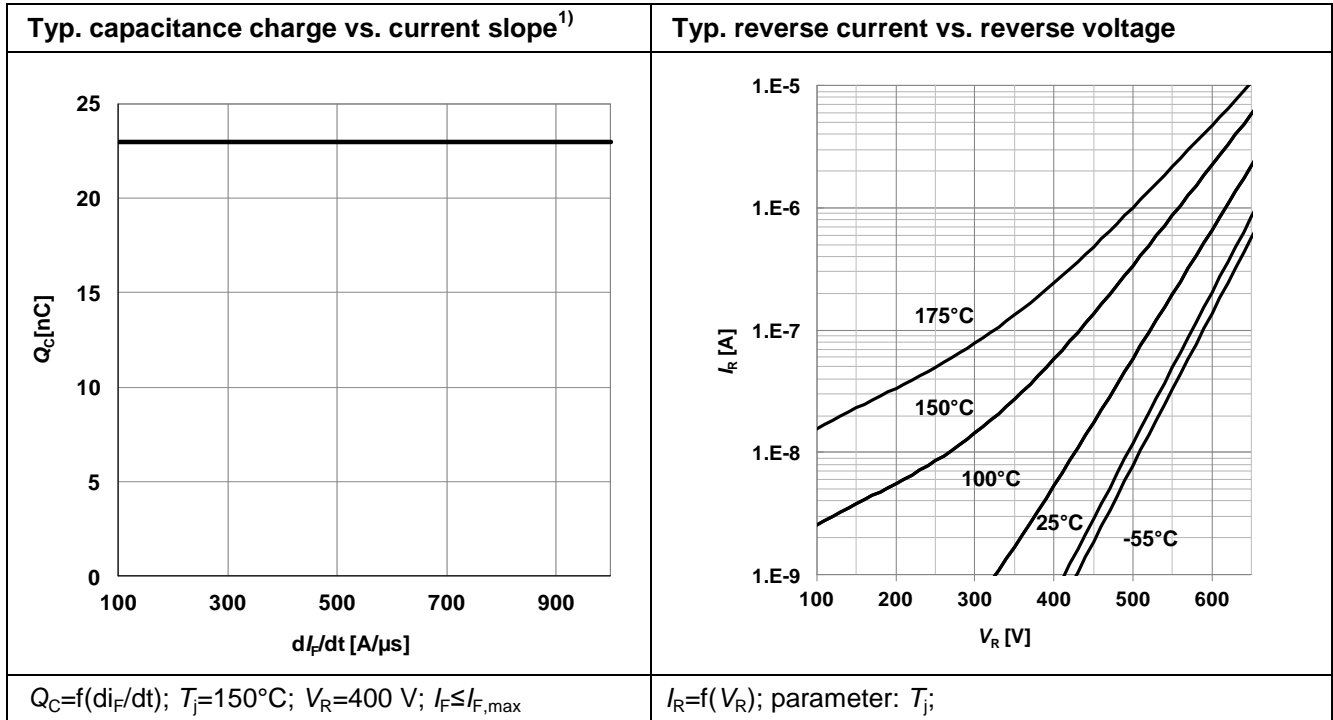


Table 9



1) Only capacitive charge, guaranteed by design.

Table 10

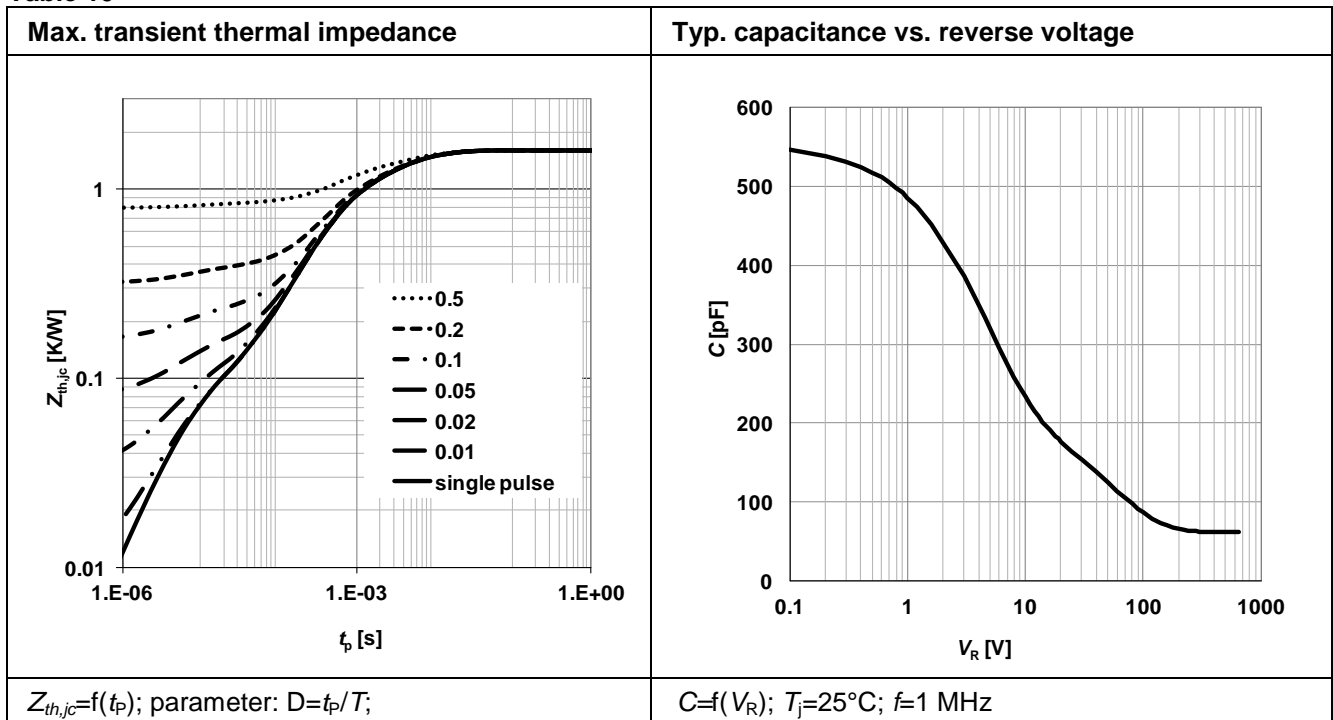
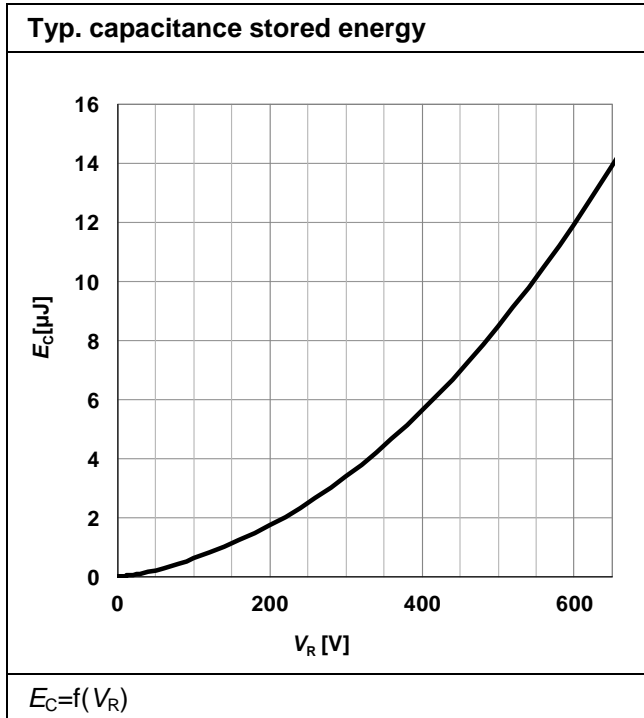


Table 11



6 Package outlines

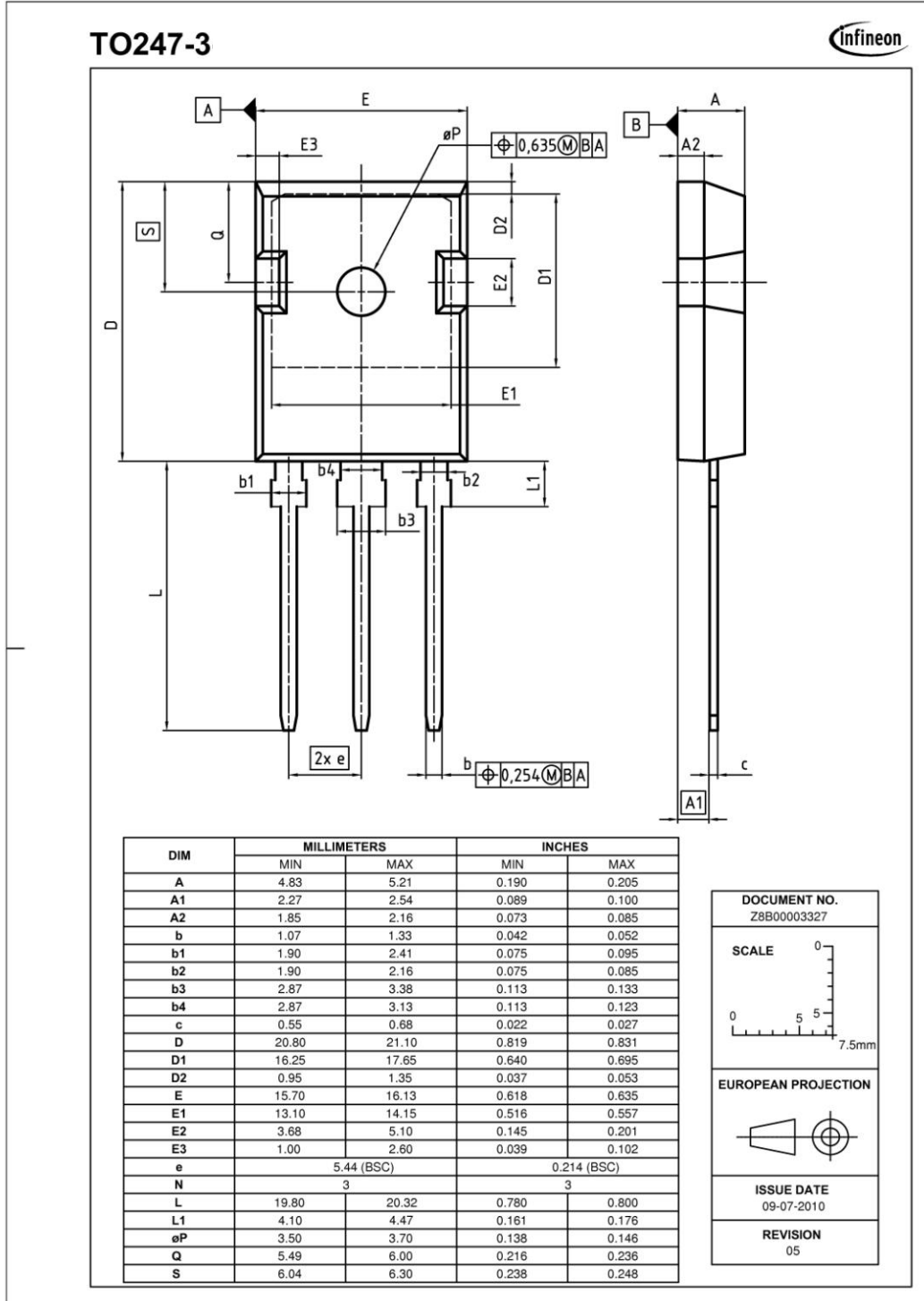


Figure 1 Outlines TO-247, dimensions in mm/inches

7 Revision History

5th. Generation thinQ!™ SiC Schottky Diode

Revision History: 2012-06-28, Rev. 2.0

Previous Revision:

Revision	Subjects (major changes since last version)

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