Never stop thinking

SiC

Silicon Carbide Diode

2nd Generation thinQ!™

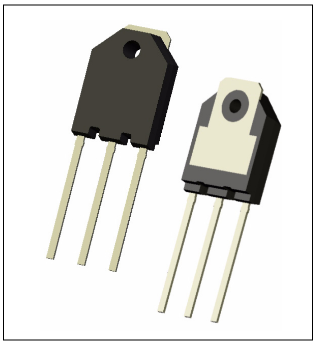
2nd Generation thinQ!™ SiC Schottky Diode
IDY15S120

Data Sheet

Rev. 2.0, 2011-02-28
Final

Industrial & Multimarket

1 Description



The second generation of Infineon SiC Schottky diodes has emerged over the years as the industry standard. The IDYxxS120 products are extending the already broad portfolio with the new TO-247HC (high creepage) package.

The new package layout is fully compatible with the industry standard TO247, and can therefore easily be placed in already existing designs, with no extra efforts.

The higher creepage distance increases the safety margin against the risk of short circuits, especially arcing, which might be triggered by the presence of dust or dirt inside the system. This reduces the need of additional chemical (silicone gel or creams) or mechanical (sheaths or foils) solutions to lower the pollution level between the leads, with all consequent benefits of a lean and faster manufacturing process

Features

- Revolutionary semiconductor material - Silicon Carbide
- Switching behavior benchmark
- No reverse recovery/ No forward recovery
- Temperature independent switching behavior
- High surge current capability
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC[1)] 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 and less fans
- Package design with high creepage distance
- Reduced EMI

Applications

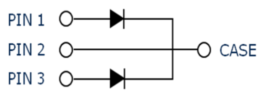
- Solar applications; UPS; Motor Drives;
- SMPS e.g.; CCM PFC

Table 1 Key Performance Parameters

Parameter	Value	Unit
V_{DC}	1200	V
Q_C	22	nC
I_F @ T_C < 150°C	15	A

Table 2 Pin Definition

Pin 1	Pin2	Pin 3
A	C	A



Type / Ordering Code	Package	Marking	Related Links
IDY15S120	PG-TO247HC-3	D15S120	IFX SiC Diodes Webpage

1) J-STD20 and JESD22

Table of Contents

2 Maximum ratings

Table 3 Maximum ratings

Parameter	Symbol	Values (leg/device)			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous forward current	I_F	-	-	7.5/15	A	T_C= < 150°C
Surge non-repetitive forward current, sine halfwave	$I_{F, SM}$	-	-	39/78		T_C= 25°C, t_p = 10 ms
		-	-	33/66		T_C= 150°C, t_p = 10 ms
Non-repetitive peak forward current	$I_{F, max}$	-	-	150/300		T_C= 25°C, t_p = 10 µs
i² t value	∫i²dt	-	-	10/40	A²s	T_C= 25°C, t_p = 10 ms
		-		6/26		T_C= 150°C, t_p = 10 ms
Repetitive peak reverse voltage	V_{RRM}	-	-	1200	V	T_j= 25°C
Diode dv/dt ruggedness	dv/dt	-	-	50	V/ns	V_R= 0...960 V
Power dissipation	P_{tot}	-	-	100/175	W	T_C= 25 °C
Operating and storage temperature	T_j, T_{stg}	-55	-	150	°C	
Mounting torque		-	-	0.6	Ncm	M3 screws Maximum of mounting processes:3

3 Thermal characteristics

Table 4 Thermal characteristics

Parameter	Symbol	Values (leg/device)			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	1.5/0.9	K/W	
Thermal resistance, junction - ambient	R_{thJA}	-	-	40		leaded
Soldering temperature, wavesoldering only allowed at leads	T_{sold}	-	-	260	°C	1.6 mm (0.063 in.) from case for 10 s

4 Electrical characteristics

Electrical characteristics, at T_j=25 °C, unless otherwise specified.

Table 5 Static characteristics

Parameter	Symbol	Values (leg/device)			Unit	Note / Test Condition
		Min.	Typ.	Max.		
DC blocking voltage	V_{DC}	1200	-	-	V	T_j= 25 °C, I_R= 0.1 mA
Diode forward voltage	V_F	-	1.65	1.8		I_F= 10 A, T_j= 25 °C
		-	2.55			I_F= 10 A, T_j= 150 °C
Reverse current	I_R	-	7.5/15	180/360	µA	I_R= 1200 V, T_j=25 °C
		-	30/60	750/1500		I_R= 1200 V, T_j=150 °C

Table 6 AC characteristics

Parameter	Symbol	Values (leg/device)			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Total capacitive charge	Q_c	-	11/22	-	nC	V_R= 400 V, $F \leq I\ F_{max}$ di_F /dt =200 A/µs, T_j=150 °C
Switching time[1]	t_c	-	-	<10	ns	
	C	-	375/750	-	pF	V_R= 1 V, f= 1 MHz
		-	30/60	-		V_R= 300 V, f= 1 MHz
		-	27/54	-		V_R= 600 V, f= 1 MHz

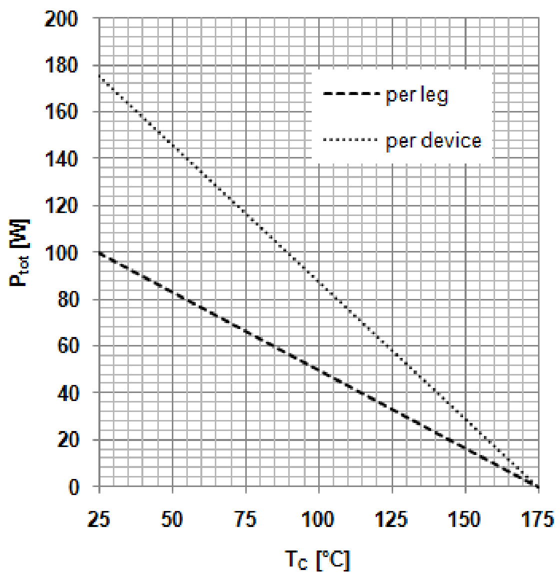
1) t_c is the time constant for the capacitive displacement current waveform (independent from T_j, I_{LOAD} and di/dt), different from t_{rr} which is dependent on T_j I_{LOAD} and di/dt. No reverse recovery time constant t_{rr} due to absence of minority carrier injection.

5 Electrical characteristics diagrams

Electrical characteristics, at T_j=25 °C, unless otherwise specified.

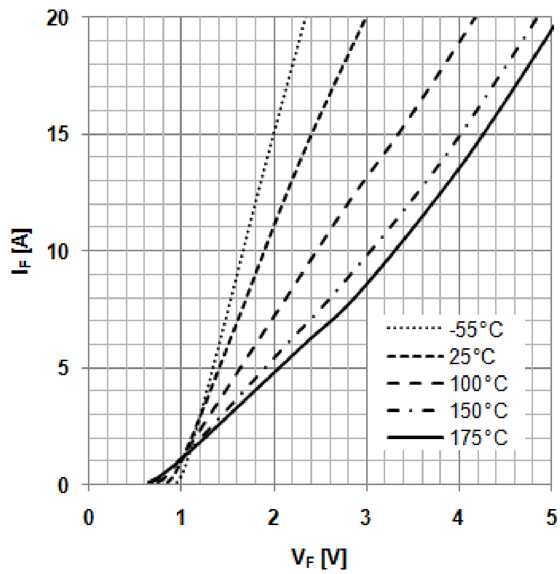
Table 7

Power dissipation



$P_{tot} = f(T_C)$; parameter: $R_{thJC(max)}$

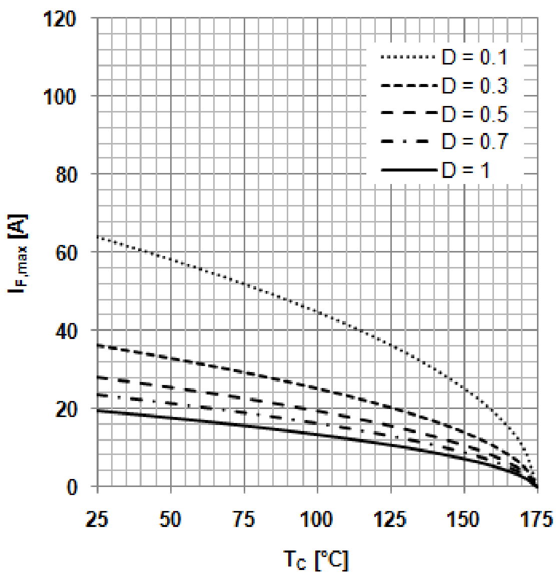
Typ. forward characteristic (per leg)



I_F=f(V_F); t_p=400 µs; parameter: T_j ; I_F=$f(T_C)$;
per device the values double

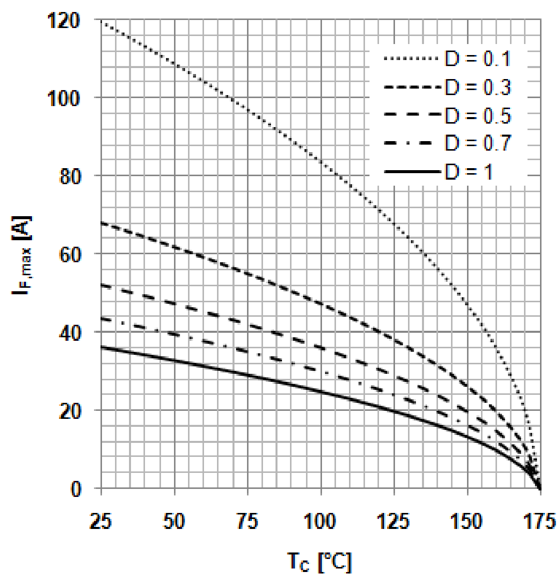
Table 8

Diode forward current (per leg)



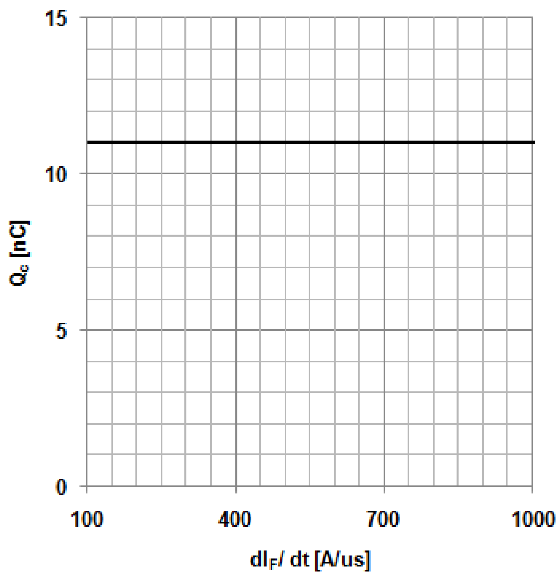
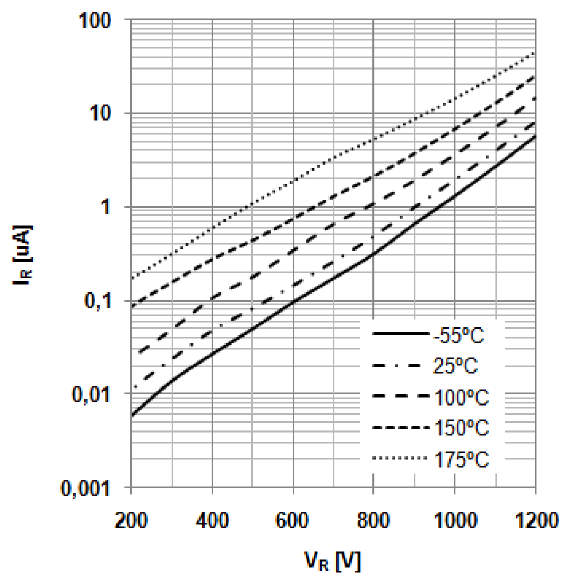
$T_j \leq$ 175 °C; parameter: $R_{thJC(max)}$; V_F (max); D=t_p /T

Diode forward current (per device)



$T_j \leq$ 175 °C; parameter: $R_{thJC(max)}$; V_F (max); D=t_p /T

Table 9

<table>
<tr><th>Typ. capacitance charge vs. current slope[1)]
(per leg)</th><th>Typ. reverse current vs. reverse voltage (per leg)</th></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>Q_D=f(diF/dt)4); T_j = 150 °C; $I_F \leq I_{F\ max}$;
per device the values double</td><td>I_R =f(V_R); parameter: T_j ; per device the values double</td></tr>
</table>

1) Only capacitive charge occuring, guaranteed by design

Table 10

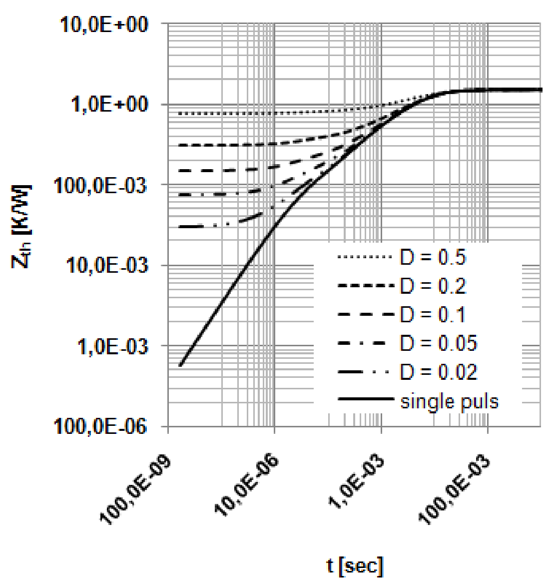
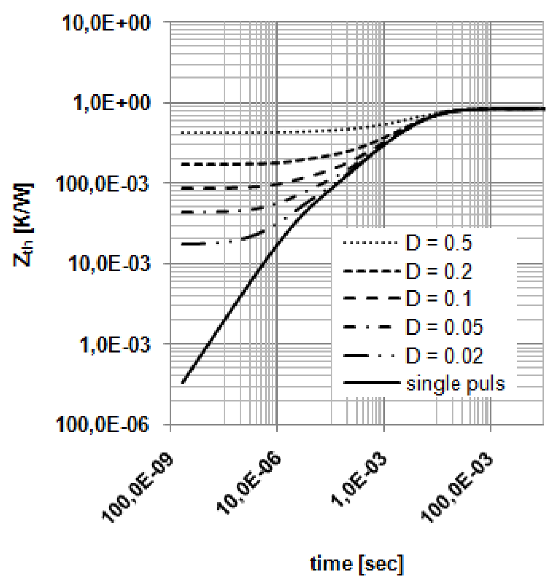
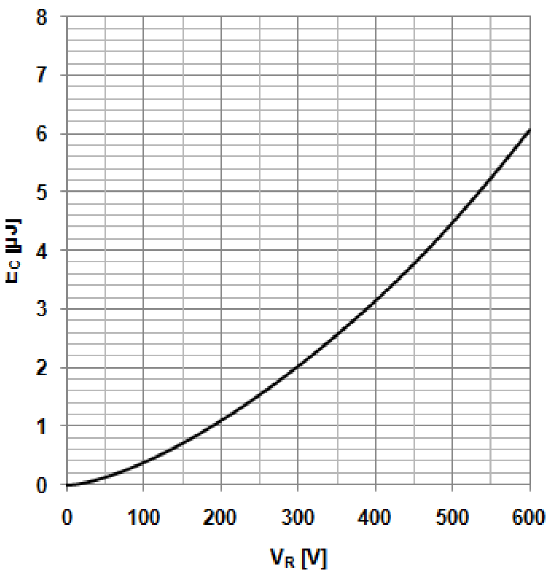
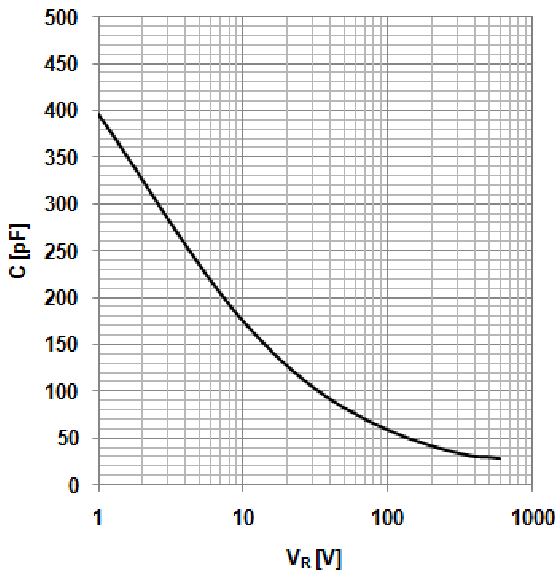
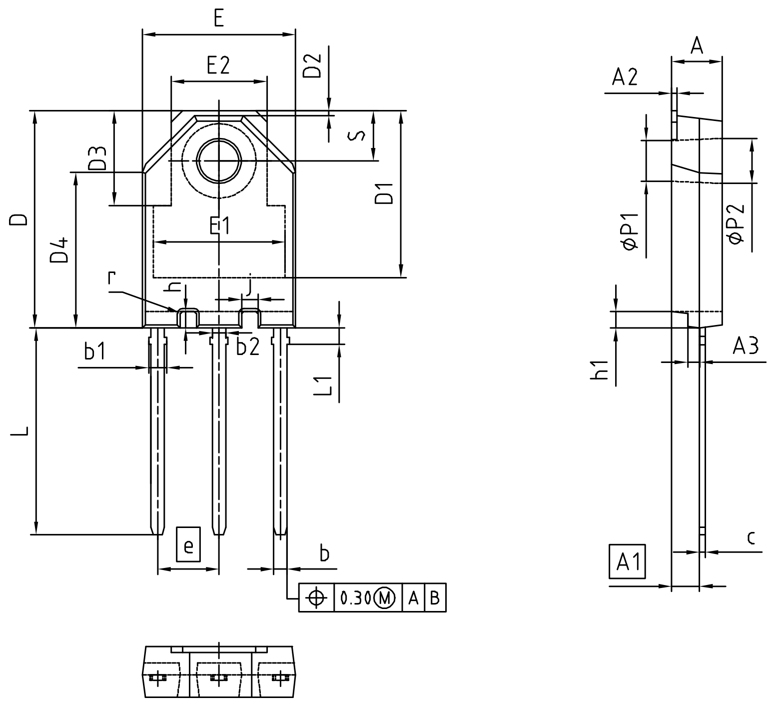
<table>
<tr><th>Typ. transient thermal impedance (per leg)</th><th>Typ. transient thermal impedance (per device)</th></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>Z_{thjc}=f(t_P) ; parameter: D = t_P/T</td><td>Z_{thjc}=f(t_P) ; parameter: D = t_P/T</td></tr>
</table>

Table 11

Typ. C stored energy (per leg)	Typ. capacitance vs. reverse voltage (per leg)
	
E_C=*f*(V_R); per device the values double	C=*f*(V_R); T_C=25 °C, *f*=1 MHz; per device the values double

6 Package outlines



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.40	4.60	0.173	0.181
A1	2.40	2.60	0.094	0.102
A2	0.40	0.60	0.016	0.024
A3	0.95	1.15	0.037	0.045
b	1.10	1.30	0.043	0.051
b1	1.50	1.70	0.059	0.067
b2	1.10	1.30	0.043	0.051
c	0.40	0.60	0.016	0.024
D	19.05	19.45	0.750	0.766
D1	14.69	14.89	0.578	0.586
D2	0.35	0.55	0.014	0.022
D3	8.30	8.50	0.327	0.335
D4	13.51	14.11	0.532	0.556
E	13.40	13.80	0.528	0.543
E1	11.60	11.80	0.457	0.465
E2	8.30	8.70	0.327	0.343
e	5.45		0.215	
N	3		3	
L	18.05	18.65	0.711	0.734
L1	1.35	1.55	0.053	0.061
øP1	3.51	3.71	0.138	0.146
øP2	4.00	4.10	0.157	0.161
S	4.35	4.55	0.171	0.179
j	1.35	1.55	0.053	0.061
h	1.35	1.55	0.053	0.061
r	max 0.2		max 0.008	
h1	1.35	1.55	0.053	0.061

DOCUMENT NO.
Z8B00151733

SCALE 0 2.5 5mm

EUROPEAN PROJECTION

ISSUE DATE
11-03-2009

REVISION
01

TOHC–3–1

Figure 1 Dimensions in mm/inches

7 Revision History

2nd Generation thinQ!™ 2nd Generation thinQ!™ SiC Schottky Diode

Revision History: 2011-02-28, Rev. 2.0

Previous Revision:

Revision	Subjects (major changes since last revision)
2.0	Release of final data sheet

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Edition 2011-02-28

Published by
Infineon Technologies AG
81726 Munich, Germany

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