Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

SiC

Silicon Carbide Diode

5th Generation thinQ!™

650V SiC Schottky Diode

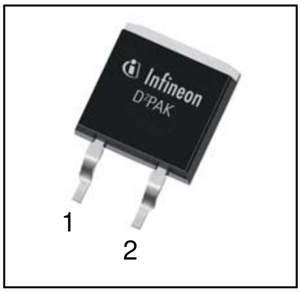
IDK05G65C5

Final Data Sheet

Rev. 2.0, 2013-07-20

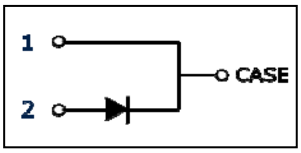
Power Management & Multimarket

5th Generation thinQ!™ SiC Schottky Diode IDK05G65C5



1 Description

ThinQ!™ Generation 5 represents Infineon leading edge technology for the SiC Schottky Barrier diodes. The Infineon proprietary diffusion soldering process, already introduced with G3 is now combined with a new, more compact design and thin-wafer technology. The result is a new family of products showing improved efficiency over all load conditions, resulting from both the improved thermal characteristics and a lower figure of merit (Qc x Vf).
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 JEDEC[1] for target applications
- Breakdown voltage tested at 11 mA[2]
- 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	8	nC
E_C; V_R=400V	1.8	µJ
I_F @ T_C < 145°C	5	A

Table 2 Pin Definition

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

Type / ordering Code	Package	Marking	Related links
IDK05G65C5	PG-TO263-2	D0565C5	www.infineon.com/sic

1) J-STD20 and JESD22
2) All devices tested under avalanche conditions for a time periode of 10ms

Table of Contents

2 Maximum ratings

Table 3 Maximum ratings

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Continuous forward current	I_F	–	–	5	A	T_C < 145°C, D=1
Surge non-repetitive forward current, sine halfwave	$I_{F,SM}$	–	–	46		T_C = 25°C, t_p=10 ms
		–	–	41		T_C = 150°C, t_p=10 ms
Non-repetitive peak forward current	$I_{F,max}$	–	–	251		T_C = 25°C, t_p=10 µs
i²t value	$\int i^2dt$	–	–	10.4	A²s	T_C = 25°C, t_p=10 ms
		–	–	8.4		T_C = 150°C, t_p=10 ms
Repetitive peak reverse voltage	V_{RRM}	–	–	650	V	T_j = 25°C
Diode dv/dt ruggedness	*dv/dt*	–	–	100	V/ns	V_R=0..480 V
Power dissipation	P_{tot}	–	–	55	W	T_C = 25°C
Operating and storage temperature	$T_j;T_{stg}$	-55	–	175	°C	
Mounting torque		–	–	60	Ncm	M2.5 screws

3 Thermal characteristics

Table 4 Thermal characteristics TO-263-2

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction-case	R_{thJC}	–	1.7	2.7	K/W	
Thermal resistance, junction-ambient [1]	R_{thJA}	–	–	62		SMD version, device on PCB, minimal footprint
			35			SMD version, device on PCB, 6cm² cooling area
Soldering temperature, wave- & reflow soldering allowed	T_{sold}	–	–	260	°C	Reflow MSL 1

1) Device on 40mm*40mm*1.5mm one layer epoxy PCB FR4 with 6cm² copper area (thickness 70µm) for drain connection, PCB is vertical without air stream cooling.

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= 0.83 mA, T_j=25°C
Diode forward voltage	V_F	–	1.5	1.8		I_F= 5 A, T_j=25°C
		–	1.8	2.2		I_F= 5 A, T_j=150°C
Reverse current	I_R	–	0.25	830	µA	V_R=650 V, T_j=25°C
		–	0.06	220		V_R=600 V, T_j=25°C
		–	1	3200		V_R=650 V, T_j=150°C

Table 6 AC characteristics

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Total capacitive charge	Q_c	–	8		nC	V_R=400 V, di/dt=200A/µs, $I_F \leq I_{F,MAX}$, T_j=150°C.
Total Capacitance	C	–	160	–	pF	V_R=1 V, f=1 MHz
		–	20	–		V_R=300 V, f=1 MHz
		–	20	–		V_R=600 V, f=1 MHz

5 Electrical characteristics diagrams

Table 7

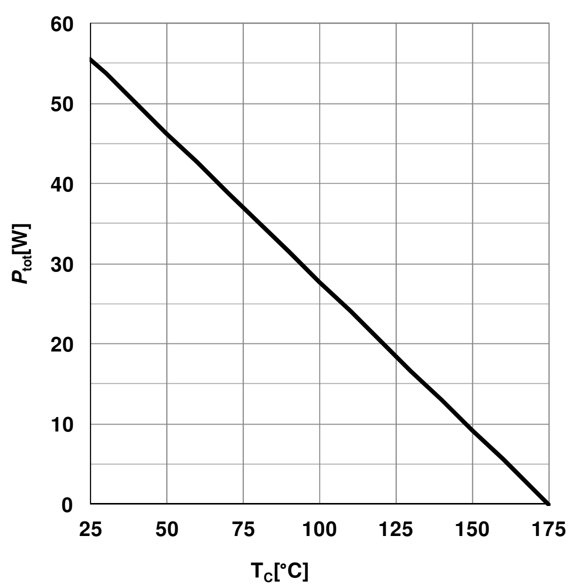
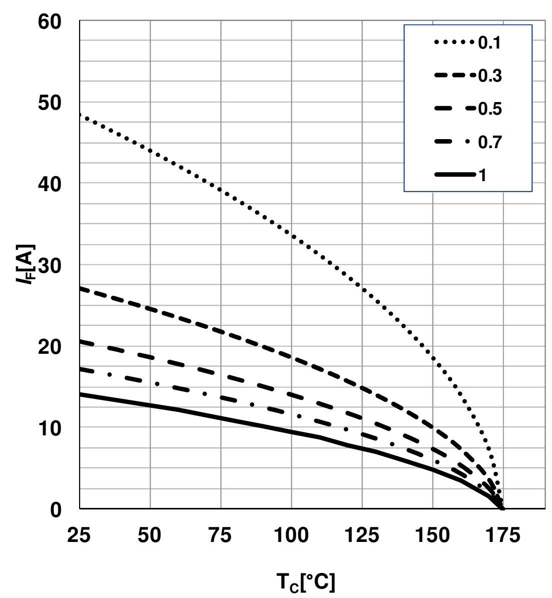
Power dissipation	Maximal diode forward current
	
P_{tot}=f(T_C); $R_{thJC,max}$	I_F=f(T_C); $R_{thJC,max}$; T_j≤175°C; parameter D=duty cycle

Table 8

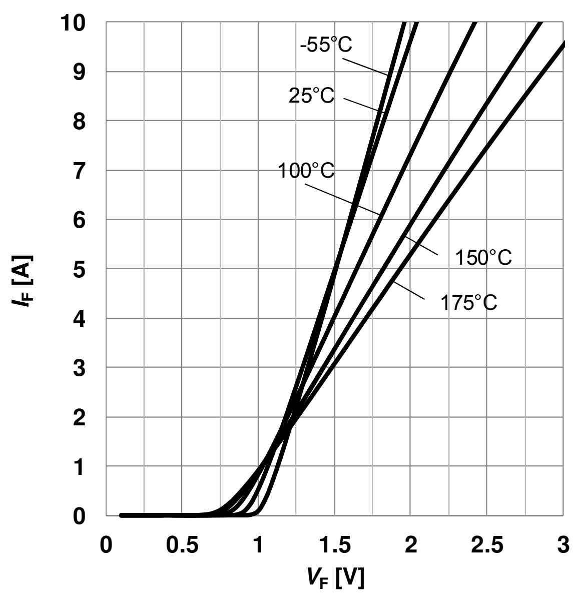
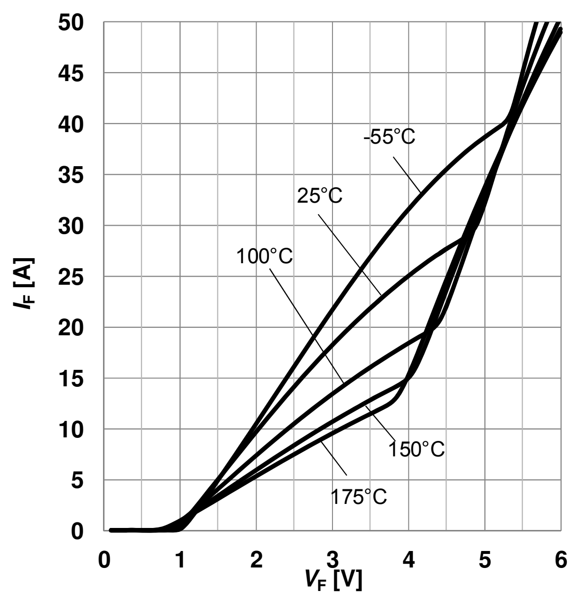
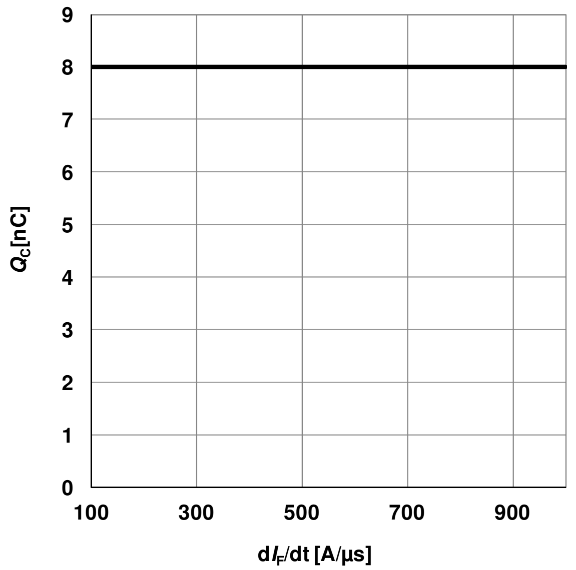
Typical forward characteristics	Typical forward characteristics in surge current
	
I_F=f(V_F); t_p=200 µs; parameter: T_j	I_F=f(V_F); t_p=200 µs; parameter: T_j

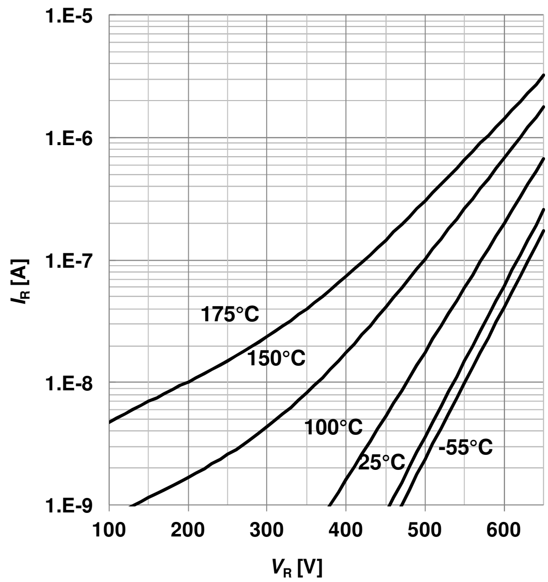
Table 9

Typ. capacitance charge vs. current slope[1)]



Q_C=f(di_F/dt); T_j=150°C; V_R=400 V; $I_F \le I_{F,max}$

Typ. reverse current vs. reverse voltage

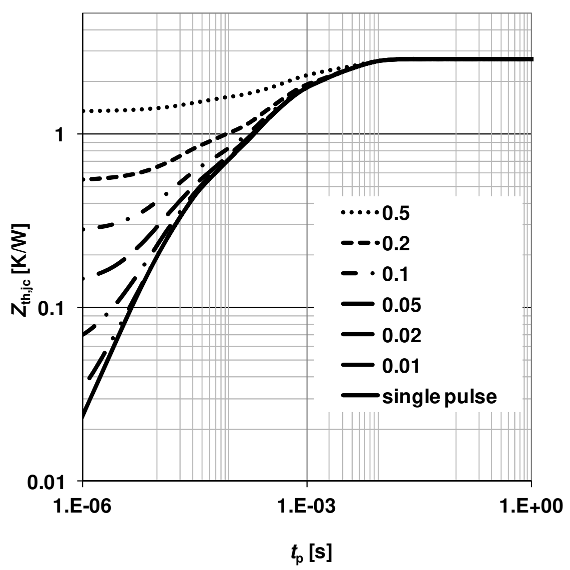


I_R=f(V_R); parameter: T_j;

1) Only capacitive charge, guaranteed by design.

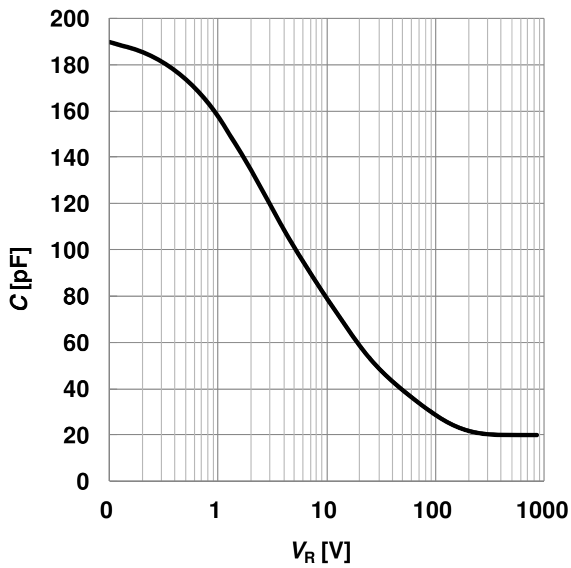
Table 10

Max. transient thermal impedance



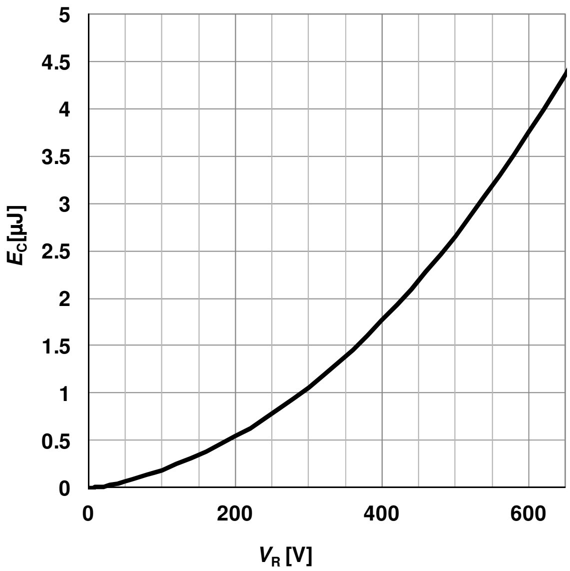
$Z_{th,jc}$=f(t_P); parameter: D=t_P/T;

Typ. capacitance vs. reverse voltage



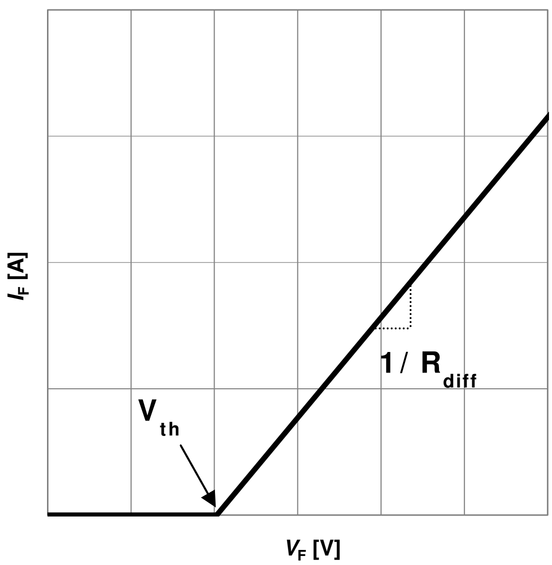
C=f(V_R); T_j=25°C; f=1 MHz

Table 11

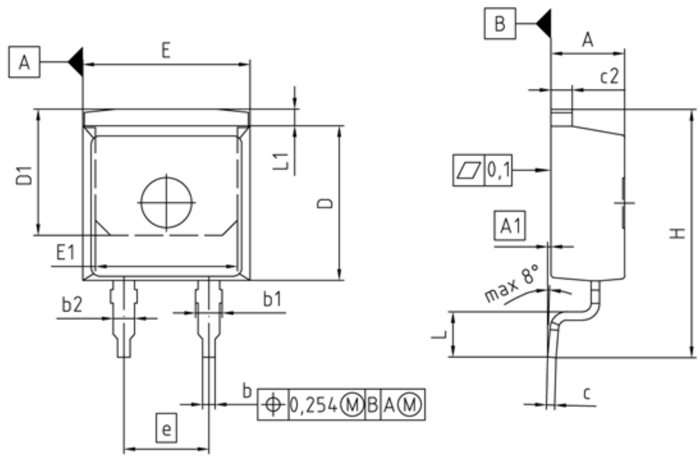
Typ. capacitance stored energy

E_C=f(V_R)

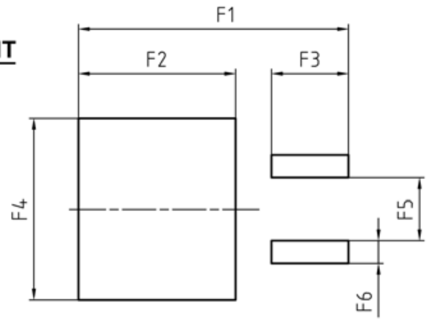
6 Simplified Forward Characteristics Model

Table 12

Equivalent forward current curve	Mathematical Equation
	$V_F = V_{TH} + R_{DIFF} \cdot I_F$ $V_{TH}(T_j) = -0.001 \cdot T_j + 1.04\ [V]$ $R_{DIFF}(T_j) = 2.57 \cdot 10^{-6} \cdot T_j^2 + 2.57 \cdot 10^{-4} \cdot T_j + 0.093\ [\Omega]$
V_F=f(I_F)	T_j in °C; -55°C < T_j < 175°C; I_F < 10 A

7 Package outlines

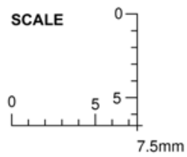




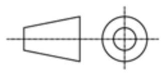
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.50	0.169	0.177
A1	0.00	0.25	0.000	0.010
b	0.65	0.85	0.026	0.033
b1	1.19	1.69	0.047	0.066
b2	1.19	1.39	0.047	0.055
c	0.40	0.60	0.016	0.024
c2	1.17	1.37	0.046	0.054
D	9.05	9.45	0.356	0.372
D1	6.90	7.65	0.272	0.301
E	9.80	10.20	0.386	0.402
E1	7.25	8.60	0.285	0.339
e	5.08 (BSC)		0.200 (BSC)	
N	2		2	
H	14.61	15.88	0.575	0.625
L	2.40	3.00	0.094	0.118
L1	0.70	1.30	0.028	0.051
F1	16.15		0.636	
F2	9.40		0.370	
F3	4.60		0.181	
F4	10.80		0.425	
F5	3.73		0.147	
F6	1.35		0.053	

DOCUMENT NO.
Z8B00163096

SCALE



EUROPEAN PROJECTION



ISSUE DATE
08-05-2013

REVISION
02

Figure 1 Outlines TO-263, dimensions in mm/inches

8 Revision History

5th Generation thinQ!™ SiC Schottky Diode

Revision History: 2013-07-20, Rev. 2.0	
Previous Revision:	
Revision	**Subjects (major changes since last version)**
2.0	Release of final data sheet

We Listen to Your Comments

Any information within this document that you feel is wrong, unclear or missing at all?
Your feedback will help us to continuously improve the quality of this document.
Please send your proposal (including a reference to this document) to: **erratum@infineon.com**

Edition 2013-07-20
Published by
Infineon Technologies AG
81726 Munich, Germany

Information

For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office (www.infineon.com).

Warnings

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office.

The Infineon Technologies component described in this Data Sheet may be used in life-support devices or systems and/or automotive, aviation and aerospace applications or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support, automotive, aviation and aerospace device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

w w w . i n f i n e o n . c o m

Published by Infineon Technologies AG