Diode

Silicon Carbide Schottky Diode

IDM05G120C5

5th Generation thinQ!™ 1200 V SiC Schottky Diode

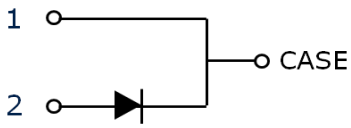
Final Datasheet

Rev. 2.0 2015-08-28

Industrial Power Control

SiC Schottky Diode

Features:



- Revolutionary semiconductor material - Silicon Carbide
- No reverse recovery current / No forward recovery
- Temperature independent switching behavior
- Low forward voltage even at high operating temperature
- Tight forward voltage distribution
- Excellent thermal performance
- Extended surge current capability
- Specified dv/dt ruggedness
- Qualified according to JEDEC[1)] for target applications
- Pb-free lead plating; RoHS compliant

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
- Related Links: www.infineon.com/sic

Applications

- Solar inverters
- Uninterruptable power supplies
- Motor drives
- Power Factor Correction

Package pin definitions

- Pin 1 and backside – cathode
- Pin 2 – anode

Key Performance and Package Parameters

Type	V_{DC}	I_F	Q_C	$T_{j,max}$	Marking	Package
IDM05G120C5	1200V	5A	24nC	175°C	D0512C5	PG-TO252-2

1) J-STD20 and JESD22

Table of Contents

Maximum ratings

Parameter	Symbol	Value	Unit
Repetitive peak reverse voltage	V_{RRM}	1200	V
Continoues forward current for $R_{th(j-c,max)}$ T_C = 164°C, D=1 T_C = 135°C, D=1 T_C = 25°C, D=1	I_F	 5 10.8 22.2	A
Surge non-repetitive forward current, sine halfwave T_C=25°C, t_p=10ms T_C=150°C, t_p=10ms	$I_{F,SM}$	 59 50	
Non-repetitive peak forward current T_C = 25°C, t_p=10 µs	$I_{F,max}$	472	
i²t value T_C = 25°C, t_p=10 ms T_C = 150°C, t_p=10 ms	$\int i^2dt$	 17.4 12.5	A²s
Diode dv/dt ruggedness V_R=0...960 V	dv/dt	80	V/ns
Power dissipation T_C = 25°C	P_{tot}	144	W
Operating temperature	T_j	-55…175	°C
Storage temperature	T_{stg}	-55…150	
Soldering temperature, Wave- and reflowsoldering allowed (reflow MSL1)	T_{sold}	260	

Thermal Resistances

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Characteristic						
Diode thermal resistance, junction – case	$R_{th(j-c)}$		-	0.8	1.04	K/W
Thermal resistance, junction – ambient	$R_{th(j-a)}$	SMD version, device on PCB, minimal footprint	-	-	62	
		SMD version, device on PCB, 6 cm² cooling area[2)]		35		

[2)] Device on 40 mm*40mm*1.5 epoxy PCB FR4 with 6cm² (one layer, 70µm thick) copper for cathode connection. PCB is vertical without air stream cooling.

Electrical Characteristics

Static Characteristic, at Tj=25°C, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
DC blocking voltage	V_{DC}	T_j = 25°C	1200	-	-	V
Diode forward voltage	V_F	I_F= 5 A, T_j=25°C I_F= 5 A, T_j=150°C	- -	1.50 1.95	1.8 2.6	V
Reverse current	I_R	V_R=1200 V, T_j=25°C V_R=1200 V, T_j=150°C		2.5 12	33 175	µA

Dynamic Characteristics, at T_j=25°C, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Total capacitive charge	Q_C	V_R = 800 V, T_j=150°C $Q_C = \int_0^{V_R} C(V)dV$	-	24	-	nC
Total Capacitance	C	V_R=1 V, f=1 MHz V_R=400 V, f=1 MHz V_R=800 V, f=1 MHz	- - -	301 21 17	- - -	pF

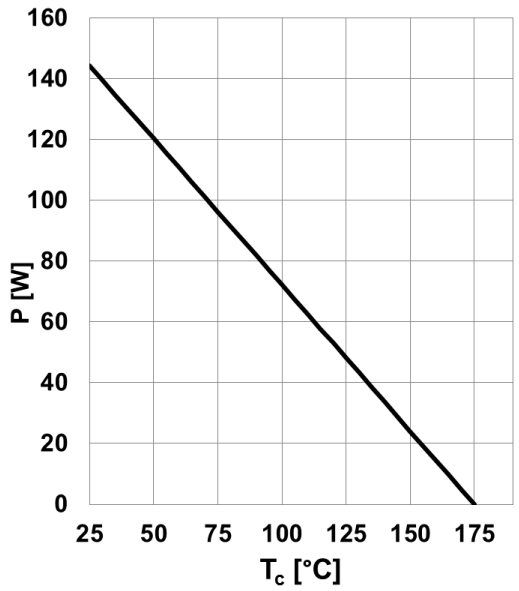


Figure 1. **Power dissipation as a function of case temperature,** $P_{tot}=f(T_C)$, $R_{th(j-c),max}$

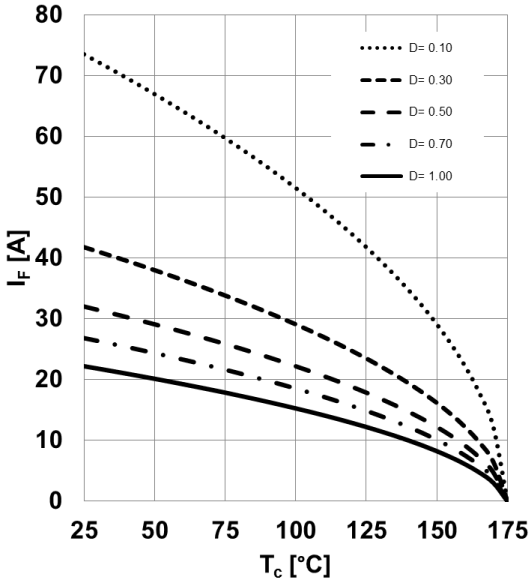


Figure 2. **Diode forward current as function of temperature,** $T_j \leq 175°C$, $R_{th(j-c),max}$, parameter D=duty cycle, V_{th}, *Rdiff* @ T_j=175°C

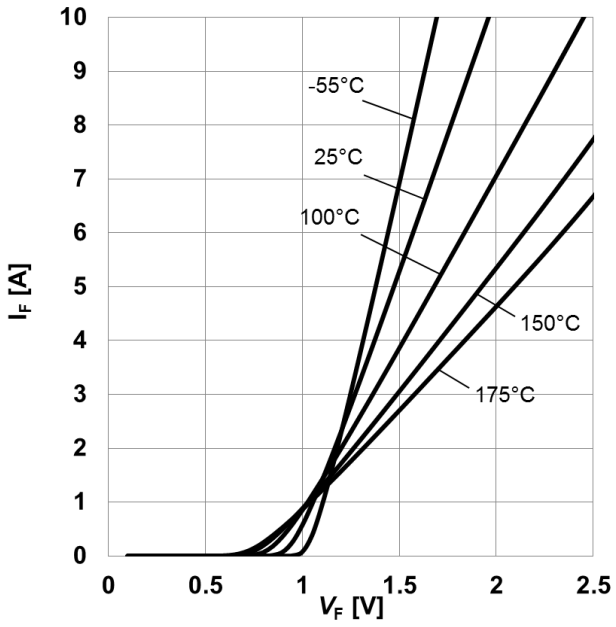


Figure 3. **Typical forward characteristics,** $I_F=f(V_F)$, t_p= 10 µs, parameter: T_j

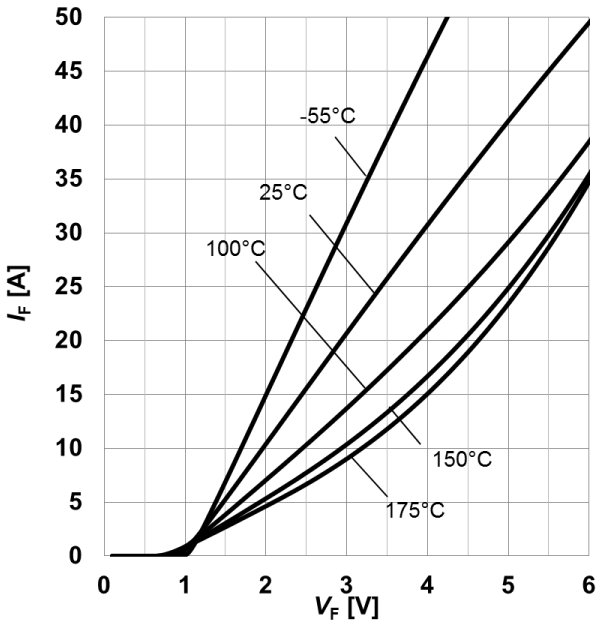


Figure 4. **Typical forward characteristics in surge current,** $I_F=f(V_F)$, t_p= 10 µs, parameter: T_j

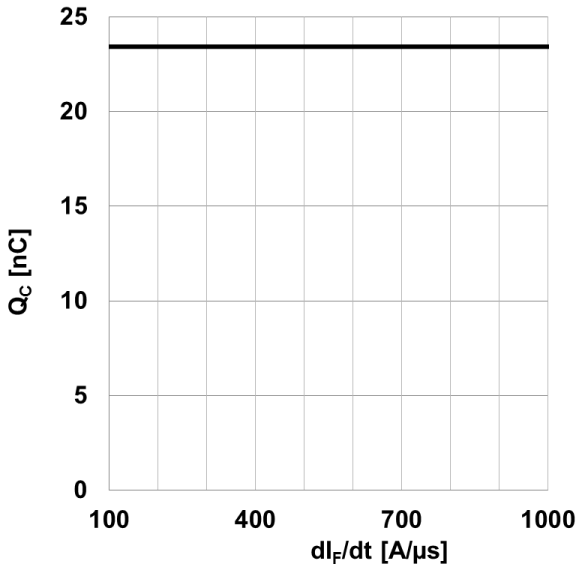


Figure 5. **Typical capacitance charge as function of current slope**[1], Q_C=f(dI_F/dt), T_j=150°C

1) Only capacitive charge, guaranteed by design.

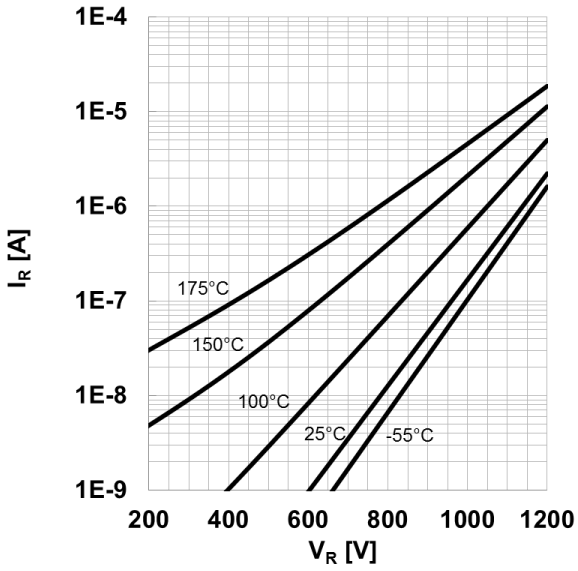


Figure 6. **Typical reverse current as function of reverse voltage,** I_R=f(V_R), parameter: T_j

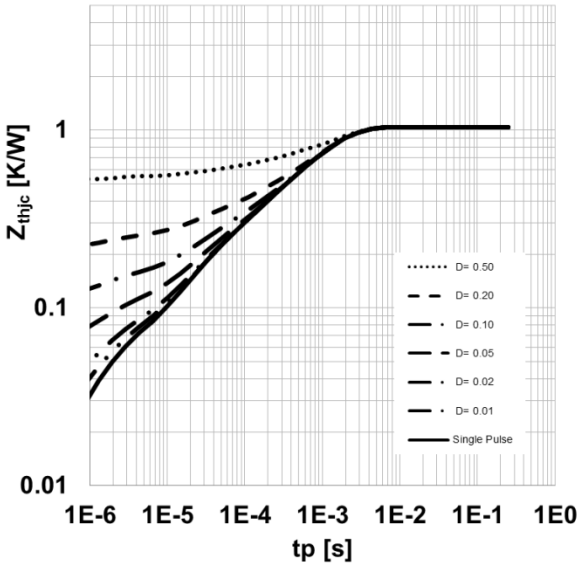


Figure 7. **Max. transient thermal impedance,** $Z_{th,jc}$=f(t_P), parameter: D=t_P/T

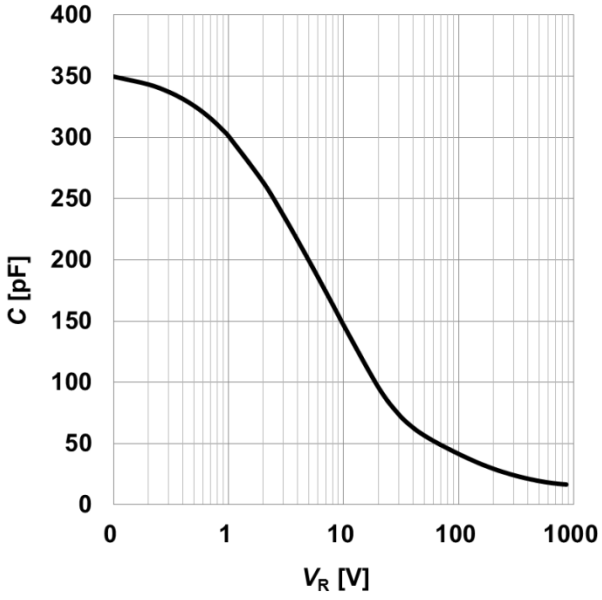


Figure 8. **Typical capacitance as function of reverse voltage,** C=f(V_R); T_j=25°C; f=1 MHz

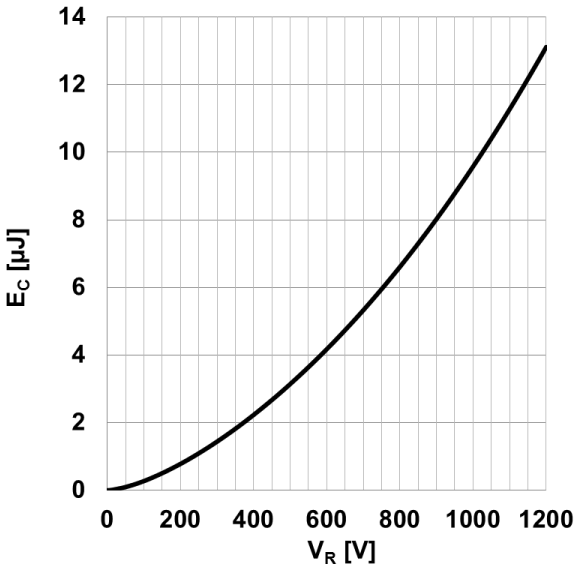
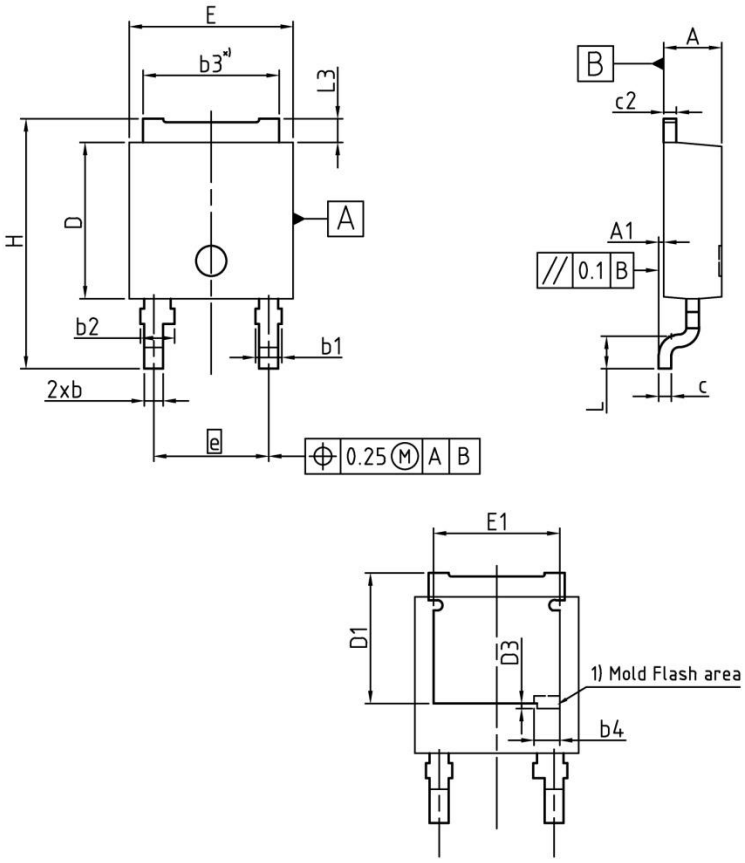


Figure 9. **Typical capacitance stored energy as function of reverse voltage,**

$$E_C = \int_0^{V_R} C(V)VdV$$

PG-TO252-2



*) mold flash not included

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.20	2.35	0.087	0.093
A1	0.00	0.15	0.000	0.006
b	0.65	0.85	0.026	0.033
b1	-	1.15	-	0.045
b2	1.05	1.45	0.041	0.057
b3	5.30	5.50	0.209	0.217
b4	1.02		0.040	
c	0.46	0.58	0.018	0.023
c2	0.46	0.58	0.018	0.023
D	6.02	6.22	0.237	0.245
D1	5.04	5.44	0.198	0.214
E	6.45	6.65	0.254	0.262
E1	5.00		0.197	
e	4.57 (BSC)		0.180 (BSC)	
N	2		2	
H	9.40	10.40	0.370	0.409
L	1.19	1.39	0.047	0.055
D3	0.20		0.008	
L3	0.90	1.10	0.035	0.043

DOCUMENT NO. Z8B00173481
SCALE 0 2.0 4mm
EUROPEAN PROJECTION
ISSUE DATE 29-05-2014
REVISION 01

Revision History

IDM05G120C5

Revision: 2015-08-28, Rev. 2.0

Previous Revision:

Revision	Date	Subjects (major changes since last version)
2.0	28.08.2015	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

Published by
Infineon Technologies AG
81726 Munich, Germany

Legal Disclaimer
The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

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.