

Diode

Silicon Carbide Schottky Diode

IDH20G120C5

5th Generation thinQ!™ 1200 V SiC Schottky Diode

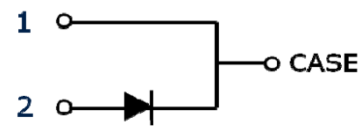
IDH20G120C5

Rev. 2.0 2015-09-03

thinQ!™ 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 JEDEC¹⁾ for target applications
- Pb-free lead plating; RoHS compliant



Benefits

- System efficiency improvement over Si diodes
- Enabling higher frequency / increased power density solutions
- System size / cost savings due to reduced heatsink requirements and smaller magnetics
- Reduced EMI
- Highest efficiency across the entire load range
- Robust diode operation during surge events
- High reliability
- RelatedLinks: 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
IDH20G120C5	1200V	20A	82nC	175°C	D2012C5	PG-TO220-2-1

1) J-STD20 and JESD22

Table of Contents

Description	2
Table of Contents	3
Maximum Ratings	4
Thermal Resistances	4
Electrical Characteristics	5
Electrical Characteristics Diagram	6
Package Drawings	9
Revision History	10
Disclaimer	10

Maximum ratings

Parameter	Symbol	Value	Unit
Repetitive peak reverse voltage	V_{RRM}	1200	V
Continues forward current for $R_{th(j-c,max)}$ $T_C = 150^{\circ}C$, $D=1$ $T_C = 135^{\circ}C$, $D=1$ $T_C = 25^{\circ}C$, $D=1$	I_F	20 27 56	A
Surge non-repetitive forward current, sine halfwave $T_C=25^{\circ}C$, $t_p=10ms$ $T_C=150^{\circ}C$, $t_p=10ms$	$I_{F,SM}$	198 168	A
Non-repetitive peak forward current $T_C = 25^{\circ}C$, $t_p=10 \mu s$	$I_{F,max}$	1200	A
i^2t value $T_C = 25^{\circ}C$, $t_p=10 ms$ $T_C = 150^{\circ}C$, $t_p=10 ms$	$\int i^2 dt$	195 140	A ² s
Diode dv/dt ruggedness $V_R=0...960V$	dv/dt	80	V/ns
Power dissipation $T_C = 25^{\circ}C$	P_{tot}	330	W
Operating and storage temperature	$T_{jr}; T_{stg}$	-55...175	$^{\circ}C$
Soldering temperature, wavesoldering only allowed at leads, 1.6mm (0.063 in.) from case for 10 s	T_{sold}	260	$^{\circ}C$
Mounting torque M3 and M4 screws	M	0.7	Nm

Thermal Resistances

Thermal Resistances						
Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Characteristic						
Diode thermal resistance, junction – case	R _{th(j-c)}		-	0.35	0.46	K/W
Thermal resistance, junction – ambient	R _{th(j-a)}	lead	-	-	62	K/W

Electrical Characteristics

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

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Static Characteristic						
DC blocking voltage	V_{DC}	$T_j = 25^{\circ}C$	1200	-	-	V
Diode forward voltage	V_F	$I_F = 20A, T_j = 25^{\circ}C$	-	1.5	1.8	V
		$I_F = 20A, T_j = 150^{\circ}C$	-	2.0	2.6	
Reverse current	I_R	$V_R = 1200V, T_j = 25^{\circ}C$		8.5	123	μA
		$V_R = 1200V, T_j = 150^{\circ}C$		44	630	

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

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Dynamic Characteristics						
Total capacitive charge	Q _C	V _R =800V, T _j =150°C $Q_C = \int_0^{V_R} C(V)dV$	-	82	-	nC
Total Capacitance	C	V _R =1 V, f=1 MHz	-	1050	-	pF
		V _R =400 V, f=1 MHz	-	74	-	
		V _R =800 V, f=1 MHz	-	59	-	

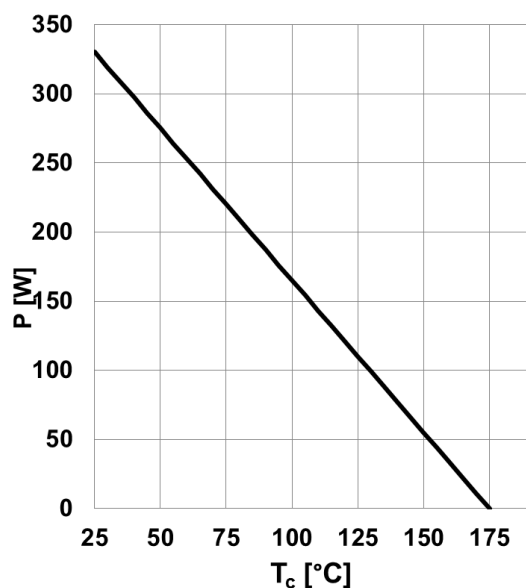


Figure 1. Power dissipation as a function of case temperature, $P_{\text{tot}}=f(T_C, R_{\text{th(j-c),max}})$

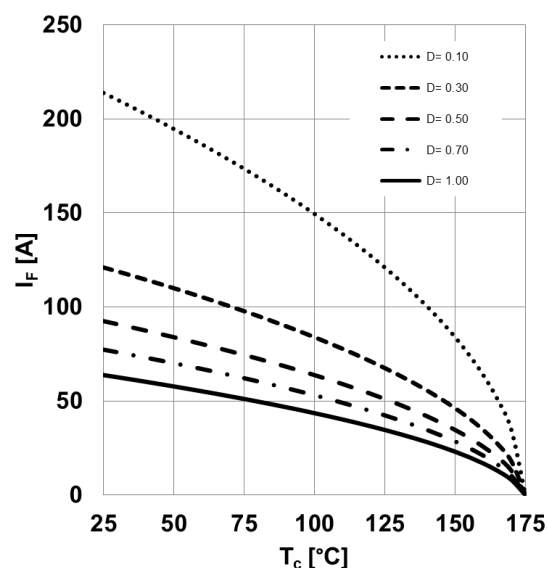


Figure 2. Diode forward current as function of temperature, $T_j \leq 175^\circ\text{C}$, $R_{\text{th(j-c),max}}$, parameter D =duty cycle, V_{th} , R_{diff} @ $T_j=175^\circ\text{C}$

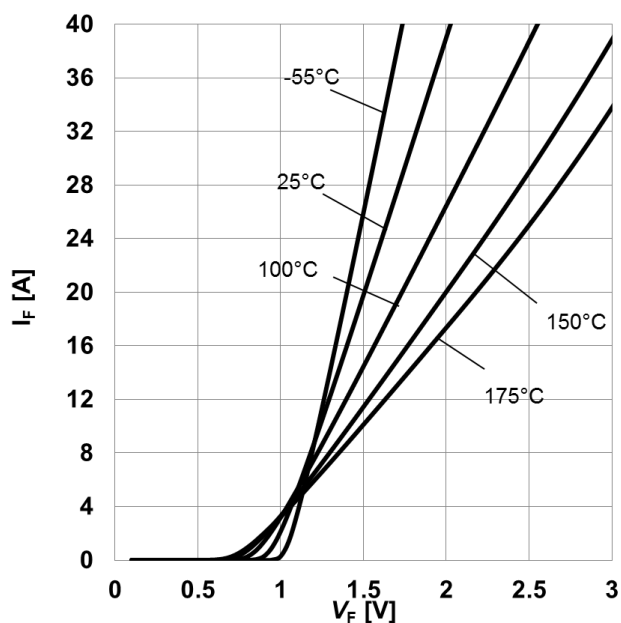


Figure 3. Typical forward characteristics, $I_F=f(V_F)$, $t_p=10\text{ }\mu\text{s}$, parameter: T_j

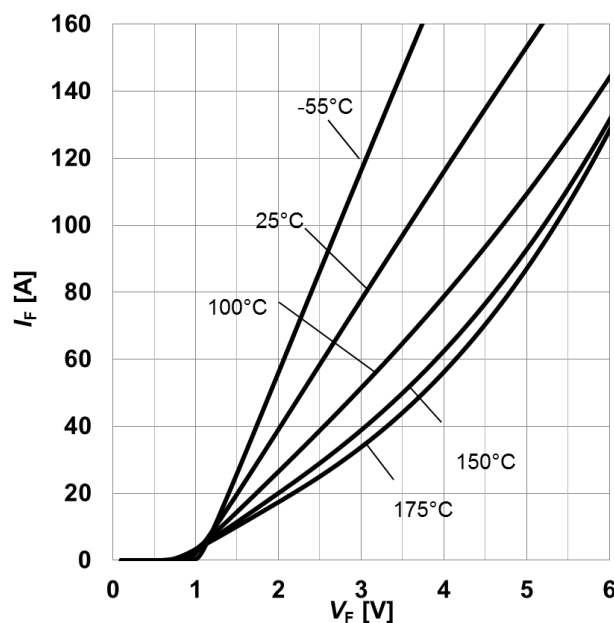


Figure 4. Typical forward characteristics in surge current, $I_F=f(V_F)$, $t_p=10\text{ }\mu\text{s}$, parameter: T_j

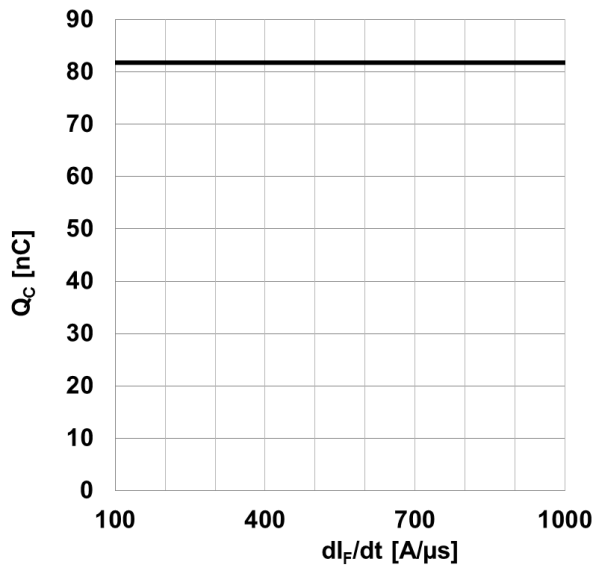


Figure 5. **Typical capacitive charge as function of current slope¹**, $Q_C=f(di_F/dt)$, $T_j=150^\circ\text{C}$
1) Only capacitive charge, guaranteed by design.

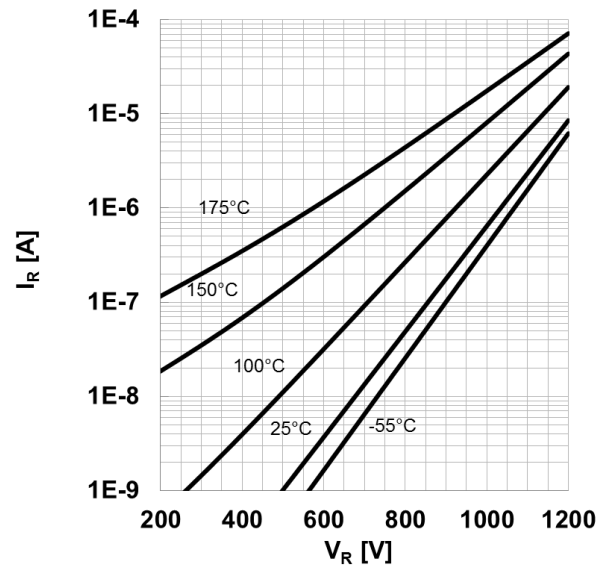


Figure 6. **Typical reverse current as function of reverse voltage**, $I_R=f(V_R)$, parameter: T_j

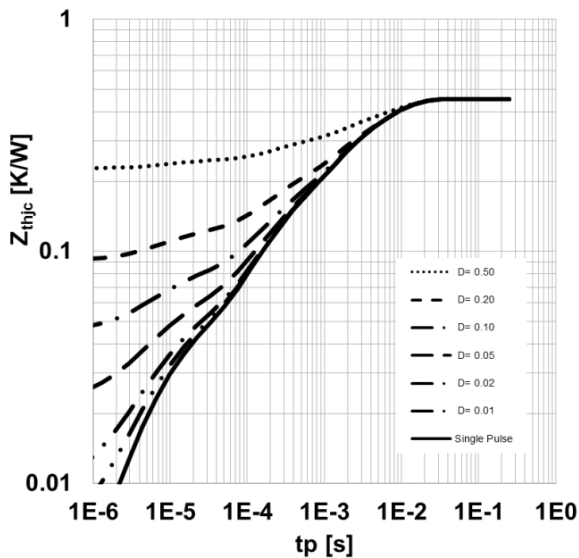


Figure 7. **Max. transient thermal impedance**, $Z_{th,jc}=f(t_p)$, parameter: $D=t_p/T$

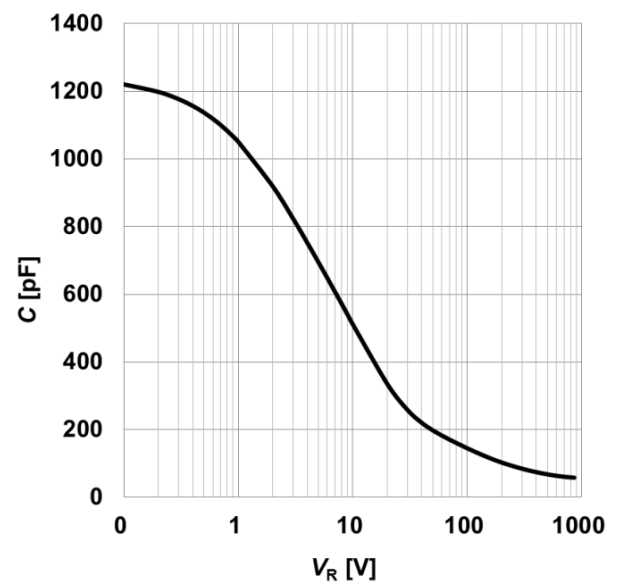


Figure 8. **Typical capacitance as function of reverse voltage**, $C=f(V_R)$; $T_j=25^\circ\text{C}$; $f=1\text{ MHz}$

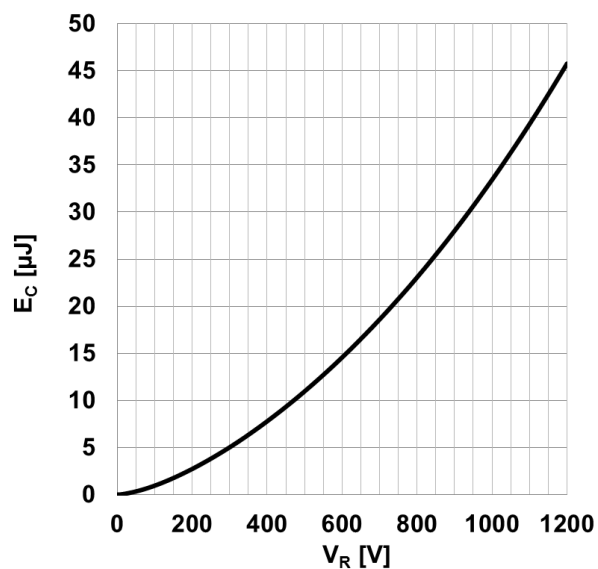
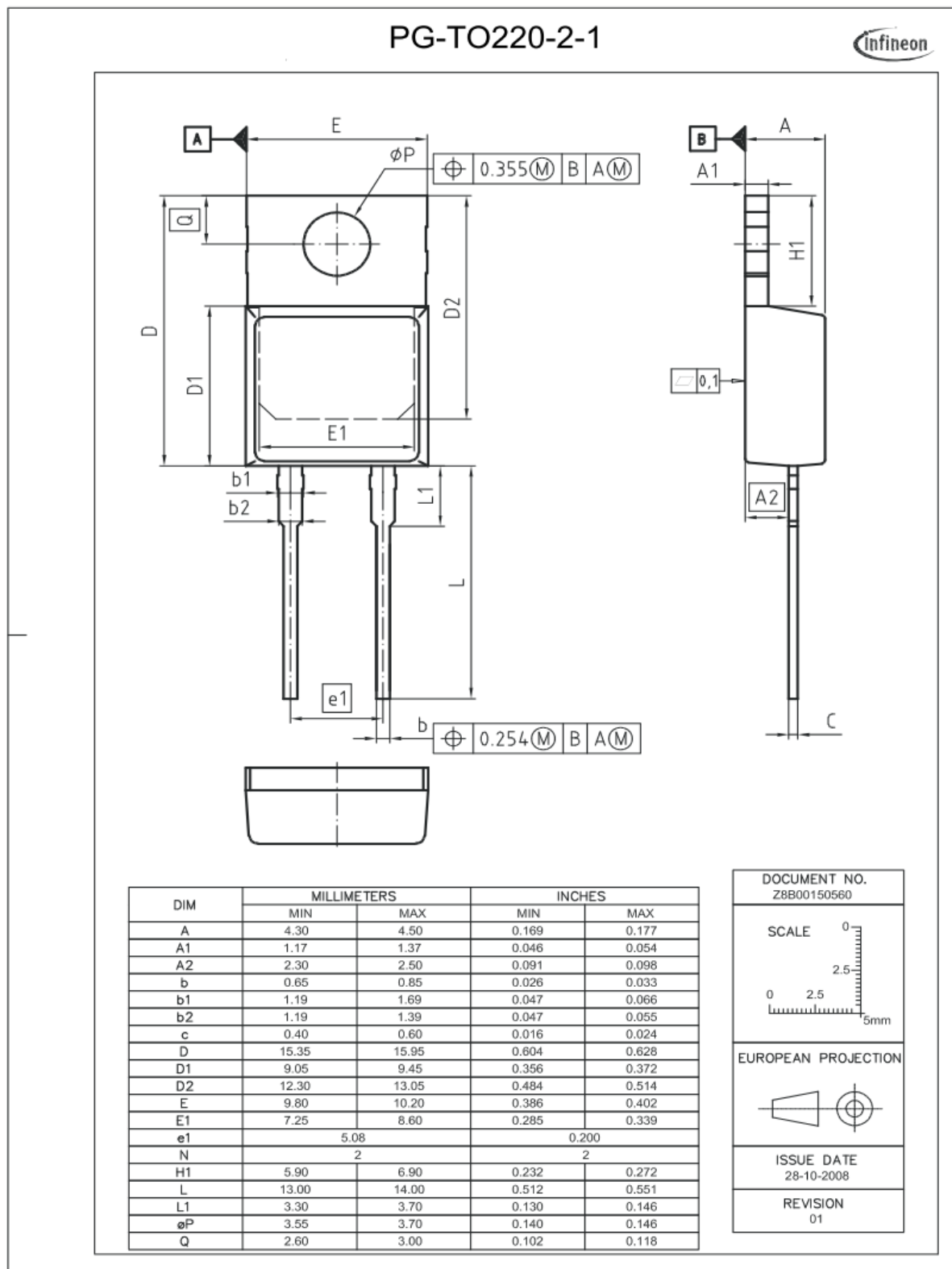


Figure 9. **Typical capacitively stored energy as function of reverse voltage,**

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



Revision History

IDH20G120C5

Revision: 2015-09-03, Rev. 2.0

Previous Revision:

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

© 2015 Infineon Technologies AG

All Rights Reserved.

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.