

# Diode

Silicon Carbide Schottky Diode

## IDM10G120C5

5<sup>th</sup> Generation CoolSiC™ 1200 V SiC Schottky Diode

### Final Datasheet

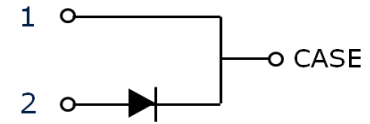
Rev. 2.1 2021-06-09

Industrial Power Control

## CoolSiC™ 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<sup>1)</sup> 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](http://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 <sub>DC</sub>	I <sub>F</sub>	Q <sub>C</sub>	T <sub>j,max</sub>	Marking	Package
IDM10G120C5	1200V	10A	41nC	175°C	D1012C5	PG-TO252-2

1) J-STD20 and JEDEC22

**Table of Contents**

Description.....	2
Table of Contents.....	3
Maximum ratings.....	4
Thermal Resistances .....	4
Electrical Characteristics.....	5
Electrical Characteristics diagram .....	5
Package Drawings .....	9
Revision History .....	10
Disclaimer.....	10

**Maximum ratings**

Parameter	Symbol	Value	Unit
Repetitive peak reverse voltage	$V_{RRM}$	1200	V
Continuous forward current for $R_{th(j-c,max)}$ $T_C = 160^\circ\text{C}$ , $D=1$ $T_C = 135^\circ\text{C}$ , $D=1$ $T_C = 25^\circ\text{C}$ , $D=1$	$I_F$	10 18 38	A
Surge non-repetitive forward current, sine halfwave $T_C=25^\circ\text{C}$ , $t_p=10\text{ms}$ $T_C=150^\circ\text{C}$ , $t_p=10\text{ms}$	$I_{F,SM}$	99 84	
Non-repetitive peak forward current $T_C = 25^\circ\text{C}$ , $t_p=10 \mu\text{s}$	$I_{F,max}$	711	
$i^2t$ value $T_C = 25^\circ\text{C}$ , $t_p=10 \text{ms}$ $T_C = 150^\circ\text{C}$ , $t_p=10 \text{ms}$	$\int i^2 dt$	49 35	A <sup>2</sup> s
Diode $dv/dt$ ruggedness $V_R=0\dots960 \text{V}$	$dv/dt$	150	V/ns
Power dissipation $T_C = 25^\circ\text{C}$	$P_{tot}$	223	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.	
<b>Characteristic</b>						
Diode thermal resistance, junction – case	$R_{th(j-c)}$		-	0.5	0.7	K/W
Thermal resistance, junction – ambient	$R_{th(j-a)}$	SMD version, device on PCB, minimal footprint	-	-	62	
		SMD version, device on PCB, 6 cm <sup>2</sup> cooling area <sup>2)</sup>		35		

<sup>2)</sup> Device on 40 mm\*40mm\*1.5 epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70μm thick) copper for cathode connection. PCB is vertical without air stream cooling.

**Electrical Characteristics**
**Static Characteristic, at T<sub>j</sub>=25°C, unless otherwise specified**

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
DC blocking voltage	V <sub>DC</sub>	T <sub>j</sub> = 25°C	1200	-	-	V
Diode forward voltage	V <sub>F</sub>	I <sub>F</sub> = 10 A, T <sub>j</sub> =25°C	-	1.5	1.8	V
		I <sub>F</sub> = 10 A, T <sub>j</sub> =150°C	-	2.0	2.6	
Reverse current	I <sub>R</sub>	V <sub>R</sub> =1200 V, T <sub>j</sub> =25°C		4	62	μA
		V <sub>R</sub> =1200 V, T <sub>j</sub> =150°C		22	320	

**Dynamic Characteristics, at T<sub>j</sub>=25°C, unless otherwise specified**

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Total capacitive charge	Q <sub>C</sub>	V <sub>R</sub> = 800 V, T <sub>j</sub> =150°C	-	41	-	nC
		$Q_C = \int_0^{V_R} C(V) dV$				
Total Capacitance	C	V <sub>R</sub> =1 V, f=1 MHz	-	525	-	pF
		V <sub>R</sub> =400 V, f=1 MHz	-	37	-	
		V <sub>R</sub> =800 V, f=1 MHz	-	29	-	

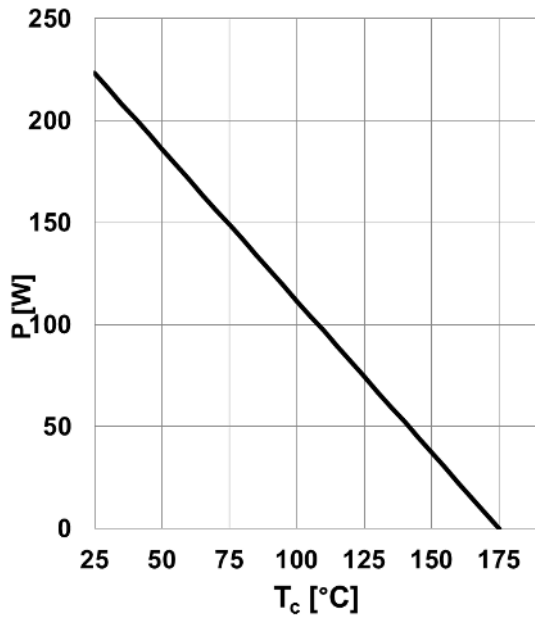


Figure 1. Power dissipation as a function of case temperature,  $P_{tot}=f(T_c)$ ,  $R_{th(j-c),max}$

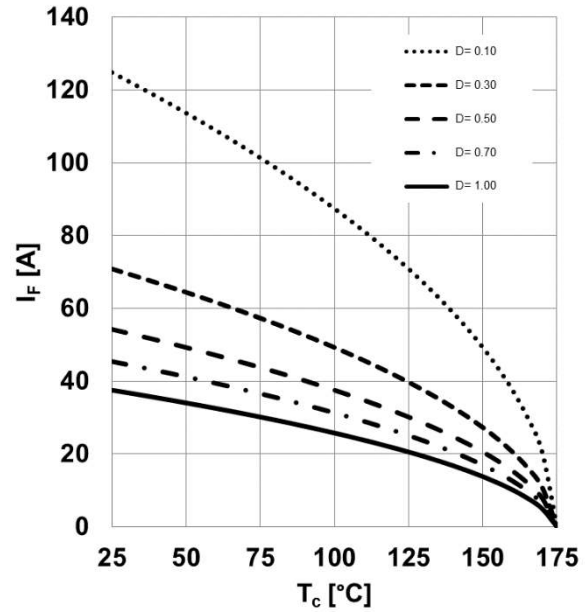


Figure 2. Diode forward current as function of temperature,  $T_j \leq 175^\circ\text{C}$ ,  $R_{th(j-c),max}$ , parameter  $D$ =duty cycle,  $V_{th}$ ,  $R_{diff}$  @  $T_j=175^\circ\text{C}$

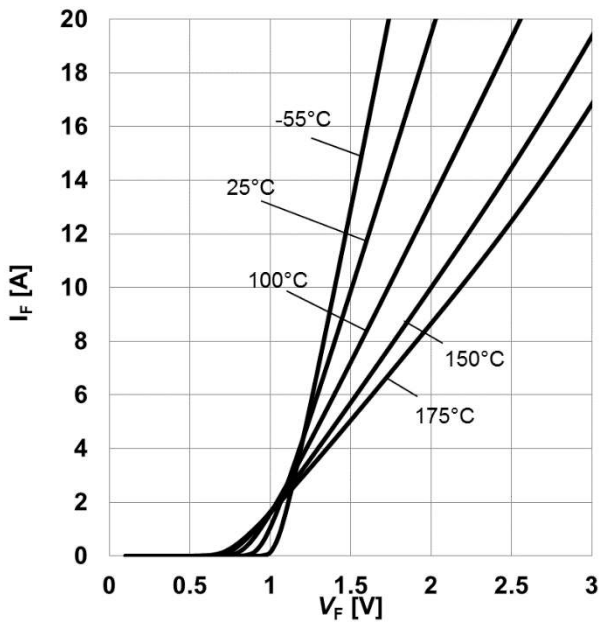


Figure 3. Typical forward characteristics,  $I_F=f(V_F)$ ,  $t_p=10 \mu\text{s}$ , parameter:  $T_j$

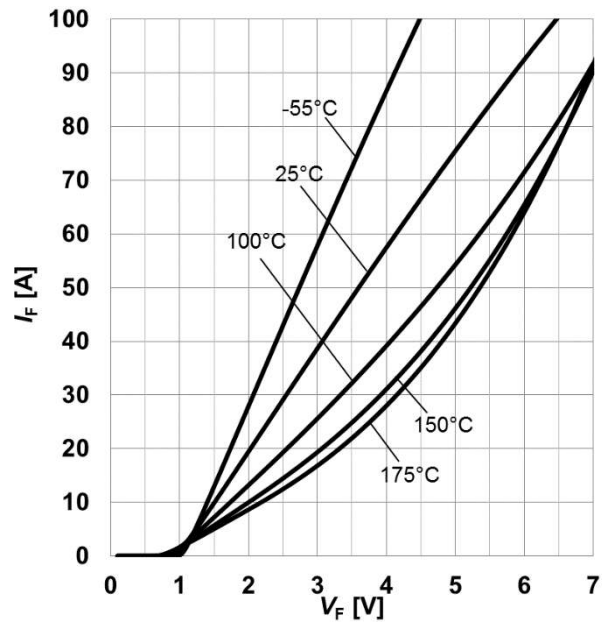


Figure 4. Typical forward characteristics in surge current,  $I_F=f(V_F)$ ,  $t_p=10 \mu\text{s}$ , parameter:  $T_j$

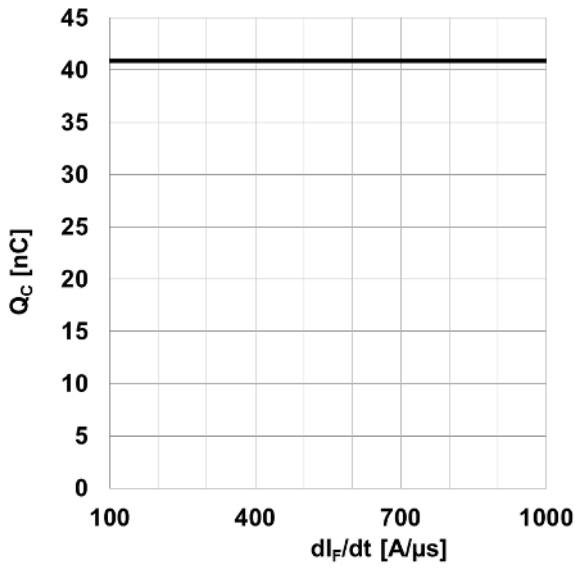


Figure 5. **Typical capacitance charge as function of current slope<sup>1</sup>**,  $Q_C=f(dl_F/dt)$ ,  $T_j=150^\circ\text{C}$   
 1) Only capacitive charge, guaranteed by design.

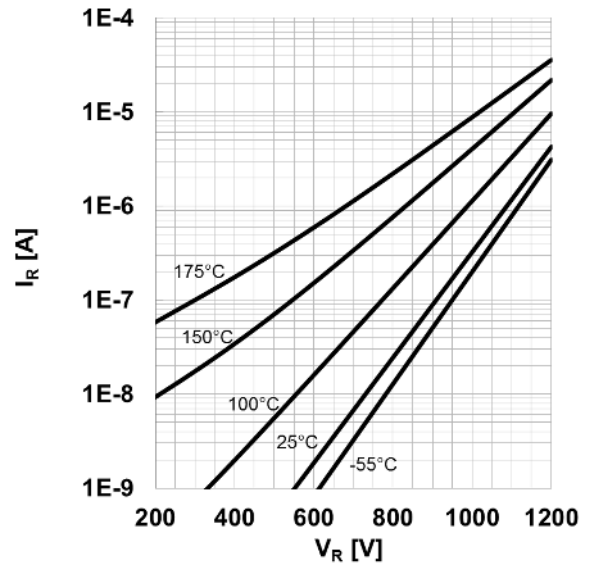


Figure 6. **Typical reverse current as function of reverse voltage**,  $I_R=f(V_R)$ , parameter:  $T_j$

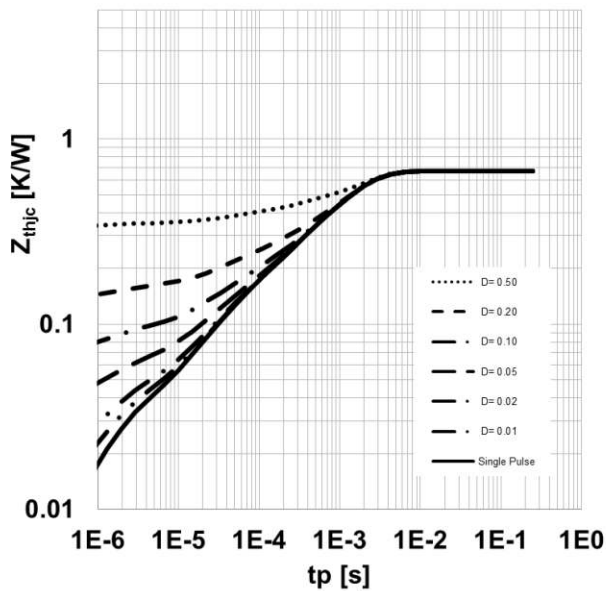


Figure 7. **Max. transient thermal impedance**,  $Z_{th,jc}=f(t_p)$ , parameter:  $D=t_p/T$

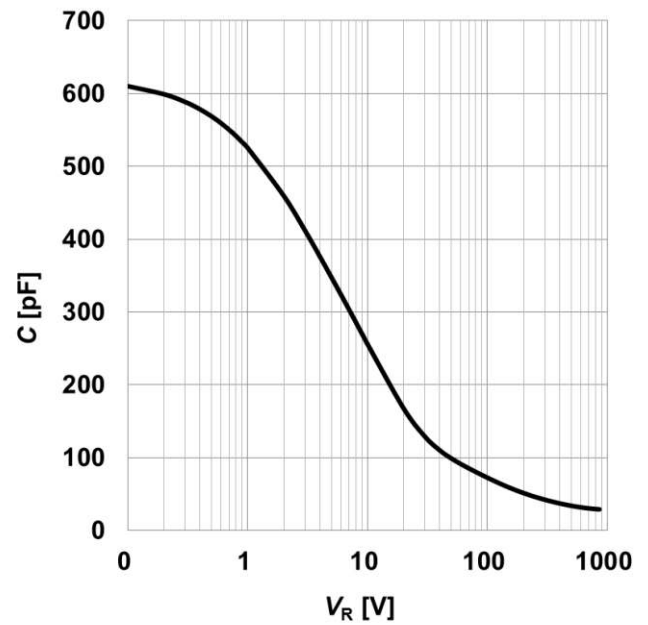


Figure 8. **Typical capacitance as function of reverse voltage**,  $C=f(V_R)$ ;  $T_j=25^\circ\text{C}$ ;  $f=1\text{ MHz}$

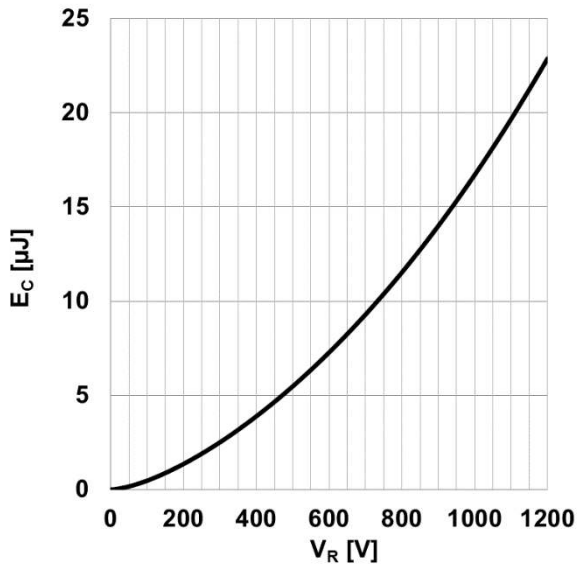
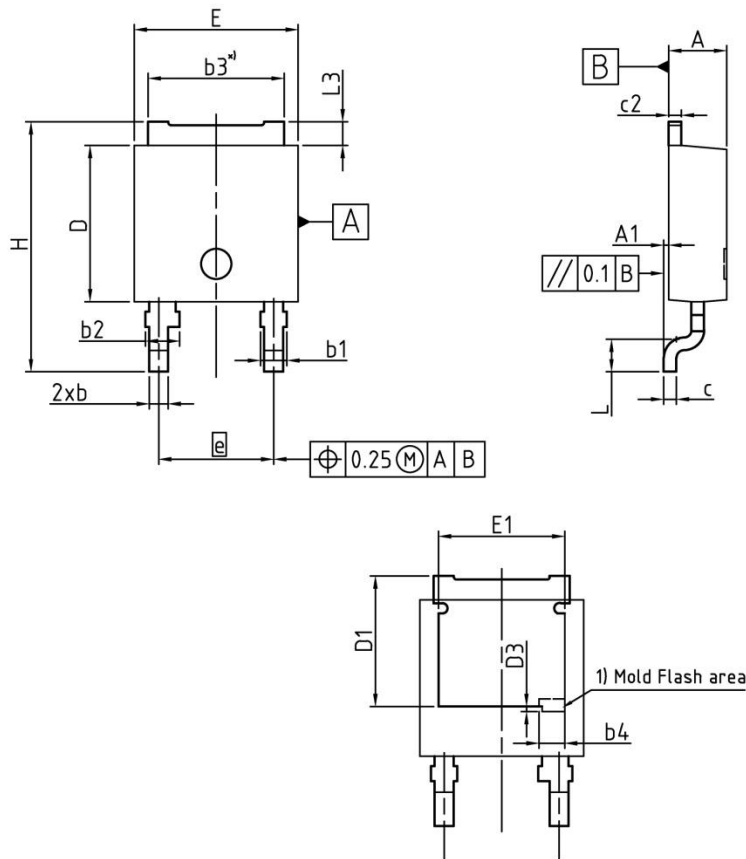


Figure 9. **Typical capacitance stored energy as function of reverse voltage,**

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



PG-TO252-2

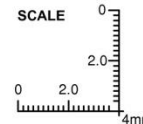


\*) mold flash not included

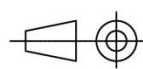
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.20	2.35	0.087	0.093
A1	0.00	0.15	0.000	0.006
b	0.65	0.85	0.026	0.033
b1	-	1.15	-	0.045
b2	1.05	1.45	0.041	0.057
b3	5.30	5.50	0.209	0.217
b4	1.02		0.040	
c	0.46	0.58	0.018	0.023
c2	0.46	0.58	0.018	0.023
D	6.02	6.22	0.237	0.245
D1	5.04	5.44	0.198	0.214
E	6.45	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



EUROPEAN PROJECTION



ISSUE DATE  
29-05-2014

REVISION  
01

**Revision History**IDM10G120C5

---

Revision: 2021-06-09, Rev. 2.1

---

Previous Revision:

Revision	Date	Subjects (major changes since last version)
2.0	2015-22-07	Final data sheet
2.1	2021-06-09	Increased $dv/dt$ ruggedness

**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](mailto:erratum@infineon.com)

**Published by****Infineon Technologies AG****81726 München, Germany****© Infineon Technologies AG 2021.****All Rights Reserved.****Important Notice**

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffheitsgarantie"). With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, 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.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office ([www.infineon.com](http://www.infineon.com)).

Please note that this product is not qualified according to the AEC Q100 or AEC Q101 documents of the Automotive Electronics Council.

**Warnings**

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.