Diode

Silicon Carbide Schottky Diode

IDM02G120C5

5th Generation CoolSiC™ 1200 V SiC Schottky Diode

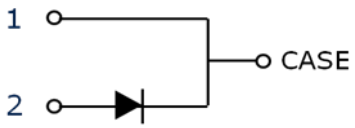
Final Data Sheet

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[1)] 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
IDM02G120C5	1200V	2A	14nC	175°C	D0212C5	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 = 170°C, D=1 T_C = 135°C, D=1 T_C = 25°C, D=1	I_F	 2 7 14	A
Surge non-repetitive forward current, sine halfwave T_C=25°C, t_p=10ms T_C=150°C, t_p=10ms	$I_{F,SM}$	 37 31	
Non-repetitive peak forward current T_C = 25°C, t_p=10 µs	$I_{F,max}$	344	
i²t value T_C = 25°C, t_p=10 ms T_C = 150°C, t_p=10 ms	$\int i^2dt$	 7.0 4.9	A²s
Diode dv/dt ruggedness V_R=0...960 V	dv/dt	150	V/ns
Power dissipation T_C = 25°C	P_{tot}	98	W
Operating and storage temperature	T_j;T_{stg}	-55…175	°C
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	$R_{th(j-c)}$		-	1.2	1.5	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, 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°C	1200	-	-	V
Diode forward voltage	V_F	I_F= 2 A, T_j=25°C I_F= 2 A, T_j=150°C	- -	1.4 1.7	1.65 2.30	V
Reverse current	I_R	V_R=1200 V, T_j=25°C V_R=1200 V, T_j=150°C		1.2 6	18 90	µA

AC 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 = 800 V, T_j=150°C $Q_C = \int_0^{V_R} C(V)dV$	-	14	-	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	- - -	182 13 10	- - -	pF

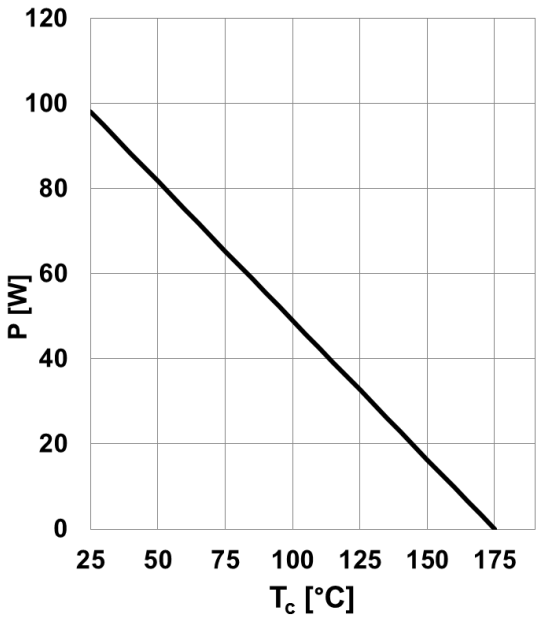


Figure 1. **Power dissipation as a function of case temperature,** $P_{tot}=f(T_C)$, $R_{th(j\text{-}c),max}$

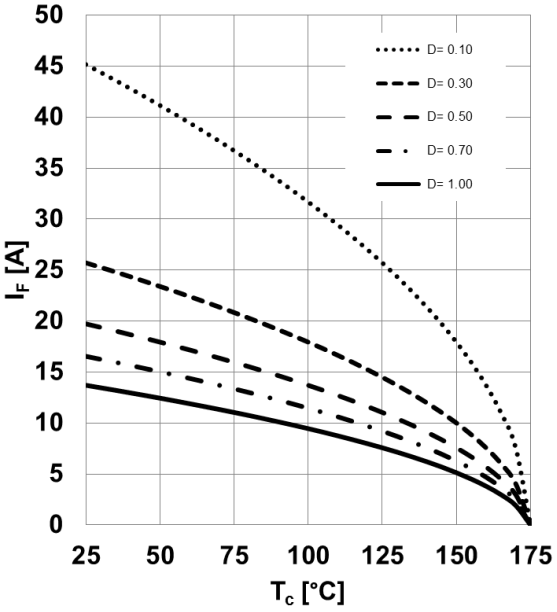


Figure 2. **Diode forward current as function of temperature,** $T_j \leq 175°C$, $R_{th(j\text{-}c),max}$, parameter D=duty cycle, V_{th}, *Rdiff* @ T_j=175°C

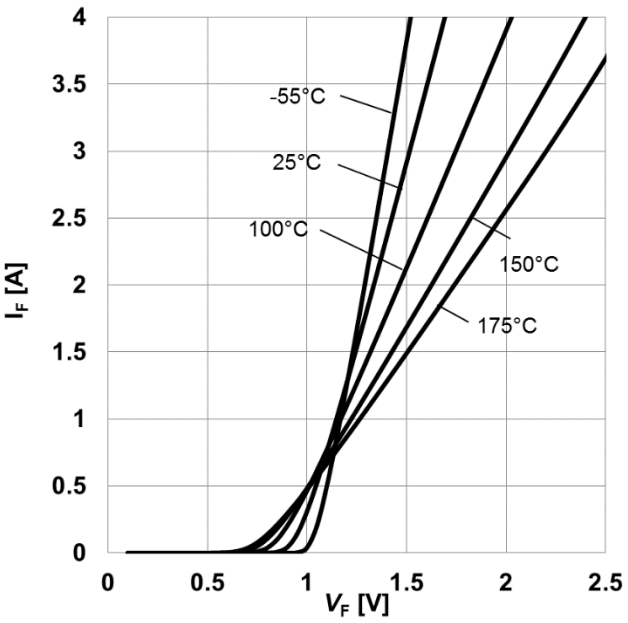


Figure 3. **Typical forward characteristics,** $I_F=f(V_F)$, t_p= 10 µs, parameter: T_j

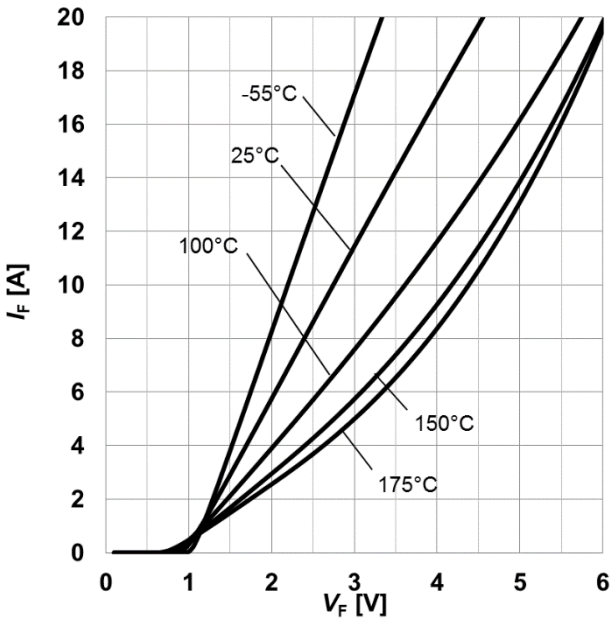


Figure 4. **Typical forward characteristics in surge current,** $I_F=f(V_F)$, t_p= 10 µs, parameter: T_j

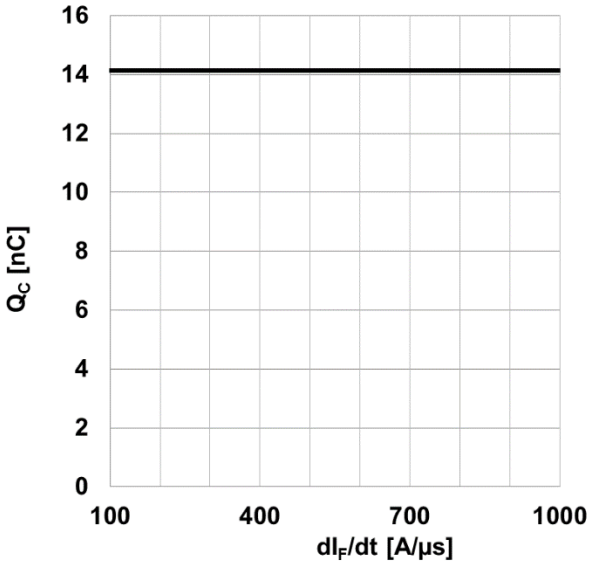


Figure 5. **Typical capacitance charge as function of current slope**[1], Q_C=f(dI_F/dt), T_j=150°C

1) Only capacitive charge, guaranteed by design.

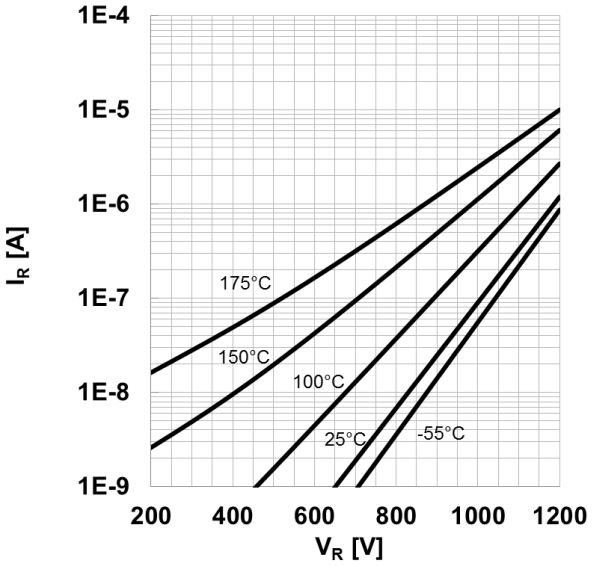


Figure 6. **Typical reverse current as function of reverse voltage,** I_R=f(V_R), parameter: T_j

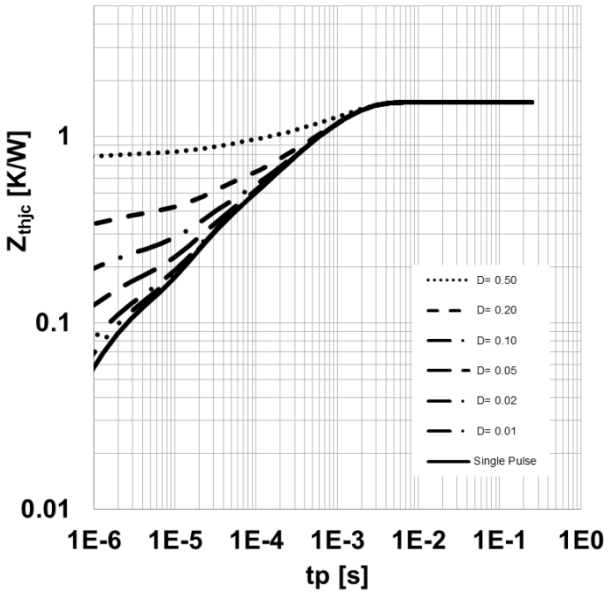


Figure 7. **Max. transient thermal impedance,** $Z_{th,jc}$=f(t_P), parameter: D=t_P/T

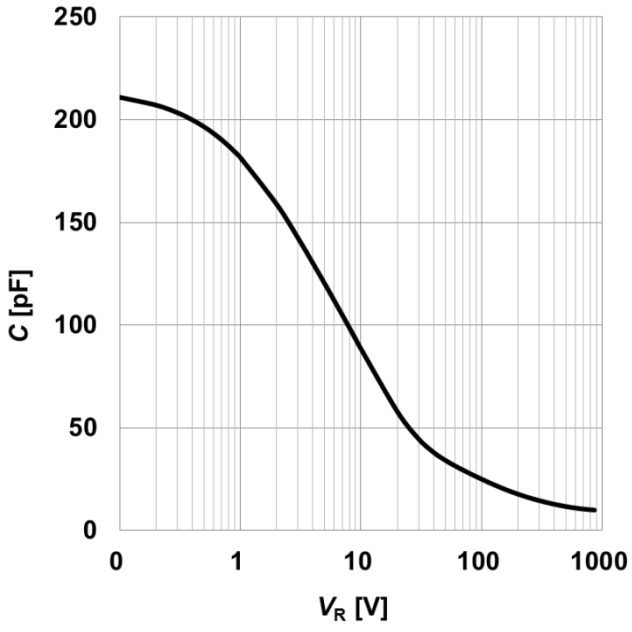


Figure 8. **Typical capacitance as function of reverse voltage**, C=f(V_R); T_j=25°C; f=1 MHz

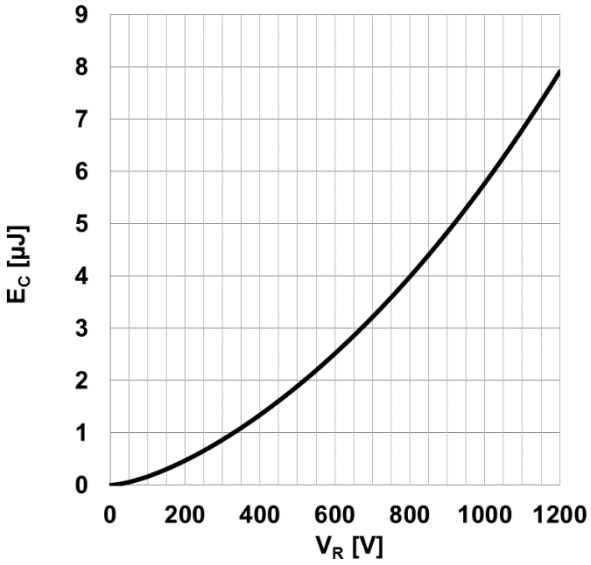
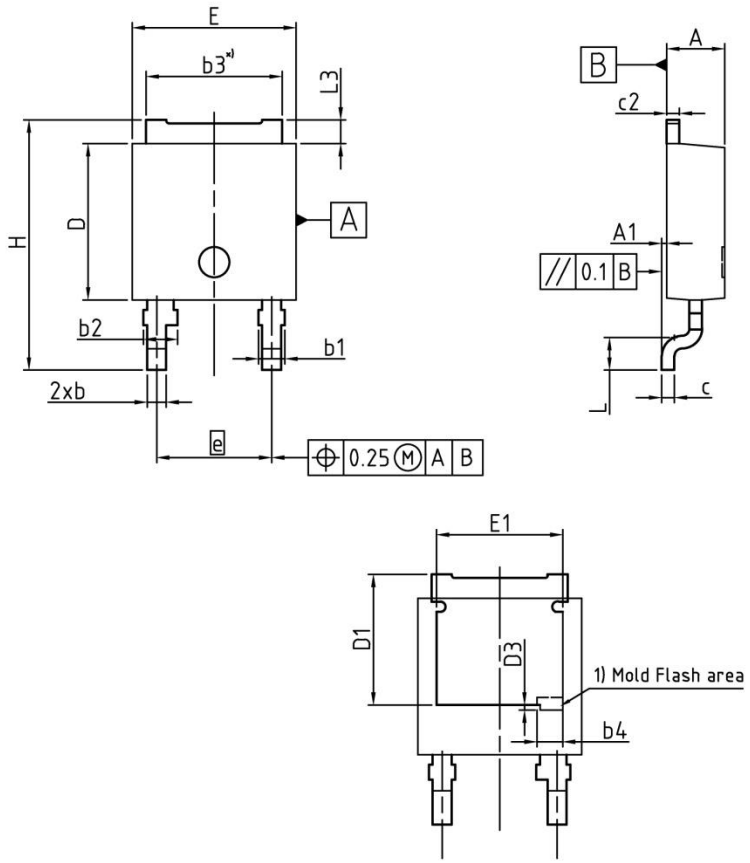


Figure 9. **Typical capacitance stored energy as function of reverse voltage,**

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

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 0 2.0 4mm
EUROPEAN PROJECTION	
ISSUE DATE	29-05-2014
REVISION	01

Revision History

IDM02G120C5

Revision: 2021-06-09, Rev. 2.1

Previous Revision:

Revision	Date	Subjects (major changes since last version)
2.0	2015-06-22	Final data sheet
2.1	2021-06-09	Increased d*v*/d*t* 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

Published by
Infineon Technologies AG
81726 München, Germany

Important Notice

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie"). 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).

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.