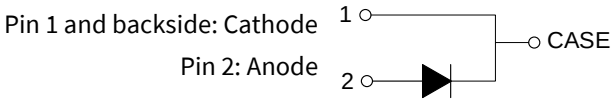
5th Generation CoolSiC™ 1200V Schottky Diode

SiC Diode

Features

- Revolutionary semiconductor material - Silicon Carbide
- No reverse recovery current / no forward recovery
- Temperature independent switching behaviour
- Low forward voltage even at high operating temperature
- Tight forward voltage distribution
- Excellent thermal performance
- Extended surge current capability
- Specified dv/dt ruggedness
- Pb-free lead plating; RoHS compliant

Pin definition



Potential applications

- Drives
- Industrial power supplies: Industrial UPS
- Solar central inverters and Solar string inverter

Product validation

- Qualified for industrial applications according to the relevant tests of JEDEC 47/20/22

Description

- 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
- Related Links: www.infineon.com/SiC

Key performance parameters

Type	V_{DC}	I_F	Q_C	$T_{vj,max}$	Marking	Package
IDK20G120C5	1200 V	20 A	82nC	175°C	D2012C5	PG-TO263-2

Table of contents

Features 1
Potential applications 1
Product validation 1
Description 1
Key performance parameters 1
Table of contents 2
1 Maximum ratings 3
2 Thermal resistances 5
3 Electrical Characteristics 6
4 Electrical Characteristics Diagrams 7
5 Package Drawing 10
Revision history 11

1 Maximum ratings

Note: For optimum lifetime and reliability, Infineon recommends operating conditions that do not exceed 80% of the maximum ratings stated in this datasheet.

Parameter	Symbol	Value	Unit
Repetitive peak reverse voltage $T_C \geq 25°C$	V_{RRM}	1200	V
Continuous forward current for $R_{th(j-c,max)}$ $T_C = 145°C$, D=1 $T_C = 135°C$, D=1 $T_C = 25°C$, D=1	I_F	 20 27 56	A
Surge repetitive forward current, sine halfwave[1] T_C=25°C, t_p=10ms T_C=100°C, t_p=10ms	$I_{F,RM}$	 80 60	A
Surge non-repetitive forward current, sine halfwave T_C=25°C, t_p=10ms T_C=150°C, t_p=10ms	$I_{F,SM}$	 198 168	A
Non-repetitive peak forward current $T_C = 25°C$, t_p=10 µs	$I_{F,max}$	1200	A
i^2t value $T_C = 25°C$, t_p=10 ms $T_C = 150°C$, t_p=10 ms	$\int i^2dt$	 195 140	A^2s
Diode dv/dt ruggedness V_R=0...960 V	dv/dt	150	V/ns
Power dissipation for $R_{th(j-c,max)}$ $T_C = 25°C$	P_{tot}	330	W

[1] Not subject to production test. The test was performed with 20000 pulses (two consecutive half-wave rectified sines with 10 ms period).

Maximum ratings

Operating temperature	T_{vj}	-55…175	°C
Storage temperature	T_{stg}	-55…150	°C
Soldering temperature, reflow soldering (MSL1 according to JEDEC J-STD-020)	T_{sold}	260	°C

2 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	$R_{th(j-a)}$	Leaded	-	-	62	K/W

3 Electrical Characteristics

Static Characteristics, at T_{vj}=25°C, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
DC blocking voltage	V_{DC}	T_{vj} = 25°C, I_R=50µA	1200	-	-	V
Diode forward voltage	V_F	I_F= 20A, T_{vj}=25°C	-	1.5	1.8	V
		I_F= 20A, T_{vj}=150°C	-	2.0	-	
Reverse current	I_R	V_R=1200V, T_{vj}=25°C	-	8.5	123	µA
		V_R=1200V, T_{vj}=150°C	-	44	-	

Dynamic Characteristics, at T_{vj}=25°C, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Total capacitive charge	Q_C	V_R = 800V, T_{vj}=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	-	

4 Electrical Characteristics Diagrams

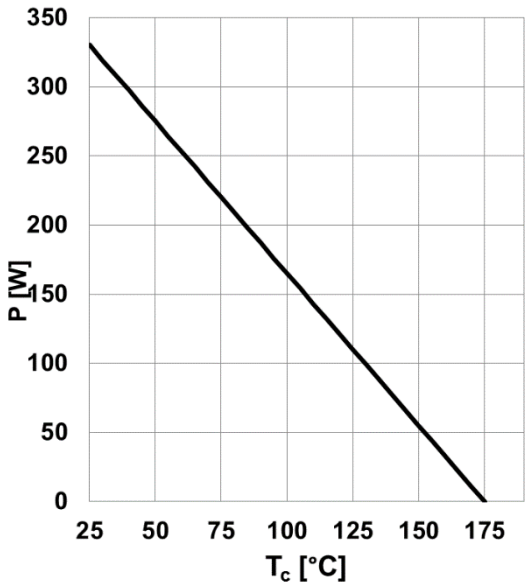


Figure 1. Power dissipation as function of case temperature, $P_{tot}=f(T_C)$, $R_{th(j-c),max}$

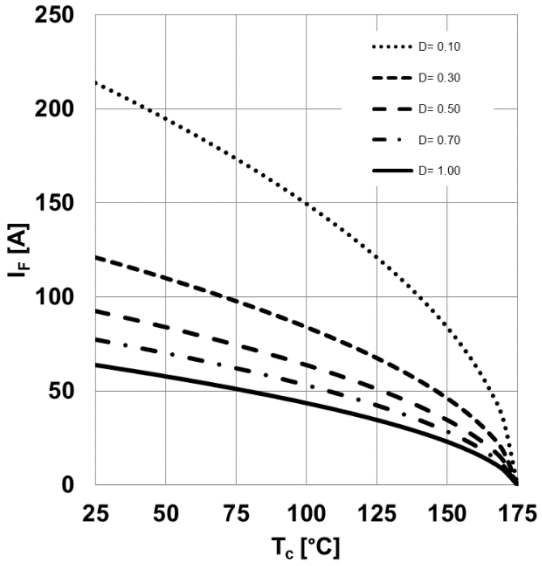


Figure 2. Diode forward current as function of temperature, parameter: T_{vj}≤175°C, $R_{th(j-c),max}$, D=duty cycle, V_{th}, R_{diff} @ T_{vj}=175°C

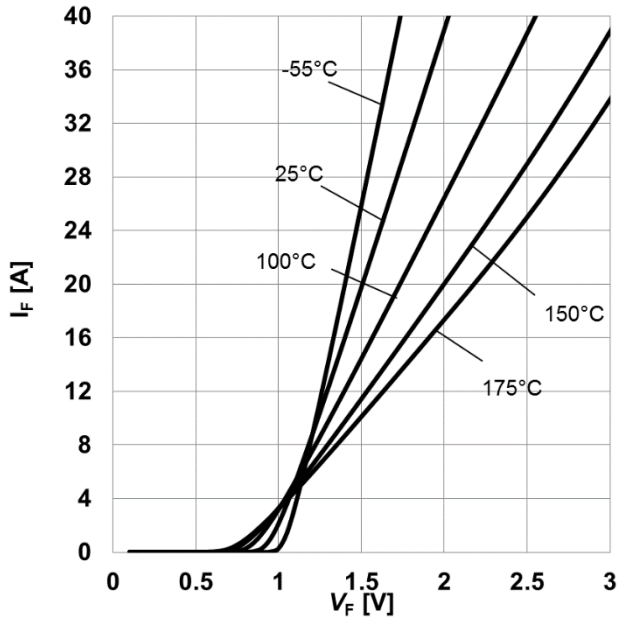


Figure 3. Typical forward characteristics, $I_F=f(V_F)$, t_p= 10 µs, parameter: T_{vj}

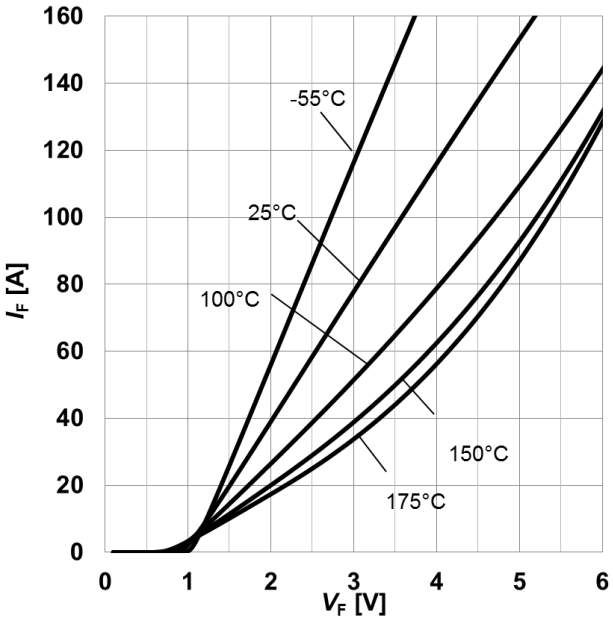


Figure 4. Typical forward characteristics in surge current, $I_F=f(V_F)$, t_p= 10 µs, parameter: T_{vj}

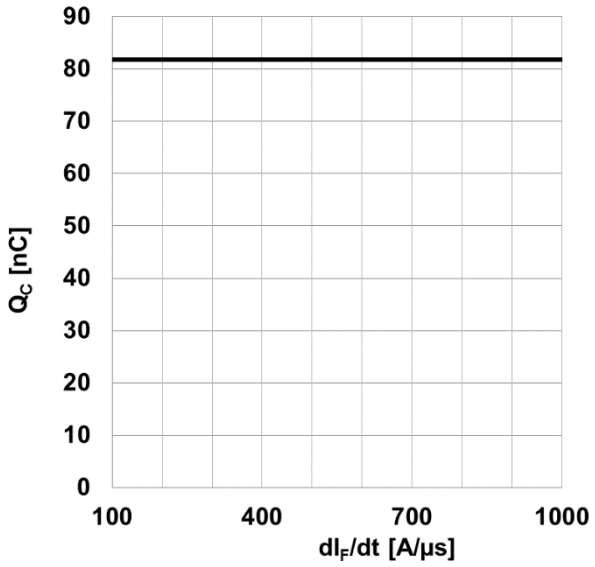


Figure 5. Typical capacitive charge as function of current slope, Q_C=f(dIF/dt), T_{vj}=150°C

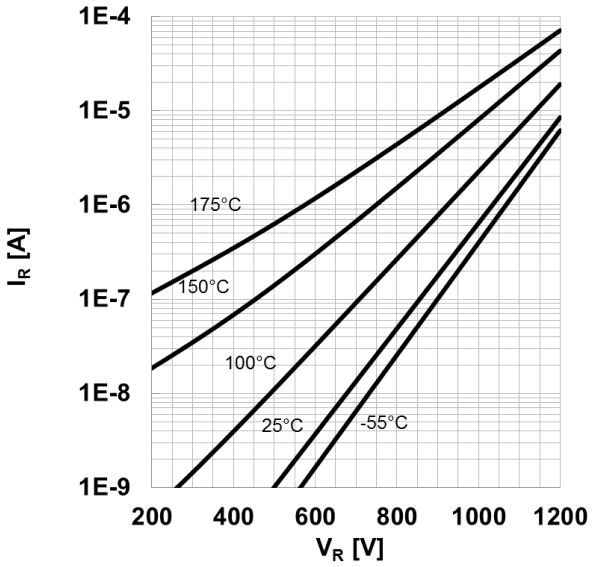


Figure 6. Typical reverse characteristics, I_R=f(V_R), parameter: T_{vj}

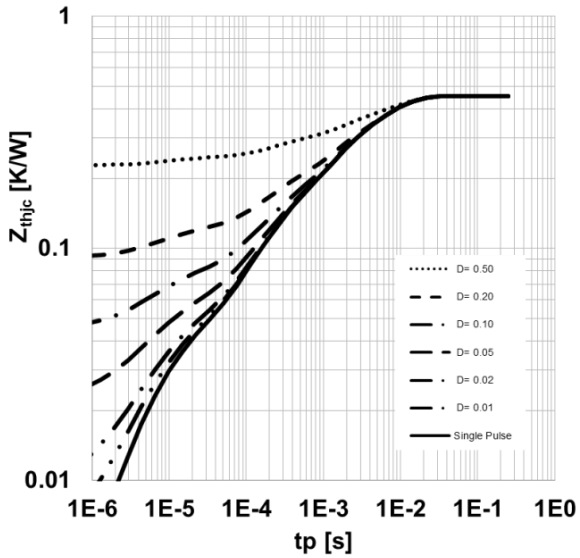


Figure 7. Max. transient thermal impedance, $Z_{th,j\text{-}c}$=f(t_P), parameter: D=t_P/T

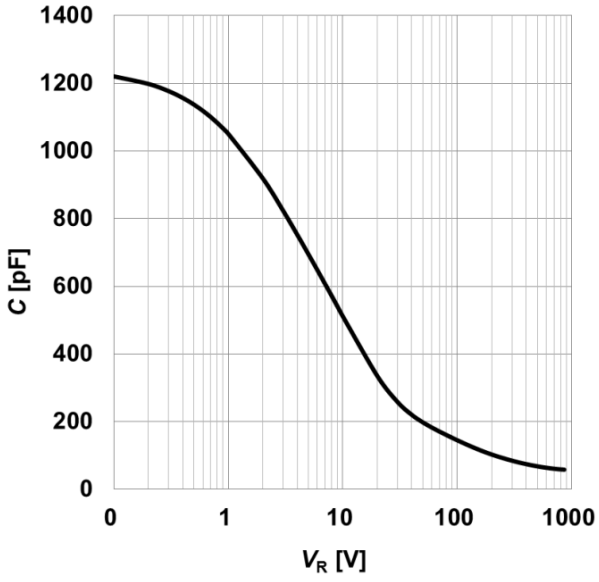


Figure 8. Typical capacitance as function of reverse voltage, C=f(V_R); T_{vj}=25°C; f=1 MHz

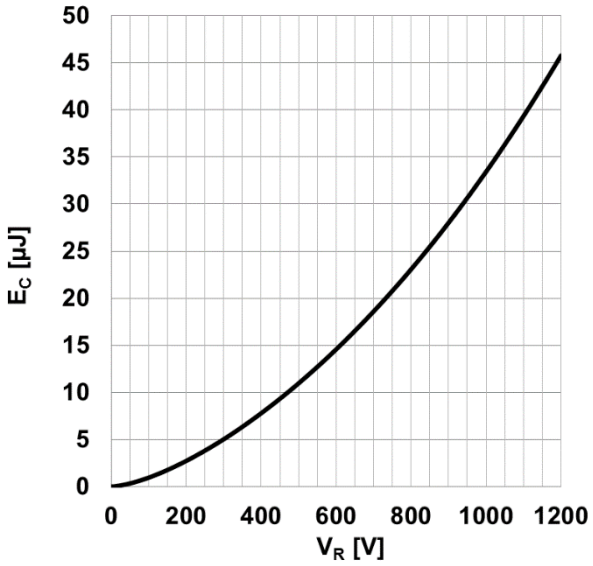
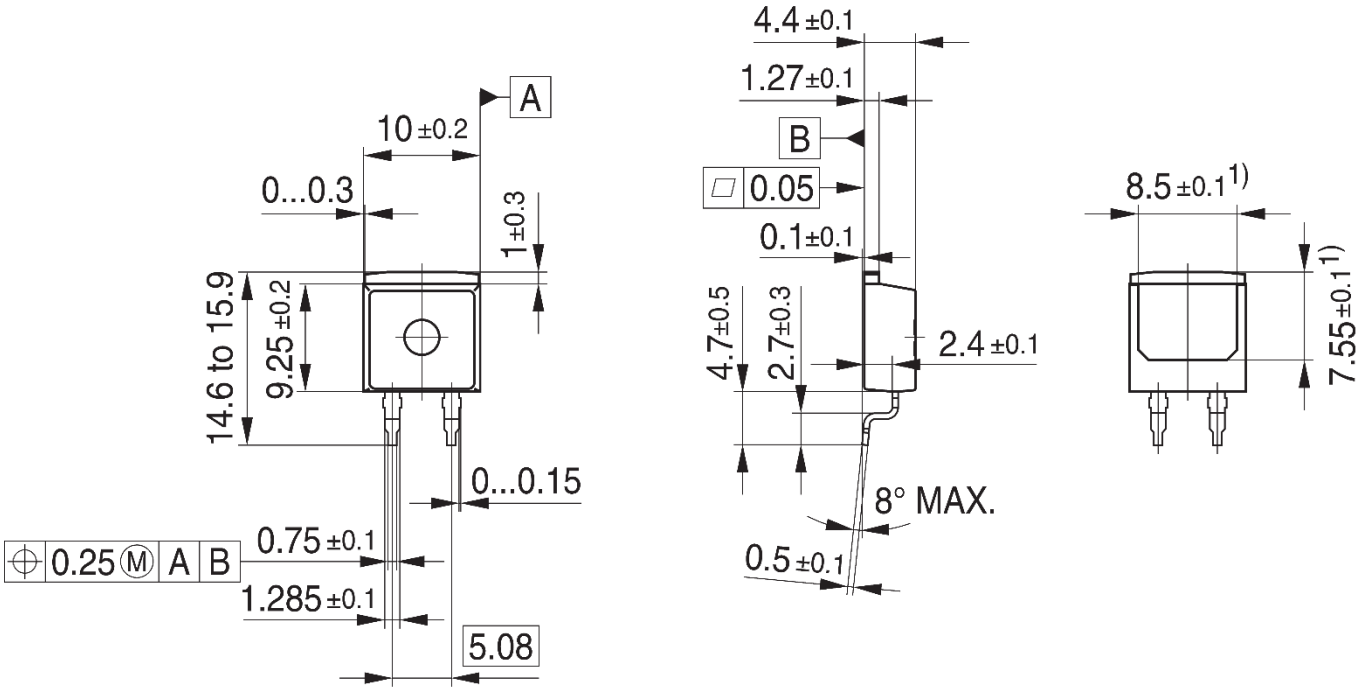


Figure 9. Typical capacitively stored energy as function of reverse voltage, E_C=f(V_R)

5 Package Drawing

PG-TO263-2



1) Typical
Metal surface min. X = 7.25, y = 6.9
All metal surfaces: tin plated, except area of cut

All dimensions do not include mold flash or protrusions
All dimensions are in units mm
The drawings is in complicance with ISO 128-30, Projection Methode 1 [⇿]

Revision history

Document version	Date of release	Description of changes
V 2.0	2019-10-28	Final Datasheet
V 2.1	2021-07-14	Increased d*v*/d*t* ruggedness

Trademarks
All referenced product or service names and trademarks are the property of their respective owners.

Edition 2021-07-14

Published by

Infineon Technologies AG

81726 München, Germany

Do you have a question about this document?

Email: erratum@infineon.com

Document reference

n.a.

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.