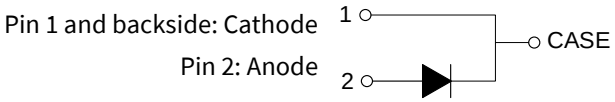
5th Generation CoolSiC™ 1200V Schottky Diode

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

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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

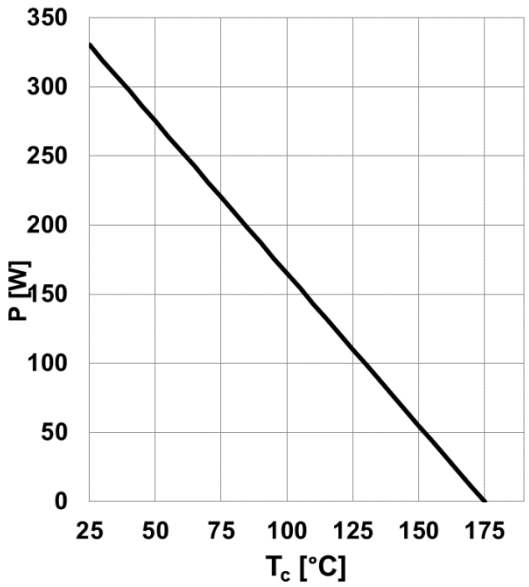


Figure 1. Power dissipation as function of case temperature, $P_{tot}=f(T_C)$, $R_{th(j-c),max}$

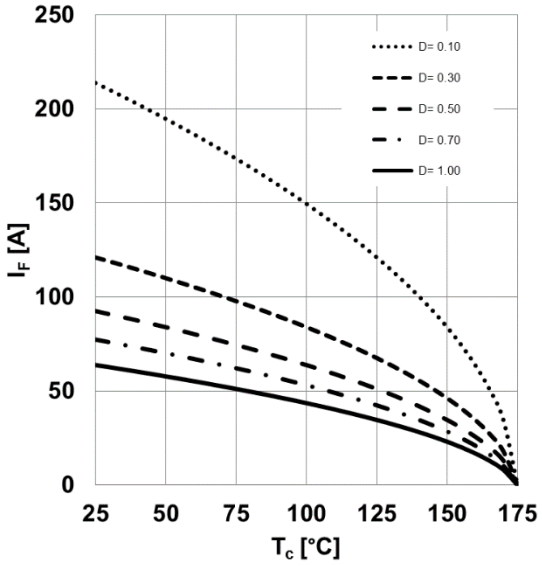


Figure 2. Diode forward current as function of temperature, parameter: T_{vj}≤175°C, $R_{th(j-c),max}$, D=duty cycle, V_{th}, R_{diff} @ T_{vj}=175°C

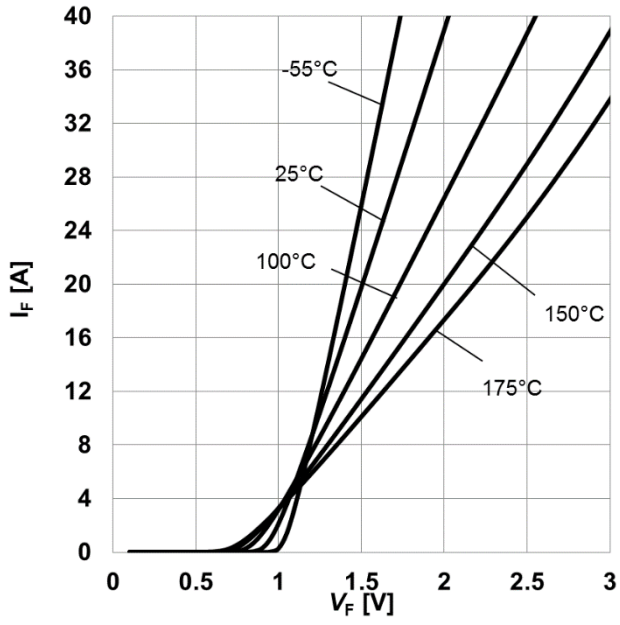


Figure 3. Typical forward characteristics, $I_F=f(V_F)$, t_p= 10 µs, parameter: T_{vj}

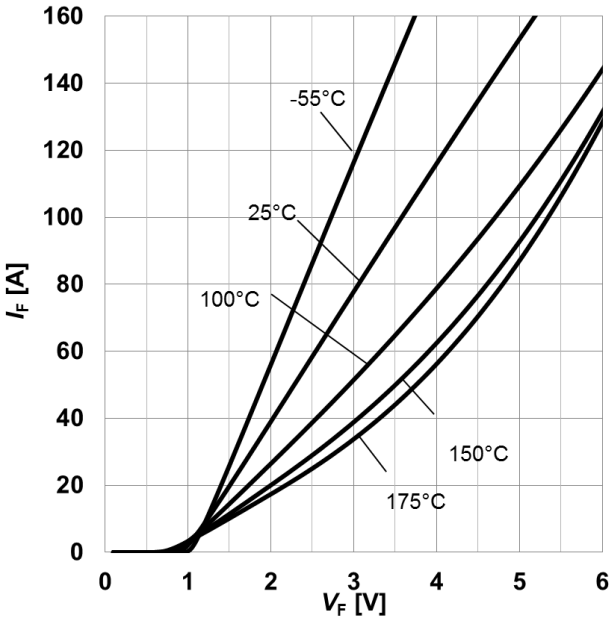


Figure 4. Typical forward characteristics in surge current, $I_F=f(V_F)$, t_p= 10 µs, parameter: T_{vj}

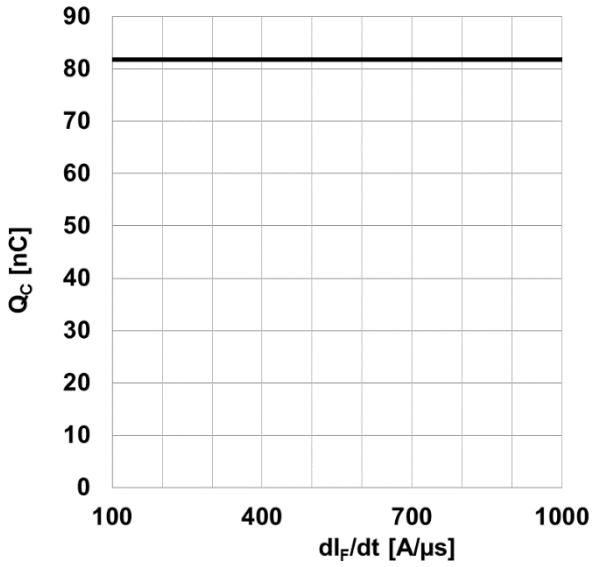


Figure 5. Typical capacitive charge as function of current slope, $Q_C=f(dIF/dt)$, T_{vj}=150°C

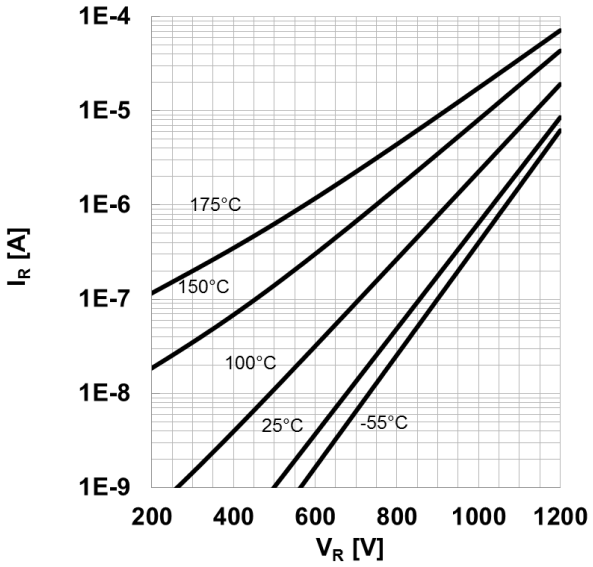


Figure 6. Typical reverse characteristics, $I_R=f(V_R)$, parameter: T_{vj}

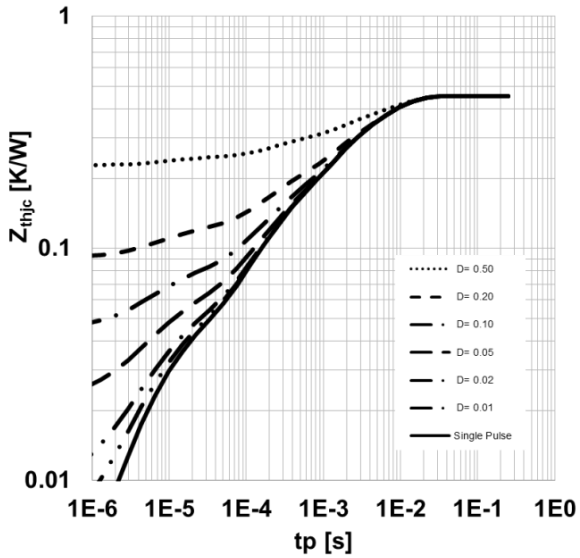


Figure 7. Max. transient thermal impedance, $Z_{th,j-c}=f(t_P)$, parameter: $D=t_P/T$

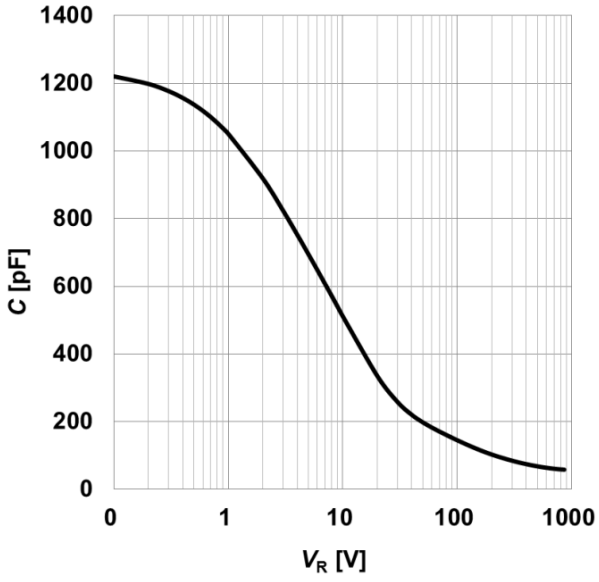


Figure 8. Typical capacitance as function of reverse voltage, $C=f(V_R)$; T_{vj}=25°C; f=1 MHz

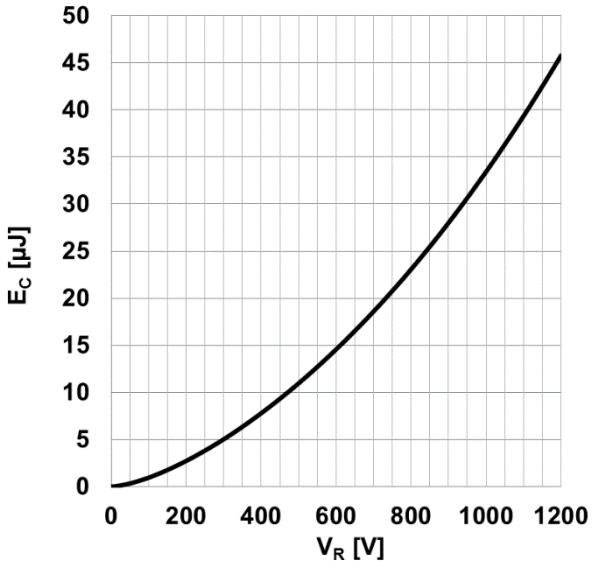
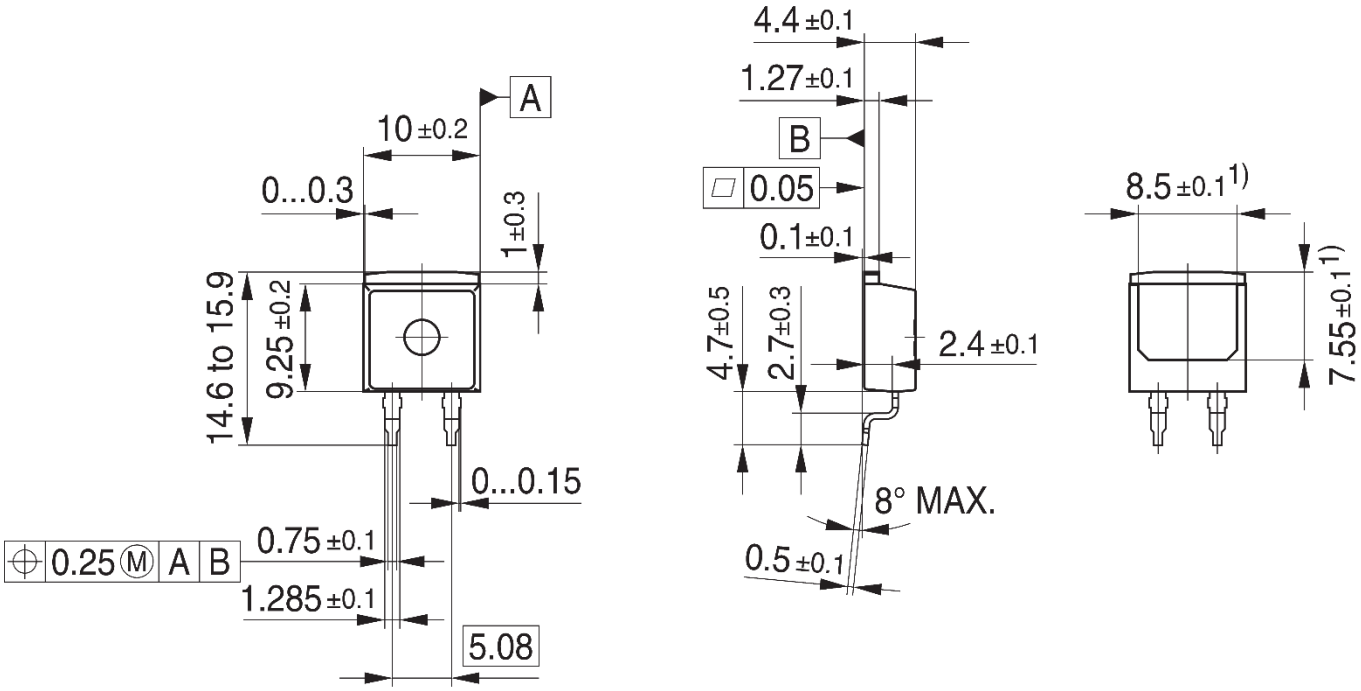


Figure 9. Typical capacitively stored energy as function of reverse voltage, E_C=f(V_R)

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

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Edition 2021-07-14

Published by

Infineon Technologies AG

81726 München, Germany

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Document reference

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