5th Generation CoolSiC™ 1200V Schottky Diode

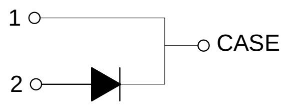
SiC Diode

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

Pin 1 and backside: Cathode
Pin 2: Anode



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
IDK16G120C5	1200 V	16 A	57nC	175°C	D1612C5	PG-TO263-2

Table of contents

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	16 19 40	A
Surge repetitive forward current, sine halfwave[1] T_C=25°C, t_p=10ms T_C=100°C, t_p=10ms	$I_{F,RM}$	64 48	A
Surge non-repetitive forward current, sine halfwave T_C=25°C, t_p=10ms T_C=150°C, t_p=10ms	$I_{F,SM}$	140 120	A
Non-repetitive peak forward current T_C = 25°C, t_p=10 µs	$I_{F,max}$	850	A
i^2t value T_C = 25°C, t_p=10 ms T_C = 150°C, t_p=10 ms	$\int i^2 dt$	99 71	A^2s
Diode d*v*/d*t* ruggedness V_R=0...960 V	d*v*/d*t*	150	V/ns
Power dissipation for $R_{th(j-c,max)}$ T_C = 25°C	P_{tot}	250	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	$R_{th(j-c)}$		-	0.46	0.60	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= 16A, T_{vj}=25°C I_F= 16A, T_{vj}=150°C	- -	1.65 2.25	1.95 -	V
Reverse current	I_R	V_R=1200V, T_{vj}=25°C V_R=1200V, T_{vj}=150°C	- -	5.5 28	80 -	µA

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 $Q_C = \int_0^{V_R} C(V)dV$	-	57	-	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	- - -	730 52 40	- - -	pF

4 Electrical Characteristics Diagrams

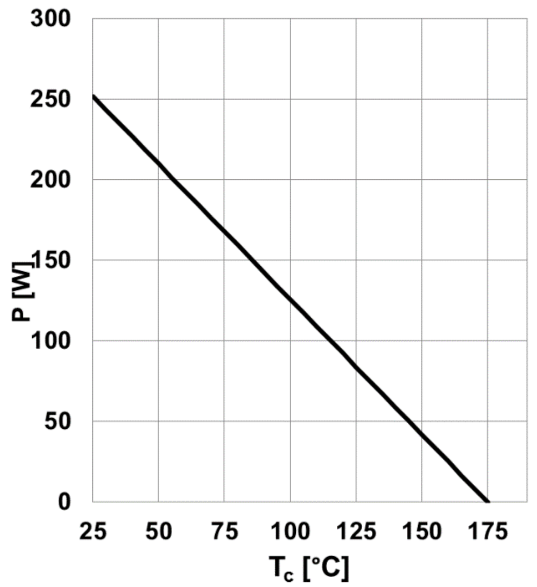


Figure 1. Power dissipation as function of case temperature, P_{tot}=f(T_C), $R_{th(j-c),max}$

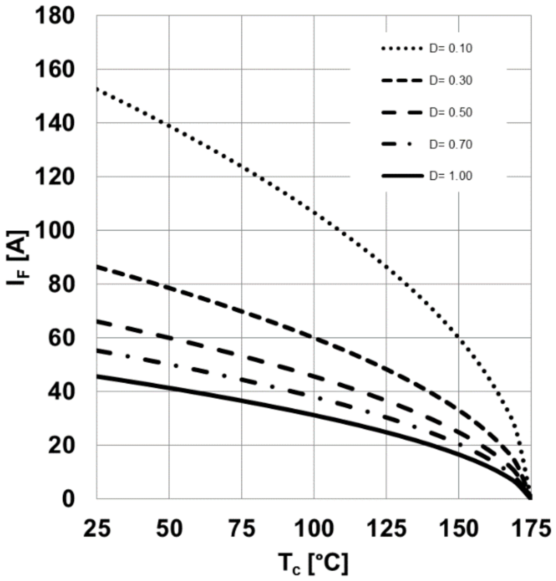


Figure 2. Diode forward current as function of temperature, parameter: T_{vj}≤175°C, $R_{th(j-c),max}$, *D*=duty cycle, V_{th}, R_{diff} @ T_{vj}=175°C

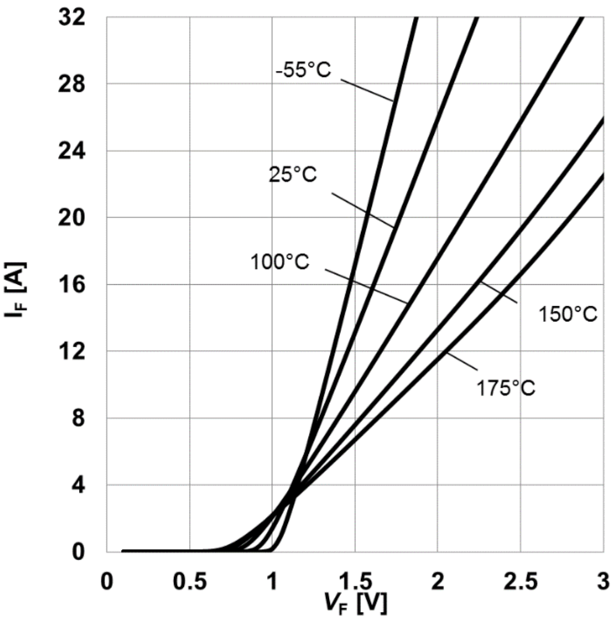


Figure 3. Typical forward characteristics, I_F=f(V_F), t_p= 10 µs, parameter: T_{vj}

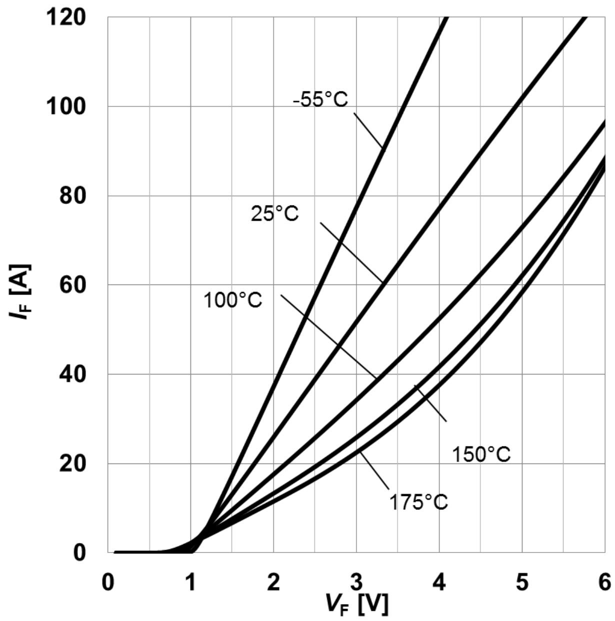


Figure 4. Typical forward characteristics in surge current, I_F=f(V_F), t_p= 10 µs, parameter: T_{vj}

Electrical Characteristics Diagrams

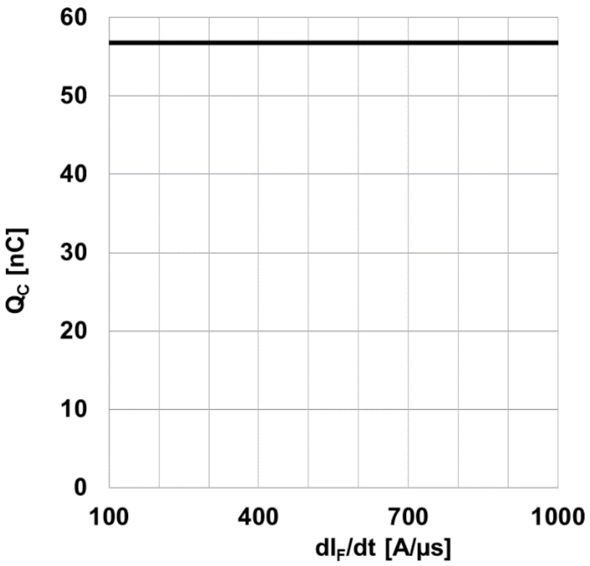


Figure 5. Typical capacitive charge as function of current slope, Q_C=f(dIF/dt), T_{vj}=150°C

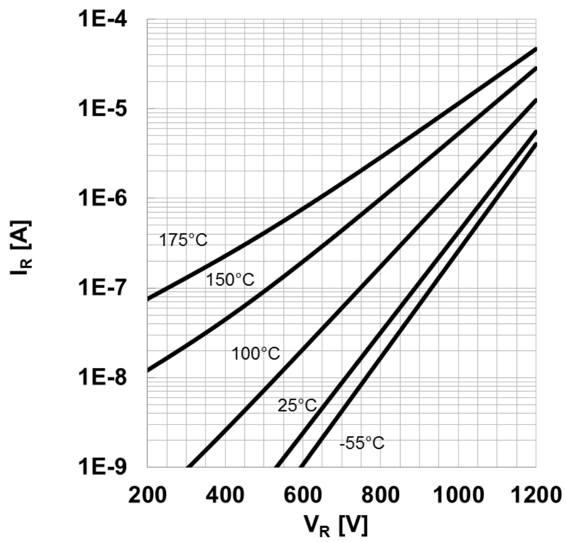


Figure 6. Typical reverse characteristics, I_R=f(V_R), parameter: T_{vj}

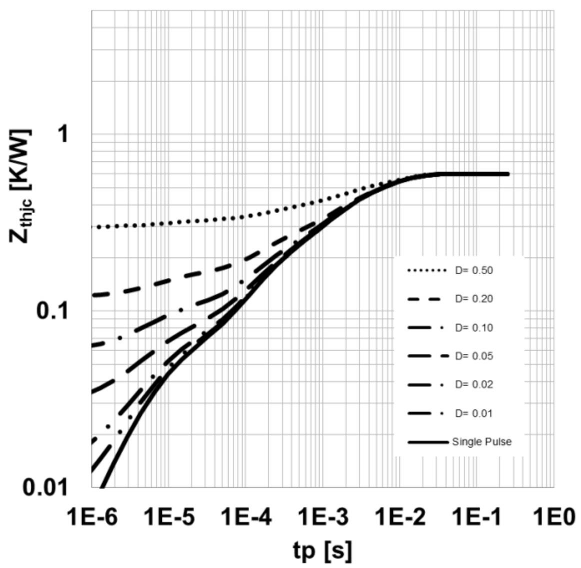


Figure 7. Max. transient thermal impedance, $Z_{th,j-c}$=f(t_P), parameter: D=tP/T

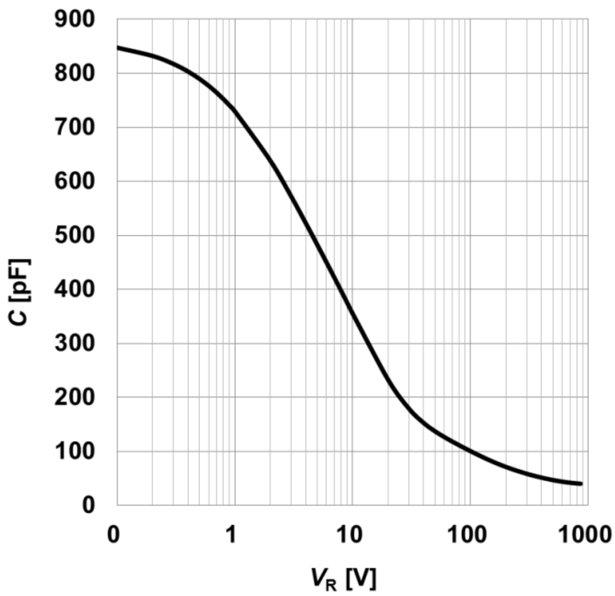


Figure 8. Typical capacitance as function of reverse voltage, C=f(V_R); T_{vj}=25°C; f=1 MHz

Electrical Characteristics Diagrams

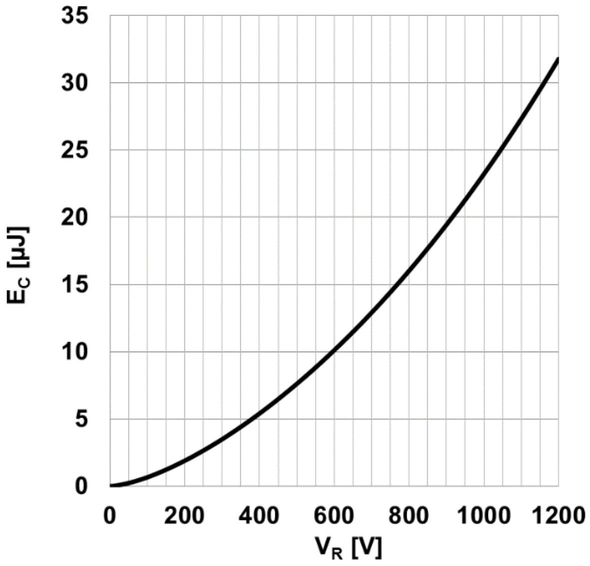
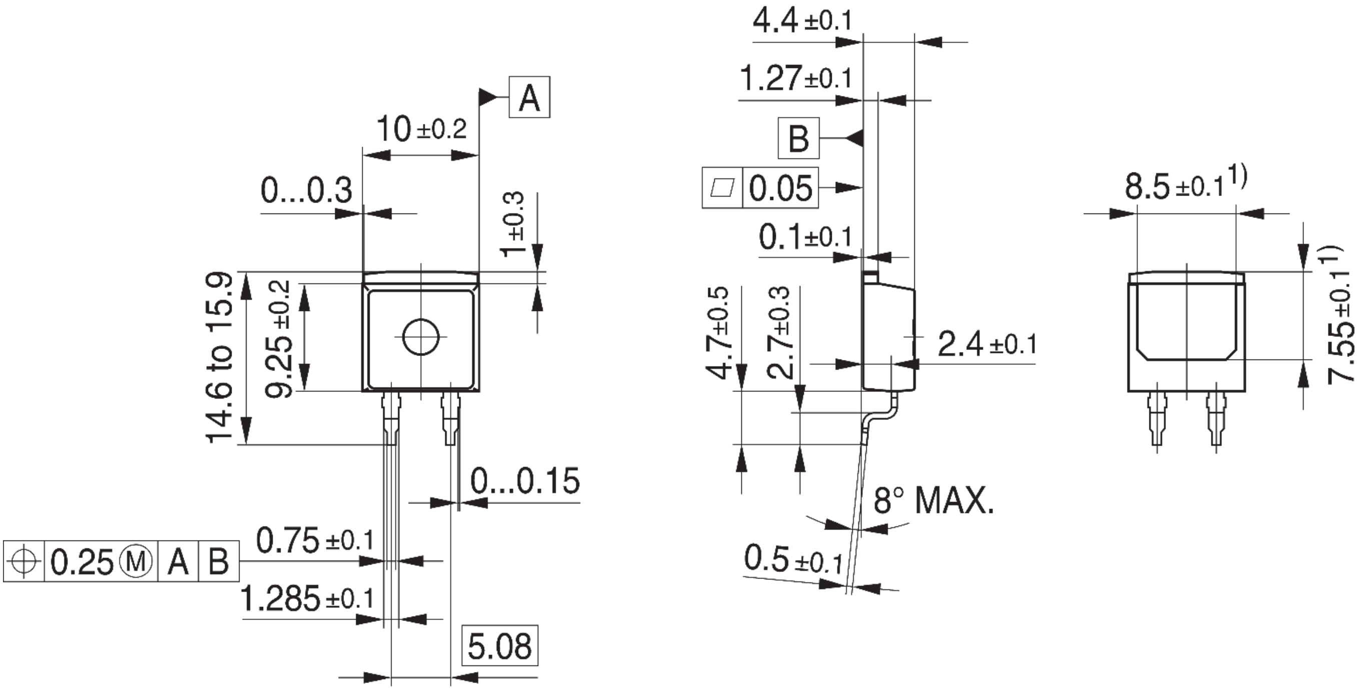


Figure 9. Typical capacitively stored energy as function of reverse voltage, E_C=f(V_R)

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 Method 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.