5th Generation CoolSiC™ 1200V Schottky Diode

SiC Diode

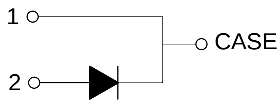
Features

- No reverse recovery current / no forward recovery
- High surge current capability
- Temperature independent switching behaviour
- Low forward voltage even at high operating temperature
- Tight forward voltage distribution
- Specified dv/dt ruggedness
- Pb-free lead plating; RoHS compliant

Pin definition

Pin 1 and backside: Cathode

Pin 2: Anode



Potential applications

- Industrial power supplies: Industrial UPS
- Infrastructure-Charge: Charger
- Metal treatment: Welding
- Solar central inverters, Solar string inverter and Solar optimizer

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

Green

RoHS

Key performance parameters

Type	V_{DC}	I_F	Q_C	$T_{vj,max}$	Marking	Package
IDWD20G120C5	1200 V	20 A	106nC	175°C	D2012C5	PG-TO247-2

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 $R_{th(j-c,max)}$ $T_C = 156°C$, D=1 $T_C = 135°C$, D=1 $T_C = 25°C$, D=1	I_F	 20 29 62	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	$I_{F,SM}$	 190 180	A
Non-repetitive peak forward current $T_C = 25°C$, t_p=10 µs	$I_{F,max}$	1774	A
i^2t value $T_C = 25°C$, t_p=10 ms $T_C = 150°C$, t_p=10 ms	$\int i^2dt$	 180 162	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}	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, wave soldering only allowed at leads 1.6mm (0.063 in.) from case for 10 s	T_{sold}	260	°C
Mounting torque, M3 screw Maximum of mounting processes: 3	M	0.6	Nm

2 Thermal resistances

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Characteristic						
Diode thermal resistance, junction – case	$R_{th(j-c)}$		-	0.45	0.6	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=500µA	1200	-	-	V
Diode forward voltage	V_F	I_F= 20A, T_{vj}=25°C	-	1.4	1.65	V
		I_F= 20A, T_{vj}=150°C	-	1.7	-	
Reverse current	I_R	V_R=1200V, T_{vj}=25°C	-	12	166	µA
		V_R=1200V, T_{vj}=150°C	-	58	-	

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 & 25°C $Q_C = \int_0^{V_R} C(V)dV$	-	106	-	nC
Total Capacitance	C	V_R=1 V, f=1 MHz	-	1368	-	pF
		V_R=400 V, f=1 MHz	-	96	-	
		V_R=800 V, f=1 MHz	-	76	-	

4 Electrical Characteristics Diagrams

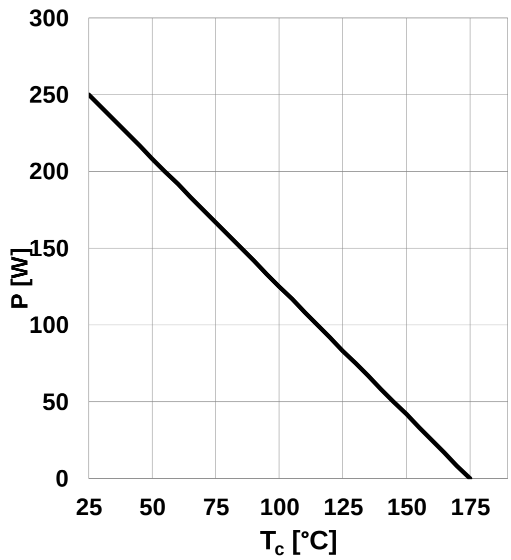


Figure 1. Power dissipation as function of case temperature, P_{tot}=f(TC), $R_{th(j-c),max}$

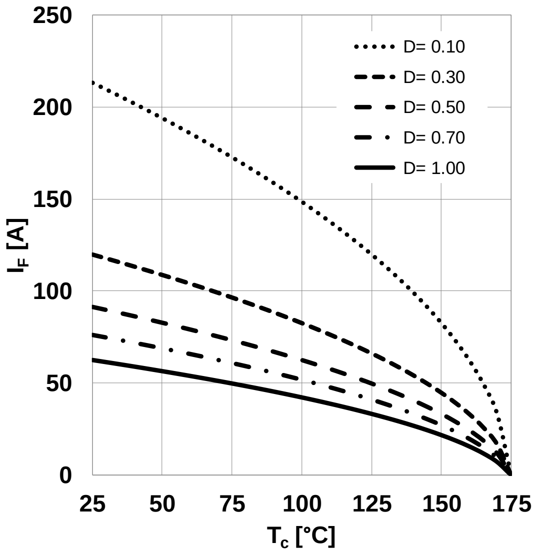


Figure 2. Diode forward current as function of temperature, parameter: T_{vj}≤175°C, $R_{th(j-c),max}$, D=duty cycle, V_{th}, R_{diff} @ T_{vj}=175°C

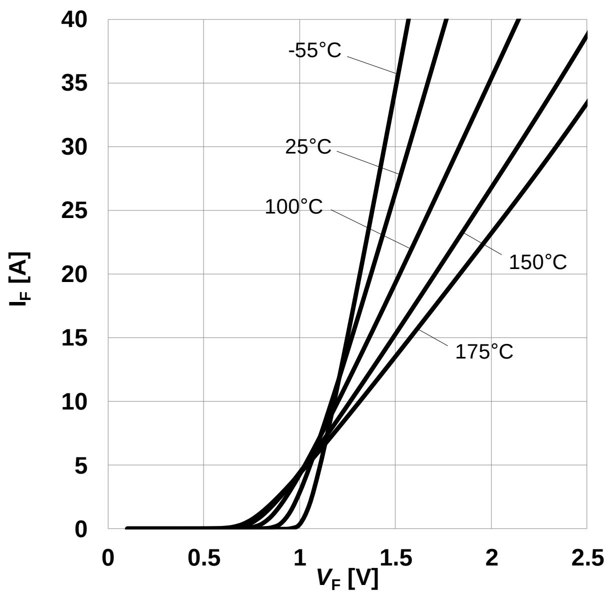


Figure 3. Typical forward characteristics, I_F=f(V_F), t_p= 10 µs, parameter: T_{vj}

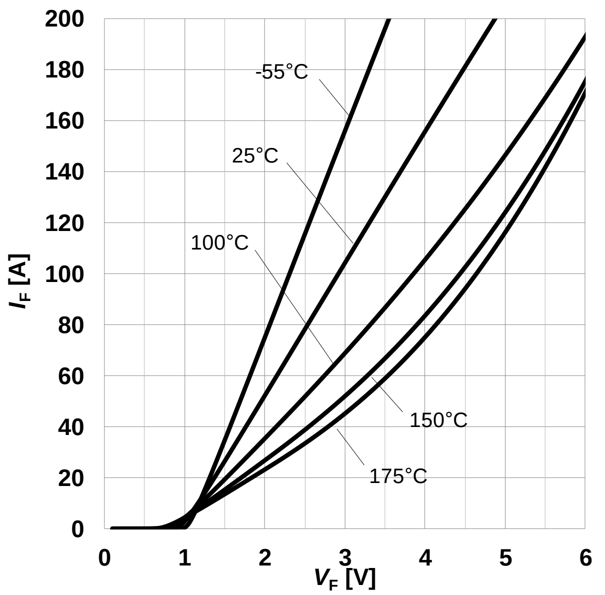


Figure 4. Typical forward characteristics in surge current, I_F=f(V_F), t_p= 10 µs, parameter: T_{vj}

Electrical Characteristics Diagrams

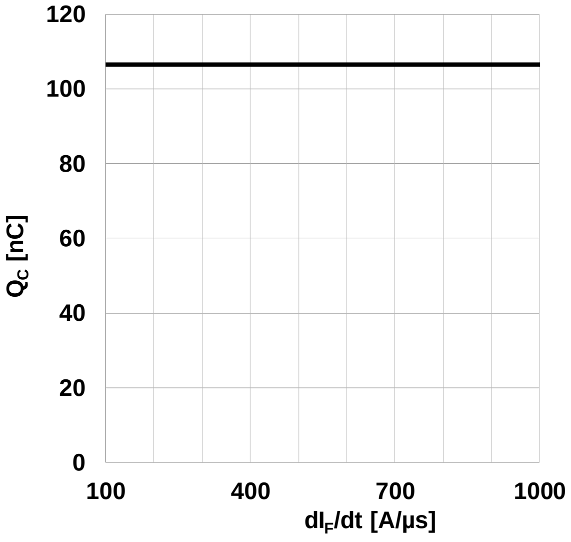


Figure 5. Typical capacitive charge as function of current slope[2], Q_C=f(dI_F/dt), T_{vj}=150°C

2) guaranteed by design

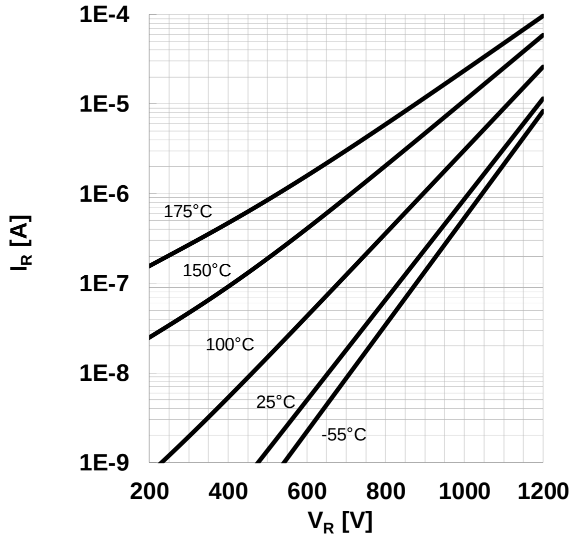


Figure 6. Typical reverse characteristics, I_R=f(V_R), parameter: T_{vj}

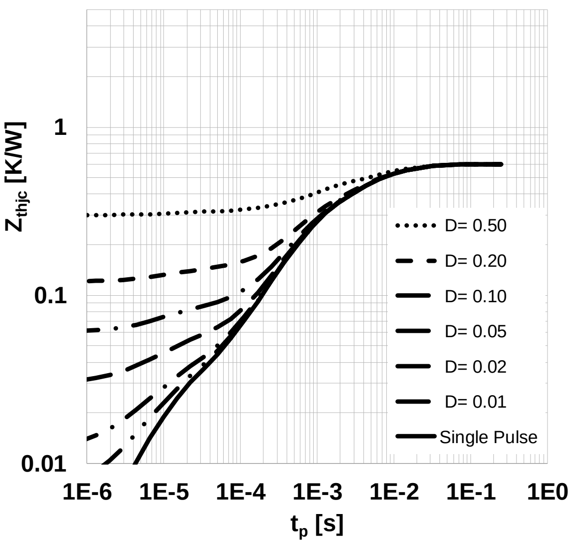


Figure 7. Max. transient thermal impedance, $Z_{th,j-c}$=f(tP), parameter: D=tP/T

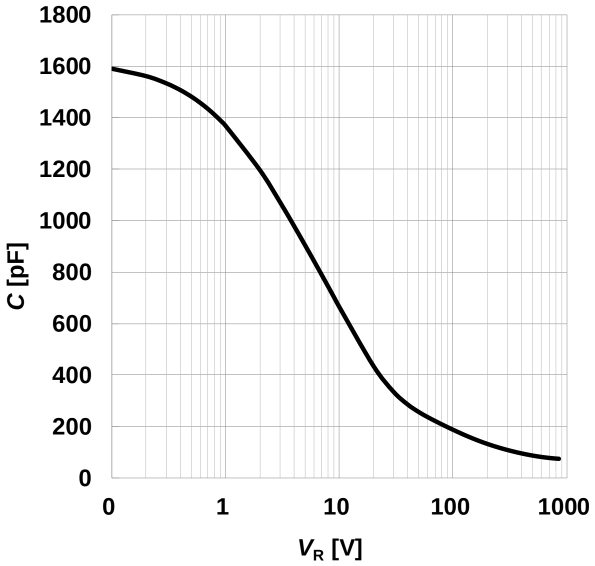


Figure 8. Typical capacitance as function of reverse voltage, C=f(VR); T_{vj}=25°C; f=1 MHz

Electrical Characteristics Diagrams

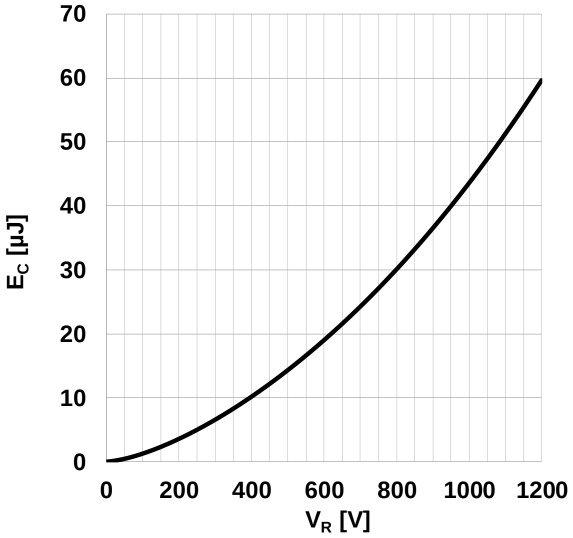
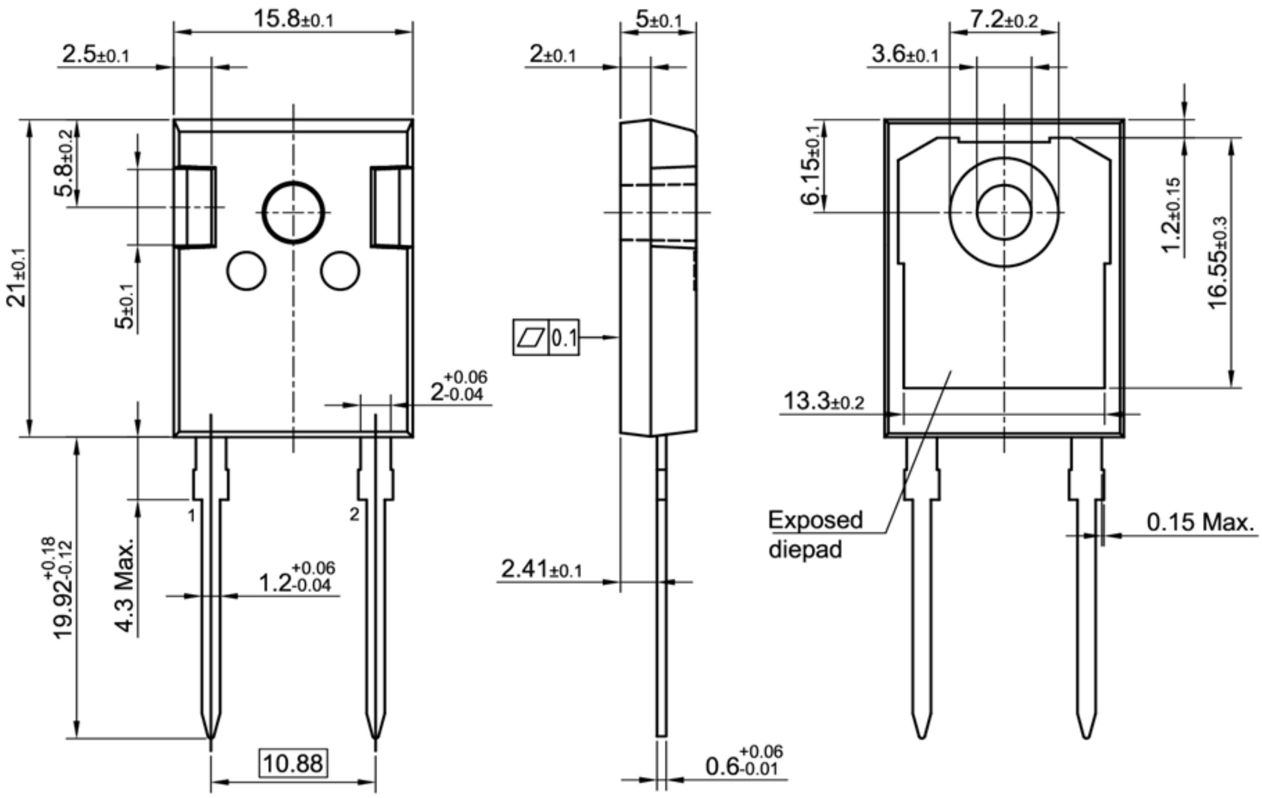


Figure 9. Typical capacitively stored energy as function of reverse voltage, E_C=f(V_R)

5 Package Drawing

PG-TO247-2



All dimensions do not include mold flash or protrusions

All dimensions are in units mm

The drawing is in compliance with ISO 128-30, Projection Method 1 [⊲⊕]

Revision history

Document version	Date of release	Description of changes
V 1.0	2018-12-21	Preliminary Datasheet
V 2.0	2019-01-30	Final Datasheet
V 2.1	2021-03-01	Increased d*v*/d*t* ruggedness

Trademarks

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Document reference

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