

# Diode

Silicon Carbide Schottky Diode

## IDH20G120C5

5<sup>th</sup> Generation CoolSiC™ 1200 V SiC Schottky Diode

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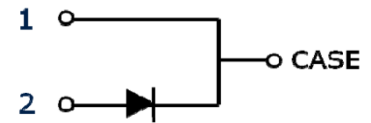
Rev. 2.2 2021-03-01

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<sup>1)</sup> 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](http://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 <sub>DC</sub>	I <sub>F</sub>	Q <sub>C</sub>	T <sub>j,max</sub>	Marking	Package
IDH20G120C5	1200V	20A	82nC	175°C	D2012C5	PG-TO220-2-1

1) J-STD20 and JEDEC22

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**Maximum ratings**

Parameter	Symbol	Value	Unit
Repetitive peak reverse voltage	$V_{RRM}$	1200	V
Continues forward current for $R_{th(j-c,max)}$ $T_C = 150^\circ\text{C}$ , $D=1$ $T_C = 135^\circ\text{C}$ , $D=1$ $T_C = 25^\circ\text{C}$ , $D=1$	$I_F$	20 27 56	A
Surge non-repetitive forward current, sine halfwave $T_C=25^\circ\text{C}$ , $t_p=10\text{ms}$ $T_C=150^\circ\text{C}$ , $t_p=10\text{ms}$	$I_{F,SM}$	198 168	A
Non-repetitive peak forward current $T_C = 25^\circ\text{C}$ , $t_p=10 \mu\text{s}$	$I_{F,max}$	1200	A
$i^2t$ value $T_C = 25^\circ\text{C}$ , $t_p=10 \text{ms}$ $T_C = 150^\circ\text{C}$ , $t_p=10 \text{ms}$	$\int i^2 dt$	195 140	A <sup>2</sup> s
Diode $dv/dt$ ruggedness $V_R=0\dots960\text{V}$	$dv/dt$	150	V/ns
Power dissipation $T_C = 25^\circ\text{C}$	$P_{tot}$	330	W
Operating and storage temperature	$T_j; T_{stg}$	-55...175	$^\circ\text{C}$
Soldering temperature, wavesoldering only allowed at leads, 1.6mm (0.063 in.) from case for 10 s	$T_{sold}$	260	$^\circ\text{C}$
Mounting torque M3 and M4 screws	$M$	0.7	Nm

**Thermal Resistances**

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
<b>Characteristic</b>						
Diode thermal resistance, junction – case	$R_{th(j-c)}$		-	0.35	0.46	K/W
Thermal resistance, junction – ambient	$R_{th(j-a)}$	lead	-	-	62	K/W

**Electrical Characteristics**
**Static Characteristics, at T<sub>j</sub>=25°C, unless otherwise specified**

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
<b>Static Characteristic</b>						
DC blocking voltage	V <sub>DC</sub>	T <sub>j</sub> = 25°C	1200	-	-	V
Diode forward voltage	V <sub>F</sub>	I <sub>F</sub> = 20A, T <sub>j</sub> =25°C	-	1.5	1.8	V
		I <sub>F</sub> = 20A, T <sub>j</sub> =150°C	-	2.0	2.6	
Reverse current	I <sub>R</sub>	V <sub>R</sub> =1200V, T <sub>j</sub> =25°C		8.5	123	μA
		V <sub>R</sub> =1200V, T <sub>j</sub> =150°C		44	630	

**Dynamic Characteristics, at T<sub>j</sub>=25°C, unless otherwise specified**

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
<b>Dynamic Characteristics</b>						
Total capacitive charge	Q <sub>C</sub>	V <sub>R</sub> =800V, T <sub>j</sub> =150°C $Q_C = \int_0^{V_R} C(V) dV$	-	82	-	nC
Total Capacitance	C	V <sub>R</sub> =1 V, f=1 MHz	-	1050	-	pF
		V <sub>R</sub> =400 V, f=1 MHz	-	74	-	
		V <sub>R</sub> =800 V, f=1 MHz	-	59	-	

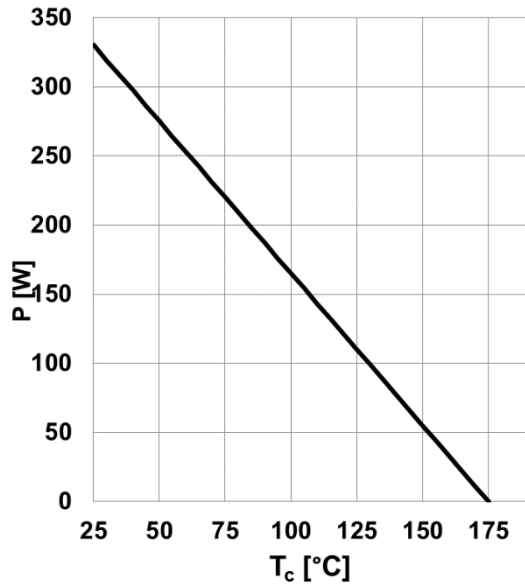


Figure 1. Power dissipation as a function of case temperature,  $P_{tot}=f(T_c, R_{th(j-c),max})$

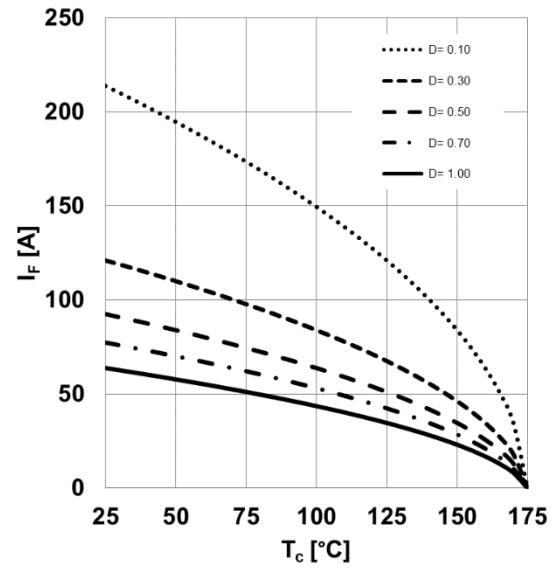


Figure 2. Diode forward current as function of temperature,  $T_j \leq 175^\circ\text{C}$ ,  $R_{th(j-c),max}$ , parameter  $D$ =duty cycle,  $V_{th}$ ,  $R_{diff}$  @  $T_j=175^\circ\text{C}$

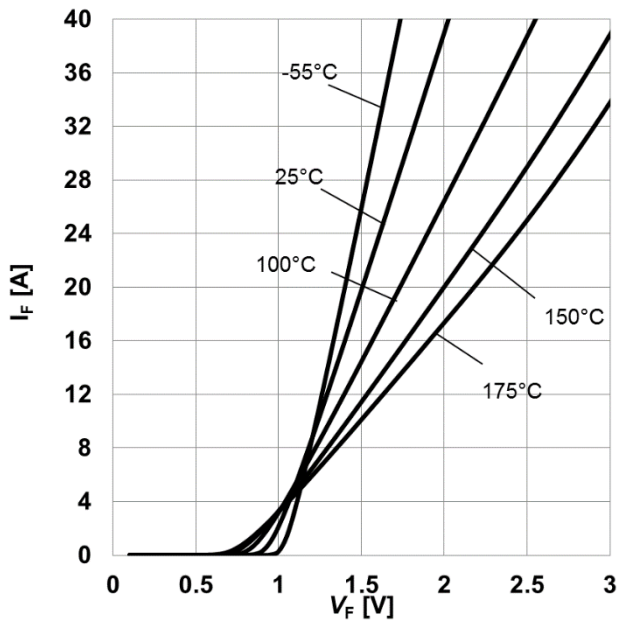


Figure 3. Typical forward characteristics,  $I_f=f(V_f)$ ,  $t_p=10 \mu\text{s}$ , parameter:  $T_j$

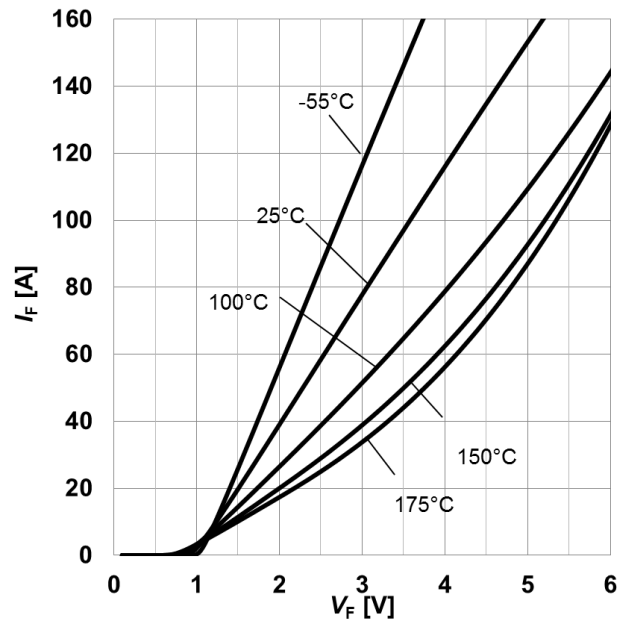


Figure 4. Typical forward characteristics in surge current,  $I_f=f(V_f)$ ,  $t_p=10 \mu\text{s}$ , parameter:  $T_j$

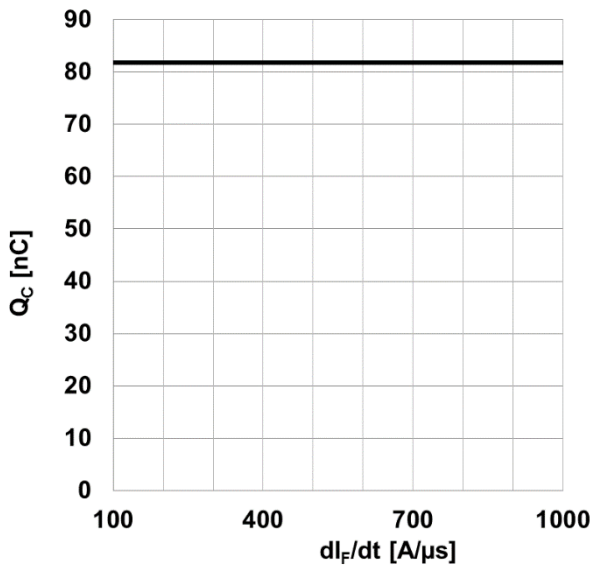


Figure 5. **Typical capacitive charge as function of current slope<sup>1</sup>,  $Q_C=f(di_F/dt)$ ,  $T_j=150^\circ\text{C}$**   
 1) Only capacitive charge, guaranteed by design.

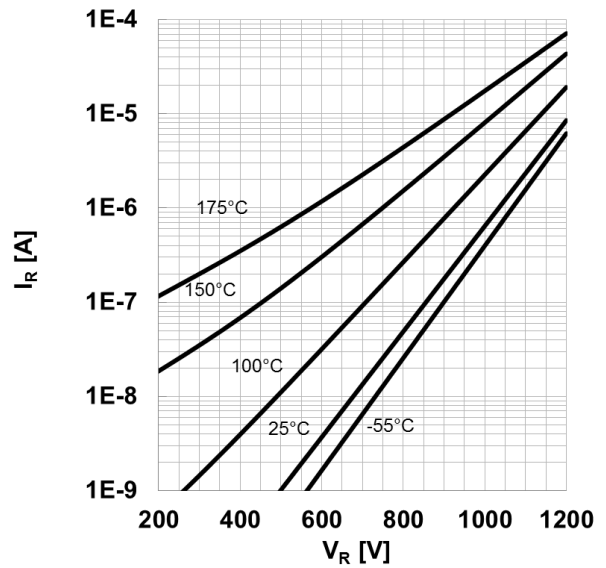


Figure 6. **Typical reverse current as function of reverse voltage,  $I_R=f(V_R)$ , parameter:  $T_j$**

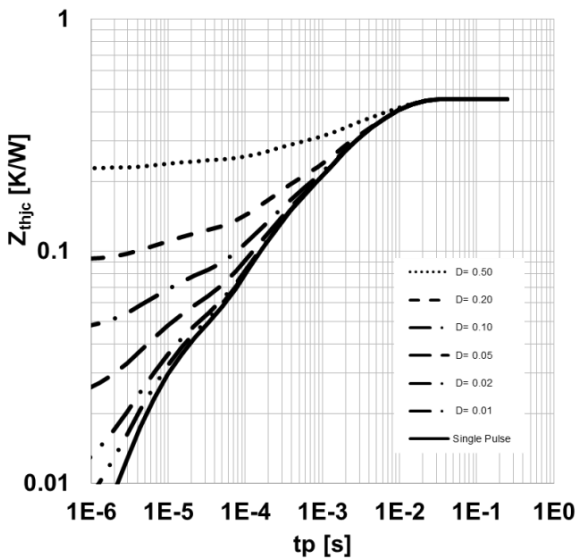


Figure 7. **Max. transient thermal impedance,  $Z_{th,jc}=f(t_p)$ , parameter:  $D=t_p/T$**

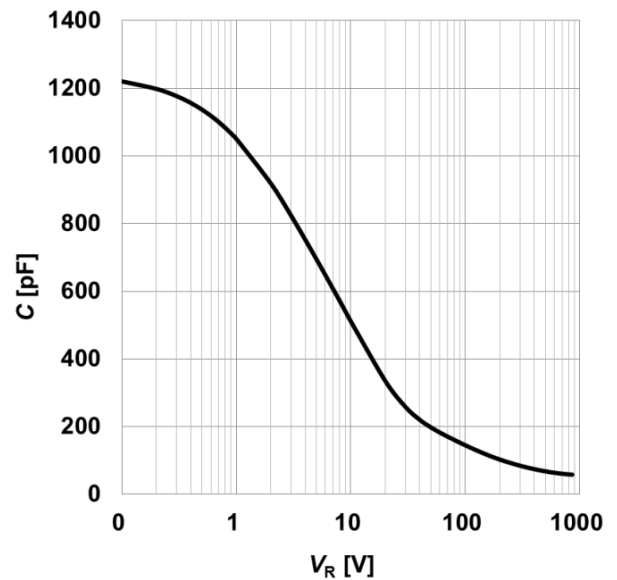


Figure 8. **Typical capacitance as function of reverse voltage,  $C=f(V_R)$ ;  $T_j=25^\circ\text{C}$ ;  $f=1\text{ MHz}$**

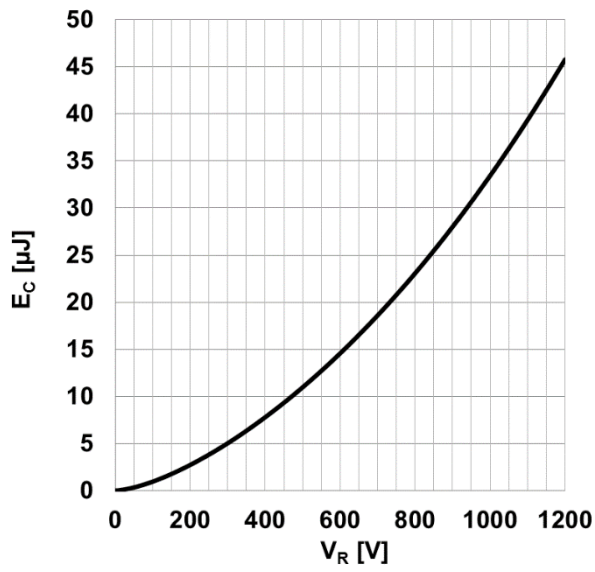
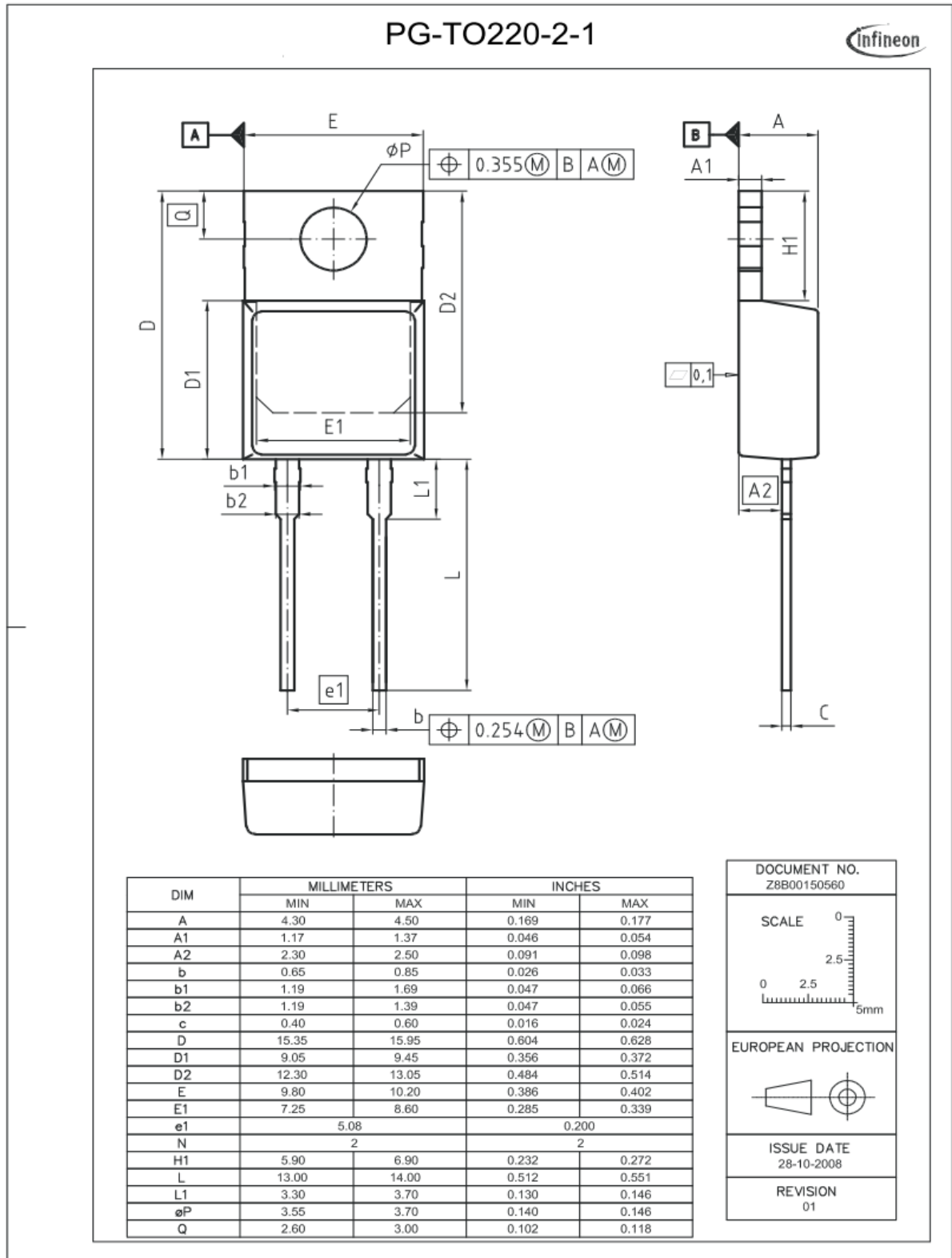


Figure 9. Typical capacitively stored energy as function of reverse voltage,

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



**Revision History**IDH20G120C5

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**Revision: 2021-03-01, Rev. 2.2**Previous Revision:

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Revision	Date	Subjects (major changes since last version)
2.0	2015-09-03	Final data sheet
2.1	2017-07-21	Editorial Changes
2.2	2021-03-01	Increased $dv/dt$ ruggedness

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