

# Diode

Silicon Carbide Schottky Diode

## IDH05G120C5

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

**Final Datasheet**

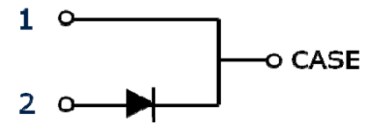
Rev. 2.1 2017-07-21

**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
IDH05G120C5	1200V	5A	24nC	175°C	D0512C5	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 $R_{th(j-c,max)}$ $T_C = 161^\circ\text{C}$ , D=1 $T_C = 135^\circ\text{C}$ , D=1 $T_C = 25^\circ\text{C}$ , D=1	$I_F$	5.0 9.2 19.1	A
Surge non-repetitive forward current, sine halfwave $T_C=25^\circ\text{C}$ , $t_p=10\text{ms}$ $T_C=150^\circ\text{C}$ , $t_p=10\text{ms}$	$I_{F,SM}$	59 50	A
Non-repetitive peak forward current $T_C = 25^\circ\text{C}$ , $t_p=10 \mu\text{s}$	$I_{F,max}$	472	A
$i^2t$ value $T_C = 25^\circ\text{C}$ , $t_p=10 \text{ms}$ $T_C = 150^\circ\text{C}$ , $t_p=10 \text{ms}$	$\int i^2 dt$	17.4 12.5	A <sup>2</sup> s
Diode $dv/dt$ ruggedness $V_R=0\dots960\text{V}$	$dv/dt$	80	V/ns
Power dissipation $T_C = 25^\circ\text{C}$	$P_{tot}$	109	W
Operating temperature	$T_j$	-55...175	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55...150	$^\circ\text{C}$
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	$R_{th(j-c)}$		-	1.06	1.37	K/W
Thermal resistance, junction – ambient	$R_{th(j-a)}$	leaded	-	-	62	K/W

**Electrical Characteristics**
**Static Characteristics, at  $T_j=25^\circ\text{C}$ , unless otherwise specified**

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
<b>Static Characteristic</b>						
DC blocking voltage	$V_{DC}$	$T_j = 25^\circ\text{C}$	1200	-	-	V
Diode forward voltage	$V_F$	$I_F = 5\text{A}, T_j = 25^\circ\text{C}$	-	1.50	1.8	V
		$I_F = 5\text{A}, T_j = 150^\circ\text{C}$	-	1.95	2.6	
Reverse current	$I_R$	$V_R = 1200\text{V}, T_j = 25^\circ\text{C}$		2.5	33	$\mu\text{A}$
		$V_R = 1200\text{V}, T_j = 150^\circ\text{C}$		12	175	

**Dynamic Characteristics, at  $T_j=25^\circ\text{C}$ , unless otherwise specified**

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
<b>Dynamic Characteristics</b>						
Total capacitive charge	$Q_C$	$V_R = 800\text{V}, T_j = 150^\circ\text{C}$ $Q_C = \int_0^{V_R} C(V) dV$	-	24	-	nC
Total Capacitance	$C$	$V_R = 1\text{V}, f = 1\text{MHz}$	-	301	-	pF
		$V_R = 400\text{V}, f = 1\text{MHz}$	-	21	-	
		$V_R = 800\text{V}, f = 1\text{MHz}$	-	17	-	

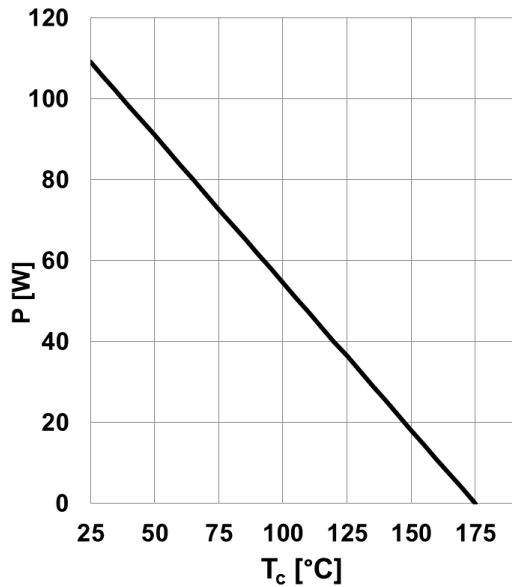


Figure 1. Power dissipation as a function of case temperature,  $P_{tot}=f(T_c)$ ,  $R_{th(j-c),max}$

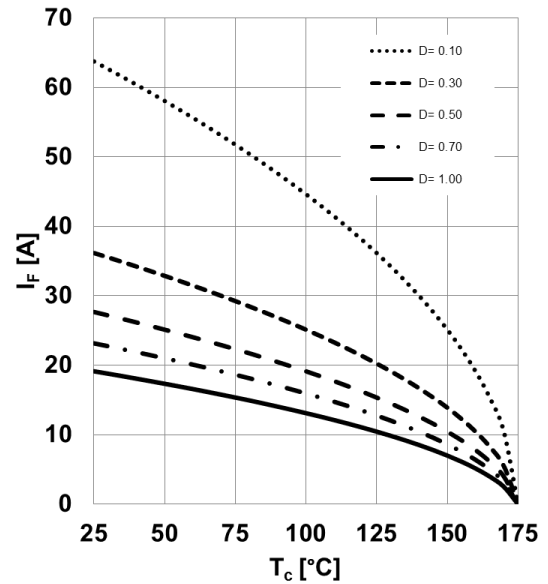


Figure 2. Diode forward current as function of temperature,  $T_j \leq 175^\circ\text{C}$ ,  $R_{th(j-c),max}$ , parameter  $D$ =duty cycle,  $V_{th}$ ,  $R_{diff}$  @  $T_j=175^\circ\text{C}$

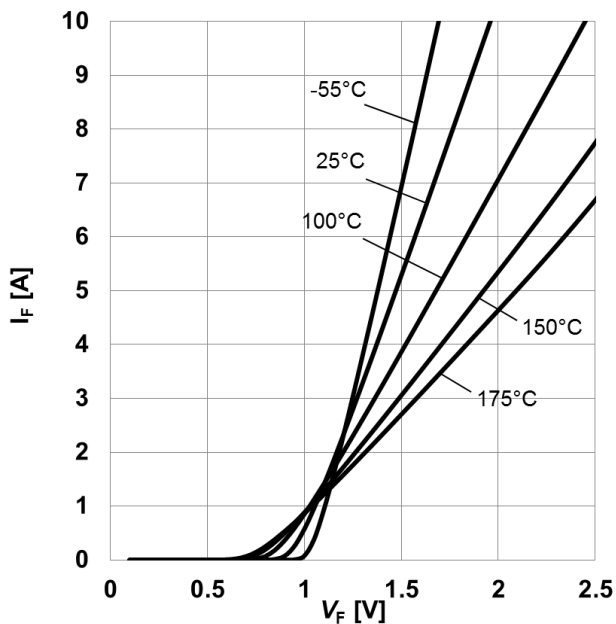


Figure 3. Typical forward characteristics,  $I_F=f(V_F)$ ,  $t_p=10 \mu\text{s}$ , parameter:  $T_j$

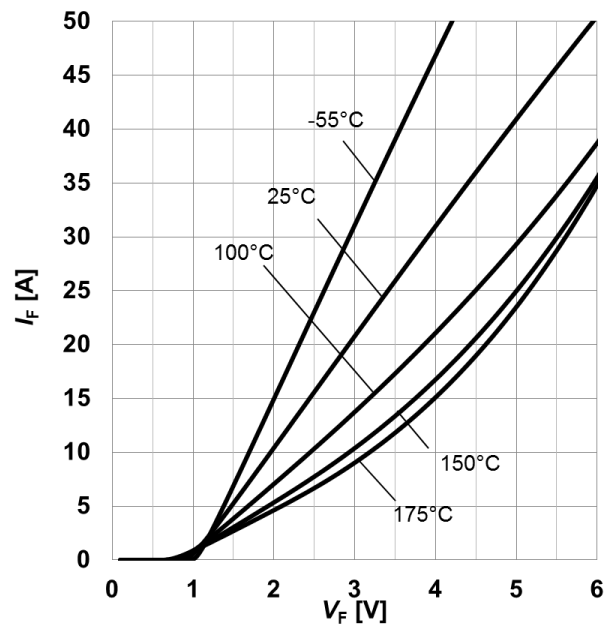


Figure 4. Typical forward characteristics in surge current,  $I_F=f(V_F)$ ,  $t_p=10 \mu\text{s}$ , parameter:  $T_j$

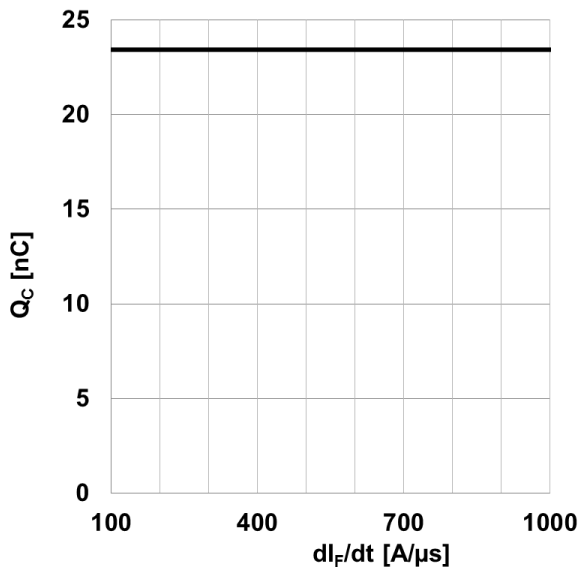


Figure 5. **Typical capacitive charge as function of current slope**<sup>1</sup>,  $Q_C=f(di_F/dt)$ ,  $T_j=150^\circ\text{C}$   
 1) Only capacitive charge, guaranteed by design.

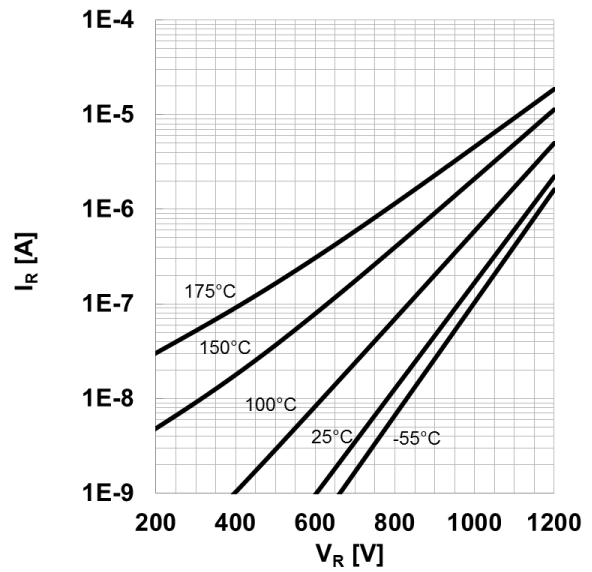


Figure 6. **Typical reverse current as function of reverse voltage**,  $I_R=f(V_R)$ , parameter:  $T_j$

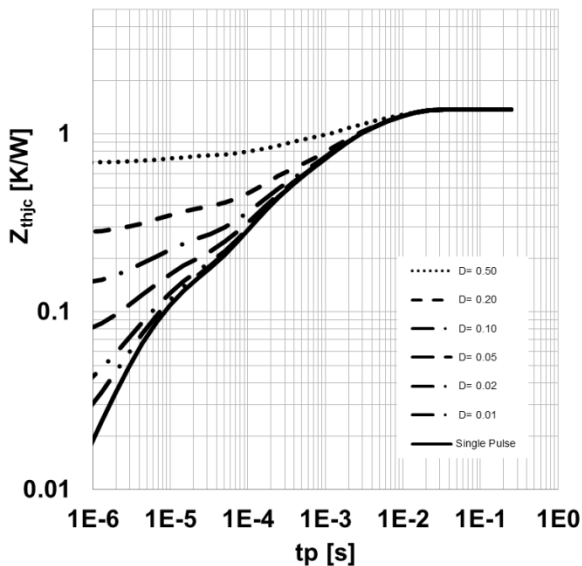


Figure 7. **Max. transient thermal impedance**,  $Z_{th,jc}=f(t_p)$ , parameter:  $D=t_p/T$

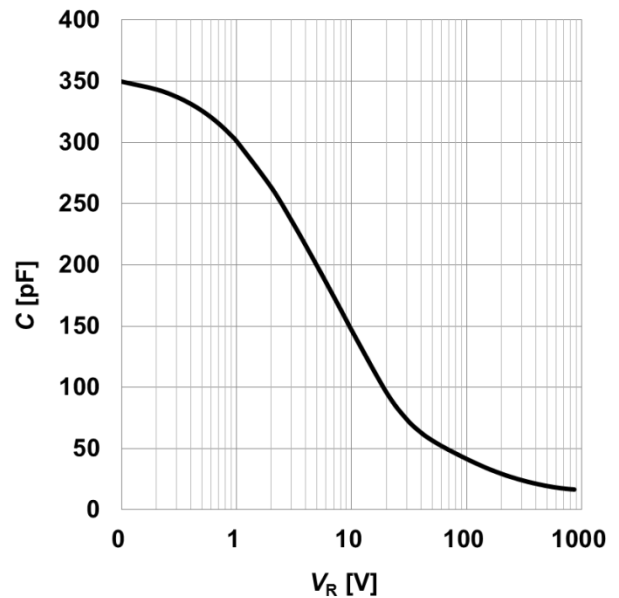


Figure 8. **Typical capacitance as function of reverse voltage**,  $C=f(V_R)$ ;  $T_j=25^\circ\text{C}$ ;  $f=1\text{ MHz}$

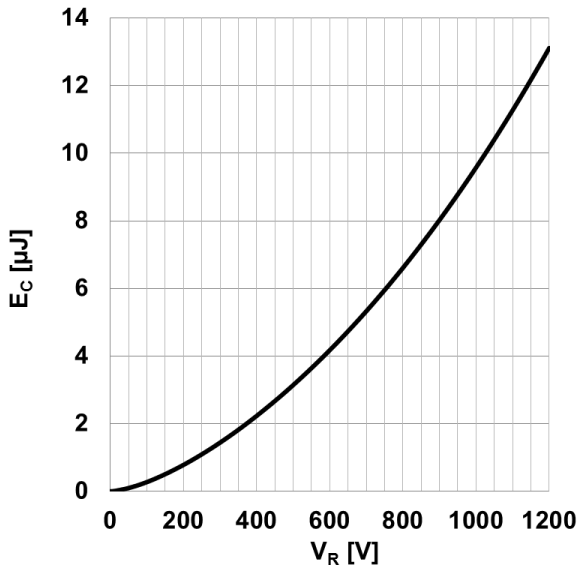
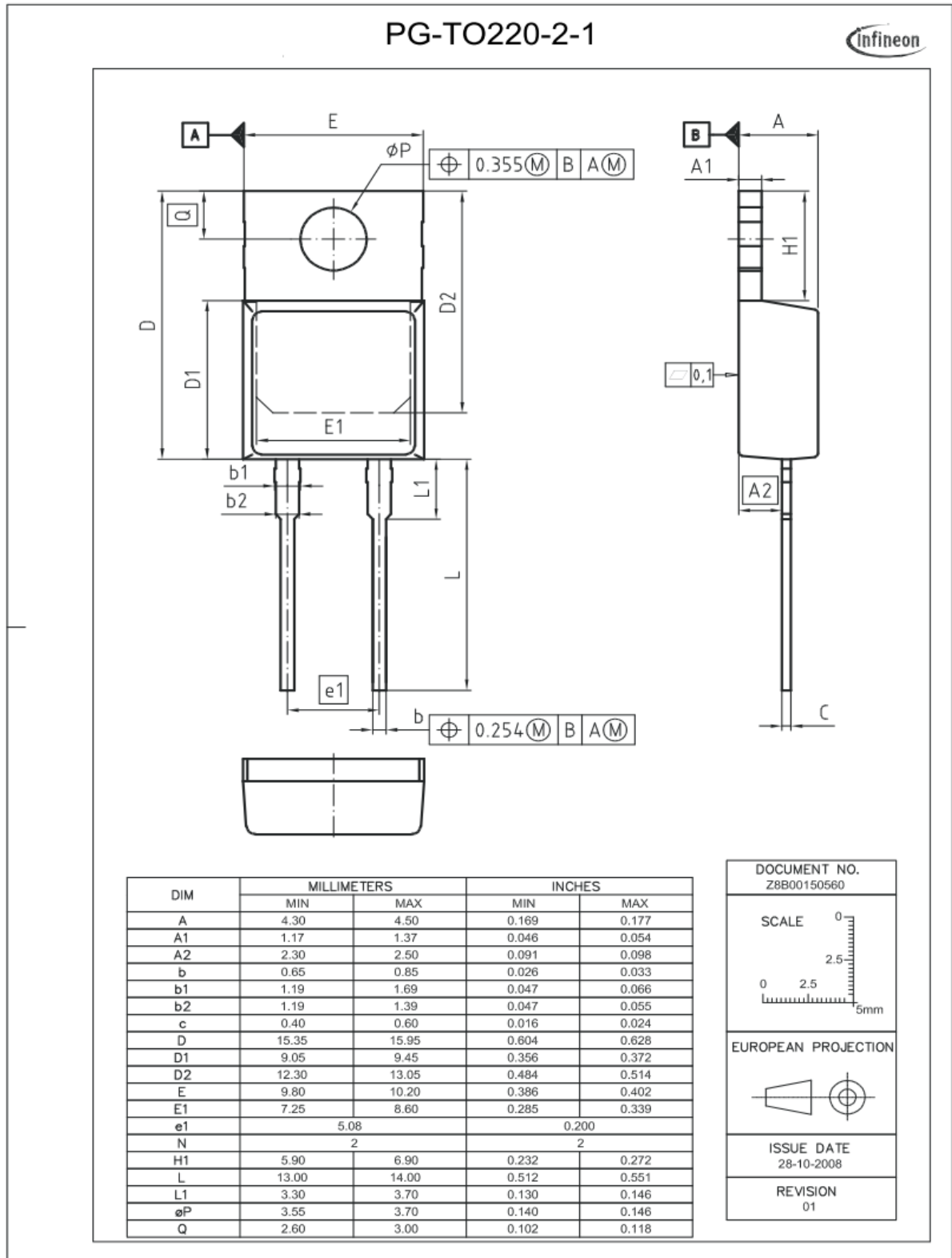


Figure 9. Typical capacitively stored energy as function of reverse voltage,

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





**Revision History**

IDH05G120C5

**Revision: 2017-07-21, Rev. 2.1**

Previous Revision:

Revision	Date	Subjects (major changes since last version)
2.0	2015-08-28	Final data sheet
2.1	-	Editorial Changes

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