

# Diode

Silicon Carbide Schottky Diode

## IDH02G120C5

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

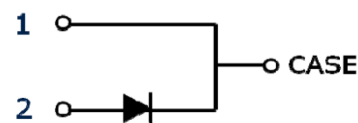
## Final Datasheet

Rev. 2.2 2021-03-01

## 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
IDH02G120C5	1200V	2A	14nC	175°C	D0212C5	PG-TO220-2-1

1) J-STD20 and JEDEC22

## Table of Contents

Description .....	2
Table of Contents .....	3
Maximum Ratings .....	4
Thermal Resistances .....	4
Electrical Characteristics .....	5
Electrical Characteristics Diagram .....	6
Package Drawings .....	9
Revision History .....	10
Disclaimer .....	11

### Maximum ratings

Parameter	Symbol	Value	Unit
Repetitive peak reverse voltage	$V_{RRM}$	1200	V
Continues forward current for $R_{th(j-c,max)}$ $T_C = 168^{\circ}C$ , $D=1$ $T_C = 135^{\circ}C$ , $D=1$ $T_C = 25^{\circ}C$ , $D=1$	$I_F$	2 5.7 11.8	A
Surge non-repetitive forward current, sine halfwave $T_C=25^{\circ}C$ , $t_p=10ms$ $T_C=150^{\circ}C$ , $t_p=10ms$	$I_{F,SM}$	37 31	A
Non-repetitive peak forward current $T_C = 25^{\circ}C$ , $t_p=10 \mu s$	$I_{F,max}$	344	A
$i^2t$ value $T_C = 25^{\circ}C$ , $t_p=10 ms$ $T_C = 150^{\circ}C$ , $t_p=10 ms$	$\int i^2 dt$	7 4.9	A <sup>2</sup> s
Diode $dv/dt$ ruggedness $V_R=0...960V$	$dv/dt$	150	V/ns
Power dissipation $T_C = 25^{\circ}C$	$P_{tot}$	75	W
Operating and storage temperature	$T_j; T_{stg}$	-55...175	$^{\circ}C$
Soldering temperature, wavesoldering only allowed at leads, 1.6mm (0.063 in.) from case for 10 s	$T_{sold}$	260	$^{\circ}C$
Mounting torque M3 and M4 screws	$M$	0.7	Nm

### Thermal Resistances

Thermal Resistances						
Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Characteristic						
Diode thermal resistance, junction – case	R <sub>th(j-c)</sub>		-	1.54	2	K/W
Thermal resistance, junction – ambient	R <sub>th(j-a)</sub>	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.	
Static Characteristic						
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> = 2A, T <sub>j</sub> =25°C	-	1.4	1.65	V
		I <sub>F</sub> = 2A, T <sub>j</sub> =150°C	-	1.7	2.3	
Reverse current	I <sub>R</sub>	V <sub>R</sub> =1200V, T <sub>j</sub> =25°C		1.2	18	μA
		V <sub>R</sub> =1200V, T <sub>j</sub> =150°C		6	90	

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

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Dynamic Characteristics						
Total capacitive charge	Q <sub>C</sub>	V <sub>R</sub> =800V, T <sub>j</sub> =150°C $Q_C = \int_0^{V_R} C(V)dV$	-	14	-	nC
Total Capacitance	C	V <sub>R</sub> =1 V, f=1 MHz	-	182	-	pF
		V <sub>R</sub> =400 V, f=1 MHz	-	13	-	
		V <sub>R</sub> =800 V, f=1 MHz	-	10	-	

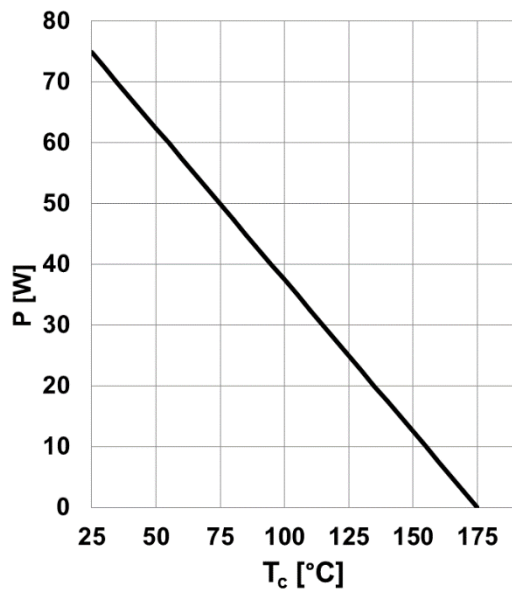


Figure 1. **Power dissipation as a function of case temperature,  $P_{tot}=f(T_c)$ ,  $R_{th(j-c),max}$**

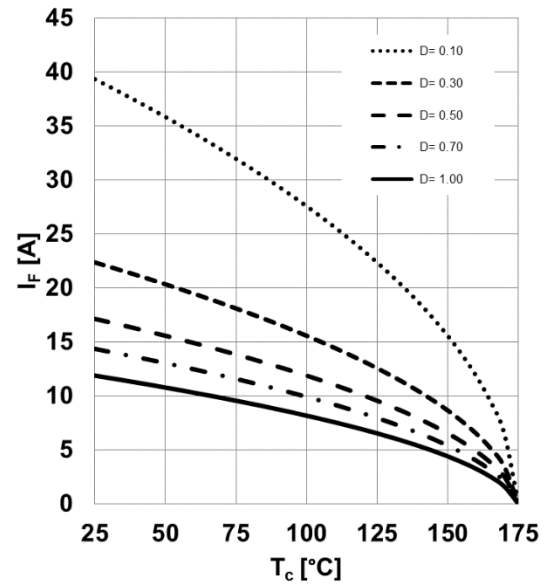


Figure 2. **Diode forward current as function of temperature,  $T_j \leq 175^\circ\text{C}$ ,  $R_{th(j-c),max}$ , parameter  $D$ =duty cycle,  $V_{th}$ ,  $R_{diff}$  @  $T_j=175^\circ\text{C}$**

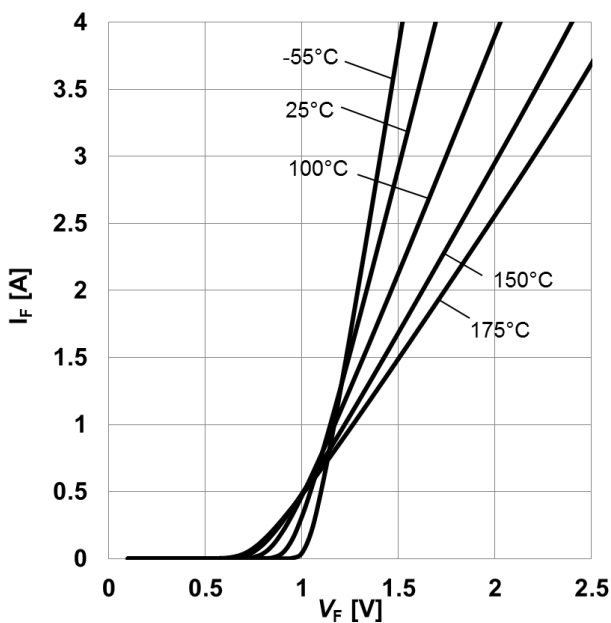


Figure 3. **Typical forward characteristics,  $I_F=f(V_F)$ ,  $t_p=10\text{ }\mu\text{s}$ , parameter:  $T_j$**

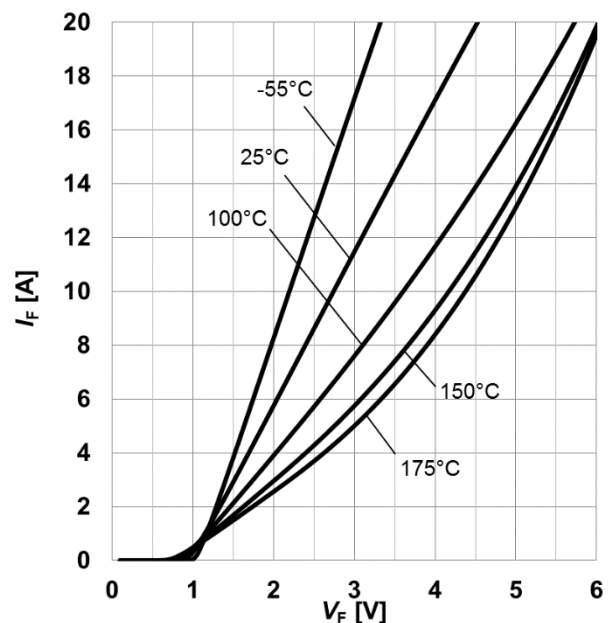


Figure 4. **Typical forward characteristics in surge current,  $I_F=f(V_F)$ ,  $t_p=10\text{ }\mu\text{s}$ , parameter:  $T_j$**

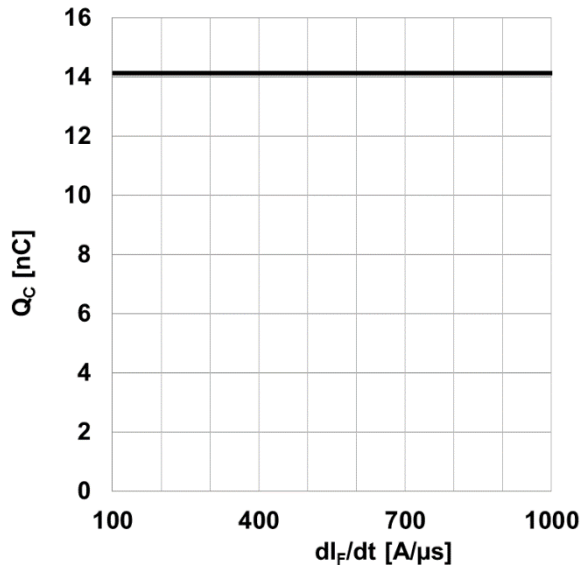


Figure 5. **Typical capacitive charge as function of current slope<sup>1</sup>**,  $Q_C=f(dI_F/dt)$ ,  $T_J=150^{\circ}\text{C}$   
1) Only capacitive charge, guaranteed by design.

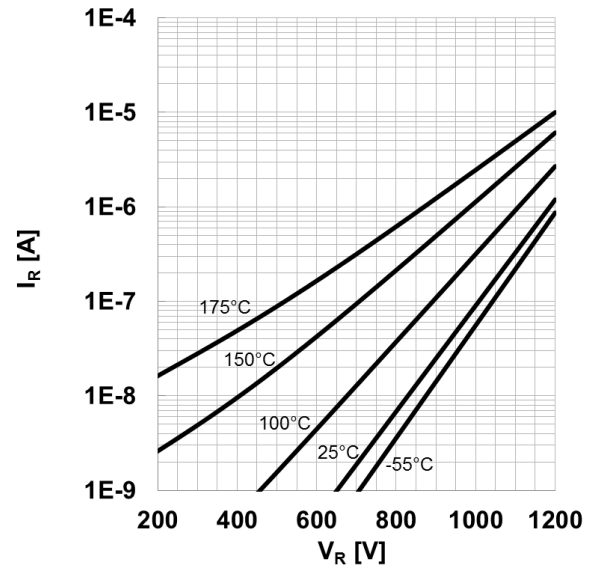


Figure 6. **Typical reverse current as function of reverse voltage**,  $I_R=f(V_R)$ , parameter:  $T_J$

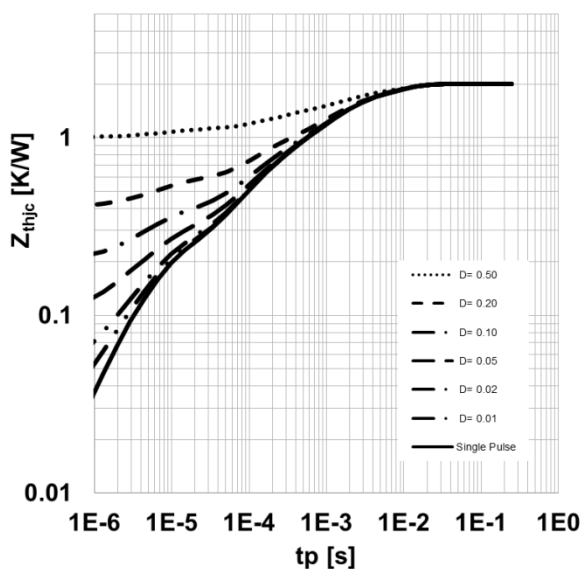


Figure 7. **Max. transient thermal impedance**,  $Z_{thjc}=f(t_p)$ , parameter:  $D=t_p/T$

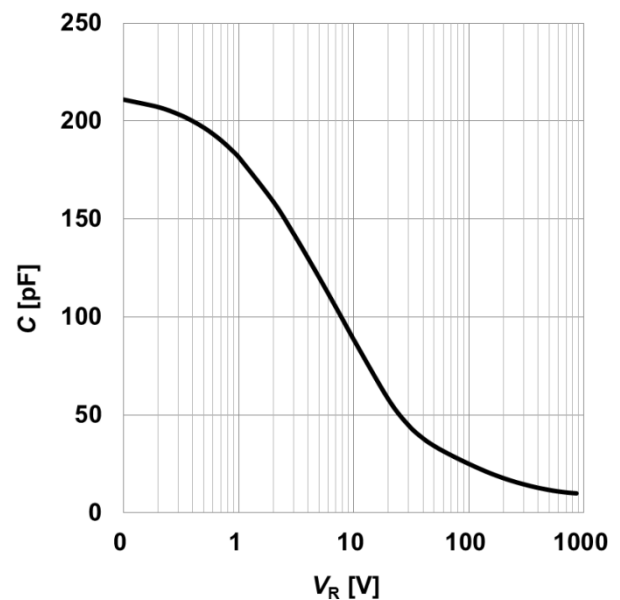


Figure 8. **Typical capacitance as function of reverse voltage**,  $C=f(V_R)$ ;  $T_J=25^{\circ}\text{C}$ ;  $f=1\text{ MHz}$

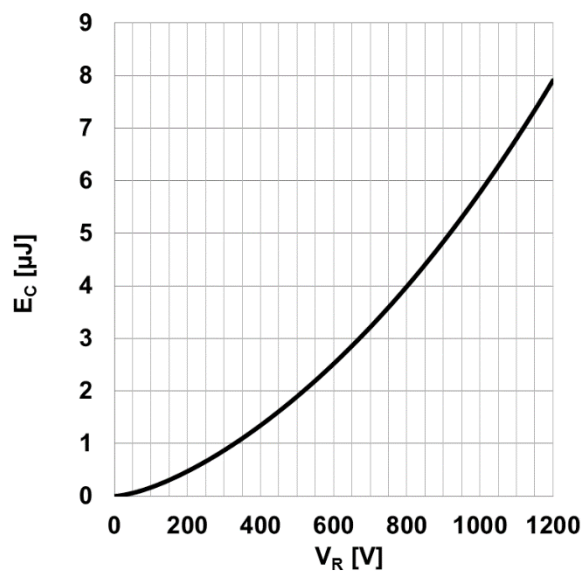
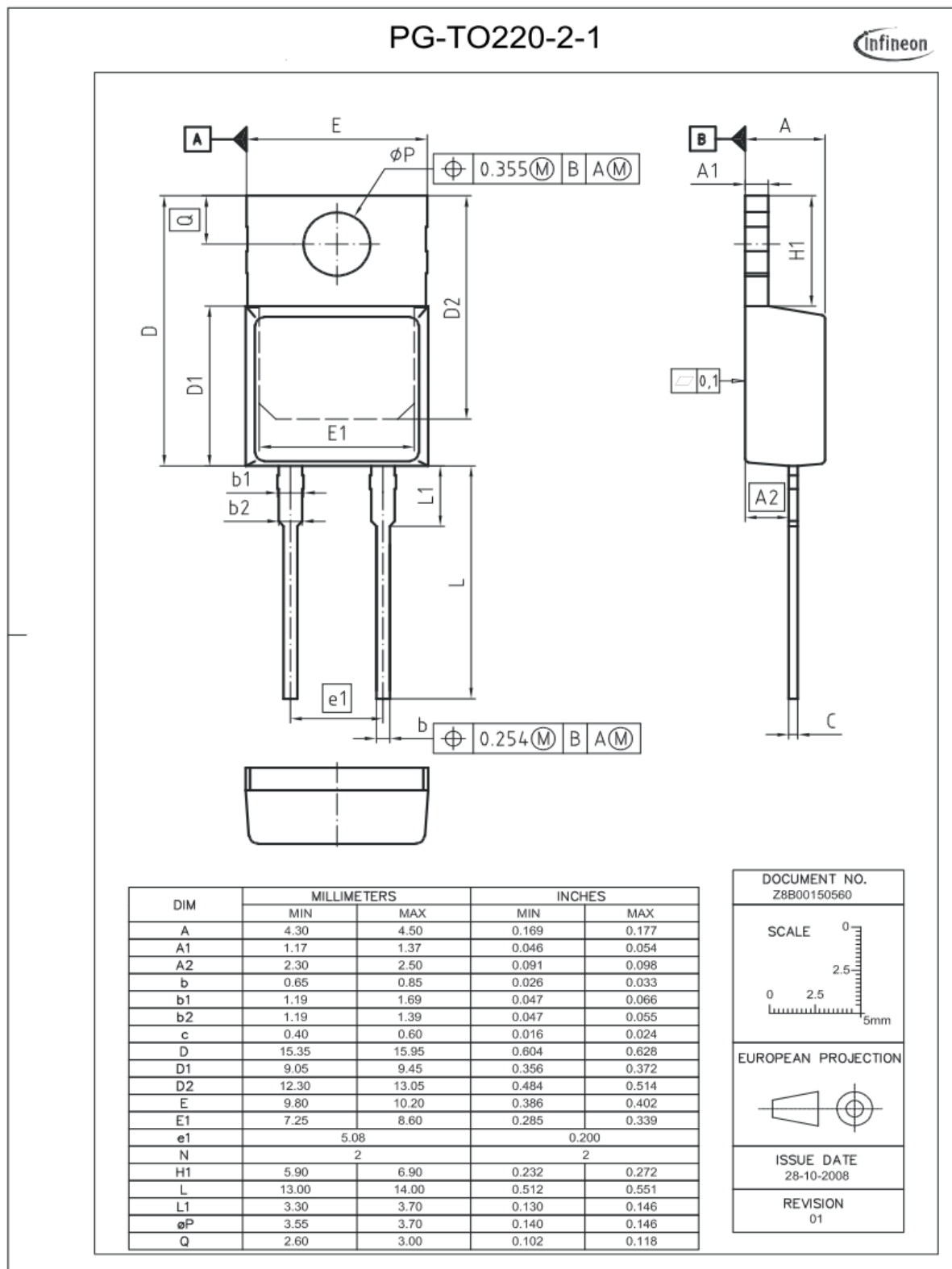


Figure 9. **Typical capacitively stored energy as function of reverse voltage,**

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



**Revision History**

IDH02G120C5

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

Previous Revision:

Revision	Date	Subjects (major changes since last version)
2.0	2015-07-22	Final data sheet
2.1	2017-07-21	Editorial change
2.2	2021-03-01	Increased $dv/dt$ ruggedness

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