

Diode

Silicon Carbide Schottky Diode

IDH05G120C5

5th Generation thinQ!TM 1200 V SiC Schottky Diode

Final Datasheet

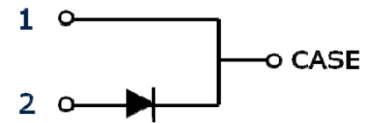
Rev. 2.0 2015-08-28

Industrial Power Control

thinQ!™ 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 JEDEC¹⁾ 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



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 _{DC}	I _F	Q _C	T _{j,max}	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 ² 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.	
Characteristic						
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.	
Static Characteristic						
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	μA
		$V_R = 1200\text{V}, T_j = 150^\circ\text{C}$		12	175	

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

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Dynamic Characteristics						
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	-	

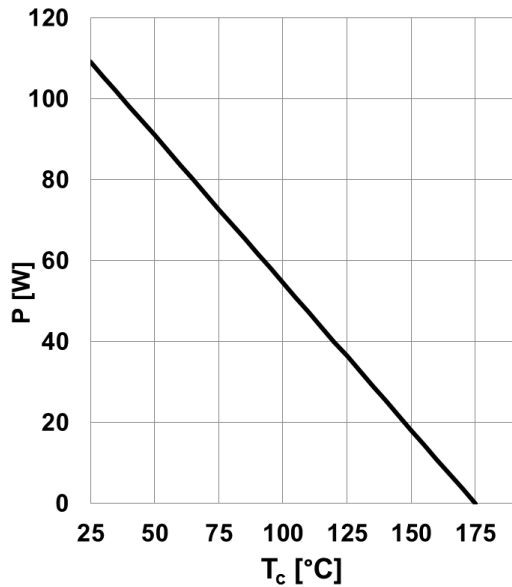


Figure 1. Power dissipation as a function of case temperature, $P_{tot}=f(T_c)$, $R_{th(j-c),max}$

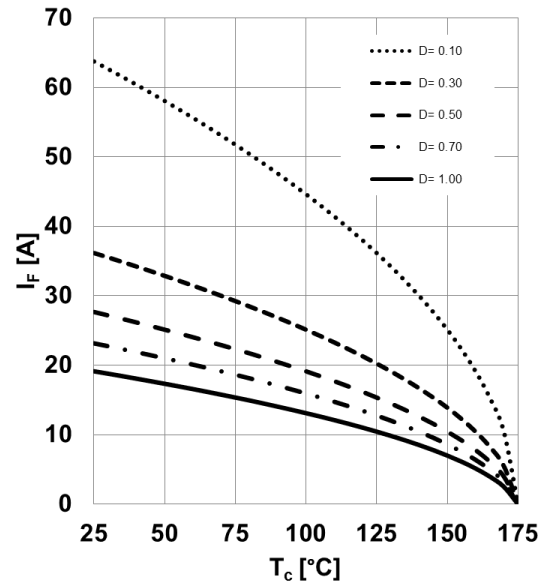


Figure 2. Diode forward current as function of temperature, $T_j \leq 175^\circ\text{C}$, $R_{th(j-c),max}$, parameter D =duty cycle, V_{th} , R_{diff} @ $T_j=175^\circ\text{C}$

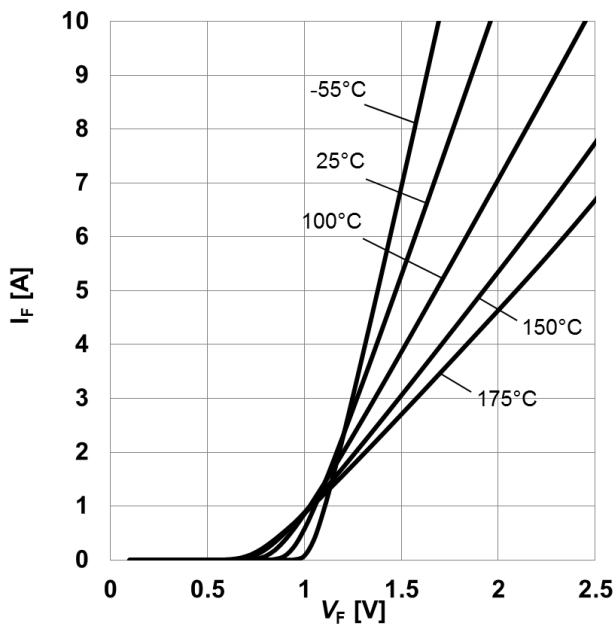


Figure 3. Typical forward characteristics, $I_F=f(V_F)$, $t_p=10\ \mu\text{s}$, parameter: T_j

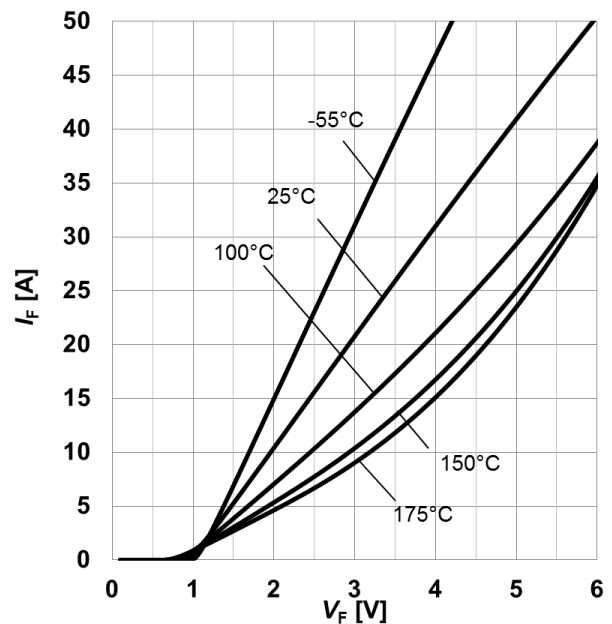


Figure 4. Typical forward characteristics in surge current, $I_F=f(V_F)$, $t_p=10\ \mu\text{s}$, parameter: T_j

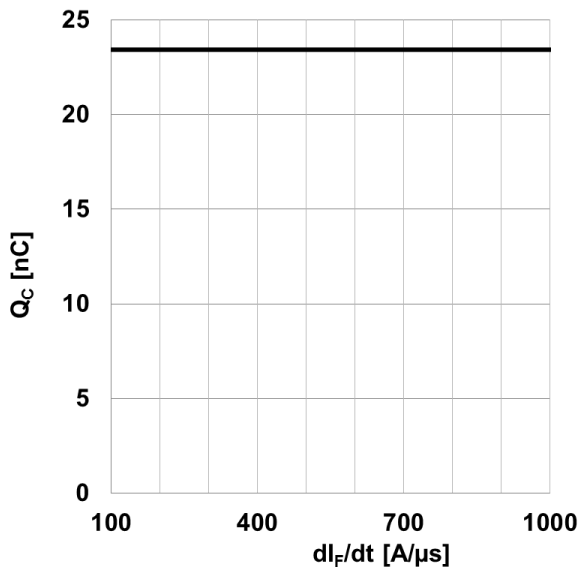


Figure 5. **Typical capacitive charge as function of current slope**¹, $Q_C=f(di_F/dt)$, $T_j=150^\circ\text{C}$
 1) Only capacitive charge, guaranteed by design.

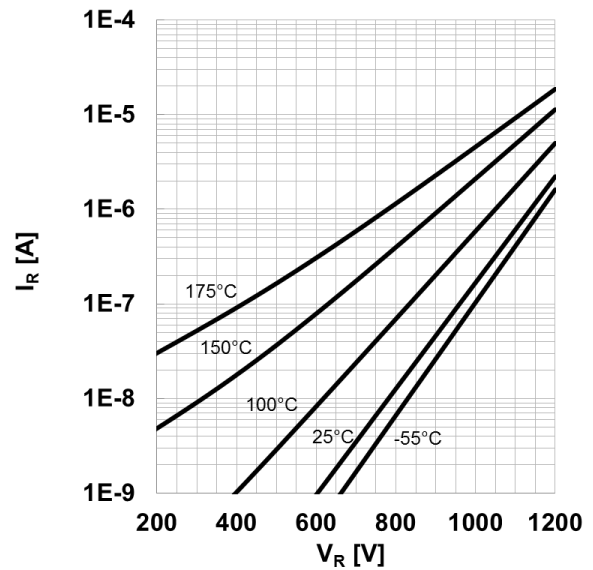


Figure 6. **Typical reverse current as function of reverse voltage**, $I_R=f(V_R)$, parameter: T_j

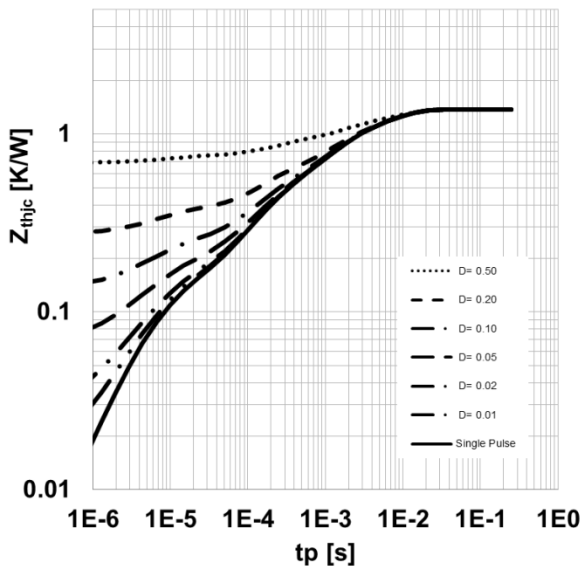


Figure 7. **Max. transient thermal impedance**, $Z_{th,jc}=f(t_p)$, parameter: $D=t_p/T$

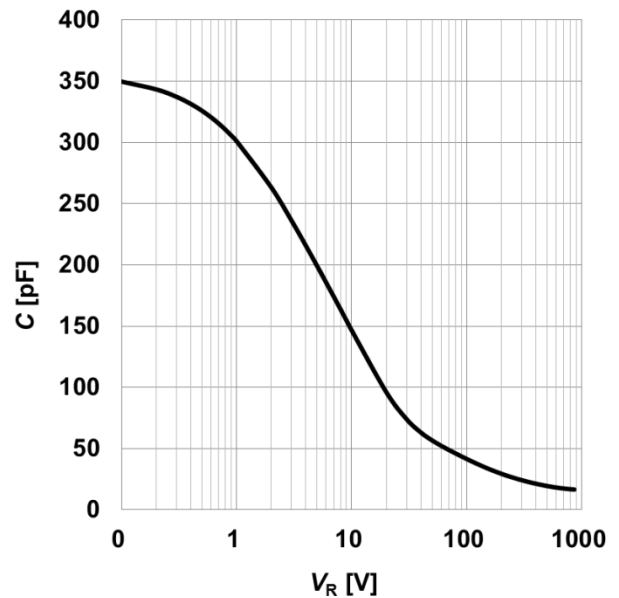


Figure 8. **Typical capacitance as function of reverse voltage**, $C=f(V_R)$; $T_j=25^\circ\text{C}$; $f=1\text{ MHz}$

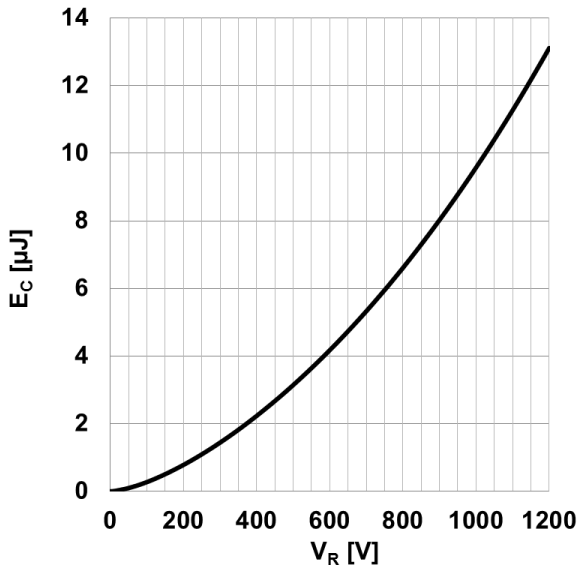
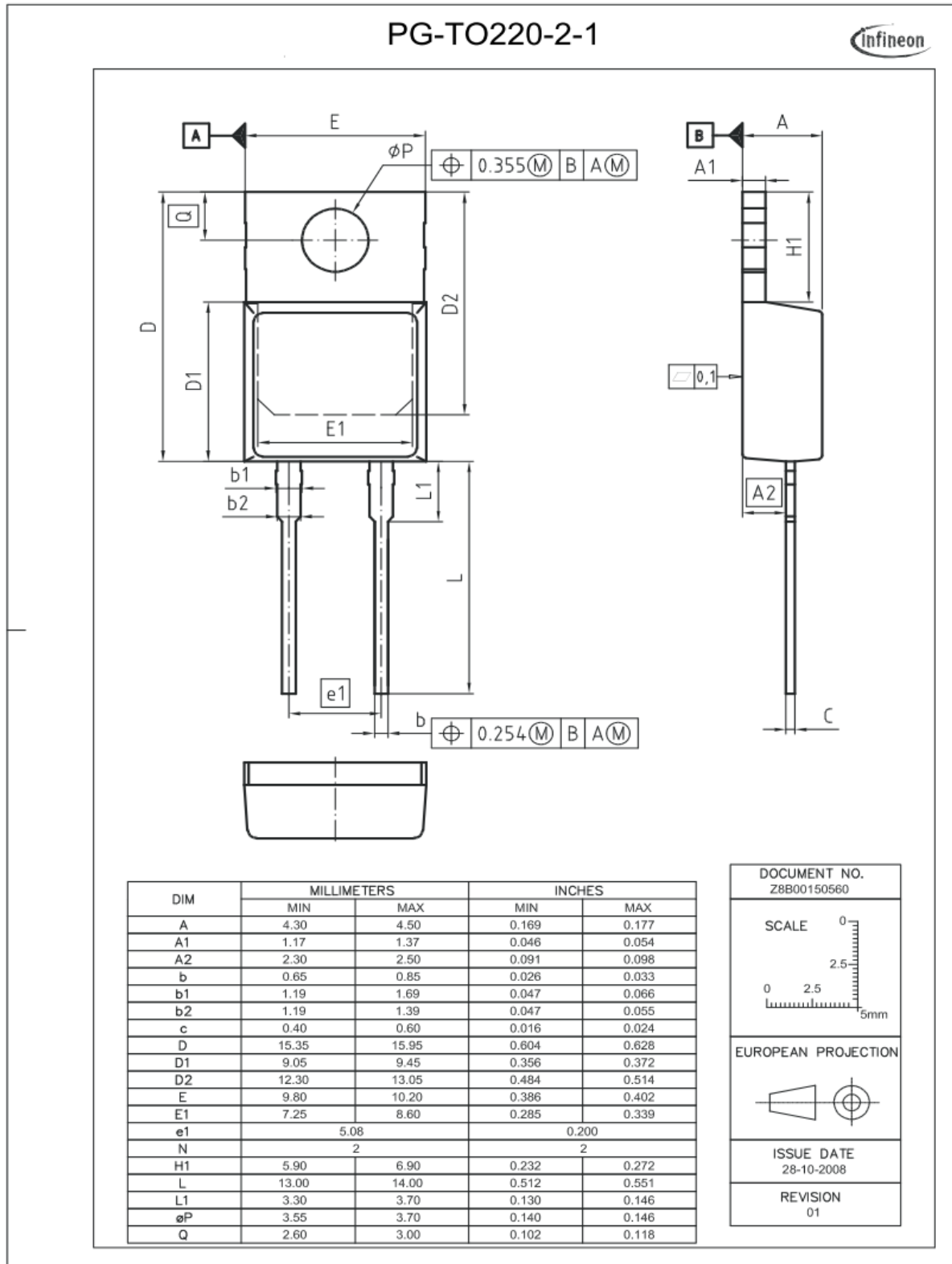


Figure 9. Typical capacitively stored energy as function of reverse voltage,

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



Revision History

IDH05G120C5

Revision: 2015-08-28, Rev. 2.0

Previous Revision:

Revision	Date	Subjects (major changes since last version)
2.0	-	Final data sheet

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