

# Diode

Silicon Carbide Schottky Diode

## IDM05G120C5

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

### Final Datasheet

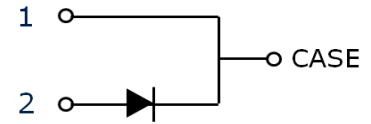
Rev. 2.0 2015-08-28

Industrial Power Control

## 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
- System cost / size savings due to reduced cooling requirements
- Enabling higher frequency / increased power density solutions
- Higher system reliability due to lower operating temperatures
- Reduced EMI
- Related Links: [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
IDM05G120C5	1200V	5A	24nC	175°C	D0512C5	PG-TO252-2

1) J-STD20 and JEDEC22

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**Maximum ratings**

Parameter	Symbol	Value	Unit
Repetitive peak reverse voltage	$V_{RRM}$	1200	V
Continuous forward current for $R_{th(j-c,max)}$ $T_C = 164^\circ\text{C}$ , $D=1$ $T_C = 135^\circ\text{C}$ , $D=1$ $T_C = 25^\circ\text{C}$ , $D=1$	$I_F$	5 10.8 22.2	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	
Non-repetitive peak forward current $T_C = 25^\circ\text{C}$ , $t_p=10 \mu\text{s}$	$I_{F,max}$	472	
$i^2t$ 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 $T_C = 25^\circ\text{C}$	$P_{tot}$	144	W
Operating temperature	$T_j$	-55...175	°C
Storage temperature	$T_{stg}$	-55...150	
Soldering temperature, Wave- and reflowsoldering allowed (reflow MSL1)	$T_{sold}$	260	

**Thermal Resistances**

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
<b>Characteristic</b>						
Diode thermal resistance, junction – case	$R_{th(j-c)}$		-	0.8	1.04	K/W
Thermal resistance, junction – ambient	$R_{th(j-a)}$	SMD version, device on PCB, minimal footprint	-	-	62	
		SMD version, device on PCB, 6 cm <sup>2</sup> cooling area <sup>2)</sup>		35		

<sup>2)</sup> Device on 40 mm\*40mm\*1.5 epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70μm thick) copper for cathode connection. PCB is vertical without air stream cooling.

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

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
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> = 5 A, T <sub>j</sub> = 25°C	-	1.50	1.8	V
		I <sub>F</sub> = 5 A, T <sub>j</sub> = 150°C	-	1.95	2.6	
Reverse current	I <sub>R</sub>	V <sub>R</sub> = 1200 V, T <sub>j</sub> = 25°C		2.5	33	μA
		V <sub>R</sub> = 1200 V, T <sub>j</sub> = 150°C		12	175	

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

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Total capacitive charge	Q <sub>C</sub>	V <sub>R</sub> = 800 V, T <sub>j</sub> = 150°C $Q_C = \int_0^{V_R} C(V) dV$	-	24	-	nC
Total Capacitance	C	V <sub>R</sub> = 1 V, f = 1 MHz	-	301	-	pF
		V <sub>R</sub> = 400 V, f = 1 MHz	-	21	-	
		V <sub>R</sub> = 800 V, f = 1 MHz	-	17	-	

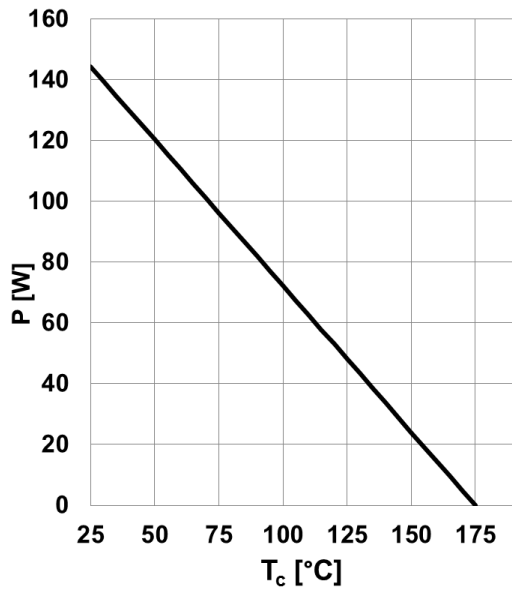


Figure 1. Power dissipation as a function of case temperature,  $P_{tot}=f(T_C)$ ,  $R_{th(j-c),max}$

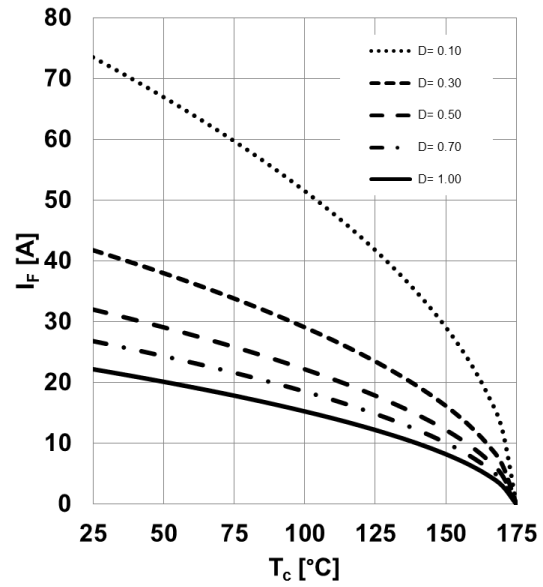


Figure 2. Diode forward current as function of temperature,  $T_j \leq 175^\circ\text{C}$ ,  $R_{th(j-c),max}$ , parameter  $D$ =duty cycle,  $V_{th}$ ,  $R_{diff}$  @  $T_j=175^\circ\text{C}$

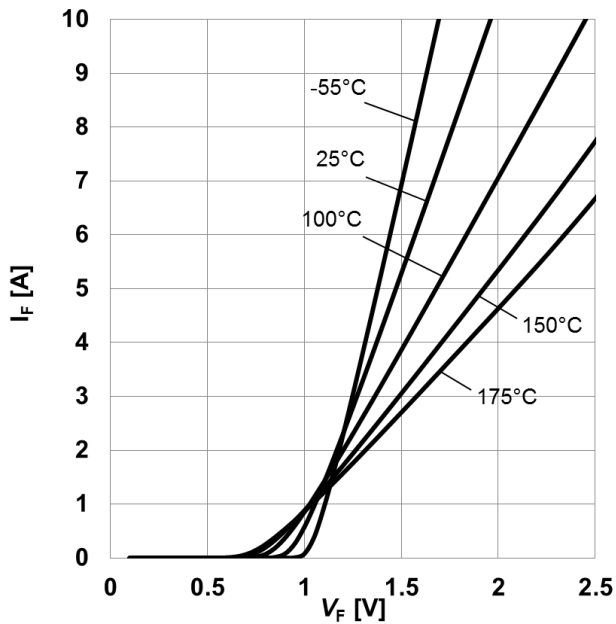


Figure 3. Typical forward characteristics,  $I_F=f(V_F)$ ,  $t_p=10 \mu\text{s}$ , parameter:  $T_j$

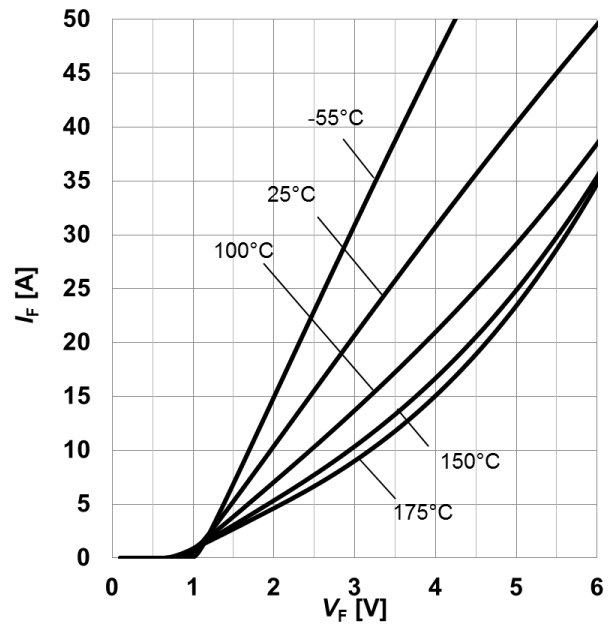


Figure 4. Typical forward characteristics in surge current,  $I_F=f(V_F)$ ,  $t_p=10 \mu\text{s}$ , parameter:  $T_j$

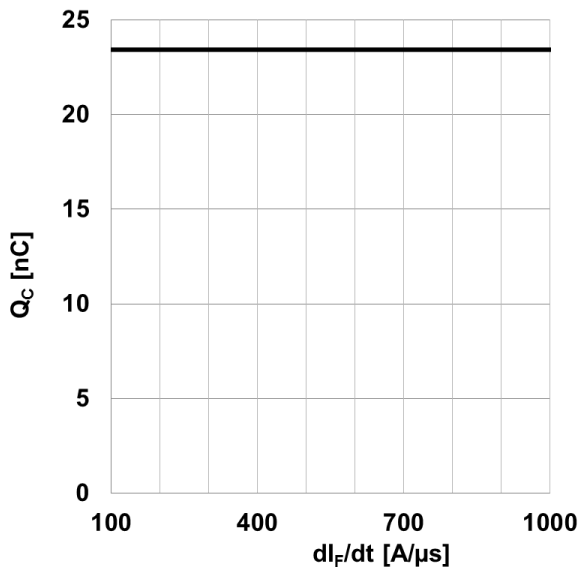


Figure 5. **Typical capacitance charge as function of current slope**<sup>1</sup>,  $Q_C=f(di_F/dt)$ ,  $T_j=150^\circ\text{C}$   
 1) Only capacitive charge, guaranteed by design.

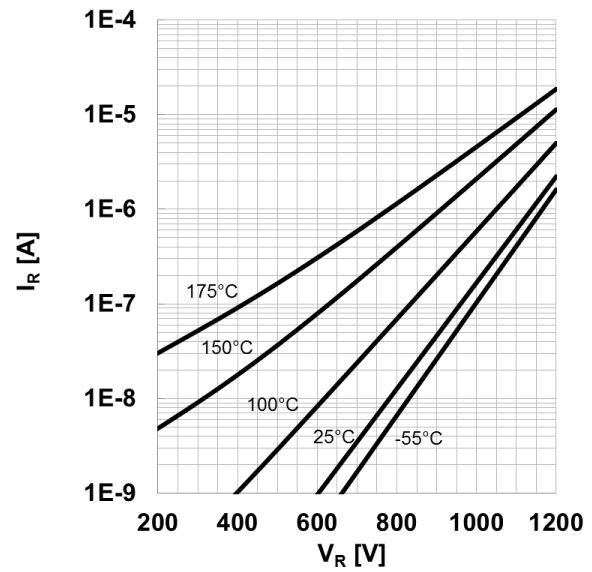


Figure 6. **Typical reverse current as function of reverse voltage**,  $I_R=f(V_R)$ , parameter:  $T_j$

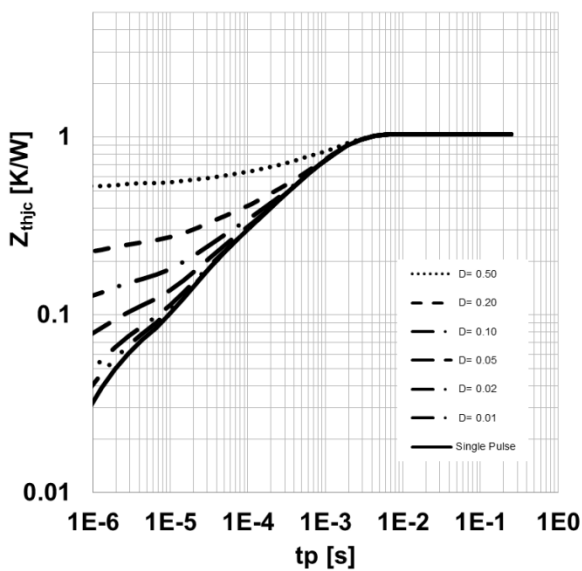


Figure 7. **Max. transient thermal impedance**,  $Z_{th,jc}=f(t_p)$ , parameter:  $D=t_p/T$

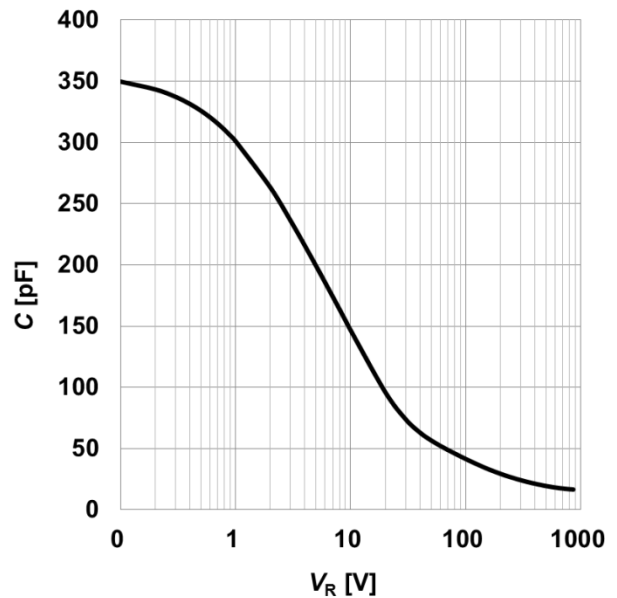


Figure 8. **Typical capacitance as function of reverse voltage**,  $C=f(V_R)$ ;  $T_j=25^\circ\text{C}$ ;  $f=1\text{ MHz}$

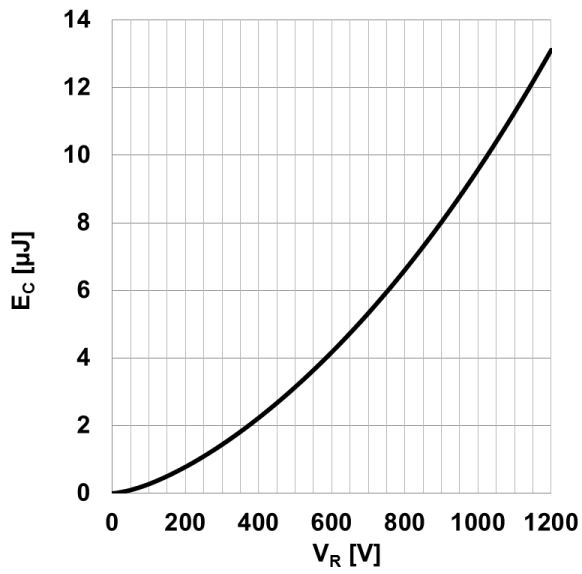
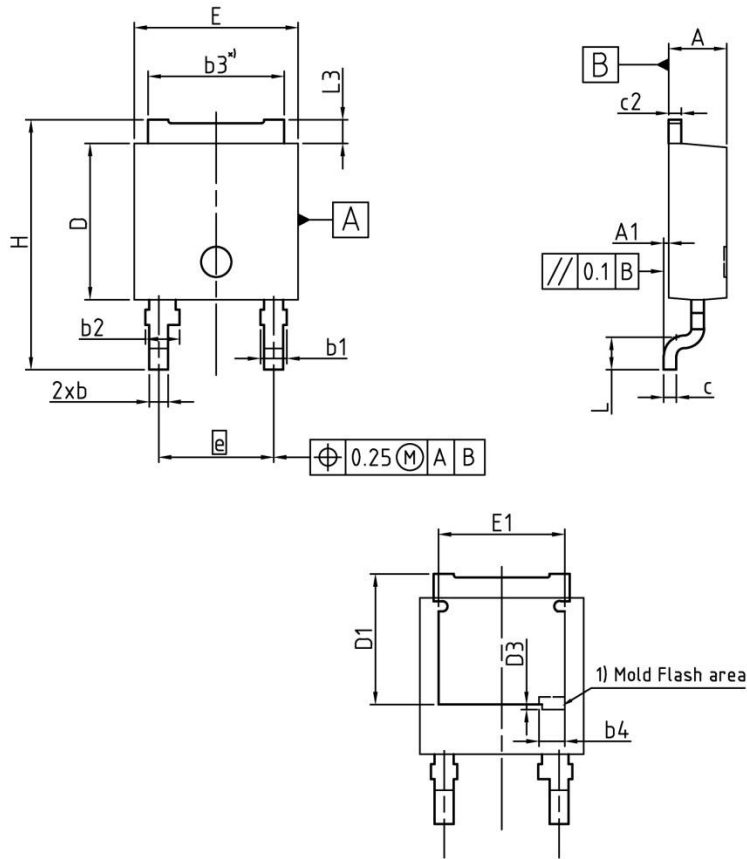


Figure 9. Typical capacitance stored energy as function of reverse voltage,

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



PG-TO252-2



\*) mold flash not included

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.20	2.35	0.087	0.093
A1	0.00	0.15	0.000	0.006
b	0.65	0.85	0.026	0.033
b1	-	1.15	-	0.045
b2	1.05	1.45	0.041	0.057
b3	5.30	5.50	0.209	0.217
b4	1.02		0.040	
c	0.46	0.58	0.018	0.023
c2	0.46	0.58	0.018	0.023
D	6.02	6.22	0.237	0.245
D1	5.04	5.44	0.198	0.214
E	6.45	6.65	0.254	0.262
E1	5.00		0.197	
e	4.57 (BSC)		0.180 (BSC)	
N	2		2	
H	9.40	10.40	0.370	0.409
L	1.19	1.39	0.047	0.055
D3	0.20		0.008	
L3	0.90	1.10	0.035	0.043

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Revision	Date	Subjects (major changes since last version)
2.0	28.08.2015	Final data sheet

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