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Diode

Silicon Carbide Schottky Diode

IDM05G120C5

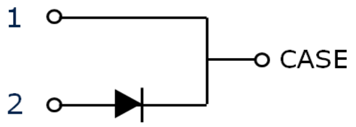
5th Generation thinQ!™ 1200 V SiC Schottky Diode

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[1)] 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

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
IDM05G120C5	1200V	5A	24nC	175°C	D0512C5	PG-TO252-2

1) J-STD20 and JESD22

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Maximum ratings

Parameter	Symbol	Value	Unit
Repetitive peak reverse voltage	V_{RRM}	1200	V
Continoues forward current for $R_{th(j\text{-}c,max)}$ T_C = 164°C, D=1 T_C = 135°C, D=1 T_C = 25°C, D=1	I_F	5 10.8 22.2	A
Surge non-repetitive forward current, sine halfwave T_C=25°C, t_p=10ms T_C=150°C, t_p=10ms	$I_{F,SM}$	59 50	
Non-repetitive peak forward current T_C = 25°C, t_p=10 µs	$I_{F,max}$	472	
i^2t value T_C = 25°C, t_p=10 ms T_C = 150°C, t_p=10 ms	$\int i^2dt$	17.4 12.5	A^2s
Diode dv/dt ruggedness V_R=0...960 V	dv/dt	80	V/ns
Power dissipation T_C = 25°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.	
Characteristic						
Diode thermal resistance, junction – case	$R_{th(j\text{-}c)}$		-	0.8	1.04	K/W
Thermal resistance, junction – ambient	$R_{th(j\text{-}a)}$	SMD version, device on PCB, minimal footprint	-	-	62	
		SMD version, device on PCB, 6 cm^2 cooling area[2)]		35		

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

Electrical Characteristics

Static Characteristic, at Tj=25°C, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
DC blocking voltage	V_{DC}	T_j = 25°C	1200	-	-	V
Diode forward voltage	V_F	I_F= 5 A, T_j=25°C I_F= 5 A, T_j=150°C	- -	1.50 1.95	1.8 2.6	V
Reverse current	I_R	V_R=1200 V, T_j=25°C V_R=1200 V, T_j=150°C		2.5 12	33 175	µA

Dynamic Characteristics, at T_j=25°C, unless otherwise specified

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

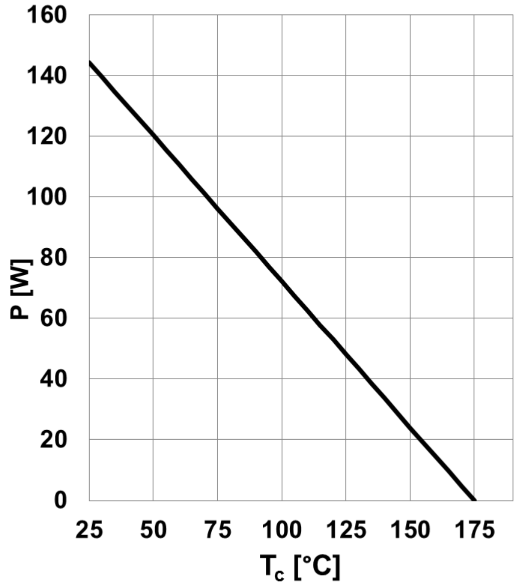


Figure 1. **Power dissipation as a function of case temperature,** P_{tot}=f(T_C), $R_{th(j-c),max}$

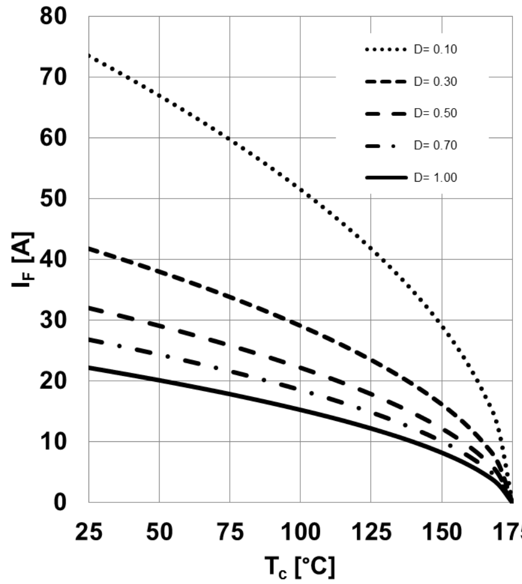


Figure 2. **Diode forward current as function of temperature,** T_j≤175°C, $R_{th(j-c),max}$, parameter D=duty cycle, V_{th}, *Rdiff* @ T_j=175°C

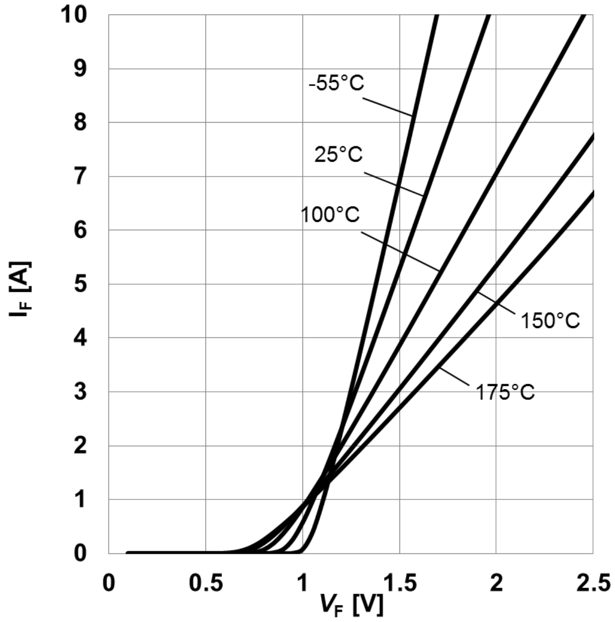


Figure 3. **Typical forward characteristics,** I_F=f(V_F), t_p= 10 µs, parameter: T_j

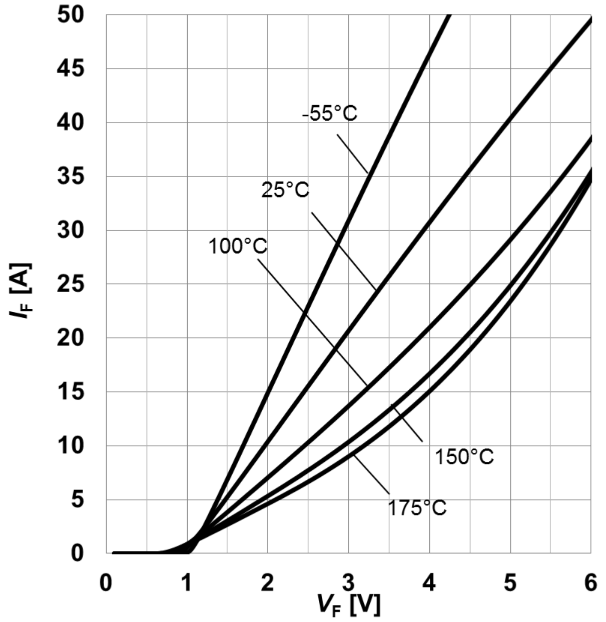


Figure 4. **Typical forward characteristics in surge current,** I_F=f(V_F), t_p= 10 µs, parameter: T_j

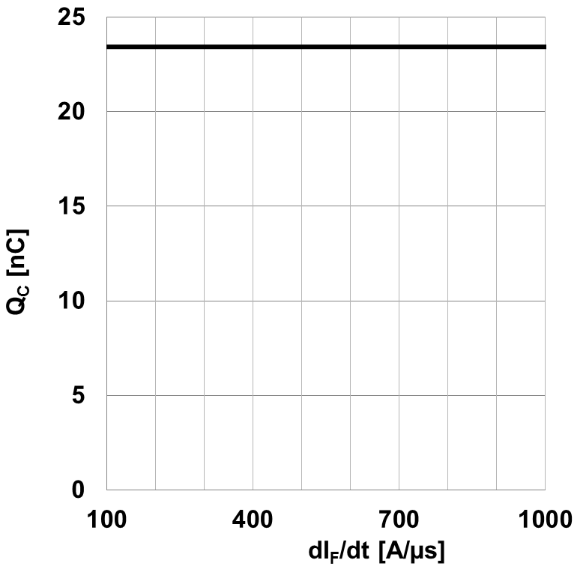


Figure 5. **Typical capacitance charge as function of current slope[1]**, Q_C=f(dI_F/dt), T_j=150°C

1) Only capacitive charge, guaranteed by design.

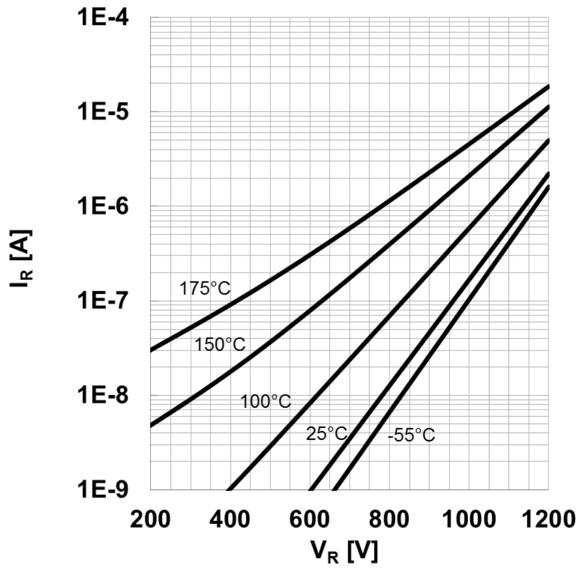


Figure 6. **Typical reverse current as function of reverse voltage,** I_R=f(V_R), parameter: T_j

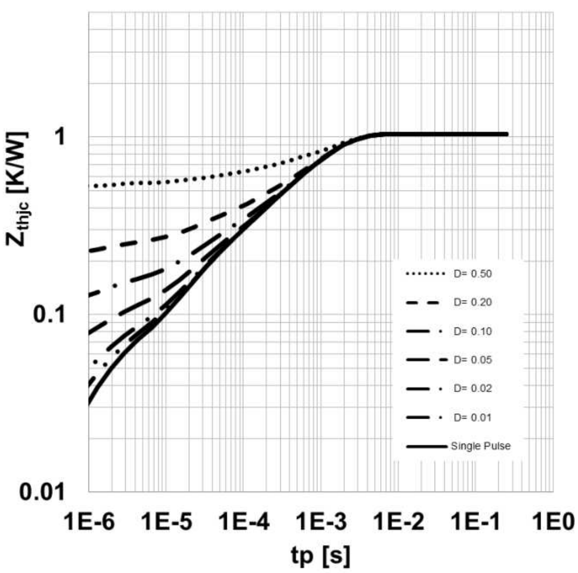


Figure 7. **Max. transient thermal impedance,** $Z_{th,jc}$=f(t_P), parameter: D=t_P/T

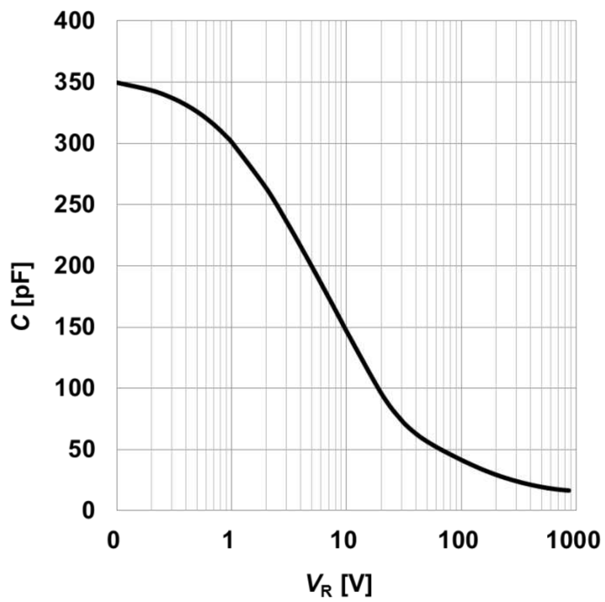


Figure 8. **Typical capacitance as function of reverse voltage,** C=f(V_R); T_j=25°C; f=1 MHz

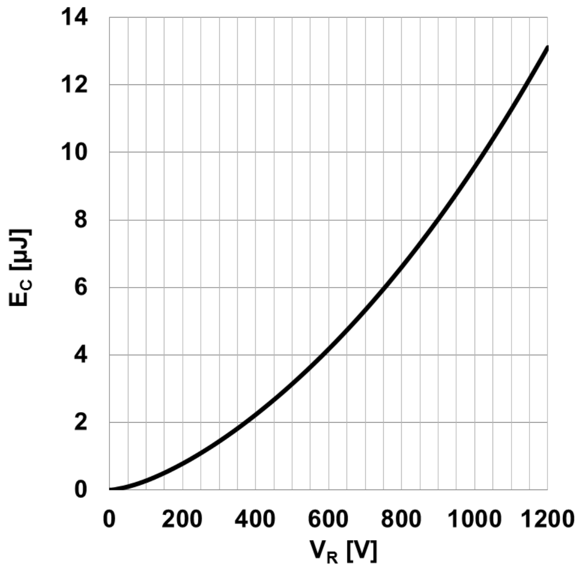
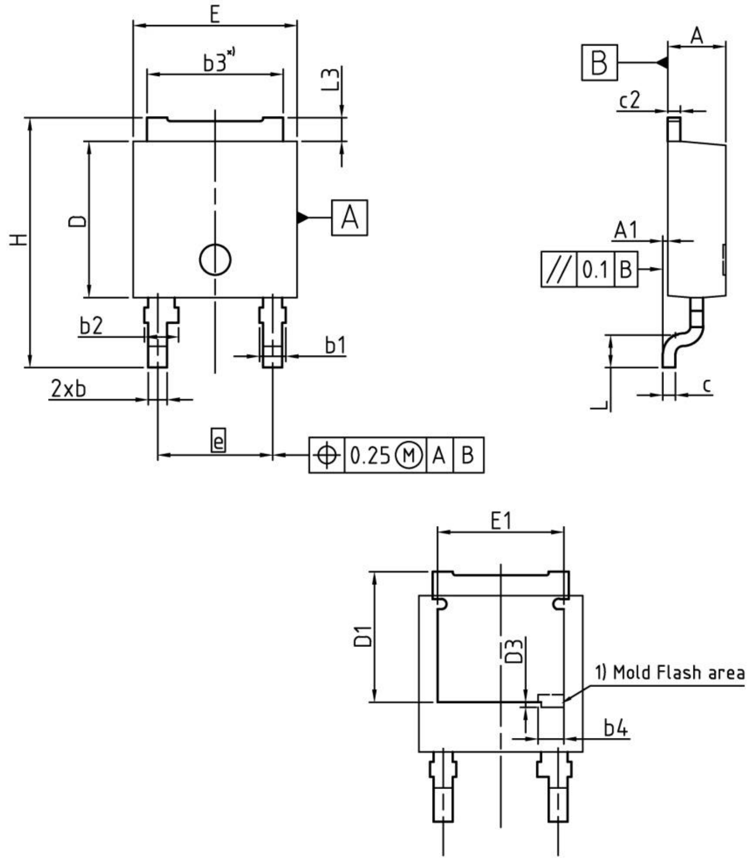


Figure 9. **Typical capacitance stored energy as function of reverse voltage,**

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

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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ISSUE DATE 29-05-2014
REVISION 01

Revision History

IDM05G120C5

Revision: 2015-08-28, Rev. 2.0

Previous Revision:

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

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