

# Diode

Silicon Carbide Schottky Diode

## IDM02G120C5

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

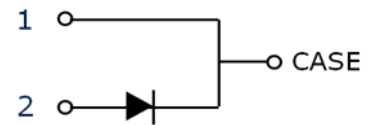
### Final Data Sheet

Rev. 2.1, 2021-06-09

## 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
IDM02G120C5	1200V	2A	14nC	175°C	D0212C5	PG-TO252-2

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 .....	5
Package Drawings .....	9
Revision History .....	10
Disclaimer.....	10

**Maximum ratings**

Parameter	Symbol	Value	Unit
Repetitive peak reverse voltage	$V_{RRM}$	1200	V
Continuous forward current for $R_{th(j-c,max)}$ $T_C = 170^\circ\text{C}$ , $D=1$ $T_C = 135^\circ\text{C}$ , $D=1$ $T_C = 25^\circ\text{C}$ , $D=1$	$I_F$	2 7 14	A
Surge non-repetitive forward current, sine halfwave $T_C=25^\circ\text{C}$ , $t_p=10\text{ms}$ $T_C=150^\circ\text{C}$ , $t_p=10\text{ms}$	$I_{F,SM}$	37 31	
Non-repetitive peak forward current $T_C = 25^\circ\text{C}$ , $t_p=10 \mu\text{s}$	$I_{F,max}$	344	
$i^2t$ value $T_C = 25^\circ\text{C}$ , $t_p=10 \text{ms}$ $T_C = 150^\circ\text{C}$ , $t_p=10 \text{ms}$	$\int i^2 dt$	7.0 4.9	A <sup>2</sup> s
Diode $dv/dt$ ruggedness $V_R=0\dots960 \text{V}$	$dv/dt$	150	V/ns
Power dissipation $T_C = 25^\circ\text{C}$	$P_{tot}$	98	W
Operating and storage temperature	$T_j; T_{stg}$	-55...175	°C
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	$R_{th(j-c)}$		-	1.2	1.5	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, at T<sub>j</sub>=25°C, unless otherwise specified**

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
<b>Static Characteristic</b>						
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> = 2 A, T <sub>j</sub> =25°C	-	1.4	1.65	V
		I <sub>F</sub> = 2 A, T <sub>j</sub> =150°C	-	1.7	2.30	
Reverse current	I <sub>R</sub>	V <sub>R</sub> =1200 V, T <sub>j</sub> =25°C		1.2	18	μA
		V <sub>R</sub> =1200 V, T <sub>j</sub> =150°C		6	90	

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

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
<b>Dynamic Characteristics</b>						
Total capacitive charge	Q <sub>C</sub>	V <sub>R</sub> = 800 V, T <sub>j</sub> =150°C $Q_C = \int_0^{V_R} C(V) dV$	-	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	-	

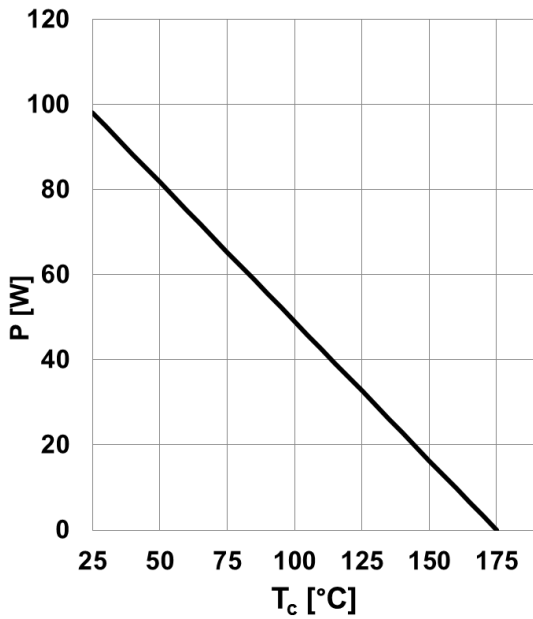


Figure 1. Power dissipation as a function of case temperature,  $P_{tot}=f(T_c)$ ,  $R_{th(j-c),max}$

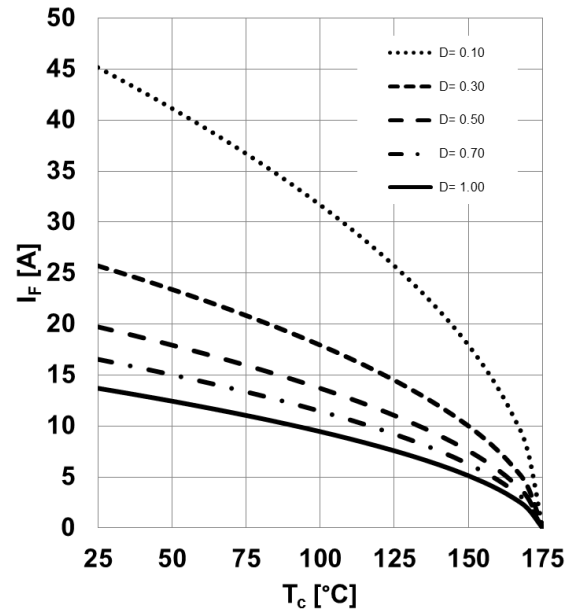


Figure 2. Diode forward current as function of temperature,  $T_j \leq 175^\circ\text{C}$ ,  $R_{th(j-c),max}$ , parameter  $D$ =duty cycle,  $V_{th}$ ,  $R_{diff}$  @  $T_j=175^\circ\text{C}$

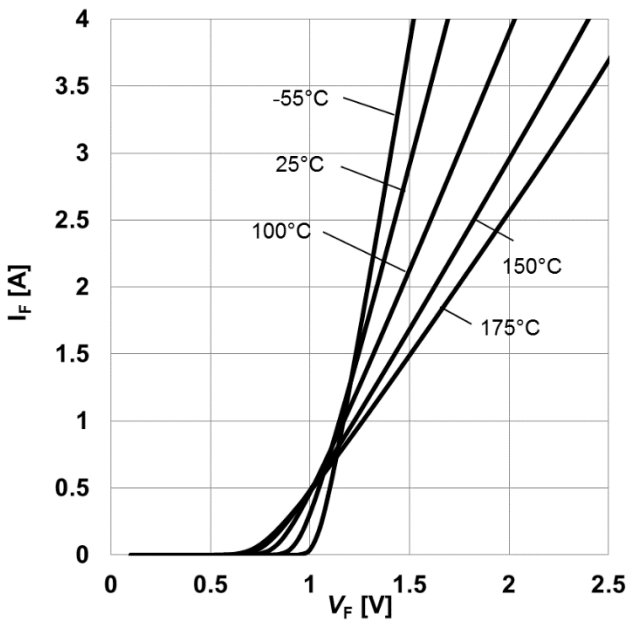


Figure 3. Typical forward characteristics,  $I_F=f(V_F)$ ,  $t_p=10\ \mu\text{s}$ , parameter:  $T_j$

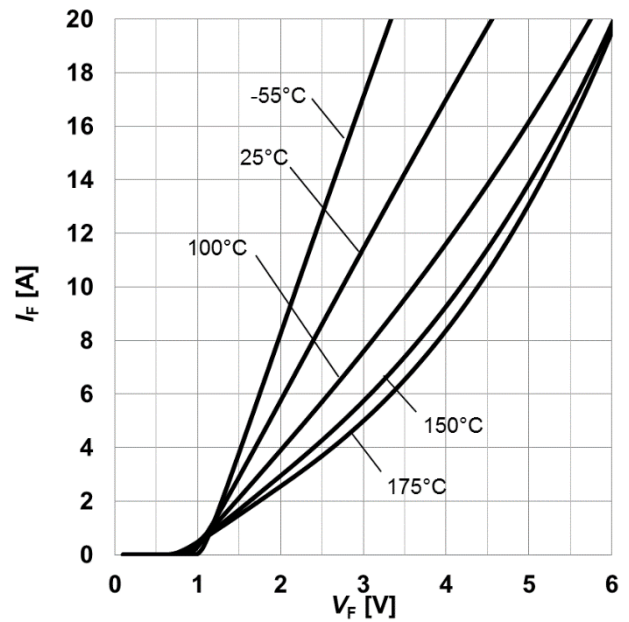


Figure 4. Typical forward characteristics in surge current,  $I_F=f(V_F)$ ,  $t_p=10\ \mu\text{s}$ , parameter:  $T_j$

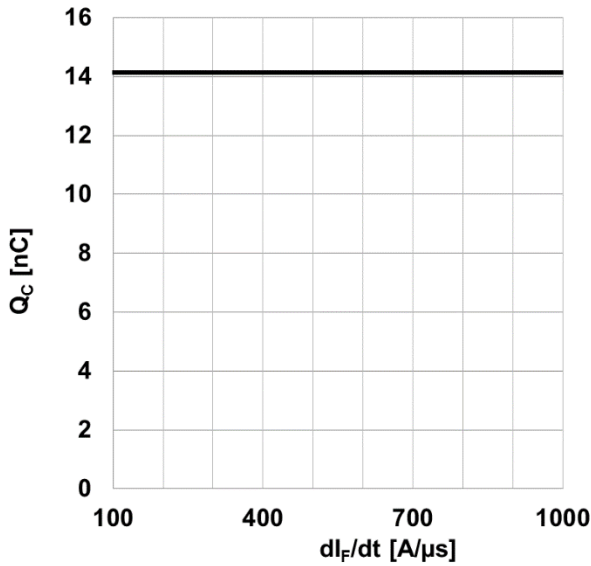


Figure 5. Typical capacitance charge as function of current slope<sup>1</sup>,  $Q_C=f(di_F/dt)$ ,  $T_j=150^\circ\text{C}$   
 1) Only capacitive charge, guaranteed by design.

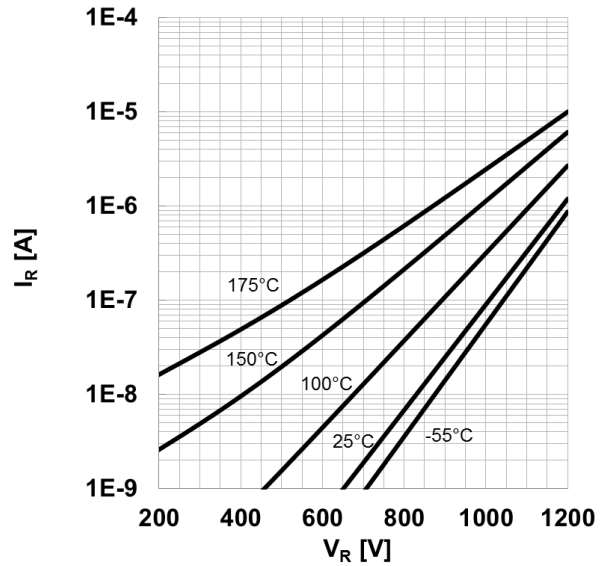


Figure 6. Typical reverse current as function of reverse voltage,  $I_R=f(V_R)$ , parameter:  $T_j$

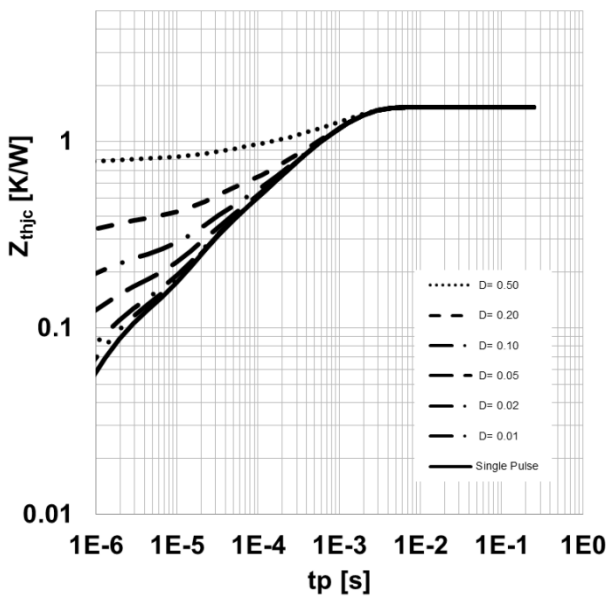


Figure 7. Max. transient thermal impedance,  $Z_{th,jc}=f(t_p)$ , parameter:  $D=t_p/T$

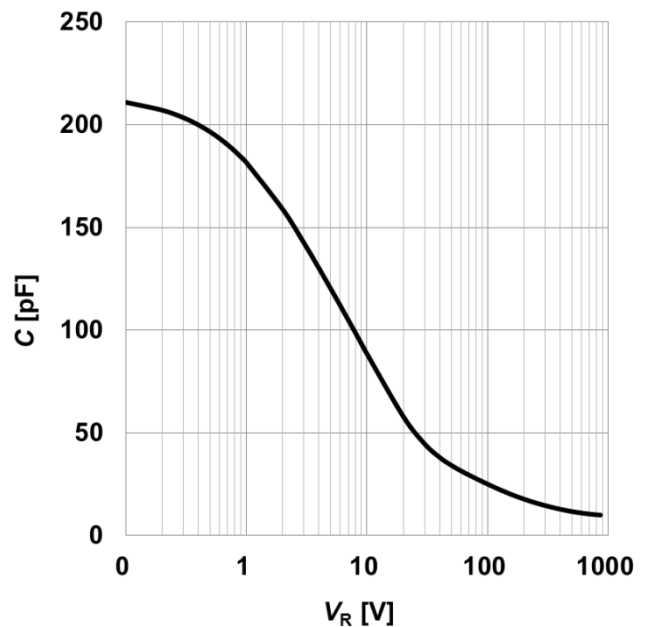


Figure 8. Typical capacitance as function of reverse voltage,  $C=f(V_R)$ ;  $T_j=25^\circ\text{C}$ ;  $f=1\text{ MHz}$

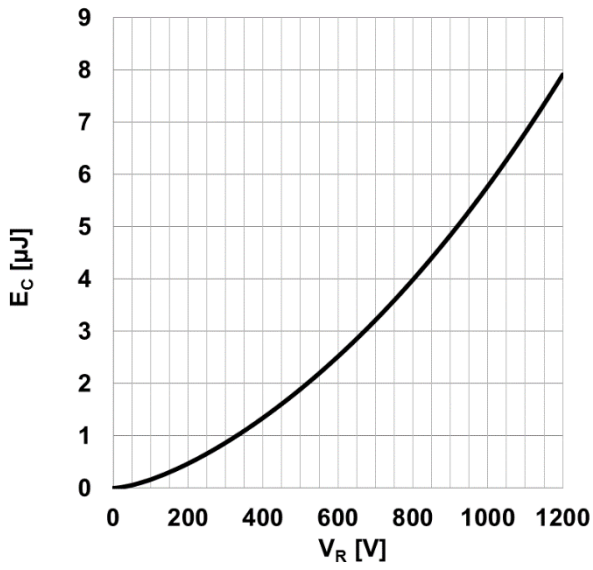
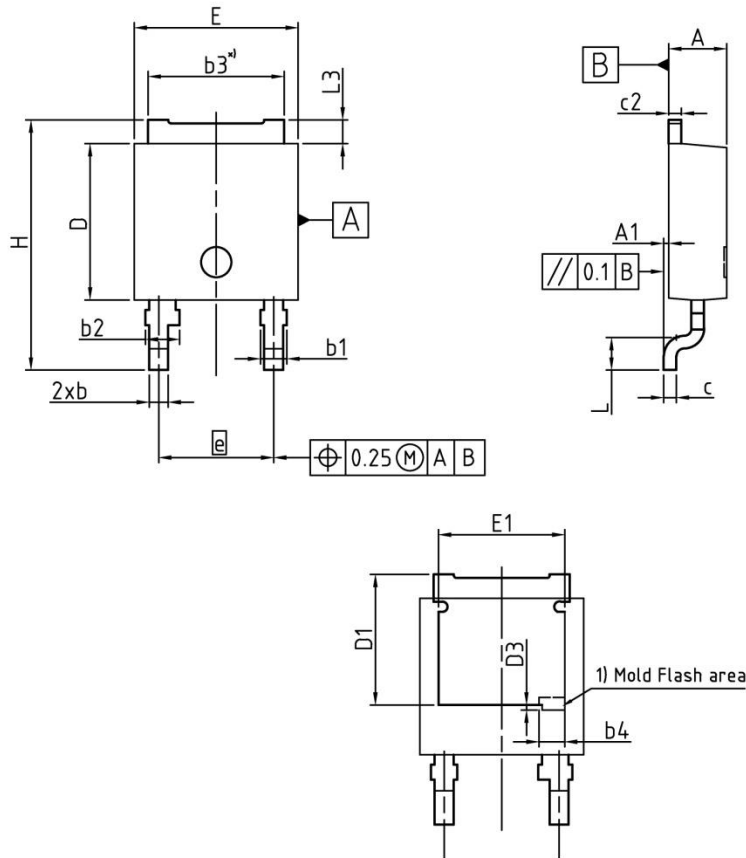


Figure 9. Typical capacitance stored energy as function of reverse voltage,

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



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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Previous Revision:

Revision	Date	Subjects (major changes since last version)
2.0	2015-06-22	Final data sheet
2.1	2021-06-09	Increased $dv/dt$ ruggedness

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