3rd Generation thinQ!™ SiC Schottky Diode

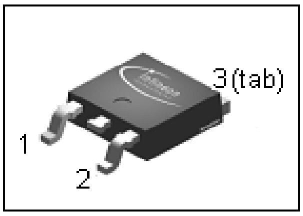
Features

- Revolutionary semiconductor material - Silicon Carbide
- Switching behavior benchmark
- No reverse recovery / No forward recovery
- Temperature independent switching behavior
- High surge current capability
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC[1)] for target applications
- Breakdown voltage tested at 20mA[2)]
- Optimized for high temperature operation
- Lowest Figure of Merit Q_C/I_F

Product Summary

V_{DC}	600	V
Q_C	19	nC
I_F; T_C< 130 °C	12	A

PG-TO252-3



thinQ! 3G Diode designed for fast switching applications like:

- SMPS e.g.; CCM PFC
- Motor Drives; Solar Applications; UPS

RoHS

HAL

Type	Package	Marking	Pin 1	Pin 2	Pin 3
IDD12SG60C	PG-TO252-3	D12G60C	n.c.	A	C

Maximum ratings

Parameter	Symbol	Conditions	Value	Unit
Continuous forward current	I_F	T_C<130 °C	12	A
Surge non-repetitive forward current, sine halfwave	$I_{F,SM}$	T_C=25 °C, t_p=10 ms	59	
		T_C=150 °C, t_p=10 ms	51	
Non-repetitive peak forward current	$I_{F,max}$	T_C=25 °C, t_p=10 µs	430	
i^2t value	$\int i^2dt$	T_C=25 °C, t_p=10 ms	17	A^2s
		T_C=150 °C, t_p=10 ms	12	
Repetitive peak reverse voltage	V_{RRM}	T_j=25 °C	600	V
Diode dv/dt ruggedness	dv/dt	V_R= 0….480 V	50	V/ns
Power dissipation	P_{tot}	T_C=25 °C	125	W
Operating and storage temperature	T_j, T_{stg}		-55 ... 175	°C
Soldering temperature, reflow soldering (max)	T_{sold}	reflow MSL1	260	

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal characteristics						
Thermal resistance, junction - case	R_{thJC}		-	-	1.2	K/W
Thermal resistance, junction - ambient	R_{thJA}	SMD version, device on PCB, minimal footprint	-	-	75	
		SMD version, device on PCB, 6 cm^2 cooling area[5]	-	50	-	

Electrical characteristics, at T_j=25 °C, unless otherwise specified

Parameter	Symbol	Conditions	min.	typ.	max.	Unit
Static characteristics						
DC blocking voltage	V_{DC}	I_R=0.05 mA, T_j=25 °C	600	-	-	V
Diode forward voltage	V_F	I_F=12 A, T_j=25 °C	-	1.8	2.1	
		I_F=12 A, T_j=150 °C	-	2.2	-	
Reverse current	I_R	V_R=600 V, T_j=25 °C	-	1	100	μA
		V_R=600 V, T_j=150 °C	-	4	1000	
AC characteristics						
Total capacitive charge	Q_c	V_R=400 V, $I_F \leq I_{F,max}$, di_F/dt=200 A/μs, T_j=150 °C	-	19	-	nC
Switching time[3]	t_c		-	-	<10	ns
Total capacitance	C	V_R=1 V, f=1 MHz	-	310	-	pF
		V_R=300 V, f=1 MHz	-	50	-	
		V_R=600 V, f=1 MHz	-	50	-	

[1] J-STD20 and JESD22

[2] All devices tested under avalanche conditions, for a time periode of 10ms, at 20mA.

[3] t_c is the time constant for the capacitive displacement current waveform (independent from T_j, I_{LOAD} and di/dt), different from t_{rr} which is dependent on T_j, I_{LOAD} and di/dt. No reverse recovery time constant t_{rr} due to absence of minority carrier injection.

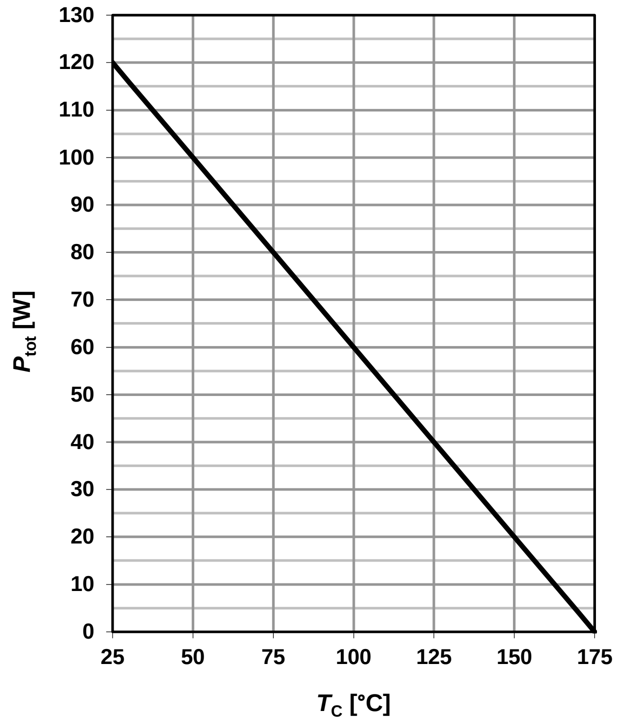
[4] Under worst case Z_{th} conditions.

[5] Device on 40mm*40mm*1.5 epoxy PCB FR4 with 6cm² (one layer, 70μm thick) copper area for drain connection. PCB is vertical without blown air

[6] Only capacitive charge occuring, guaranteed by design.

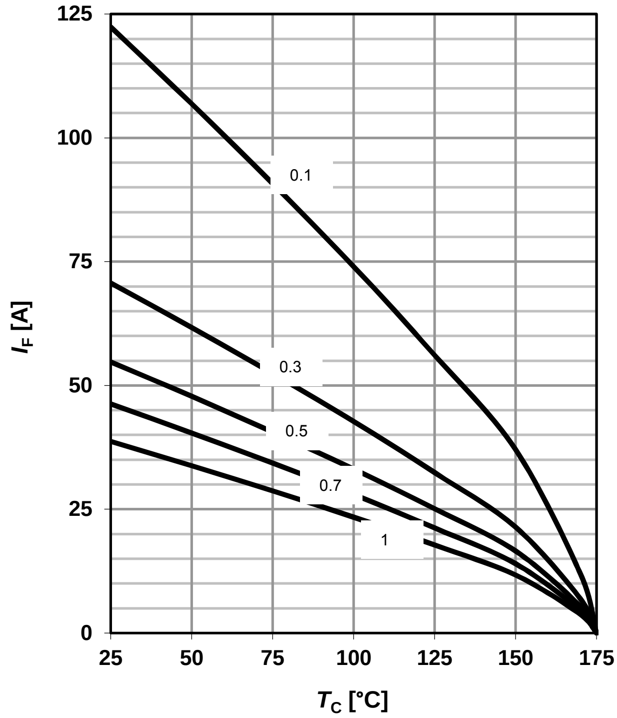
1 Power dissipation

P_{tot}=f(T_C); parameter: $R_{thJC(max)}$



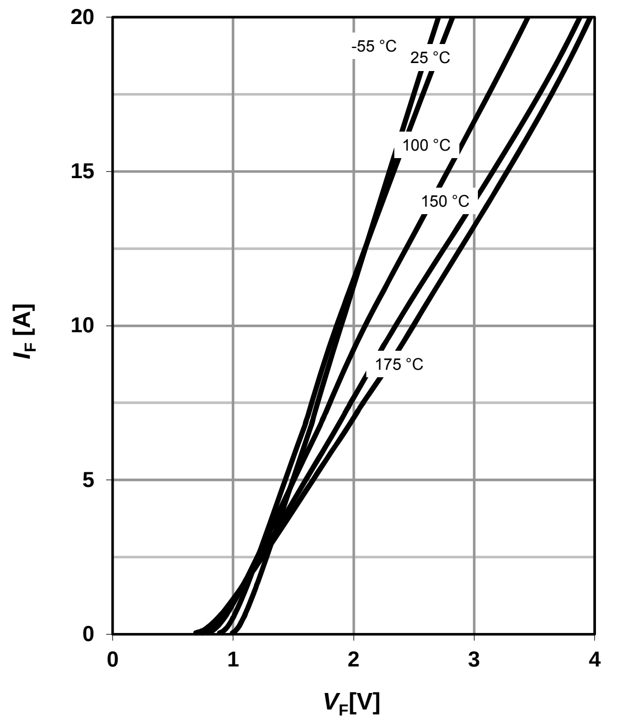
2 Diode forward current

I_F=f(T_C)[4]; T_j≤175 °C; parameter: $D = t_p/T$



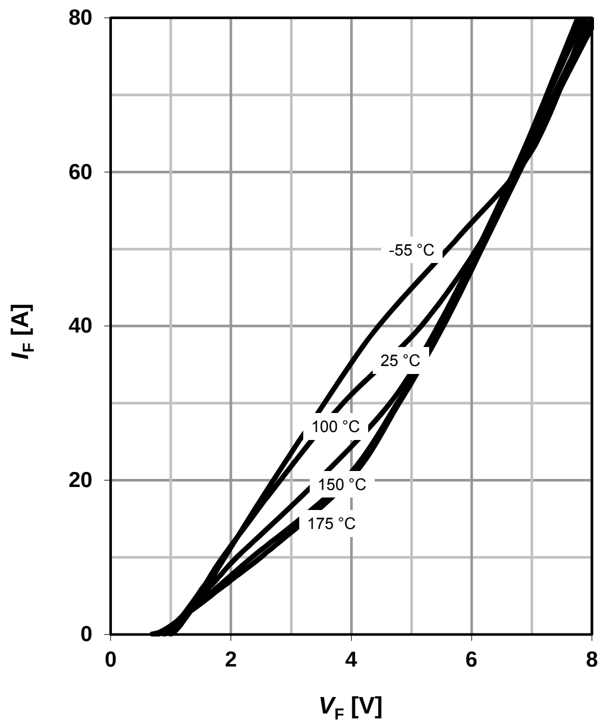
3 Typ. forward characteristic

I_F=f(V_F); t_p=400 µs; parameter: T_j



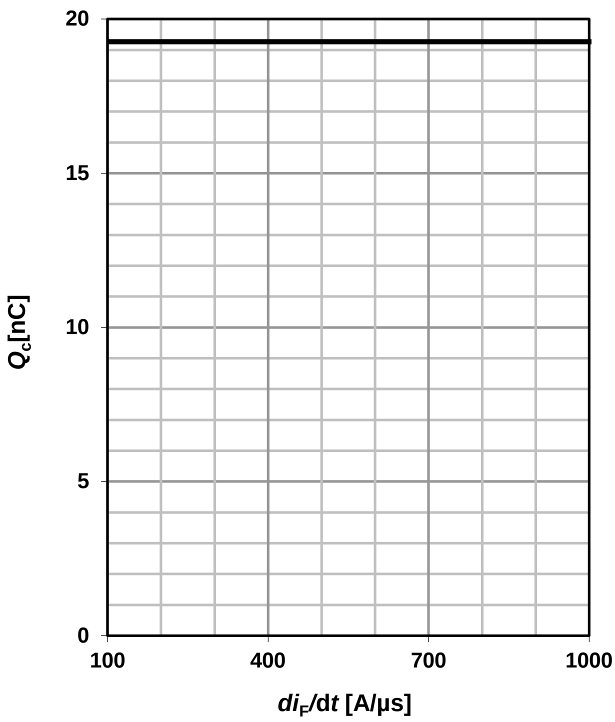
4 Typ. forward characteristic in surge current mode

I_F=f(V_F); t_p=400 µs; parameter: T_j



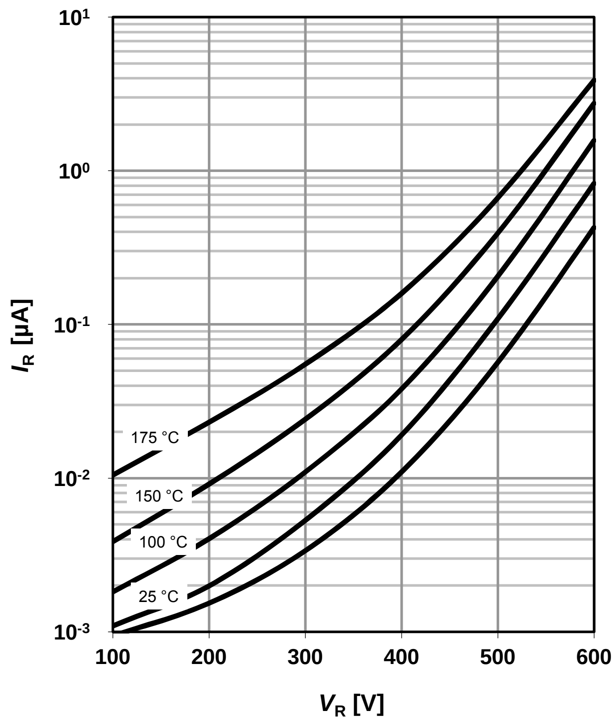
5 Typ. capacitance charge vs. current slope

Q_C=f(di_F/dt)[6)]; $I_F \leq I_{F,max}$



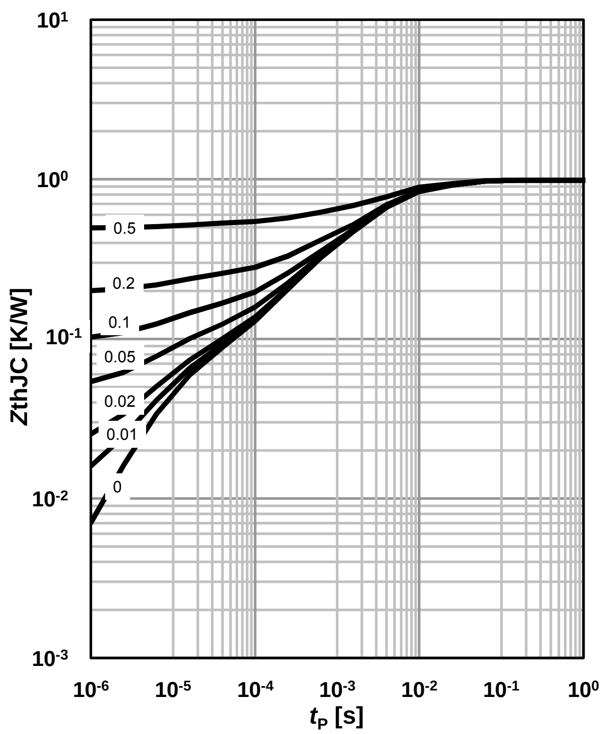
6 Typ. reverse current vs. reverse voltage

I_R=f(V_R); parameter: T_j



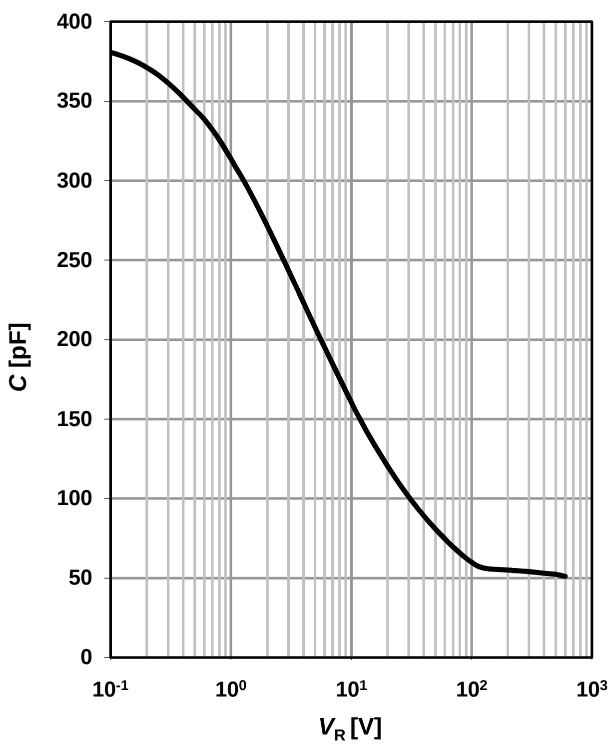
7 Typ. transient thermal impedance

Z_{thJC}=f(t_p); parameter: $D = t_P/T$



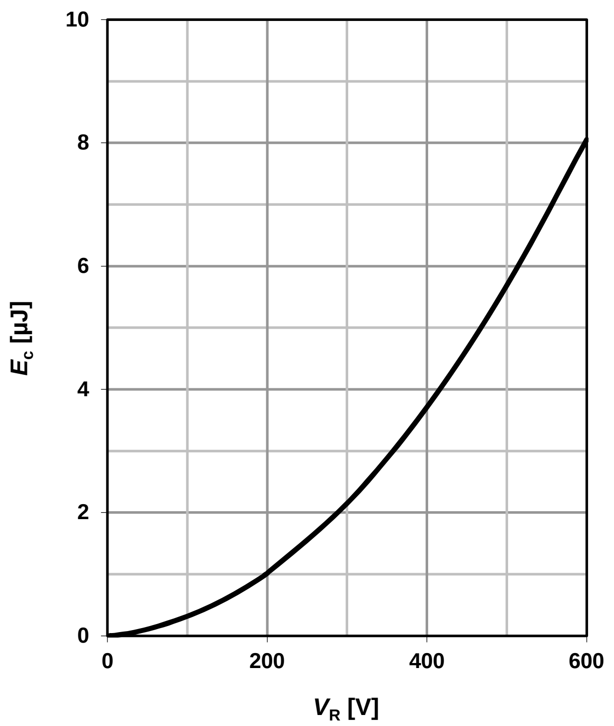
8 Typ. capacitance vs. reverse voltage

C=f(V_R); T_C=25 °C, f=1 MHz

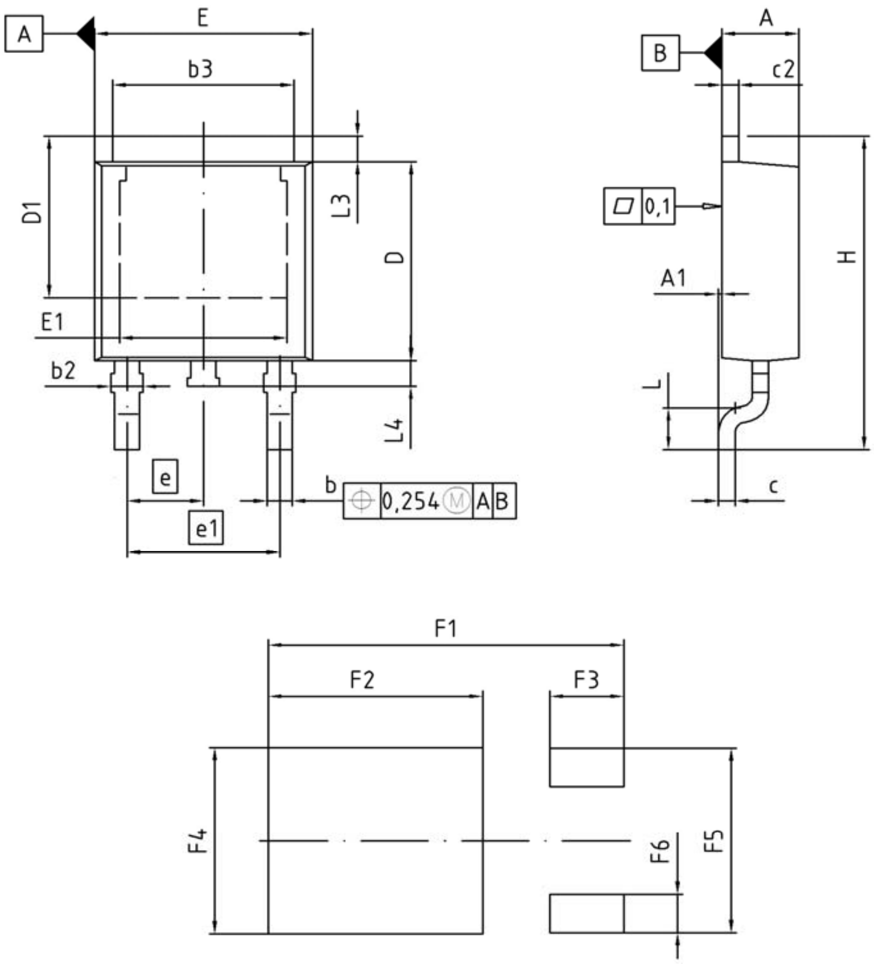


9 Typ. C stored energy

E_C=f(V_R)



PG-TO252-3: Outline



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.16	2.41	0.085	0.095
A1	0.00	0.15	0.000	0.006
b	0.64	0.89	0.025	0.035
b2	0.65	1.15	0.026	0.045
b3	5.00	5.50	0.197	0.217
c	0.46	0.60	0.018	0.024
c2	0.46	0.98	0.018	0.039
D	5.97	6.22	0.235	0.245
D1	5.02	5.84	0.198	0.230
E	6.40	6.73	0.252	0.265
E1	4.70	5.21	0.185	0.205
e	2.29		0.090	
e1	4.57		0.180	
N	3		3	
H	9.40	10.48	0.370	0.413
L	1.18	1.70	0.046	0.067
L3	0.90	1.25	0.035	0.049
L4	0.51	1.00	0.020	0.039
F1	10.50	10.70	0.413	0.421
F2	6.30	6.50	0.248	0.256
F3	2.10	2.30	0.083	0.091
F4	5.70	5.90	0.224	0.232
F5	5.66	5.86	0.223	0.231
F6	1.10	1.30	0.043	0.051

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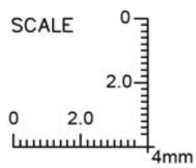
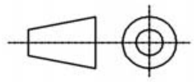
SCALE



EUROPEAN PROJECTION



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