2^{nd} 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

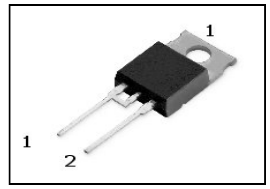
thinQ! 2G Diode designed for applications like:

- SMPS e.g. CCM PFC; typ P_{out}= 200 - 400W

Product Summary

V_{DC}	600	V
Q_c	3.2	nC
I_F @ T_C < 140°C	2	A
I_F @ T_C < 100°C	3	A

PG-TO220-2-2



Type	Package	Marking	Pin 1	Pin 2
IDT02S60C	PG-TO220-2-2	D02S60C	C	A

Maximum ratings

Parameter	Symbol	Conditions	Value	Unit
Continuous forward current	I_F	T_C<140 °C	2	A
		T_C<100 °C	3	
RMS forward current	$I_{F,RMS}$	f=50 Hz	2.8	
Surge non-repetitive forward current, sine halfwave	$I_{F,SM}$	T_C=25 °C, t_p=10 ms	13.2	
		T_C=150°C, t_p=10 ms	11.2	
Repetitive peak forward current	$I_{F,RM}$	T_j=150 °C, T_C=100 °C, D=0.1	9.1	
Non-repetitive peak forward current	$I_{F,max}$	T_C=25 °C, t_p=10 µs	100	
i^2t value	$\int i^2 dt$	T_C=25 °C, t_p=10 ms	0.85	A^2s
		T_C=150°C, t_p=10 ms	0.6	
Repetitive peak reverse voltage	V_{RRM}	T_j=25 °C	600	V
Diode dv/dt ruggedness	dv/dt	V_R = 0….480V	50	V/ns
Power dissipation	P_{tot}	T_C=25 °C	18	W
Operating and storage temperature	T_j, T_{stg}		-55 ... 175	°C
Mounting torque		M3 and M3.5 screws	60	Mcm

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal characteristics						
Thermal resistance, junction - case	R_{thJC}		-	-	8.5	K/W
Thermal resistance, junction - ambient	R_{thJA}	leaded	-	-	62	
Soldering temperature, wavesoldering only allowed at leads	T_{sold}	1.6mm (0.063 in.) from case for 10s	-	-	260	°C
Electrical characteristics						
Static characteristics						
DC blocking voltage	V_{DC}	I_R=0.1 mA	600	-	-	V
Repetitive peak reverse voltage	V_{RRM}	T_j = 25°C	-	-	600	
Diode forward voltage	V_F	I_F=2 A, T_j=25 °C	-	1.7	1.9	
		I_F=2 A, T_j=150 °C	-	2.1	2.6	
		I_F=3 A, T_j=25 °C	-	2.1	2.4	
		I_F=3 A, T_j=150 °C	-	2.8	3.7	
Reverse current	I_R	V_R=600 V, T_j=25 °C	-	0.23	15	µA
		V_R=600 V, T_j=150 °C	-	1	150	
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	-	3.2	-	nC
Switching time[3]	t_c		-	-	<10	ns
Total capacitance	C	V_R=1 V, f= MHz	-	60	-	pF
		V_R=300 V, f=1 MHz	-	8	-	
		V_R=600 V, f=1 MHz	-	8	-	

1) J-STD20 and JESD22

2) All devices tested under avalanche condition, 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}, di/dt. No reverse recovery time constant t_{rr} due to absence of minority carrier injection.

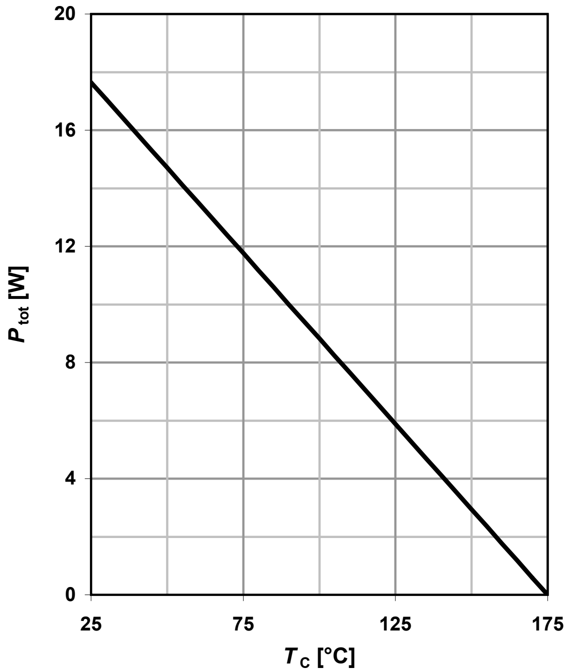
4) Under worst case Zth conditions.

5) Repetitive condition defined by $T_j \leq$ 175°C

6) Only capacitive charge occuring, guaranteed by design.

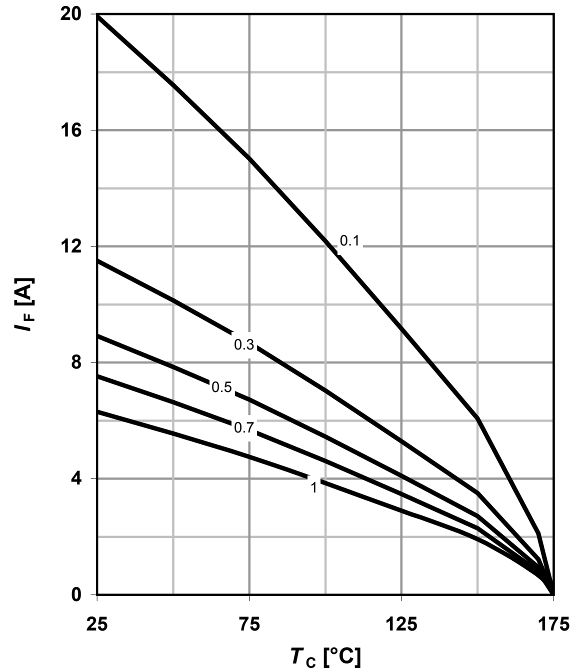
1 Power dissipation

P_{tot}=f(T_C)



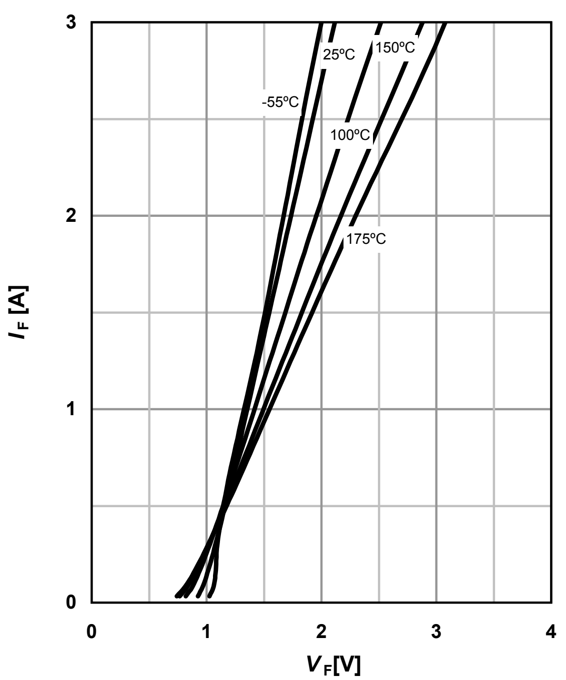
2 Diode forward current

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



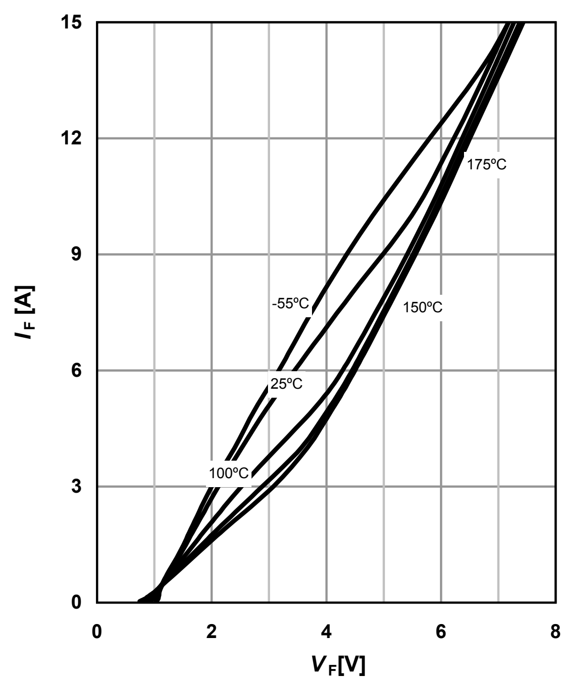
3 Typ. forward characteristic

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



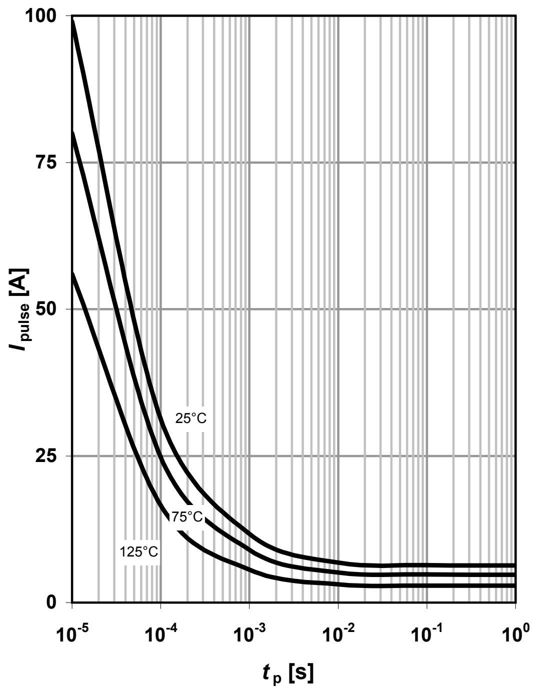
4 Typ. forward characteristic in surge current mode

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



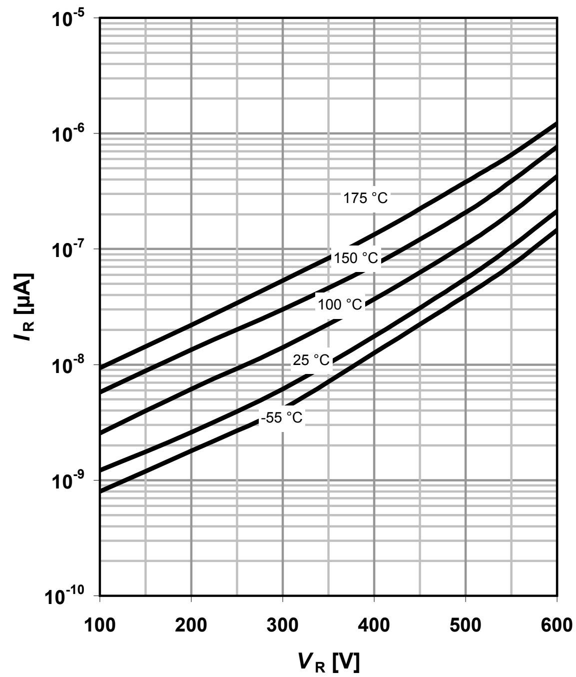
5 Max. repetitive pulse current

I_{pulse}=f(t_P)[4)5)]; parameter T_C



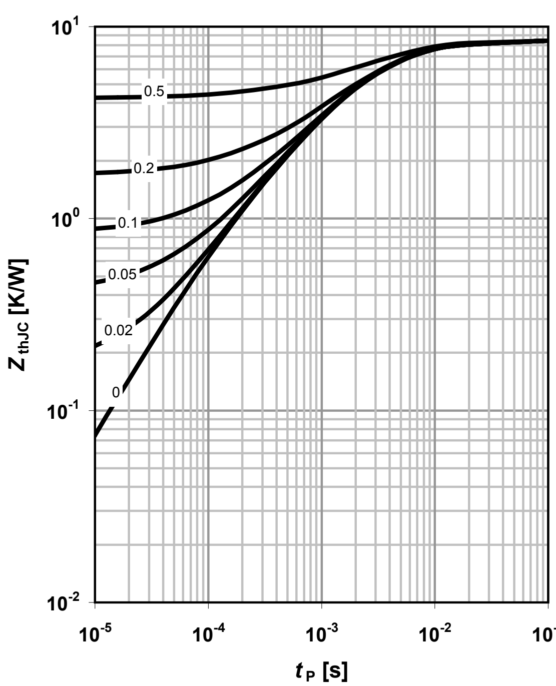
6 Typ. reverse current vs. reverse voltage

I_R=f(V_R); parameter: T_j



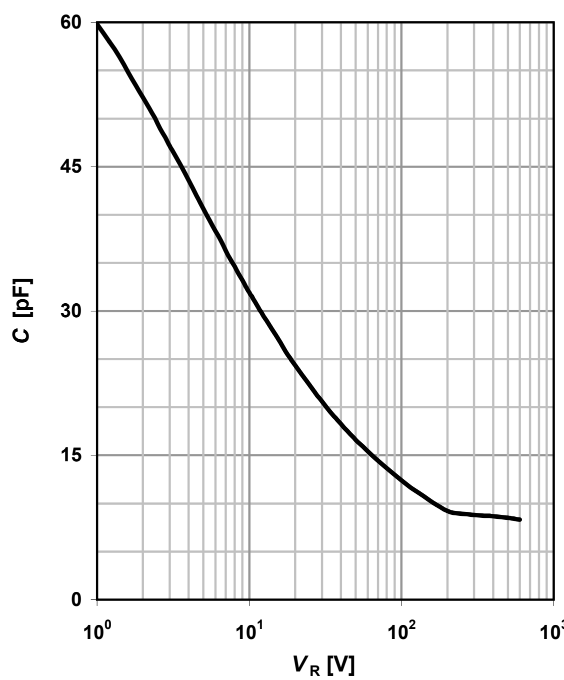
7 Transient thermal impedance

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



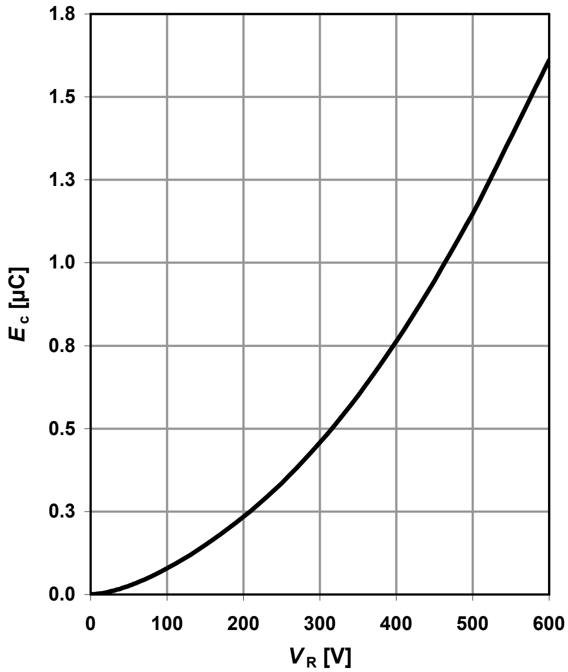
8 Typ. capacitance vs. reverse voltage

C=f(V_R); T_C=25 °C, f=1 MHz



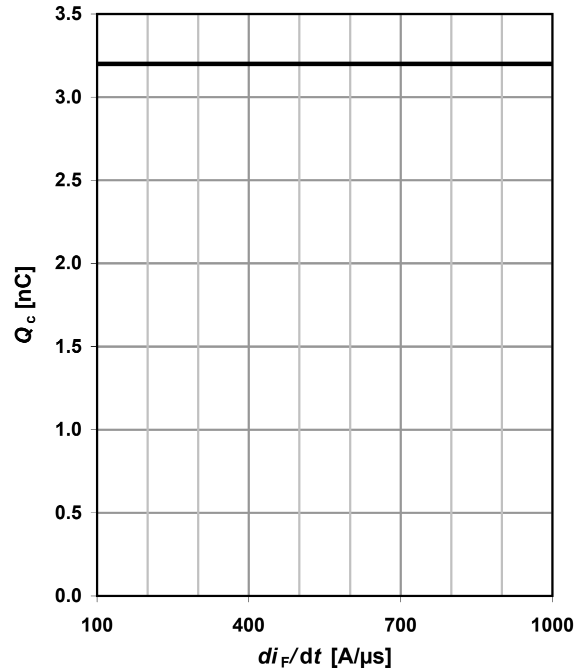
9 Typ. C stored energy

$E_C=f(V_R)$

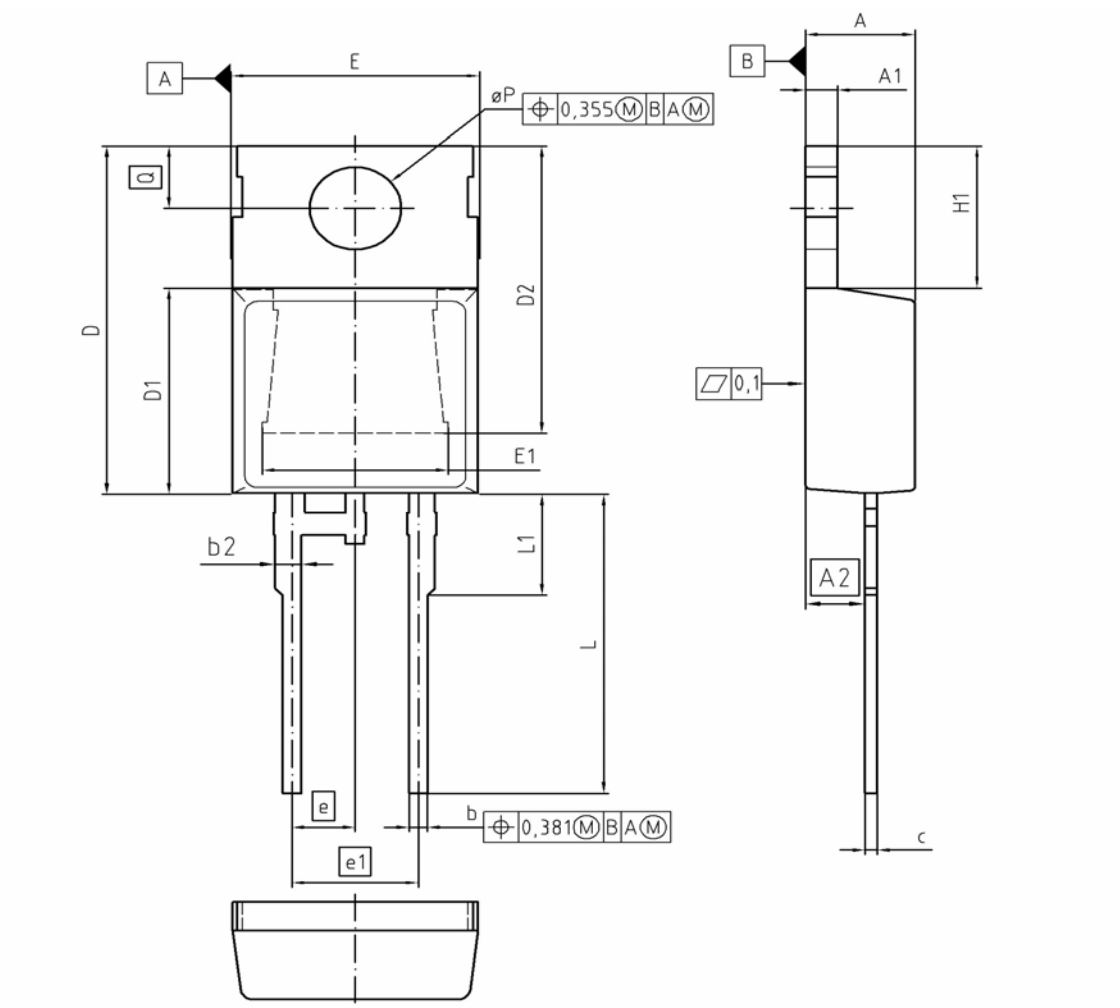


10 Typ. capacitance charge vs. current slope

$Q_C=f(di_F/dt)$[6]; $T_j=150$ °C; $I_F \leq I_{F,max}$



Package Outline:PG-TO220-2-2



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.191	4.699	0.165	0.185
A1	1.170	1.400	0.046	0.055
A2	2.215	2.718	0.087	0.107
b	0.635	0.889	0.025	0.035
b2	0.950	1.651	0.037	0.065
c	0.330	0.635	0.013	0.025
D	14.808	15.950	0.583	0.628
D1	8.509	9.450	0.335	0.372
D2	12.850	14.245	0.506	0.561
E	9.677	10.363	0.381	0.408
E1	6.500	8.788	0.256	0.346
e	2.540		0.100	
e1	5.080		0.200	
N	2		2	
H1	5.900	6.900	0.232	0.272
L	12.700	14.000	0.500	0.551
L1	3.048	4.800	0.120	0.189
øP	3.550	3.886	0.140	0.153
Q	2.540	3.048	0.100	0.120

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