

2nd Generation thinQ!TM SiC Schottky Diode

Features

- Revolutionary semiconductor material - Silicon Carbide
- No reverse recovery/ no forward recovery
- Temperature independent switching behavior
- High surge current capability
- Qualified according to JEDEC¹⁾ for target applications
- Breakdown voltage tested at 5mA²⁾
- Optimized for high temperature operation

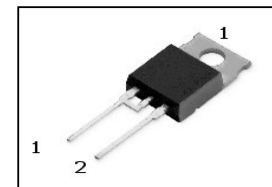
thinQ! 2G Diode designed for fast switching applications like:

- CCM PFC

Product Summary

V_{DC}	600	V
Q_c	5	nC
I_F	3	A

PG-TO220-2-2



Type	Package	Marking	Pin 1	Pin 2
IDT03S60C	PG-TO220-2-2	D03S60C	C	A

Maximum ratings,

Parameter	Symbol	Conditions	Value	Unit
Continuous forward current	I_F	$T_C < 120\text{ °C}$	3	A
		$T_C < 70\text{ °C}$	4.5	
RMS forward current	$I_{F,RMS}$	$f = 50\text{ Hz}$	4.2	
Surge non-repetitive forward current, sine halfwave	$I_{F,SM}$	$T_C = 25\text{ °C}, t_p = 10\text{ ms}$	16	
		$T_C = 150\text{ °C}, t_p = 10\text{ ms}$	14	
Repetitive peak forward current	$I_{F,RM}$	$T_j = 150\text{ °C}, T_C = 100\text{ °C}, D = 0.1$	10.5	
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25\text{ °C}, t_p = 10\text{ }\mu\text{s}$	115	
i^2t value	$\int i^2 dt$	$T_C = 25\text{ °C}, t_p = 10\text{ ms}$	1.2	A ² s
		$T_C = 150\text{ °C}, t_p = 10\text{ ms}$	0.96	
Repetitive peak reverse voltage	V_{RRM}	$T_j = 25\text{ °C}$	600	V
Diode dv/dt ruggedness	dv/dt	$V_R = 0 \dots 480\text{ V}$	50	V/ns
Power dissipation	P_{tot}	$T_C = 25\text{ °C}$	25	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}		-	-	5.9	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}	$I_R=0.05mA, T_j=25^\circ C$	600	-	-	V
Diode forward voltage	V_F	$I_F=3 A, T_j=25^\circ C$	-	1.7	1.9	
		$I_F=3 A, T_j=150^\circ C$	-	2.1	2.6	
		$I_F=4.5 A, T_j=25^\circ C$	-	2.1	2.4	
		$I_F=4.5 A, T_j=150^\circ C$	-	2.8	3.7	
Reverse current	I_R	$V_R=600 V, T_j=25^\circ C$	-	0.32	30	µA
		$V_R=600 V, T_j=150^\circ C$	-	1.3	300	

AC characteristics

Total capacitive charge	Q_c	$V_R=400 V, I_F \leq I_{F,max}, di/dt=200 A/\mu s,$	-	5	-	nC
Switching time ³⁾	t_c	$T_j=150^\circ C$	-	-	<10	ns
	C	$V_R=1 V, f= MHz$	-	90	-	pF
		$V_R=300 V, f=1 MHz$	-	12	-	
		$V_R=600 V, f=1 MHz$	-	12	-	

¹⁾ J-STD20 and JESD22

²⁾ All devices tested under avalanche condition, for a time periode of 5ms, at 5mA.

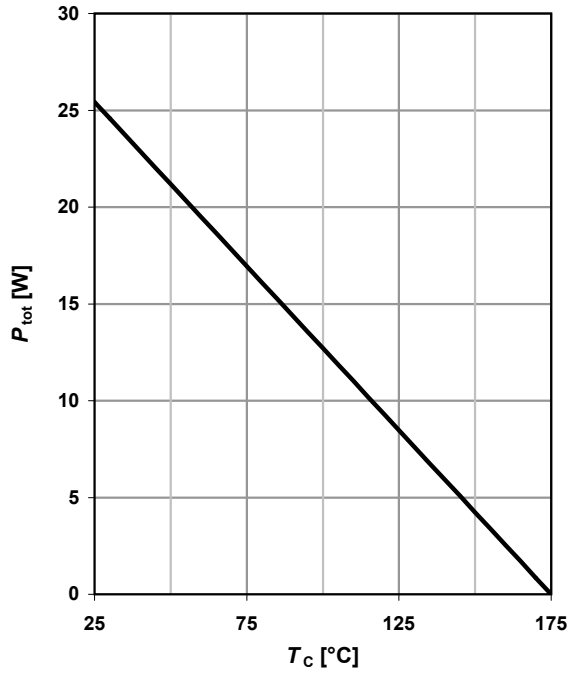
³⁾ t_c is the time constant for the capacitive displacement current waveform (independent from T_j, I_{LOAD} and di/dt), different from t_{rr} , which is dependent on $T_j, I_{LOAD}, di/dt$. No reverse recovery time constant t_{rr} due to absence of minority carrier injection.

⁴⁾ Only capacitive charge occuring, guaranteed by design.

1 Power dissipation

$$P_{tot} = f(T_C)$$

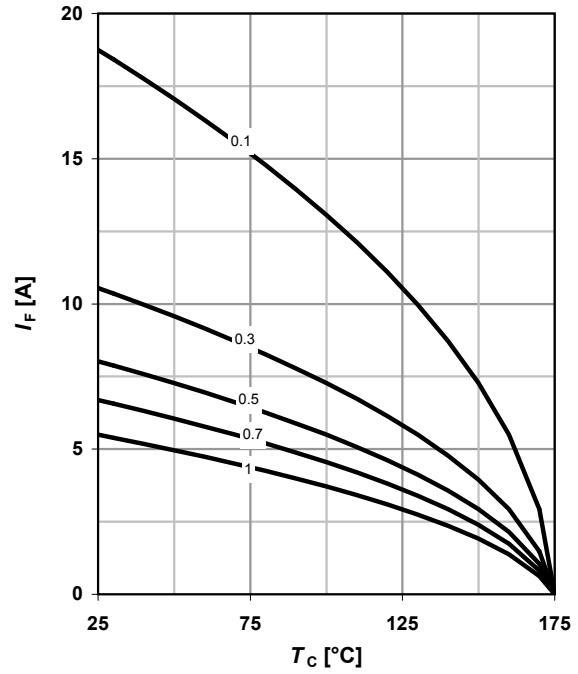
parameter: $R_{thJC(max)}$



2 Diode forward current

$$I_F = f(T_C); T_j \leq 175 \text{ °C}$$

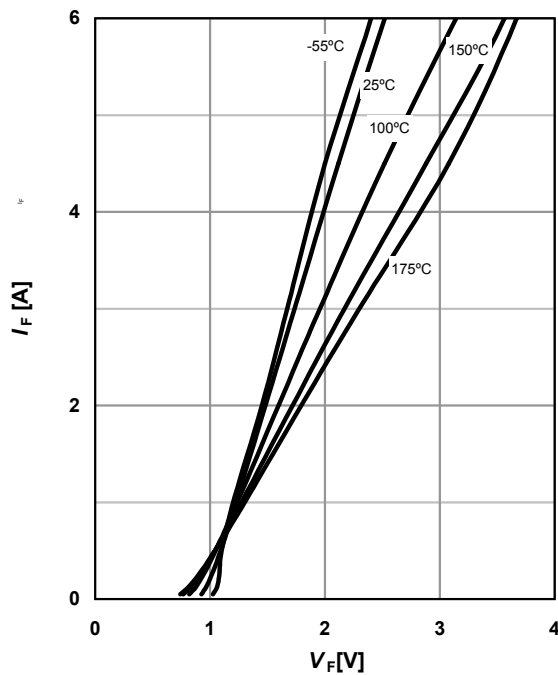
parameter: $D = t_p/T$



3 Typ. forward characteristic

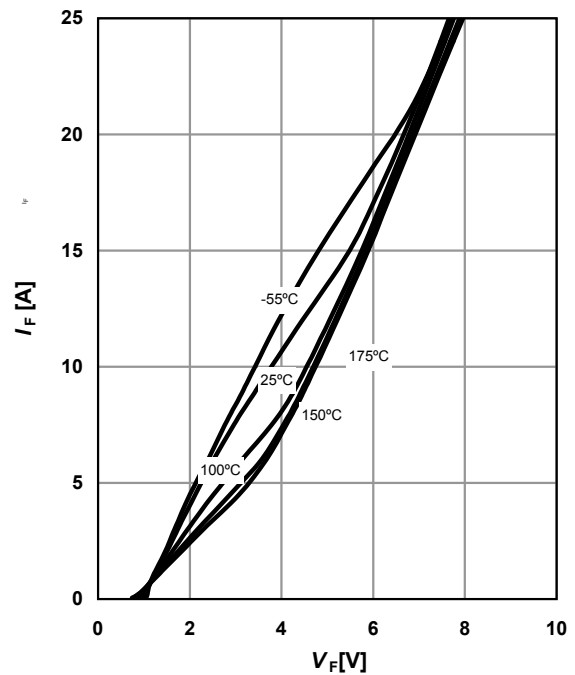
$$I_F = f(V_F); t_p = 400 \text{ } \mu\text{s}$$

parameter: T_j



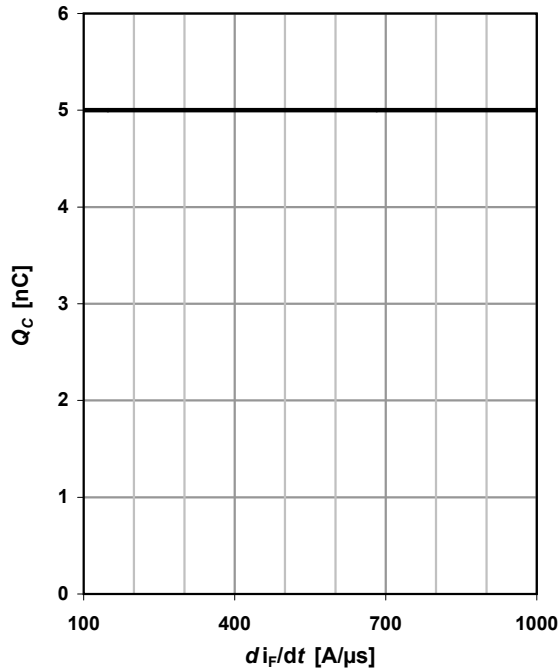
4 Typ. forward characteristic in surge current mode

$$I_F = f(V_F); t_p = 400 \text{ } \mu\text{s}; \text{ parameter: } T_j$$



5 Typ. capacitance charge vs. current slope

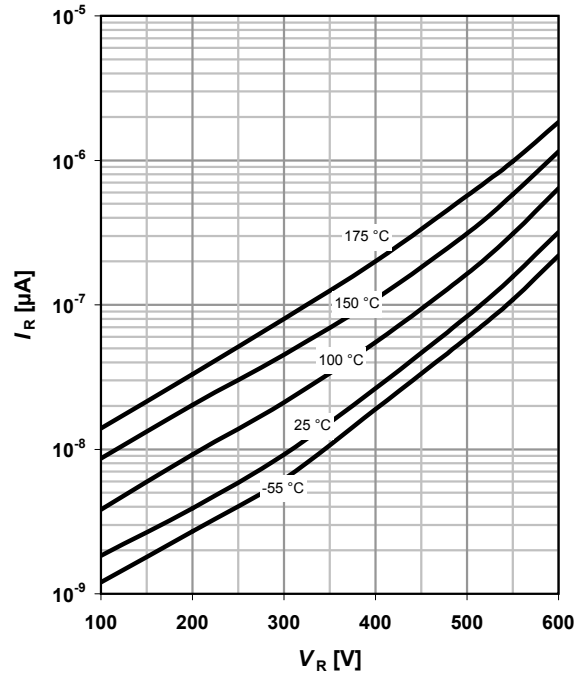
$Q_C = f(di_F/dt^4); T_J = 150\text{ }^\circ\text{C}; I_F \leq I_{F,max}$



6 Typ. reverse current vs. reverse voltage

$I_R = f(V_R)$

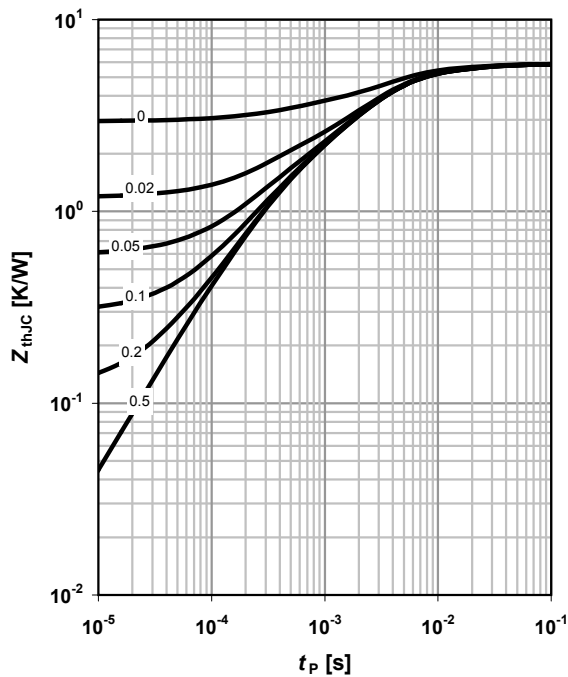
parameter: T_J



7 Transient thermal impedance

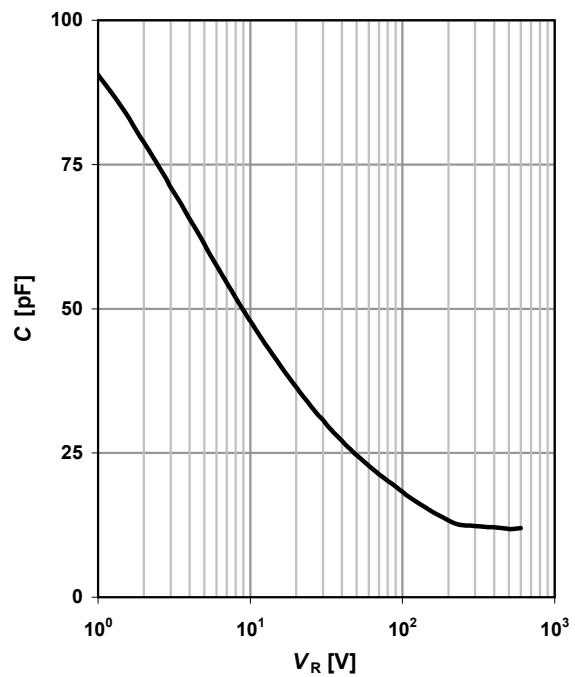
$Z_{thJC} = f(t_p)$

parameter: $D = t_p/T$



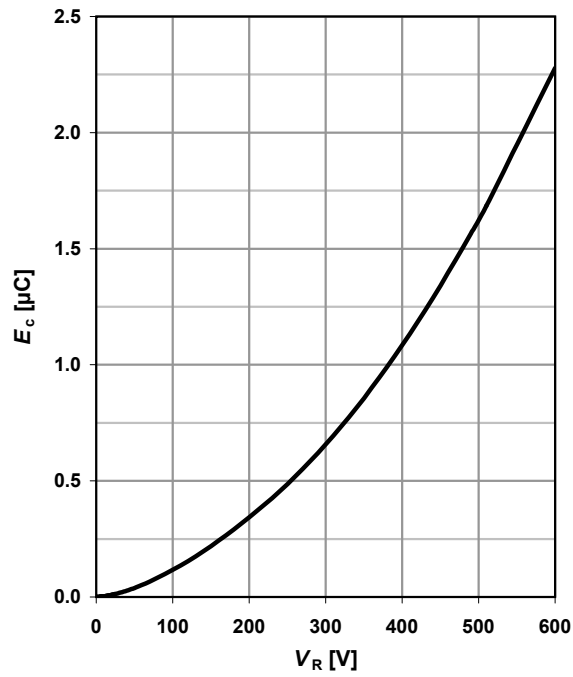
8 Typ. capacitance vs. reverse voltage

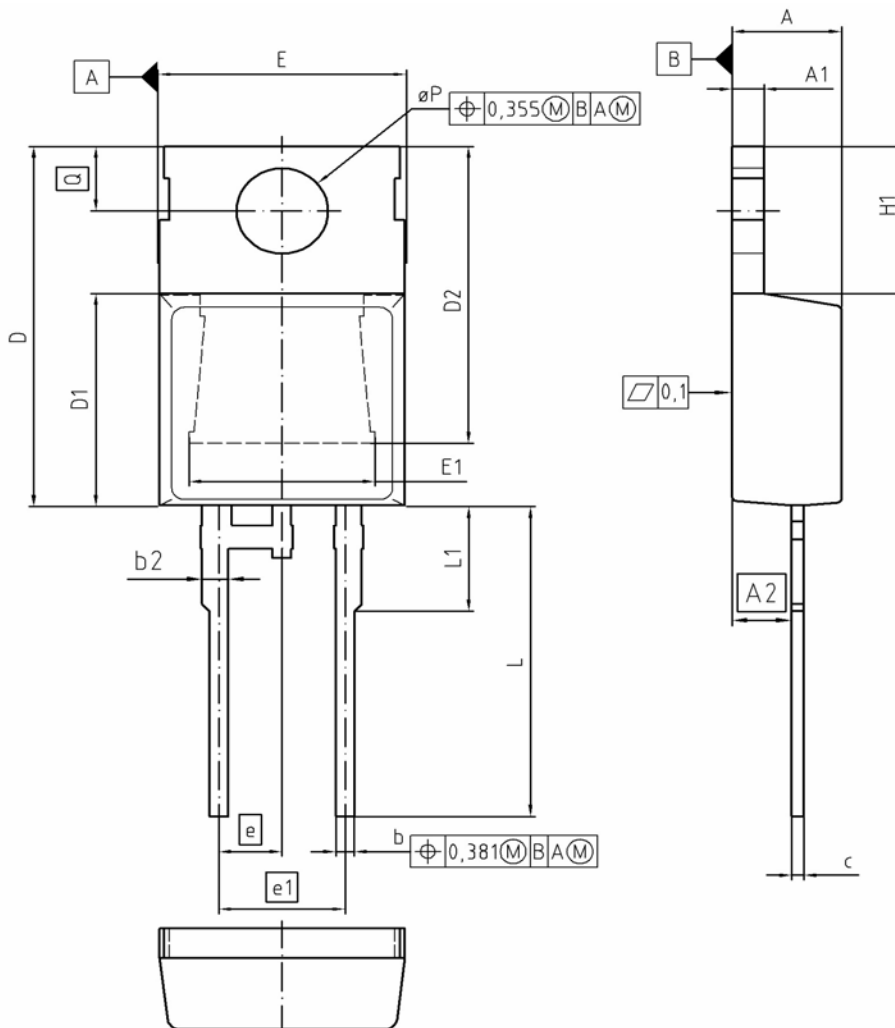
$C = f(V_R); T_C = 25\text{ }^\circ\text{C}, f = 1\text{ MHz}$



9 Typ. C stored energy

$$E_C = f(V_R)$$



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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