

2nd Generation thinQ!TM SiC Schottky Diode

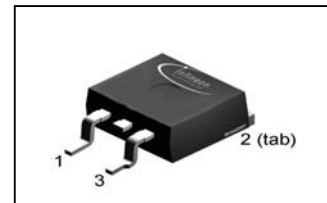
Features

- Revolutionary semiconductor material - Silicon Carbide
- Switching behavior benchmark
- No reverse recovery/ No forward recovery
- No temperature influence on the switching behavior
- High surge current capability
- Pb-free lead plating; RoHs compliant
- Qualified according to JEDEC¹⁾ for target applications
- Breakdown voltage tested at 5mA²⁾

Product Summary

V_{DC}	600	V
Q_c	24	nC
I_F	10	A

D²PAK (PG-TO220-3-45)



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

- CCM PFC
- Motor Drives

Type	Package	Marking	Pin 1	Pin 2
IDB10S60C	D ² PAK (PG-TO220-3-45)	D10S60C	C	A

Maximum ratings, at $T_j=25\text{ }^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous forward current	I_F	$T_C < 135\text{ }^\circ\text{C}$	10	A
RMS forward current	$I_{F,RMS}$	$f=50\text{ Hz}$	15	
Surge non-repetitive forward current, sine halfwave	$I_{F,SM}$	$T_C=25\text{ }^\circ\text{C}$, $t_p=10\text{ ms}$	76	
Repetitive peak forward current	$I_{F,RM}$	$T_j=150\text{ }^\circ\text{C}$, $T_C=100\text{ }^\circ\text{C}$, $D=0.1$	32	
Non-repetitive peak forward current	$I_{F,max}$	$T_C=25\text{ }^\circ\text{C}$, $t_p=10\text{ }\mu\text{s}$	350	
i ² t value	$\int i^2 dt$	$T_C=25\text{ }^\circ\text{C}$, $t_p=10\text{ ms}$	29	A ² s
Repetitive peak reverse voltage	V_{RRM}		600	V
Diode ruggedness dv/dt	dv/dt	$V_R=0\dots 480\text{V}$	50	V/ns
Power dissipation	P_{tot}	$T_C=25\text{ }^\circ\text{C}$	83	W
Operating and storage temperature	T_j , T_{stg}		-55 ... 175	°C

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Thermal characteristics

Thermal resistance, junction - case	R_{thJC}		-	-	1.8	K/W
Thermal resistance, junction - ambient	R_{thJA}	SMD version, device on PCB, minimal Footprint	-	-	62	
		SMD version, device on PCB, 6 cm ² cooling area ³⁾	-	35	-	
Soldering temperature, reflowsoldering @ 10sec.	T_{sold}	reflow MSL1	-	-	260	°C

Electrical characteristics, at $T_j=25\text{ °C}$, unless otherwise specified

Static characteristics

DC blocking voltage	V_{DC}	$I_R=0.14\text{ mA}$	600	-	-	V
Diode forward voltage	V_F	$I_F=10\text{ A}, T_j=25\text{ °C}$	-	1.5	1.7	
		$I_F=10\text{ A}, T_j=150\text{ °C}$	-	1.7	2.1	
Reverse current	I_R	$V_R=600\text{ V}, T_j=25\text{ °C}$	-	1.4	140	μA
		$V_R=600\text{ V}, T_j=150\text{ °C}$	-	5	1400	

AC characteristics

Total capacitive charge	Q_c	$V_R=400\text{ V}, I_F \leq I_{F,max}$, $di_F/dt=200\text{ A}/\mu\text{s}$,	-	24	-	nC
Switching time ⁴⁾	t_c	$T_j=150\text{ °C}$	-	-	<10	ns
Total capacitance	C	$V_R=1\text{ V}, f=1\text{ MHz}$	-	480	-	pF
		$V_R=300\text{ V}, f=1\text{ MHz}$	-	60	-	
		$V_R=600\text{ V}, f=1\text{ MHz}$	-	60	-	

¹⁾ J-STD20 and JESD22

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

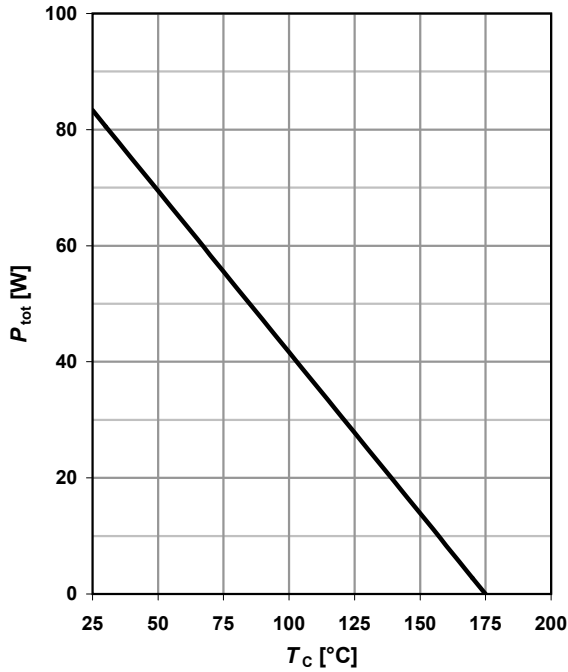
³⁾ Device on 40mm*40mm*1.5mm epox PCB FR4 with 6cm² (one layer, 70μm thick) copper area for drain connection. PCB is vertikal with out blown air.

⁴⁾ 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.

⁵⁾ Only capacitive charge occuring, guaranteed by design.

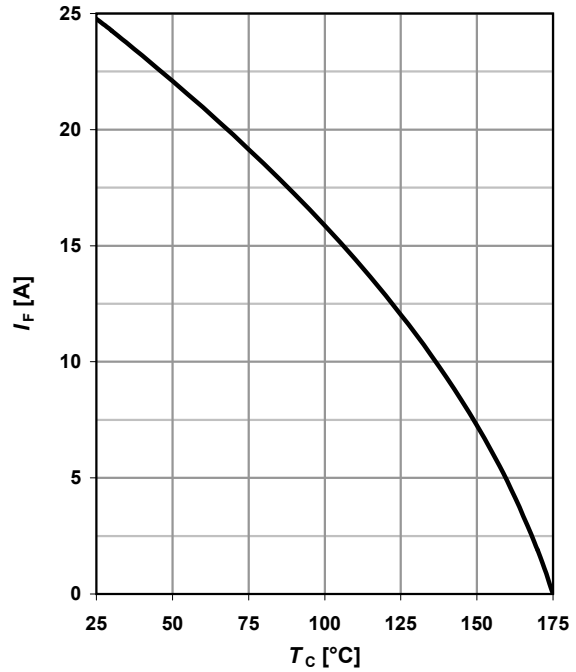
1 Power dissipation

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



2 Diode forward current

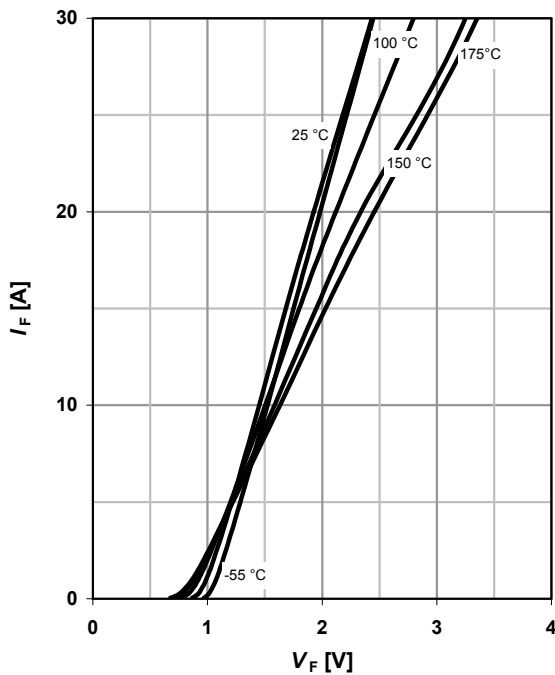
$$I_F = f(T_C); T_j \leq 175^\circ\text{C}$$



3 Typ. forward characteristic

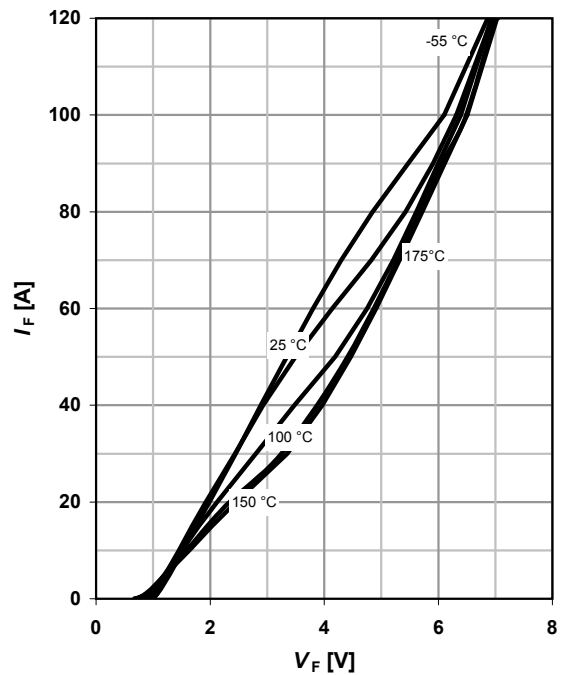
$$I_F = f(V_F); t_p = 400 \mu\text{s}$$

parameter: T_j



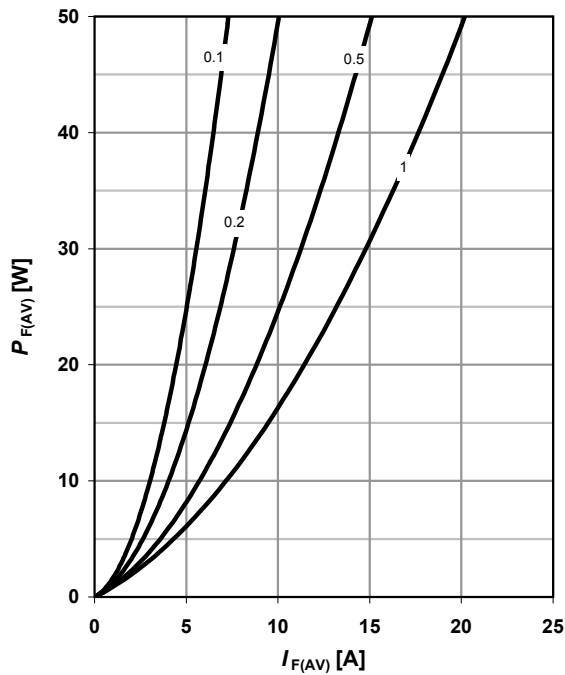
4 Typ. forward characteristic in surge current mode

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



5 Typ. forward power dissipation vs. average forward current

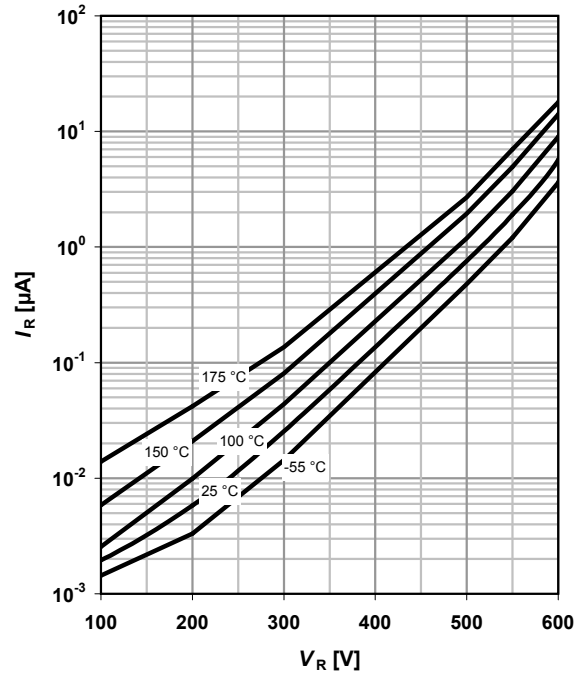
$$P_{F,AV} = f(I_F), T_C = 100\text{ }^\circ\text{C}, \text{ parameter: } D = t_p/T$$



6 Typ. reverse current vs. reverse voltage

$$I_R = f(V_R)$$

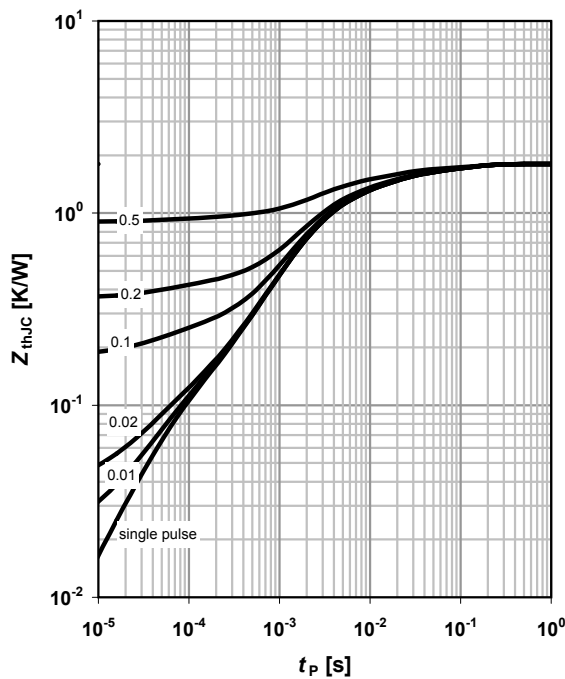
parameter: T_j



7 Transient thermal impedance

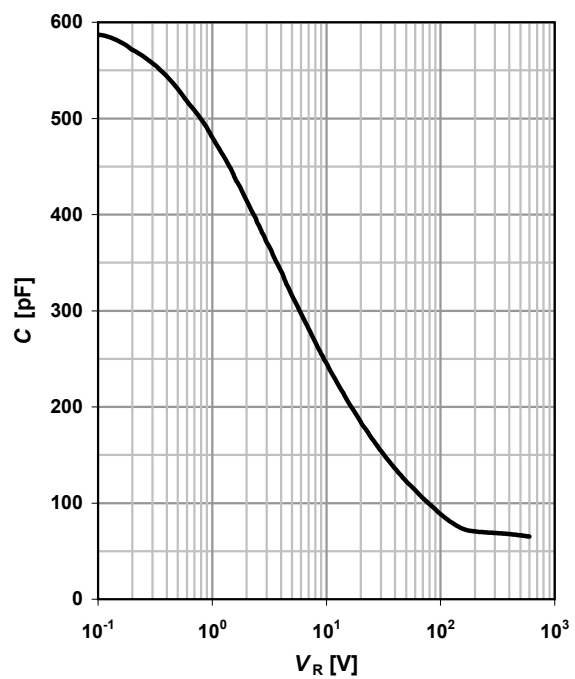
$$Z_{thJC} = f(t_p)$$

parameter: $D = t_p/T$



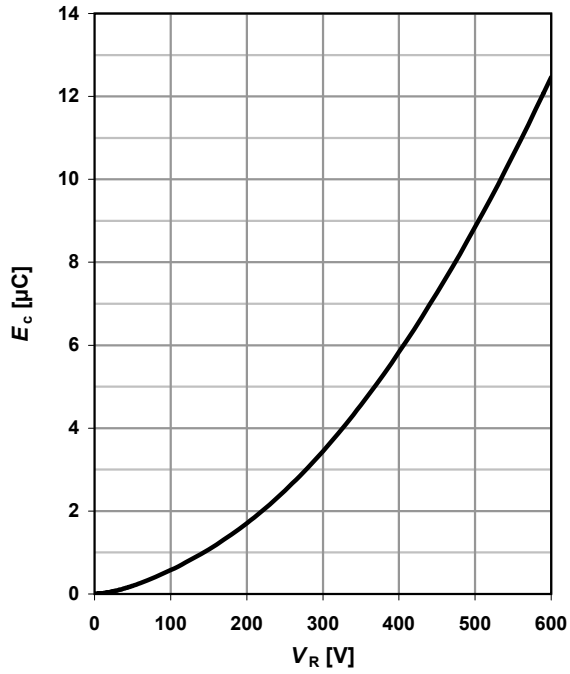
8 Typ. capacitance vs. reverse voltage

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

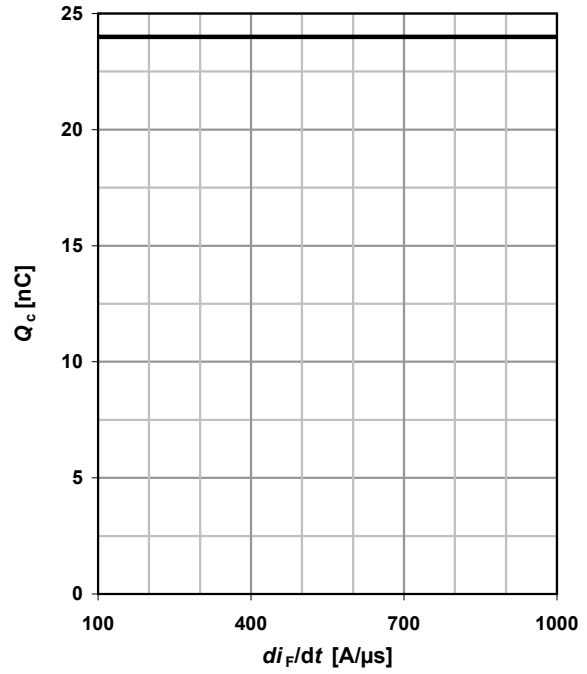


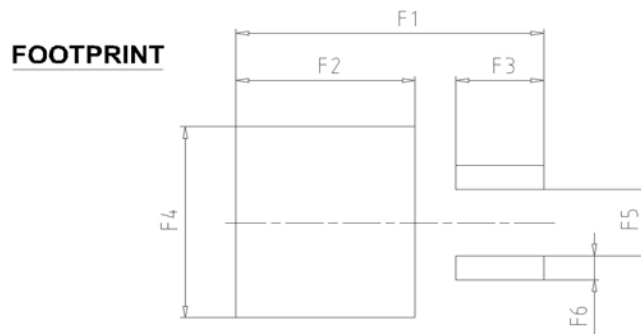
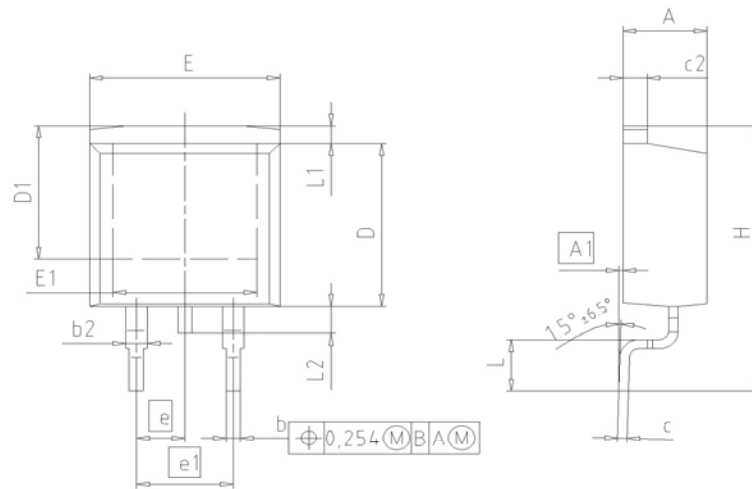
9 Typ. C stored energy

$$E_C = f(V_R)$$


10 Typ. Capacitive charge vs. current slope

$$Q_C = f(di_F/dt)^{0.5}; T_j = 150\text{ °C}; I_F \leq I_{F,max}$$



PG-TO220-3-45 (D²PAK): Outline


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.57	0.169	0.180
A1	0.00	0.25	0.000	0.010
b	0.65	0.85	0.026	0.033
b2	0.95	1.15	0.037	0.045
c	0.33	0.65	0.013	0.026
c2	1.17	1.40	0.046	0.055
D	8.51	9.45	0.335	0.372
D1	7.10	7.90	0.280	0.311
E	9.80	10.31	0.386	0.406
E1	6.50	8.60	0.256	0.339
e	2.54		0.100	
e1	5.08		0.200	
N	2		2	
H	14.61	15.88	0.575	0.625
L	2.29	3.00	0.090	0.118
L1	0.70	1.60	0.028	0.063
L2	1.00	1.78	0.039	0.070
F1	16.05	16.25	0.632	0.640
F2	9.30	9.50	0.366	0.374
F3	4.50	4.70	0.177	0.185
F4	10.70	10.90	0.421	0.429
F5	3.65	3.85	0.144	0.152
F6	1.25	1.45	0.049	0.057

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SCALE

7.5mm

EUROPEAN PROJECTION

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REVISION
01

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