

## 2<sup>nd</sup> Generation thinQ!<sup>TM</sup> SiC Schottky Diode

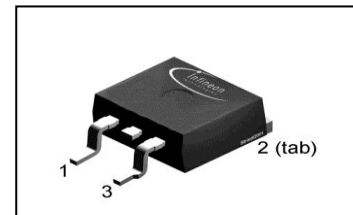
### Features

- 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 JEDEC<sup>1)</sup> for target applications
- Breakdown voltage tested at 5mA<sup>2)</sup>

### Product Summary

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

D<sup>2</sup>PAK (PG-TO263-3-2)



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

- CCM PFC
- Motor Drives

Type	Package	Marking	Pin 2	Pin 3
IDB10S60C	D2PAK (PG-TO263-3-2)	D10S60C	C	A

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

Parameter	Symbol	Conditions	Value	Unit
Continuous forward current	$I_F$	$T_C < 135\text{ °C}$	10	A
RMS forward current	$I_{F,RMS}$	$f=50\text{ Hz}$	15	
Surge non-repetitive forward current, sine halfwave	$I_{F,SM}$	$T_C=25\text{ °C}, t_p=10\text{ ms}$	76	
Repetitive peak forward current	$I_{F,RM}$	$T_j=150\text{ °C}, T_C=100\text{ °C}, D=0.1$	32	
Non-repetitive peak forward current	$I_{F,max}$	$T_C=25\text{ °C}, t_p=10\text{ }\mu\text{s}$	350	
$i^2t$ value	$\int i^2 dt$	$T_C=25\text{ °C}, t_p=10\text{ ms}$	29	A <sup>2</sup> 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	$P_{tot}$	$T_C=25\text{ °C}$	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 <sup>2</sup> cooling area <sup>3)</sup>	-	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	$Q_c$	$V_R=400\text{ V}$ , $I_F \leq I_{F,max}$ , $di_F/dt=200\text{ A}/\mu\text{s}$ , $T_j=150\text{ °C}$	-	24	-	nC
Switching time <sup>4)</sup>	$t_c$		-	-	<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	-	

<sup>1)</sup> J-STD20 and JESD22

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

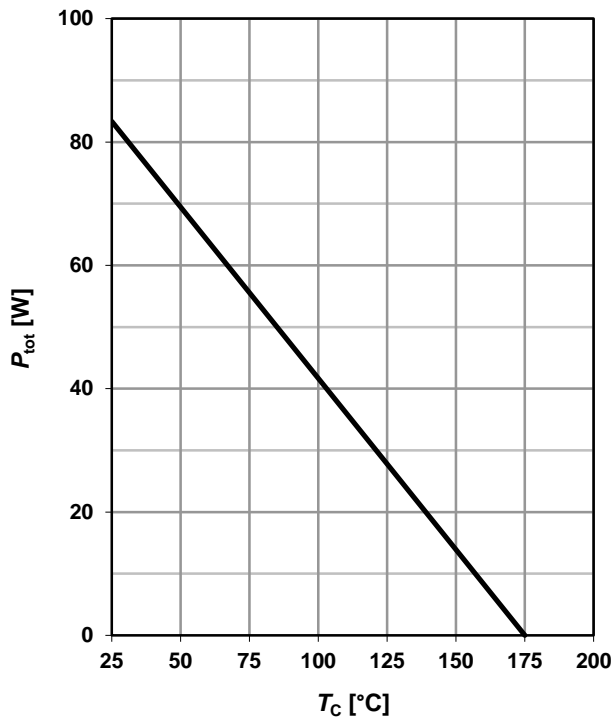
<sup>3)</sup> Device on 40mm\*40mm\*1.5mm epox PCB FR4 with 6cm<sup>2</sup> (one layer, 70μm thick) copper area for drain connection. PCB is vertikal with out blown air.

<sup>4)</sup>  $t_c$  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.

<sup>5)</sup> Only capacative charge occuring, guaranteed by design.

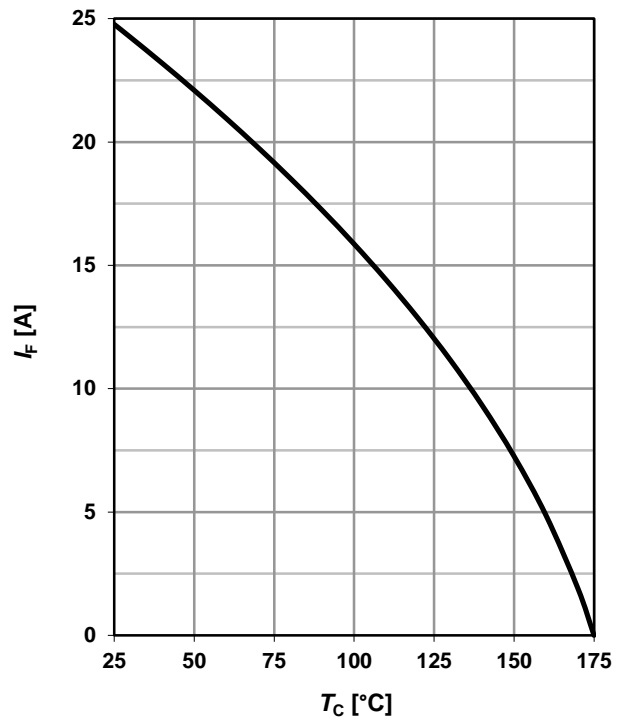
**1 Power dissipation**

$P_{tot}=f(T_C)$



**2 Diode forward current**

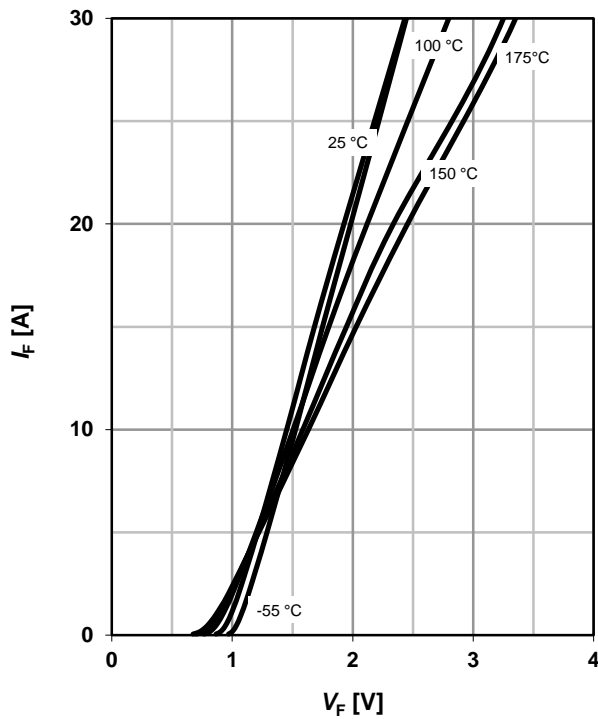
$I_F=f(T_C); T_j \leq 175\text{ °C}$



**3 Typ. forward characteristic**

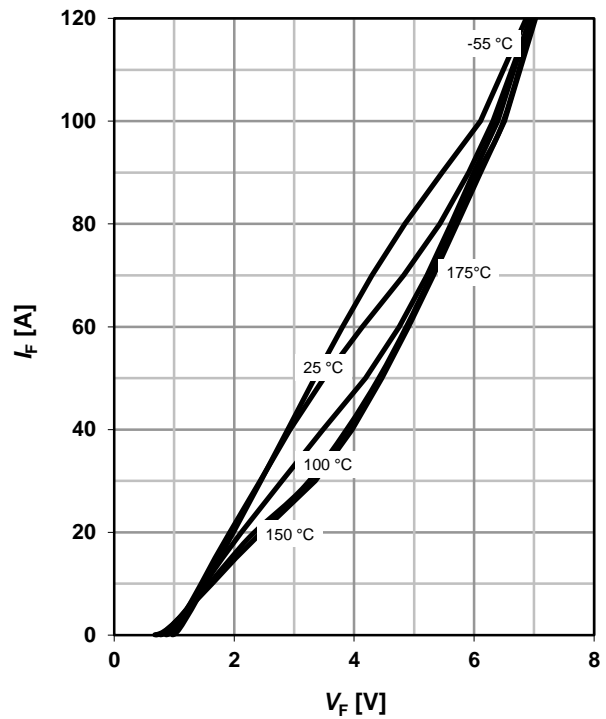
$I_F=f(V_F); t_p=400\text{ }\mu\text{s}$

parameter:  $T_j$



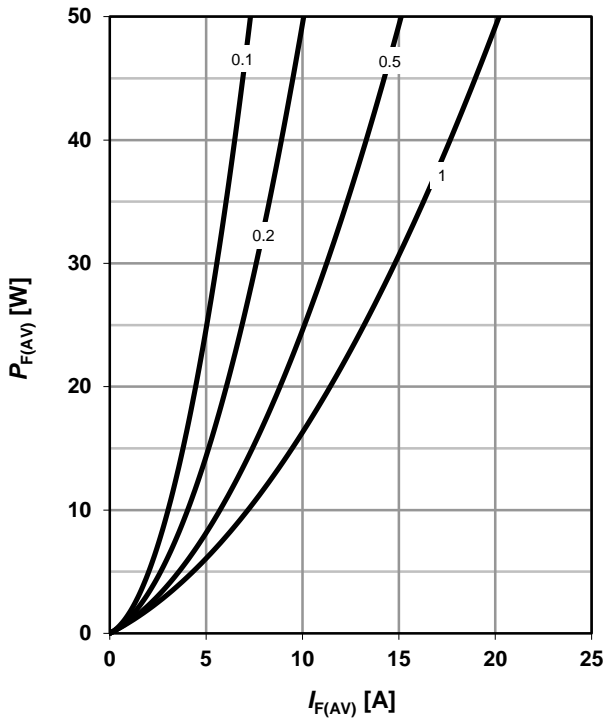
**4 Typ. forward characteristic in surge current mode**

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



**5 Typ. forward power dissipation vs. average forward current**

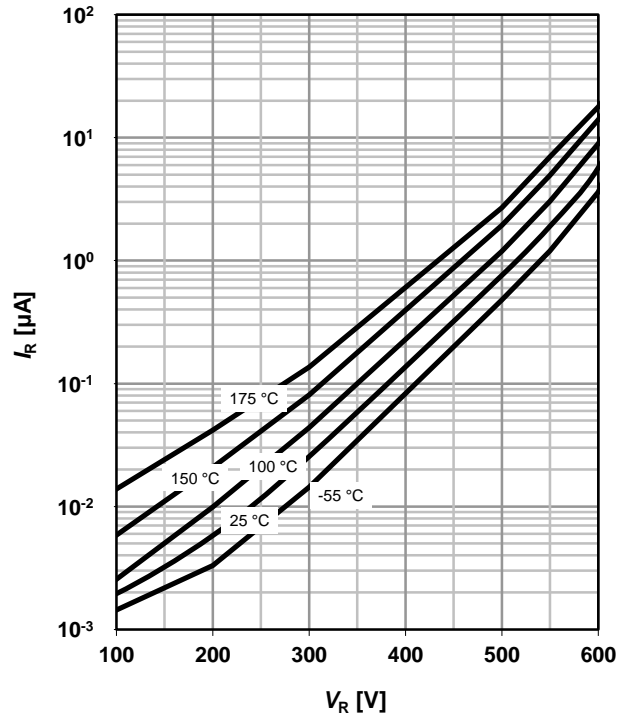
$P_{F(AV)} = f(I_F)$ ,  $T_C = 100\text{ °C}$ , parameter:  $D = t_p/T$



**6 Typ. reverse current vs. reverse voltage**

$I_R = f(V_R)$

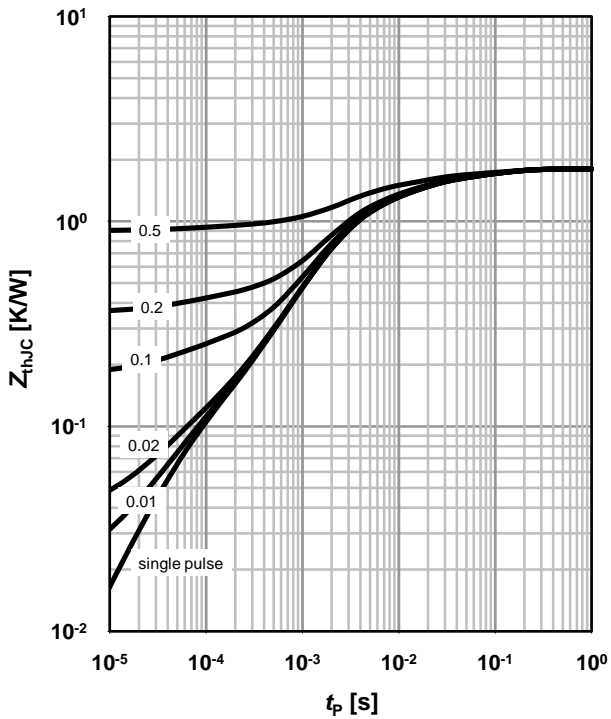
parameter:  $T_j$



**7 Transient thermal impedance**

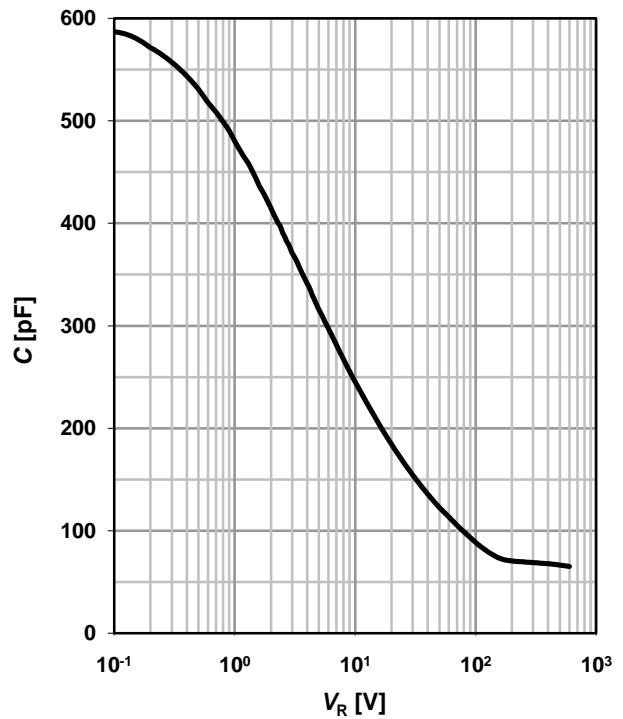
$Z_{thJC} = f(t_p)$

parameter:  $D = t_p/T$



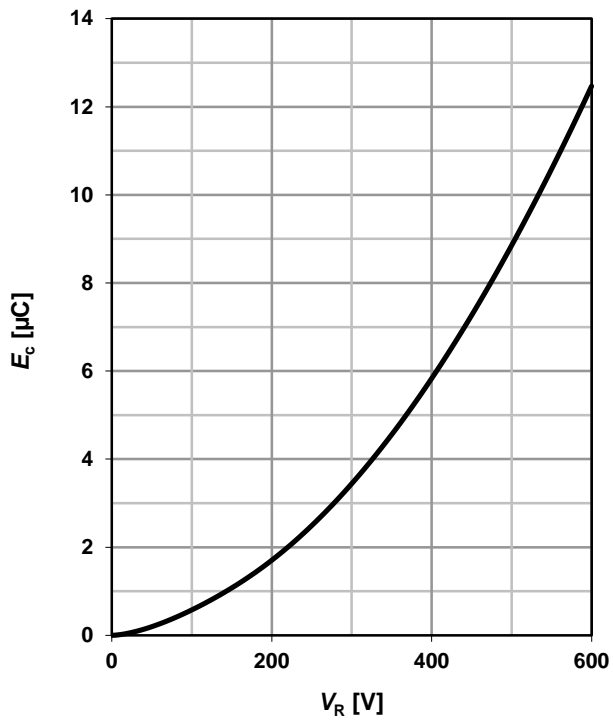
**8 Typ. capacitance vs. reverse voltage**

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



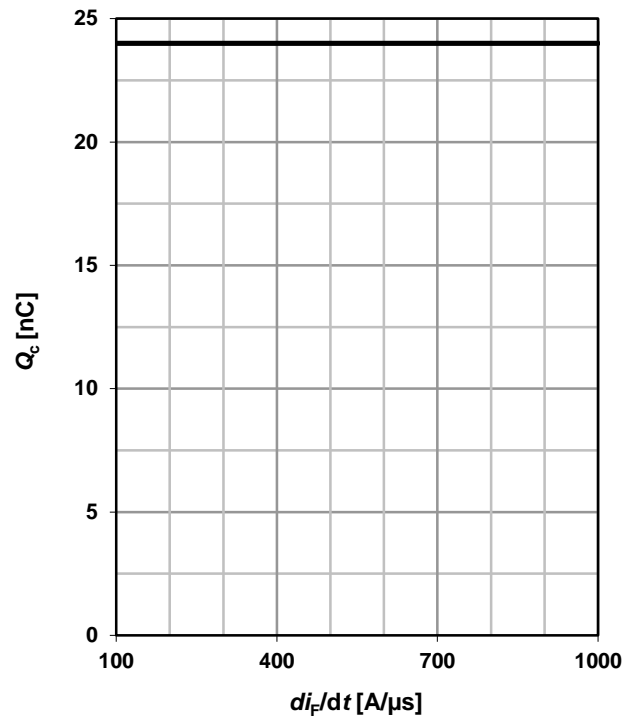
9 Typ. C stored energy

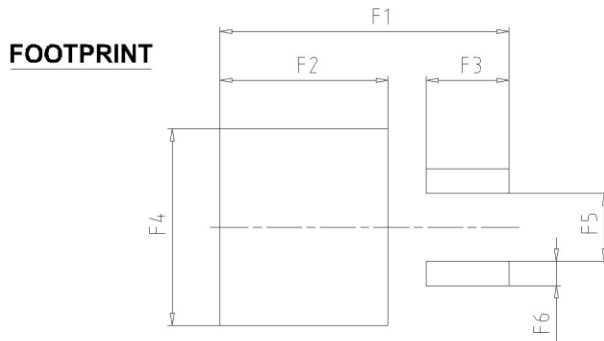
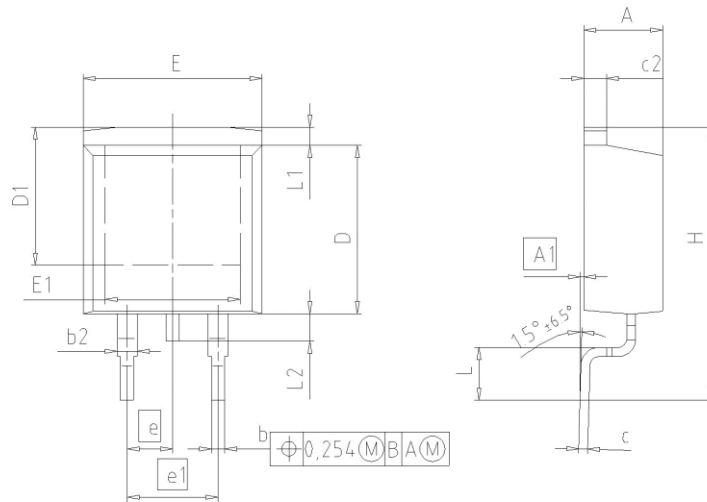
$$E_C = f(V_R)$$



10 Typ. Capacitive charge vs. current slope

$$Q_C = f(di_F/dt)^5; T_j = 150 \text{ °C}; I_F \leq I_{F,max}$$



**PG-TO263-3-2 (D<sup>2</sup>PAK): 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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