

thinQ!™ SiC Schottky Diode

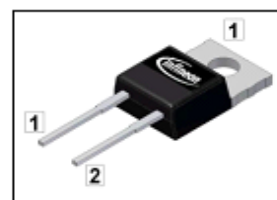
Features

- 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 JEDEC¹⁾ for target applications
- Optimized for high temperature operation
- Lowest Figure of Merit Q_C/I_F

Product Summary

V_{DC}	1200	V
Q_C	18	nC
$I_F; T_C < 130\text{ °C}$	5	A

PG-TO220-2



thinQ!™ Diode designed for fast switching applications like:

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

Type	Package	Marking	Pin 1	Pin 2
IDH05S120	PG-TO220-2	D05S120	C	A

Maximum ratings

Parameter	Symbol	Conditions	Value	Unit
Continuous forward current	I_F	$T_C < 130\text{ °C}$	5	A
Surge non-repetitive forward current, sine halfwave	$I_{F,SM}$	$T_C = 25\text{ °C}, t_p = 10\text{ ms}$	29	
		$T_C = 150\text{ °C}, t_p = 10\text{ ms}$	25	
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25\text{ °C}, t_p = 10\text{ μs}$	110	
i^2t value	$\int i^2 dt$	$T_C = 25\text{ °C}, t_p = 10\text{ ms}$	4	A^2s
		$T_C = 150\text{ °C}, t_p = 10\text{ ms}$	3	
Repetitive peak reverse voltage	V_{RRM}	$T_j = 25\text{ °C}$	1200	V
Diode dv/dt ruggedness	dv/dt	$V_R = 0 \dots 480\text{ V}$	50	V/ns
Power dissipation	P_{tot}	$T_C = 25\text{ °C}$	75	W
Operating and storage temperature	T_j, T_{stg}		-55 ... 175	°C
Mounting torque		M3 and M3.5 screws	60	Ncm

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Thermal characteristics

Thermal resistance, junction - case	R_{thJC}		-	-	2	K/W
Thermal resistance, junction - ambient	R_{thJA}	Thermal resistance, junction- ambient, leaded	-	-	62	
Soldering temperature, wavesoldering only allowed at leads	T_{solder}	1.6 mm (0.063 in.) from case for 10 s	-	-	260	°C

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

Static characteristics

Diode forward voltage	V_F	$I_F = 5\text{ A}$, $T_j = 25^\circ\text{C}$	-	1.65	1.8	V
		$I_F = 5\text{ A}$, $T_j = 150^\circ\text{C}$	-	2.55	-	
Reverse current	I_R	$V_R = 1200\text{ V}$, $T_j = 25^\circ\text{C}$	-	5	120	μA
		$V_R = 1200\text{ V}$, $T_j = 150^\circ\text{C}$	-	20	1000	

AC characteristics

Total capacitive charge	Q_c	$V_R = 400\text{ V}$, $I_F \leq I_{F,max}$, $di_F/dt = 200\text{ A}/\mu\text{s}$, $T_j = 150^\circ\text{C}$	-	18	-	nC
Switching time ²⁾	t_c	$T_j = 150^\circ\text{C}$	-	-	<10	ns
Total capacitance	C	$V_R = 1\text{ V}$, $f = 1\text{ MHz}$	-	250	-	pF
		$V_R = 300\text{ V}$, $f = 1\text{ MHz}$	-	20	-	
		$V_R = 600\text{ V}$, $f = 1\text{ MHz}$	-	18	-	

¹⁾ J-STD20 and JESD22

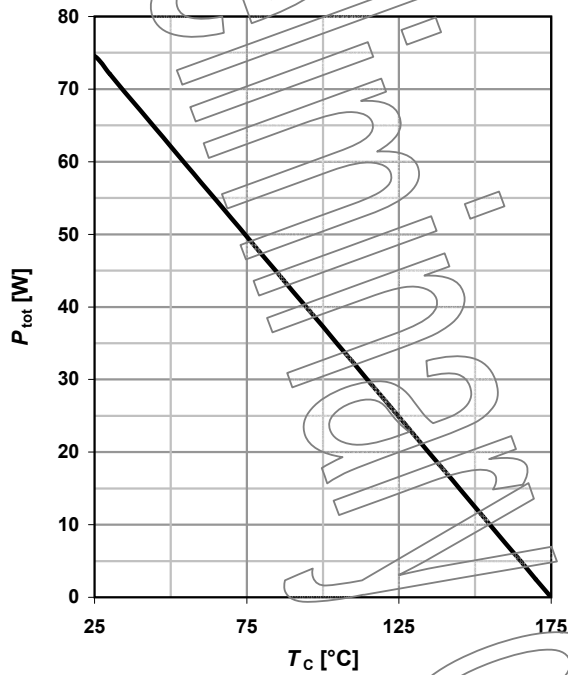
²⁾ t_c is the time constant for the capacitive displacement current waveform (independent from T_j , I_{LOAD} and di/dt), different from t_{rr} which is dependent on T_j , I_{LOAD} and di/dt . No reverse recovery time constant t_{rr} due to absence of minority carrier injection

³⁾ Under worst case Z_{th} conditions.

⁴⁾ Only capacitive charge occurring, guaranteed by design

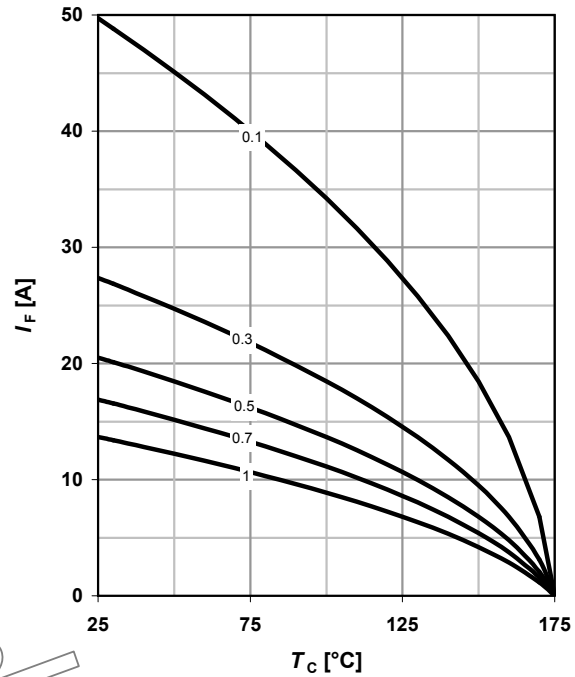
1 Power dissipation

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



2 Diode forward current

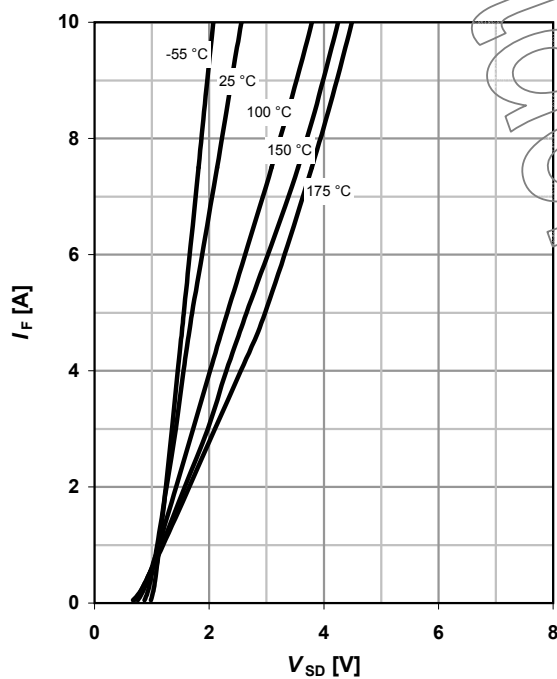
$$I_F = f(T_C)^3; T_j \leq 175 \text{ °C}; \text{ parameter: } D = t_p/T$$



3 Typ. forward characteristic

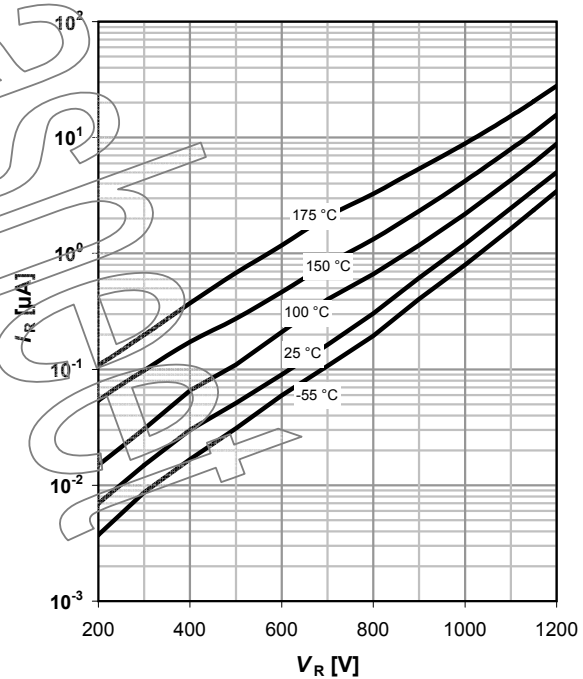
$$I_F = f(V_F); t_p = 400 \text{ } \mu\text{s}$$

parameter: T_j



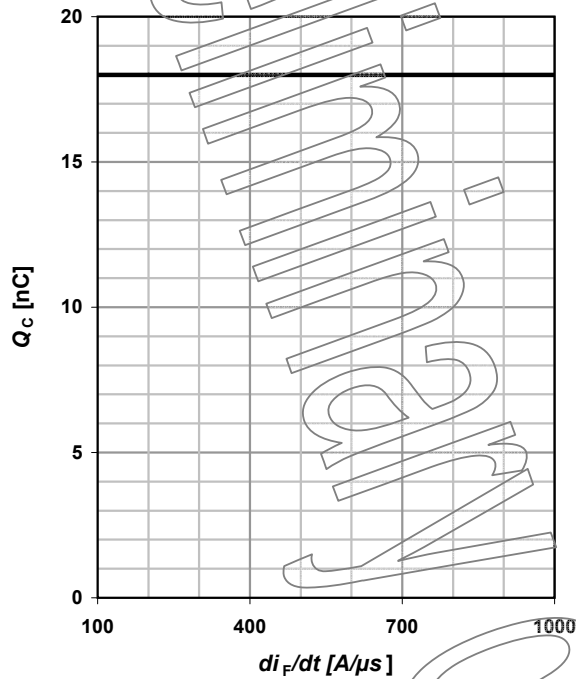
4 Typ. Reverse current vs. reverse voltage

$$I_R = f(V_R)$$



5 Typ. capacitance charge vs. current slope

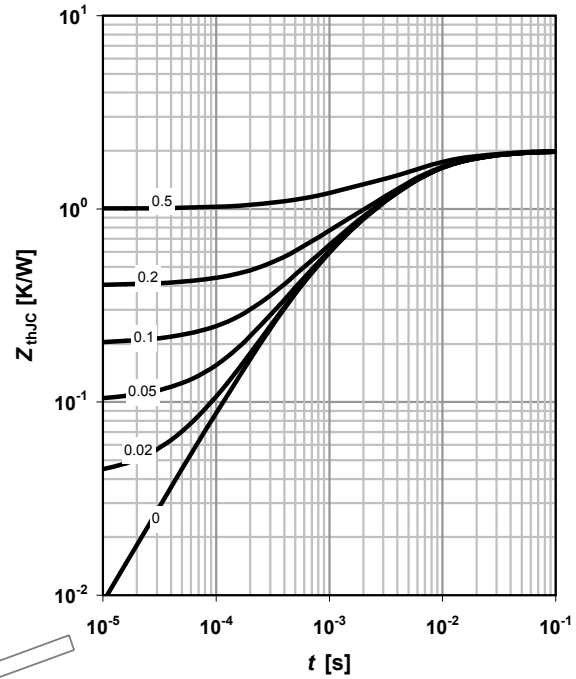
$$Q_C = f\left(\left(\frac{di_F}{dt}\right)^4\right), I_F \leq I_{F,max}$$



6 Transient thermal impedance

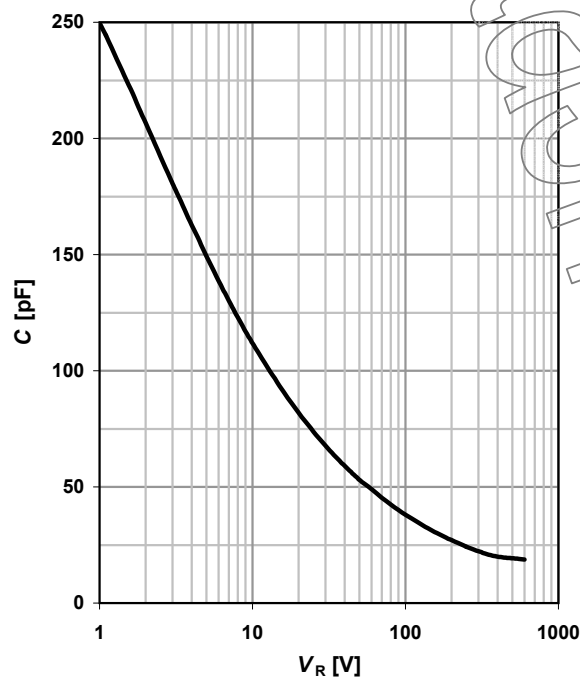
$$Z_{thJC} = f(t_p)$$

$$\text{parameter: } D = t_p/T$$



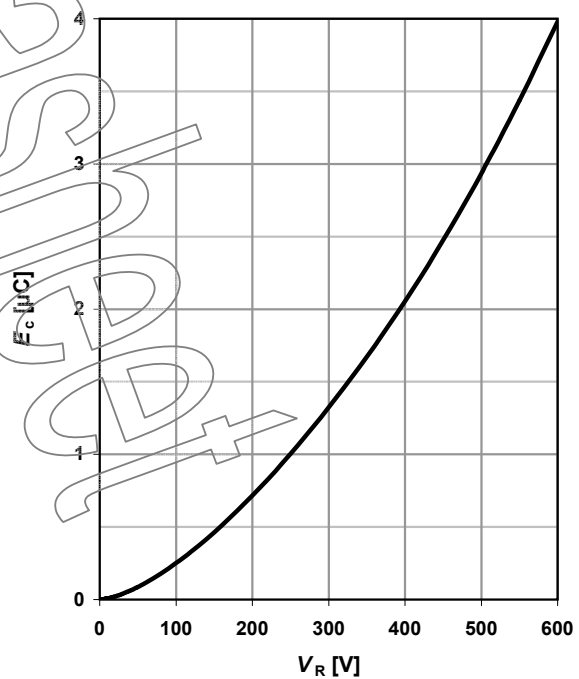
7 Typ. capacitance vs. reverse voltage

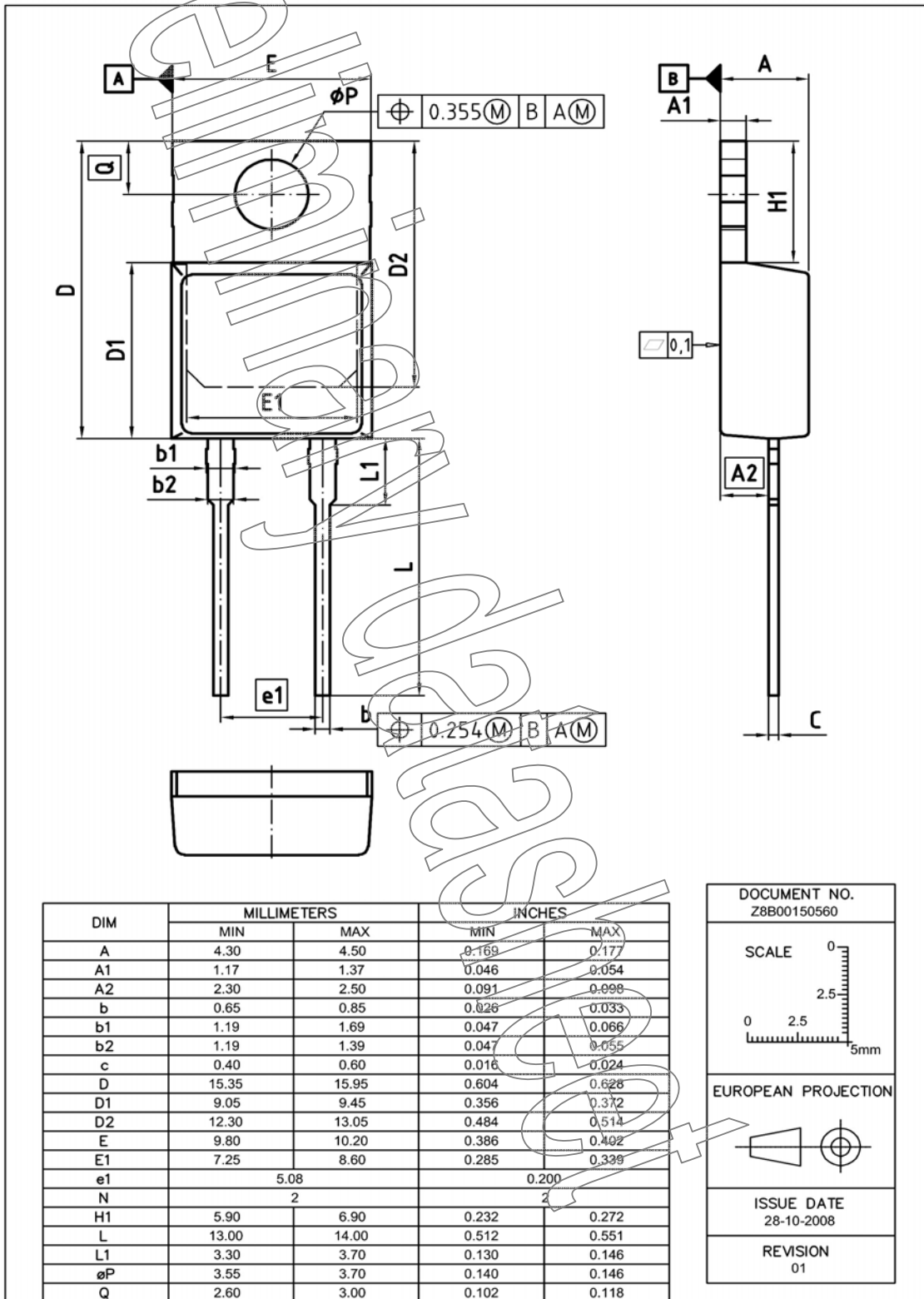
$$C = f(V_R); T_C = 25^\circ\text{C}, f = 1\text{ MHz}$$



8 Typ. C stored energy

$$E_C = f(V_R)$$





Dimensions in mm

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