

Silicon Carbide Schottky Diode

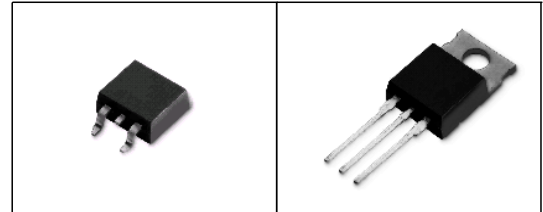
- Revolutionary semiconductor material - Silicon Carbide
- Switching behavior benchmark
- No reverse recovery
- No temperature influence on the switching behavior
- No forward recovery

Product Summary

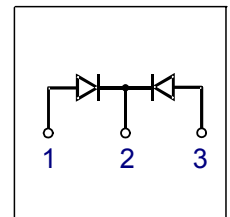
V_{RRM}	300	V
Q_C	23	nC
I_F	2x10	A

P-TO220-3.SMD

P-TO220-3-1.



Type	Package	Ordering Code	Marking
SDP20S30	P-TO220-3-1.	Q67040-S4419	D20S30
SDB20S30	P-TO220-3.SMD	Q67040-S4374	S20S30



Maximum Ratings, at $T_j = 25^\circ\text{C}$, unless otherwise specified (per leg)

Parameter	Symbol	Value	Unit
Continuous forward current, $T_C=100^\circ\text{C}$	I_F	10	A
RMS forward current, $f=50\text{Hz}$	I_{FRMS}	14	
Surge non repetitive forward current, sine halfwave $T_C=25^\circ\text{C}$, $t_p=10\text{ms}$	I_{FSM}	36	
Repetitive peak forward current $T_j=150^\circ\text{C}$, $T_C=100^\circ\text{C}$, $D=0.1$	I_{FRM}	45	
Non repetitive peak forward current $t_p=10\mu\text{s}$, $T_C=25^\circ\text{C}$	I_{FMAX}	100	
i^2t value, $T_C=25^\circ\text{C}$, $t_p=10\text{ms}$	$\int I^2 dt$	6.5	A^2s
Repetitive peak reverse voltage	V_{RRM}	300	V
Surge peak reverse voltage	V_{RSM}	300	
Power dissipation, single diode mode, $T_C=25^\circ\text{C}$	P_{tot}	65	W
Operating and storage temperature	T_j , T_{stg}	-55... +175	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - case (per leg)	R_{thJC}	-	-	2.3	K/W
SMD version, device on PCB:	R_{thJA}				
P-TO263-3-2: @ min. footprint		-	-	62	
P-TO263-3-2: @ 6 cm ² cooling area ¹⁾		-	35	-	

Electrical Characteristics, at $T_j = 25\text{ °C}$, unless otherwise specified (per leg)

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Diode forward voltage	V_F				V
$I_F=10A, T_j=25^{\circ}C$		-	1.5	1.7	
$I_F=10A, T_j=150^{\circ}C$		-	1.5	1.9	
Reverse current	I_R				μA
$V_R=300V, T_j=25^{\circ}C$		-	15	200	
$V_R=300V, T_j=150^{\circ}C$		-	20	1000	

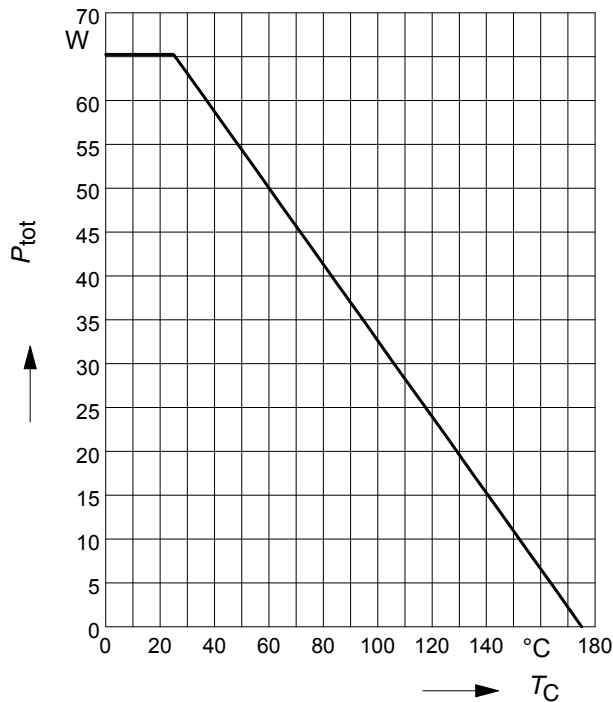
¹⁾Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical without blown air.

Electrical Characteristics, at $T_j = 25^\circ\text{C}$, unless otherwise specified (per leg)

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Total capacitive charge ¹⁾ $V_R=200V, I_F=10A, di_F/dt=-200A/\mu s, T_j=150^{\circ}C$	Q_C	-	23	-	nC
Switching time ²⁾ $V_R=200V, I_F=10A, di_F/dt=-200A/\mu s, T_j=150^{\circ}C$	t_{rr}	-	n.a.	-	ns
Total capacitance $V_R=0V, T_C=25^{\circ}C, f=1MHz$ $V_R=150V, T_C=25^{\circ}C, f=1MHz$ $V_R=300V, T_C=25^{\circ}C, f=1MHz$	C	- - -	600 55 40	- - -	pF

1 Power dissipation (per leg)

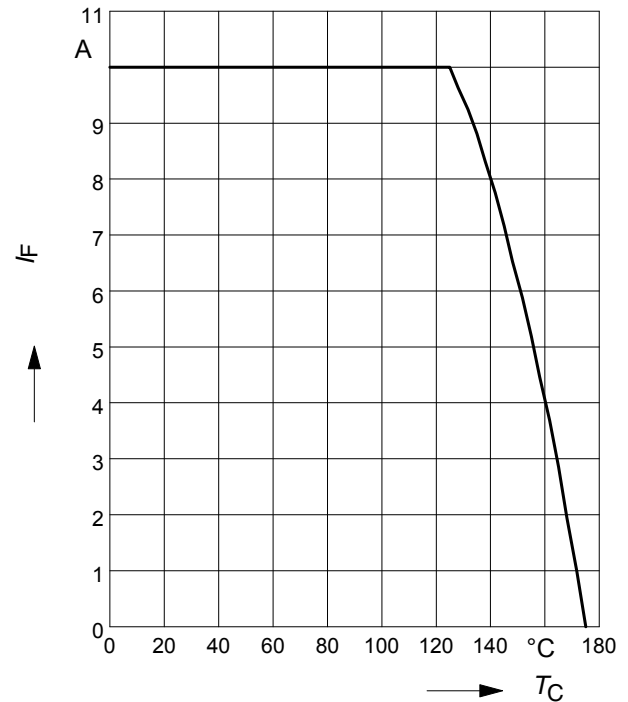
$$P_{\text{tot}} = f(T_C)$$



2 Diode forward current (per leg)

$$I_F = f(T_C)$$

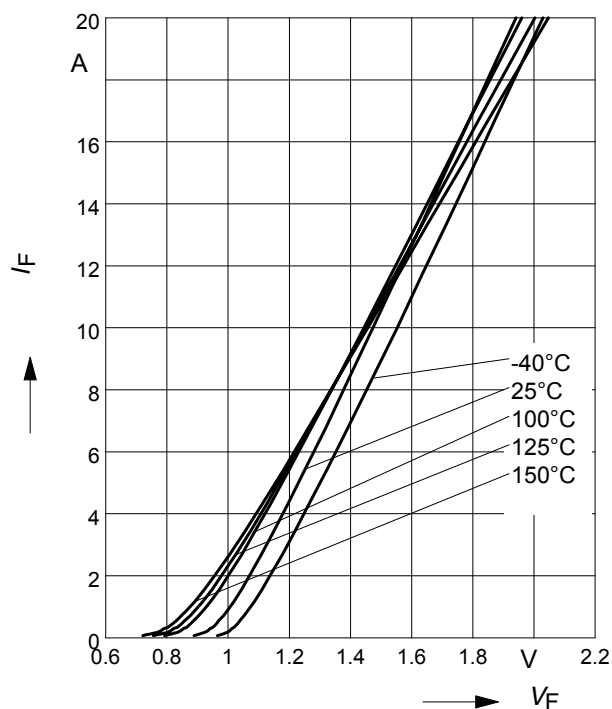
parameter: $T_j \leq 175$ °C



3 Typ. forward characteristic (per leg)

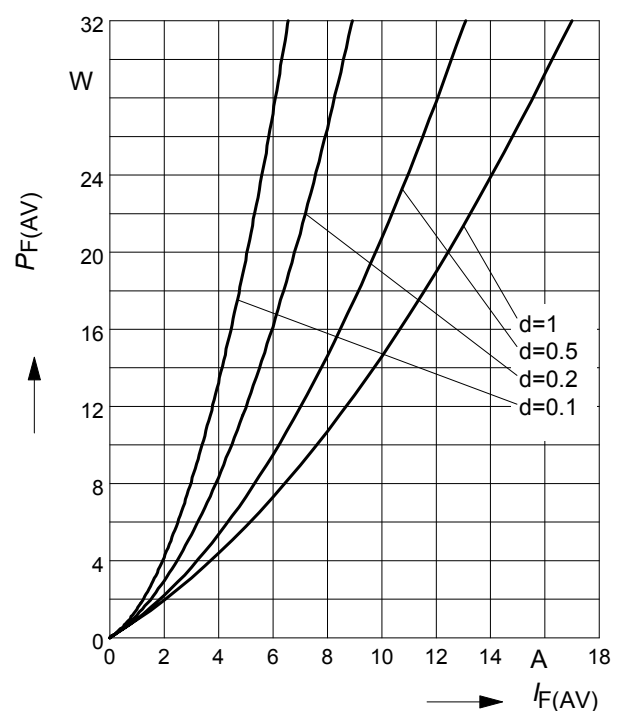
$$I_F = f(V_F)$$

parameter: T_j , $t_p = 350$ μs



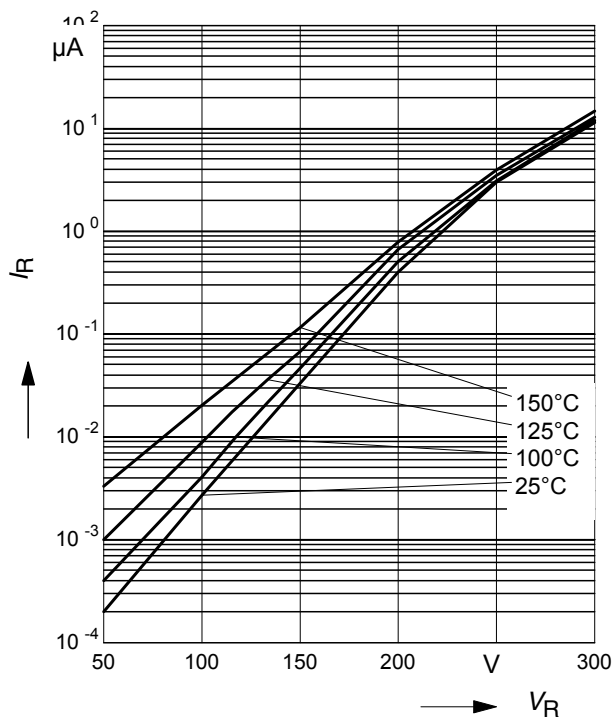
4 Typ. forward power dissipation vs. average forward current (per leg)

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



5 Typ. reverse current vs. reverse voltage

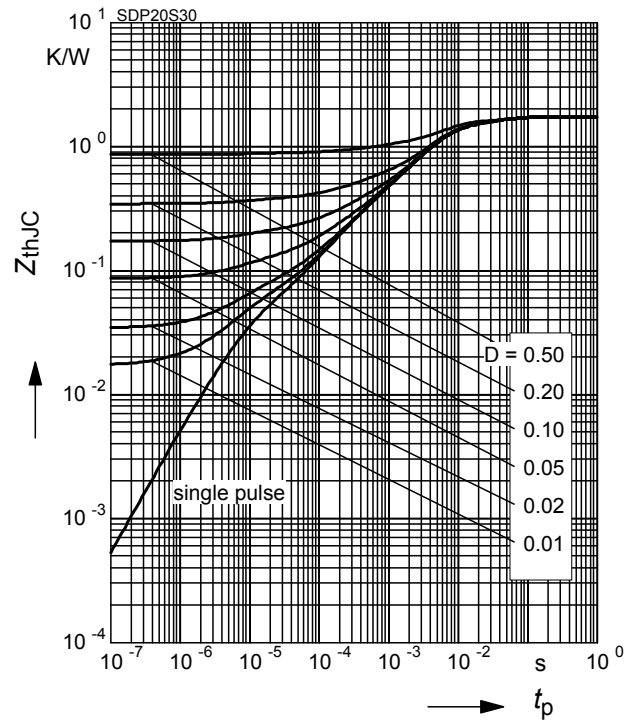
(per leg) $I_R = f(V_R)$



6 Transient thermal impedance (per leg)

$Z_{thJC} = f(t_p)$

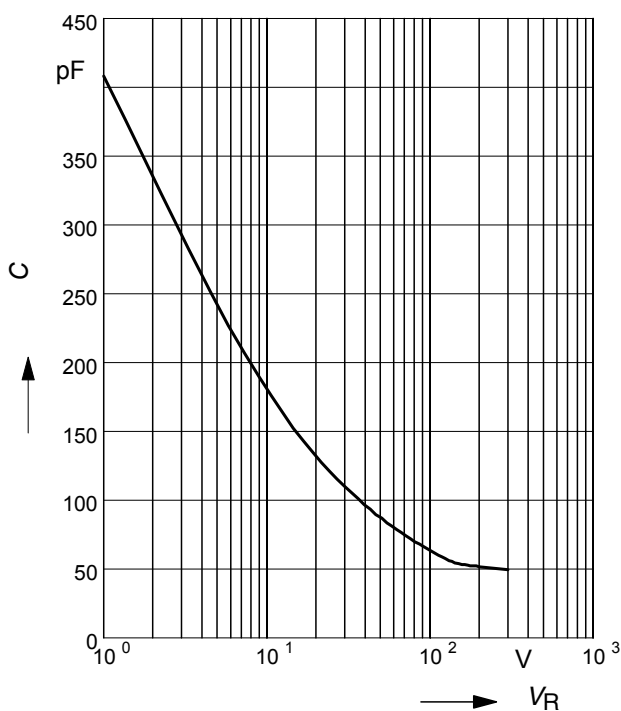
parameter : $D = t_p/T$



7 Typ. capacitance vs. reverse voltage

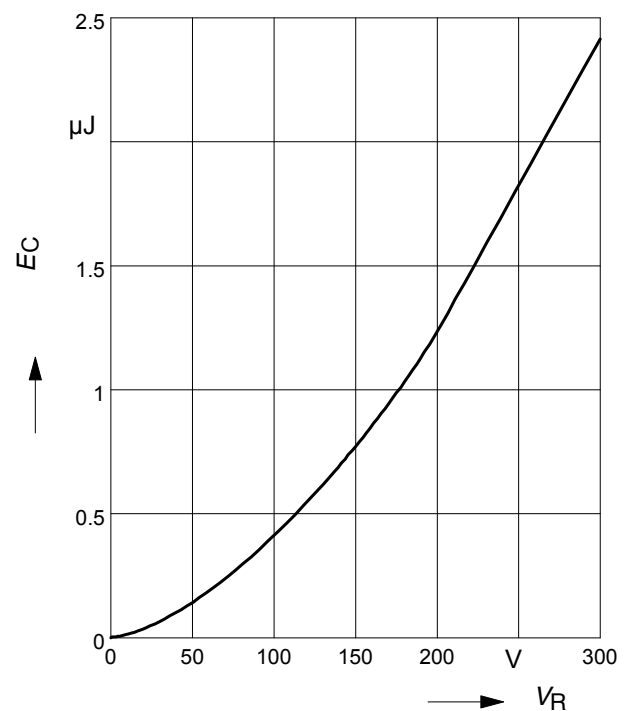
(per leg) $C = f(V_R)$

parameter: $T_C = 25^\circ C$, $f = 1$ MHz



8 Typ. C stored energy (per leg)

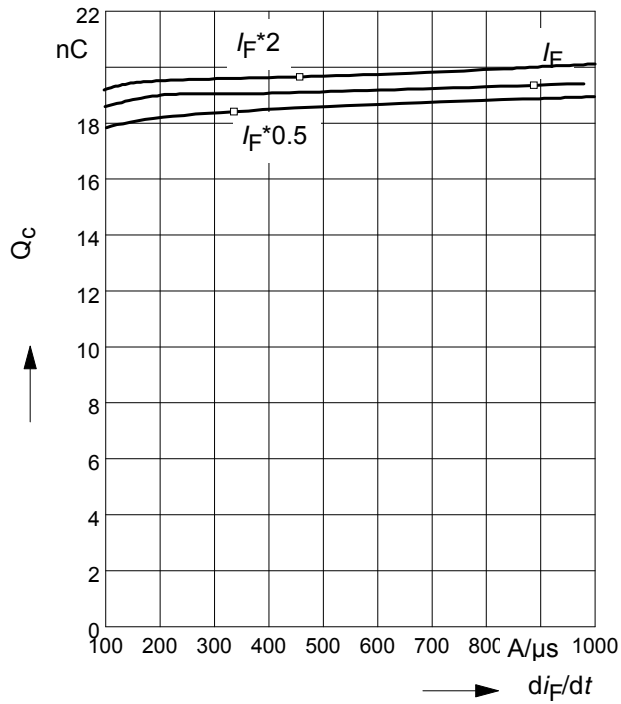
$E_C = f(V_R)$



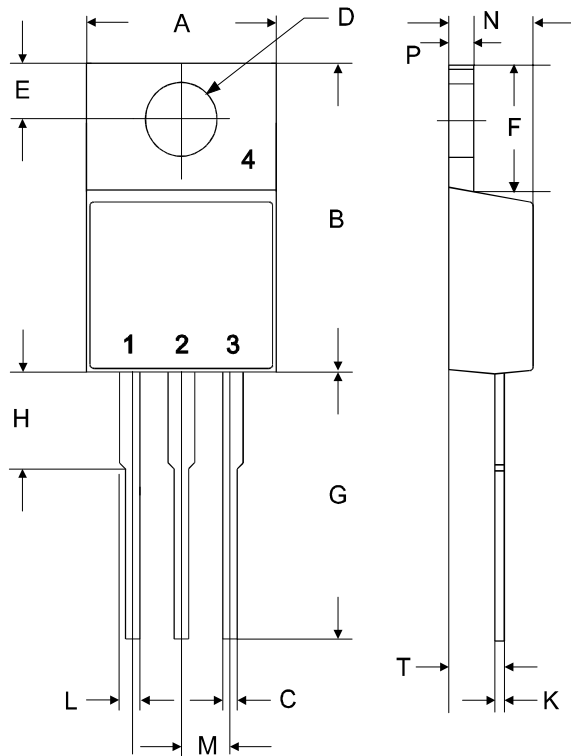
9 Typ. capacitive charge vs. current slope

(per leg) $Q_c = f(di_F/dt)$

parameter: $T_j = 150\text{ }^\circ\text{C}$

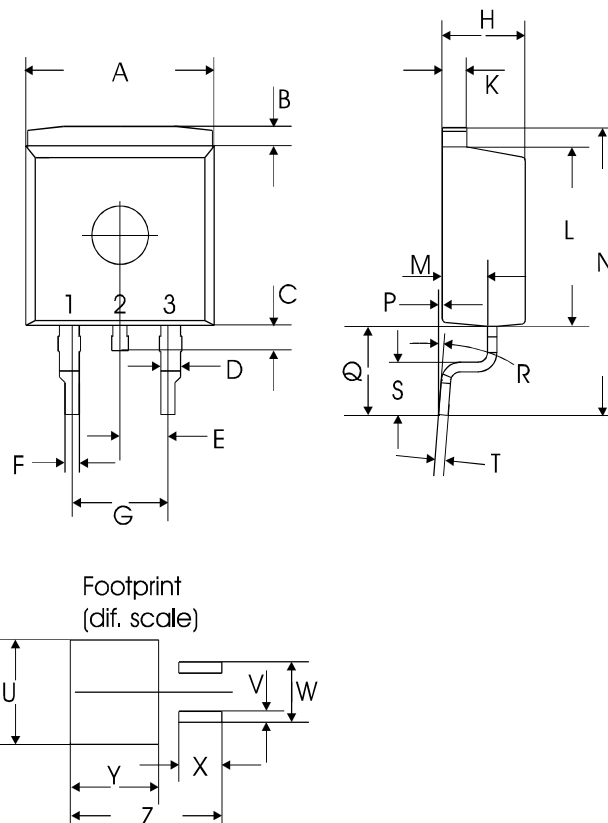


P-TO220-3-1



symbol	dimensions			
	[mm]		[inch]	
	min	max	min	max
A	9.70	10.30	0.3819	0.4055
B	14.88	15.95	0.5858	0.6280
C	0.65	0.86	0.0256	0.0339
D	3.55	3.89	0.1398	0.1531
E	2.60	3.00	0.1024	0.1181
F	6.00	6.80	0.2362	0.2677
G	13.00	14.00	0.5118	0.5512
H	4.35	4.75	0.1713	0.1870
K	0.38	0.65	0.0150	0.0256
L	0.95	1.32	0.0374	0.0520
M	2.54 typ.		0.1 typ.	
N	4.30	4.50	0.1693	0.1772
P	1.17	1.40	0.0461	0.0551
T	2.30	2.72	0.0906	0.1071

TO-220-3-45 (P-TO220SMD)



symbol	dimensions			
	[mm]		[inch]	
	min	max	min	max
A	9.80	10.00	0.3858	0.3937
B	1.3 typ.		0.0512 typ.	
C	1.25	1.75	0.0492	0.0689
D	0.95	1.15	0.0374	0.0453
E	2.54 typ.		0.1 typ.	
F	0.72	0.85	0.0283	0.0335
G	5.08 typ.		0.2 typ.	
H	4.30	4.50	0.1693	0.1772
K	1.28	1.40	0.0504	0.0551
L	9.00	9.40	0.3543	0.3701
M	2.30	2.50	0.0906	0.0984
N	14.1 typ.		0.5551 typ.	
P	0.00	0.20	0.0000	0.0079
Q	3.30	3.90	0.1299	0.1535
R	8° max		8° max	
S	1.70	2.50	0.0669	0.0984
T	0.50	0.65	0.0197	0.0256
U	10.8 typ.		0.4252 typ.	
V	1.35 typ.		0.0532 typ.	
W	6.43 typ.		0.2532 typ.	
X	4.60 typ.		0.1811 typ.	
Y	9.40 typ.		0.3701 typ.	
Z	16.15 typ.		0.6358 typ.	

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