

Silicon Carbide Schottky Diode

- Worlds first 600V Schottky diode
- Revolutionary semiconductor material - Silicon Carbide
- Switching behavior benchmark
- No reverse recovery
- No temperature influence on the switching behavior
- Ideal diode for Power Factor Correction up to 800W¹⁾
- No forward recovery

Product Summary

V_{RRM}	600	V
Q_C	13	nC
I_F	4	A



Type	Package	Ordering Code	Marking	Pin 1	PIN 2	PIN 3
SDP04S60	P-TO220-3-1.	Q67040-S4369	D04S60	n.c.	C	A
SDD04S60	P-TO252-3-1.	Q67040-S4368	D04S60	n.c.	A	C
SDT04S60	P-TO220-2-2.	Q67040-S4445	D04S60	C	A	

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

Parameter	Symbol	Value	Unit
Continuous forward current, $T_C=100^\circ\text{C}$	I_F	4	A
RMS forward current, $f=50\text{Hz}$	I_{FRMS}	5.6	
Surge non repetitive forward current, sine halfwave $T_C=25^\circ\text{C}$, $t_p=10\text{ms}$	I_{FSM}	12.5	
Repetitive peak forward current $T_j=150^\circ\text{C}$, $T_C=100^\circ\text{C}$, $D=0.1$	I_{FRM}	18	
Non repetitive peak forward current $t_p=10\mu\text{s}$, $T_C=25^\circ\text{C}$	I_{FMAX}	40	
i^2t value, $T_C=25^\circ\text{C}$, $t_p=10\text{ms}$	$\int i^2 dt$	0.78	A ² s
Repetitive peak reverse voltage	V_{RRM}	600	V
Surge peak reverse voltage	V_{RSM}	600	
Power dissipation, $T_C=25^\circ\text{C}$	P_{tot}	36.5	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	R_{thJC}	-	-	4.1	K/W
Thermal resistance, junction - ambient, leaded	R_{thJA}	-	-	62	
SMD version, device on PCB:	R_{thJA}				
P-TO263-3-2: @ min. footprint		-	-	62	
P-TO263-3-2: @ 6 cm ² cooling area ²⁾		-	35	-	
P-TO252-3-1: @ min. footprint		-	-	75	
P-TO252-3-1: @ 6 cm ² cooling area ²⁾		-	-	50	

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Diode forward voltage	V_F				V
$I_F=4A, T_j=25\text{ °C}$		-	1.7	1.9	
$I_F=4A, T_j=150\text{ °C}$		-	2	2.4	
Reverse current	I_R				μA
$V_R=600V, T_j=25\text{ °C}$		-	15	200	
$V_R=600V, T_j=150\text{ °C}$		-	40	1000	

¹CCM, $V_{IN} = 85VAC$, $T_j = 150\text{ °C}$, $T_C = 100\text{ °C}$, $\eta = 93\%$, $\Delta I_{IN} = 30\%$

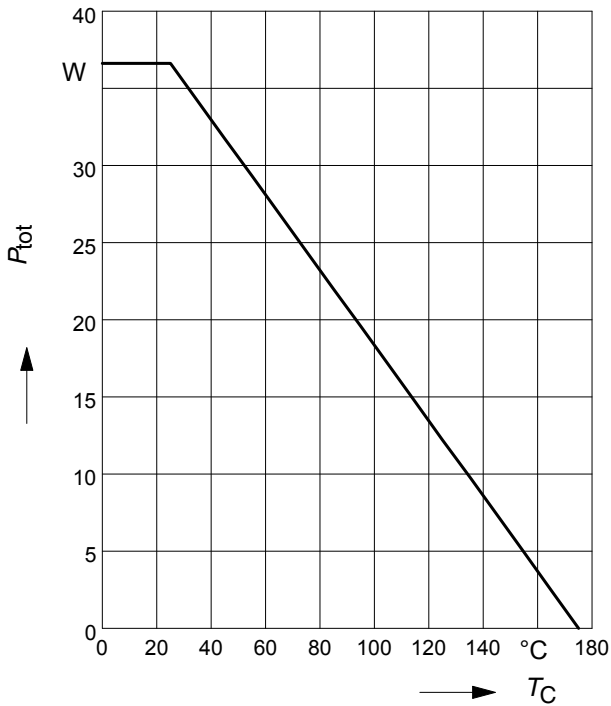
²Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical without blown air.

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Total capacitive charge $V_R=400\text{V}$, $I_F=4\text{A}$, $di_F/dt=200\text{A}/\mu\text{s}$, $T_j=150^\circ\text{C}$	Q_C	-	13	-	nC
Switching time $V_R=400\text{V}$, $I_F=4\text{A}$, $di_F/dt=200\text{A}/\mu\text{s}$, $T_j=150^\circ\text{C}$	t_{rr}	-	n.a.	-	ns
Total capacitance $V_R=0\text{V}$, $T_C=25^\circ\text{C}$, $f=1\text{MHz}$ $V_R=300\text{V}$, $T_C=25^\circ\text{C}$, $f=1\text{MHz}$ $V_R=600\text{V}$, $T_C=25^\circ\text{C}$, $f=1\text{MHz}$	C	-	150 10 7	-	pF

1 Power dissipation

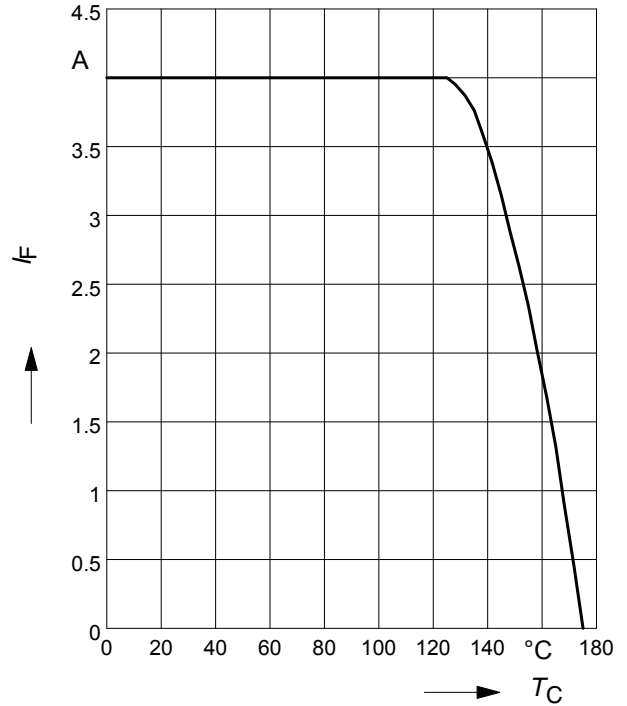
$P_{tot} = f(T_C)$



2 Diode forward current

$I_F = f(T_C)$

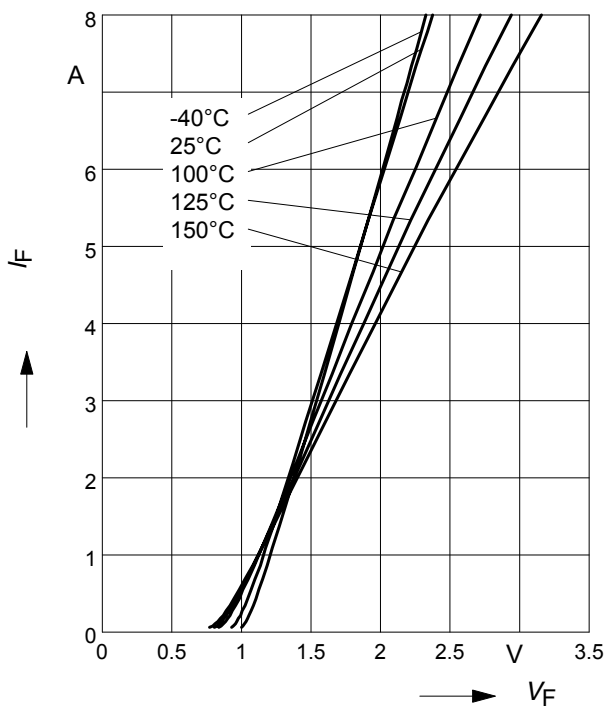
parameter: $T_j \leq 175^\circ\text{C}$



3 Typ. forward characteristic

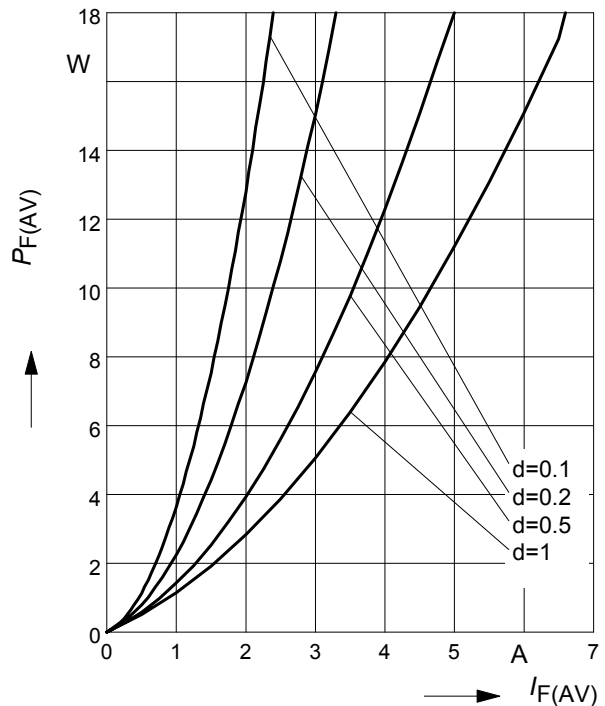
$I_F = f(V_F)$

parameter: $T_j, t_p = 350 \mu\text{s}$



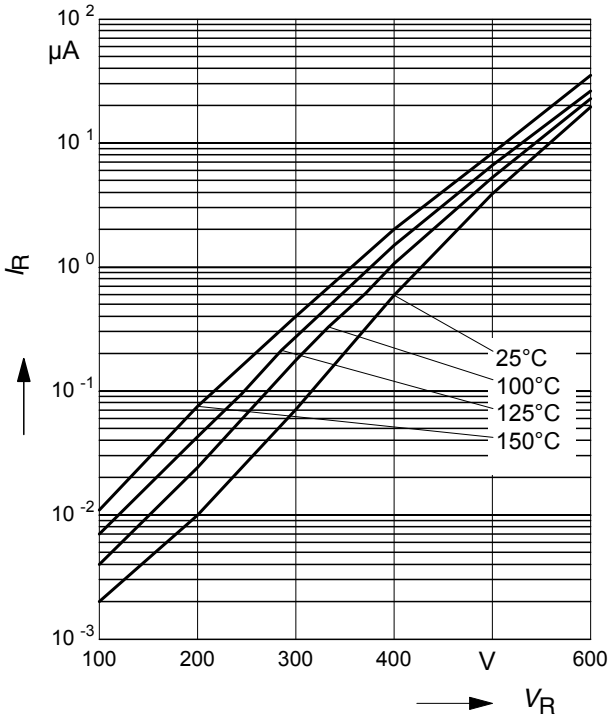
4 Typ. forward power dissipation vs. average forward current

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



5 Typ. reverse current vs. reverse voltage

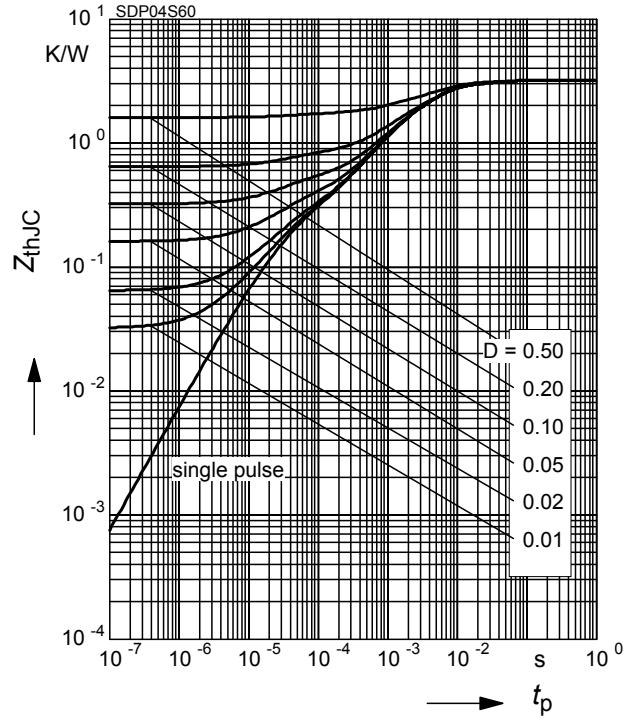
$$I_R = f(V_R)$$



6 Transient thermal impedance

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

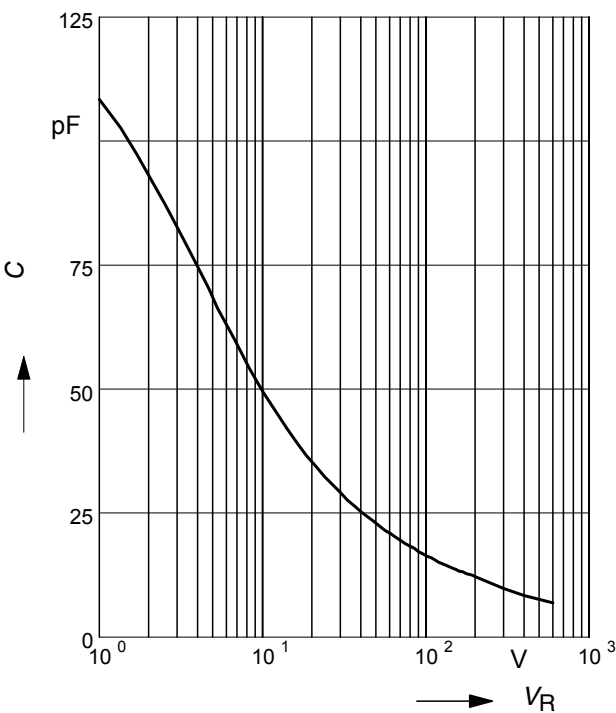
parameter : $D = t_p/T$



7 Typ. capacitance vs. reverse voltage

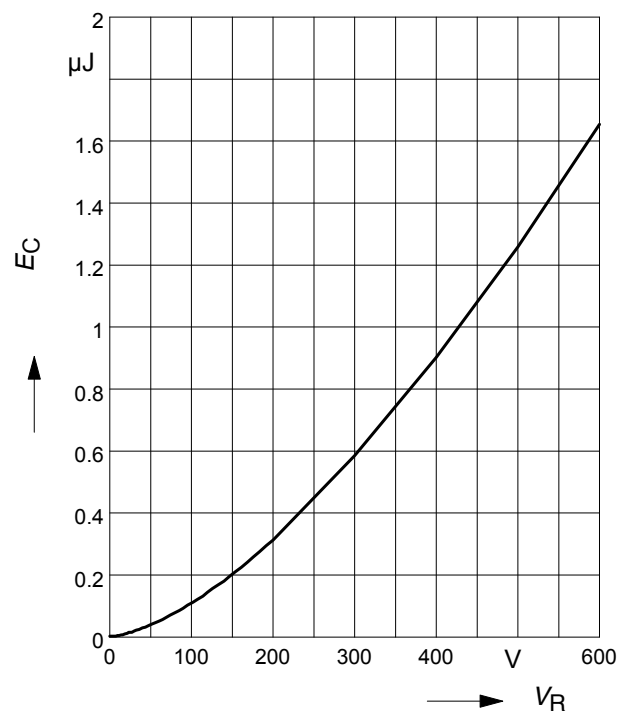
$$C = f(V_R)$$

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



8 Typ. C stored energy

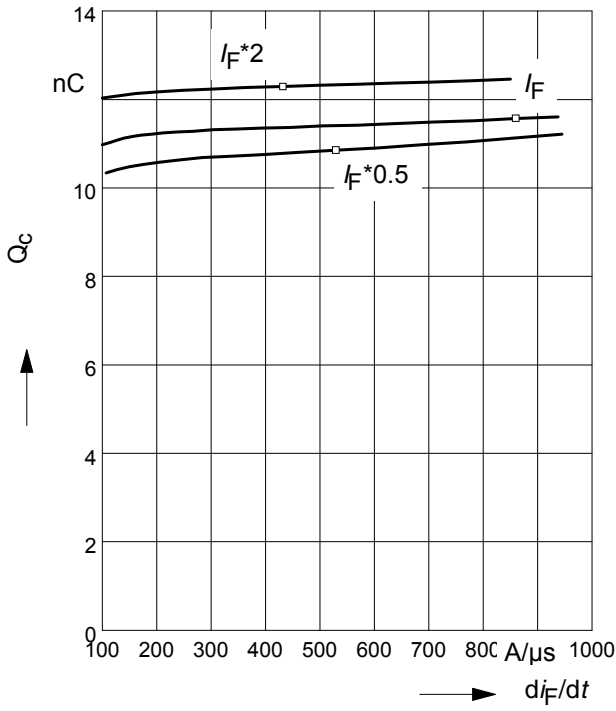
$$E_C = f(V_R)$$

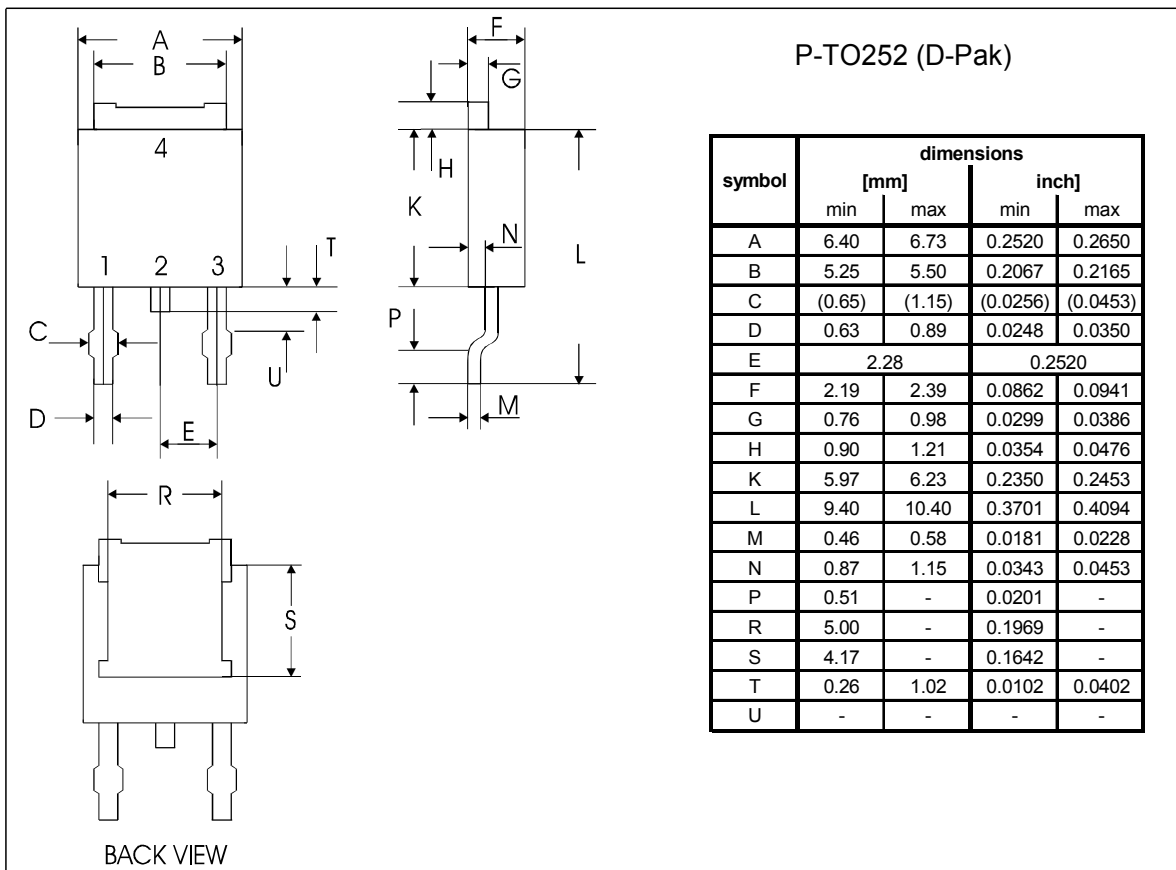
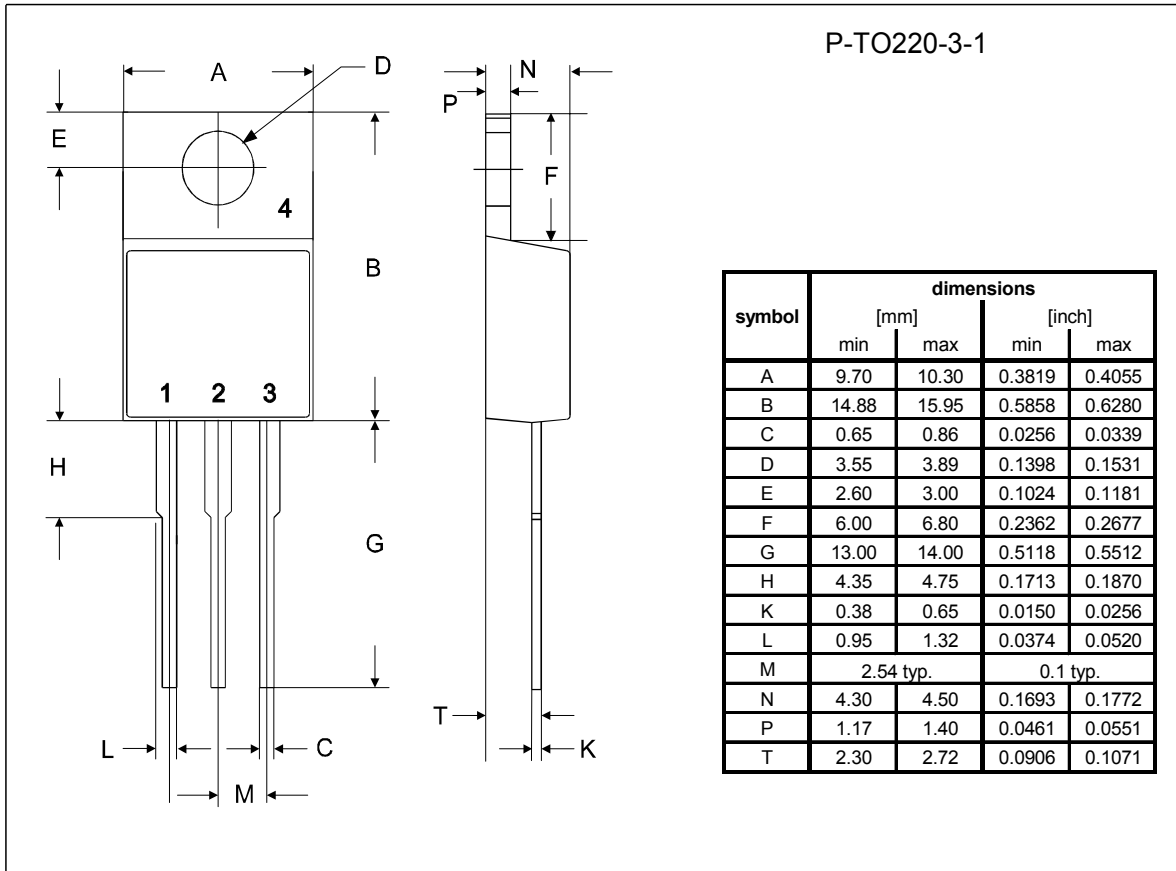


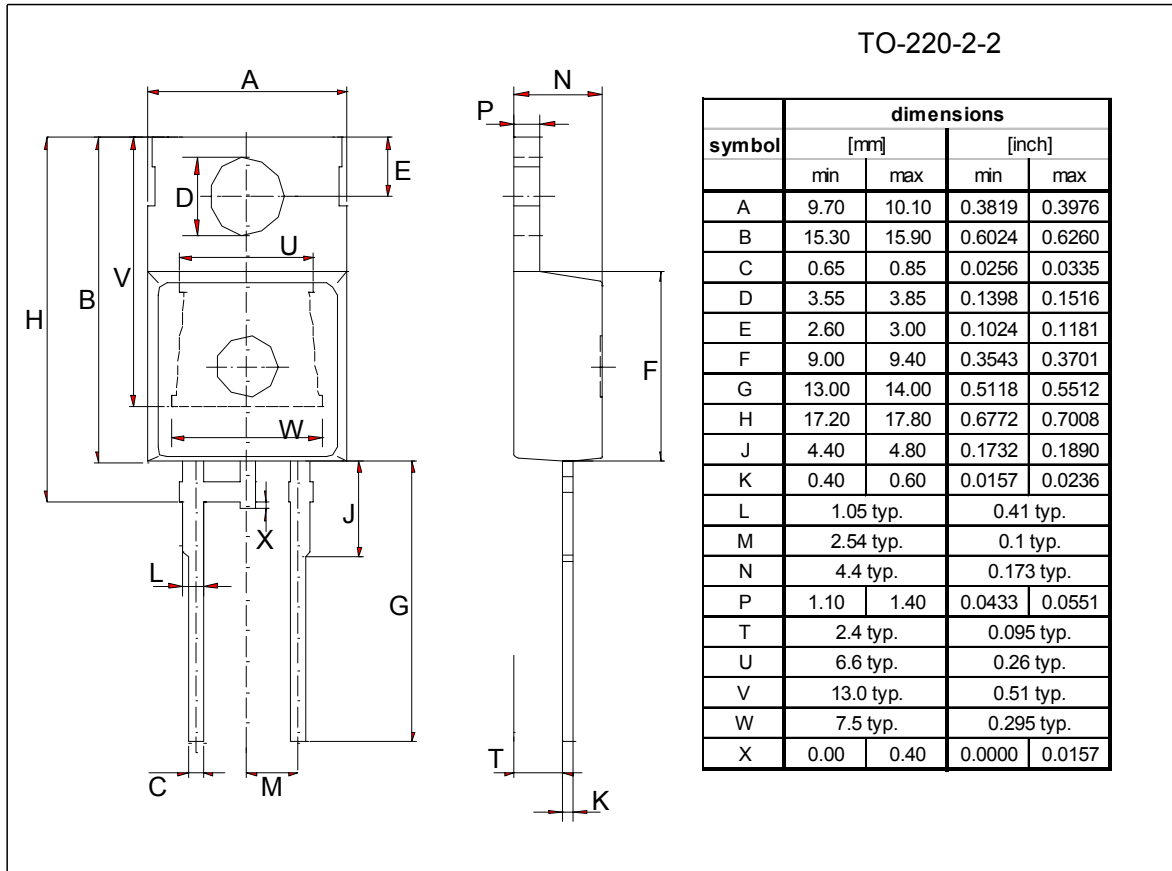
9 Typ. capacitive charge vs. current slope

$$Q_C = f(di_F/dt)$$

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







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