

### 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 1200W<sup>F</sup>)
- No forward recovery

### Product Summary

$V_{RRM}$	600	V
$Q_C$	21	nC
$I_F$	6	A



Type	Package	Ordering Code	Marking	Pin 1	PIN 2	PIN 3
SDP06S60	P-TO220-3-1.	Q67040-S4371	D06S60	n.c.	C	A
SDB06S60	P-TO220-3.SMD	Q67040-S4370	D06S60	n.c.	C	A
SDT06S60	P-TO220-2-2.	Q67040-S4446	D06S60	C	A	

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

Parameter	Symbol	Value	Unit
Continuous forward current, $T_C=100^\circ\text{C}$	$I_F$	6	A
RMS forward current, $f=50\text{Hz}$	$I_{FRMS}$	8.4	
Surge non repetitive forward current, sine halfwave $T_C=25^\circ\text{C}$ , $t_p=10\text{ms}$	$I_{FSM}$	21.5	
Repetitive peak forward current $T_j=150^\circ\text{C}$ , $T_C=100^\circ\text{C}$ , $D=0.1$	$I_{FRM}$	28	
Non repetitive peak forward current $t_p=10\mu\text{s}$ , $T_C=25^\circ\text{C}$	$I_{FMAX}$	60	
$i^2t$ value, $T_C=25^\circ\text{C}$ , $t_p=10\text{ms}$	$\int I^2 dt$	2.3	A <sup>2</sup> s
Repetitive peak reverse voltage	$V_{RRM}$	600	V
Surge peak reverse voltage	$V_{RSM}$	600	
Power dissipation, $T_C=25^\circ\text{C}$	$P_{tot}$	57.6	W
Operating and storage temperature	$T_j, T_{stg}$	-55... +175	$^\circ\text{C}$

**Thermal Characteristics**

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Characteristics</b>					
Thermal resistance, junction - case	$R_{thJC}$	-	-	2.6	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 <sup>2</sup> cooling area <sup>F)</sup>		-	35	-	
P-TO252-3-1: @ min. footprint		-	-	75	
P-TO252-3-1: @ 6 cm <sup>2</sup> cooling area <sup>F)</sup>		-	-	50	

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Static Characteristics</b>					
Diode forward voltage	$V_F$				V
$I_F=6\text{A}, T_j=25\text{ }^\circ\text{C}$		-	1.5	1.7	
$I_F=6\text{A}, T_j=150\text{ }^\circ\text{C}$		-	1.7	2.1	
Reverse current	$I_R$				$\mu\text{A}$
$V_R=600\text{V}, T_j=25\text{ }^\circ\text{C}$		-	20	200	
$V_R=600\text{V}, T_j=150\text{ }^\circ\text{C}$		-	50	1000	

<sup>1</sup>CCM,  $V_{IN}=85\text{VAC}$ ,  $T_j=150\text{ }^\circ\text{C}$ ,  $T_C=100\text{ }^\circ\text{C}$ ,  $\eta=93\%$ ,  $\Delta I_{IN}=30\%$

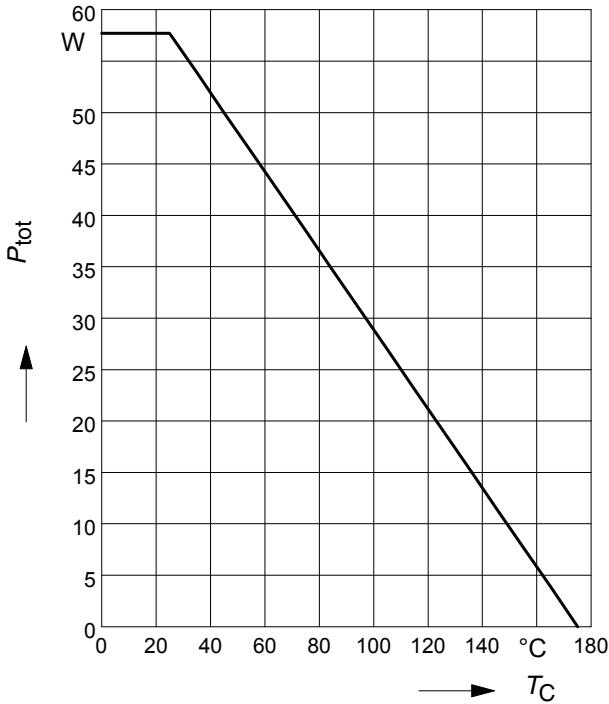
<sup>2</sup>Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical without blown air.

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>AC Characteristics</b>					
Total capacitive charge $V_R=400\text{V}$ , $I_F=6\text{A}$ , $di_F/dt=200\text{A}/\mu\text{s}$ , $T_j=150\text{ }^\circ\text{C}$	$Q_C$	-	21	-	nC
Switching time $V_R=400\text{V}$ , $I_F=6\text{A}$ , $di_F/dt=200\text{A}/\mu\text{s}$ , $T_j=150\text{ }^\circ\text{C}$	$t_{rr}$	-	n.a.	-	ns
Total capacitance $V_R=0\text{V}$ , $T_C=25\text{ }^\circ\text{C}$ , $f=1\text{MHz}$ $V_R=300\text{V}$ , $T_C=25\text{ }^\circ\text{C}$ , $f=1\text{MHz}$ $V_R=600\text{V}$ , $T_C=25\text{ }^\circ\text{C}$ , $f=1\text{MHz}$	$C$	-	300 20 15	-	pF

**1 Power dissipation**

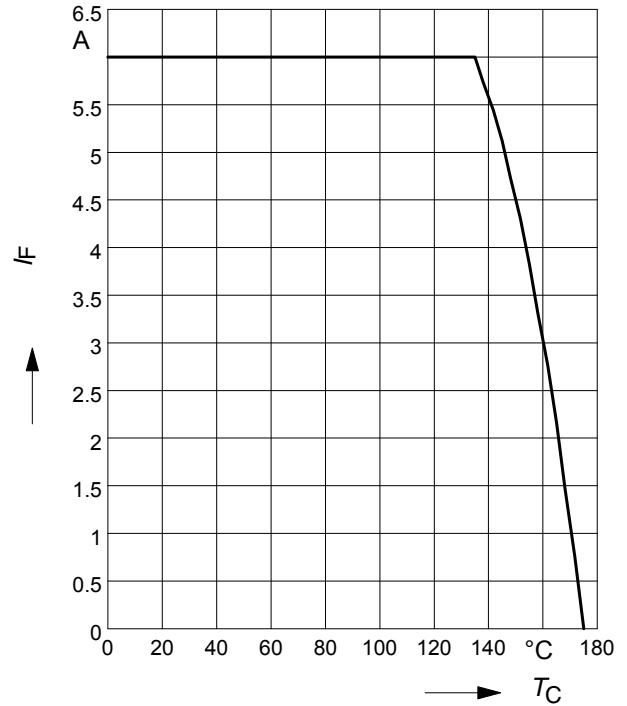
$P_{tot} = f(T_C)$



**2 Diode forward current**

$I_F = f(T_C)$

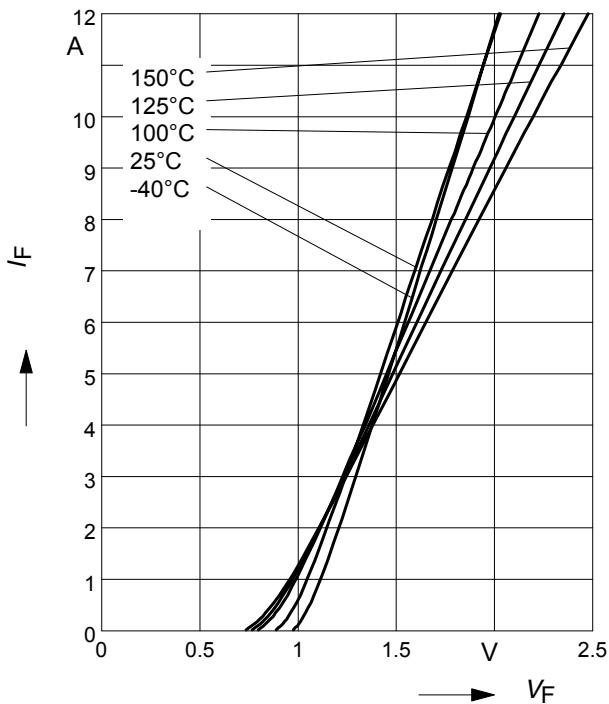
parameter:  $T_j \leq 175^\circ\text{C}$



**3 Typ. forward characteristic**

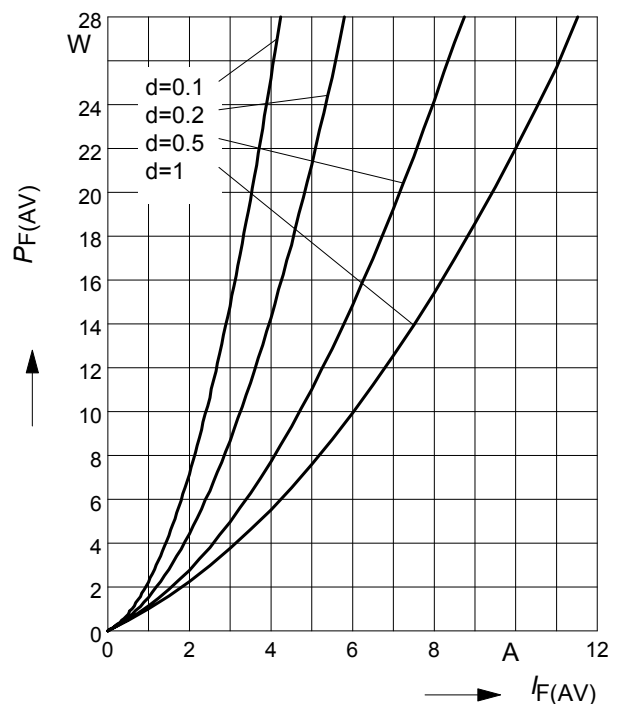
$I_F = f(V_F)$

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



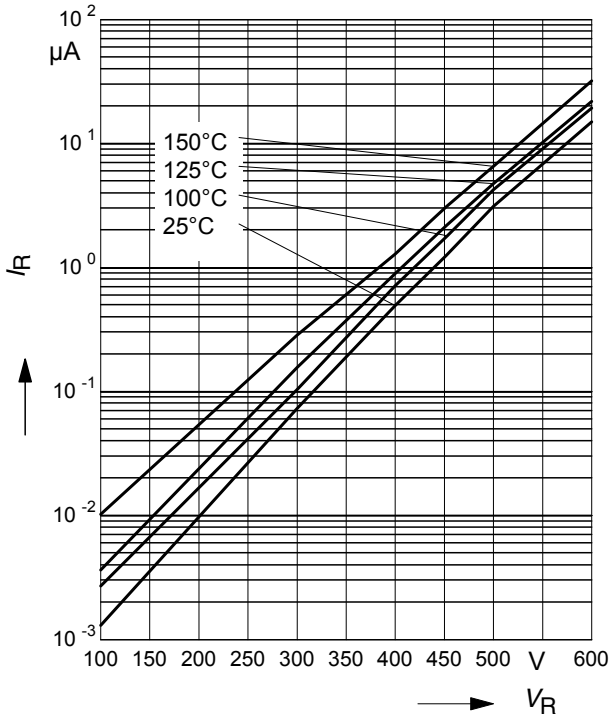
**4 Typ. forward power dissipation vs. average forward current**

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



**5 Typ. reverse current vs. reverse voltage**

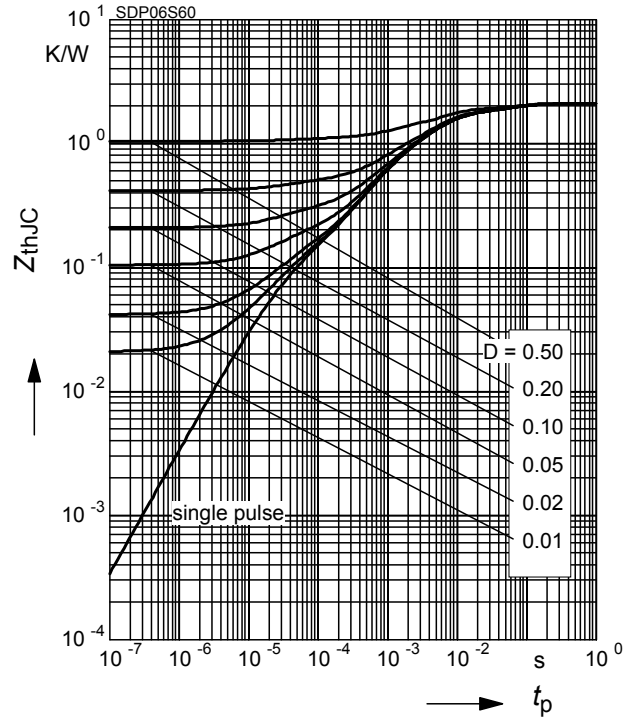
$$I_R = f(V_R)$$



**6 Transient thermal impedance**

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

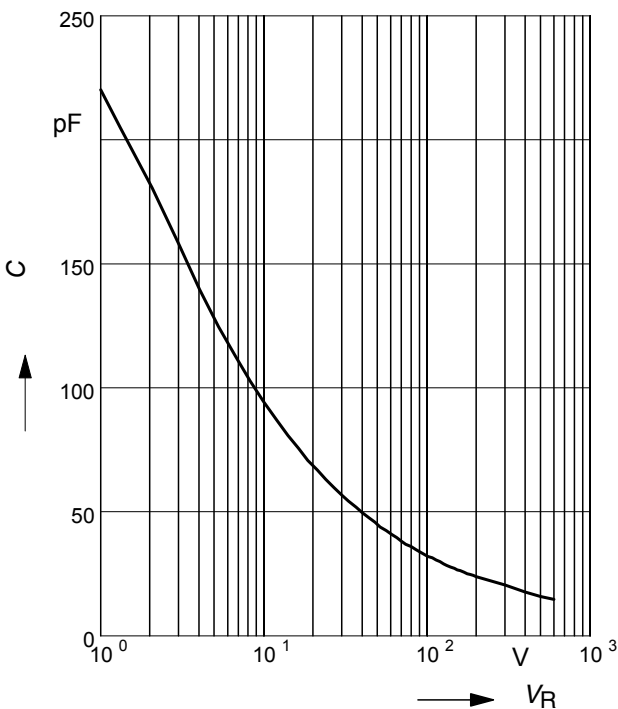
parameter :  $D = t_p/T$



**7 Typ. capacitance vs. reverse voltage**

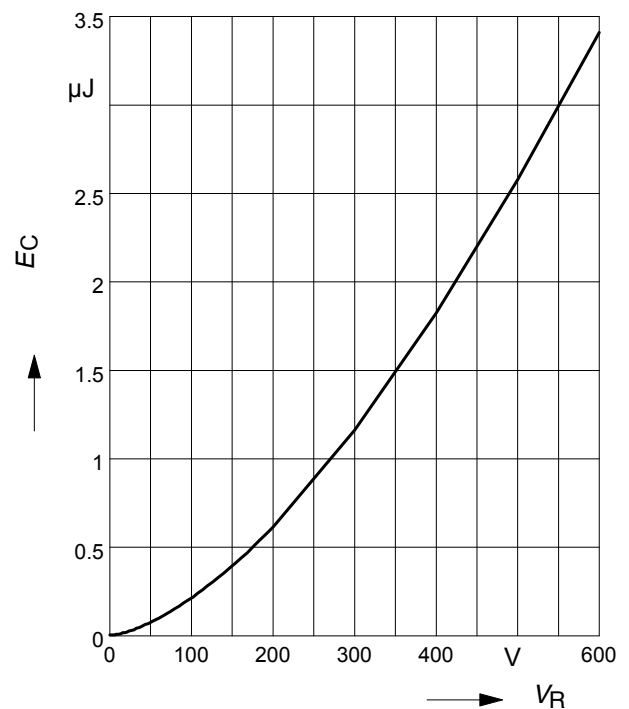
$$C = f(V_R)$$

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



**8 Typ. C stored energy**

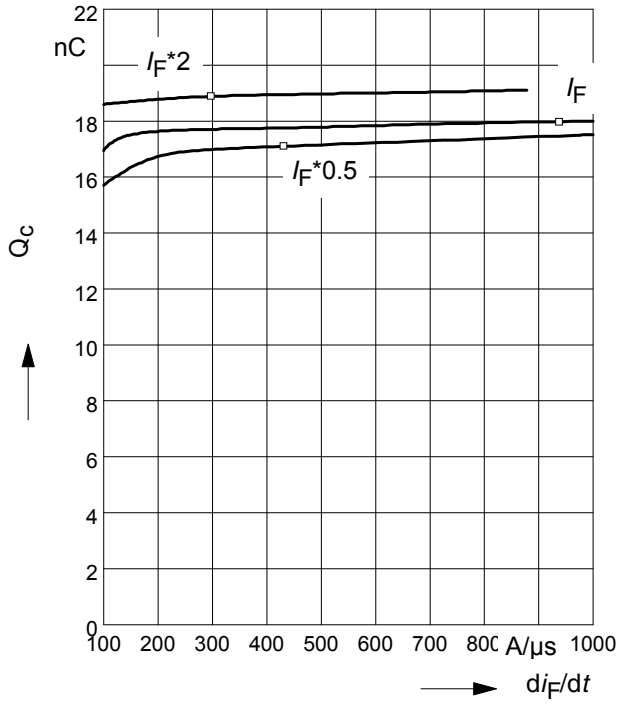
$$E_C = f(V_R)$$

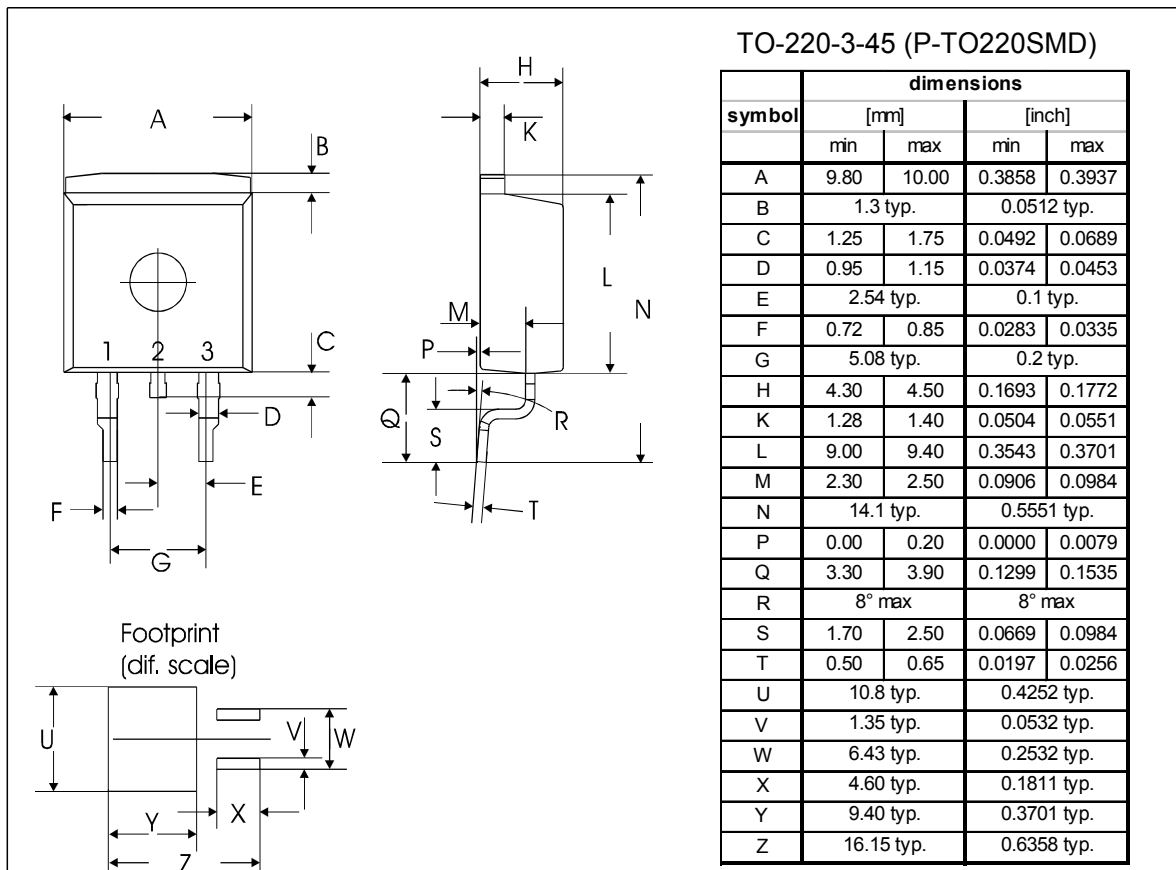
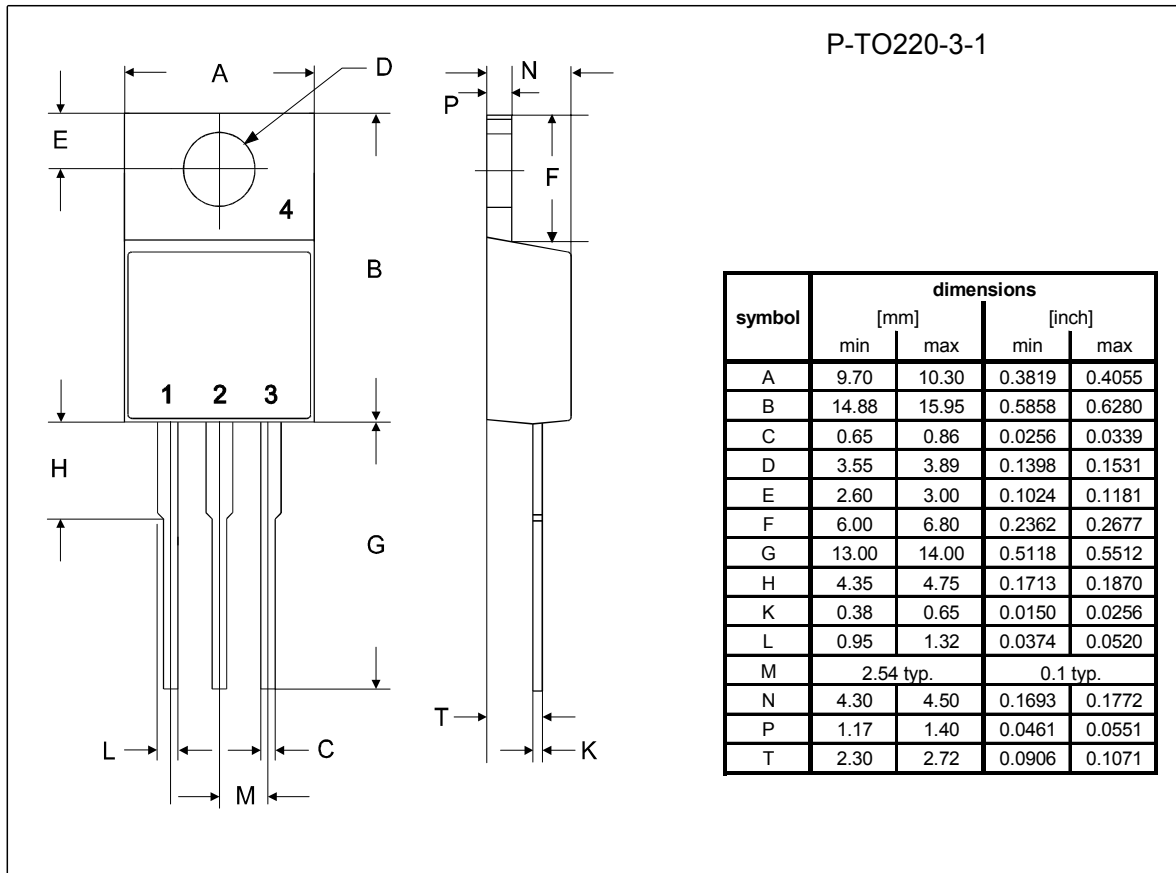


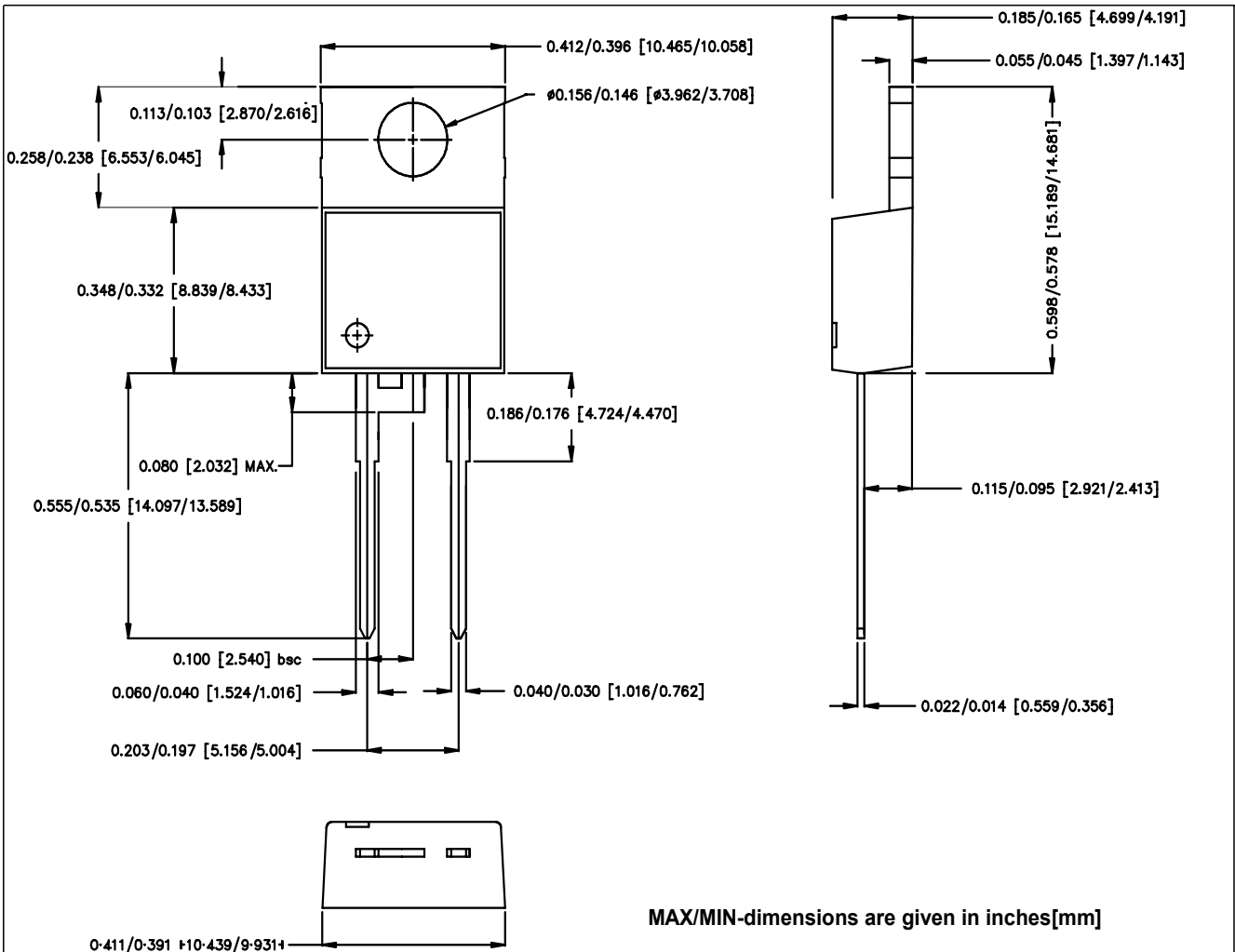
9 Typ. capacitive charge vs. current slope

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

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









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