

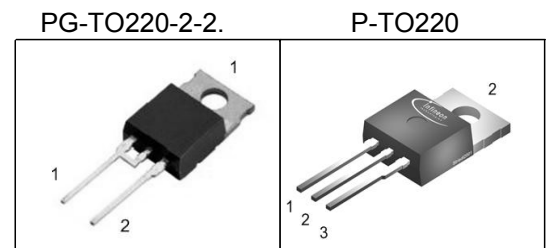
### Silicon Carbide Schottky Diode

- 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>1)</sup>
- No forward recovery
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC<sup>0)</sup> for target applications

### thinQ!<sup>TM</sup> SiC Schottky Diode

#### 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	Q67040-S4371	D06S60	n.c.	C	A
SDT06S60	PG-TO220-2-2.	Q67040-S4446	D06S60	C	A	

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

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

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

<sup>0</sup>J-STD20 and JESD22

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

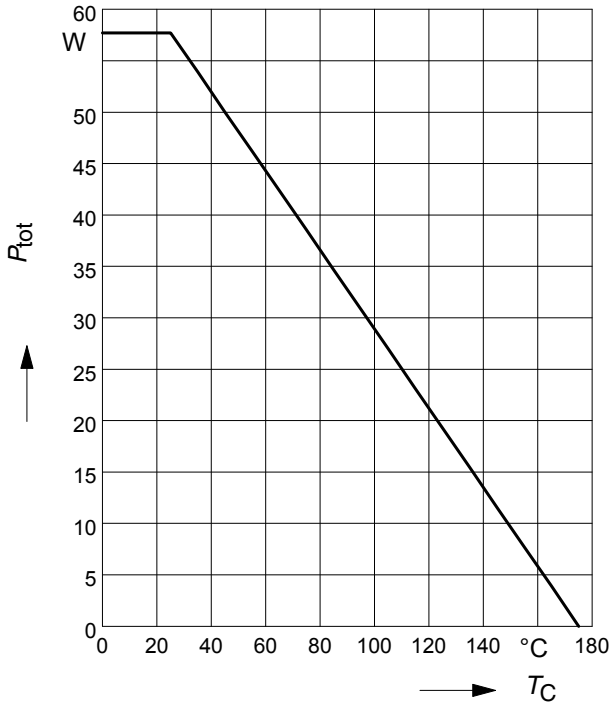
<sup>2</sup>Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical without blown air.

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

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

**1 Power dissipation**

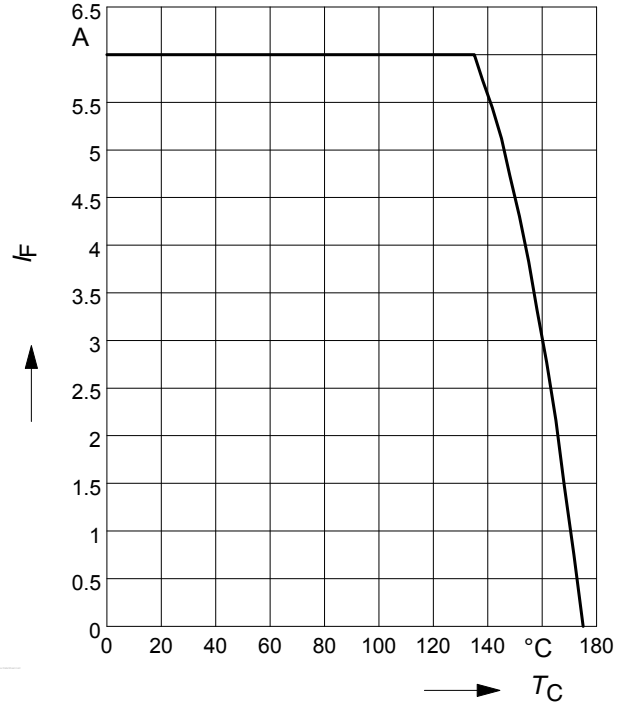
$P_{tot} = f(T_C)$



**2 Diode forward current**

$I_F = f(T_C)$

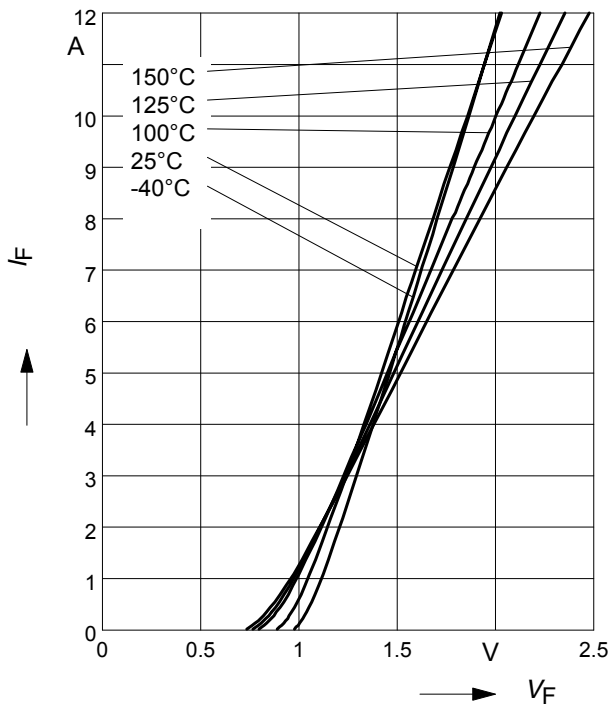
parameter:  $T_j \leq 175^\circ\text{C}$



**3 Typ. forward characteristic**

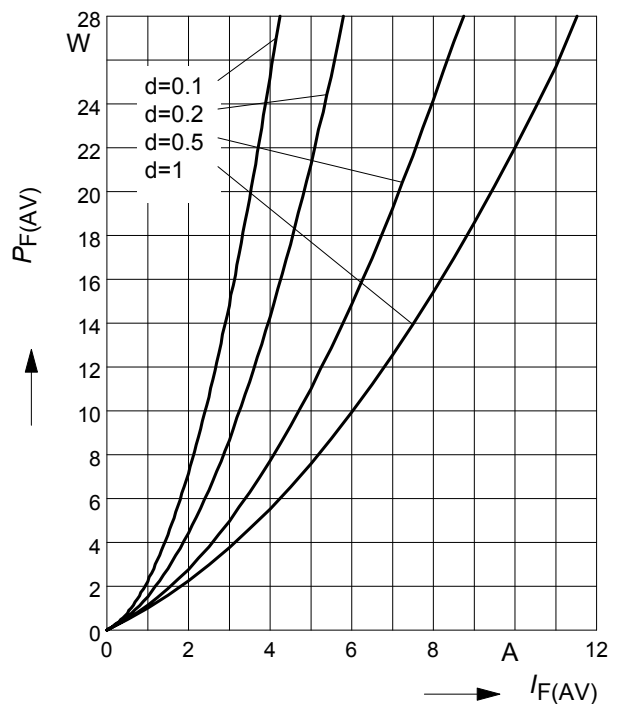
$I_F = f(V_F)$

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



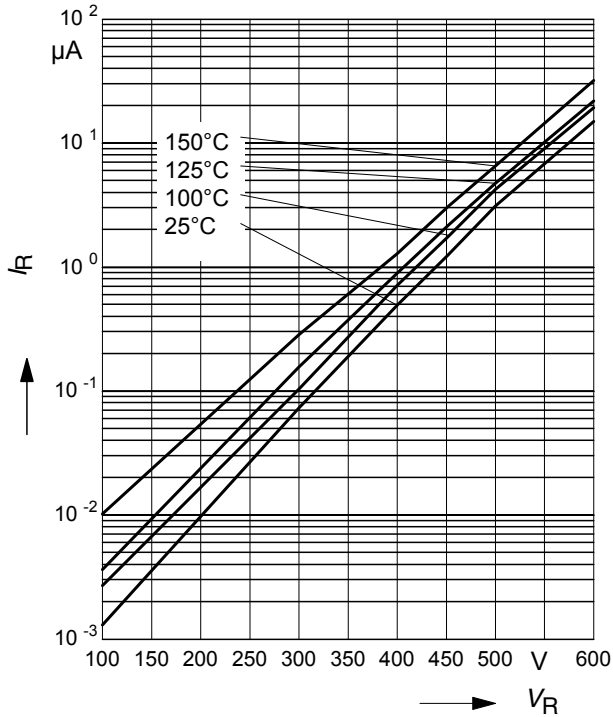
**4 Typ. forward power dissipation vs. average forward current**

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



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

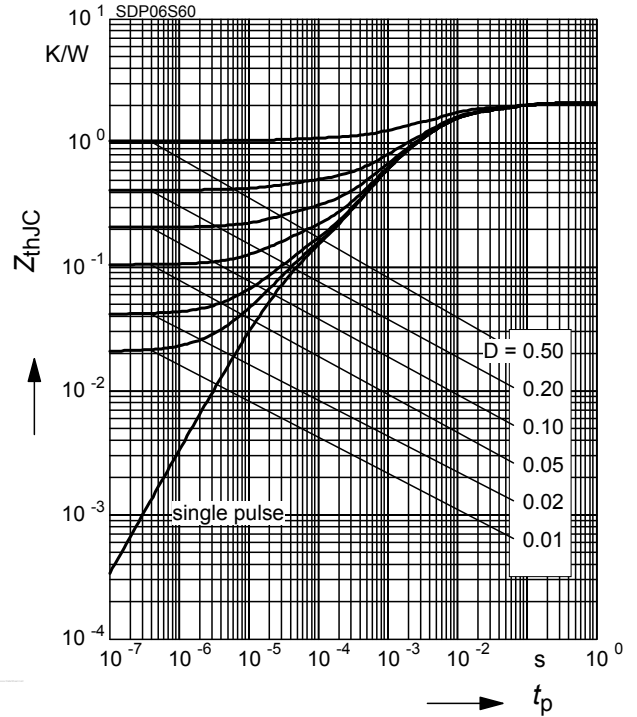
$$I_R = f(V_R)$$



**6 Transient thermal impedance**

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

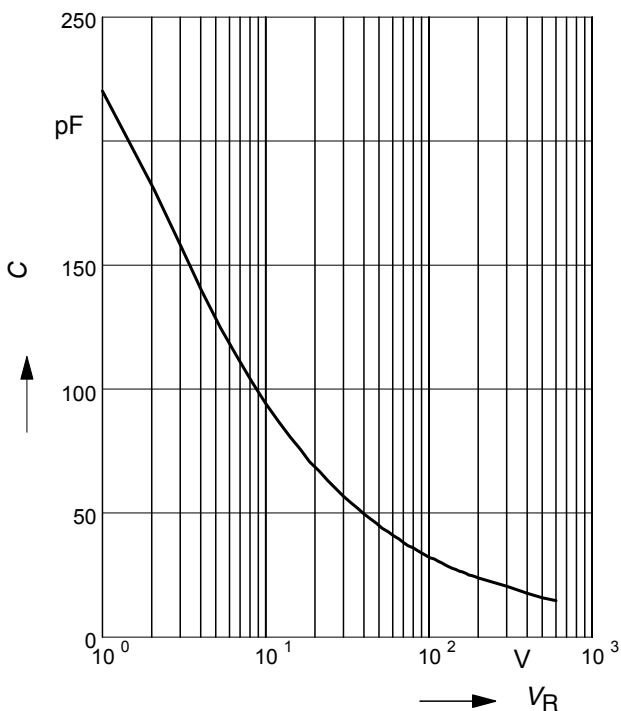
parameter :  $D = t_p/T$



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

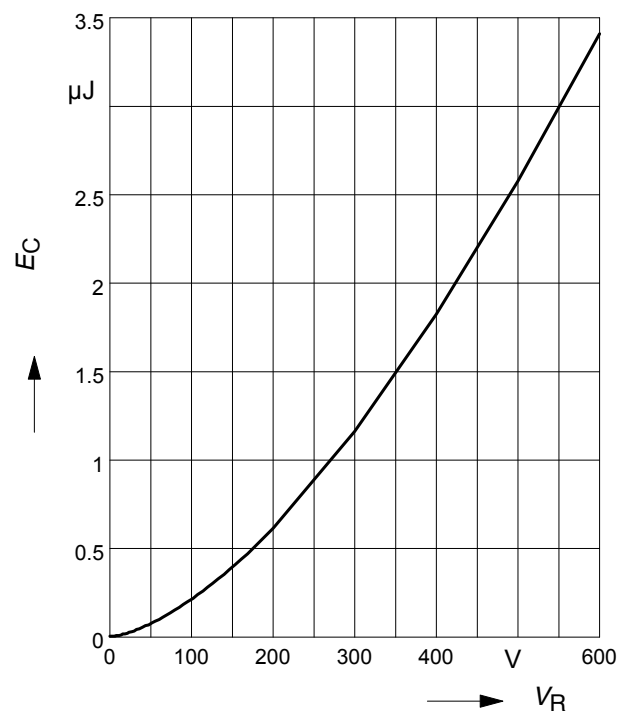
$$C = f(V_R)$$

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



**8 Typ. C stored energy**

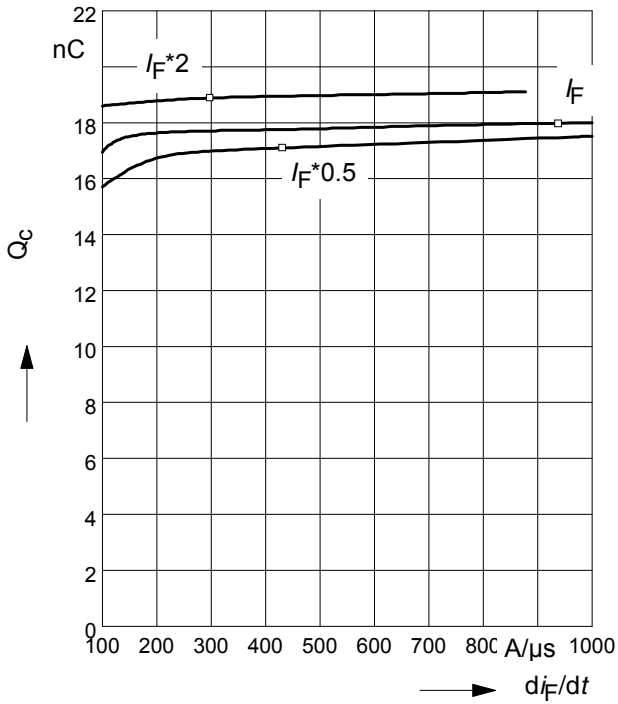
$$E_C = f(V_R)$$



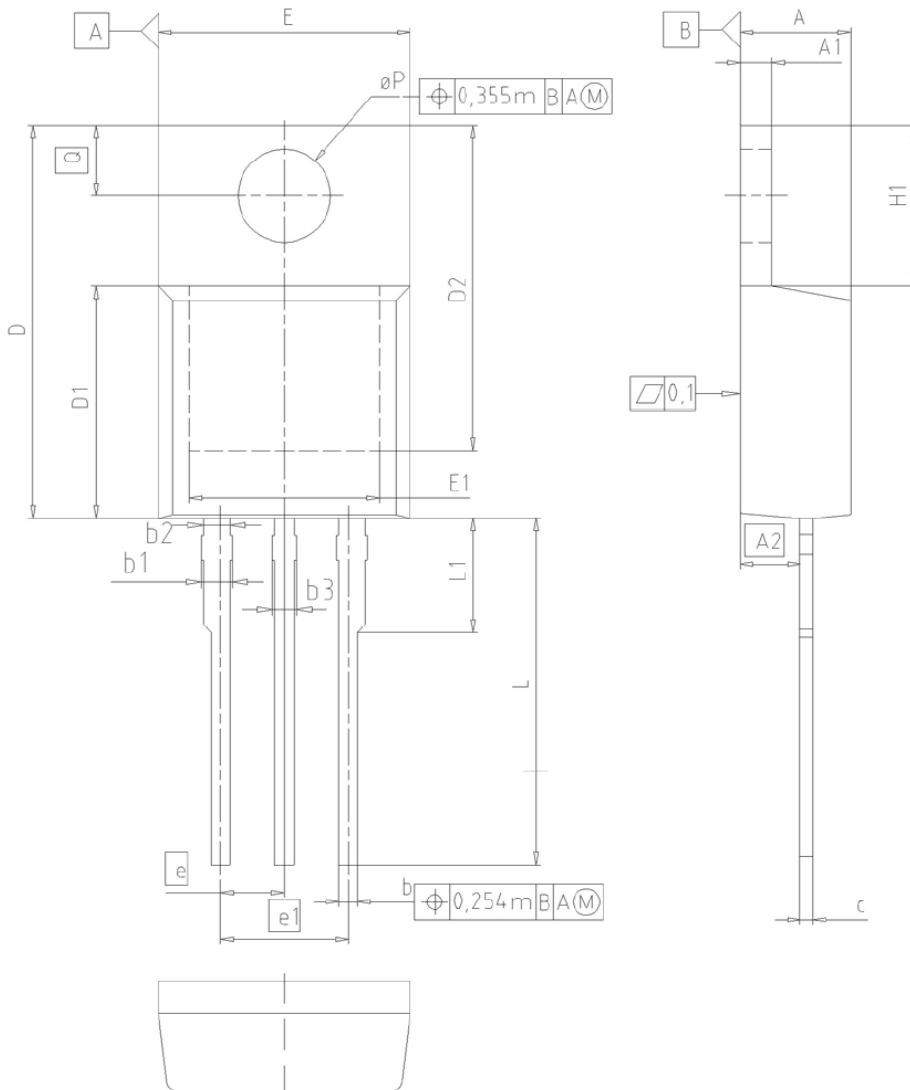
9 Typ. capacitive charge vs. current slope

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

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



P-TO220-3-1, P-TO220-3-21



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.57	0.169	0.180
A1	1.17	1.40	0.046	0.055
A2	2.15	2.72	0.085	0.107
b	0.65	0.86	0.026	0.034
b1	0.95	1.40	0.037	0.055
b2	0.95	1.15	0.037	0.045
b3	0.65	1.15	0.026	0.045
c	0.33	0.60	0.013	0.024
D	14.81	15.95	0.583	0.628
D1	8.51	9.45	0.335	0.372
D2	12.19	13.10	0.480	0.516
E	9.70	10.36	0.382	0.408
E1	6.50	8.60	0.256	0.339
e	2.54		0.100	
e1	5.08		0.200	
N	3		3	
H1	5.90	6.90	0.232	0.272
L	13.00	14.00	0.512	0.551
L1	-	4.80	-	0.189
$\phi P$	3.60	3.89	0.142	0.153
Q	2.60	3.00	0.102	0.118

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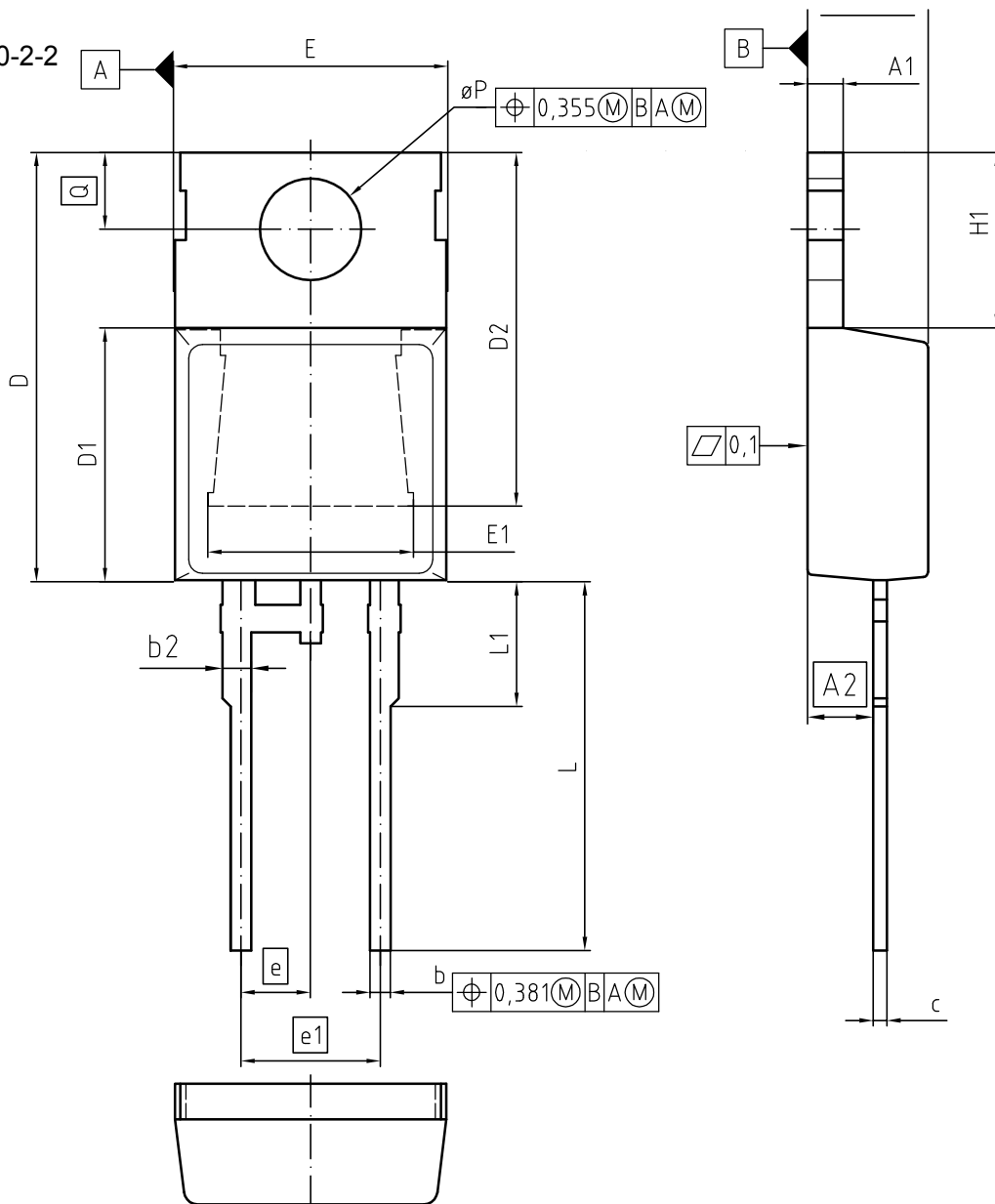
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PG-TO-220-2-2



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.191	4.699	0.165	0.185
A1	1.170	1.400	0.046	0.055
A2	2.215	2.718	0.087	0.107
b	0.635	0.889	0.025	0.035
b2	0.950	1.651	0.037	0.065
c	0.330	0.635	0.013	0.025
D	14.808	15.950	0.583	0.628
D1	8.509	9.450	0.335	0.372
D2	12.850	14.245	0.506	0.561
E	9.677	10.363	0.381	0.408
E1	6.500	8.788	0.256	0.346
e	2.540		0.100	
e1	5.080		0.200	
N	2		2	
H1	5.900	6.900	0.232	0.272
L	12.700	14.000	0.500	0.551
L1	3.048	4.800	0.120	0.189
øP	3.550	3.886	0.140	0.153
Q	2.540	3.048	0.100	0.120

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