Silicon Carbide Schottky Diode

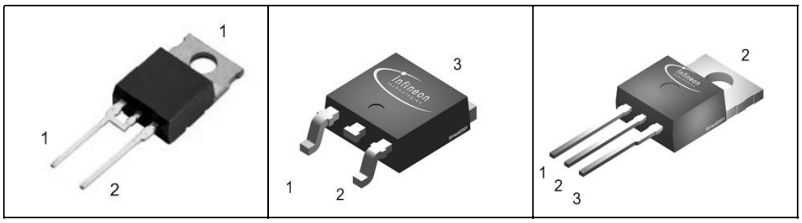
thinQ!™ SiC Schottky Diode

- 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 800W[1)]
- No forward recovery
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC[0)] for target applications

Product Summary

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

PG-TO220-2-2. P-TO252 P-TO220



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

Maximum Ratings, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous forward current, T_C=100°C	I_F	4	A
RMS forward current, f=50Hz	I_{FRMS}	5.6	
Surge non repetitive forward current, sine halfwave T_C=25°C, t_p=10ms	I_{FSM}	12.5	
Repetitive peak forward current T_j=150°C, T_C=100°C, D=0.1	I_{FRM}	18	
Non repetitive peak forward current t_p=10µs, T_C=25°C	I_{FMAX}	40	
i^2t value, T_C=25°C, t_p=10ms	$\int i^2dt$	0.78	A²s
Repetitive peak reverse voltage	V_{RRM}	600	V
Surge peak reverse voltage	V_{RSM}	600	
Power dissipation, T_C=25°C	P_{tot}	36.5	W
Operating and storage temperature	T_j , T_{stg}	-55... +175	°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}				
PG-TO252-3-1: @ min. footprint		-	-	75	
PG-TO252-3-1: @ 6 cm^2 cooling area [2)]		-	-	50	

Electrical Characteristics, at T_j = 25 °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°C		-	1.7	1.9	
I_F=4A, T_j=150°C		-	2	2.4	
Reverse current	I_R				µA
V_R=600V, T_j=25°C		-	15	200	
V_R=600V, T_j=150°C		-	40	1000	

[0]J-STD20 and JESD22

[1]CCM, V_{IN}= 85VAC, T_j = 150°C, T_C =100°C, η = 93%, Δ I_{IN} = 30%

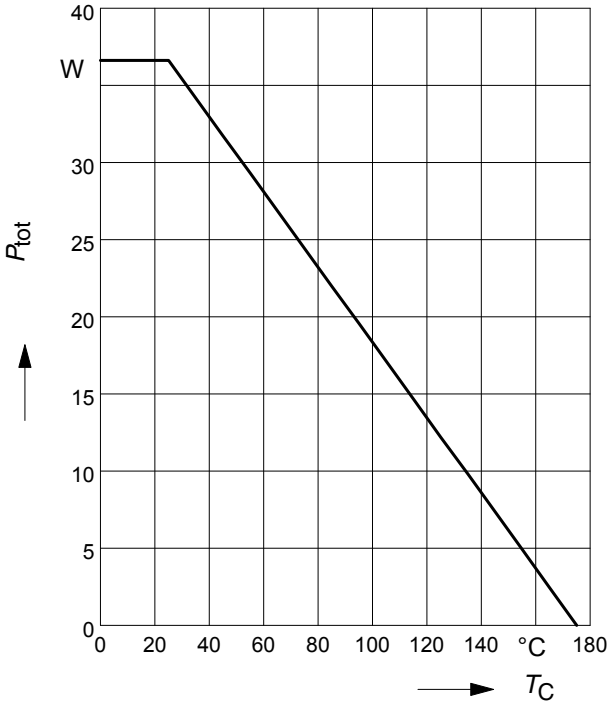
[2]Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 µm thick) copper area for drain connection. PCB is vertical without blown air.

Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

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

1 Power dissipation

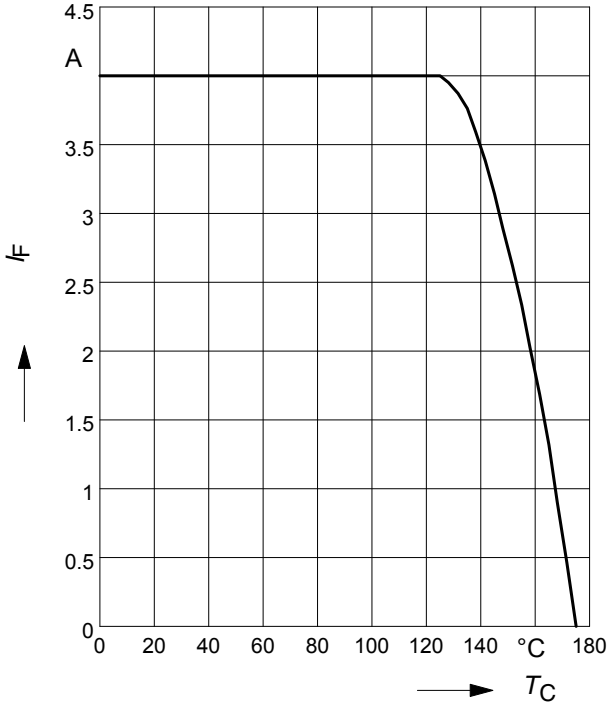
$P_{tot} = f(T_C)$



2 Diode forward current

$I_F = f(T_C)$

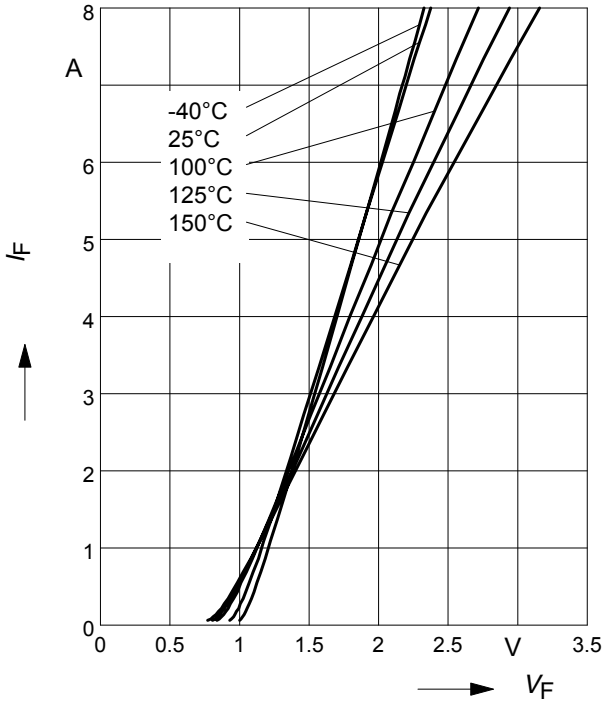
parameter: $T_j \leq 175$ °C



3 Typ. forward characteristic

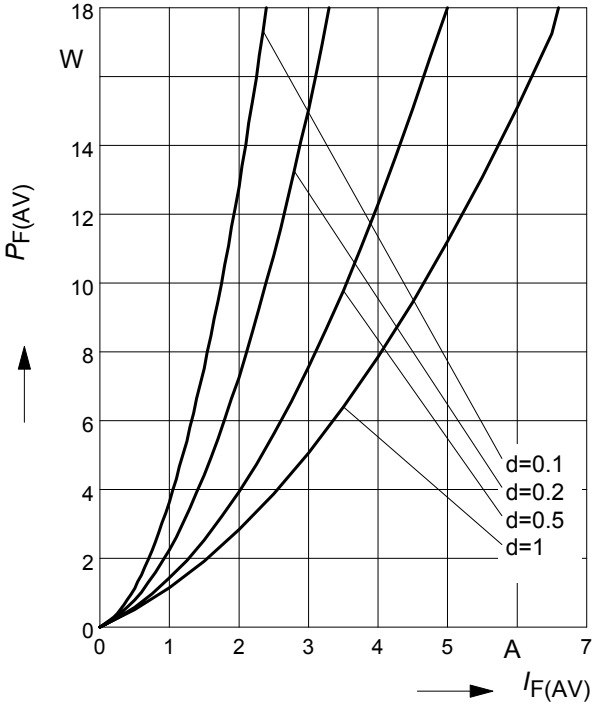
$I_F = f(V_F)$

parameter: T_j , tp = 350 µs



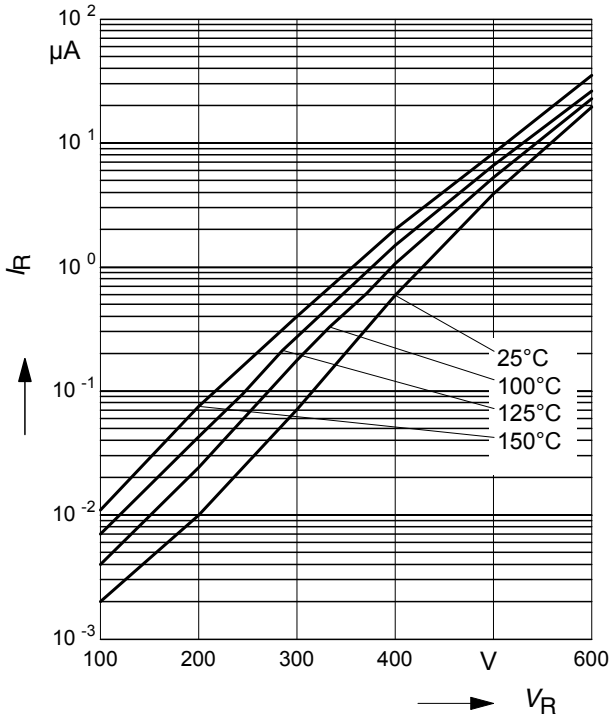
4 Typ. forward power dissipation vs. average forward current

$P_{F(AV)}=f(I_F)$ T_C=100°C, $d = t_p/T$



5 Typ. reverse current vs. reverse voltage

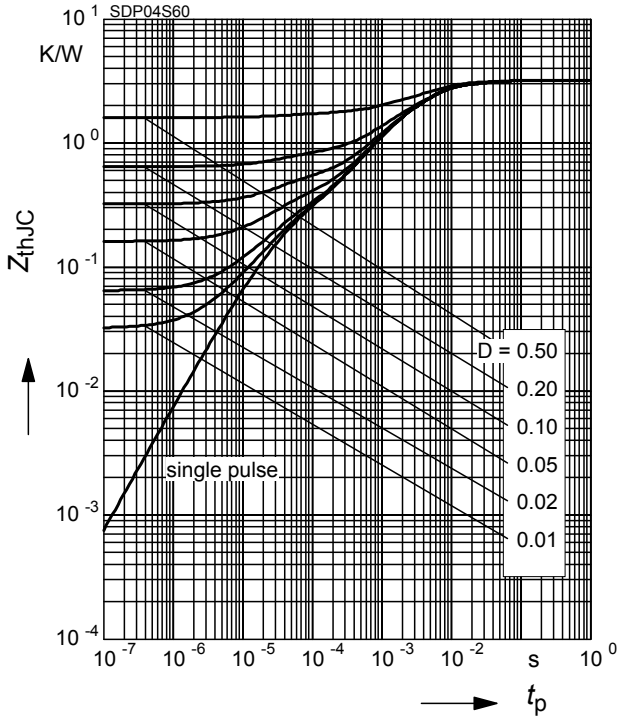
$I_R=f(V_R)$



6 Transient thermal impedance

$Z_{thJC} = f(t_p)$

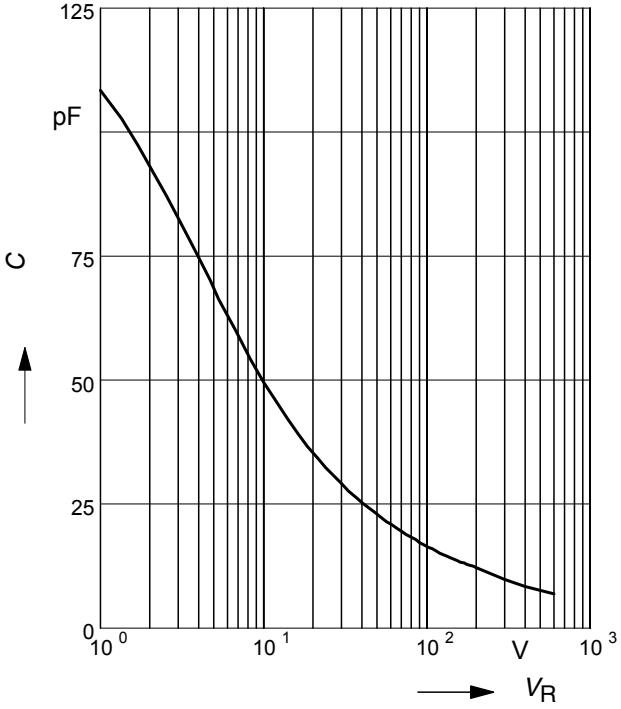
parameter : $D = t_p/T$



7 Typ. capacitance vs. reverse voltage

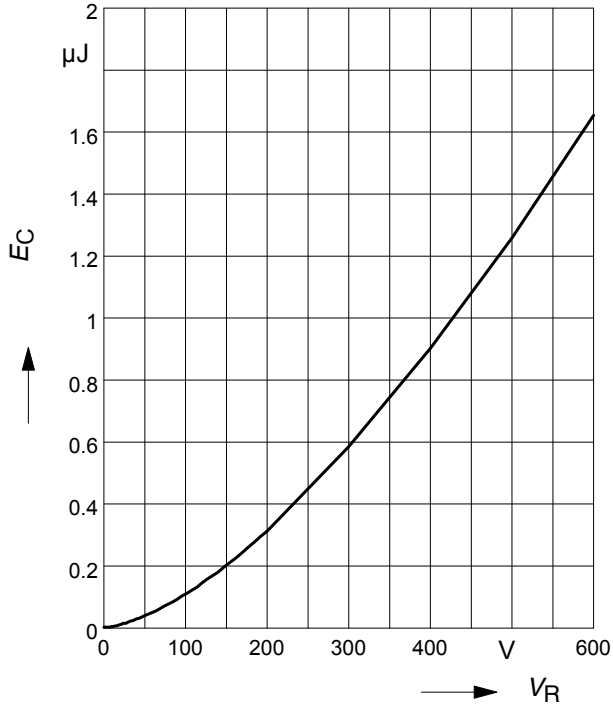
$C= f(V_R)$

parameter: T_C = 25 °C, f = 1 MHz



8 Typ. C stored energy

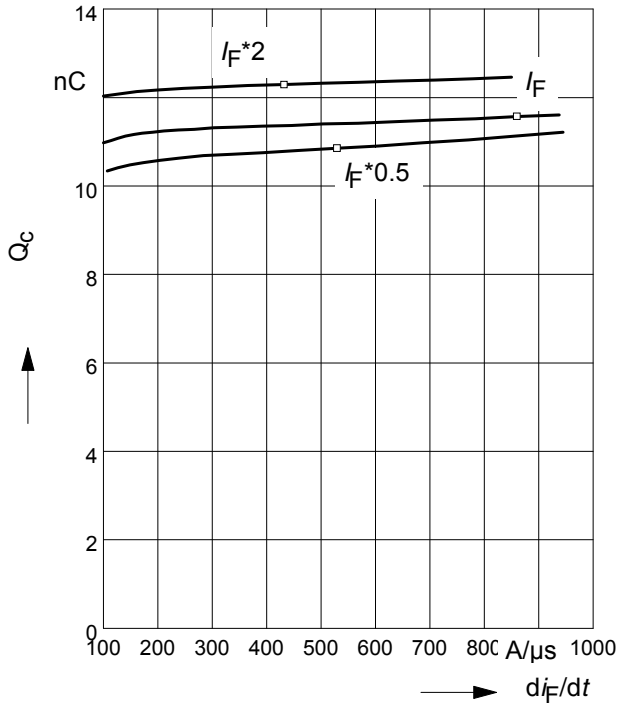
$E_C=f(V_R)$



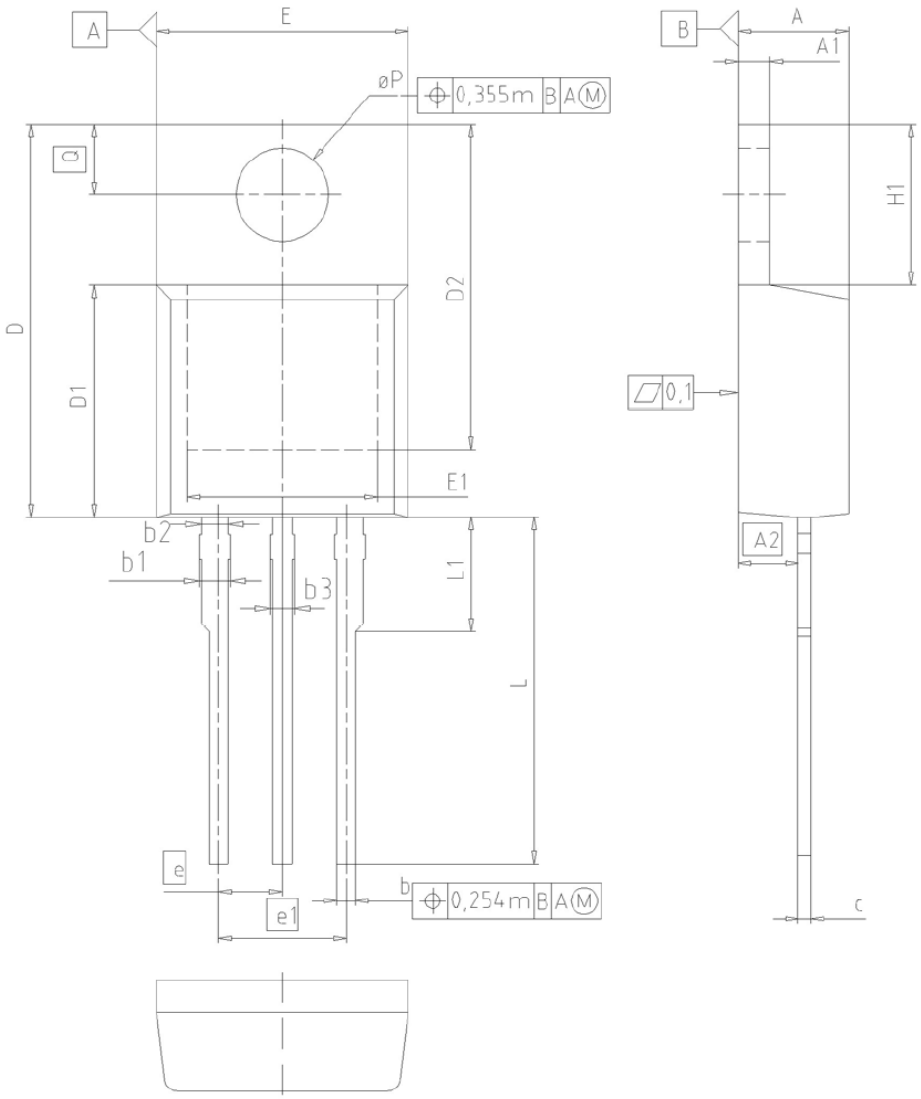
9 Typ. capacitive charge vs. current slope

$Q_c = f(di_F/dt)$

parameter: T_j = 150 °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
øP	3.60	3.89	0.142	0.153
Q	2.60	3.00	0.102	0.118

DOCUMENT NO.
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SCALE
0
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0 2.5
5mm

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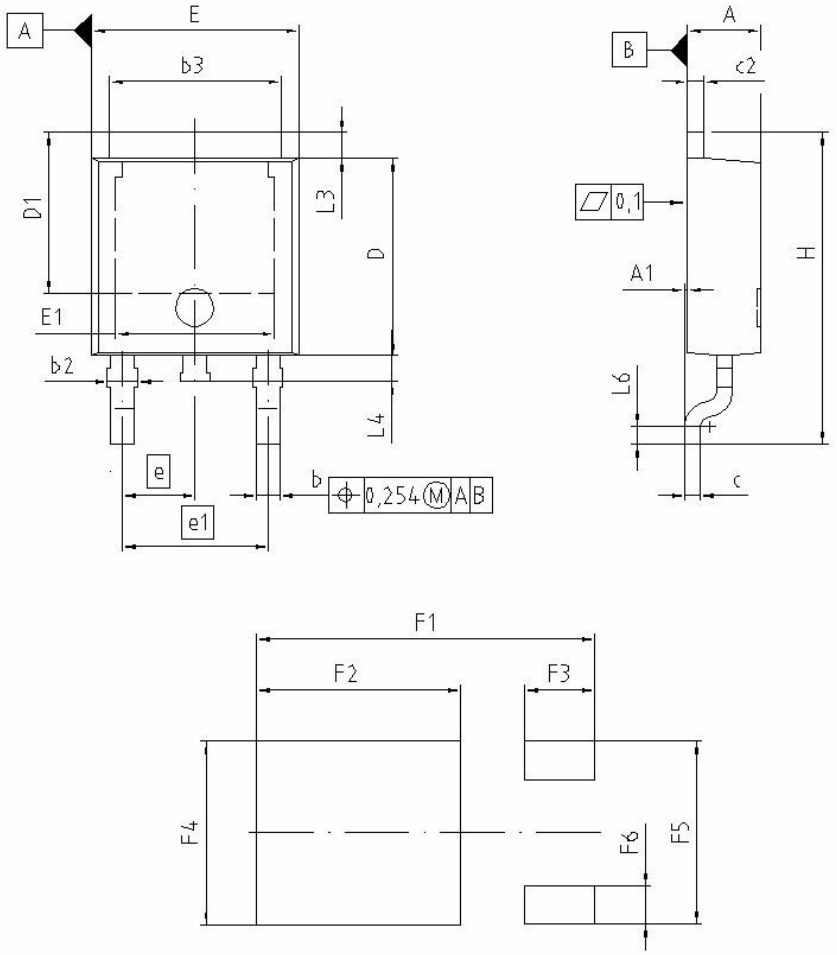
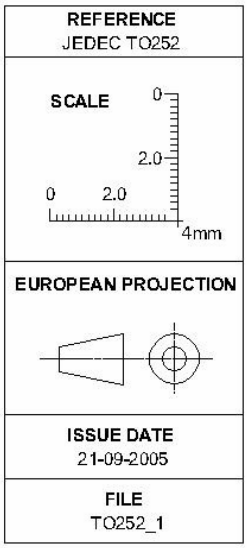
05

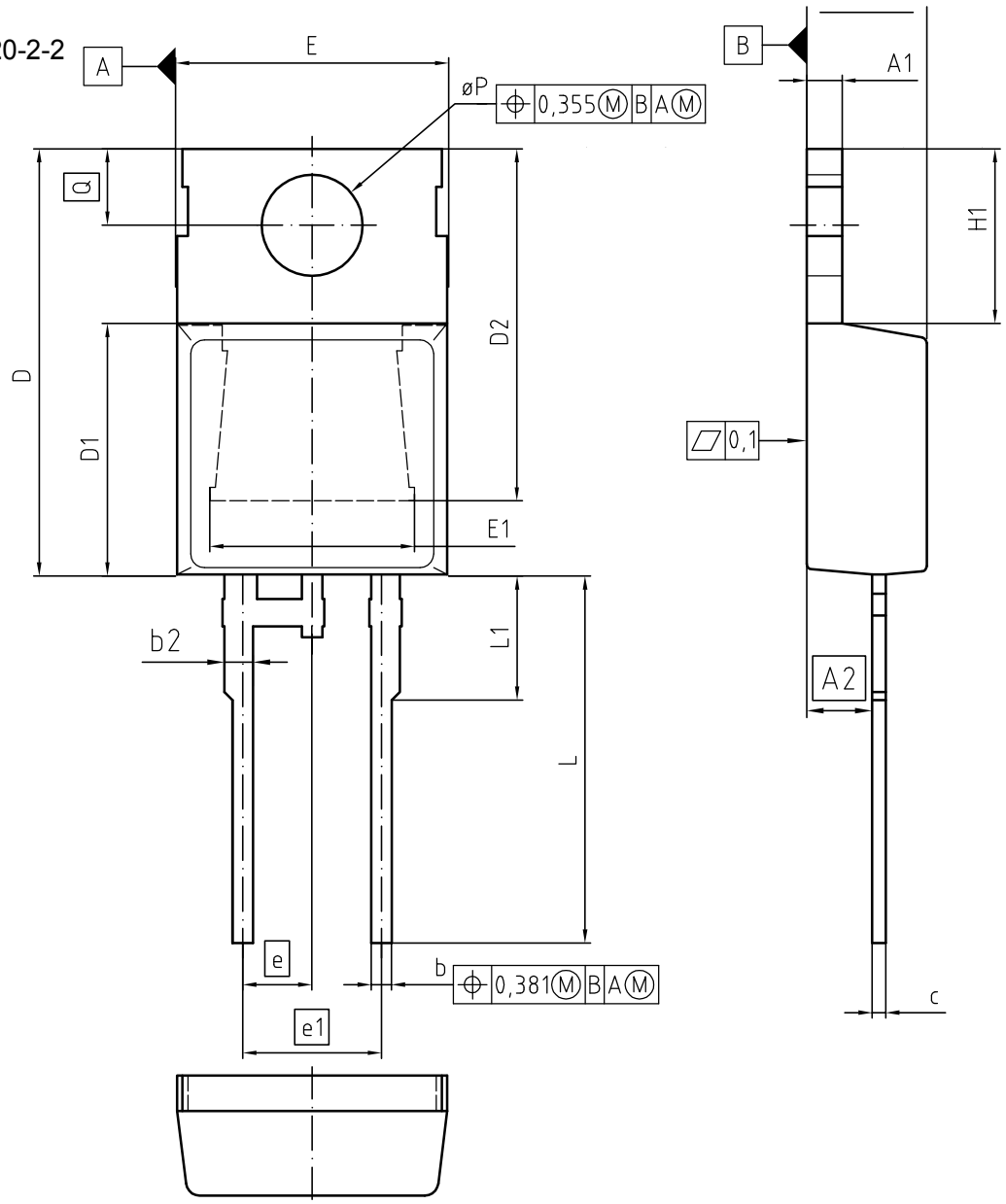
P-TO252-3-1, P-TO252-3-11, P-TO252-3-21 (D-Pak)



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.159	2.413	0.085	0.095
A1	0.000	0.150	0.000	0.006
b	0.635	0.889	0.025	0.035
b2	0.650	1.150	0.026	0.045
b3	5.004	5.500	0.197	0.217
c	0.457	0.580	0.018	0.023
c2	0.460	0.980	0.018	0.039
D	5.969	6.223	0.235	0.245
D1	5.020	5.842	0.198	0.230
E	6.400	6.731	0.252	0.265
E1	4.850	5.207	0.191	0.205
e	2.286		0.090	
e1	4.572		0.180	
N	3		3	
H	9.400	10.480	0.370	0.413
L3	0.900	1.143	0.035	0.045
L4	0.584	0.950	0.023	0.037
L6	0.510	0.686	0.020	0.027
F1	10.500	10.700	0.413	0.421
F2	6.300	6.500	0.248	0.256
F3	2.100	2.300	0.083	0.091
F4	5.700	5.900	0.224	0.232
F5	5.660	5.860	0.222	0.231
F6	1.100	1.300	0.043	0.051



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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