

SE30NS60

N-Channel Enhancement-Mode COOLMOSFET

Revision: A

General Description

Thigh Density Cell Design For Ultra Low On-Resistance Fully Characterized Avalanche Voltage and Current Improved Shoot-Through FOM

- Simple Drive Requirement
- Small Package Outline
- Surface Mount Device

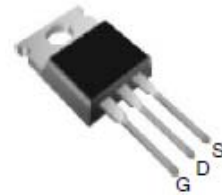
Features

For a single MOSFET

- $V_{DS} = 600V$
- $R_{DS(ON)} = 110m\Omega @ V_{GS}=10V @ I_{DS}=14.5A$

Pin configurations

See Diagram below



TO-220



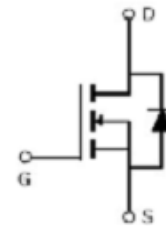
TO-220F



TO-263



TO-247



Absolute Maximum Ratings

Parameter		Symbol	Rating	Units
Drain-Source Voltage		V_{DS}	600	V
Gate-Source Voltage		V_{GS}	± 30	V
Drain Current	Continuous	I_D	30	A
	Pulsed		89	
Total Power Dissipation @TC=25°C	TO-220,TO-247,TO-263	P_D	219	W
	TO-220F		34	
Operating Junction Temperature Range		T_J	-55 to 150	°C

Thermal Resistance

Symbol	Parameter	Min	Max	Units
$R_{\theta JC}$	Junction to Case		3.65	°C/W
$R_{\theta JA}$	Junction to Ambient ($t \leq 10s$)		80	°C/W

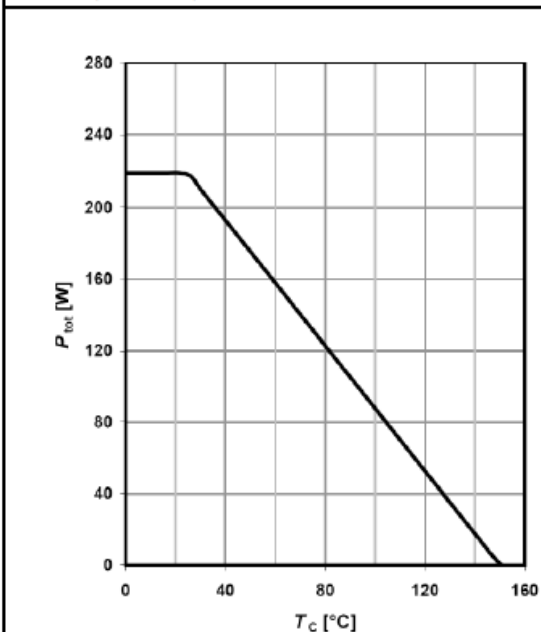
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Electrical Characteristics (T _J =25°C unless otherwise noted)						
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS (Note 2)						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0 V	600			V
I _{DSS}	Drain to Source Leakage Current	V _{DS} = 600V, V _{GS} =0V			2	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =20 V			100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D =250μA	2.5	3	3.5	V
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =14.5A		110	125	mΩ
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =100V, f=1MHz		2127		pF
C _{oss}	Output Capacitance			125		pF
C _{rss}	Reverse Transfer Capacitance			82		pF
SWITCHING PARAMETERS						
Q _g	Total Gate Charge ²	V _{GS} =10V, V _{DD} =480V, I _D =14.5A		12		nC
Q _{gs}	Gate Source Charge			49		nC
Q _{gd}	Gate Drain Charge			96		nC
t _{d(on)}	Turn-On Delay Time	V _{GS} =13V, V _{DS} =400V, R _{GEN} =1.7Ω I _D =14.5A		15		ns
t _{d(off)}	Turn-Off Delay Time			83		ns
t _{d(r)}	Turn-On Rise Time			12		ns
t _{d(f)}	Turn-Off Fall Time			7		ns

Typical Characteristics

Power dissipation

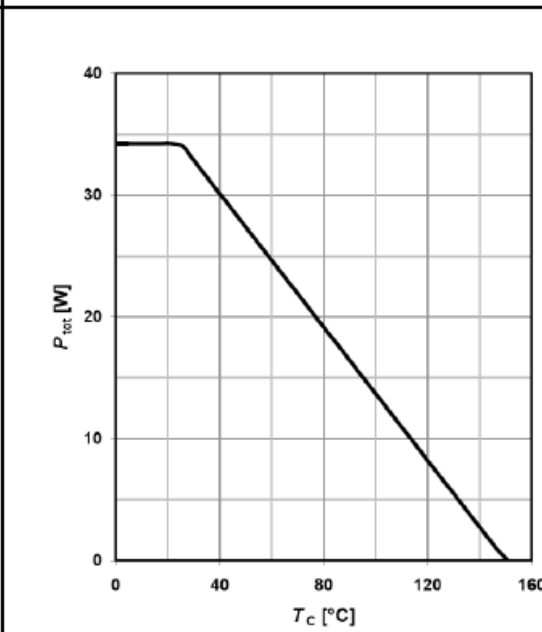
TO-220, TO-247, TO-263



$P_{tot} = f(T_c)$

Power dissipation

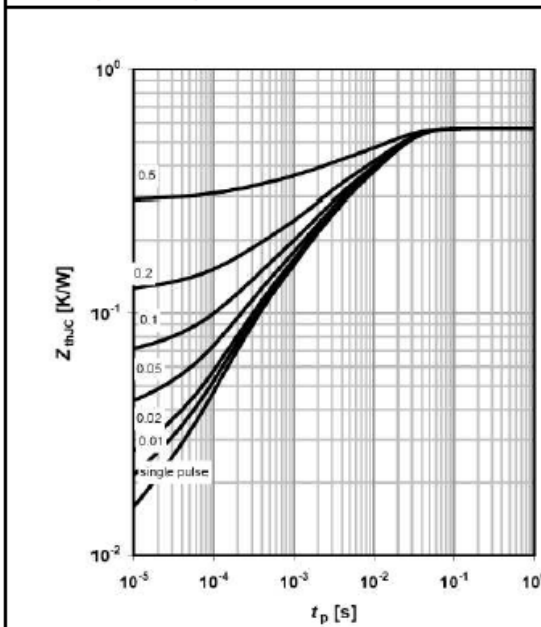
TO-220 FullPAK



$P_{tot} = f(T_c)$

Max. transient thermal impedance

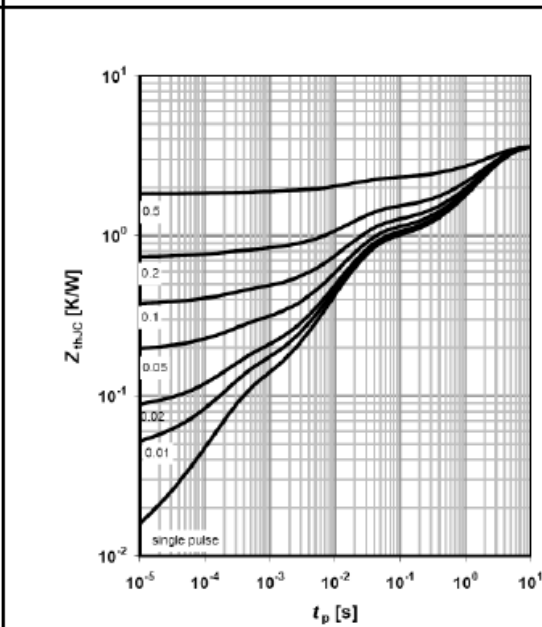
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$Z_{(thJC)} = f(t_p)$; parameter: $D = t_p / T$

Max. transient thermal impedance

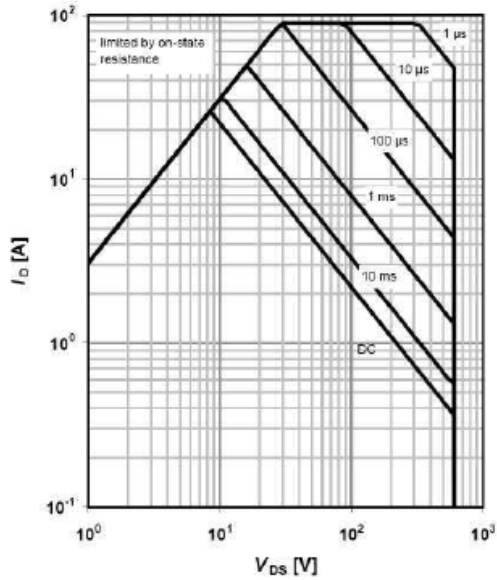
TO-220 FullPAK



$Z_{(thJC)} = f(t_p)$; parameter: $D = t_p / T$

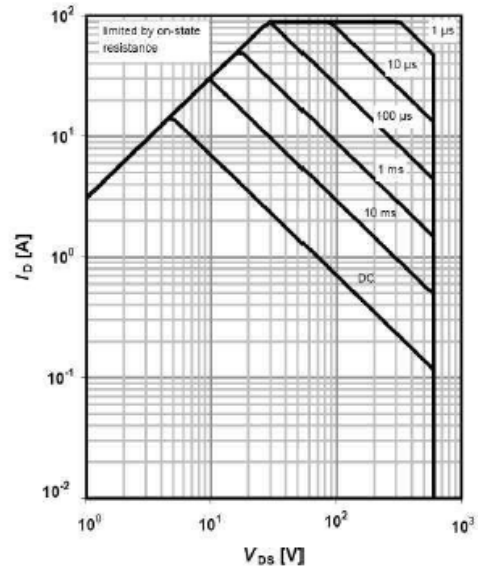
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**Safe operating area $T_C=25\text{ }^\circ\text{C}$
TO-220, TO-247, TO-263**



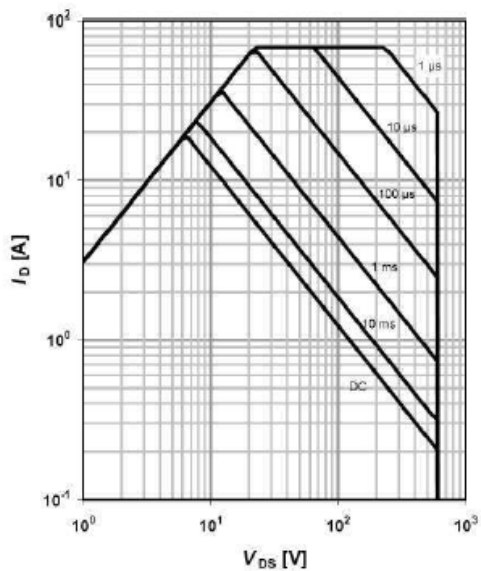
$I_D=f(V_{DS}); T_C=25\text{ }^\circ\text{C}; D=0; \text{parameter } t_p$

**Safe operating area $T_C=25\text{ }^\circ\text{C}$
TO-220 FullPAK**



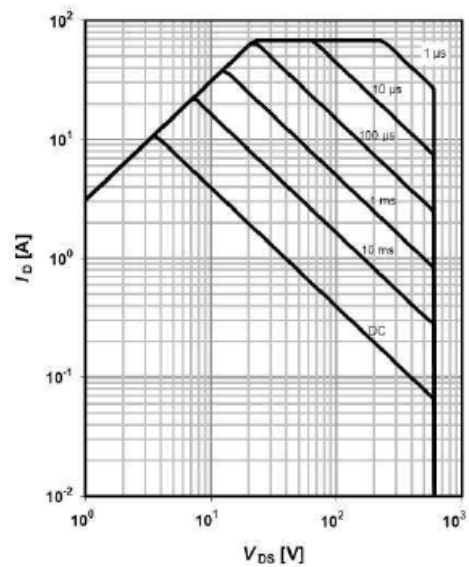
$I_D=f(V_{DS}); T_C=25\text{ }^\circ\text{C}; D=0; \text{parameter } t_p$

**Safe operating area $T_C=80\text{ }^\circ\text{C}$
TO-220, TO-247, TO-263**

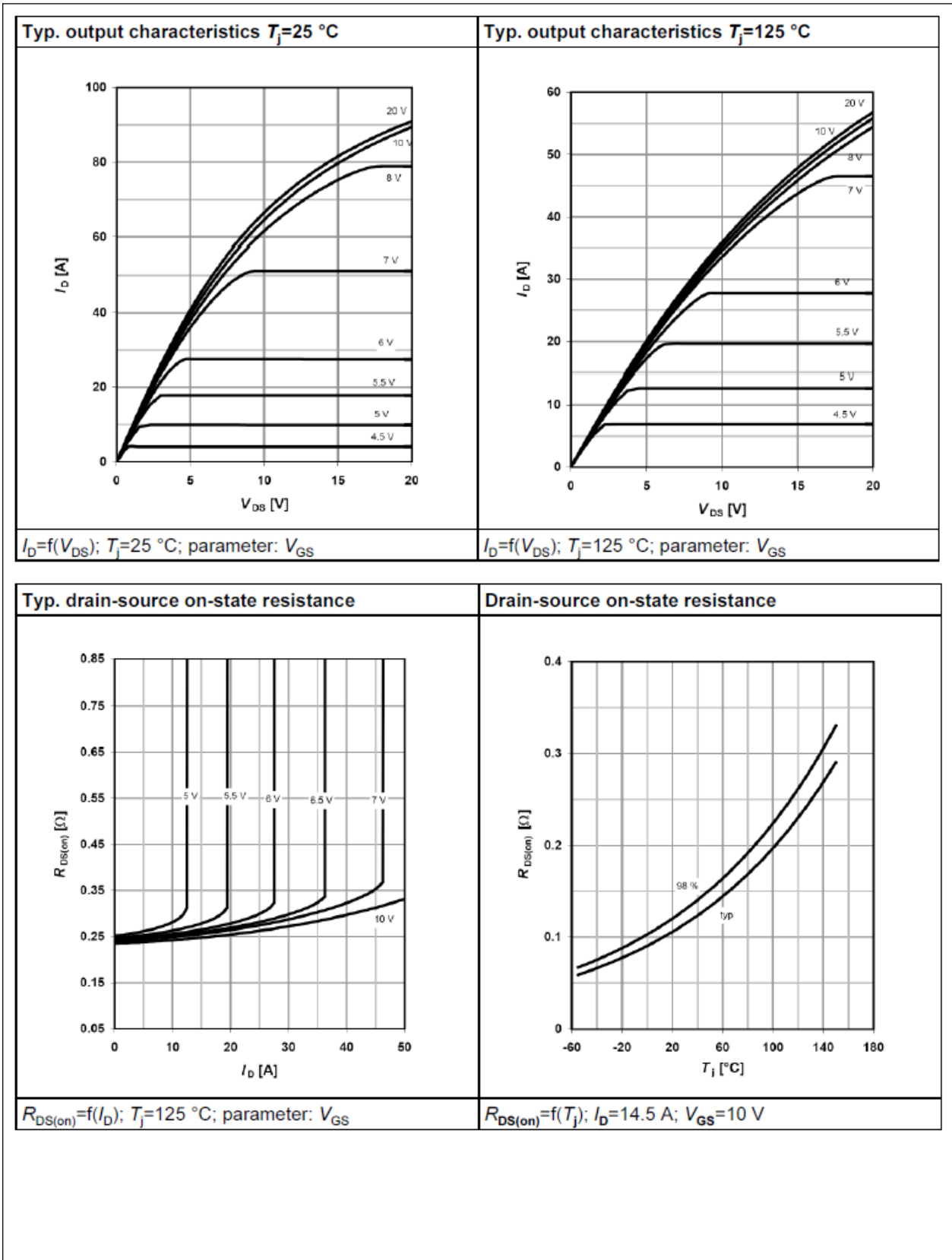


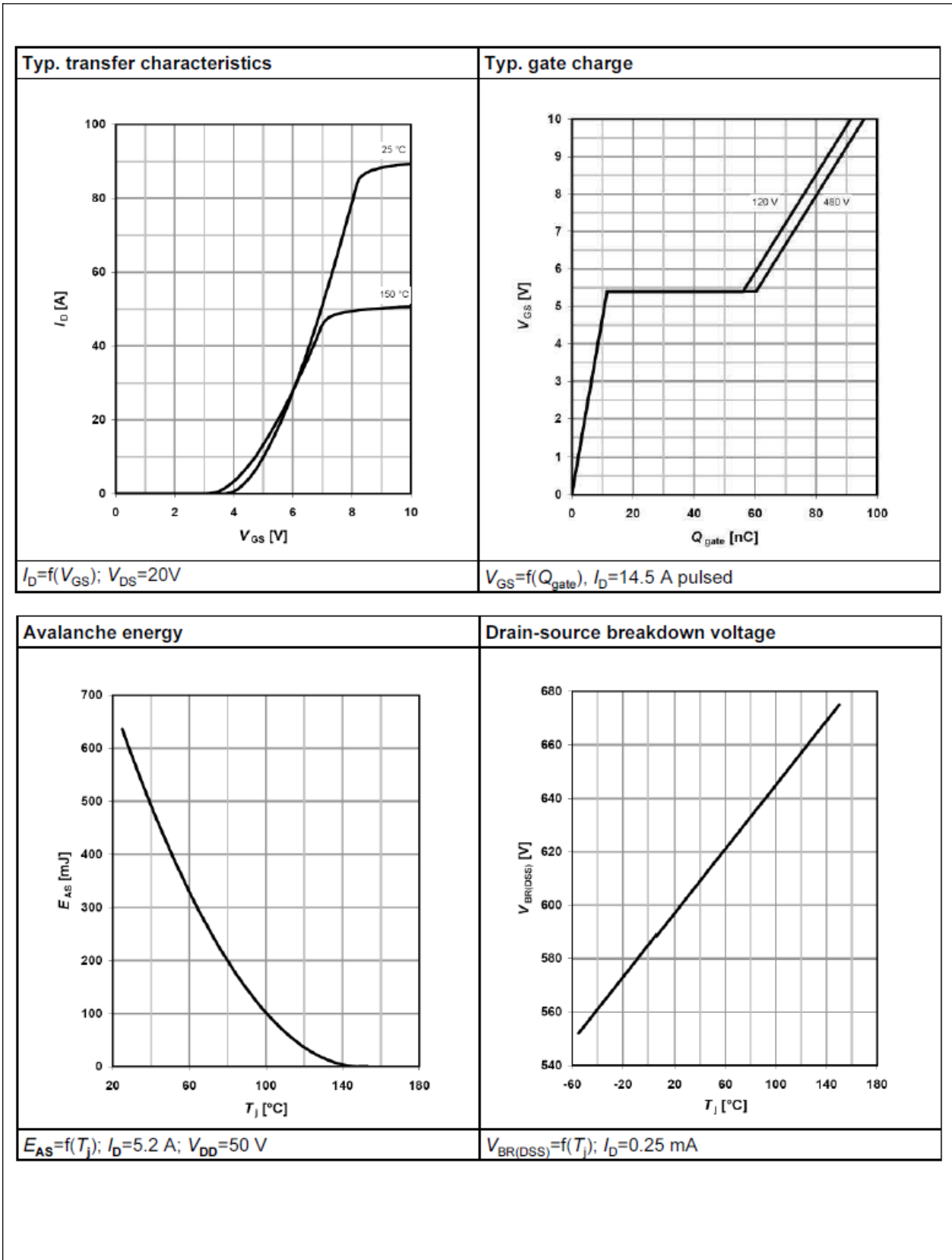
$I_D=f(V_{DS}); T_C=80\text{ }^\circ\text{C}; D=0; \text{parameter } t_p$

**Safe operating area $T_C=80\text{ }^\circ\text{C}$
TO-220 FullPAK**



$I_D=f(V_{DS}); T_C=80\text{ }^\circ\text{C}; D=0; \text{parameter } t_p$

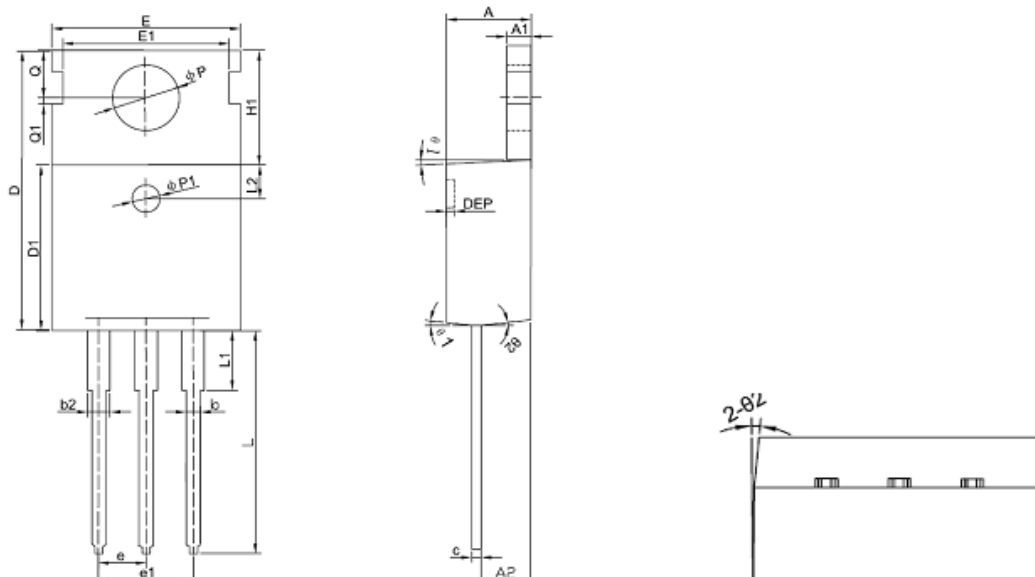




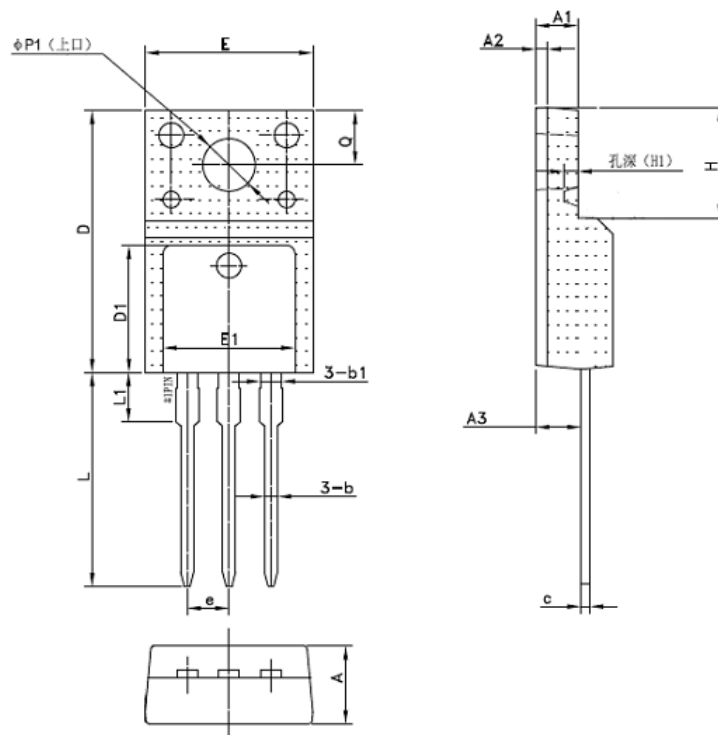
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Package Outline Dimension

TO-220

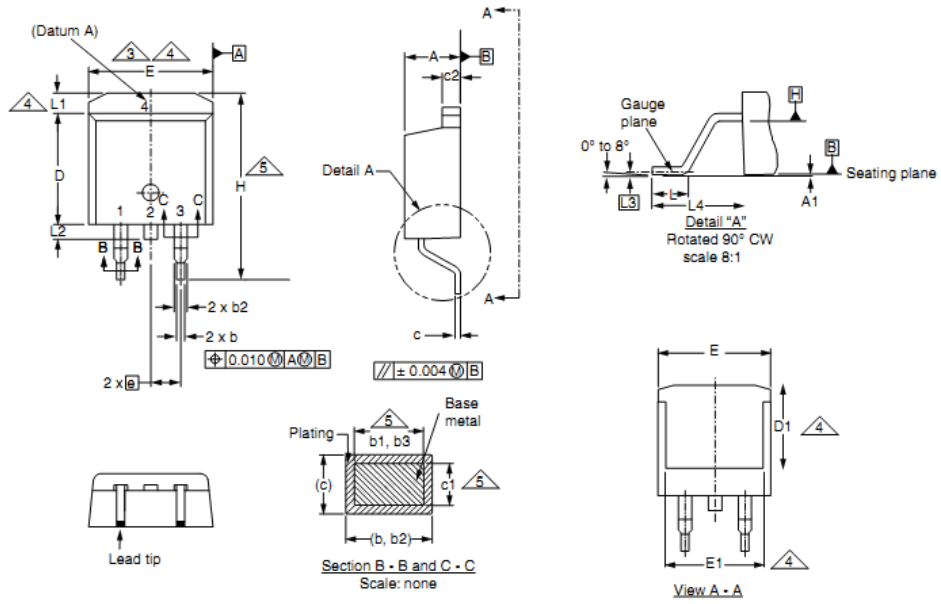


Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
A	4.400	4.550	4.700	0.173	0.179	0.185
A1	1.270	1.300	1.330	0.050	0.051	0.052
A2	2.590	2.690	2.790	0.102	0.106	0.110
b	0.770	-	0.900	0.030	-	0.035
b2	1.230	-	1.360	0.048	-	0.054
c	0.480	0.500	0.520	0.019	0.020	0.020
D	15.100	15.400	15.700	-	0.606	-
D1	9.000	9.100	9.200	0.354	0.358	0.362
DEP	0.050	0.285	0.520	0.002	0.011	0.020
E	10.060	10.160	10.260	0.396	0.400	0.404
E1	-	8.700	-	-	0.343	-
ΦP1	1.400	1.500	1.600	0.055	0.059	0.063
e	2.54BSC			0.1BSC		
e1	5.08BSC			0.2BSC		
H1	6.100	6.300	6.500	0.240	0.248	0.256
L	12.750	12.960	13.170	0.502	0.510	0.519
L1	-	-	3.950	-	-	0.156
L2	1.85REF			0.073REF		
ΦP	3.570	3.600	3.630	0.141	0.142	0.143
Q	2.730	2.800	2.870	0.107	0.110	0.113
Q1	-	0.200	-	-	0.008	-
θ1	5 ⁰	7 ⁰	9 ⁰	5 ⁰	7 ⁰	9 ⁰
θ2	1 ⁰	3 ⁰	5 ⁰	1 ⁰	3 ⁰	5 ⁰



Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	4.50	4.70	4.90
A1	2.44	2.54	2.64
A2	0.60	0.70	0.80
A3	2.56	2.76	2.96
b	0.70	0.80	0.95
b1	-	1.28	-
c	0.45	0.50	0.65
D	15.67	15.87	16.07
D1	-	7.70	-
E	9.96	10.16	10.36
E1	-	8.00	-
e	2.54(BSC)		
H	6.50	6.70	6.90
(H1)	-	(0.81)	-
L	12.48	12.98	13.20
L1	-	2.93	-
$\phi P1$	2.98	3.18	3.38
Q	3.10	3.30	3.50

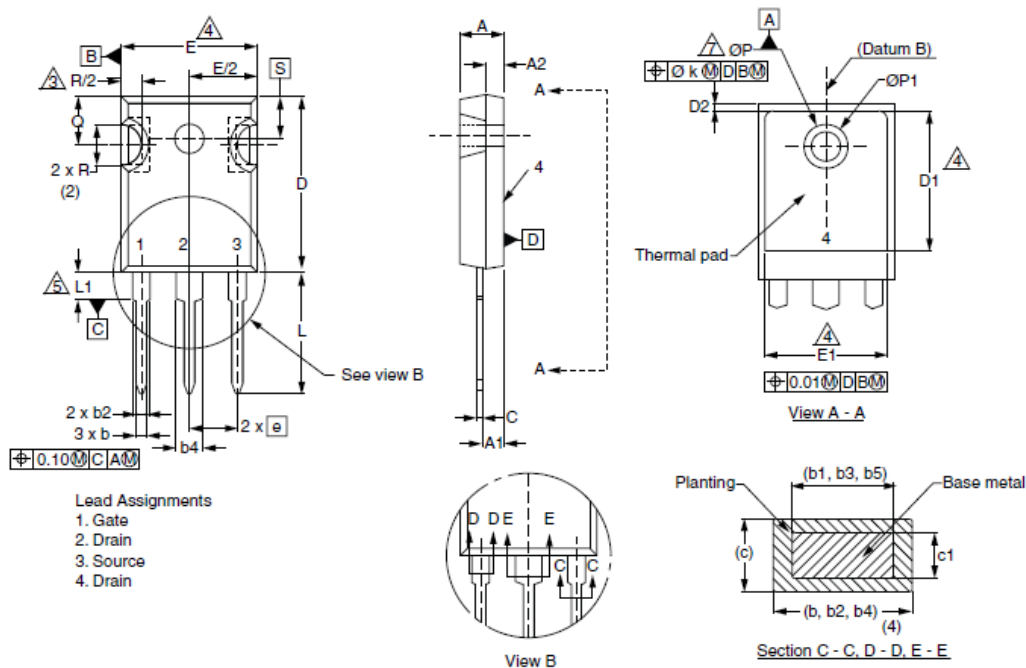
TO-263



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.06	4.83	0.160	0.190
A1	0.00	0.25	0.000	0.010
b	0.51	0.99	0.020	0.039
b1	0.51	0.89	0.020	0.035
b2	1.14	1.78	0.045	0.070
b3	1.14	1.73	0.045	0.068
c	0.38	0.74	0.015	0.029
c1	0.38	0.58	0.015	0.023
c2	1.14	1.65	0.045	0.065
D	8.38	9.65	0.330	0.380

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
D1	6.86	-	0.270	-
E	9.65	10.67	0.380	0.420
E1	6.22	-	0.245	-
e	2.54 BSC		0.100 BSC	
H	14.61	15.88	0.575	0.625
L	1.78	2.79	0.070	0.110
L1	-	1.65	-	0.066
L2	-	1.78	-	0.070
L3	0.25 BSC		0.010 BSC	
L4	4.78	5.28	0.188	0.208

TO-247



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.58	5.31	0.180	0.209
A1	2.21	2.59	0.087	0.102
A2	1.17	2.49	0.046	0.098
b	0.99	1.40	0.039	0.055
b1	0.99	1.35	0.039	0.053
b2	1.53	2.39	0.060	0.094
b3	1.65	2.37	0.065	0.093
b4	2.42	3.43	0.095	0.135
b5	2.59	3.38	0.102	0.133
c	0.38	0.86	0.015	0.034
c1	0.38	0.76	0.015	0.030
D	19.71	20.82	0.776	0.820
D1	13.08	-	0.515	-

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
D2	0.51	1.30	0.020	0.051
E	15.29	15.87	0.602	0.625
E1	13.72	-	0.540	-
e	5.46 BSC		0.215 BSC	
Ø k	0.254		0.010	
L	14.20	16.25	0.559	0.640
L1	3.71	4.29	0.146	0.169
N	7.62 BSC		0.300 BSC	
Ø P	3.51	3.66	0.138	0.144
Ø P1	-	7.39	-	0.291
Q	5.31	5.69	0.209	0.224
R	4.52	5.49	0.178	0.216
S	5.51 BSC		0.217 BSC	

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