

SE40200G

N-Channel Enhancement-Mode MOSFET

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

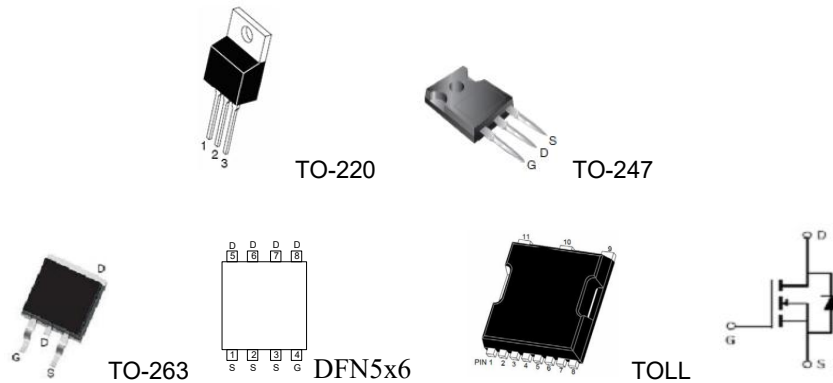
Features

For a single MOSFET

- $V_{DS} = 40V$
- $R_{DS(ON)} = 1.8m\Omega @ V_{GS}=10V$

Pin configurations

See Diagram below



Absolute Maximum Ratings

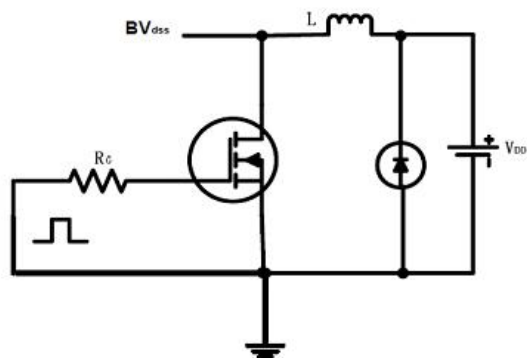
Parameter		Symbol	Rating	Units
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	± 20	V
Drain Current	Continuous	I_D	200	A
	Pulsed		780	
Single Pulse Avalanche Energy		E_{AS}	1080	mJ
Peak Diode Recovery		dv/dt	5	V/ns
Total Power Dissipation	@TA=25°C	P_D	250	W
Operating Junction Temperature Range		T_J	-55 to 150	°C

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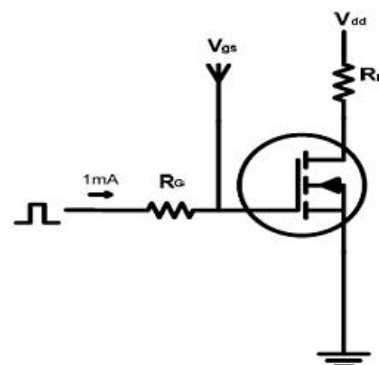
Electrical Characteristics (T _J =25°C unless otherwise noted)						
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS (Note 2)						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0 V	40			V
I _{DSS}	Drain to Source Leakage Current	V _{DS} = 120V, V _{GS} =0V			10	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =40V			100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D =250μA	1.0	2.0	3.0	V
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =20A		1.8	2.4	mΩ
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =25V, f=1MHz		5700		pF
C _{oss}	Output Capacitance			1420		pF
C _{rss}	Reverse Transfer Capacitance			530		pF
SWITCHING PARAMETERS						
Q _g	Total Gate Charge ²	V _{GS} =10V, V _{DS} =80V, I _D =20A		96		nC
Q _{gs}	Gate Source Charge			22		nC
Q _{gd}	Gate Drain Charge			10		nC
t _{d(on)}	Turn-On Delay Time	V _{GS} =10V, V _{DS} =80V, R _{GEN} =3.9Ω I _D =20A		24		ns
t _{d(off)}	Turn-Off Delay Time			72		ns
t _{d(r)}	Turn-On Rise Time			26		ns
t _{d(f)}	Turn-Off Fall Time			31		ns
Thermal Resistance						
Symbol	Parameter	TO-220			Units	
R _{θJC}	Junction to Case	0.6			°C/W	
R _{θJA}	Junction to Ambient (t ≤ 10s)	60			°C/W	

Test Circuits and Waveform

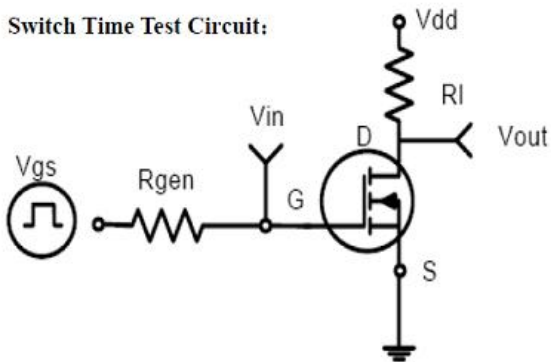
EAS test circuits:



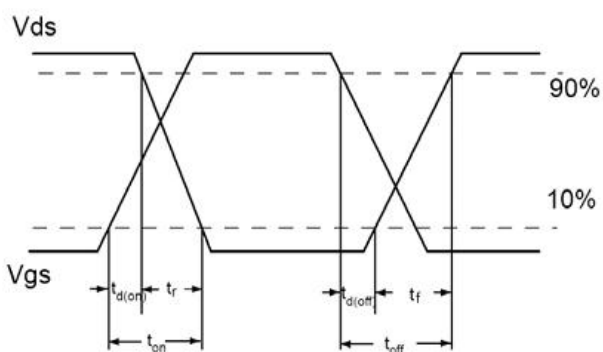
Gate charge test circuit:



Switch Time Test Circuit:



Switch Waveforms:



Typical Characteristics

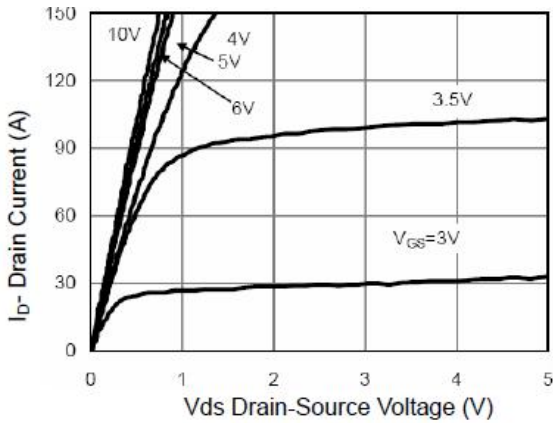


Figure 1 Output Characteristics

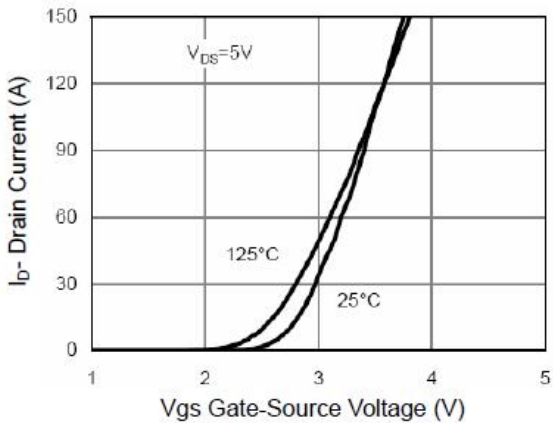


Figure 2 Transfer Characteristics

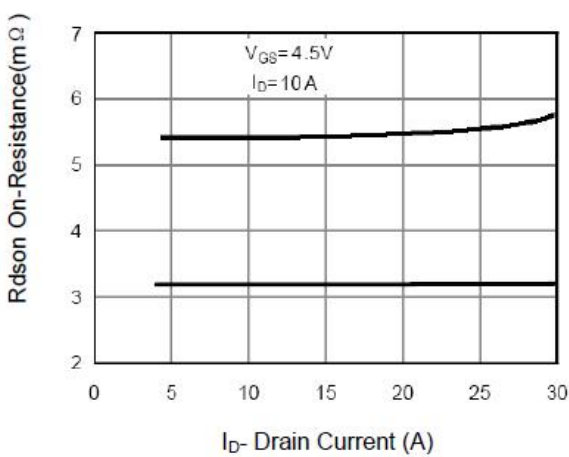


Figure 3 Rds(on)- Drain Current

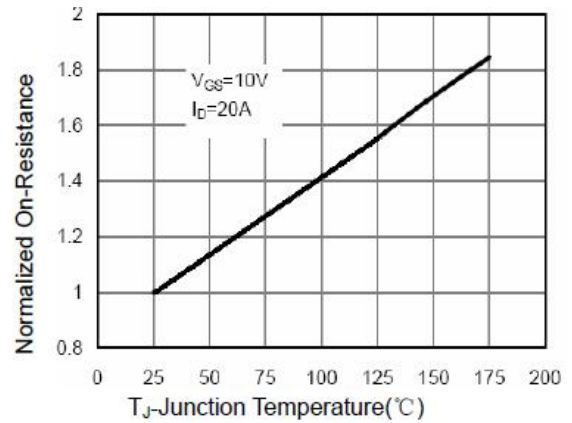


Figure 4 Rds(on)-Junction Temperature

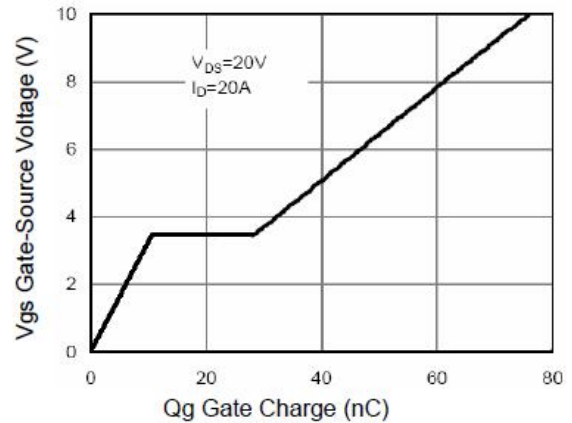


Figure 5 Gate Charge

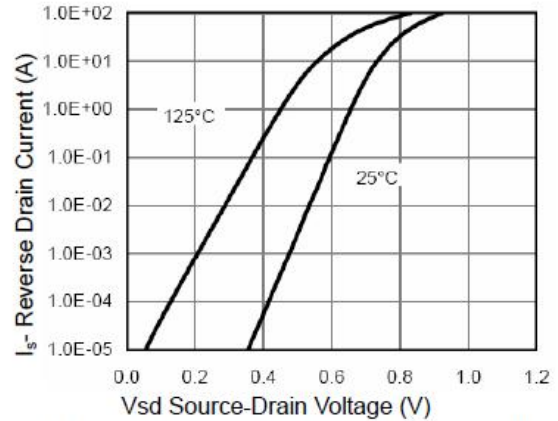


Figure 6 Source- Drain Diode Forward

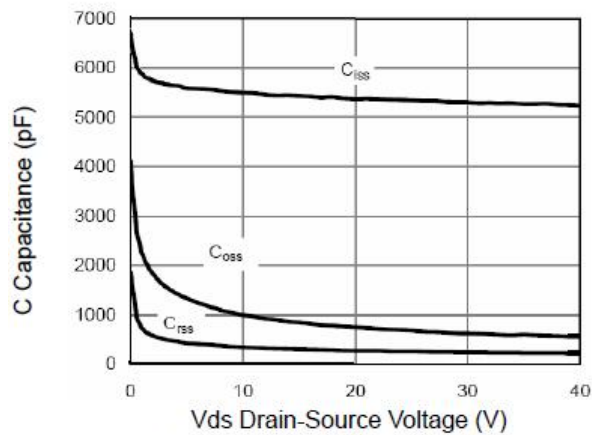


Figure 7 Capacitance vs Vds

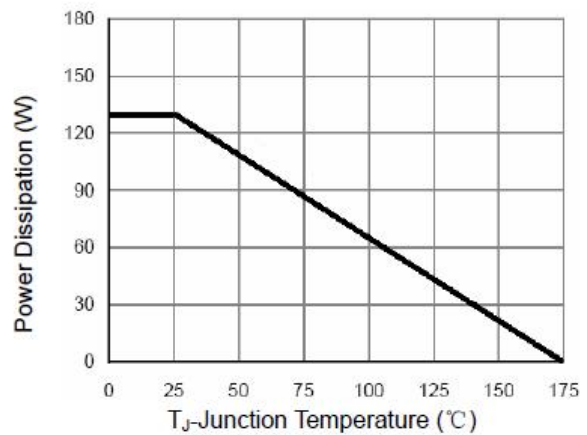


Figure 9 Power De-rating

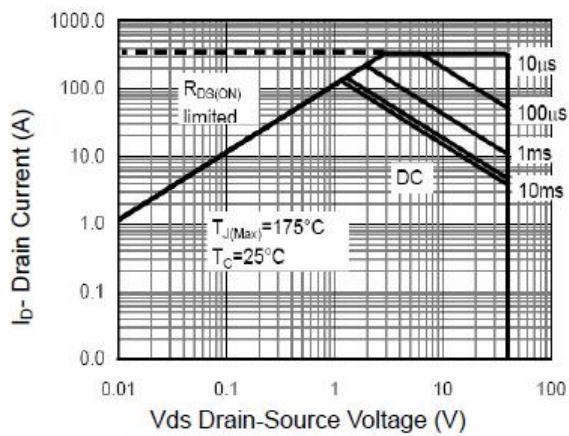


Figure 8 Safe Operation Area

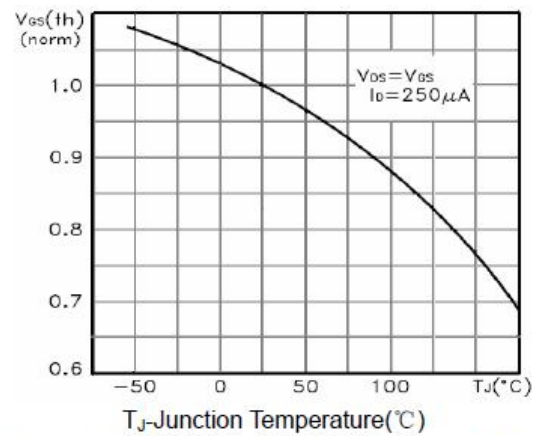


Figure 10 $V_{GS(th)}$ vs Junction Temperature

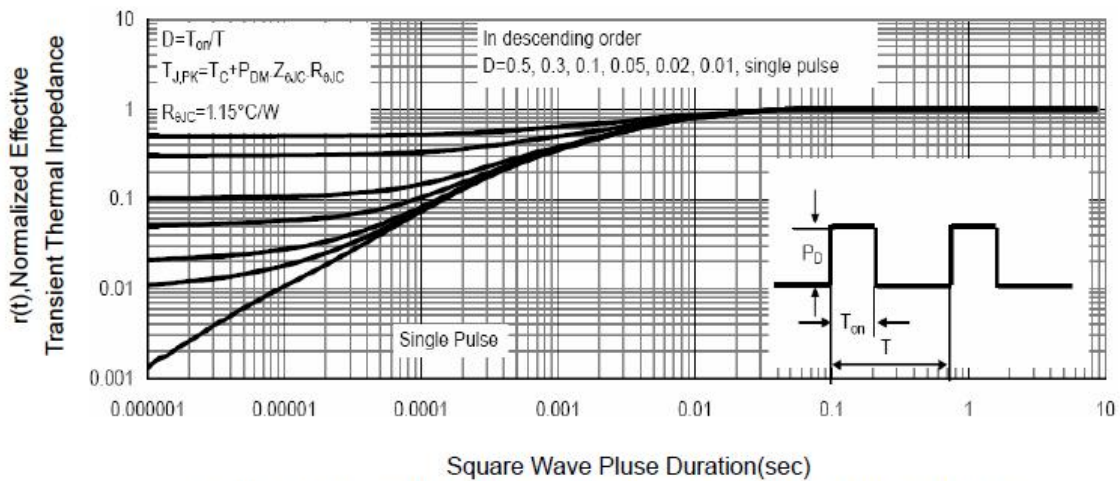
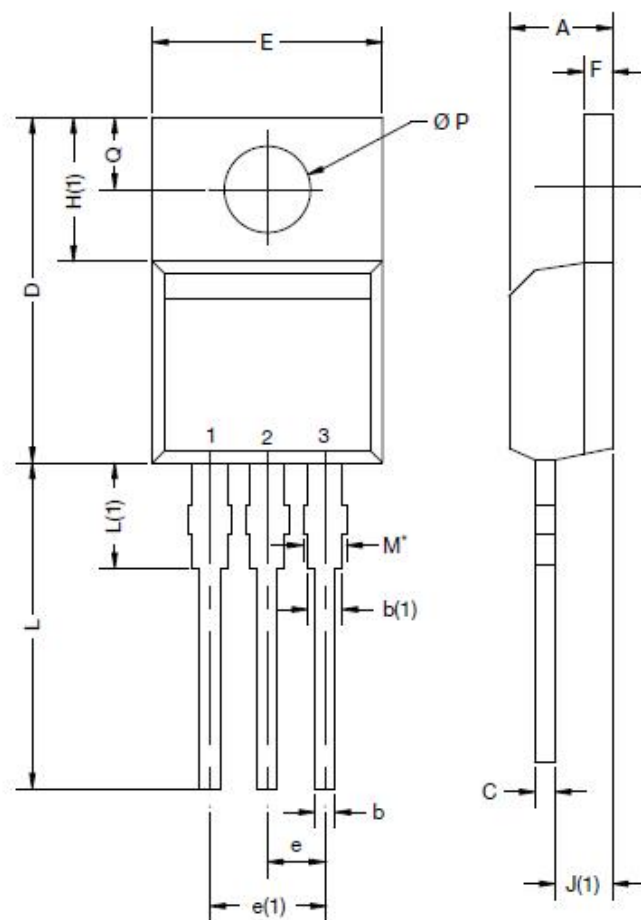


Figure 11 Normalized Maximum Transient Thermal Impedance

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Package Outline Dimension

TO-220

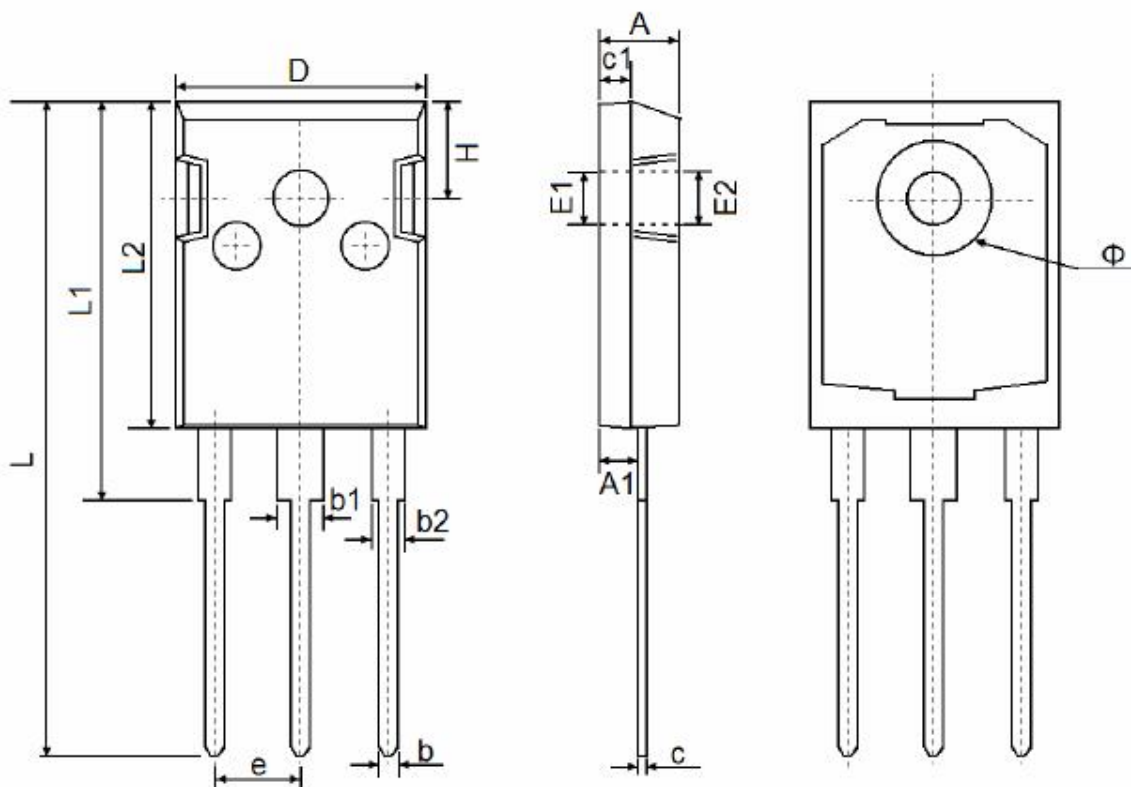


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.24	4.65	0.167	0.183
b	0.69	1.02	0.027	0.040
b(1)	1.14	1.78	0.045	0.070
c	0.36	0.61	0.014	0.024
D	14.33	15.85	0.564	0.624
E	9.96	10.52	0.392	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.10	6.71	0.240	0.264
J(1)	2.41	2.92	0.095	0.115
L	13.36	14.40	0.526	0.567
L(1)	3.33	4.04	0.131	0.159
$\varnothing P$	3.53	3.94	0.139	0.155
Q	2.54	3.00	0.100	0.118

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Package Outline Dimension

TO-247

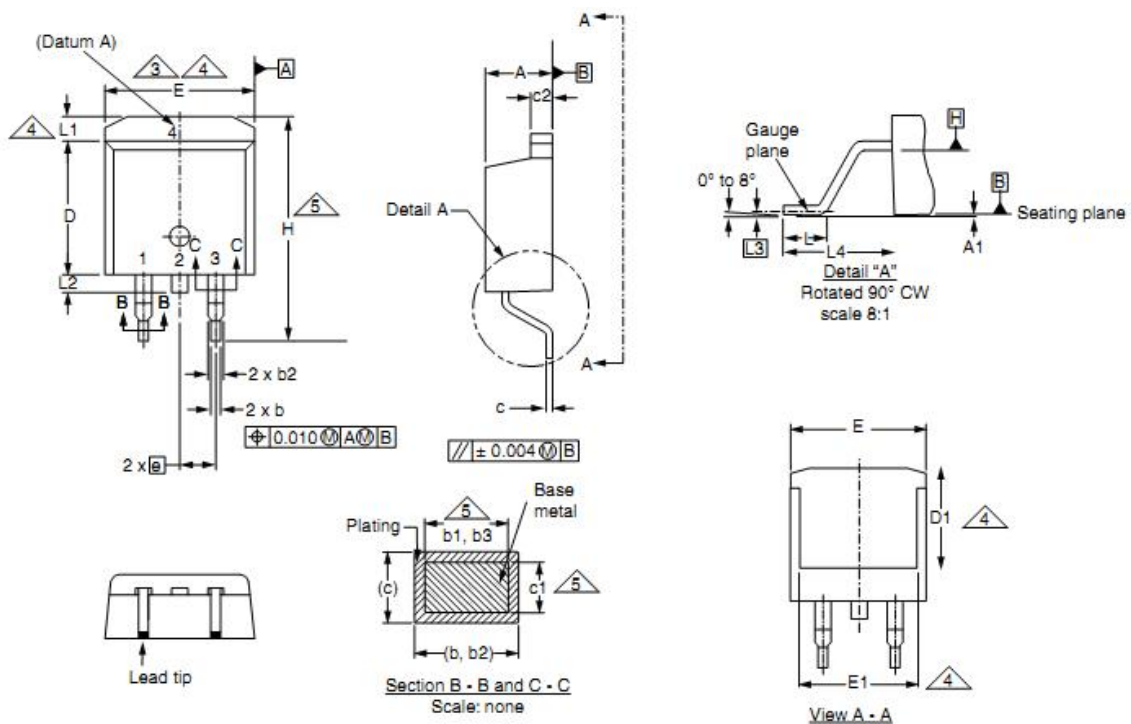


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.850	5.150	0.191	0.200
A1	2.200	2.600	0.087	0.102
b	1.000	1.400	0.039	0.055
b1	2.800	3.200	0.110	0.126
b2	1.800	2.200	0.071	0.087
c	0.500	0.700	0.020	0.028
c1	1.900	2.100	0.075	0.083
D	15.450	15.750	0.608	0.620
E1	3.500 REF		0.138 REF	
E2	3.600 REF		0.142 REF	
L	40.900	41.300	1.610	1.626
L1	24.800	25.100	0.976	0.988
L2	20.300	20.600	0.799	0.811
Φ	7.100	7.300	0.280	0.287
e	5.450 TYP		0.215 TYP	
H	5.980 REF		0.235 REF	

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Package Outline Dimension

TO-263



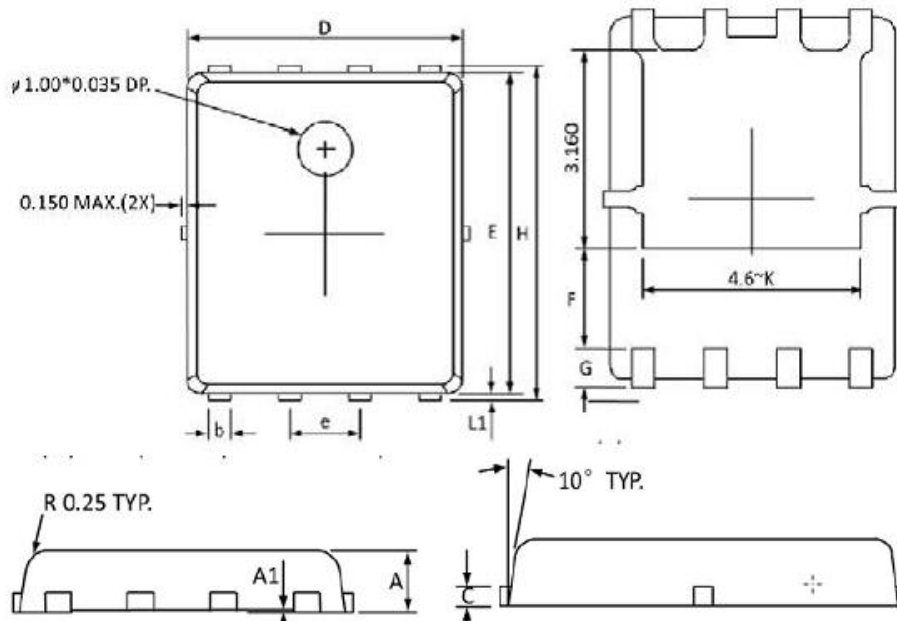
DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.06	4.83	0.160	0.190
A1	0.00	0.25	0.000	0.010
b	0.51	0.99	0.020	0.039
b1	0.51	0.89	0.020	0.035
b2	1.14	1.78	0.045	0.070
b3	1.14	1.73	0.045	0.068
c	0.38	0.74	0.015	0.029
c1	0.38	0.58	0.015	0.023
c2	1.14	1.65	0.045	0.065
D	8.38	9.65	0.330	0.380

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

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Package Outline Dimension

DFN5X6

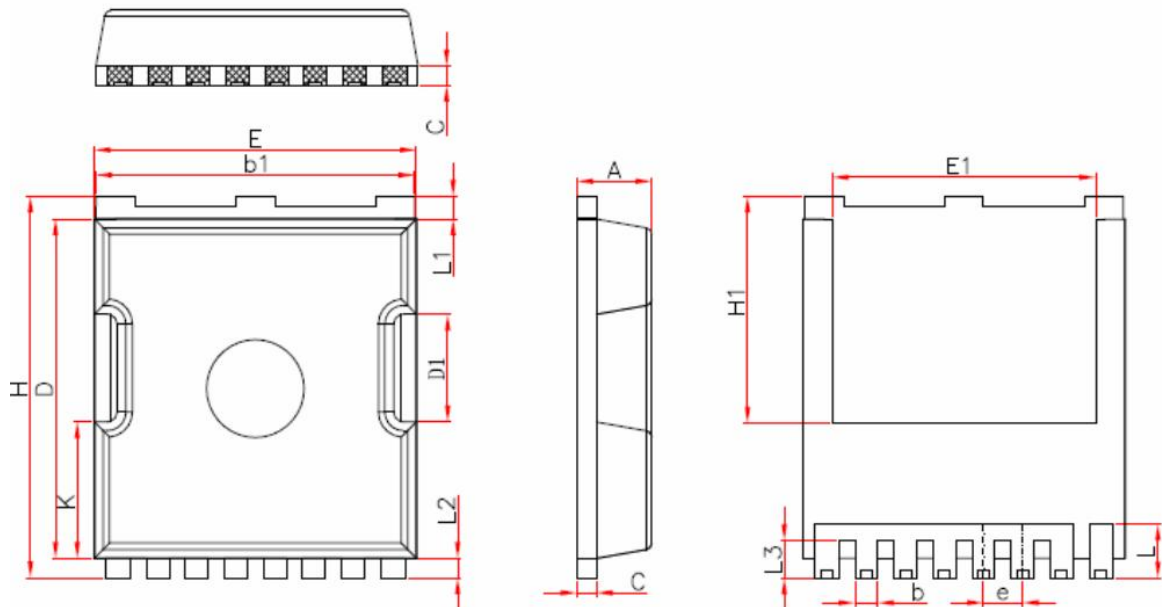


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.800	1.000	0.032	0.039
A1	0.000	0.005	0.000	0.000
b	0.350	0.490	0.014	0.019
C	0.254 Ref		0.254 Ref	
D	4.900	5.100	0.193	0.200
E	5.700	5.900	0.225	0.232
e	1.27 BSC		1.27 BSC	
F	1.600 Ref		1.600 Ref	
G	0.600 Ref		0.600 Ref	
H	5.950	6.200	0.235	0.244
L1	0.100	0.180	0.004	0.007
K	3.200 Ref		3.200 Ref	

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Package Outline Dimension

TOLL



Symbol	Millimeters		
	Min.	Nom.	Max.
A	2.20	2.30	2.40
b	0.65	0.75	0.85
b1	9.70	9.80	9.90
C	0.50	0.60	0.70
D	10.30	10.40	10.50
D1	3.15	3.3	3.45
E	9.70	9.90	10.10
E1	8.00	8.10	8.20
e	1.10	1.20	1.30
H	11.6	11.7	11.8
H1	6.85	6.95	7.05
K	4.08	4.18	4.28
L	1.60	1.65	2.10
L1	0.60	0.70	0.80
L2	0.50	0.60	0.70
L3	1.05	1.20	1.30