

SE60150

N-Channel Enhancement-Mode MOSFET

Revision: A

General Description

This type used advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge.

- High density cell design for ultra low $R_{DS(ON)}$
- Excellent package for good heat dissipation
- Special technology for high ESD capability

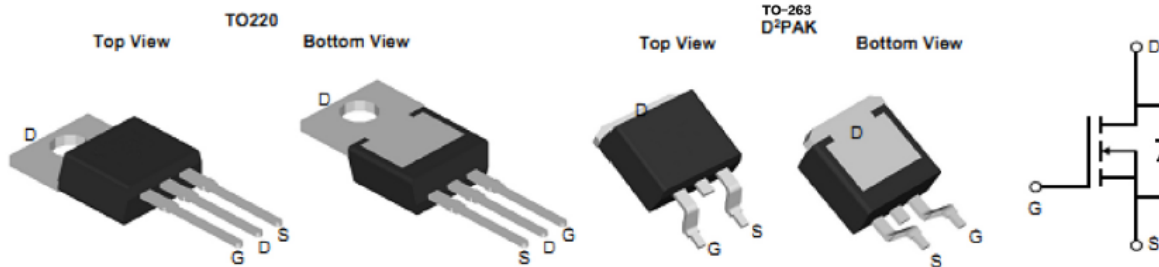
Features

For a single MOSFET

- $V_{DS} = 60V$
- $R_{DS(ON)} < 3.5m\Omega @ V_{GS}=10V$
- $R_{DS(ON)} < 5.2m\Omega @ V_{GS}=6V$

Pin configurations

See Diagram below



Absolute Maximum Ratings

Parameter		Symbol	Rating	Units
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	± 20	V
Drain Current	Continuous	I_D	150	A
	Pulsed		420	
Total Power Dissipation	@TA=25°C	P_D	272.5	W
Operating Junction Temperature Range		T_J	-55 to 175	°C

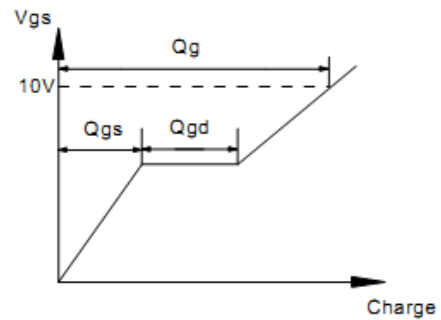
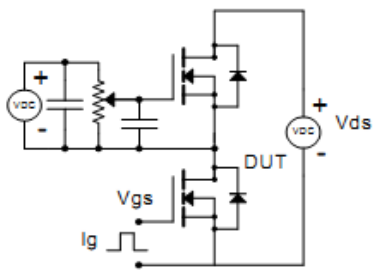
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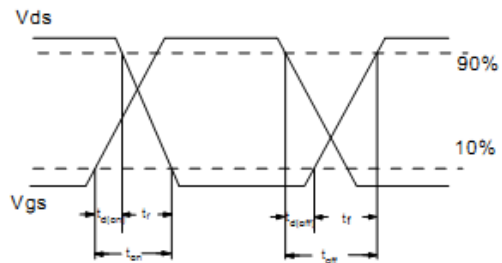
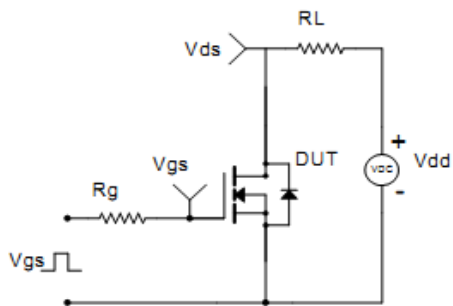
Electrical Characteristics (T _J =25°C unless otherwise noted)						
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS (Note 2)						
B _V DSS	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0 V	60			V
I _{DSS}	Drain to Source Leakage Current	V _{DS} = 60V, V _{GS} =0V			1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =20V			100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D =250μA	2.2	2.85	3.5	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A, TO220		2.9	3.5	mΩ
		V _{GS} =6V, I _D =20A, TO220		3.7	5.2	
		V _{GS} =10V, I _D =20A, TO263		2.6	3.2	
		V _{GS} =6V, I _D =20A, TO263		3.4	4.9	
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =40V, f=1MHz		7765		pF
C _{oss}	Output Capacitance			960		pF
C _{rss}	Reverse Transfer Capacitance			66		pF
SWITCHING PARAMETERS						
Q _g	Total Gate Charge ²	V _{GS} =10V, V _{DS} =40V, I _D =20A		127	178	nC
Q _{gs}	Gate Source Charge			58		nC
Q _{gd}	Gate Drain Charge			35		nC
t _{d(on)}	Turn-On Delay Time	V _{GS} =10V, V _{DS} =40V, R _{GEN} =3Ω		24		ns
t _{d(off)}	Turn-Off Delay Time			55		ns
t _{d(r)}	Turn-On Rise Time			18		ns
t _{d(f)}	Turn-Off Fall Time			17		ns
Thermal Resistance						
Symbol	Parameter	Min	Typ	Units		
R _{θJC}	Junction to Case	0.35	0.55	°C/W		

Test Circuit

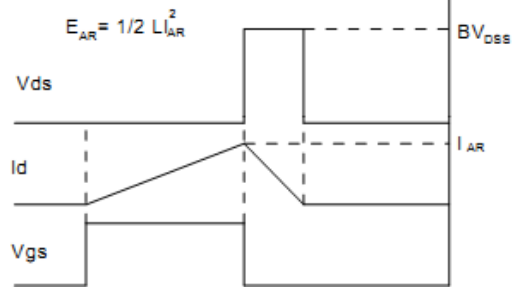
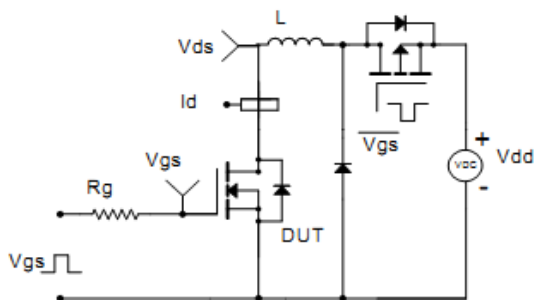
Gate Charge Test Circuit & Waveform



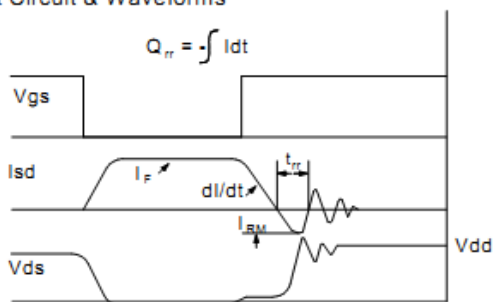
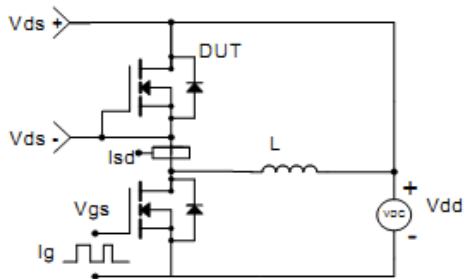
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Typical Characteristics

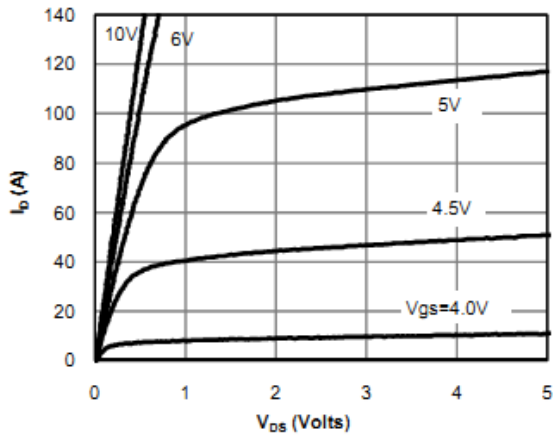


Fig 1: On-Region Characteristics (Note E)

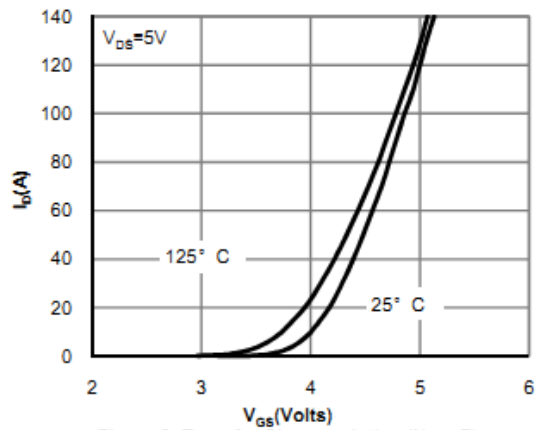


Figure 2: Transfer Characteristics (Note E)

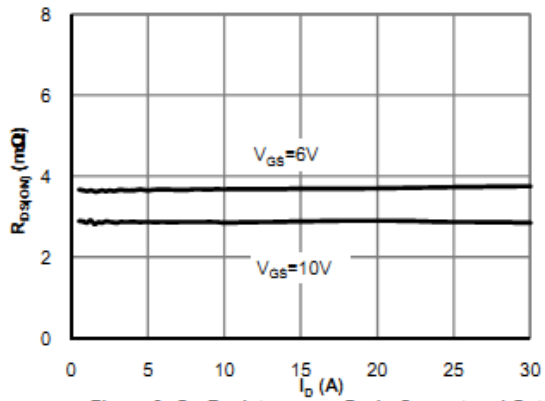


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

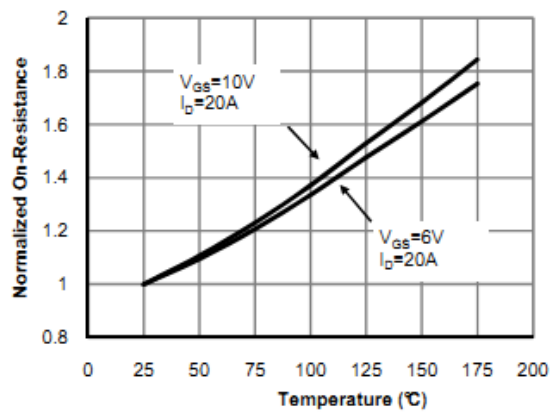


Figure 4: On-Resistance vs. Junction Temperature (Note E)

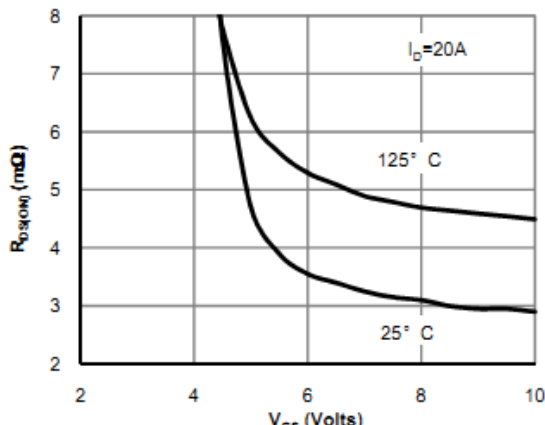


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

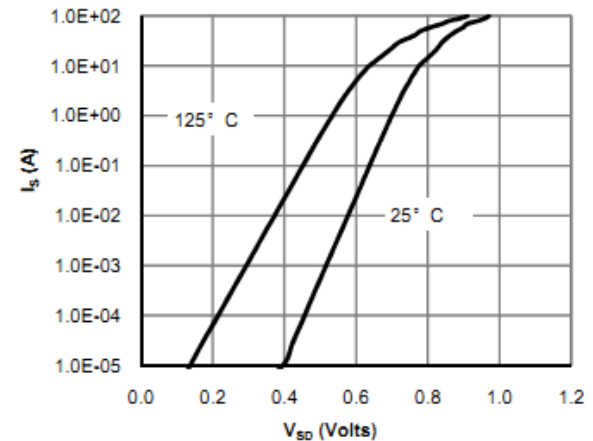


Figure 6: Body-Diode Characteristics (Note E)

Typical Characteristics

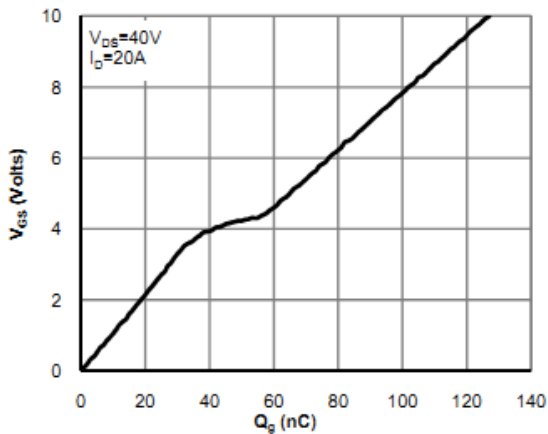


Figure 7: Gate-Charge Characteristics

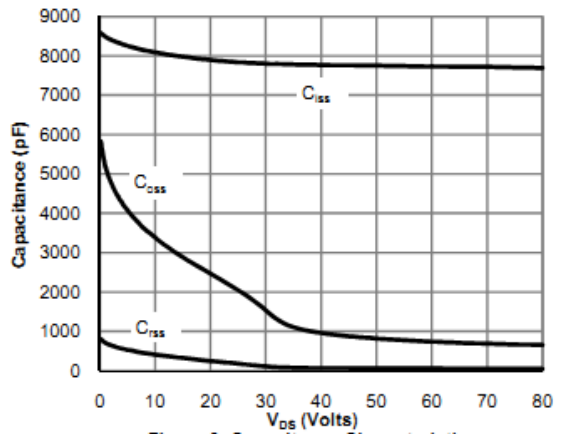


Figure 8: Capacitance Characteristics

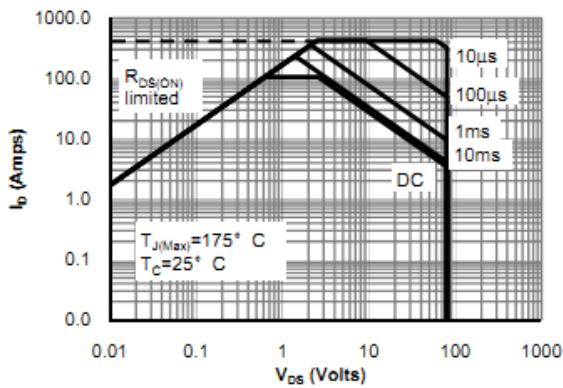


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

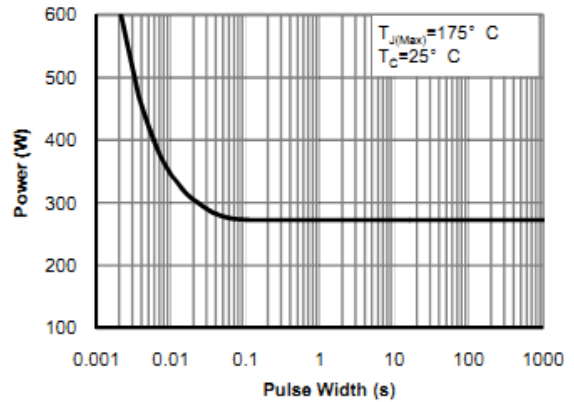


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

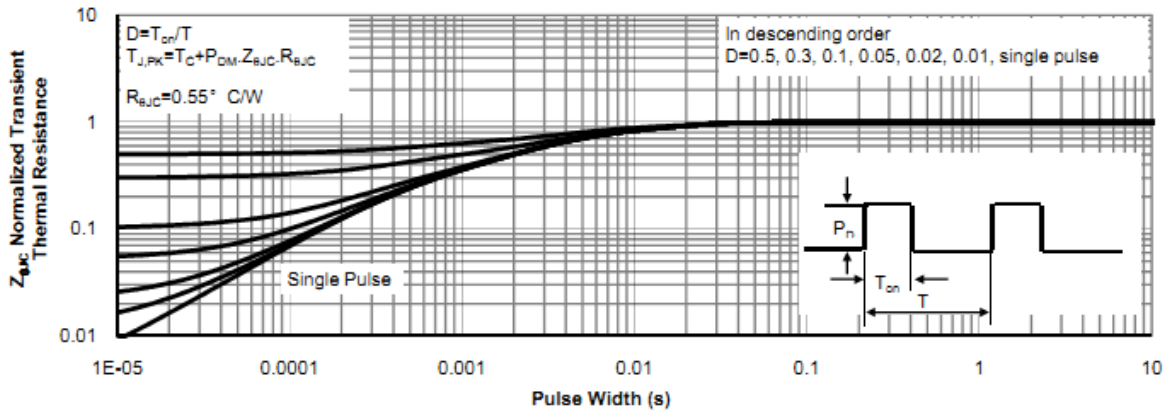


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

Typical Characteristics

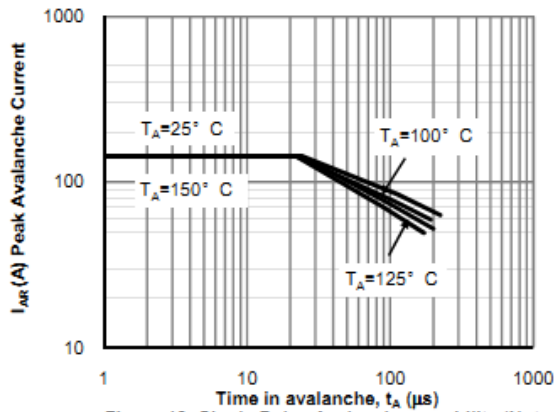


Figure 12: Single Pulse Avalanche capability (Note C)

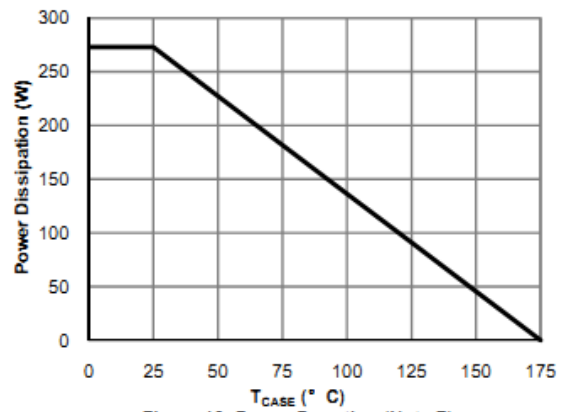


Figure 13: Power De-rating (Note F)

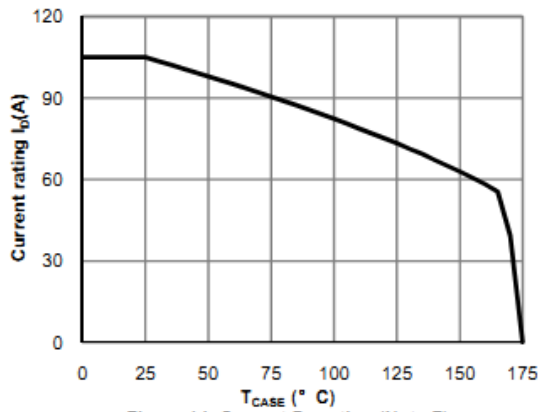


Figure 14: Current De-rating (Note F)

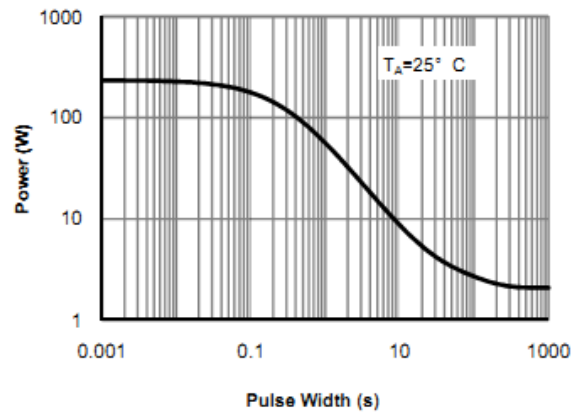


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

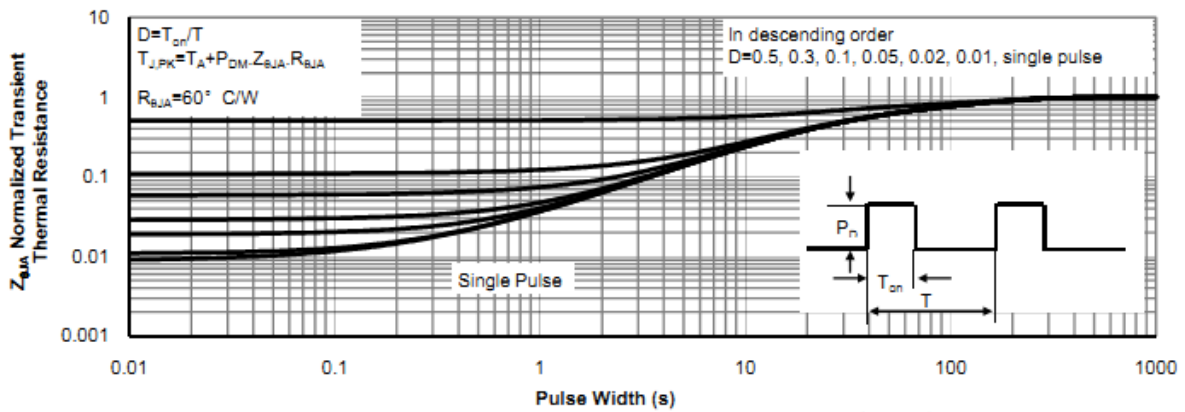
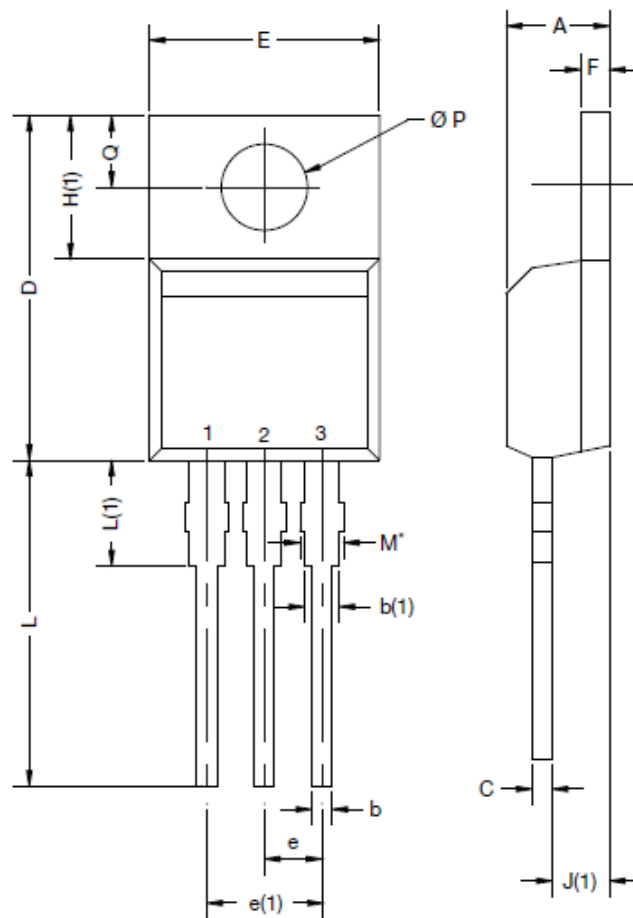


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

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Package Outline Dimension

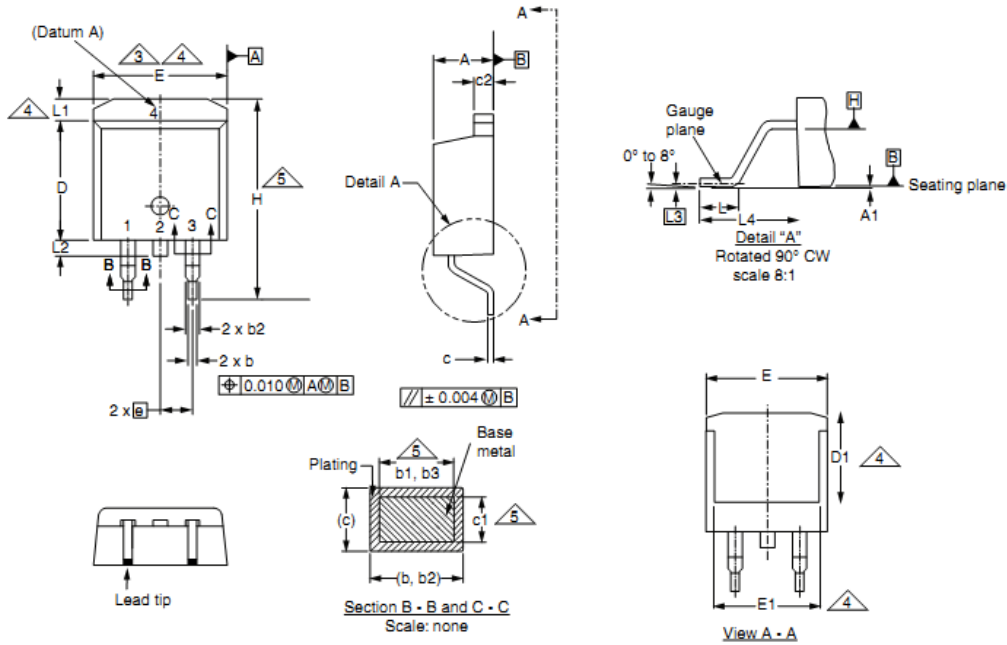
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DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.24	4.65	0.167	0.183
b	0.69	1.02	0.027	0.040
b(1)	1.14	1.78	0.045	0.070
c	0.36	0.61	0.014	0.024
D	14.33	15.85	0.564	0.624
E	9.96	10.52	0.392	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
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

Package Outline Dimension

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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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