

P-Channel 40 V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^d	Q _g (Typ.)
- 40	0.035 at V _{GS} = - 10 V	- 8.2	23 nC
	0.048 at V _{GS} = - 4.5 V	- 7.2	

FEATURES

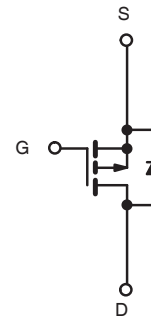
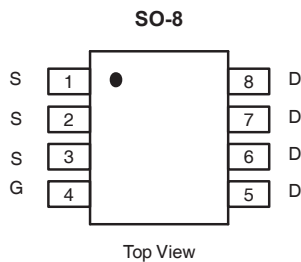
- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested

APPLICATIONS

- Power management
- Load switch
- Battery protection



RoHS
COMPLIANT



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V _{DS}	-40	V
Gate-source voltage	V _{GS}	± 20	
Continuous drain current (T _J = 150 °C)	I _D	T _C = 25 °C	-8.2
		T _C = 70 °C	-6.8
		T _A = 25 °C	-6.7 ^{a, b}
		T _A = 70 °C	-5.6 ^{a, b}
Pulsed drain current	I _{DM}	-30	A
Continuous source-drain diode current	I _S	T _C = 25 °C	
		T _A = 25 °C	-4.1 ^{a, b}
Avalanche current	I _{AS}	-8	mJ
Single-pulse avalanche energy	E _{AS}	7.5	
Maximum power dissipation	P _D	T _C = 25 °C	5.3
		T _C = 70 °C	3.7
		T _A = 25 °C	2.6 ^{a, b}
		T _A = 70 °C	1.8 ^{a, b}
Operating junction and storage temperature range	T _J , T _{stg}	-55 to +150	°C

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient ^{a, c}	R _{thJA}	35	50	°C/W
Maximum junction-to-foot	R _{thJF}	20	30	

Notes

- Surface mounted on 1" x 1" FR4 board
- t = 10 s
- Maximum under steady state conditions is 85 °C/W
- Based on T_C = 25 °C

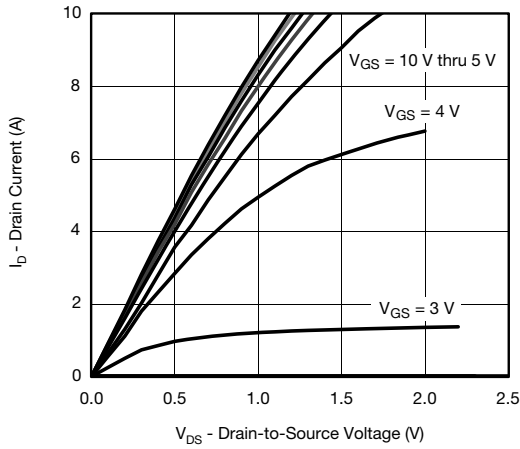
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-40	-	-	V
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$	-	-42	-	mV/ $^\circ\text{C}$
$V_{GS(th)}$ temperature coefficient	$\Delta V_{GS(th)}/T_J$		-	4.6	-	
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-1	-	-3	V
Gate-source leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	$V_{DS} = -32\text{ V}, V_{GS} = 0\text{ V}$	-	-	-1	μA
On-state drain current ^a		$V_{DS} = -32\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$	-	-	-5	
Drain-source on-state resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -5\text{ A}$	-	0.035	0.045	Ω
Forward transconductance ^a		$V_{GS} = -4.5\text{ V}, I_D = -4\text{ A}$	-	0.048	0.065	
	g_{fs}	$V_{DS} = -10\text{ V}, I_D = -5\text{ A}$	-	14	-	S
Dynamic ^b						
Input capacitance	C_{iss}	$V_{DS} = -32\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	-	1670	-	μF
Output capacitance	C_{oss}		-	380	-	
Reverse transfer capacitance	C_{rss}		-	105	-	
Total gate charge	Q_g	$V_{DS} = -32\text{ V}, V_{GS} = -10\text{ V}, I_D = -5\text{ A}$	-	23	-	nC
Gate-source charge		$V_{DS} = -32\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -4\text{ A}$	-	10	-	
Gate-drain charge			-	4	-	
Gate resistance	R_g	$f = 1\text{ MHz}$	-	5	-	Ω
Turn-on delay time	$t_{d(on)}$	$V_{DD} = -20\text{ V}, R_L = 4\text{ }\Omega$ $I_D \cong -5\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$	-	10	-	ns
Rise time	t_r		-	15	-	
Turn-off delay time	$t_{d(off)}$		-	33	-	
Fall time	t_f		-	9	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = -20\text{ V}, R_L = 4\text{ }\Omega$ $I_D \cong -4\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$	-	44	-	
Rise time	t_r		-	33	-	
Turn-off delay time	$t_{d(off)}$		-	58	-	
Fall time	t_f		-	25	-	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I_S	$T_C = 25\text{ }^\circ\text{C}$	-	-	-8.2	A
Pulse diode forward current	I_{SM}		-	-	-30	
Body diode voltage	V_{SD}	$I_S = -2\text{ A}, V_{GS} = 0\text{ V}$	-	-0.7	-1.2	V
Body diode reverse recovery time	t_{rr}	$I_F = -2\text{ A}, di/dt = 100\text{ A}/\mu\text{s},$ $T_J = 25\text{ }^\circ\text{C}$	-	25	50	ns
Body diode reverse recovery charge	Q_{rr}		-	17	35	nC
Reverse recovery fall time	t_a		-	15	-	ns
Reverse recovery rise time	t_b		-	11	-	

Notes

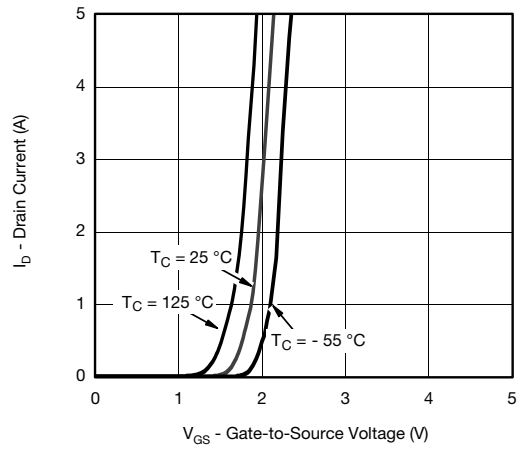
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
- b. Guaranteed by design, not subject to production testing

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

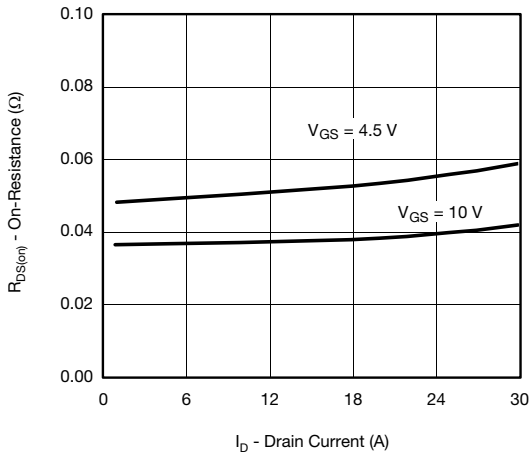
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



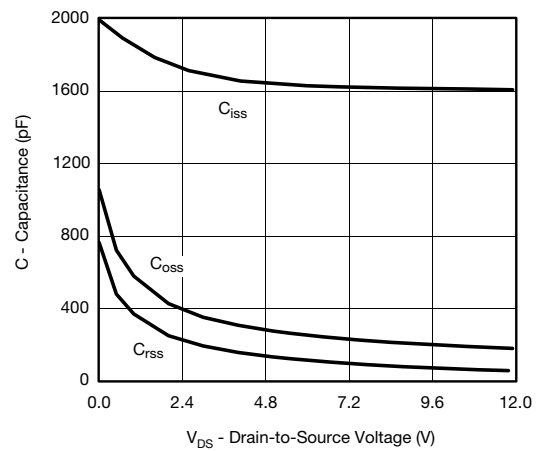
Output Characteristics



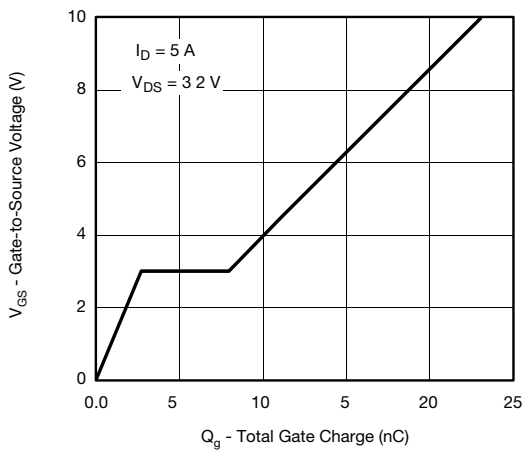
Transfer Characteristics



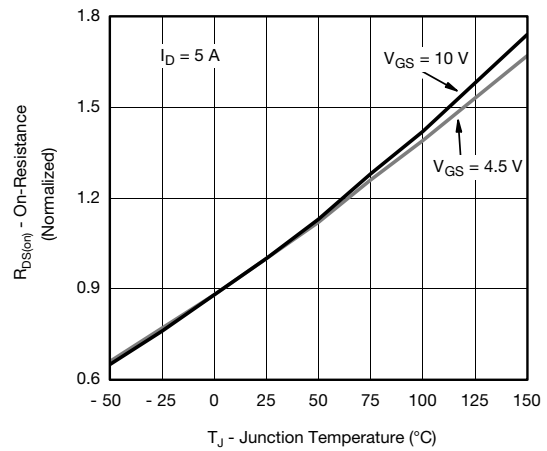
On-Resistance vs. Drain Current



Capacitance

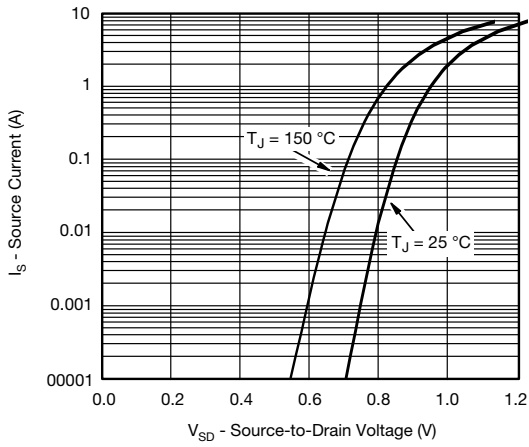


Gate Charge

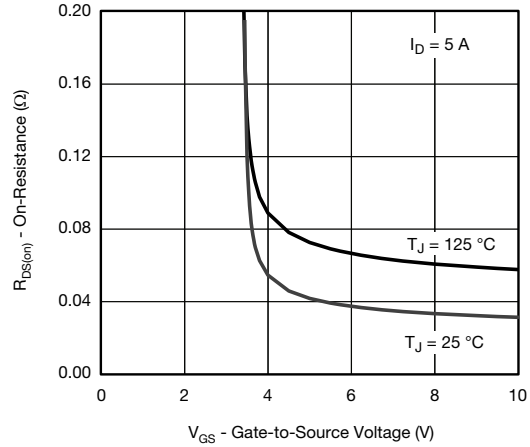


On-Resistance vs. Junction Temperature

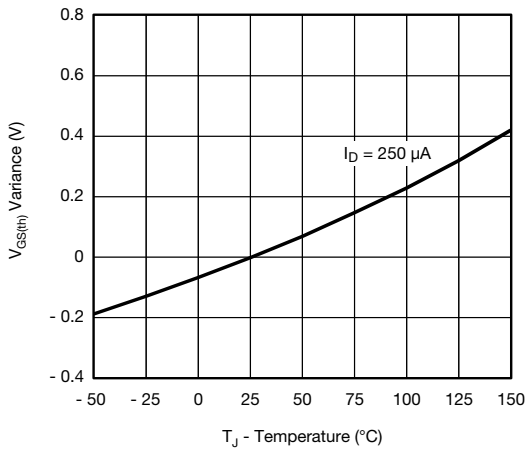
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



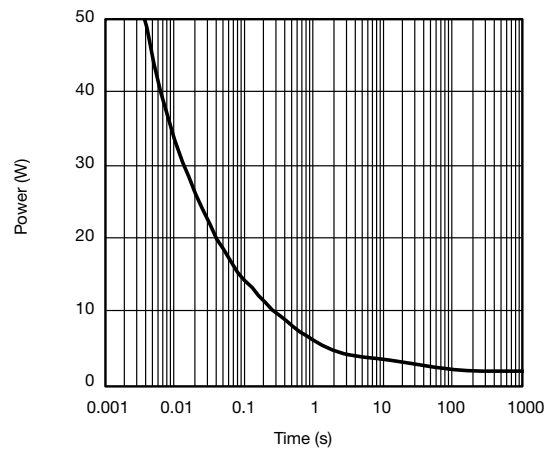
Source-Drain Diode Forward Voltage



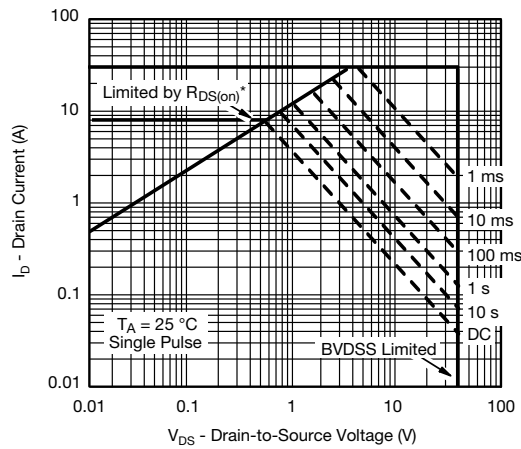
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



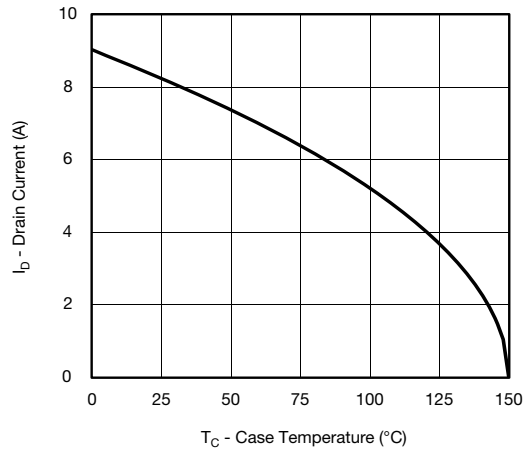
Single Pulse Power, Junction-to-Ambient



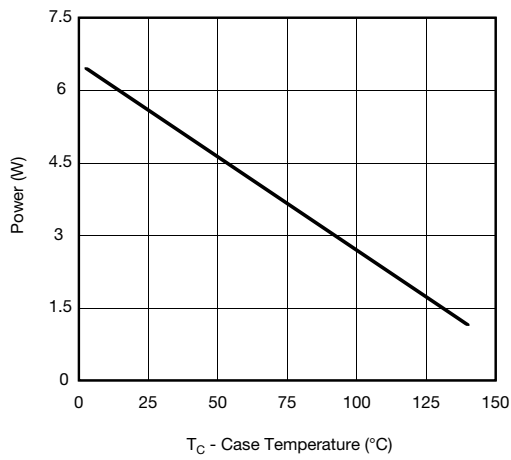
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area

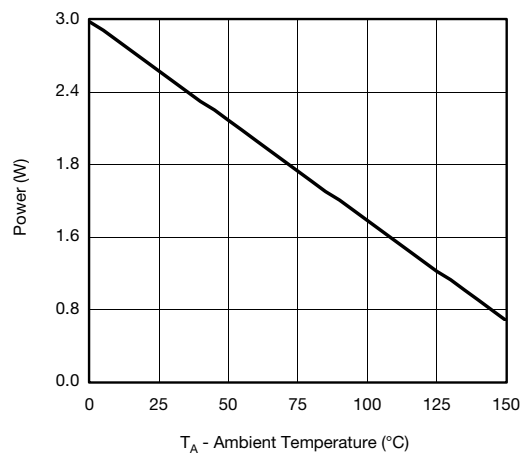
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating ^a



Power, Junction-to-Foot

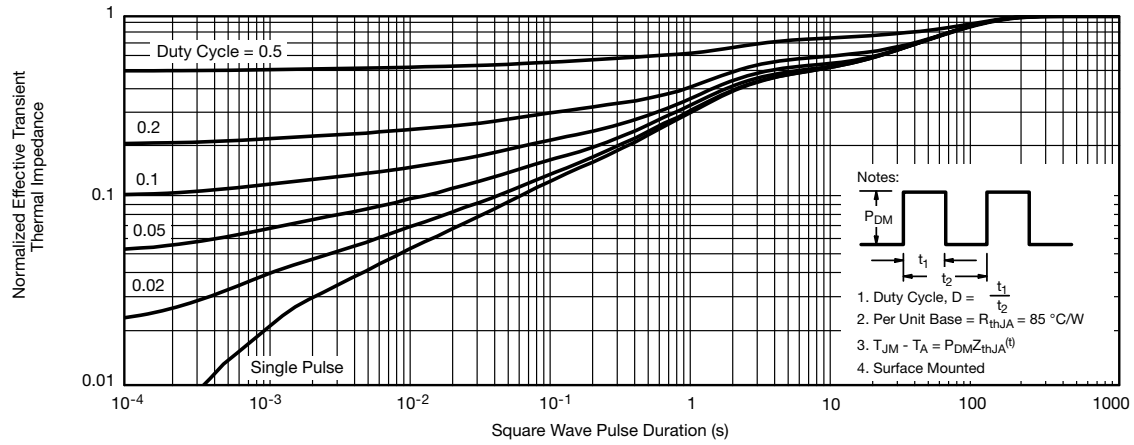


Power Derating, Junction-to-Ambient

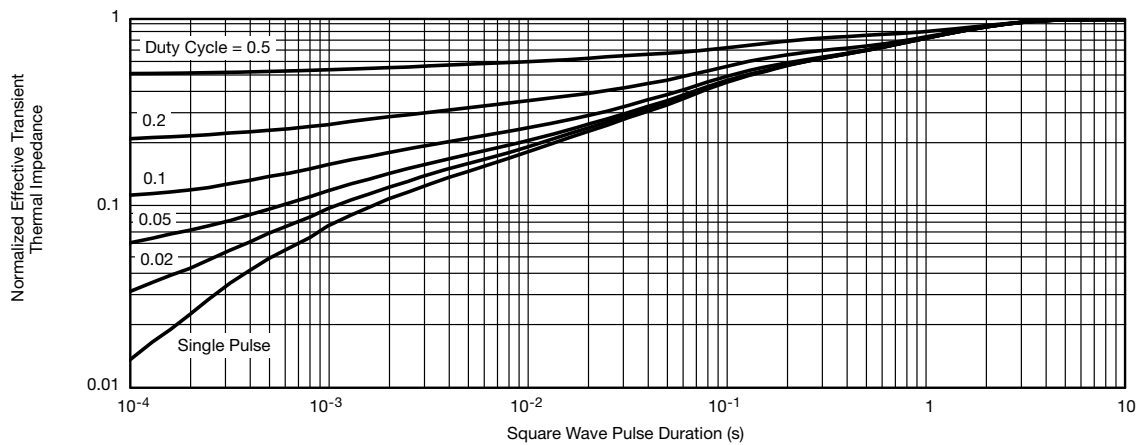
Note

- a. The power dissipation P_D is based on T_J max. = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

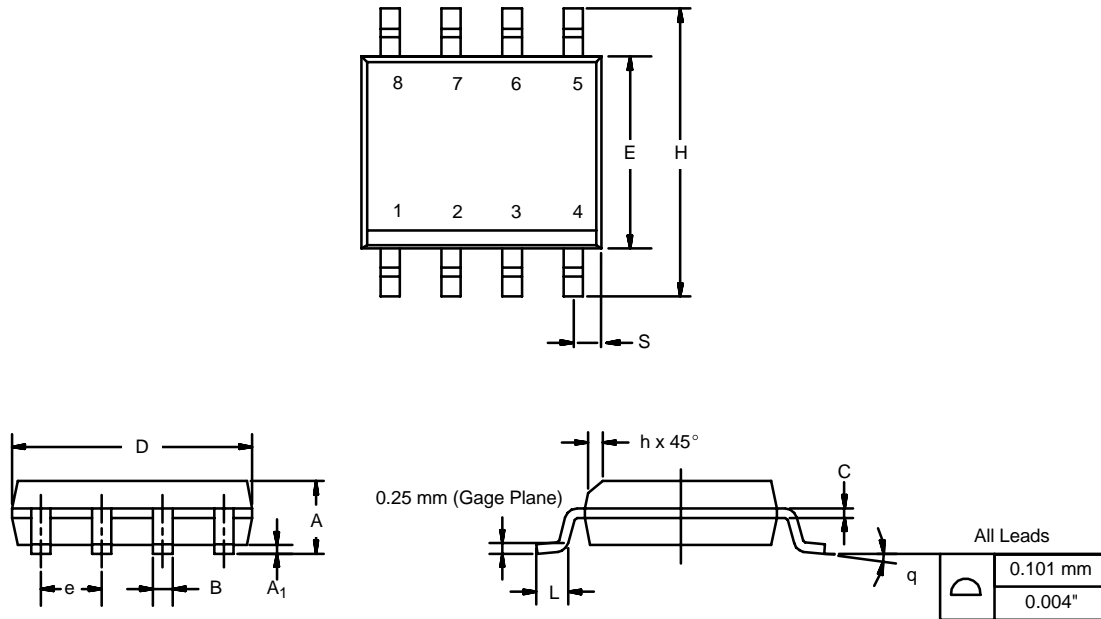


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

SOIC (NARROW): 8-LEAD
JEDEC Part Number: MS-012



DIM	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A ₁	0.10	0.20	0.004	0.008
B	0.35	0.51	0.014	0.020
C	0.19	0.25	0.0075	0.010
D	4.80	5.00	0.189	0.196
E	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
h	0.25	0.50	0.010	0.020
L	0.50	0.93	0.020	0.037
q	0°	8°	0°	8°
S	0.44	0.64	0.018	0.026
ECN: C-06527-Rev. I, 11-Sep-06				
DWG: 5498				

RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads
Dimensions in Inches/(mm)

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