SI9934BDY-T1-E3-VB Datasheet

Dual P-Channel 20 V (D-S) MOSFET

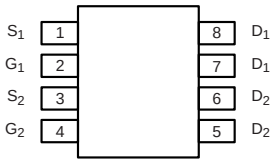
PRODUCT SUMMARY	
V_{DS} (V)	- 20
$R_{DS(on)}$ (Ω) at V_{GS} = - 10 V	0.019
$R_{DS(on)}$ (Ω) at V_{GS} = - 4.5 V	0.023
I_D (A) per leg	-8.5
Configuration	Dual

FEATURES

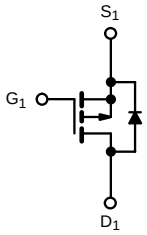
- Trench Power MOSFET
- 100 % R_g and UIS Tested

Pb-free
RoHS COMPLIANT
HALOGEN FREE

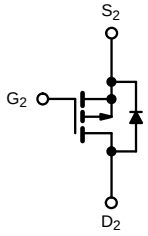
SO-8



Top View



P-Channel MOSFET



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	- 25	V
Gate-Source Voltage		V_{GS}	± 12	
Continuous Drain Current	T_C = 25 °C	I_D	- 8.5	A
	T_C = 125 °C		- 6	
Continuous Source Current (Diode Conduction)		I_S	- 4	
Pulsed Drain Current[a]		I_{DM}	- 26	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	- 17	
Single Pulse Avalanche Energy		E_{AS}	14	mJ
Maximum Power Dissipation[a]	T_C = 25 °C	P_D	3.7	W
	T_C = 125 °C		1.3	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to + 175	°C

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-Ambient	PCB Mount[b]	R_{thJA}	110	°C/W
Junction-to-Foot (Drain)		R_{thJF}	45	

Notes

a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. When mounted on 1" square PCB (FR-4 material).
c. Parametric verification ongoing.

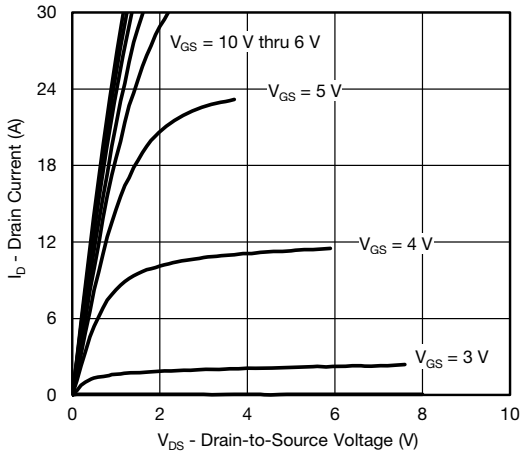
SPECIFICATIONS (T_C = 25 °C, unless otherwise noted)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static							
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = - 250 µA		- 20	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA		- 0.5	- 1.0	- 1.5	
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 12 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V	V_{DS} = -25 V	-	-	- 1	µA
		V_{GS} = 0 V	V_{DS} = - 25 V, T_J = 125 °C	-	-	- 50	
		V_{GS} = 0 V	V_{DS} = - 25 V, T_J = 175 °C	-	-	- 150	
On-State Drain Current[a]	$I_{D(on)}$	V_{GS} = - 10 V	V_{DS} ≤ - 5 V	- 20	-	-	A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 10V	I_D = - 4.9 A	-	0.019	-	Ω
		V_{GS} = - 10 V	I_D = - 4.9 A, T_J = 125 °C	-	0.034	-	
		V_{GS} = - 10V	I_D = - 4.9 A, T_J = 175 °C	-	0.056	-	
		V_{GS} = - 4.5 V	I_D = - 3.7 A	-	0.023	-	
Forward Transconductance[b]	g_{fs}	V_{DS} = - 15 V, I_D = - 4.9 A		-	9	-	S
Dynamic[b]							
Input Capacitance	C_{iss}	V_{GS} = 0 V	V_{DS} = - 25 V, f = 1 MHz	-	2820	-	pF
Output Capacitance	C_{oss}			-	126	190	
Reverse Transfer Capacitance	C_{rss}			-	90	115	
Total Gate Charge[c]	Q_g	V_{GS} = - 4.5 V	V_{DS} = - 15 V, I_D = - 4.9 A	-	15	22	nC
Gate-Source Charge[c]	Q_{gs}			-	2.1		
Gate-Drain Charge[c]	Q_{gd}			-	3.5	-	
Gate Resistance	R_g	f = 1 MHz		2.60	5.26	8.50	Ω
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = - 15 V, R_L = 6.8 Ω I_D ≅ - 1 A, V_{GEN} = - 10 V, R_g = 1 Ω		-	3	5	ns
Rise Time[c]	t_r			-	9	14	
Turn-Off Delay Time[c]	$t_{d(off)}$			-	20	30	
Fall Time[c]	t_f			-	9	14	
Source-Drain Diode Ratings and Characteristics[b]							
Pulsed Current[a]	I_{SM}			-	-	- 26	A
Forward Voltage	V_{SD}	I_F = - 2 A, V_{GS} = 0 V		-	- 0.8	- 1.2	V

Notes

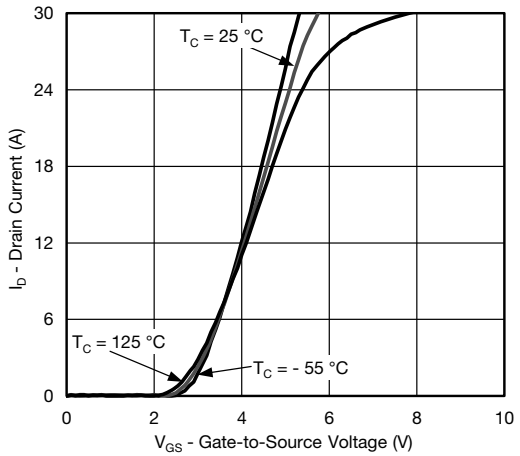
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

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.

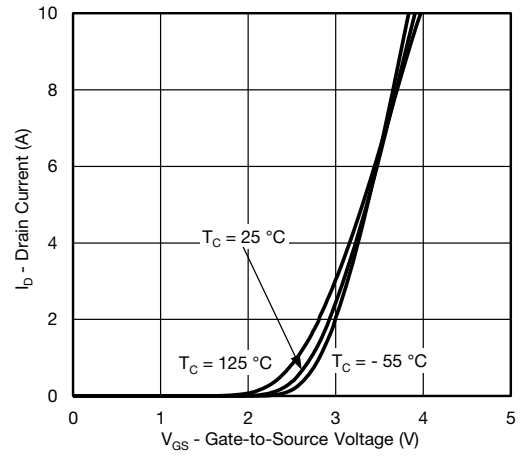
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



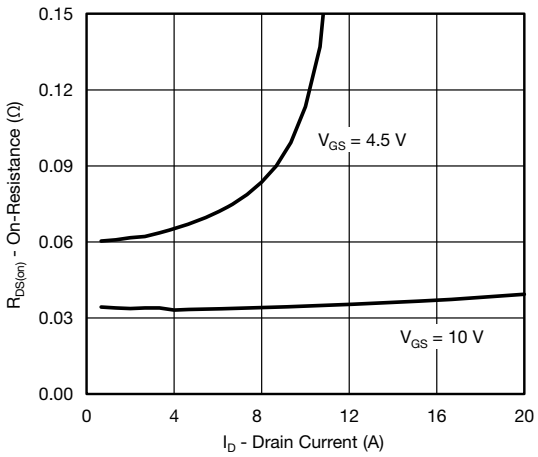
Output Characteristics



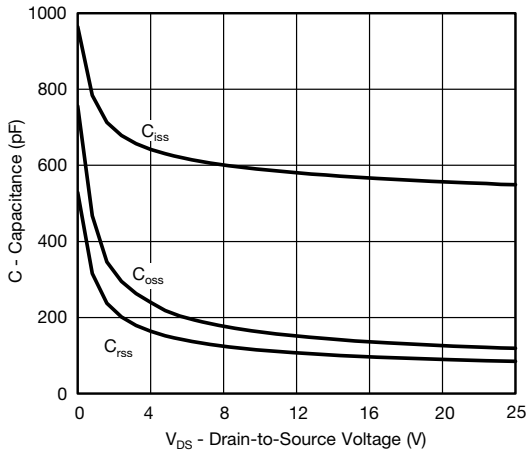
Transfer Characteristics



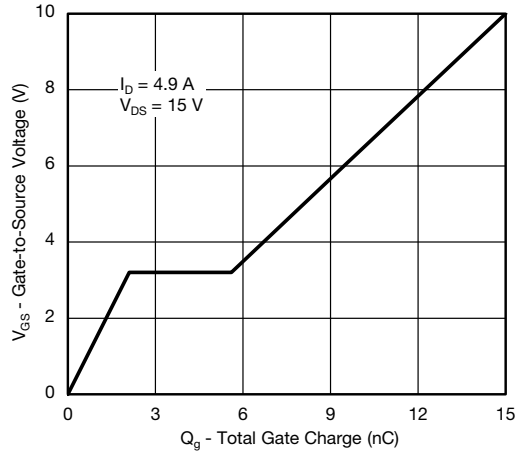
Transfer Characteristics



On-Resistance vs. Drain Current

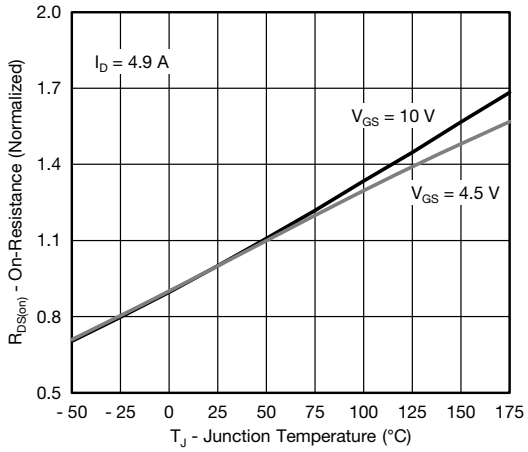


Capacitance

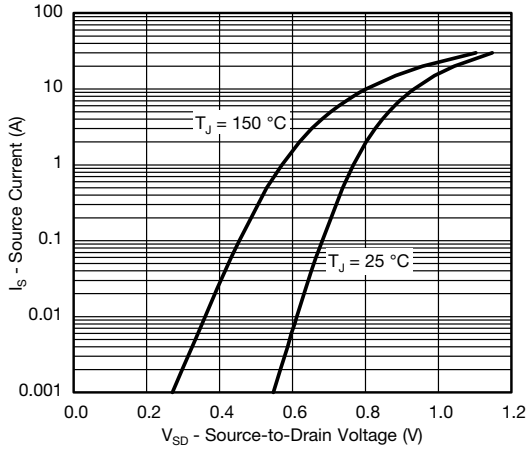


Gate Charge

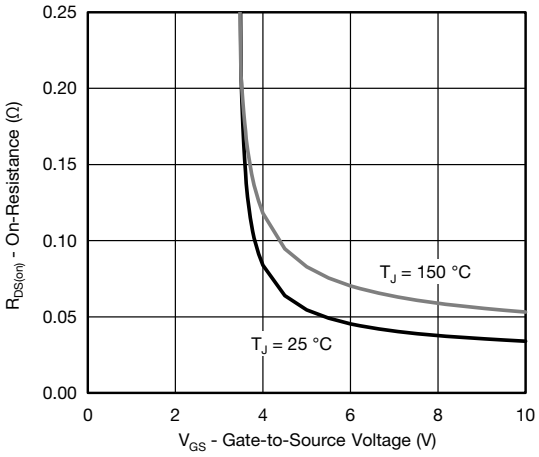
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



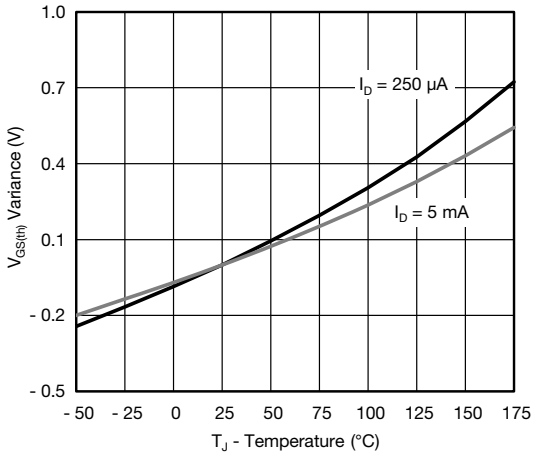
On-Resistance vs. Junction Temperature



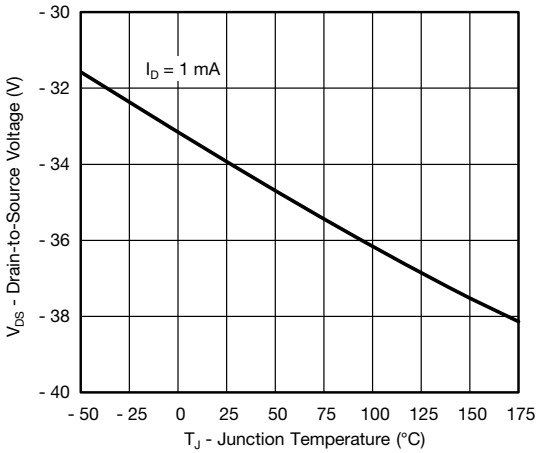
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

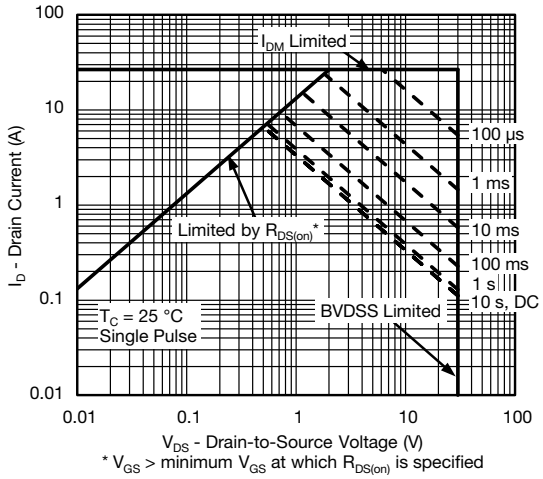


Threshold Voltage

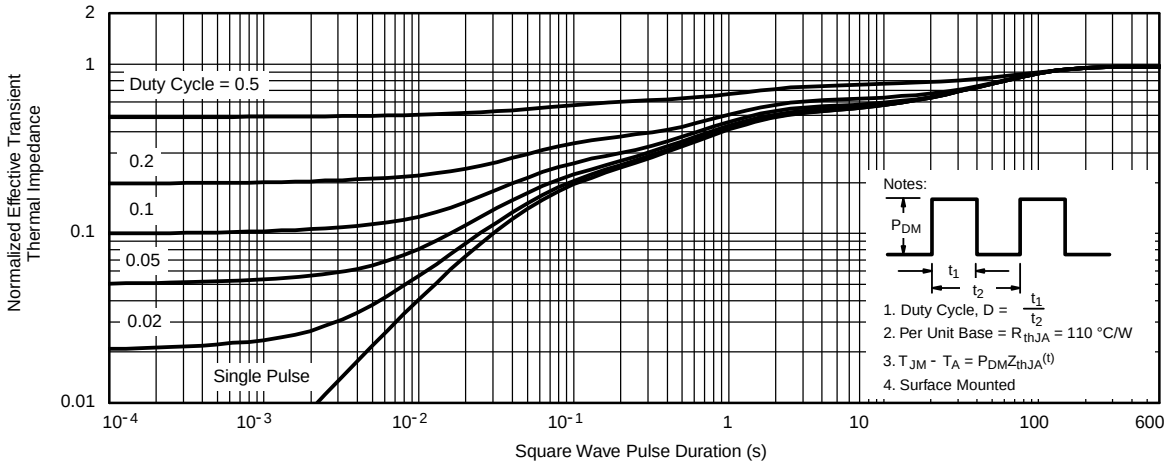


Drain Source Breakdown vs. Junction Temperature

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

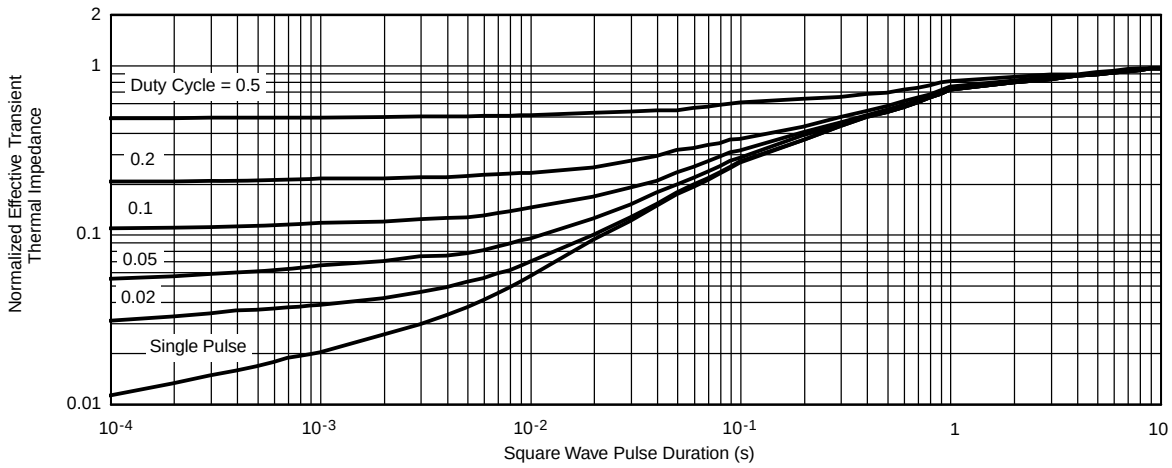


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

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



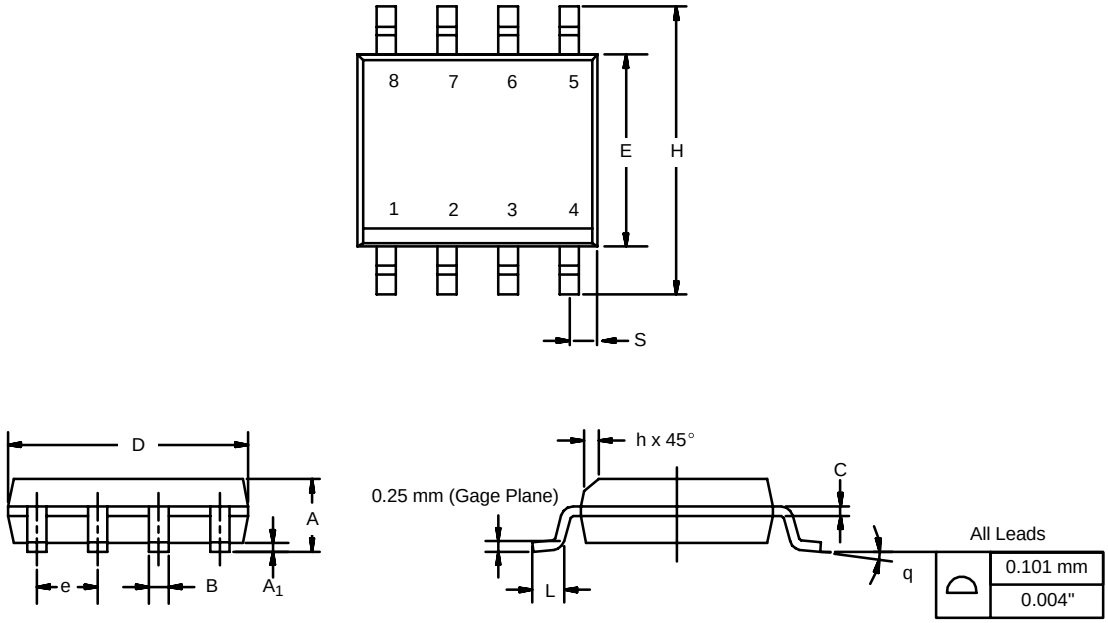
Normalized Thermal Transient Impedance, Junction-to-Foot

Note

- The characteristics shown in the two graphs
  - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
  - Normalized Transient Thermal Impedance Junction-to-Foot (25 °C)

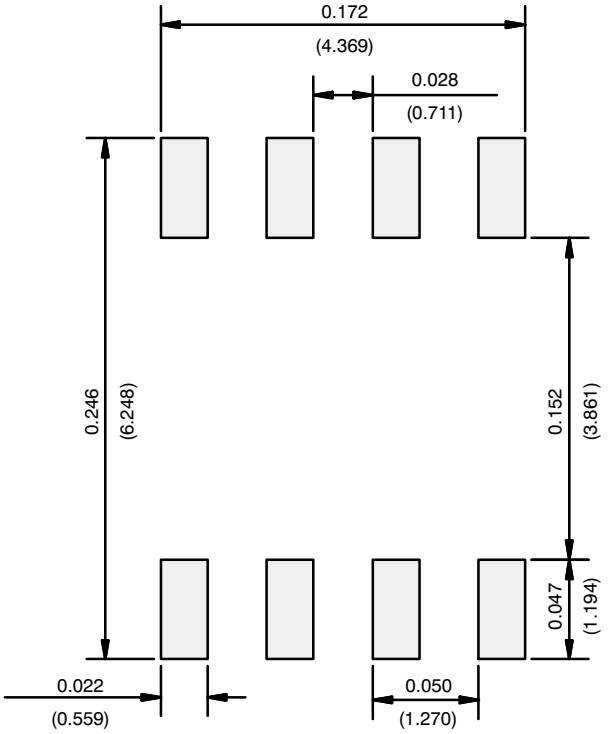
  are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

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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