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

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
- 20	0.00875 at V_{GS} = - 4.5 V	- 14
	0.01075 at V_{GS} = - 2.5 V	- 12
	0.0135 at V_{GS} = - 1.8 V	- 11

FEATURES

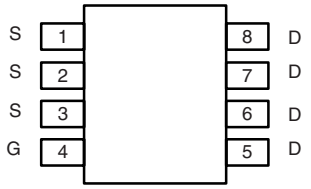
- **Halogen-free Option Available**
- TrenchFET® Power MOSFET

Pb-free
RoHS COMPLIANT

APPLICATIONS

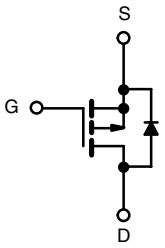
- Game Station
  - Load Switch

SO-8



Top View

Ordering Information: Si4421DY-T1-E3 (Lead (Pb)-free)
Si4421DY-T1-GE3 (Lead (Pb)-free and Halogen-free)



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted					
Parameter		**Symbol**	**10 s**	**Steady State**	**Unit**
Drain-Source Voltage		V_{DS}	- 20		V
Gate-Source Voltage		V_{GS}	± 8		
Continuous Drain Current (T_J = 150 °C)[a]	T_A = 25 °C	I_D	- 14	- 10	A
	T_A = 70 °C		- 11.5	- 8	
Pulsed Drain Current		I_{DM}	- 40		
Continuous Source Current (Diode Conduction)[a]		I_S	- 2.7	- 1.36	
Maximum Power Dissipation[a]	T_A = 25 °C	P_D	3.0	1.5	W
	T_A = 70 °C		1.9	0.95	
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]	t ≤ 10 s	R_{thJA}	33	42	°C/W
	Steady State		70	85	
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	16	21	

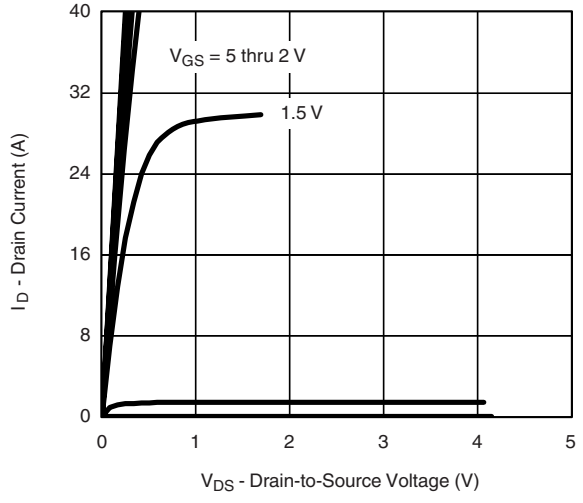
Notes:
a. Surface Mounted on 1" x 1" FR4 board.

SPECIFICATIONS T_J = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = - 850$ µA	- 0.4		- 0.8	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0$ V, $V_{GS} = \pm 8$ V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = - 20$ V, $V_{GS} = 0$ V			- 1	µA
		$V_{DS} = - 20$ V, $V_{GS} = 0$ V, $T_J = 70$ °C			- 10	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} = - 5$ V, $V_{GS} = - 4.5$ V	- 30			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	$V_{GS} = - 4.5$ V, $I_D = - 14$ A		0.007	0.00875	Ω
		$V_{GS} = - 2.5$ V, $I_D = - 12$ A		0.0085	0.01075	
		$V_{GS} = - 1.8$ V, $I_D = - 11$ A		0.011	0.0135	
Forward Transconductance[a]	g_{fs}	$V_{DS} = - 10$ V, $I_D = - 14$ A		55		S
Diode Forward Voltage[a]	V_{SD}	$I_S = - 2.7$ A, $V_{GS} = 0$ V		- 0.6	- 1.1	V
Dynamic[b]						
Total Gate Charge	Q_g	$V_{DS} = - 10$ V, $V_{GS} = - 4.5$ V, $I_D = - 14$ A		82	125	nC
Gate-Source Charge	Q_{gs}			10		
Gate-Drain Charge	Q_{gd}			27		
Gate Resistance	R_g			3		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = - 10$ V, $R_L = 10$ Ω $I_D \cong - 1$ A, $V_{GEN} = - 4.5$ V, $R_G = 6$ Ω		45	70	ns
Rise Time	t_r			90	140	
Turn-Off Delay Time	$t_{d(off)}$			350	550	
Fall Time	t_f			170	260	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = - 2.1$ A, dI/dt = 100 A/µs		135	210	

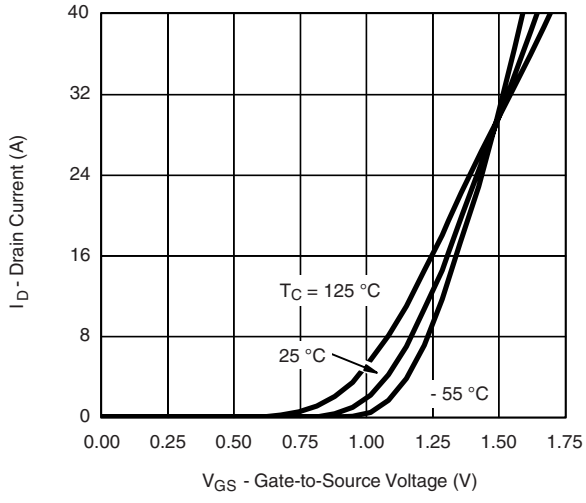
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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

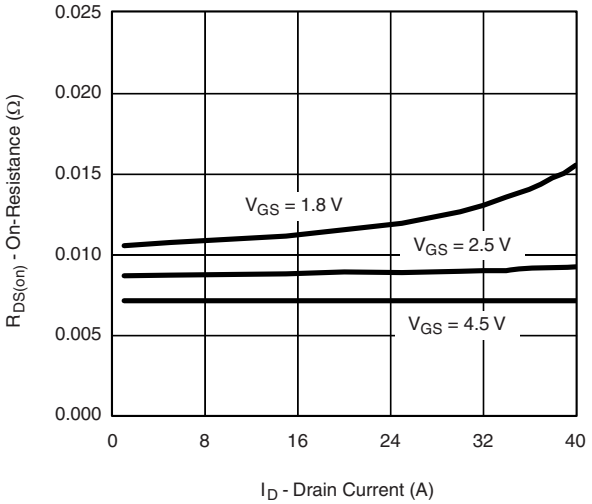


Output Characteristics

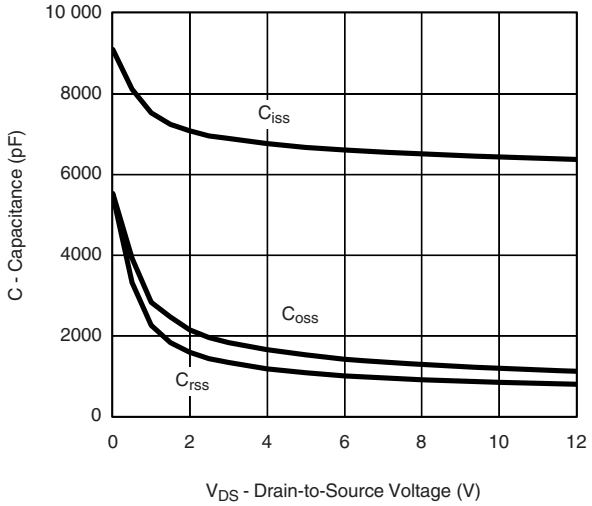


Transfer Characteristics

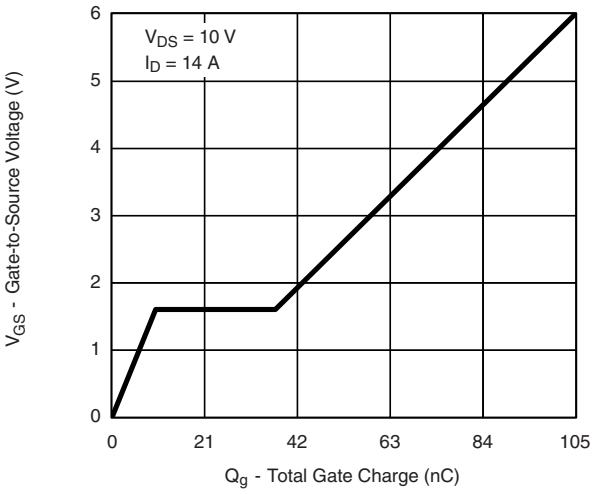
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



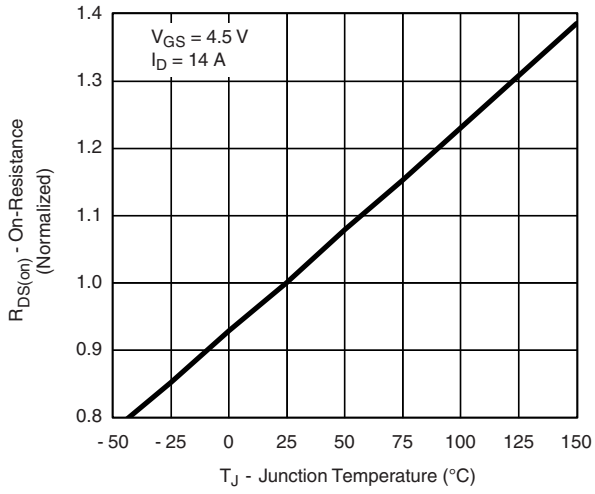
On-Resistance vs. Drain Current



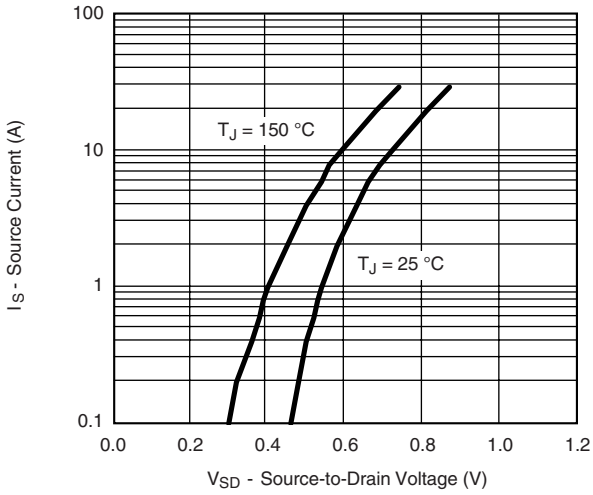
Capacitance



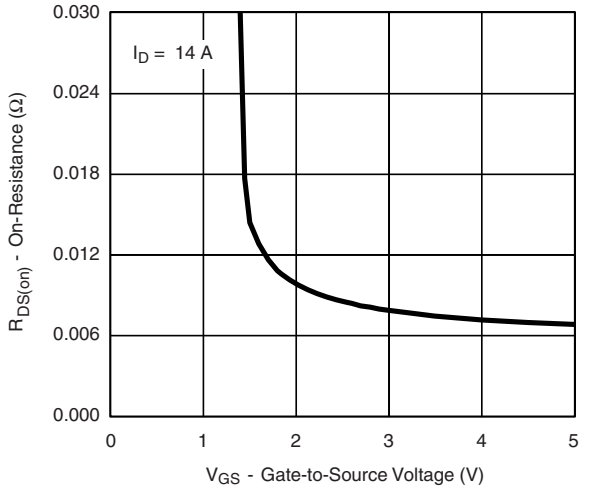
Gate Charge



On-Resistance vs. Junction Temperature

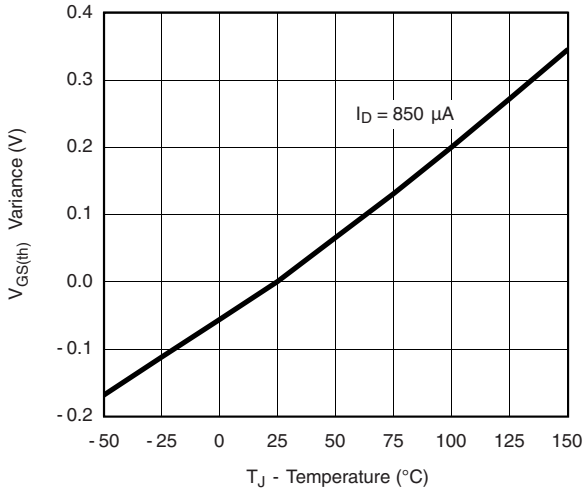


Source-Drain Diode Forward Voltage

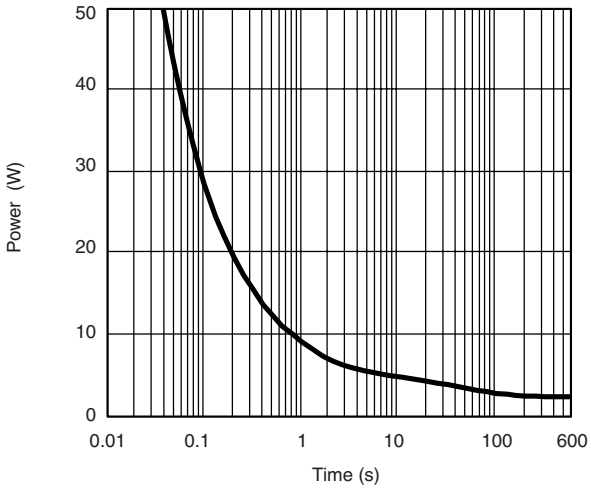


On-Resistance vs. Gate-to-Source Voltage

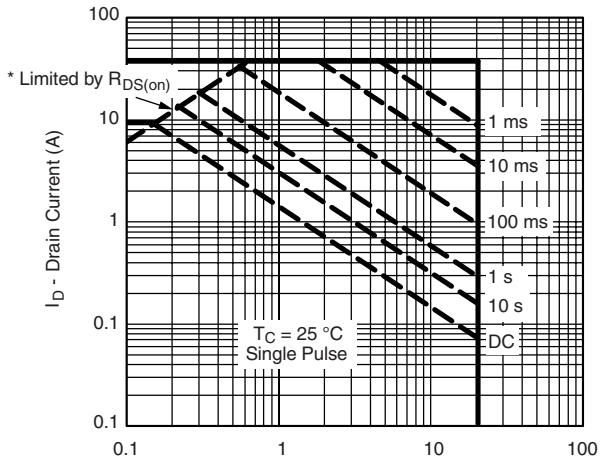
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Threshold Voltage

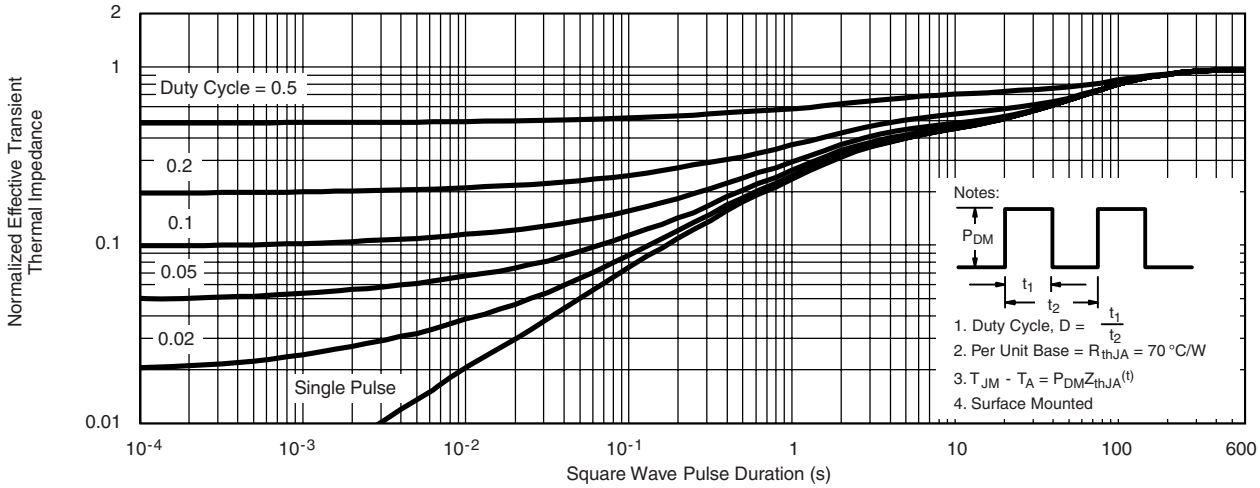


Single Pulse Power



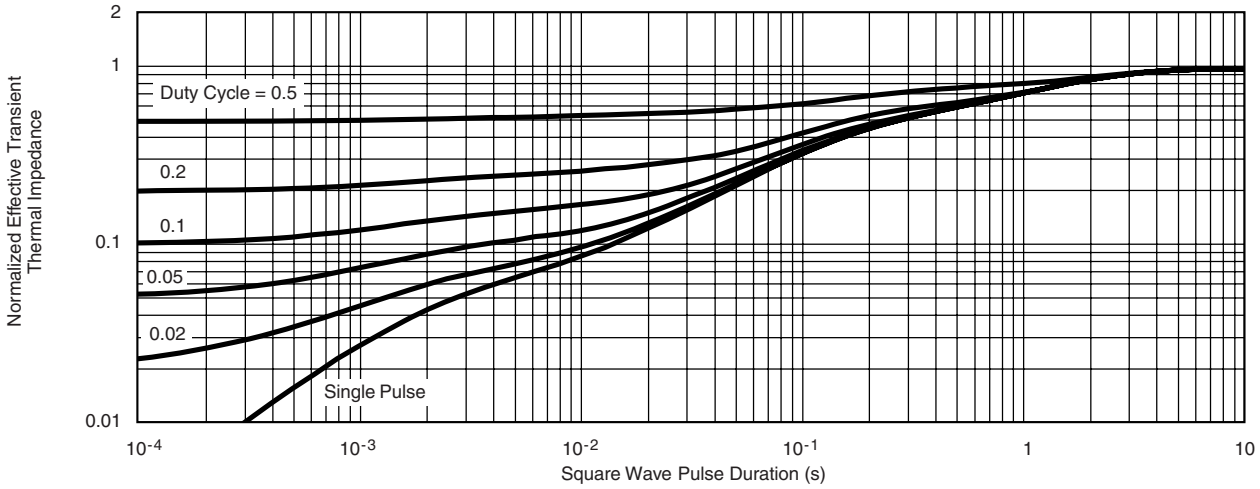
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Case



Normalized Thermal Transient Impedance, Junction-to-Ambient

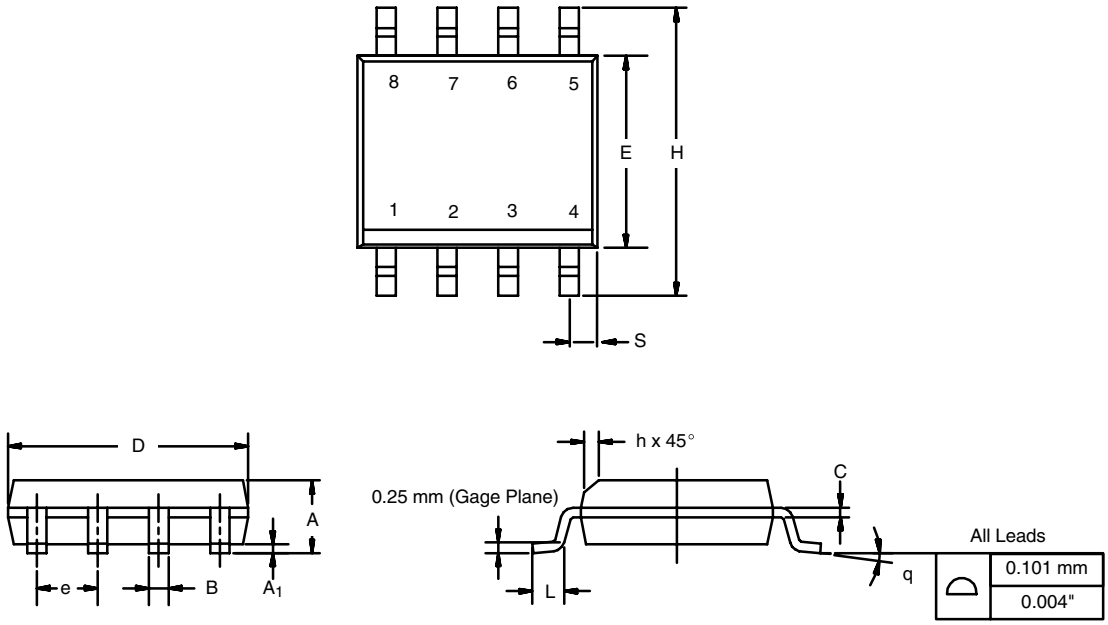
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Foot

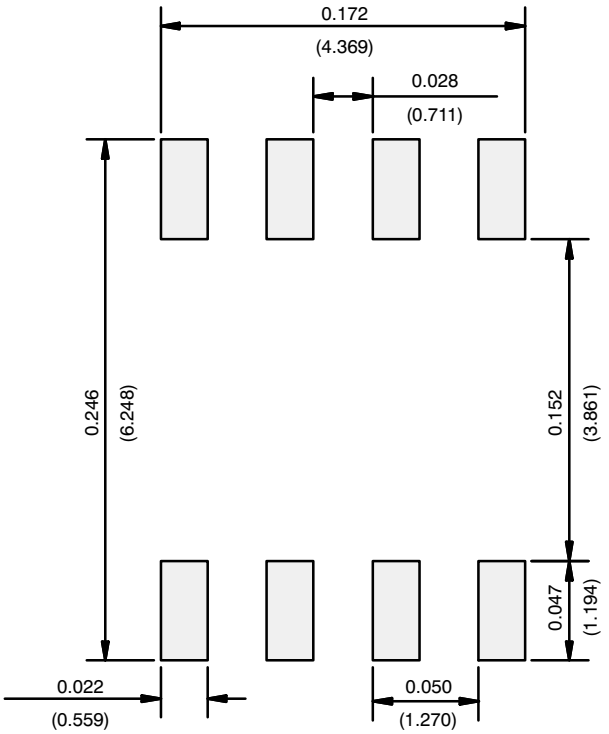
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SOIC (NARROW): 8-LEAD
JEDEC Part Number: MS-012



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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