

TSM4415CS RL-VB Datasheet

P-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY

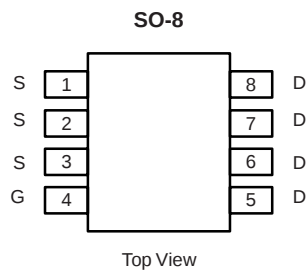
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
- 30	0.033 at $V_{GS} = - 10$ V	- 5.8
	0.043 at $V_{GS} = - 6$ V	- 5.0
	0.056 at $V_{GS} = - 4.5$ V	- 4.4

FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- Trench Power MOSFET
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available



ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$, unless otherwise noted

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Parameter		Symbol	10 s	Steady State	Unit
Drain-Source Voltage		V_{DS}	- 30		V
Gate-Source Voltage		V_{GS}	± 20		
Continuous Drain Current ($T_J = 150\text{ }^{\circ}\text{C}$) ^a	$T_A = 25\text{ }^{\circ}\text{C}$	I_D	- 5.8	- 4.1	A
	$T_A = 70\text{ }^{\circ}\text{C}$		- 4.6	- 3.2	
Pulsed Drain Current		I_{DM}	- 30		
Continuous Source Current (Diode Conduction) ^a		I_S	- 2.3	- 1.1	
Maximum Power Dissipation ^a	$T_A = 25\text{ }^{\circ}\text{C}$	P_D	2.5	1.3	W
	$T_A = 70\text{ }^{\circ}\text{C}$		1.6	0.8	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150		$^{\circ}\text{C}$

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	$t \leq 10$ s	R_{thJA}	40	50	$^\circ\text{C/W}$
	Steady State		70	95	
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	24	30	

Notes:

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

SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ. ^a	Max.	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250\text{ }\mu\text{A}$	- 0.7		- 2.0	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -30\text{ V}$, $V_{GS} = 0\text{ V}$			- 1	μA
		$V_{DS} = -30\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 70\text{ }^{\circ}\text{C}$			- 5	
On-State Drain Current ^b	$I_{D(on)}$	$V_{DS} \leq -10\text{ V}$, $V_{GS} = -10\text{ V}$	- 20			A
		$V_{DS} \leq -5\text{ V}$, $V_{GS} = -4.5\text{ V}$	- 5			
Drain-Source On-State Resistance ^b	$R_{DS(on)}$	$V_{GS} = -10\text{ V}$, $I_D = -5.8\text{ A}$		0.033		Ω
		$V_{GS} = -6\text{ V}$, $I_D = -5\text{ A}$		0.043		
		$V_{GS} = -4.5\text{ V}$, $I_D = -4.4\text{ A}$		0.056		
Forward Transconductance ^b	g_{fs}	$V_{DS} = -15\text{ V}$, $I_D = -5.8\text{ A}$		13		S
Diode Forward Voltage ^b	V_{SD}	$I_S = -2.3\text{ A}$, $V_{GS} = 0\text{ V}$		- 0.8	- 1.1	V
Dynamic^a						
Total Gate Charge	Q_g	$V_{DS} = -15\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -3.5\text{ A}$		16	24	nC
Gate-Source Charge	Q_{gs}			2.3		
Gate-Drain Charge	Q_{gd}			4.5		
Gate Resistance	R_g			8.8		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}$, $R_L = 15\text{ }\Omega$ $I_D \cong -1\text{ A}$, $V_{GEN} = -10\text{ V}$, $R_g = 6\text{ }\Omega$		14	25	ns
Rise Time	t_r			14	25	
Turn-Off Delay Time	$t_{d(off)}$			42	70	
Fall Time	t_f			30	50	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = -1.2\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}$		30	60	

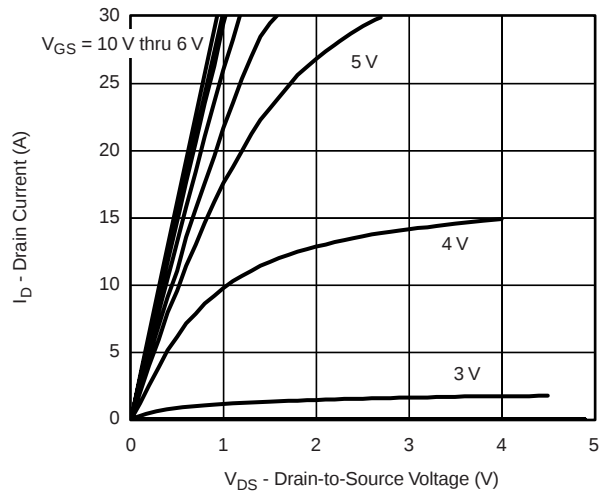
Notes:

a. Guaranteed by design, not subject to production testing.

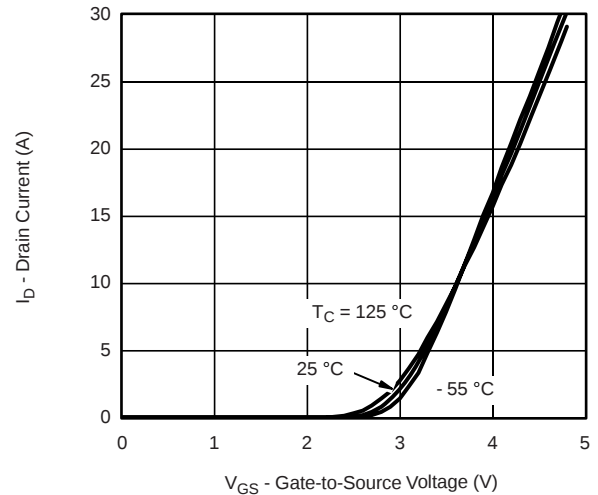
b. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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.

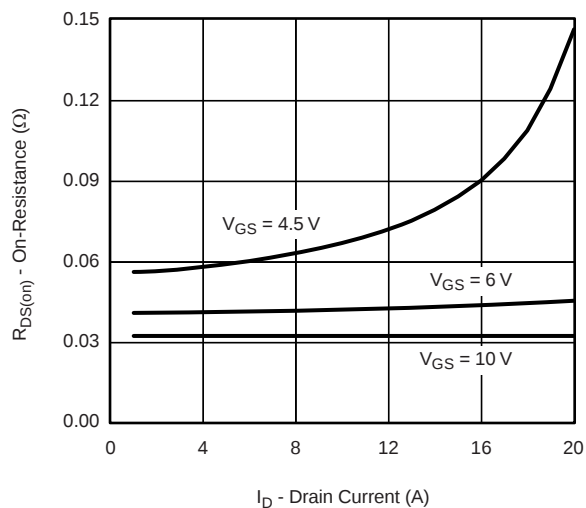
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



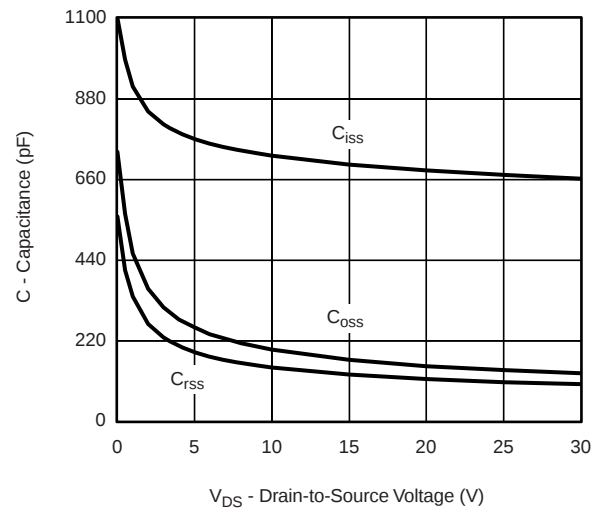
Output Characteristics



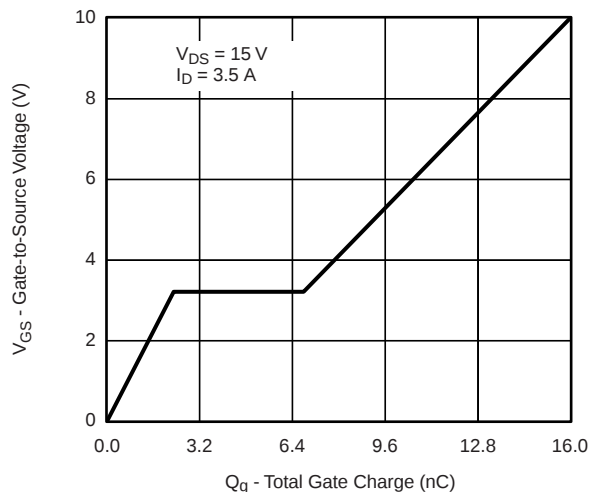
Transfer Characteristics



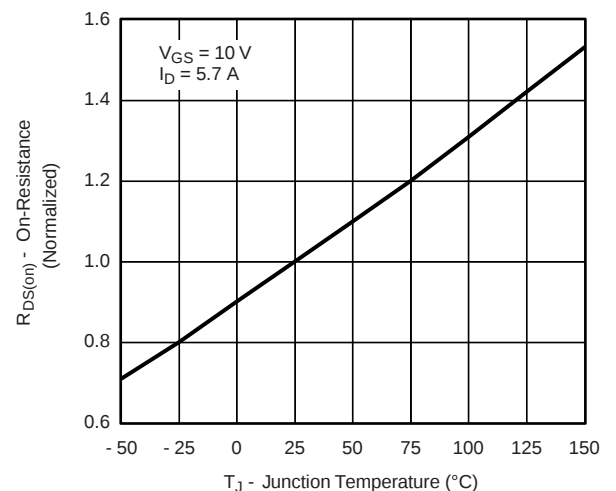
On-Resistance vs. Drain Current



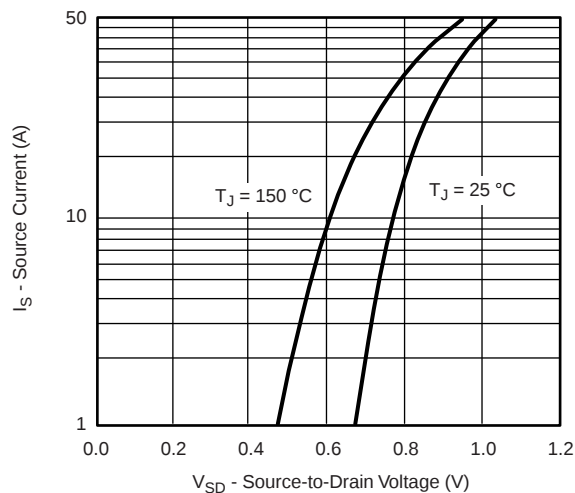
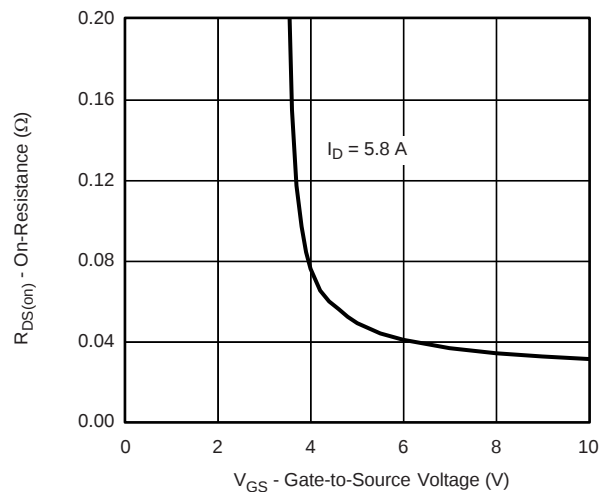
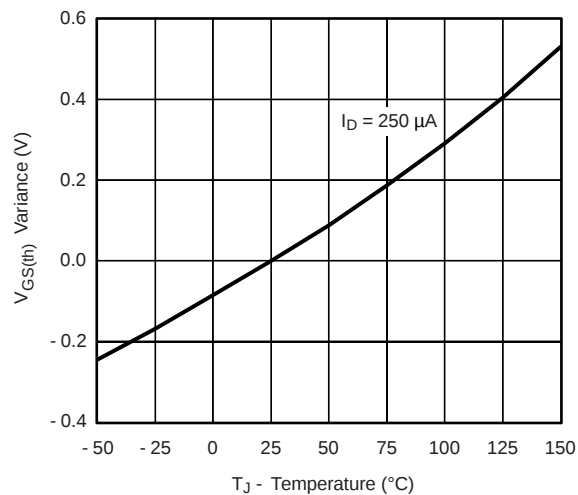
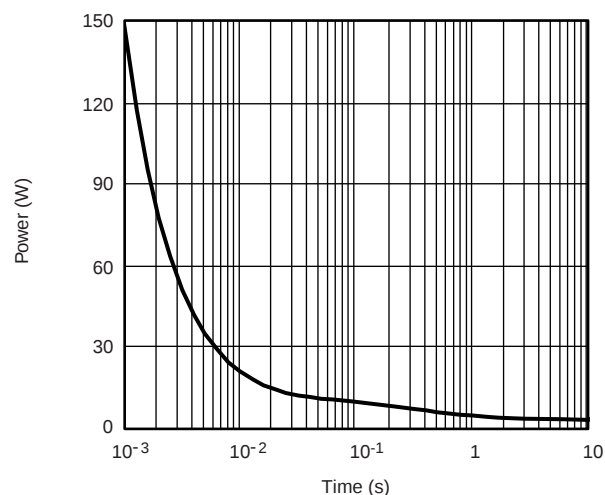
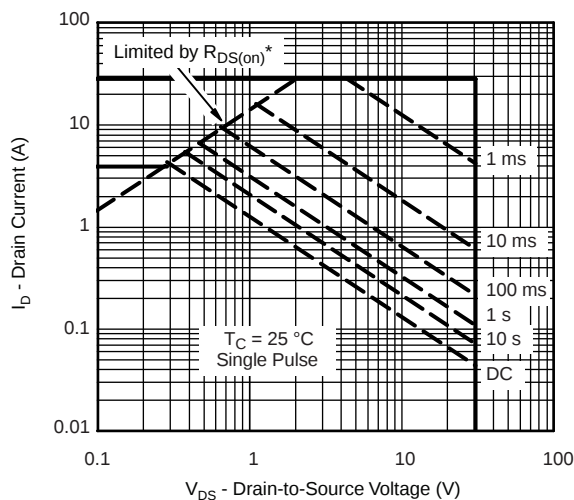
Capacitance

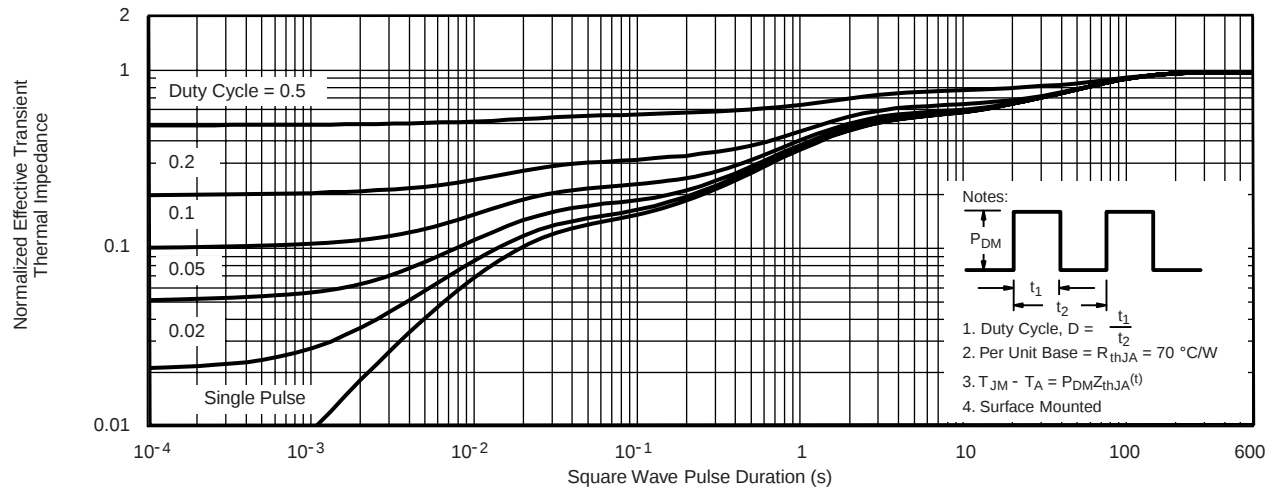
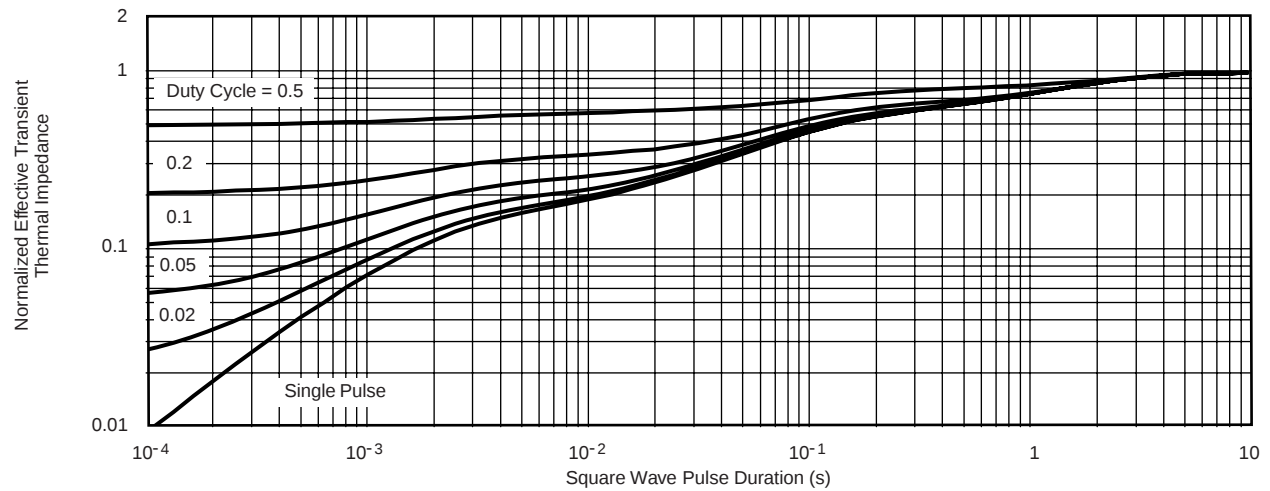


Gate Charge

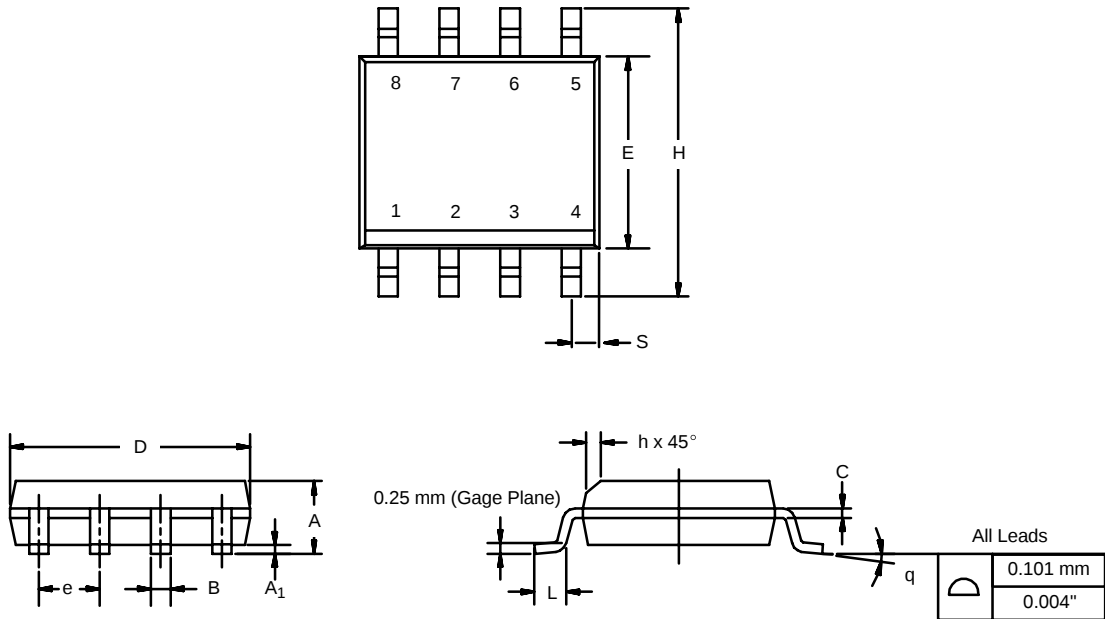


On-Resistance vs. Junction Temperature

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*** $V_{DS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified**Safe Operating Area, Junction-to-Foot**

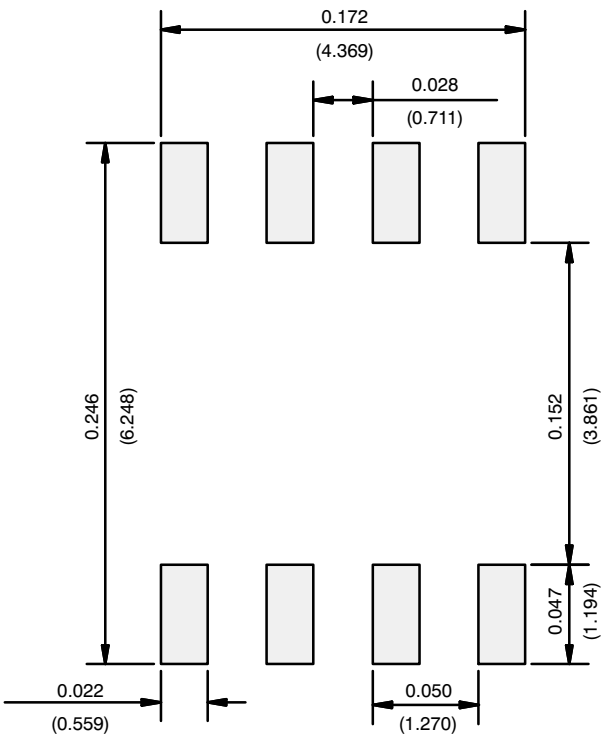
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

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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