40V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_A = +25°C
40V	8.5mΩ @ V_{GS} = 10V	12.8A
	12.5mΩ @ V_{GS} = 4.5V	10.6A

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Description and Applications

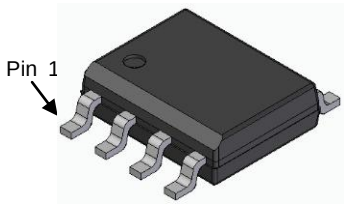
This MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$), maintain superior switching performance, making it ideal for high efficiency power management applications.

- DC-DC Converters
- Synchronous Rectification
- Power Supplies

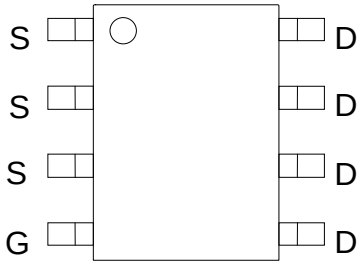
Mechanical Data

- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.076 grams (Approximate)

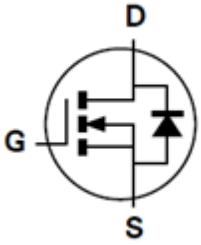
SO-8



Top View



Pin-Out
Top View



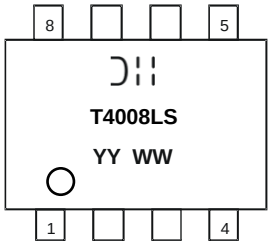
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMT4008LSS-13	SO-8	2,500/Tape & Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



= Manufacturer's Marking
T4008LS = Product Type Marking Code
YYWW = Date Code Marking
YY or YY = Year (ex: 19 = 2019)
WW or WW = Week (01 to 53)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	40	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current, V_{GS} = 10V (Note 6)	T_A = +25°C T_A = +70°C	I_D	12.8 10.3	A
Continuous Drain Current, V_{GS} = 10V (Note 5)	T_A = +25°C T_A = +70°C	I_D	10.2 8.2	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)		I_{DM}	90	A
Maximum Continuous Body Diode Forward Current (Note 6)		I_S	2.6	A
Avalanche Current, L = 0.1mH		I_{AS}	23.4	A
Avalanche Energy, L = 0.1mH		E_{AS}	27.3	mJ

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)		P_D	1.32	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	94	°C/W
Total Power Dissipation (Note 6)		P_D	2.09	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	59.2	°C/W
Thermal Resistance, Junction to Case		$R_{\theta JC}$	7.6	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	40	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 32V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	1.56	3	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	6.8	8.5	mΩ	V_{GS} = 10V, I_D = 12A
		—	9.6	12.5		V_{GS} = 4.5V, I_D = 10A
Diode Forward Voltage	V_{SD}	—	0.8	1.2	V	V_{GS} = 0V, I_S = 10A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	1,143	—	pF	V_{DS} = 20V, V_{GS} = 0V, f = 1MHz
Output Capacitance	C_{oss}	—	320	—		
Reverse Transfer Capacitance	C_{rss}	—	24.9	—		
Gate Resistance	R_G	—	0.91	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 10V)	Q_G	—	18.6	—	nC	V_{DS} = 20V, I_D = 10A
Total Gate Charge (V_{GS} = 4.5V)	Q_G	—	9.4	—		
Gate-Source Charge	Q_{GS}	—	1.9	—		
Gate-Drain Charge	Q_{GD}	—	3.3	—		
Turn-On Delay Time	$t_{D(ON)}$	—	4.9	—	ns	V_{GS} = 10V, V_{DS} = 20V, R_G = 6Ω, I_D = 10A
Turn-On Rise Time	t_R	—	5.9	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	26.2	—		
Turn-Off Fall Time	t_F	—	10.9	—		
Reverse Recovery Time	t_{RR}	—	14.5	—	ns	I_F = 10A, di/dt = 400A/µs
Reverse Recovery Charge	Q_{RR}	—	13.0	—	nC	

Notes:
5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

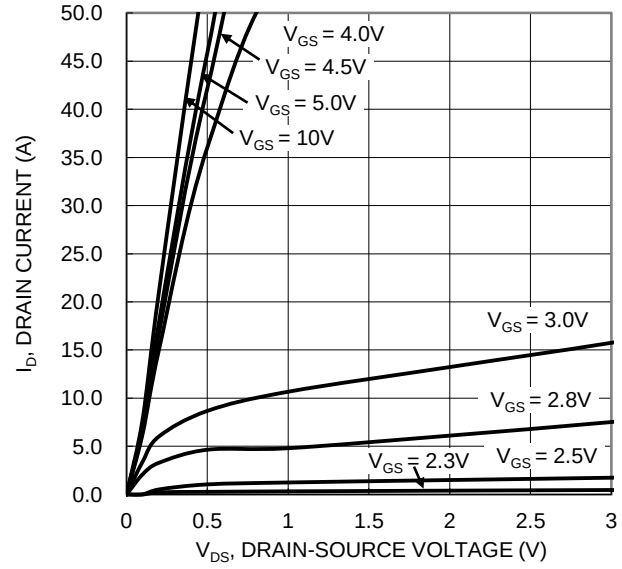


Figure 1. Typical Output Characteristic

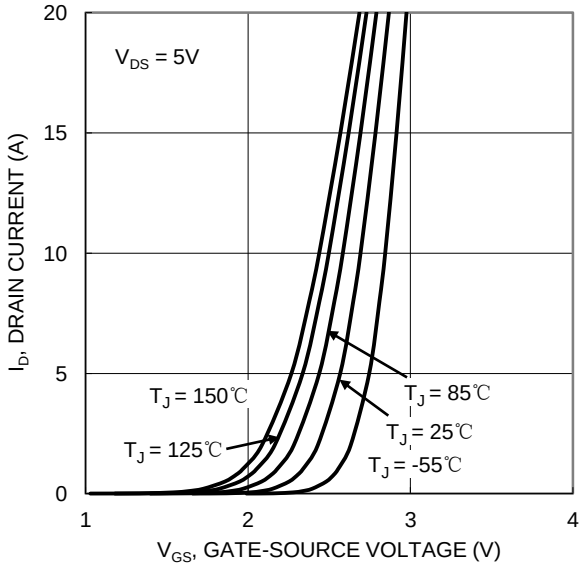


Figure 2. Typical Transfer Characteristic

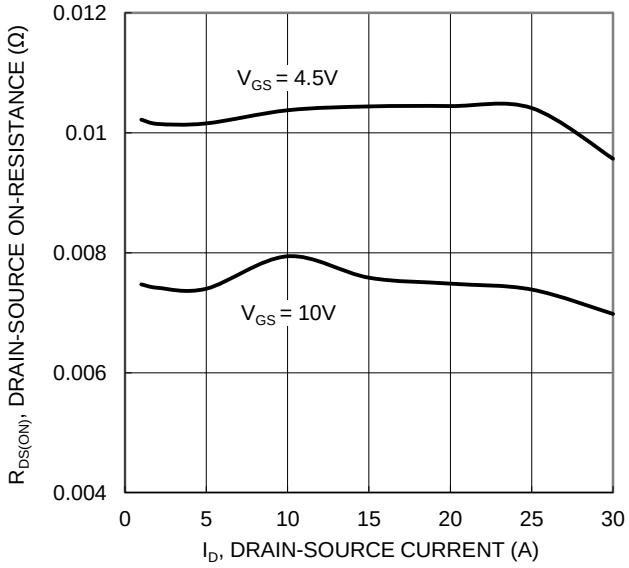


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

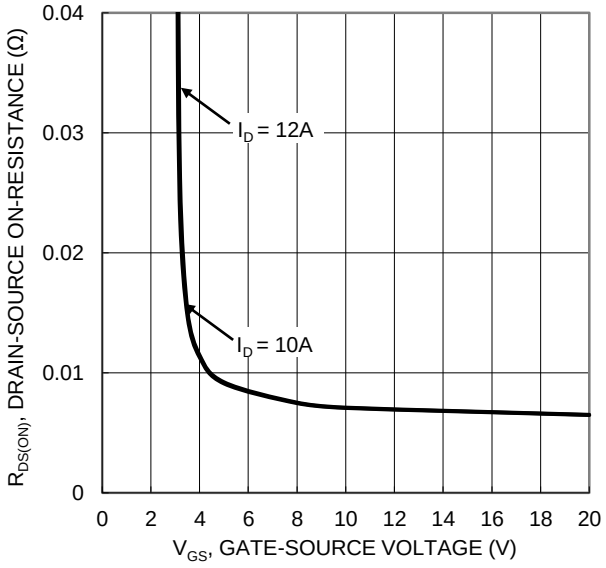


Figure 4. Typical Transfer Characteristic

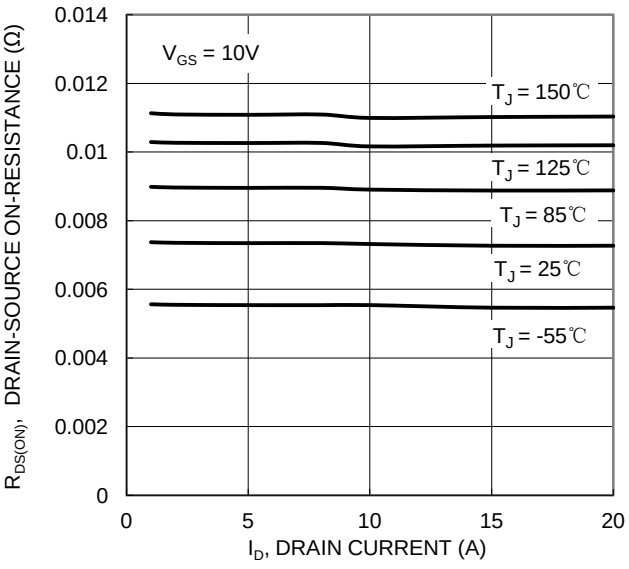


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

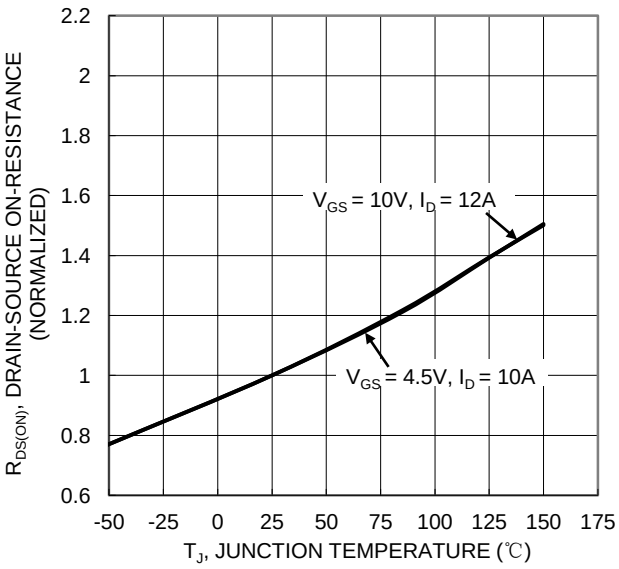


Figure 6. On-Resistance Variation with Junction Temperature

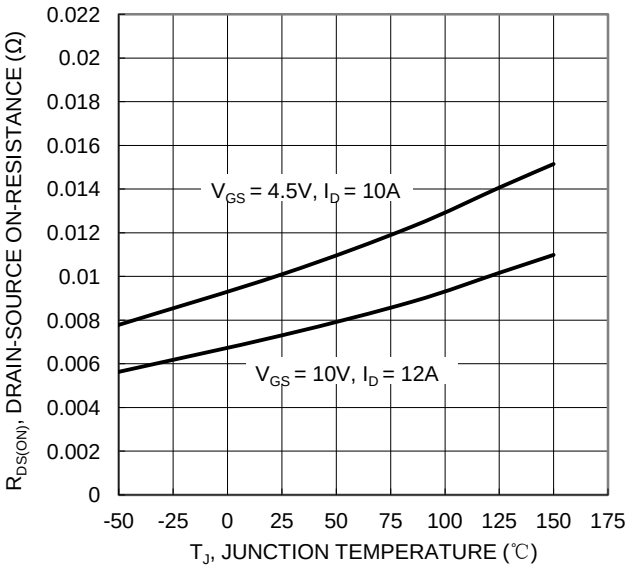


Figure 7. On-Resistance Variation with Junction Temperature

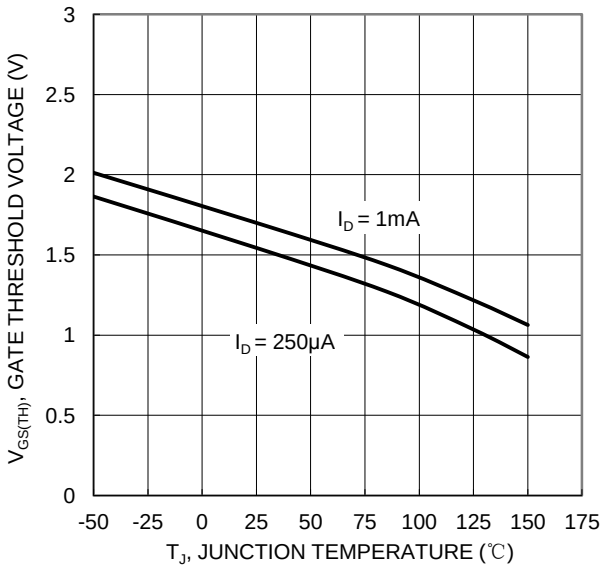


Figure 8. Gate Threshold Variation vs. Junction Temperature

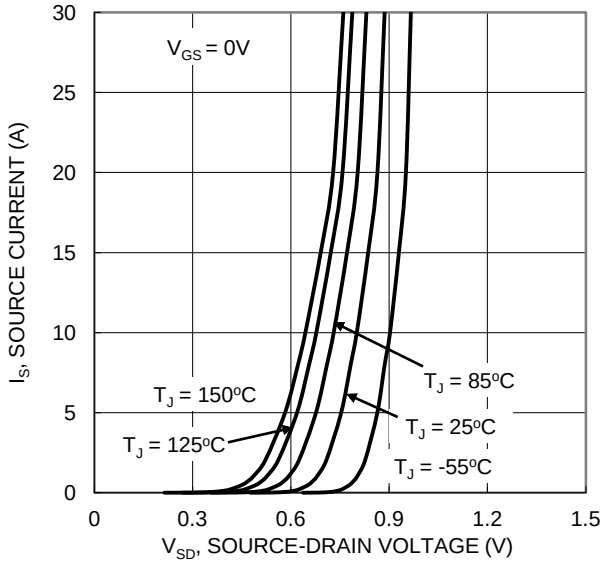


Figure 9. Diode Forward Voltage vs. Current

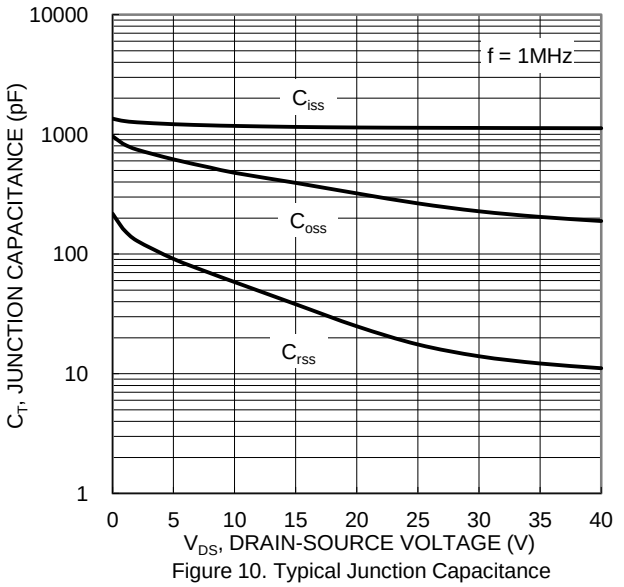


Figure 10. Typical Junction Capacitance

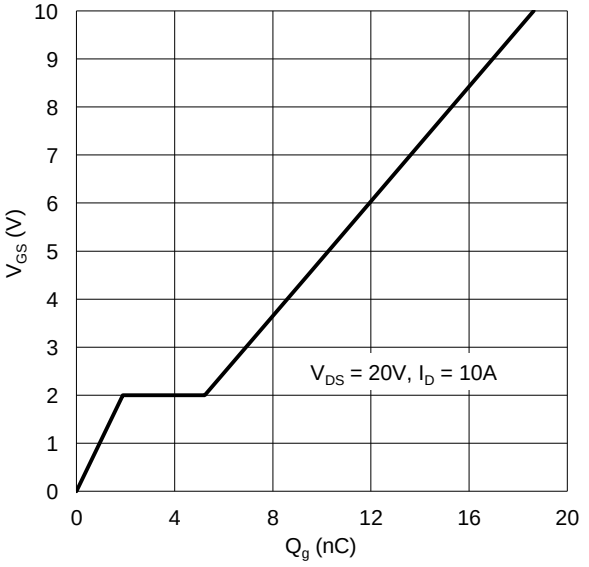


Figure 11. Gate Charge

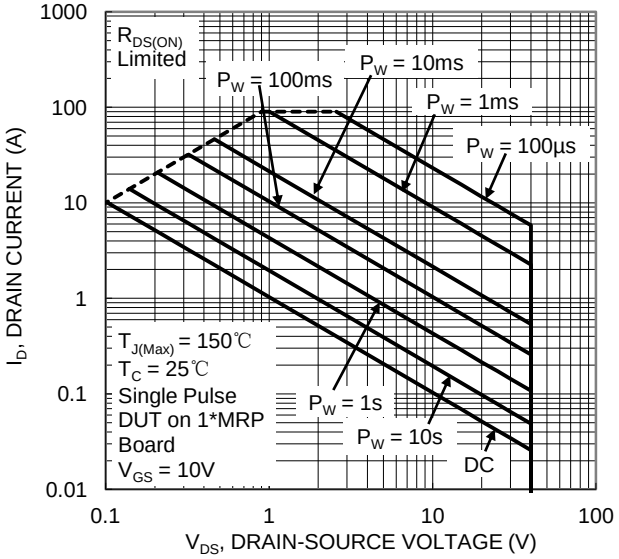


Figure 12. SOA, Safe Operation Area

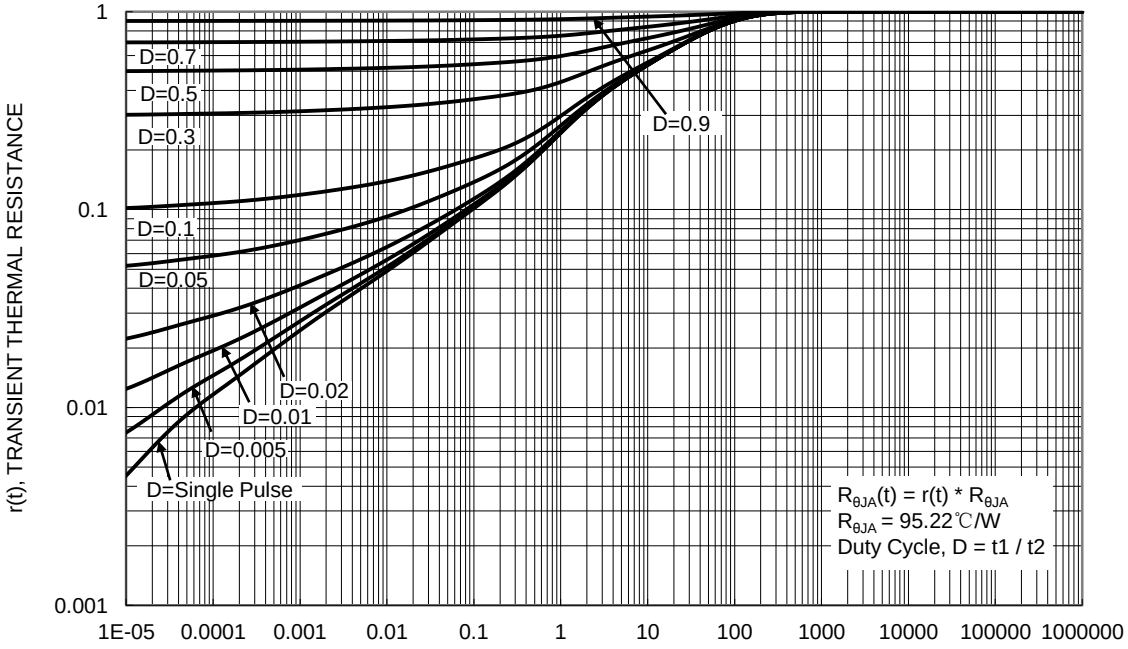


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

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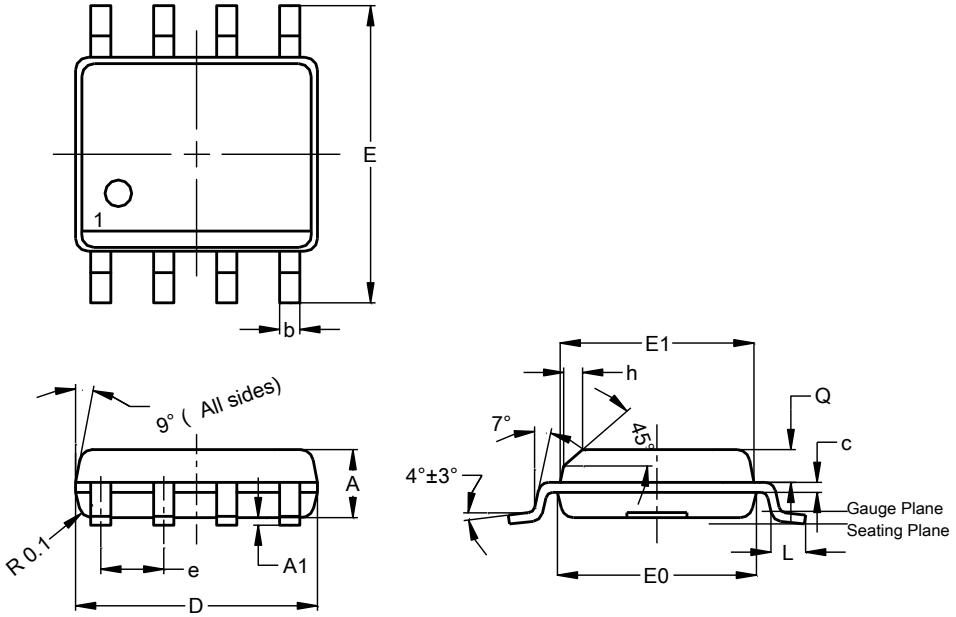
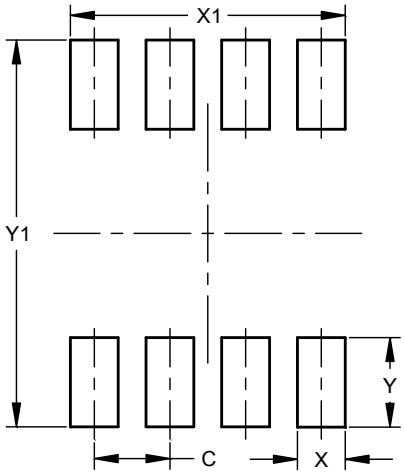


SO-8			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	--	--	1.27
h	-	--	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

SO-8



Dimensions	Value (in mm)
C	1.27
X	0.802
X1	4.612
Y	1.505
Y1	6.50

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