AP4957GM-VB Datasheet

P-Channel 40 V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω) Max.	I_D (A)	Q_g (Typ.)
- 40	0.0176 at V_{GS} = - 10 V	- 8 [d]	35.4 nC
	0.0208 at V_{GS} = - 4.5 V	- 7 [d]	

FEATURES

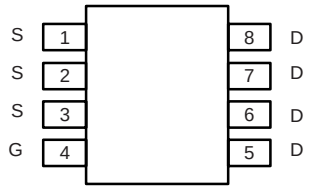
- 100% R_g and UIS Tested

Pb-free
RoHS COMPLIANT
HALOGEN FREE

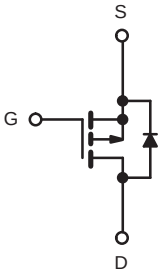
APPLICATIONS

- Adaptor Switch
- Load Switch
- Power Management
- Mobile Computing

SO-8



Top View



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)	T_C = 25 °C	I_D	- 8 [d]	A
	T_C = 70 °C		- 7 [d]	
	T_A = 25 °C		- 7.7 [a, b]	
	T_A = 70 °C		- 7.7 [a, b]	
Pulsed Drain Current (t = 300 µs)		I_{DM}	- 32	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	- 18[d]	
	T_A = 25 °C		- 3[a, b]	
Avalanche Current	L = 0.1 mH	I_{AS}	- 20	
Single-Pulse Avalanche Energy		E_{AS}	20	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	52	W
	T_C = 70 °C		33	
	T_A = 25 °C		3.7[a, b]	
	T_A = 70 °C		2.4[a, b]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C
Soldering Recommendations (Peak Temperature)[e, f]			260	

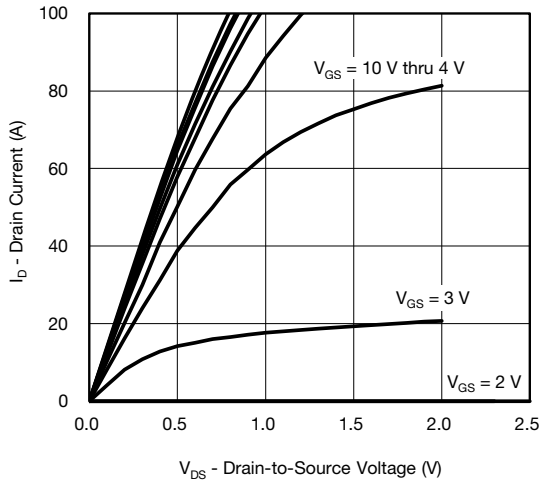
THERMAL RESISTANCE RATINGS					
Parameter		**Symbol**	**Typical**	**Maximum**	**Unit**
Maximum Junction-to-Ambient[a, c]	t ≤ 10 s	R_{thJA}	26	33	°C/W
Maximum Junction-to-Case	Steady State	R_{thJC}	1.9	2.4	

Notes:
a. Surface mounted on 1" x 1" FR4 board.
b. t = 10 s.
c. Maximum under steady state conditions is 81 °C/W.
d. Package limited.

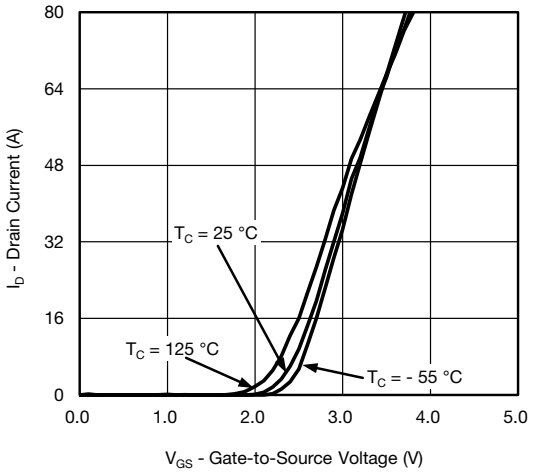
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = - 250 µA	- 40			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = - 250 µA		- 23		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			4.6		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA	- 1		- 2.5	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 40 V, V_{GS} = 0 V			- 1	µA
		V_{DS} = - 40 V, V_{GS} = 0 V, T_J = 55 °C			- 5	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq$ - 10 V, V_{GS} = - 10 V	- 30			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 10 V, I_D = - 15 A		0.0176		Ω
		V_{GS} = - 4.5 V, I_D = - 10 A		0.0208		
Forward Transconductance[a]	g_{fs}	V_{DS} = - 10 V, I_D = - 15 A		50		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = - 15 V, V_{GS} = 0 V, f = 1 MHz		3280		pF
Output Capacitance	C_{oss}			427		
Reverse Transfer Capacitance	C_{rss}			382		
Total Gate Charge	Q_g	V_{DS} = - 15 V, V_{GS} = - 10 V, I_D = - 10 A		73	110	nC
		V_{DS} = - 15 V, V_{GS} = - 4.5 V, I_D = - 10 A		35.4	53	
Gate-Source Charge	Q_{gs}			10.6		
Gate-Drain Charge	Q_{gd}			11.6		
Gate Resistance	R_g	f = 1 MHz	0.4	1.6	3.2	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 15 V, R_L = 1.5 Ω $I_D \cong$ - 10 A, V_{GEN} = - 10 V, R_g = 1 Ω		11	22	ns
Rise Time	t_r			11	22	
Turn-Off DelayTime	$t_{d(off)}$			45	90	
Fall Time	t_f			8	16	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 15 V, R_L = 1.5 Ω $I_D \cong$ - 10 A, V_{GEN} = - 4.5 V, R_g = 1 Ω		55	100	
Rise Time	t_r			82	150	
Turn-Off DelayTime	$t_{d(off)}$			40	80	
Fall Time	t_f			13	26	
Drain-Source Body Diode Characteristics						
Continous Source-Drain Diode Current	I_S	T_C = 25 °C			- 18	A
Pulse Diode Forward Current	I_{SM}				- 70	
Body Diode Voltage	V_{SD}	I_S = - 3 A, V_{GS} = 0 V		- 0.74	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = - 10 A, dI/dt = 100 A/µs, T_J = 25 °C		18	36	ns
Body Diode Reverse Recovery Charge	Q_{rr}			8	16	nC
Reverse Recovery Fall Time	t_a			7		ns
Reverse Recovery Rise Time	t_b			11		

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

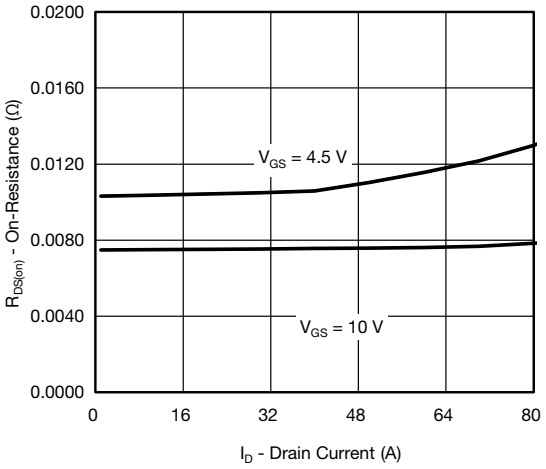
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



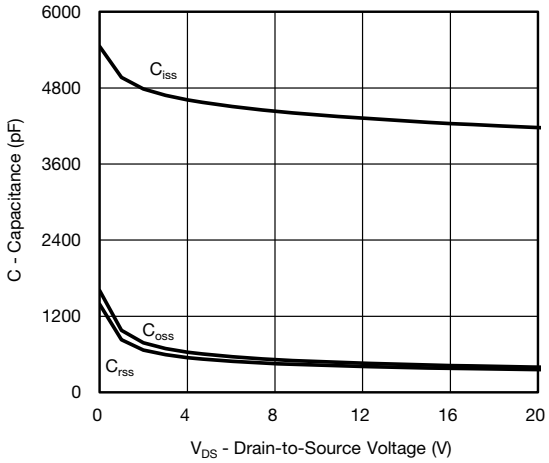
Output Characteristics



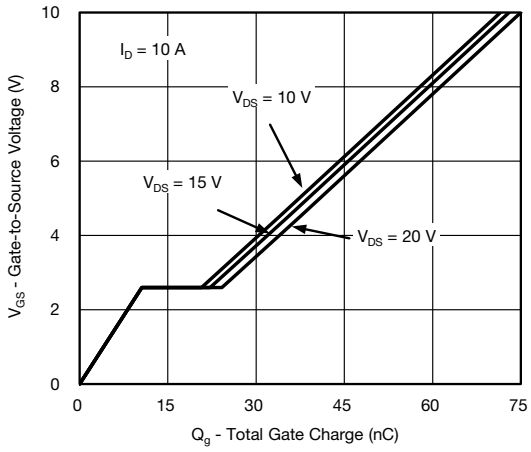
Transfer Characteristics



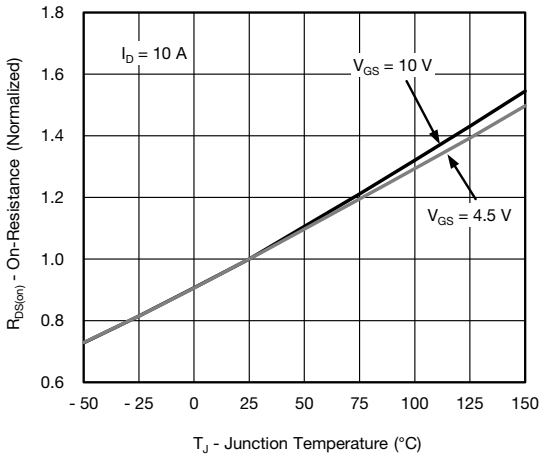
On-Resistance vs. Drain Current



Capacitance

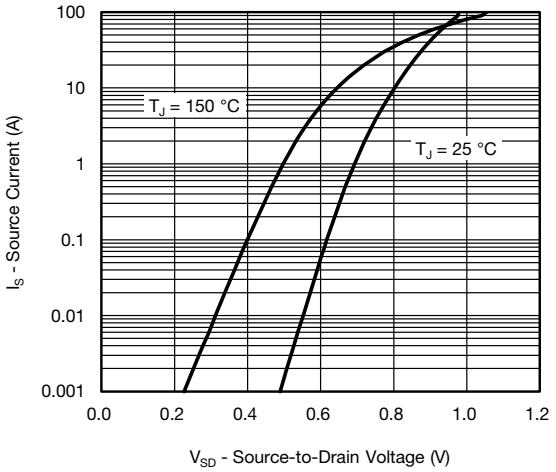


Gate Charge

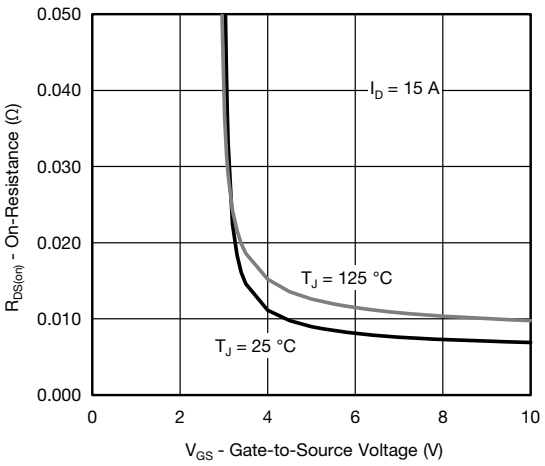


On-Resistance vs. Junction Temperature

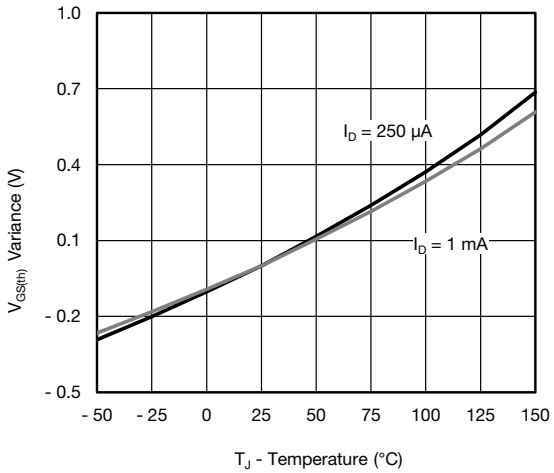
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



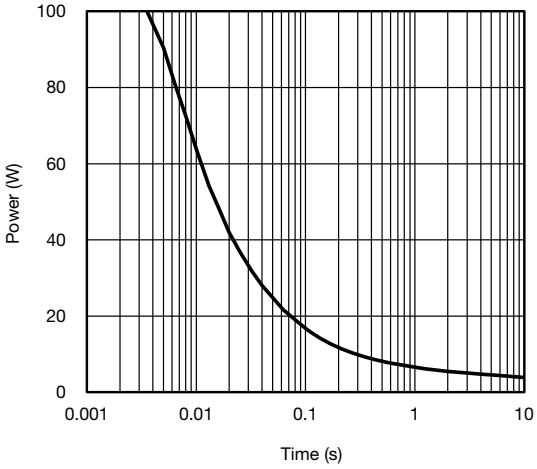
Source-Drain Diode Forward Voltage



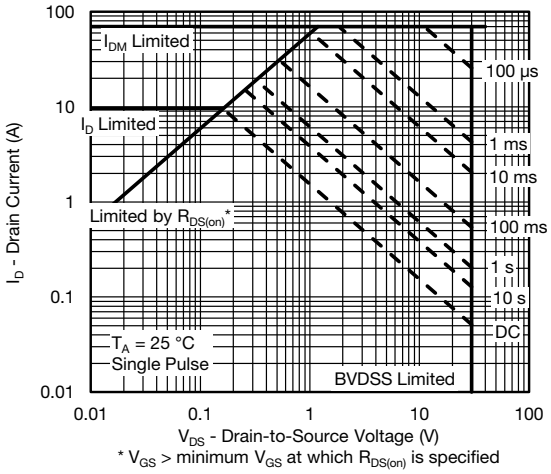
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

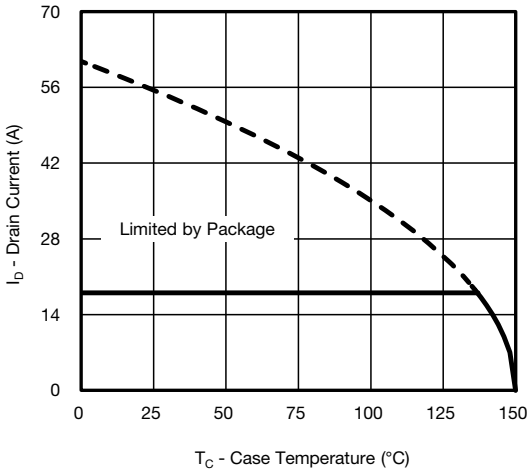


Single Pulse Power, Junction-to-Ambient

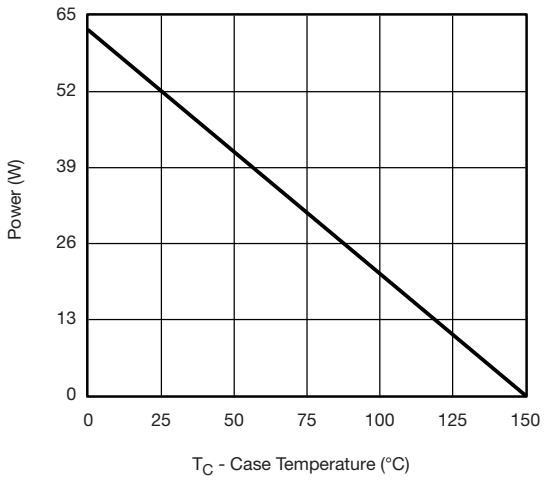


Safe Operating Area

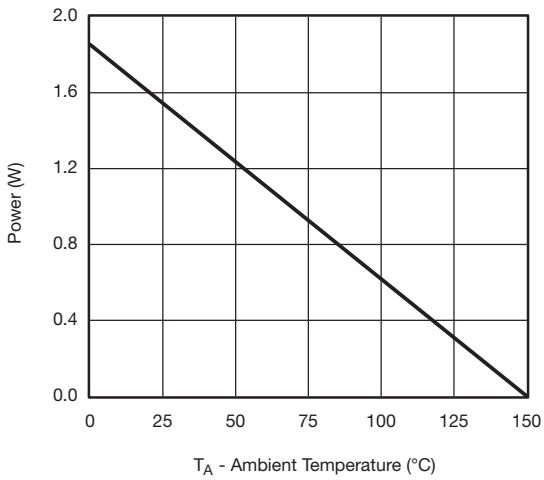
MOSFET TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



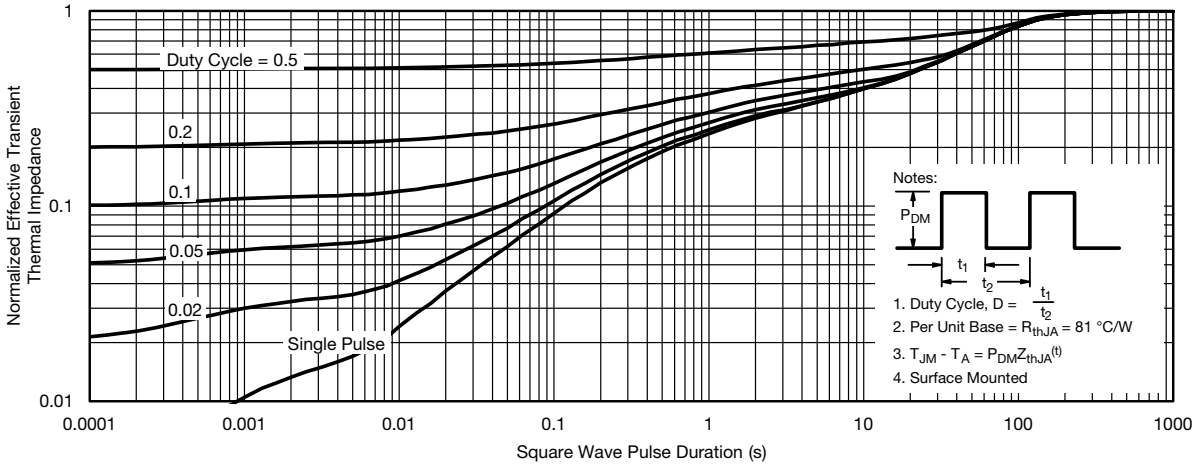
Power, Junction-to-Case



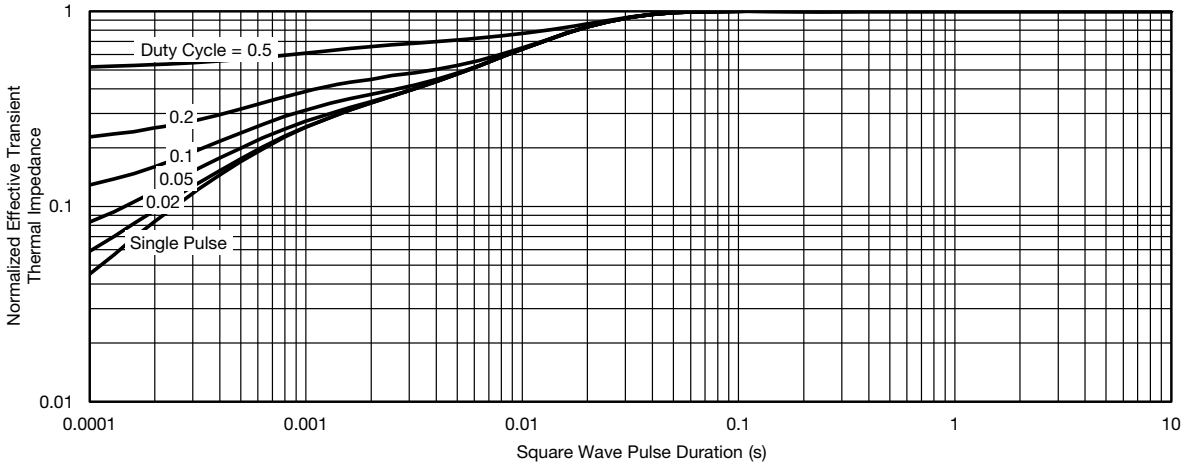
Power, Junction-to-Ambient

* 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)



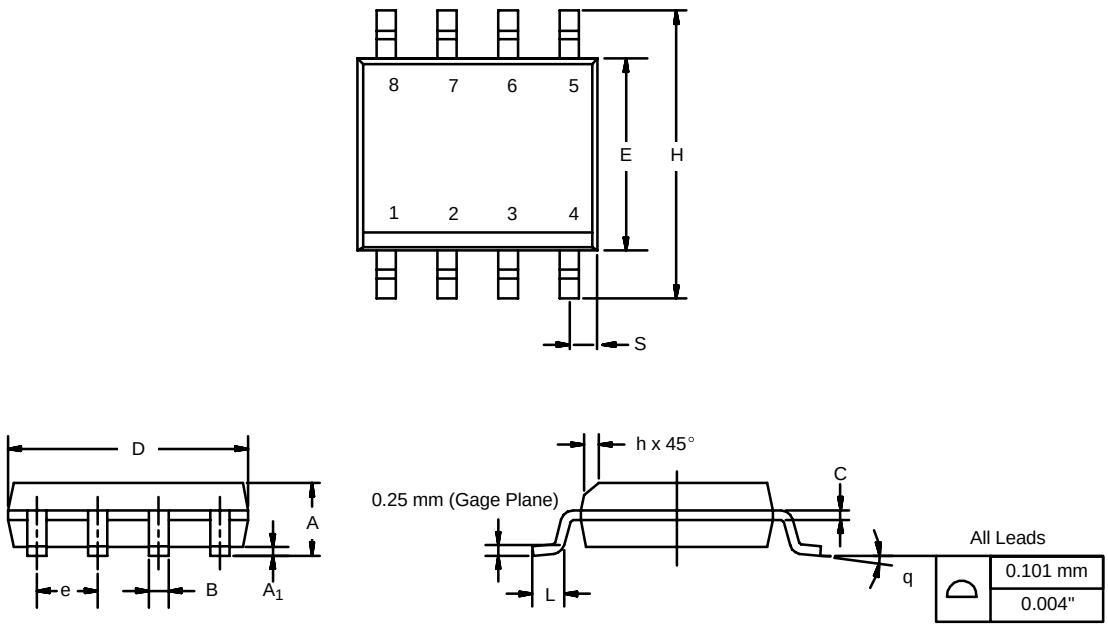
Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

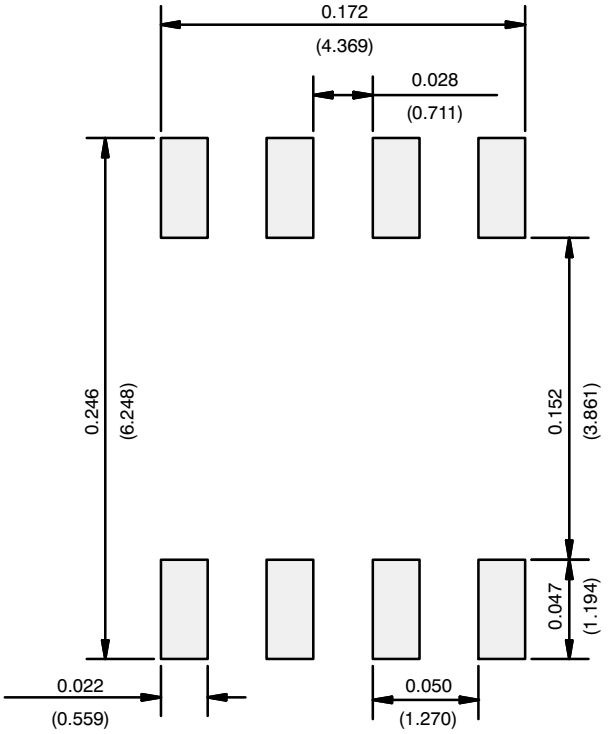
SOIC (NARROW): 8-LEAD

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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