Dual N-Channel 40-V MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
40	0.016 at V_{GS} = 10 V	8	56
	0.019 at V_{GS} = 4.5 V	8	

FEATURES

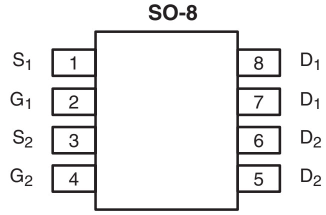
- **Halogen-free According to IEC 61249-2-21 Available**
- TrenchFET® Power MOSFET
- 100 % R_g Tested
- UIS Tested

Pb-free
RoHS COMPLIANT
HALOGEN FREE Available

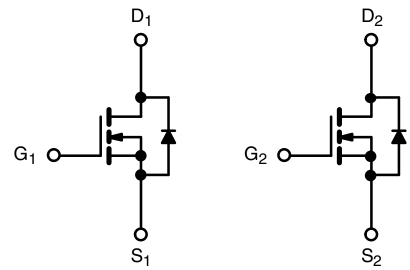
APPLICATIONS

- CCFL Inverter

SO-8



Top View



N-Channel MOSFET N-Channel MOSFET

Ordering Information: Si4904DY-T1-E3 (Lead (Pb)-free)
Si4904DY-T1-GE3 (Lead (Pb)-free and Halogen-free)

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}	± 16	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	8	A
	T_C = 70 °C		8	
	T_A = 25 °C		8[b, c]	
	T_A = 70 °C		6.5[b, c]	
Pulsed Drain Current (10 µs Pulse Width)		I_{DM}	20	
Source-Drain Current Diode Current	T_C = 25 °C	I_S	2.7	
	T_A = 25 °C		1.6[b, c]	
Pulsed Source-Drain Current		I_{SM}	20	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	20	
Single Pulse Avalanche Energy		E_{AS}	20	
Maximum Power Dissipation	T_C = 25 °C	P_D	3.25	W
	T_C = 70 °C		2.10	
	T_A = 25 °C		2.0[b, c]	
	T_A = 70 °C		1.25[b, c]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typ.	Max.	Unit
Maximum Junction-to-Ambient[b, d]	t ≤ 10 s	R_{thJA}	45	62.5	°C/W
Maximum Junction-to-Foot (Drain)	Steady-State	R_{thJF}	29	38	

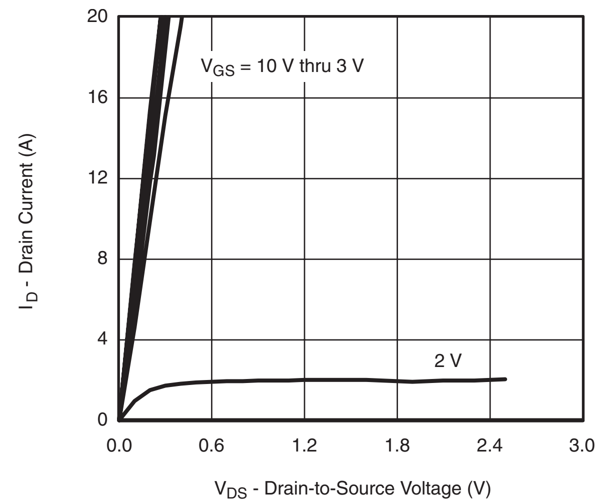
Notes:
a. Based on T_C = 25 °C.
b. Surface Mounted on 1" x 1" FR4 board.
c. t = 10 s.
d. Maximum under steady state conditions is 120 °C/W.

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		40		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	I_D = 250 µA		- 4.8		
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D= 250 µA	0.8		2.0	V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 16 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			10	
On-State Drain Current[b]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 10 V	20			A
Drain-Source On-State Resistance[b]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 5 A		0.013	0.016	Ω
		V_{GS} = 4.5 V, I_D = 4 A		0.015	0.019	
Forward Transconductance[b]	g_{fs}	V_{DS} = 15 V, I_D = 5 A		23		S
Dynamic[a]						
Input Capacitance	C_{iss}	N-Channel V_{DS} = 20 V, V_{GS} = 0 V, I_D = 1 MHz		2390		pF
Output Capacitance	C_{oss}			270		
Reverse Transfer Capacitance	C_{rss}			165		
Total Gate Charge	Q_g	V_{DS} = 20 V, V_{GS} = 10 V, I_D = 5 A		56	85	nC
		N-Channel V_{DS} = 20 V, V_{GS} = 4.5 V, I_D = 5 A		26	40	
Gate-Source Charge	Q_{gs}			5.5		
Gate-Drain Charge	Q_{gd}			9.7		
Gate Resistance	R_g	f = 1 MHz		2.6	4.0	
Turn-On Delay Time	$t_{d(on)}$	N-Channel V_{DD} = 20 V, R_L = 4 Ω $I_D \cong$ 5 A, V_{GEN} = 4.5 V, R_g = 1 Ω		15	23	ns
Rise Time	t_r			20	30	
Turn-Off Delay Time	$t_{d(off)}$			56	85	
Fall Time	t_f			10	15	
Turn-On Delay Time	$t_{d(on)}$	N-Channel V_{DD} = 20 V, R_L =4 Ω $I_D \cong$ 5 A, V_{GEN} = 4.5 V, R_g = 1 Ω		88	135	
Rise Time	t_r			117	180	
Turn-Off Delay Time	$t_{d(off)}$			62	95	
Fall Time	t_f			19	30	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			2.7	A
Pulse Diode Forward Current[a]	I_{SM}				20	
Body Diode Voltage	V_{SD}	I_S = 1.5 A		0.69	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	N-Channel I_F = 2 A, dI/dt = 100 A/µs, T_J = 25 °C		62	95	ns
Body Diode Reverse Recovery Charge	Q_{rr}			62	95	nC
Reverse Recovery Fall Time	t_a			26		nS
Reverse Recovery Rise Time	t_b			36		

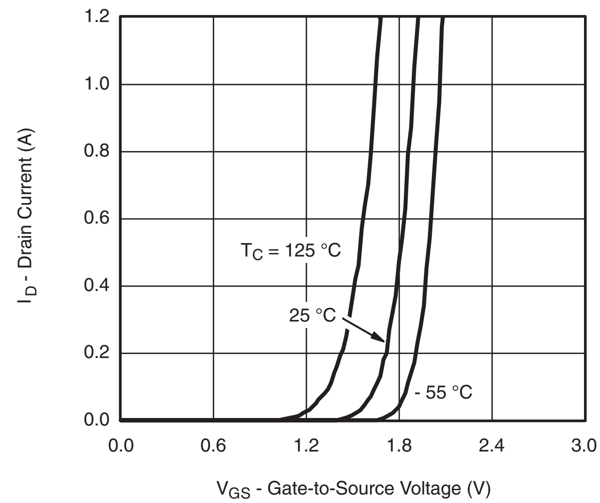
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Document Number: 73793
S09-0540-Rev. C, 06-Apr-09

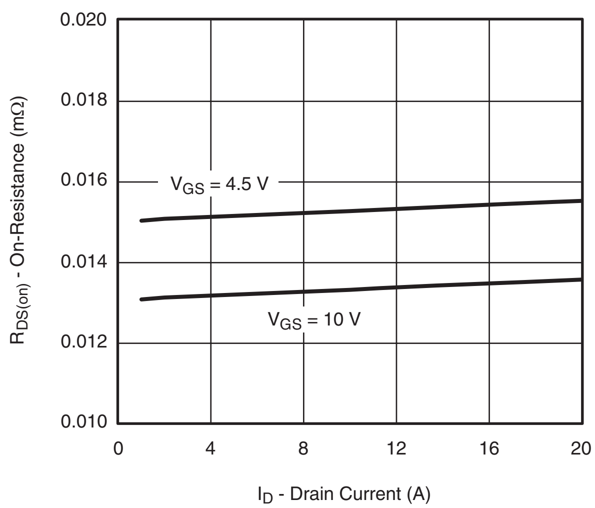
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



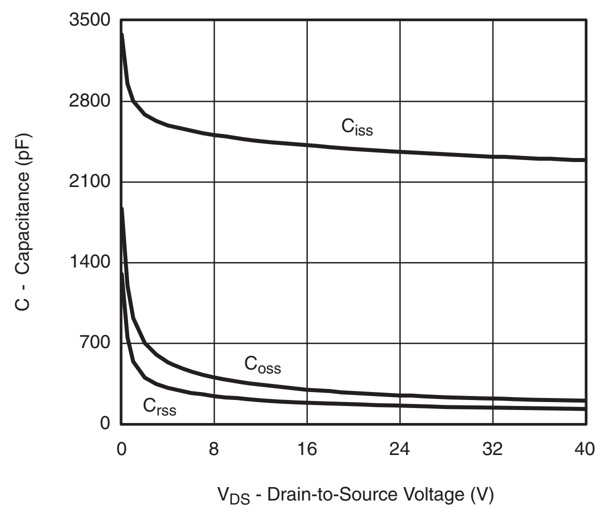
Output Characteristics



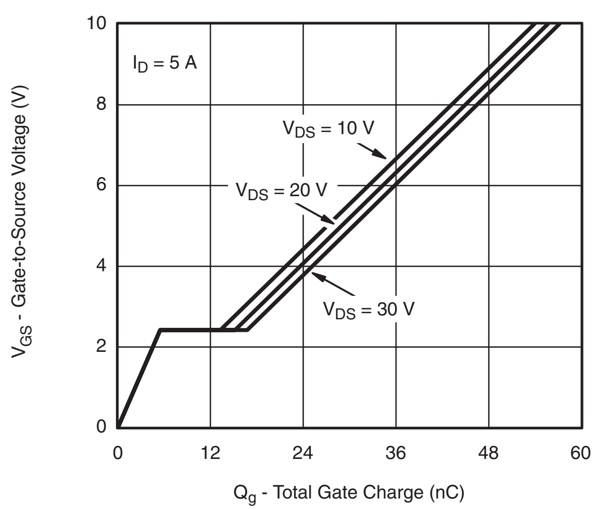
Transfer Characteristics



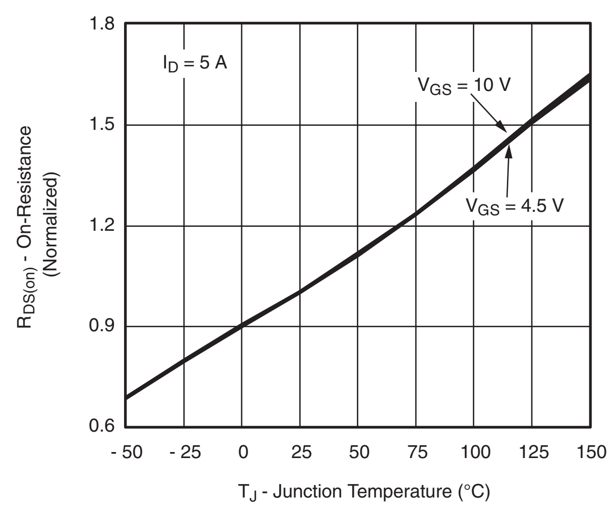
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

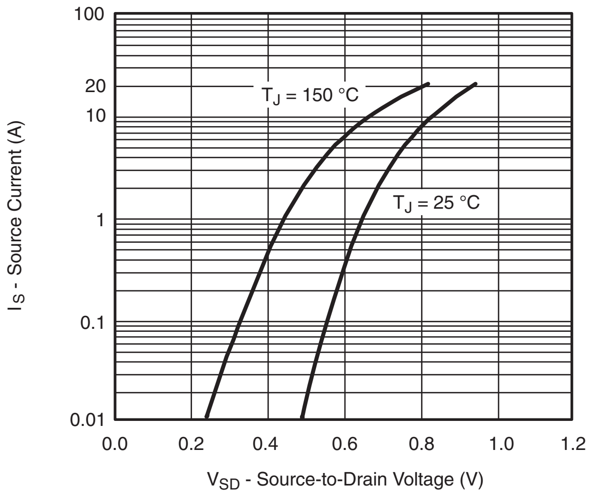


Gate Charge

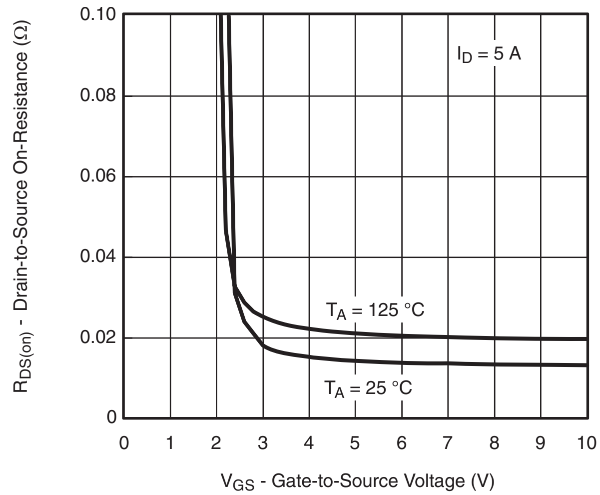


On-Resistance vs. Junction Temperature

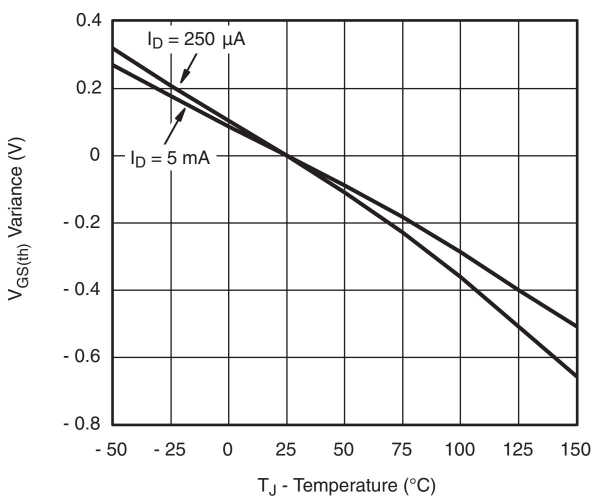
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



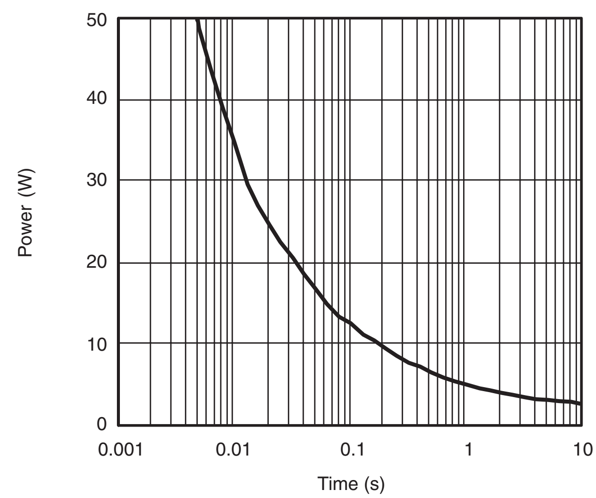
Source-Drain Diode Forward Voltage



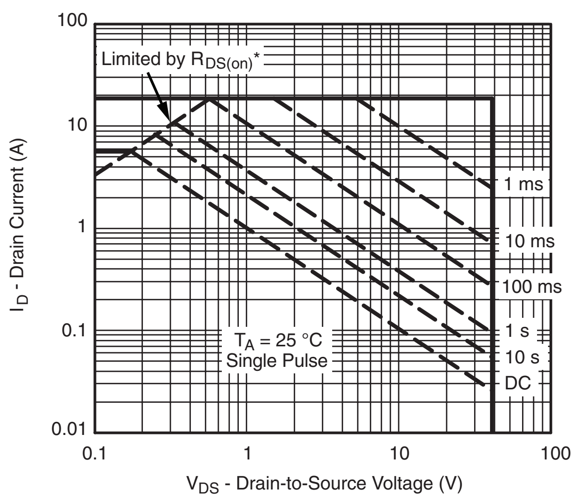
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



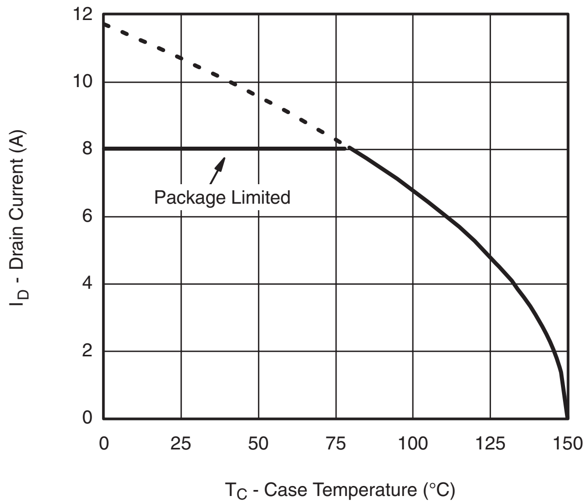
Single Pulse Power, Junction-to-Ambient



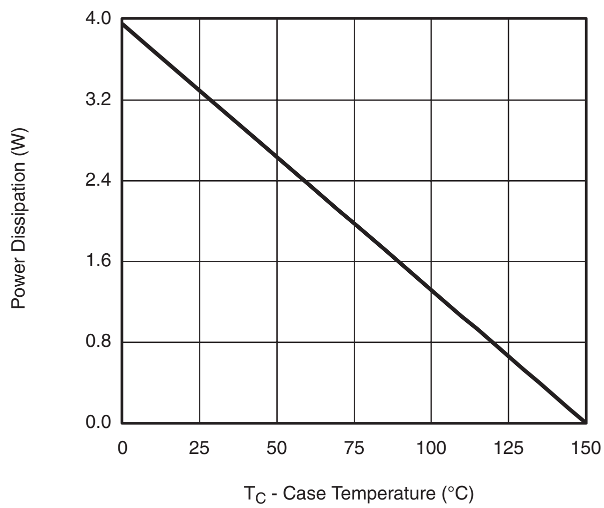
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

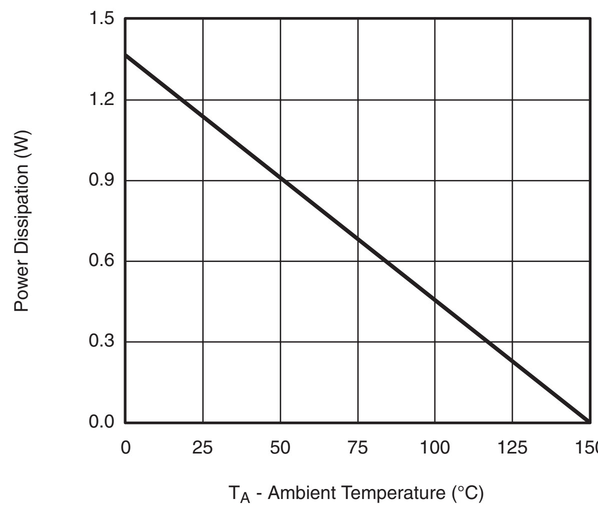
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*



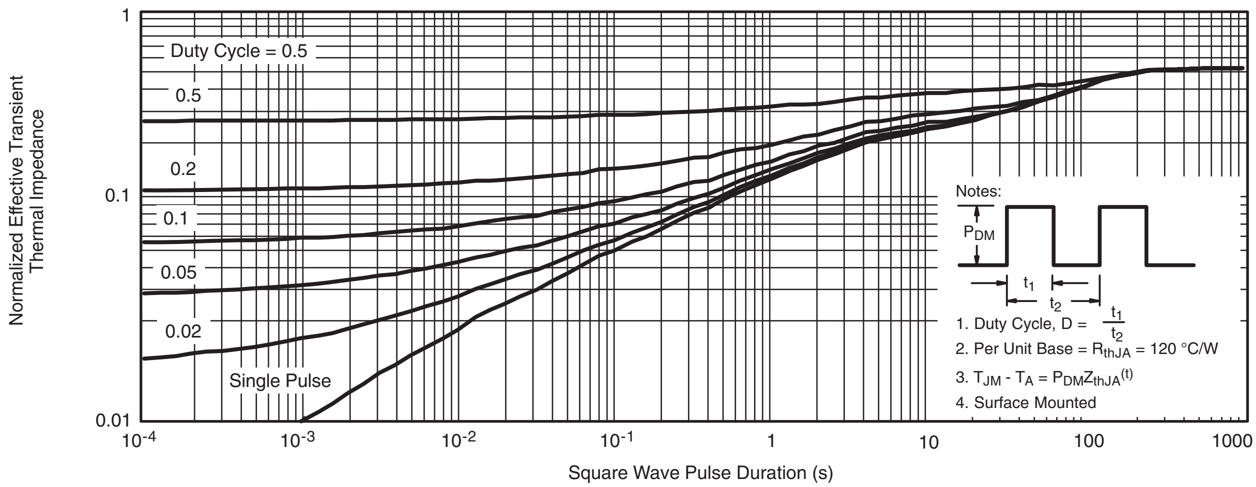
Power Derating, Junction-to-Foot



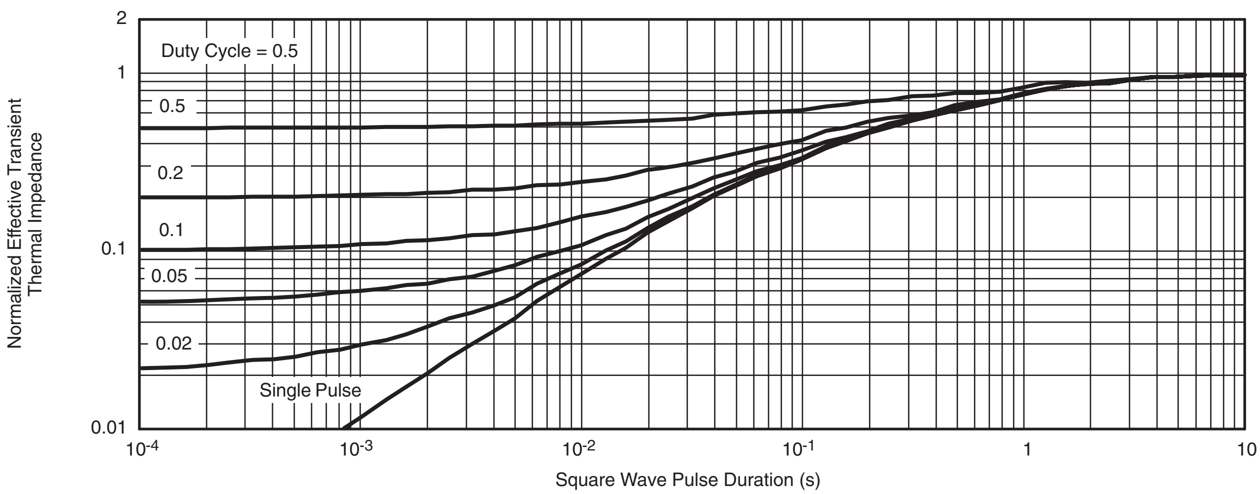
Power Derating, Junction-to-Ambient

* 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

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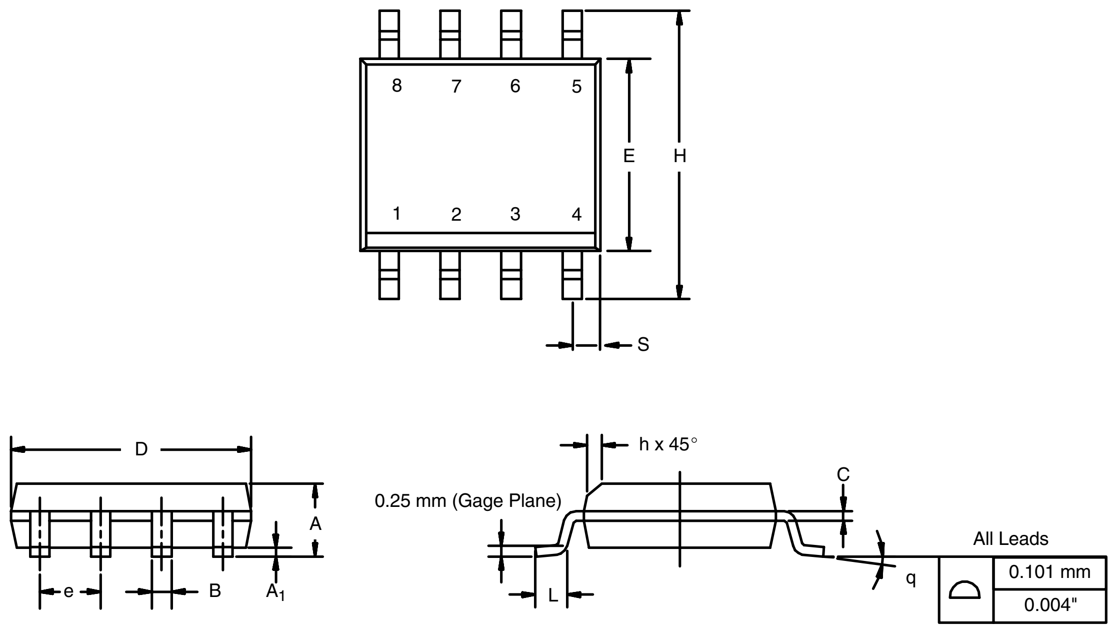
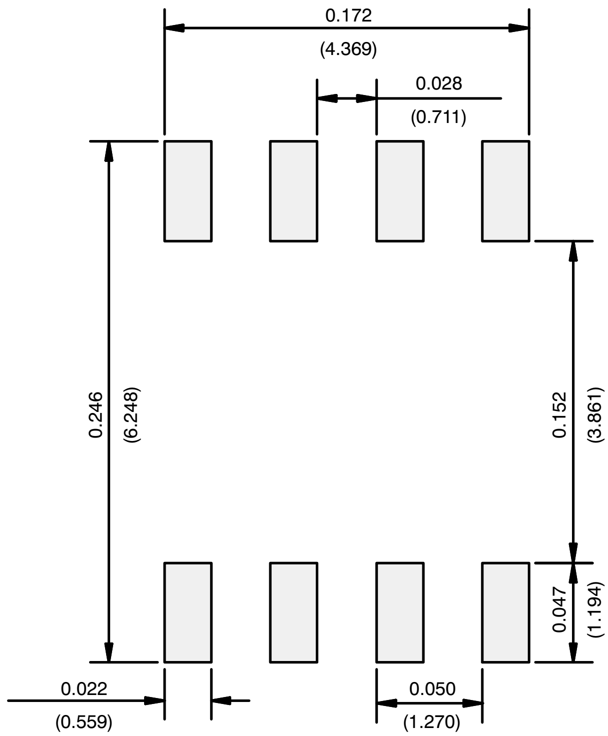
SOIC (NARROW): 8-LEAD
JEDEC Part Number: MS-012



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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