

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

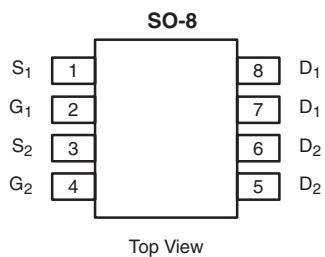
- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET® Power MOSFET
- 100 % R_g Tested
- UIS Tested



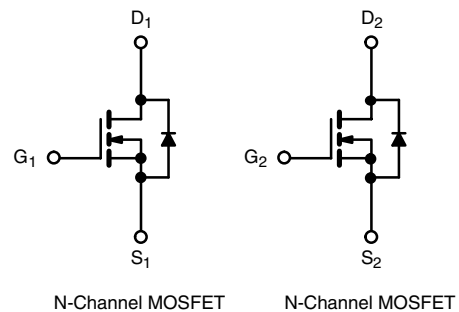
RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- CCFL Inverter



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)	I_D	$T_C = 25$ °C	A
		$T_C = 70$ °C	
		$T_A = 25$ °C	
		$T_A = 70$ °C	
Pulsed Drain Current (10 μ s Pulse Width)	I_{DM}	20	
Source-Drain Current Diode Current	I_S	$T_C = 25$ °C	
		$T_A = 25$ °C	
Pulsed Source-Drain Current	I_{SM}	20	
Single Pulse Avalanche Current	I_{AS}	20	
Single Pulse Avalanche Energy	E_{AS}	20	
Maximum Power Dissipation	P_D	$T_C = 25$ °C	W
		$T_C = 70$ °C	
		$T_A = 25$ °C	
		$T_A = 70$ °C	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typ.	Max.	Unit
Maximum Junction-to-Ambient ^{b, d}	$t \leq 10$ s	R_{thJA}	45	62.5	°C/W
Maximum Junction-to-Foot (Drain)	Steady-State	R_{thJF}	29	38	

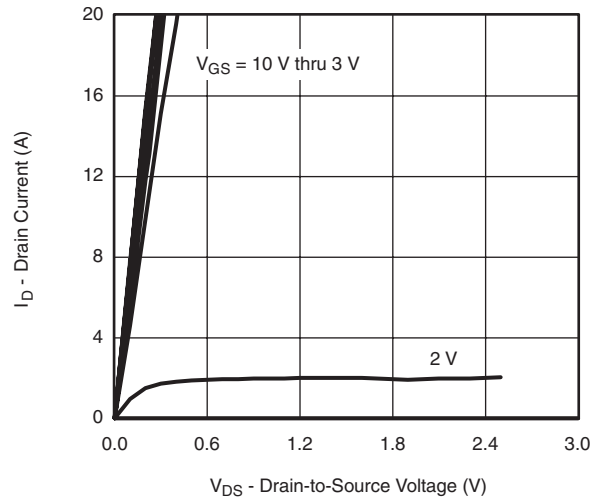
Notes:

- Based on $T_C = 25$ °C.
- Surface Mounted on 1" x 1" FR4 board.
- $t = 10$ s.
- Maximum under steady state conditions is 120 °C/W.

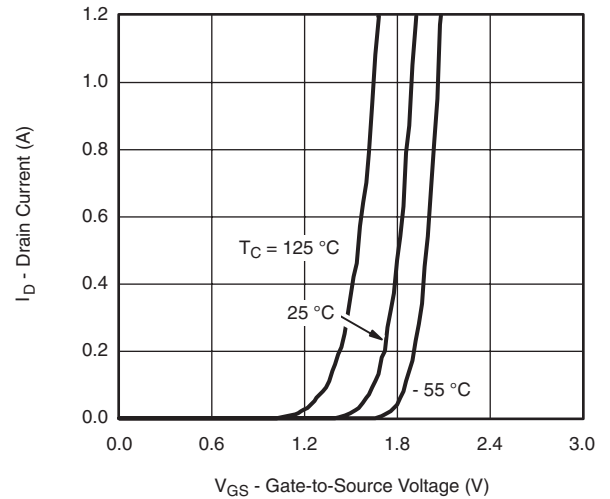
SPECIFICATIONS T _J = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	40			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		40		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{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 ≅ 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 ≅ 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.

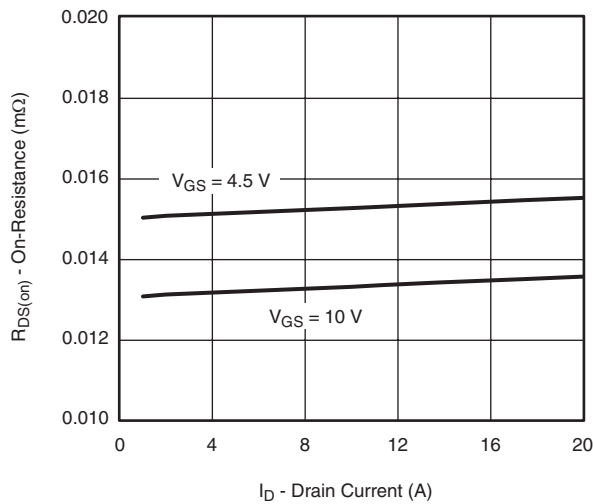
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



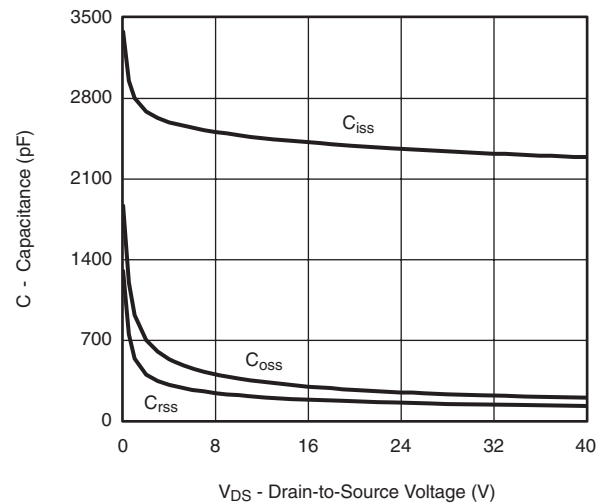
Output Characteristics



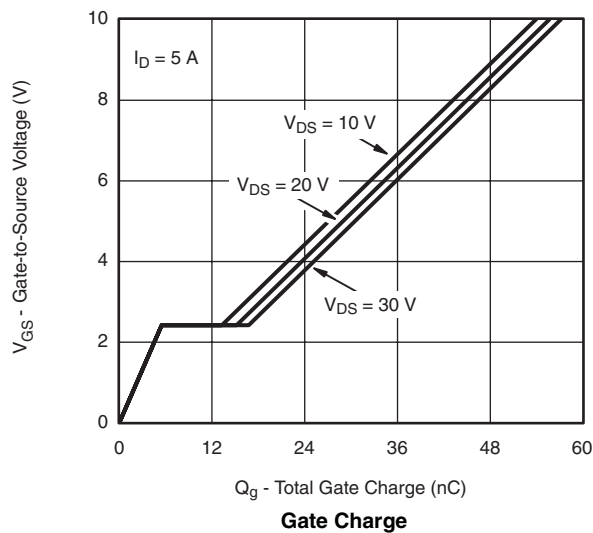
Transfer Characteristics



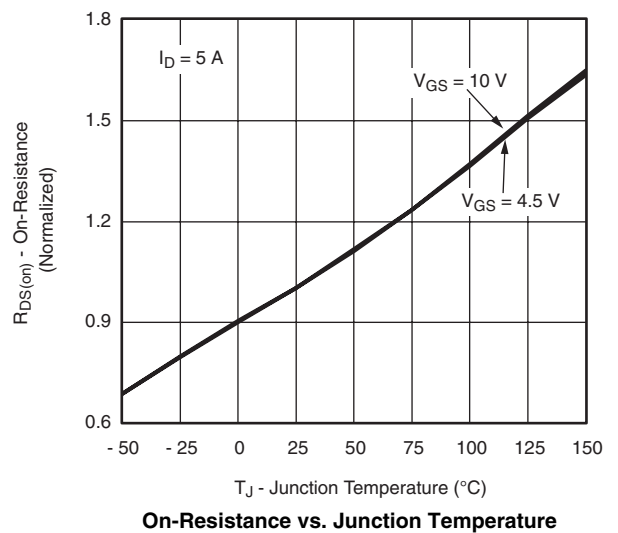
On-Resistance vs. Drain Current and Gate Voltage



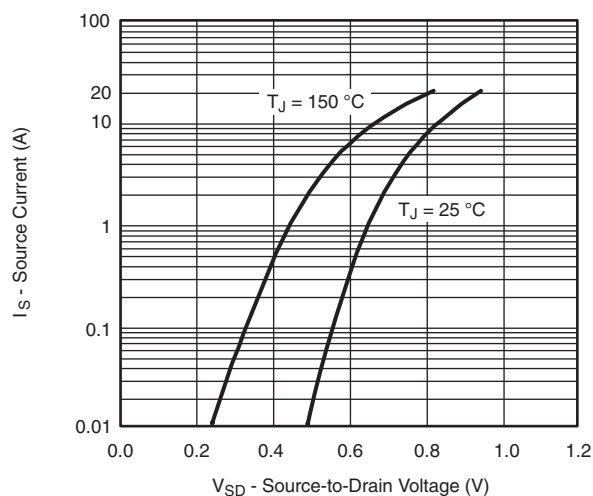
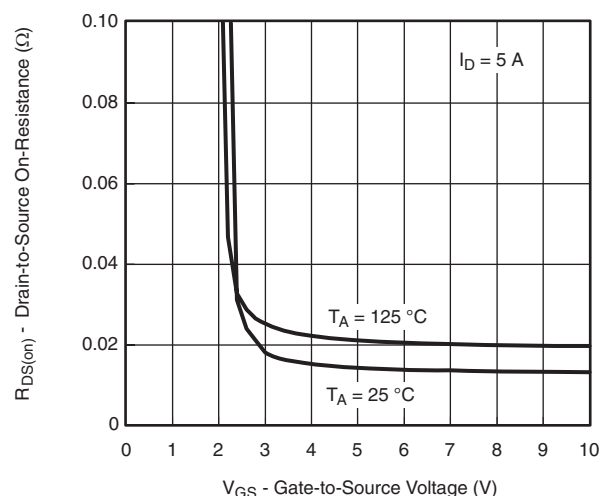
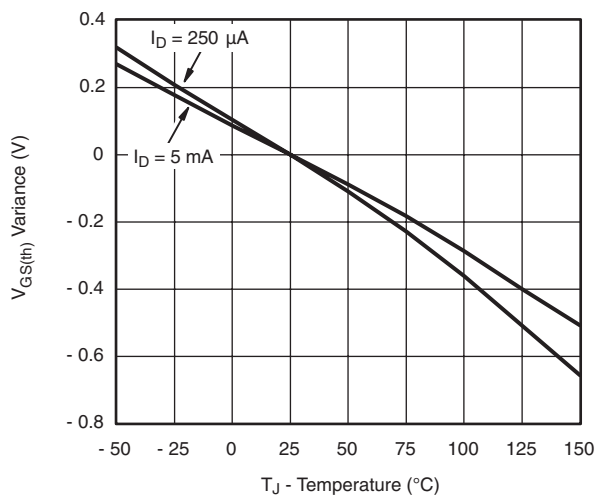
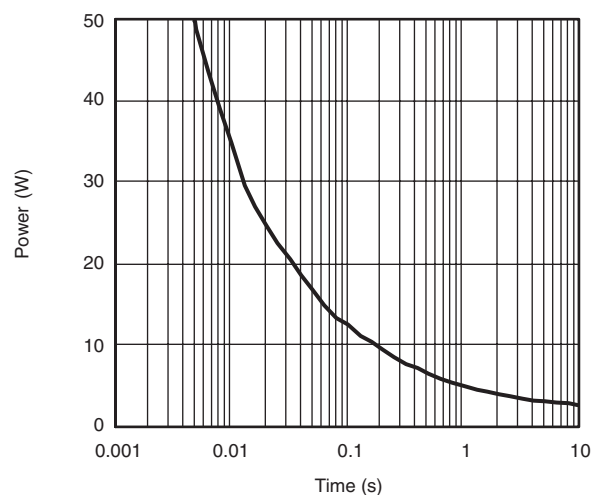
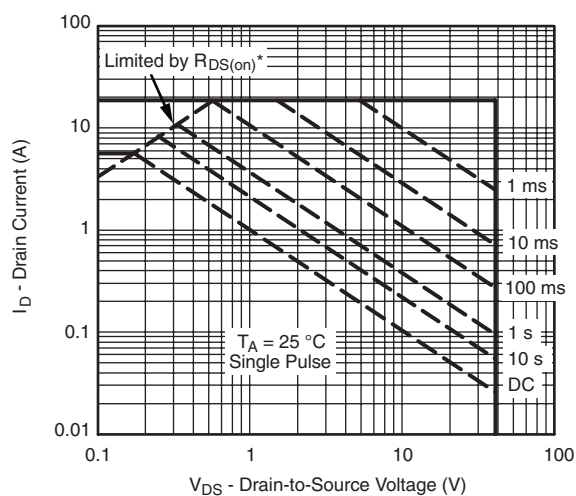
Capacitance



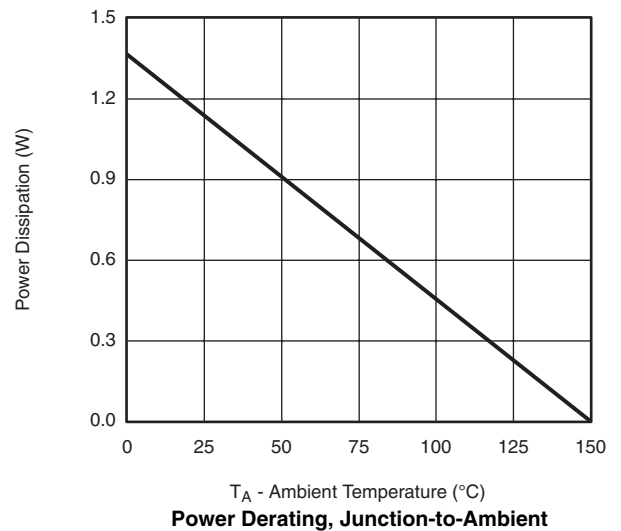
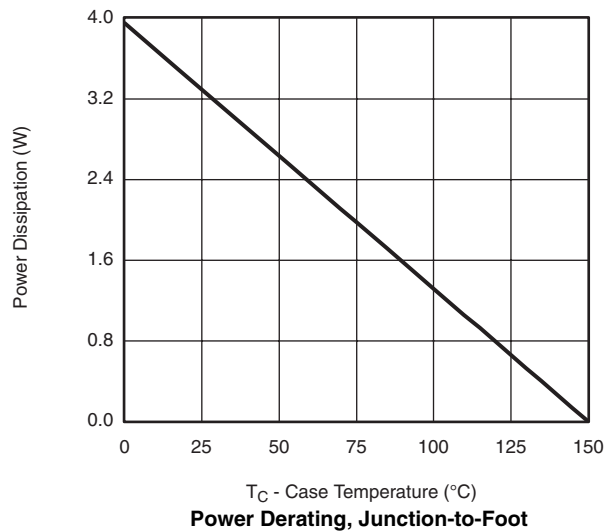
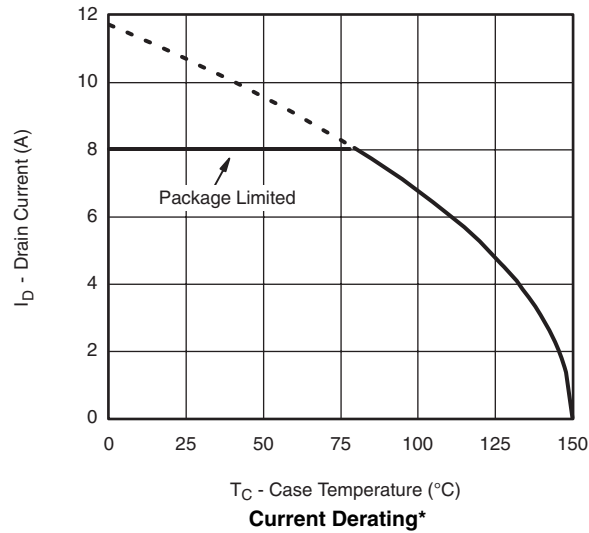
Gate Charge



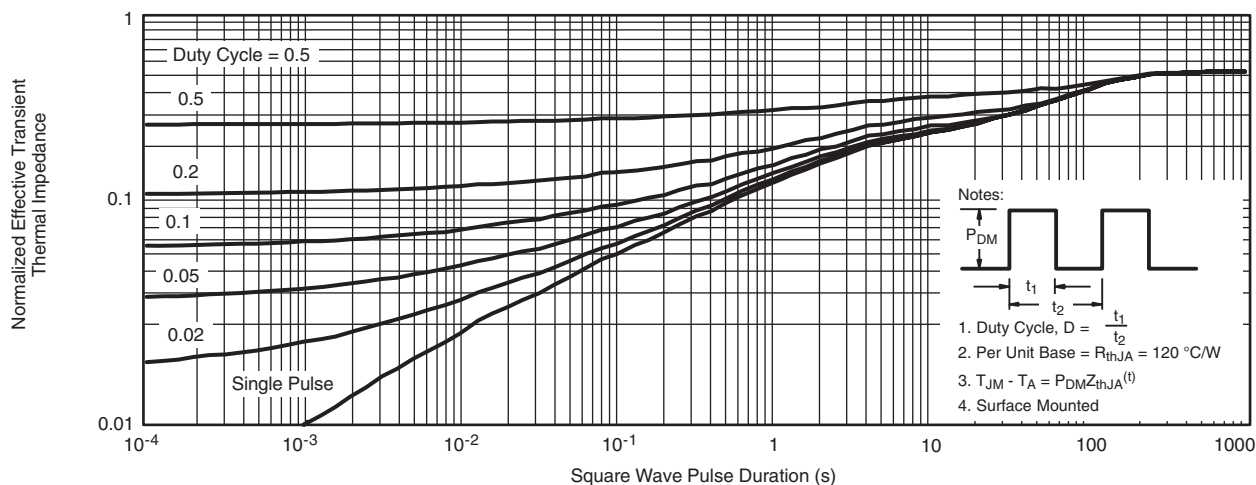
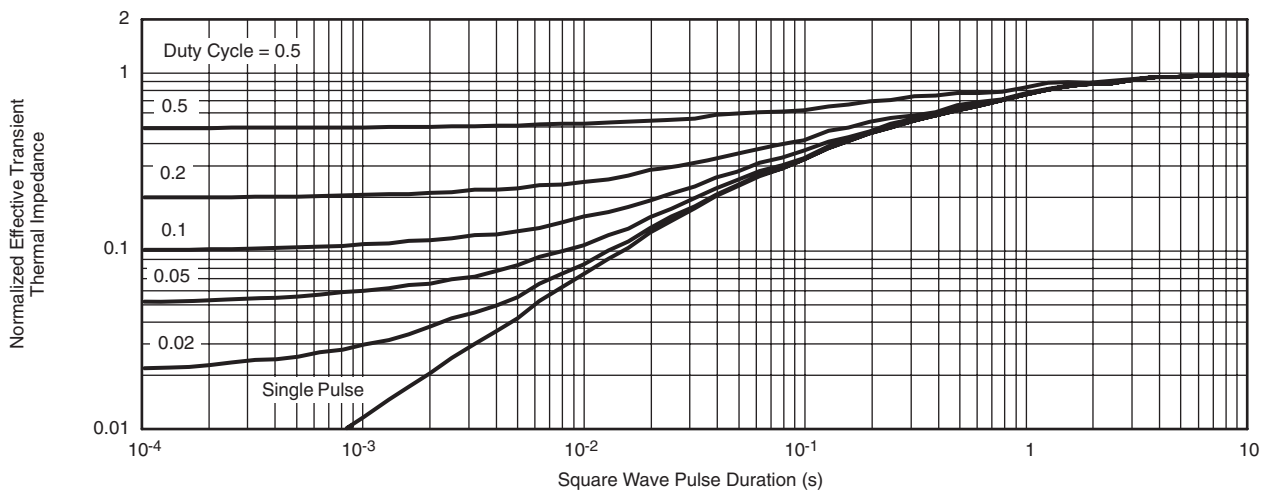
On-Resistance vs. Junction Temperature

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



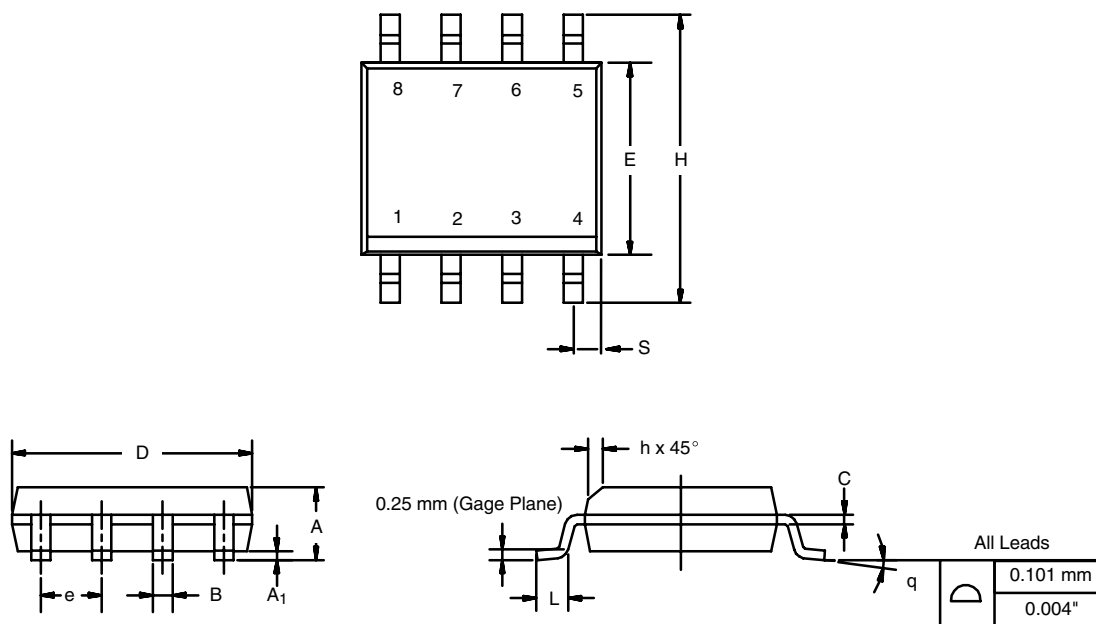
* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

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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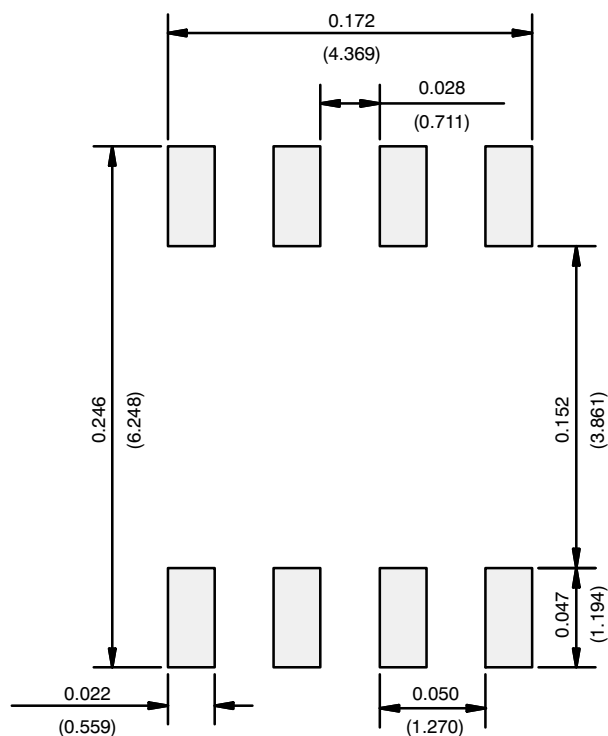
SOIC (NARROW): 8-LEAD

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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