

N-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^d	Q_g (Typ.)
60	0.036 at $V_{GS} = 10$ V	8	10.5 nC
	0.043 at $V_{GS} = 4.5$ V	8	

FEATURES

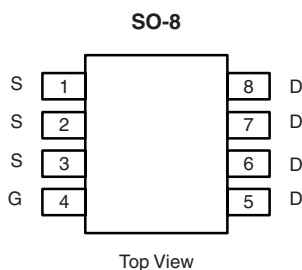
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- Optimized for “Low Side” Synchronous Rectifier Operation
- 100 % R_g and UIS Tested



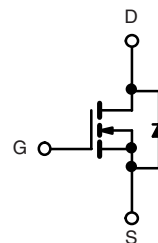
RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- CCFL Inverter



Ordering Information: Si4436DY-T1-E3 (Lead (Pb)-free)
Si4436DY-T1-GE3 (Lead (Pb)-free and Halogen-free)



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ($T_J = 150$ °C)	$T_C = 25$ °C	I_D	8 ^a	A
	$T_C = 70$ °C		6.8	
	$T_A = 25$ °C		6.1 ^{b, c}	
	$T_A = 70$ °C		4.8 ^{b, c}	
Pulsed Drain Current		I_{DM}	25	
Continuous Source-Drain Diode Current	$T_C = 25$ °C	I_S	4.2	
	$T_A = 25$ °C		2.1 ^{b, c}	
Avalanche Current		I_{AS}	15	mJ
Single-Pulse Avalanche Energy		E_{AS}	11.2	
Maximum Power Dissipation	$T_C = 25$ °C	P_D	5	W
	$T_C = 70$ °C		3.2	
	$T_A = 25$ °C		2.5 ^{b, c}	
	$T_A = 70$ °C		1.6 ^{b, c}	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	$t \leq 10$ s	R_{thJA}	38	50	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	20	25	

Notes:

- Package limited.
- Surface mounted on 1" x 1" FR4 board.
- $t = 10$ s.
- Maximum under Steady State conditions is 85 °C/W.



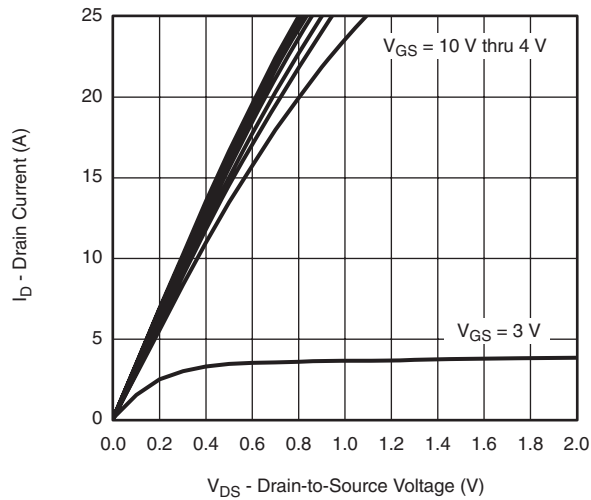
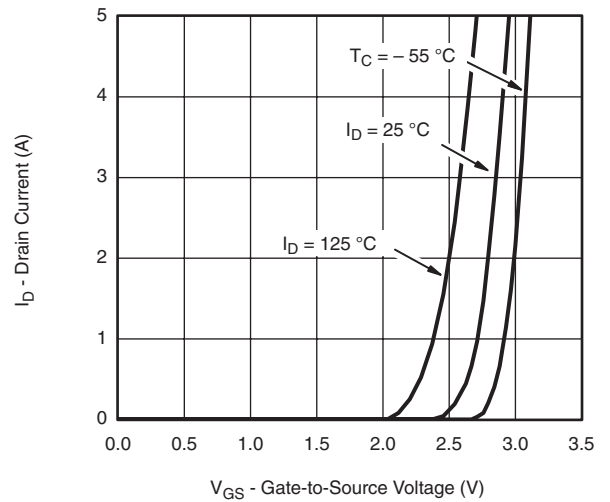
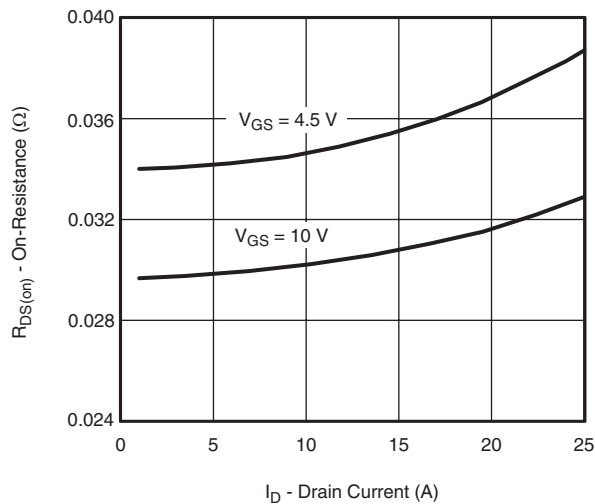
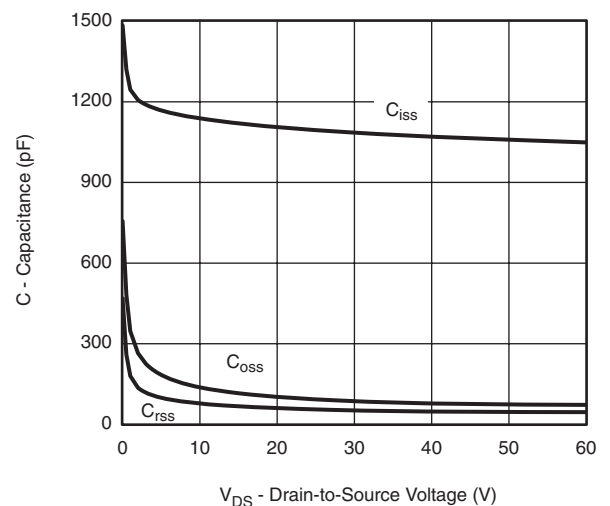
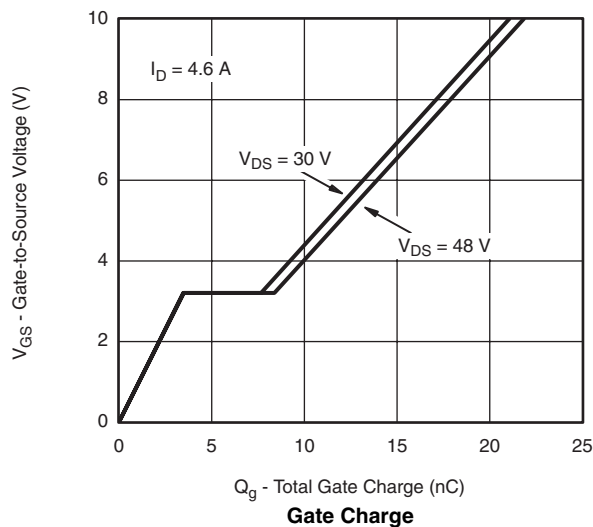
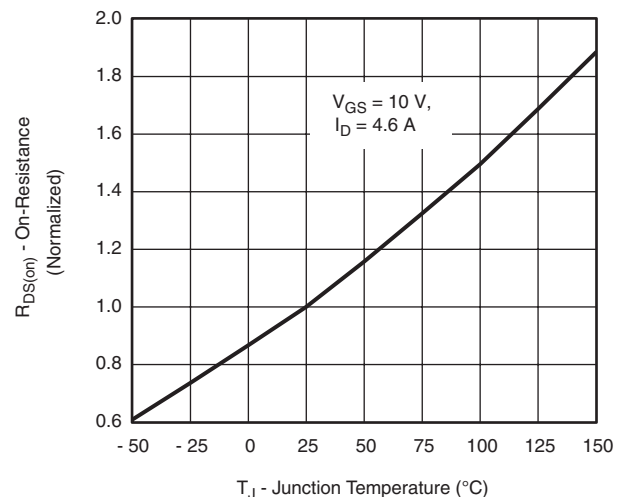
SPECIFICATIONS T _J = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	60			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		55		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 6.3		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1.5		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} = 60 V, V _{GS} = 0 V			1	μA
		V _{DS} = 60 V, V _{GS} = 0 V, T _J = 55 °C			10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	25			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 4.6 A		0.030	0.036	Ω
		V _{GS} = 4.5 V, I _D = 4.2 A		0.035	0.043	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 4.6 A		20		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 30 V, V _{GS} = 0 V, f = 1 MHz		1100		pF
Output Capacitance	C _{oss}			90		
Reverse Transfer Capacitance	C _{rss}			55		
Total Gate Charge	Q _g	V _{DS} = 30 V, V _{GS} = 10 V, I _D = 4.6 A		21	32	nC
		V _{DS} = 30 V, V _{GS} = 4.5 V, I _D = 4.6 A		10.5	16	
Gate-Source Charge	Q _{gs}			3.5		
Gate-Drain Charge	Q _{gd}			4.2		
Gate Resistance	R _g	f = 1 MHz		3.3	5	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 30 V, R _L = 5.4 Ω I _D ≅ 5.6 A, V _{GEN} = 4.5 V, R _g = 1 Ω		20	30	ns
Rise Time	t _r			150	225	
Turn-Off DelayTime	t _{d(off)}			20	30	
Fall Time	t _f			60	90	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 30 V, R _L = 5.4 Ω I _D ≅ 5.6 A, V _{GEN} = 10 V, R _g = 1 Ω		10	15	
Rise Time	t _r			15	25	
Turn-Off DelayTime	t _{d(off)}			25	40	
Fall Time	t _f			10	15	
Drain-Source Body Diode Characteristics						
Continous Source-Drain Diode Current	I _S	T _C = 25 °C			4.2	A
Pulse Diode Forward Current ^a	I _{SM}				25	
Body Diode Voltage	V _{SD}	I _S = 2 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 5.5 A, dI/dt = 100 A/μs, T _J = 25 °C		25	50	ns
Body Diode Reverse Recovery Charge	Q _{rr}			25	50	nC
Reverse Recovery Fall Time	t _a			19		ns
Reverse Recovery Rise Time	t _b			6		

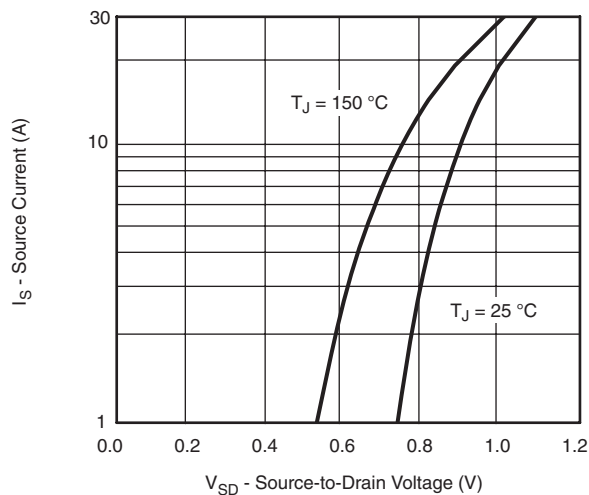
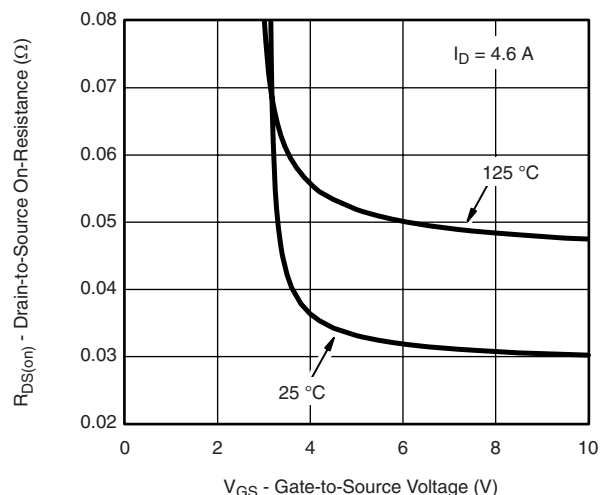
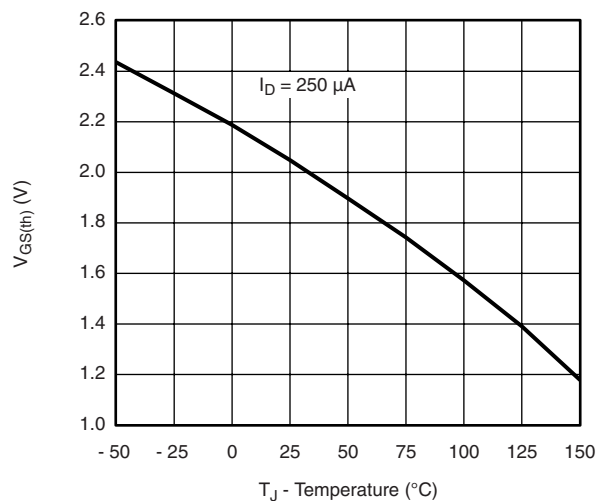
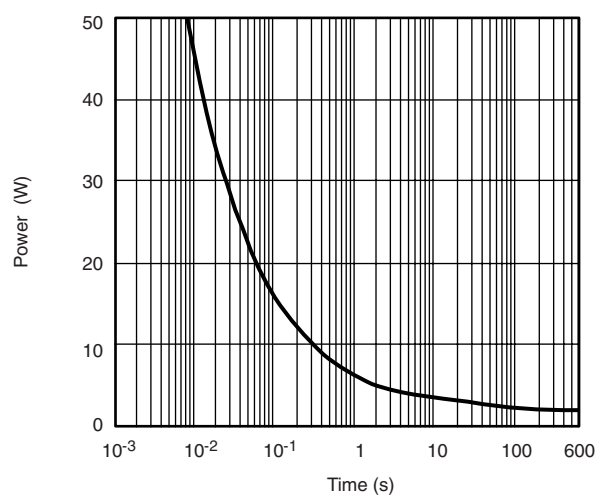
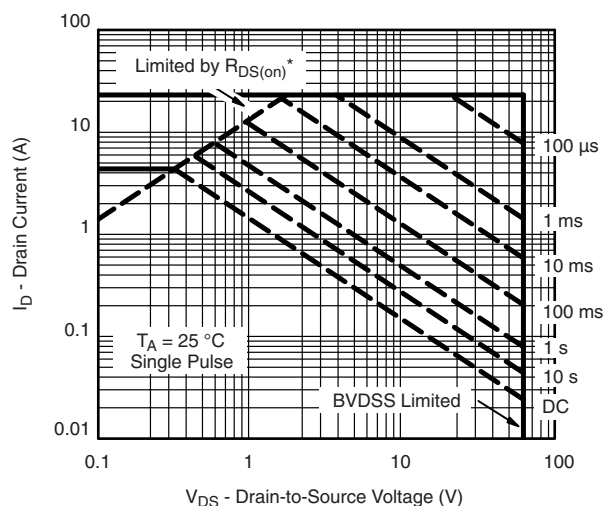
Notes:

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

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

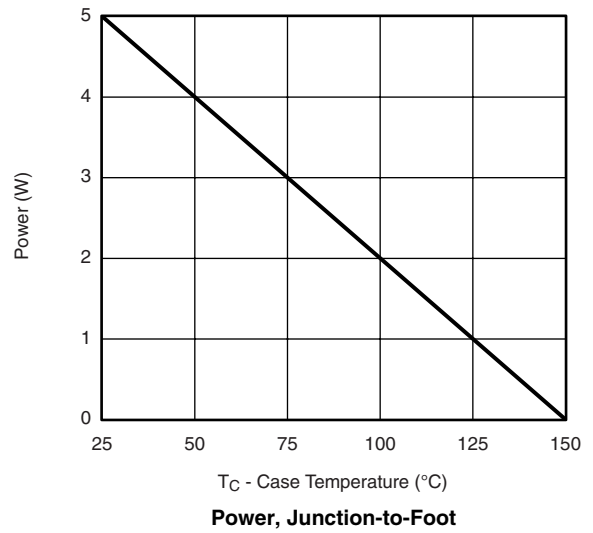
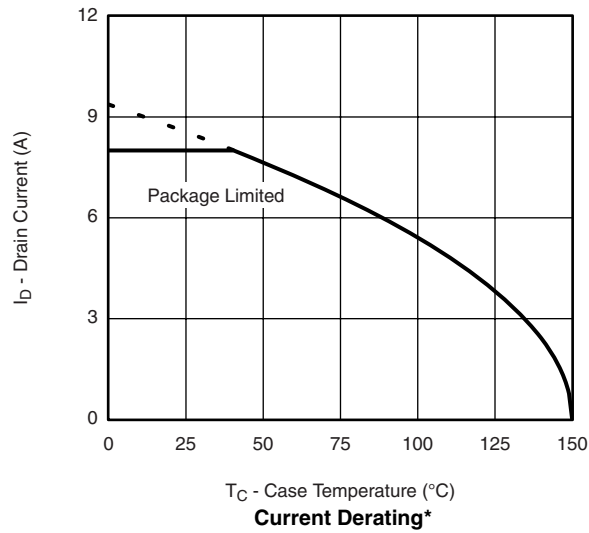
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

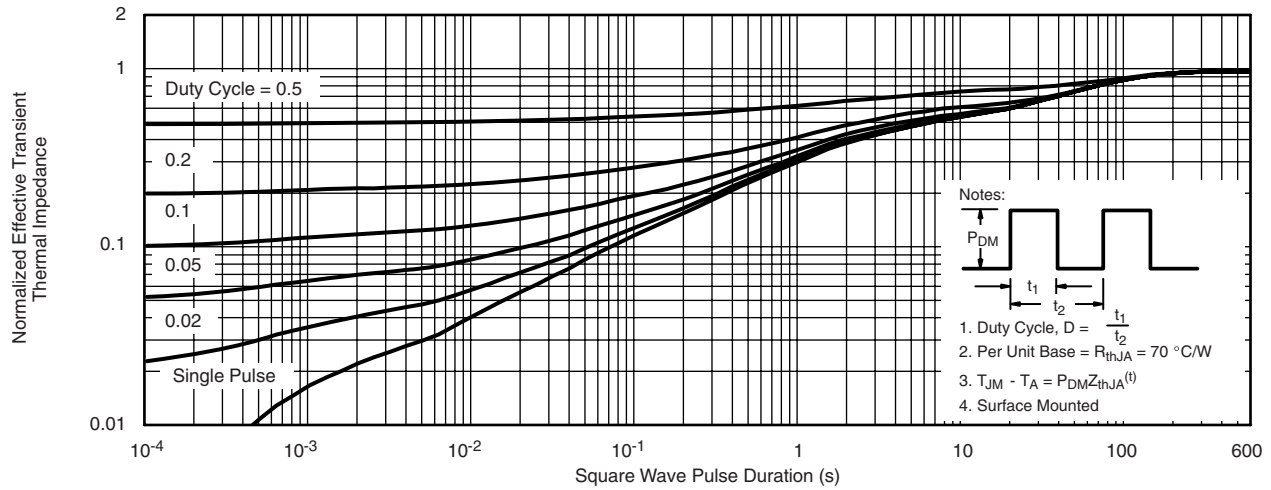
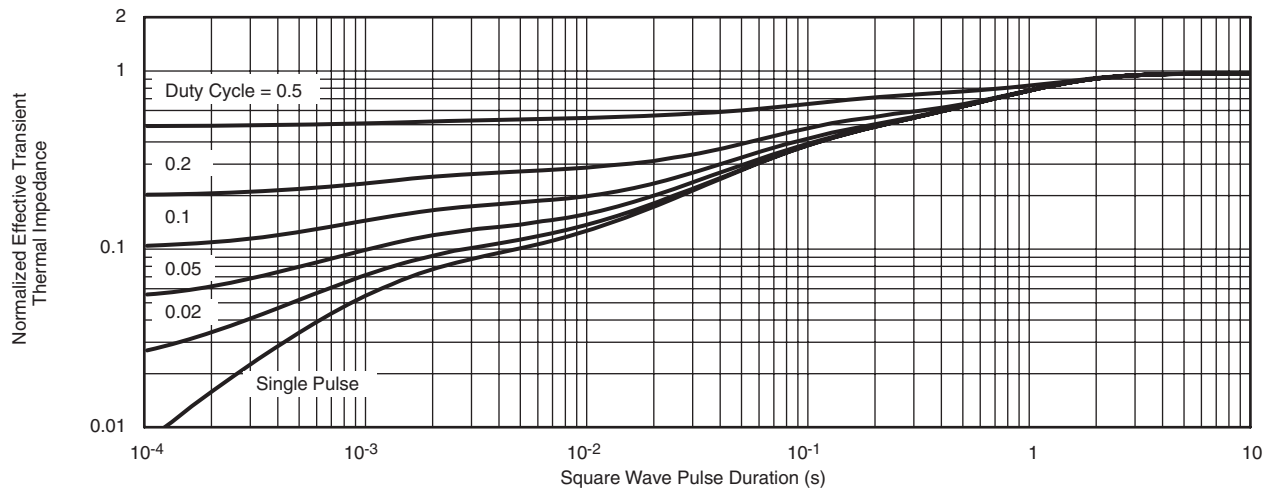
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**Source-Drain Diode Forward Voltage****On-Resistance vs. Gate-to-Source Voltage****Threshold Voltage****Single Pulse Power, Junction-to-Ambient*** $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified**Safe Operating Area**



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-Foot**

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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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