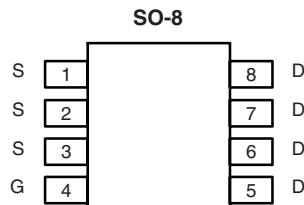


N-Channel 40-V (D-S) MOSFET

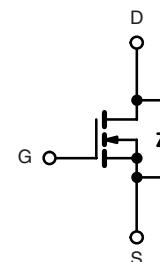
PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
40	0.0038 at V _{GS} = 10 V	33	37.5 nC
	0.0045 at V _{GS} = 4.5 V	31	

FEATURES

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



Top View



Ordering Information: Si4456DY-T1-E3 (Lead (Pb)-free)
Si4456DY-T1-GE3 (Lead (Pb)-free and Halogen-free)

N-Channel MOSFET

APPLICATIONS

- Secondary Rectification
- Point of Load

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	33	A	
	T _C = 70 °C	27		
	T _A = 25 °C	23 ^{b, c}		
	T _A = 70 °C	18 ^{b, c}		
Pulsed Drain Current	I _{DM}	70		
Continuous Source-Drain Diode Current	T _C = 25 °C	7.0		
	T _A = 25 °C	3.0 ^{b, c}		
Avalanche Current	I _{AS}	40		
Single Pulse Avalanche Energy	E _{AS}	80	mJ	
Maximum Power Dissipation	T _C = 25 °C	7.8	W	
	T _C = 70 °C	5.0		
	T _A = 25 °C	3.5 ^{b, c}		
	T _A = 70 °C	2.2 ^{b, c}		
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150		

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	R _{thJA}	29	35	°C/W
Maximum Junction-to-Foot (Drain)	R _{thJF}	13	16	

Notes:

- a. Based on T_C = 25 °C.
- b. Surface Mounted on 1" x 1" FR4 board.
- c. t = 5 s.
- d. Maximum under steady state conditions is 80 °C/W.

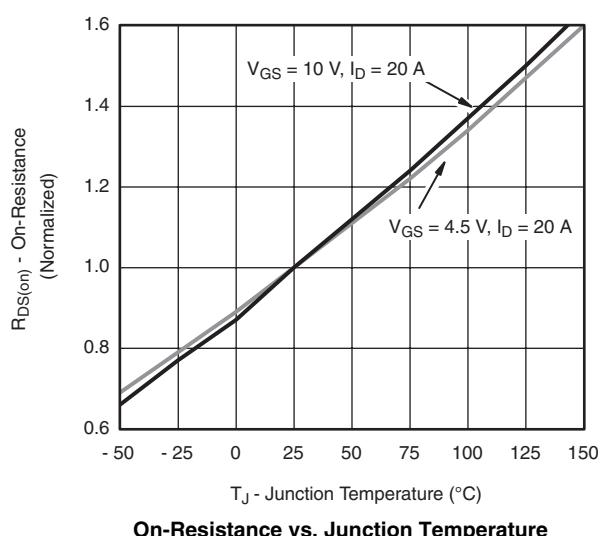
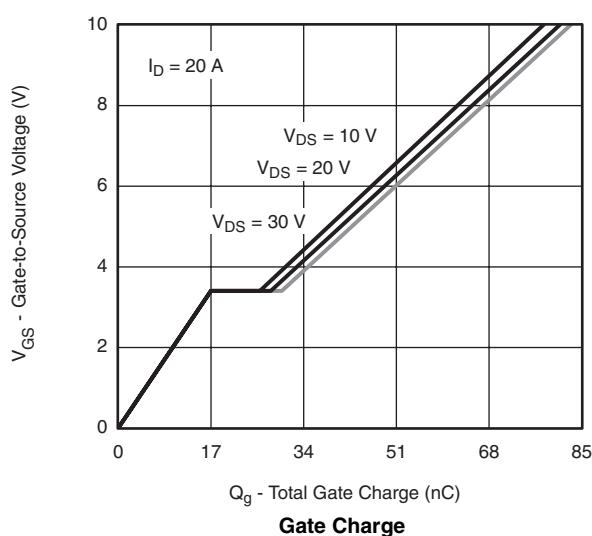
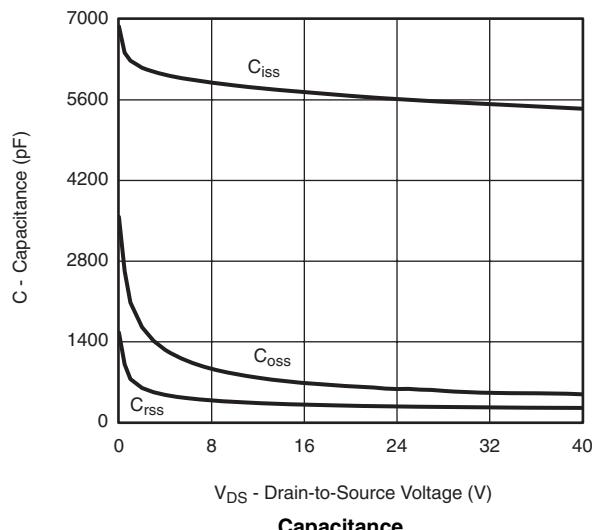
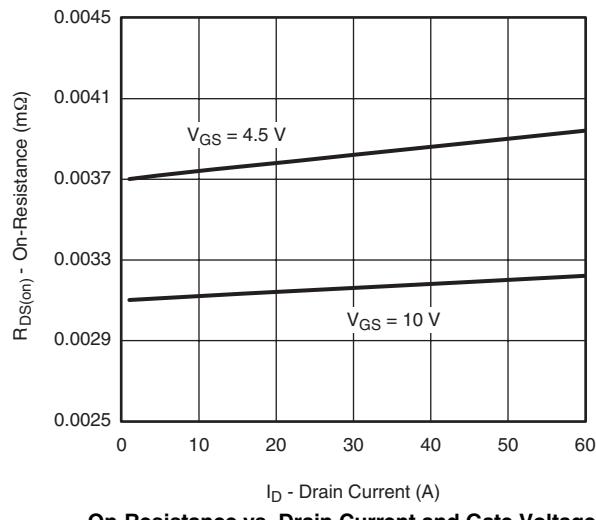
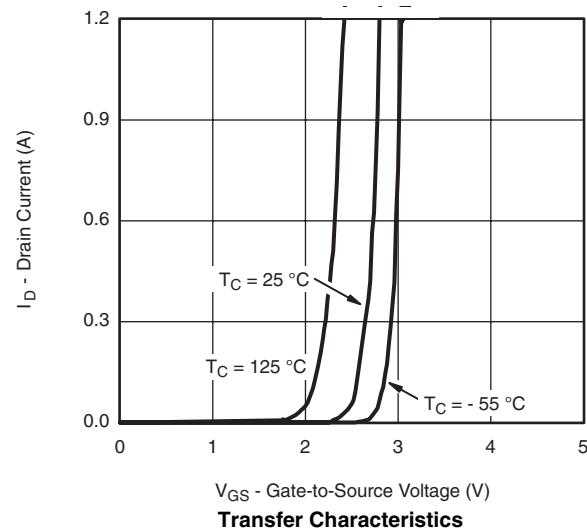
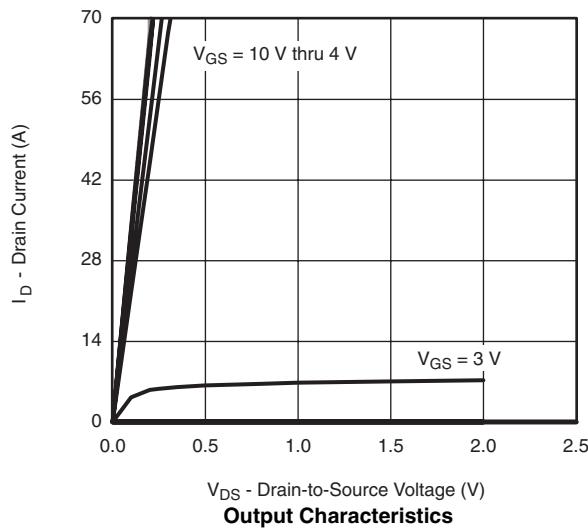
SPECIFICATIONS $T_J = 25^\circ\text{C}$, unless otherwise noted

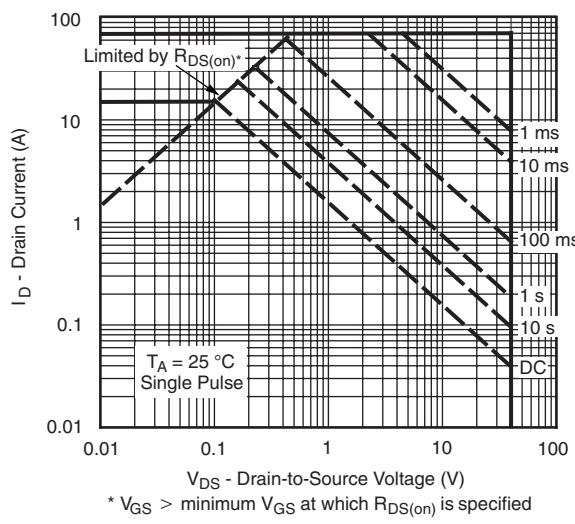
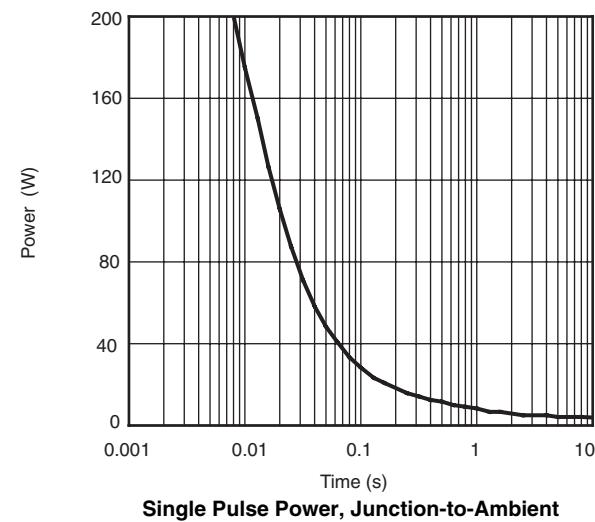
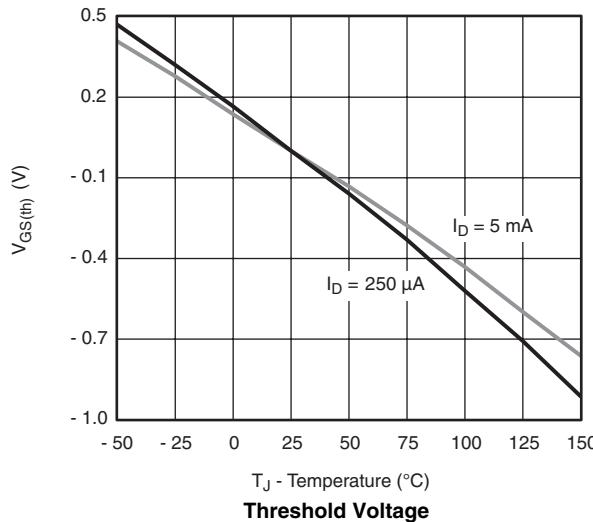
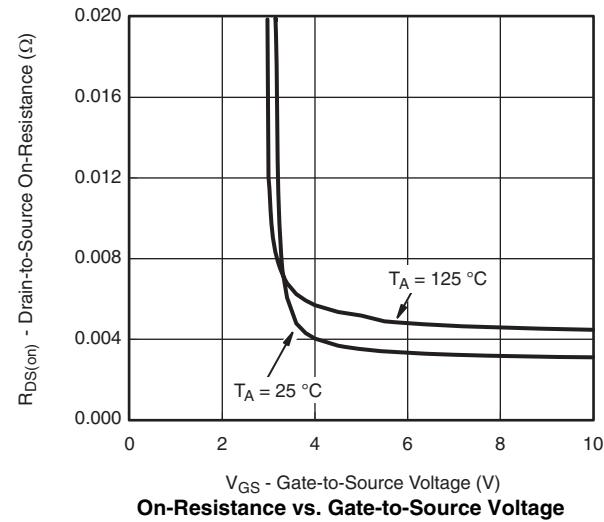
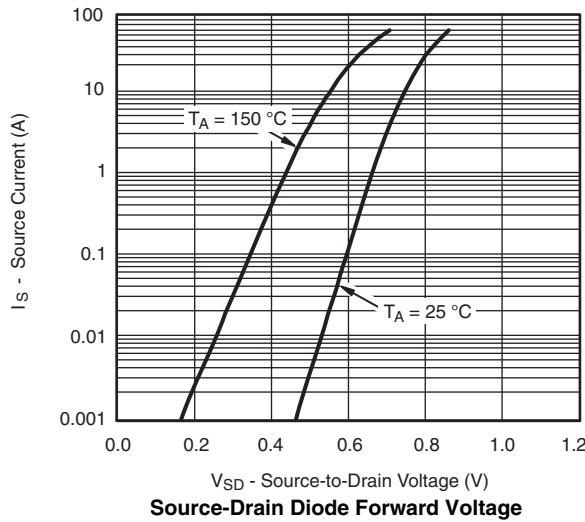
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$	40			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250 \mu\text{A}$		54		mV/ $^\circ\text{C}$
$V_{GS(\text{th})}$ Temperature Coefficient	$\Delta V_{GS(\text{th})}/T_J$			- 7		
Gate-Source Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$, $I_D = 250 \mu\text{A}$	1.5		2.8	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0 \text{ V}$, $V_{GS} = \pm 20 \text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40 \text{ V}$, $V_{GS} = 0 \text{ V}$			1	μA
		$V_{DS} = 40 \text{ V}$, $V_{GS} = 0 \text{ V}$, $T_J = 55^\circ\text{C}$			10	
On-State Drain Current ^a	$I_{D(\text{on})}$	$V_{DS} = \geq 5 \text{ V}$, $V_{GS} = 10 \text{ V}$	30			A
Drain-Source On-State Resistance ^a	$R_{DS(\text{on})}$	$V_{GS} = 10 \text{ V}$, $I_D = 20 \text{ A}$		0.0031	0.0038	Ω
		$V_{GS} = 4.5 \text{ V}$, $I_D = 15 \text{ A}$		0.0037	0.0045	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15 \text{ V}$, $I_D = 20 \text{ A}$		110		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 20 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$		5670		pF
Output Capacitance	C_{oss}			621		
Reverse Transfer Capacitance	C_{rss}			287		
Total Gate Charge	Q_g	$V_{DS} = 20 \text{ V}$, $V_{GS} = 10 \text{ V}$, $I_D = 20 \text{ A}$		81	122	nC
				37.5	57	
Gate-Source Charge	Q_{gs}	$V_{DS} = 20 \text{ V}$, $V_{GS} = 4.5 \text{ V}$, $I_D = 20 \text{ A}$		17		
Gate-Drain Charge	Q_{gd}			11		
Gate Resistance	R_g	$f = 1 \text{ MHz}$		1.05	1.6	Ω
Turn-On Delay Time	$t_{d(\text{on})}$	$V_{DD} = 20 \text{ V}$, $R_L = 2 \Omega$ $I_D \geq 10 \text{ A}$, $V_{GEN} = 4.5 \text{ V}$, $R_g = 1 \Omega$		145	220	ns
Rise Time	t_r			208	320	
Turn-Off Delay Time	$t_{d(\text{off})}$			56	85	
Fall Time	t_f			15	23	
Turn-On Delay Time	$t_{d(\text{on})}$			21	32	
Rise Time	t_r			58	90	
Turn-Off Delay Time	$t_{d(\text{off})}$			55	85	
Fall Time	t_f			8	15	
Drain-Source Body Diode Characteristics						
Continous Source-Drain Diode Current	I_S	$T_C = 25^\circ\text{C}$			7	A
Pulse Diode Forward Current ^a	I_{SM}				70	
Body Diode Voltage	V_{SD}	$I_S = 3 \text{ A}$		0.71	1.1	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 13 \text{ A}$, $dl/dt = 100 \text{ A}/\mu\text{s}$, $T_J = 25^\circ\text{C}$		38	60	ns
Body Diode Reverse Recovery Charge	Q_{rr}			42	65	nC
Reverse Recovery Fall Time	t_a			21		ns
Reverse Recovery Rise Time	t_b			17		

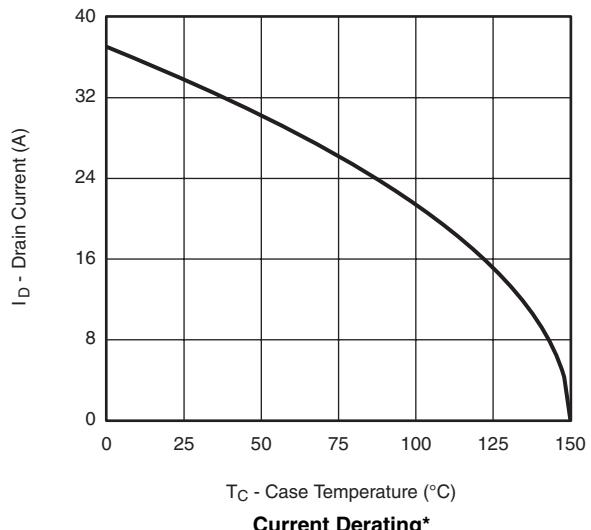
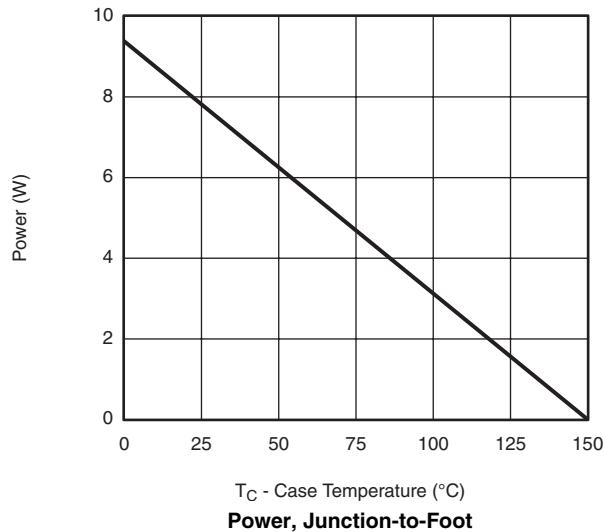
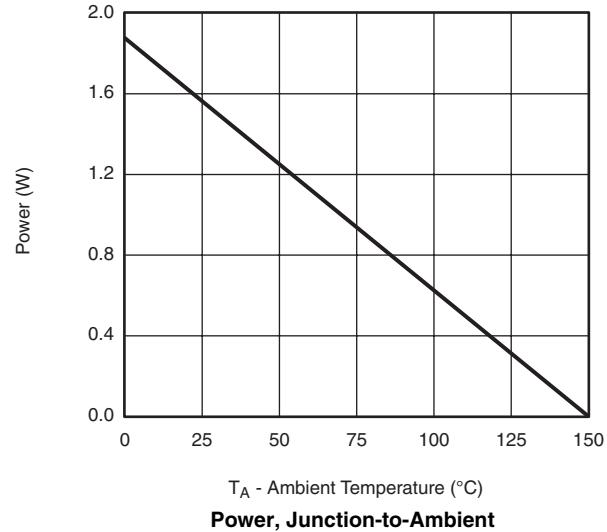
Notes:

a. Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

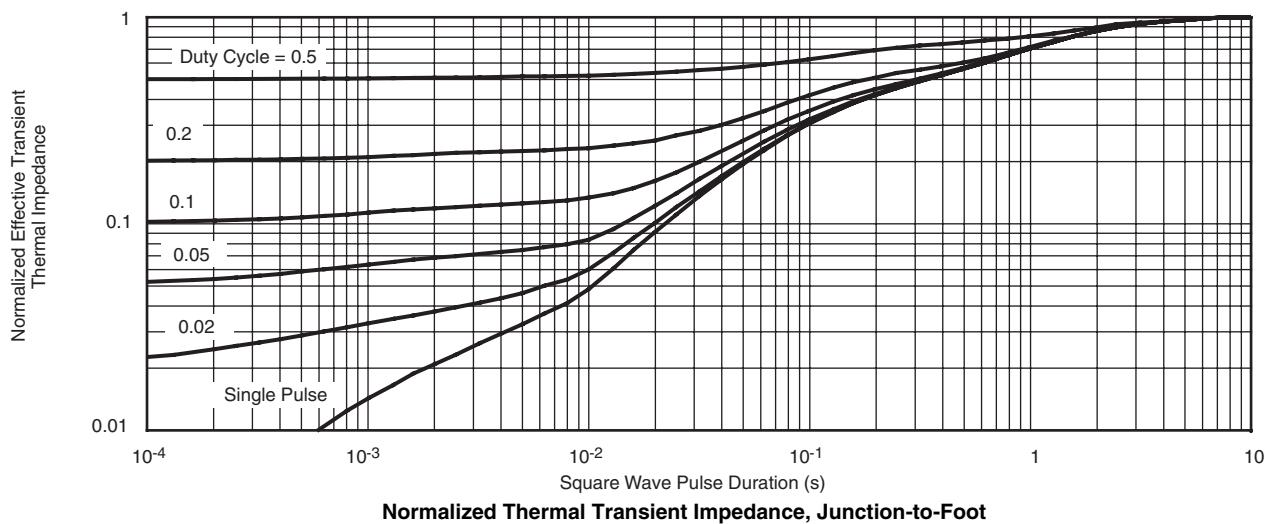
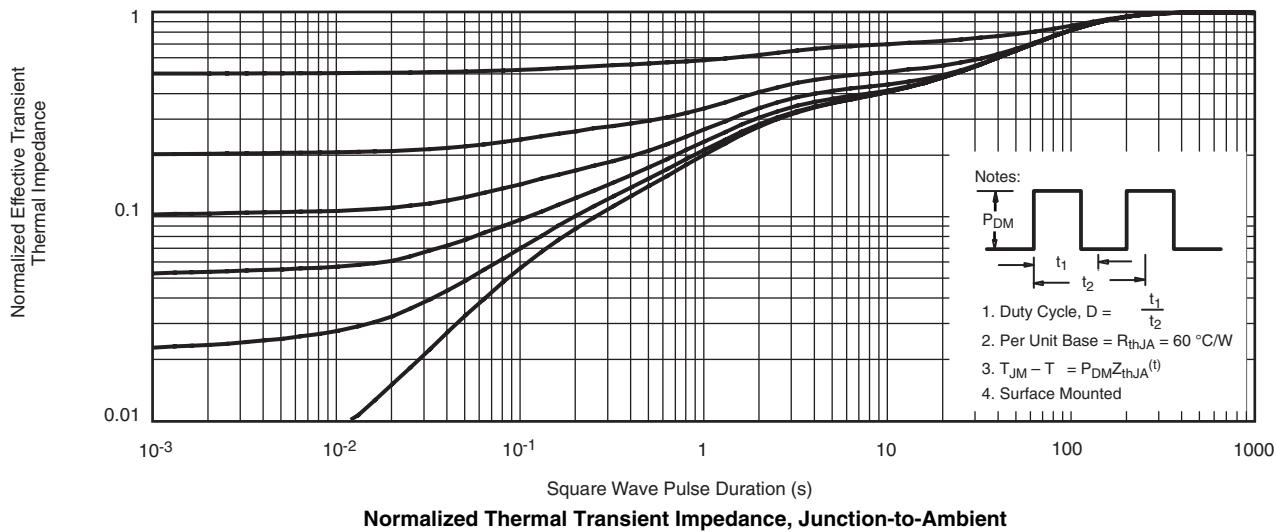
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$, unless otherwise noted


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Current Derating*

Power, Junction-to-Foot

Power, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(\text{max})} = 150^\circ\text{C}$, 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 $T_A = 25^\circ\text{C}$, unless otherwise noted

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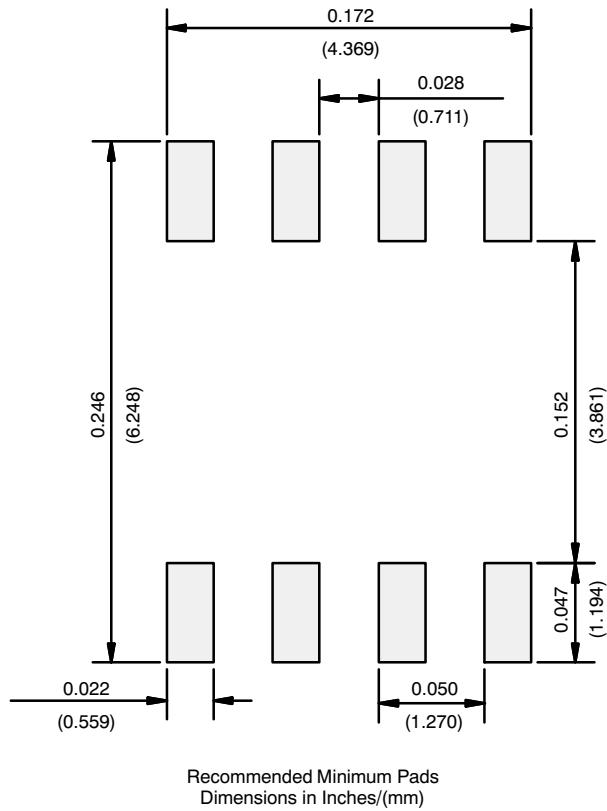
SOIC (NARROW): 8-LEAD

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



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