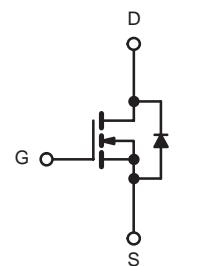
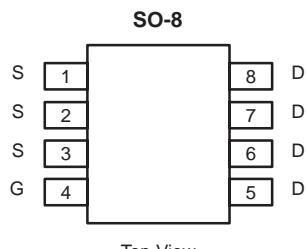


## N-Channel 40-V (D-S) MOSFET

PRODUCT SUMMARY			
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a</sup>	$Q_g$ (Typ.)
40	0.0045 at $V_{GS} = 10$ V	18	8 nC
	0.0065 at $V_{GS} = 4.5$ V	14.5	

### FEATURES

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



### APPLICATIONS

- Notebook CPU Core
  - High-Side Switch

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	$V_{DS}$	40	V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$		
Continuous Drain Current ( $T_J = 150$ °C)	$I_D$	18		
		13.5		
	$T_C = 25$ °C	12 <sup>b, c</sup>	A	
		9.6 <sup>b, c</sup>		
Pulsed Drain Current	$I_{DM}$	50		
Continuous Source-Drain Diode Current	$I_S$	4.5		
		2.2 <sup>b, c</sup>		
Single Pulse Avalanche Current	$I_{AS}$	20	mJ	
Avalanche Energy	$E_{AS}$	20		
Maximum Power Dissipation	$P_D$	5		
		3.2		
		2.5 <sup>b, c</sup>		
		1.6 <sup>b, c</sup>		
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 <sup>b, d</sup>	$R_{thJA}$	38	50	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	$R_{thJF}$	20	

Notes:

- Based on  $T_C = 25$  °C.
- Surface Mounted on 1" x 1" FR4 board.
- $t = 10$  s.
- Maximum under Steady State conditions is 85 °C/W.

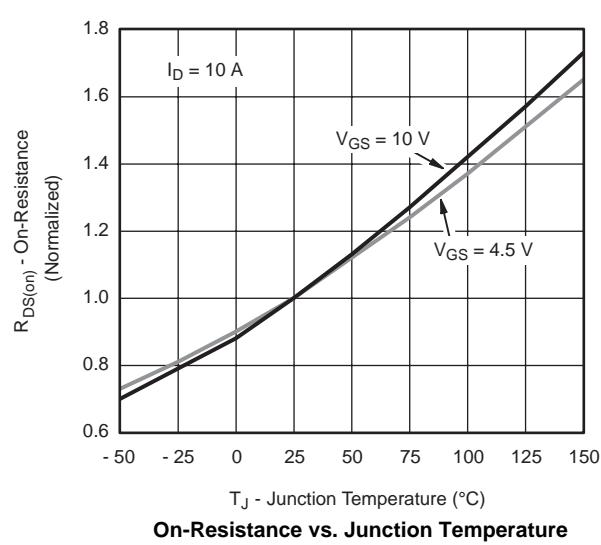
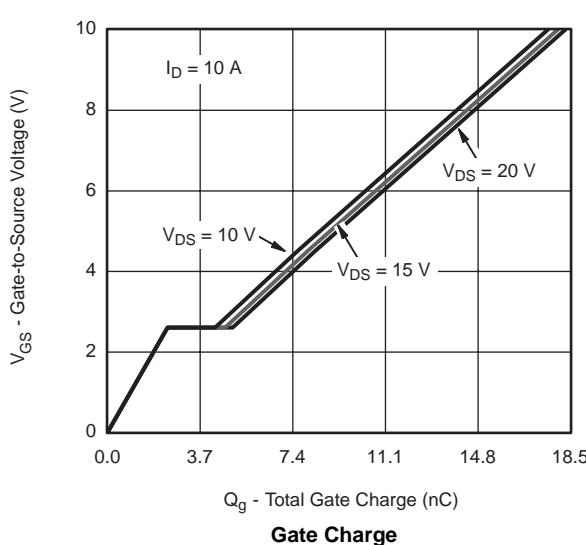
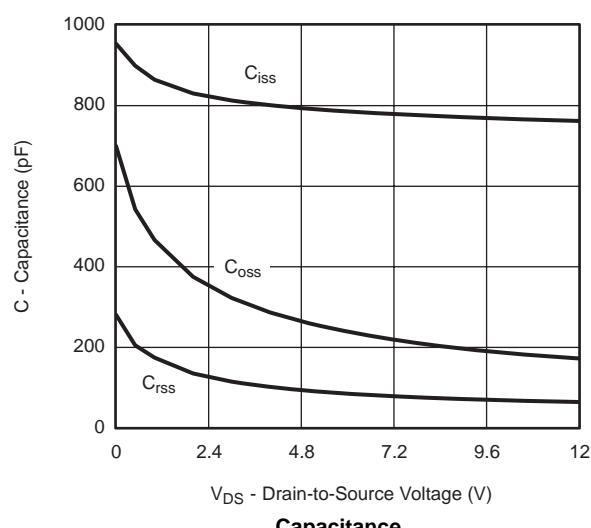
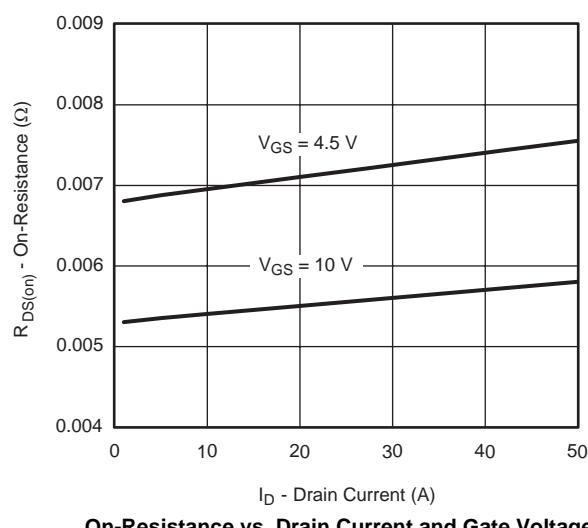
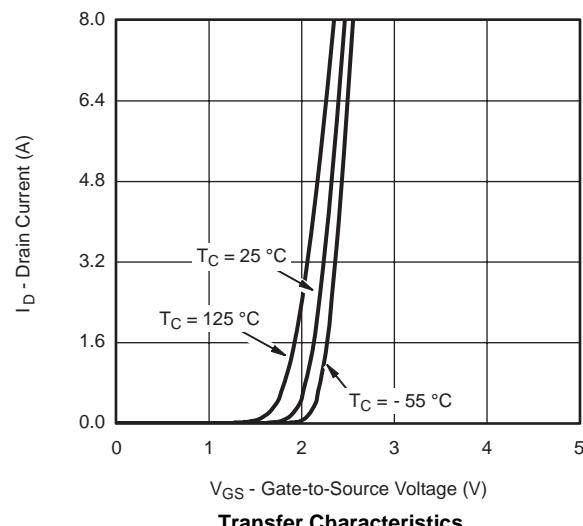
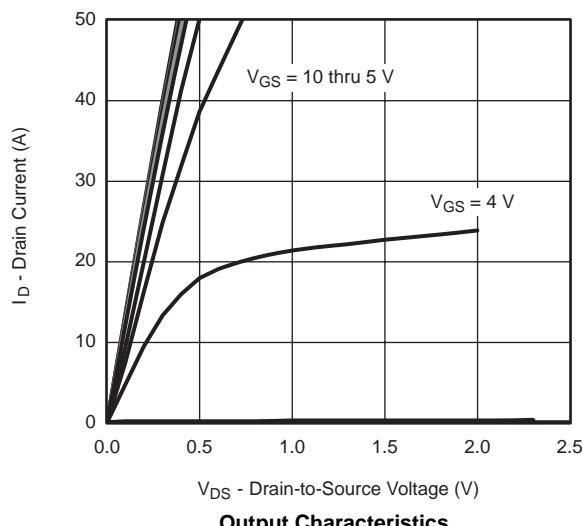
**SPECIFICATIONS**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

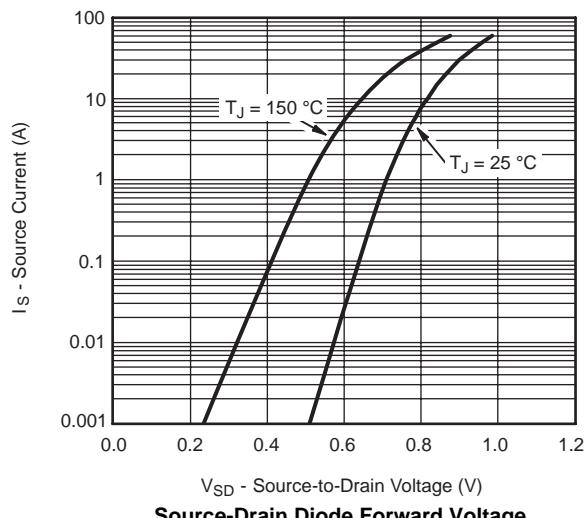
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$	40			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250 \mu\text{A}$		34		mV/°C
$V_{GS(\text{th})}$ Temperature Coefficient	$\Delta V_{GS(\text{th})}/T_J$			- 4.7		
Gate-Source Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{A}$	1.0		3.0	V
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0 \text{ V}$ , $V_{GS} = \pm 20 \text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 40 \text{ V}$ , $V_{GS} = 0 \text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 40 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $T_J = 55^\circ\text{C}$			10	
On-State Drain Current <sup>a</sup>	$I_{D(\text{on})}$	$V_{DS} \geq 5 \text{ V}$ , $V_{GS} = 10 \text{ V}$	30			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(\text{on})}$	$V_{GS} = 10 \text{ V}$ , $I_D = 10 \text{ A}$		0.0038		$\Omega$
		$V_{GS} = 4.5 \text{ V}$ , $I_D = 7 \text{ A}$		0.0057		
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15 \text{ V}$ , $I_D = 10 \text{ A}$		30		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 15 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 1 \text{ MHz}$		985		pF
Output Capacitance	$C_{oss}$			205		
Reverse Transfer Capacitance	$C_{rss}$			76		
Total Gate Charge	$Q_g$	$V_{DS} = 15 \text{ V}$ , $V_{GS} = 10 \text{ V}$ , $I_D = 10 \text{ A}$		18	27	nC
				8	12	
Gate-Source Charge	$Q_{gs}$	$V_{DS} = 15 \text{ V}$ , $V_{GS} = 4.5 \text{ V}$ , $I_D = 10 \text{ A}$		2.4		
Gate-Drain Charge	$Q_{gd}$			2.3		
Gate Resistance	$R_g$	$f = 1 \text{ MHz}$	0.3	1.3	2.6	$\Omega$
Turn-On Delay Time	$t_{d(\text{on})}$	$V_{DD} = 15 \text{ V}$ , $R_L = 1.5 \Omega$ $I_D \geq 10 \text{ A}$ , $V_{GEN} = 4.5 \text{ V}$ , $R_g = 1 \Omega$		14	25	ns
Rise Time	$t_r$			12	24	
Turn-Off Delay Time	$t_{d(\text{off})}$			19	35	
Fall Time	$t_f$			9	18	
Turn-On Delay Time	$t_{d(\text{on})}$	$V_{DD} = 15 \text{ V}$ , $R_L = 1.5 \Omega$ $I_D \geq 10 \text{ A}$ , $V_{GEN} = 10 \text{ V}$ , $R_g = 1 \Omega$		8	16	ns
Rise Time	$t_r$			10	20	
Turn-Off Delay Time	$t_{d(\text{off})}$			16	30	
Fall Time	$t_f$			9	18	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25^\circ\text{C}$			4.5	A
Pulse Diode Forward Current <sup>a</sup>	$I_{SM}$				50	
Body Diode Voltage	$V_{SD}$	$I_S = 3 \text{ A}$		0.76	1.1	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 10 \text{ A}$ , $dl/dt = 100 \text{ A}/\mu\text{s}$ , $T_J = 25^\circ\text{C}$		14	28	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			5	10	nC
Reverse Recovery Fall Time	$t_a$			8		ns
Reverse Recovery Rise Time	$t_b$			6		

Notes:

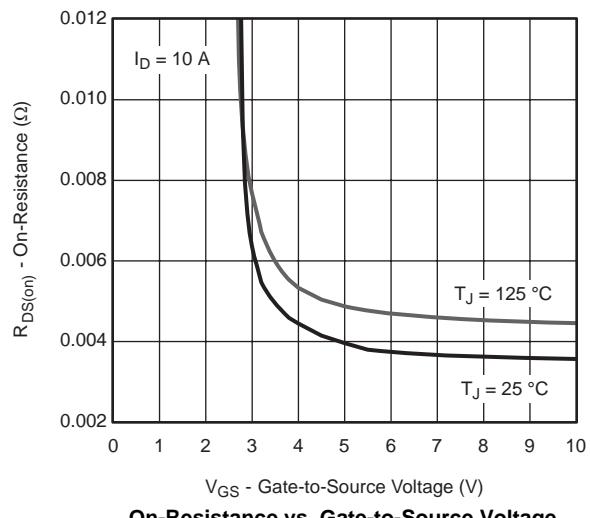
- a. Pulse test; pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$
- b. Guaranteed by design, not subject to production testing.

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.

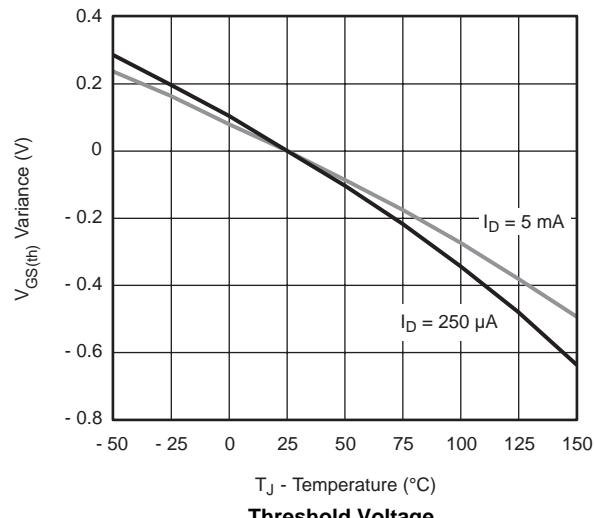
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted


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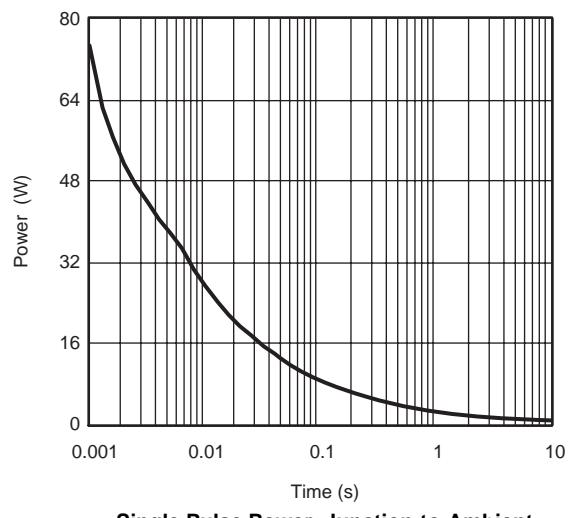
Source-Drain Diode Forward Voltage



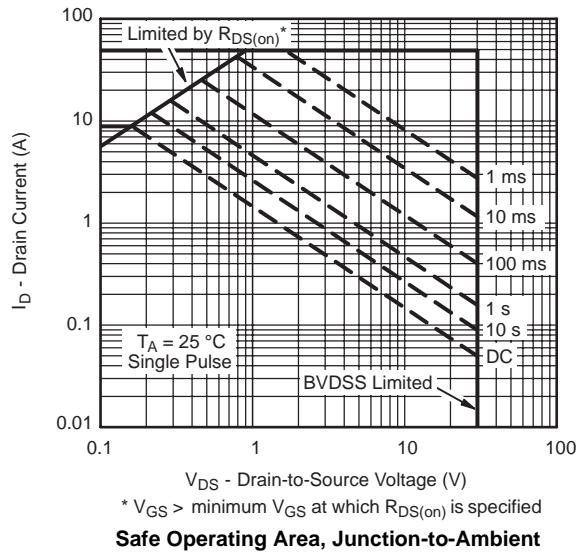
On-Resistance vs. Gate-to-Source Voltage



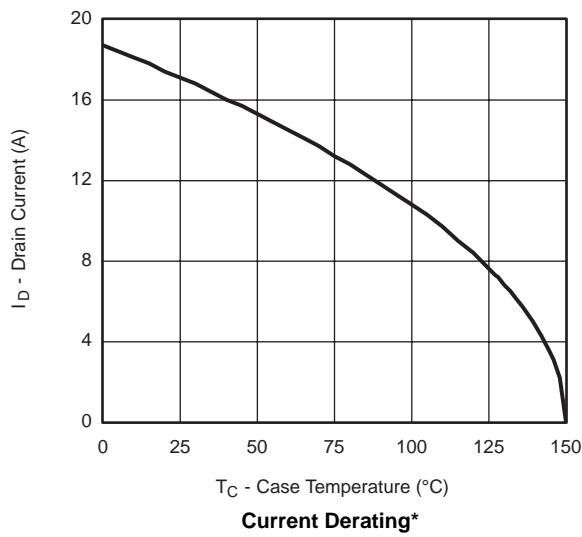
Threshold Voltage



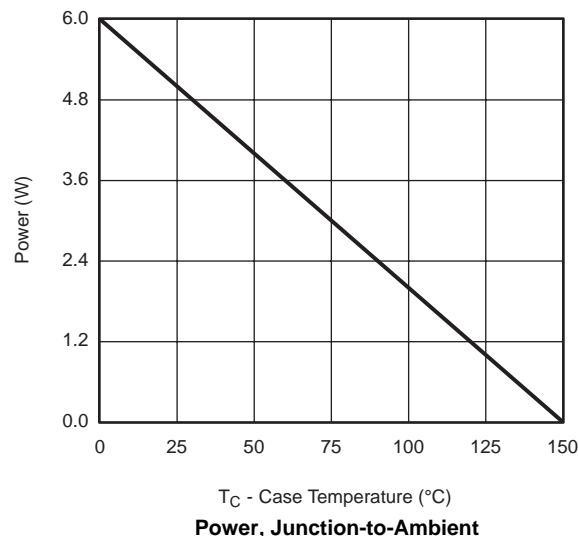
Single Pulse Power, Junction-to-Ambient



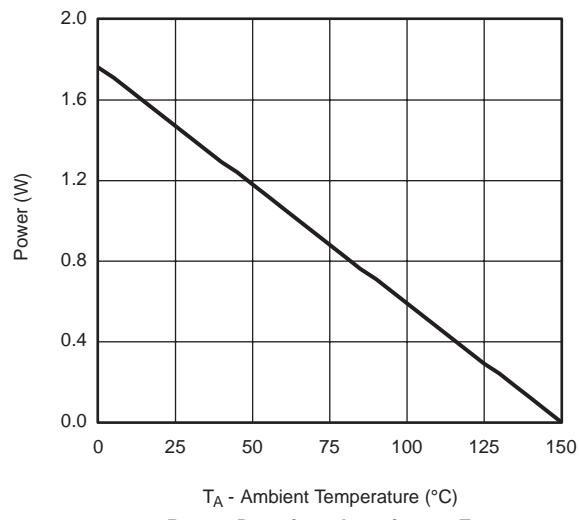
Safe Operating Area, Junction-to-Ambient

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted


Current Derating\*

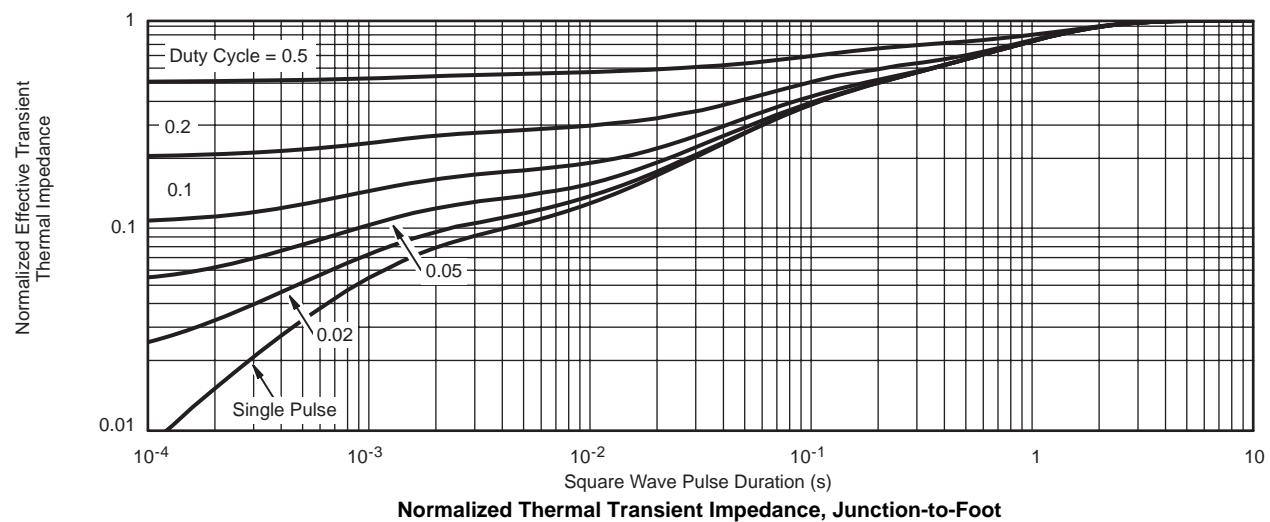
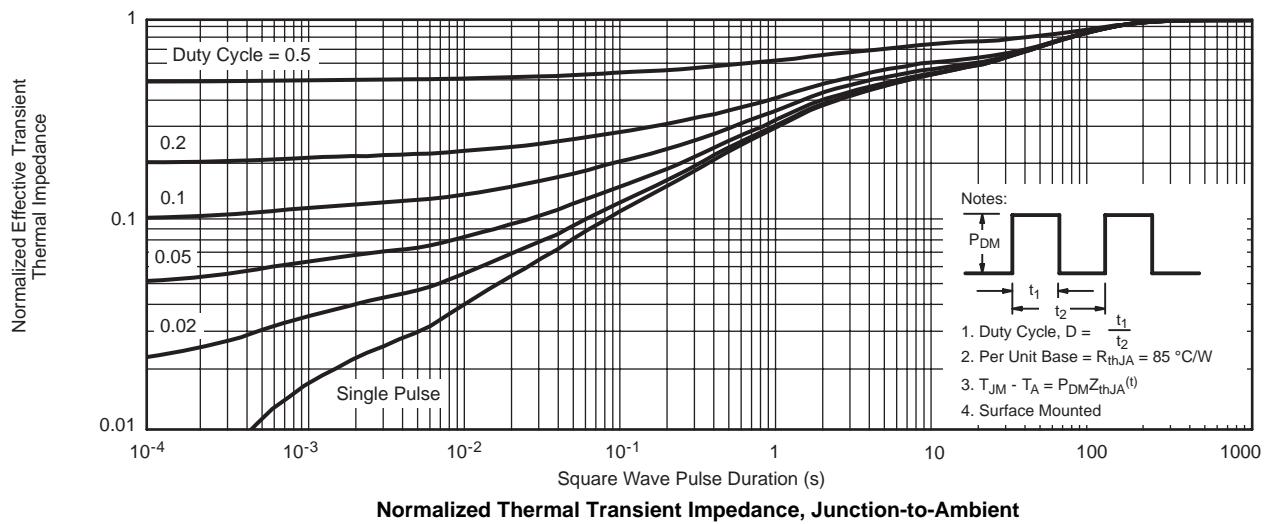


Power, Junction-to-Ambient



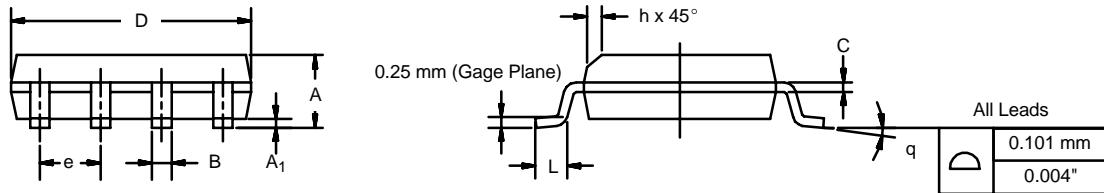
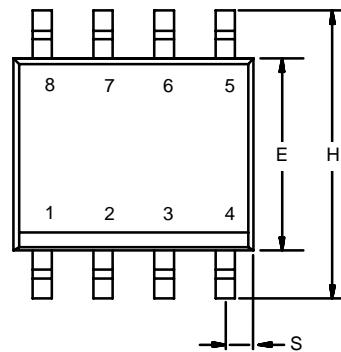
Power Derating, Junction-to-Foot

\* 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


**SOIC (NARROW): 8-LEAD**

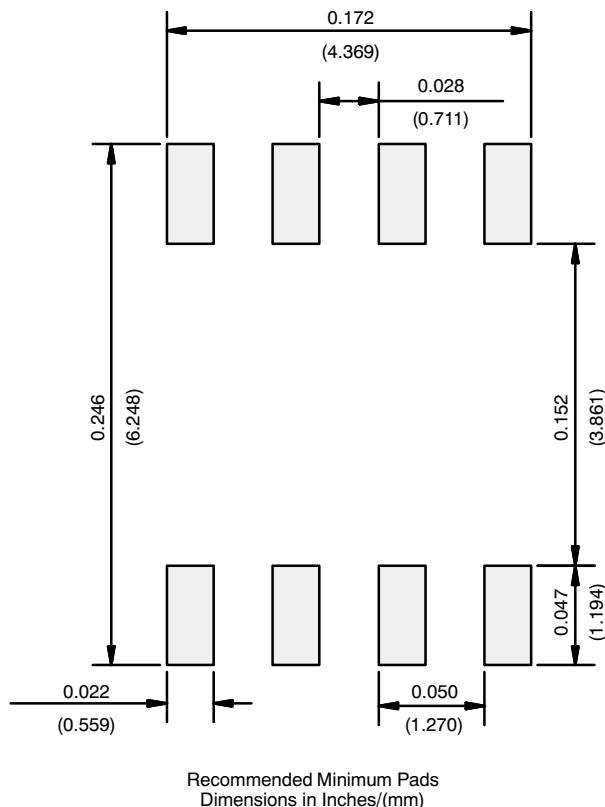
JEDEC Part Number: MS-012



DIM	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A <sub>1</sub>	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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