IRF7459UTRPBF-VB Datasheet

N-Channel 20-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[a]	Q_g (Typ.)
20	0.0049 at V_{GS} = 4.5 V	20[e]	27.5 nC
	0.0056 at V_{GS} = 2.5 V	20[e]	

FEATURES

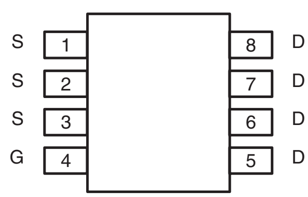
- **Halogen-free According to IEC 61249-2-21 Definition**
- Trench Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC

Pb-free
RoHS COMPLIANT
HALOGEN FREE Available

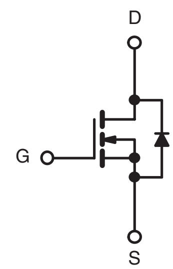
APPLICATIONS

- Low-Side MOSFET for Synchronous Buck
  - Game Machine
  - PC

SO-8



Top View



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	± 16	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	20[e]	A
	T_C = 70 °C		18.2	
	T_A = 25 °C		15.2[b, c]	
	T_A = 70 °C		12.1[b, c]	
Pulsed Drain Current		I_{DM}	50	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	5.1	
	T_A = 25 °C		2.2[b, c]	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	30	
Avalanche Energy		E_{AS}	45	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	5.7	W
	T_C = 70 °C		3.6	
	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 ≤ 10 s	R_{thJA}	39	50	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	18	22	

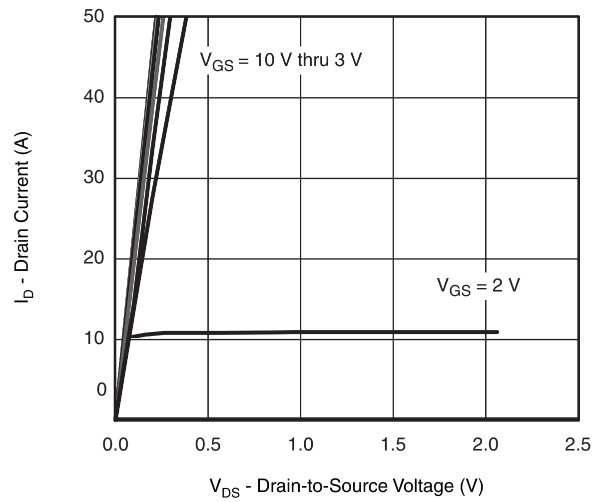
Notes:
a. Based on T_C = 25 °C.
b. Surface Mounted on 1" x 1" FR4 board.
c. t = 10 s.
d. Maximum under Steady State conditions is 85 °C/W.
e. Package limited.

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	20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA		19		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 5.3		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS} , I_D = 250 µA	1.0		2.1	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 16 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V			1	µA
		V_{DS} = 20 V, V_{GS} = 0 V, T_J = 55 °C			10	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq$ 5 V, V_{GS} = 10 V	30			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 10 A		0.0049		Ω
		V_{GS} = 2.5 V, I_D = 7 A		0.0056		
Forward Transconductance[a]	g_{fs}	V_{DS} = 10 V, I_D = 10 A		55		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz		3700		pF
Output Capacitance	C_{oss}			745		
Reverse Transfer Capacitance	C_{rss}			315		
Total Gate Charge	Q_g	V_{DS} = 10 V, V_{GS} = 10 V, I_D = 10 A		62	95	nC
		V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = 10 A		27.5	42	
Gate-Source Charge	Q_{gs}			8.0		
Gate-Drain Charge	Q_{gd}			6.0		
Gate Resistance	R_g	f = 1 MHz	0.15	0.7	1.4	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 10 V, R_L = 2 Ω $I_D \cong$ 5 A, V_{GEN} = 4.5 V, R_g = 1 Ω		30	55	ns
Rise Time	t_r			13	25	
Turn-Off Delay Time	$t_{d(off)}$			60	100	
Fall Time	t_f			30	55	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 10 V, R_L = 2 Ω $I_D \cong$ 5 A, V_{GEN} = 10 V, R_g = 1 Ω		13	25	
Rise Time	t_r			9	18	
Turn-Off Delay Time	$t_{d(off)}$			38	65	
Fall Time	t_f			8	16	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			5.1	A
Pulse Diode Forward Current[a]	I_{SM}				50	
Body Diode Voltage	V_{SD}	I_S = 2 A		0.71	1.1	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 10 A, dI/dt = 100 A/µs, T_J = 25 °C		26	50	ns
Body Diode Reverse Recovery Charge	Q_{rr}			16	30	nC
Reverse Recovery Fall Time	t_a			13		ns
Reverse Recovery Rise Time	t_b			13		

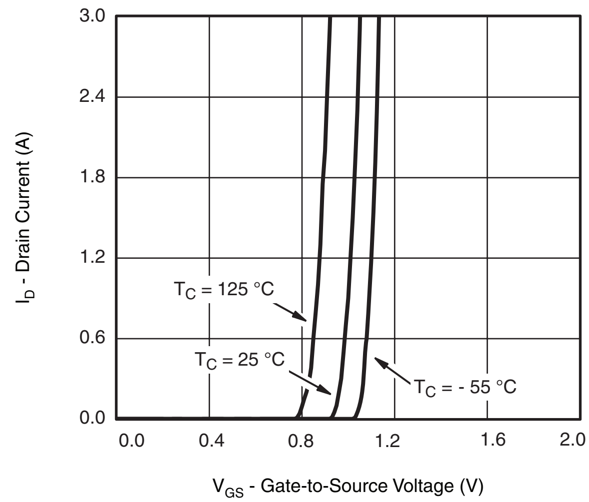
Notes:
a. Pulse test; pulse width $\leq$ 300 µs, duty cycle $\leq$ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

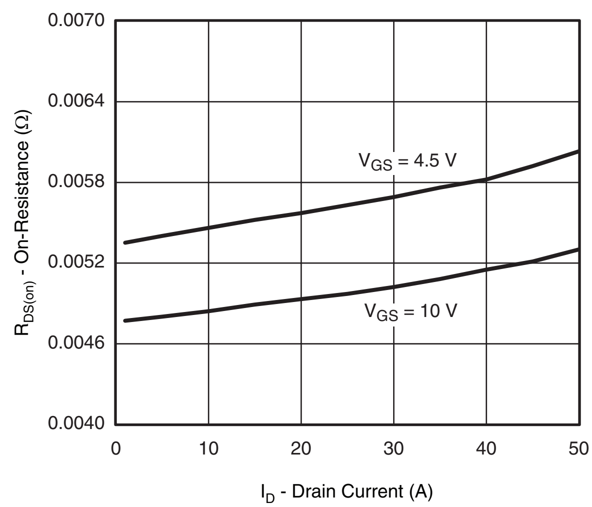
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



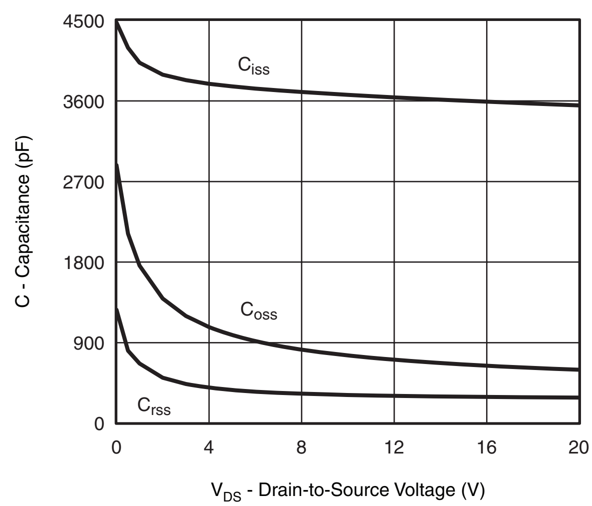
Output Characteristics



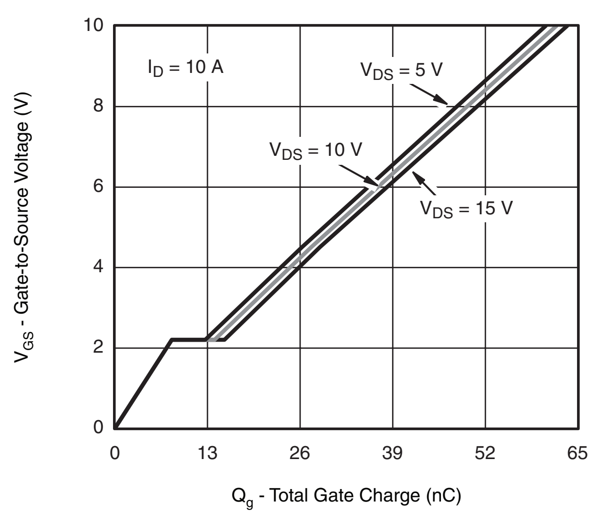
Transfer Characteristics



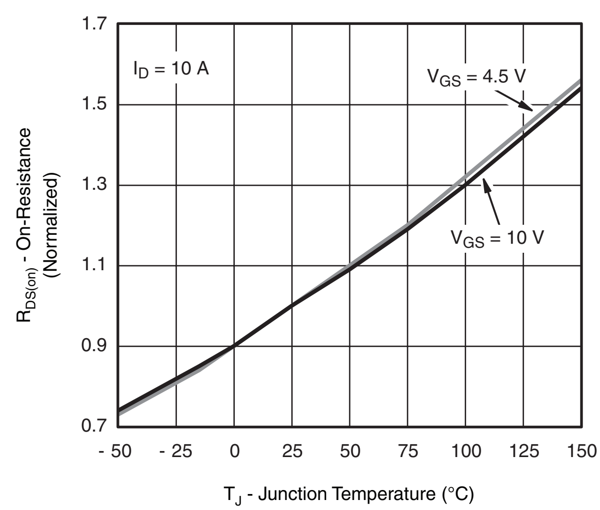
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

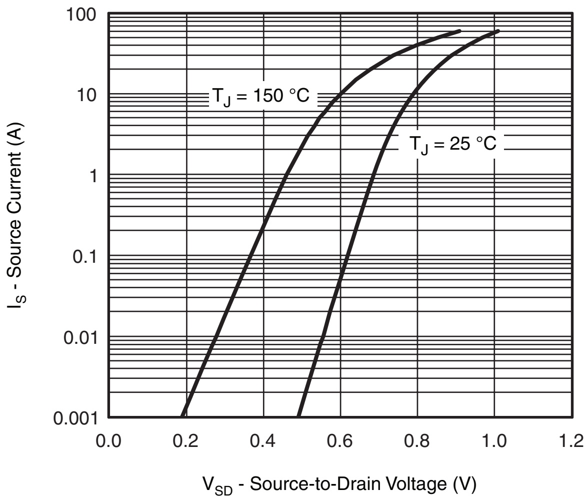


Gate Charge

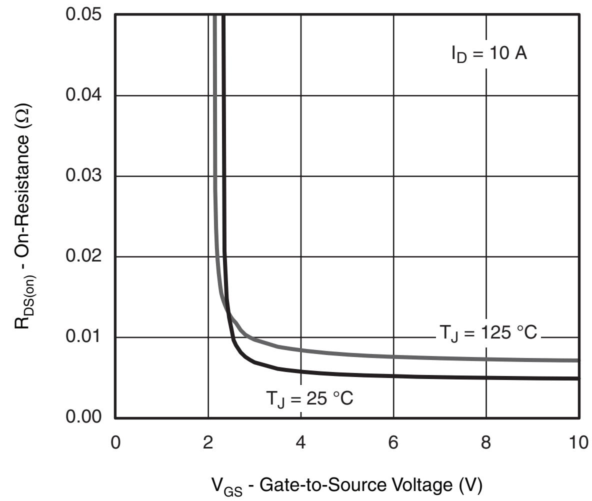


On-Resistance vs. Junction Temperature

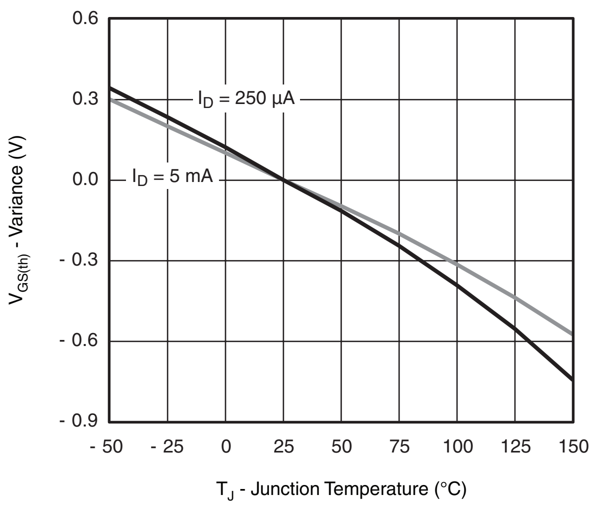
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



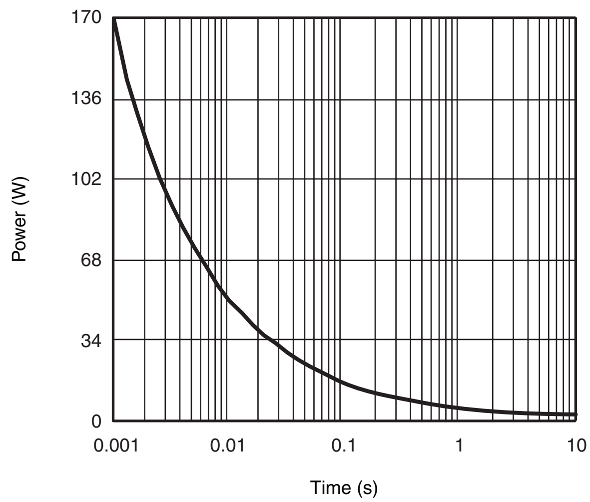
Source-Drain Diode Forward Voltage



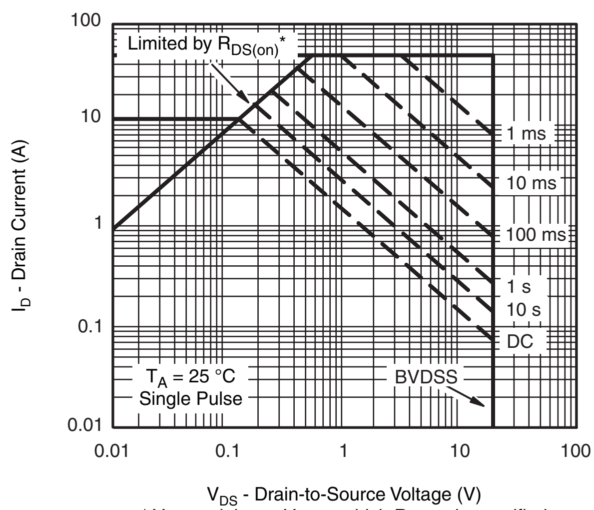
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



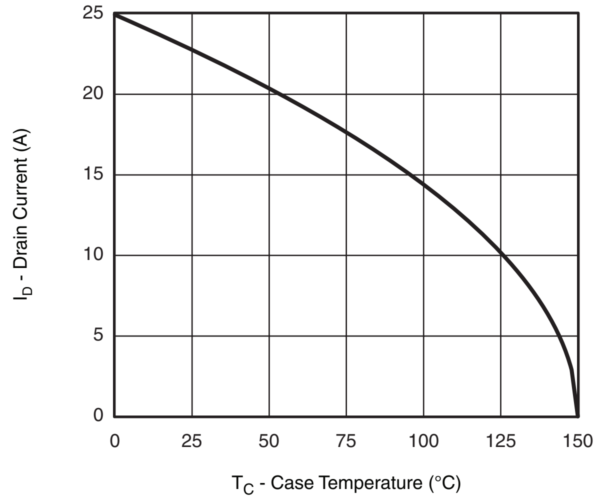
Single Pulse Power, Junction-to-Ambient



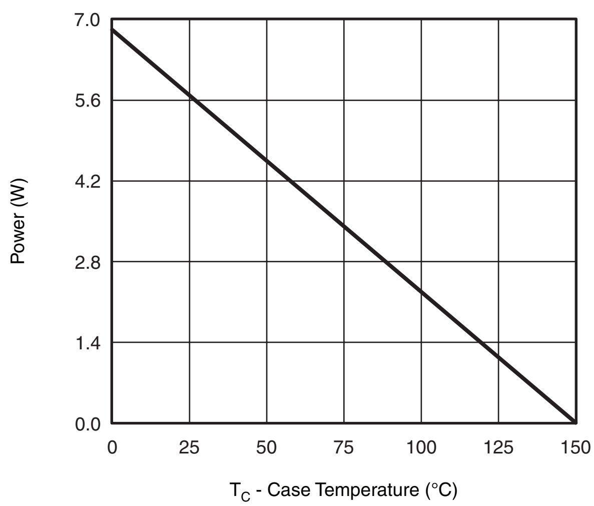
* V_{DS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

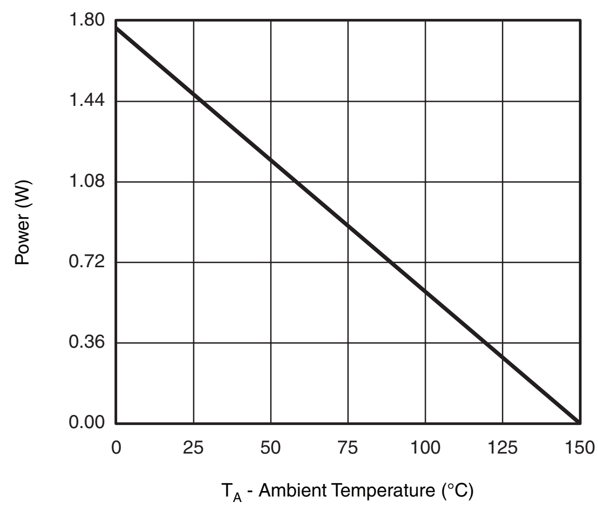
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*



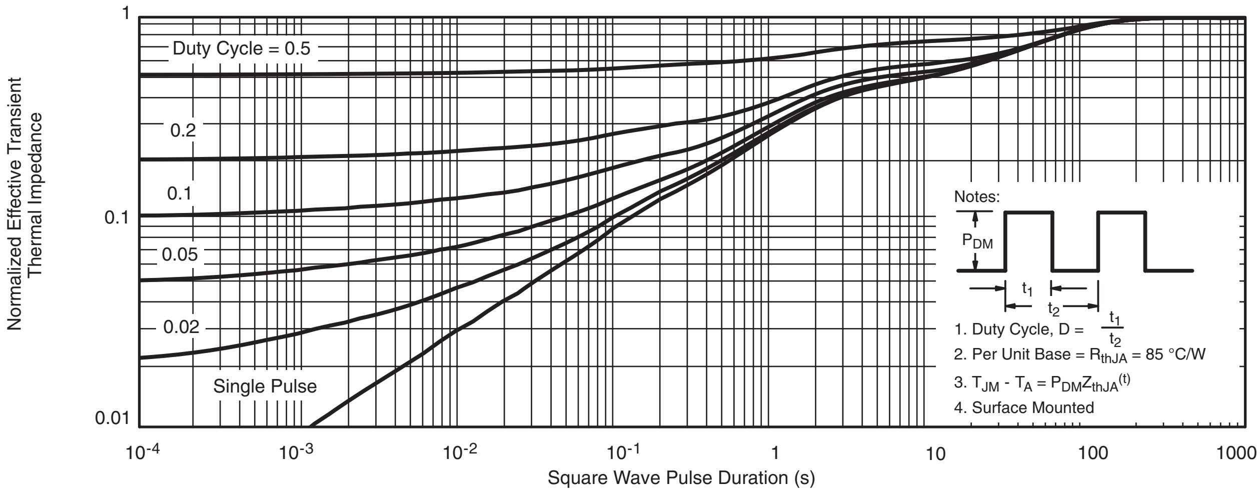
Power, Junction-to-Foot



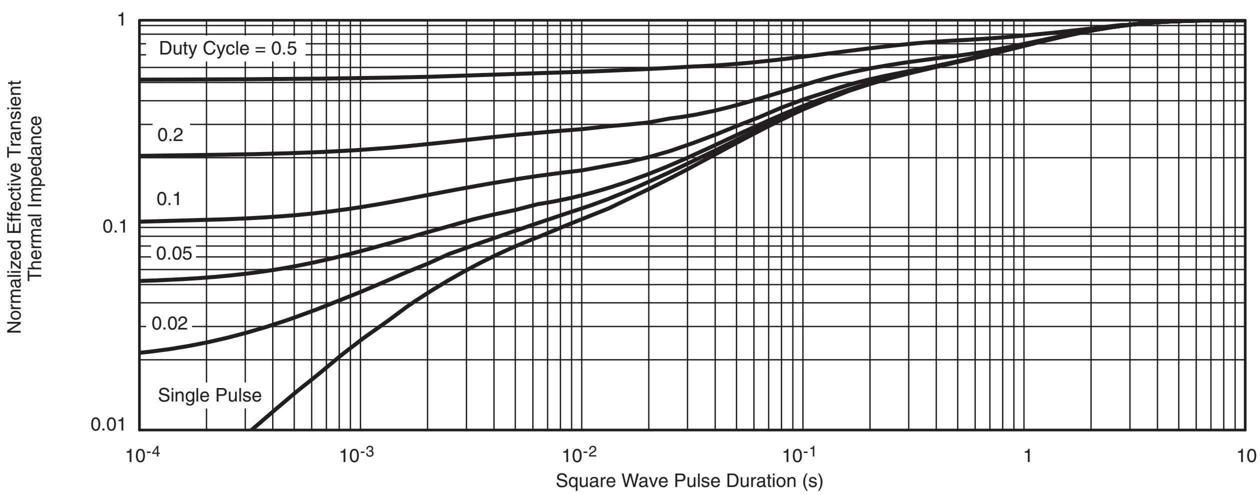
Power, Junction-to-Ambient

* 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



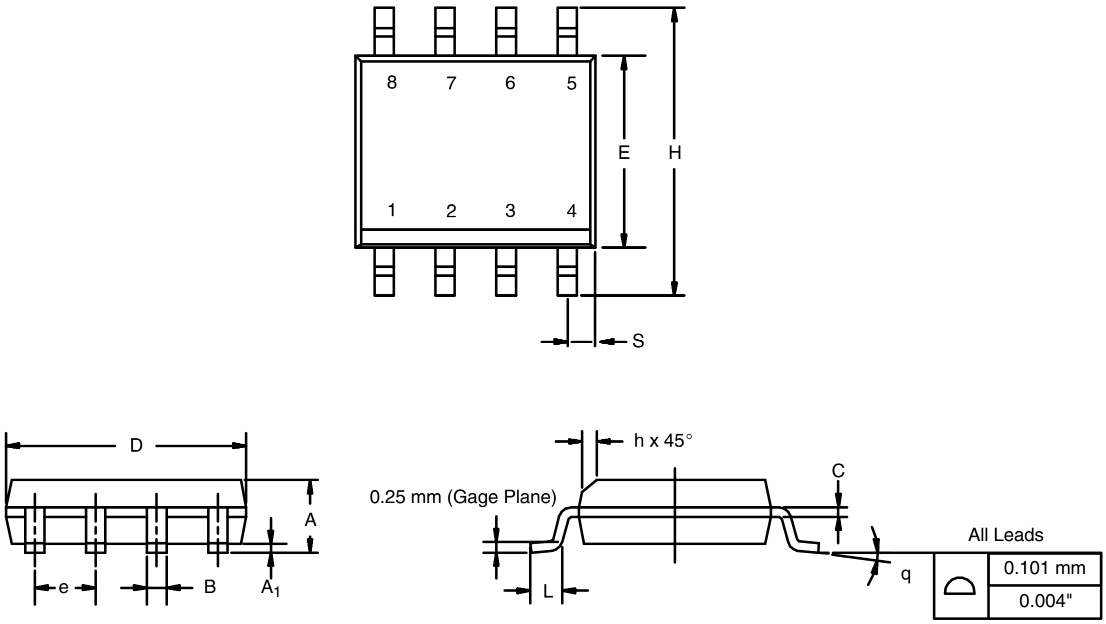
Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

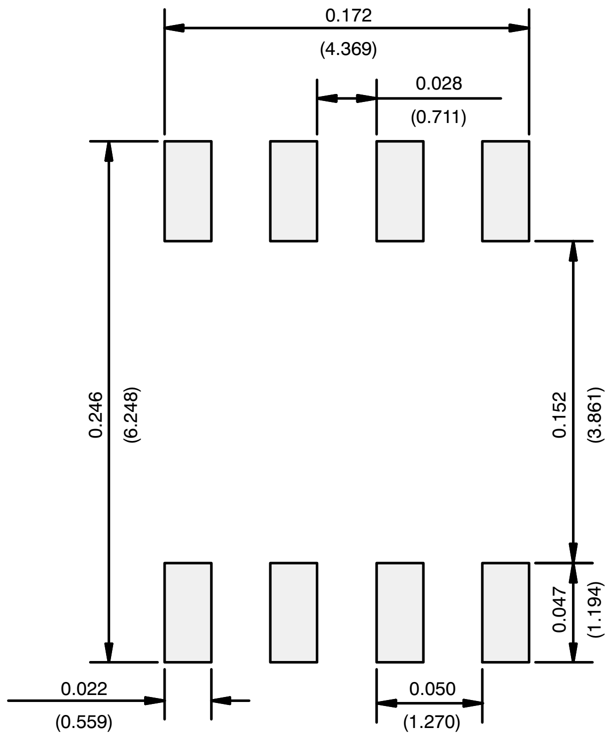
SOIC (NARROW): 8-LEAD

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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