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

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
- 20	0.015 at V_{GS} = - 4.5 V	- 13[a]	20 nC
	0.021 at V_{GS} = - 2.5 V	- 10[a]	
	0.040 at V_{GS} = - 1.8 V	- 8	

FEATURES

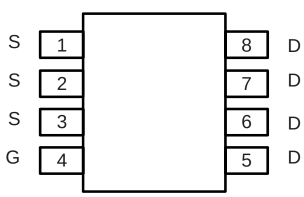
- **Halogen-free According to IEC 61249-2-21 Definition**
- TrenchFET® Power MOSFET
- 100 % R_g Tested
- Built in ESD Protection with Zener Diode
- Typical ESD Performance: 1800 V
- Compliant to RoHS Directive 2002/95/EC

Pb-free
RoHS COMPLIANT
HALOGEN FREE

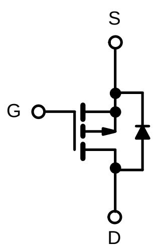
APPLICATIONS

- Portable Devices
  - Load Switch
  - Battery Switch
  - Charger Switch

SO-8



Top View



P-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}	± 12	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	- 13[a]	A
	T_C = 70 °C		- 10[a]	
	T_A = 25 °C		- 8[b, c]	
	T_A = 70 °C		- 7.1[b, c]	
Pulsed Drain Current		I_{DM}	- 50	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	- 6[a]	
	T_A = 25 °C		- 2.9[b, c]	
Maximum Power Dissipation	T_C = 25 °C	P_D	19	W
	T_C = 70 °C		12	
	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	°C
Soldering Recommendations (Peak Temperature)[d, e]			260	

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient[b, e]	t ≤ 5 s	R_{thJA}	28	36	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	5.3	6.5	

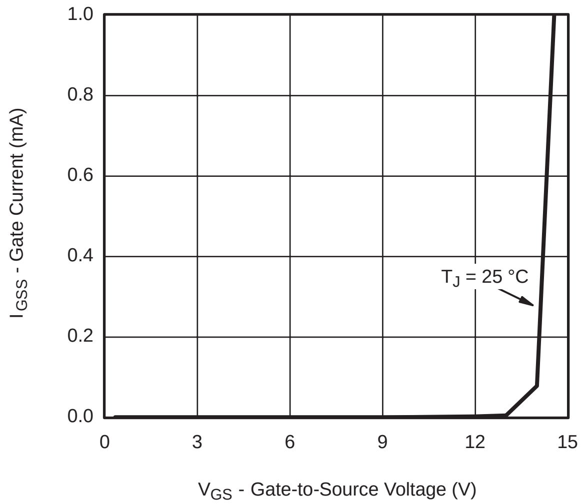
Notes:
a. Package limited.
b. Surface Mounted on 1" x 1" FR4 board.
c. t = 5 s.
d. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.
e. Maximum under Steady State conditions is 80 °C/W.

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	- 20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = - 250 µA		- 12		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			3		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA	- 0.5		- 1.2	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 12 V			± 20	µA
		V_{DS} = 0 V, V_{GS} = ± 4.5 V			± 0.5	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 20 V, V_{GS} = 0 V			- 1	
		V_{DS} = - 20 V, V_{GS} = 0 V, T_J = 55 °C			- 10	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} ≤ - 5 V, V_{GS} = - 4.5 V	- 20			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 4.5 V, I_D = - 5.6 A		0.015		Ω
		V_{GS} = - 2.5 V, I_D = - 5.3 A		0.021		
		V_{GS} = - 1.8 V, I_D = - 2.5 A		0.040		
Forward Transconductance[a]	g_{fs}	V_{DS} = - 10 V, I_D = - 5.6 A		35		S
Dynamic[b]						
Total Gate Charge	Q_g	V_{DS} = - 10 V, V_{GS} = - 8 V, I_D = - 5 A		50	75	nC
Gate-Source Charge		V_{DS} = - 10 V, V_{GS} = - 4.5 V, I_D = - 5 A		20	30	
	Q_{gs}			3.3		
Gate-Drain Charge	Q_{gd}			8.4		
Gate Resistance	R_g	f = 1 MHz	0.2	1	2	kΩ
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 10 V, R_L = 1 Ω I_D ≅ - 5 A, V_{GEN} = - 4.5 V, R_g = 1 Ω		0.71	1.1	us
Rise Time	t_r			1.7	2.6	
Turn-Off Delay Time	$t_{d(off)}$			6	9	
Fall Time	t_f			3.2	5	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 10 V, R_L = 1 Ω I_D ≅ - 5 A, V_{GEN} = - 10 V, R_g = 1 Ω		0.3	0.45	
Rise Time	t_r			0.6	0.9	
Turn-Off Delay Time	$t_{d(off)}$			10	15	
Fall Time	t_f			3.5	5.5	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			- 6	A
Pulse Diode Forward Current	I_{SM}				- 50	
Body Diode Voltage	V_{SD}	I_S = - 5 A, V_{GS} = 0 V		- 0.85	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 6 A, dI/dt = 100 A/µs, T_J = 25 °C		30	60	ns
Body Diode Reverse Recovery Charge	Q_{rr}			20	40	nC
Reverse Recovery Fall Time	t_a			13		ns
Reverse Recovery Rise Time	t_b			17		

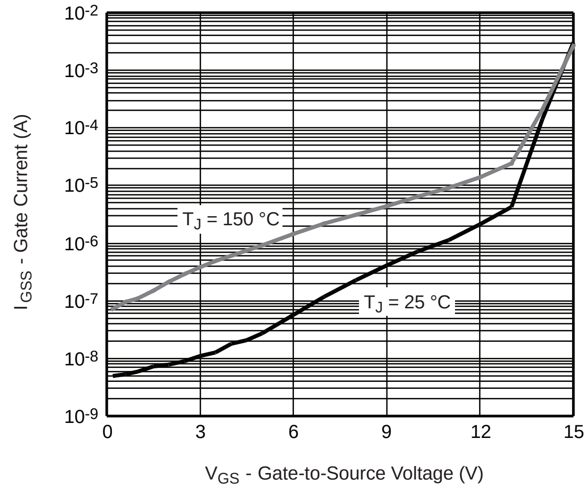
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

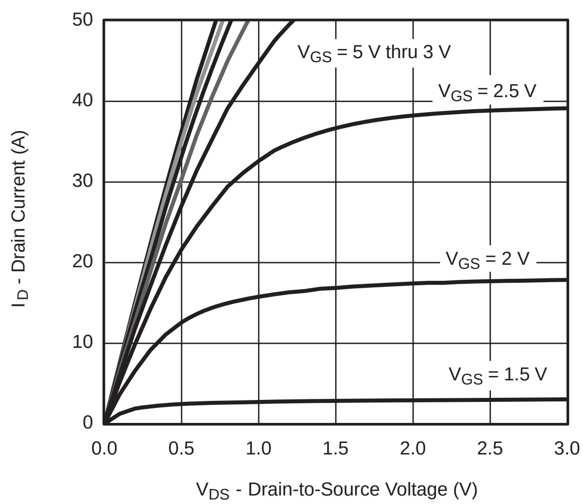
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



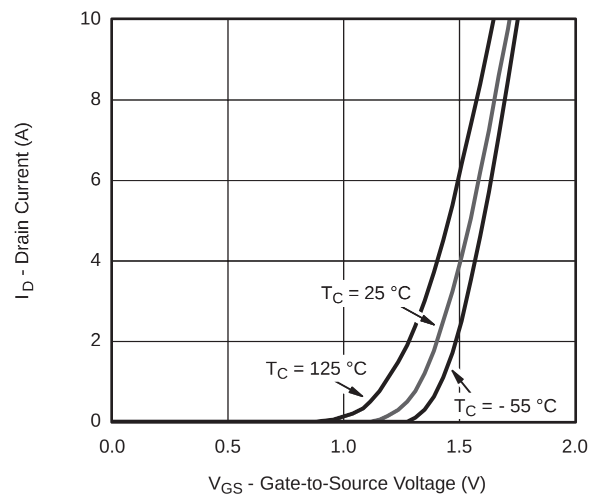
Gate Current vs. Gate-Source Voltage



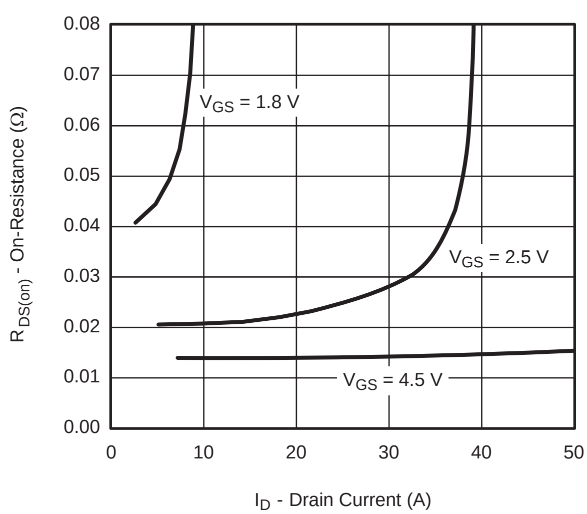
Gate Current vs. Gate-Source Voltage



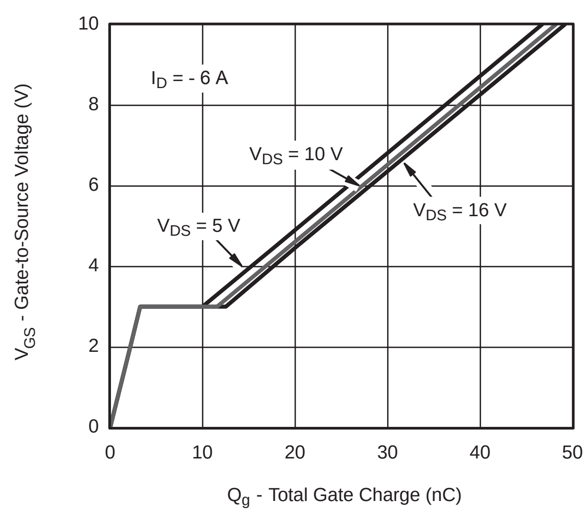
Output Characteristics



Transfer Characteristics

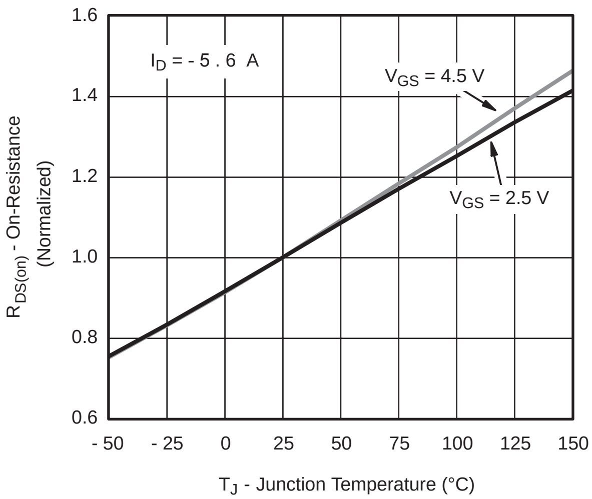


On-Resistance vs. Drain Current

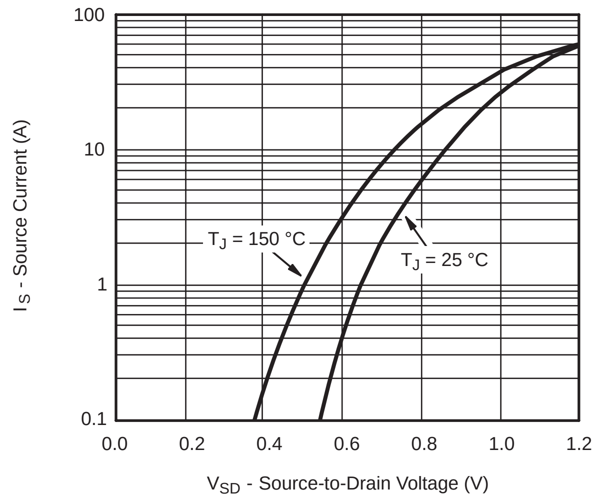


Gate Charge

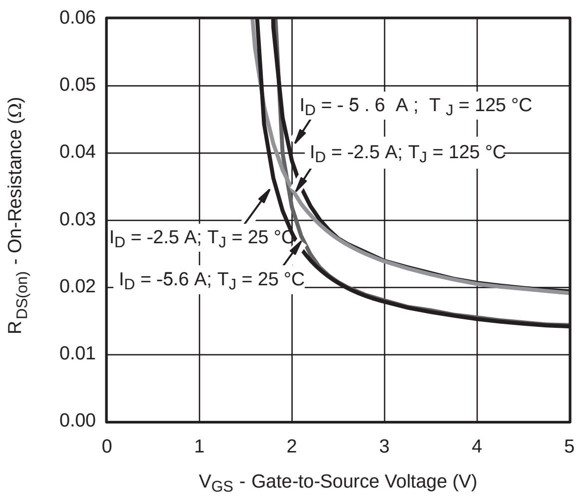
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



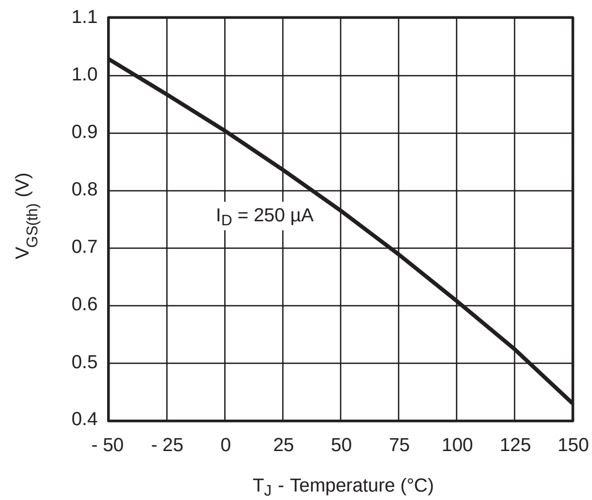
On-Resistance vs. Junction Temperature



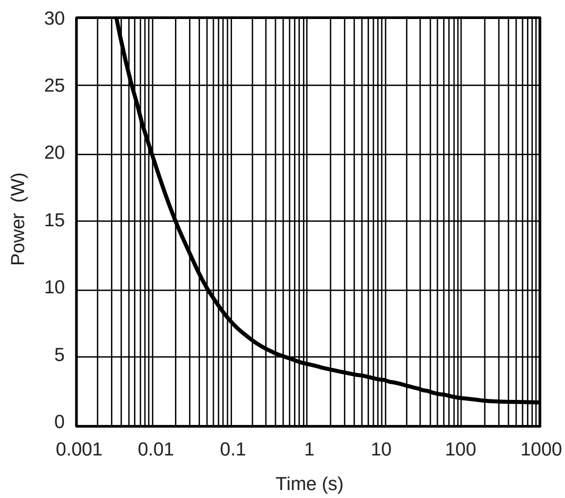
Soure-Drain Diode Forward Voltage



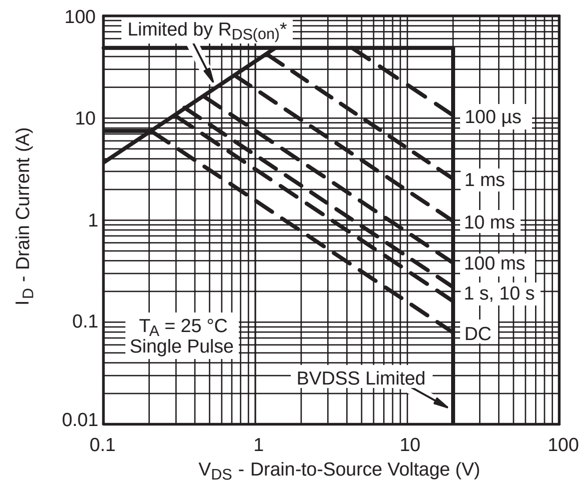
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



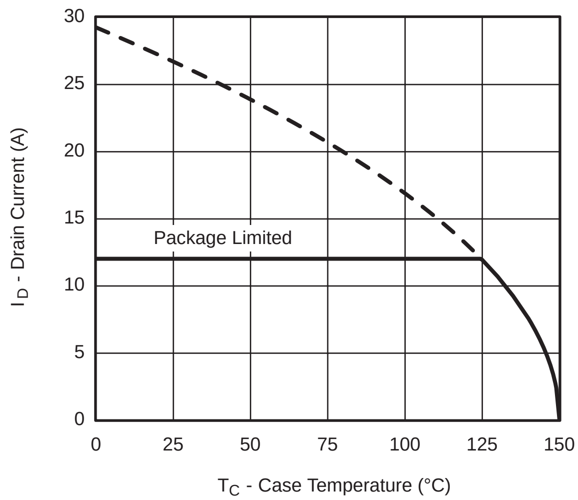
Single Pulse Power, Junction-to-Ambient



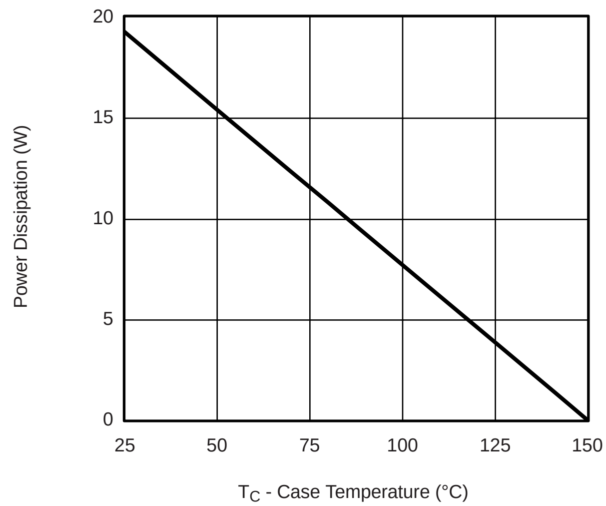
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



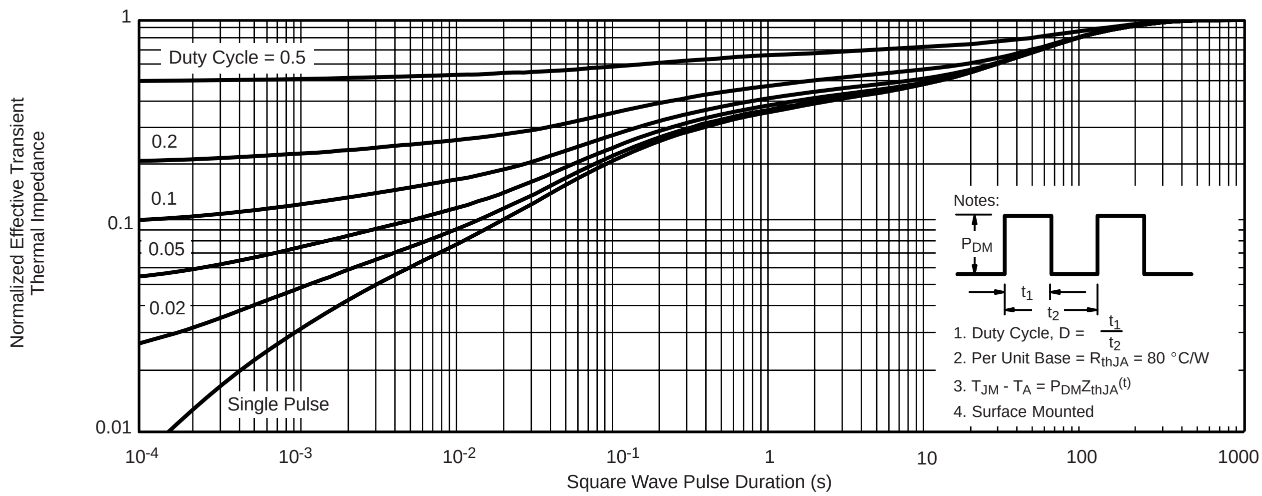
Current Derating*



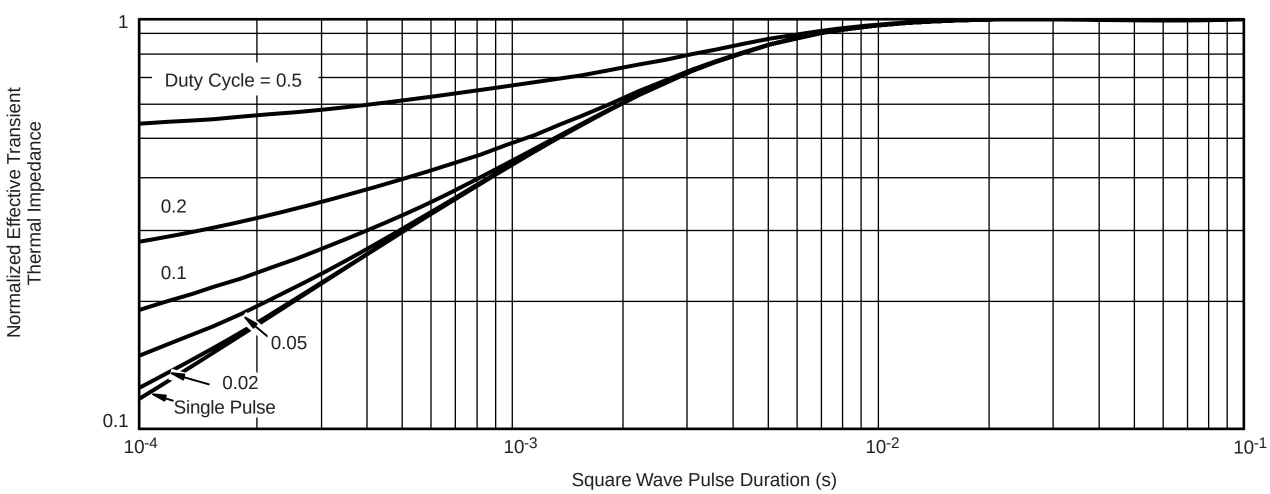
Power Derating

* 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



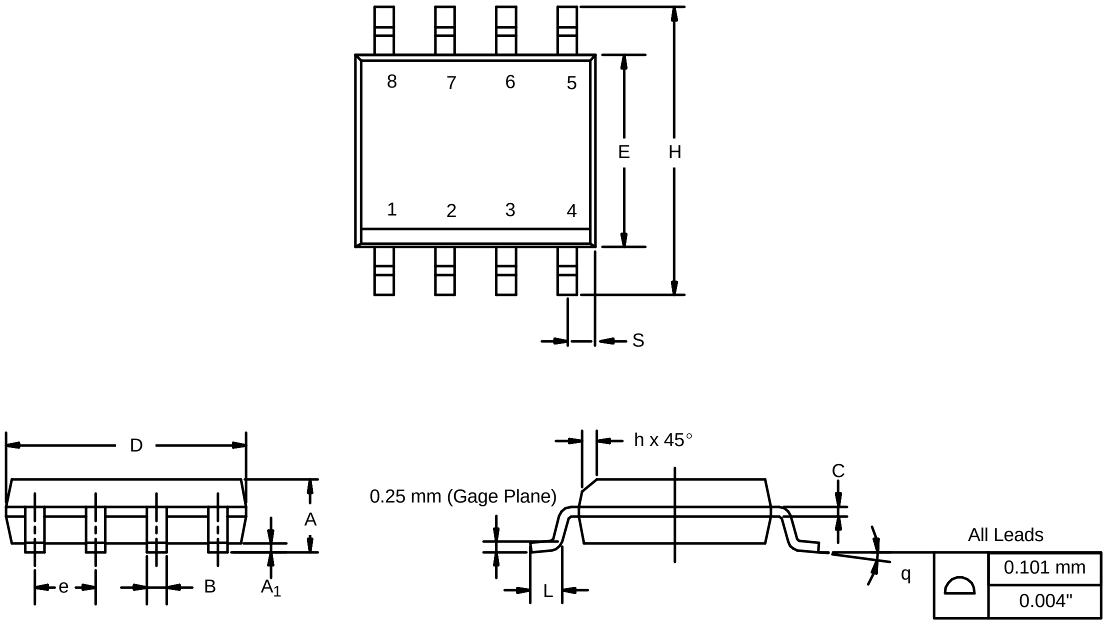
Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

SOIC (NARROW): 8-LEAD

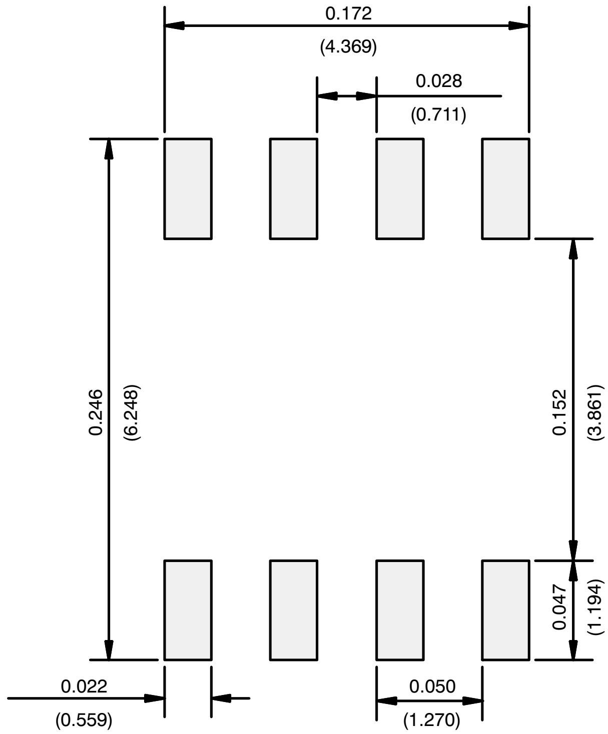
JEDEC Part Number: MS-012



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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