

N-Channel 12-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
12	0.0017 at $V_{GS} = 4.5$ V	50	56 nC
	0.002 at $V_{GS} = 2.5$ V	46	
	0.0027 at $V_{GS} = 1.8$ V	40	

FEATURES

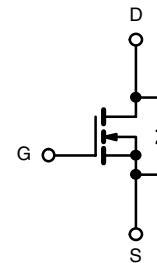
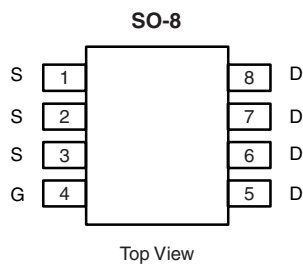
- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET® Power MOSFET
- 100 % R_g Tested
- 100 % UIS Tested



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- POL
- DC/DC



N-Channel MOSFET

Ordering Information: Si4448DY-T1-E3 (Lead (Pb)-free)
Si4448DY-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	12	V
Gate-Source Voltage	V_{GS}	± 8	
Continuous Drain Current ($T_J = 150$ °C)	$T_C = 25$ °C	50	A
	$T_C = 70$ °C	40	
	$T_A = 25$ °C	32 ^{b, c}	
	$T_A = 70$ °C	26 ^{b, c}	
Pulsed Drain Current	I_{DM}	70	A
Continuous Source-Drain Diode Current	$T_C = 25$ °C	7	
	$T_A = 25$ °C	3 ^{b, c}	
Single Pulse Avalanche Current	I_{AS}	20	mJ
Avalanche Energy	E_{AS}	20	
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	°C

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:

- Based on $T_C = 25$ °C.
- Surface Mounted on 1" x 1" FR4 board.
- $t = 10$ s.
- Maximum under Steady State conditions is 80 °C/W.

SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	12			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		14		mV/ $^{\circ}\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 3.3		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	0.4		1.0	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 8\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 12\text{ V}$, $V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 12\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 55\text{ }^{\circ}\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}$, $V_{GS} = 4.5\text{ V}$	40			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}$, $I_D = 20\text{ A}$		0.0014	0.0017	Ω
		$V_{GS} = 2.5\text{ V}$, $I_D = 15\text{ A}$		0.0016	0.0020	
		$V_{GS} = 1.8\text{ V}$, $I_D = 10\text{ A}$		0.0022	0.0027	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 6\text{ V}$, $I_D = 20\text{ A}$		190		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 6\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		12350		pF
Output Capacitance	C_{oss}			2775		
Reverse Transfer Capacitance	C_{rss}			1590		
Total Gate Charge	Q_g	$V_{DS} = 6\text{ V}$, $V_{GS} = 4.5\text{ V}$, $I_D = 10\text{ A}$		99	150	nC
Gate-Source Charge	Q_{gs}	$V_{DS} = 6\text{ V}$, $V_{GS} = 2.5\text{ V}$, $I_D = 10\text{ A}$		56	85	
Gate-Drain Charge	Q_{gd}			10.3		
Gate Resistance	R_g			13.4		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 6\text{ V}$, $R_L = 0.6\text{ }\Omega$ $I_D \cong 10\text{ A}$, $V_{GEN} = 4.5\text{ V}$, $R_g = 1\text{ }\Omega$		0.75	1.5	Ω
Rise Time	t_r			38	70	
Turn-Off Delay Time	$t_{d(off)}$			22	40	
Fall Time	t_f			240	400	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 6\text{ V}$, $R_L = 0.6\text{ }\Omega$ $I_D \cong 10\text{ A}$, $V_{GEN} = 8\text{ V}$, $R_g = 1\text{ }\Omega$		33	55	ns
Rise Time	t_r			20	40	
Turn-Off Delay Time	$t_{d(off)}$			11	22	
Fall Time	t_f			100	170	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^{\circ}\text{C}$			7	A
Pulse Diode Forward Current ^a	I_{SM}				70	
Body Diode Voltage	V_{SD}	$I_S = 3\text{ A}$		0.54	1.1	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 10\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^{\circ}\text{C}$		84	140	ns
Body Diode Reverse Recovery Charge	Q_{rr}			93	150	nC
Reverse Recovery Fall Time	t_a			28		ns
Reverse Recovery Rise Time	t_b			56		

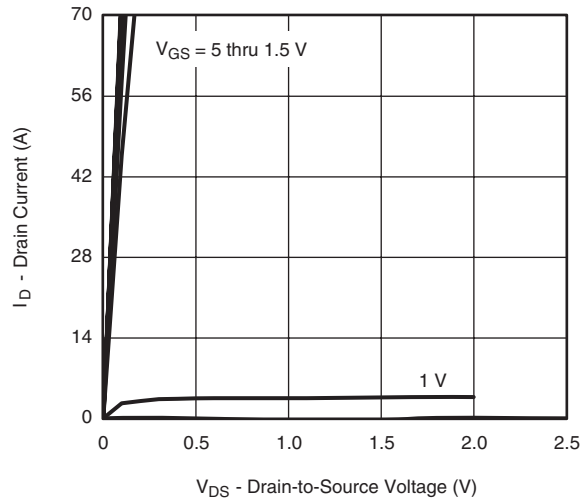
Notes:

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

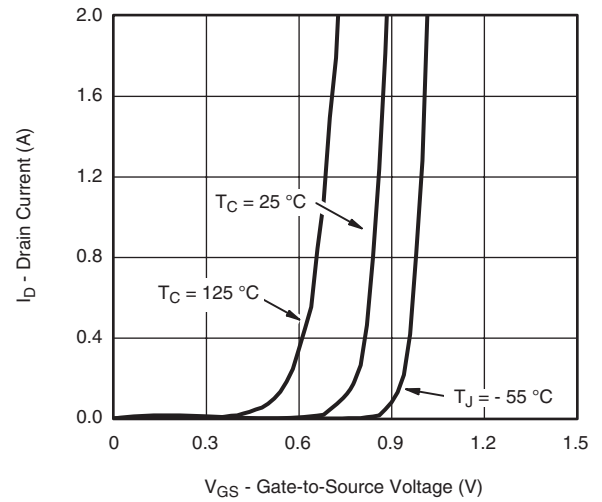
b. Guaranteed by design, not subject to production testing.

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.

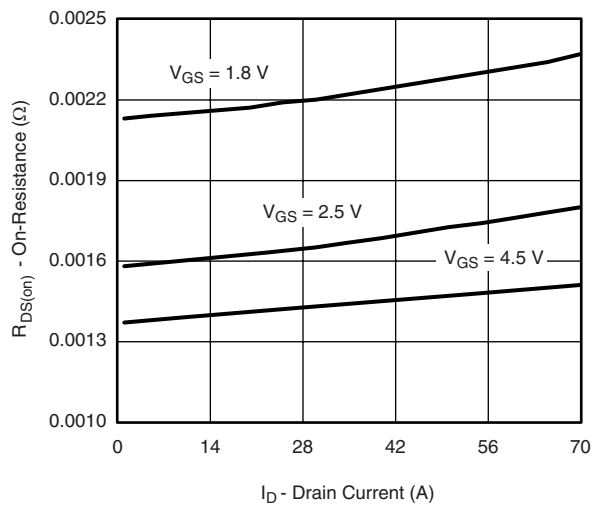
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



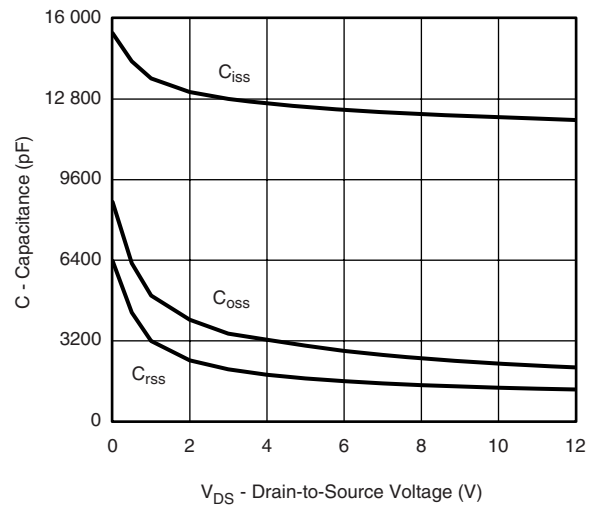
Output Characteristics



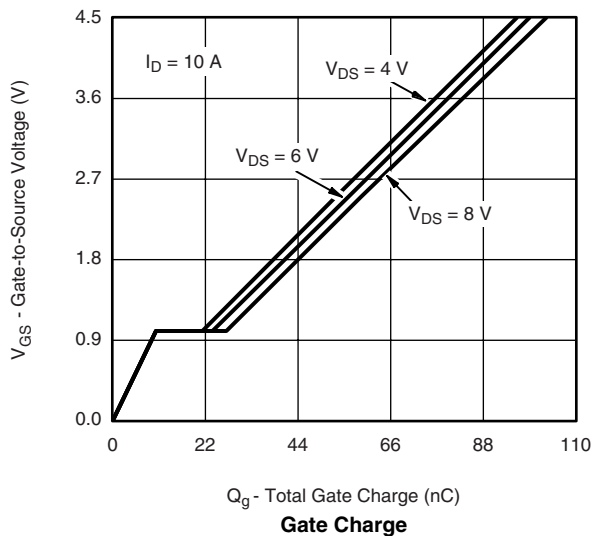
Transfer Characteristics



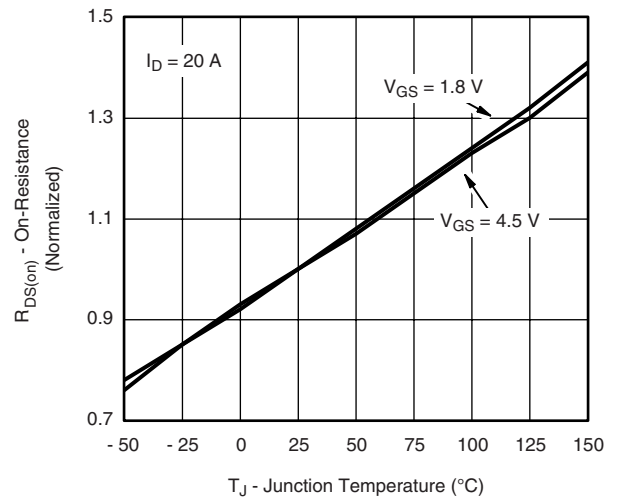
On-Resistance vs. Drain Current and Gate Voltage



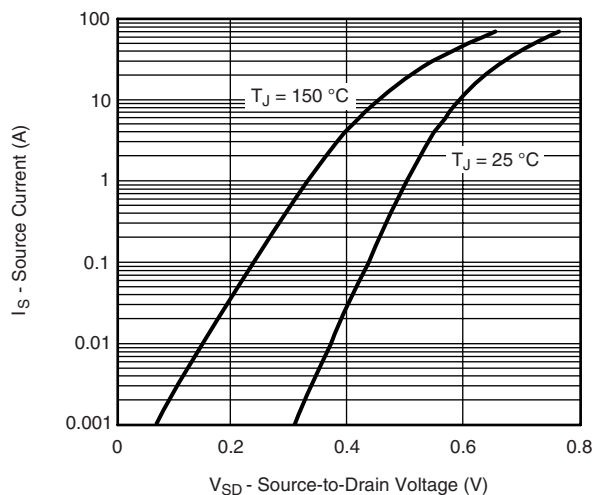
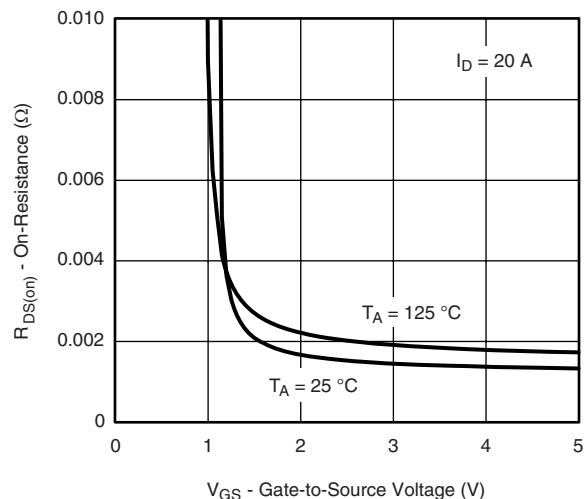
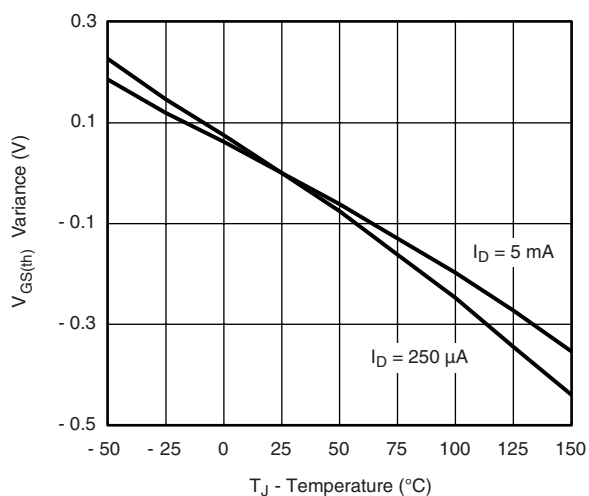
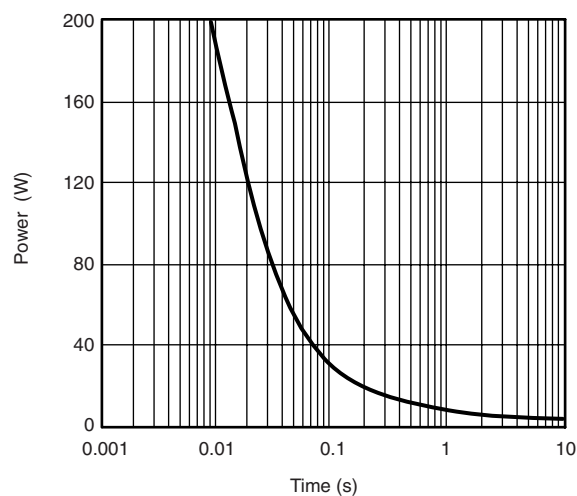
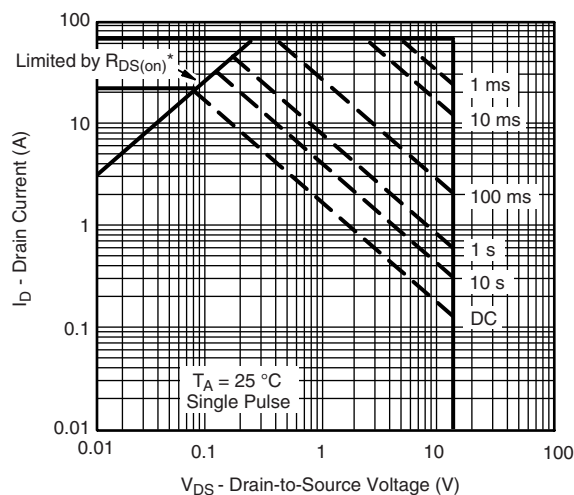
Capacitance



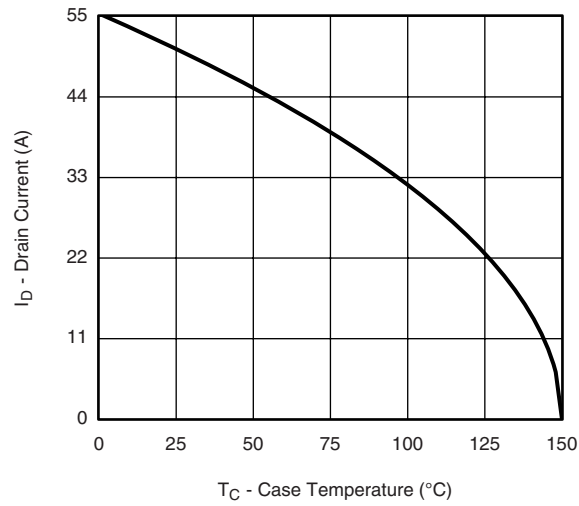
Gate Charge



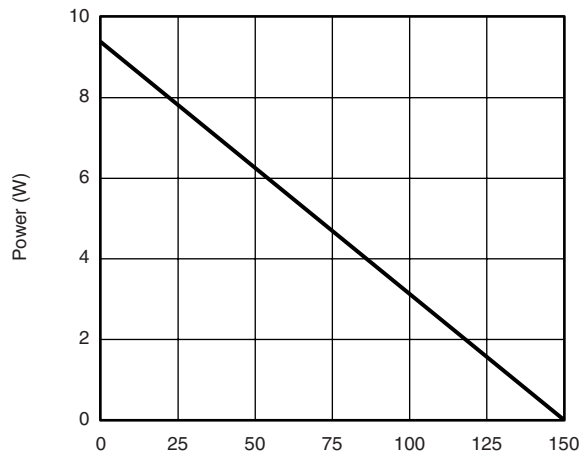
On-Resistance vs. Junction Temperature

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*** $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified**Safe Operating Area, Junction-to-Ambient**

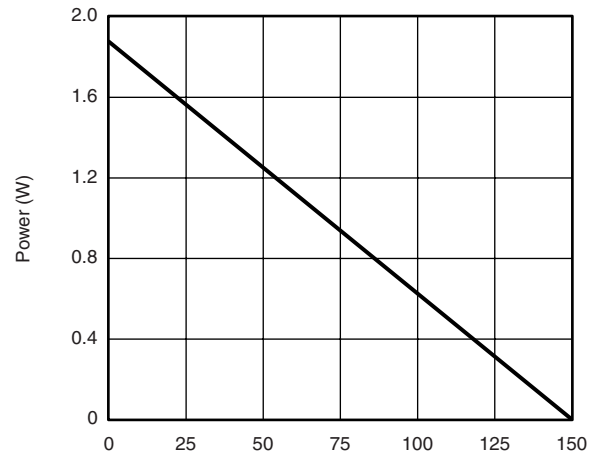
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*

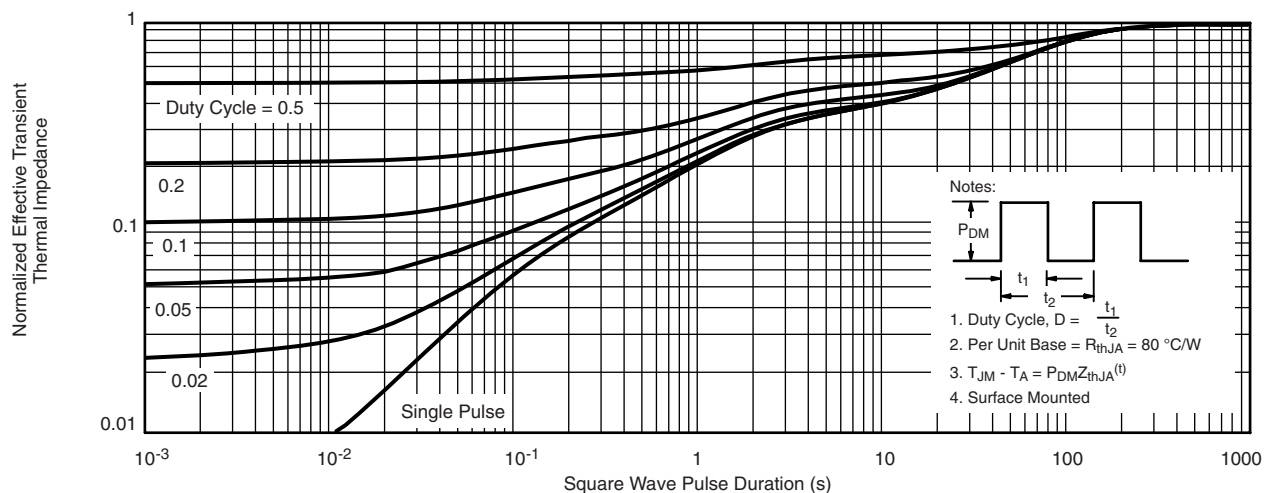
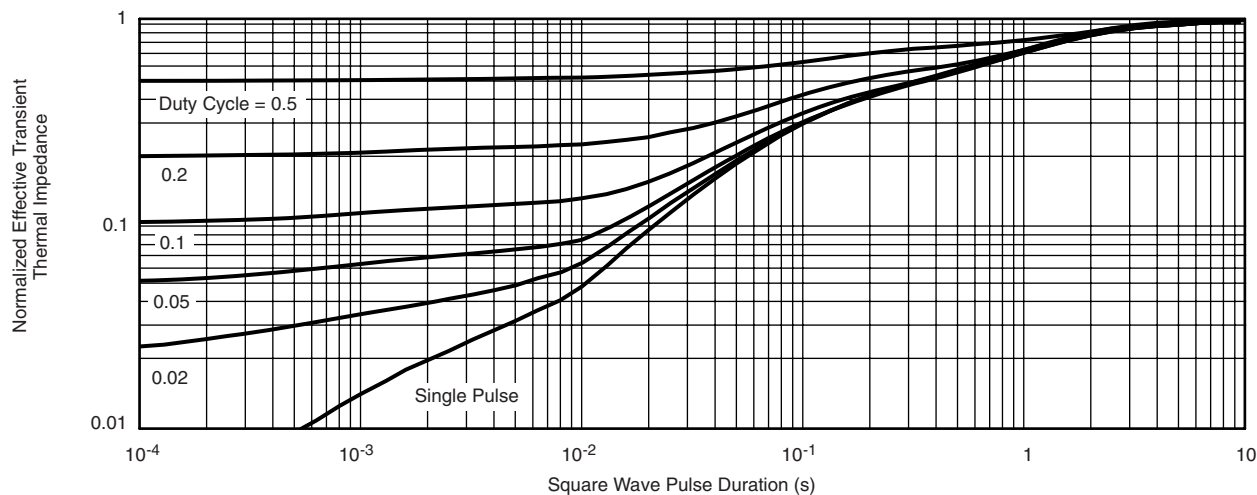


Power, Junction-to-Foot



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**

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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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