

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

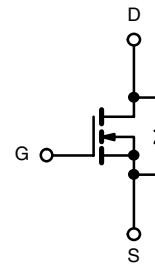
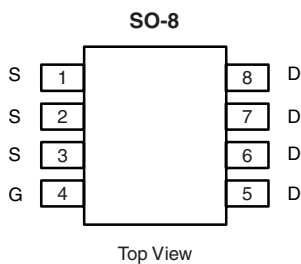
- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET[®] Power MOSFET
- 100 % R_g Tested
- 100 % UIS Tested



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)	I _D	T _C = 25 °C	50
		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	I _S	T _C = 25 °C	
		T _A = 25 °C	3 ^{b, c}
Single Pulse Avalanche Current	I _{AS}	20	mJ
Avalanche Energy	E _{AS}	20	
Maximum Power Dissipation	P _D	T _C = 25 °C	7.8
		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.

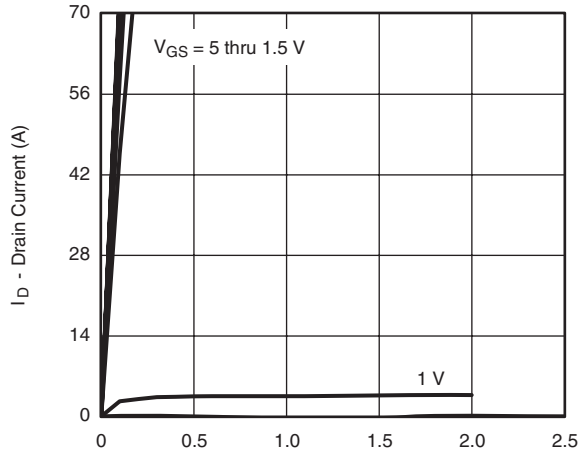
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	12			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		14		mV/°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		μF
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
			$V_{DS} = 6\text{ V}$, $V_{GS} = 2.5\text{ V}$, $I_D = 10\text{ A}$		56	
Gate-Source Charge	Q_{gs}			10.3		
Gate-Drain Charge	Q_{gd}			13.4		
Gate Resistance	R_g	$f = 1\text{ MHz}$		0.75	1.5	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 6\text{ V}$, $R_L = 0.6\text{ }\Omega$ $I_D \cong 10\text{ A}$, $V_{GEN} = 4.5\text{ V}$, $R_g = 1\text{ }\Omega$		38	70	ns
Rise Time	t_r			22	40	
Turn-Off Delay Time	$t_{d(off)}$			240	400	
Fall Time	t_f			33	55	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 6\text{ V}$, $R_L = 0.6\text{ }\Omega$ $I_D \cong 10\text{ A}$, $V_{GEN} = 8\text{ V}$, $R_g = 1\text{ }\Omega$		20	40	
Rise Time	t_r			11	22	
Turn-Off Delay Time	$t_{d(off)}$			100	170	
Fall Time	t_f			11	22	
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:

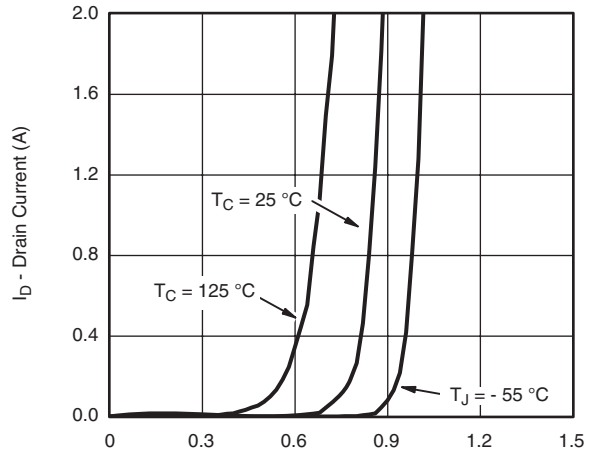
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

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.

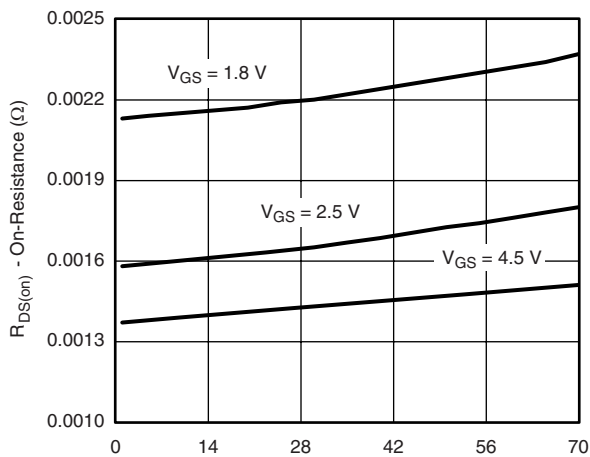
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



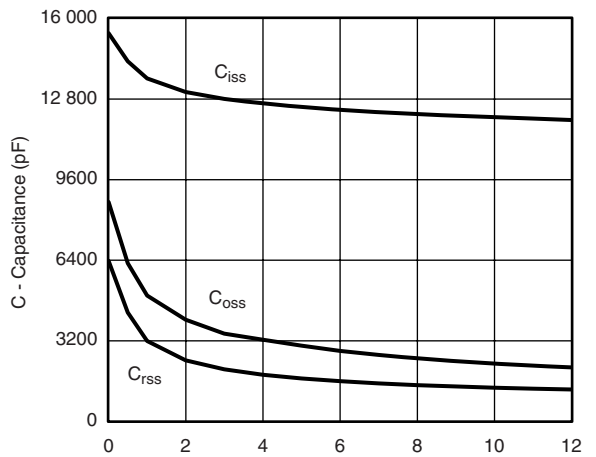
Output Characteristics



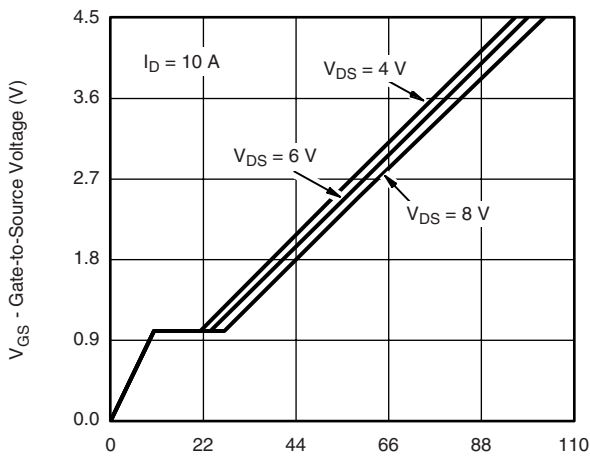
Transfer Characteristics



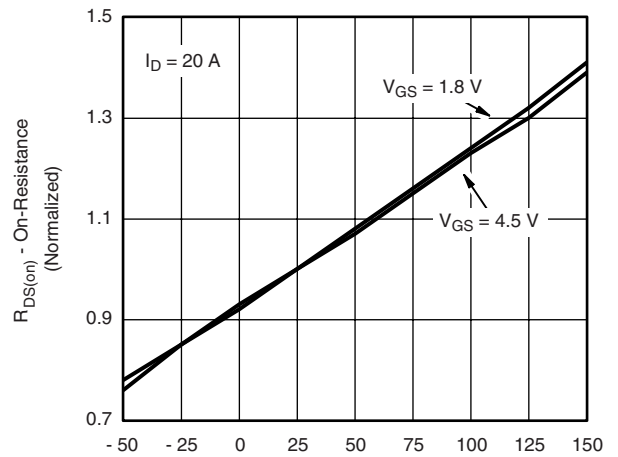
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

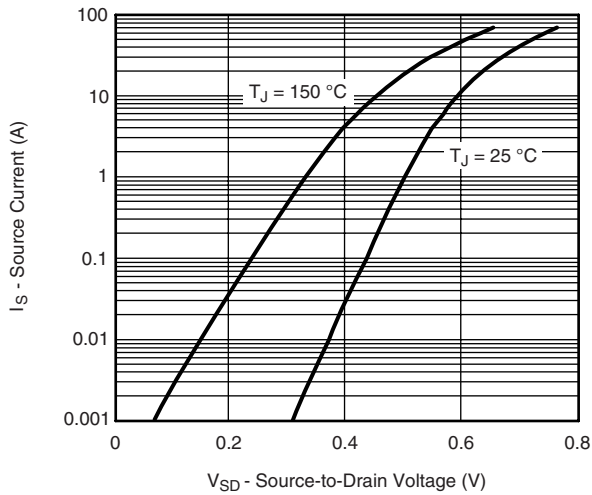


Gate Charge

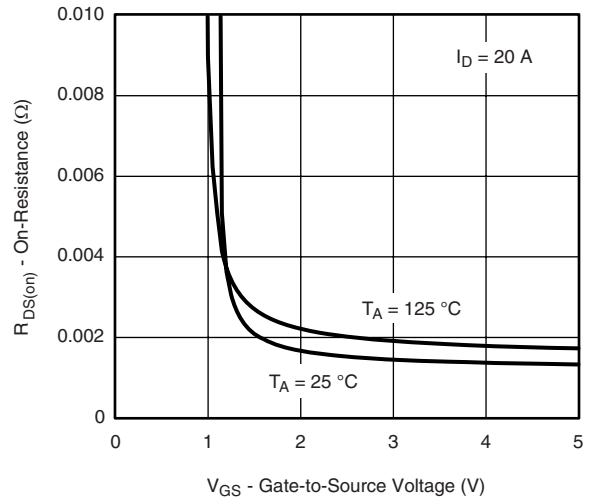


On-Resistance vs. Junction Temperature

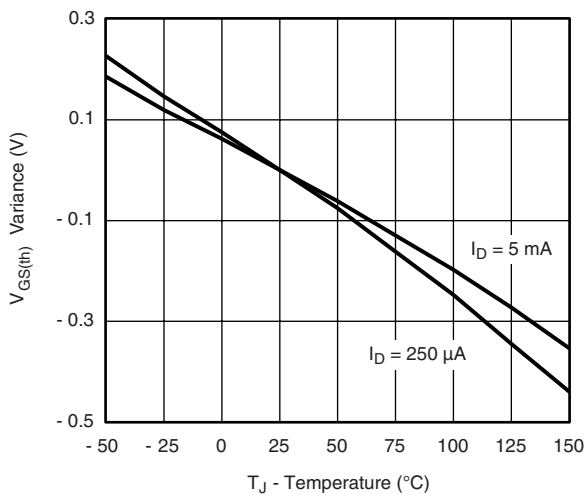
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



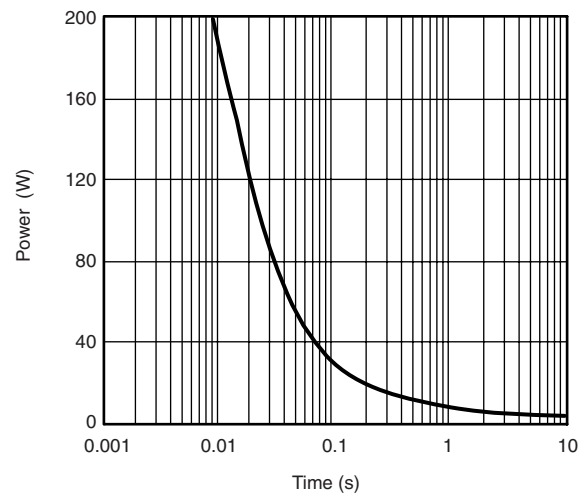
Source-Drain Diode Forward Voltage



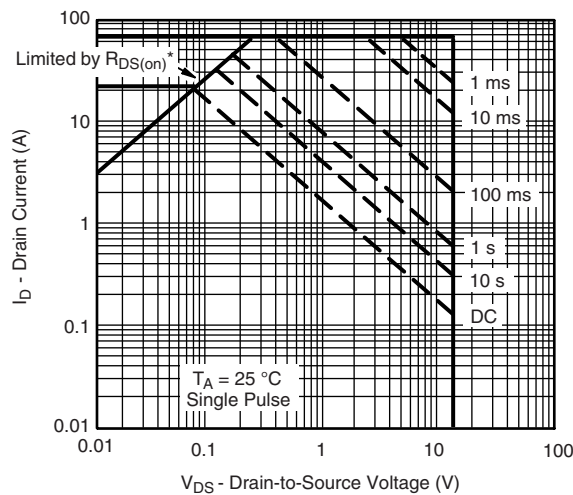
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

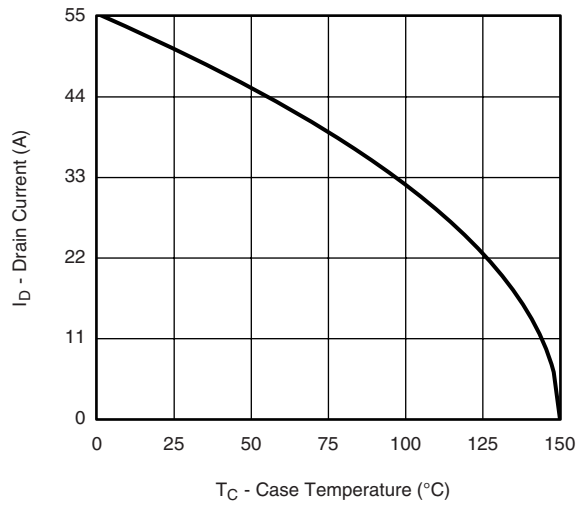


Single Pulse Power, Junction-to-Ambient

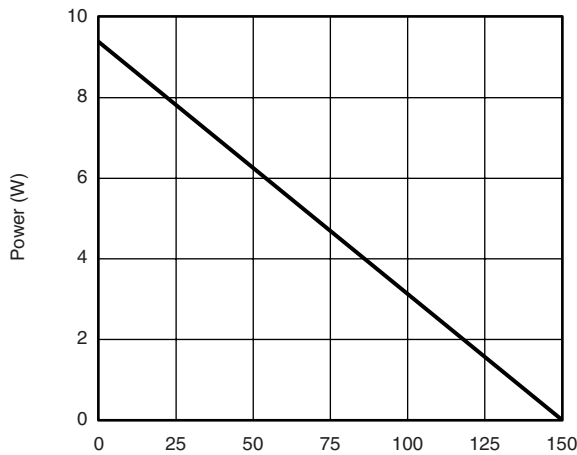


Safe Operating Area, Junction-to-Ambient

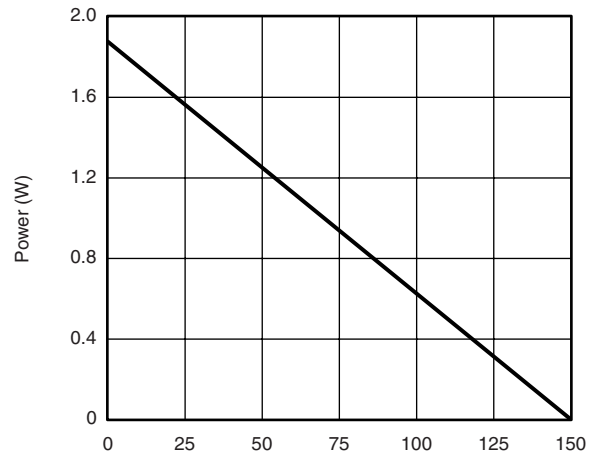
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*



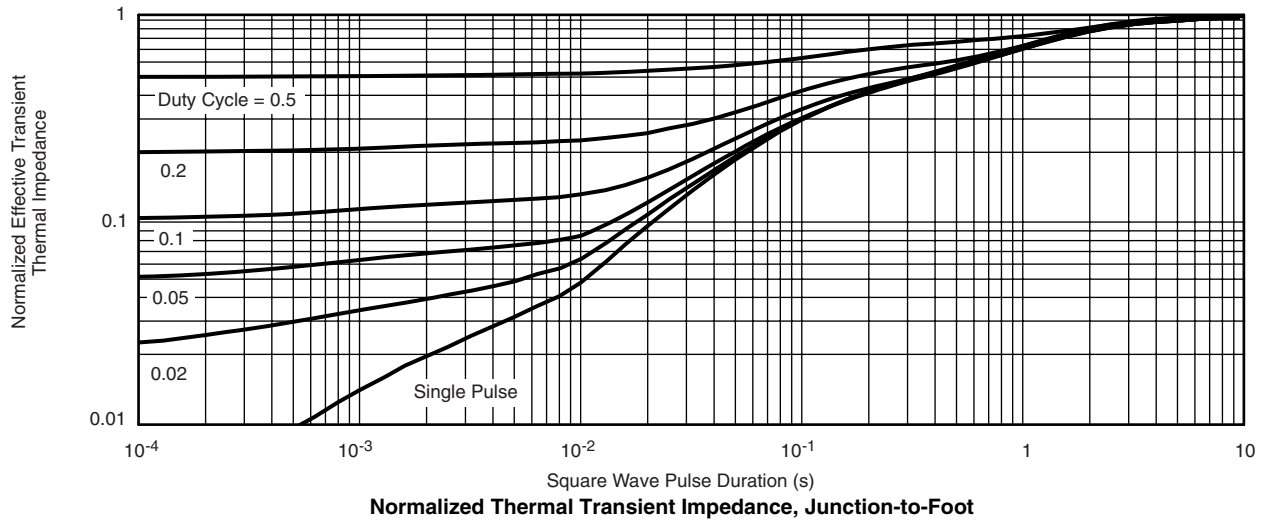
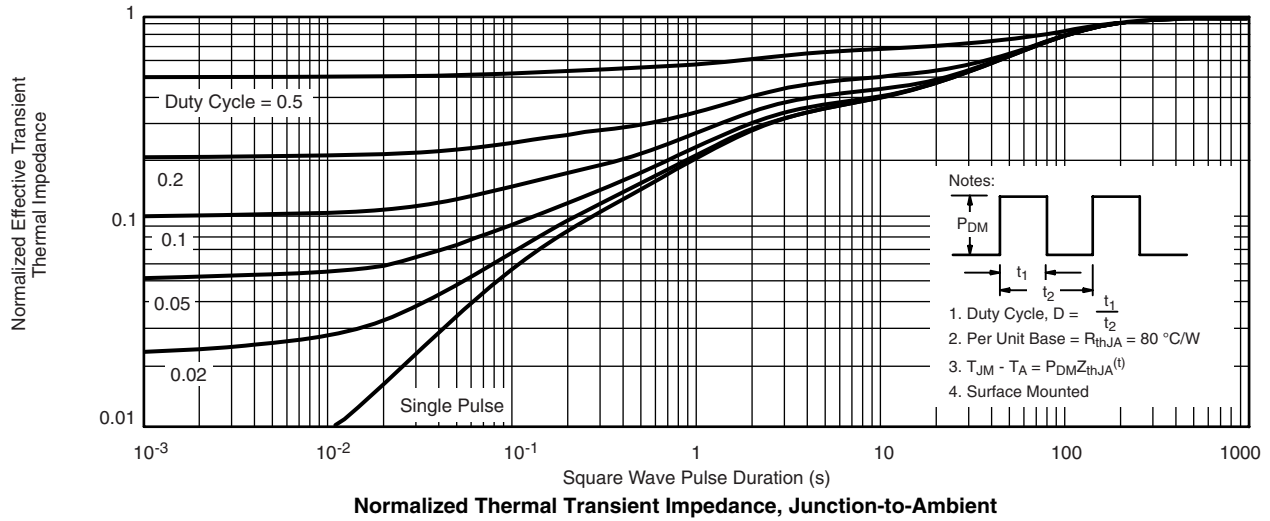
T_C - Case Temperature (°C)
Power, Junction-to-Foot



T_A - Ambient Temperature (°C)
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



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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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