

N-Channel 25-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ)
25	0.0027 at $V_{GS} = 10$ V	36	49 nC
	0.0032 at $V_{GS} = 4.5$ V	29	

FEATURES

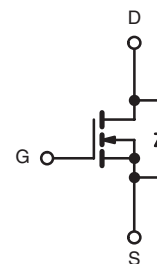
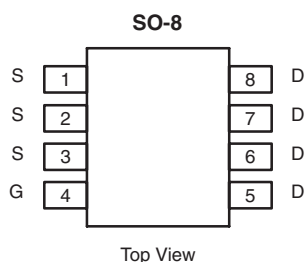
- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET[®] Power MOSFET
- 100 % R_g Tested



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Synchronous Buck - Low Side
 - Notebook
 - Server
 - Workstation
- Synchronous Rectifier - POL



Ordering Information: Si4630DY-T1-E3 (Lead (Pb)-free)
Si4630DY-T1-GE3 (Lead (Pb)-free and Halogen-free)

N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	25	V
Gate-Source Voltage		V_{GS}	± 16	
Continuous Drain Current ($T_J = 150$ °C)	$T_C = 25$ °C	I_D	40	A
	$T_C = 70$ °C		32	
	$T_A = 25$ °C		27 ^{b, c}	
	$T_A = 70$ °C		21 ^{b, c}	
Pulsed Drain Current		I_{DM}	70	
Continuous Source-Drain Diode Current	$T_C = 25$ °C	I_S	7.0	
	$T_A = 25$ °C		3.0 ^{b, c}	
Single Pulse Avalanche Current		I_{AS}	30	mJ
Avalanche Energy		E_{AS}	45	
Maximum Power Dissipation	$T_C = 25$ °C	P_D	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	

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	$t \leq 10$ s	R_{thJA}	29	35	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	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 °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	25			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		28		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 6		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1.0		2.2	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} = 25 V, V _{GS} = 0 V			1	μA
		V _{DS} = 25 V, V _{GS} = 0 V, T _J = 55 °C			10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	30			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 20 A		0.0022	0.0027	Ω
		V _{GS} = 4.5 V, I _D = 15 A		0.0026	0.0032	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 20 A		120		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz		6670		pF
Output Capacitance	C _{oss}			997		
Reverse Transfer Capacitance	C _{rss}			531		
Total Gate Charge	Q _g	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 20 A		107.5	161	nC
		V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 20 A		49	73	
Gate-Source Charge	Q _{gs}			15.7		
Gate-Drain Charge	Q _{gd}			13.6		
Gate Resistance	R _g	f = 1 MHz		1.5	2.25	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 1.5Ω I _D ≅ 10 A, V _{GEN} = 4.5 V, R _g = 1 Ω		37	56	ns
Rise Time	t _r			122	185	
Turn-Off DelayTime	t _{d(off)}			47	71	
Fall Time	t _f			15	23	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 1.5 Ω I _D ≅ 10 A, V _{GEN} = 10 V, R _g = 1 Ω		17	26	
Rise Time	t _r			93	140	
Turn-Off DelayTime	t _{d(off)}			60	90	
Fall Time	t _f			9	15	
Drain-Source Body Diode Characteristics						
Continous Source-Drain Diode Current	I _S	T _C = 25 °C			7	A
Pulse Diode Forward Current ^a	I _{SM}				70	
Body Diode Voltage	V _{SD}	I _S = 3 A		0.72	1.1	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 13 A, dI/dt = 100 A/μs, T _J = 25 °C		47	70	ns
Body Diode Reverse Recovery Charge	Q _{rr}			50	75	nC
Reverse Recovery Fall Time	t _a			23		ns
Reverse Recovery Rise Time	t _b			24		

Notes:

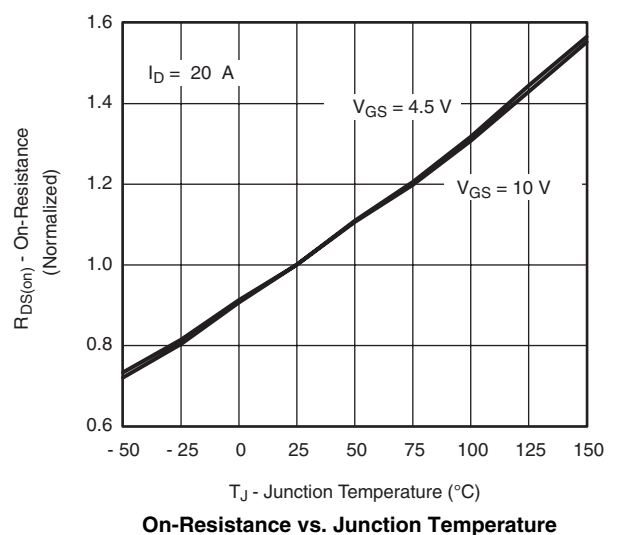
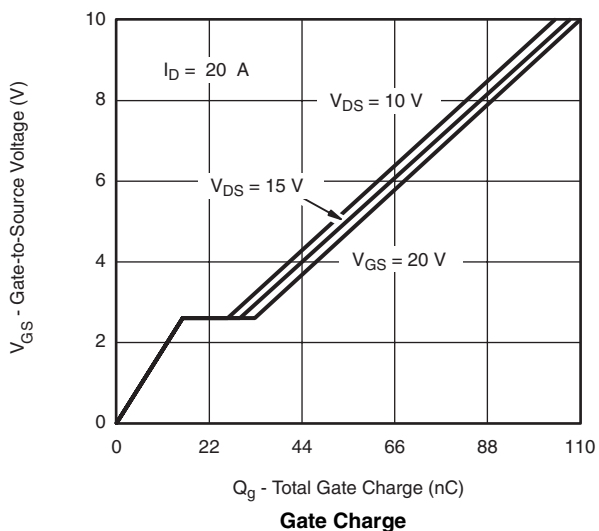
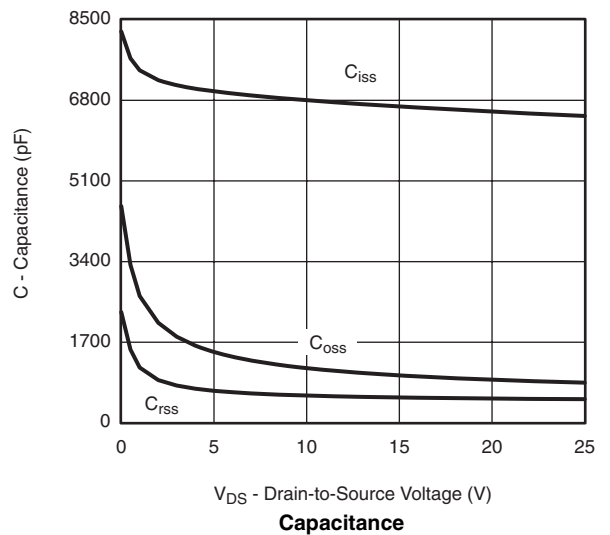
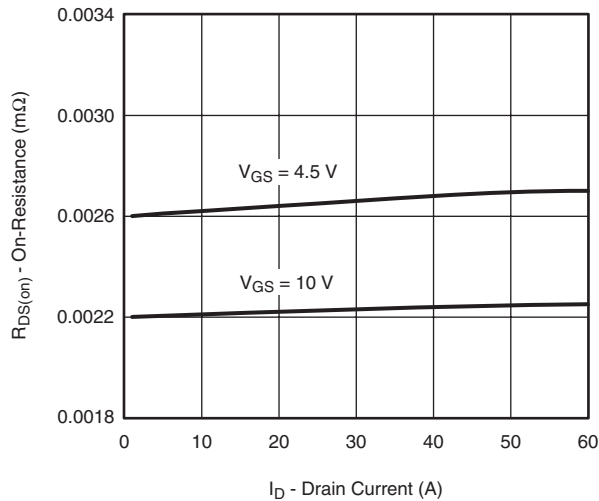
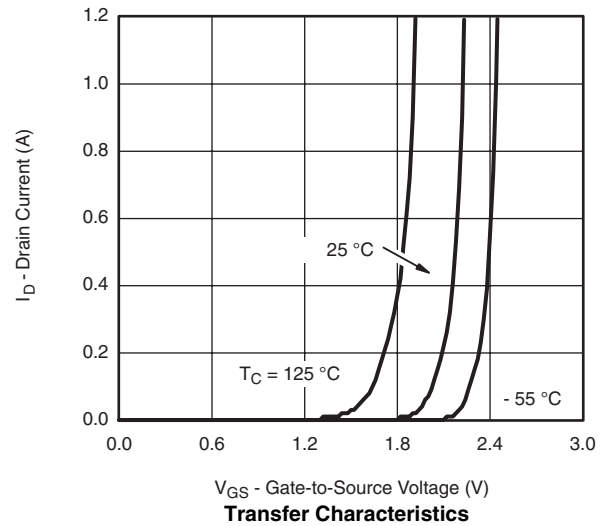
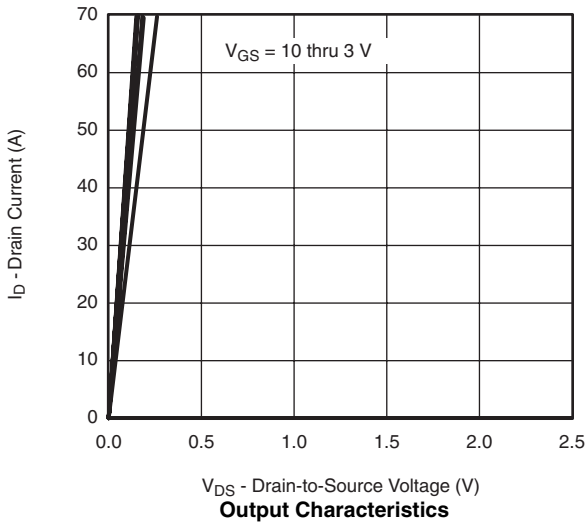
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

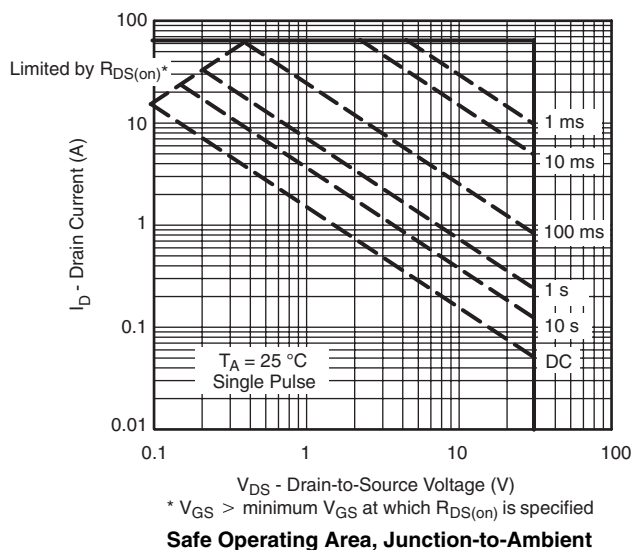
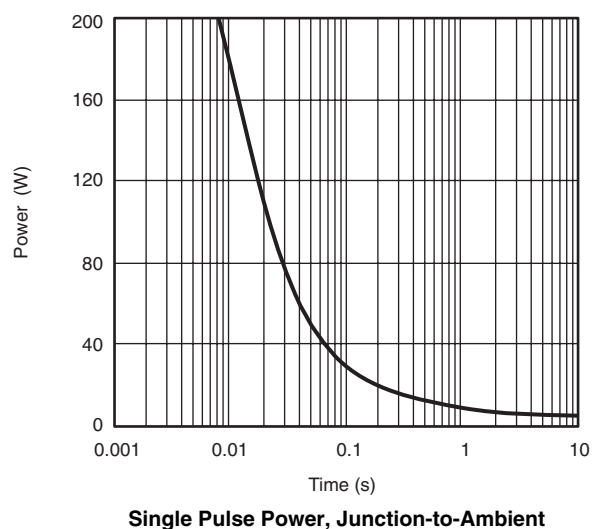
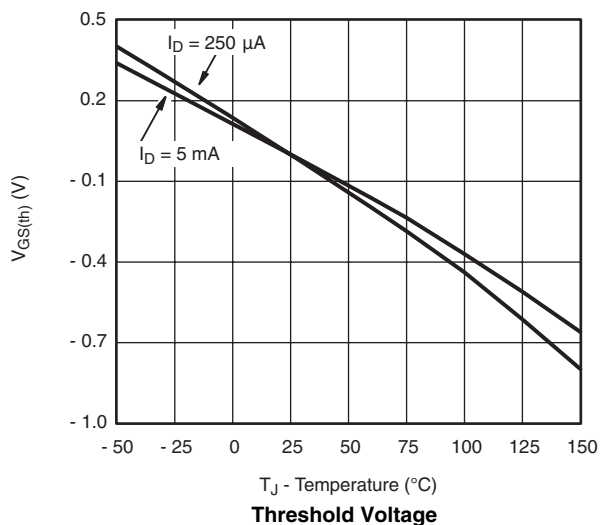
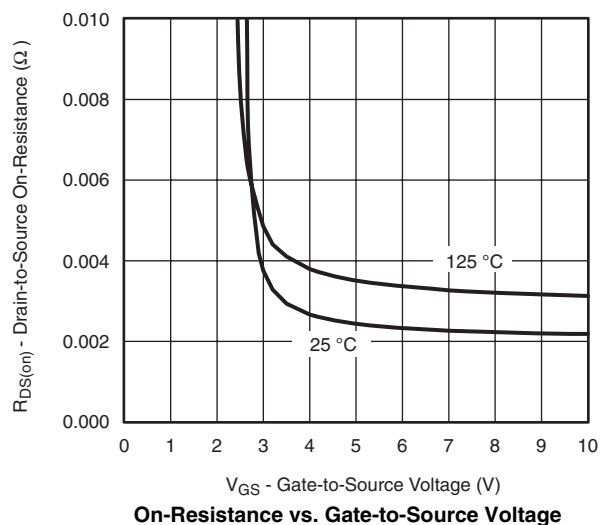
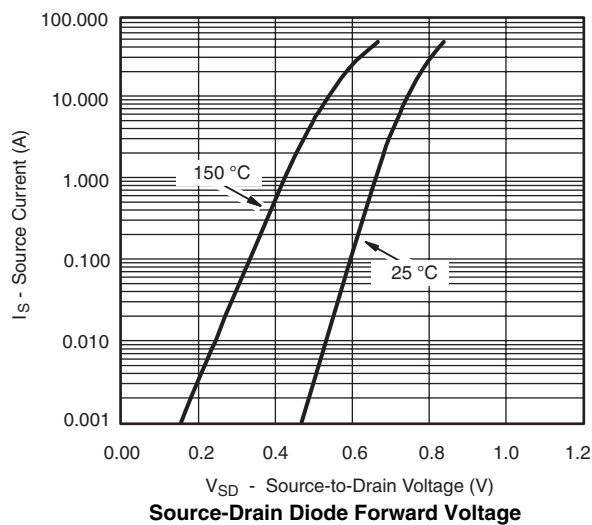
b. Guaranteed by design, not subject to production testing.

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.

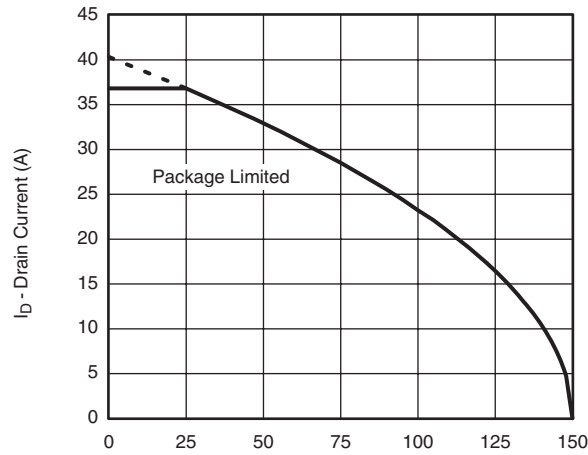


TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



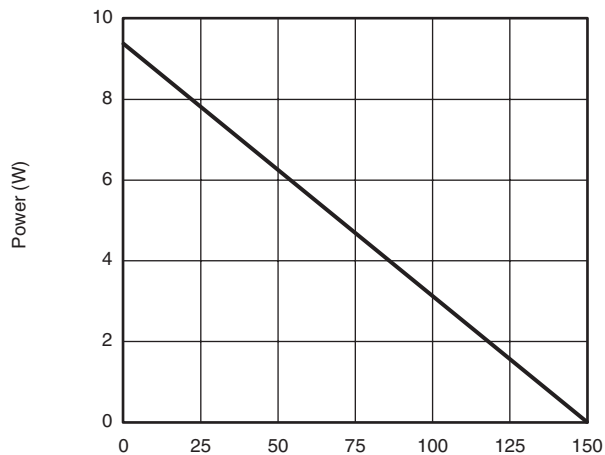
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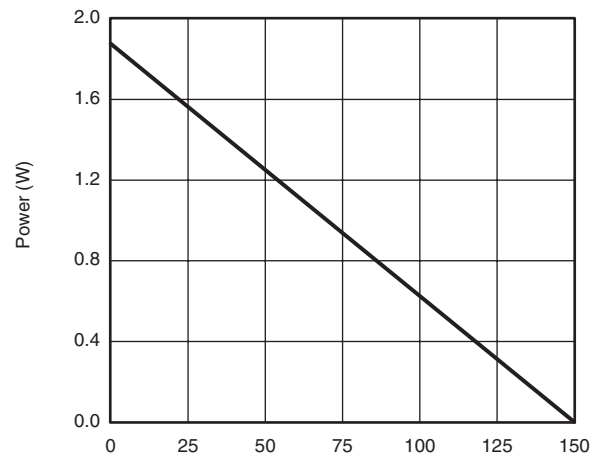
T_C - Case Temperature (°C)

Current Derating*



T_C - Case Temperature (°C)

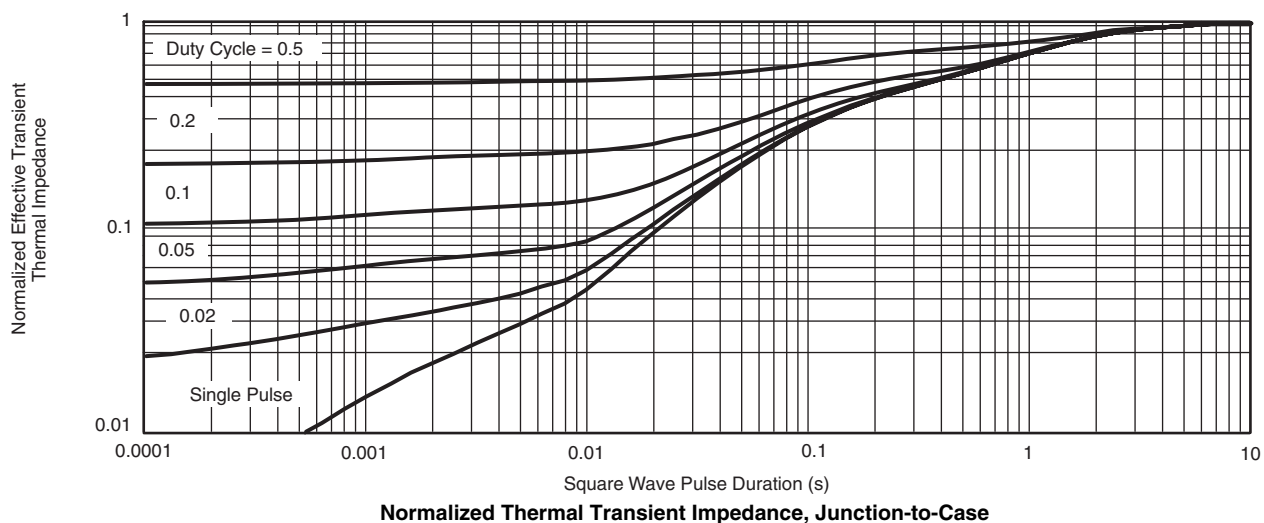
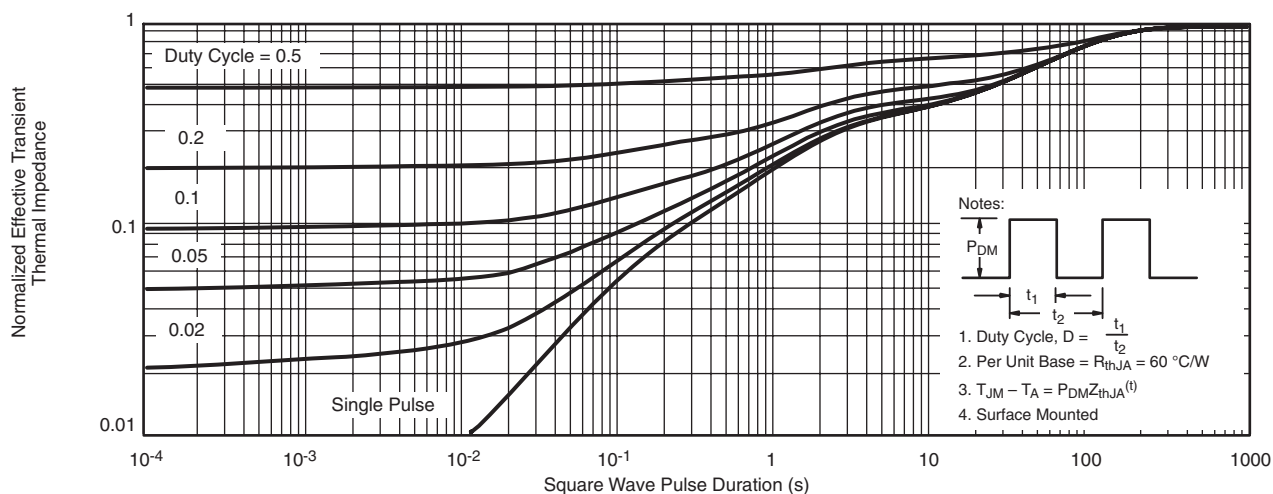
Power, Junction-to-Foot



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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