

Dual N-Channel 30 V (D-S) MOSFET

PRODUCT SUMMARY

	V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
Channel 1	30	0.0153 at $V_{GS} = 10$ V	8 ^e	8.4
		0.0184 at $V_{GS} = 4.5$ V	8 ^e	
Channel 2	30	0.0280 at $V_{GS} = 10$ V	8	3.6
		0.0340 at $V_{GS} = 4.5$ V	7.1	

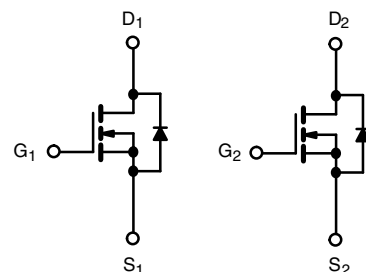
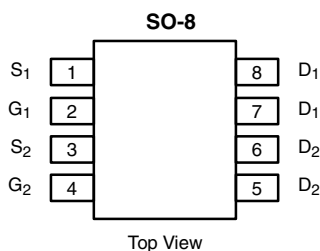
FEATURES

- TrenchFET[®] Power MOSFET
- 100 % R_g Tested
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC


RoHS
COMPLIANT

APPLICATIONS

- DC/DC for Notebook PC



Ordering Information: Si4276DY-T1-E3 (Lead (Pb)-free)

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

Parameter		Symbol	Channel 1	Channel 2	Unit
Drain-Source Voltage		V _{DS}	30		V
Gate-Source Voltage		V _{GS}	± 20		
Continuous Drain Current (T _J = 150 °C)	T _C = 25 °C	I _D	8 ^e	8	A
	T _C = 70 °C		8 ^e	6.4	
	T _A = 25 °C		8 ^{b, c, e}	6.8 ^{b, c}	
	T _A = 70 °C		7.6 ^{b, c}	5.5 ^{b, c}	
Pulsed Drain Current (10 μs Pulse Width)		I _{DM}	50	30	
Source-Drain Current Diode Current	T _C = 25 °C	I _S	3.0	2.3	A
	T _A = 25 °C		1.7 ^{b, c}	1.7 ^{b, c}	
Single Pulse Avalanche Current	L = 0.1 mH	I _{AS}	20	10	mJ
Avalanche Energy		E _{AS}	20	5	
Maximum Power Dissipation	T _C = 25 °C	P _D	3.6	2.8	W
	T _C = 70 °C		2.3	1.8	
	T _A = 25 °C		2.1 ^{b, c}	2.0 ^{b, c}	
	T _A = 70 °C		1.3 ^{b, c}	1.3 ^{b, c}	
Operating Junction and Storage Temperature Range		T _J , T _{sta}	- 55 to 150		°C

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Channel 1		Channel 2		Unit
			Typical	Maximum	Typical	Maximum	
Maximum Junction-to-Ambient ^{b, d}	$t \leq 10$ s	R_{thJA}	47	60	58	62.5	°C/W
Maximum Junction-to-Foot (Drain)	Steady	R_{thJF}	30	35	38	45	

Notes:

- Based on $T_C = 25$ °C.
- Surface mounted on 1" x 1" FR4 board.
- $t = 10$ s.
- Maximum under steady state conditions is 107 °C/W (Ch 1) and 110 °C/W (Ch 2).
- Package limited.

SPECIFICATIONS ($T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ. ^a	Max.	Unit		
Static								
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	Ch 1	30		V		
		V _{GS} = 0 V, I _D = 250 μA	Ch 2	30				
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA	Ch 1		29	mV/°C		
		I _D = 250 μA	Ch 2		30			
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J	I _D = 250 μA	Ch 1		- 5.2			
		I _D = 250 μA	Ch 2		- 4.4			
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	Ch 1	1.2		2.5	V	
		V _{DS} = V _{GS} , I _D = 250 μA	Ch 2	1.2		2.5		
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V	Ch 1			100	nA	
			Ch 2			100		
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V	Ch 1			1	μA	
		V _{DS} = 30 V, V _{GS} = 0 V	Ch 2			1		
		V _{DS} = 30 V, V _{GS} = 0 V, T _J = 55 °C	Ch 1			10		
		V _{DS} = 30 V, V _{GS} = 0 V, T _J = 55 °C	Ch 2			10		
On-State Drain Current ^b	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 10 V	Ch 1	10			A	
		V _{DS} = 5 V, V _{GS} = 10 V	Ch 2	10				
Drain-Source On-State Resistance ^b	R _{DS(on)}	V _{GS} = 10 V, I _D = 9.5 A	Ch 1		0.0127	0.0153	Ω	
		V _{GS} = 10 V, I _D = 6.8 A	Ch 2		0.0230	0.0280		
		V _{GS} = 4.5 V, I _D = 8.7 A	Ch 1		0.0146	0.0184		
		V _{GS} = 4.5 V, I _D = 6.1 A	Ch 2		0.0280	0.0340		
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 9.5 A	Ch 1		43		S	
		V _{DS} = 15 V, I _D = 6.8 A	Ch 2		17			
Dynamic ^a								
Input Capacitance	C _{iss}	Channel 1 V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz Channel 2 V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz	Ch 1		1000		pF	
Output Capacitance	C _{oss}		Ch 2		366			
			Ch 1		215			
Reverse Transfer Capacitance	C _{rss}		Ch 2		82			
		Ch 1		85				
Total Gate Charge	Q _g	Channel 1 V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 9.5 A Channel 2 V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 6.8 A	Ch 2		45		nC	
			V _{DS} = 15 V, V _{GS} = 10 V, I _D = 9.5 A	Ch 1		17.2		26
			V _{DS} = 15 V, V _{GS} = 10 V, I _D = 6.8 A	Ch 2		7.3		15
			Ch 1		8.4	17		
			Ch 2		3.6	8		
			Gate-Source Charge	Q _{gs}	Ch 1			3
Ch 2		1.1						
Gate-Drain Charge	Q _{gd}		Ch 1		2.6			
			Ch 2		1.3			
Gate Resistance	R _g	f = 1 MHz	Ch 1	0.6	3.1	6.2	Ω	
			Ch 2	0.5	2.6	5.2		

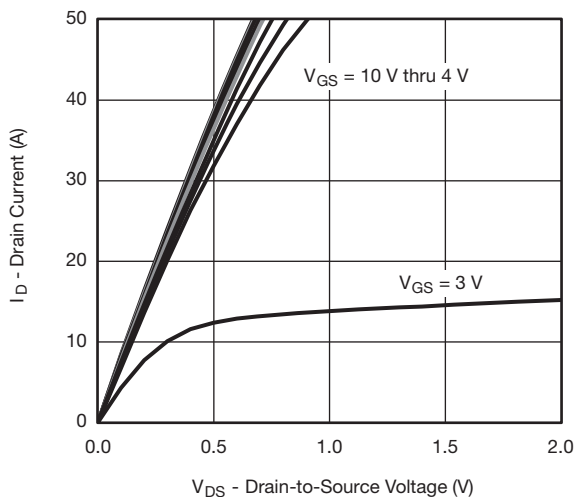
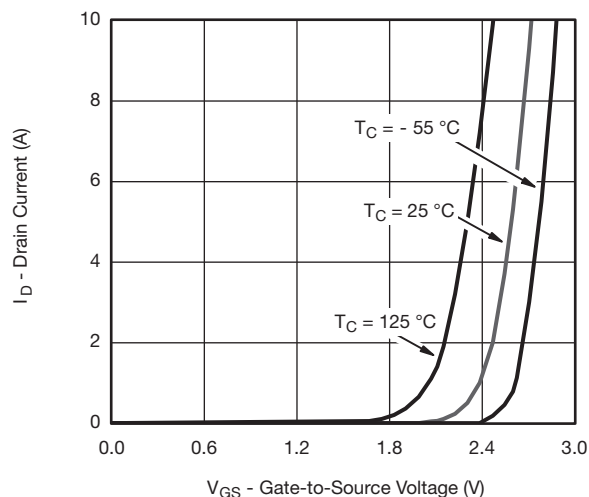
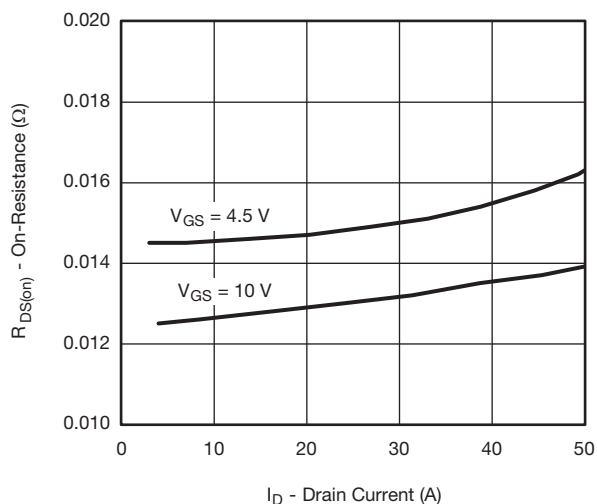
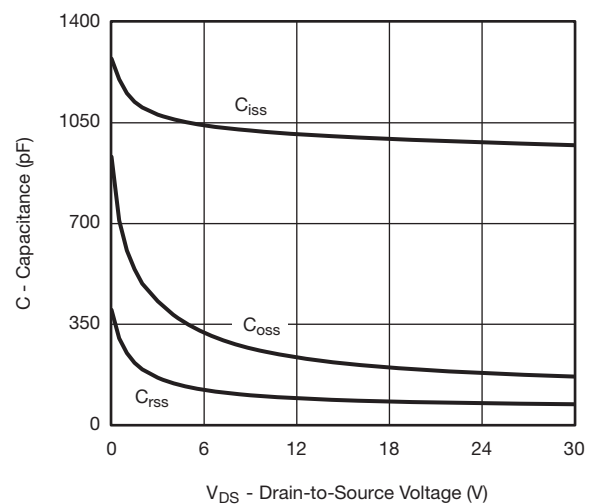
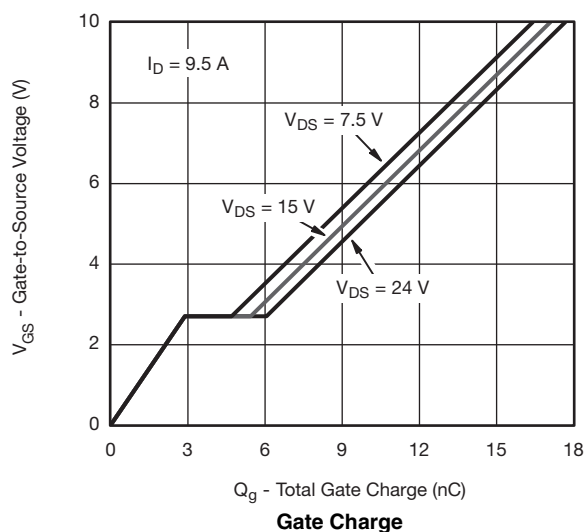
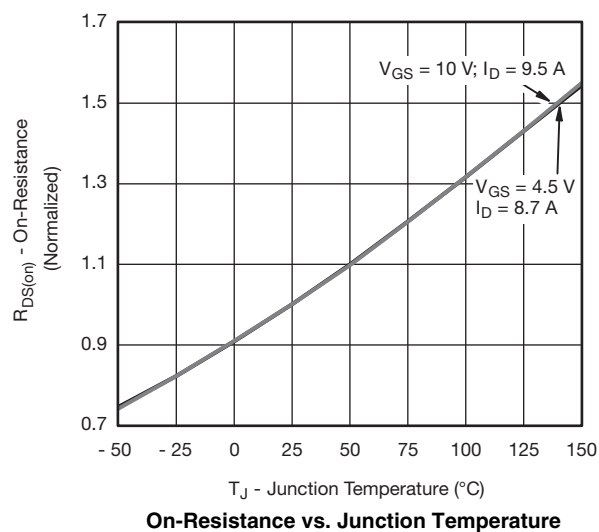
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)								
Parameter	Symbol	Test Conditions		Min.	Typ. ^a	Max.	Unit	
Dynamic ^a								
Turn-On Delay Time	t _{d(on)}	Channel 1 V _{DD} = 15 V, R _L = 2 Ω I _D ≅ 7.6 A, V _{GEN} = 10 V, R _g = 1 Ω	Ch 1		8	16	ns	
			Ch 2		4	8		
Rise Time	t _r		Ch 1		10	20		
			Ch 2		8	16		
Turn-Off DelayTime	t _{d(off)}	Channel 2 V _{DD} = 15 V, R _L = 2.7 Ω I _D ≅ 5.5 A, V _{GEN} = 10 V, R _g = 1 Ω	Ch 1		20	30		
			Ch 2		11	20		
Fall Time	t _f		Ch 1		7	14		
			Ch 2		7	14		
Turn-On Delay Time	t _{d(on)}	Channel 1 V _{DD} = 15 V, R _L = 2 Ω I _D ≅ 7.6 A, V _{GEN} = 4.5 V, R _g = 1 Ω	Ch 1		14	21		
			Ch 2		8	16		
Rise Time	t _r		Ch 1		11	20		
			Ch 2		10	20		
Turn-Off Delay Time	t _{d(off)}	Channel 2 V _{DD} = 15 V, R _L = 2.7 Ω I _D ≅ 5.5 A, V _{GEN} = 4.5 V, R _g = 1 Ω	Ch 1		18	27		
			Ch 2		10	20		
Fall Time	t _f		Ch 1		7	14		
			Ch 2		7	14		
Drain-Source Body Diode Characteristics								
Continous Source-Drain Diode Current	I _S	T _C = 25 °C	Ch 1			3	A	
			Ch 2			2.3		
Pulse Diode Forward Current ^a	I _{SM}		Ch 1			50		
			Ch 2			30		
Body Diode Voltage	V _{SD}	I _S = 7.6 A	Ch 1		0.82	1.2	V	
		I _S = 5.5 A	Ch 2		0.85	1.2		
Body Diode Reverse Recovery Time	t _{rr}	Channel 1 I _F = 7.7 A, dl/dt = 100 A/μs, T _J = 25 °C	Ch 1		20	30	ns	
			Ch 2		13	20		
Body Diode Reverse Recovery Charge	Q _{rr}		Channel 2 I _F = 5.5 A, dl/dt = 100 A/μs, T _J = 25 °C	Ch 1		12	20	nC
				Ch 2		6	12	
Reverse Recovery Fall Time	t _a	Channel 2 I _F = 5.5 A, dl/dt = 100 A/μs, T _J = 25 °C		Ch 1		11		ns
				Ch 2		7		
Reverse Recovery Rise Time	t _b		Channel 2 I _F = 5.5 A, dl/dt = 100 A/μs, T _J = 25 °C	Ch 1		9		
				Ch 2		6		

Notes:

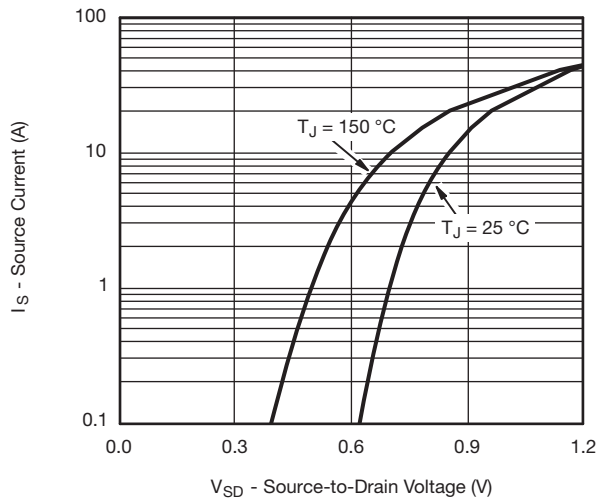
a. Guaranteed by design, not subject to production testing.

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

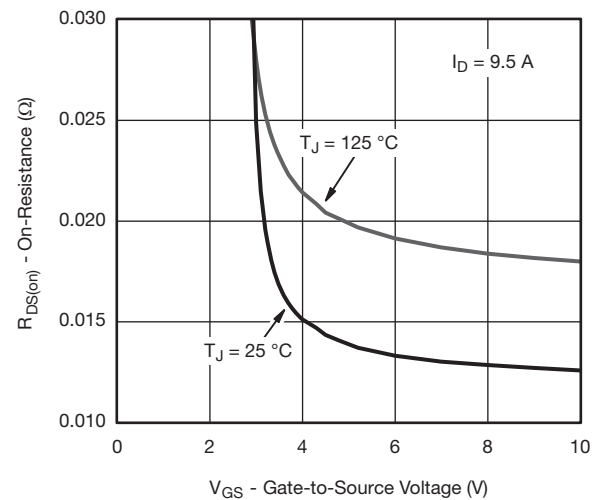
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)**Output Characteristics****Transfer Characteristics****On-Resistance vs. Drain Current****Capacitance****Gate Charge****On-Resistance vs. Junction Temperature**

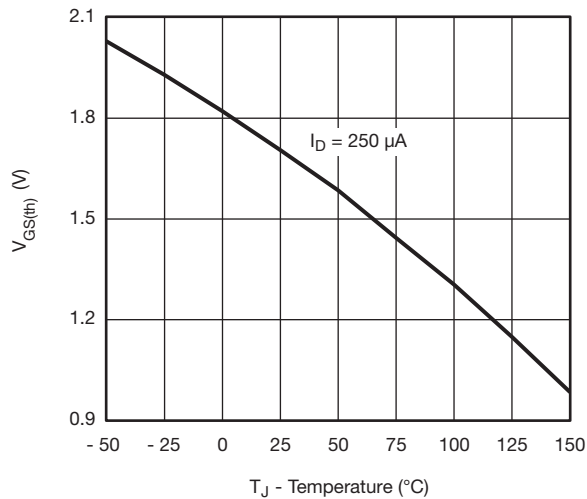
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



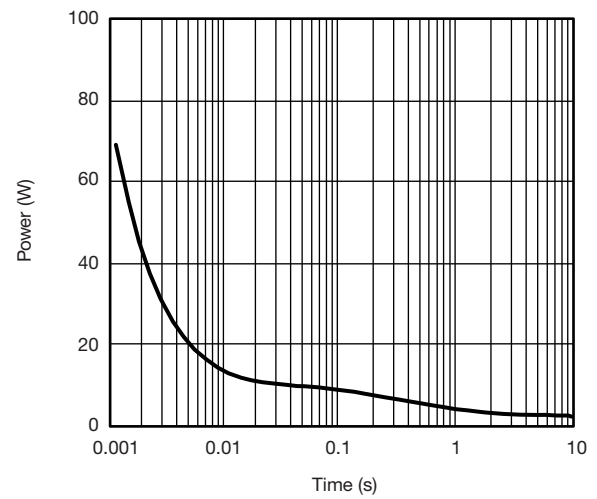
Source-Drain Diode Forward Voltage



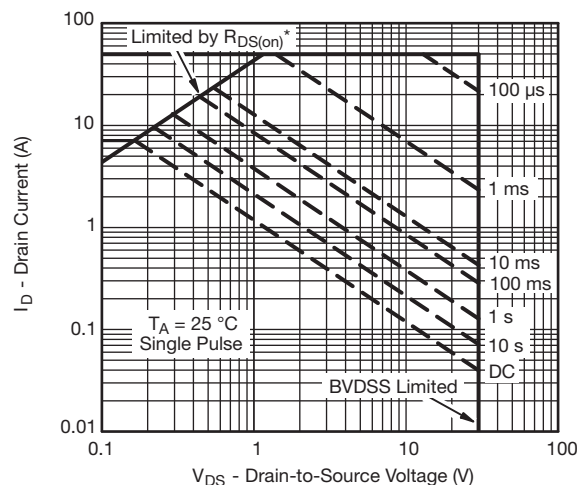
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

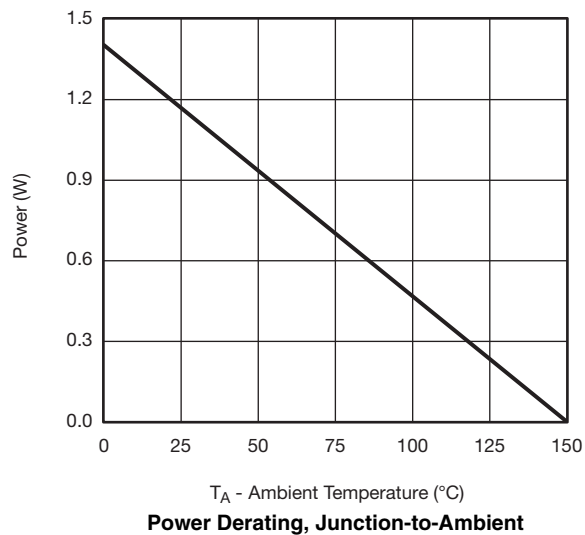
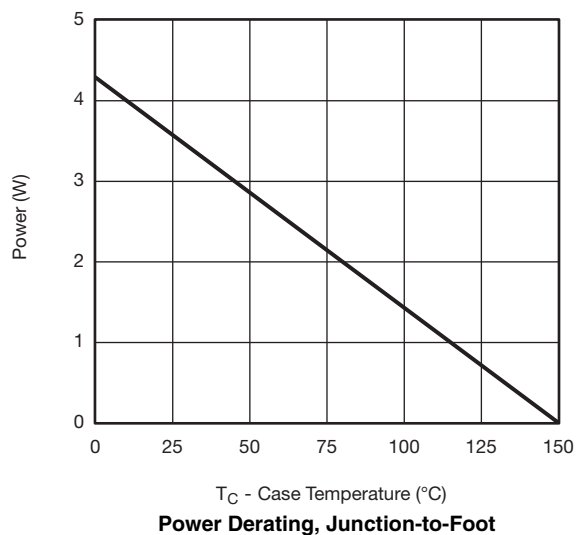
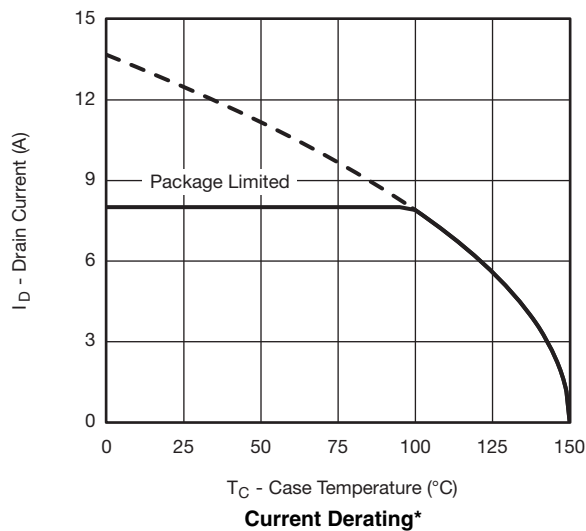


Single Pulse Power, Junction-to-Ambient



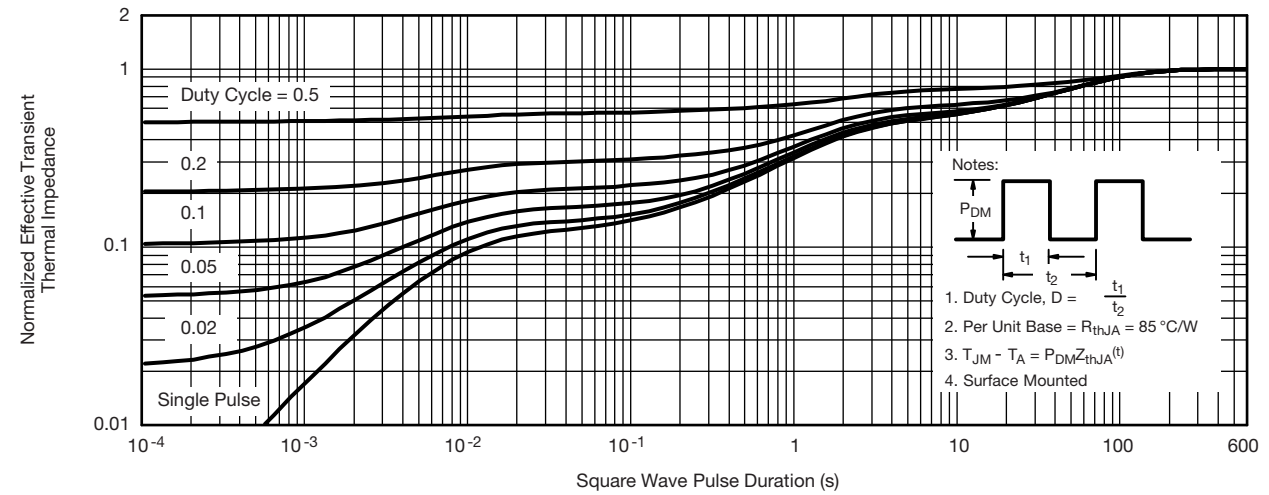
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

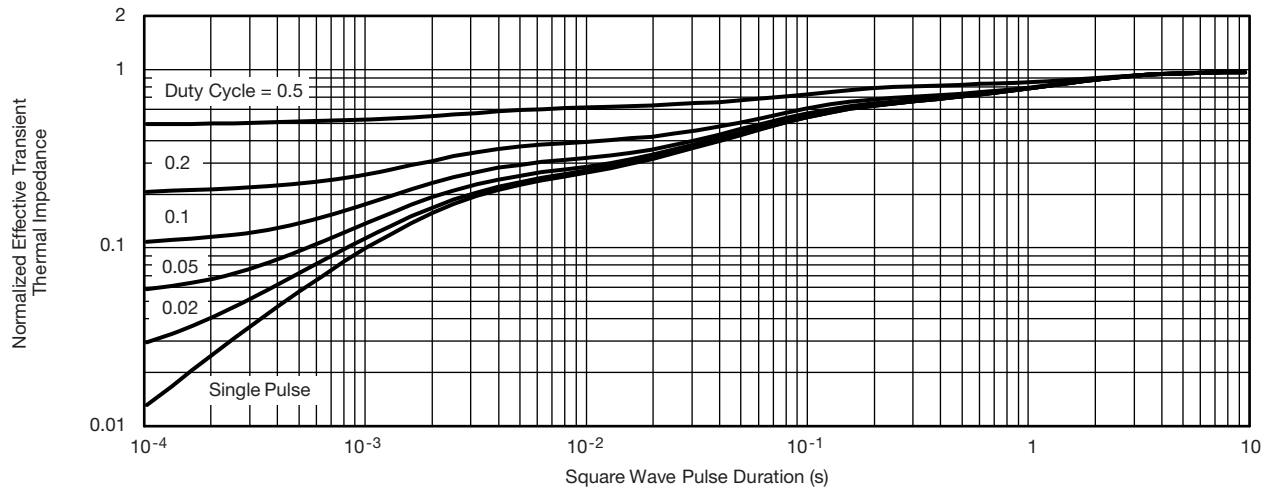
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

* 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.

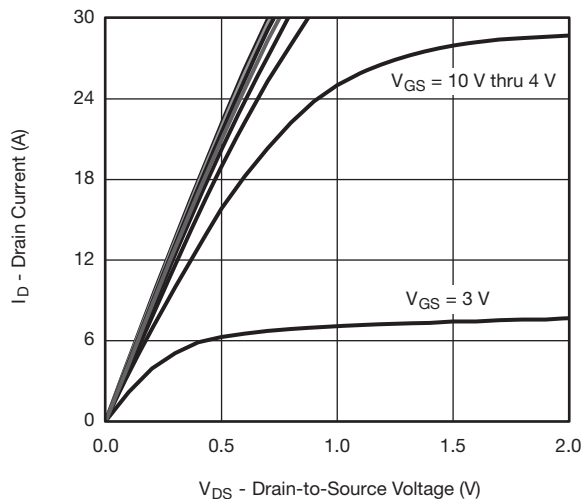
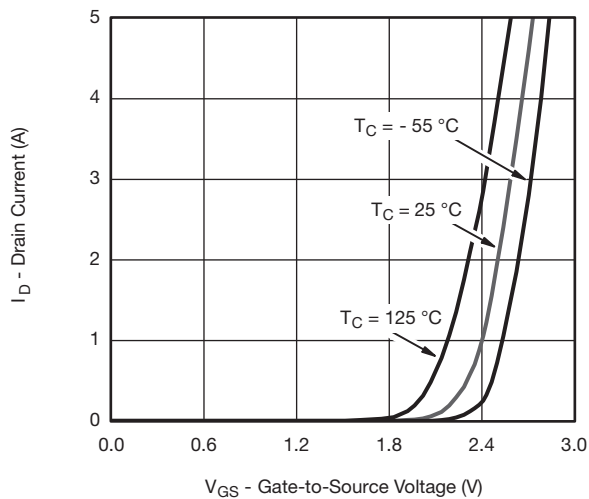
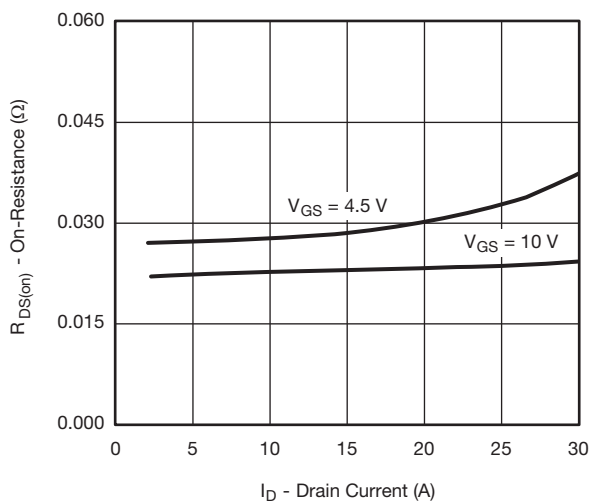
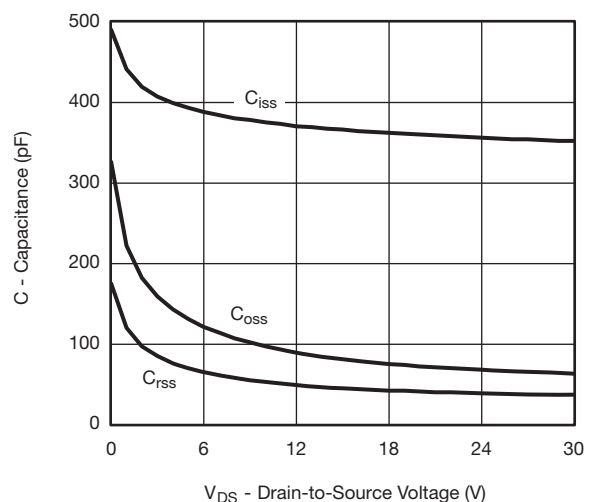
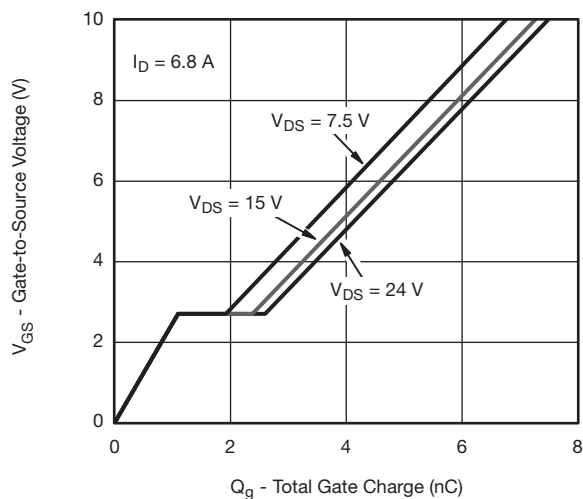
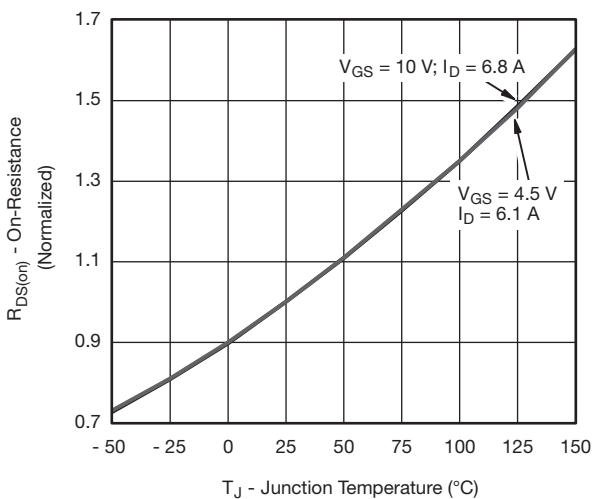
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



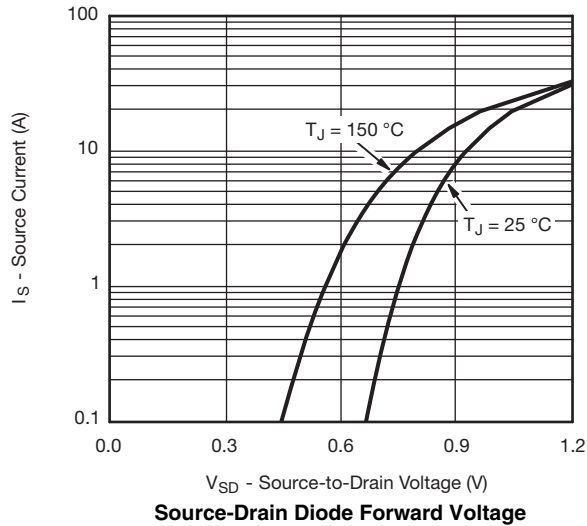
Normalized Thermal Transient Impedance, Junction-to-Ambient



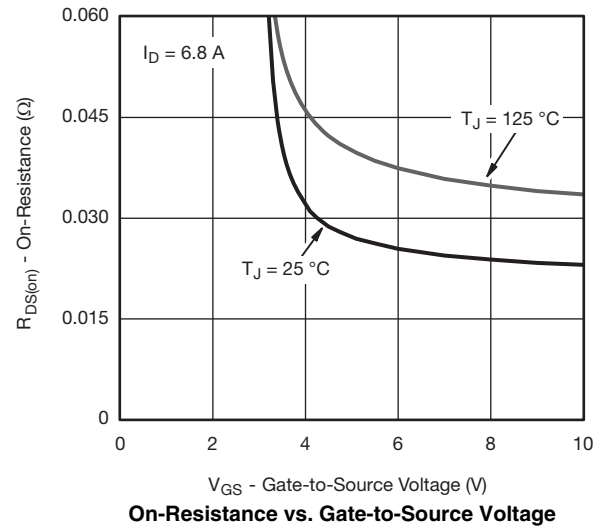
Normalized Thermal Transient Impedance, Junction-to-Foot

CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)**Output Characteristics****Transfer Characteristics****On-Resistance vs. Drain Current****Capacitance****Gate Charge****On-Resistance vs. Junction Temperature**

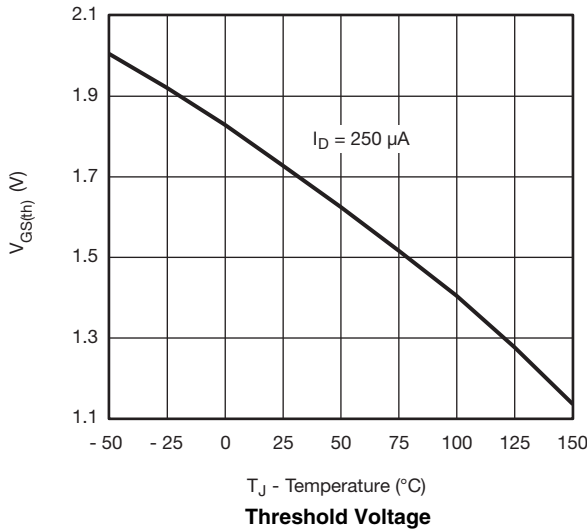
CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



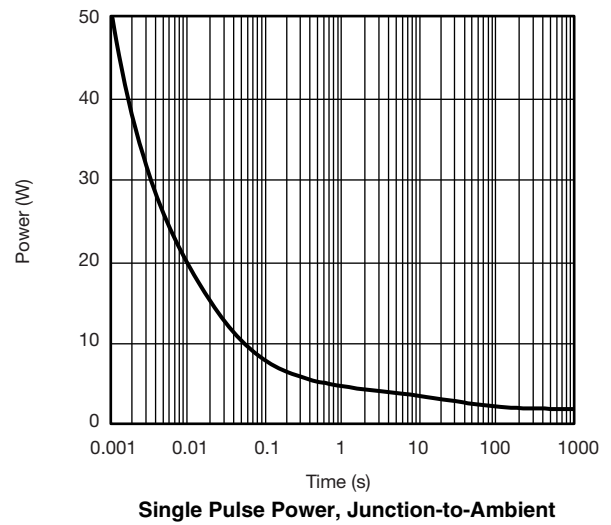
Source-Drain Diode Forward Voltage



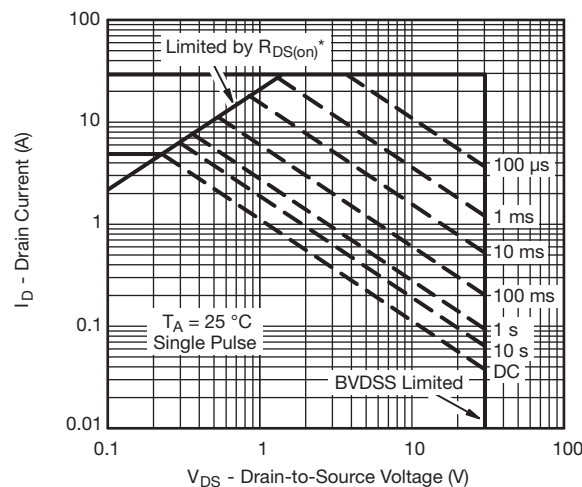
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

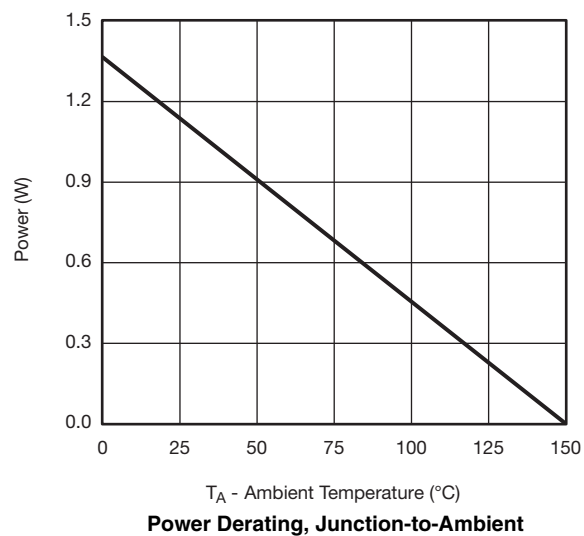
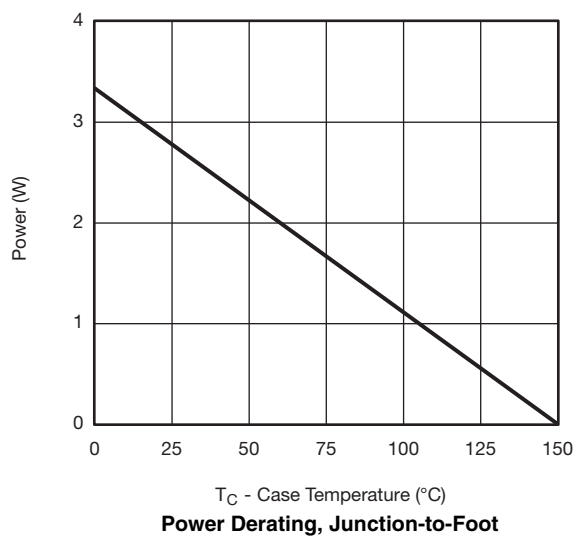
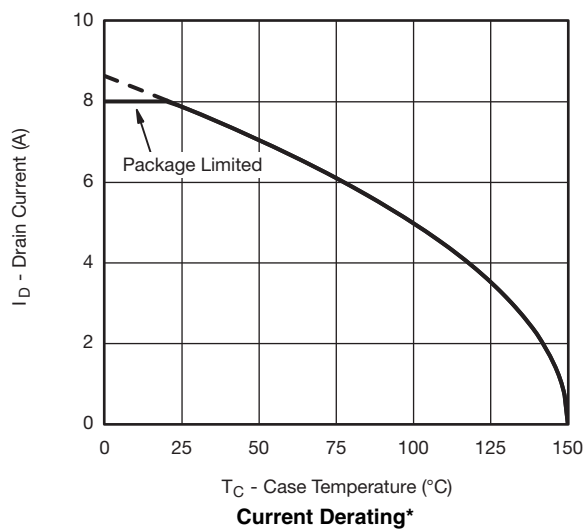


Single Pulse Power, Junction-to-Ambient



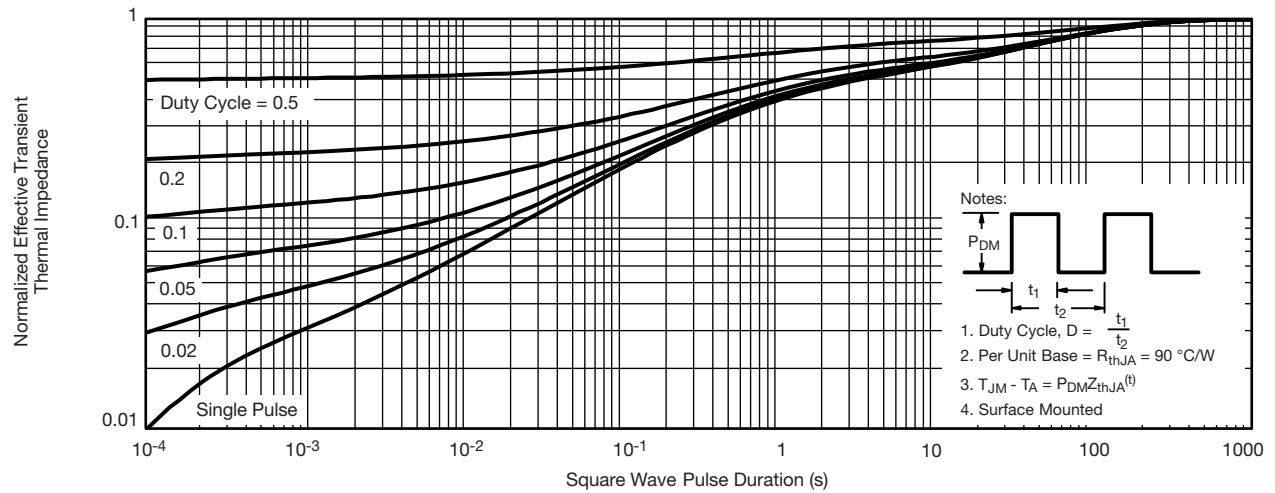
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

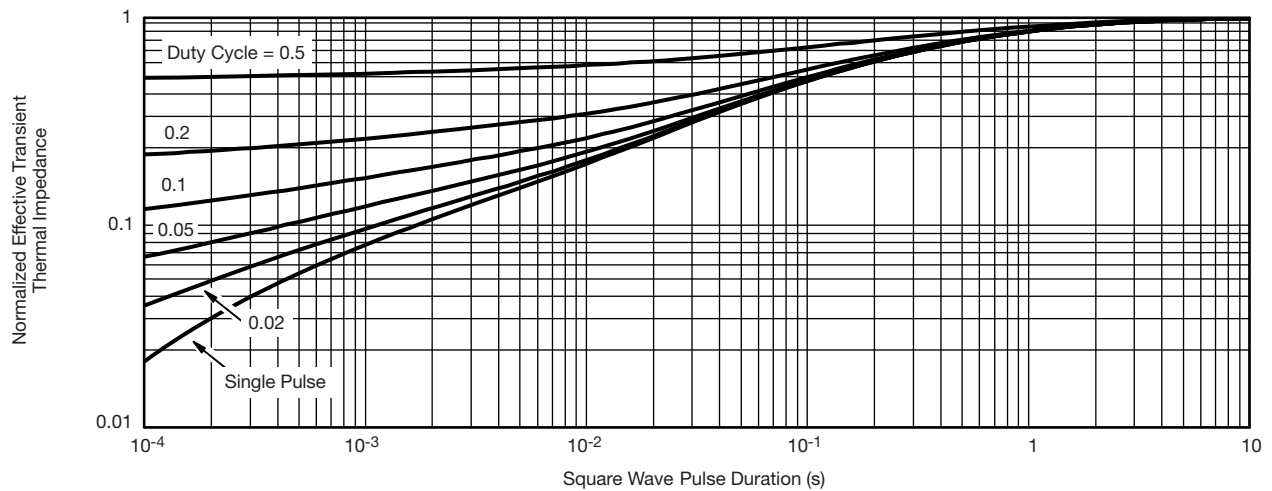
CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

* 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.

CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations.

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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