

Dual N-Channel 30-V (D-S) MOSFET with Schottky Diode

PRODUCT SUMMARY				
	V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
Channel-1	30	0.0160 at V _{GS} = 10 V	8.0 ^e	19
		0.0186 at V _{GS} = 4.5 V	8.0 ^e	
Channel-2	30	0.0264 at V _{GS} = 10 V	8.0 ^e	6
		0.0290 at V _{GS} = 4.5 V	8.0 ^e	

FEATURES

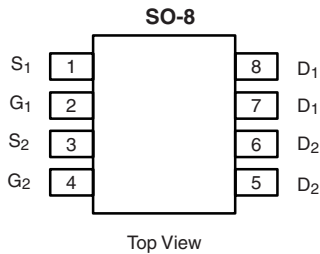
- Halogen-free According to IEC 61249-2-21 Definition
- SkyFET® Monolithic TrenchFET® Power MOSFET and Schottky Diode
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC



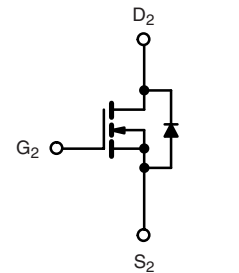
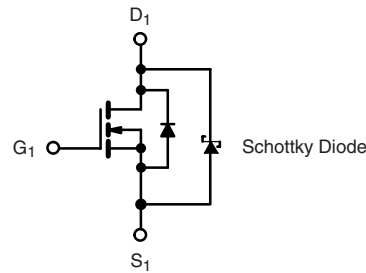
RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Notebook Logic DC-DC
- Low Current DC-DC



Ordering Information: Si4622DY-T1-E3 (Lead (Pb)-free)
Si4622DY-T1-GE3 (Lead (Pb)-free and Halogen-free)



ABSOLUTE MAXIMUM RATINGS T _A = 25 °C, unless otherwise noted				
Parameter	Symbol	Channel-1	Channel-2	Unit
Drain-Source Voltage	V _{DS}	30	30	V
Gate-Source Voltage	V _{GS}	± 20	± 16	
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C	8 ^e	A
		T _C = 70 °C	8 ^e	
		T _A = 25 °C	8 ^{b, c, e}	
		T _A = 70 °C	7.2 ^{b, c}	
Pulsed Drain Current (10 μs Pulse Width)	I _{DM}	60	30	
Source-Drain Current Diode Current	I _S	T _C = 25 °C	2.8	
		T _A = 25 °C	1.8 ^{b, c}	
Single Pulse Avalanche Current	I _{AS}	25	15	
Single Pulse Avalanche Energy	E _{AS}	31.2	11.2	mJ
Maximum Power Dissipation	P _D	T _C = 25 °C	3.3	W
		T _C = 70 °C	2.1	
		T _A = 25 °C	2.2 ^{b, c}	
		T _A = 70 °C	1.4 ^{b, c}	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150		°C

THERMAL RESISTANCE RATINGS						
Parameter	Symbol	Channel-1		Channel-2		Unit
		Typ.	Max.	Typ.	Max.	
Maximum Junction-to-Ambient ^{b, d}	R _{thJA}	45	56	55	62.5	°C/W
Maximum Junction-to-Foot (Drain)	R _{thJF}	29	38	33	40	

Notes:

- Based on T_C = 25 °C.
- Surface Mounted on 1" x 1" FR4 board.
- t = 10 s.
- Maximum under Steady State conditions is 110 °C/W (Channel-1) and 110 °C/W (Channel-2).
- Package limited.

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}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	Ch-1	30		V	
		$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	Ch-2	30			
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$	Ch-2		33	mV/ $^\circ\text{C}$	
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	$I_D = 250\text{ }\mu\text{A}$	Ch-2		- 4.7		
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 1\text{ mA}$	Ch-1	1.5		2.5	
		$V_{DS} = V_{GS}, I_D = 1\text{ mA}$	Ch-2	1		2.2	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	Ch-1			100	
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 16\text{ V}$	Ch-2			100	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	Ch-1		0.04	0.2	
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	Ch-2			1	
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 100\text{ }^\circ\text{C}$	Ch-1		4.4	44	mA
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 100\text{ }^\circ\text{C}$	Ch-2			5	μA
On-State Drain Current ^b	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	Ch-1	25		A	
		$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	Ch-2	20			
Drain-Source On-State Resistance ^b	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 9.6\text{ A}$	Ch-1		0.0132	0.0160	
		$V_{GS} = 10\text{ V}, I_D = 6.7\text{ A}$	Ch-2		0.022	0.0264	
		$V_{GS} = 4.5\text{ V}, I_D = 8.9\text{ A}$	Ch-1		0.0155	0.0186	
		$V_{GS} = 4.5\text{ V}, I_D = 6.4\text{ A}$	Ch-2		0.0240	0.0290	
Forward Transconductance ^b	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 9.6\text{ A}$	Ch-1		94	S	
		$V_{DS} = 15\text{ V}, I_D = 6.7\text{ A}$	Ch-2		10		
Dynamic^a							
Input Capacitance	C_{iss}	Channel-1 $V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	Ch-1		2458	pF	
			Ch-2		760		
Output Capacitance	C_{oss}		Ch-1		385		
			Ch-2		110		
Reverse Transfer Capacitance	C_{rss}	Channel-2 $V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	Ch-1		150		
			Ch-2		50		
Total Gate Charge	Q_g		$V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V}, I_D = 9.6\text{ A}$	Ch-1		40	60
			$V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V}, I_D = 6.7\text{ A}$	Ch-2		13.2	20
		Channel-1 $V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 9.6\text{ A}$	Ch-1		19	29	
			Ch-2		6	12	
Gate-Source Charge	Q_{gs}	Channel-2 $V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 6.7\text{ A}$	Ch-1		8	nC	
Gate-Drain Charge	Q_{gd}		Ch-2		2.1		
			Ch-1		6		
			Ch-2		1.4		
Gate Resistance	R_g	$f = 1\text{ MHz}$	Ch-1	0.26	1.3	2.6	
			Ch-2	0.62	3.1	6.2	



SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted							
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Dynamic^a							
Turn-On Delay Time	$t_{d(on)}$	Channel-1 $V_{DD} = 15\text{ V}$, $R_L = 2\ \Omega$ $I_D \cong 7.7\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 1\ \Omega$	Ch-1		14	21	ns
			Ch-2		8	16	
Rise Time	t_r		Ch-1		8	16	
			Ch-2		10	20	
Turn-Off Delay Time	$t_{d(off)}$	Channel-2 $V_{DD} = 15\text{ V}$, $R_L = 2.8\ \Omega$ $I_D \cong 5.3\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 1\ \Omega$	Ch-1		25	38	
			Ch-2		17	26	
Fall Time	t_f		Ch-1		9	18	
			Ch-2		8	15	
Turn-On Delay Time	$t_{d(on)}$	Channel-1 $V_{DD} = 15\text{ V}$, $R_L = 2\ \Omega$ $I_D \cong 7.7\text{ A}$, $V_{GEN} = 4.5\text{ V}$, $R_g = 1\ \Omega$	Ch-1		27	35	
			Ch-2		14	21	
Rise Time	t_r		Ch-1		15	23	
			Ch-2		12	18	
Turn-Off Delay Time	$t_{d(off)}$	Channel-2 $V_{DD} = 15\text{ V}$, $R_L = 2.8\ \Omega$ $I_D \cong 5.3\text{ A}$, $V_{GEN} = 4.5\text{ V}$, $R_g = 1\ \Omega$	Ch-1		29	44	
			Ch-2		21	32	
Fall Time	t_f		Ch-1		11	17	
			Ch-2		11	17	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$	Ch-1			2.8	A
			Ch-2				
Pulse Diode Forward Current ^a	I_{SM}		Ch-1			60	
			Ch-2				
Body Diode Voltage	V_{SD}	$I_S = 2\text{ A}$	Ch-1		0.57	0.68	V
		$I_S = 5.3\text{ A}$	Ch-2		0.8	1.2	
Body Diode Reverse Recovery Time	t_{rr}	Channel-1 $I_F = 7.7\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^\circ\text{C}$	Ch-1		26	39	ns
			Ch-2		17	26	
Body Diode Reverse Recovery Charge	Q_{rr}	Channel-2 $I_F = 5.3\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^\circ\text{C}$	Ch-1		15	23	nC
			Ch-2		8	16	
Reverse Recovery Fall Time	t_a		Ch-1		13		ns
			Ch-2		10		
Reverse Recovery Rise Time	t_b		Ch-1		13		
			Ch-2		7		

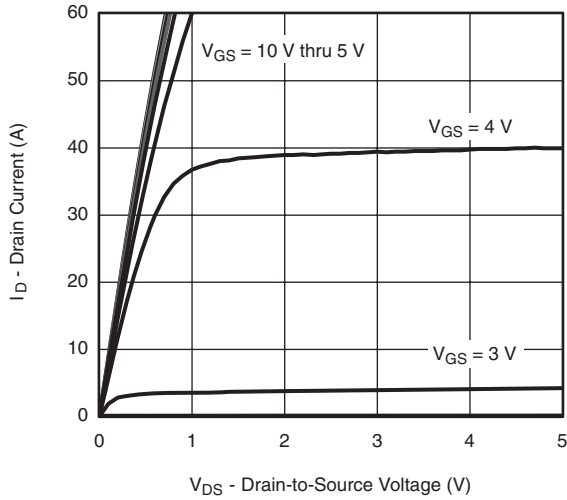
Notes:

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

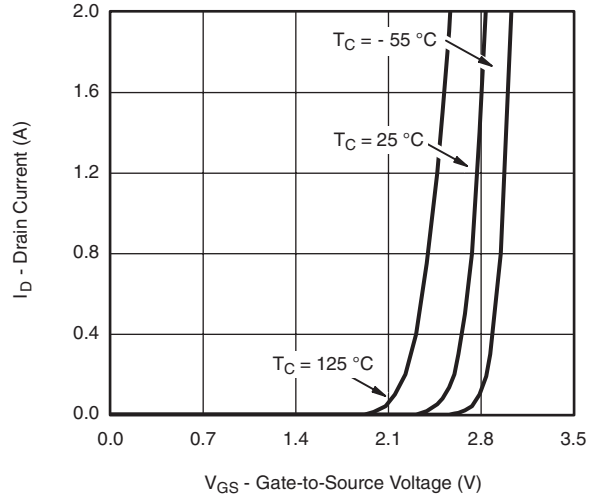
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



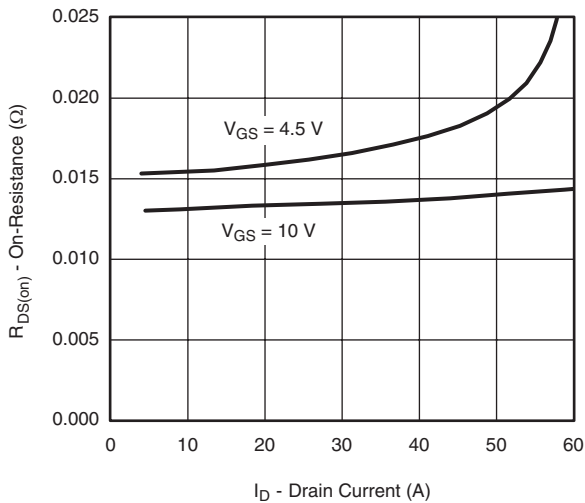
CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



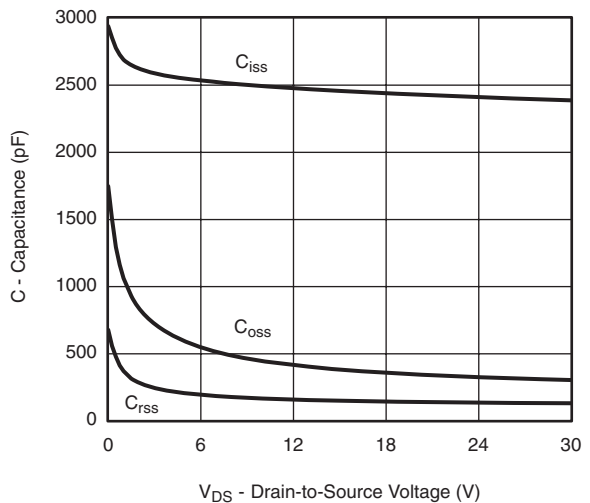
Output Characteristics



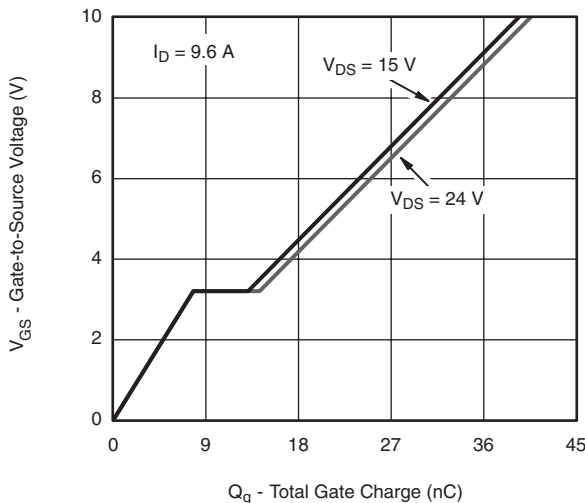
Transfer Characteristics



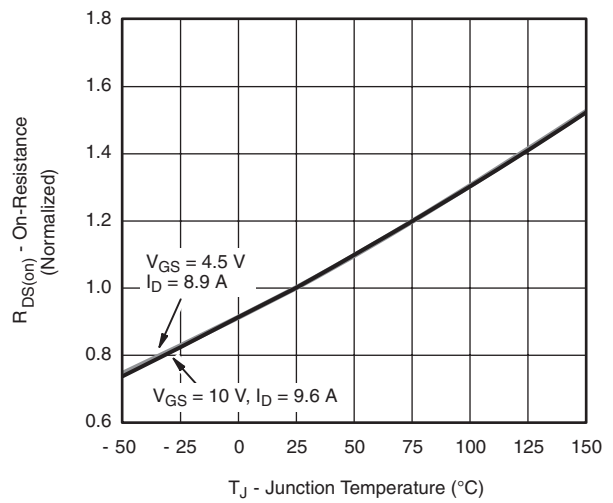
On-Resistance vs. Drain Current



Capacitance



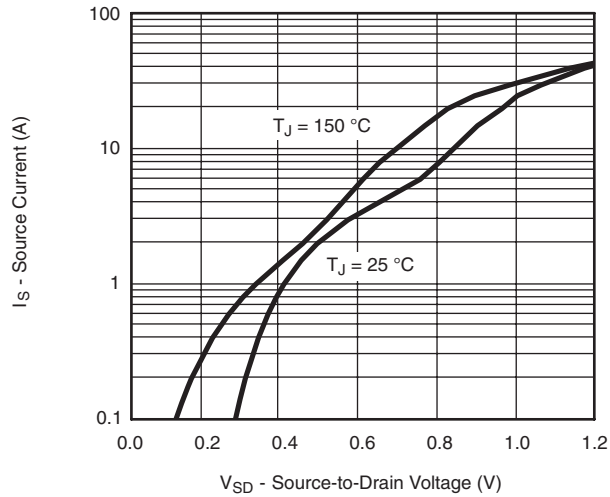
Gate Charge



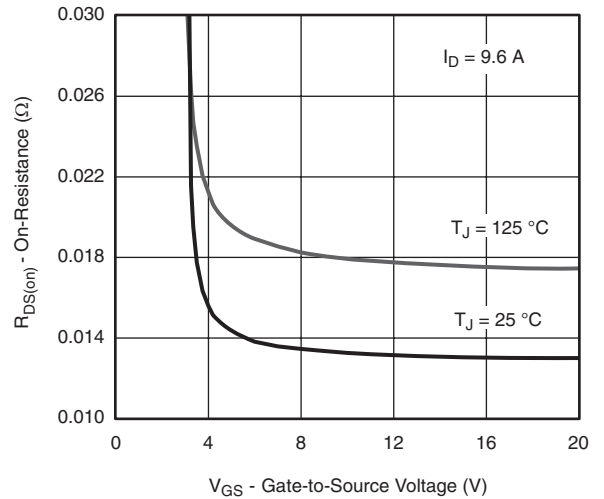
On-Resistance vs. Junction Temperature



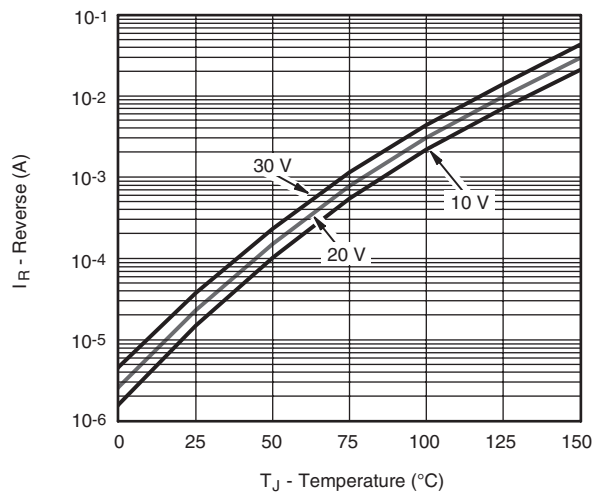
CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



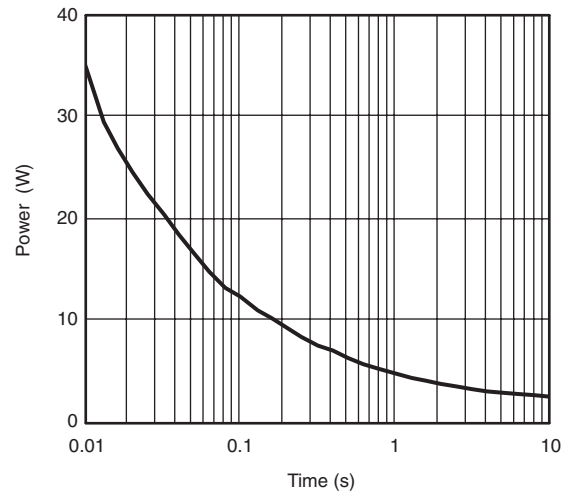
Source-Drain Diode Forward Voltage



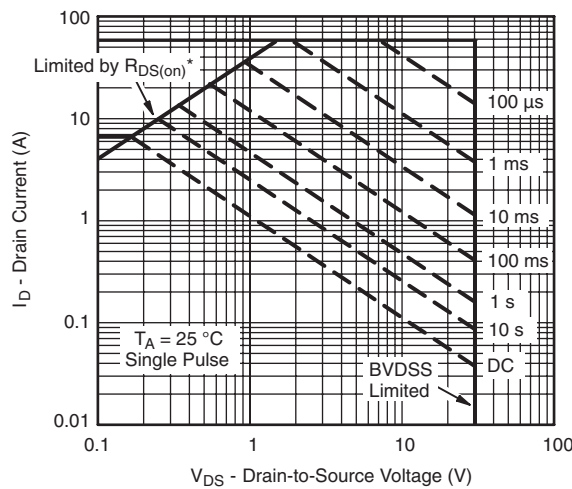
On-Resistance vs. Gate-to-Source Voltage



Reverse Current (Schottky)



Single Pulse Power, Junction-to-Ambient

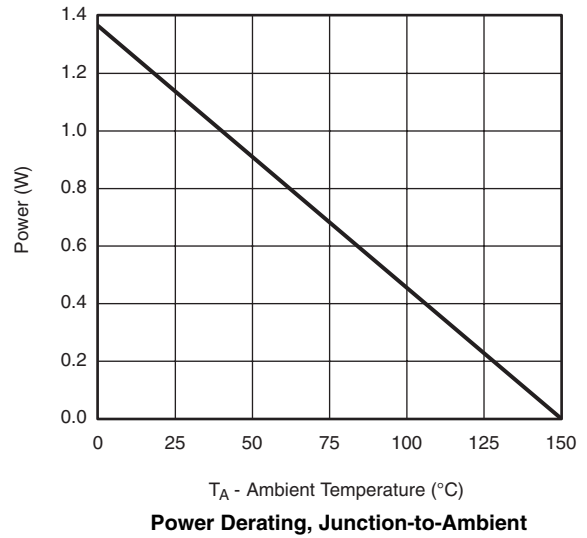
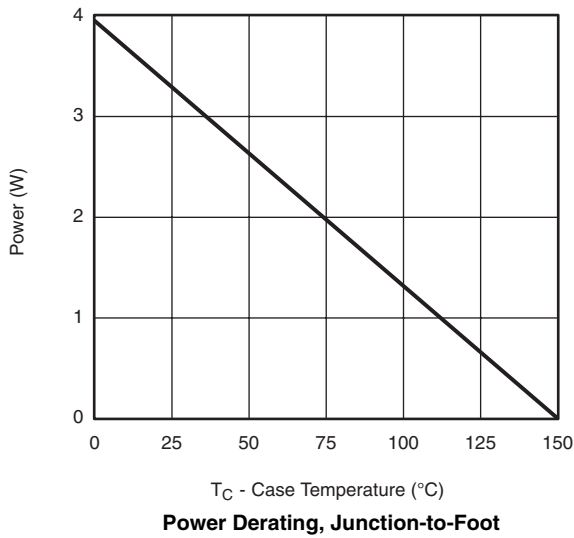
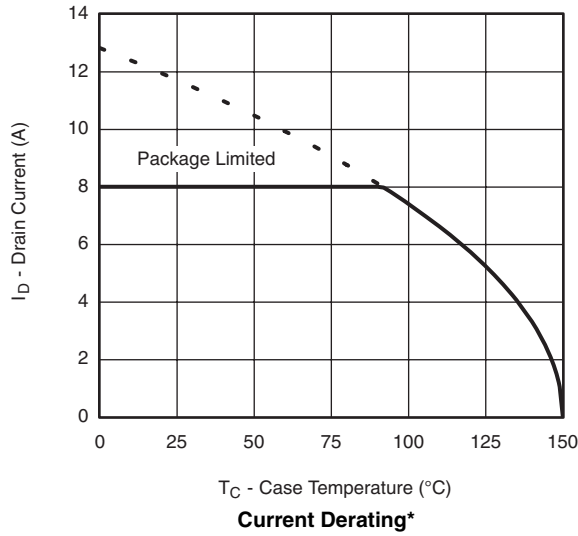


* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient



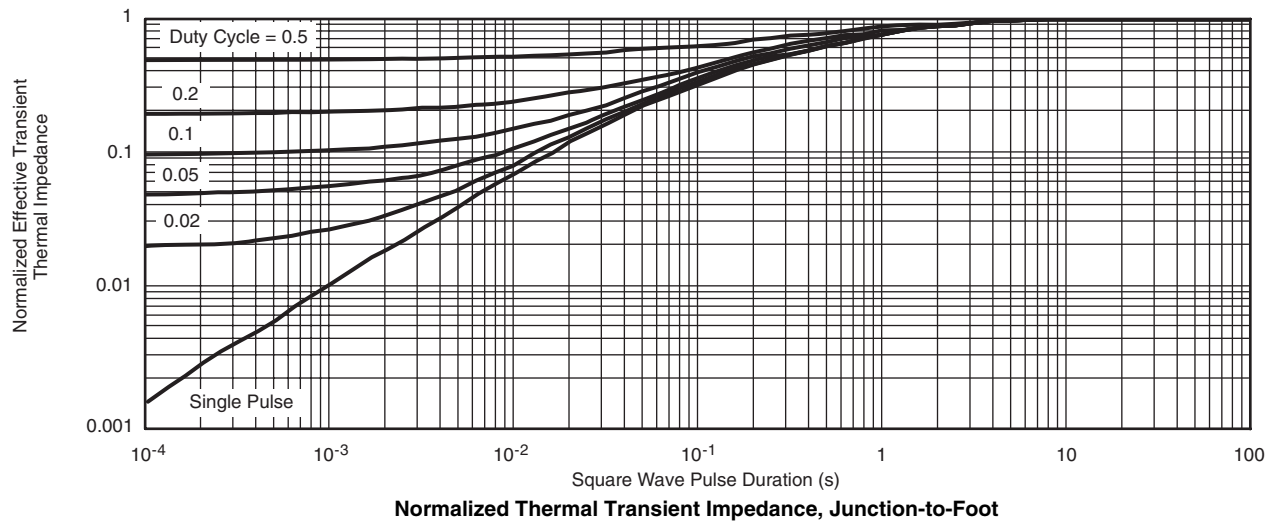
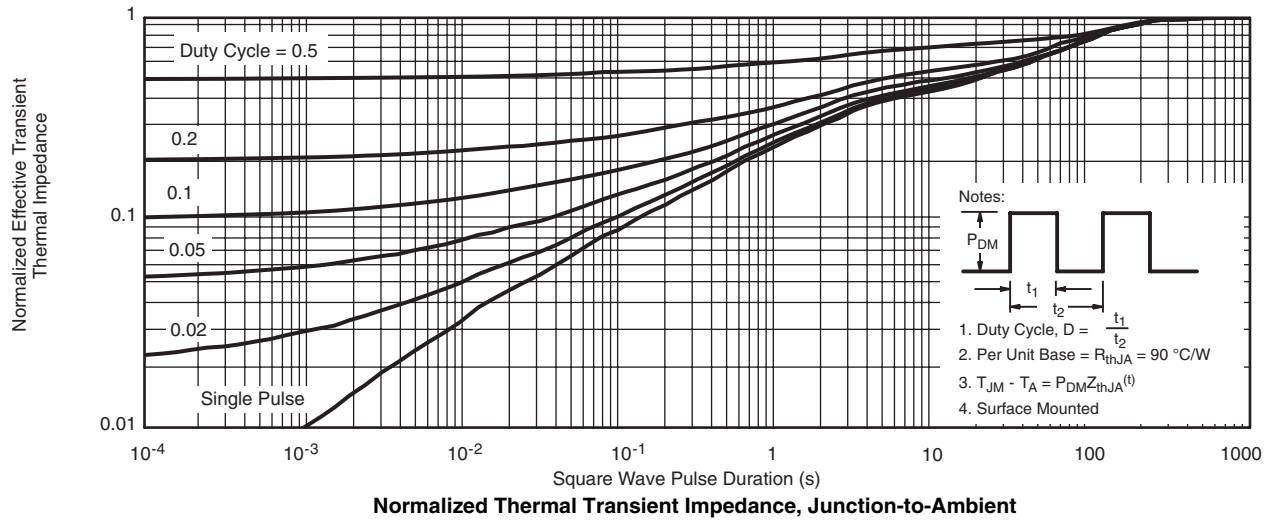
CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



* 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.

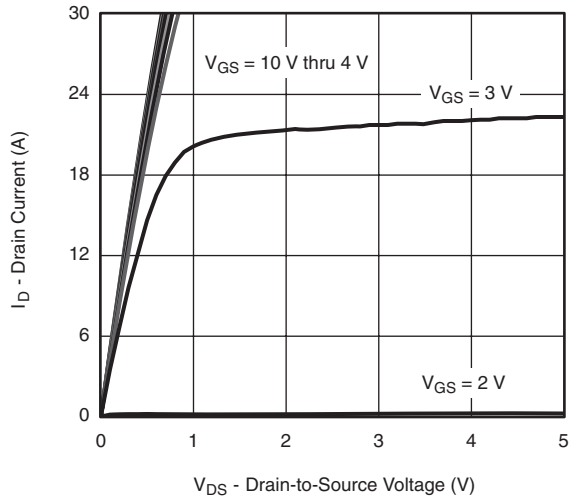


CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

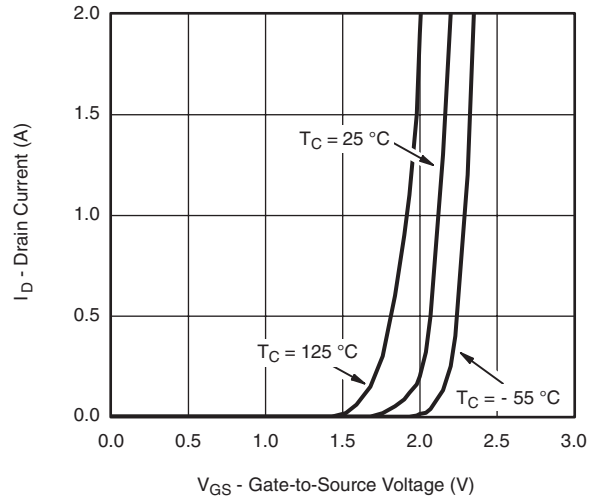




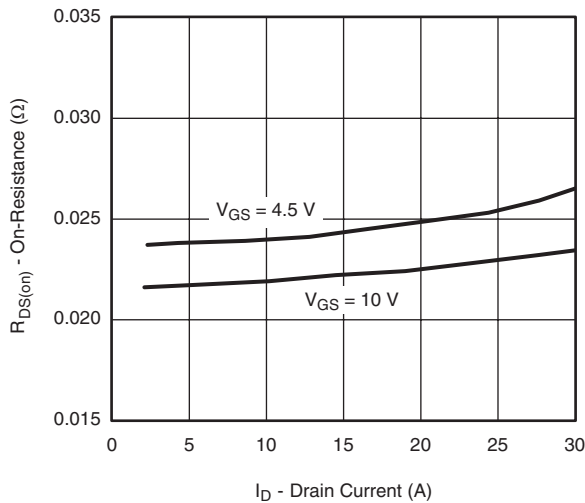
CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



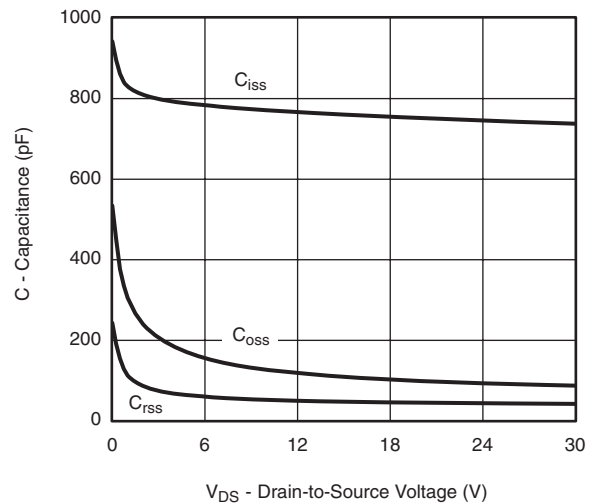
Output Characteristics



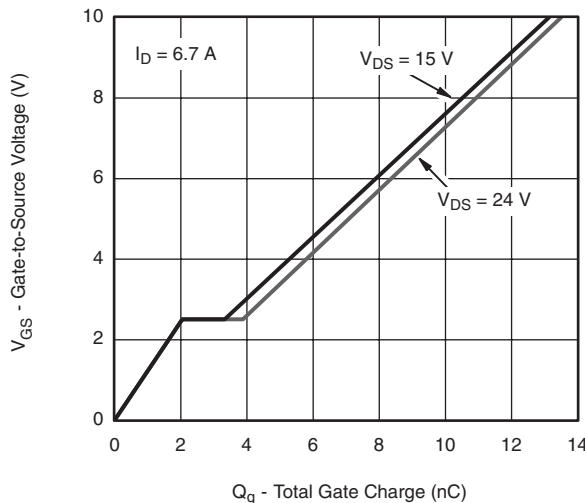
Transfer Characteristics



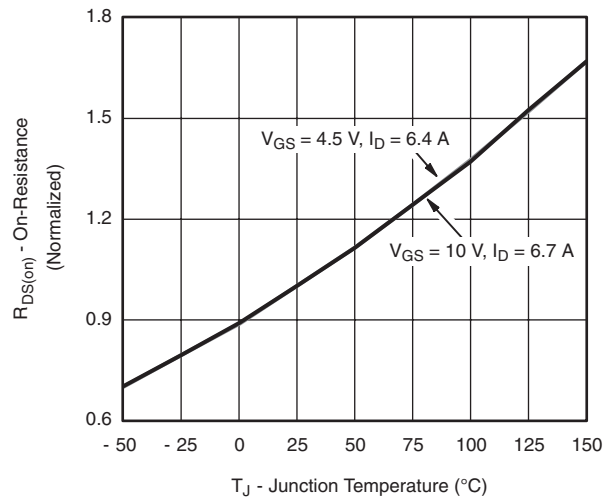
On-Resistance vs. Drain Current



Capacitance



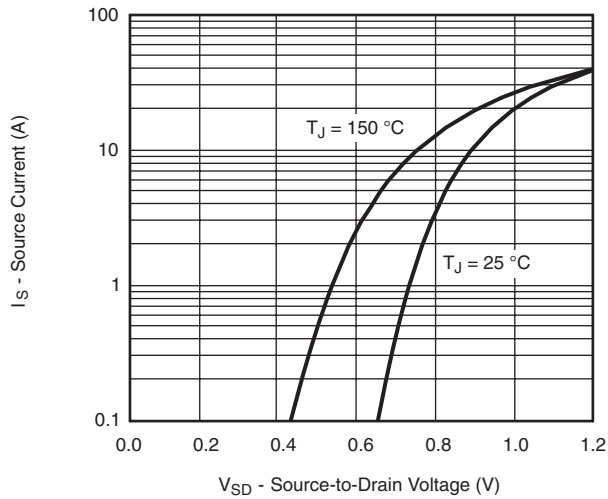
Gate Charge



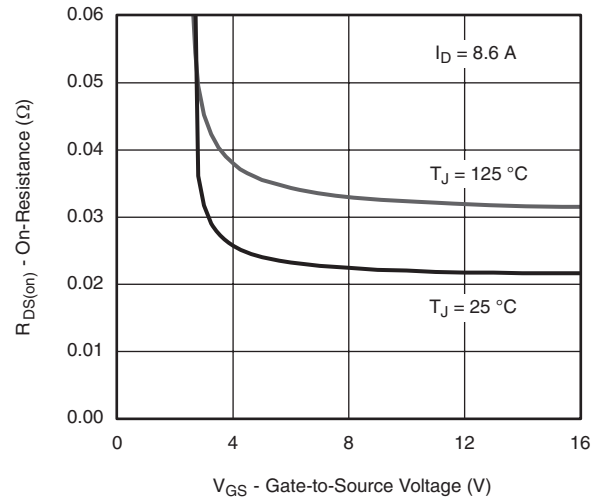
On-Resistance vs. Junction Temperature



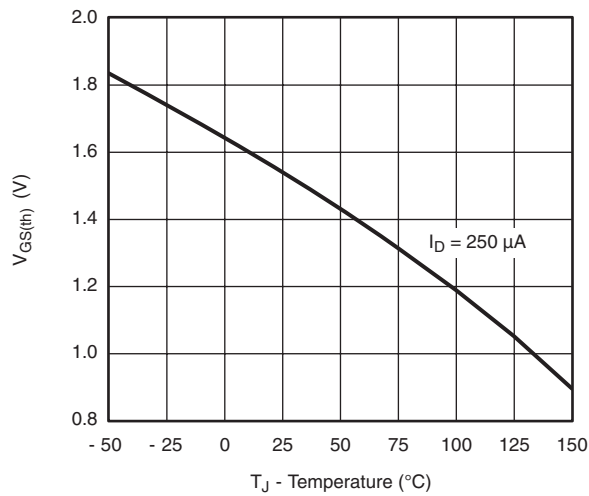
CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



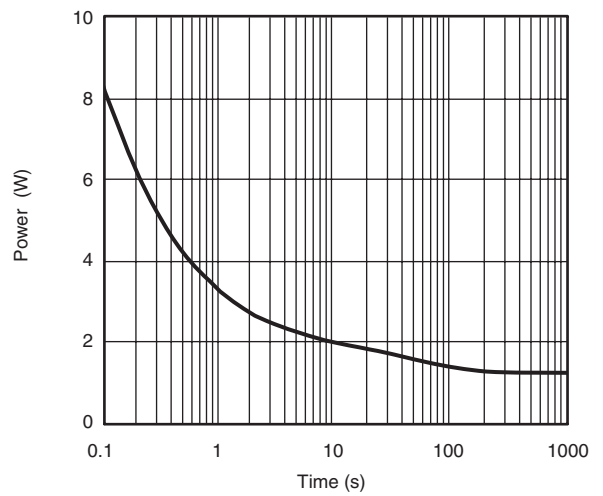
Source-Drain Diode Forward Voltage



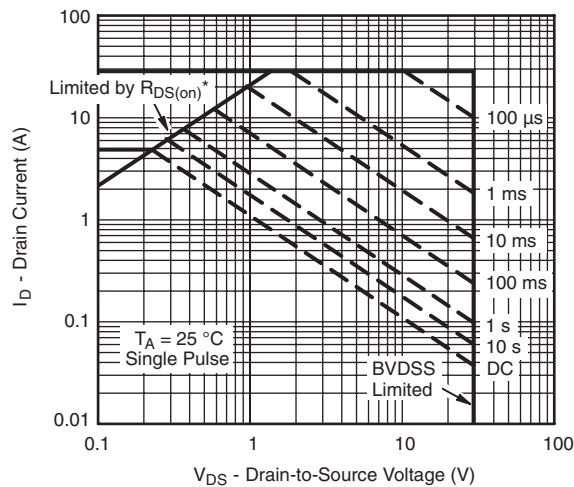
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient

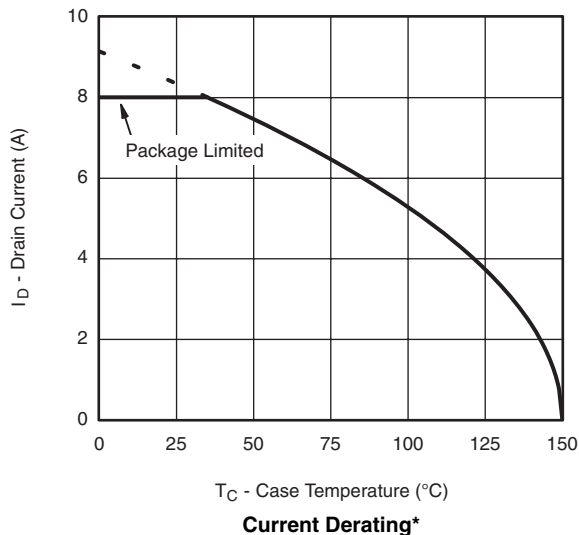


* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

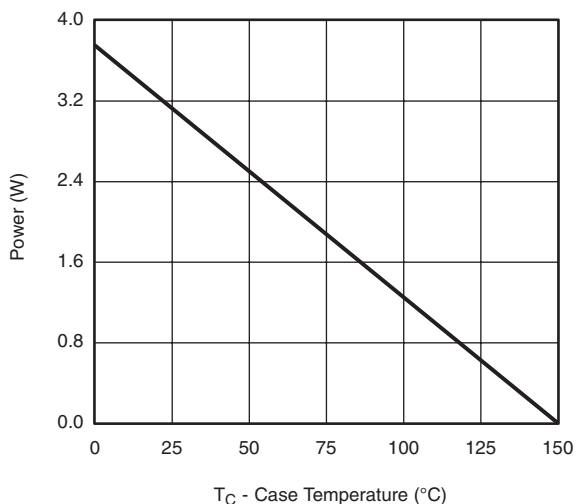
Safe Operating Area, Junction-to-Ambient



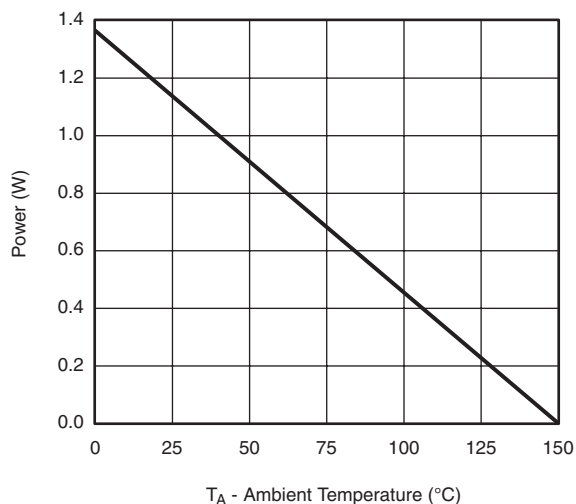
CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*



Power Derating, Junction-to-Foot

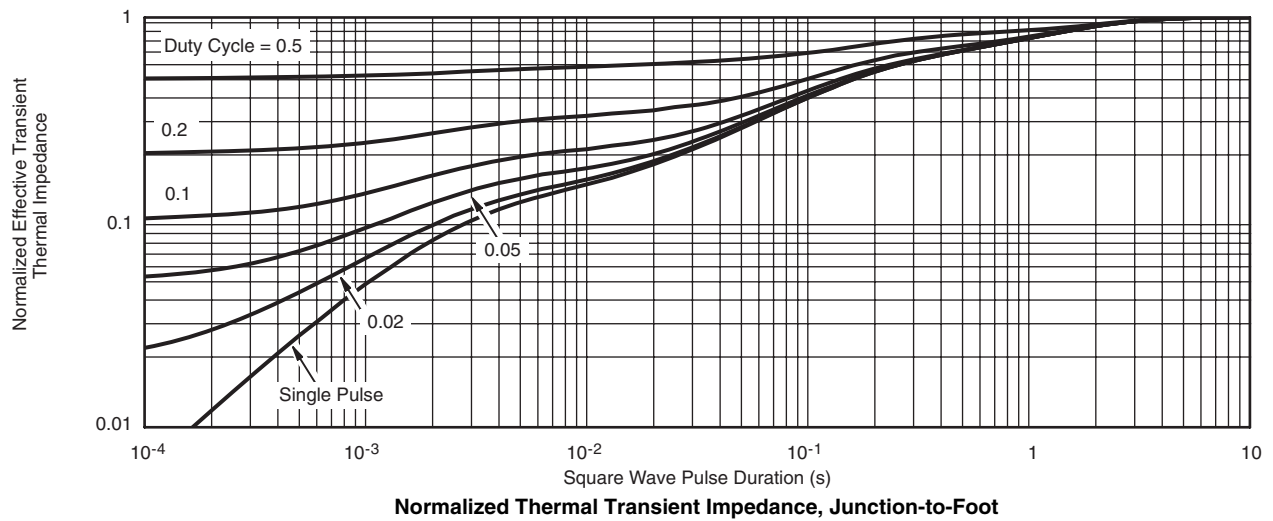
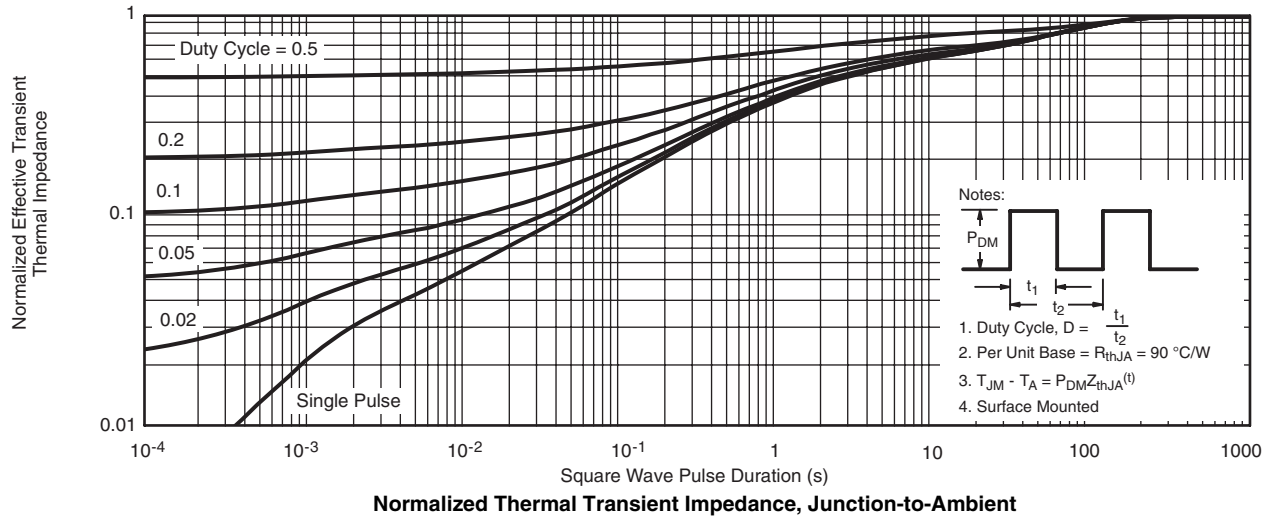


Power Derating, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)} = 150\text{ °C}$, 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

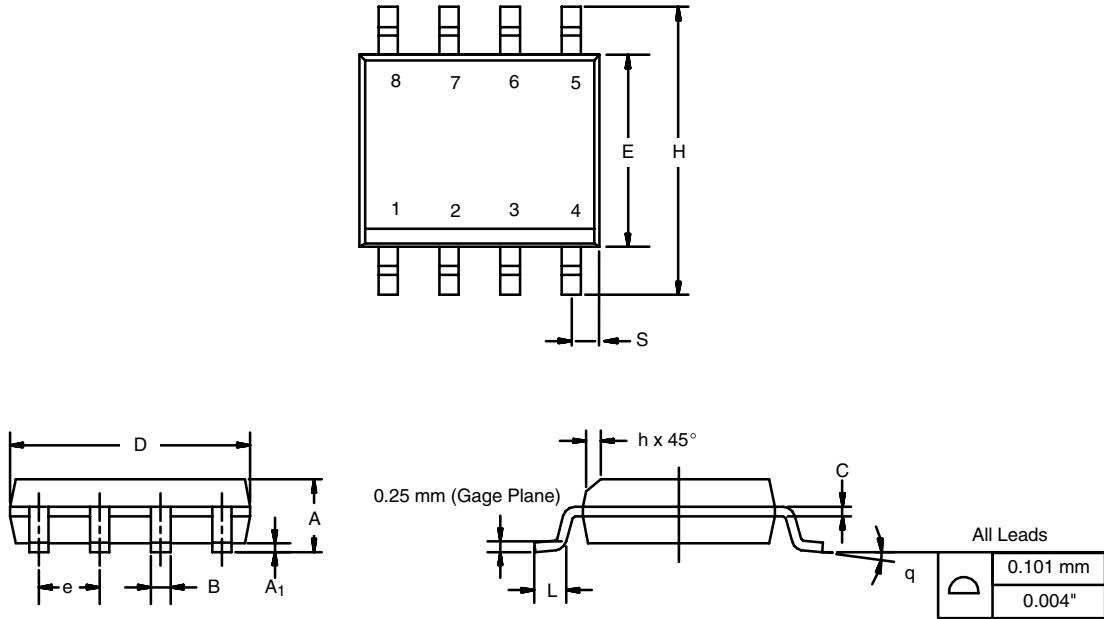


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SOIC (NARROW): 8-LEAD

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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