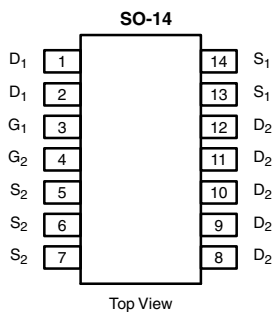


Dual N-Channel 20 V (D-S) MOSFET with Schottky Diode

PRODUCT SUMMARY				
	V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
Channel-1	20	0.0085 at V _{GS} = 10 V	14.8	8.1
		0.0115 at V _{GS} = 4.5 V	12.8	
Channel-2	20	0.0070 at V _{GS} = 10 V	22	8.4
		0.0095 at V _{GS} = 4.5 V	18.9	

SCHOTTKY PRODUCT SUMMARY		
V _{DS} (V)	V _{SD} (V) Diode Forward Voltage	I _F (A)
20	0.55 V at 2.5 A	2



FEATURES

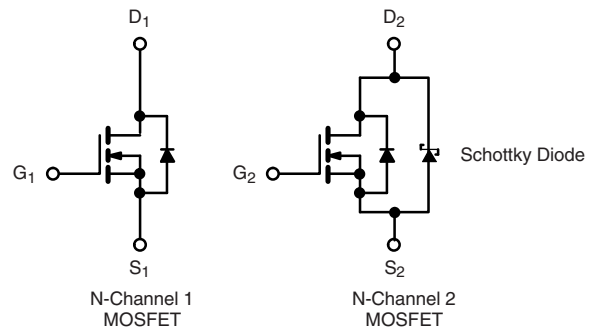
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- 100 % R_g Tested
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- DC/DC Converters, Synchronous Buck Converters
 - Game Stations
 - Notebook PC Logic



Ordering Information: Si4340DDY-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}	20		V	
Gate-Source Voltage	V _{GS}	± 20			
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C	14.8	22	A
		T _C = 70 °C	11.8	17.6	
		T _A = 25 °C	12.1 ^{b, c}	16.3 ^{b, c}	
		T _A = 70 °C	9.7 ^{b, c}	13 ^{b, c}	
Pulsed Drain Current (t = 300 μs)	I _{DM}	50	60	A	
Source-Drain Current Diode Current	I _S	T _C = 25 °C	2.5		4.5
		T _A = 25 °C	1.7 ^{b, c}	2.5 ^{b, c}	
Single Pulse Avalanche Current	I _{AS}	15		mJ	
Single Pulse Avalanche Energy	E _{AS}	11.25			
Maximum Power Dissipation	P _D	T _C = 25 °C	3	5.4	W
		T _C = 70 °C	1.9	3.5	
		T _A = 25 °C	2 ^{b, c}	3 ^{b, c}	
		T _A = 70 °C	1.3 ^{b, c}	1.9 ^{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}	53	62.5	35	42	°C/W	
Maximum Junction-to-Foot (Drain)	R _{thJF}	35	42	18	23		

Notes:

a. Based on T_C = 25 °C.

b. Surface mounted on 1" x 1" FR4 board.

c. t = 10 s.

d. Maximum under steady state conditions for channel 1 is 110 °C/W and channel 2 is 87 °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}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	Ch-1	20			V
		$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	Ch-2	20			
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$	Ch-1		20		mV/ $^\circ\text{C}$
		$I_D = 25\text{ mA}$	Ch-2		22		
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	$I_D = 250\text{ }\mu\text{A}$	Ch-1		- 4.4		
		$I_D = 25\text{ mA}$	Ch-2		- 4.6		
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	Ch-1	1		2.5	V
		$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	Ch-2	1		2.5	
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	Ch-1			100	nA
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	Ch-2			100	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$	Ch-1			1	μA
		$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$	Ch-2			100	
		$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$	Ch-1			15	
		$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$	Ch-2			10 000	
On-State Drain Current ^b	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	Ch-1	20			A
		$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	Ch-2	30			
Drain-Source On-State Resistance ^b	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 11.5\text{ A}$	Ch-1		0.0065	0.0085	Ω
		$V_{GS} = 10\text{ V}, I_D = 15.2\text{ A}$	Ch-2		0.0060	0.0070	
		$V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$	Ch-1		0.0091	0.0115	
		$V_{GS} = 4.5\text{ V}, I_D = 14\text{ A}$	Ch-2		0.0077	0.0095	
Forward Transconductance ^b	g_{fs}	$V_{DS} = 10\text{ V}, I_D = 11.5\text{ A}$	Ch-1		28		S
		$V_{DS} = 10\text{ V}, I_D = 15.2\text{ A}$	Ch-2		44		
Dynamic^a							
Input Capacitance	C_{iss}	Channel-1 $V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	Ch-1		862		pF
Output Capacitance	C_{oss}		Ch-2		956		
Reverse Transfer Capacitance	C_{rss}	Channel-2 $V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	Ch-1		280		
			Ch-2		363		
Total Gate Charge	Q_g	$V_{DS} = 10\text{ V}, V_{GS} = 10\text{ V}, I_D = 12\text{ A}$	Ch-1		17.4	26	nC
			Ch-2		17.8	27	
		Channel-1 $V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 12\text{ A}$	Ch-1		8.1	12.5	
			Ch-2		8.4	12.5	
Gate-Source Charge	Q_{gs}	Channel-2 $V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 12\text{ A}$	Ch-1		2.2		
Gate-Drain Charge	Q_{gd}		Ch-2		2.6		
Gate Resistance	R_g	$f = 1\text{ MHz}$	Ch-1		2.2	4.4	Ω
			Ch-2		2.6	5.2	

Notes:

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



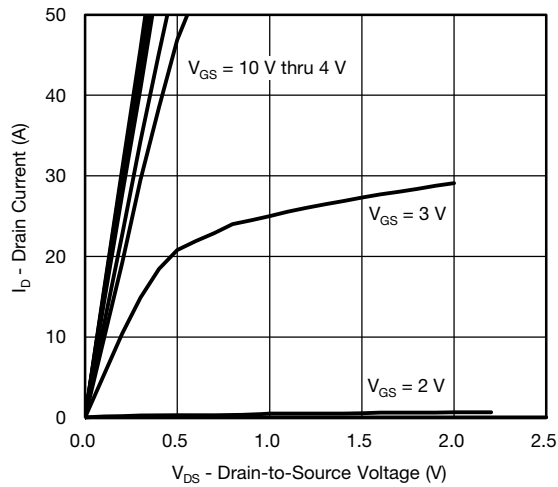
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)							
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Dynamic^a							
Turn-On Delay Time	$t_{d(on)}$	Channel-1 $V_{DD} = 10\text{ V}, R_L = 1\ \Omega$ $I_D = 10\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\ \Omega$	Ch-1		18	35	ns
			Ch-2		20	40	
Rise Time	t_r		Ch-1		37	70	
			Ch-2		34	65	
Turn-Off Delay Time	$t_{d(off)}$	Channel-2 $V_{DD} = 10\text{ V}, R_L = 1\ \Omega$ $I_D = 10\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\ \Omega$	Ch-1		19	35	
			Ch-2		21	40	
Fall Time	t_f		Ch-1		10	20	
			Ch-2		10	20	
Turn-On Delay Time	$t_{d(on)}$	Channel-1 $V_{DD} = 10\text{ V}, R_L = 1\ \Omega$ $I_D = 10\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\ \Omega$	Ch-1		9	18	
			Ch-2		9	18	
Rise Time	t_r		Ch-1		13	26	
			Ch-2		13	26	
Turn-Off Delay Time	$t_{d(off)}$	Channel-2 $V_{DD} = 10\text{ V}, R_L = 1\ \Omega$ $I_D = 10\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\ \Omega$	Ch-1		16	32	
			Ch-2		15	30	
Fall Time	t_f		Ch-1		8	16	
			Ch-2		8	16	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$	Ch-1			2.5	A
			Ch-2			4.5	
Pulse Diode Forward Current ^a	I_{SM}		Ch-1			50	
			Ch-2			60	
Body Diode Voltage	V_{SD}	$I_S = 5\text{ A}$	Ch-1		0.76	1.2	V
		$I_S = 2.5\text{ A}$	Ch-2		0.43	0.55	
Body Diode Reverse Recovery Time	t_{rr}	Channel-1 $I_F = 9.2\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$	Ch-1		18	36	ns
			Ch-2		18	36	
Body Diode Reverse Recovery Charge	Q_{rr}		Ch-1		7	14	nC
			Ch-2		7	14	
Reverse Recovery Fall Time	t_a	Channel-2 $I_F = 2.5\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$	Ch-1		8		ns
			Ch-2		10		
Reverse Recovery Rise Time	t_b		Ch-1		9		
			Ch-2		9		

Notes:

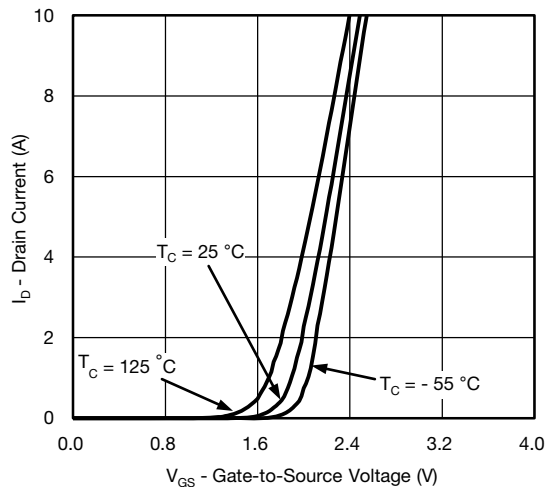
- a. Guaranteed by design, not subject to production testing.
- b. Pulse test; pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.

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.

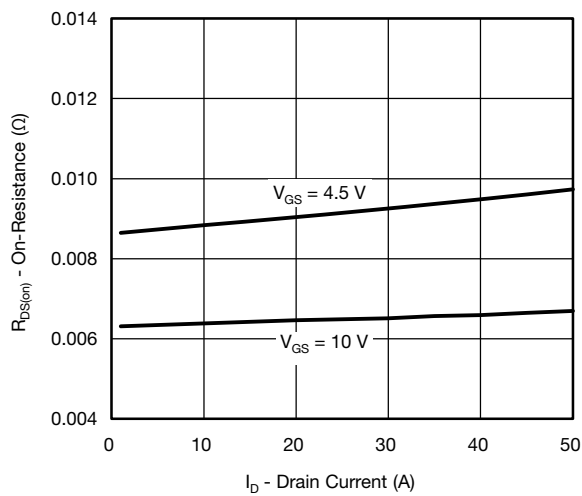
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



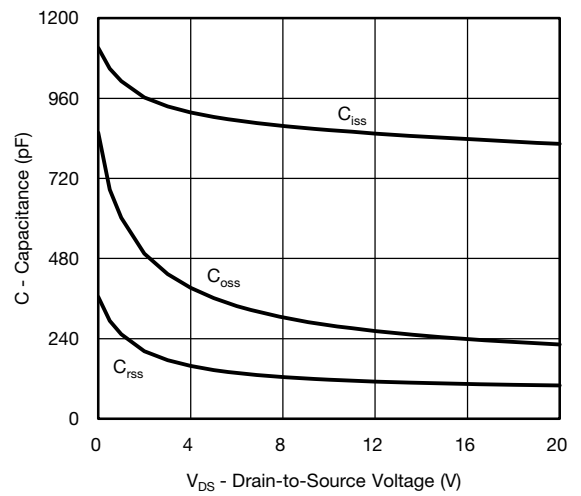
Output Characteristics



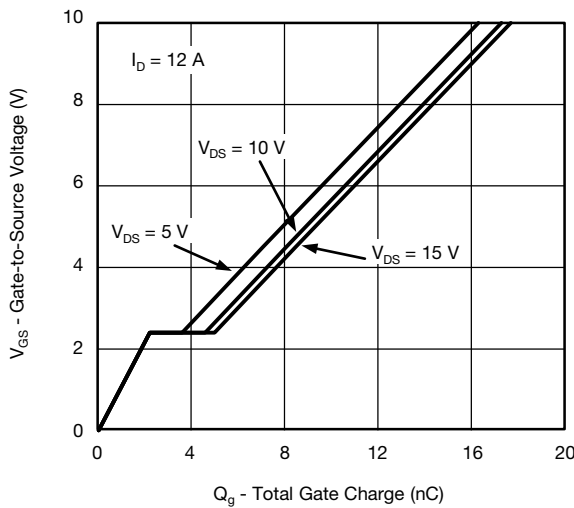
Transfer Characteristics



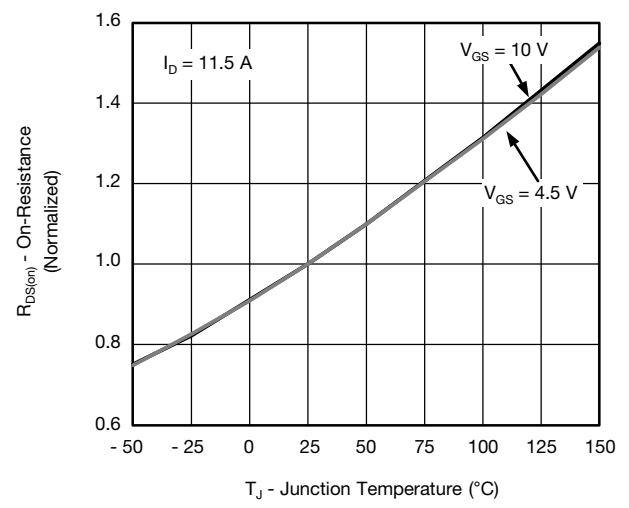
On-Resistance vs. Drain Current



Capacitance

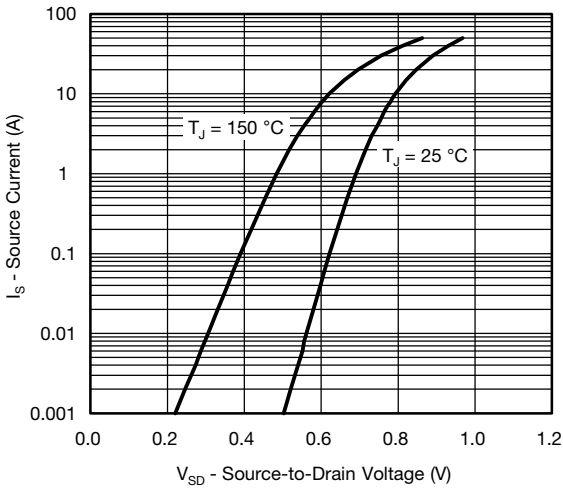


Gate Charge

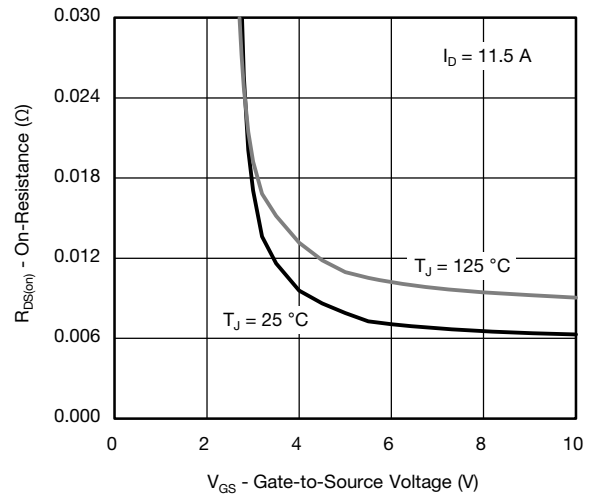


On-Resistance vs. Junction Temperature

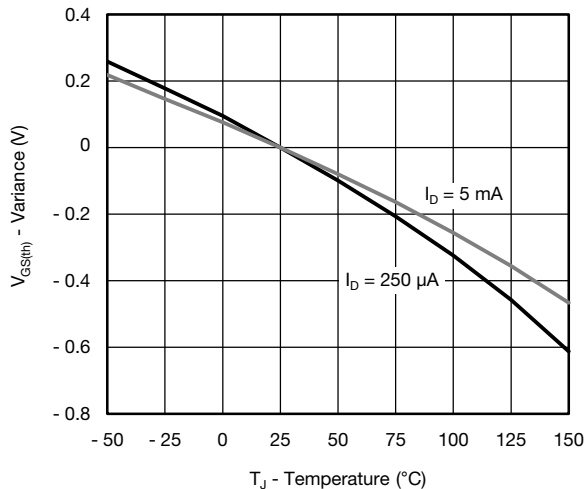
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



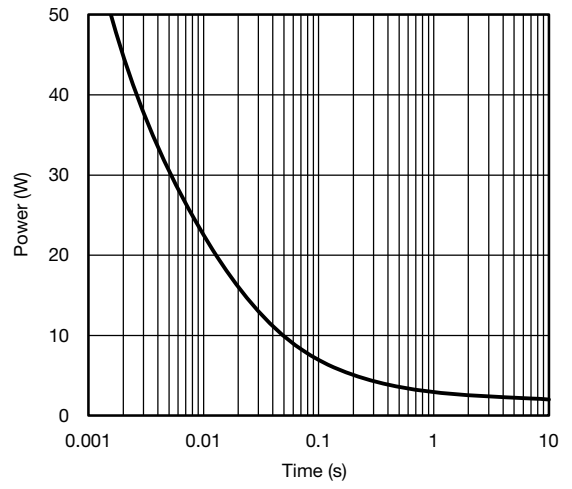
Source-Drain Diode Forward Voltage



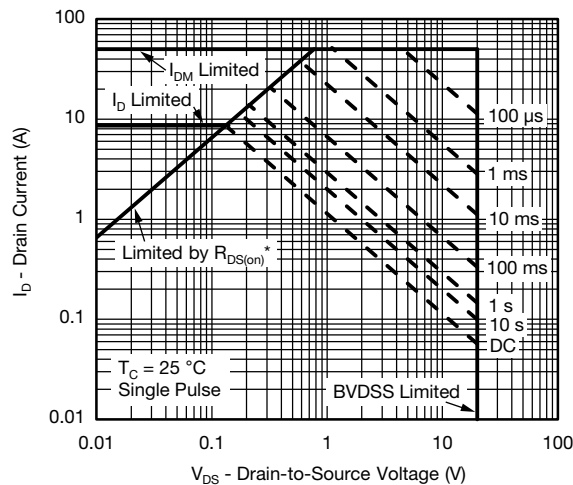
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



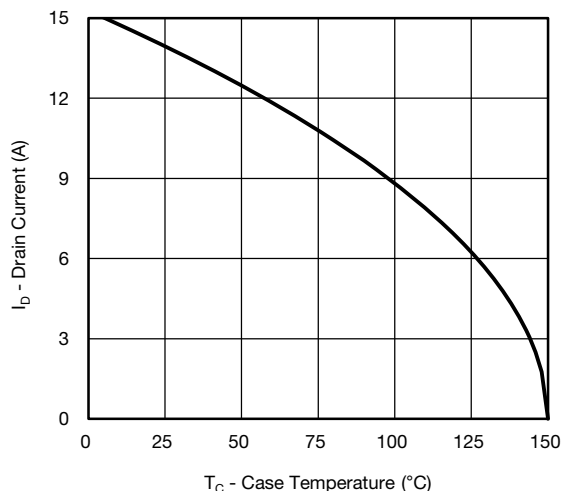
Single Pulse Power



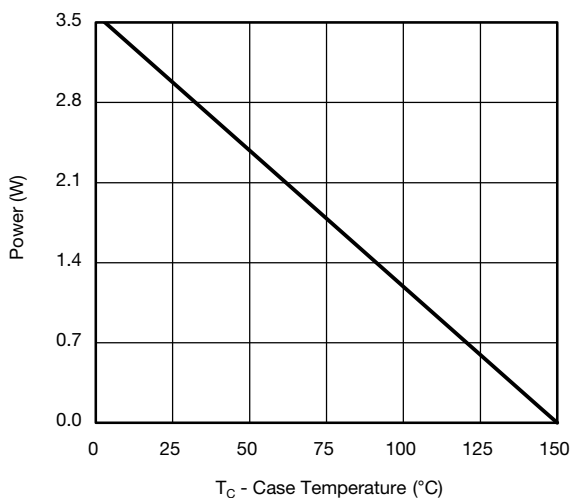
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

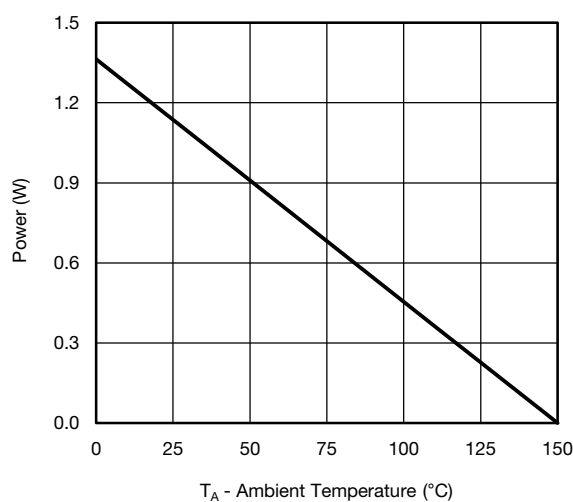
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



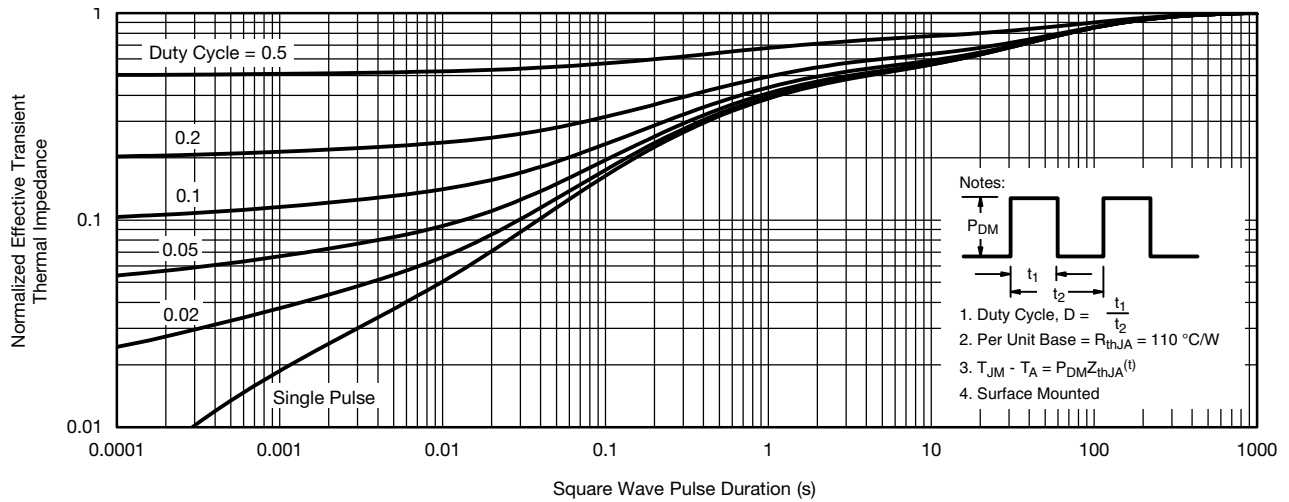
Power Derating, Junction-to-Foot



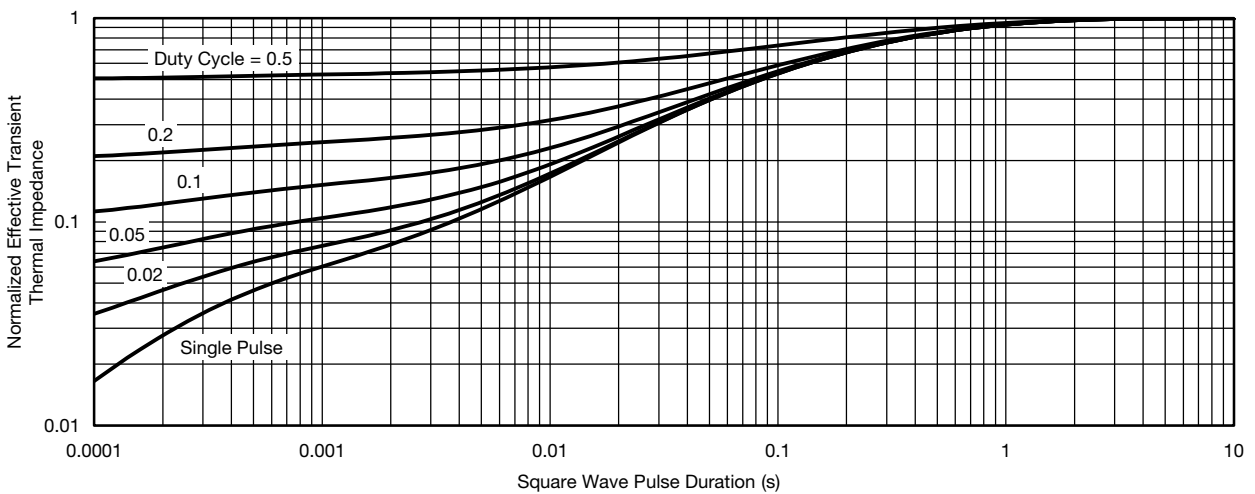
Power Derating, Junction-to-Ambient

* 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.

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

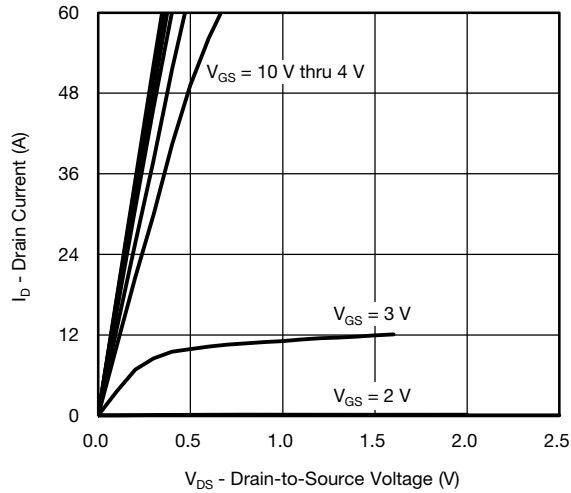


Normalized Thermal Transient Impedance, Junction-to-Ambient

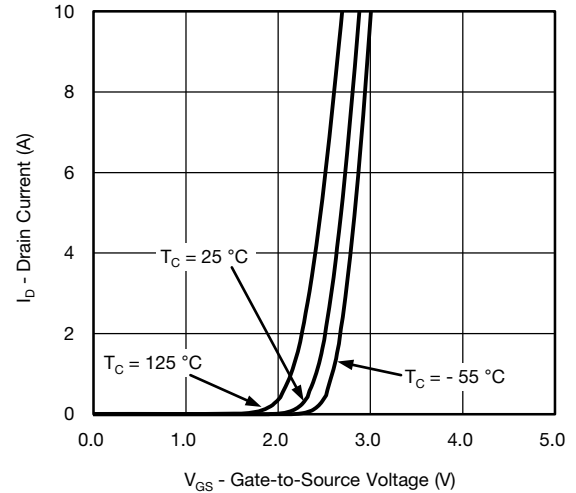


Normalized Thermal Transient Impedance, Junction-to-Foot

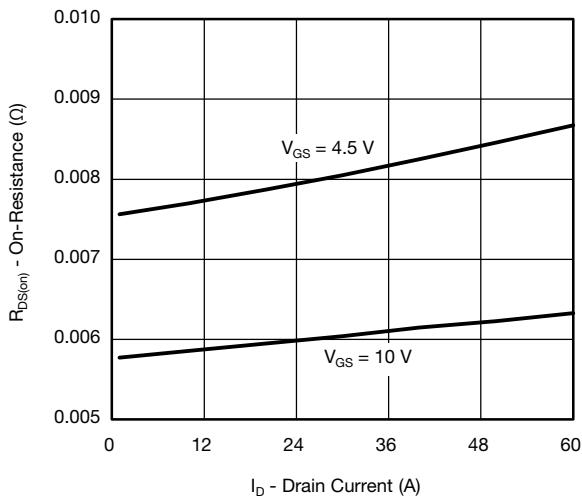
CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



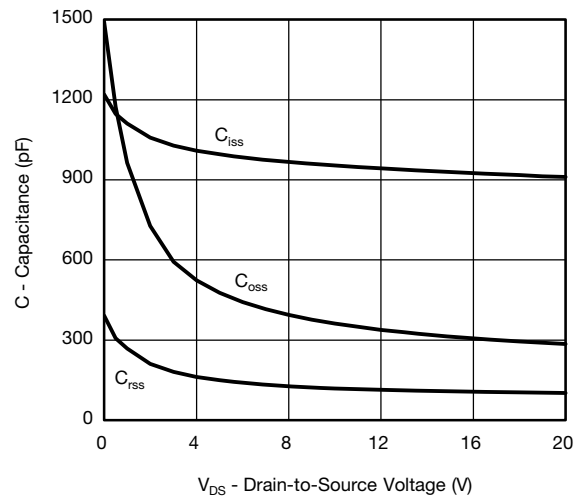
Output Characteristics



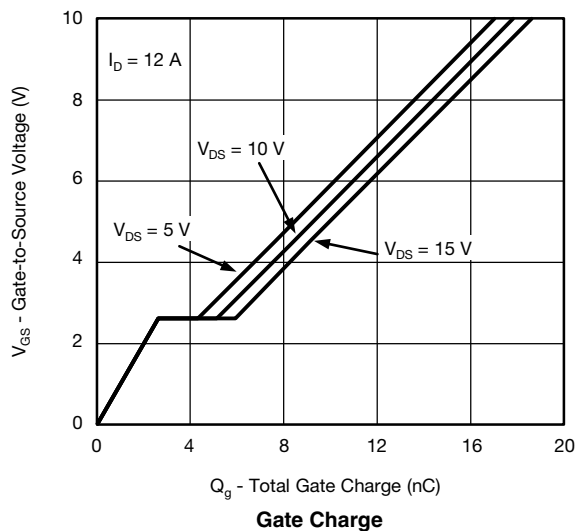
Transfer Characteristics



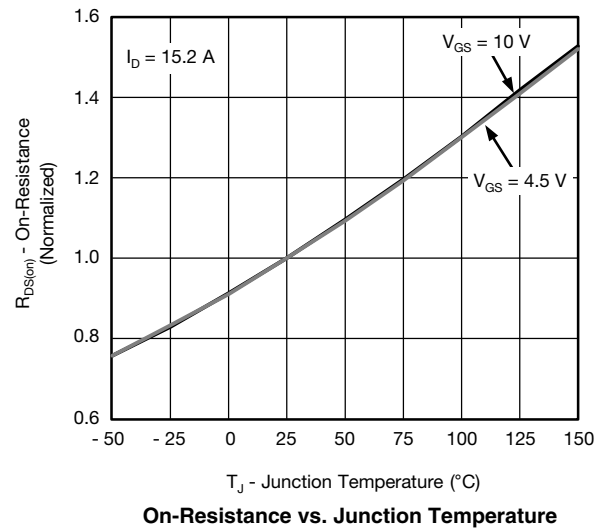
On-Resistance vs. Drain Current



Capacitance

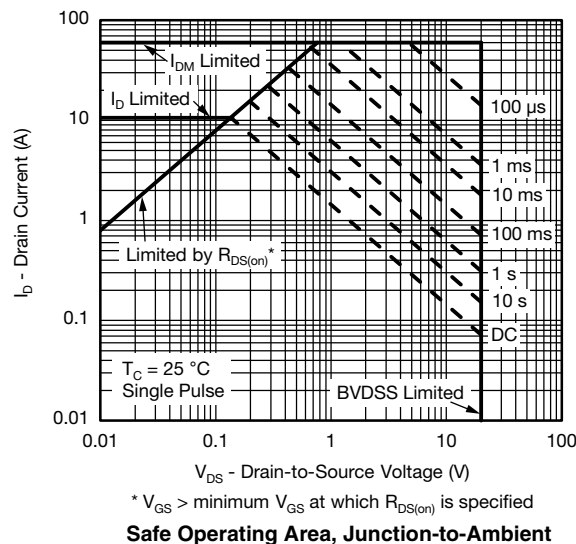
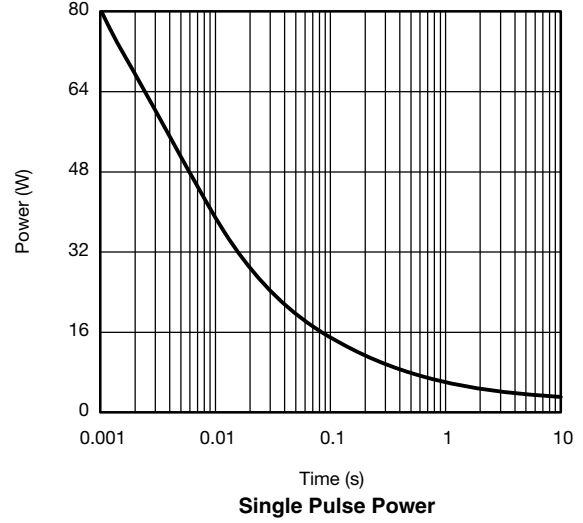
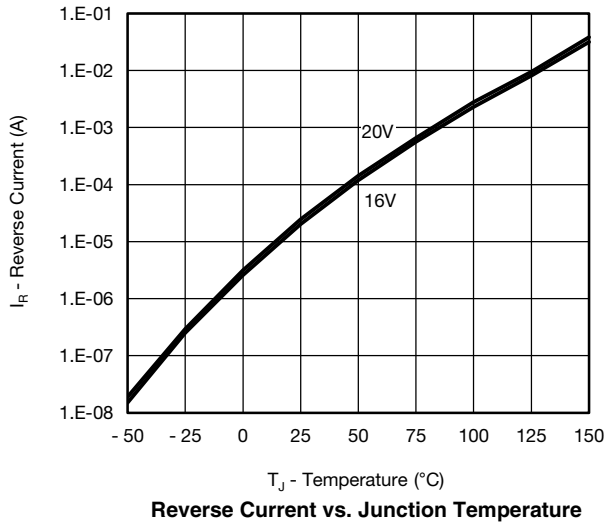
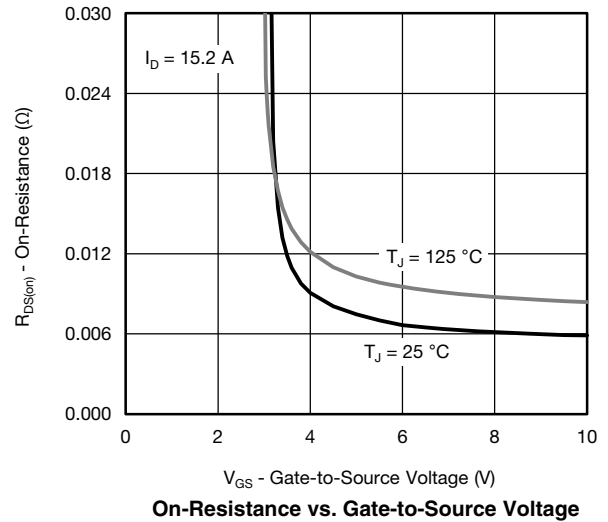
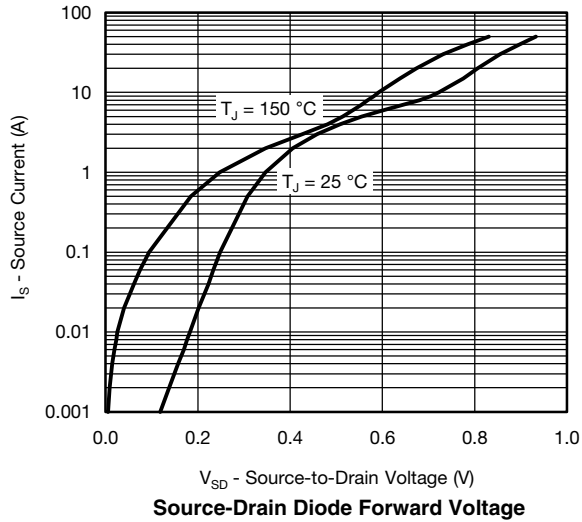


Gate Charge

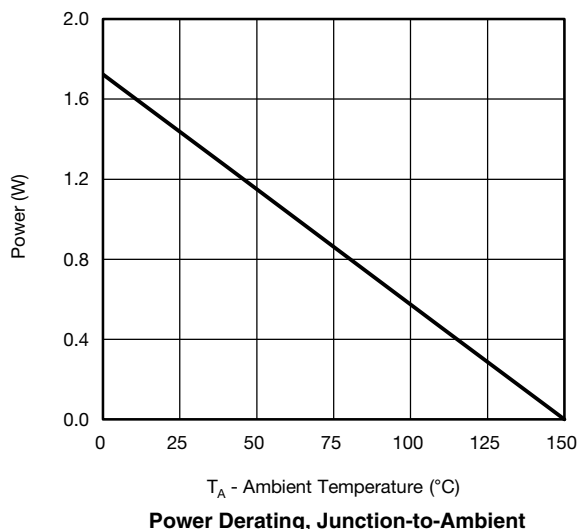
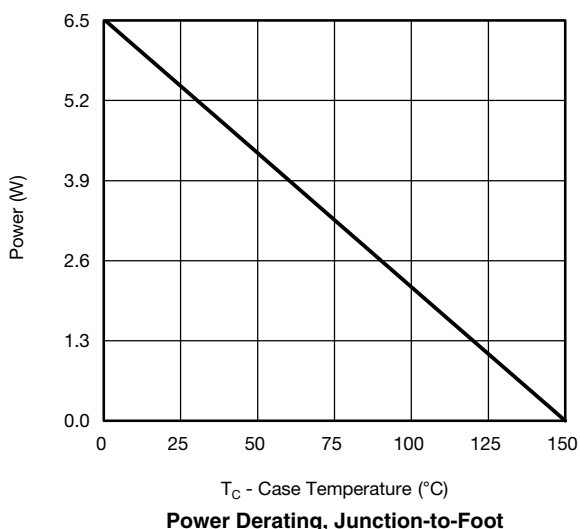
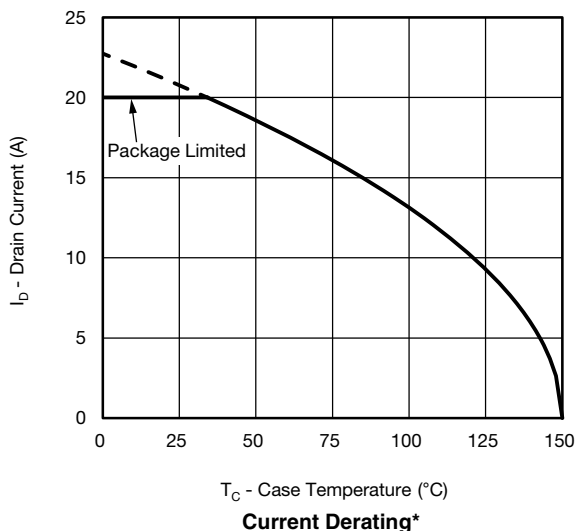


On-Resistance vs. Junction Temperature

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

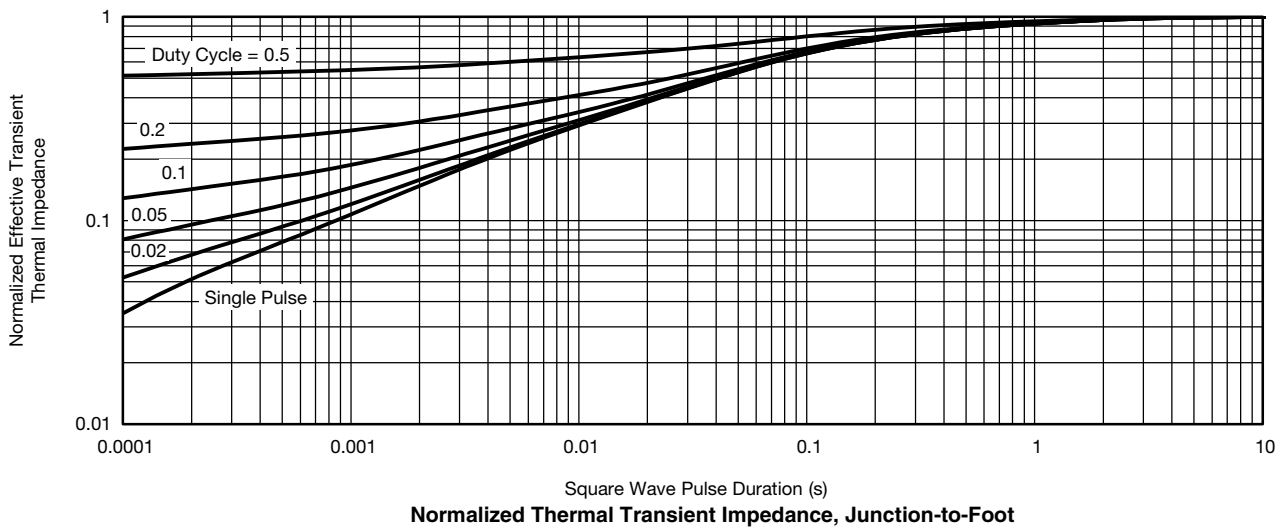
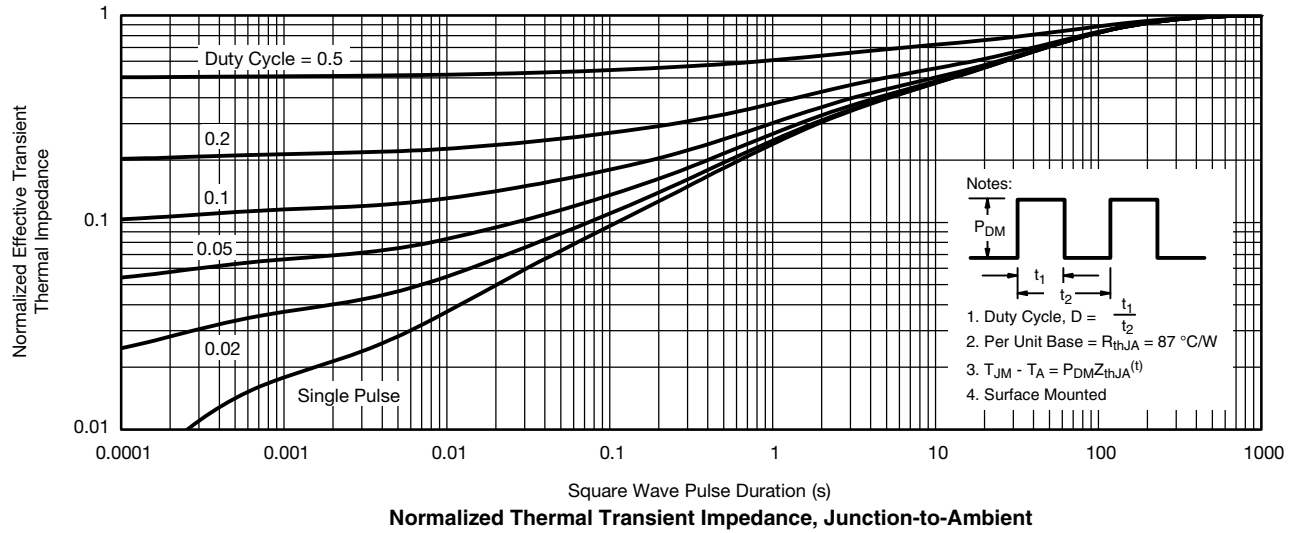


CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



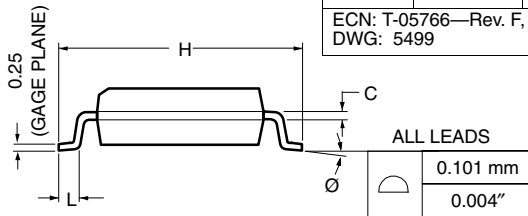
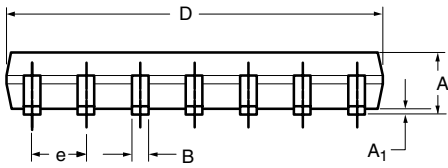
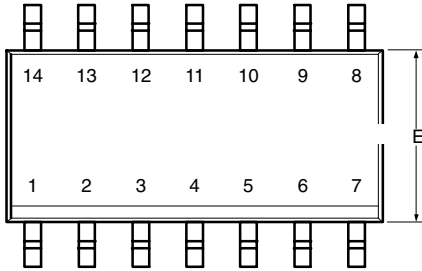
* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

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



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SOIC (NARROW): 14-LEAD



Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A₁	0.10	0.20	0.004	0.008
B	0.38	0.51	0.015	0.020
C	0.18	0.23	0.007	0.009
D	8.55	8.75	0.336	0.344
E	3.8	4.00	0.149	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
L	0.50	0.93	0.020	0.037
Ø	0°	8°	0°	8°

ECN: T-05766—Rev. F, 19-Sep-05
DWG: 5499



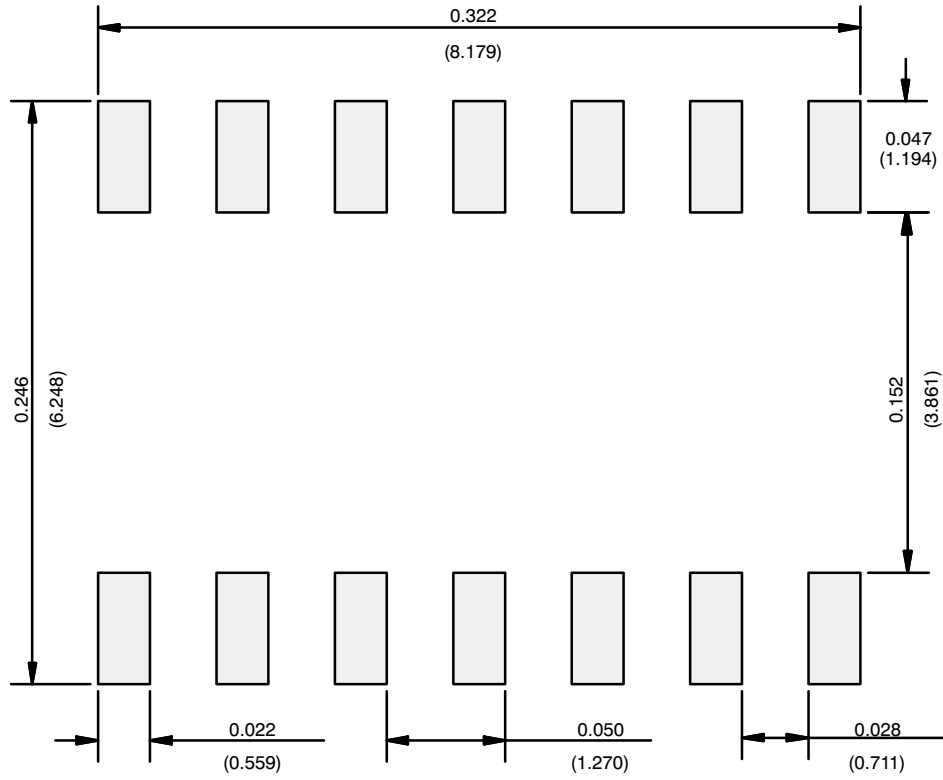
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RECOMMENDED MINIMUM PADS FOR SO-14



Recommended Minimum Pads
Dimensions in Inches/(mm)

[Return to Index](#)



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