

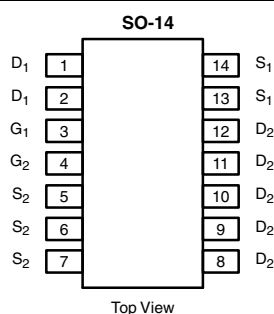
Dual N-Channel 20 V (D-S) MOSFET with Schottky Diode

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



Ordering Information: Si4340DDY-T1-GE3 (Lead (Pb)-free and Halogen-free)

FEATURES

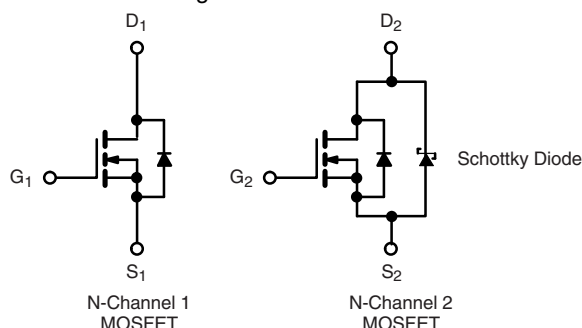
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- 100 % R_g Tested
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

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



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	14.8	22	A
		11.8	17.6	
		12.1 ^{b, c}	16.3 ^{b, c}	
		9.7 ^{b, c}	13 ^{b, c}	
Pulsed Drain Current (t = 300 μs)	I _{DM}	50	60	
Source-Drain Current Diode Current	I _S	2.5	4.5	
		1.7 ^{b, c}	2.5 ^{b, c}	
Single Pulse Avalanche Current	I _{AS}	15		
Single Pulse Avalanche Energy	E _{AS}	11.25		mJ
Maximum Power Dissipation	P _D	3	5.4	W
		1.9	3.5	
		2 ^{b, c}	3 ^{b, 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 V, I _D = 250 μA	Ch-1	20			V	
		V _{GS} = 0 V, I _D = 250 μA	Ch-2	20				
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA	Ch-1		20		mV/°C	
		I _D = 25 mA	Ch-2		22			
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J	I _D = 250 μA	Ch-1		- 4.4			
		I _D = 25 mA	Ch-2		- 4.6			
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	Ch-1	1		2.5	V	
		V _{DS} = V _{GS} , I _D = 250 μA	Ch-2	1		2.5		
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V	Ch-1			100	nA	
		V _{DS} = 0 V, V _{GS} = ± 20 V	Ch-2			100		
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V	Ch-1			1	μA	
		V _{DS} = 20 V, V _{GS} = 0 V	Ch-2			100		
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 85 °C	Ch-1			15		
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 85 °C	Ch-2			10 000		
On-State Drain Current ^b	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	Ch-1	20			A	
		V _{DS} ≥ 5 V, V _{GS} = 10 V	Ch-2	30				
Drain-Source On-State Resistance ^b	R _{DS(on)}	V _{GS} = 10 V, I _D = 11.5 A	Ch-1		0.0065	0.0085	Ω	
		V _{GS} = 10 V, I _D = 15.2 A	Ch-2		0.0060	0.0070		
		V _{GS} = 4.5 V, I _D = 10 A	Ch-1		0.0091	0.0115		
		V _{GS} = 4.5 V, I _D = 14 A	Ch-2		0.0077	0.0095		
Forward Transconductance ^b	g _{fs}	V _{DS} = 10 V, I _D = 11.5 A	Ch-1		28		S	
		V _{DS} = 10 V, I _D = 15.2 A	Ch-2		44			
Dynamic ^a								
Input Capacitance	C _{iss}	Channel-1 V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	Ch-1		862		pF	
			Ch-2		956			
Output Capacitance	C _{oss}	Channel-2 V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	Ch-1		280			
			Ch-2		363			
Reverse Transfer Capacitance	C _{rss}		Ch-1		116			
			Ch-2		120			
Total Gate Charge	Q _g	V _{DS} = 10 V, V _{GS} = 10 V, I _D = 12 A	Ch-1		17.4	26	nC	
		V _{DS} = 10 V, V _{GS} = 10 V, I _D = 12 A	Ch-2		17.8	27		
		Channel-1 V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 12 A	Ch-1		8.1	12.5		
			Ch-2		8.4	12.5		
Gate-Source Charge	Q _{gs}	Channel-2 V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 12 A	Ch-1		2.2			
			Ch-2		2.6			
Gate-Drain Charge	Q _{gd}		Ch-1		2.4			
			Ch-2		2.5			
Gate Resistance	R _g	f = 1 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 $\leq 2\%$.



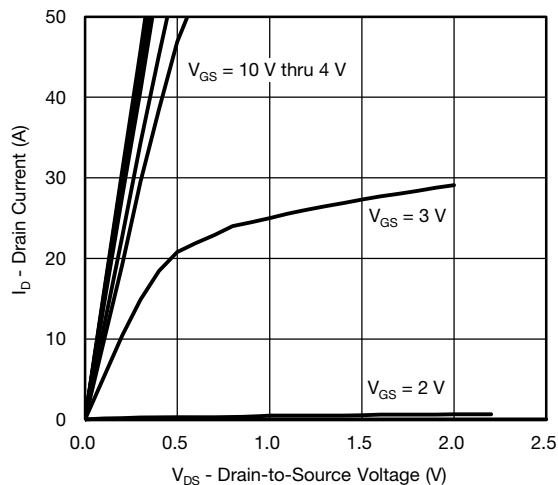
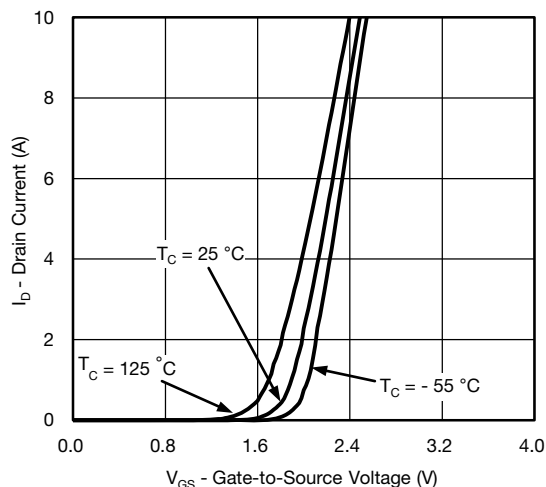
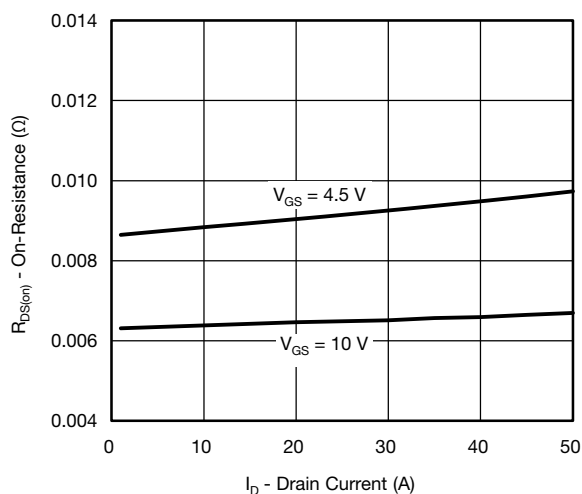
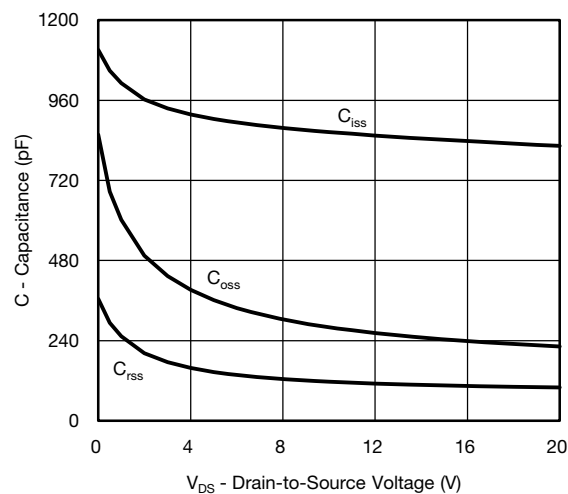
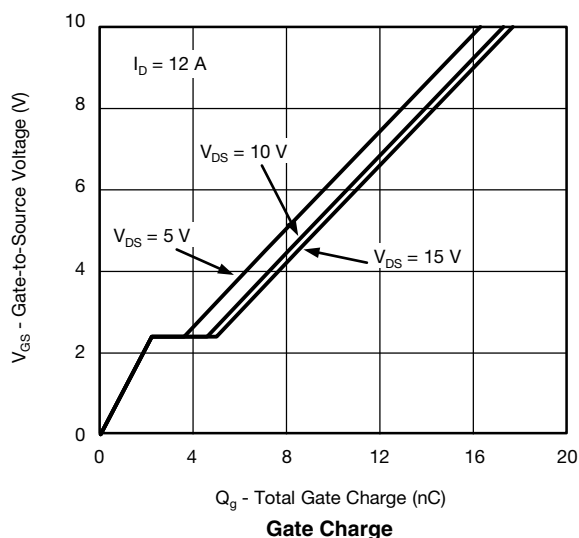
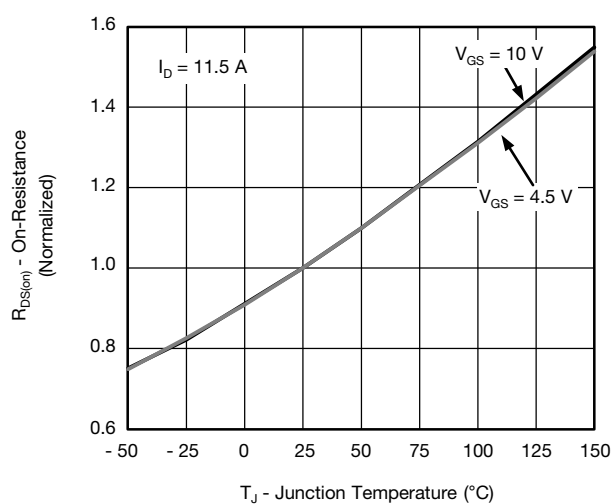
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)								
Parameter	Symbol	Test Conditions		Min.	Typ.	Max.	Unit	
Dynamic ^a								
Turn-On Delay Time	t _{d(on)}	Channel-1 V _{DD} = 10 V, R _L = 1 Ω I _D ≅ 10 A, V _{GEN} = 4.5 V, R _g = 1 Ω	Ch-1		18	35	ns	
			Ch-2		20	40		
Rise Time	t _r		Ch-1		37	70		
			Ch-2		34	65		
Turn-Off Delay Time	t _{d(off)}	Channel-2 V _{DD} = 10 V, R _L = 1 Ω I _D ≅ 10 A, V _{GEN} = 4.5 V, R _g = 1 Ω	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 V, R _L = 1 Ω I _D ≅ 10 A, V _{GEN} = 10 V, R _g = 1 Ω	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 V, R _L = 1 Ω I _D ≅ 10 A, V _{GEN} = 10 V, R _g = 1 Ω	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 °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 A	Ch-1		0.76	1.2	V	
		I _S = 2.5 A	Ch-2		0.43	0.55		
Body Diode Reverse Recovery Time	t _{rr}	Channel-1 I _F = 9.2 A, dI/dt = 100 A/μs, T _J = 25 °C	Ch-1		18	36	ns	
			Ch-2		18	36		
Body Diode Reverse Recovery Charge	Q _{rr}		Channel-2 I _F = 2.5 A, dI/dt = 100 A/μs, T _J = 25 °C	Ch-1		7	14	nC
				Ch-2		7	14	
Reverse Recovery Fall Time	t _a			Ch-1		8		ns
				Ch-2		10		
Reverse Recovery Rise Time	t _b		Ch-1		9			
			Ch-2		9			

Notes:

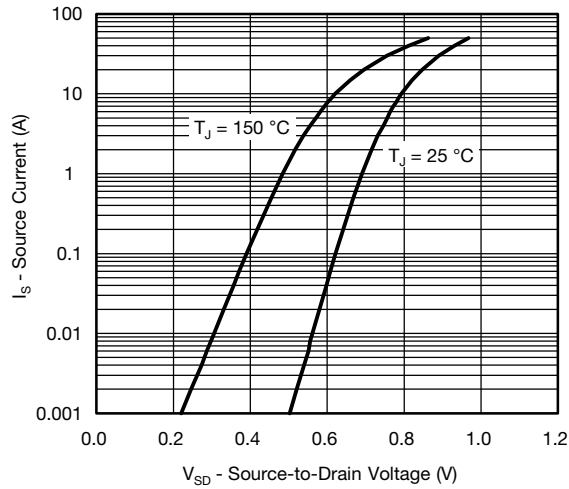
a. Guaranteed by design, not subject to production testing.

b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.

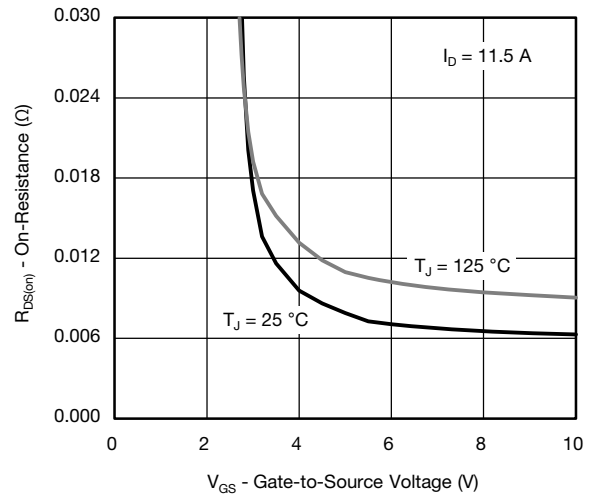
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

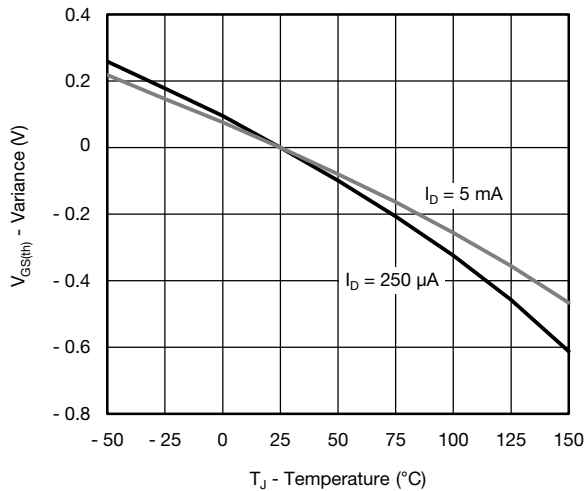
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



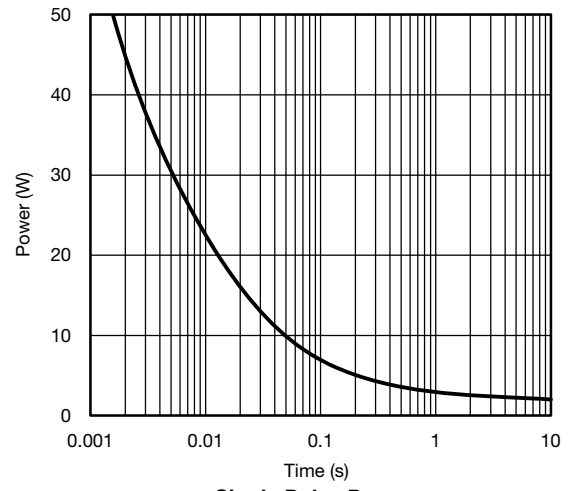
Source-Drain Diode Forward Voltage



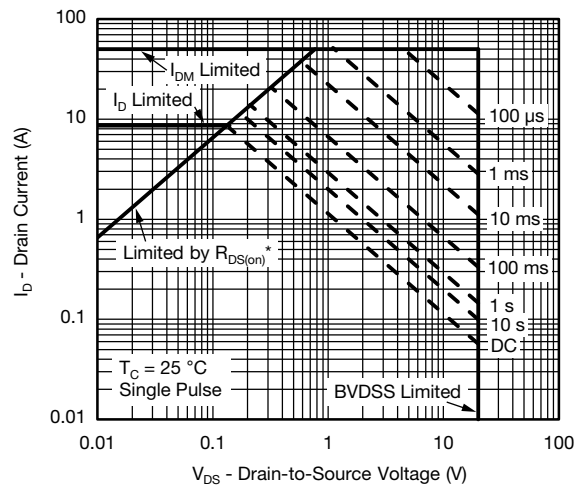
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

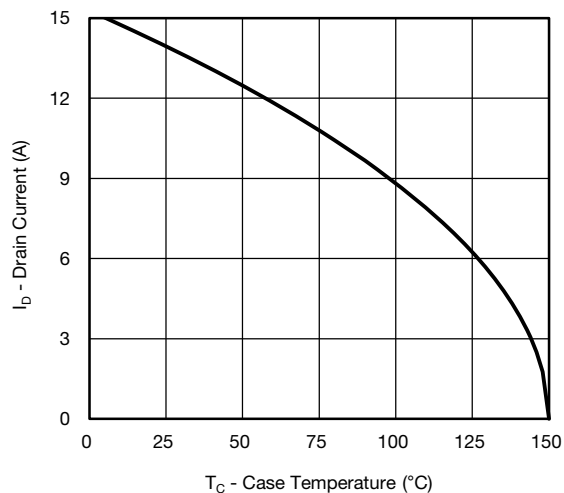
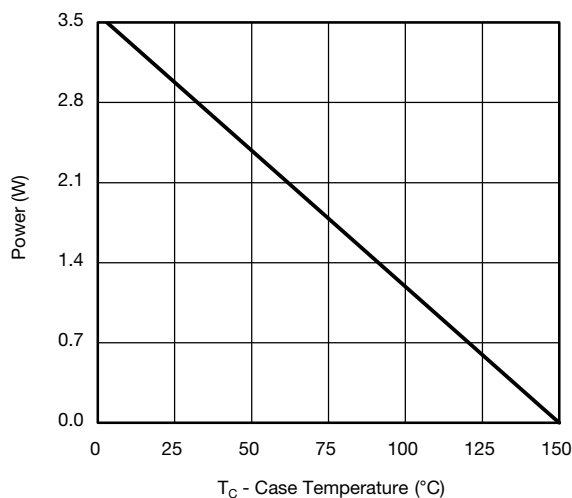
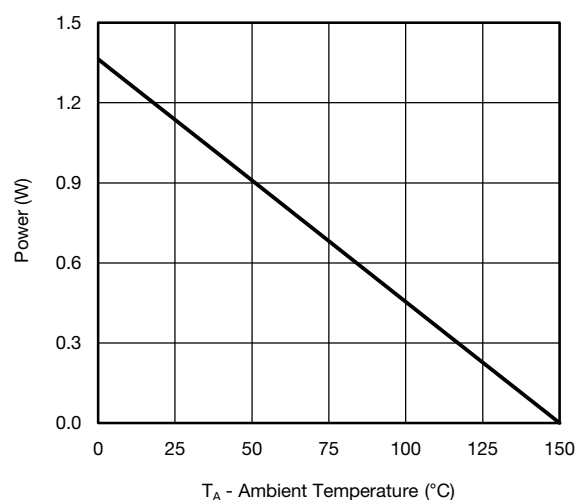


Single Pulse Power



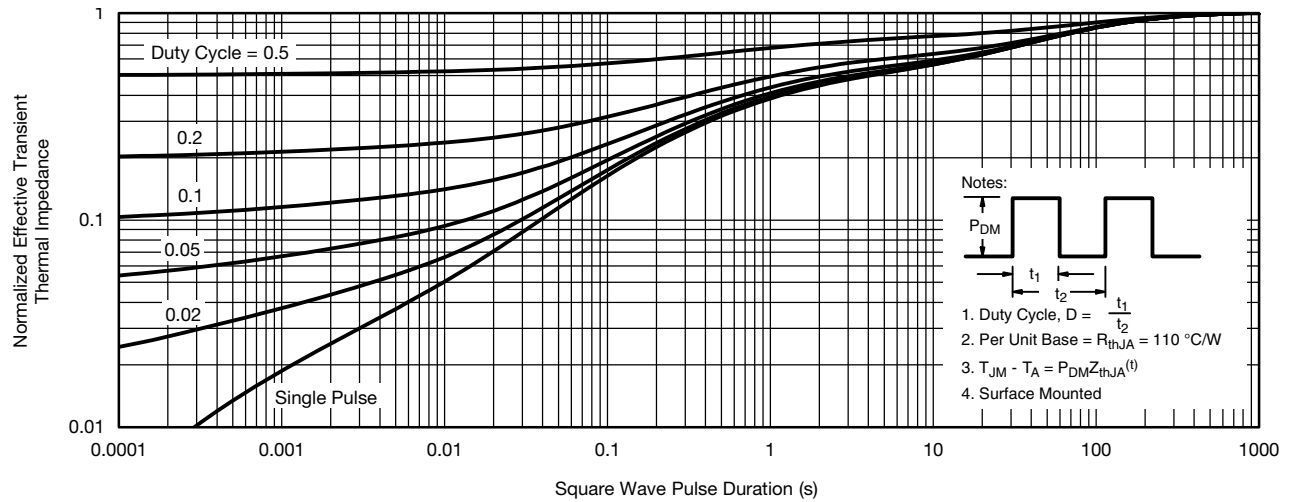
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

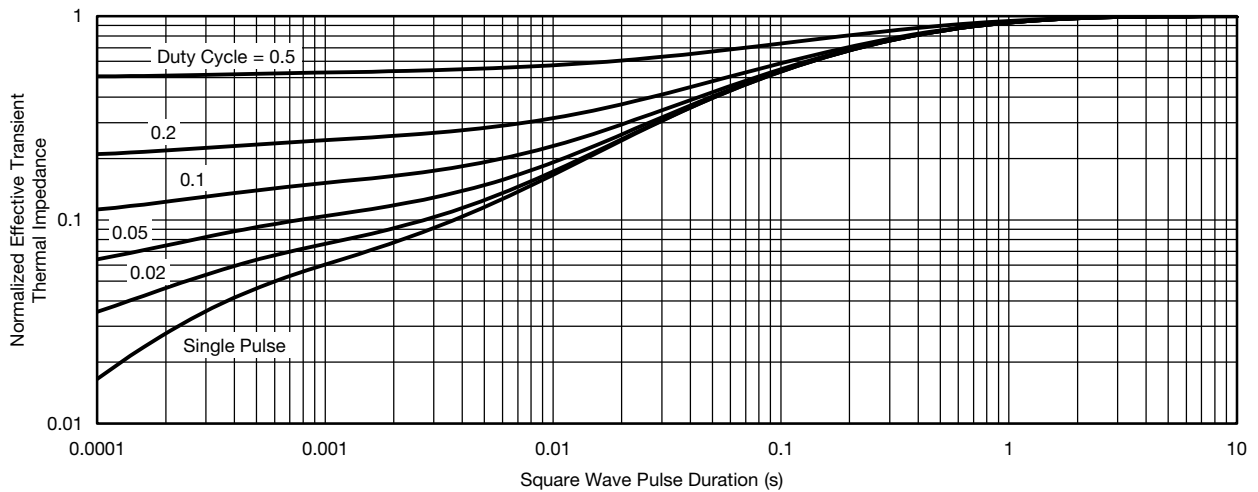
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)**Current Derating*****Power Derating, Junction-to-Foot****Power Derating, Junction-to-Ambient**

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

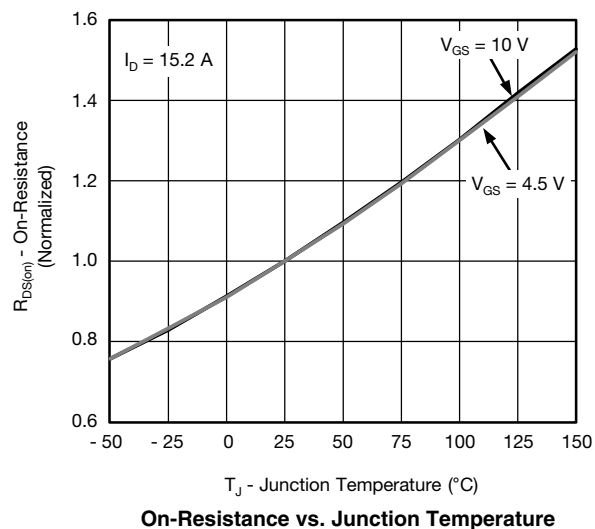
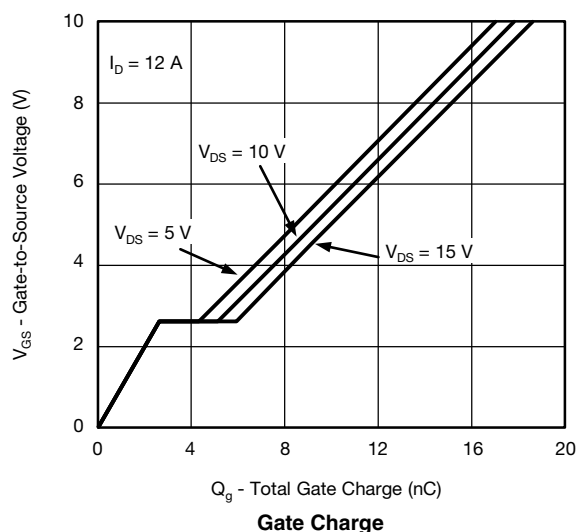
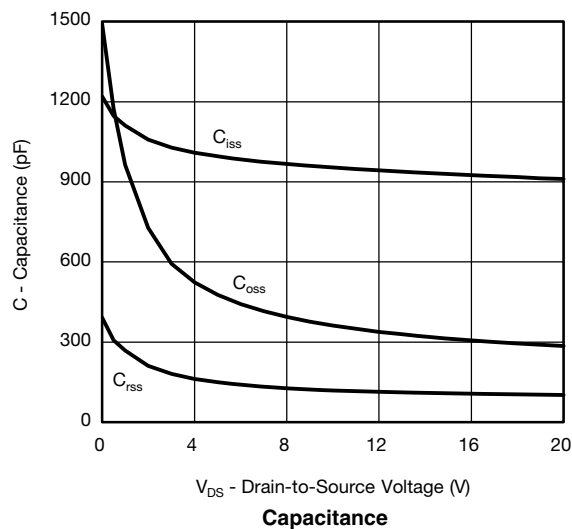
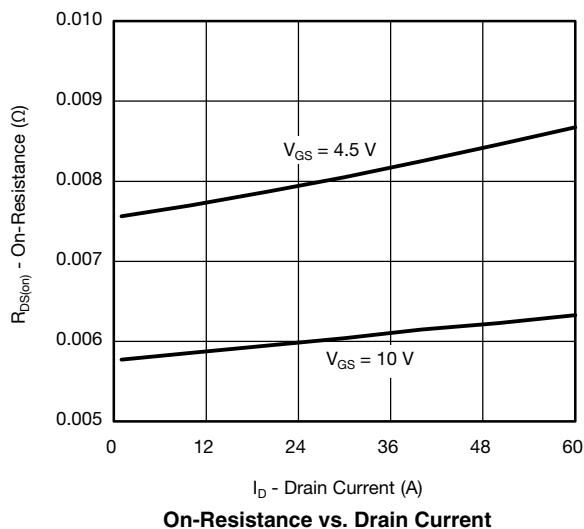
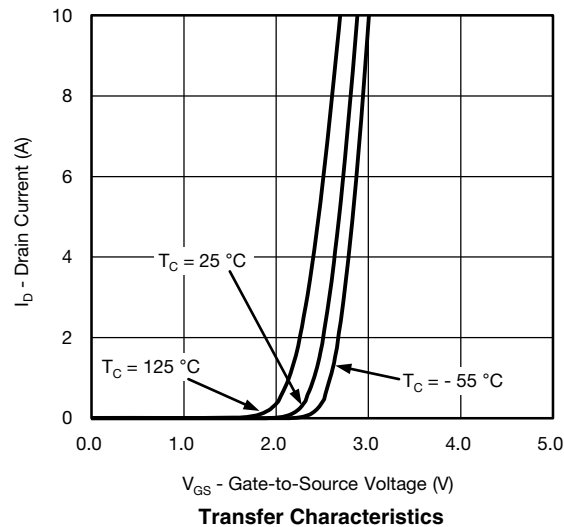
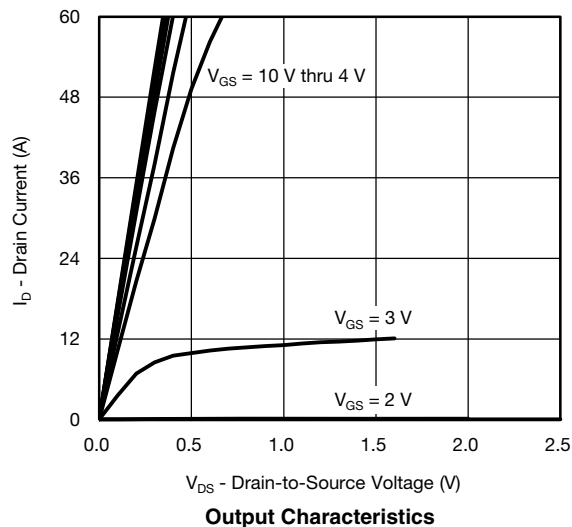
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



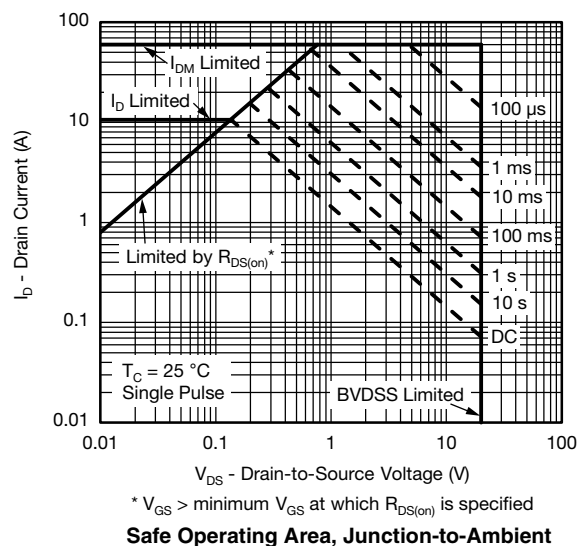
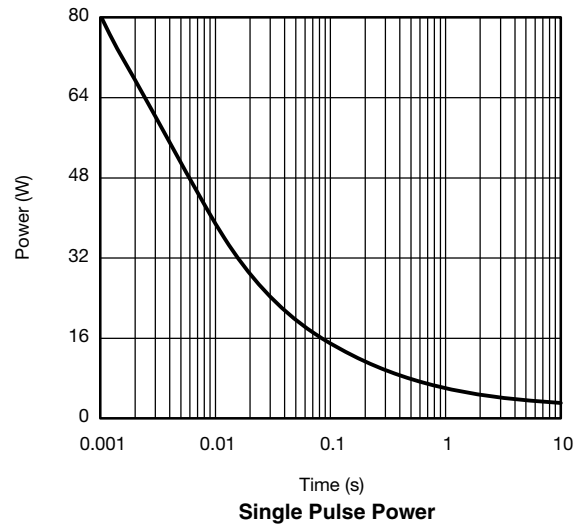
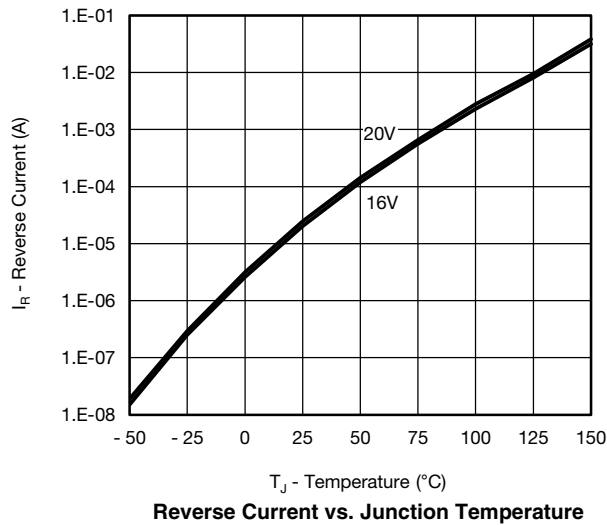
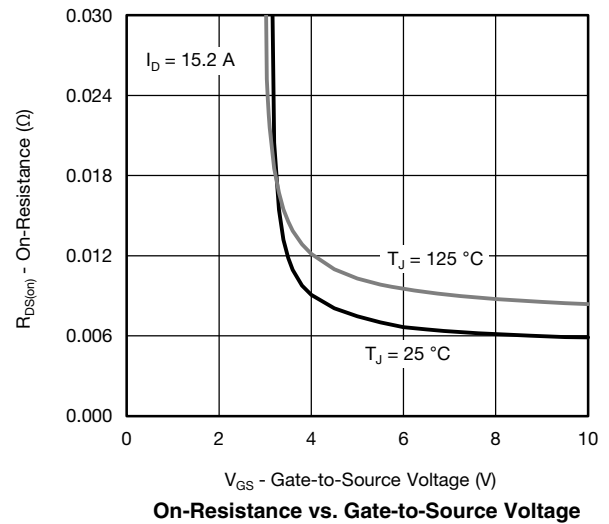
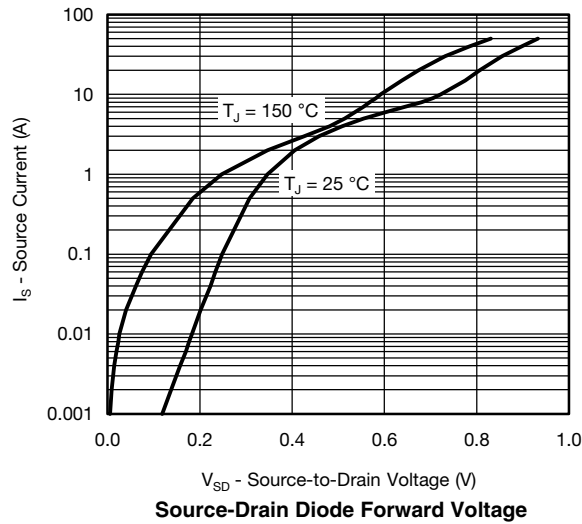
Normalized Thermal Transient Impedance, Junction-to-Ambient



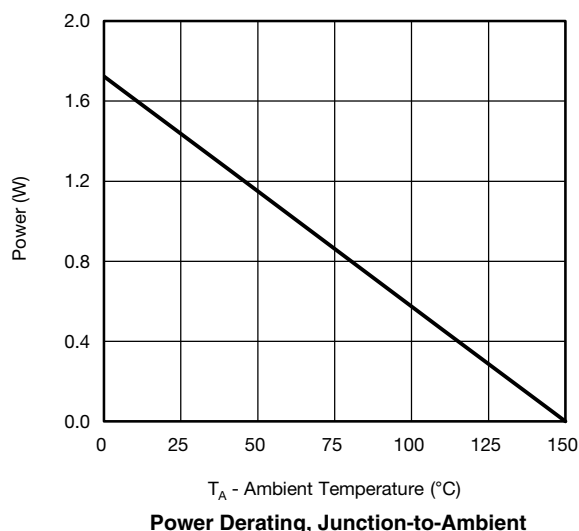
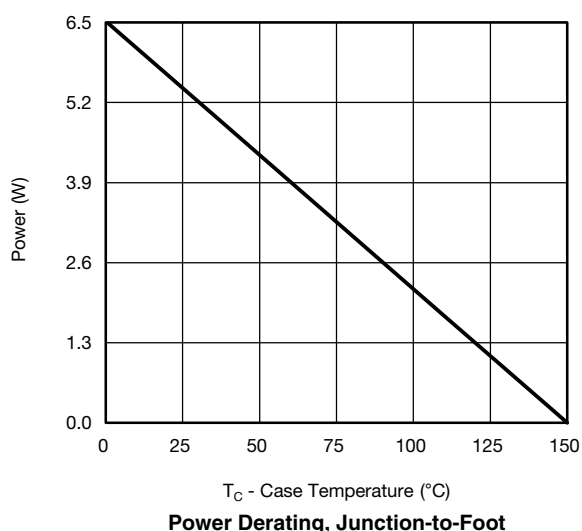
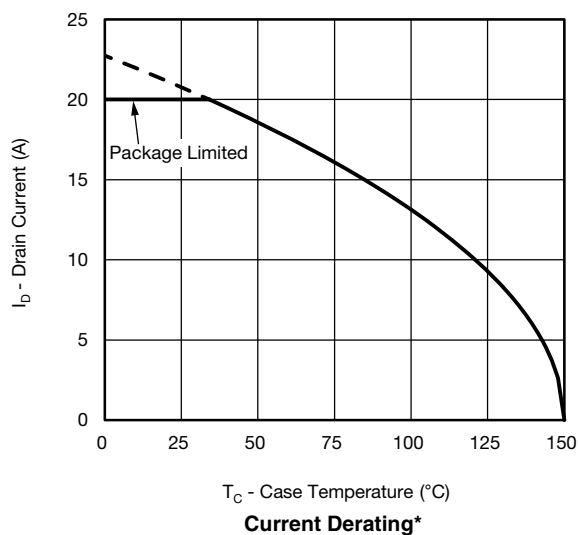
Normalized Thermal Transient Impedance, Junction-to-Foot

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

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

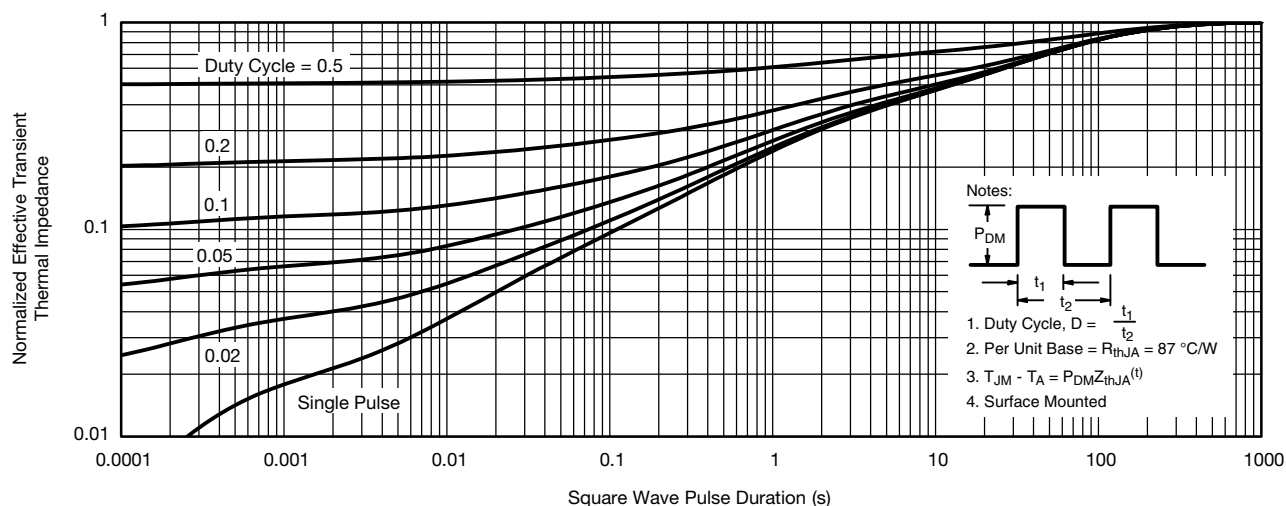


CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

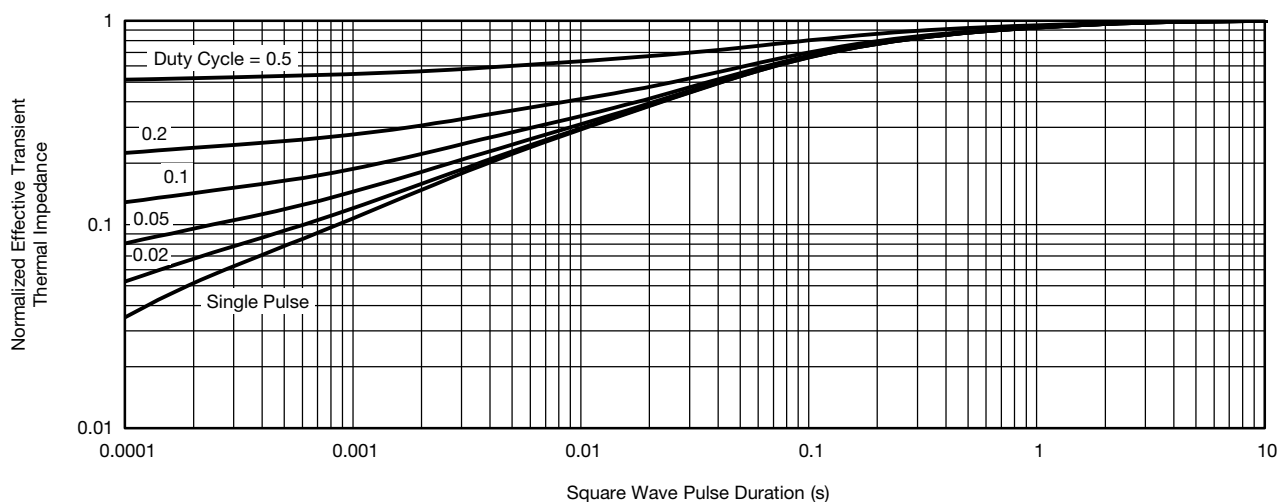


* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

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



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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