

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

PRODUCT SUMMARY

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	V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)
Channel-1	30	0.011 at V _{GS} = 10 V	10
		0.016 at V _{GS} = 4.5 V	8.2
Channel-2		0.0085 at V _{GS} = 10 V	14
		0.0095 at V _{GS} = 4.5 V	13

SCHOTTKY PRODUCT SUMMARY

V _{DS} (V)	V _{SD} (V) Diode Forward Voltage	I _F (A)
30	0.53 V at 3 A	2

FEATURES

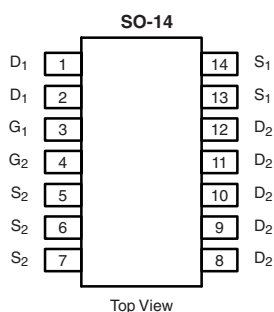
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available

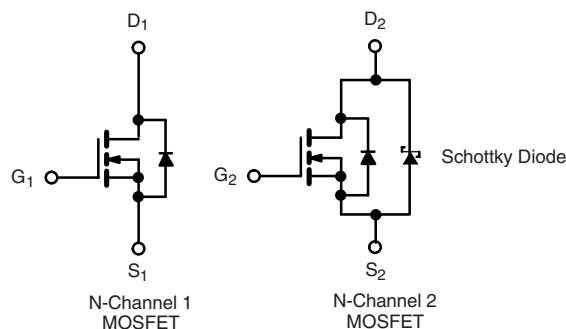
APPLICATIONS

- DC/DC Converters
- Game Stations
- Video Equipment



Top View

Ordering Information: Si4310BDY-T1-E3 (Lead (Pb)-free)
Si4310BDY-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
		10 s	Steady State	10 s	Steady State	
Drain-Source Voltage	V _{DS}	30				V
Gate-Source Voltage	V _{GS}	± 20		± 20		V
Continuous Drain Current (T _J = 150 °C) ^a	I _D	10	7.5	14	9.8	A
		8	6	11	7.8	
Pulsed Drain Current	I _{DM}	40		50		A
Continuous Source Current (Diode Conduction) ^a	I _S	1.8	1.04	2.73	1.33	A
Maximum Power Dissipation ^a	P _D	2	1.14	3.0	1.47	W
		1.28	0.73	1.9	0.94	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150				°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Channel-1		Channel-2		Schottky		Unit
		Typ.	Max.	Typ.	Max.	Typ.	Max.	
Maximum Junction-to-Ambient ^a	R _{thJA}	53	62.5	34	35	40	48	°C/W
		92	110	70	72	76	93	
Maximum Junction-to-Foot (Drain)	R _{thJF}	35	42	17	24	21	26	°C/W

Notes:

a. Surface Mounted on 1" x 1" FR4 board.

MOSFET SPECIFICATIONS T _J = 25 °C, unless otherwise noted								
Parameter	Symbol	Test Conditions		Min.	Typ. ^a	Max.	Unit	
Static								
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	Ch-1	1.0		3.0	V	
			Ch-2	1.0		3.0		
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	
			Ch-2			100		
		V _{DS} = 30 V, V _{GS} = 0 V, T _J = 85 °C	Ch-1			15		
			Ch-2			4000		
On-State Drain Current ^b	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 10 V	Ch-1	20			A	
			Ch-2	30				
Drain-Source On-State Resistance ^b	R _{DS(on)}	V _{GS} = 10 V, I _D = 10 A	Ch-1		0.009	0.011	Ω	
		V _{GS} = 10 V, I _D = 14 A	Ch-2		0.0065	0.0085		
		V _{GS} = 4.5 V, I _D = 8.2 A	Ch-1		0.013	0.016		
		V _{GS} = 4.5 V, I _D = 13 A	Ch-2		0.0075	0.0095		
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 10 A	Ch-1		30		S	
		V _{DS} = 15 V, I _D = 14 A	Ch-2		60			
Diode Forward Voltage ^b	V _{SD}	I _S = 1.8 V, V _{GS} = 0 V	Ch-1		0.76	1.1	V	
		I _S = 2.73 V, V _{GS} = 0 V	Ch-2		0.485	0.53		
Dynamic ^a								
Input Capacitance	C _{iss}	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz	Ch-1	790	1580	2370	pF	
			Ch-2	1530	3060	4590		
Output Capacitance	C _{oss}		Ch-1	145	290	435		
			Ch-2	300	600	900		
Reverse Transfer Capacitance	C _{rss}		Ch-1	70	140	210		
			Ch-2	115	225	340		
Total Gate Charge	Q _g	Channel-1 V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 10 A	Ch-1		12	18	nC	
			Ch-2		19	30		
Gate-Source Charge	Q _{gs}	Channel-2 V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 14 A	Ch-1		5.3			
			Ch-2		10			
Gate-Drain Charge	Q _{gd}		Ch-1		4.3			
			Ch-2		5			
Gate Resistance	R _g	f = 1 MHz	Ch-1	0.90	1.8	2.7	Ω	
			Ch-2	0.3	0.95	1.4		
Turn-On Delay Time	t _{d(on)}	Channel-1 V _{DD} = 15 V, R _L = 15 Ω I _D ≅ 1 A, V _{GEN} = 10 V, R _g = 6 Ω	Ch-1		13	20	ns	
Rise Time	t _r		Ch-2		17	26		
			Ch-1		10	15		
			Ch-2		12	20		
Turn-Off Delay Time	t _{d(off)}	Channel-2 V _{DD} = 15 V, R _L = 15 Ω I _D ≅ 1 A, V _{GEN} = 10 V, R _g = 6 Ω	Ch-1		33	50		
			Ch-2		53	80		
Fall Time	t _f		Ch-1		10	15		
			Ch-2		17	26		
Source-Drain Reverse Recovery Time	t _{rr}	I _F = 1.8 A, dI/dt = 100 A/μs	Ch-1		25	40		
		I _F = 2.73 V, dI/dt = 100 A/μs	Ch-2		31	50		

Notes:

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

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

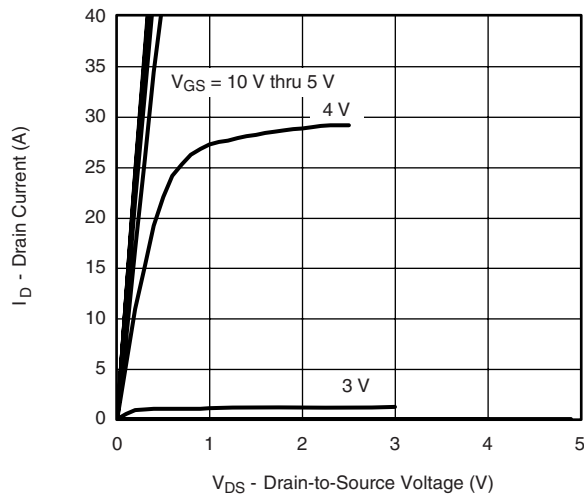


SCHOTTKY SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted

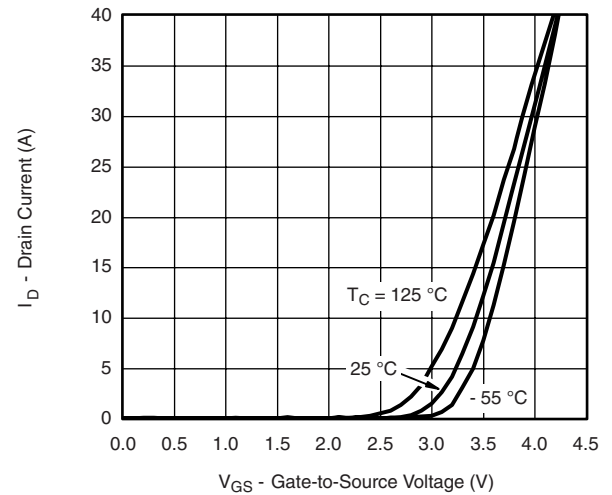
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Forward voltage Drop	V_F	$I_F = 3\text{ A}$		0.485	0.53	V
		$I_F = 3\text{ A}$, $T_J = 125\text{ }^{\circ}\text{C}$		0.42	0.42	
Maximum Reverse Leakage Current	I_{rm}	$V_R = 30\text{ V}$		0.008	0.100	mA
		$V_R = 30\text{ V}$, $T_J = 75\text{ }^{\circ}\text{C}$		0.4	5	
		$V_R = 30\text{ V}$, $T_J = 125\text{ }^{\circ}\text{C}$		0.5	20	
Junction Capacitance	C_T	$V_R = 15\text{ V}$		102		pF

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.

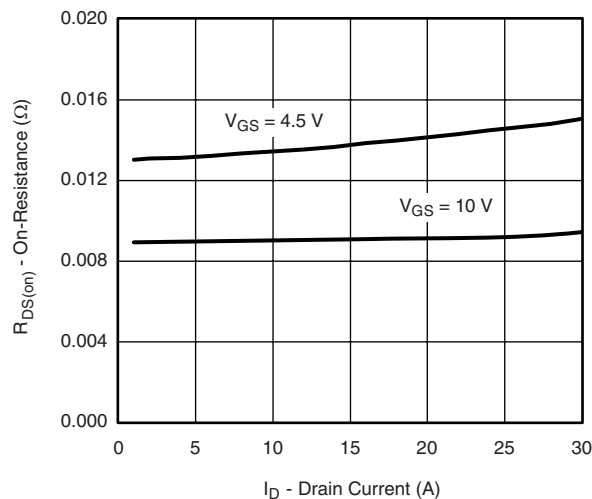
CHANNEL-1 TYPICAL CHARACTERISTICS $25\text{ }^{\circ}\text{C}$, unless otherwise noted



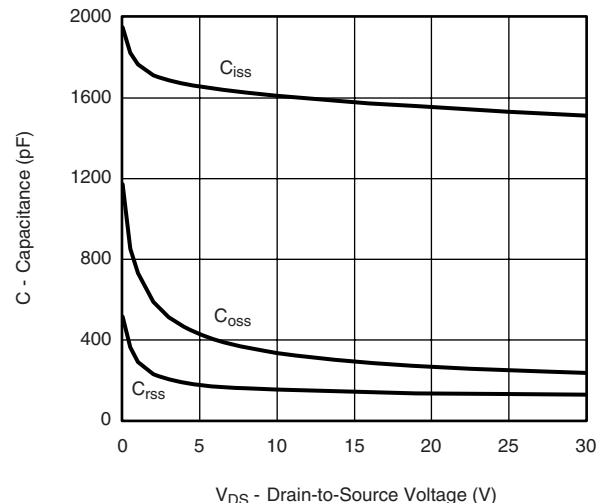
Output Characteristics



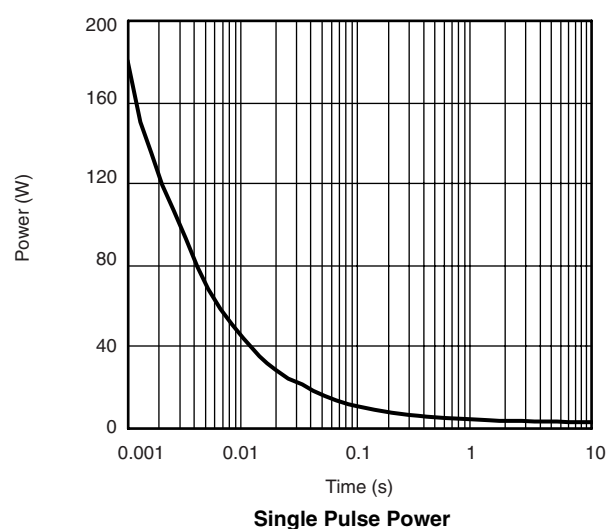
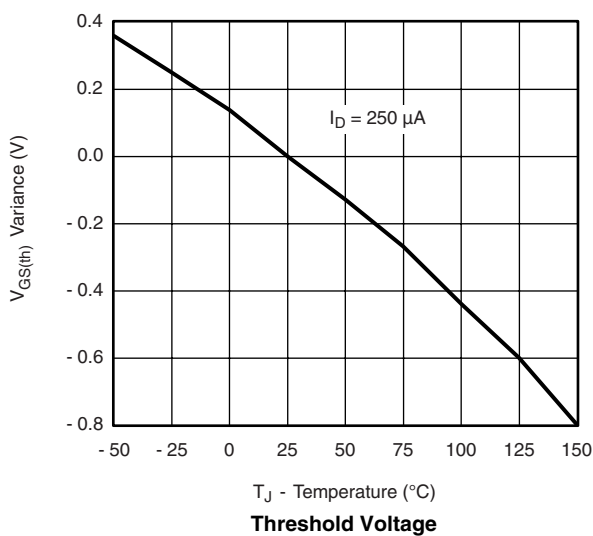
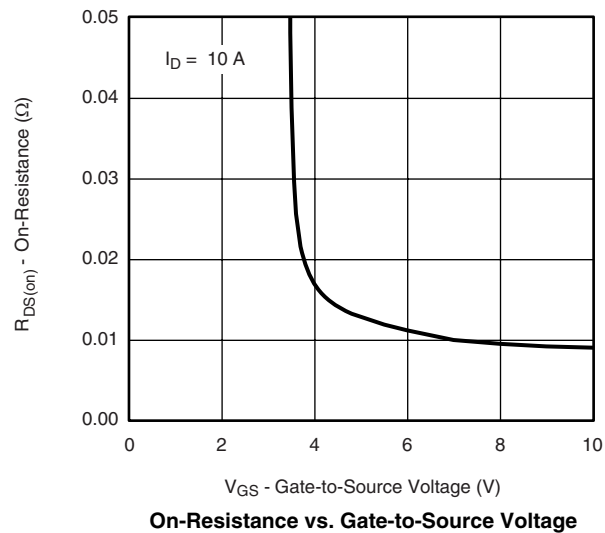
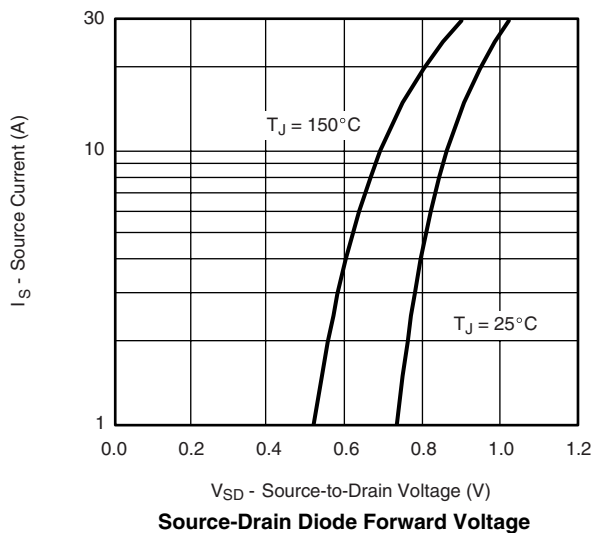
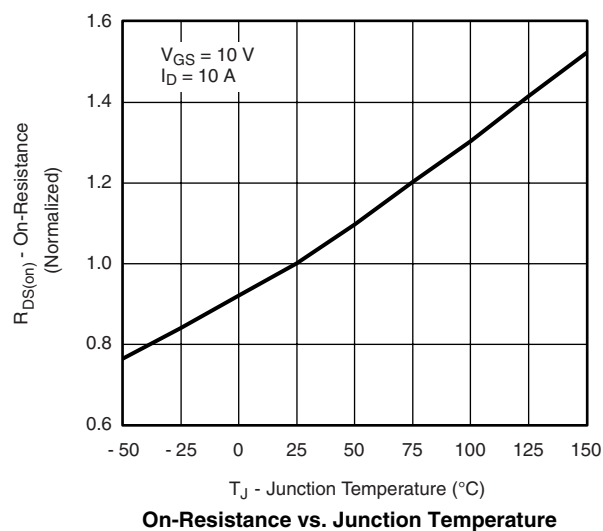
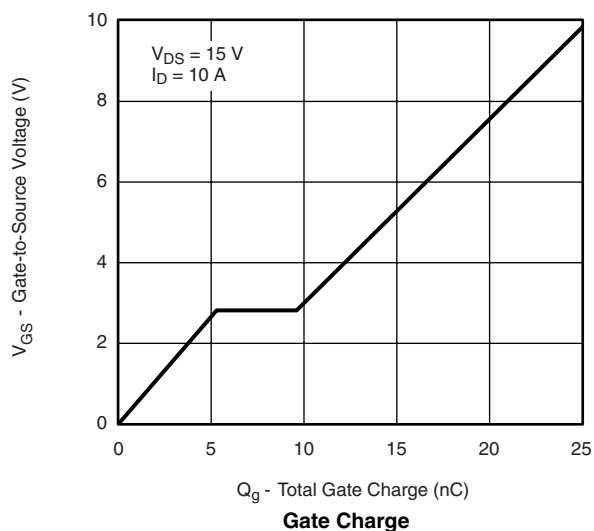
Transfer Characteristics



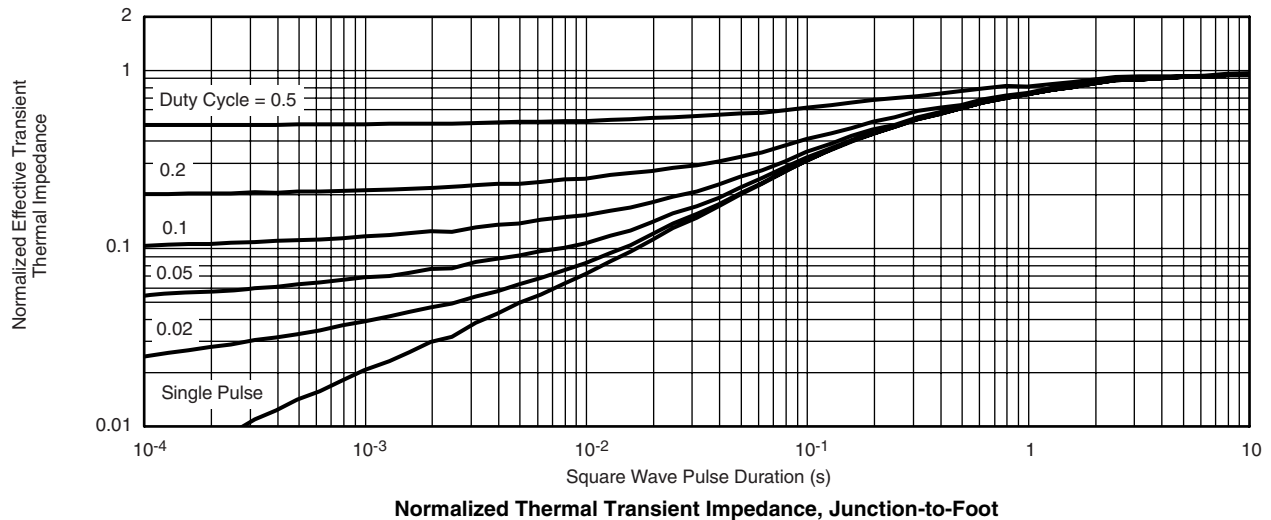
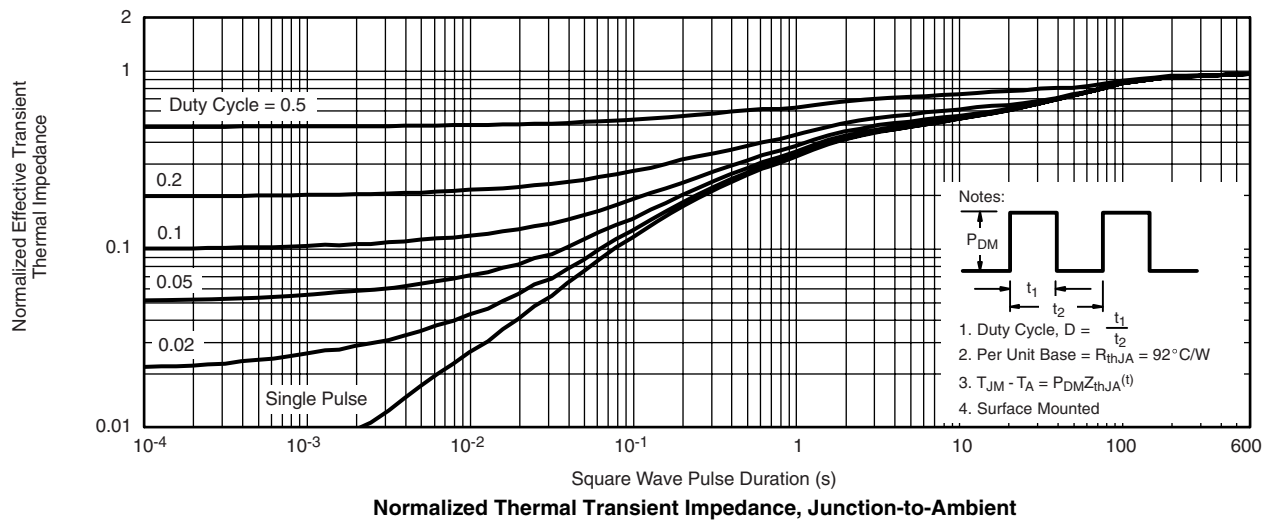
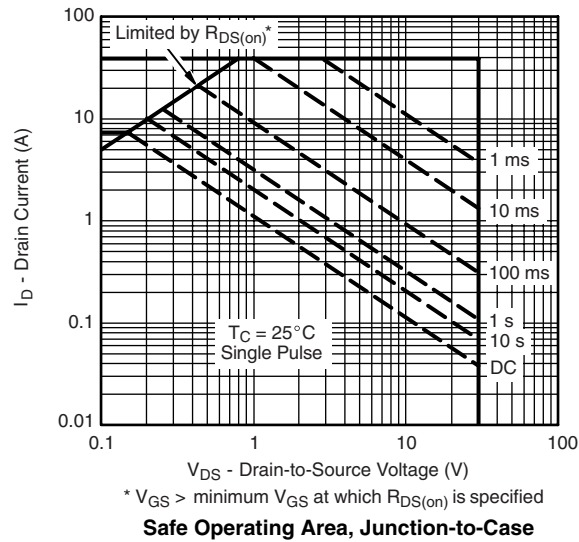
On-Resistance vs. Drain Current

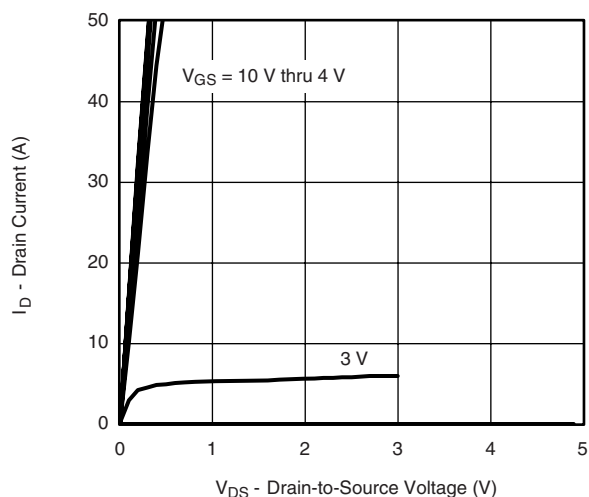
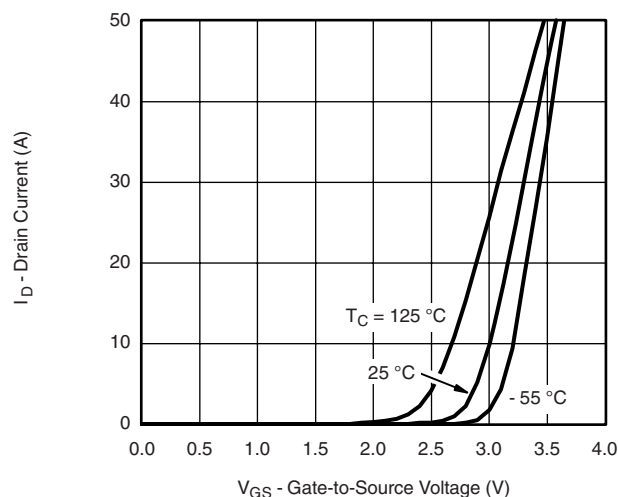
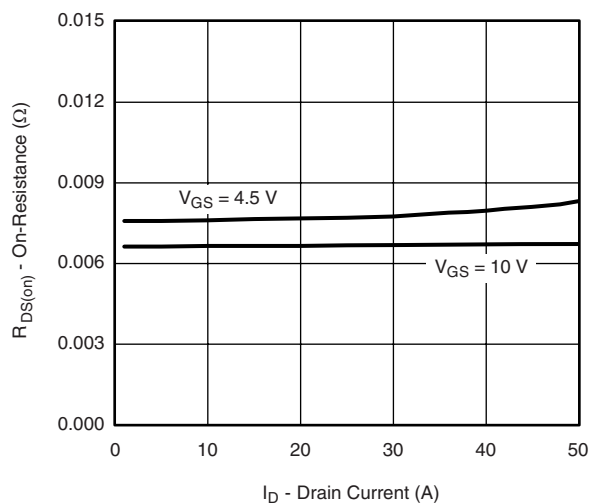
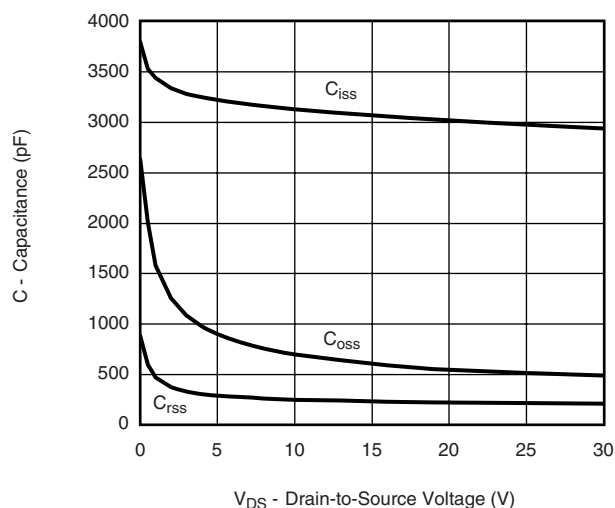
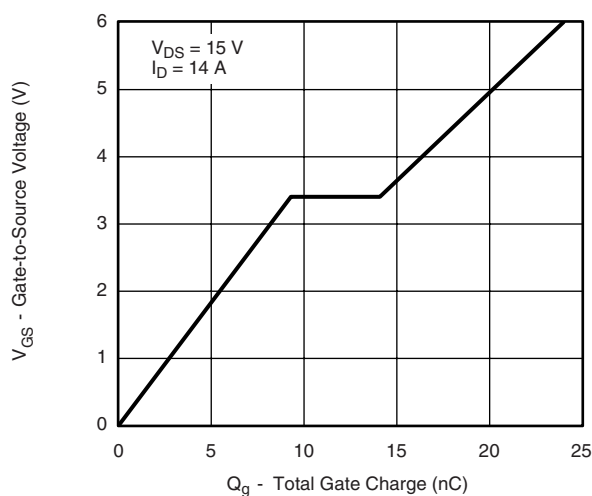
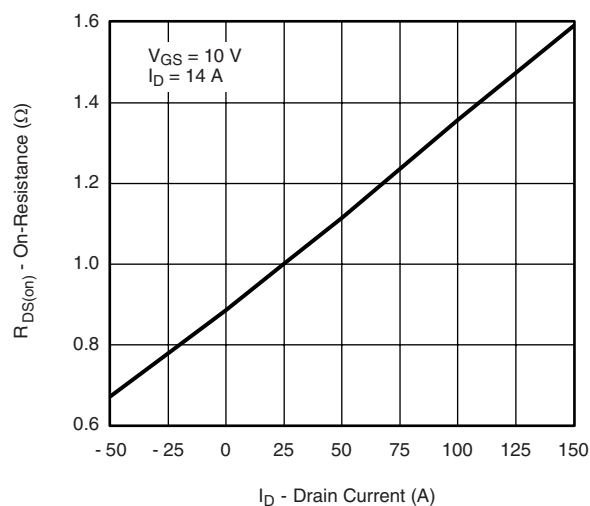


Capacitance

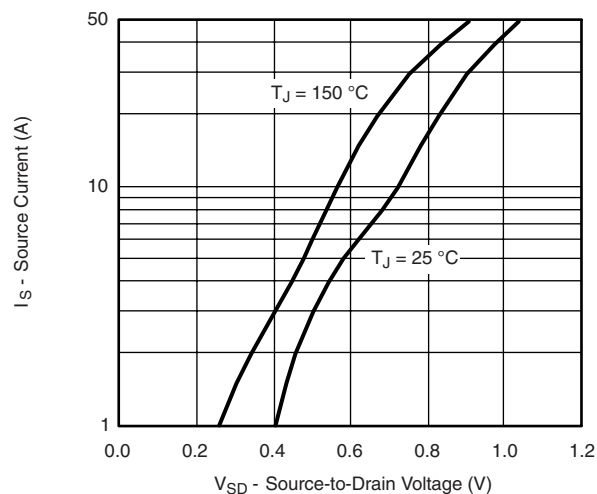
CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

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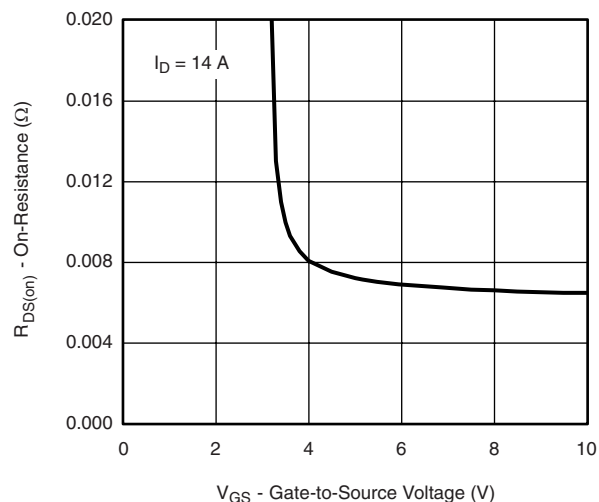


CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**Output Characteristics****Transfer Characteristics****On-Resistance vs. Drain Current****Capacitance****Gate Charge****On-Resistance vs. Junction Temperature**

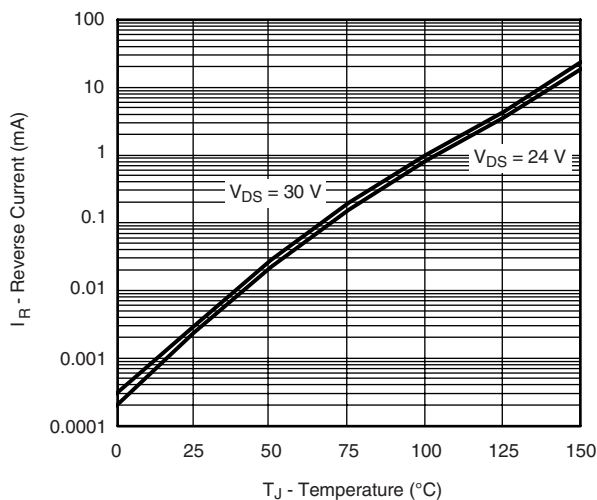
CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



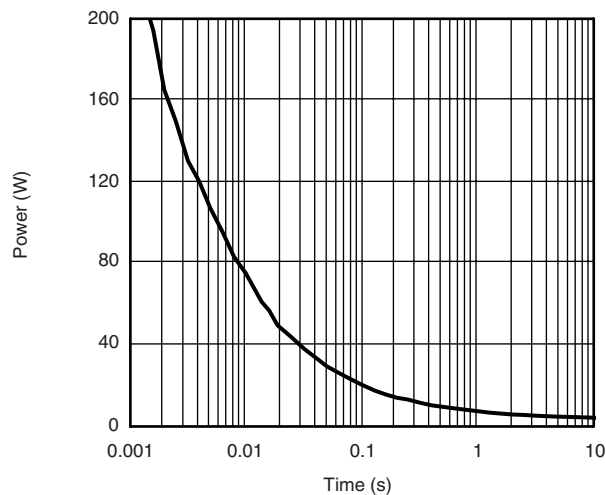
Source-Drain Diode Forward Voltage



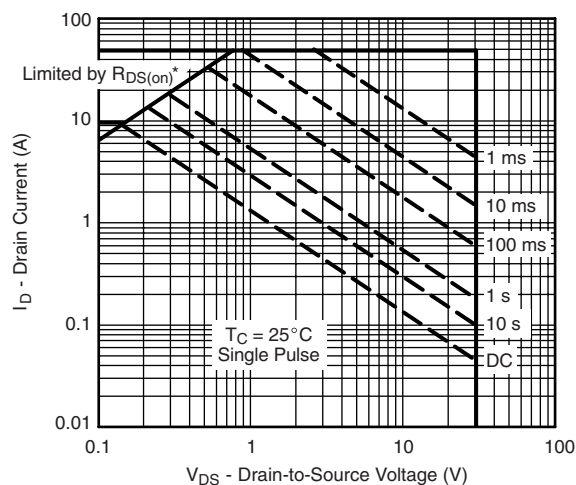
On-Resistance vs. Gate-to-Source Voltage



Reverse Current vs. Junction Temperature

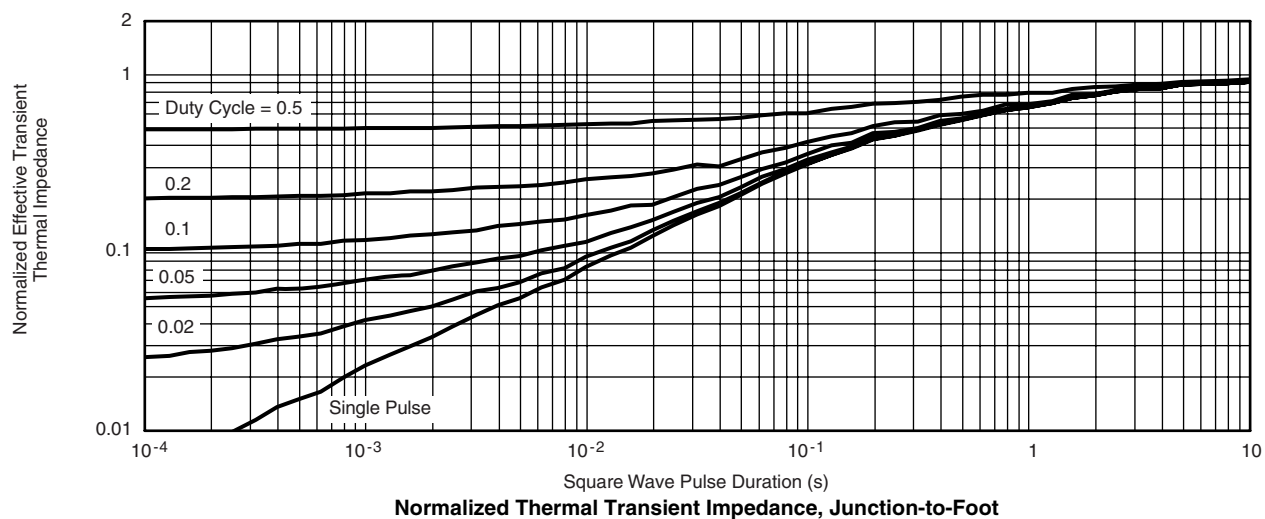
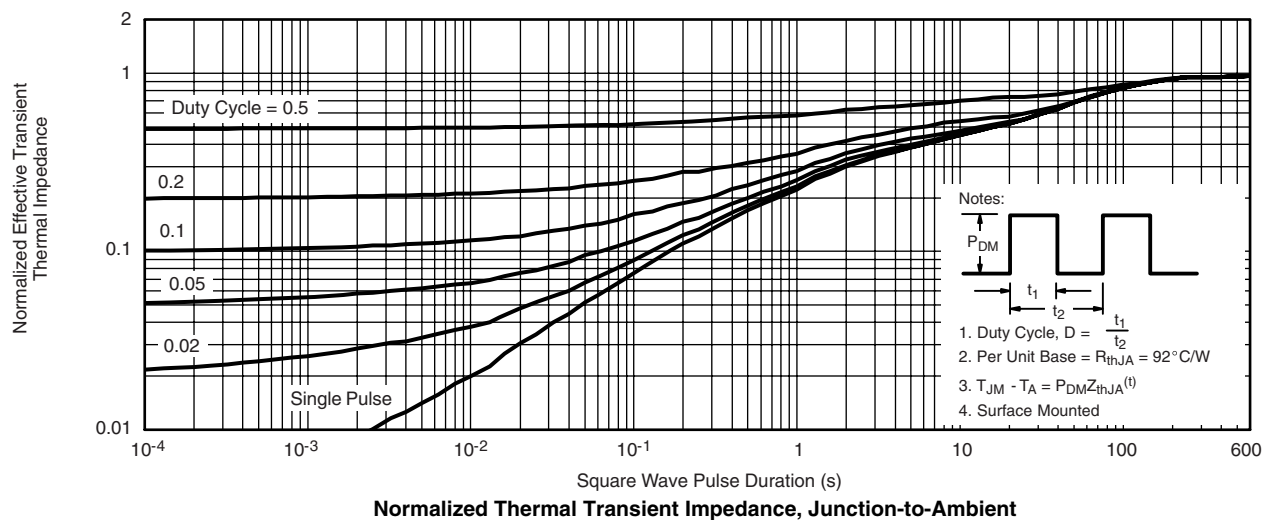
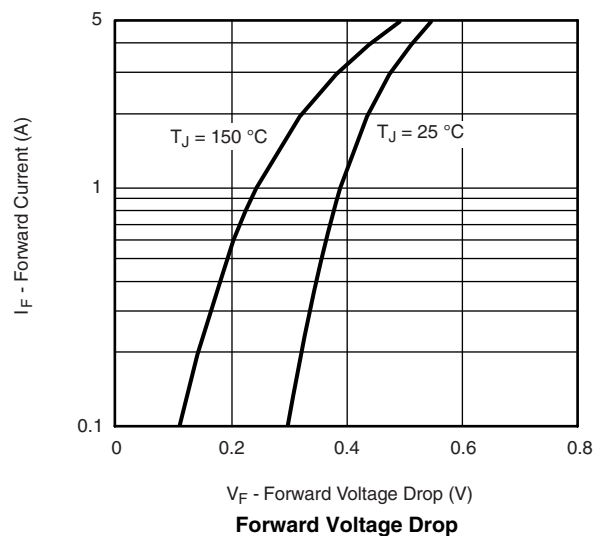
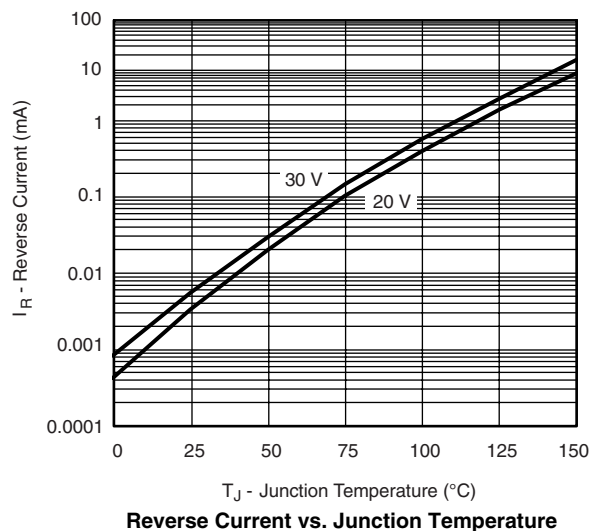


Single Pulse Power

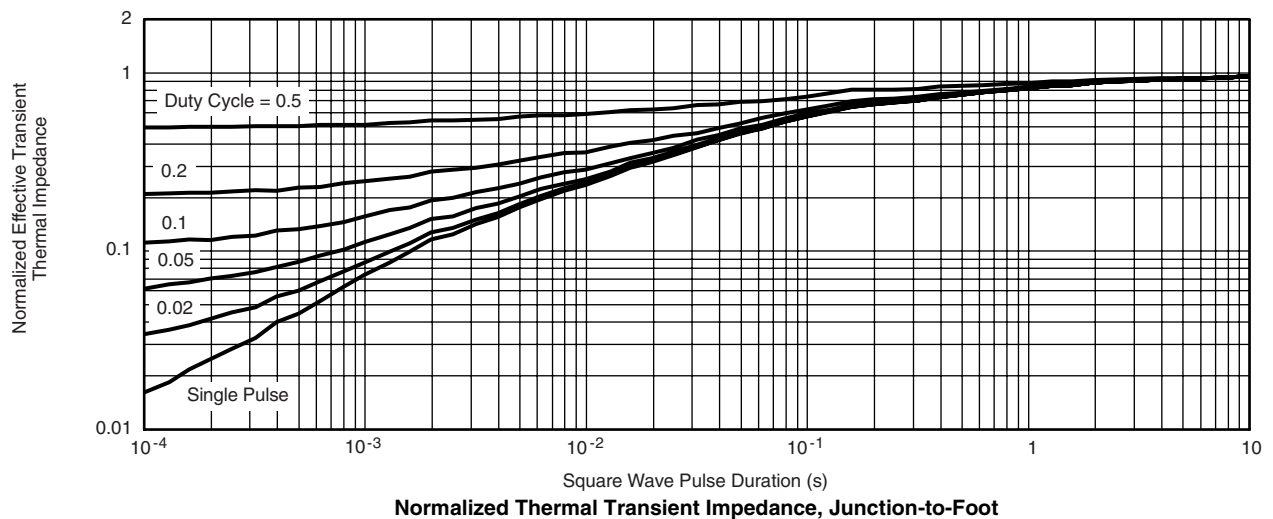
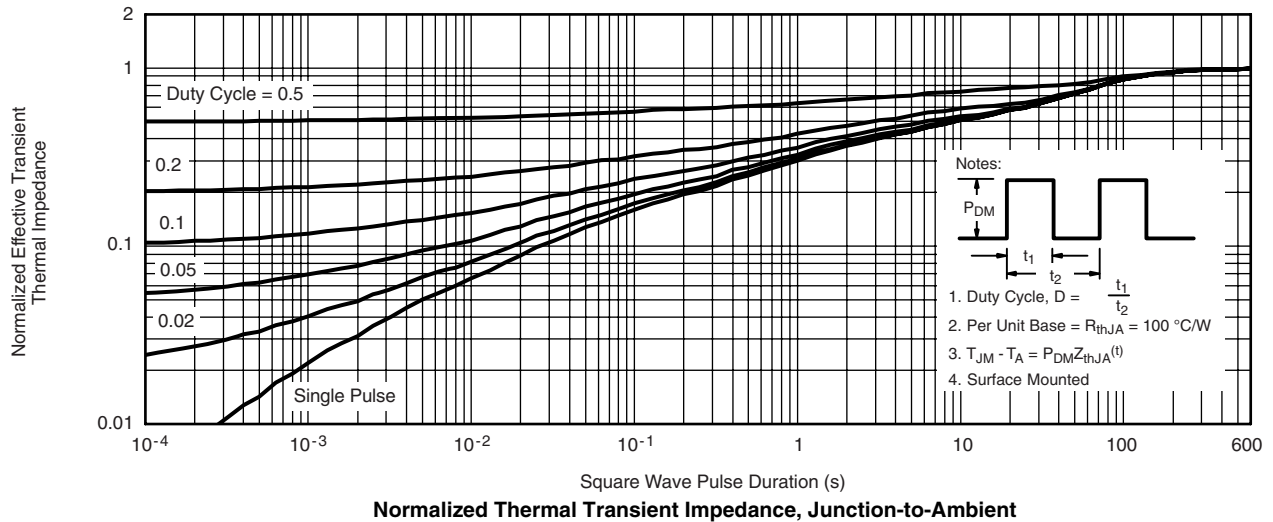
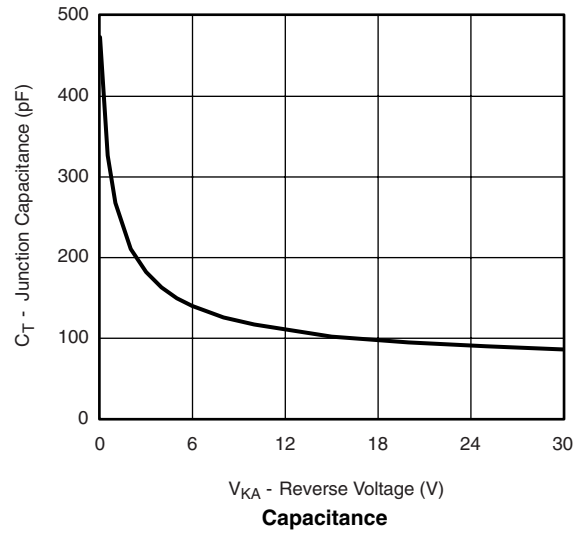


* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Case

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

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