

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

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

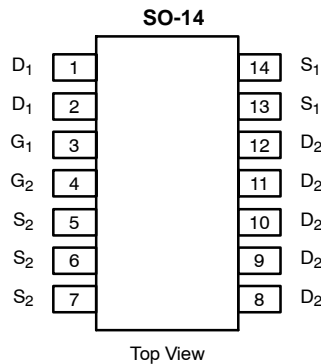
SCHOTTKY PRODUCT SUMMARY		
V _{DS} (V)	V _{SD} (V) Diode Forward Voltage	I _F (A)
30	0.53 V @ 3 A	2.0

FEATURES

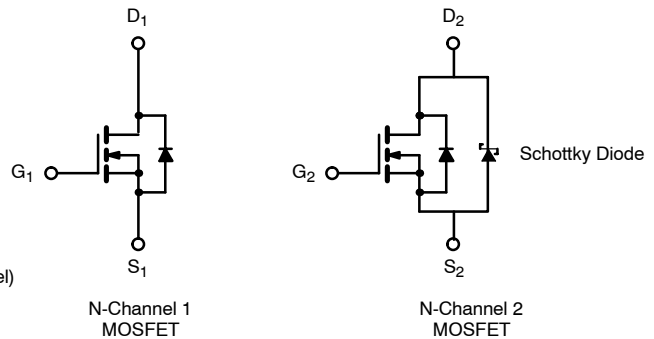
- TrenchFET® Power MOSFET
- 100% R_g Tested

APPLICATIONS

- DC/DC Converters
 - Game Stations
 - Video Equipment



Ordering Information:
Si4310BDY—E3
Si4310BDY-T1—E3 (with Tape and Reel)



ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C UNLESS OTHERWISE NOTED)							
Parameter	Symbol	Channel-1		Channel-2		Unit	
		10 secs	Steady State	10 secs	Steady State		
Drain-Source Voltage	V _{DS}	30				V	
Gate-Source Voltage	V _{GS}	± 20		± 20			
Continuous Drain Current (T _J = 150 °C) ^a	I _D	T _A = 25 °C	10	7.5	14	9.8	A
		T _A = 70 °C	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		
Maximum Power Dissipation ^a	P _D	T _A = 25 °C	2	1.14	3.0	1.47	W
		T _A = 70 °C	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}	t ≤ 10 sec	53	62.5	34	35	40	48	°C/W
		Steady-State	92	110	70	72	76	93	
Maximum Junction-to-Foot (Drain)	R _{thJF}	Steady-State	35	42	17	24	21	26	

Notes

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

MOSFET SPECIFICATIONS ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED).									
Parameter	Symbol	Test Condition	Min	Typ ^a	Max	Unit			
Static									
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	Ch-1	1.0		3.0	V		
			Ch-2	1.0		3.0			
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\ \text{V}, V_{GS} = \pm 20\ \text{V}$	Ch-1			100	nA		
			Ch-2			100			
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 30\ \text{V}, V_{GS} = 0\ \text{V}$	Ch-1			1	μA		
			Ch-2			100			
		$V_{DS} = 30\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 85^\circ\text{C}$	Ch-1			15			
			Ch-2			4000			
On-State Drain Current ^b	$I_{D(on)}$	$V_{DS} = 5\ \text{V}, V_{GS} = 10\ \text{V}$	Ch-1	20			A		
			Ch-2	30					
Drain-Source On-State Resistance ^b	$r_{DS(on)}$	$V_{GS} = 10\ \text{V}, I_D = 10\ \text{A}$	Ch-1		0.009	0.011	Ω		
		$V_{GS} = 10\ \text{V}, I_D = 14\ \text{A}$	Ch-2		0.0065	0.0085			
		$V_{GS} = 4.5\ \text{V}, I_D = 8.2\ \text{A}$	Ch-1		0.013	0.016			
		$V_{GS} = 4.5\ \text{V}, I_D = 13\ \text{A}$	Ch-2		0.0075	0.0095			
Forward Transconductance ^b	g_{fs}	$V_{DS} = 15\ \text{V}, I_D = 10\ \text{A}$	Ch-1		30		S		
		$V_{DS} = 15\ \text{V}, I_D = 14\ \text{A}$	Ch-2		60				
Diode Forward Voltage ^b	V_{SD}	$I_S = 1.8\ \text{A}, V_{GS} = 0\ \text{V}$	Ch-1		0.76	1.1	V		
		$I_S = 2.73\ \text{A}, V_{GS} = 0\ \text{V}$	Ch-2		0.485	0.53			
Dynamic^a									
Input Capacitance	C_{iss}	$V_{DS} = 15\ \text{V}, V_{GS} = 0\ \text{V}, f = 1\ \text{MHz}$	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 $V_{DS} = 15\ \text{V}, V_{GS} = 4.5\ \text{V}, I_D = 10\ \text{A}$ Channel-2 $V_{DS} = 15\ \text{V}, V_{GS} = 4.5\ \text{V}, I_D = 14\ \text{A}$	Ch-1		12		18	nC
Gate-Source Charge	Q_{gs}			Ch-2		19		30	
		Ch-1			5.3				
Gate-Drain Charge	Q_{gd}	Ch-2			10				
		Ch-1			4.3				
Ch-2		5							
Gate Resistance	R_g	$f = 1\ \text{MHz}$	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 $V_{DD} = 15\ \text{V}, R_L = 15\ \Omega$ $I_D \cong 1\ \text{A}, V_{GEN} = 10\ \text{V}, R_G = 6\ \Omega$ Channel-2 $V_{DD} = 15\ \text{V}, R_L = 15\ \Omega$ $I_D \cong 1\ \text{A}, V_{GEN} = 10\ \text{V}, R_G = 6\ \Omega$	Ch-1		13	20	ns		
			Ch-2		17	26			
Rise Time	t_r		Ch-1		10	15			
			Ch-2		12	20			
Turn-Off Delay Time	$t_{d(off)}$		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}	$I_F = 1.8\ \text{A}, di/dt = 100\ \text{A}/\mu\text{s}$	Ch-1		25	40			
		$I_F = 2.73\ \text{A}, di/dt = 100\ \mu\text{A}/\mu\text{s}$	Ch-2		31	50			

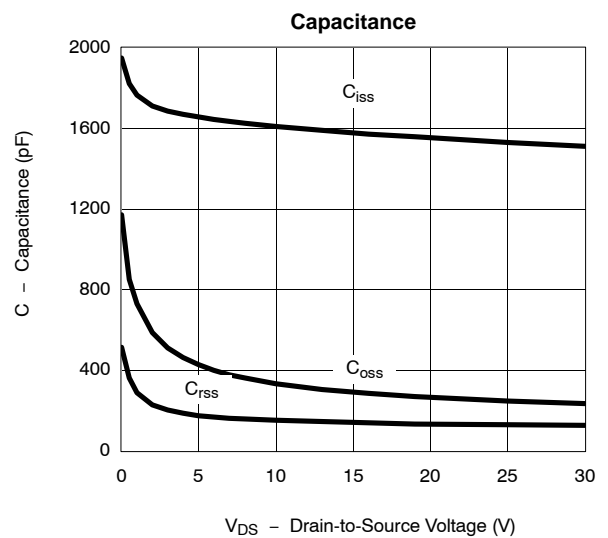
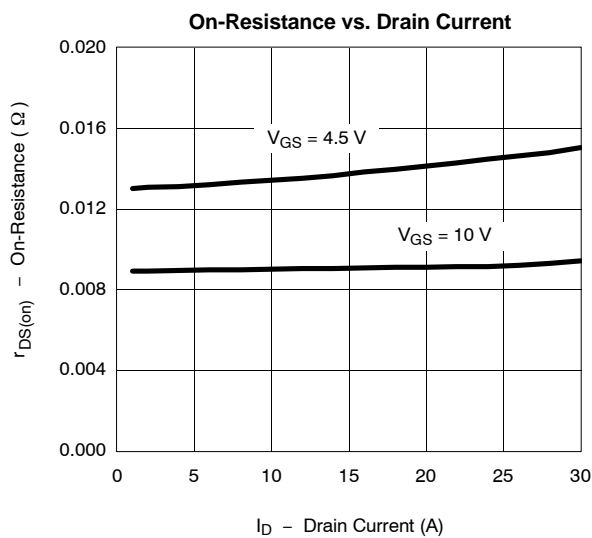
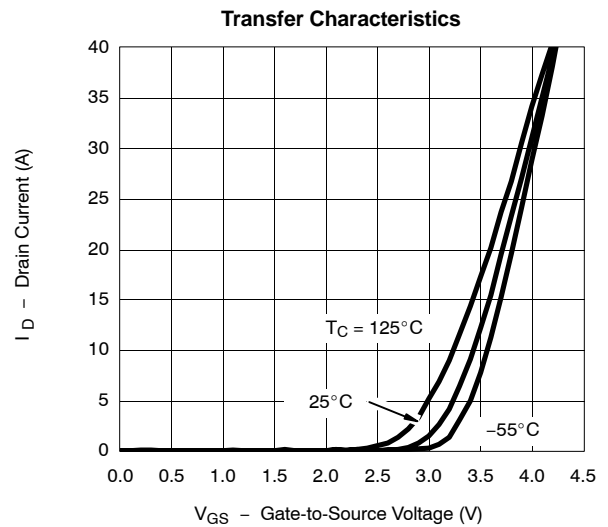
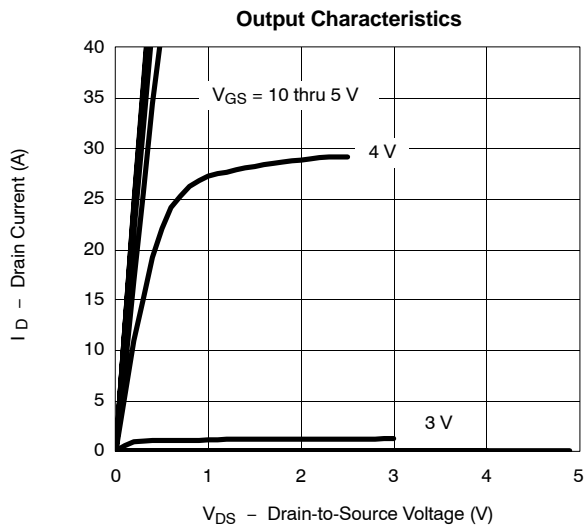
Notes

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



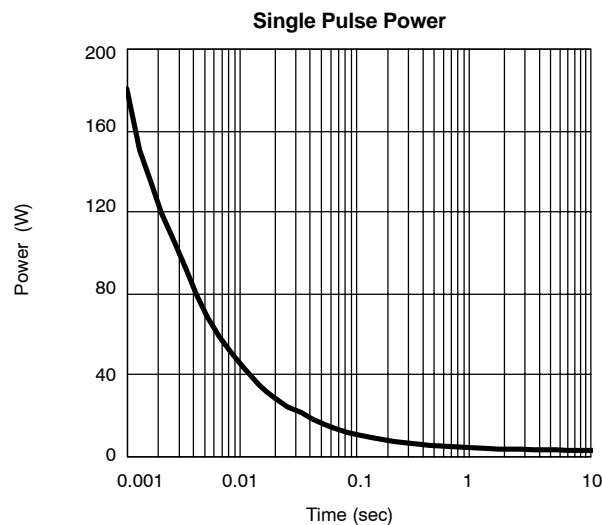
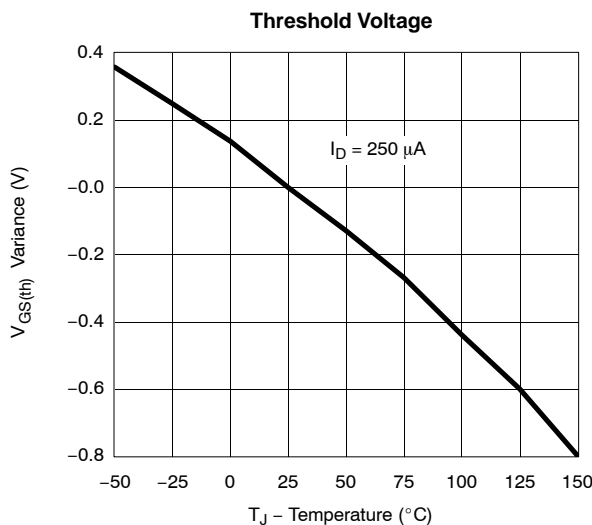
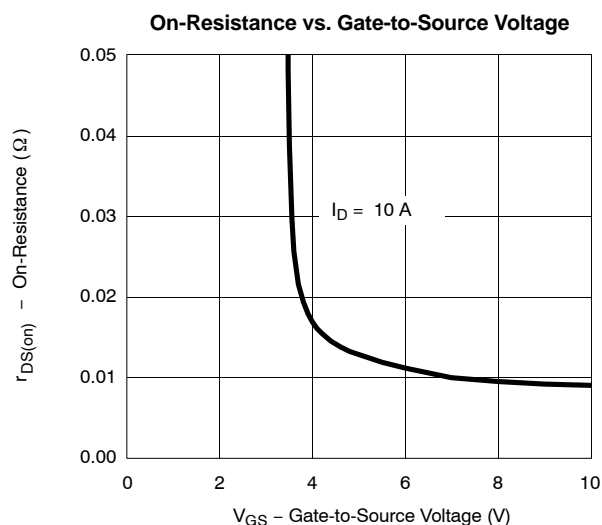
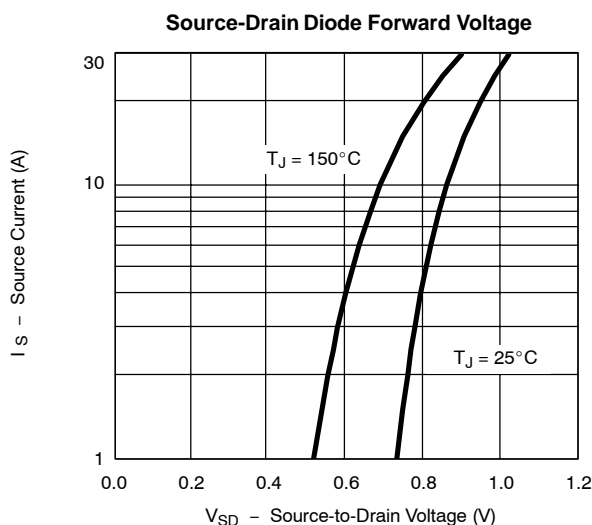
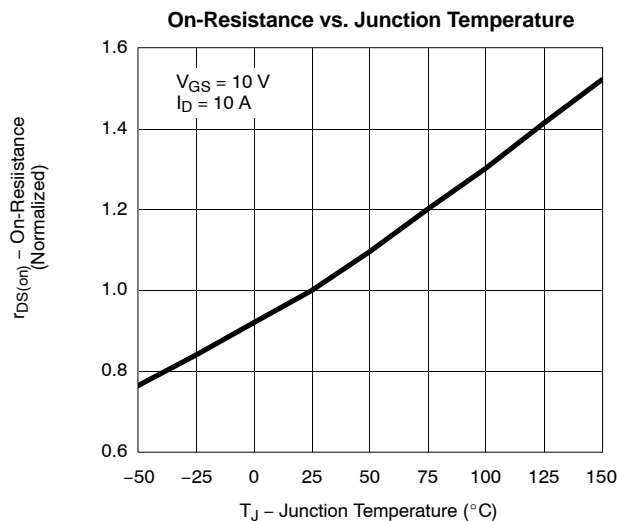
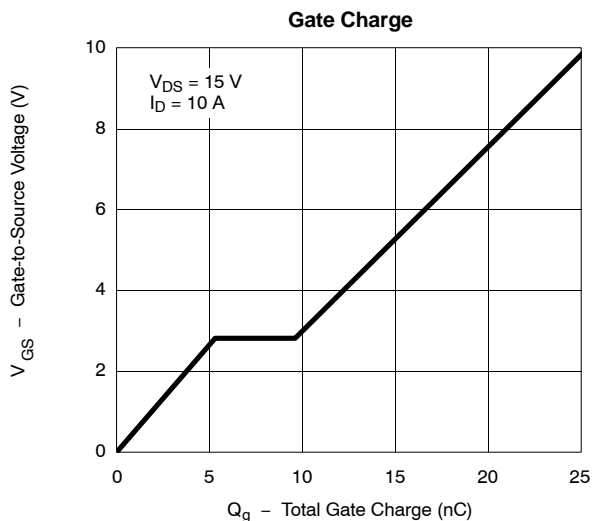
SCHOTTKY SPECIFICATIONS (T _J = 25°C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Forward Voltage Drop	V _F	I _F = 3 A		0.485	0.53	V
		I _F = 3 A, T _J = 125°C		0.42	0.42	
Maximum Reverse Leakage Current	I _{rm}	V _r = 30 V		0.008	0.100	mA
		V _r = 30 V, T _J = 75°C		0.4	5	
		V _r = -30 V, T _J = 125°C		6.5	20	
Junction Capacitance	C _T	V _r = 15 V		102		pF

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-1



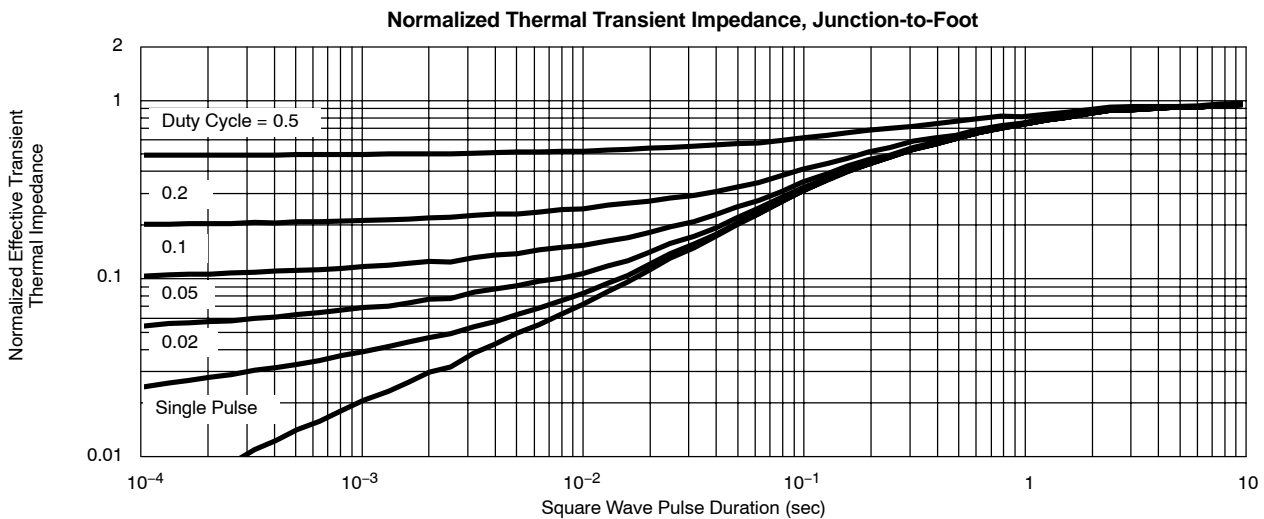
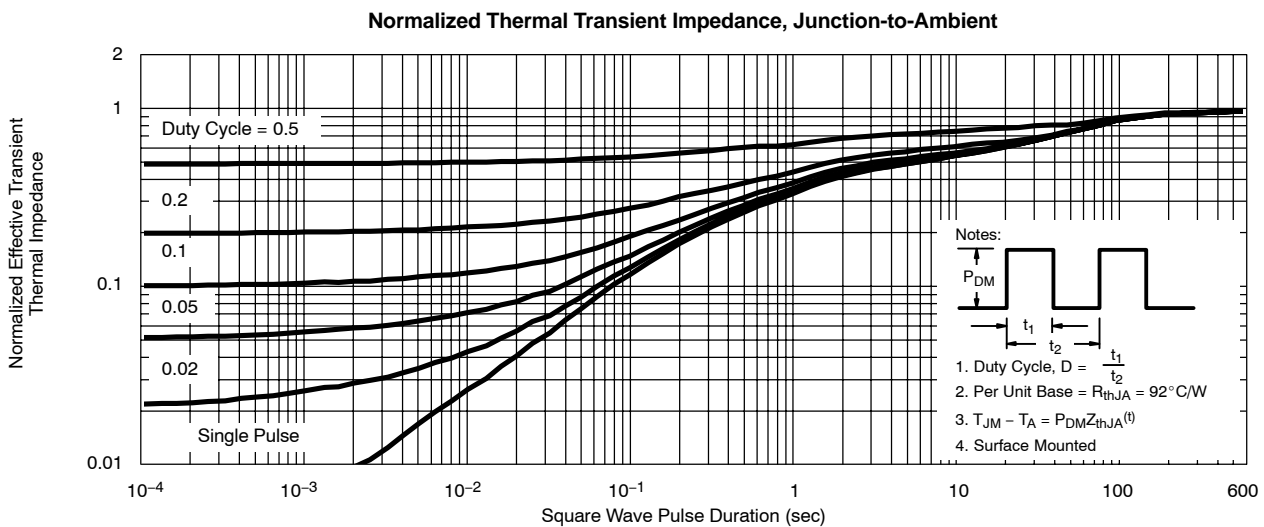
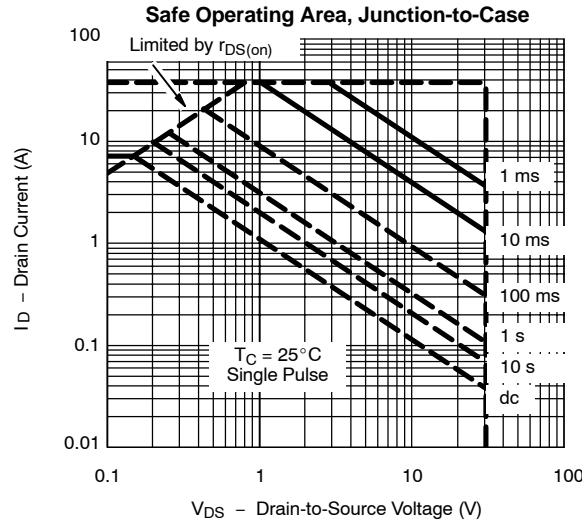
TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

CHANNEL-1





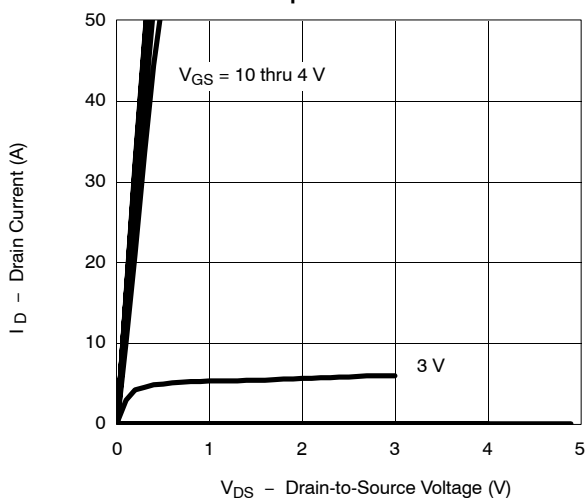
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-1



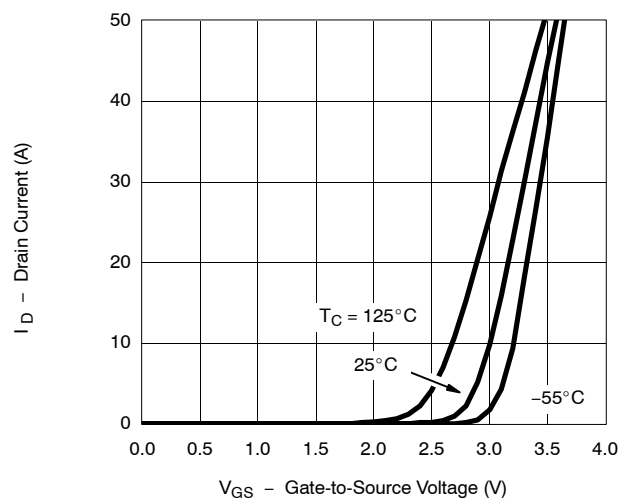
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

CHANNEL-2

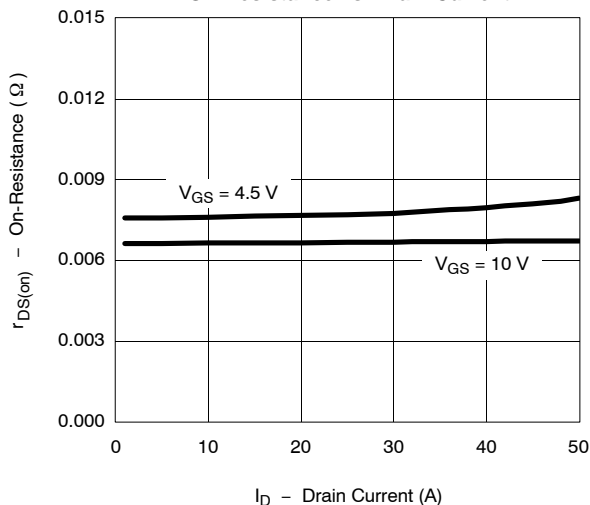
Output Characteristics



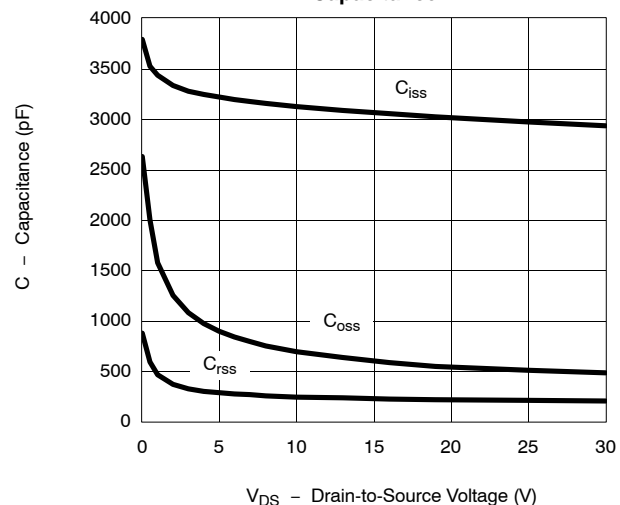
Transfer Characteristics



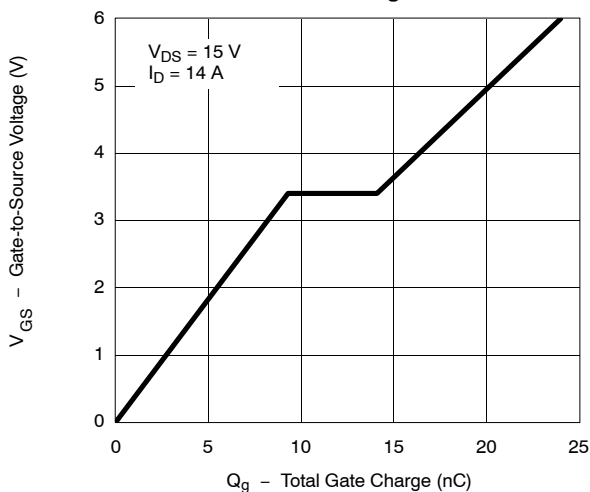
On-Resistance vs. Drain Current



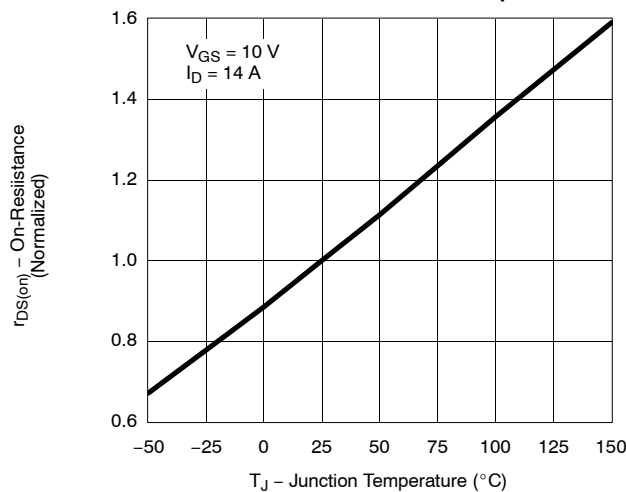
Capacitance



Gate Charge



On-Resistance vs. Junction Temperature

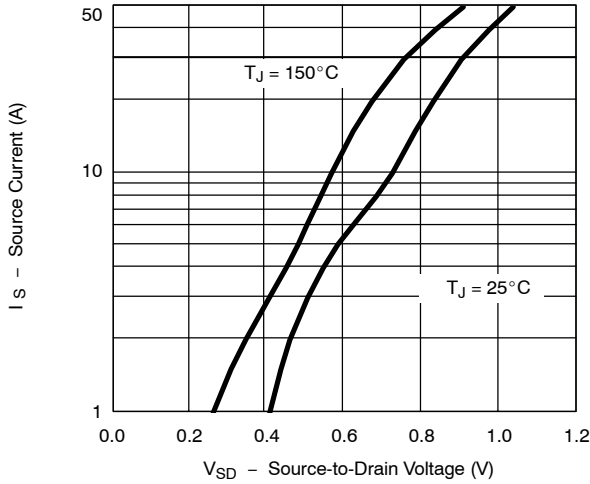




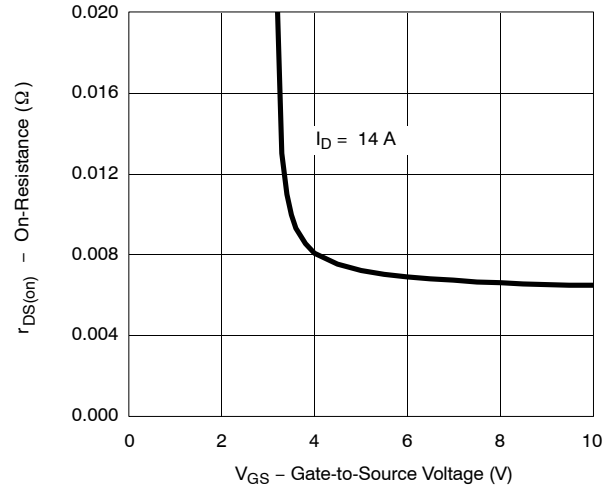
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

CHANNEL-2

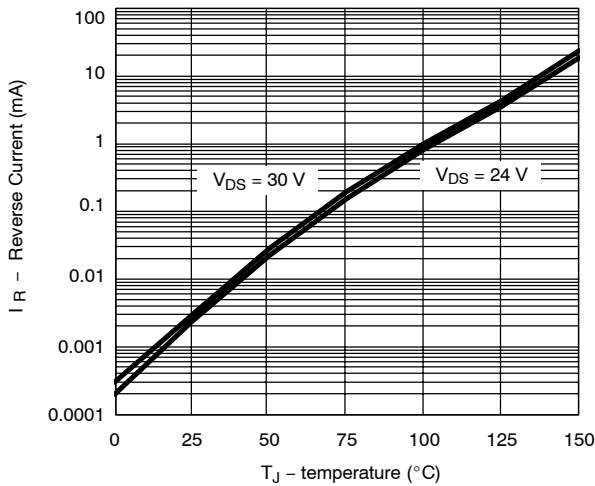
Source-Drain Diode Forward Voltage



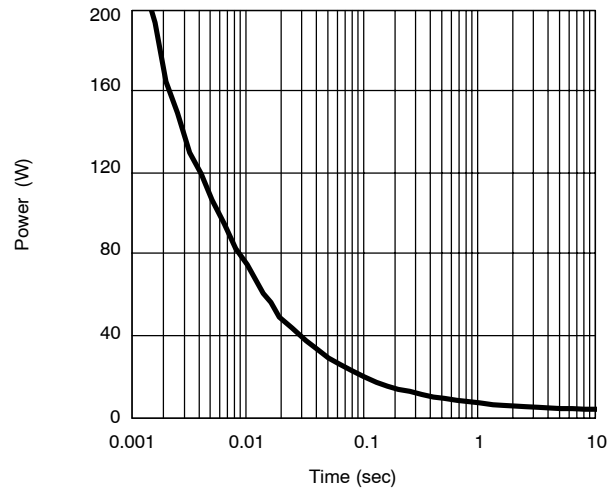
On-Resistance vs. Gate-to-Source Voltage



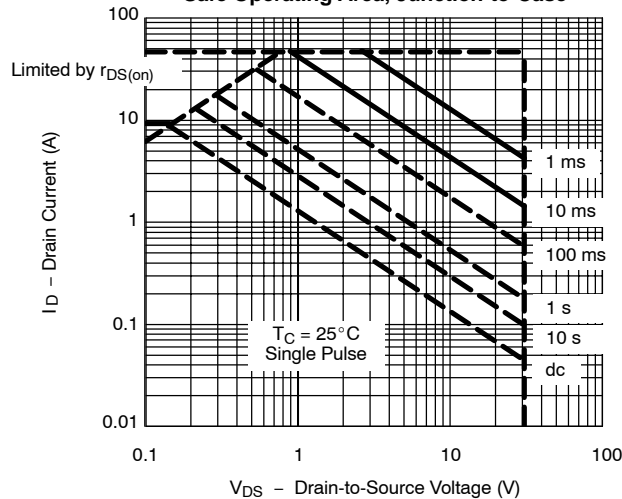
Reverse Current vs. Junction Temperature



Single Pulse Power



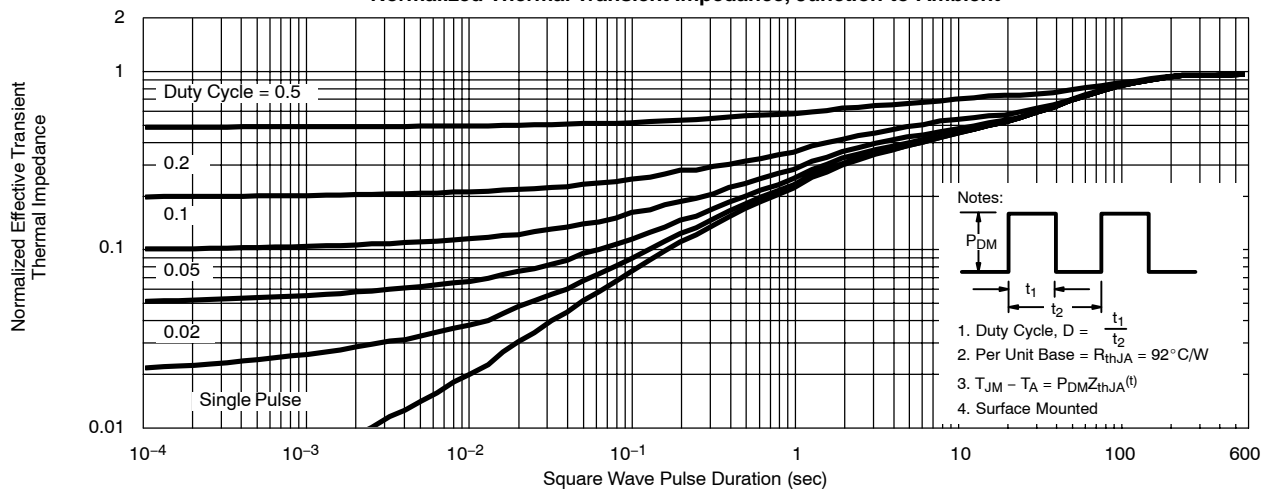
Safe Operating Area, Junction-to-Case



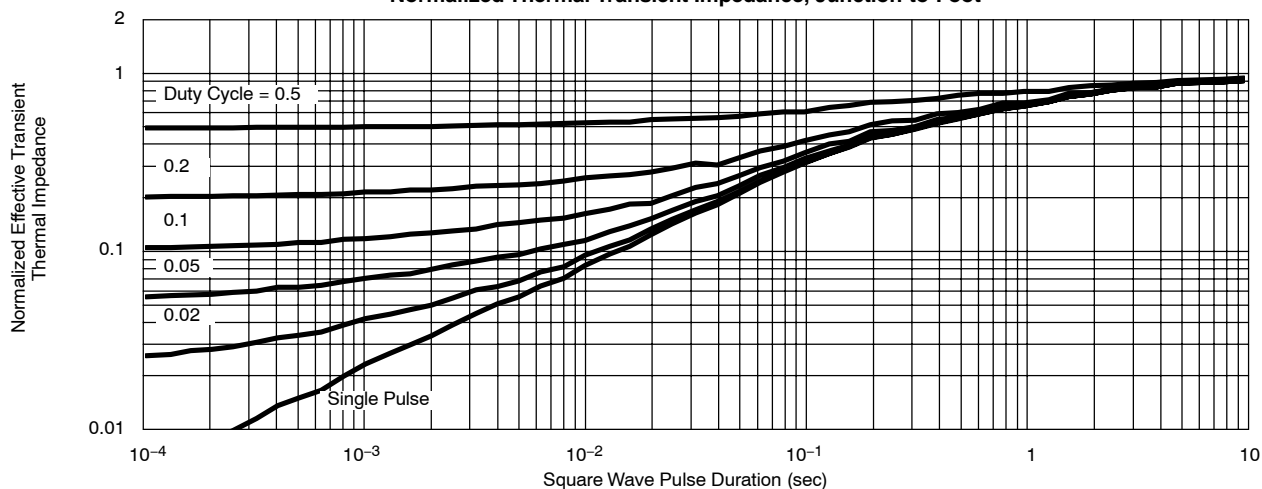
TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

CHANNEL-2

Normalized Thermal Transient Impedance, Junction-to-Ambient



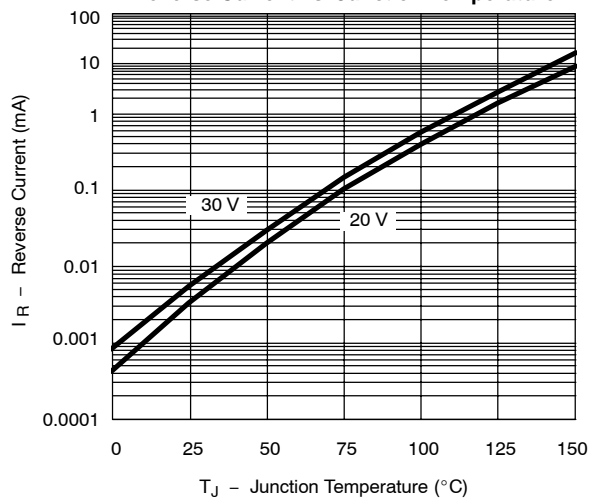
Normalized Thermal Transient Impedance, Junction-to-Foot



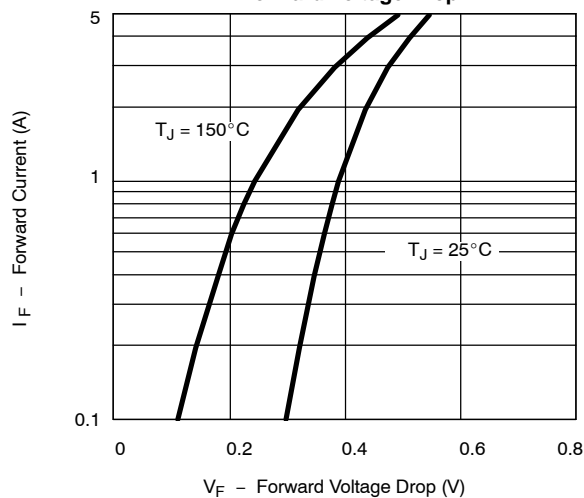
TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

SCHOTTKY

Reverse Current vs. Junction Temperature

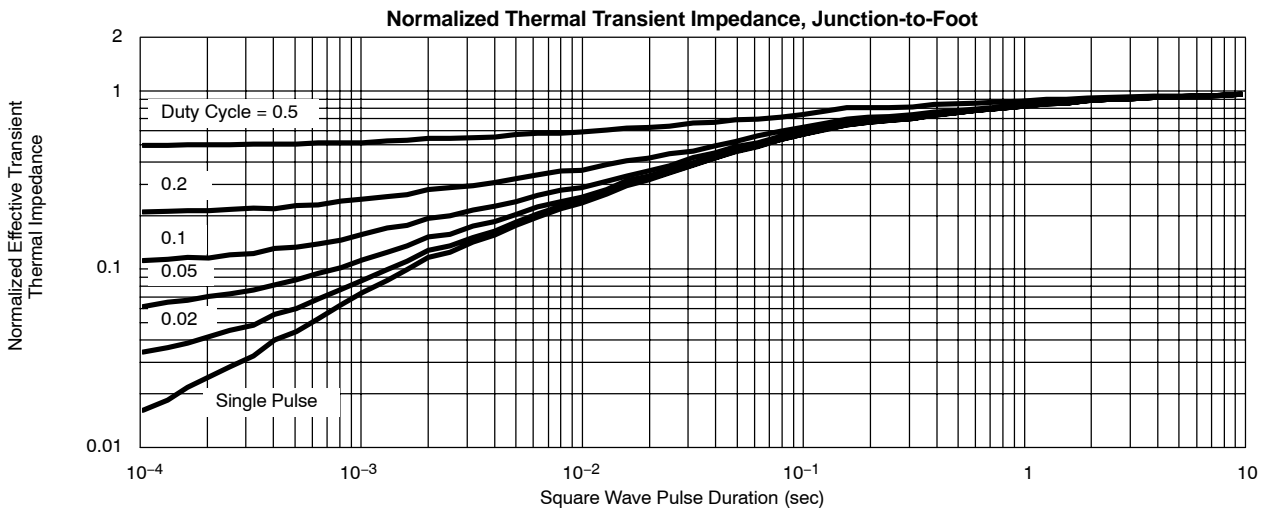
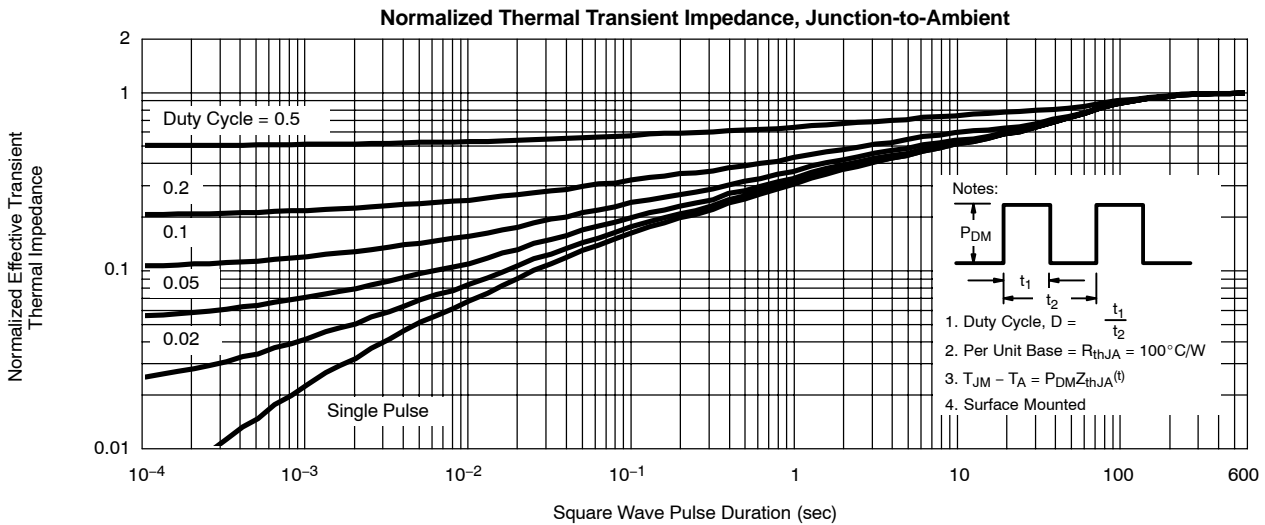
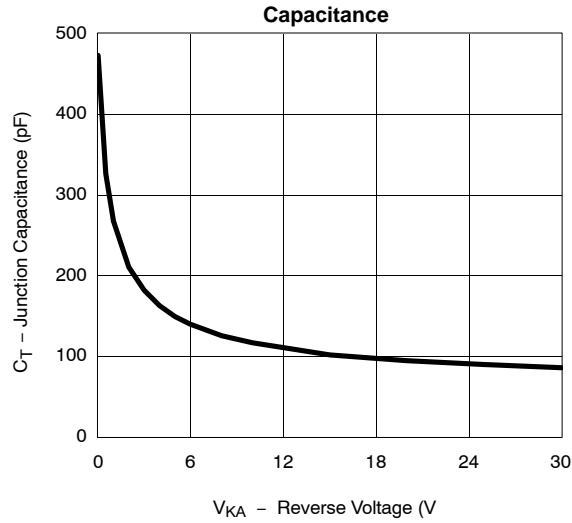


Forward Voltage Drop





TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) **SCHOTTKY**





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