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

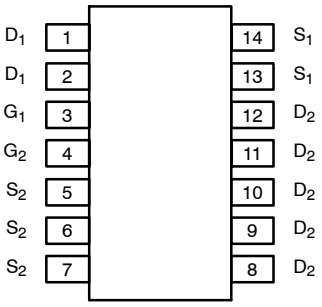
FEATURES

- TrenchFET® Power MOSFET
- 100% R_g Tested

APPLICATIONS

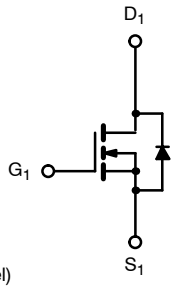
- DC/DC Converters
  - Game Stations
  - Video Equipment

SO-14

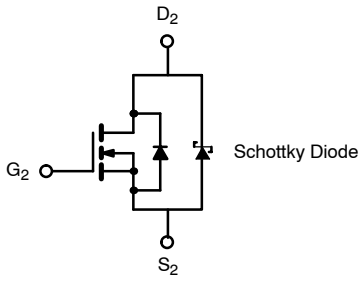


Top View

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



N-Channel 1 MOSFET



N-Channel 2 MOSFET

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]	T_A = 25°C	I_D	10	7.5	14	9.8	A
	T_A = 70°C		8	6	11	7.8	
Pulsed Drain Current		I_{DM}	40		50		
Continuous Source Current (Diode Conduction)[a]		I_S	1.8	1.04	2.73	1.33	
Maximum Power Dissipation[a]	T_A = 25°C	P_D	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]	t ≤ 10 sec	R_{thJA}	53	62.5	34	35	40	48	°C/W
	Steady-State		92	110	70	72	76	93	
Maximum Junction-to-Foot (Drain)	Steady-State	R_{thJF}	35	42	17	24	21	26	

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

MOSFET SPECIFICATIONS (T_J = 25°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 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 A, V_{GS} = 0 V	Ch-1		0.76	1.1	V
		I_S = 2.73 A, 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 Channel-2 V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 14 A	Ch-1		12	18	nC
			Ch-2		19	30	
Gate-Source Charge	Q_{gs}		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 Channel-2 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
			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 A, di/dt = 100 A/µs	Ch-1		25	40	
		I_F = 2.73 A, di/dt = 100 µA/µs	Ch-2		31	50	

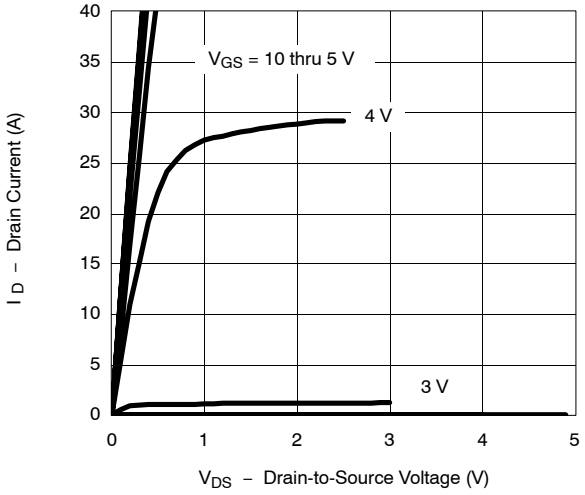
Notes
a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.

SCHOTTKY SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)

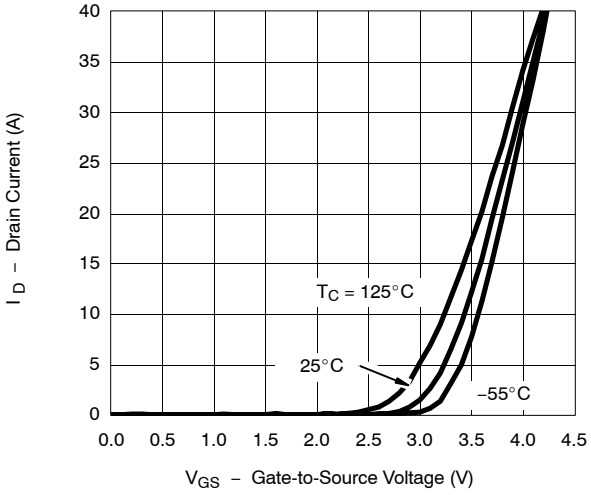
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Forward Voltage Drop	V_F	I_F = 3 A		0.485	0.53	V
		I_F = 3 A, T_J = 125°C		0.42	0.42	
Maximum Reverse Leakage Current	I_{rm}	V_r = 30 V		0.008	0.100	mA
		V_r = 30 V, T_J = 75°C		0.4	5	
		V_r = –30 V, T_J = 125°C		6.5	20	
Junction Capacitance	C_T	V_r = 15 V		102		pF

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

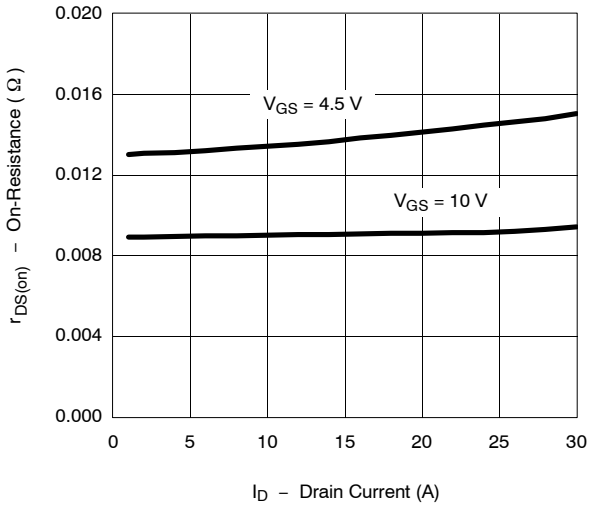
Output Characteristics



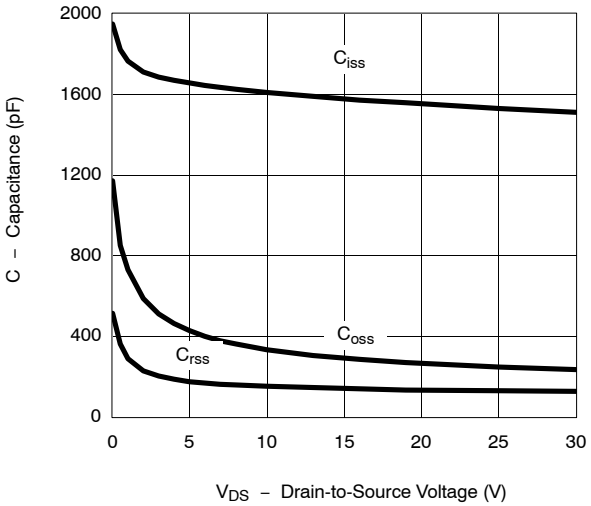
Transfer Characteristics



On-Resistance vs. Drain Current

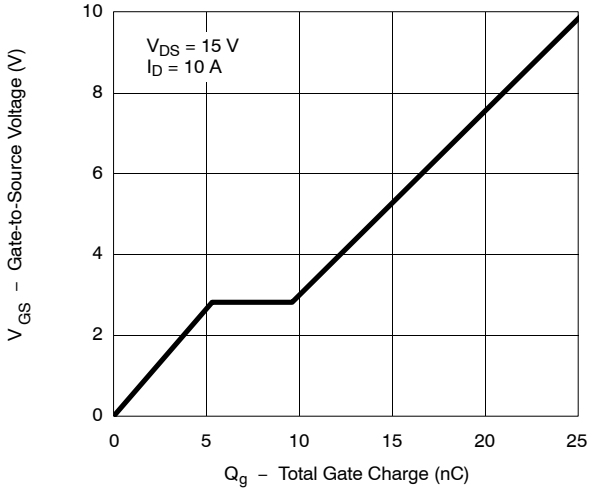


Capacitance

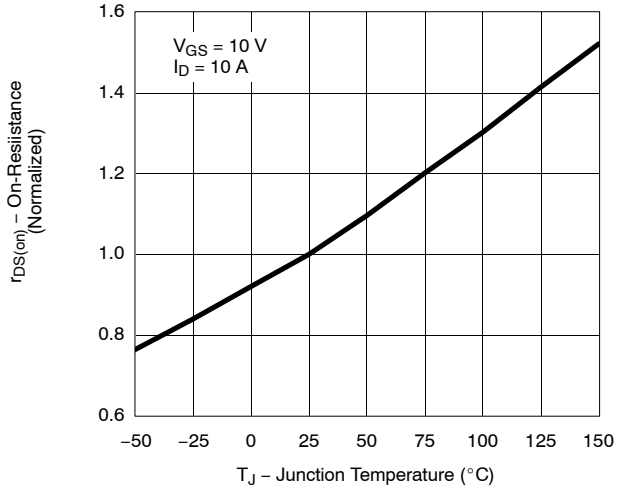


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-1

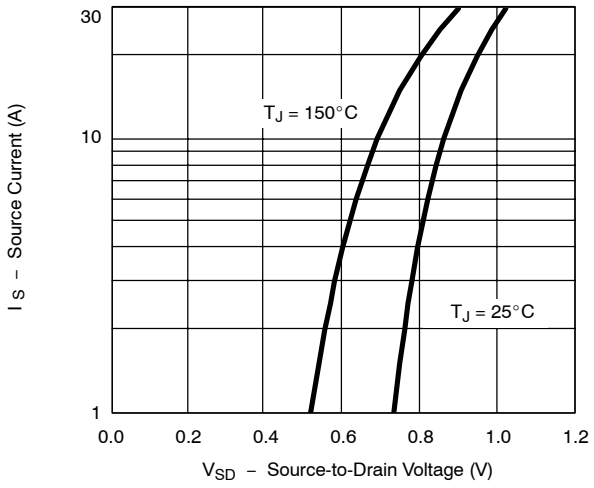
Gate Charge



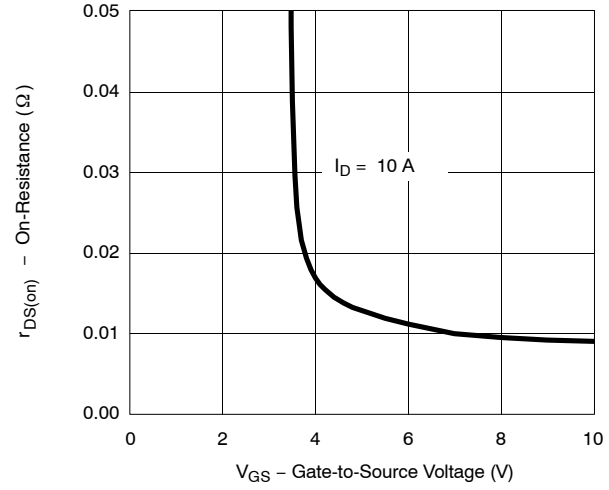
On-Resistance vs. Junction Temperature



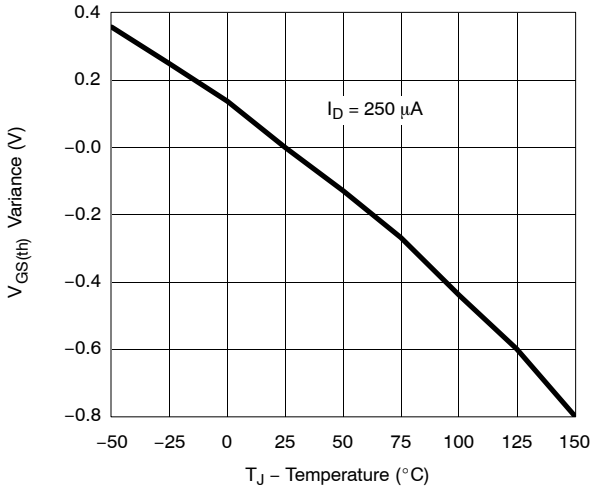
Source-Drain Diode Forward Voltage



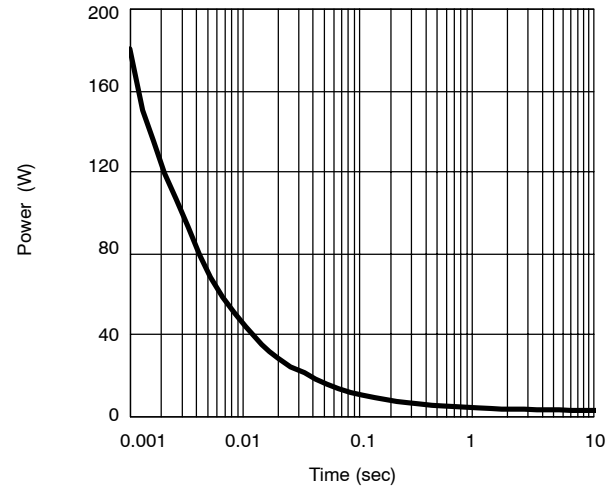
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

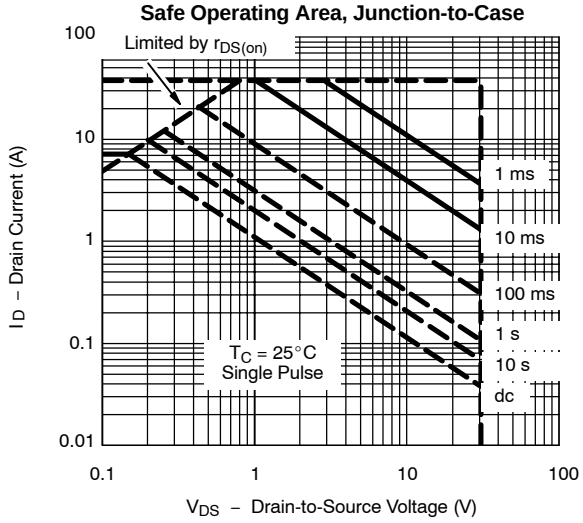


Single Pulse Power

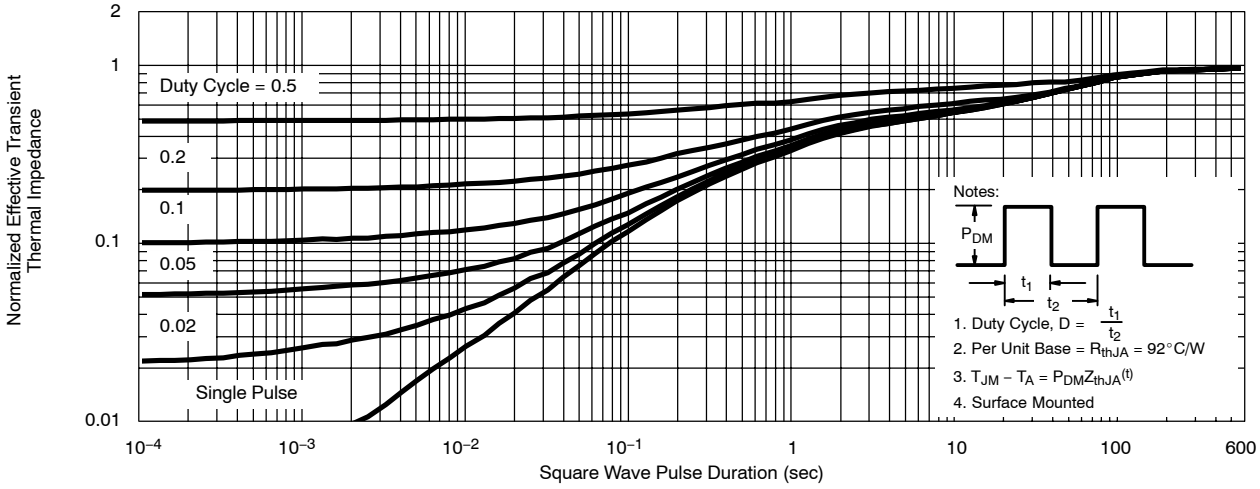


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) — CHANNEL-1

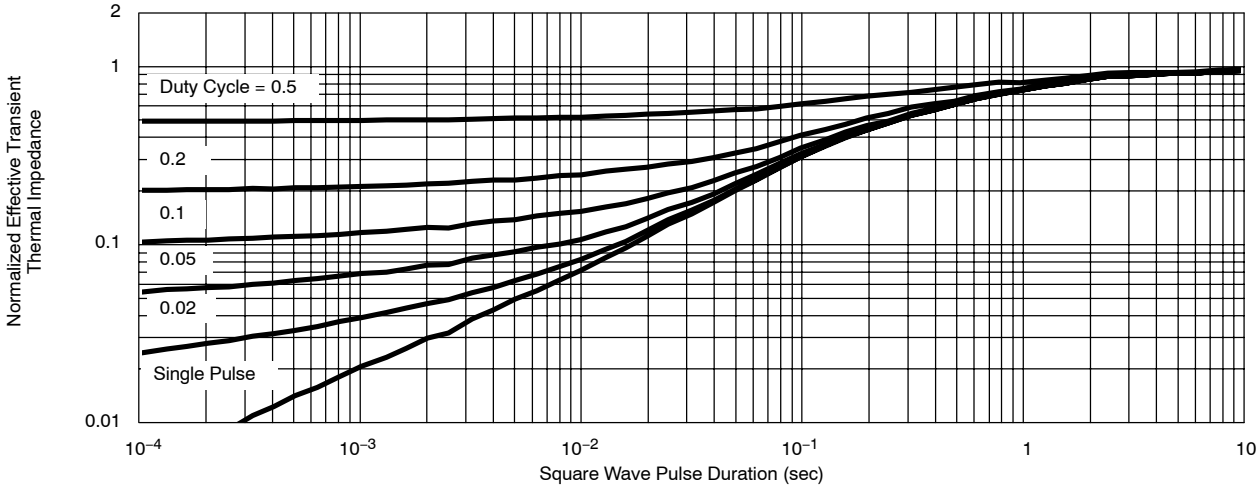
Safe Operating Area, Junction-to-Case



Normalized Thermal Transient Impedance, Junction-to-Ambient

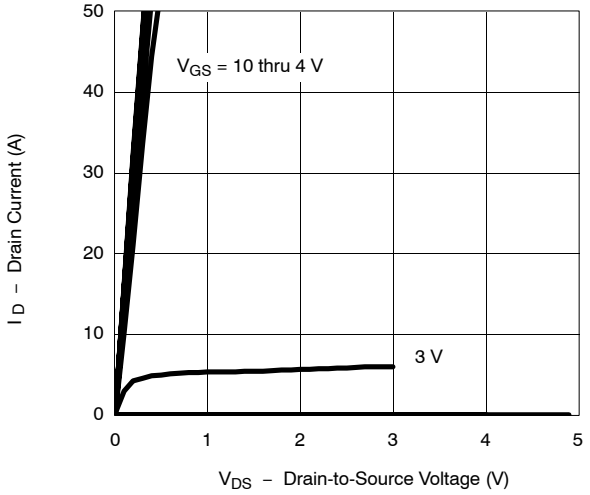


Normalized Thermal Transient Impedance, Junction-to-Foot

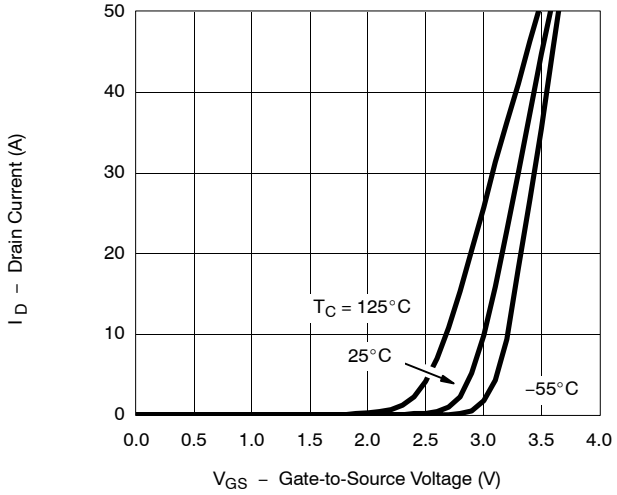


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-2

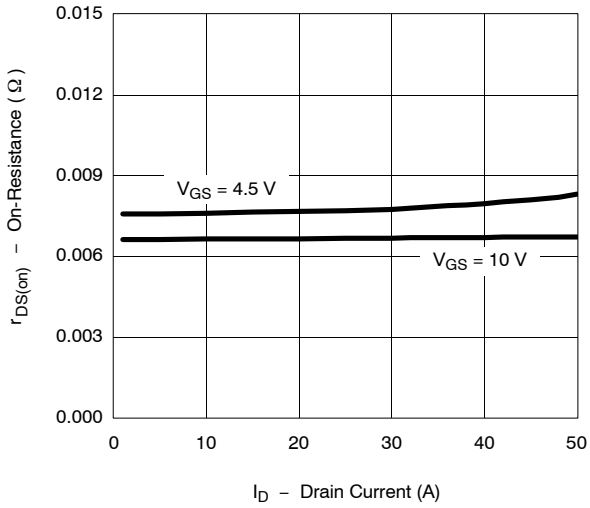
Output Characteristics



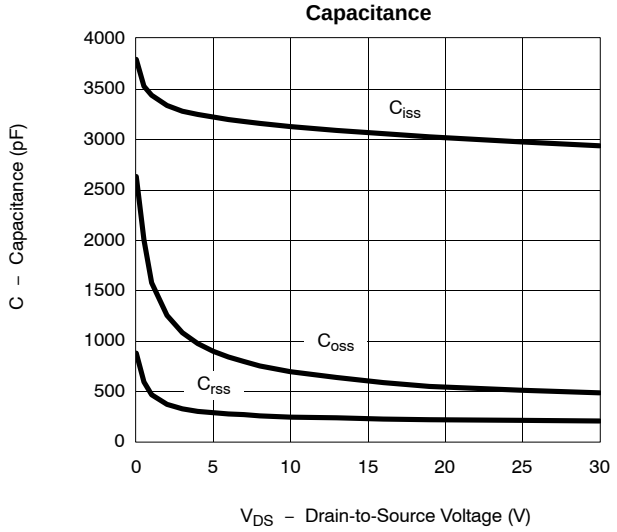
Transfer Characteristics



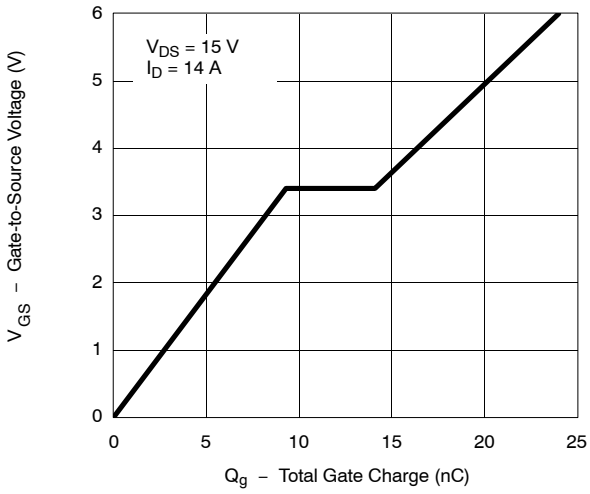
On-Resistance vs. Drain Current



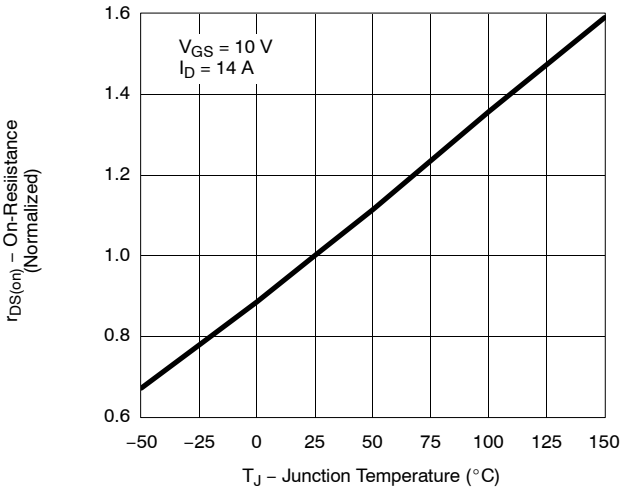
Capacitance



Gate Charge

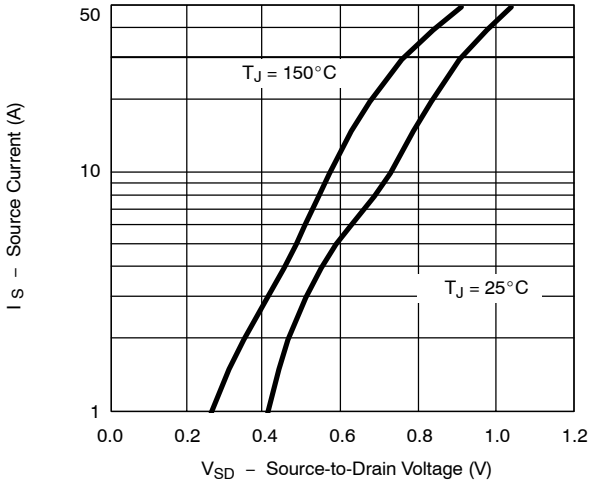


On-Resistance vs. Junction Temperature

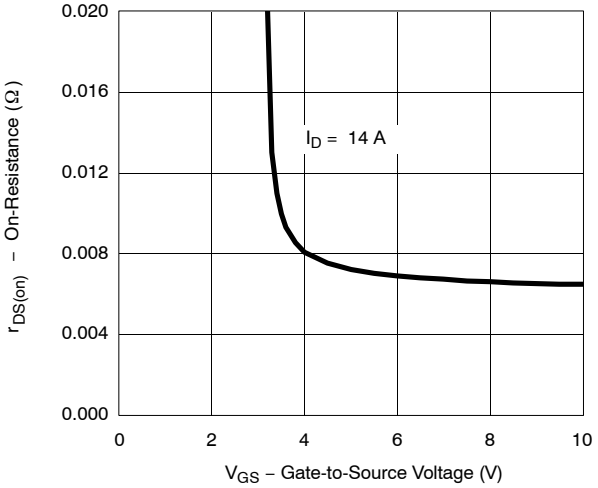


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-2

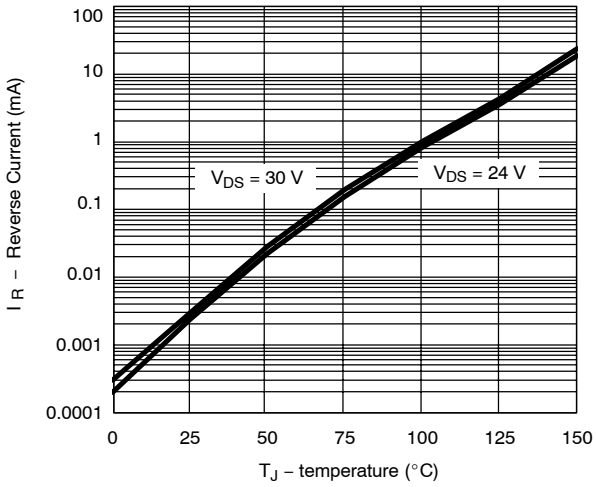
Source-Drain Diode Forward Voltage



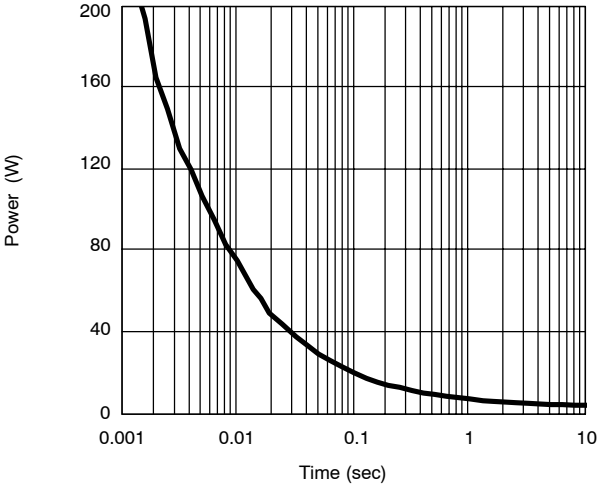
On-Resistance vs. Gate-to-Source Voltage



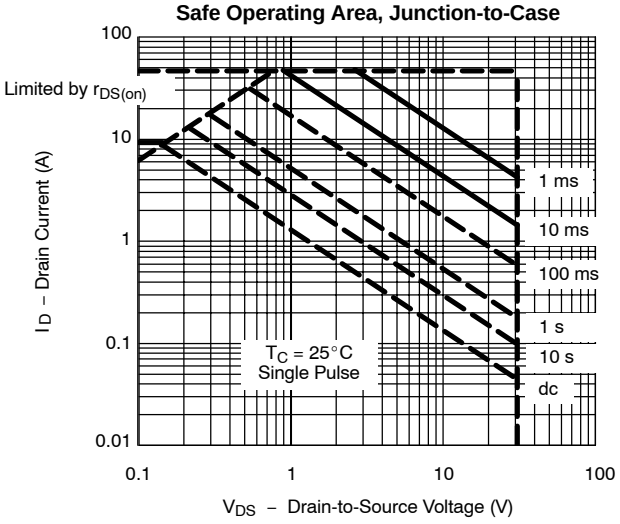
Reverse Current vs. Junction Temperature



Single Pulse Power

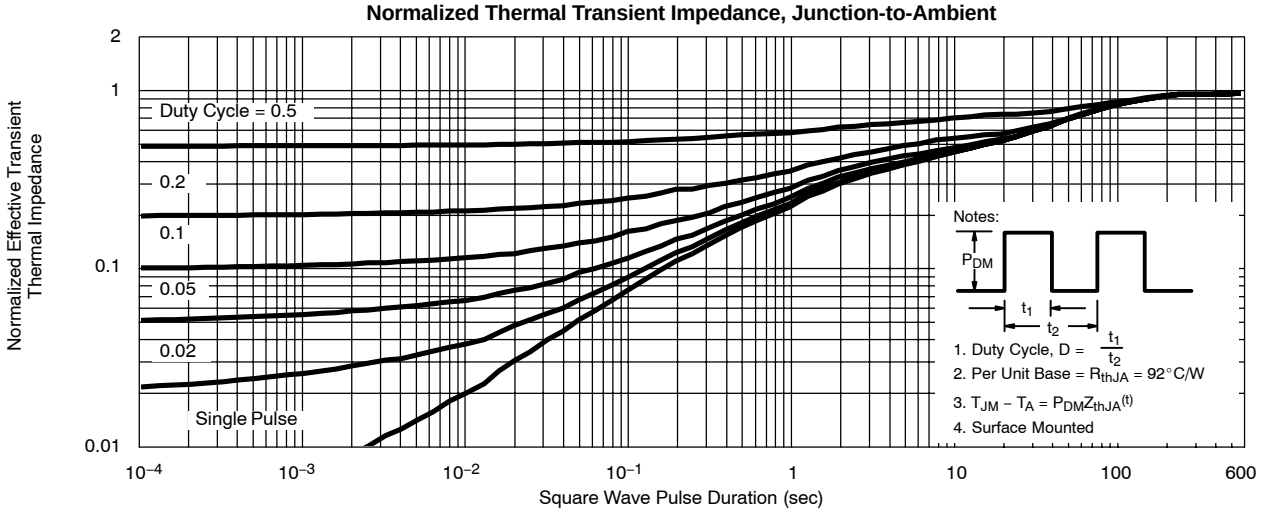


Safe Operating Area, Junction-to-Case

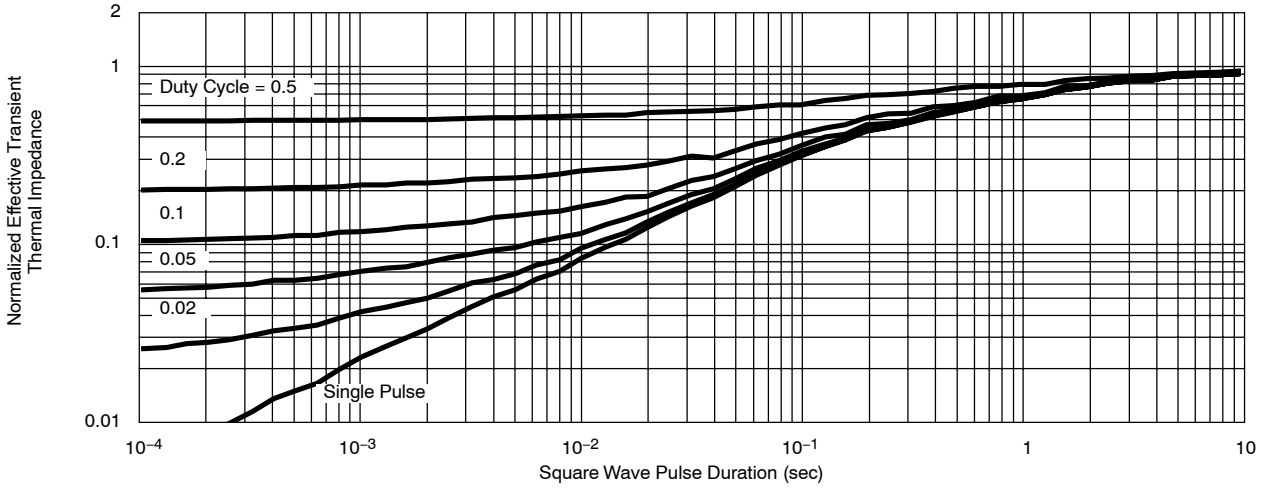


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-2

Normalized Thermal Transient Impedance, Junction-to-Ambient

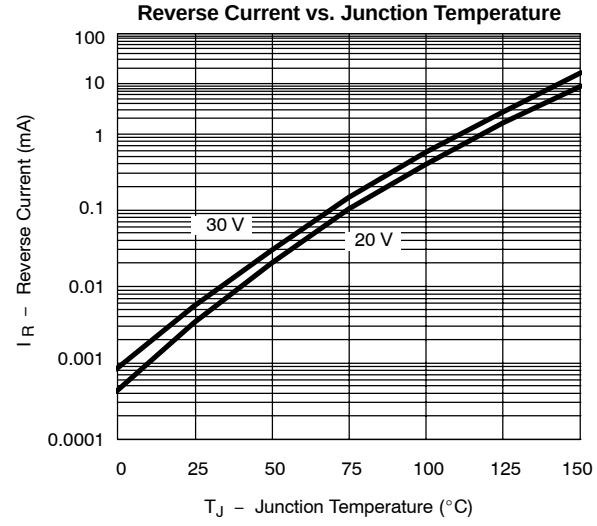


Normalized Thermal Transient Impedance, Junction-to-Foot

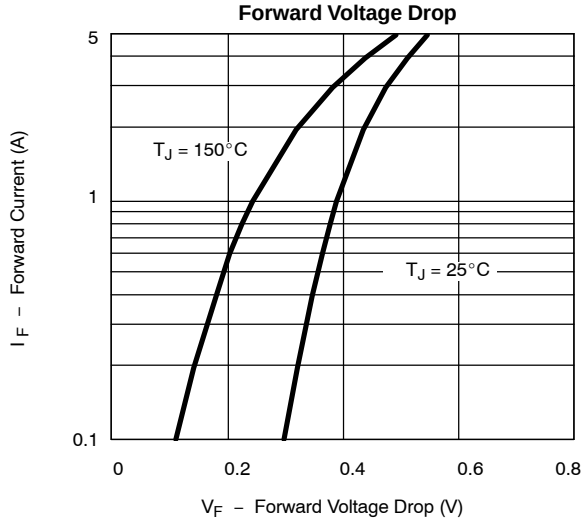


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) SCHOTTKY

Reverse Current vs. Junction Temperature

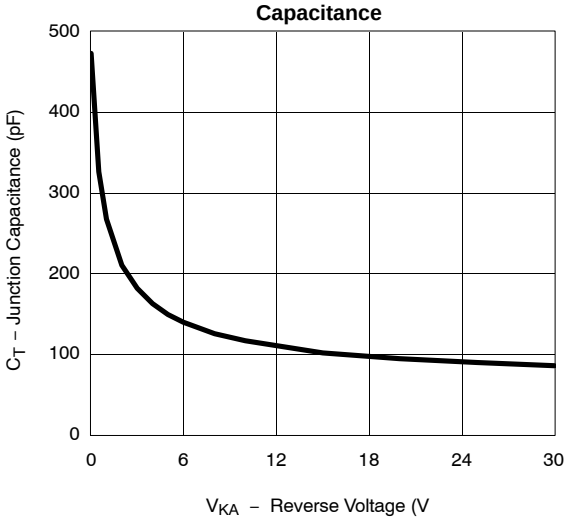


Forward Voltage Drop

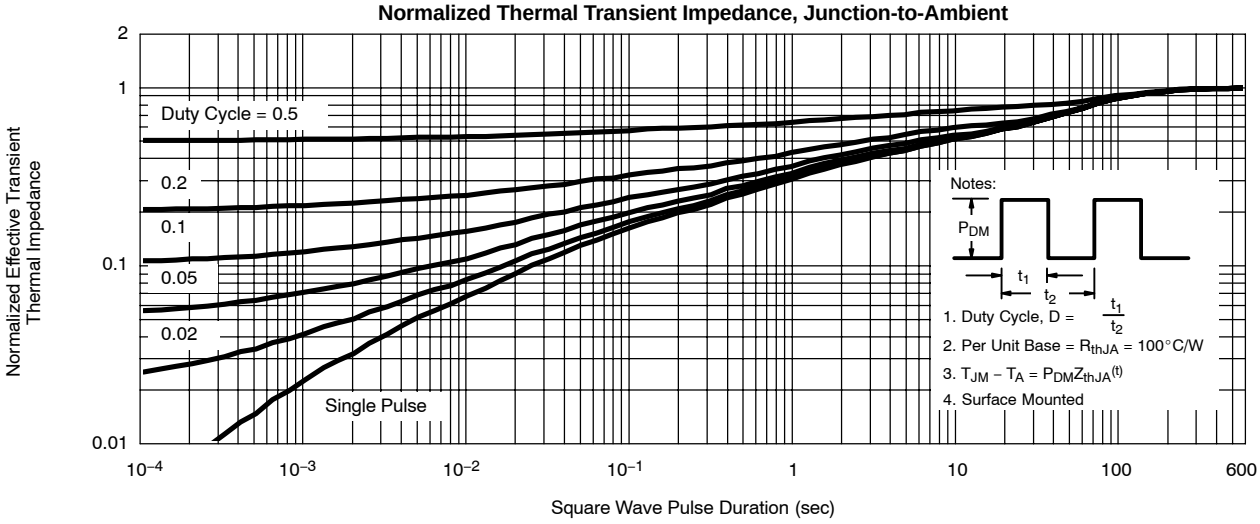


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) SCHOTTKY

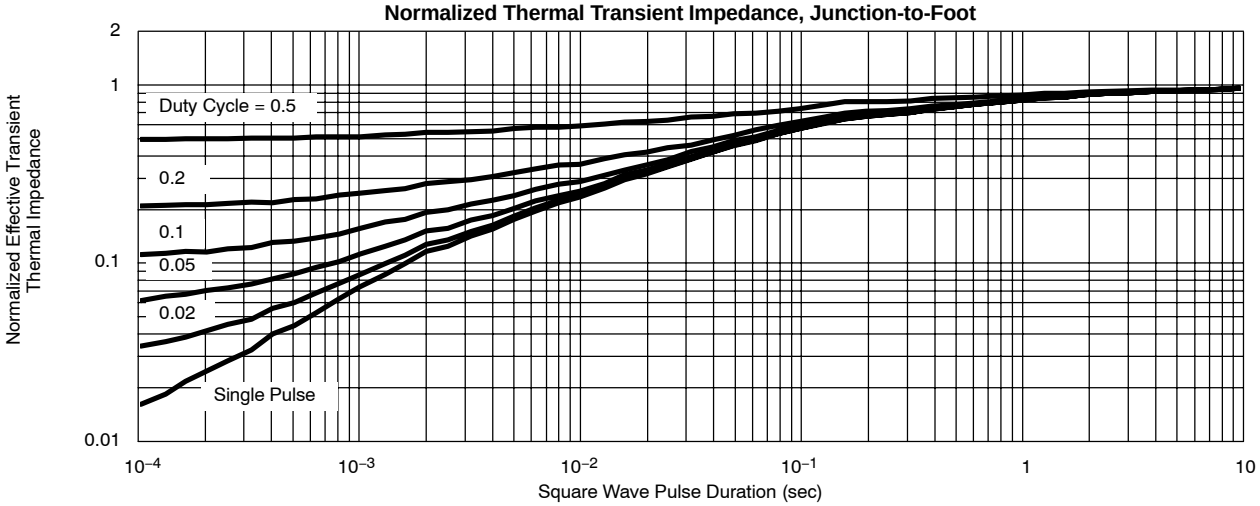
Capacitance



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot



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