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	0.022 at V_{GS} = 10 V	6.3
		0.030 at V_{GS} = 4.5 V	5.4
Channel-2		0.013 at V_{GS} = 10 V	10
		0.0185 at V_{GS} = 4.5 V	8.6

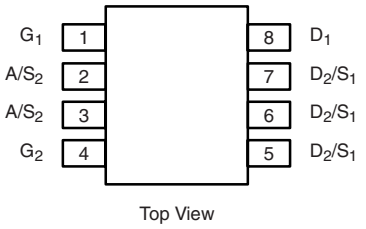
SCHOTTKY PRODUCT SUMMARY		
V_{DS} (V)	V_{SD} (V) Diode Forward Voltage	I_F (A)
30	0.50 V at 1.0 A	2.0

FEATURES

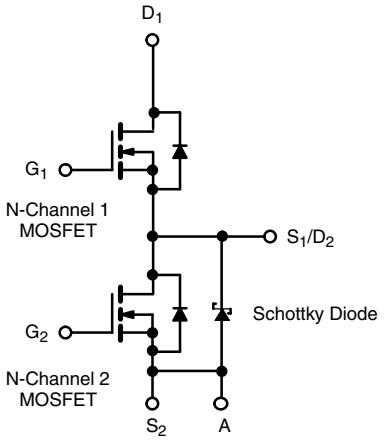
- **Halogen-free According to IEC 61249-2-21 Definition**
- LITTLE FOOT® *Plus* Power MOSFET
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC

Pb-free
RoHS COMPLIANT
HALOGEN FREE Available

SO-8



Top View



Ordering Information: Si4816DY-T1-E3 (Lead (Pb)-free)
Si4816DY-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				
Continuous Drain Current (T_J = 150 °C)[a]	T_A = 25 °C	I_D	6.3	5.3	10	7.7	A
	T_A = 70 °C		5.4	4.2	8.2	6.2	
Pulsed Drain Current		I_{DM}	30		40		
Continuous Source Current (Diode Conduction)[a]		I_S	1.3	0.9	2.2	1.15	
Avalanche Current[b]	L = 0.1 mH	I_{AS}	12		25		
Single Pulse Avalanche Energy[b]		E_{AS}	7.2		31.25		mJ
Maximum Power Dissipation[a]	T_A = 25 °C	P_D	1.4	1.0	2.4	1.25	W
	T_A = 70 °C		0.9	0.64	1.5	0.8	
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 s	R_{thJA}	72	90	43	53	48	60	°C/W
	Steady State		100	125	82	100	80	100	
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJC}	51	63	25	30	28	35	

Notes:
a. Surface Mounted on 1" x 1" FR4 board.
b. Starting date code W46BAA.

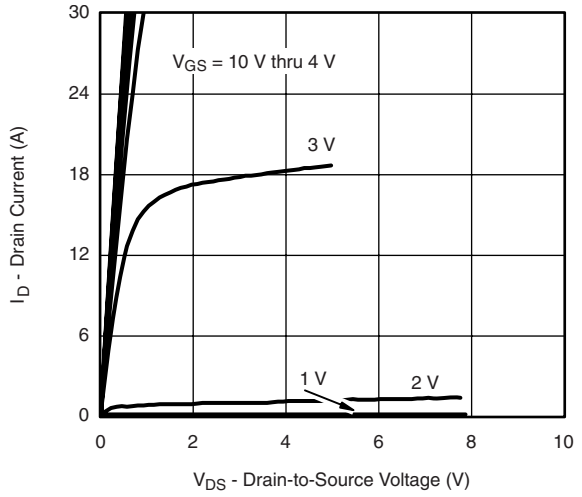
MOSFET SPECIFICATIONS T_J = 25 °C, unless otherwise noted							
Parameter	**Symbol**	**Test Conditions**		**Min.**	**Typ.[a]**	**Max.**	**Unit**
Static							
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	Ch-1	0.8		2	V
			Ch-2	1.0		3	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = 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			2000	
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 = 6.3 A	Ch-1		0.018	0.022	Ω
		V_{GS} = 10 V, I_D = 10 A	Ch-2		0.0105	0.013	
		V_{GS} = 4.5 V, I_D = 5.4 A	Ch-1		0.024	0.030	
		V_{GS} = 4.5 V, I_D = 8.6 A	Ch-2		0.015	0.0185	
Forward Transconductance[b]	g_{fs}	V_{DS} = 15 V, I_D = 6.3 A	Ch-1		17		S
		V_{DS} = 15 V, I_D = 10 A	Ch-2		28		
Diode Forward Voltage[b]	V_{SD}	I_S = 1.3 A V, V_{GS} = 0 V	Ch-1		0.7	1.1	V
		I_S = 1 A V, V_{GS} = 0 V	Ch-2		0.47	0.5	
Dynamic[a]							
Total Gate Charge	Q_g	Channel-1 V_{DS} = 15 V, V_{GS} = 5 V, I_D = 6.3 A Channel-2 V_{DS} = 15 V, V_{GS} = 5 V, I_D = - 10 A	Ch-1		8.0	12	nC
			Ch-2		15	23	
Gate-Source Charge	Q_{gs}		Ch-1		1.75		
			Ch-2		5.3		
Gate-Drain Charge	Q_{gd}		Ch-1		3.2		
			Ch-2		4.6		
Gate Resistance	R_g		Ch-1	1.5		6.1	Ω
			Ch-2	0.5		2.6	
Turn-On Delay Time	$t_{d(on)}$	Channel-1 V_{DD} = 15 V, R_L = 15 Ω $I_D \cong$ 1 A, V_{GEN} = 10 V, R_g = 6 Ω Channel-2 V_{DD} = 15 V, R_L = 15 Ω $I_D \cong$ 1 A, V_{GEN} = 10 V, R_g = 6 Ω	Ch-1		10	20	ns
			Ch-2		15	30	
Rise Time	t_r		Ch-1		5	10	
			Ch-2		5	10	
Turn-Off Delay Time	$t_{d(off)}$		Ch-1		26	50	
			Ch-2		44	80	
Fall Time	t_f		Ch-1		8	16	
			Ch-2		12	24	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = 1.3 A, dI/dt = 100 A/µs	Ch-1		30	60	
		I_F = 2.2 A, dI/dt = 100 µA/µs	Ch-2		32	70	

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

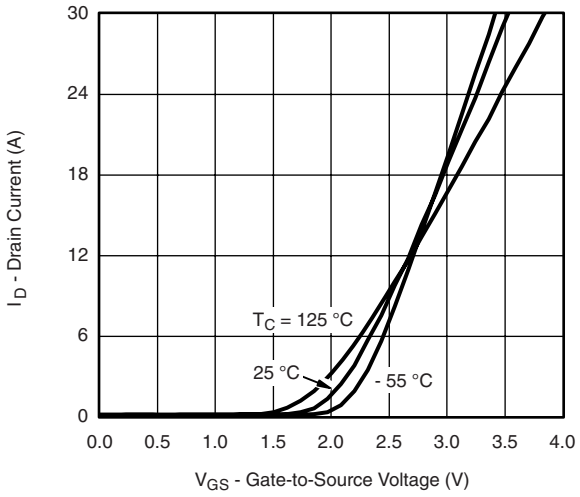
SCHOTTKY SPECIFICATIONS T_J = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Forward Voltage Drop	V_F	I_F = 1.0 A		0.47	0.50	V
		I_F = 1.0 A, T_J = 125 °C		0.36	0.42	
Maximum Reverse Leakage Current	I_{rm}	V_R = 30 V		0.004	0.100	mA
		V_R = 30 V, T_J = 100 °C		0.7	10	
		V_R = - 30 V, T_J = 125 °C		3.0	20	
Junction Capacitance	C_T	V_R = 10 V		50		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.

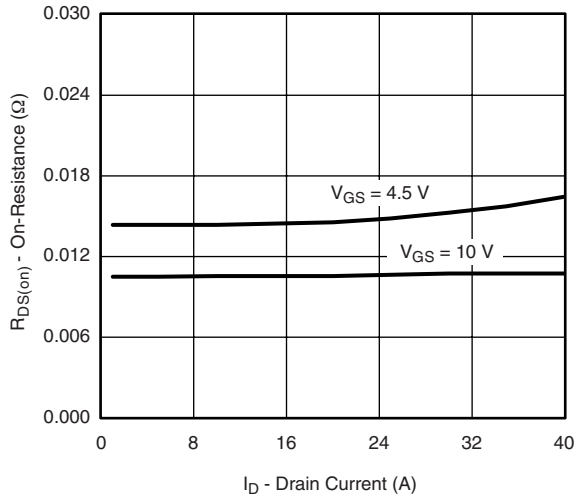
CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



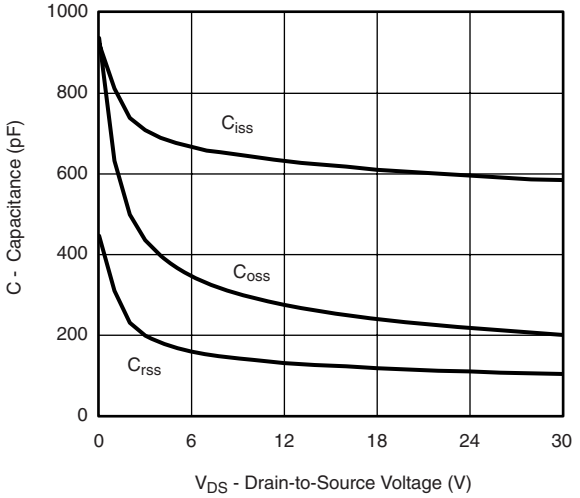
Output Characteristics



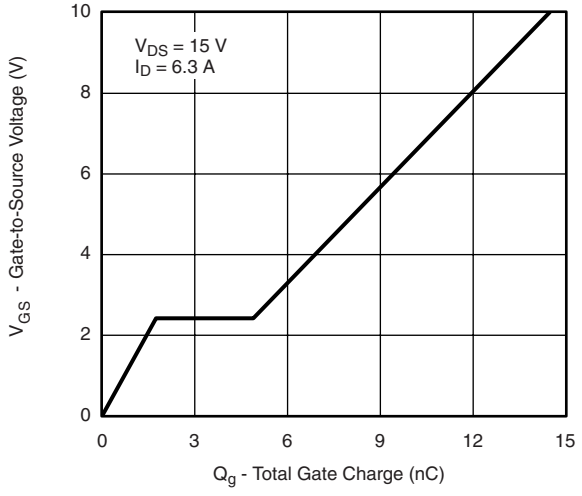
Transfer Characteristics



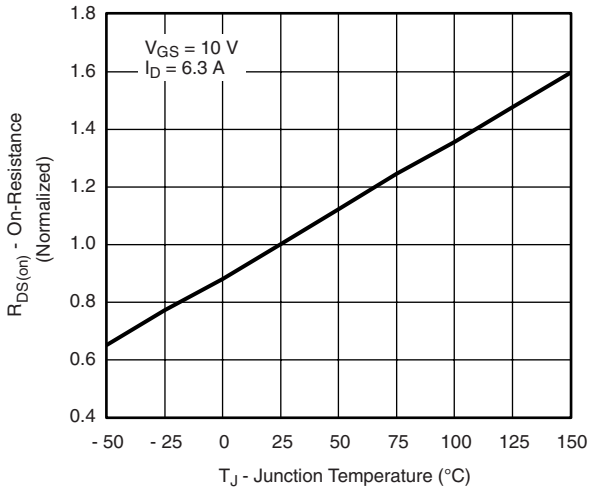
On-Resistance vs. Drain Current



Capacitance

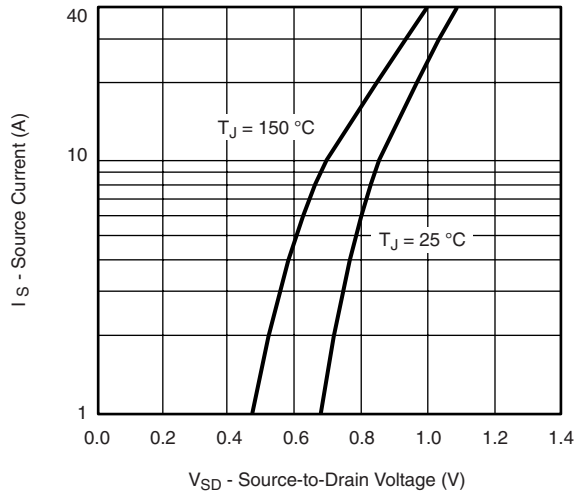


Gate Charge

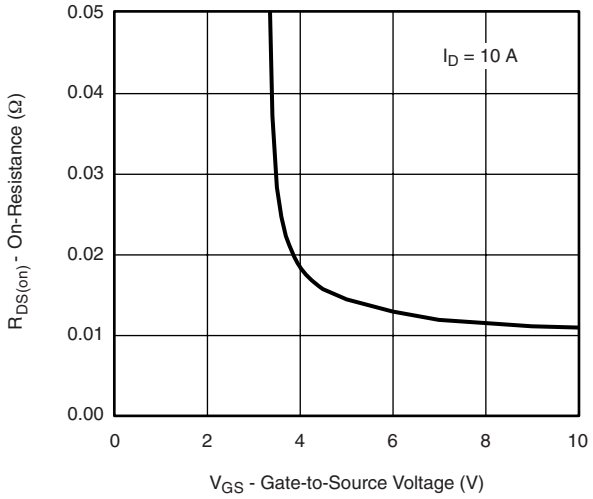


On-Resistance vs. Junction Temperature

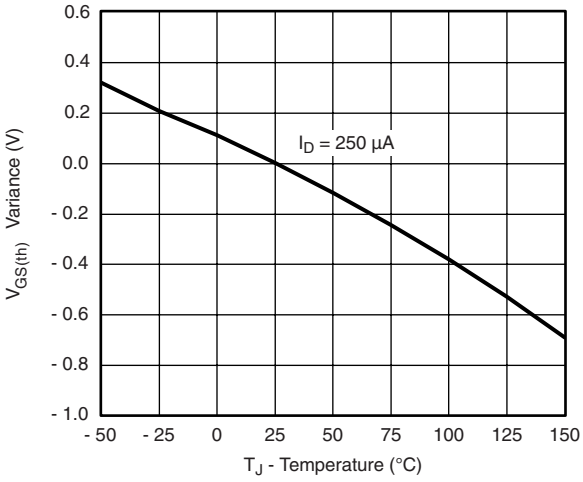
CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



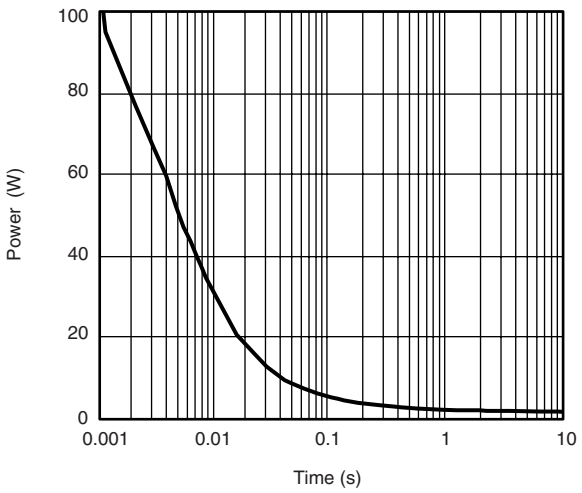
Source-Drain Diode Forward Voltage



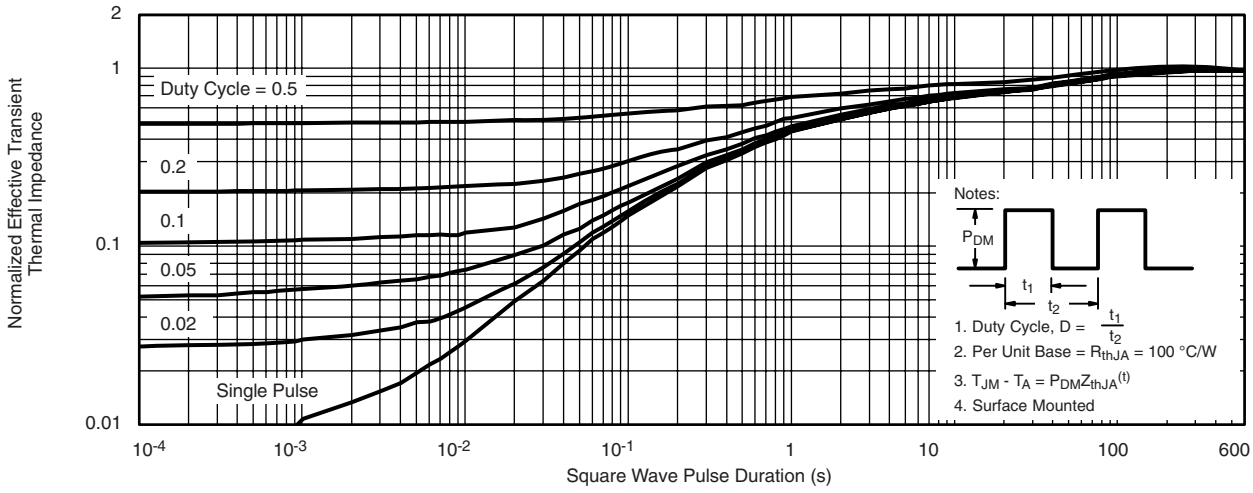
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

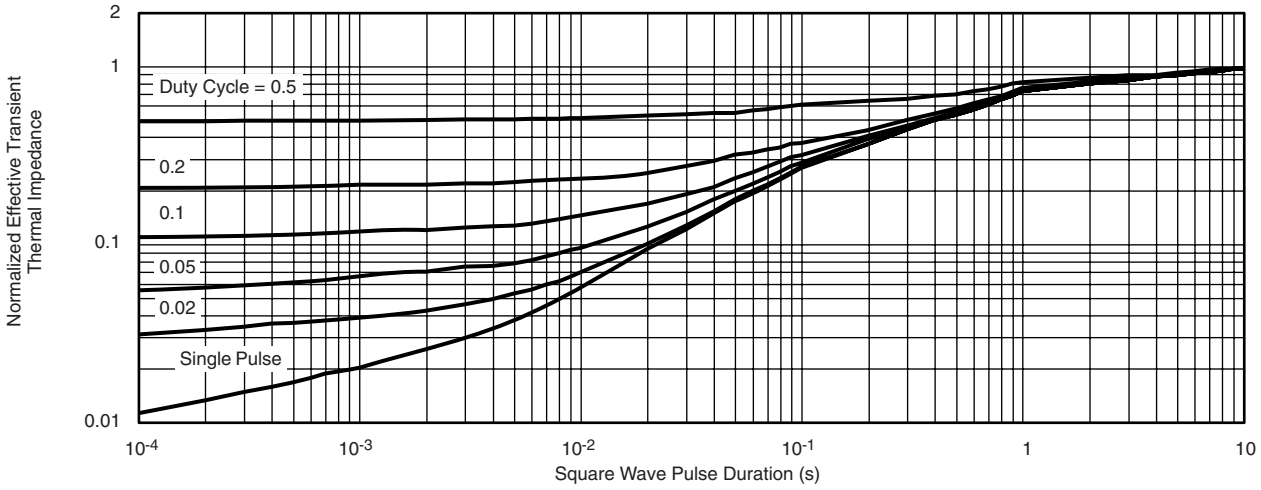


Single Pulse Power, Junction-to-Ambient



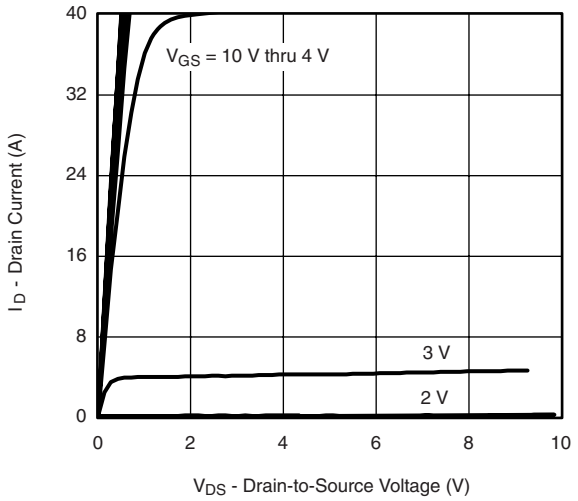
Normalized Thermal Transient Impedance, Junction-to-Ambient

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

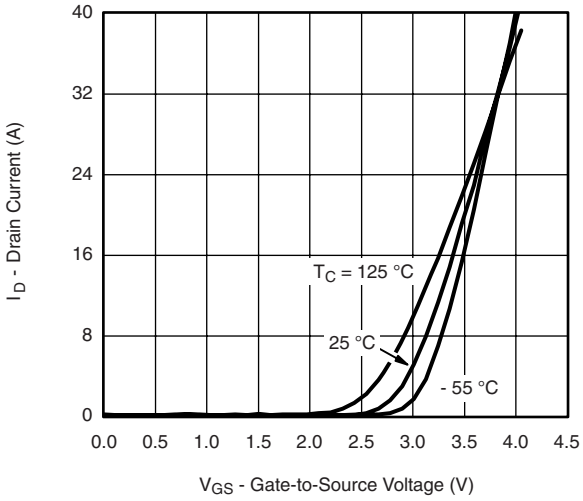


Normalized Thermal Transient Impedance, Junction-to-Foot

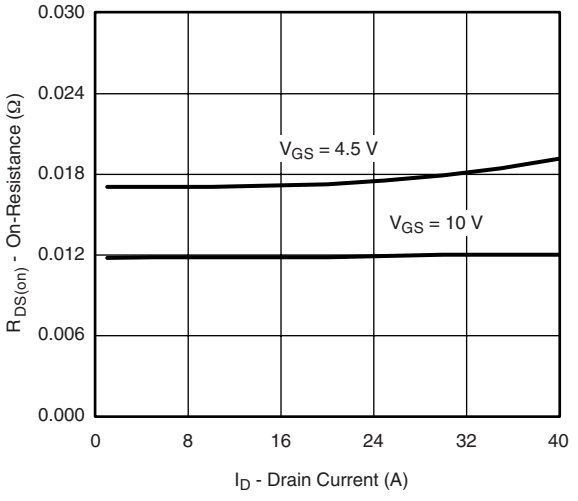
CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



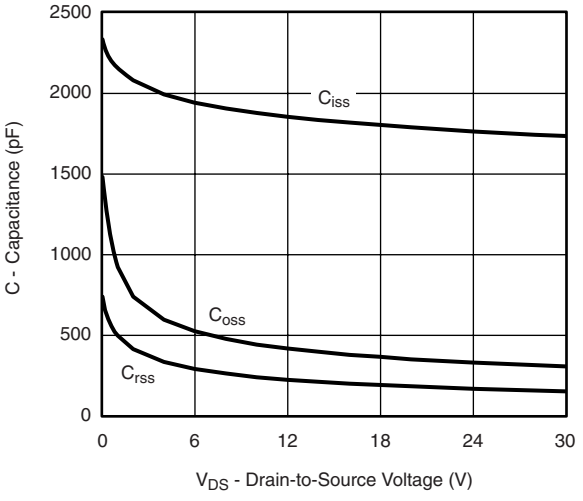
Output Characteristics



Transfer Characteristics

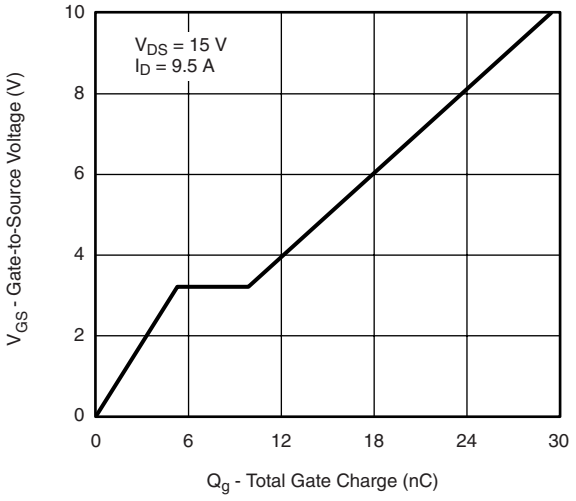


On-Resistance vs. Drain Current

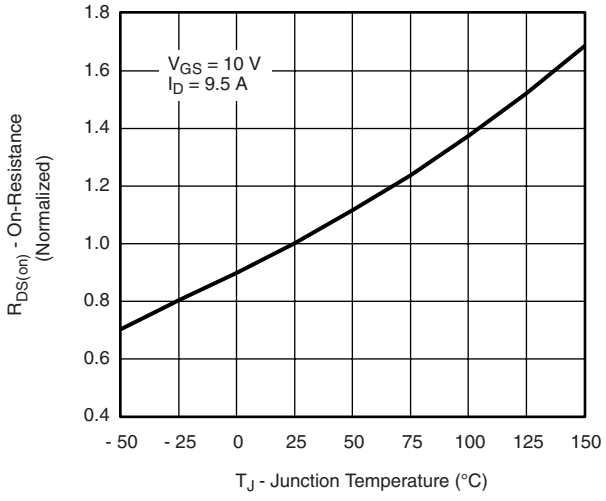


Capacitance

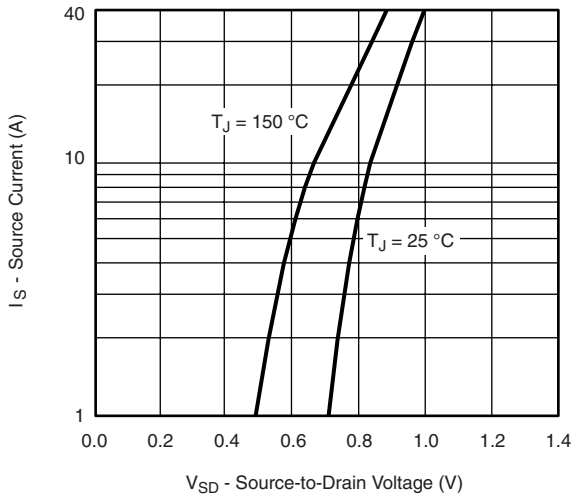
CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



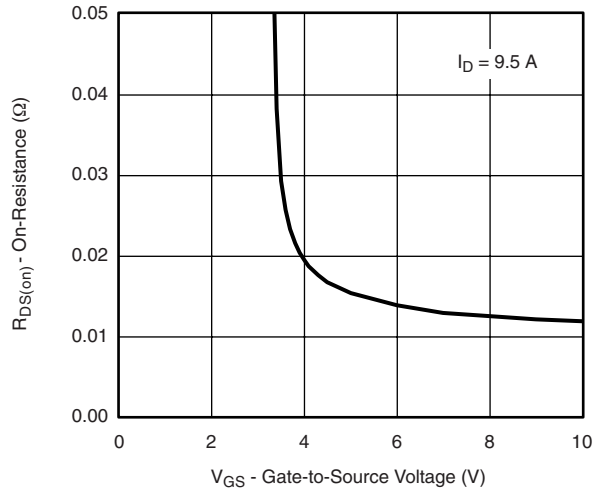
Gate Charge



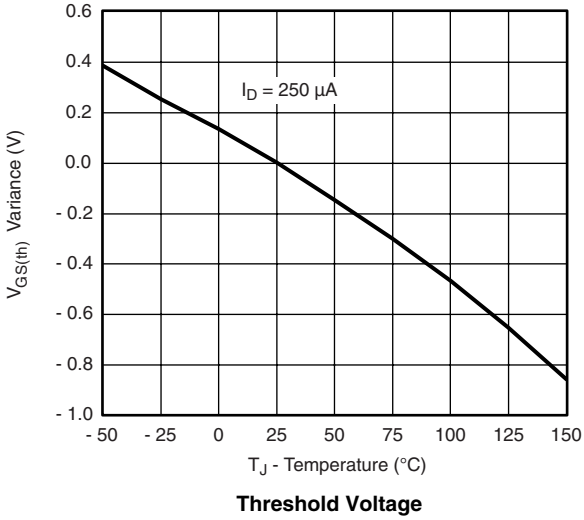
On-Resistance vs. Junction Temperature



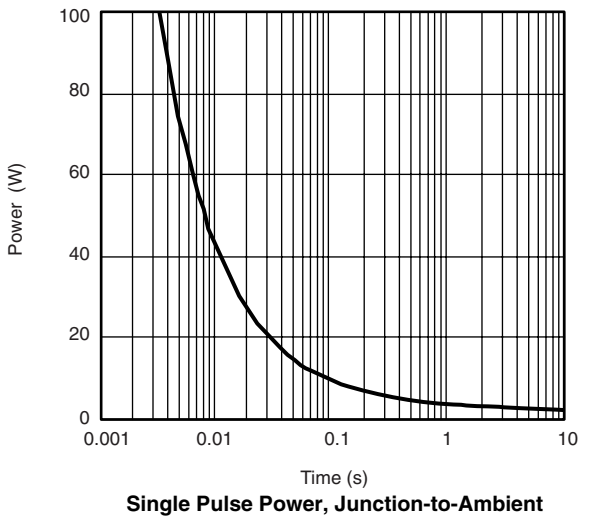
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

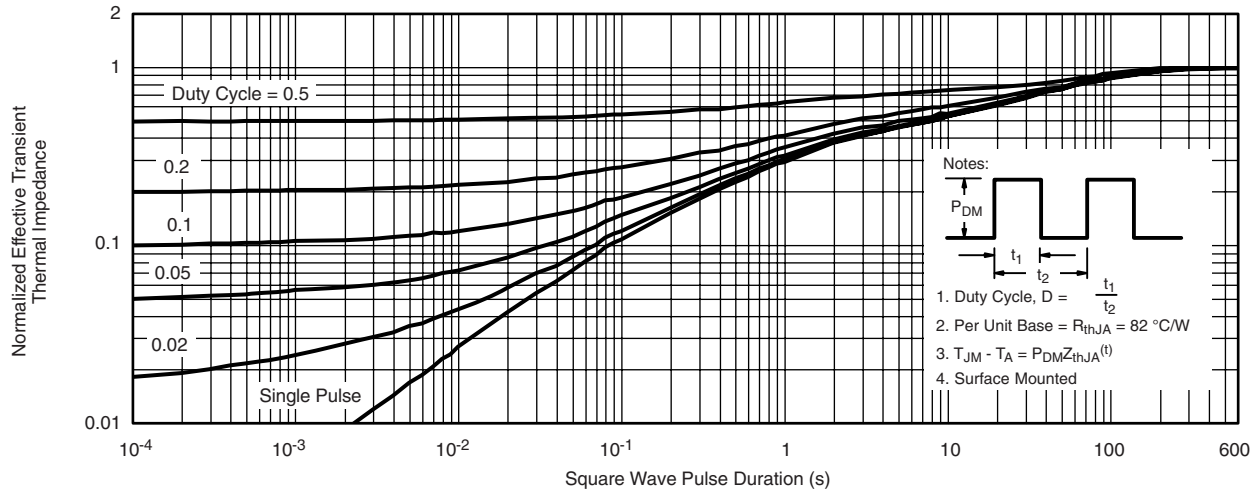


Threshold Voltage

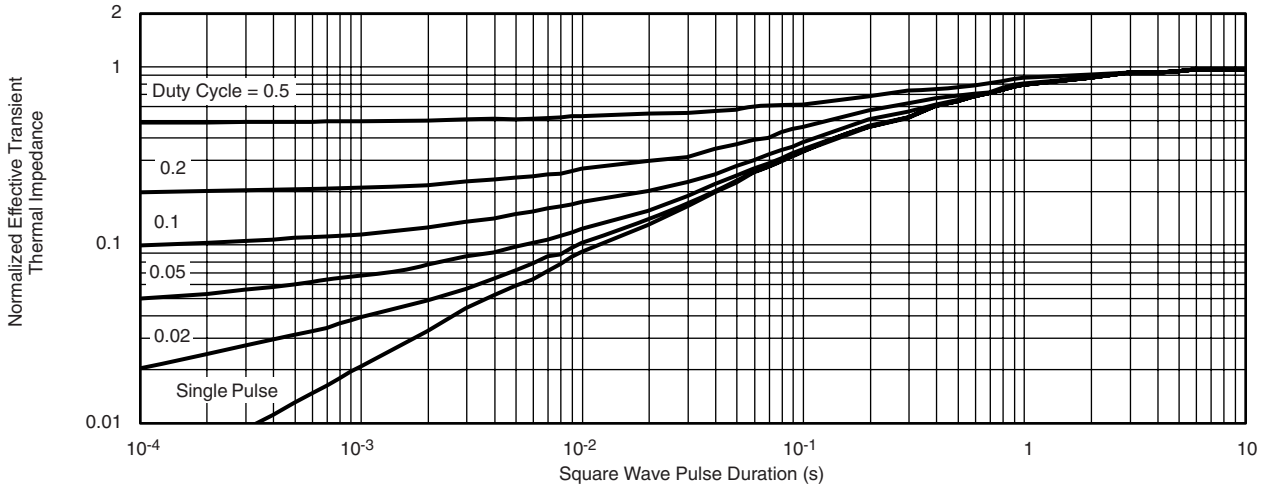


Single Pulse Power, Junction-to-Ambient

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

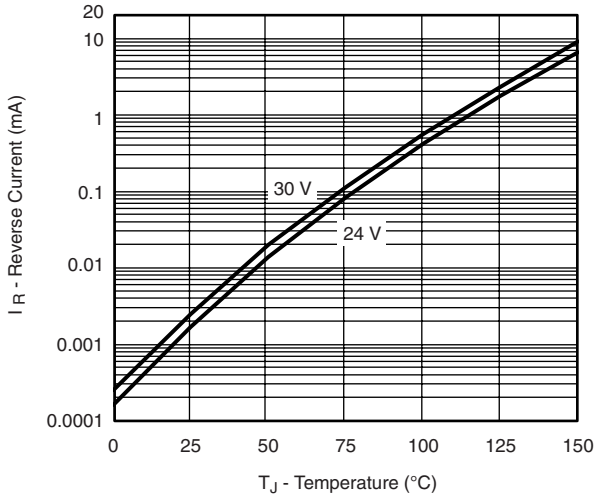


Normalized Thermal Transient Impedance, Junction-to-Ambient

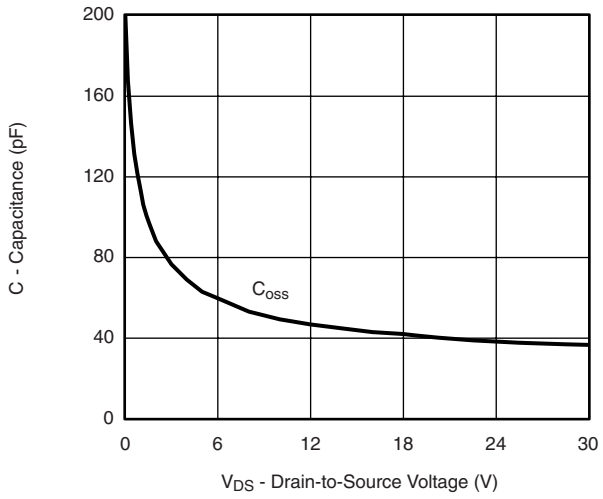


Normalized Thermal Transient Impedance, Junction-to-Foot

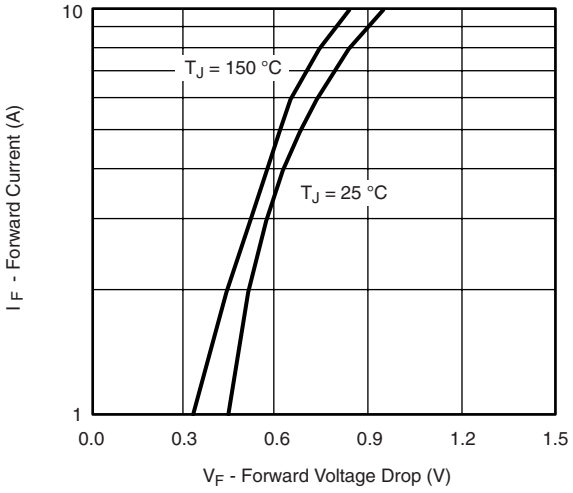
SCHOTTKY TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Reverse Current vs. Junction Temperature



Capacitance



Forward Voltage Drop

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