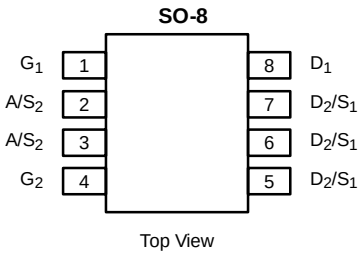
Dual N-Channel 30-V (D-S) MOSFET with Schottky Diode

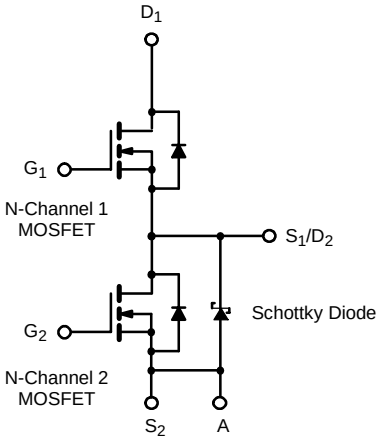
PRODUCT SUMMARY			
	V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
Channel-1	30	0.022 @ V_{GS} = 10 V	6.3
		0.030 @ V_{GS} = 4.5 V	5.4
Channel-2		0.013 @ V_{GS} = 10 V	10
		0.0185 @ V_{GS} = 4.5 V	8.6

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

FEATURES

- LITTLE FOOT® *Plus* Power MOSFET
- 100% R_g Tested





Ordering Information: Si4816DY
Si4816DY-T1 (with Tape and Reel)
Si4816DY—E3 (Lead (Pb)-Free)
Si4816DY-T1—E3 (Lead (Pb)-Free 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				
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 sec	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 Condition		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_{GS} = 0 V	Ch-1		0.7	1.1	V
		I_S = 1 A, 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		3.1	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 ≅ 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		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	

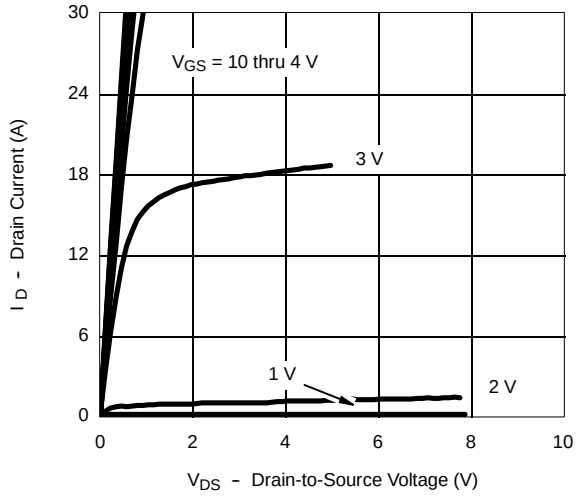
Notes
a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.

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

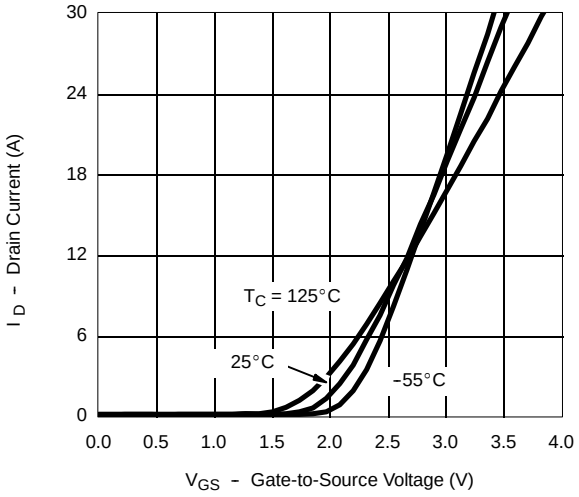
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Forward Voltage Drop	V_F	I_F = 1.0 A		0.47	0.50	V
		I_F = 1.0 A, T_J = 125°C		0.36	0.42	
Maximum Reverse Leakage Current	I_{rm}	V_r = 30 V		0.004	0.100	mA
		V_r = 30 V, T_J = 100°C		0.7	10	
		V_r = -30 V, T_J = 125°C		3.0	20	
Junction Capacitance	C_T	V_r = 10 V		50		pF

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

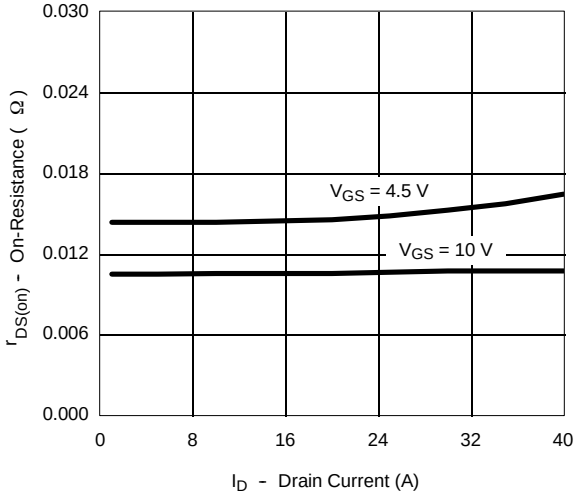
Output Characteristics



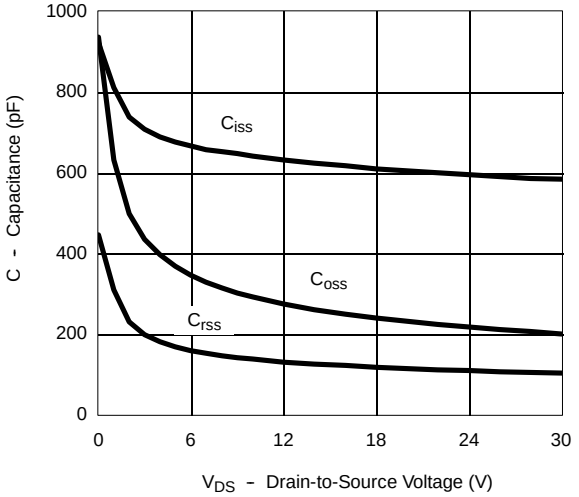
Transfer Characteristics



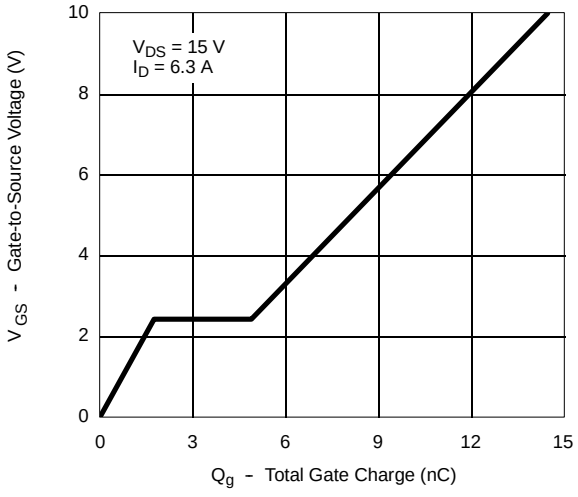
On-Resistance vs. Drain Current



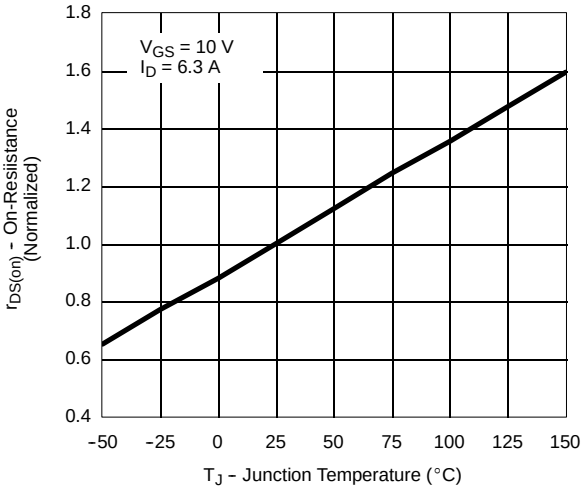
Capacitance



Gate Charge

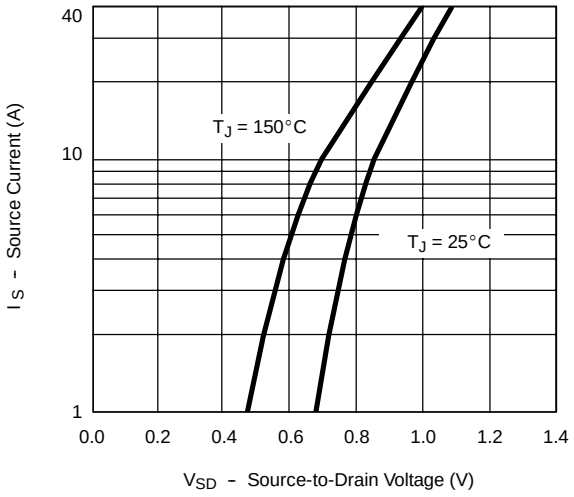


On-Resistance vs. Junction Temperature

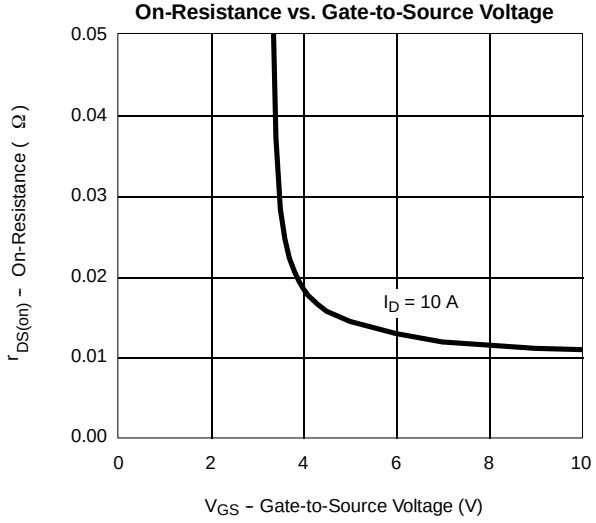


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-1

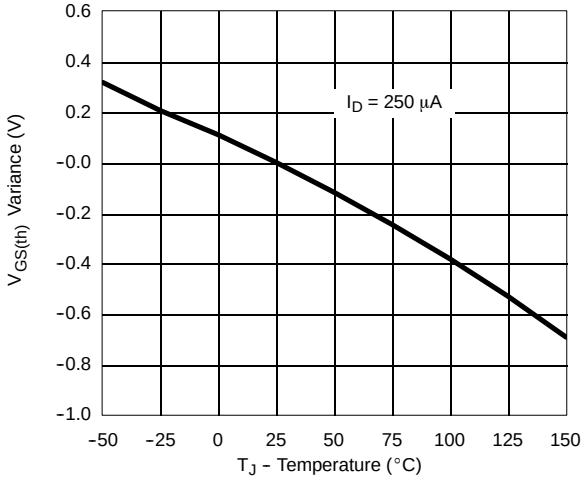
Source-Drain Diode Forward Voltage



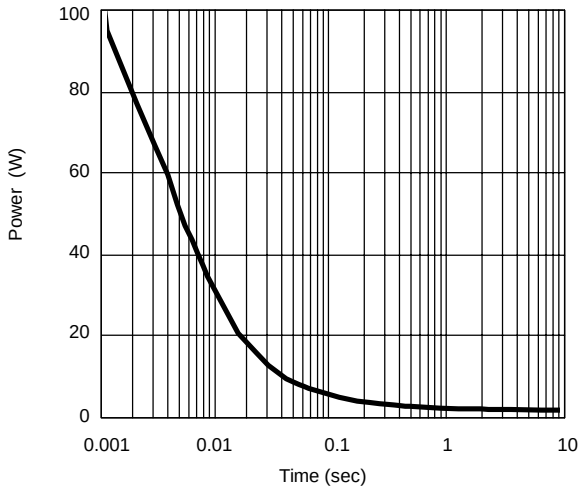
On-Resistance vs. Gate-to-Source Voltage



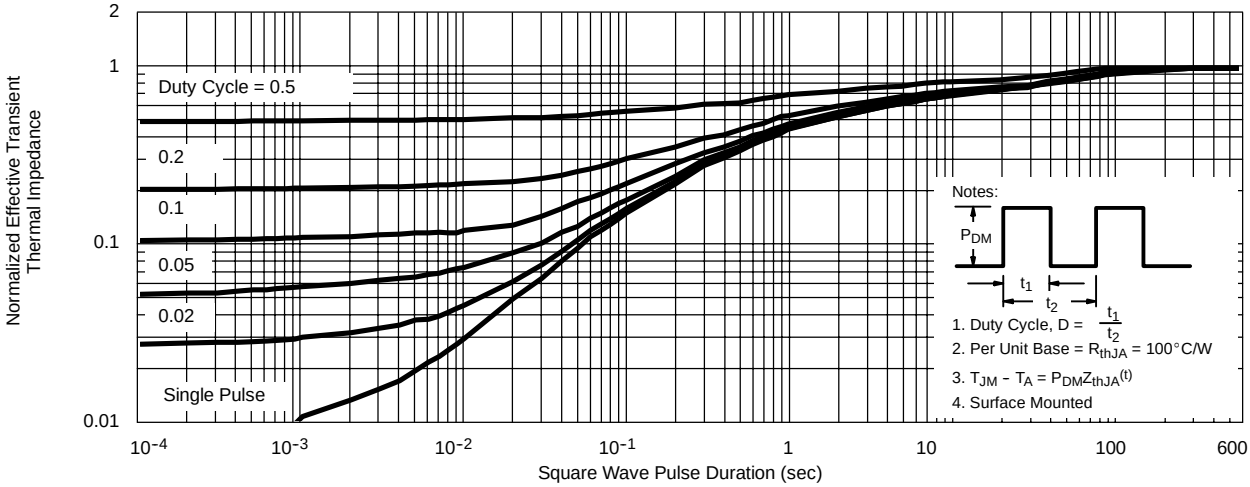
Threshold Voltage



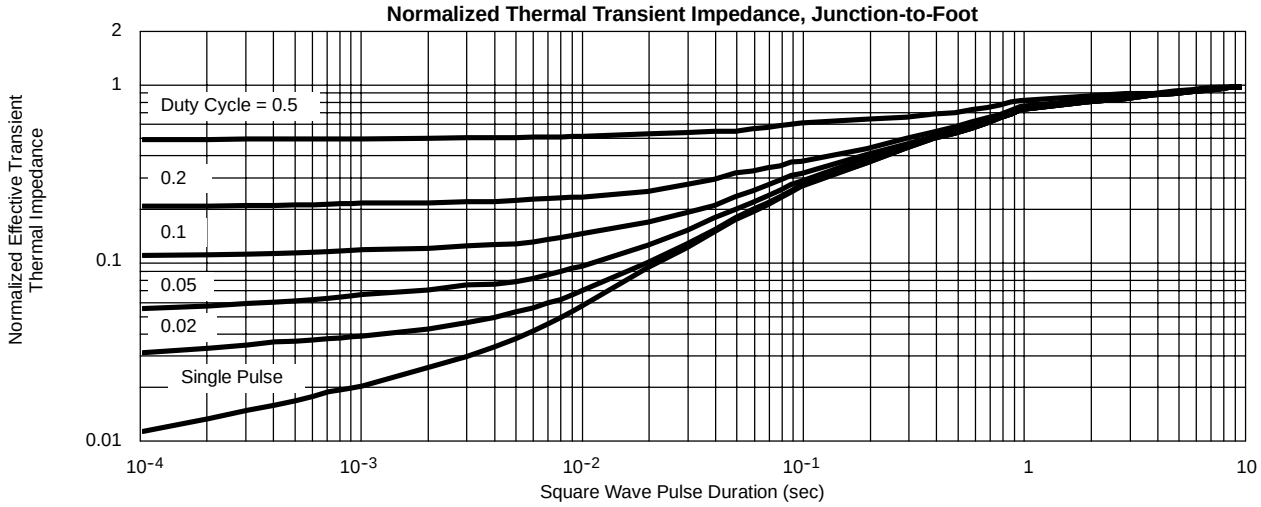
Single Pulse Power, Junction-to-Ambient



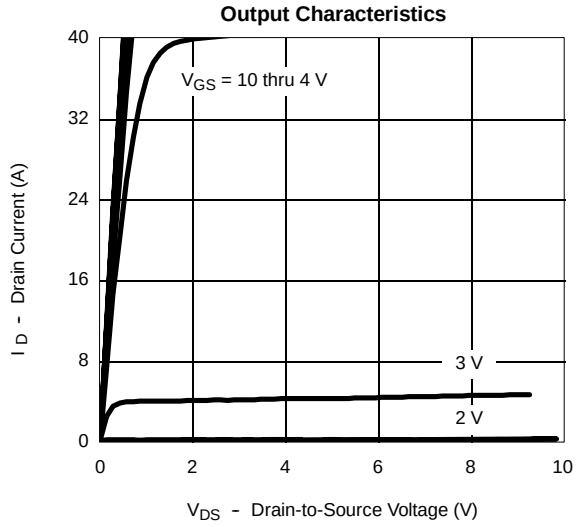
Normalized Thermal Transient Impedance, Junction-to-Ambient

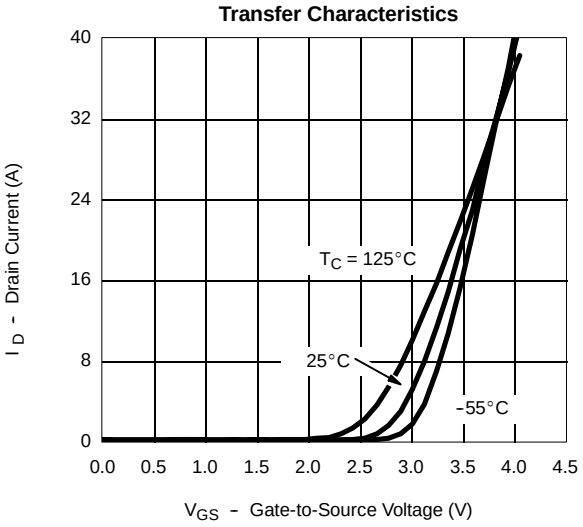


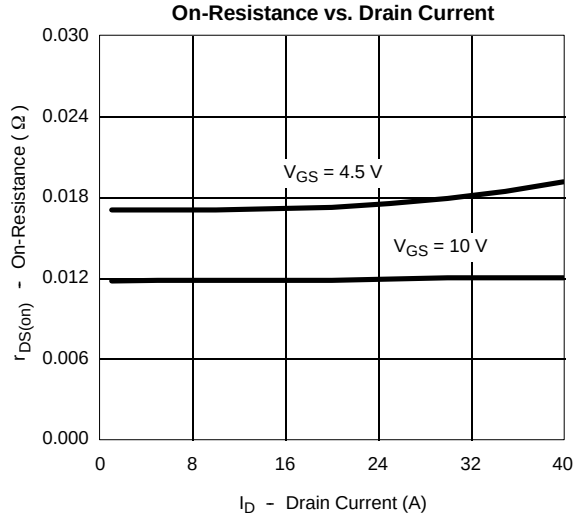
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-1

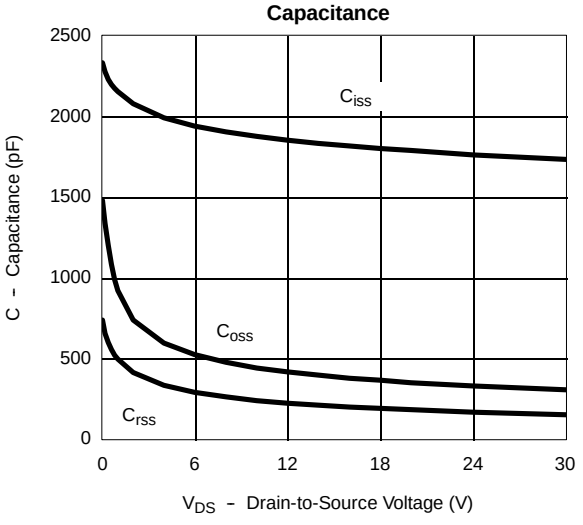


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-2



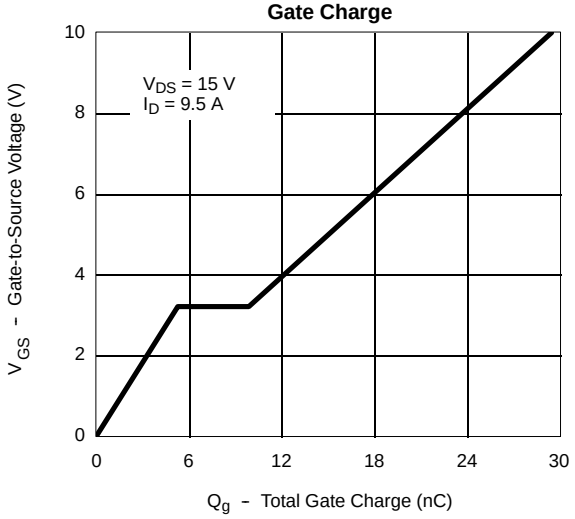




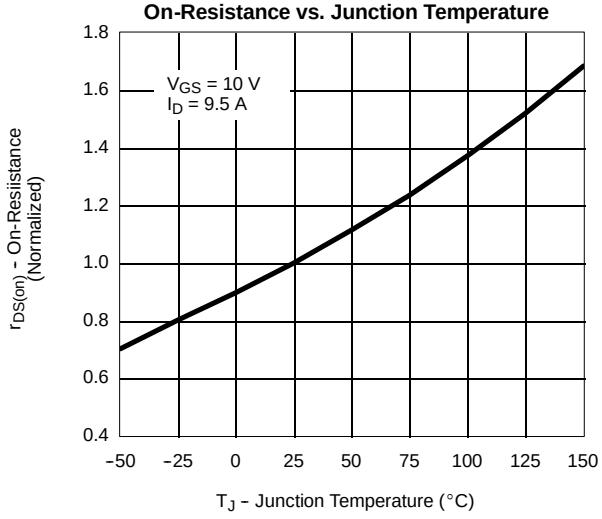


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-2

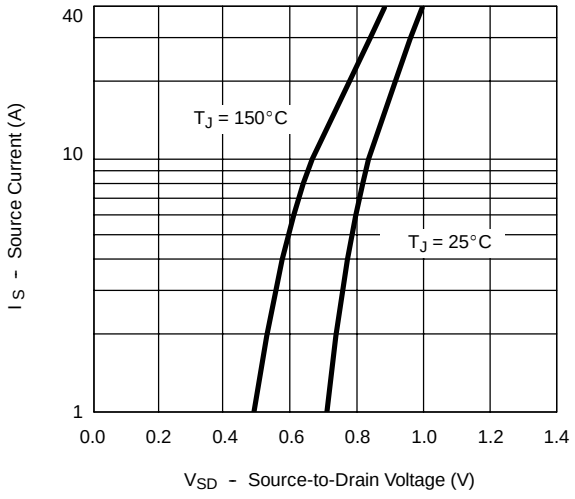
Gate Charge



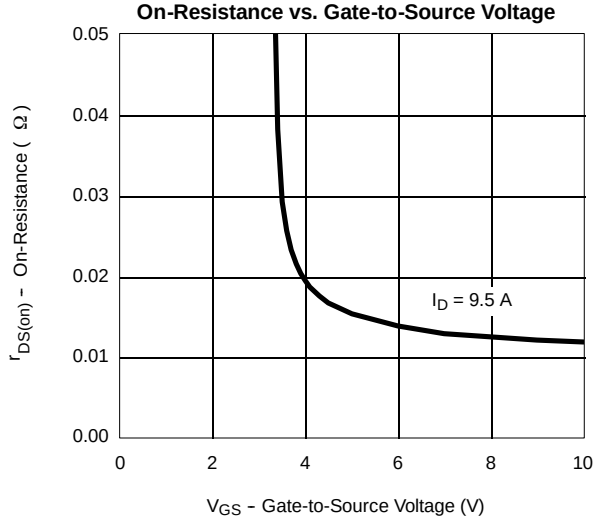
On-Resistance vs. Junction Temperature



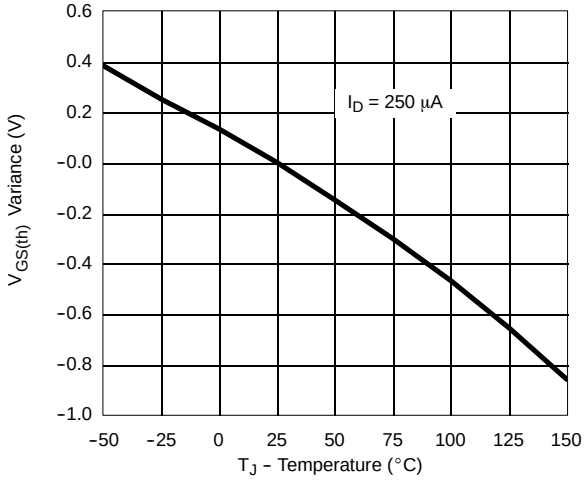
Source-Drain Diode Forward Voltage



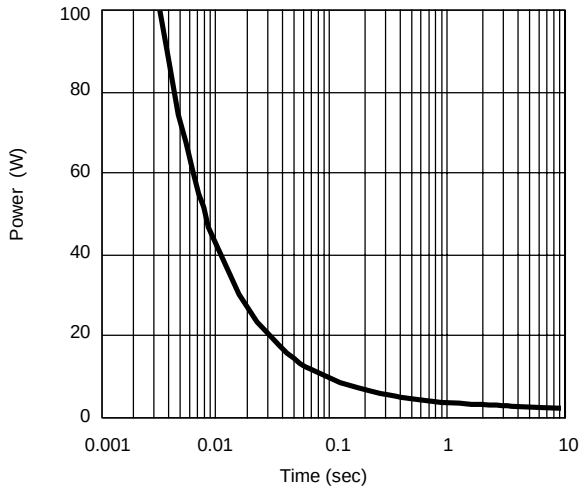
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

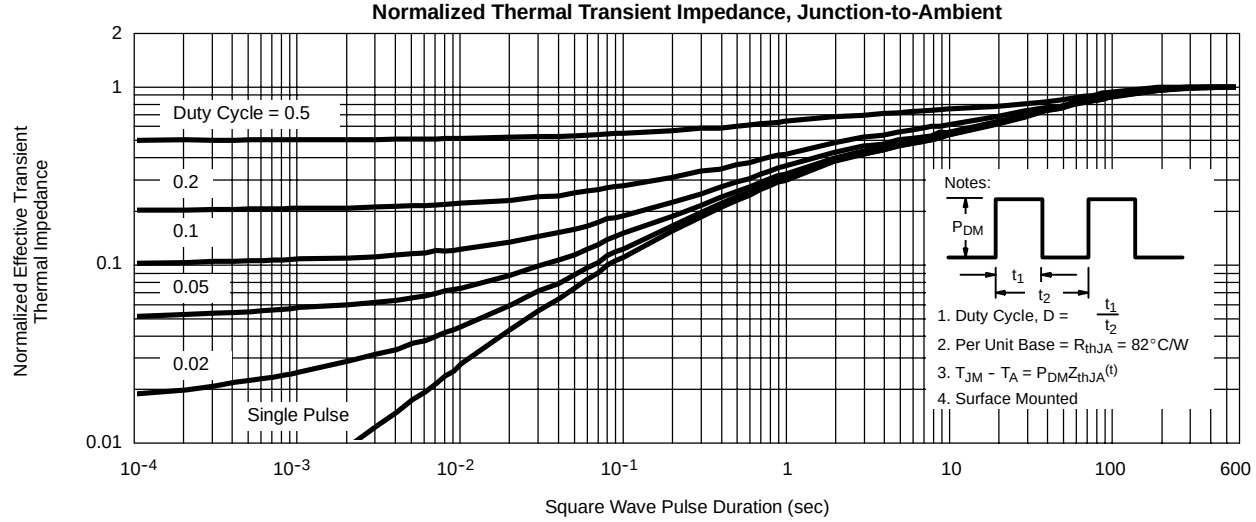


Single Pulse Power, Junction-to-Ambient

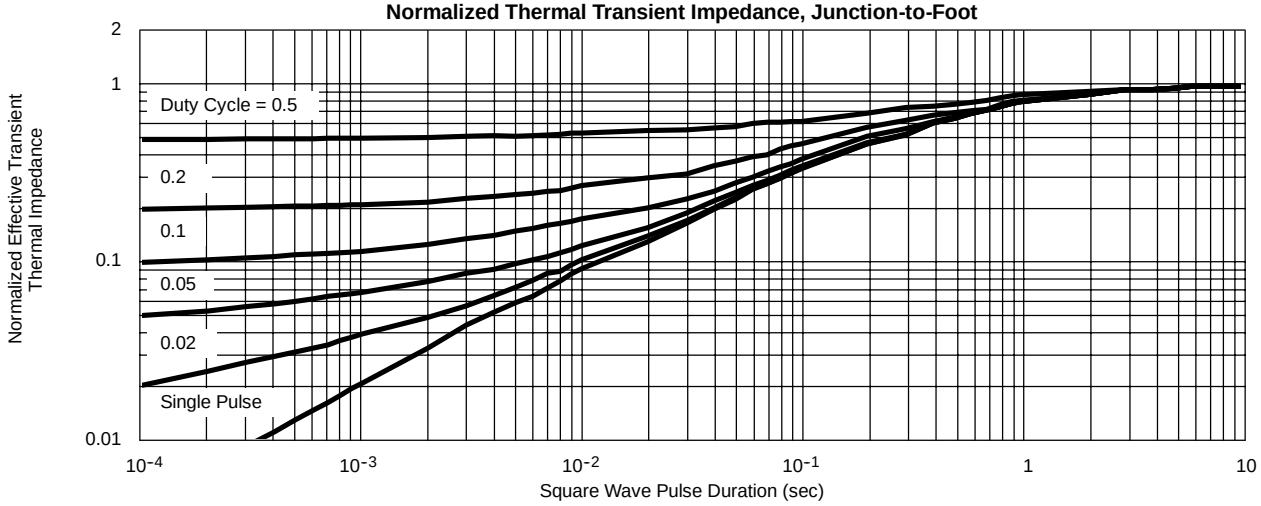


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-2

Normalized Thermal Transient Impedance, Junction-to-Ambient

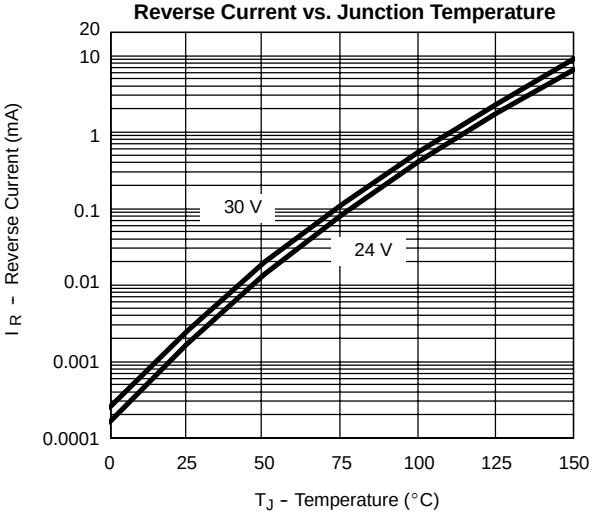


Normalized Thermal Transient Impedance, Junction-to-Foot

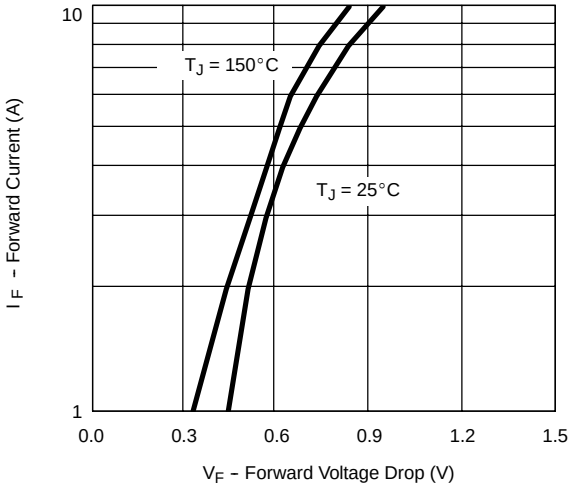
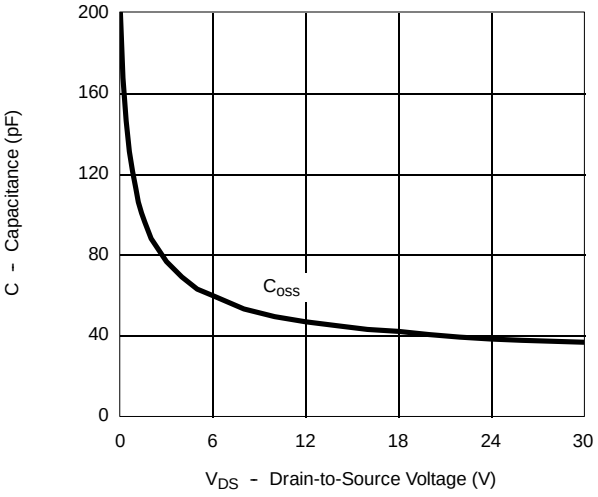


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) SCHOTTKY

Reverse Current vs. Junction Temperature



Forward Voltage Drop



Capacitance