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	7.5
		0.030 @ V_{GS} = 4.5 V	6.5
Channel-2		0.022 @ V_{GS} = 10 V	7.5
		0.028 @ V_{GS} = 4.5 V	6.5

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

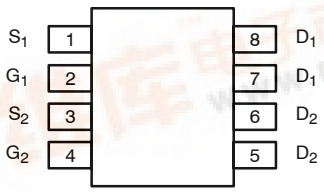
FEATURES

- LITTLE FOOT® *Plus* Schottky
- Si4830DY Pin Compatible
- PWM Optimized
- 100% R_g Tested

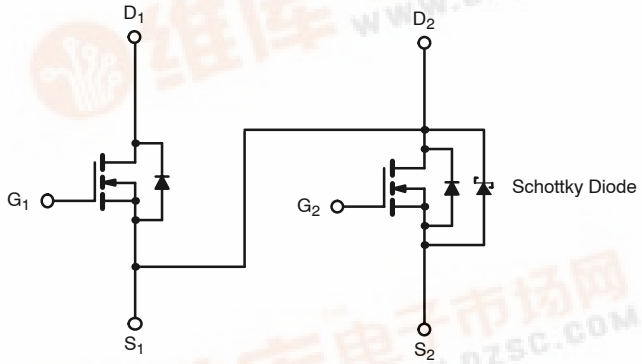
APPLICATIONS

- Asymmetrical Buck-Boost DC/DC Converter

SO-8



Top View



N-Channel MOSFET N-Channel MOSFET

Ordering Information: Si4370DY—E3 (Lead Free)
Si4370DY-T1—E3 (Lead Free with Tape and Reel)

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)							
Parameter		Symbol	10 secs		Steady State		Unit
			Channel-1	Channel-2	Channel-1	Channel-2	
Drain-Source Voltage		V_{DS}	30				V
Gate-Source Voltage		V_{GS}	±20	±12	±20	±12	
Continuous Drain Current (T_J = 150°C)[a]	T_A = 25°C	I_D	7.5		5.7		A
	T_A = 70°C		6.0		4.6		
Pulsed Drain Current		I_{DM}	30				
Continuous Source Current (Diode Conduction)[a]		I_S	1.7		0.9		
Maximum Power Dissipation[a]	T_A = 25°C	P_D	2.0		1.1		W
	T_A = 70°C		1.3		0.7		
Operating Junction and Storage Temperature Range		T_J, T_{stg}	−55 to 150				°C

THERMAL RESISTANCE RATINGS							
Parameter		Symbol	MOSFET		Schottky		Unit
			Typ	Max	Typ	Max	
Maximum Junction-to-Ambient[a]	t ≤ 10 sec	R_{thJA}	52	62.5	53	62.5	°C/W
	Steady-State		93	110	93	110	
Maximum Junction-to-Foot (Drain)	Steady-State	R_{thJF}	35	40	35	40	

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	0.8		2.0	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V	Ch-1			±100	nA
		V_{DS} = 0 V, V_{GS} = ±12 V	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	20			
Drain-Source On-State Resistance[b]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 7.5 A	Ch-1		0.014	0.022	Ω
			Ch-2		0.015	0.022	
		V_{GS} = 4.5 V, I_D = 6.5 A	Ch-1		0.024	0.030	
			Ch-2		0.020	0.028	
Forward Transconductance[b]	g_{fs}	V_{DS} = 15 V, I_D = 7.5 A	Ch-1		19		S
			Ch-2		21		
Diode Forward Voltage[b]	V_{SD}	I_S = 1 A, V_{GS} = 0 V	Ch-1		0.75	1.2	V
			Ch-2		0.47	0.5	
Dynamic[a]							
Total Gate Charge	Q_g	V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 7.5 A	Ch-1		7	11	nC
			Ch-2		11.5	18	
Gate-Source Charge	Q_{gs}		Ch-1		2.9		
			Ch-2		3.8		
Gate-Drain Charge	Q_{gd}		Ch-1		2.5		
			Ch-2		3.5		
Gate Resistance	R_g		Ch-1	0.5	1.5	1.9	Ω
			Ch-2	0.5	1.8	1.9	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 15 Ω I_D ≅ 1 A, V_{GEN} = 10 V, R_g = 6 Ω	Ch-1		9	15	ns
			Ch-2		12	20	
Rise Time	t_r		Ch-1		10	17	
			Ch-2		10	17	
Turn-Off Delay Time	$t_{d(off)}$		Ch-1		19	30	
			Ch-2		40	66	
Fall Time	t_f		Ch-1		9	15	
			Ch-2		9	15	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = 1.7 A, di/dt = 100 A/μs	Ch-1		35	55	
			Ch-2		28	45	

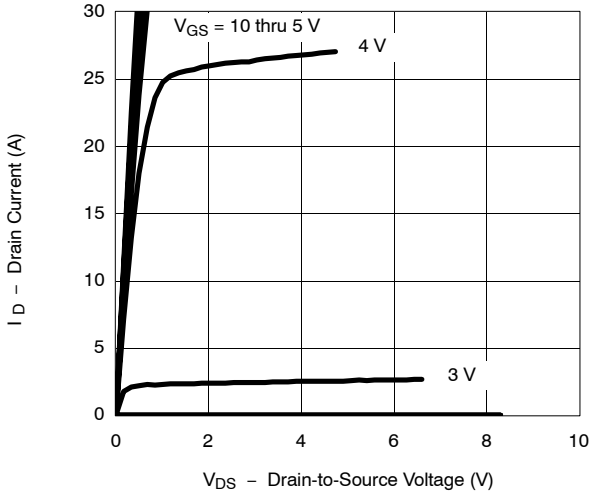
Notes
a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.

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

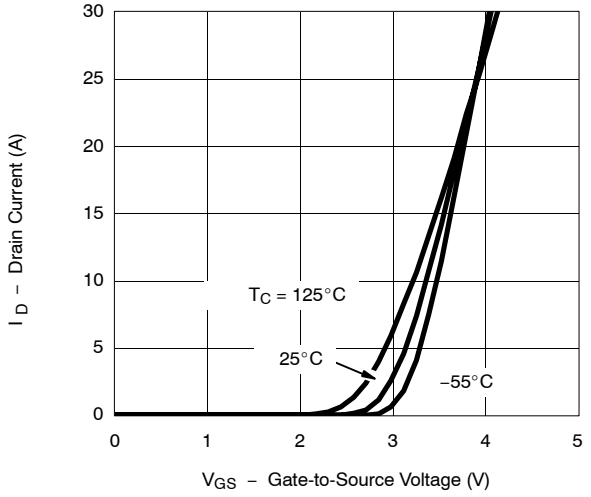
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Forward Voltage Drop	V_F	I_F = 1.0 A		0.47	0.50	V
		I_F = 1.0 A, T_J = 125°C		0.36	0.42	
Maximum Reverse Leakage Current	I_{rm}	V_r = 30 V		0.004	0.100	mA
		V_r = 30 V, T_J = 100°C		0.7	10	
		V_r = –30 V, T_J = 125°C		3.0	20	
Junction Capacitance	C_T	V_r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

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

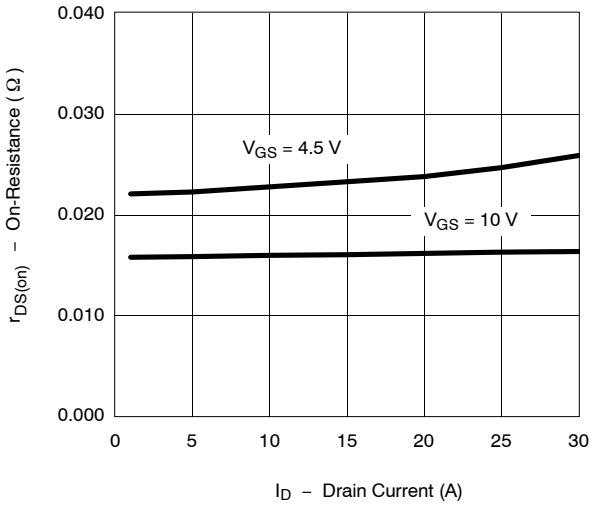
Output Characteristics



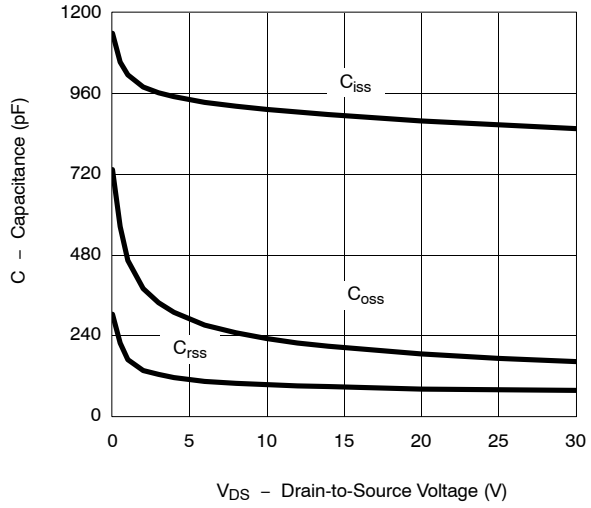
Transfer Characteristics



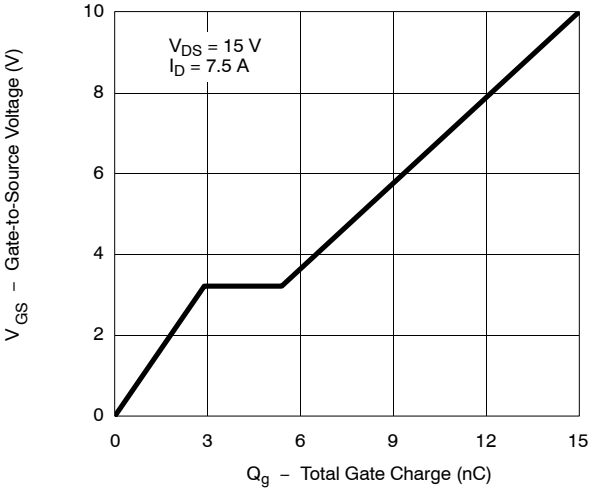
On-Resistance vs. Drain Current



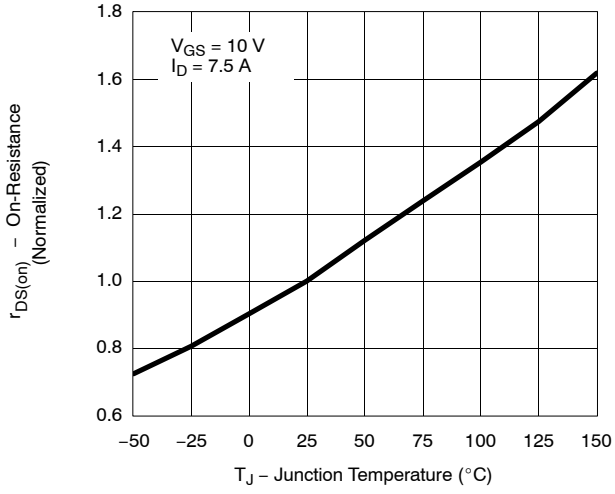
Capacitance



Gate Charge

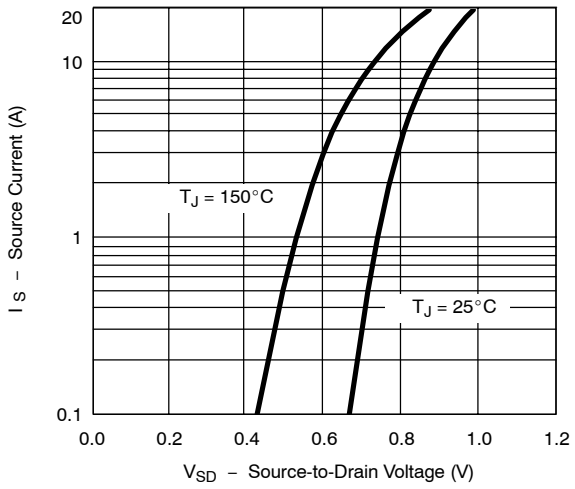


On-Resistance vs. Junction Temperature

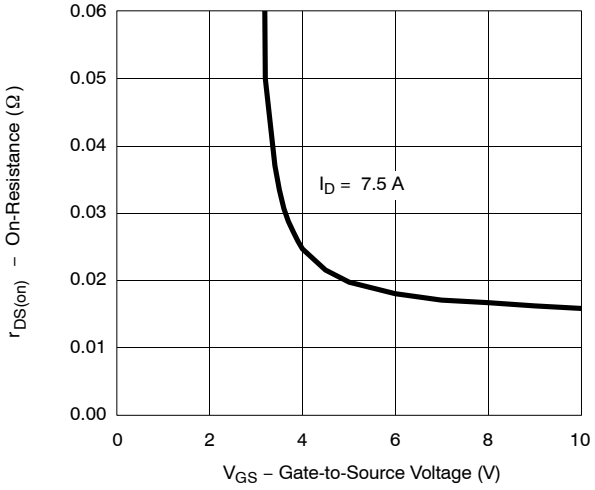


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) MOSFET CHANNEL-1

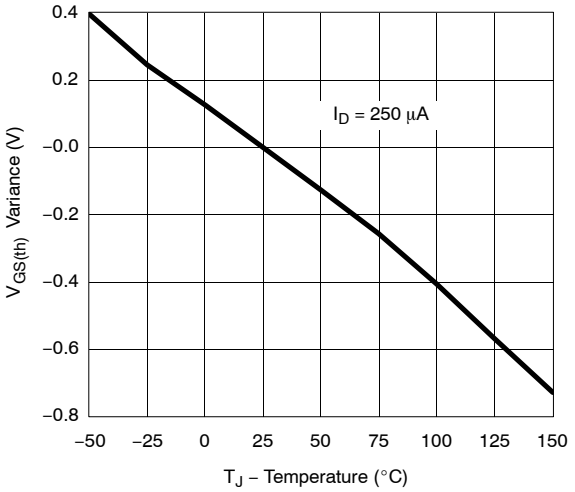
Source-Drain Diode Forward Voltage



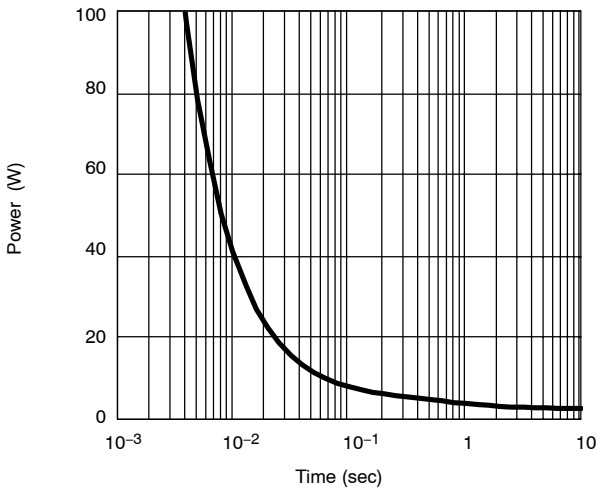
On-Resistance vs. Gate-to-Source Voltage



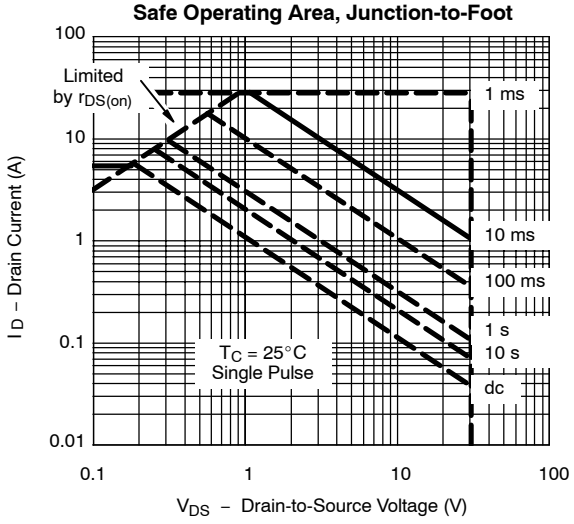
Threshold Voltage



Single Pulse Power, Junction-to-Ambient

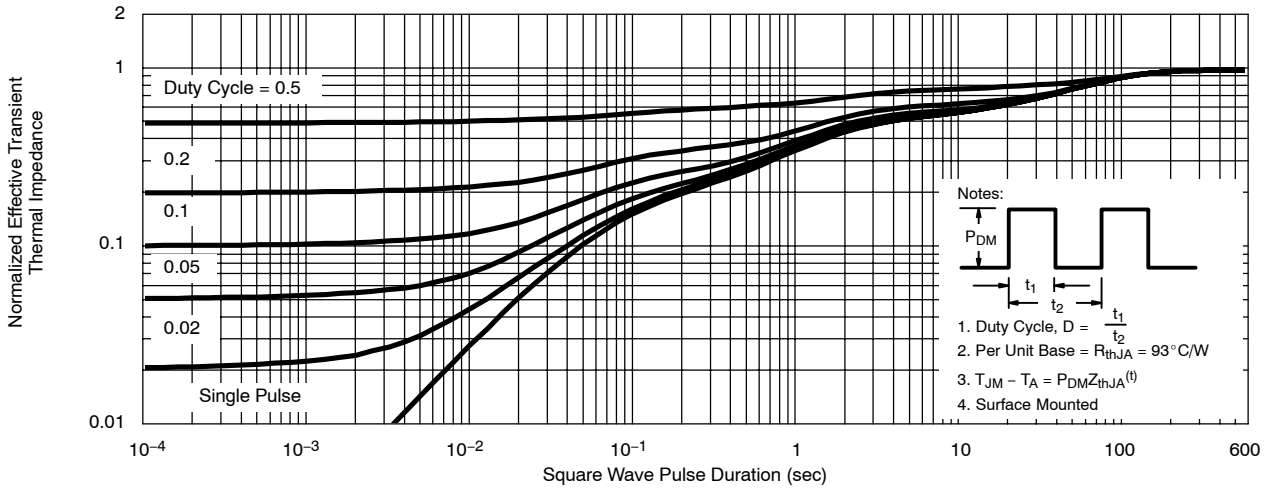


Safe Operating Area, Junction-to-Foot

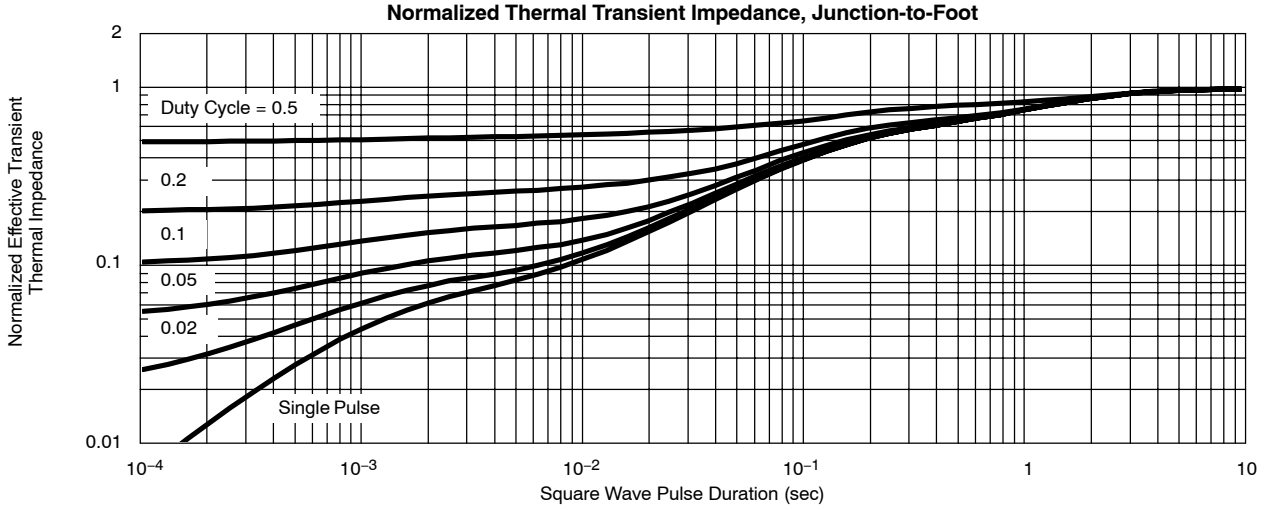


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) MOSFET CHANNEL 1

Normalized Thermal Transient Impedance, Junction-to-Ambient

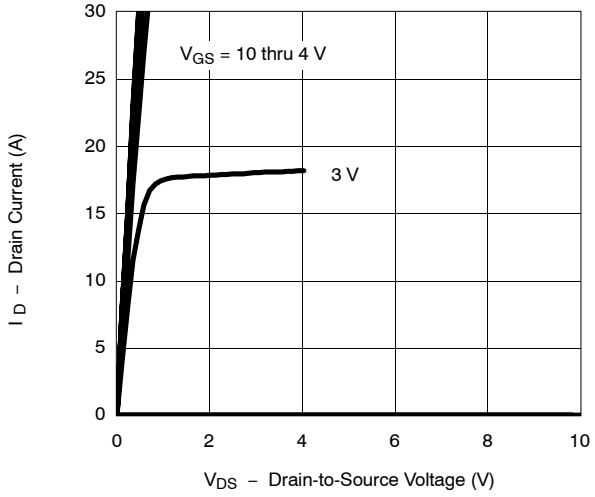


Normalized Thermal Transient Impedance, Junction-to-Foot

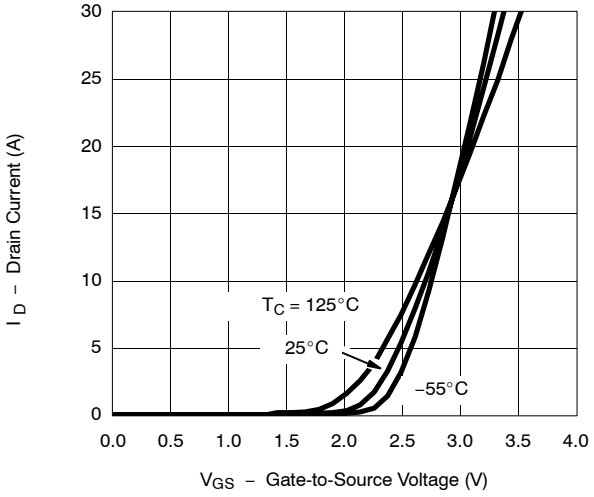


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) MOSFET CHANNEL-2

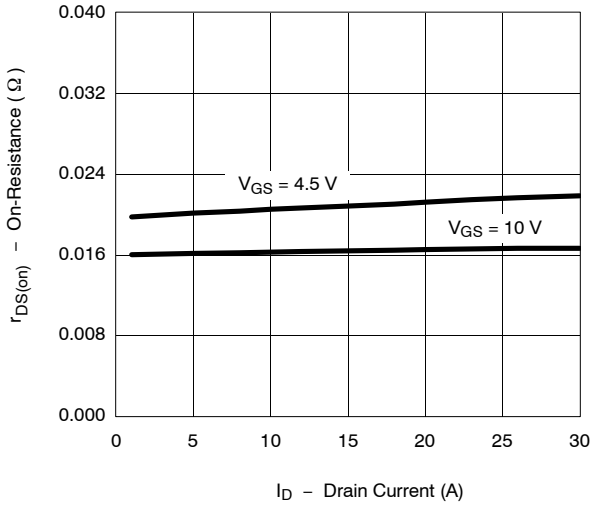
Output Characteristics



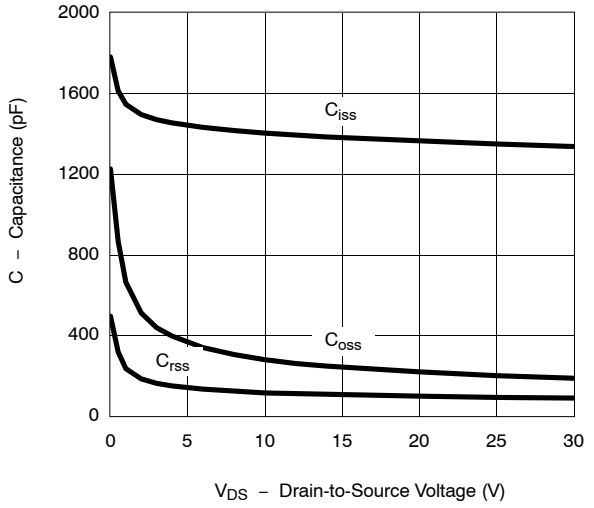
Transfer Characteristics



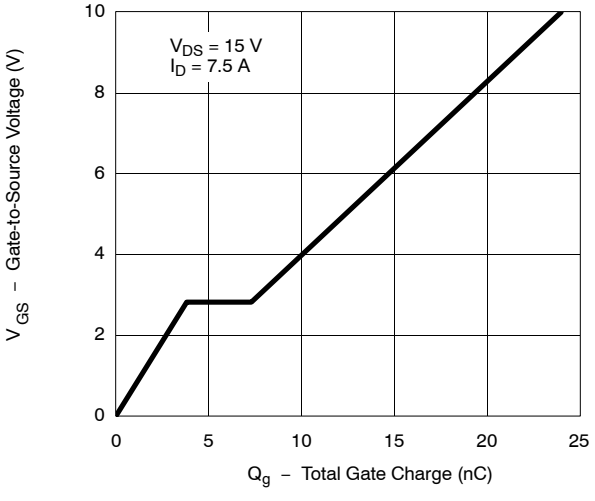
On-Resistance vs. Drain Current



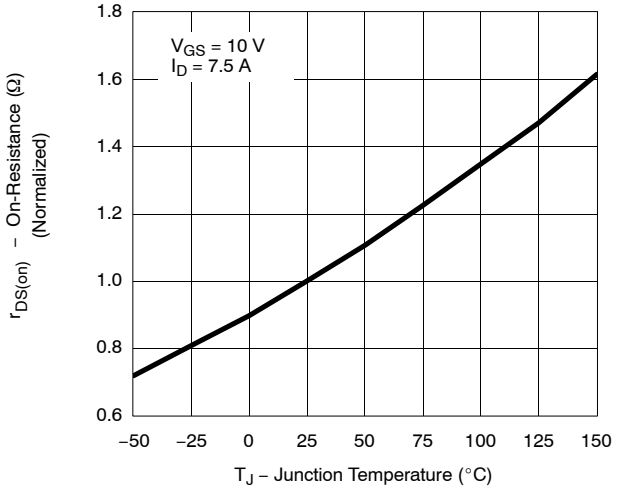
Capacitance



Gate Charge

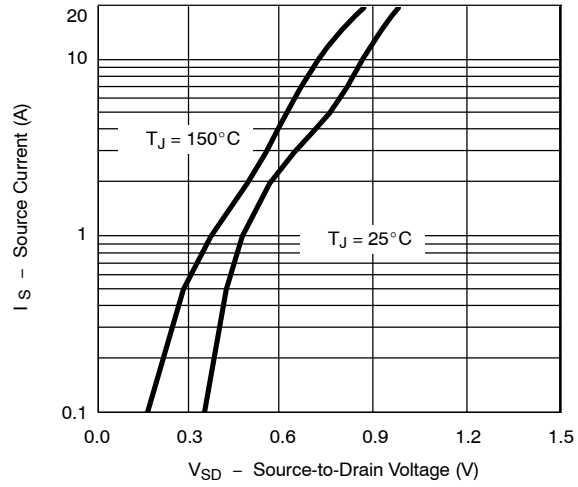


On-Resistance vs. Junction Temperature

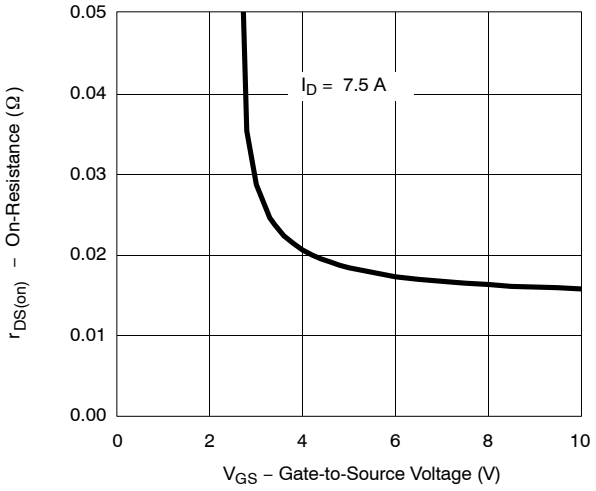


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) MOSFET CHANNEL-2

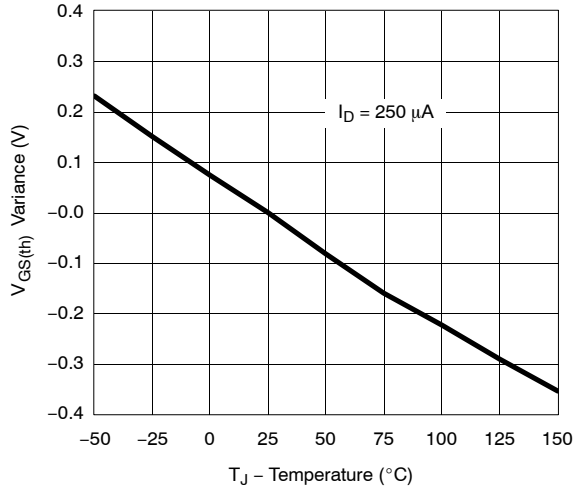
Source-Drain Diode Forward Voltage



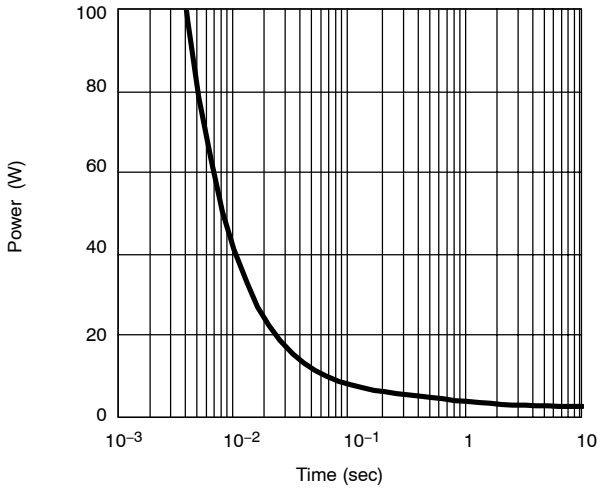
On-Resistance vs. Gate-to-Source Voltage



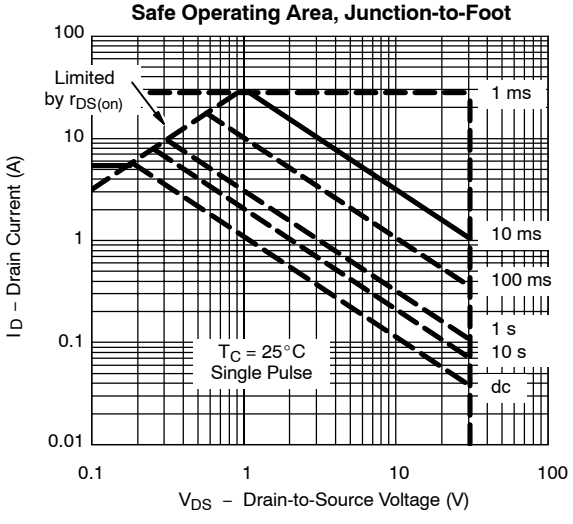
Threshold Voltage



Single Pulse Power, Junction-to-Ambient

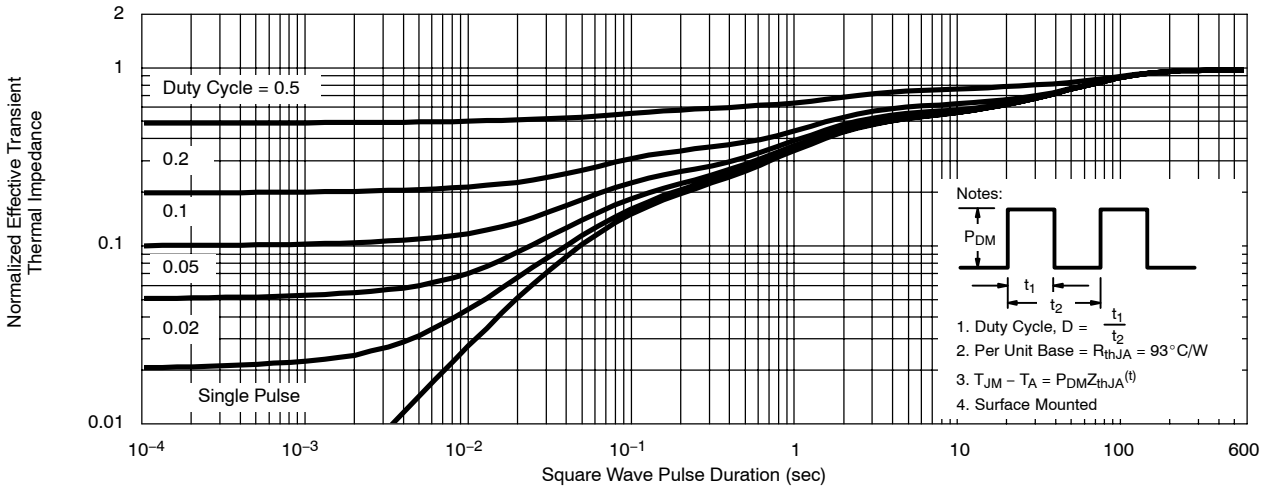


Safe Operating Area, Junction-to-Foot

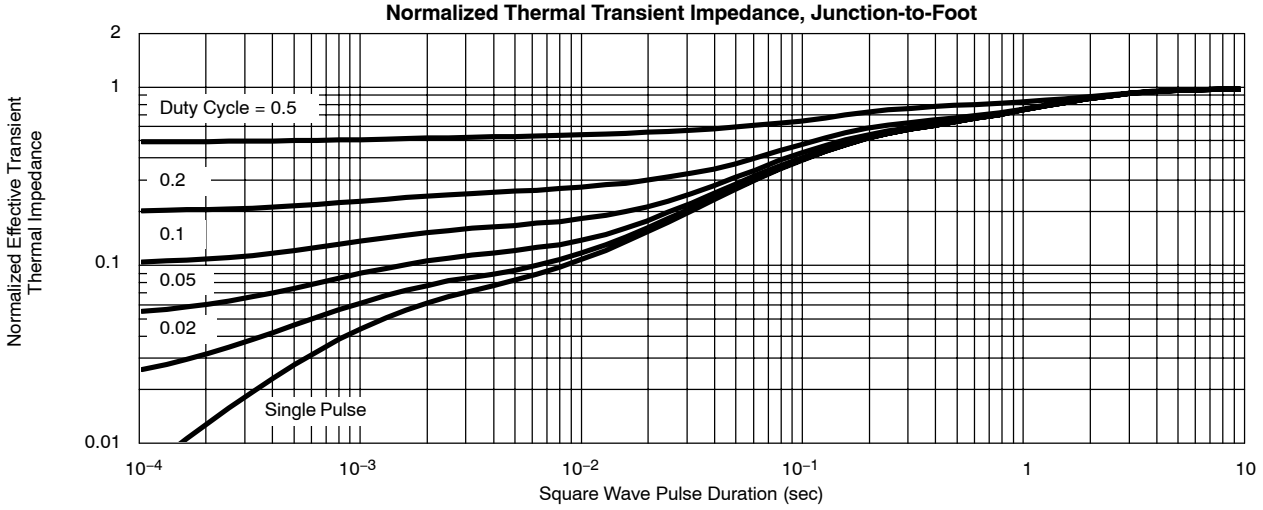


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) MOSFET CHANNEL-2

Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot



TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) SCHOTTKY