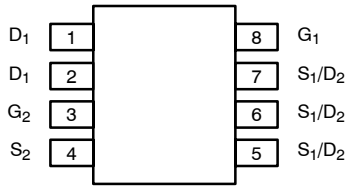
Dual N-Channel 30-V (D-S) MOSFET with Schottky Diode

PRODUCT SUMMARY			
	V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
Channel-1	30	0.021 @ V_{GS} = 10 V	7.0
		0.0325 @ V_{GS} = 4.5 V	5.6
Channel-2		0.020 @ V_{GS} = 10 V	7.4
		0.0265 @ V_{GS} = 4.5 V	6.4

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

SO-8



Top View

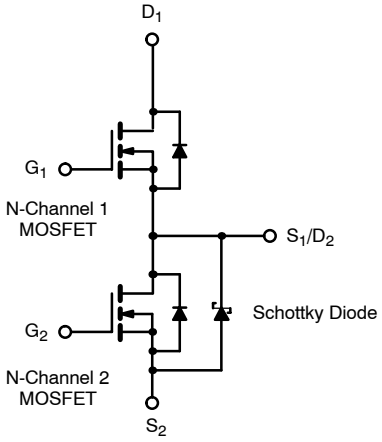
Ordering Information: Si4814DY
Si4814DY-T1 (with Tape and Reel)

FEATURES

- LITTLE FOOT® *Plus* Integrated Schottky
- Alternative Pinning for Additional Layout Options
- 100% R_g Tested

APPLICATIONS

- DC/DC Converters
  - Notebook



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)							
			Channel-1		Channel-2		
Parameter		Symbol	10 secs	Steady State	10 secs	Steady State	Unit
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	7.0	5.5	7.4	5.7	A
	T_A = 70°C		5.6	4.3	6	4.5	
Pulsed Drain Current		I_{DM}	40		40		
Continuous Source Current (Diode Conduction)[a]		I_S	1.7	1.0	1.8	0.95	
Maximum Power Dissipation[a]	T_A = 25°C	P_D	1.9	1.1	2.0	1.16	W
	T_A = 70°C		1.2	0.71	1.3	0.74	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	−55 to 150				°C

THERMAL RESISTANCE RATINGS							
			Channel-1		Channel-2		
Parameter		Symbol	Typ	Max	Typ	Max	Unit
Maximum Junction-to-Ambient[a]	t ≤ 10 sec	R_{thJA}	52	65	47	60	°C/W
	Steady-State		90	112	85	107	
Maximum Junction-to-Foot (Drain)	Steady-State	R_{thJF}	30	38	28	35	

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	0.8			V
			Ch-2	0.8			
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	20			
Drain-Source On-State Resistance[b]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 7.0 A	Ch-1		0.0175	0.021	Ω
		V_{GS} = 10 V, I_D = 7.4 A	Ch-2		0.0165	0.020	
		V_{GS} = 4.5 V, I_D = 5.6 A	Ch-1		0.027	0.0325	
		V_{GS} = 4.5 V, I_D = 6.4 A	Ch-2		0.022	0.0265	
Forward Transconductance[b]	g_{fs}	V_{DS} = 15 V, I_D = 7.0 A	Ch-1		17		S
		V_{DS} = 15 V, I_D = 7.4 A	Ch-2		20		
Diode Forward Voltage[b]	V_{SD}	I_S = 1.7 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 = 7.0 A Channel-2 V_{DS} = 15 V, V_{GS} = 5 V, I_D = −7.4 A	Ch-1		6.5	10	nC
			Ch-2		9.7	15	
Gate-Source Charge	Q_{gs}		Ch-1		1.5		
			Ch-2		2.6		
Gate-Drain Charge	Q_{gd}		Ch-1		2.7		
			Ch-2		3.8		
Gate Resistance	R_g		Ch-1	0.5	1.6	2.6	Ω
			Ch-2	0.5	1.8	3.1	
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		12	20	ns
			Ch-2		13	20	
Rise Time	t_r		Ch-1		13	20	
			Ch-2		13	20	
Turn-Off Delay Time	$t_{d(off)}$		Ch-1		22	35	
			Ch-2		29	45	
Fall Time	t_f		Ch-1		8	15	
			Ch-2		12	20	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = 1.3 A, di/dt = 100 A/μs	Ch-1		50	80	
		I_F = 2.2 A, di/dt = 100 μA/μs	Ch-2		46	80	

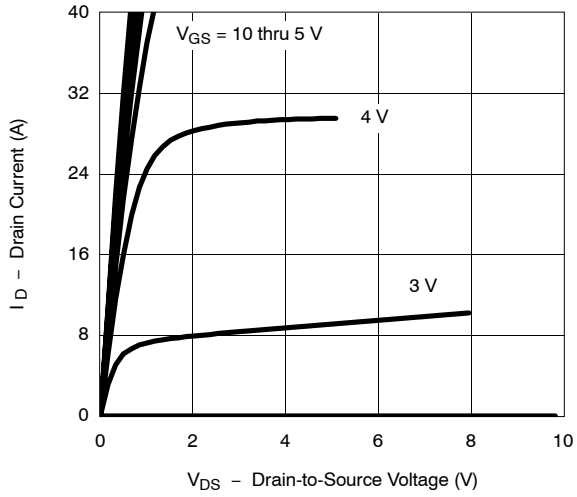
Notes
a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.

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

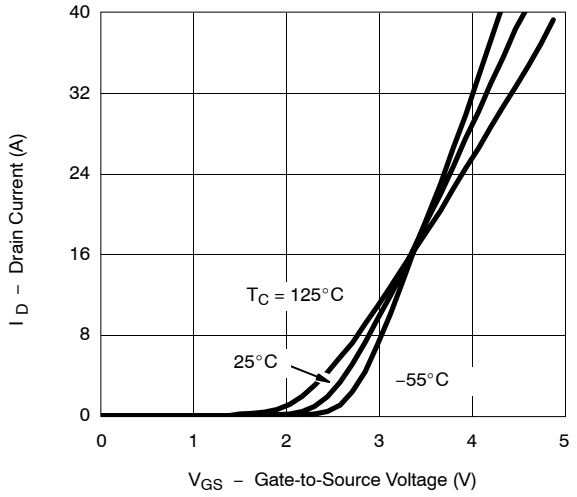
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Forward Voltage Drop	V_F	I_F = 1.0 A		0.47	0.50	V
		I_F = 1.0 A, T_J = 125°C		0.36	0.42	
Maximum Reverse Leakage Current	I_{rm}	V_r = 30 V		0.004	0.100	mA
		V_r = 30 V, T_J = 100°C		0.7	10	
		V_r = −30 V, T_J = 125°C		3.0	20	
Junction Capacitance	C_T	V_r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

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

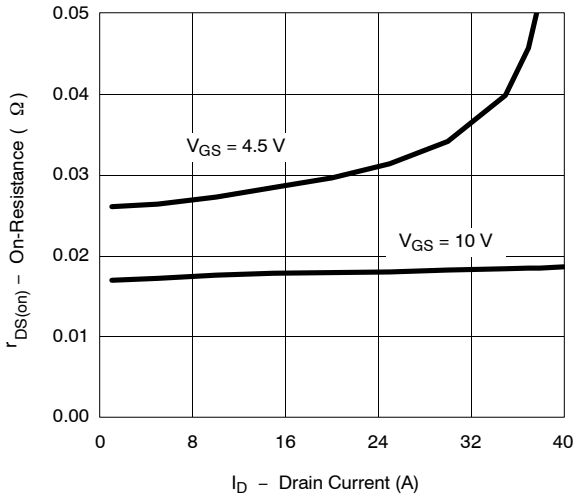
Output Characteristics



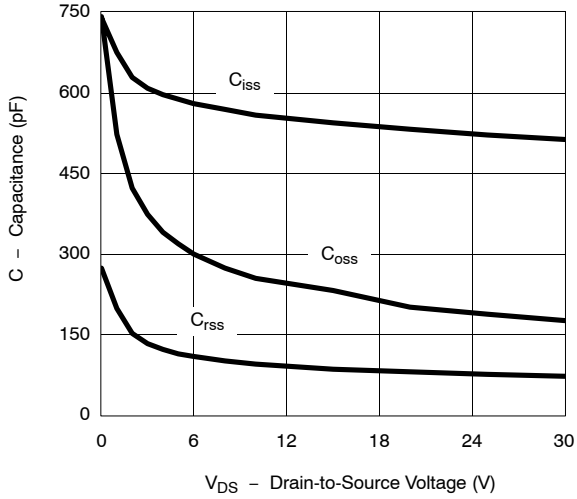
Transfer Characteristics



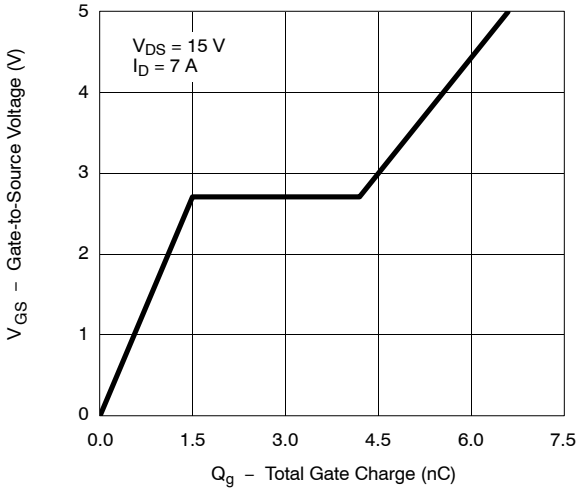
On-Resistance vs. Drain Current



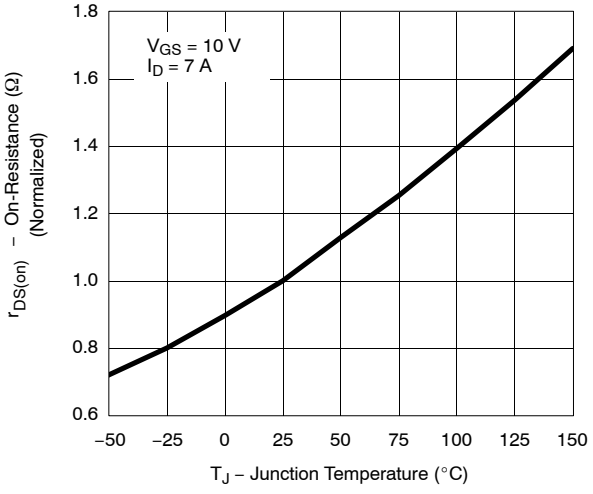
Capacitance



Gate Charge

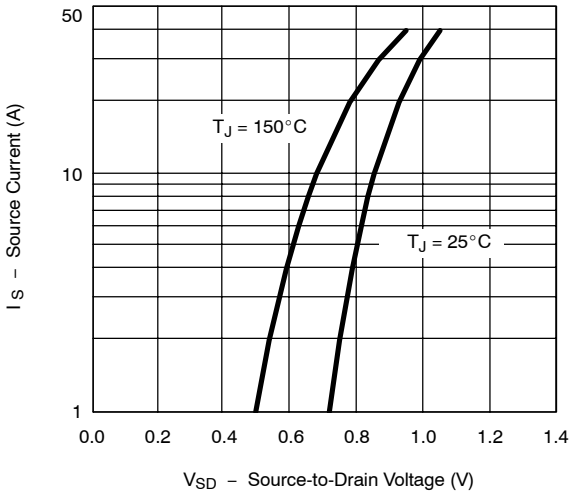


On-Resistance vs. Junction Temperature

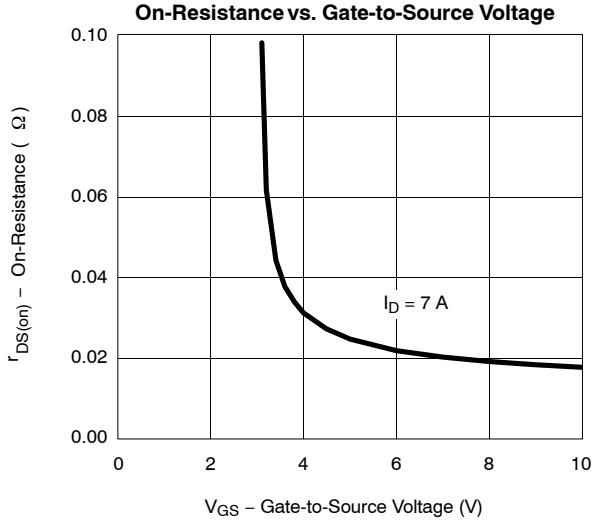


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-1

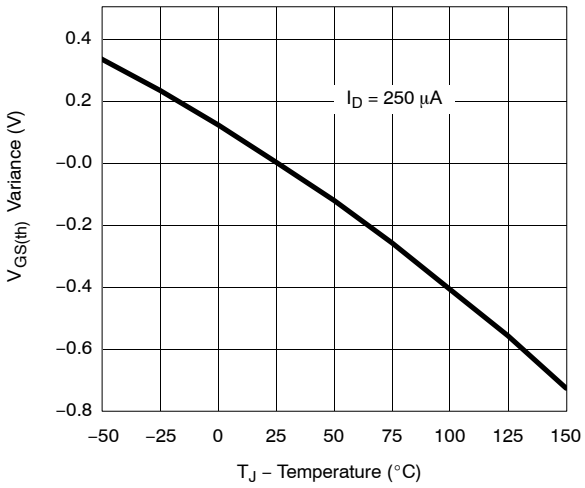
Source-Drain Diode Forward Voltage



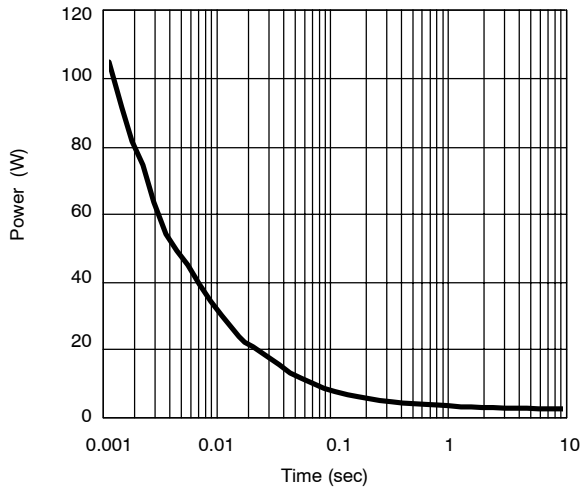
On-Resistance vs. Gate-to-Source Voltage



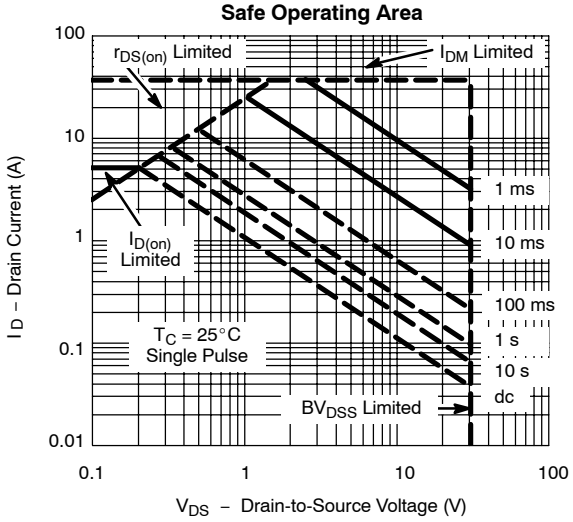
Threshold Voltage



Single Pulse Power, Junction-to-Ambient

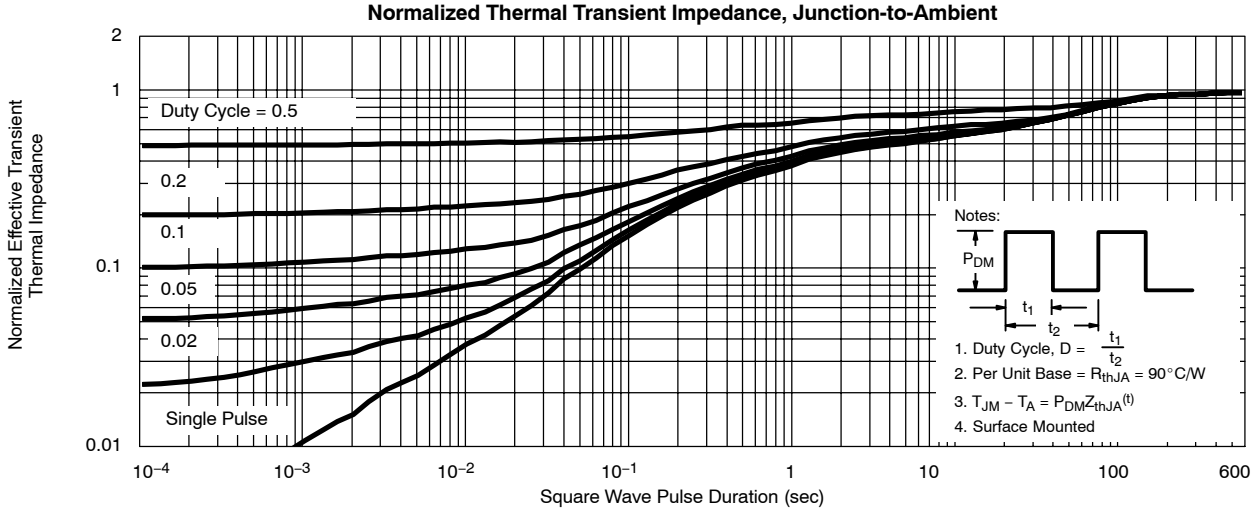


Safe Operating Area

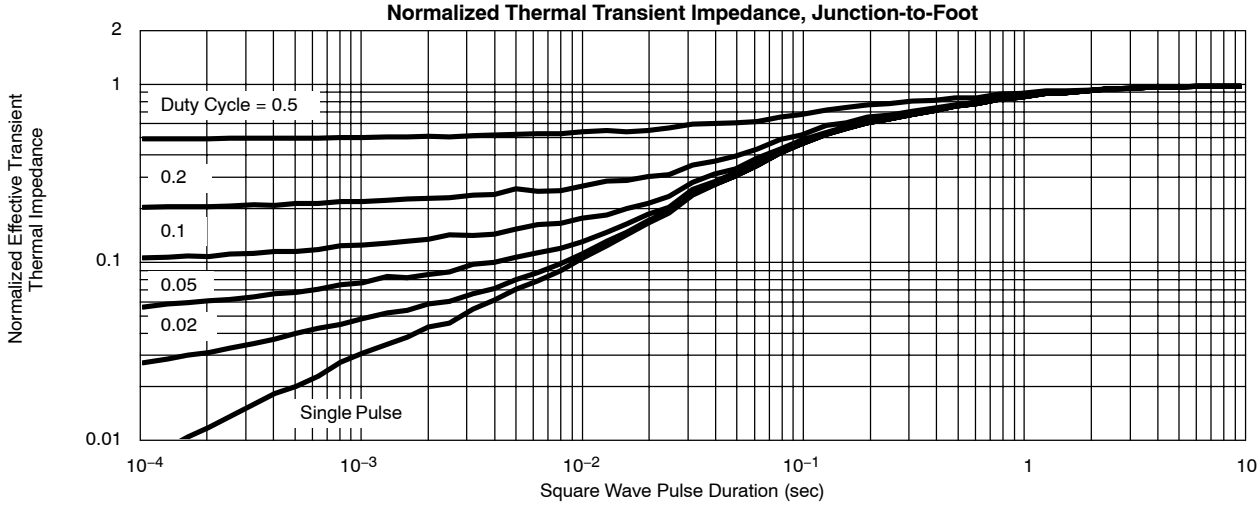


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-1

Normalized Thermal Transient Impedance, Junction-to-Ambient

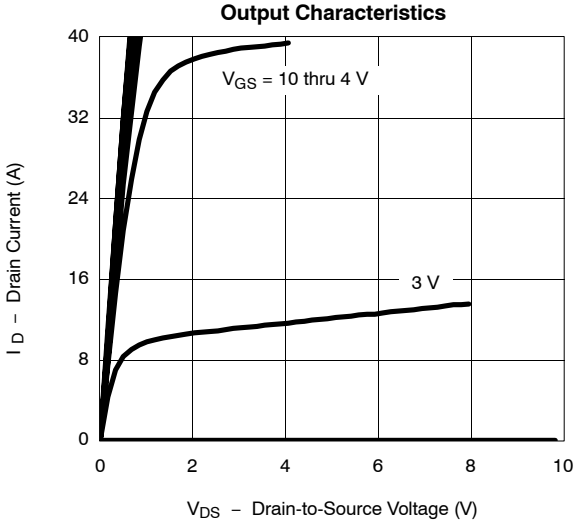


Normalized Thermal Transient Impedance, Junction-to-Foot

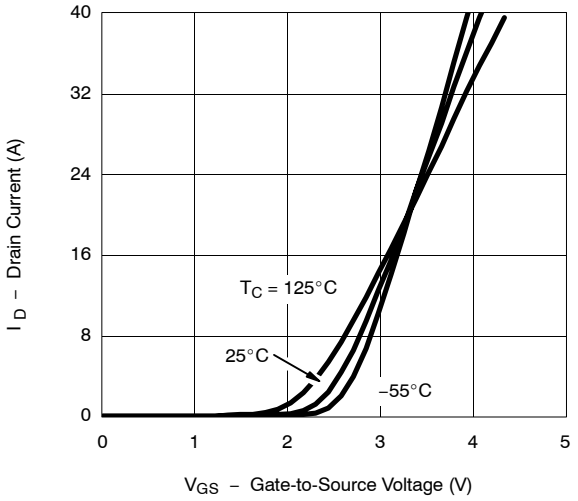


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-2

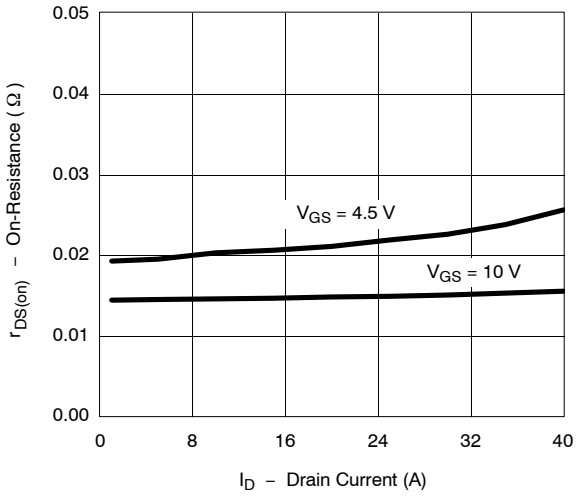
Output Characteristics



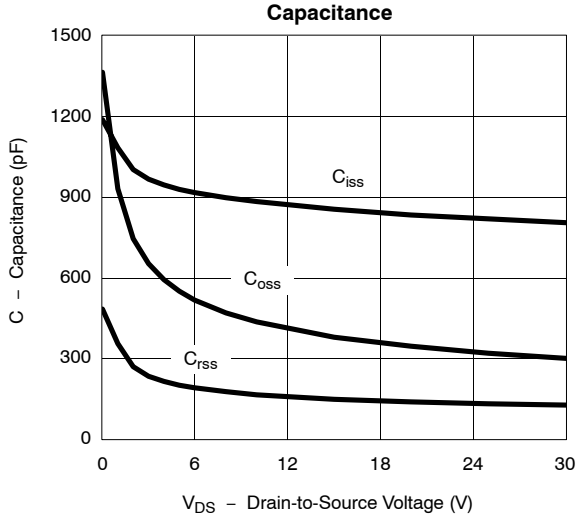
Transfer Characteristics



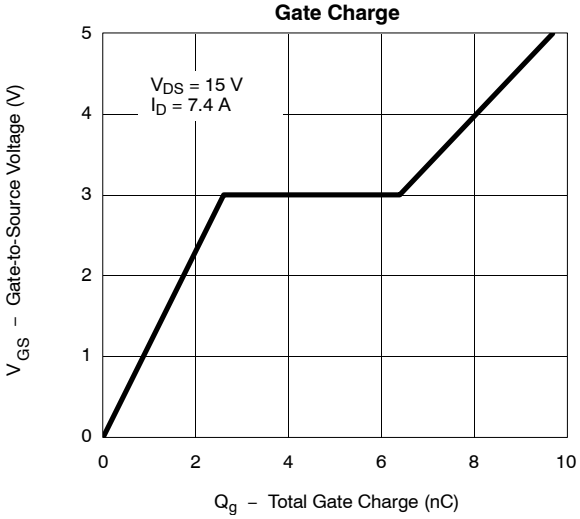
On-Resistance vs. Drain Current



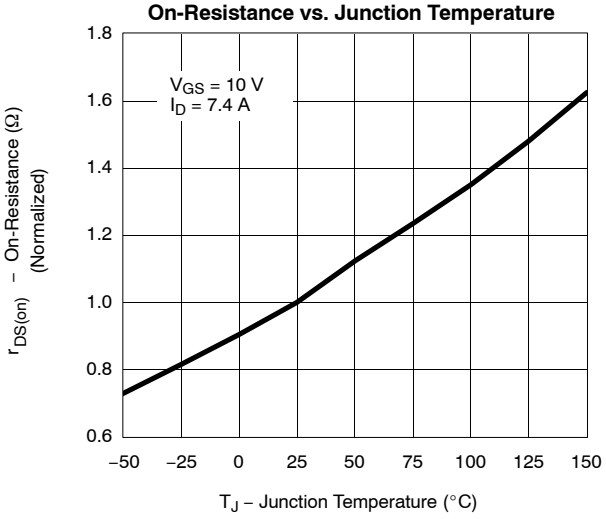
Capacitance



Gate Charge

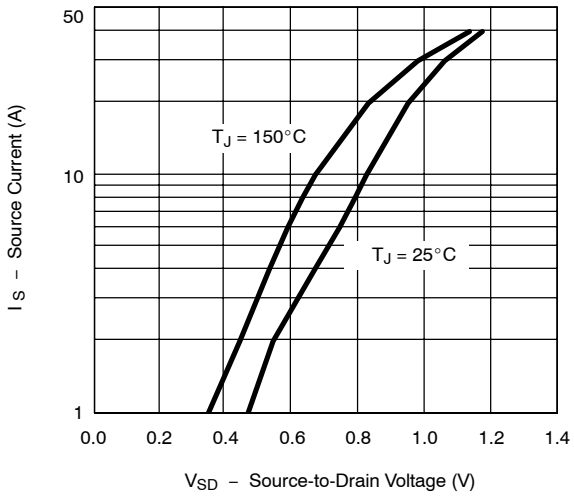


On-Resistance vs. Junction Temperature

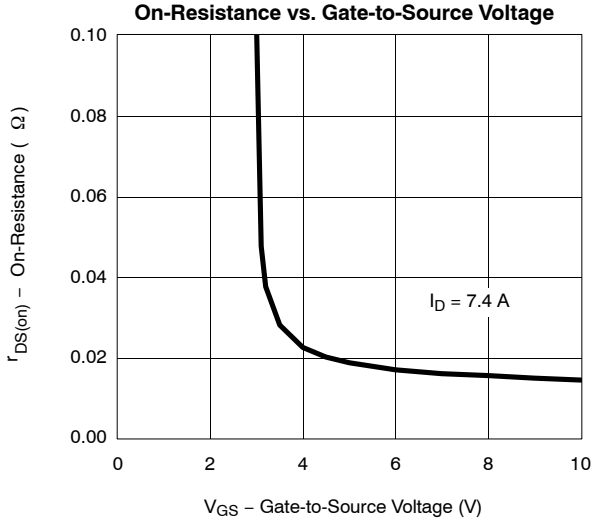


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-2

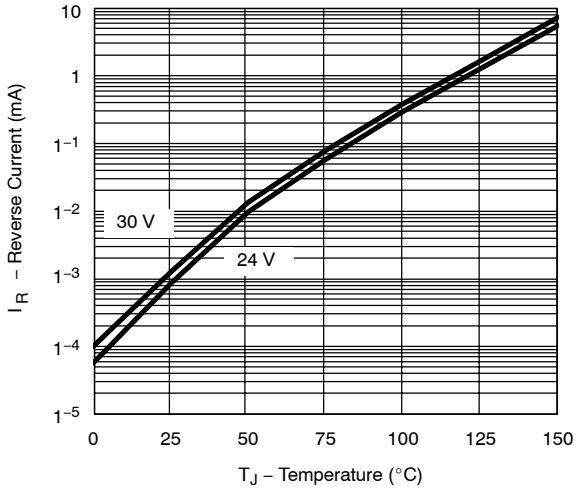
Source-Drain Diode Forward Voltage



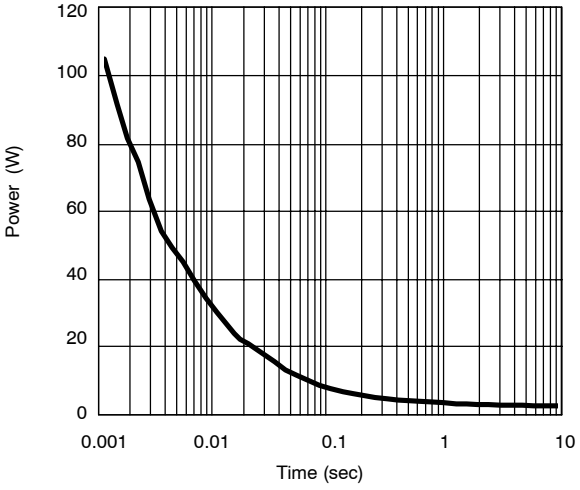
On-Resistance vs. Gate-to-Source Voltage



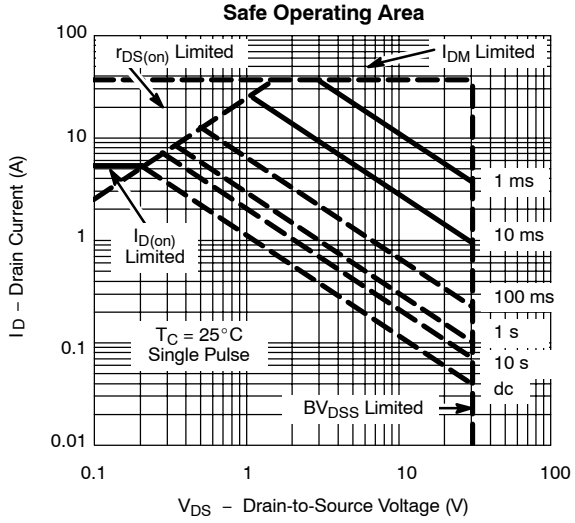
Reverse Current vs. Junction Temperature



Single Pulse Power, Junction-to-Ambient

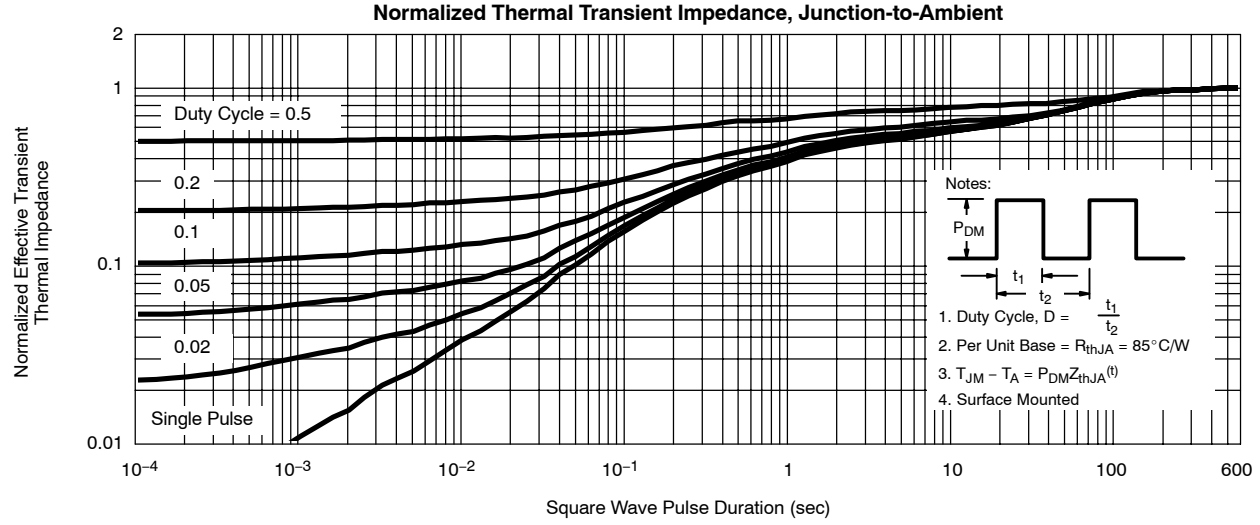


Safe Operating Area

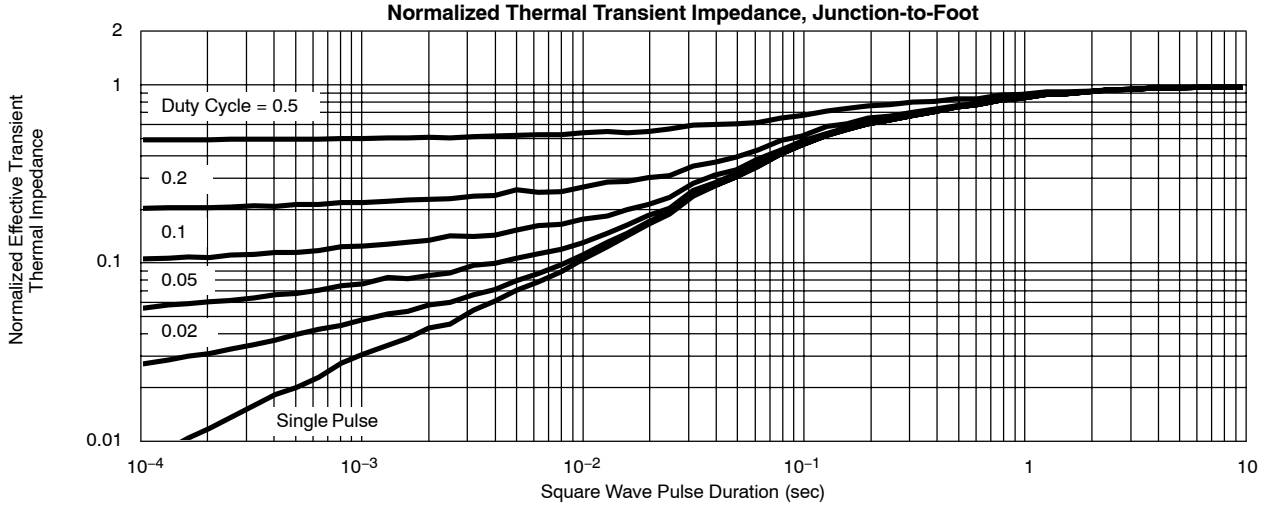


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) CHANNEL-2

Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot



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