



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

PRODUCT SUMMARY			
	V <sub>DS</sub> (V)	r <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
Channel-1	30	0.020 @ V <sub>GS</sub> = 10 V	7.5
		0.0275 @ V <sub>GS</sub> = 4.5 V	6.5
Channel-2		0.019 @ V <sub>GS</sub> = 10 V	7.5
		0.023 @ V <sub>GS</sub> = 4.5 V	6.5

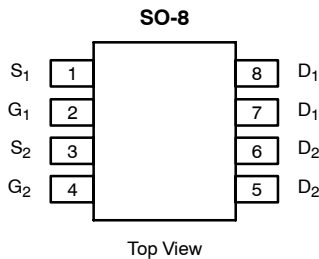
SCHOTTKY PRODUCT SUMMARY		
V <sub>DS</sub> (V)	V <sub>SD</sub> (V) Diode Forward Voltage	I <sub>F</sub> (A)
30	0.50 V @ 1.0 A	2.0

### FEATURES

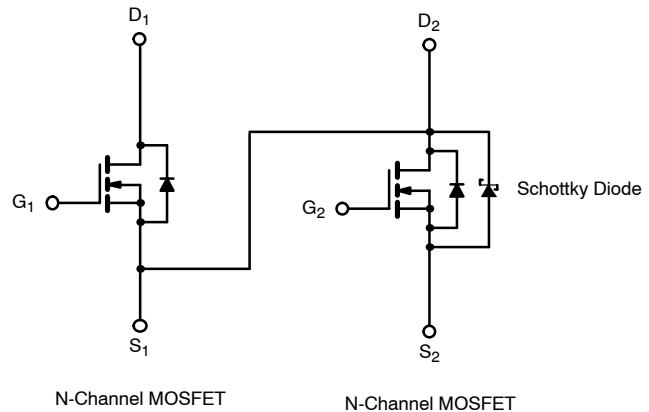
- LITTLE FOOT® Plus Schottky
- Si4830DY Pin Compatible
- PWM Optimized
- 100% R<sub>g</sub> Tested

### APPLICATIONS

- Asymmetrical Buck-Boost DC/DC Converter



Ordering Information: Si4376DY  
Si4376DY-T1 (with Tape and Reel)



ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	10 secs		Steady State		Unit
		Channel-1	Channel-2	Channel-1	Channel-2	
Drain-Source Voltage	V <sub>DS</sub>	30				V
Gate-Source Voltage	V <sub>GS</sub>	± 20	± 12	± 20	± 12	
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C		5.7		A
		T <sub>A</sub> = 70 °C		4.6		
Pulsed Drain Current	I <sub>DM</sub>	30				
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	1.7		0.9		
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C		1.1		W
		T <sub>A</sub> = 70 °C		0.7		
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to 150				°C

THERMAL RESISTANCE RATINGS							
Parameter	Symbol	MOSFET		Schottky		Unit	
		Typ	Max	Typ	Max		
Maximum Junction-to-Ambient <sup>a</sup>	R <sub>thJA</sub>	t ≤ 10 sec	52	62.5	53	62.5	°C/W
		Steady-State	93	110	93	110	
Maximum Junction-to-Foot (Drain)	R <sub>thJF</sub>	Steady-State	35	40	35	40	

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

<b>MOSFET SPECIFICATIONS (<math>T_J = 25^\circ\text{C}</math> UNLESS OTHERWISE NOTED).</b>								
Parameter	Symbol	Test Condition	Min	Typ <sup>a</sup>	Max	Unit		
<b>Static</b>								
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	Ch-1	1.0		3.0	V	
			Ch-2	0.8		2.0		
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$	Ch-1			$\pm 100$	nA	
		$V_{DS} = 0 \text{ V}, V_{GS} = \pm 12 \text{ V}$	Ch-2			$\pm 100$		
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 24 \text{ V}, V_{GS} = 0 \text{ V}$	Ch-1			1	$\mu\text{A}$	
			Ch-2			100		
		$V_{DS} = 24 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 85^\circ\text{C}$	Ch-1			15		
			Ch-2			2000		
On-State Drain Current <sup>b</sup>	$I_{D(on)}$	$V_{DS} = 5 \text{ V}, V_{GS} = 10 \text{ V}$	Ch-1	20			A	
			Ch-2	20				
Drain-Source On-State Resistance <sup>b</sup>	$r_{DS(on)}$	$V_{GS} = 10 \text{ V}, I_D = 7.5 \text{ A}$	Ch-1		0.016	0.020	$\Omega$	
			Ch-2		0.015	0.019		
		$V_{GS} = 4.5 \text{ V}, I_D = 6.5 \text{ A}$	Ch-1		0.022	0.0275		
			Ch-2		0.018	0.023		
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 15 \text{ V}, I_D = 7.5 \text{ A}$	Ch-1		30		S	
			Ch-2		30			
Diode Forward Voltage <sup>b</sup>	$V_{SD}$	$I_S = 1 \text{ A}, V_{GS} = 0 \text{ V}$	Ch-1		0.75	1.2	V	
			Ch-2		0.47	0.5		
<b>Dynamic<sup>a</sup></b>								
Total Gate Charge	$Q_g$	$V_{DS} = 15 \text{ V}, V_{GS} = 4.5 \text{ V}, I_D = 7.5 \text{ A}$	Ch-1		9	14	nC	
			Ch-2		12.5	20		
Gate-Source Charge	$Q_{GS}$		Ch-1		3.8			
			Ch-2		4.0			
Gate-Drain Charge	$Q_{gd}$		Ch-1		3.1			
			Ch-2		3.2			
Gate Resistance	$R_g$		Ch-1	0.5	1.3	2.0	$\Omega$	
			Ch-2	0.5	1.3	1.8		
Turn-On Delay Time	$t_{d(on)}$		$V_{DD} = 15 \text{ V}, R_L = 15 \Omega$ $I_D \cong 1 \text{ A}, V_{GEN} = 10 \text{ V}, R_G = 6 \Omega$	Ch-1		12	18	ns
				Ch-2		12	20	
Rise Time	$t_r$	Ch-1			11	17		
		Ch-2			11	17		
Turn-Off Delay Time	$t_{d(off)}$	Ch-1			27	40		
		Ch-2			40	66		
Fall Time	$t_f$	Ch-1			9	14		
		Ch-2			10	15		
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = 1.7 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s}$		Ch-1		35	55	
				Ch-2		28	45	

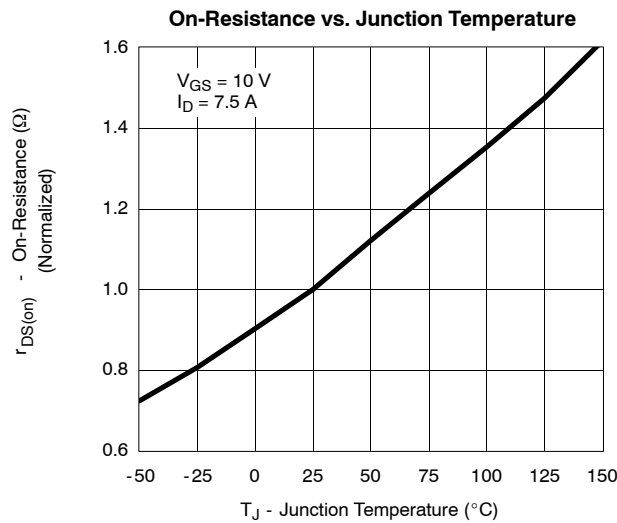
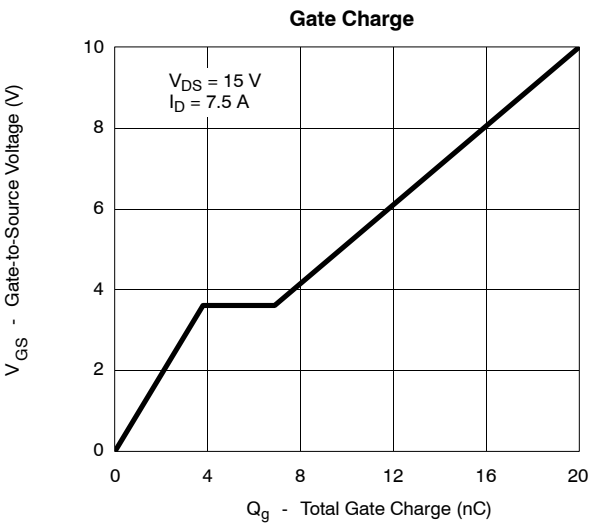
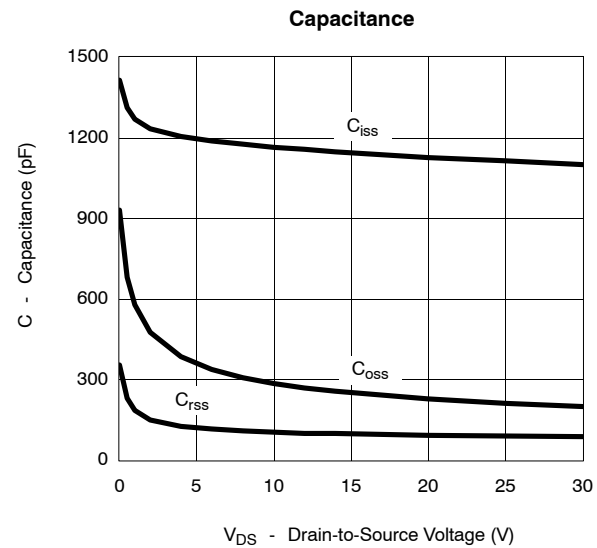
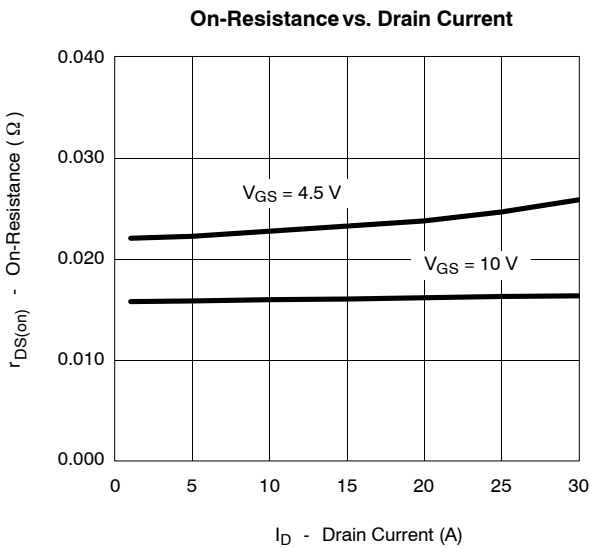
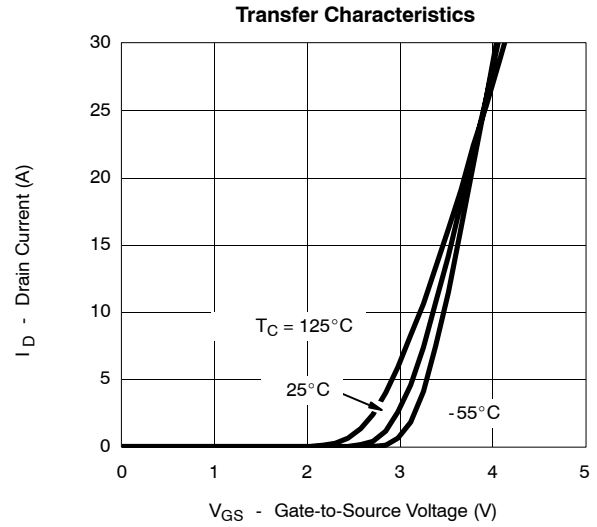
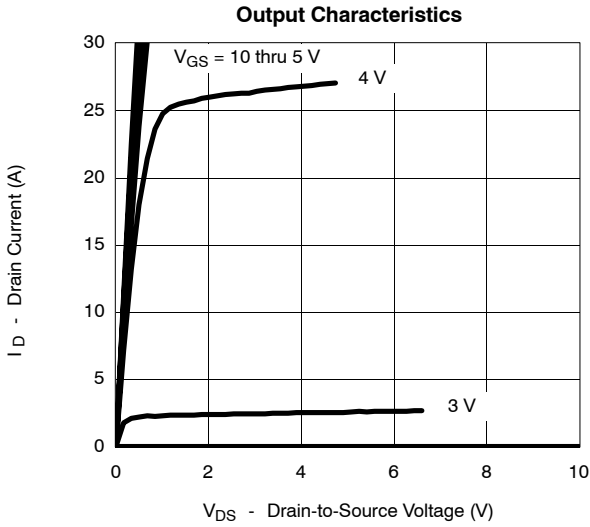
## Notes

- a. Guaranteed by design, not subject to production testing.  
b. Pulse test; pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .

<b>SCHOTTKY SPECIFICATIONS (<math>T_J = 25^\circ\text{C}</math> UNLESS OTHERWISE NOTED)</b>							
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit	
Forward Voltage Drop	$V_F$	$I_F = 1.0 \text{ A}$		0.47	0.50	V	
		$I_F = 1.0 \text{ A}, T_J = 125^\circ\text{C}$		0.36	0.42		
Maximum Reverse Leakage Current	$I_{rm}$	$V_r = 30 \text{ V}$		0.004	0.100	mA	
		$V_r = 30 \text{ V}, T_J = 100^\circ\text{C}$		0.7	10		
		$V_r = -30 \text{ V}, T_J = 125^\circ\text{C}$		3.0	20		
Junction Capacitance	$C_T$	$V_r = 10 \text{ V}$		50		pF	



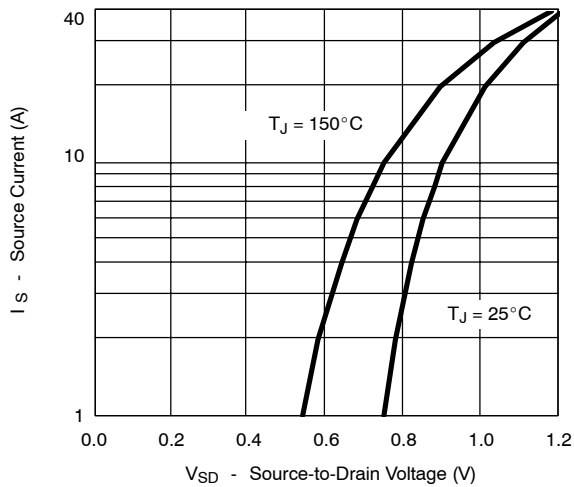
**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) MOSFET CHANNEL-1**



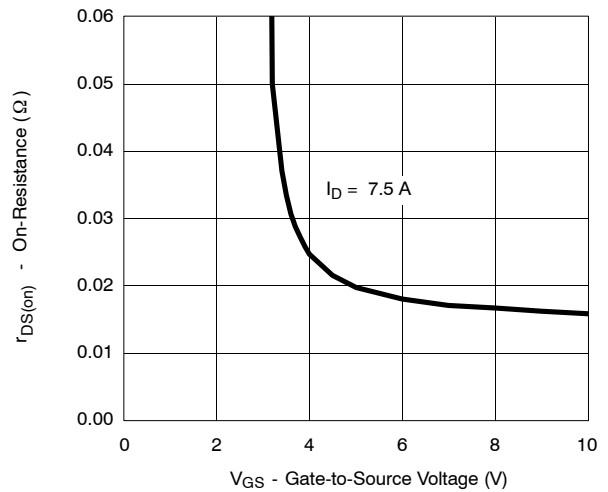


**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED) MOSFET CHANNEL-1**

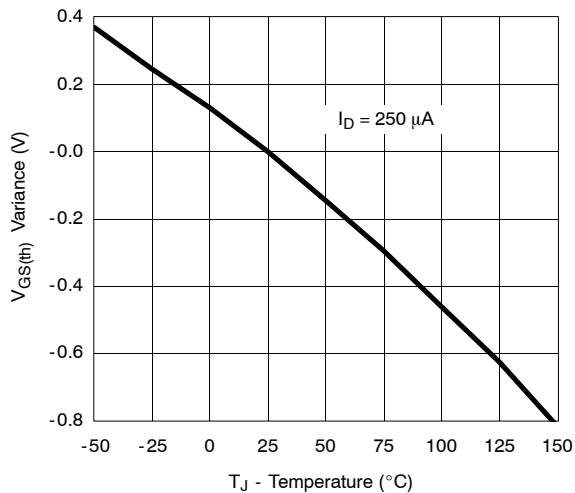
Source-Drain Diode Forward Voltage



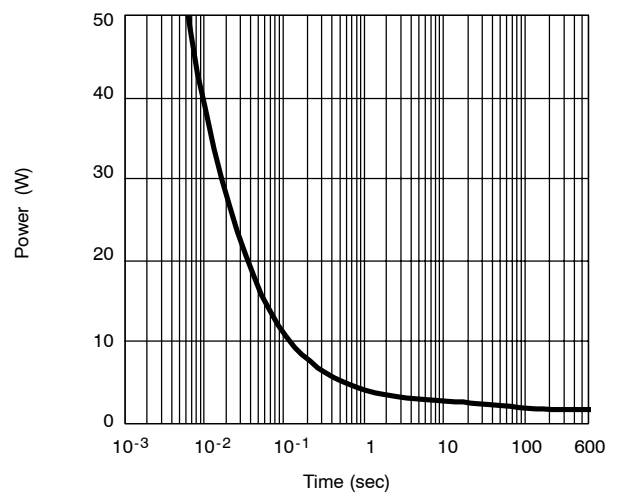
On-Resistance vs. Gate-to-Source Voltage



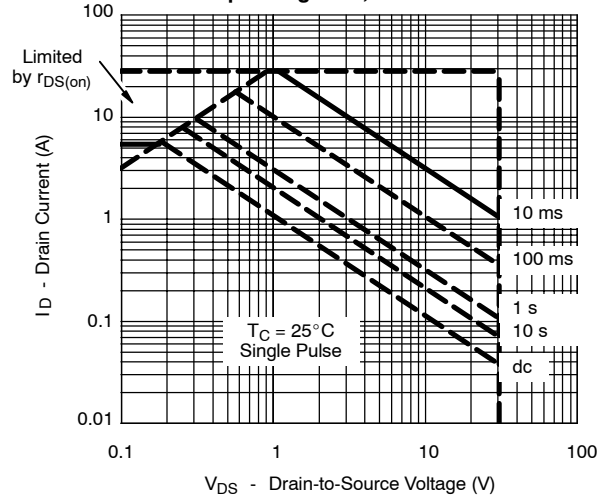
Threshold Voltage



Single Pulse Power



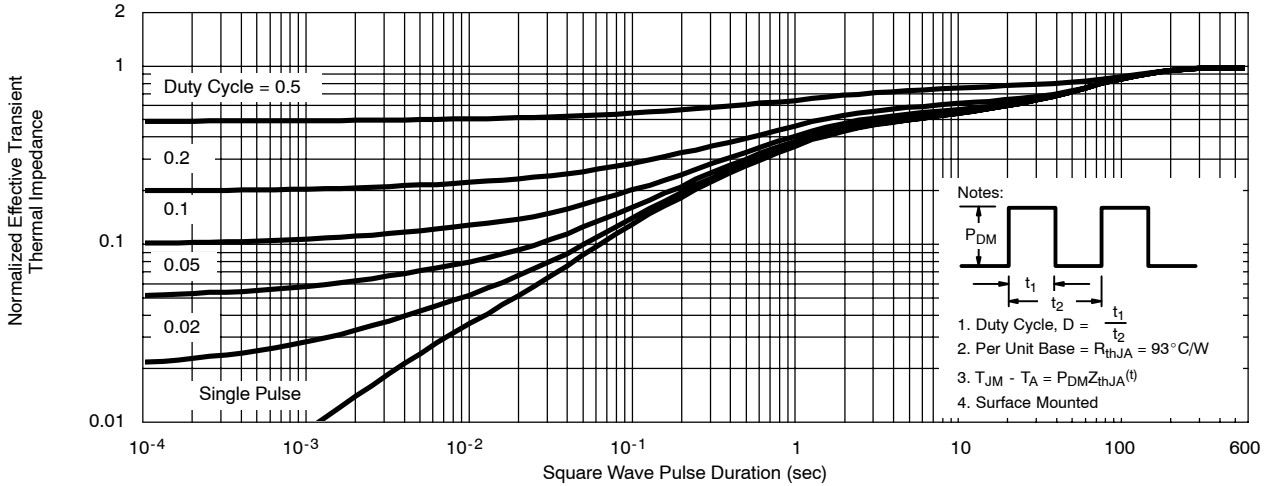
Safe Operating Area, Junction-to-Foot



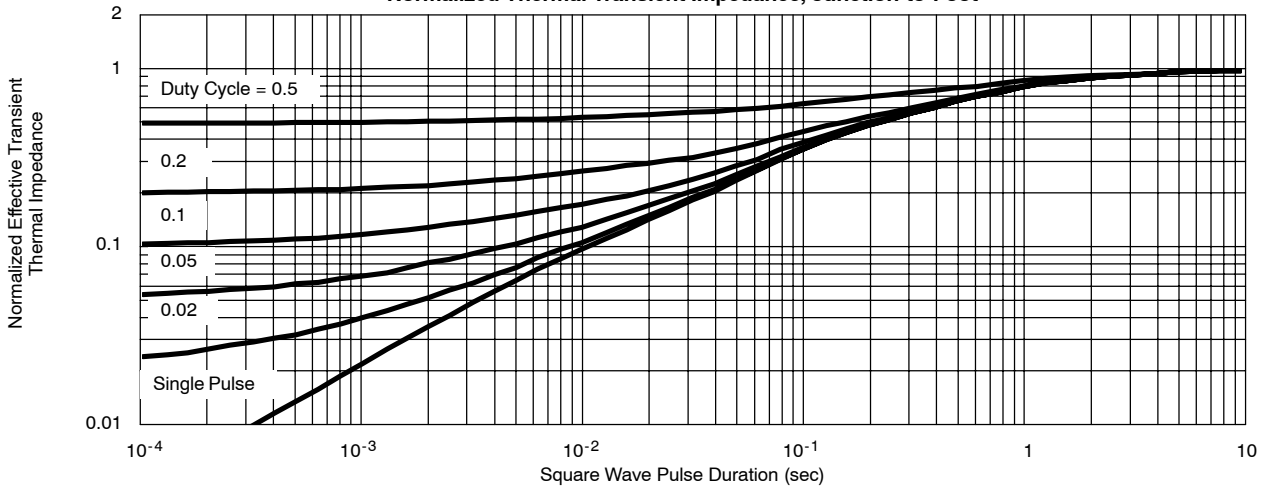


**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED) MOSFET CHANNEL 1**

Normalized Thermal Transient Impedance, Junction-to-Ambient



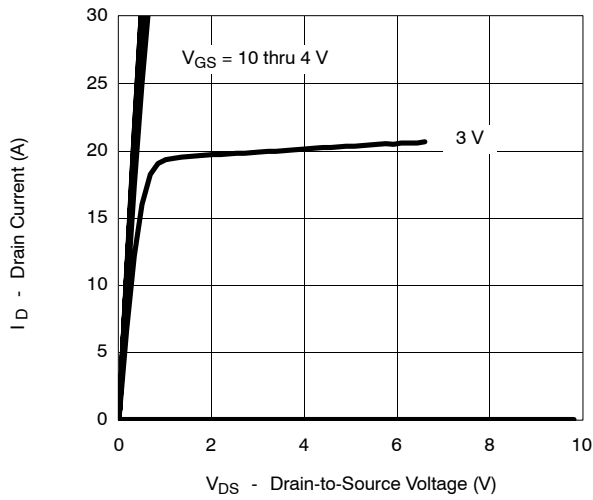
Normalized Thermal Transient Impedance, Junction-to-Foot



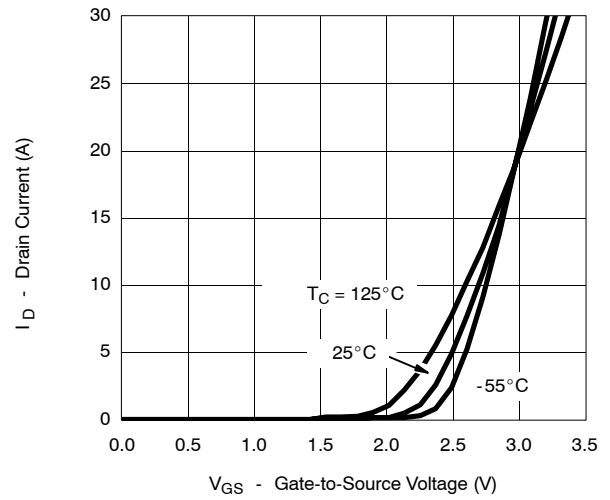


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) MOSFET CHANNEL-2**

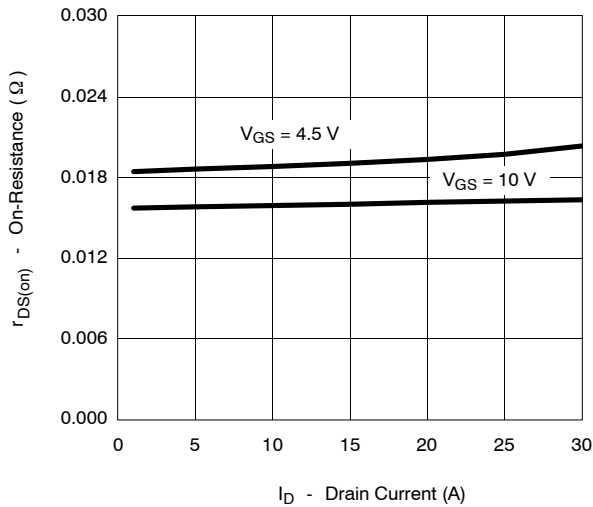
**Output Characteristics**



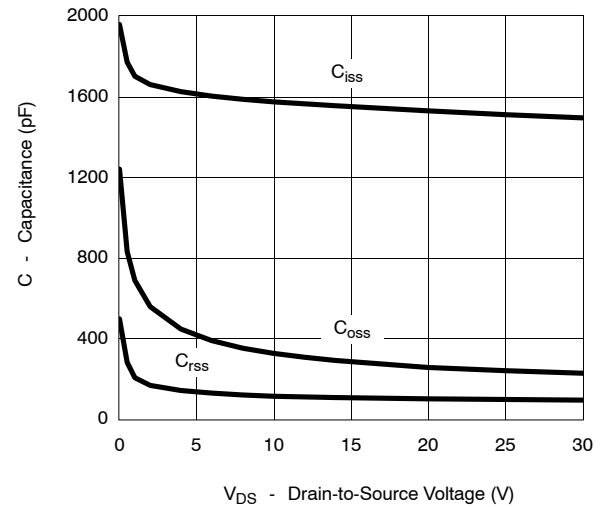
**Transfer Characteristics**



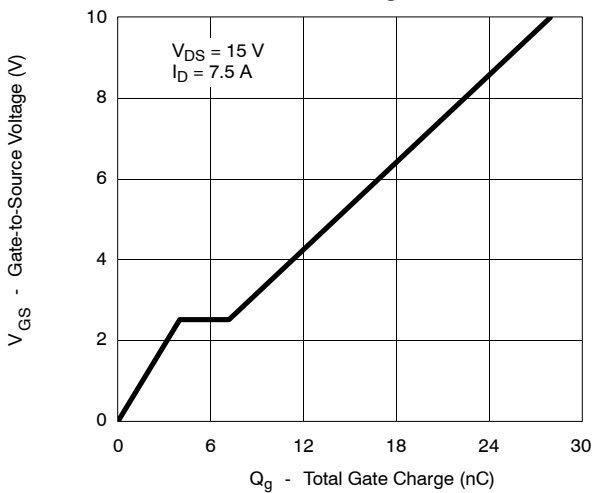
**On-Resistance vs. Drain Current**



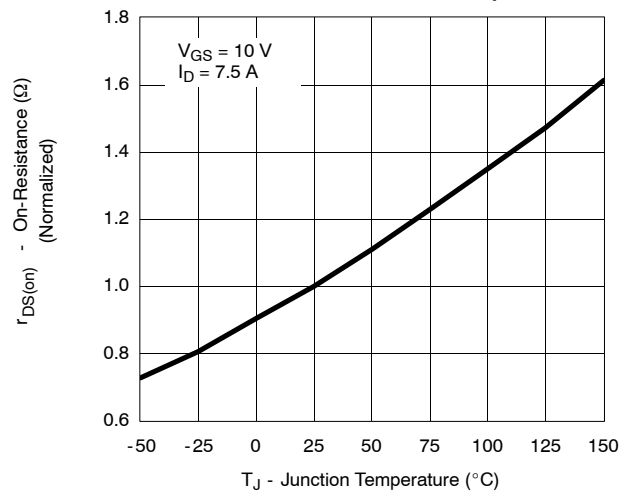
**Capacitance**



**Gate Charge**



**On-Resistance vs. Junction Temperature**

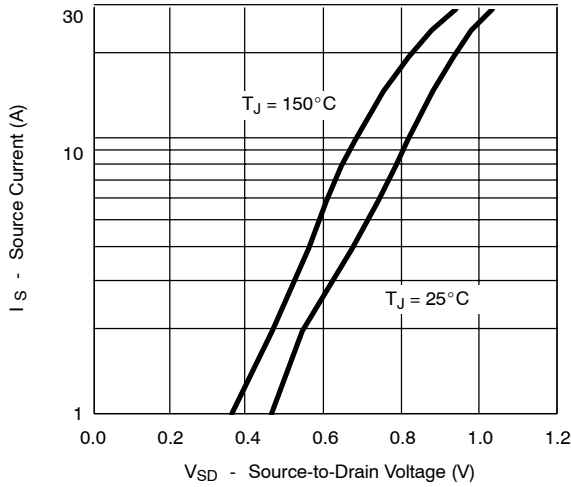




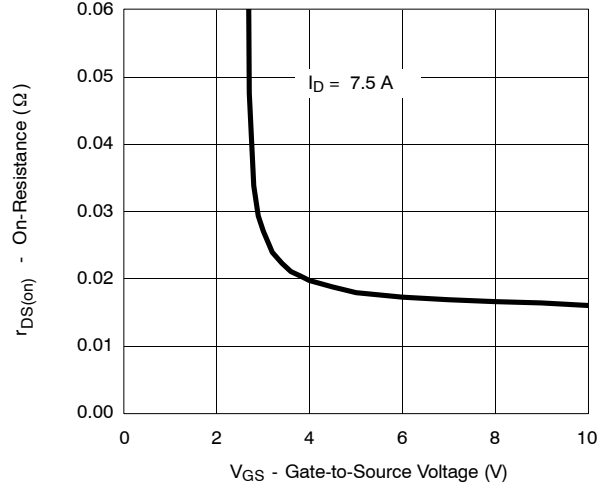
**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

**MOSFET CHANNEL-2**

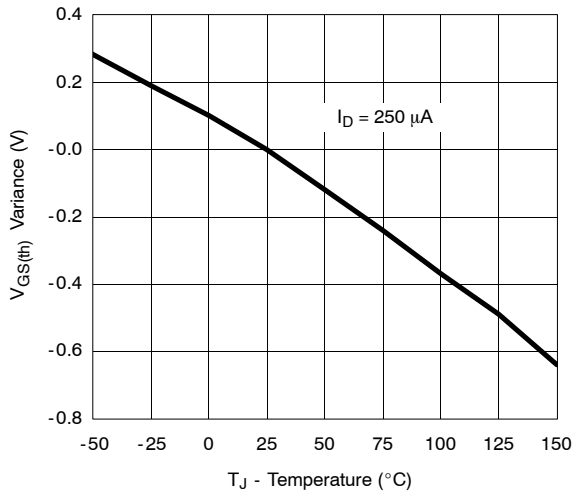
Source-Drain Diode Forward Voltage



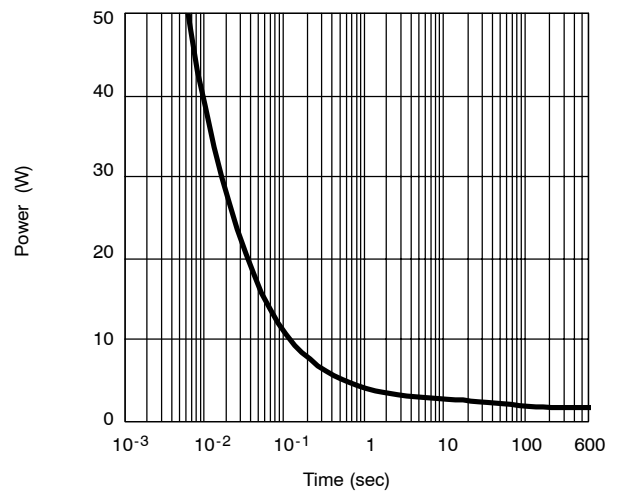
On-Resistance vs. Gate-to-Source Voltage



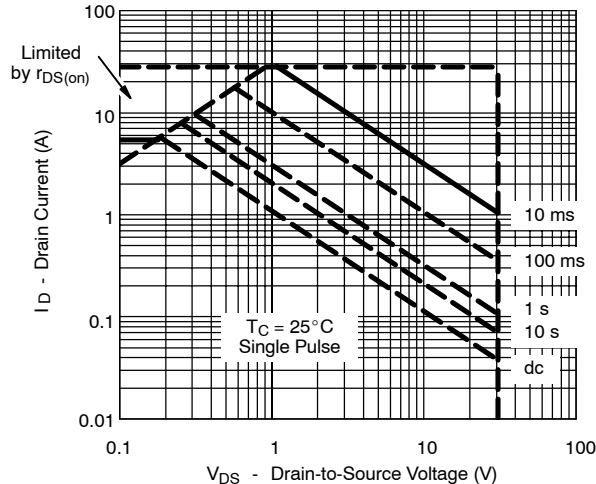
Threshold Voltage



Single Pulse Power

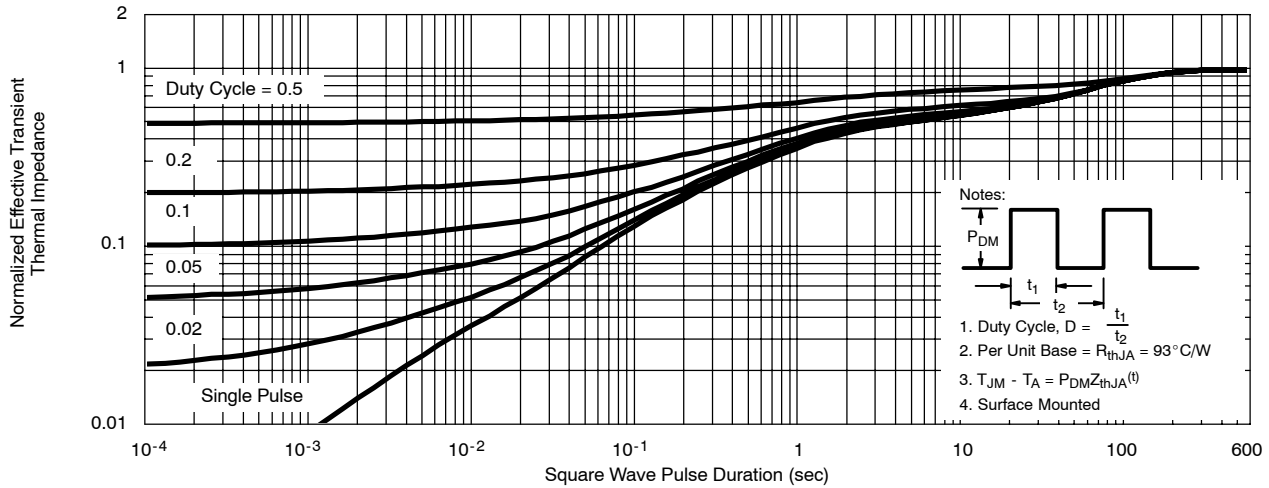


Safe Operating Area, Junction-to-Foot

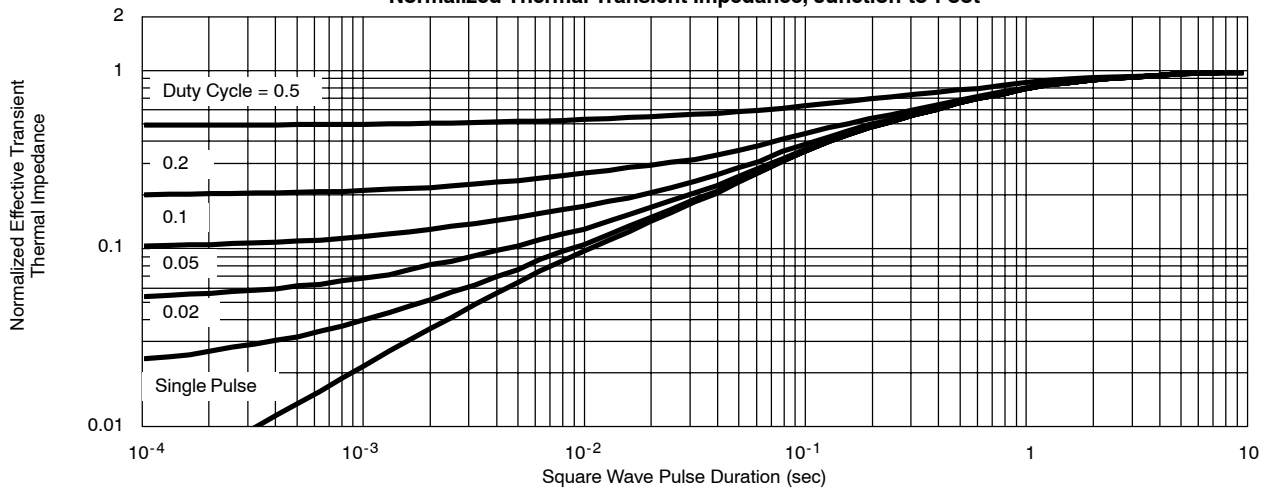


**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED) MOSFET CHANNEL-2**

**Normalized Thermal Transient Impedance, Junction-to-Ambient**



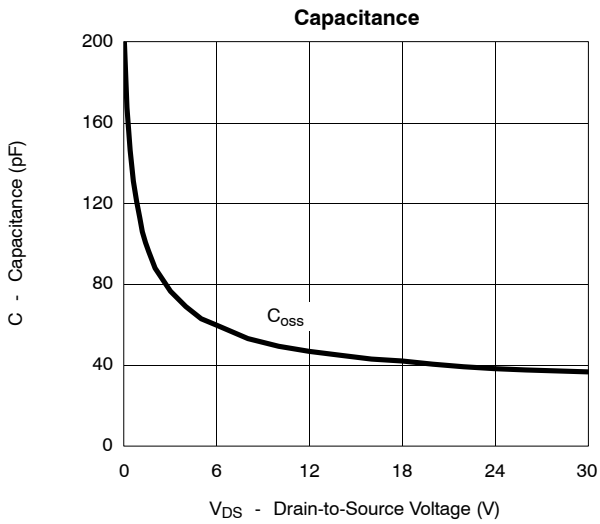
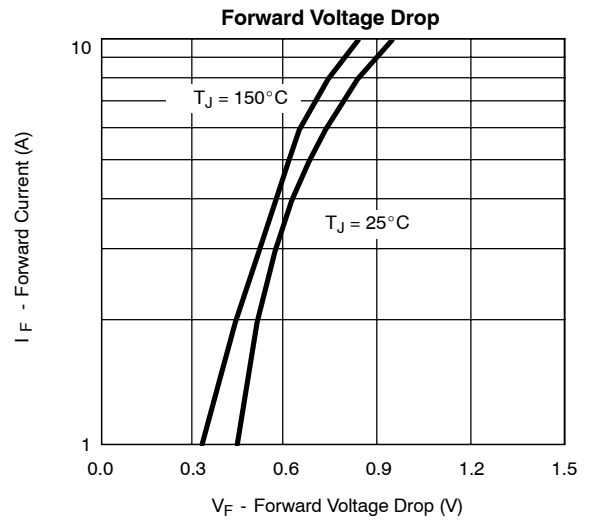
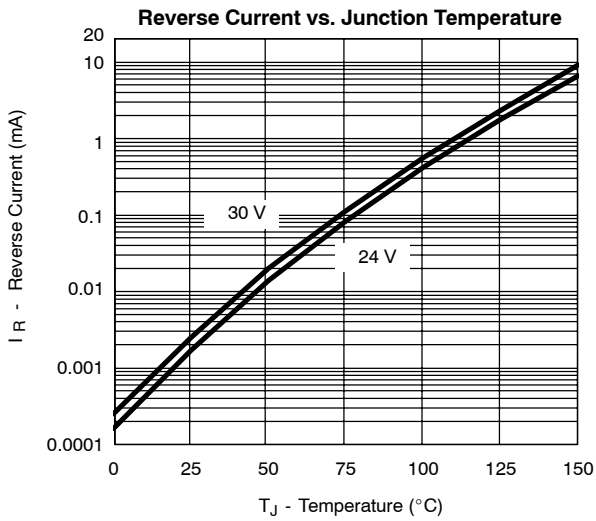
**Normalized Thermal Transient Impedance, Junction-to-Foot**







**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)** **SCHOTTKY**





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