

# Asymmetrical Dual P-Channel 30-V/20-V (D-S) MOSFETs

PRODUCT SUMMARY			
	V <sub>DS</sub> (V)	r <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
Channel-1	- 30	0.054 at V <sub>GS</sub> = - 10 V	- 5.0
		0.100 at V <sub>GS</sub> = - 4.5 V	- 3.7
Channel-2	- 20	0.027 at V <sub>GS</sub> = - 4.5 V	- 7.0
		0.035 at V <sub>GS</sub> = - 2.5 V	- 6.2
		0.048 at V <sub>GS</sub> = - 1.8 V	- 5.2

## FEATURES

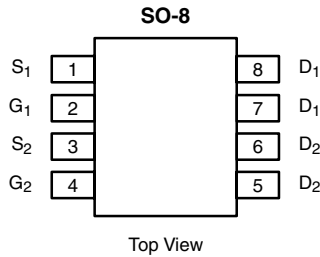
- TrenchFET<sup>®</sup> Power MOSFETs
- Low Gate Drive (2.5 V) Capability For Channel 2



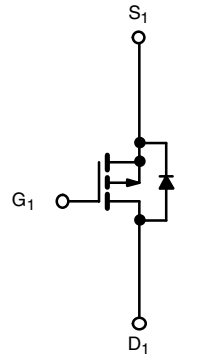
RoHS  
COMPLIANT

## APPLICATIONS

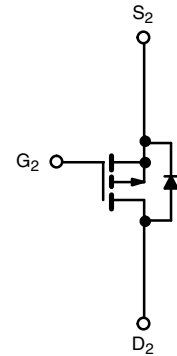
- Game Station
- Load Switch



Ordering Information: Si4955DY-T1-E3 (Lead (Pb)-free)



P-Channel MOSFET



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted							
Parameter	Symbol	Channel-1		Channel-2		Unit	
		10 sec	Steady State	10 sec	Steady State		
Drain-Source Voltage	V <sub>DS</sub>	- 30		- 20		V	
Gate-Source Voltage	V <sub>GS</sub>	± 20		± 8			
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C	- 5.0	- 3.8	- 7.0	- 5.3	A
		T <sub>A</sub> = 70 °C	- 4.0	- 3.0	- 5.6	- 4.2	
Pulsed Drain Current	I <sub>DM</sub>	- 20					
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	- 1.7	- 0.9	- 1.7	- 0.9		
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	2.0	1.1	2	1.1	W
		T <sub>A</sub> = 70 °C	1.3	0.7	1.3	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	Channel-1		Channel-2		Unit	
		Typ	Max	Typ	Max		
Maximum Junction-to-Ambient <sup>a</sup>	R <sub>thJA</sub>	t ≤ 10 sec	55	62.5	58	62.5	°C/W
		Steady State	90	110	91	110	
Maximum Junction-to-Foot (Drain)	R <sub>thJF</sub>	33	40	34	40		

Notes:

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

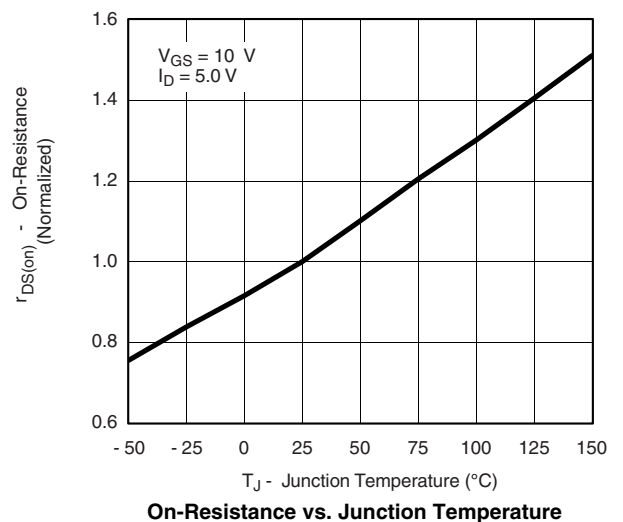
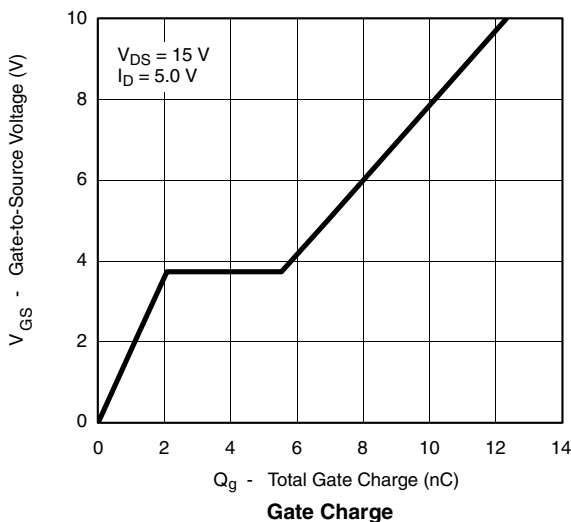
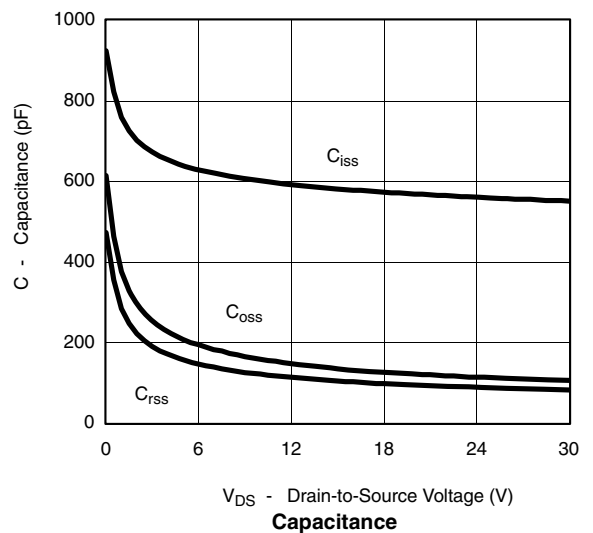
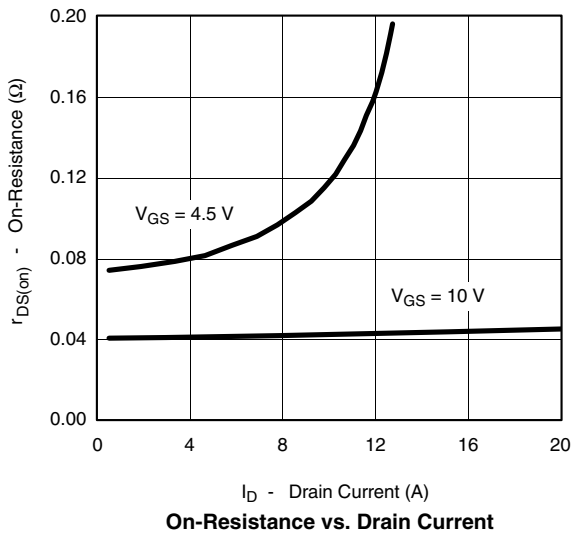
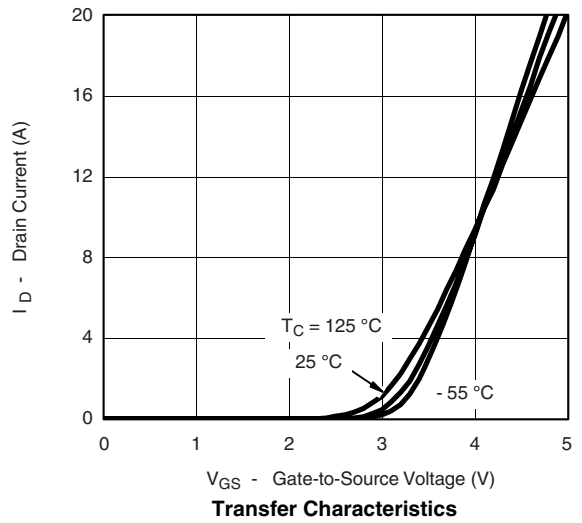
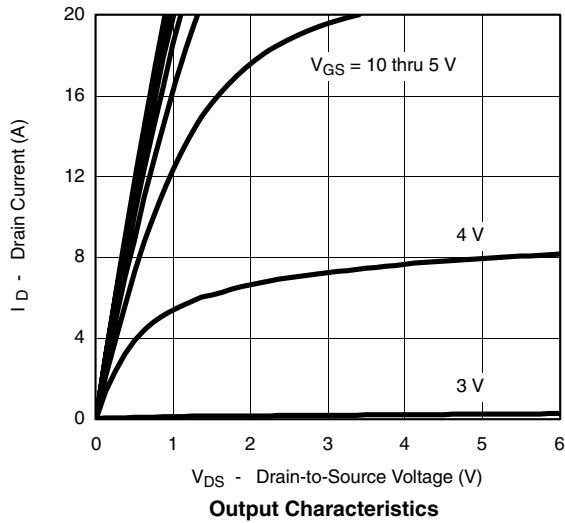
<b>SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted							
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
<b>Static</b>							
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	Ch-1	-1.0		-3	V
		$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	Ch-2	-0.4		-1	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\ \text{V}, V_{GS} = \pm 20\ \text{V}$	Ch-1			$\pm 100$	nA
		$V_{DS} = 0\ \text{V}, V_{GS} = \pm 8\ \text{V}$	Ch-2			$\pm 100$	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -30\ \text{V}, V_{GS} = 0\ \text{V}$	Ch-1			-1	$\mu\text{A}$
		$V_{DS} = -20\ \text{V}, V_{GS} = 0\ \text{V}$	Ch-2			-1	
		$V_{DS} = -30\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 85\text{ }^\circ\text{C}$	Ch-1			-5	
		$V_{DS} = -20\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 85\text{ }^\circ\text{C}$	Ch-2			-5	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq -5\ \text{V}, V_{GS} = -10\ \text{V}$	Ch-1	-20			A
		$V_{DS} \leq -5\ \text{V}, V_{GS} = -10\ \text{V}$	Ch-2	-20			
Drain-Source On-State Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = -10\ \text{V}, I_D = -5.0\ \text{A}$	Ch-1		0.044	0.054	$\Omega$
		$V_{GS} = -4.5\ \text{V}, I_D = -7.0\ \text{A}$	Ch-2		0.022	0.027	
		$V_{GS} = -4.5\ \text{V}, I_D = -3.7\ \text{A}$	Ch-1		0.082	0.100	
		$V_{GS} = -2.5\ \text{V}, I_D = -6.2\ \text{A}$	Ch-2		0.029	0.035	
		$V_{GS} = -1.8\ \text{V}, I_D = -3\ \text{A}$	Ch-2		0.039	0.048	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -15\ \text{V}, I_D = -5.0\ \text{A}$	Ch-1		10		S
		$V_{DS} = -15\ \text{V}, I_D = -3\ \text{A}$	Ch-2		25		
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = -1.7\ \text{A}, V_{GS} = 0\ \text{V}$	Ch-1		-0.80	-1.2	V
		$I_S = -1.7\ \text{A}, V_{GS} = 0\ \text{V}$	Ch-2		-0.80	-1.2	
<b>Dynamic<sup>b</sup></b>							
Total Gate Charge	$Q_g$	Channel-1 $V_{DS} = -15\ \text{V}, V_{GS} = -10\ \text{V}, I_D = -5.0\ \text{A}$	Ch-1		12.5	19	nC
			Ch-2		21	25	
Gate-Source Charge	$Q_{gs}$	Channel-2 $V_{DS} = -10\ \text{V}, V_{GS} = -4.5\ \text{V}, I_D = -7\ \text{A}$	Ch-1		2.1		nC
			Ch-2		2.6		
Gate-Drain Charge	$Q_{gd}$	Channel-2 $V_{DS} = -10\ \text{V}, V_{GS} = -4.5\ \text{V}, I_D = -7\ \text{A}$	Ch-1		3.5		nC
			Ch-2		6.0		
Turn-On Delay Time	$t_{d(on)}$	Channel-1 $V_{DD} = -15\ \text{V}, R_L = -15\ \Omega$ $I_D \cong -1\ \text{A}, V_{GEN} = -10\ \text{V}, R_G = 6\ \Omega$	Ch-1		7	15	ns
			Ch-2		20	30	
Rise Time	$t_r$	Channel-2 $V_{DD} = -10\ \text{V}, R_L = 10\ \Omega$ $I_D \cong -1\ \text{A}, V_{GEN} = -4.5\ \text{V}, R_G = 6\ \Omega$	Ch-1		10	15	ns
			Ch-2		40	60	
Turn-Off Delay Time	$t_{d(off)}$	Channel-2 $V_{DD} = -10\ \text{V}, R_L = 10\ \Omega$ $I_D \cong -1\ \text{A}, V_{GEN} = -4.5\ \text{V}, R_G = 6\ \Omega$	Ch-1		30	45	ns
			Ch-2		125	190	
Fall Time	$t_f$	Channel-2 $V_{DD} = -10\ \text{V}, R_L = 10\ \Omega$ $I_D \cong -1\ \text{A}, V_{GEN} = -4.5\ \text{V}, R_G = 6\ \Omega$	Ch-1		22	35	ns
			Ch-2		85	130	
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = -1.7\ \text{A}, di/dt = 100\ \text{A}/\mu\text{s}$	Ch-1		25	60	ns
		$I_F = -1.7\ \text{A}, di/dt = 100\ \text{A}/\mu\text{s}$	Ch-2		64	90	

Notes:

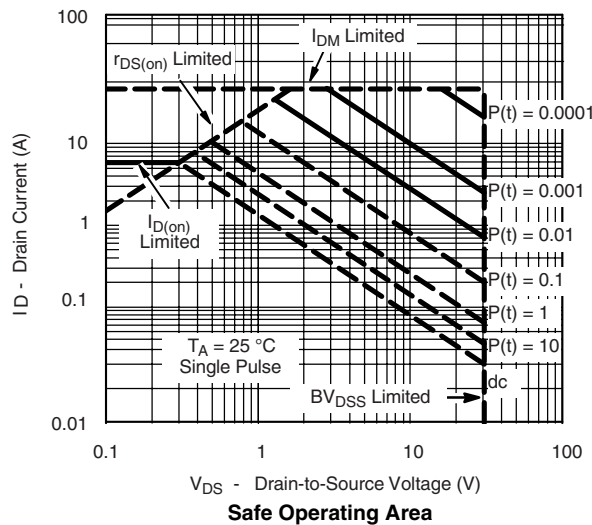
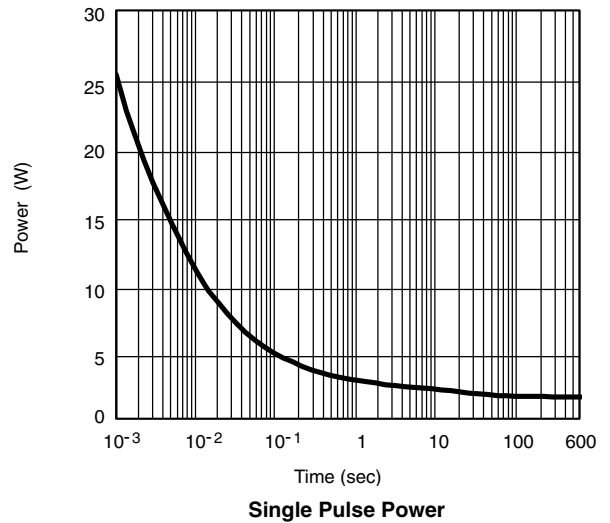
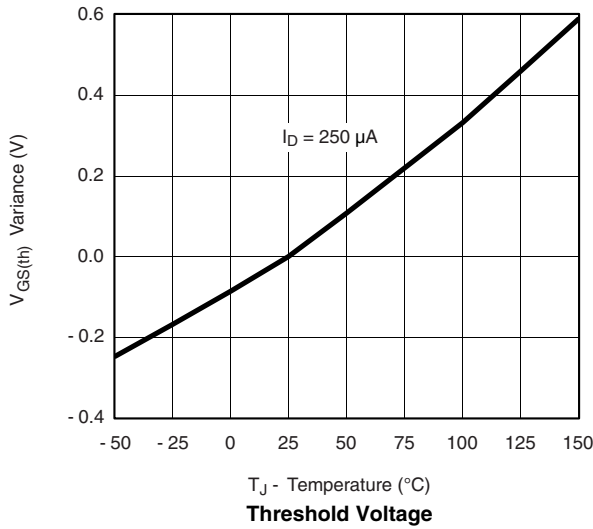
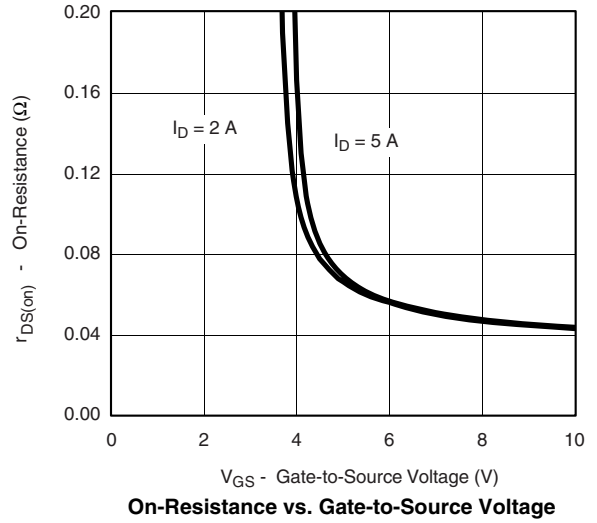
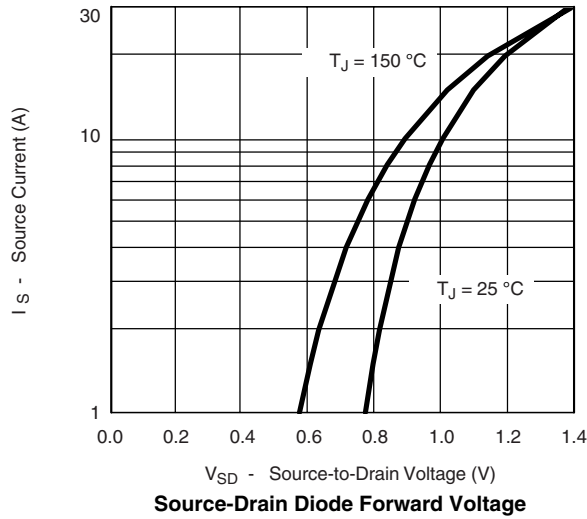
- a. Pulse test; pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .  
b. Guaranteed by design, not subject to production testing.

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.

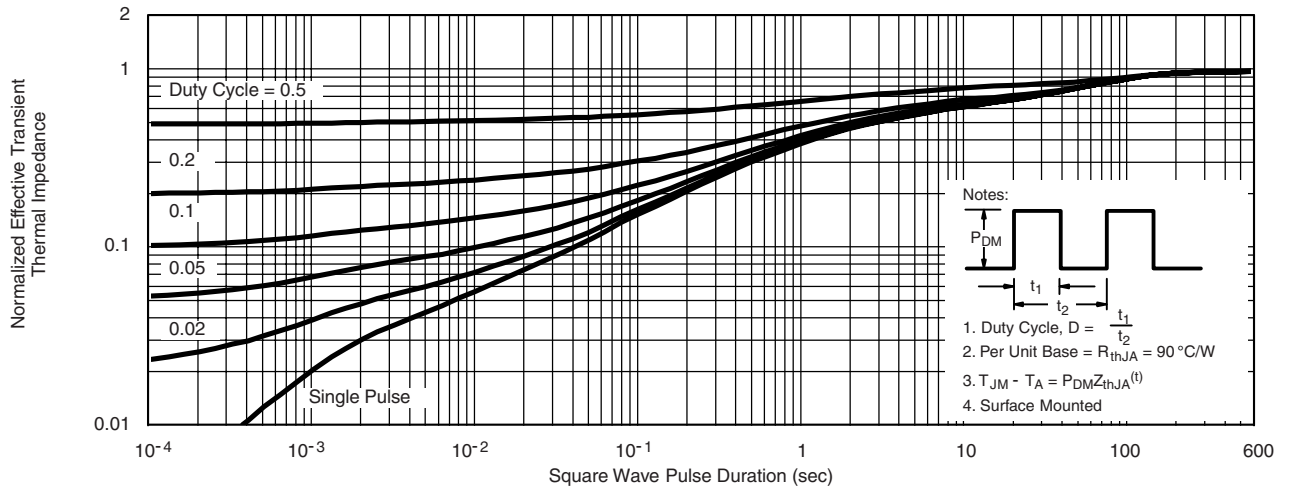
## CHANNEL 1 TYPICAL CHARACTERISTICS 25 °C unless noted



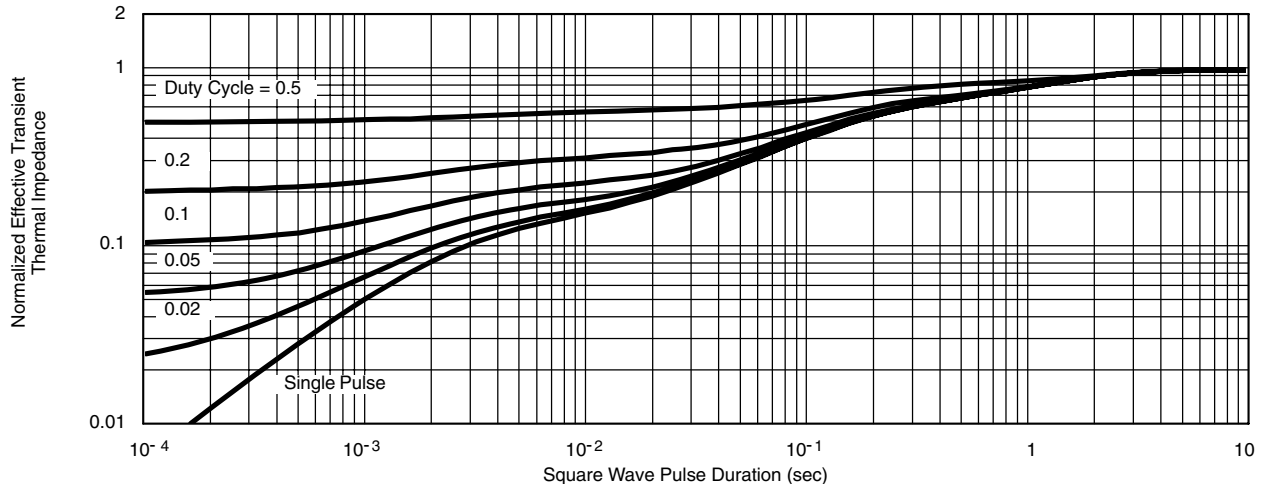
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**CHANNEL 1 TYPICAL CHARACTERISTICS** 25 °C unless noted

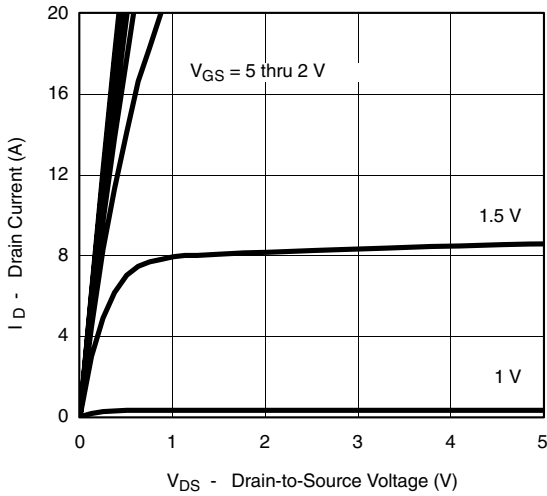


**Normalized Thermal Transient Impedance, Junction-to-Ambient**

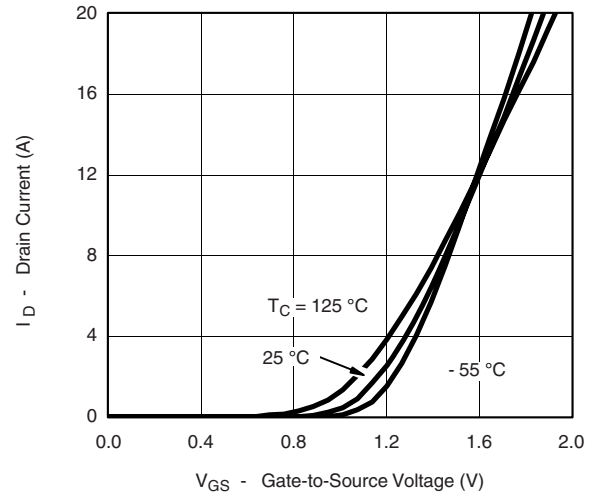


**Normalized Thermal Transient Impedance, Junction-to-Foot**

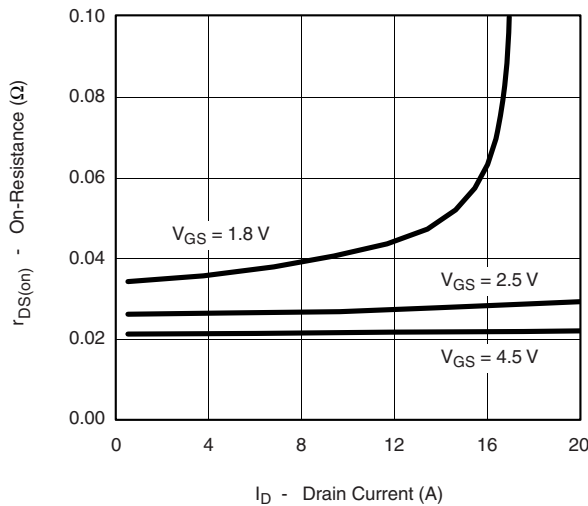
## CHANNEL 2 TYPICAL CHARACTERISTICS 25 °C unless noted



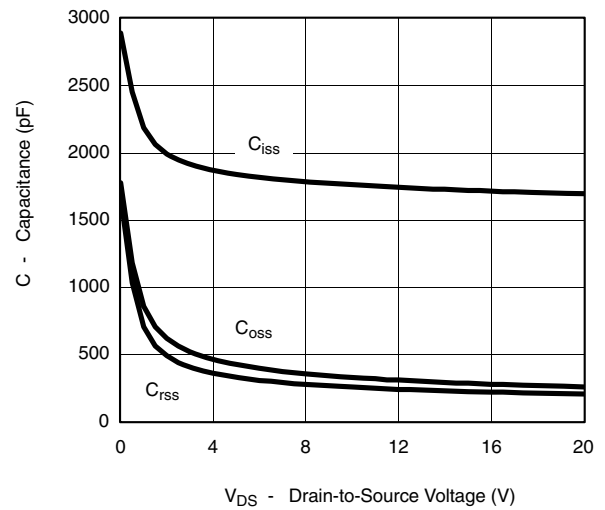
**Output Characteristics**



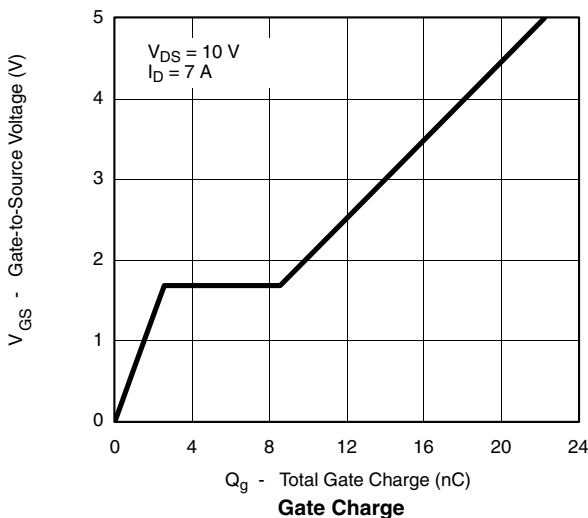
**Transfer Characteristics**



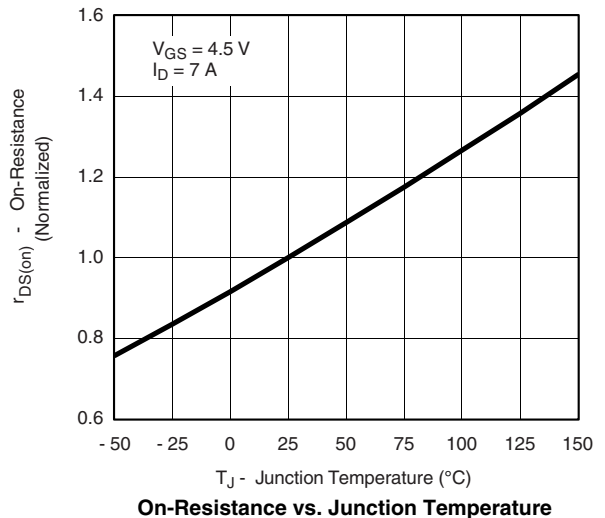
**On-Resistance vs. Drain Current**



**Capacitance**

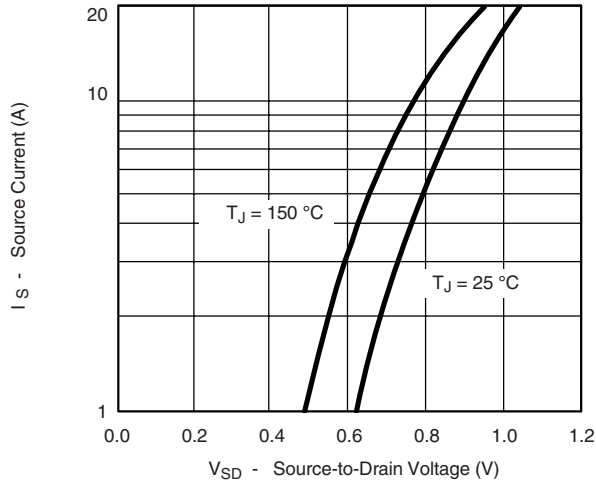


**Gate Charge**

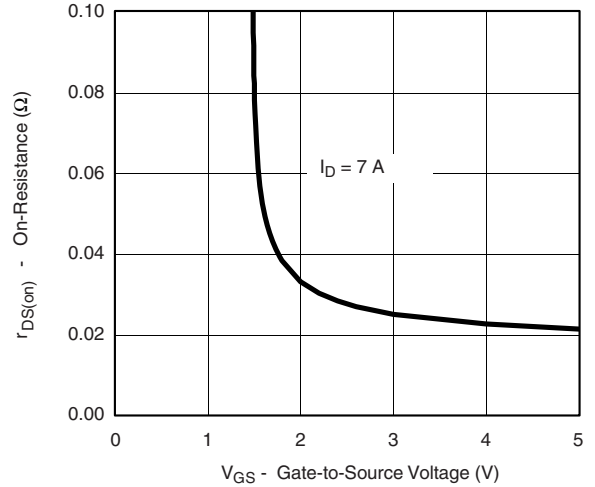


**On-Resistance vs. Junction Temperature**

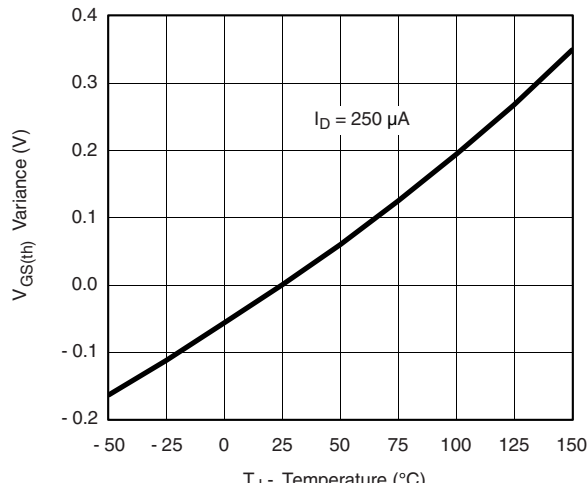
**CHANNEL 2 TYPICAL CHARACTERISTICS** 25 °C unless noted



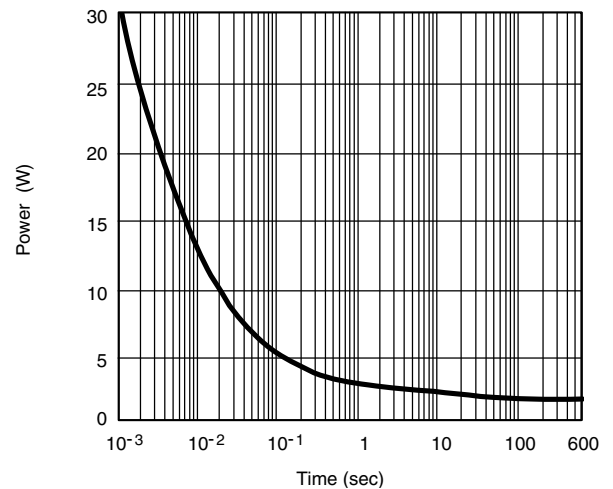
**Source-Drain Diode Forward Voltage**



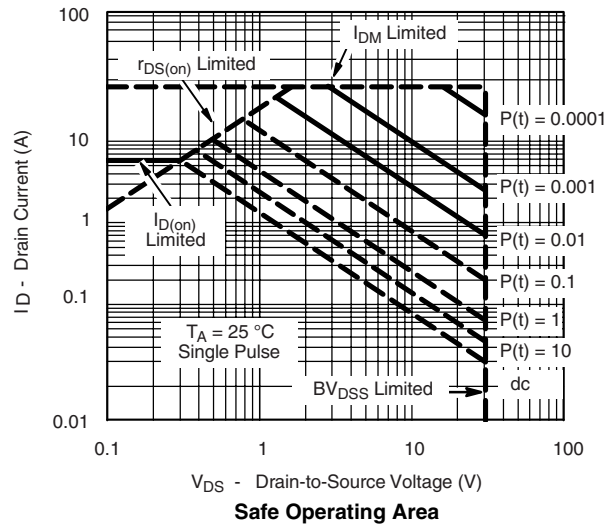
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**



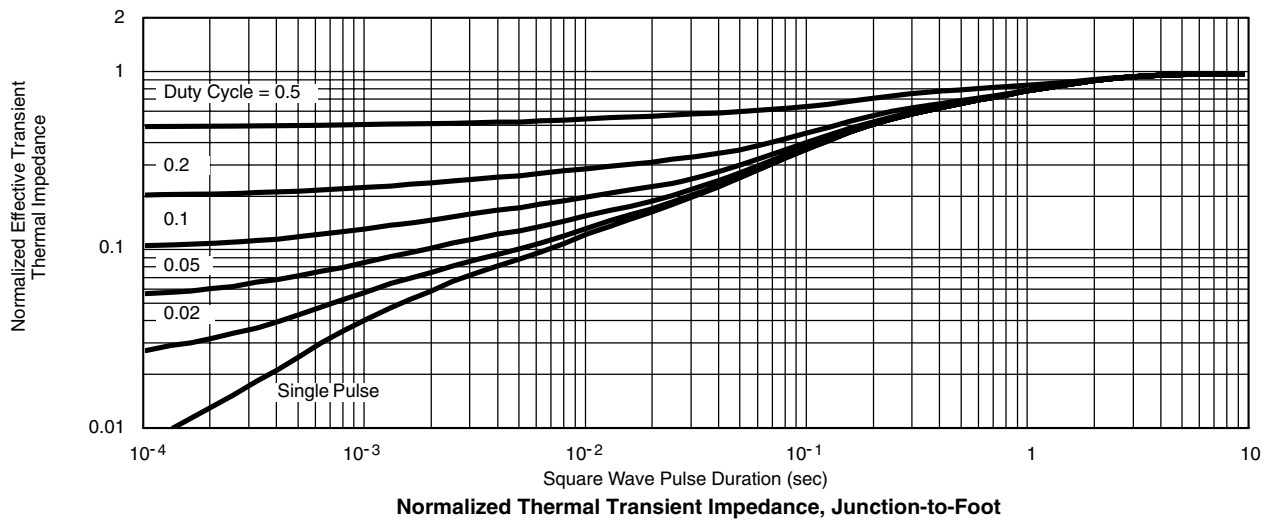
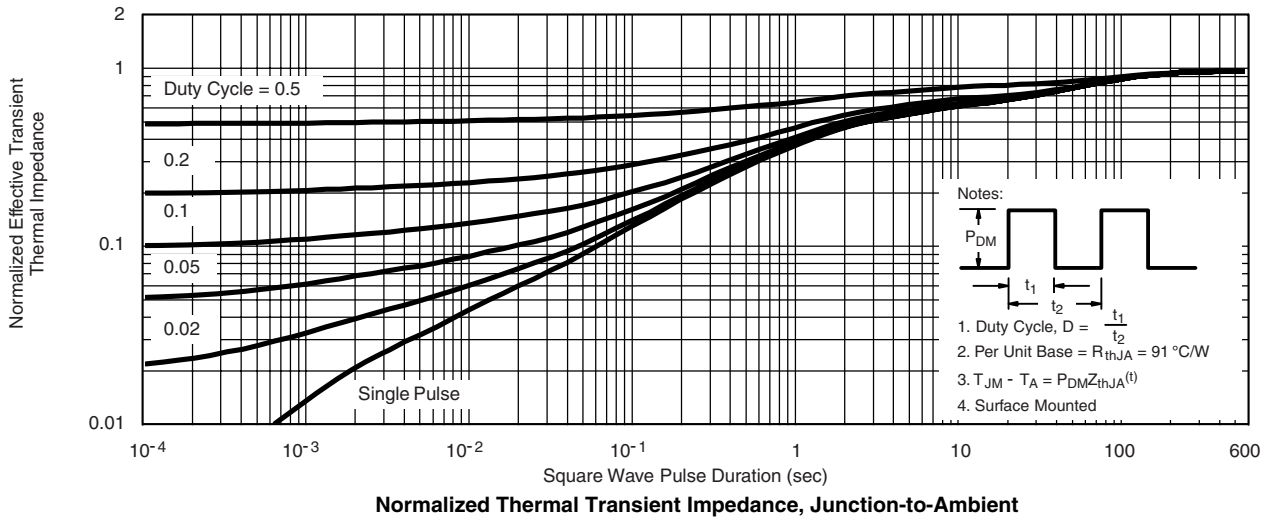
**Single Pulse Power**



**Safe Operating Area**



**CHANNEL 2 TYPICAL CHARACTERISTICS** 25 °C unless noted



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