

## Complementary 20-V (D-S) Low-Threshold MOSFET

PRODUCT SUMMARY			
	V <sub>DS</sub> (V)	r <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
N-Channel	20	0.280 at V <sub>GS</sub> = 4.5 V	1.28
		0.360 at V <sub>GS</sub> = 2.5 V	1.13
		0.450 at V <sub>GS</sub> = 1.8 V	1.0
P-Channel	-20	0.490 at V <sub>GS</sub> = -4.5 V	-1.0
		0.750 at V <sub>GS</sub> = -2.5 V	-0.81
		1.10 at V <sub>GS</sub> = -1.8 V	-0.67

### FEATURES

- TrenchFET<sup>®</sup> Power MOSFETS: 1.8 V Rated
- ESD Protected: 2000 V
- Thermally Enhanced SC-70 Package

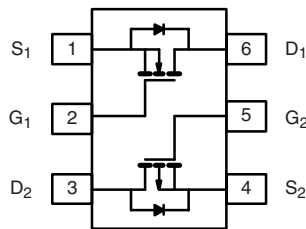


RoHS\*  
COMPLIANT

### APPLICATIONS

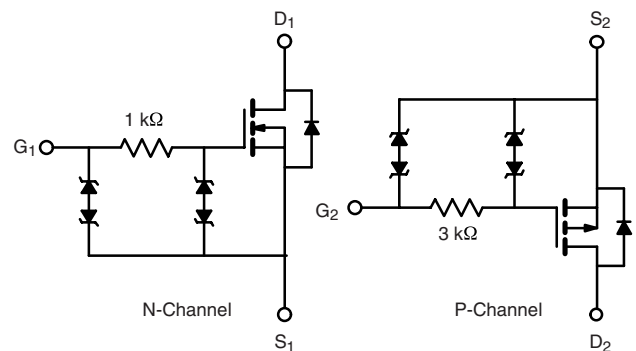
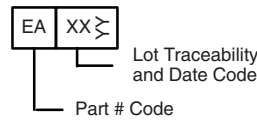
- Load Switching
- PA Switch
- Level Switch

SOT-363  
SC-70 (6-LEADS)



Top View

Marking Code



Ordering Information: Si1563EDH-T1  
Si1563EDH-T1-E3 (Lead (Pb)-free)

ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted							
Parameter	Symbol	N-Channel		P-Channel		Unit	
		5 s	Steady State	5 s	Steady State		
Drain-Source Voltage	V <sub>DS</sub>	20		-20		V	
Gate-Source Voltage	V <sub>GS</sub>	±12		±12		V	
Continuous Drain Current (T <sub>J</sub> = 150 °C)	I <sub>D</sub>	T <sub>A</sub> = 25 °C	1.28	1.13	-1.0	-0.88	A
		T <sub>A</sub> = 85 °C	0.92	0.81	-0.72	-0.63	
Pulsed Drain Current	I <sub>DM</sub>	4.0		-3.0		A	
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	0.61	0.48	-0.61	-0.48	A	
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	0.74	0.57	0.30	0.57	W
		T <sub>A</sub> = 85 °C	0.38	0.30	0.16	0.3	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to 150				°C	

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a</sup>	t ≤ 5 s	R <sub>thJA</sub>	130	170	°C/W
	Steady State		170	220	
Maximum Junction-to-Foot (Drain)	Steady State	R <sub>thJF</sub>	80	100	

Notes:

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

\* Pb containing terminations are not RoHS compliant, exemptions may apply.



SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted							
Parameter	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
<b>Static</b>							
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 100\text{ }\mu\text{A}$	N-Ch	0.45			V
		$V_{DS} = V_{GS}, I_D = -100\text{ }\mu\text{A}$	P-Ch	-0.45			
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 4.5\text{ V}$	N-Ch			$\pm 1$	$\mu\text{A}$
			P-Ch			$\pm 1$	
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$	N-Ch			$\pm 10$	$\text{mA}$
			P-Ch			$\pm 10$	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}$	N-Ch			1	$\mu\text{A}$
		$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}$	P-Ch			-1	
		$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$	N-Ch			5	
		$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$	P-Ch			-5	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 4.5\text{ V}$	N-Ch	2			A
		$V_{DS} \leq -5\text{ V}, V_{GS} = -4.5\text{ V}$	P-Ch	-2			
Drain-Source On-State Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 1.13\text{ A}$	N-Ch		0.220	0.280	$\Omega$
		$V_{GS} = -4.5\text{ V}, I_D = -0.88\text{ A}$	P-Ch		0.400	0.490	
		$V_{GS} = 2.5\text{ V}, I_D = 0.99\text{ A}$	N-Ch		0.281	0.360	
		$V_{GS} = -2.5\text{ V}, I_D = -0.71\text{ A}$	P-Ch		0.610	0.750	
		$V_{GS} = 1.8\text{ V}, I_D = 0.20\text{ A}$	N-Ch		0.344	0.450	
		$V_{GS} = -1.8\text{ V}, I_D = -0.20\text{ A}$	P-Ch		0.850	1.10	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 10\text{ V}, I_D = 1.13\text{ A}$	N-Ch		2.6		S
		$V_{DS} = -10\text{ V}, I_D = -0.88\text{ A}$	P-Ch		1.5		
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 0.48\text{ V}, V_{GS} = 0\text{ V}$	N-Ch		0.8	1.2	V
		$I_S = -0.48\text{ V}, V_{GS} = 0\text{ V}$	P-Ch		-0.8	-1.2	
<b>Dynamic<sup>b</sup></b>							
Total Gate Charge	$Q_g$	N-Channel $V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 1.13\text{ A}$	N-Ch		0.65	1.0	nC
			P-Ch		1.2	1.8	
Gate-Source Charge	$Q_{gs}$	P-Channel $V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -0.88\text{ A}$	N-Ch		0.2		
			P-Ch		0.3		
Gate-Drain Charge	$Q_{gd}$		N-Ch		0.23		
			P-Ch		0.3		
Turn-On Delay Time	$t_{d(on)}$	N-Channel $V_{DD} = 10\text{ V}, R_L = 20\text{ }\Omega$ $I_D \cong 0.5\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 6\text{ }\Omega$	N-Ch		45	70	ns
Rise Time	$t_r$		P-Ch		150	230	
		Turn-Off Delay Time	$t_{d(off)}$	N-Ch		85	
P-Ch				480	720		
Fall Time	$t_f$	P-Channel $V_{DD} = -10\text{ V}, R_L = 20\text{ }\Omega$ $I_D \cong -0.5\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 6\text{ }\Omega$	N-Ch		350	530	
			P-Ch		840	1200	
			N-Ch		210	320	
			P-Ch		850	1200	

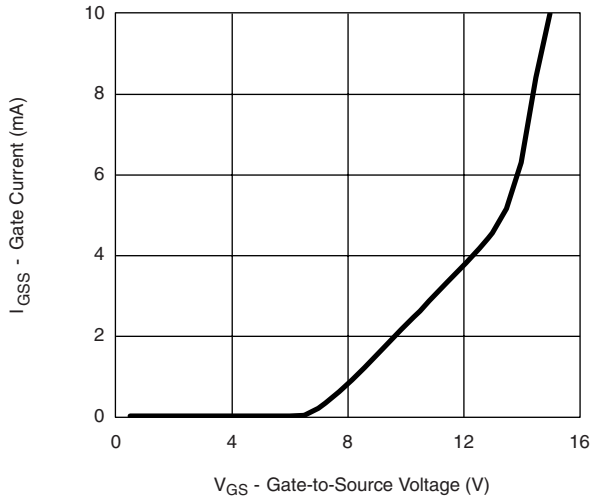
Notes:

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

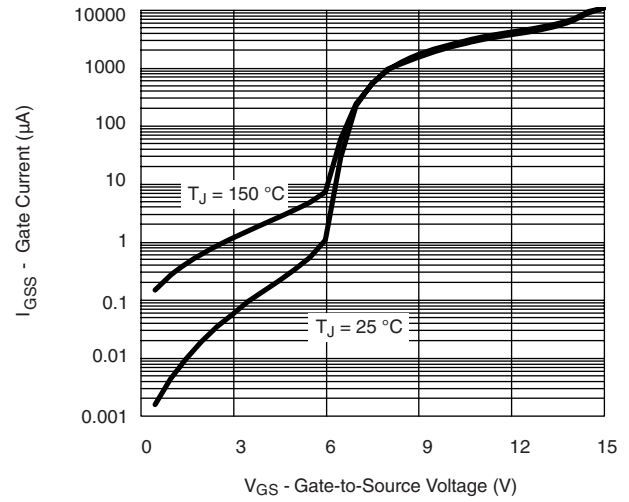
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



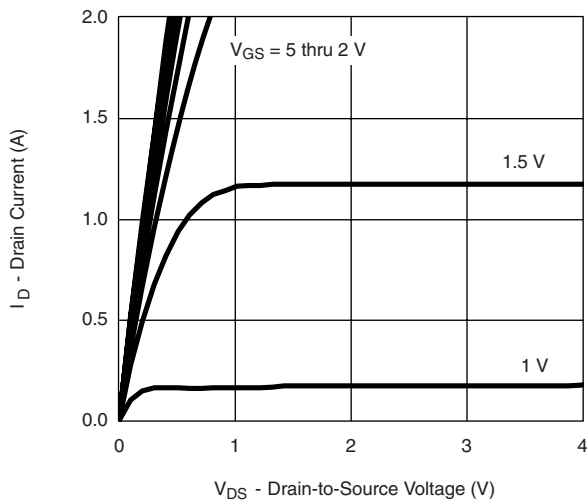
**N-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



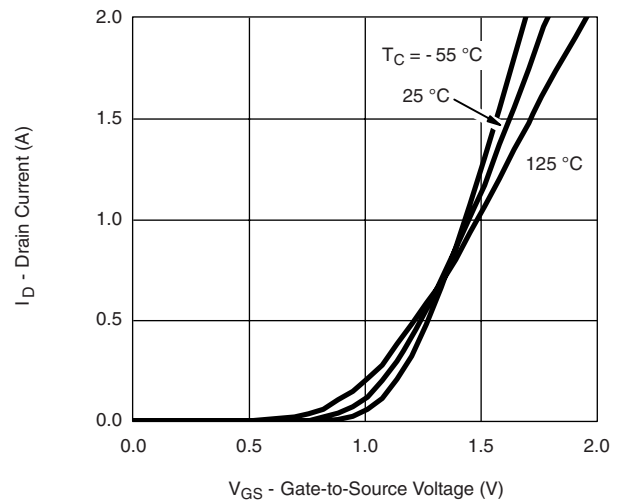
**Gate-Current vs. Gate-Source Voltage**



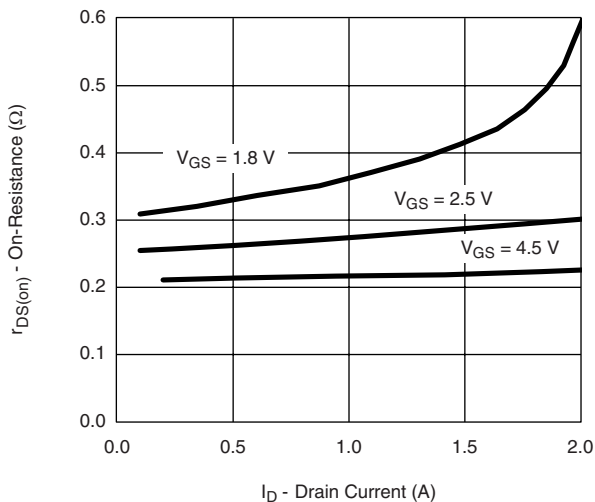
**Gate-Current vs. Gate-Source Voltage**



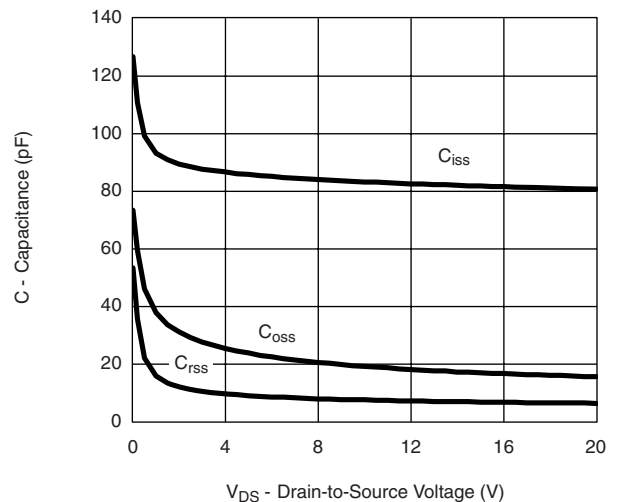
**Output Characteristics**



**Transfer Characteristics**



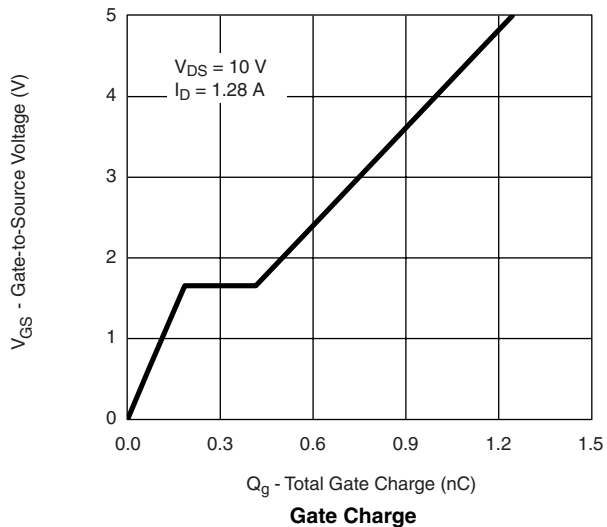
**On-Resistance vs. Drain Current**



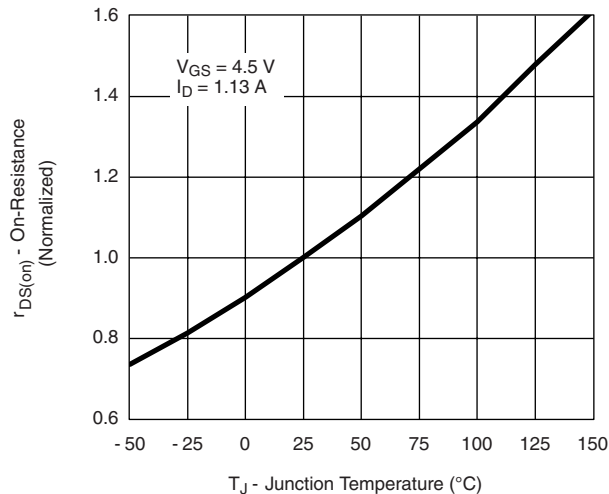
**Capacitance**



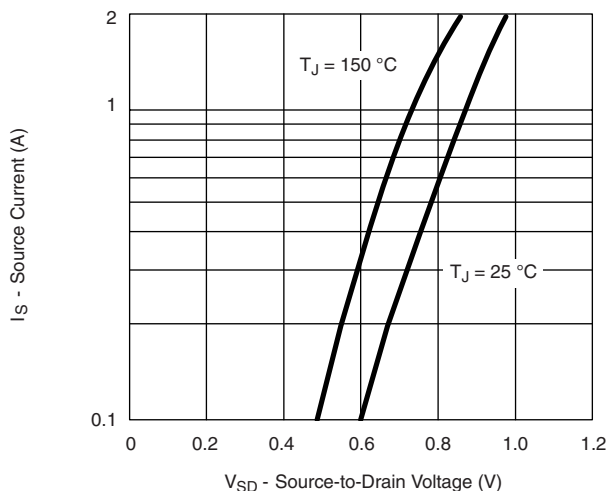
**N-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



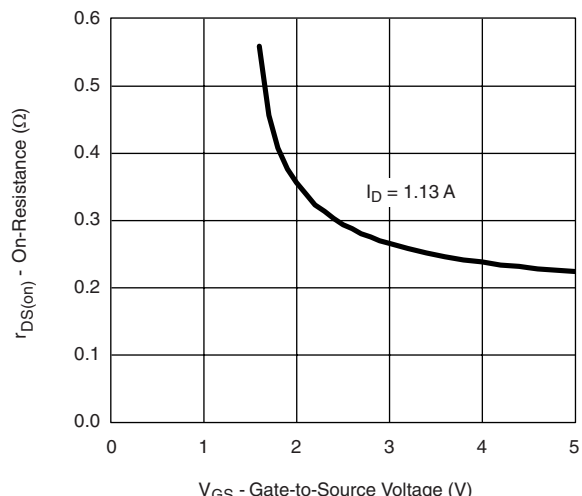
**Gate Charge**



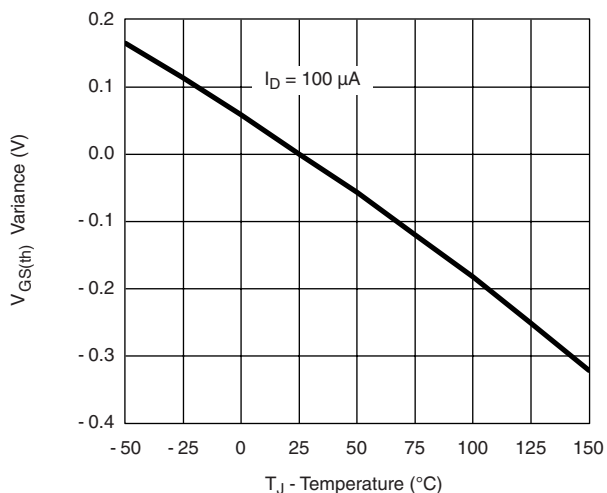
**On-Resistance vs. Junction Temperature**



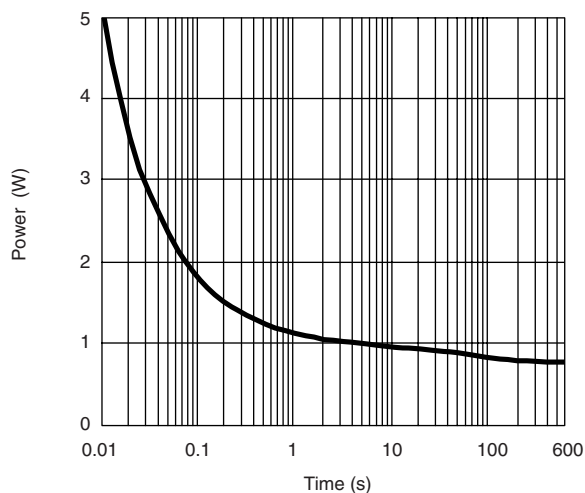
**Source-Drain Diode Forward Voltage**



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



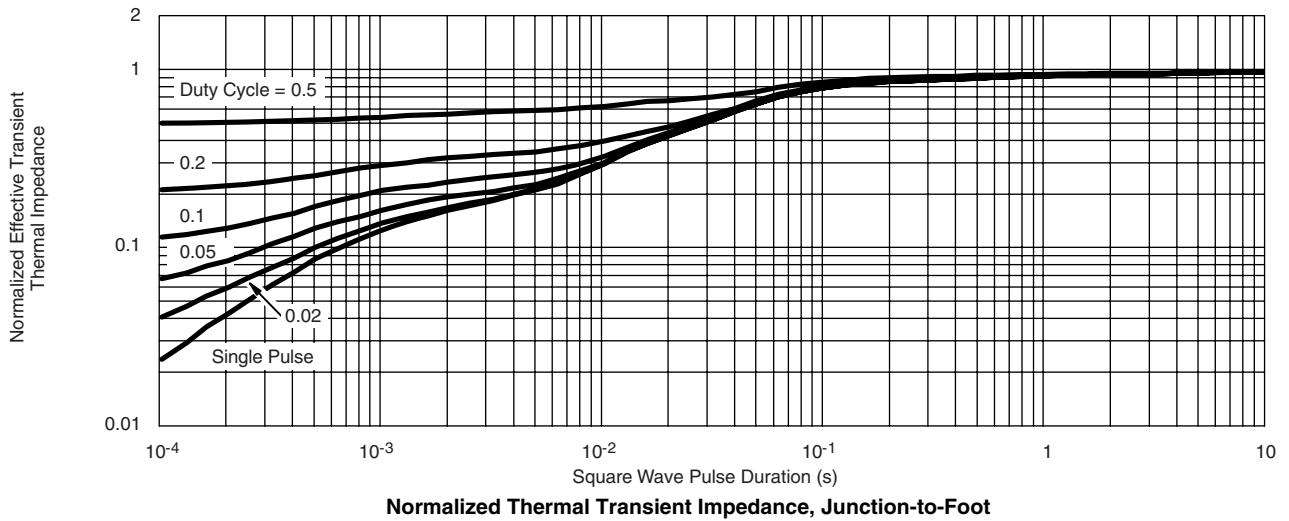
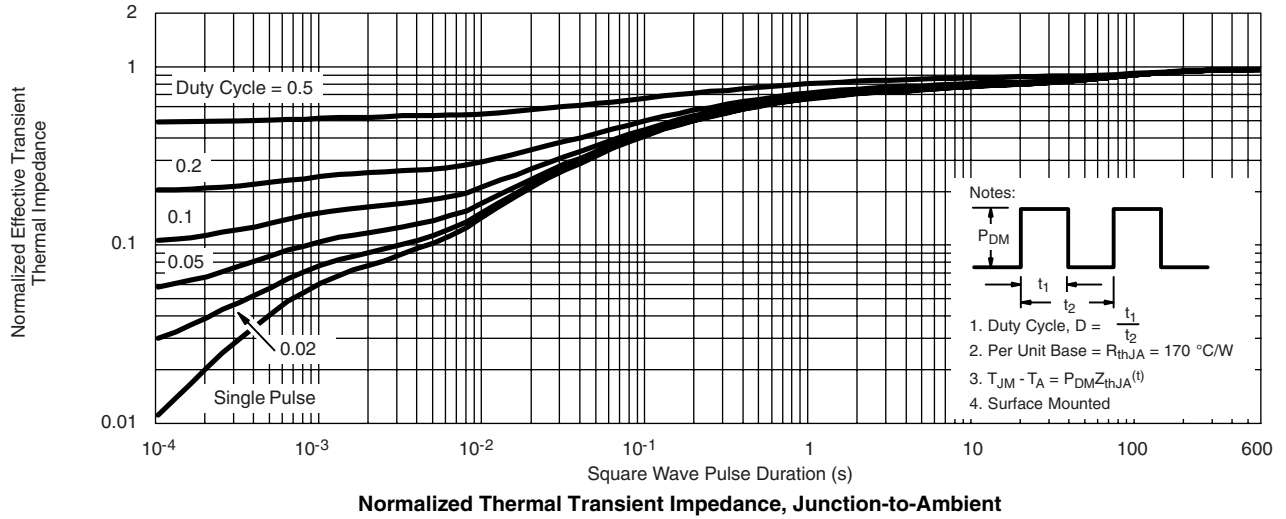
**Threshold Voltage**



**Single Pulse Power, Junction-to-Ambient**

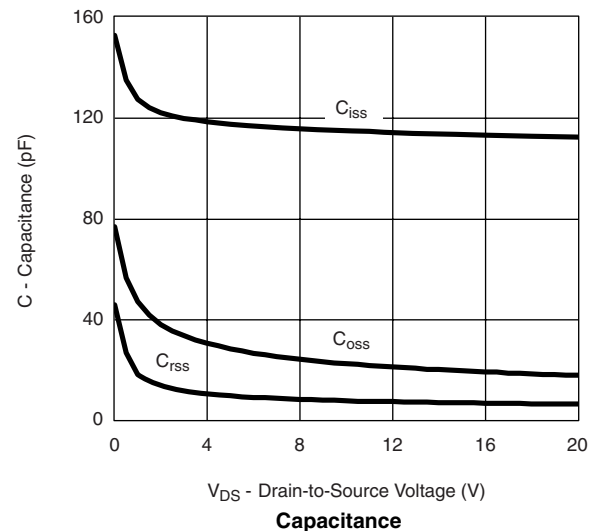
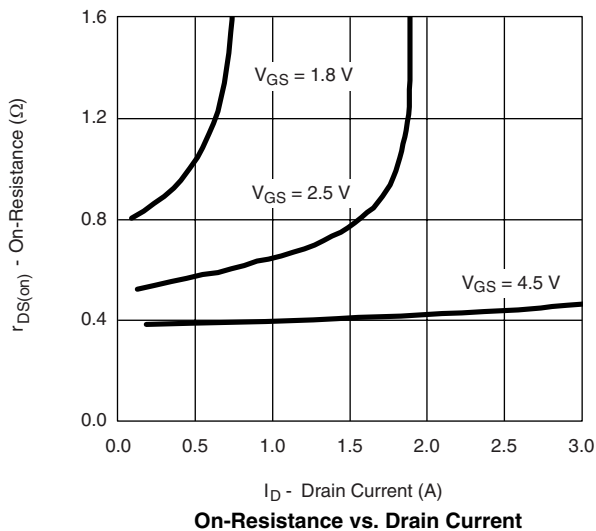
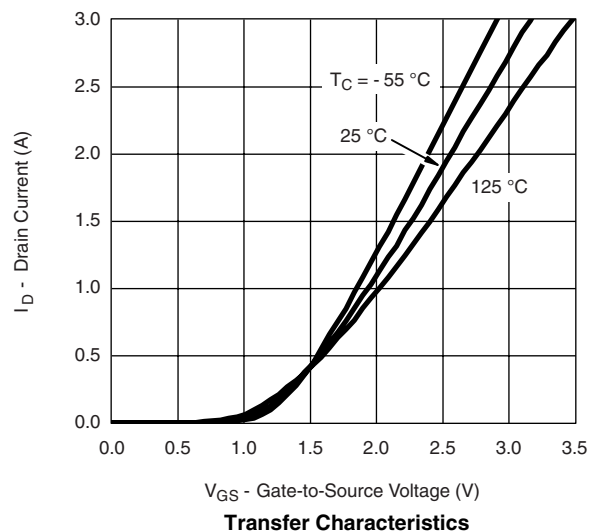
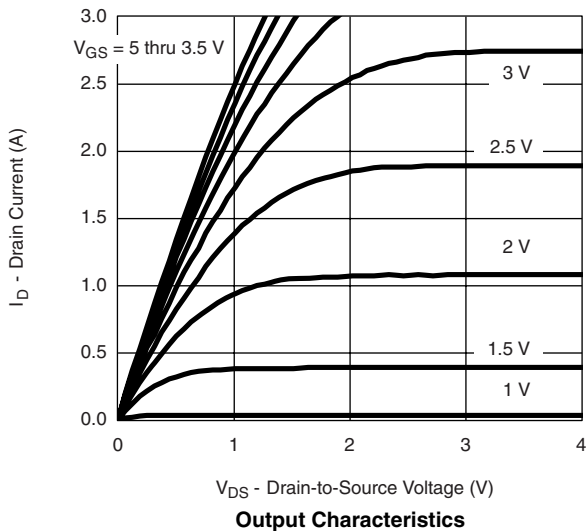
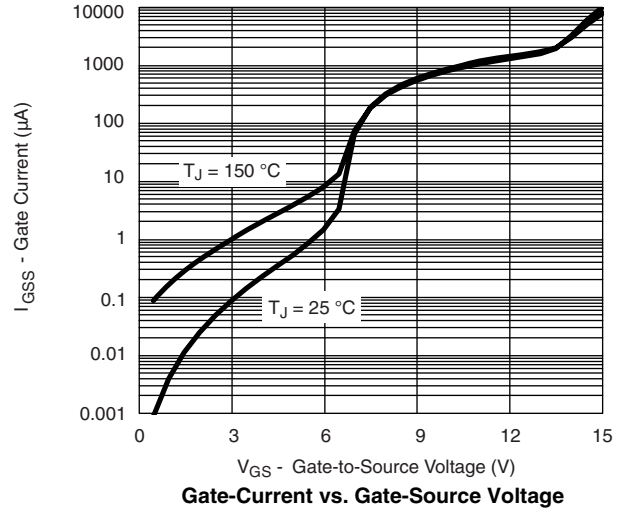
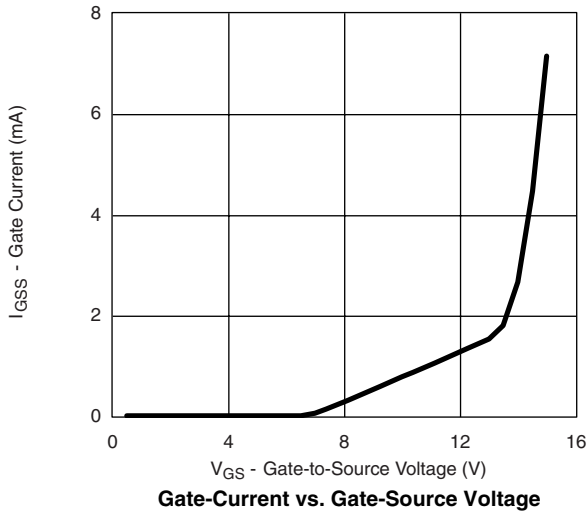


**N-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



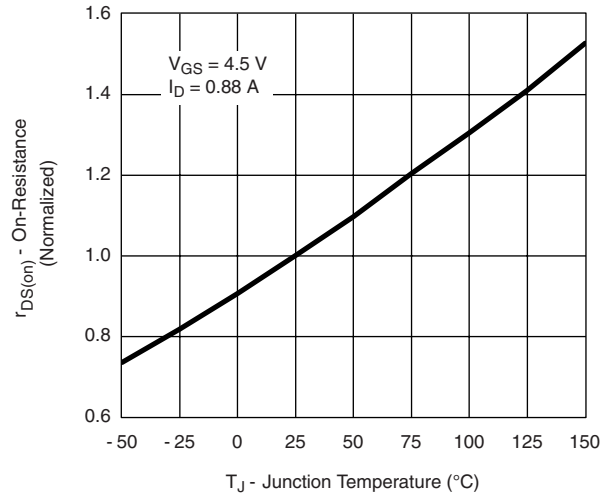
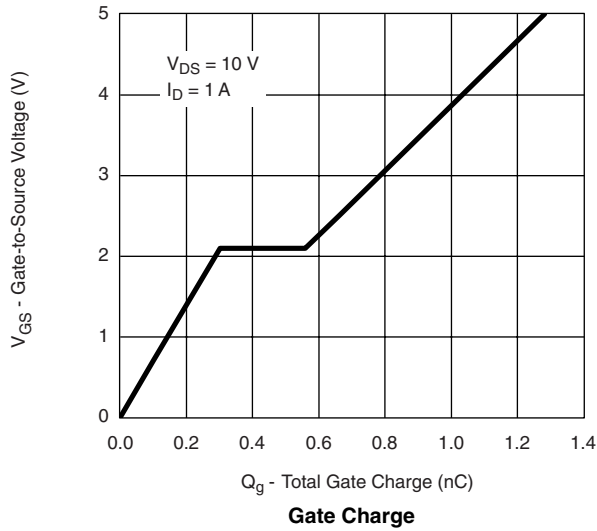


**P-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

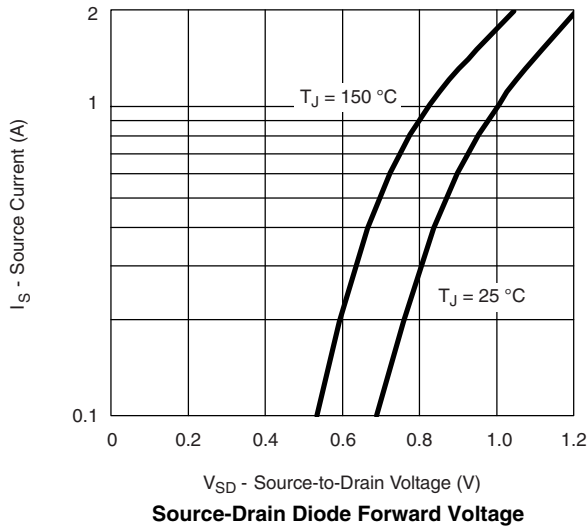




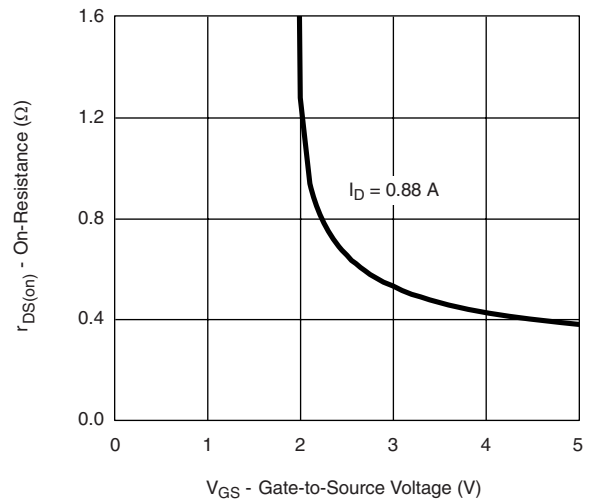
**P-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



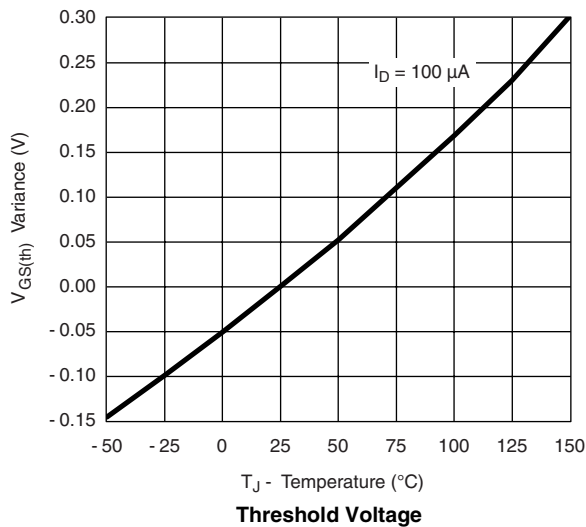
**On-Resistance vs. Junction Temperature**



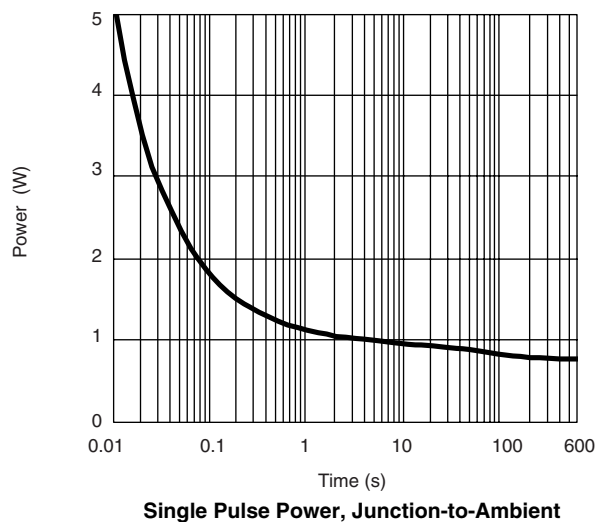
**Source-Drain Diode Forward Voltage**



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



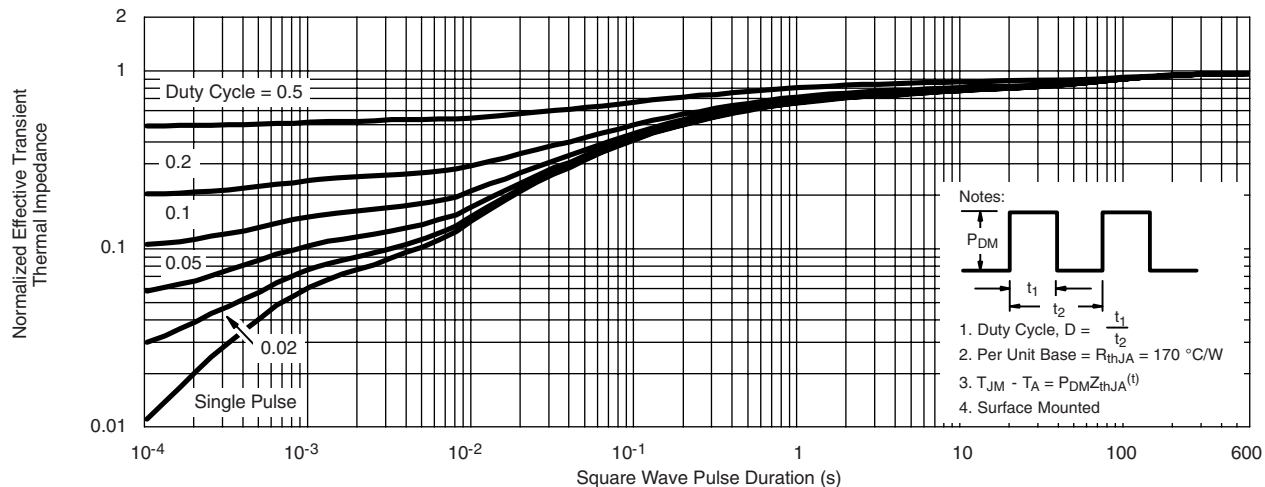
**Threshold Voltage**



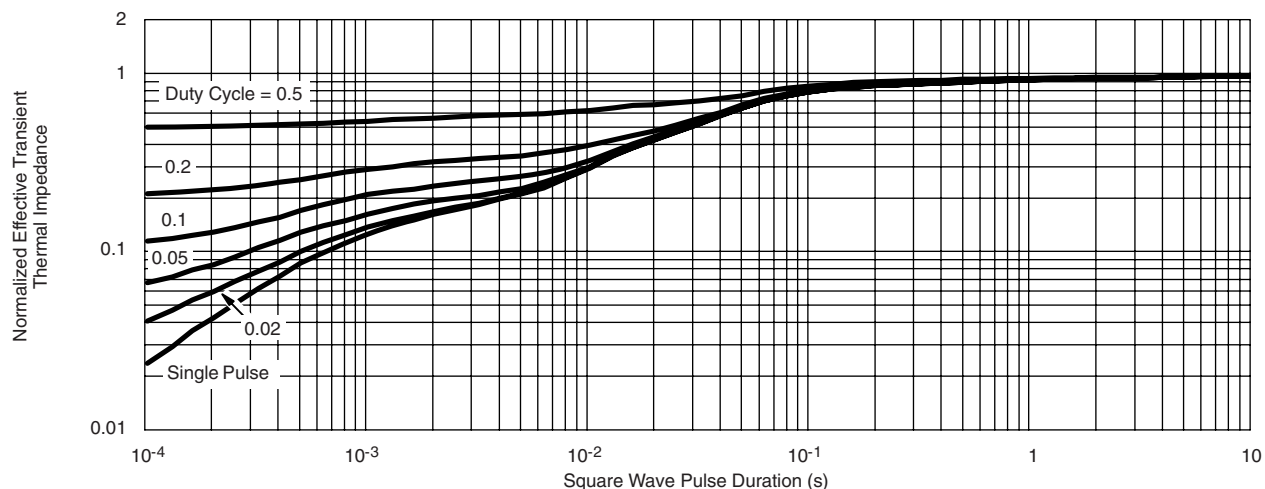
**Single Pulse Power, Junction-to-Ambient**



**P-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



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



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

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