

## Complementary MOSFET Half-Bridge (N- and P-Channel)

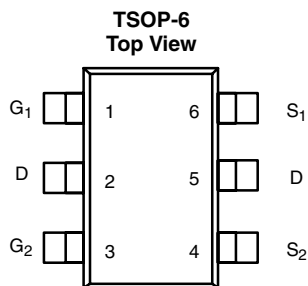
PRODUCT SUMMARY			
	$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
N-Channel	20	0.300 at $V_{GS} = 4.5$ V	1.4
		0.410 at $V_{GS} = 3.0$ V	1.2
P-Channel	- 20	0.640 at $V_{GS} = - 4.5$ V	- 0.96
		0.980 at $V_{GS} = - 3.0$ V	- 0.78

### FEATURES

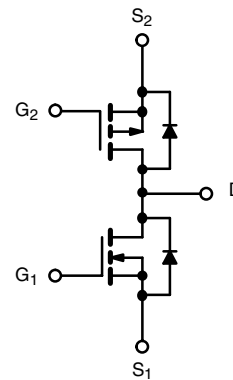
- 100 %  $R_g$  Tested



**RoHS**  
COMPLIANT



Ordering Information: Si3850ADV-T1-E3 (Lead (Pb)-free)



ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted				
Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	$V_{DS}$	20	- 20	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$		
Continuous Drain Current ( $T_J = 150$ °C)	$T_A = 25$ °C	1.4	- 0.96	A
	$T_A = 70$ °C	1.1	- 0.77	
Pulsed Drain Current	$I_{DM}$	3.5	- 2.0	
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	0.9	- 0.9	W
Maximum Power Dissipation (Surface Mounted on FR4 Board)	$T_A = 25$ °C	1.08		
	$T_A = 70$ °C	0.70		
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150		°C

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	N- or P-Channel	Unit
Maximum Junction-to-Ambient (Surface Mounted on FR4 Board, $\pm \leq 10$ sec)	$R_{thJA}$	115	°C/W

Notes:  
Maximum under Steady State condition is 150 °C/W.

**SPECIFICATIONS**  $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted

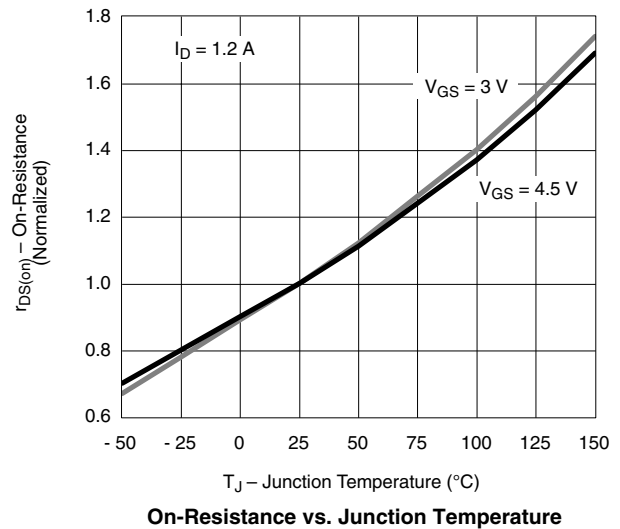
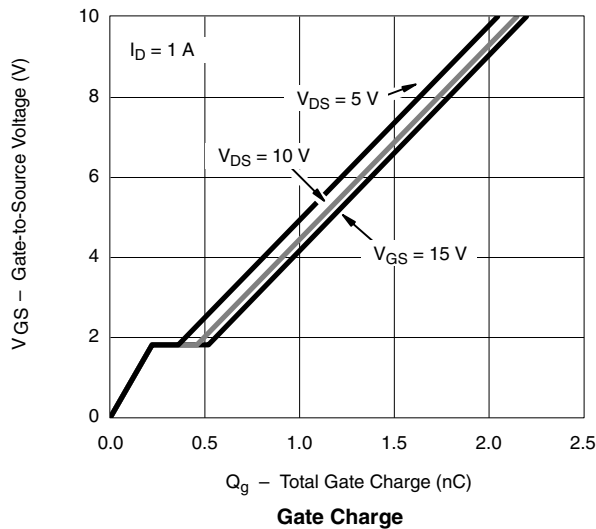
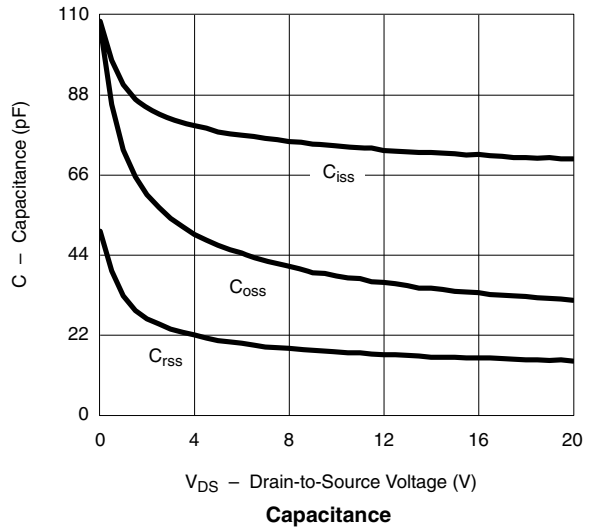
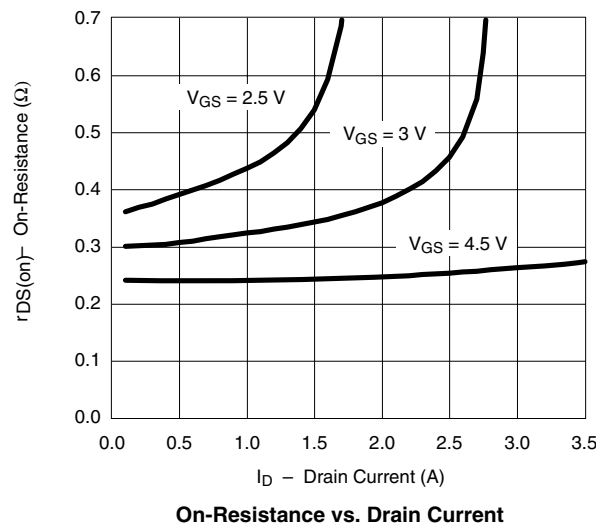
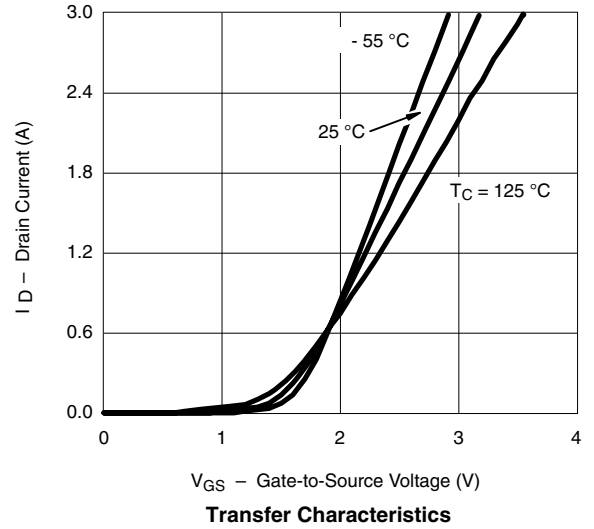
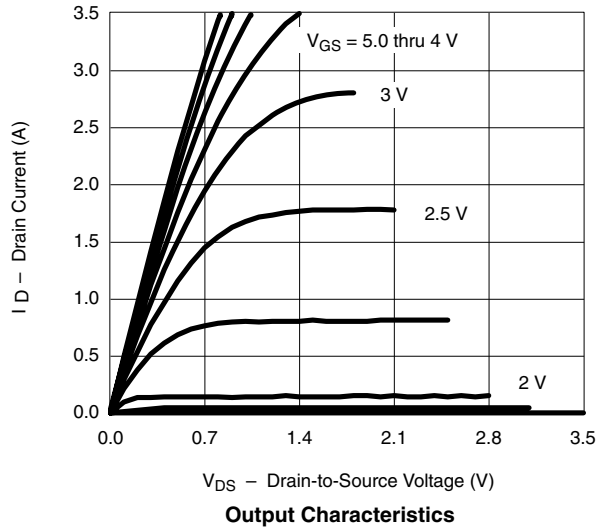
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
<b>Static</b>							
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	N-Ch	0.6		1.5	V
		$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	P-Ch	-0.6		-1.5	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\ \text{V}, V_{GS} = \pm 12\ \text{V}$			$\pm 100$	nA	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 20\ \text{V}, V_{GS} = 0\ \text{V}$	N-Ch			1	$\mu\text{A}$
		$V_{DS} = -20\ \text{V}, V_{GS} = 0\ \text{V}$	P-Ch			-1	
		$V_{DS} = 20\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 70\text{ }^\circ\text{C}$	N-Ch			10	
		$V_{DS} = -20\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 70\text{ }^\circ\text{C}$	P-Ch			-10	
On-State Drain Current <sup>b</sup>	$I_{D(on)}$	$V_{DS} = 5\ \text{V}, V_{GS} = 4.5\ \text{V}$	N-Ch	3.0			A
		$V_{DS} = -5\ \text{V}, V_{GS} = -4.5\ \text{V}$	P-Ch	-1.5			
Drain-Source On-State Resistance <sup>b</sup>	$r_{DS(on)}$	$V_{GS} = 4.5\ \text{V}, I_D = 0.5\ \text{A}$	N-Ch		0.240	0.300	$\Omega$
		$V_{GS} = -4.5\ \text{V}, I_D = -0.5\ \text{A}$	P-Ch		0.510	0.640	
		$V_{GS} = 3.0\ \text{V}, I_D = 0.5\ \text{A}$	N-Ch		0.325	0.410	
		$V_{GS} = -3.0\ \text{V}, I_D = -0.5\ \text{A}$	P-Ch		0.780	0.980	
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 10\ \text{V}, I_D = 1\ \text{A}$	N-Ch		1.8		S
		$V_{DS} = -10\ \text{V}, I_D = -1\ \text{A}$	P-Ch		1.1		
Diode Forward Voltage <sup>b</sup>	$V_{SD}$	$I_S = 0.9\ \text{A}, V_{GS} = 0\ \text{V}$	N-Ch		0.87	1.2	V
		$I_S = -0.8\ \text{A}, V_{GS} = 0\ \text{V}$	P-Ch		-1.0	-1.3	
<b>Dynamic<sup>b</sup></b>							
Total Gate Charge	$Q_g$	N-Channel $V_{DS} = 10\ \text{V}, V_{GS} = 4.5\ \text{V}, I_D = 1\ \text{A}$	N-Ch		0.95	1.4	nC
Gate-Source Charge	$Q_{gs}$		P-Ch		1.10	1.7	
Gate-Drain Charge	$Q_{gd}$	P-Channel $V_{DS} = -10\ \text{V}, V_{GS} = -4.5\ \text{V}, I_D = -1\ \text{A}$	N-Ch		0.22		nC
			P-Ch		0.28		
Gate Resistance	$R_g$		N-Ch		3.5	5.3	$\Omega$
			P-Ch		10.5	16	
Turn-On Delay Time	$t_{d(on)}$	N-Channel $V_{DD} = 10\ \text{V}, R_L = 10\ \Omega$ $I_D \cong 0.9\ \text{A}, V_{GEN} = 4.5\ \text{V}, R_G = 1\ \Omega$	N-Ch		8	14	ns
Rise Time	$t_r$		P-Ch		13	20	
Turn-Off Delay Time	$t_{d(off)}$	P-Channel $V_{DD} = -10\ \text{V}, R_L = 10\ \Omega$ $I_D \cong -0.9\ \text{A}, V_{GEN} = -4.5\ \text{V}, R_G = 1\ \Omega$	N-Ch		16	25	
			P-Ch		34	50	
Fall Time	$t_f$		N-Ch		20	30	
			P-Ch		18	30	
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 0.9\ \text{A}, di/dt = 100\ \text{A}/\mu\text{s}$	N-Ch		20	30	nC
		$I_F = -0.9\ \text{A}, di/dt = 100\ \text{A}/\mu\text{s}$	P-Ch		25	40	
Body Diode Reverse Recovery Charge	$Q_{rr}$	$I_F = 0.9\ \text{A}, di/dt = 100\ \text{A}/\mu\text{s}$	N-Ch		9	15	nC
		$I_F = -0.9\ \text{A}, di/dt = 100\ \text{A}/\mu\text{s}$	P-Ch		9	15	

## Notes:

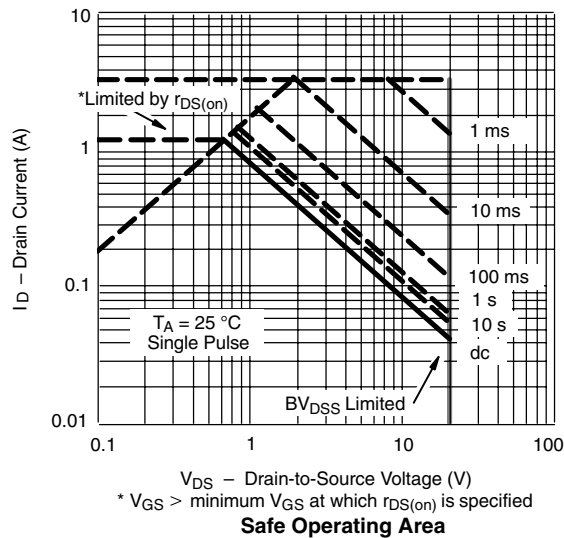
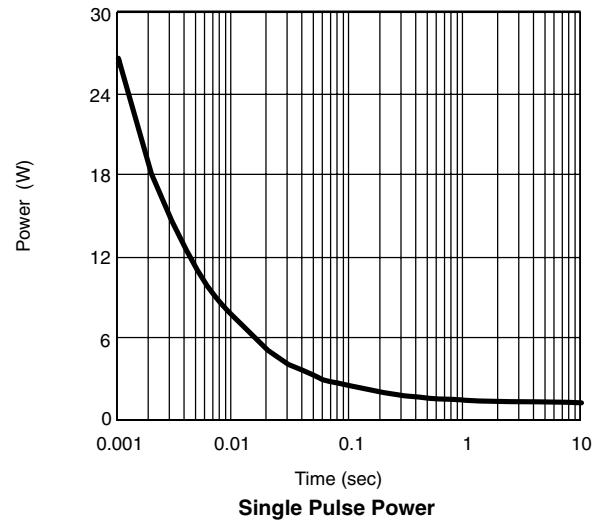
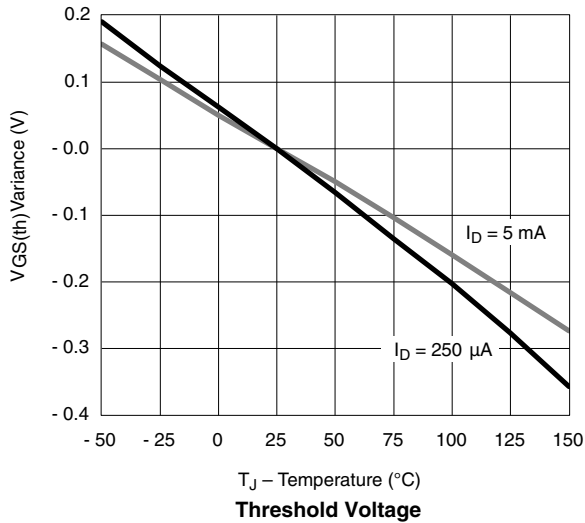
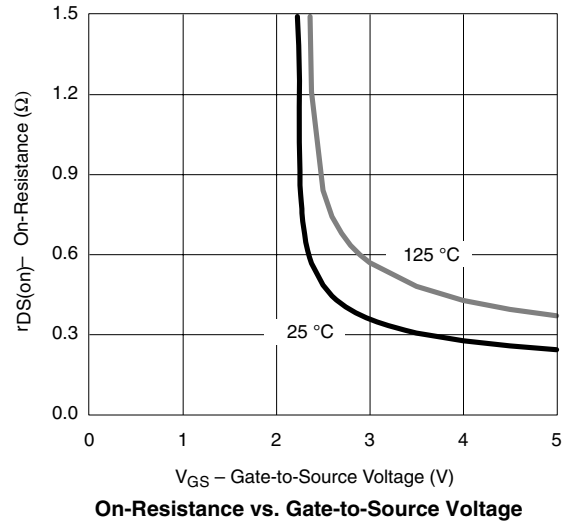
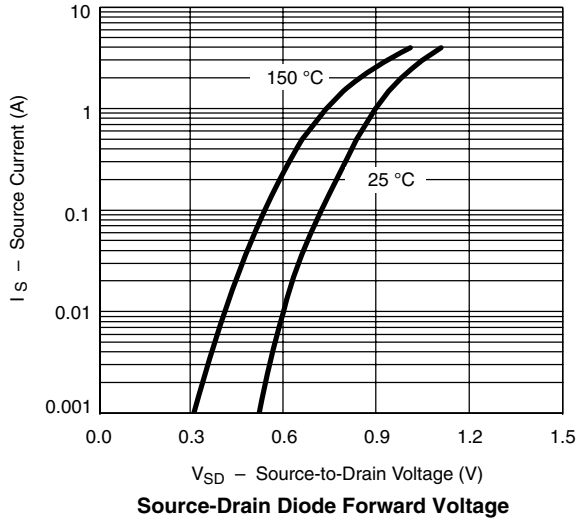
- a. Guaranteed by design, not subject to production testing.  
b. Pulse test; pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .

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.

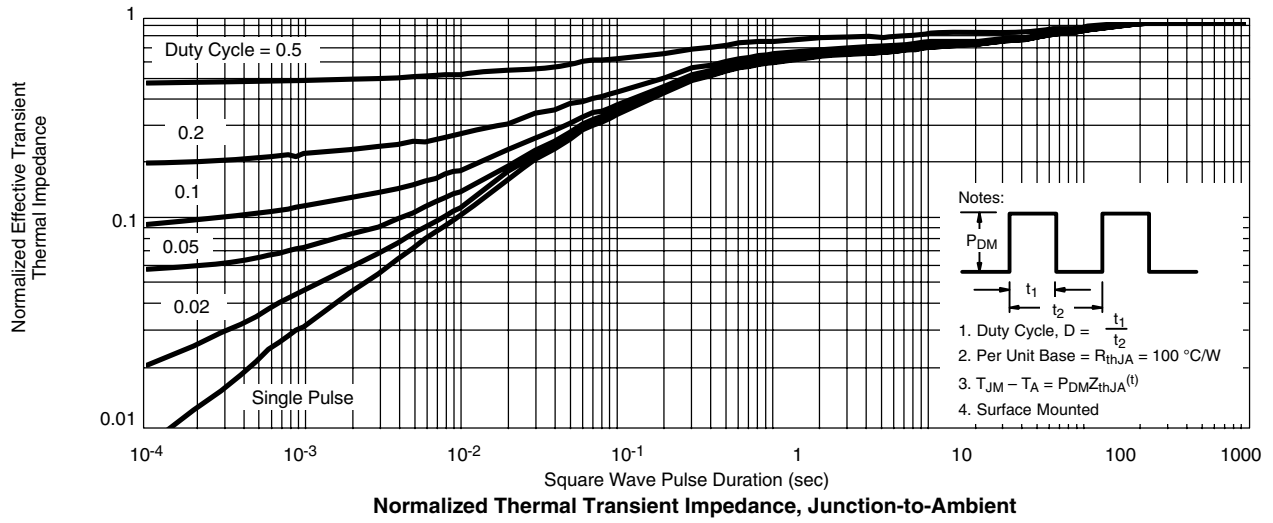
## N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless noted



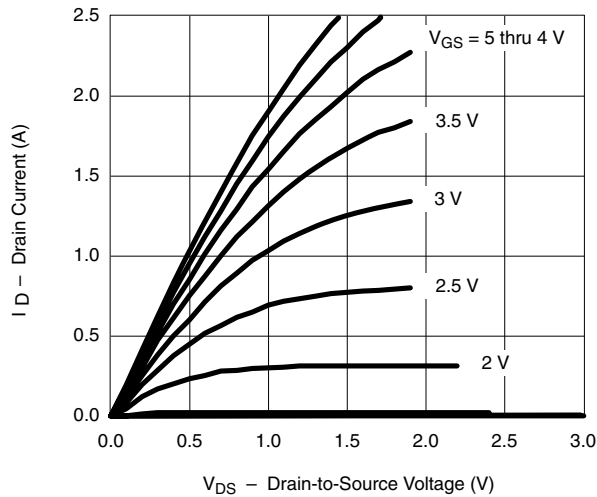
**N-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless noted



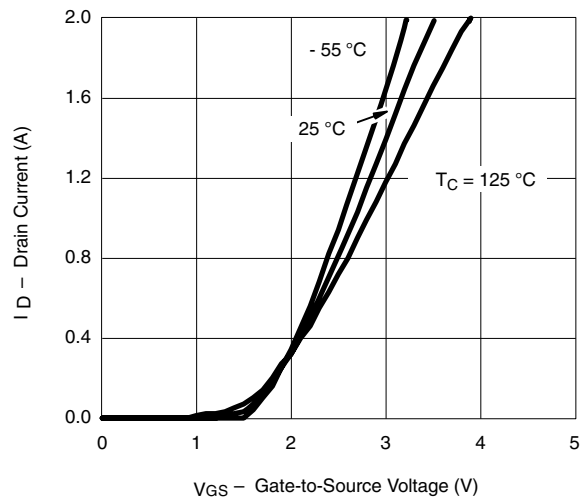
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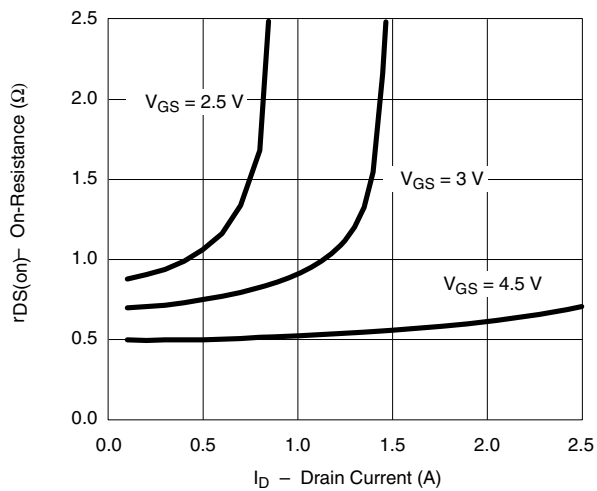
## P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless noted



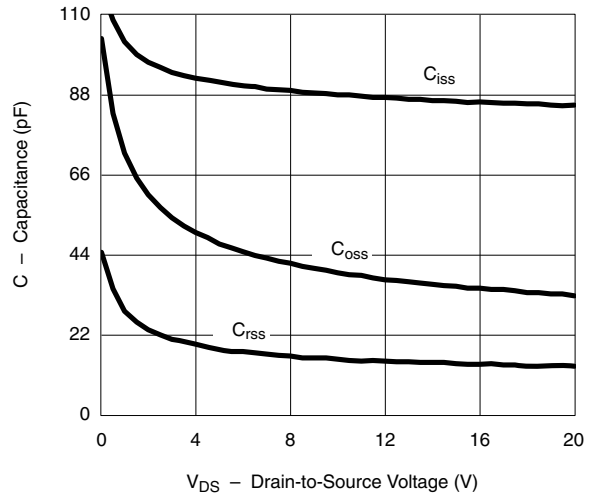
**Output Characteristics**



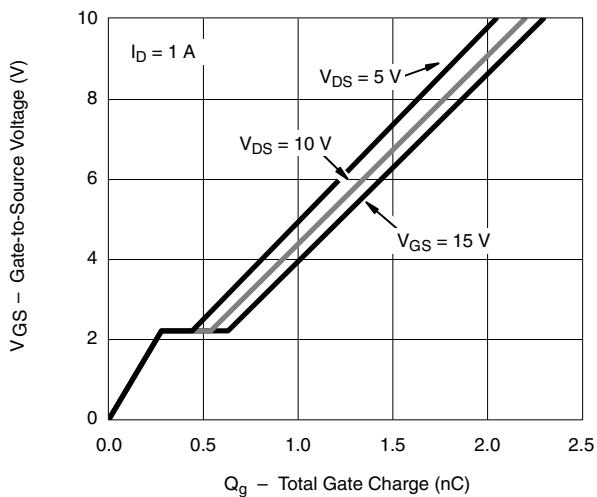
**Transfer Characteristics**



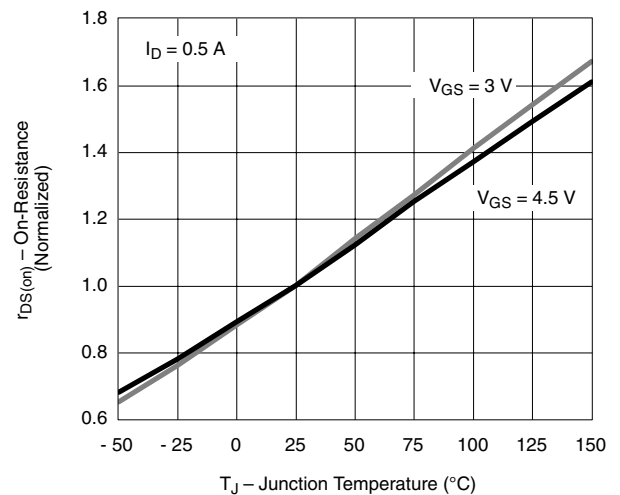
**On-Resistance vs. Drain Current**



**Capacitance**

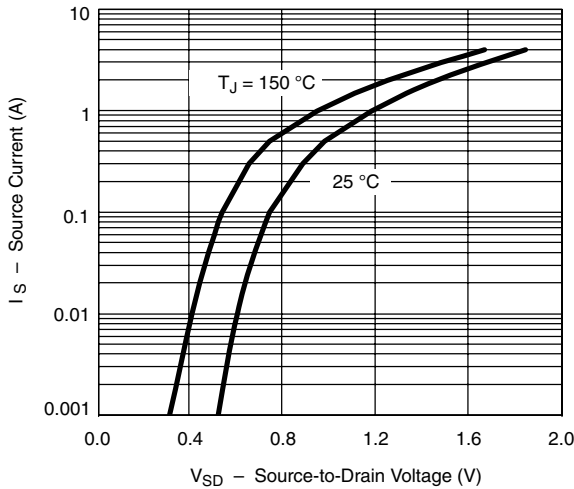


**Gate Charge**

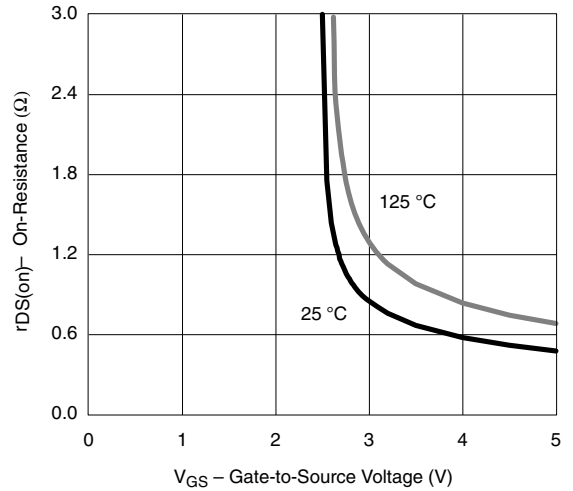


**On-Resistance vs. Junction Temperature**

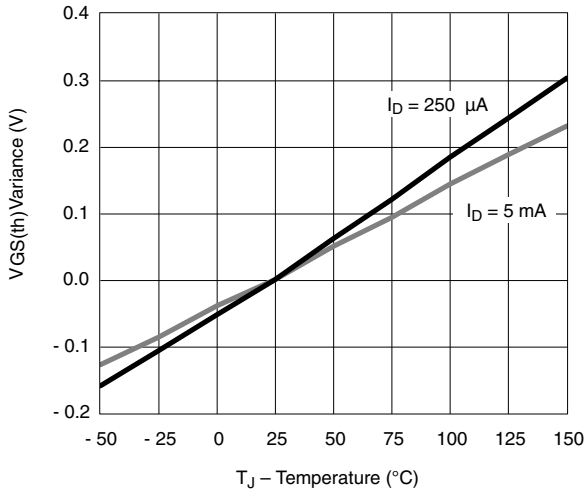
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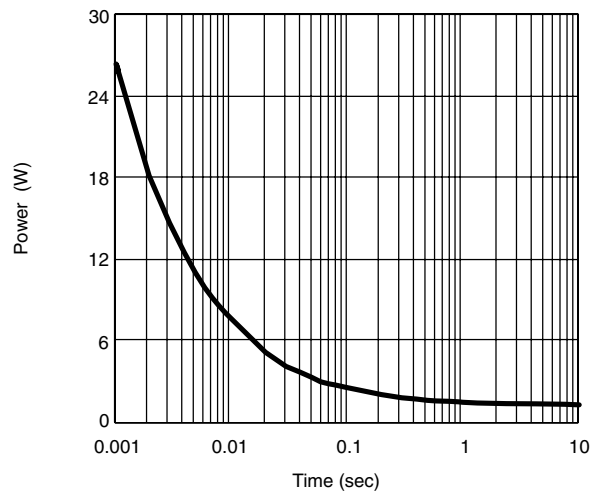
**Source-Drain Diode Forward Voltage**



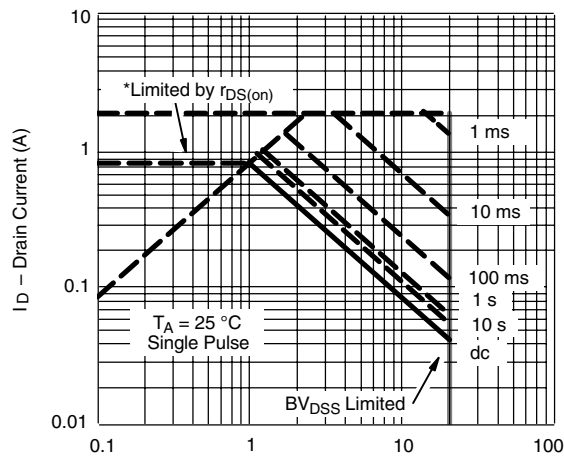
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**



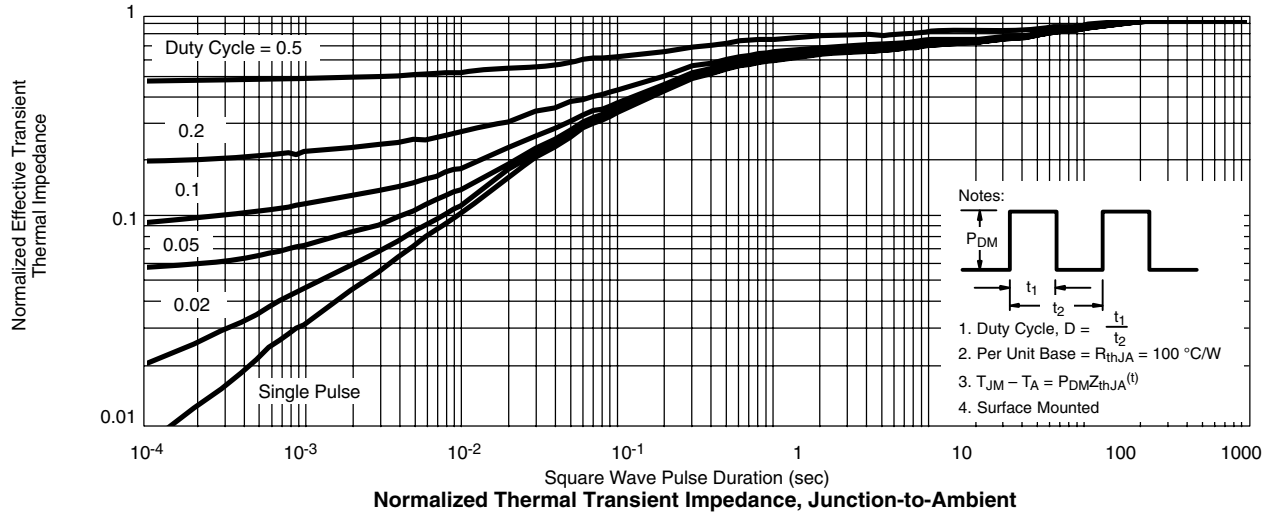
**Single Pulse Power vs. Junction-to-Ambient**



\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $r_{DS(on)}$  is specified

**Safe Operating Area**

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



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