

## N- and P-Channel 30-V (D-S) MOSFET

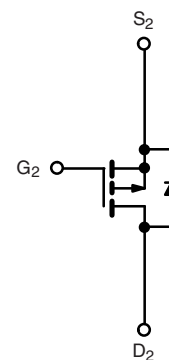
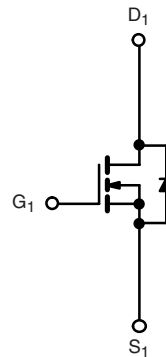
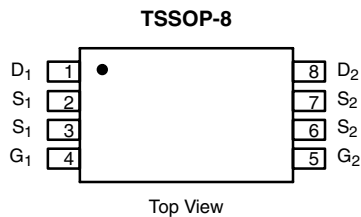
PRODUCT SUMMARY			
	V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
N-Channel	30	0.032 at V <sub>GS</sub> = 10 V	4.3
		0.046 at V <sub>GS</sub> = 4.5 V	3.7
P-Channel	- 30	0.043 at V <sub>GS</sub> = - 10 V	- 3.8
		0.073 at V <sub>GS</sub> = - 4.5 V	- 2.8

### FEATURES

- Halogen-free
- TrenchFET<sup>®</sup> Power MOSFETS



**RoHS**  
COMPLIANT



**Ordering Information:** Si6544BDQ-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted							
Parameter	Symbol	N-Channel		P-Channel		Unit	
		10 s	Steady State	10 s	Steady State		
Drain-Source Voltage	V <sub>DS</sub>	30		- 30		V	
Gate-Source Voltage	V <sub>GS</sub>	± 20					
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C	4.3	3.7	- 3.8	- 3.8	A
		T <sub>A</sub> = 70 °C	3.5	3.0	- 3.0	- 2.6	
Pulsed Drain Current	I <sub>DM</sub>	20		- 20			
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	1.0	0.7	- 1.0	- 0.7		
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	1.14	0.83	1.14	0.83	W
		T <sub>A</sub> = 70 °C	0.73	0.53	0.73	0.53	
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>	R <sub>thJA</sub>	t ≤ 10 s	88	110	°C/W
		Steady State	120	150	
Maximum Junction-to-Foot (Drain)	R <sub>thJF</sub>	65	80		

Notes:

a. Surface Mounted on FR4 board, t ≤ 10 s.

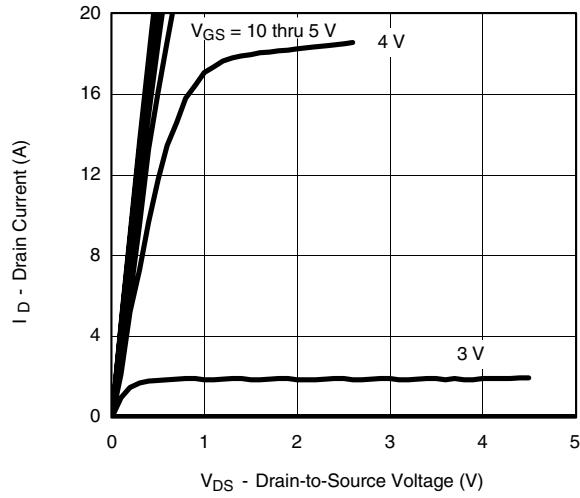
SPECIFICATIONS $T_J = 25^\circ\text{C}$ , unless otherwise noted							
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
<b>Static</b>							
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	N-Ch	1.0		3.0	V
		$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	P-Ch	-1.0		-3.0	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\ \text{V}, V_{GS} = \pm 20\ \text{V}$	n-ch N-Ch			$\pm 100$ $\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 30\ \text{V}, V_{GS} = 0\ \text{V}$	P-Ch			1	$\mu\text{A}$
		$V_{DS} = -30\ \text{V}, V_{GS} = 0\ \text{V}$	N-Ch			-1	
		$V_{DS} = 30\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 55^\circ\text{C}$	P-Ch			5	
		$V_{DS} = -30\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 55^\circ\text{C}$	N-Ch			-5	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5\ \text{V}, V_{GS} = 10\ \text{V}$	P-Ch	20			A
		$V_{DS} \geq -5\ \text{V}, V_{GS} = -10\ \text{V}$	N-Ch	-20			
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\ \text{V}, I_D = 4.3\ \text{A}$	P-Ch		0.025	0.032	$\Omega$
		$V_{GS} = -10\ \text{V}, I_D = -3.8\ \text{A}$	N-Ch		0.034	0.043	
		$V_{GS} = 4.5\ \text{V}, I_D = 3.7\ \text{A}$	P-Ch		0.037	0.046	
		$V_{GS} = -4.5\ \text{V}, I_D = -2.8\ \text{A}$	N-Ch		0.058	0.073	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15\ \text{V}, I_D = 4.3\ \text{A}$	P-Ch		11		S
		$V_{DS} = -15\ \text{V}, I_D = -3.8\ \text{A}$	N-Ch		11		
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 1.25\ \text{A}, V_{GS} = 0\ \text{V}$	P-Ch		0.77	1.1	V
		$I_S = -1.25\ \text{A}, V_{GS} = 0\ \text{V}$	N-Ch		-0.77	-1.1	
<b>Dynamic<sup>b</sup></b>							
Total Gate Charge	$Q_g$	N-Channel $V_{DS} = 15\ \text{V}, V_{GS} = 10\ \text{V}, I_D = 4.3\ \text{A}$	N-Ch		9.5	15	nC
Gate-Source Charge	$Q_{gs}$		P-Ch		16	25	
Gate-Drain Charge	$Q_{gd}$	P-Channel $V_{DS} = -15\ \text{V}, V_{GS} = -10\ \text{V}, I_D = -3.8\ \text{A}$	N-Ch		1.8		
			P-Ch		2.3		
Gate Resistance	$R_g$		N-Ch		0.45		$\Omega$
			P-Ch		8.8		
Turn-On Delay Time	$t_{d(on)}$	N-Channel $V_{DD} = 15\ \text{V}, R_L = 15\ \Omega$ $I_D \cong 1\ \text{A}, V_{GEN} = 10\ \text{V}, R_G = 6\ \Omega$	N-Ch		13	25	ns
Rise Time	$t_r$		P-Ch		14	25	
		Turn-Off Delay Time	$t_{d(off)}$	N-Ch		14	
P-Ch				14	25		
Fall Time	$t_f$	P-Channel $V_{DD} = -15\ \text{V}, R_L = 15\ \Omega$ $I_D \cong -1\ \text{A}, V_{GEN} = -10\ \text{V}, R_G = 6\ \Omega$	N-Ch		30	50	
			P-Ch		40	65	
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = 1.25\ \text{A}, dI/dt = 100\ \text{A}/\mu\text{s}$	N-Ch		30	60	
		$I_F = -1.25\ \text{A}, dI/dt = 100\ \text{A}/\mu\text{s}$	P-Ch		30		

## Notes:

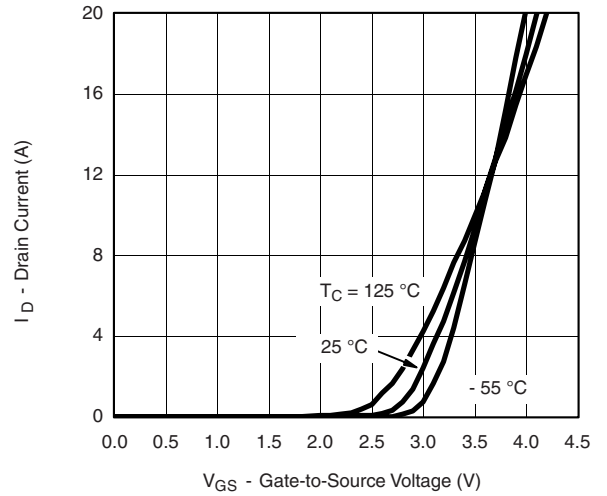
- a. Pulse test; pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .  
b. Guaranteed by design, not subject to production testing.

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.

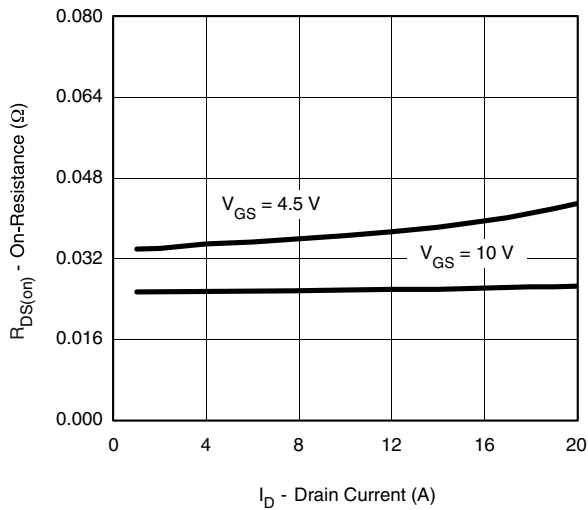
**N-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



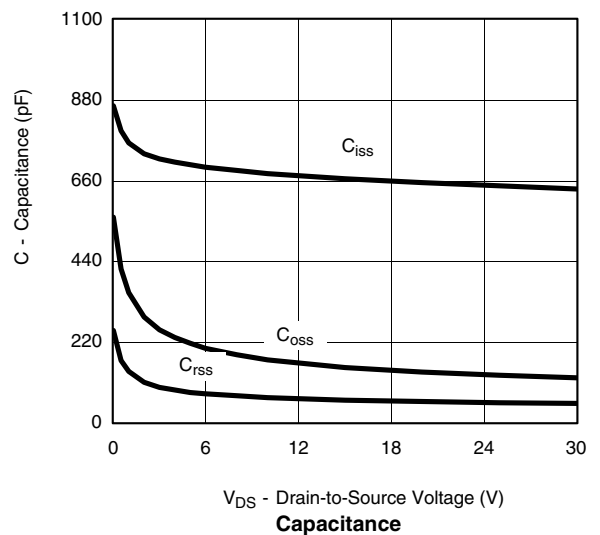
**Output Characteristics**



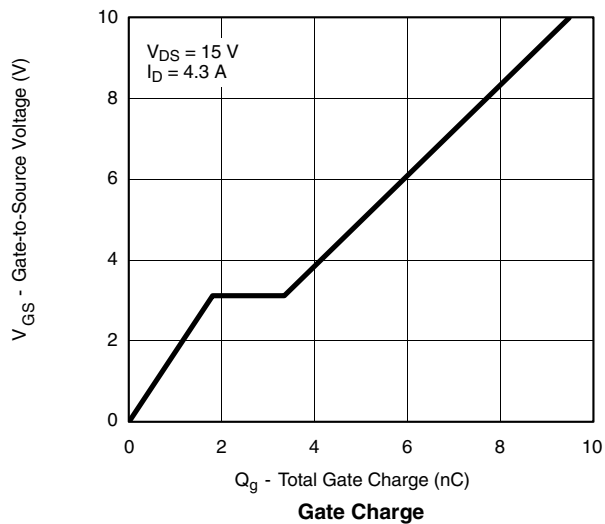
**Transfer Characteristics**



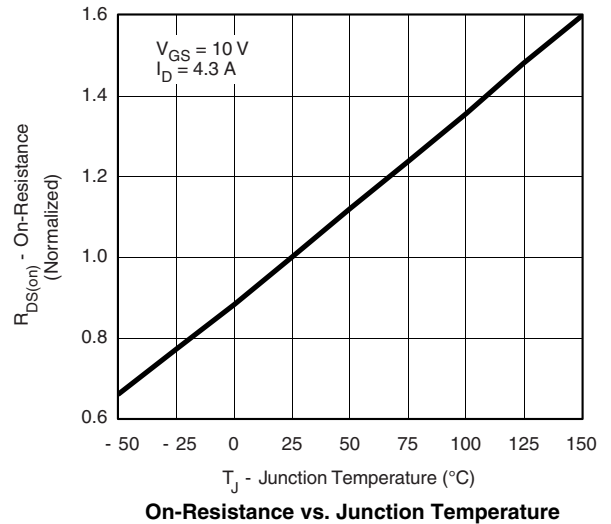
**On-Resistance vs. Drain Current**



**Capacitance**

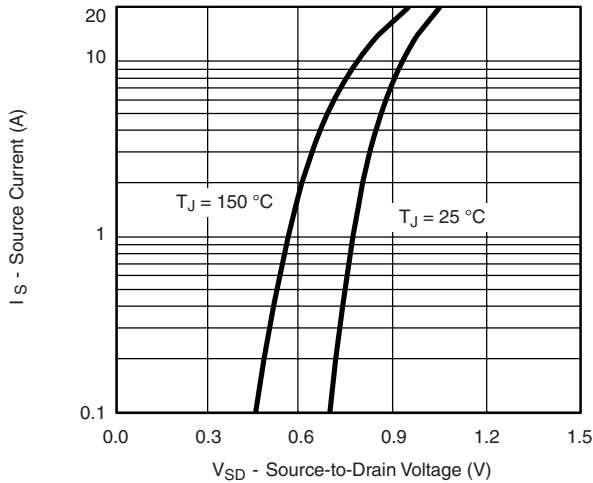


**Gate Charge**

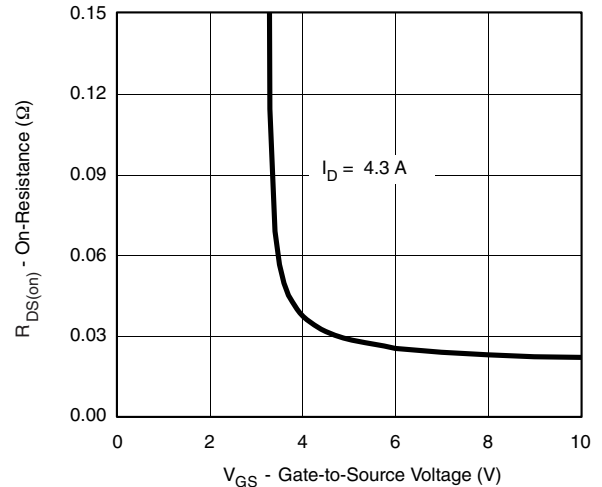


**On-Resistance vs. Junction Temperature**

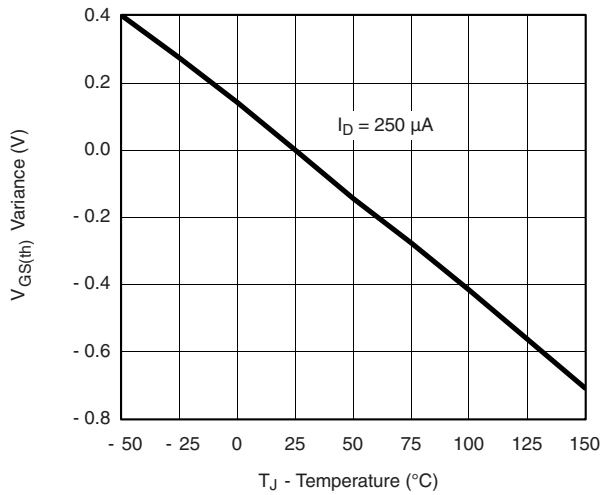
## N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



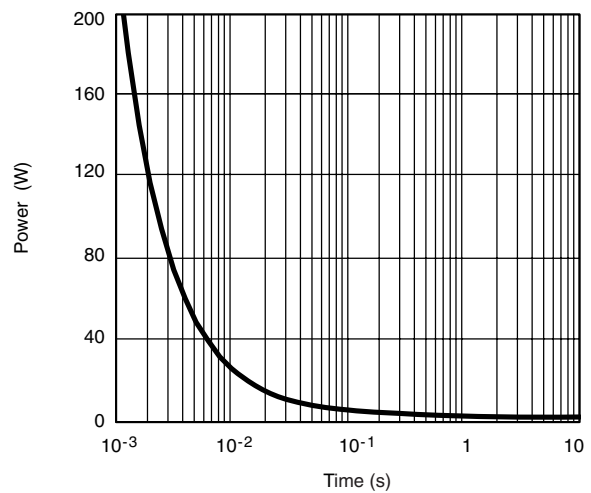
Source-Drain Diode Forward Voltage



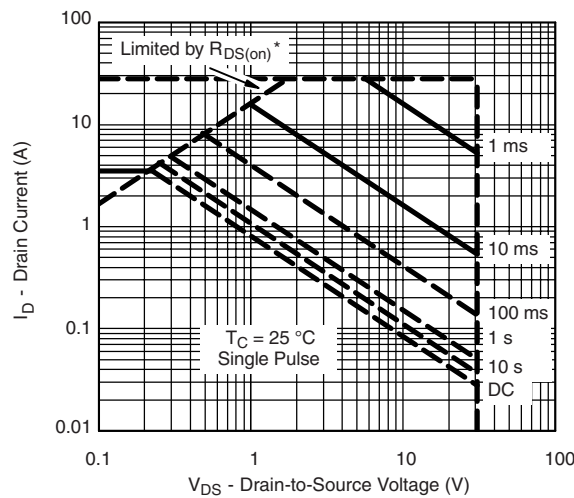
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



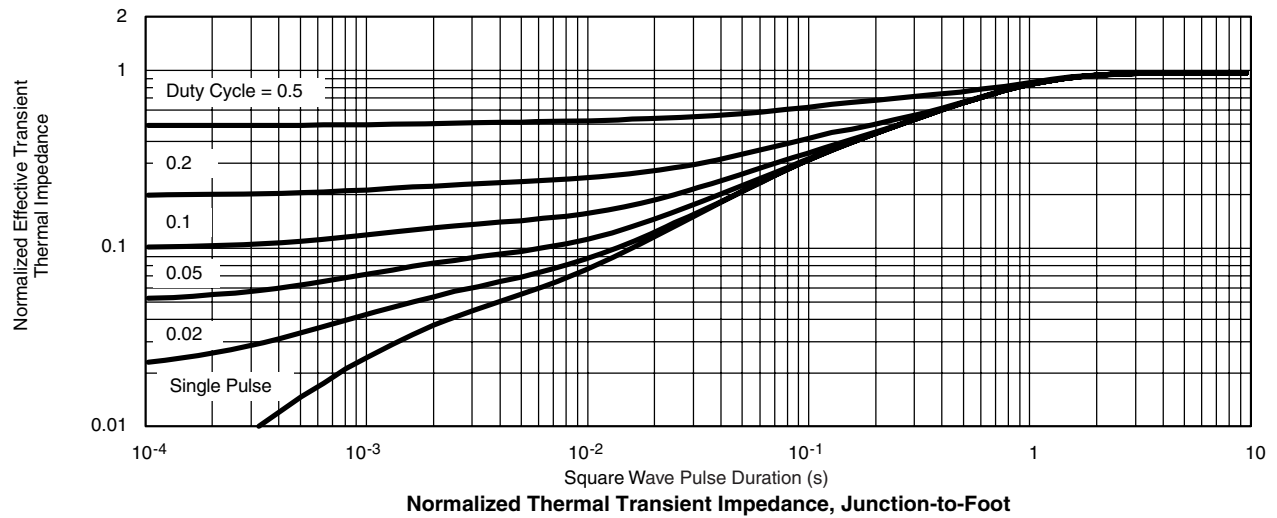
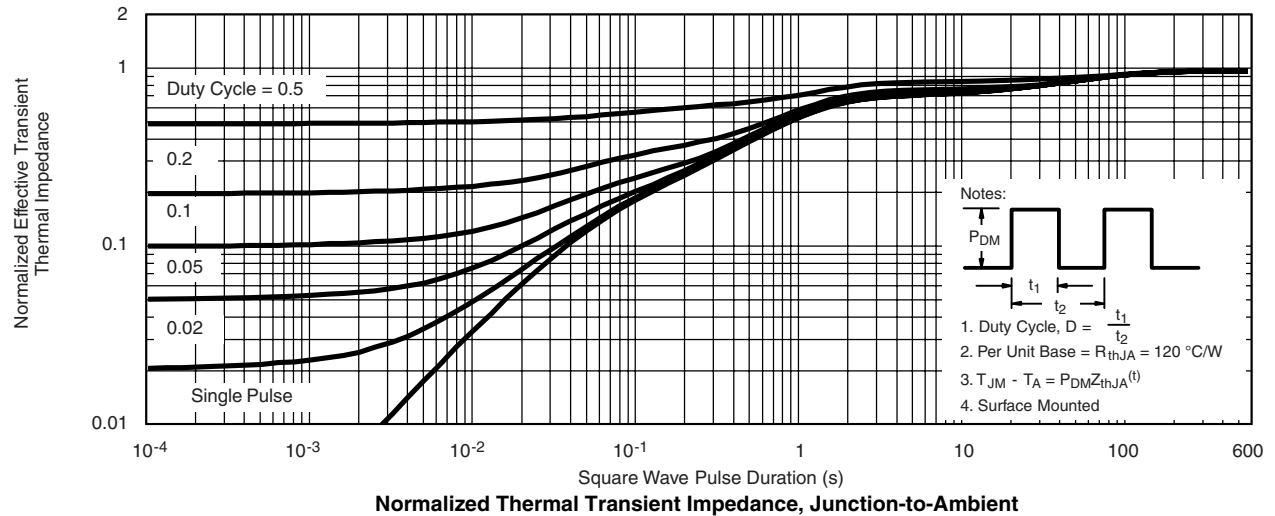
Single Pulse Power, Junction-to-Ambient



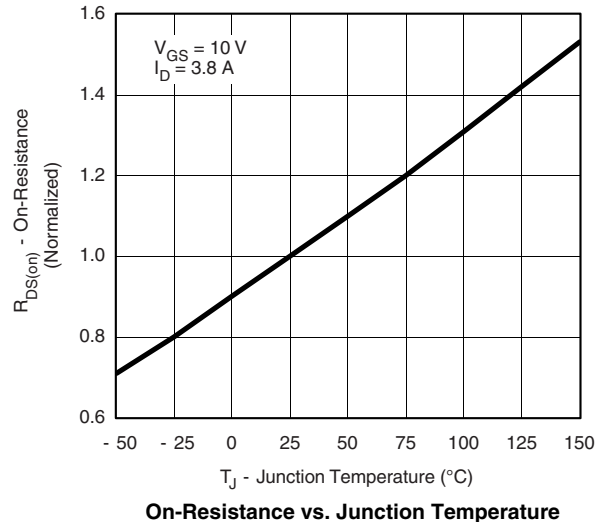
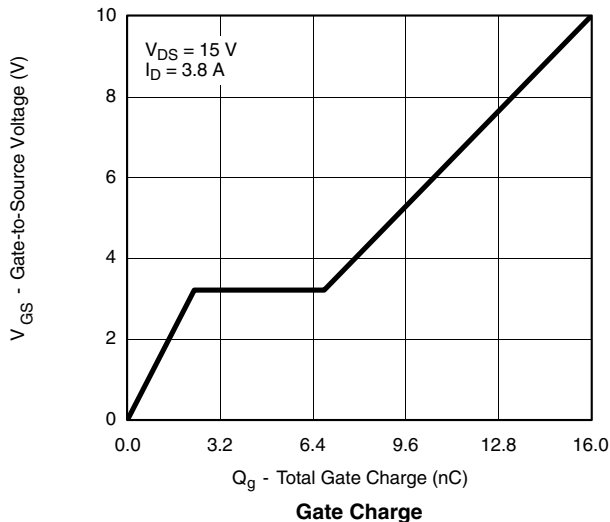
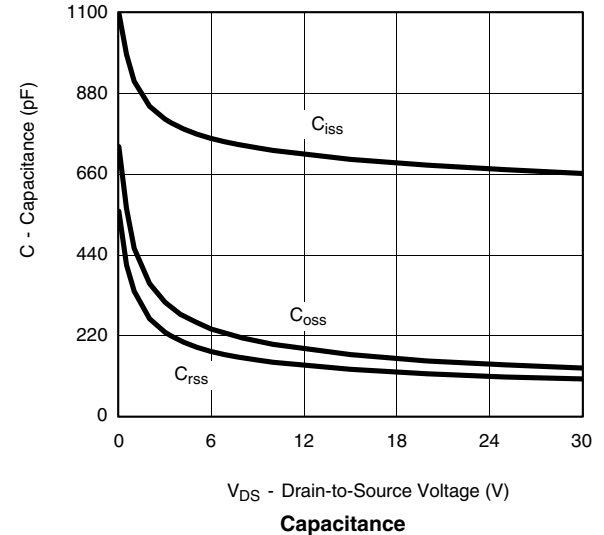
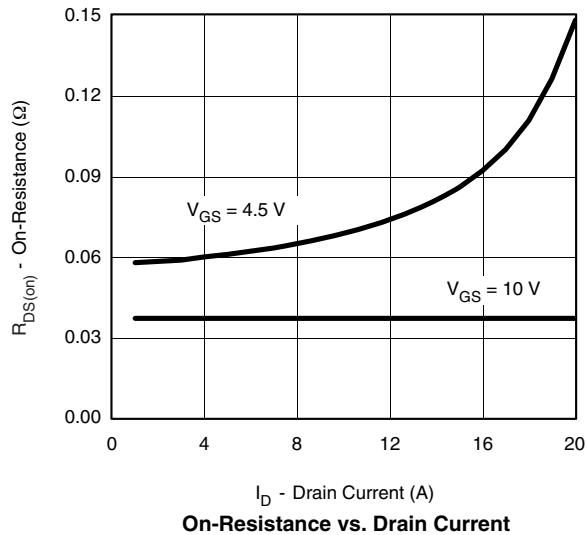
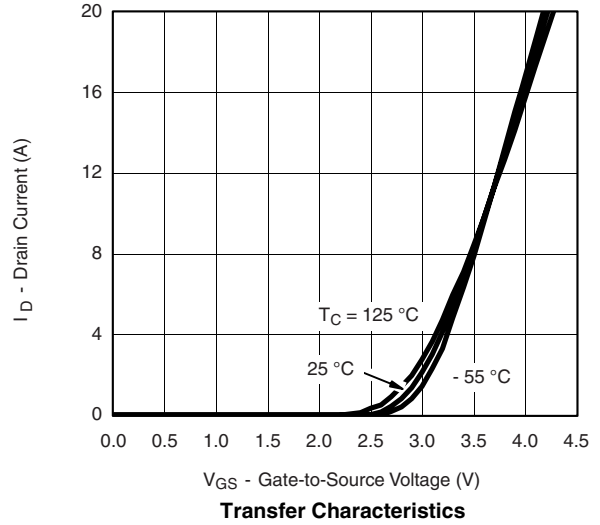
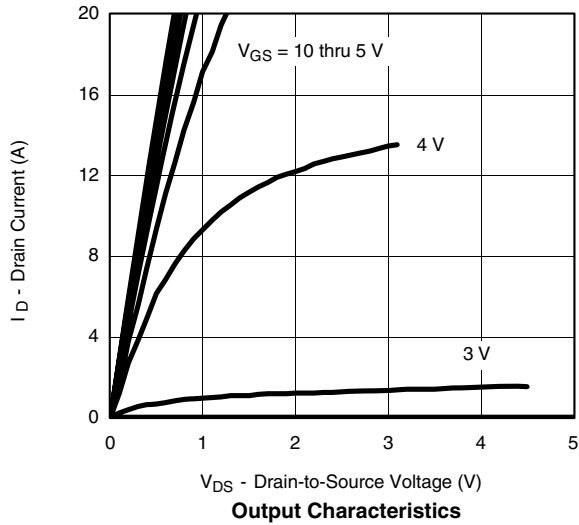
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

Safe Operating Area, Junction-to-Case

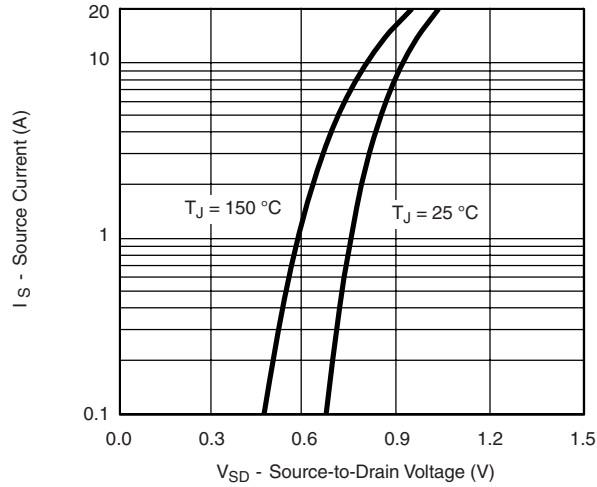
**N-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



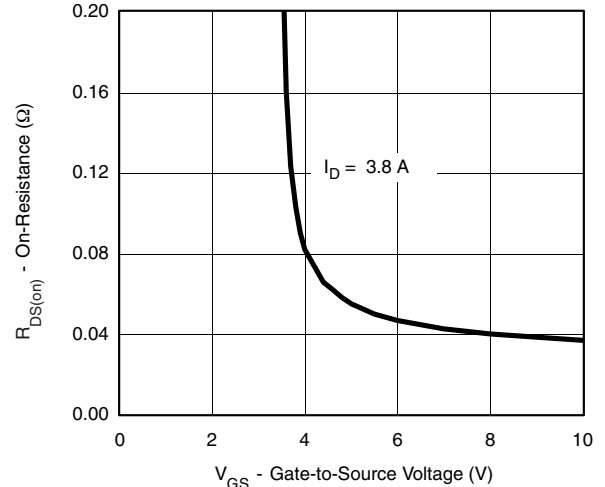
## P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



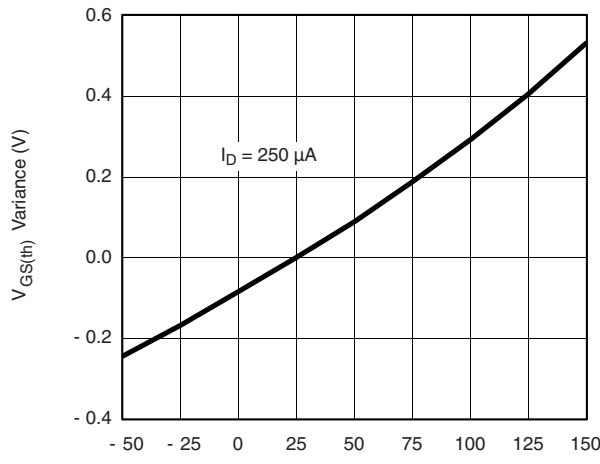
**P-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



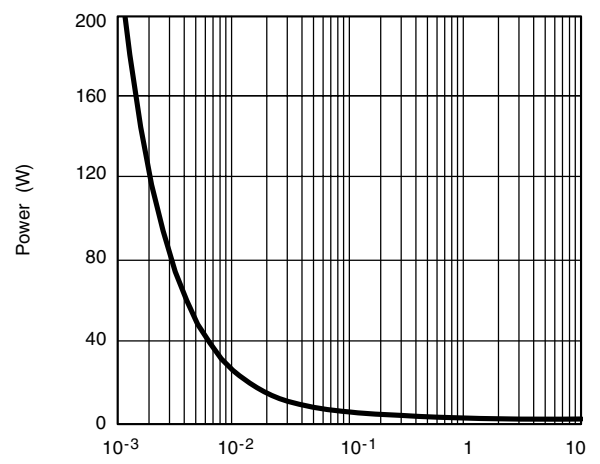
**Source-Drain Diode Forward Voltage**



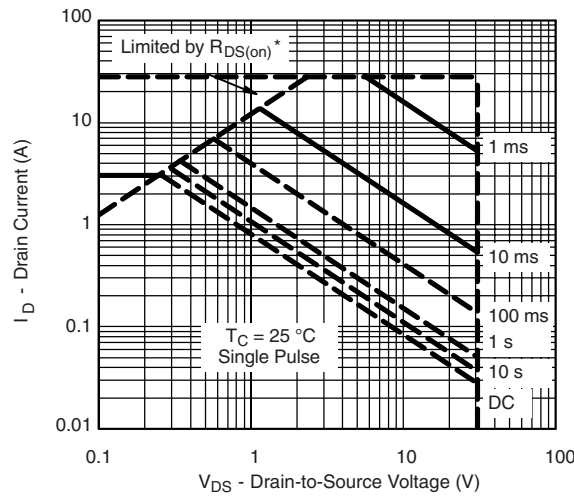
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**



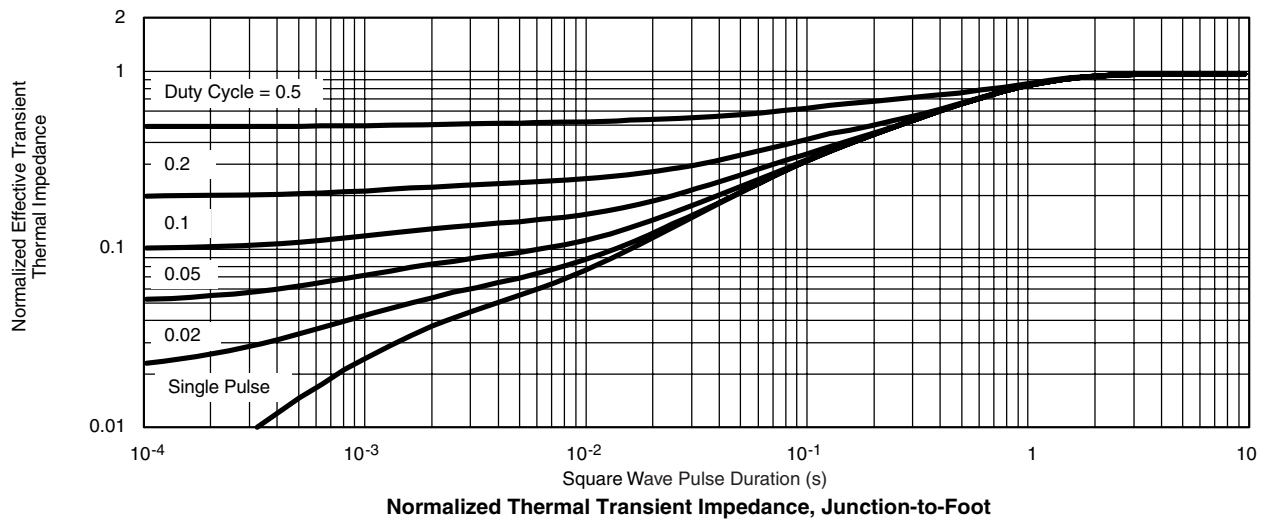
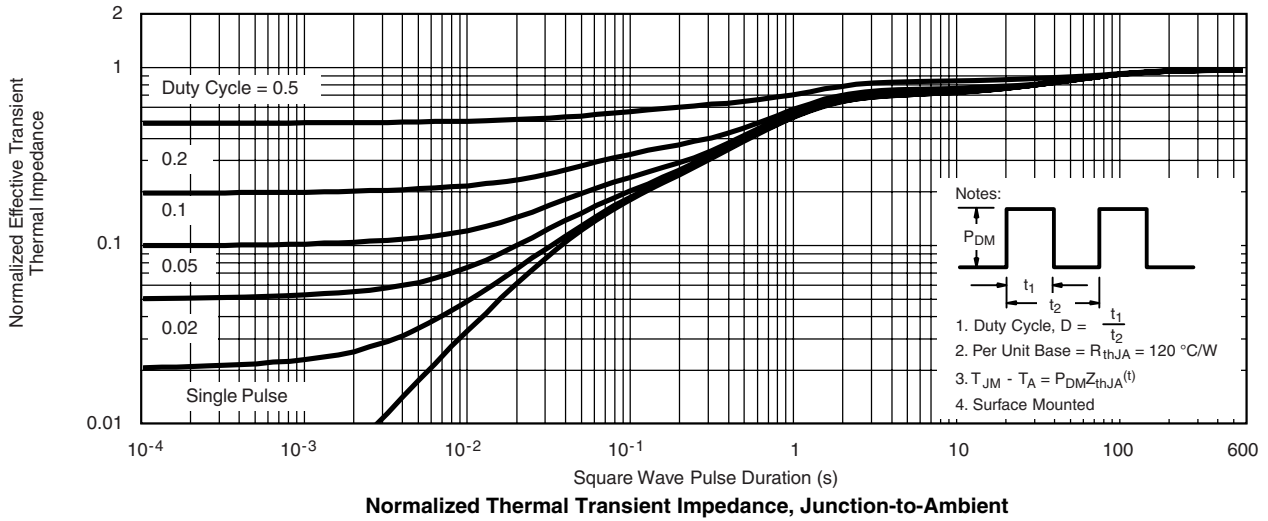
**Single Pulse Power, Junction-to-Ambient**



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

**Safe Operating Area, Junction-to-Case**

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



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