

## N- and P-Channel 60 V (D-S) MOSFET

### PRODUCT SUMMARY

	V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
N-Channel	60	1.2 at V <sub>GS</sub> = 10 V	0.5
		1.8 at V <sub>GS</sub> = 4.5 V	0.4
P-Channel	- 60	2.5 at V <sub>GS</sub> = - 10 V	- 0.4
		3.5 at V <sub>GS</sub> = - 4.5 V	- 0.3

### FEATURES

- DT-Trench Power MOSFET
- 100 % R<sub>g</sub> tested
- PWM Optimized
- Compliant to RoHS Directive 2002/95/EC

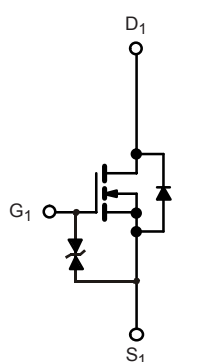
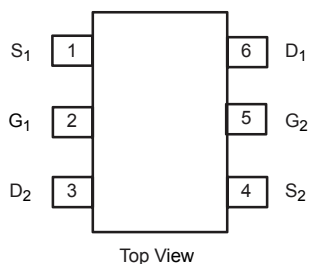


**RoHS**  
COMPLIANT

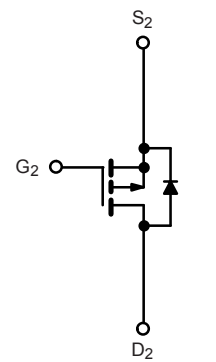
### APPLICATIONS

- LED Inverter Circuits
- DC/DC Conversion Circuits
- Motor drives
- Analog Switch

**SOT-563**



N-Channel MOSFET



P-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C, unless otherwise noted)

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C, unless otherwise noted)					
Parameter		Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage		V <sub>DS</sub>	60	- 60	V
Gate-Source Voltage		V <sub>GS</sub>	± 20		
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	T <sub>C</sub> = 25 °C	I <sub>D</sub>	0.5	- 0.4	A
	T <sub>C</sub> = 70 °C		0.4	- 0.32	
Pulsed Drain Current <sup>b</sup>		I <sub>DM</sub>	1.1	- 0.9	
Continuous Source Current (Diode Conduction) <sup>a</sup>		I <sub>S</sub>	0.5	- 0.4	W
Maximum Power Dissipation <sup>a</sup>	T <sub>C</sub> = 25 °C	P <sub>D</sub>	0.45	0.9	
	T <sub>C</sub> = 70 °C		0.29	0.72	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150		°C

Notes:

a. Surface mounted on FR4 board.

b. Pulse width limited by maximum junction temperature.

SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)							
Parameter	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Static							
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 10 μA	N-Ch	60			V
		V <sub>GS</sub> = 0 V, I <sub>D</sub> = - 10 μA	P-Ch	- 60			
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	N-Ch	1		3.0	
		V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = - 250 μA	P-Ch	- 1		- 3.0	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 5 V	N-Ch			± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V	N-Ch			1	μA
		V <sub>DS</sub> = - 60 V, V <sub>GS</sub> = 0 V	P-Ch			- 1	
		V <sub>DS</sub> = 48 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 85 °C	N-Ch			10	
		V <sub>DS</sub> = - 48 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 85 °C	P-Ch			- 10	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 4.5 V	N-Ch	0.5			A
		V <sub>DS</sub> = - 10 V, V <sub>GS</sub> = - 4.5 V	P-Ch	- 0.4			
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 0.2 A	N-Ch		1.8	3.3	Ω
		V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 0.2 A	P-Ch		3.5	6.0	
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.3 A	N-Ch		1.2	1.9	
		V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 0.3 A	P-Ch		2.5	4.0	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 0.3 A	N-Ch		105		ms
		V <sub>DS</sub> = - 10 V, I <sub>D</sub> = - 0.3A	P-Ch		80		
Diode Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>S</sub> = 0.3 A, V <sub>GS</sub> = 0 V	N-Ch		1.0	1.5	V
		I <sub>S</sub> = - 0.3 A, V <sub>GS</sub> = 0 V	P-Ch		- 1.0	- 1.4	
Dynamic <sup>b</sup>							
Total Gate Charge	Q <sub>g</sub>	N-Channel V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.3 A	N-Ch		0.5		nC
Gate-Source Charge	Q <sub>gs</sub>		P-Ch		0.3		
Gate-Drain Charge	Q <sub>gd</sub>	P-Channel V <sub>DS</sub> = - 10 V, V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 0.3 A	N-Ch		0.3		
			P-Ch		0.16		
Input Capacitance	C <sub>iss</sub>	N-Channel V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V, f = 1 MHz	N-Ch		35		pF
			P-Ch		29		
Output Capacitance	C <sub>oss</sub>	P-Channel V <sub>DS</sub> = - 30 V, V <sub>GS</sub> = 0 V, f = 1 MHz	N-Ch		5.6		
			P-Ch		6		
Reverse Transfer Capacitance	C <sub>rss</sub>		N-Ch		3		
			P-Ch		4		
Turn-On Time <sup>c</sup>	t <sub>ON</sub>	N-Channel V <sub>DD</sub> = 30 V, R <sub>L</sub> = 100 Ω I <sub>D</sub> ≅ 0.3 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 1 Ω	N-Ch		4.5		ns
Turn-Off Time <sup>c</sup>	t <sub>OFF</sub>		P-Ch		5		
		P-Channel V <sub>DD</sub> = - 30 V, R <sub>L</sub> = 100 Ω I <sub>D</sub> ≅ - 0.3 A, V <sub>GEN</sub> = - 10 V, R <sub>g</sub> = 1 Ω	N-Ch		13		
			P-Ch		18		

Notes:

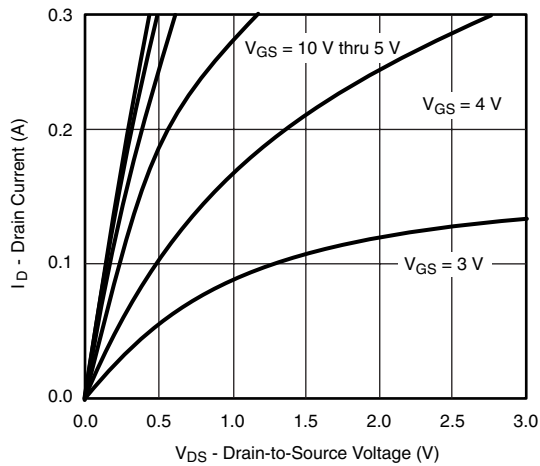
a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

b. Guaranteed by design, not subject to production testing.

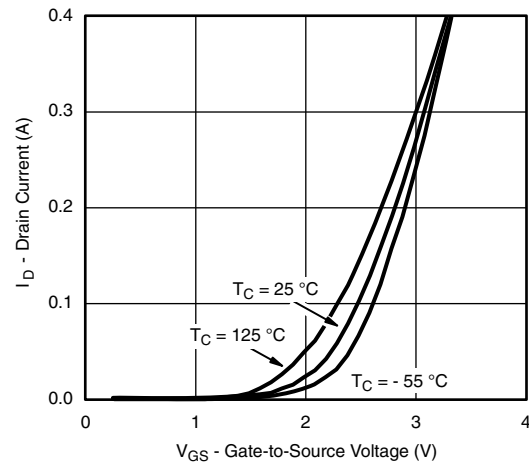
c. Switching time is essentially independent of operating temperature.

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.

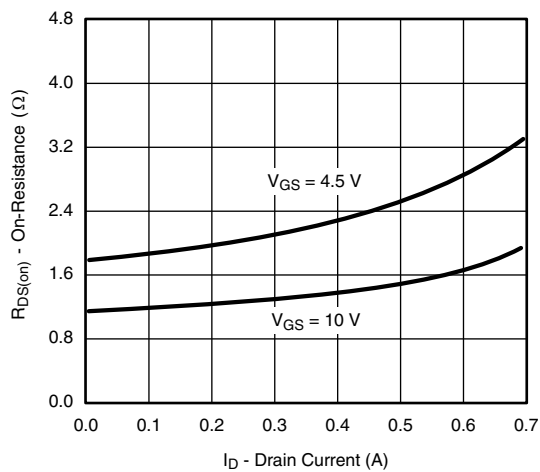
**N-CHANNEL TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted)



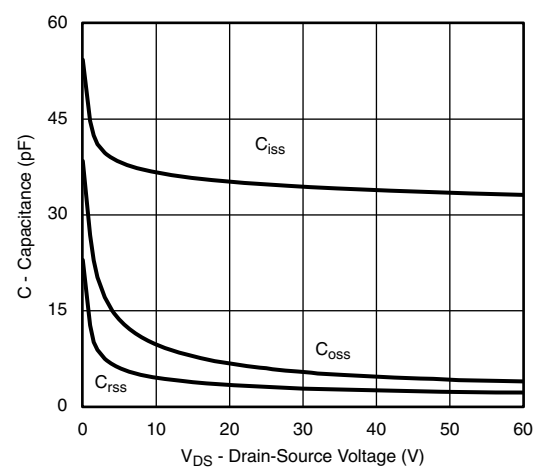
**Output Characteristics**



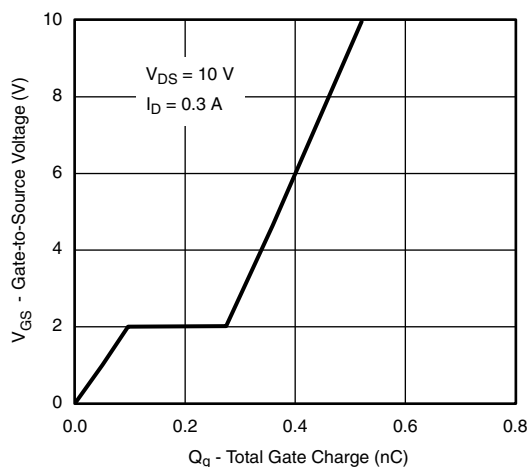
**Transfer Characteristics Curves vs. Temperature**



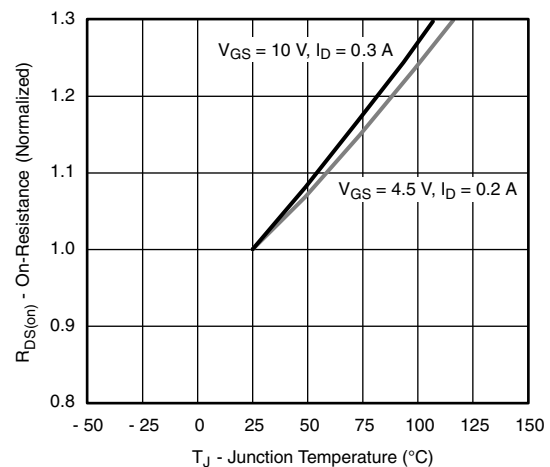
**On-Resistance vs. Drain Current**



**Capacitance**

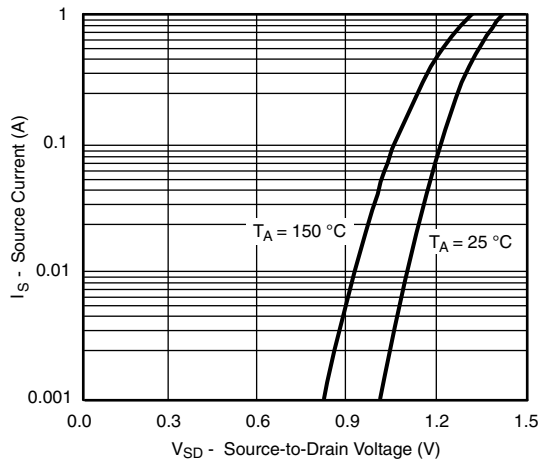


**Gate Charge**

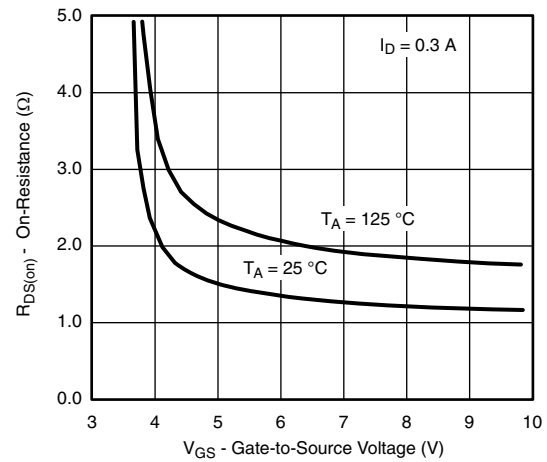


**On-Resistance vs. Junction Temperature**

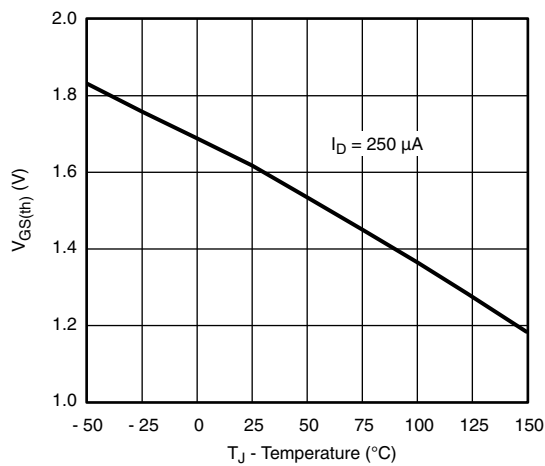
**N-CHANNEL TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted)



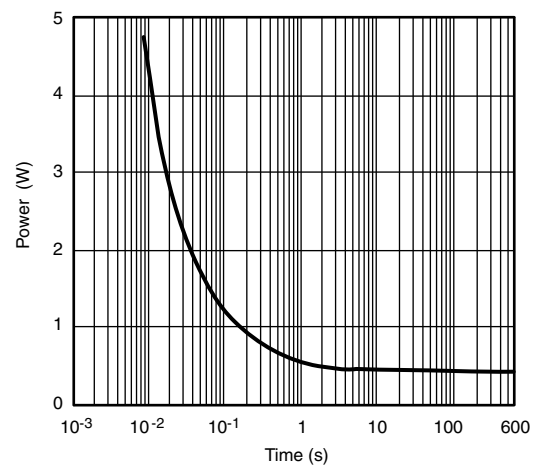
**Source-Drain Diode Forward Voltage**



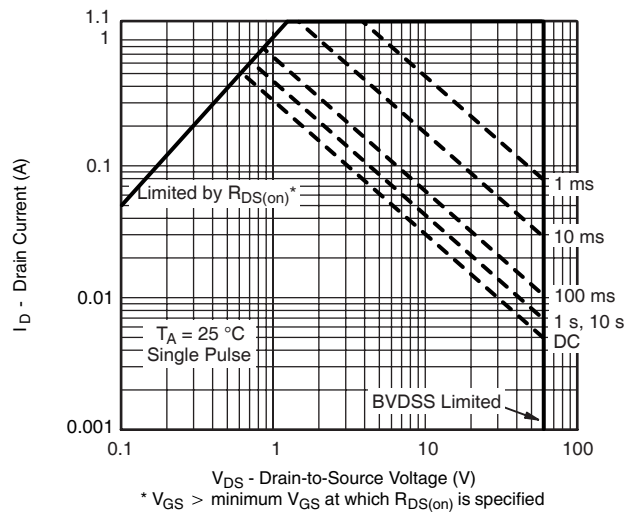
**$R_{DS(on)}$  vs.  $V_{GS}$  vs. Temperature**



**Threshold Voltage**

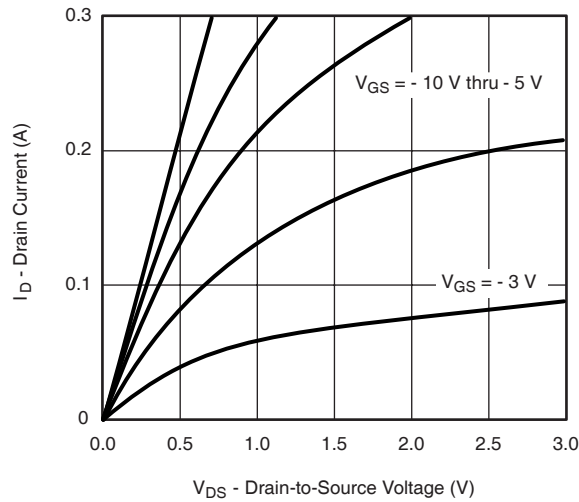


**Single Pulse Power**

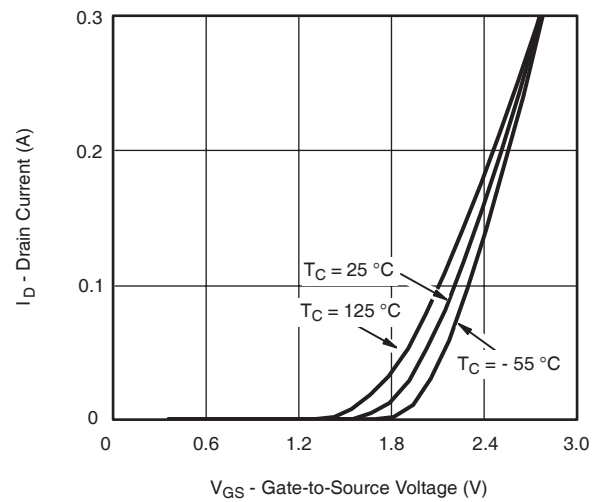


**Safe Operating Area**

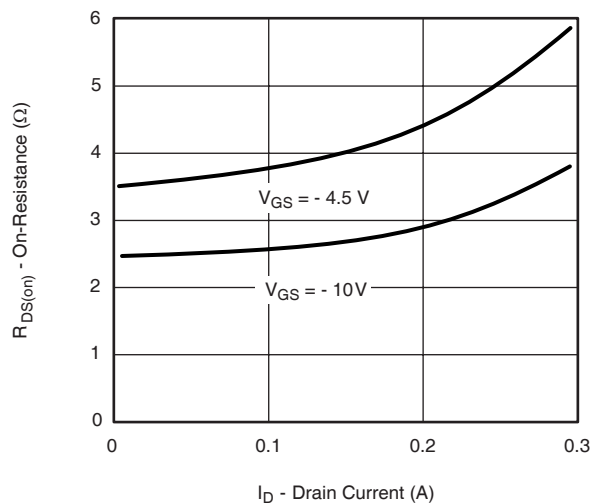
**P-CHANNEL TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted)



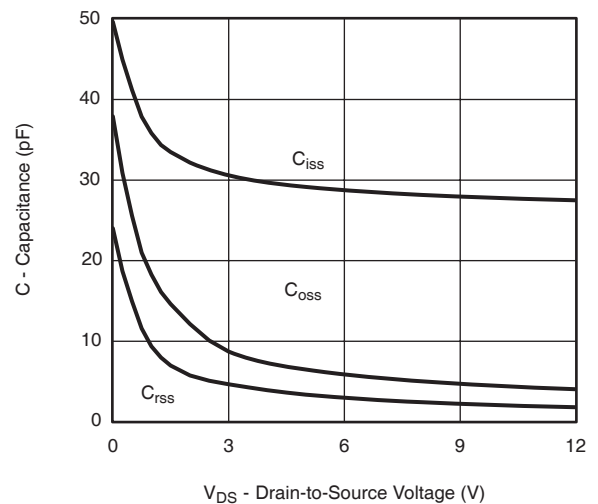
**Output Characteristics**



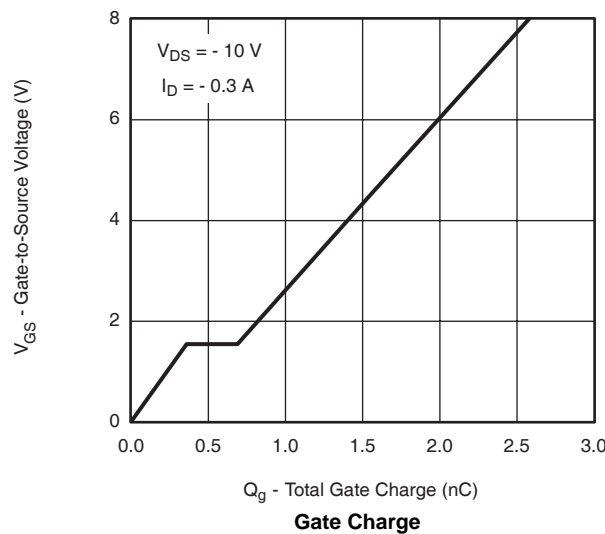
**Transfer Characteristics**



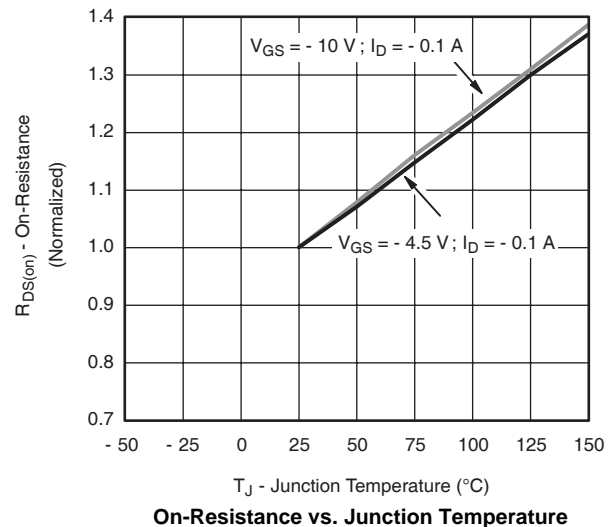
**On-Resistance vs. Drain Current and Gate Voltage**



**Capacitance**

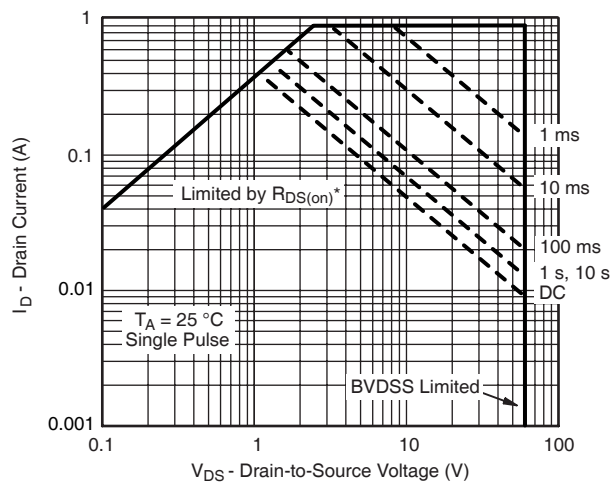
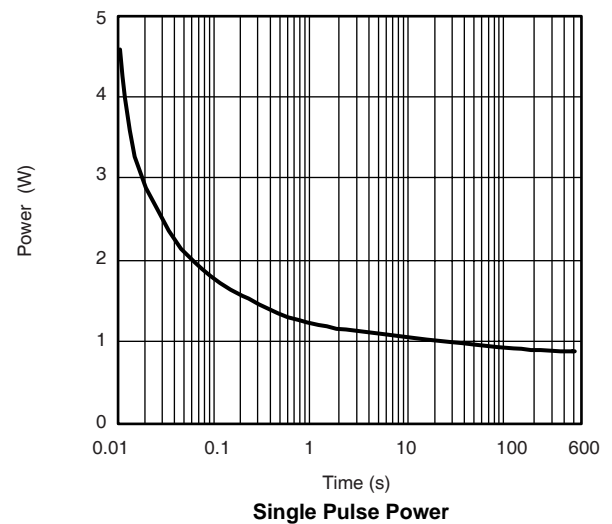
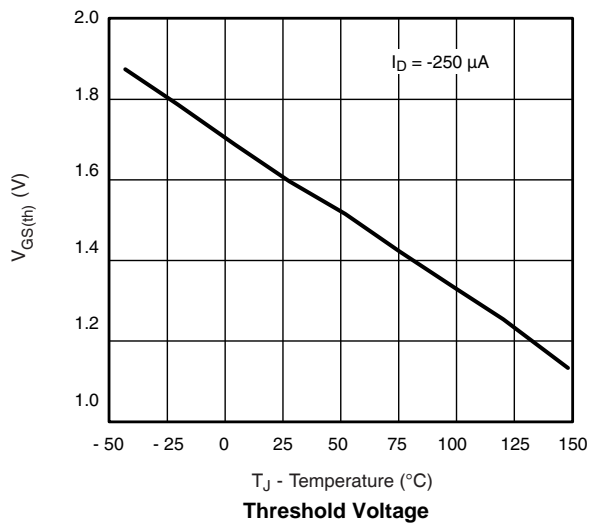
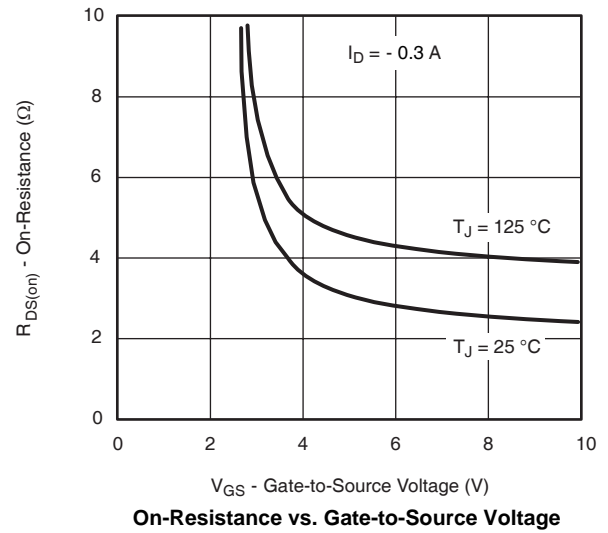
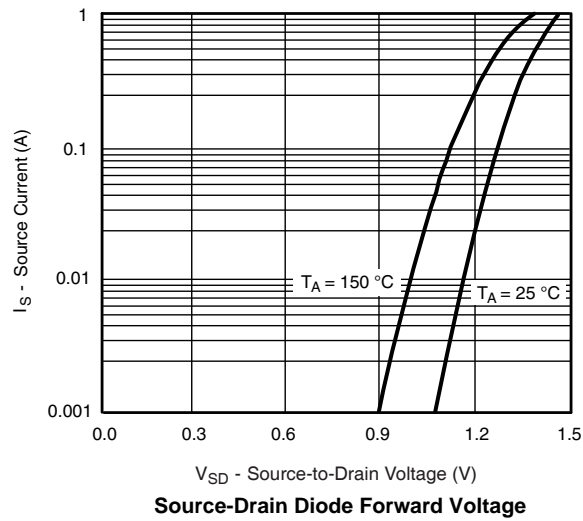


**Gate Charge**



**On-Resistance vs. Junction Temperature**

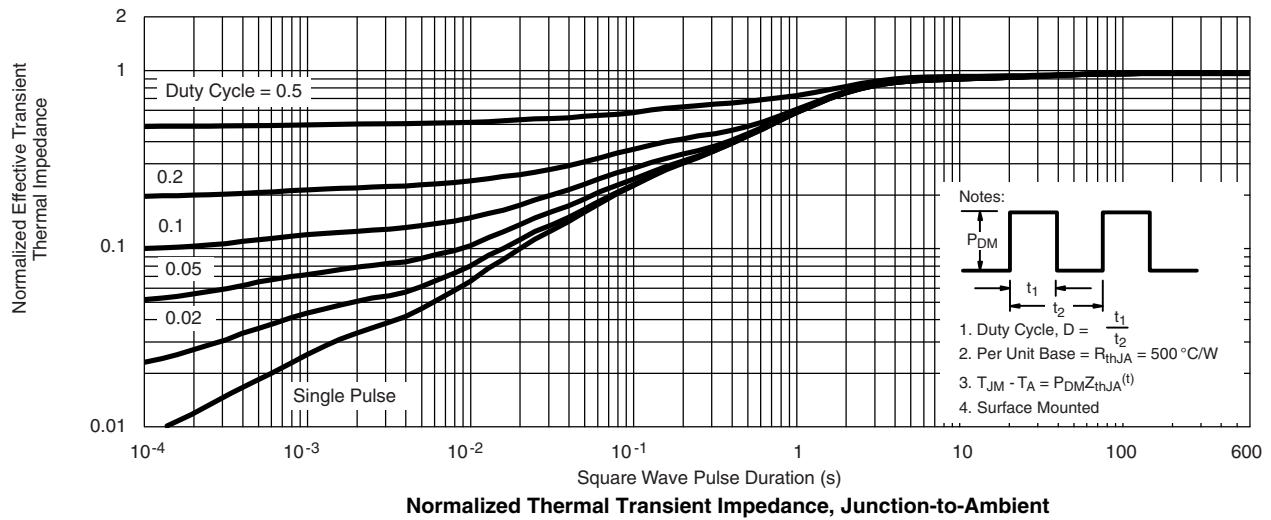
**P-CHANNEL TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted)



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

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

**N- OR P-CHANNEL TYPICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)



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