

N- and P-Channel 20-V (D-S) MOSFET

PRODUCT SUMMARY

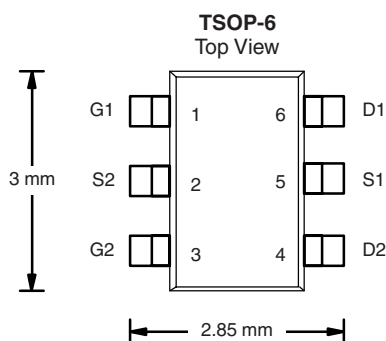
	V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
N-Channel	20	0.080 at $V_{GS} = 4.5$ V	3.0
		0.100 at $V_{GS} = 2.5$ V	2.6
		0.128 at $V_{GS} = 1.8$ V	2.3
P-Channel	- 20	0.145 at $V_{GS} = - 4.5$ V	- 2.2
		0.200 at $V_{GS} = - 2.5$ V	- 1.8
		0.300 at $V_{GS} = - 1.8$ V	- 1.5

FEATURES

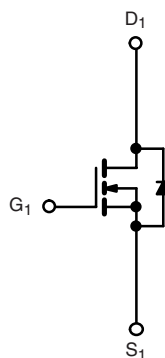
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFETs: 1.8 V Rated
- Compliant to RoHS Directive 2002/95/EC



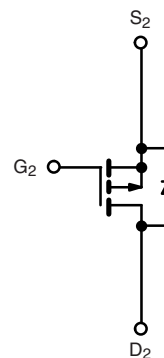
RoHS
COMPLIANT
HALOGEN
FREE
Available



Ordering Information: Si3588DV-T1-E3 (Lead (Pb)-free)
Si3588DV-T1-GE3 (Lead (Pb)-free and Halogen-free)



N-Channel MOSFET



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

Parameter		Symbol	N-Channel		P-Channel		Unit
			5 s	Steady State	5 s	Steady State	
Drain-Source Voltage		V _{DS}	20		- 20		V
Gate-Source Voltage		V _{GS}	± 8				
Continuous Drain Current (T _J = 150 °C) ^a	T _A = 25 °C	I _D	3.0	2.5	- 2.2	- 0.57	A
	T _A = 70 °C		2.3	2.0	- 1.8	- 1.5	
Pulsed Drain Current		I _{DM}	± 8				
Continuous Source Current (Diode Conduction) ^a		I _S	1.05	0.75	- 1.05	- 0.75	
Maximum Power Dissipation ^a	T _A = 25 °C	P _D	1.15	0.83	1.15	0.083	W
	T _A = 70 °C		0.73	0.53	0.73	0.53	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to 150				°C

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	$t \leq 5$ s	R_{thJA}	93	110	°C/W
	Steady State		130	150	
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	90	90	

Notes:

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

SPECIFICATIONS T _J = 25 °C, unless otherwise noted								
Parameter	Symbol	Test Conditions		Min.	Typ.	Max.	Unit	
Static								
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	N-Ch	0.45			V	
		V _{DS} = V _{GS} , I _D = - 250 μA	P-Ch	- 0.45				
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 8 V	N-Ch			± 100	nA	
		V _{DS} = 0 V, V _{GS} = ± 8 V	P-Ch			± 100		
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 16 V, V _{GS} = 0 V	N-Ch			1	μA	
		V _{DS} = - 16 V, V _{GS} = 0 V	P-Ch			- 1		
		V _{DS} = 16 V, V _{GS} = 0 V, T _J = 85 °C	N-Ch			10		
		V _{DS} = - 16 V, V _{GS} = 0 V, T _J = 85 °C	P-Ch			- 10		
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 4.5 V	N-Ch	5			A	
		V _{DS} ≤ - 5 V, V _{GS} = - 4.5 V	P-Ch	- 5				
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 4.5 V, I _D = 3 A	N-Ch		0.064	0.080	Ω	
		V _{GS} = - 4.5 V, I _D = - 2.2 A	P-Ch		0.115	0.145		
		V _{GS} = 2.5 V, I _D = 2.6 A	N-Ch		0.080	0.100		
		V _{GS} = - 2.5 V, I _D = - 1.8 A	P-Ch		0.163	0.200		
		V _{GS} = 1.8 V, I _D = 2.3 A	N-Ch		0.104	0.128		
		V _{GS} = - 1.8 V, I _D = - 1.0 A	P-Ch		0.240	0.300		
Forward Transconductance ^a	g _{fs}	V _{DS} = 5 V, I _D = 3 A	N-Ch		9		S	
		V _{DS} = - 5 V, I _D = - 2.2 A	P-Ch		5			
Diode Forward Voltage ^a	V _{SD}	I _S = 1.05 A, V _{GS} = 0 V	N-Ch		0.8	1.1	V	
		I _S = - 1.05 A, V _{GS} = 0 V	P-Ch		- 0.8	- 1.1		
Dynamic ^b								
Total Gate Charge	Q _g	N-Channel V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 3 A	N-Ch P-Ch		5 5	7.5 7.5	nC	
Gate-Source Charge	Q _{gs}		N-Ch P-Ch		0.65 1.0			
Gate-Drain Charge	Q _{gd}	P-Channel V _{DS} = - 10 V, V _{GS} = - 4.5 V, I _D = - 2.2 A	N-Ch P-Ch		0.9 0.9			
Turn-On Delay Time	t _{d(on)}	N-Channel V _{DD} = 10 V, R _L = 10 Ω I _D ≅ 0.5 A, V _{GEN} = 4.5 V, R _g = 6 Ω	N-Ch P-Ch		12 12	20 20	ns	
Rise Time	t _r		N-Ch P-Ch		30 29	50 50		
Turn-Off Delay Time	t _{d(off)}		P-Channel V _{DD} = - 4 V, R _L = 8 Ω	N-Ch P-Ch		28 24		50 45
Fall Time	t _f		I _D ≅ - 1 A, V _{GEN} = - 4.5 V, R _g = 6 Ω	N-Ch P-Ch		12 30		20 50
Source-Drain Reverse Recovery Time	t _{rr}	I _F = 1.05 A, dI/dt = 100 A/μs	N-Ch		20	40		
		I _F = - 1.05 A, dI/dt = 100 A/μs	P-Ch		20	40		

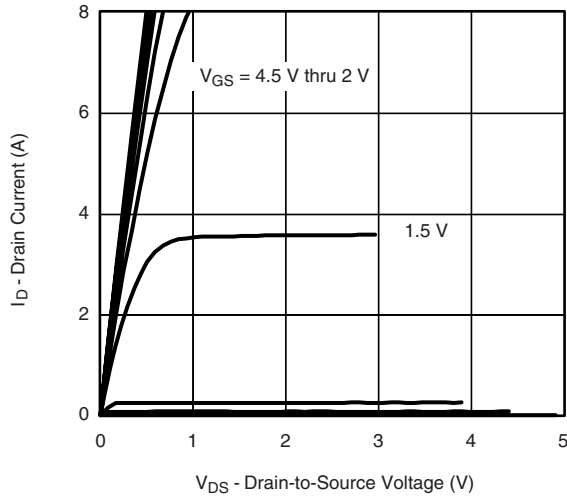
Notes:

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

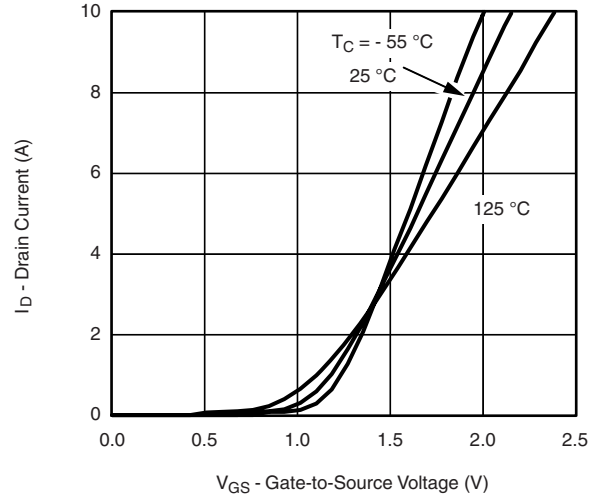
b. Guaranteed by design, not subject to production testing.

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.

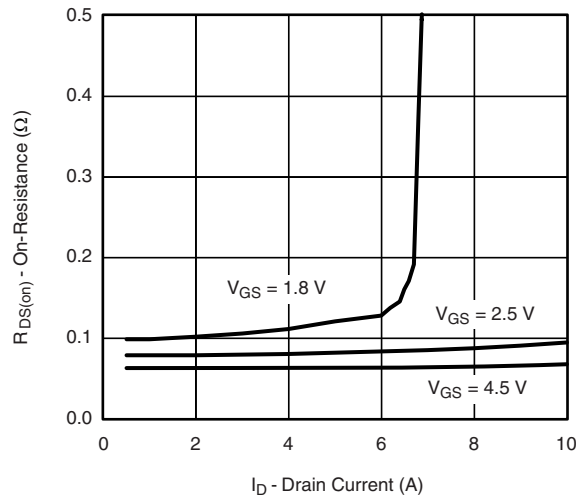
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



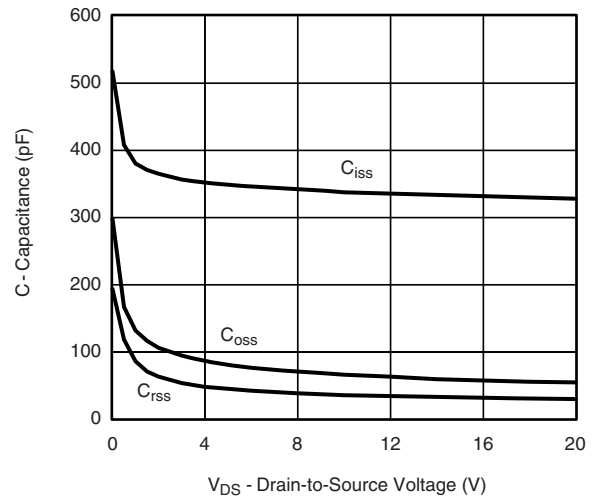
Output Characteristics



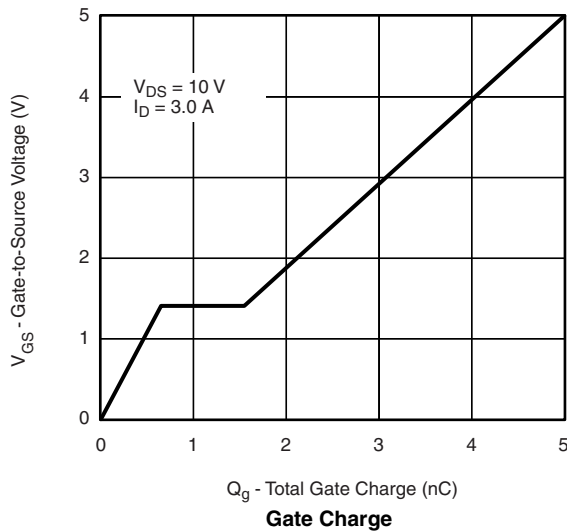
Transfer Characteristics



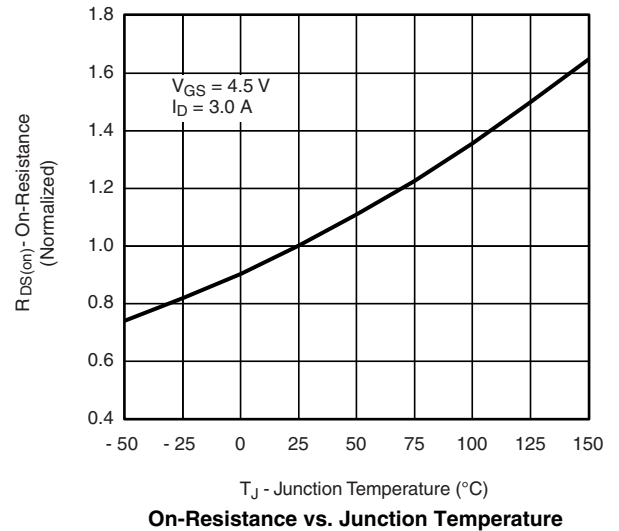
On-Resistance vs. Drain Current



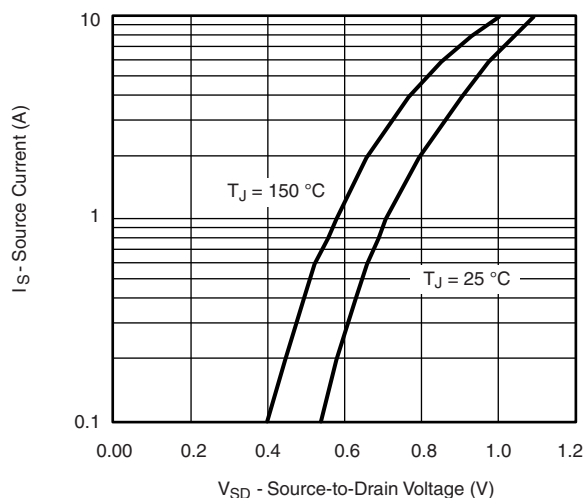
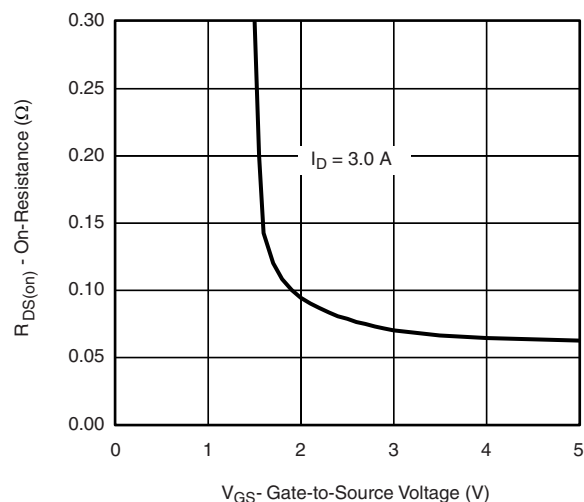
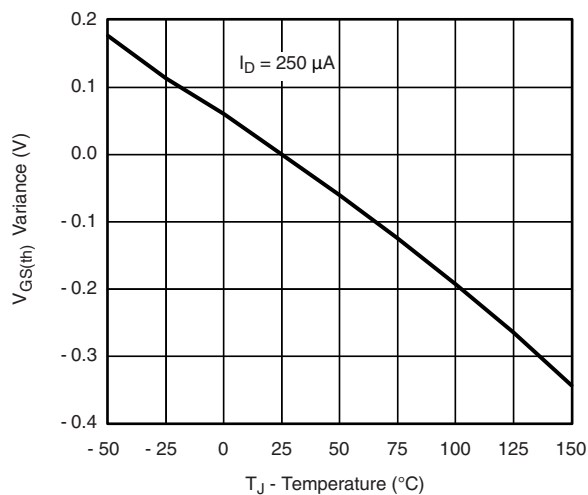
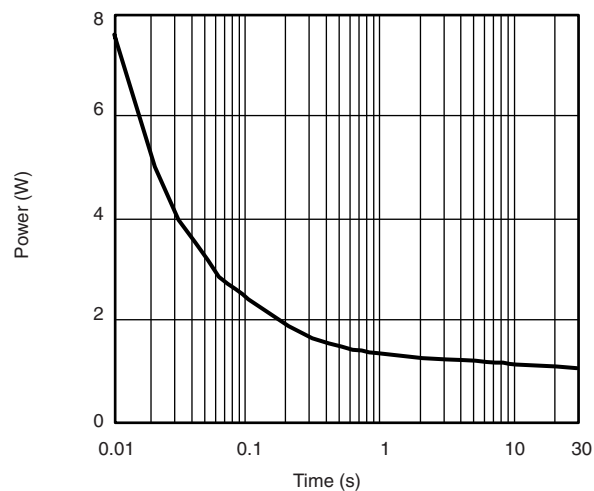
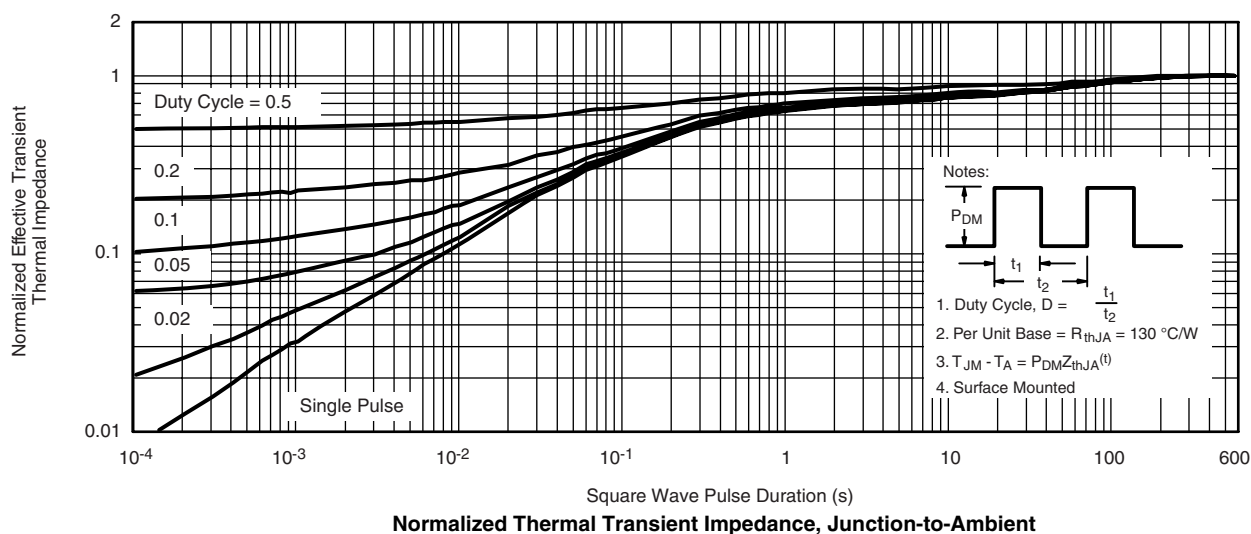
Capacitance



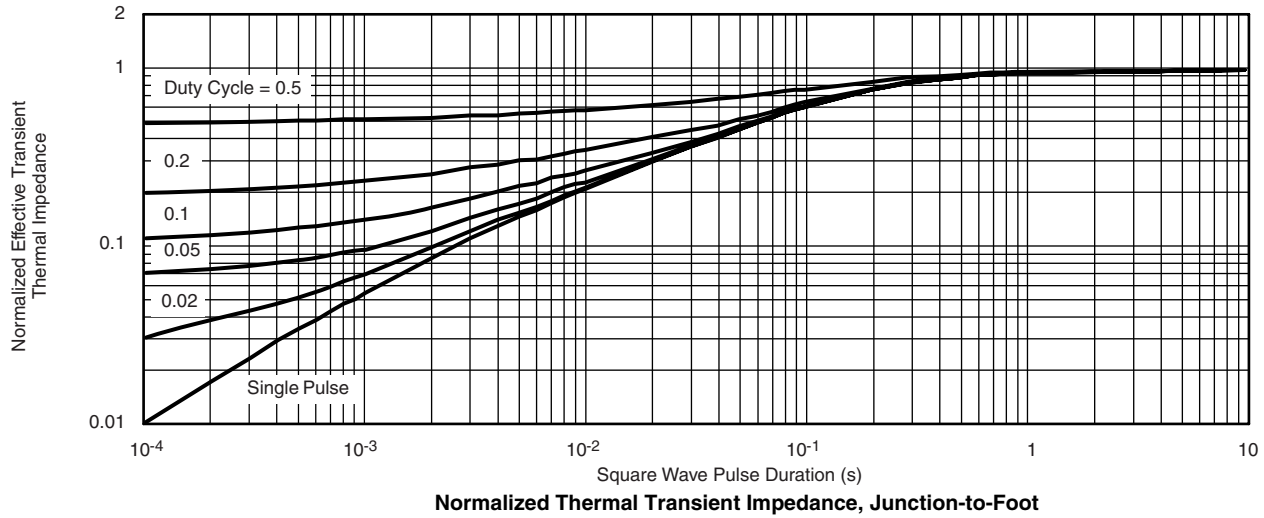
Gate Charge



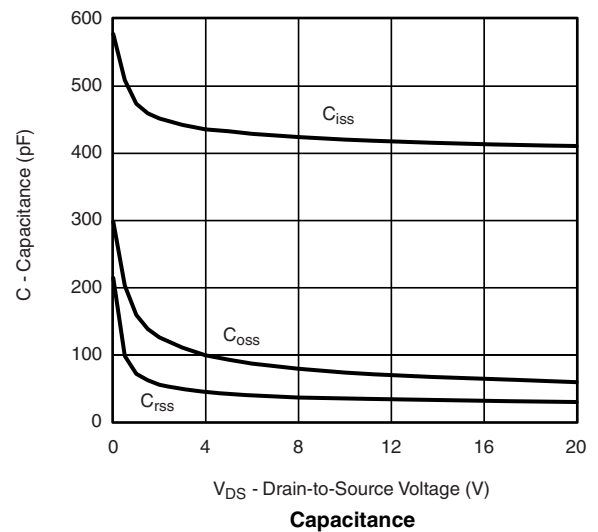
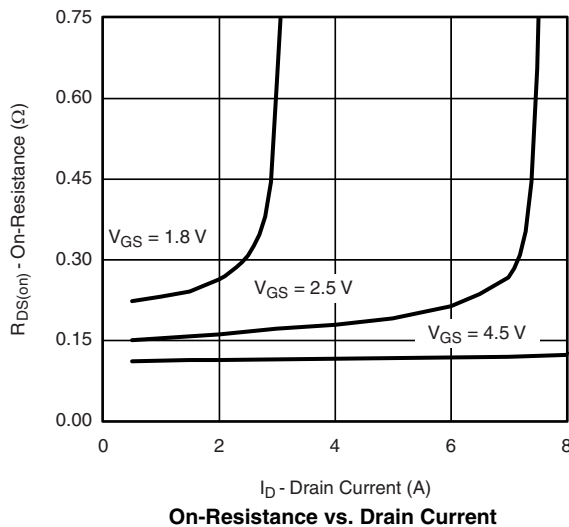
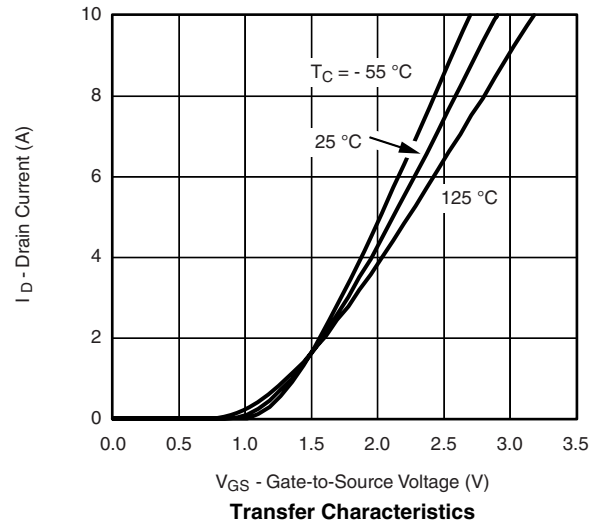
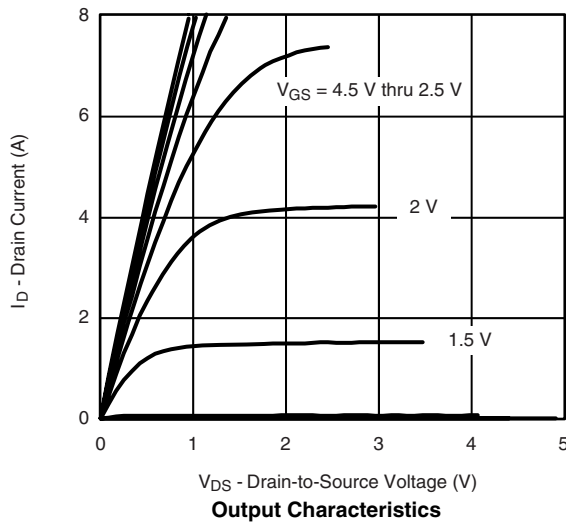
On-Resistance vs. Junction Temperature

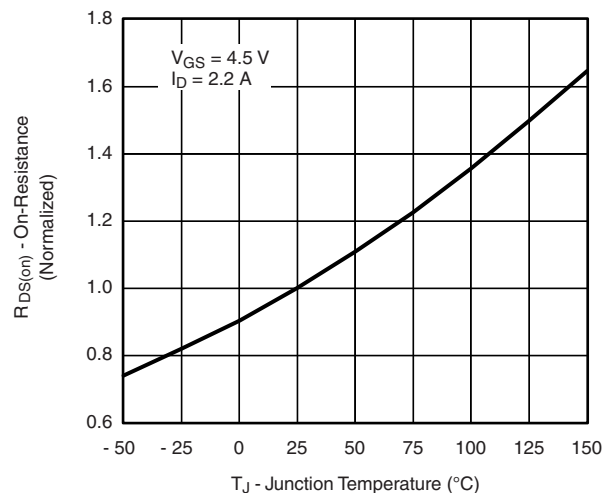
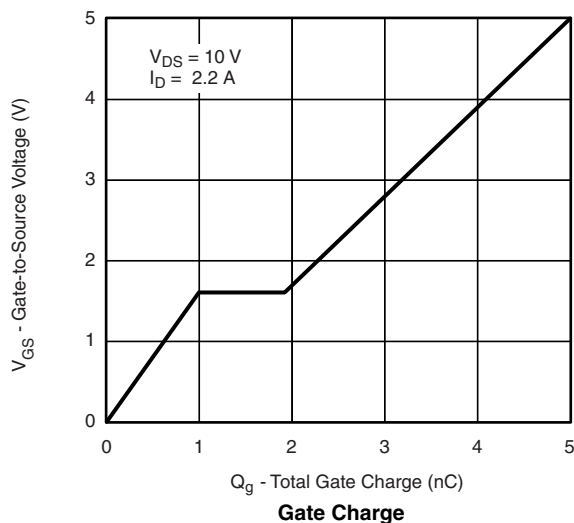
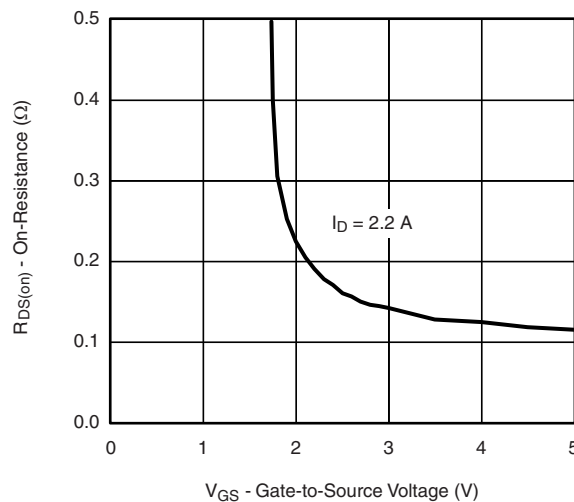
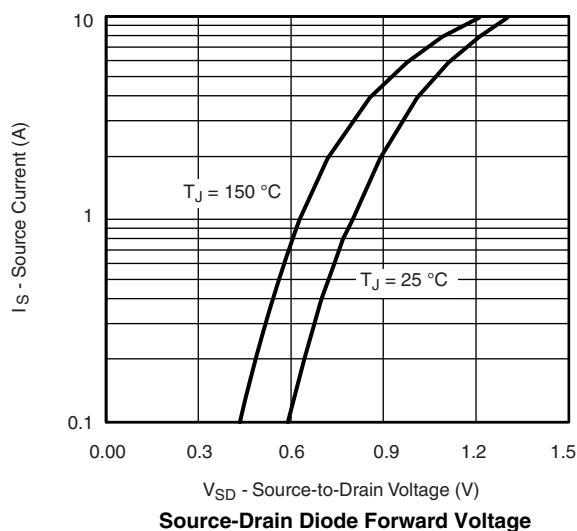
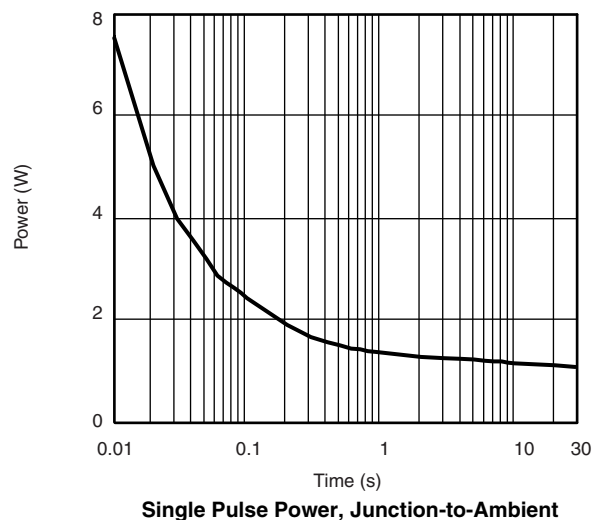
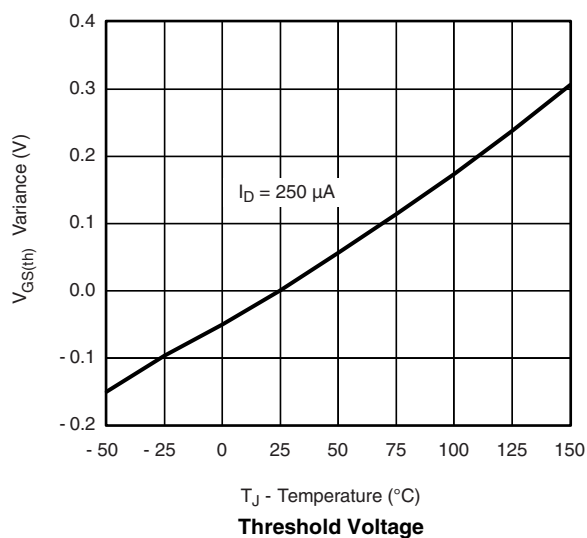
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**Source-Drain Diode Forward Voltage****On-Resistance vs. Gate-to-Source Voltage****Threshold Voltage****Single Pulse Power, Junction-to-Ambient**

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

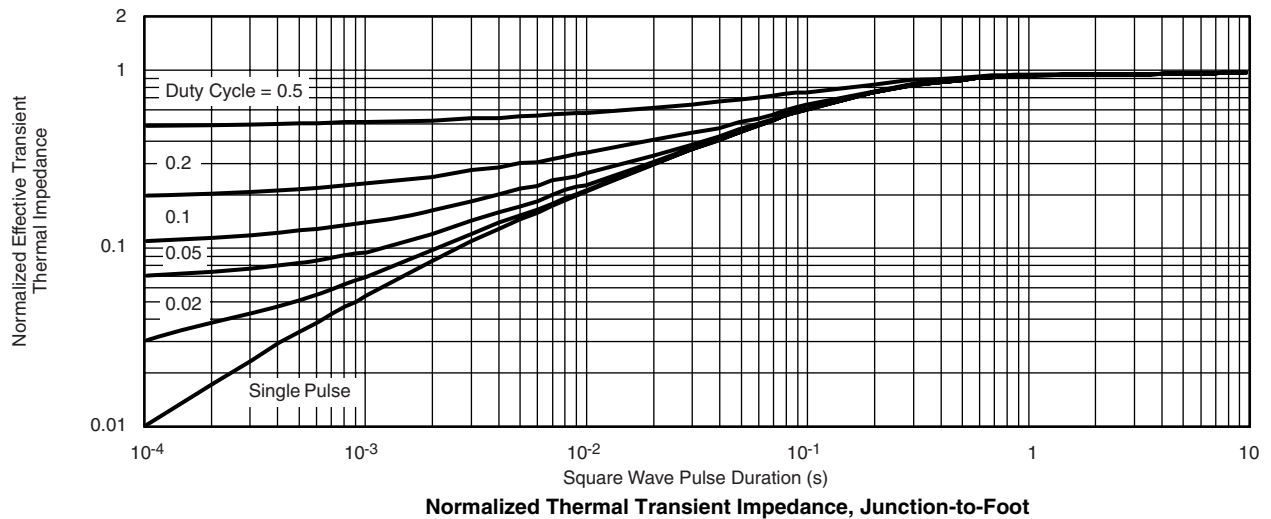
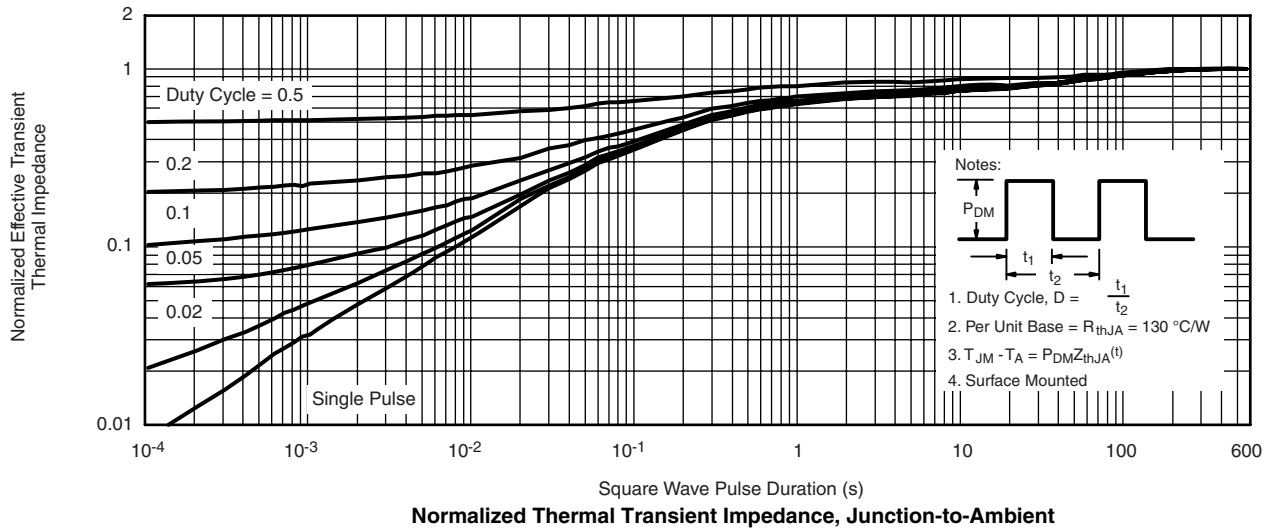


P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**On-Resistance vs. Junction Temperature****On-Resistance vs. Gate-to-Source Voltage**

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



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