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Si3588DV
 Vishay Siliconix

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

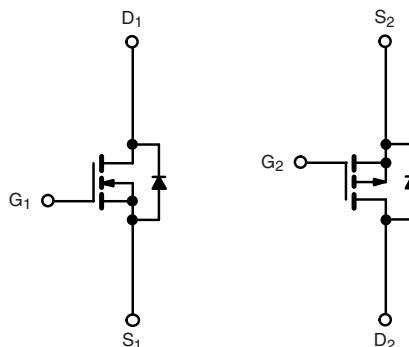
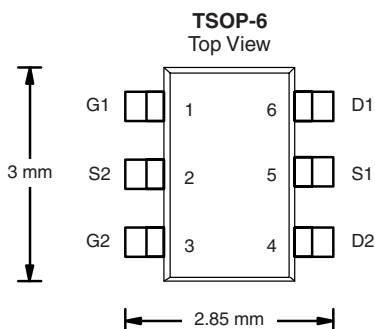
PRODUCT SUMMARY			
	V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)
N-Channel	20	0.080 at V _{GS} = 4.5 V	3.0
		0.100 at V _{GS} = 2.5 V	2.6
		0.128 at V _{GS} = 1.8 V	2.3
P-Channel	- 20	0.145 at V _{GS} = - 4.5 V	- 2.2
		0.200 at V _{GS} = - 2.5 V	- 1.8
		0.300 at V _{GS} = - 1.8 V	- 1.5

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	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	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 ≤ 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.

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SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted							
Parameter	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Static							
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	N-Ch	0.45			V
		$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	P-Ch	-0.45			
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$	N-Ch			± 100	nA
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$	P-Ch			± 100	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}$	N-Ch			1	μA
		$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}$	P-Ch			-1	
		$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$	N-Ch			10	
		$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$	P-Ch			-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 4.5\text{ V}$	N-Ch	5			A
		$V_{DS} \leq -5\text{ V}, V_{GS} = -4.5\text{ V}$	P-Ch	-5			
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 3\text{ A}$	N-Ch		0.064	0.080	Ω
		$V_{GS} = -4.5\text{ V}, I_D = -2.2\text{ A}$	P-Ch		0.115	0.145	
		$V_{GS} = 2.5\text{ V}, I_D = 2.6\text{ A}$	N-Ch		0.080	0.100	
		$V_{GS} = -2.5\text{ V}, I_D = -1.8\text{ A}$	P-Ch		0.163	0.200	
		$V_{GS} = 1.8\text{ V}, I_D = 2.3\text{ A}$	N-Ch		0.104	0.128	
		$V_{GS} = -1.8\text{ V}, I_D = -1.0\text{ A}$	P-Ch		0.240	0.300	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 5\text{ V}, I_D = 3\text{ A}$	N-Ch		9		S
		$V_{DS} = -5\text{ V}, I_D = -2.2\text{ A}$	P-Ch		5		
Diode Forward Voltage ^a	V_{SD}	$I_S = 1.05\text{ A}, V_{GS} = 0\text{ V}$	N-Ch		0.8	1.1	V
		$I_S = -1.05\text{ A}, V_{GS} = 0\text{ V}$	P-Ch		-0.8	-1.1	
Dynamic^b							
Total Gate Charge	Q_g	N-Channel $V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 3\text{ A}$	N-Ch		5	7.5	nC
Gate-Source Charge	Q_{gs}		P-Ch		5	7.5	
Gate-Drain Charge	Q_{gd}	P-Channel $V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -2.2\text{ A}$	N-Ch		0.65		
			P-Ch		1.0		
Turn-On Delay Time	$t_{d(on)}$	N-Channel $V_{DD} = 10\text{ V}, R_L = 10\text{ }\Omega$ $I_D \equiv 0.5\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 6\text{ }\Omega$	N-Ch		12	20	ns
			P-Ch		12	20	
Rise Time	t_r	P-Channel $V_{DD} = -4\text{ V}, R_L = 8\text{ }\Omega$ $I_D \equiv -1\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 6\text{ }\Omega$	N-Ch		30	50	
			P-Ch		29	50	
Turn-Off Delay Time	$t_{d(off)}$	N-Channel $V_{DD} = -4\text{ V}, R_L = 8\text{ }\Omega$ $I_D \equiv -1\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 6\text{ }\Omega$	N-Ch		28	50	
			P-Ch		24	45	
Fall Time	t_f	P-Channel $V_{DD} = -4\text{ V}, R_L = 8\text{ }\Omega$ $I_D \equiv -1\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 6\text{ }\Omega$	N-Ch		12	20	
			P-Ch		30	50	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 1.05\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$	N-Ch		20	40	
		$I_F = -1.05\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$	P-Ch		20	40	

Notes:

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

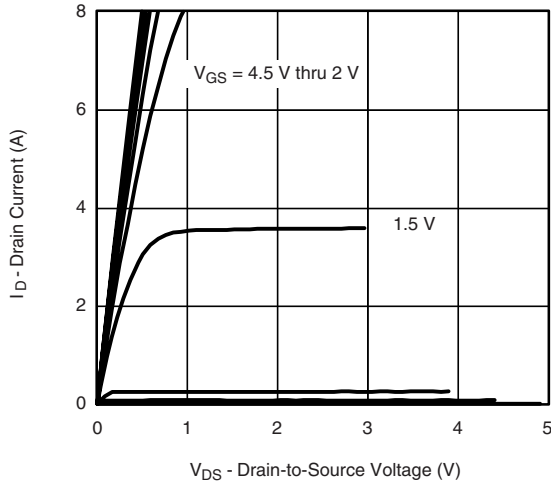
b. Guaranteed by design, not subject to production testing.

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.

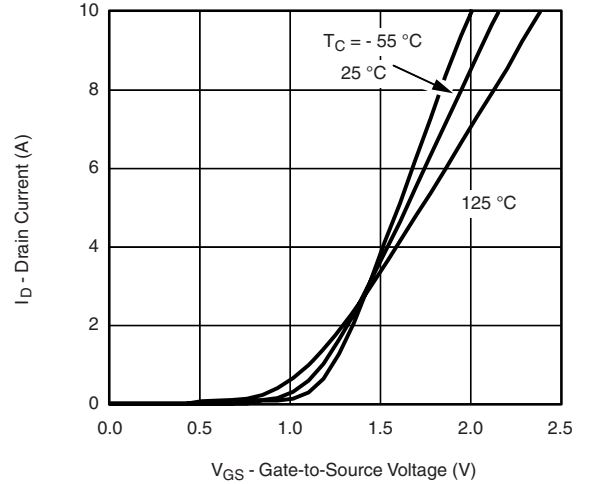


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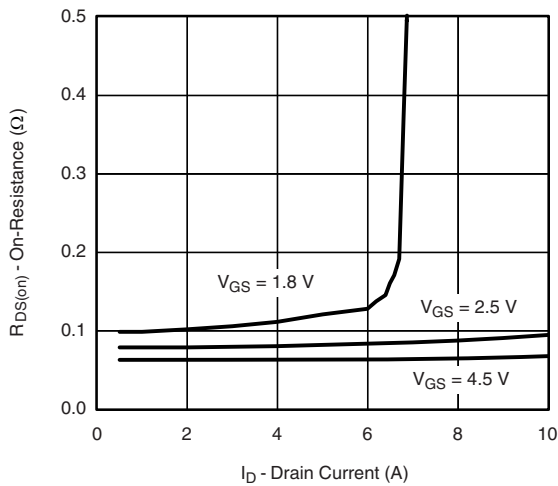
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



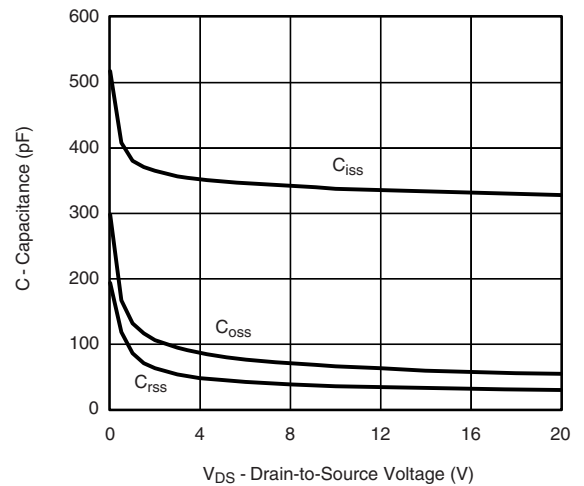
Output Characteristics



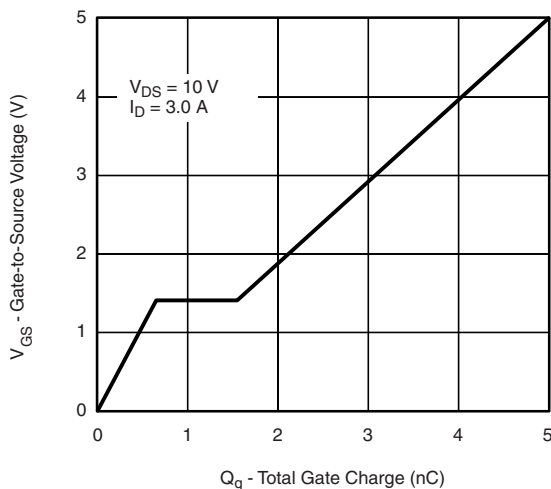
Transfer Characteristics



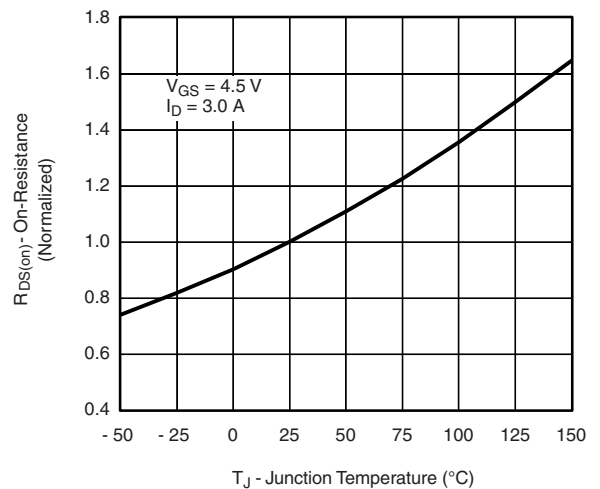
On-Resistance vs. Drain Current



Capacitance



Gate Charge



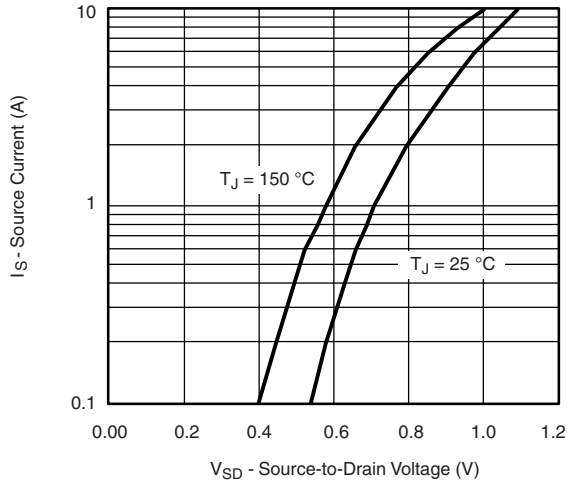
On-Resistance vs. Junction Temperature

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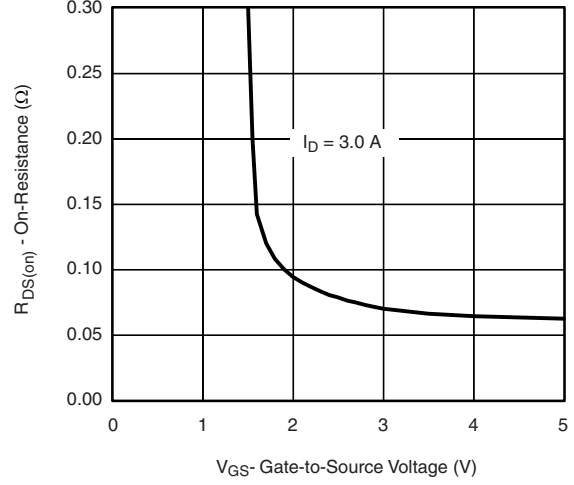
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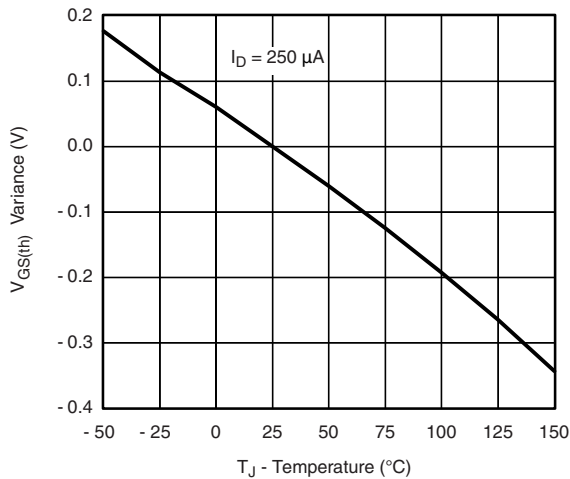
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



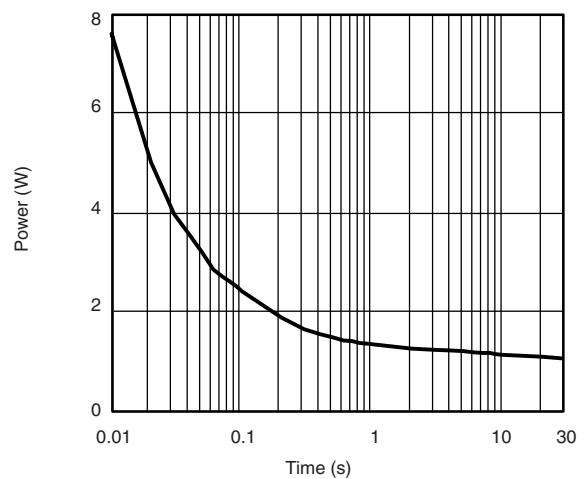
Source-Drain Diode Forward Voltage



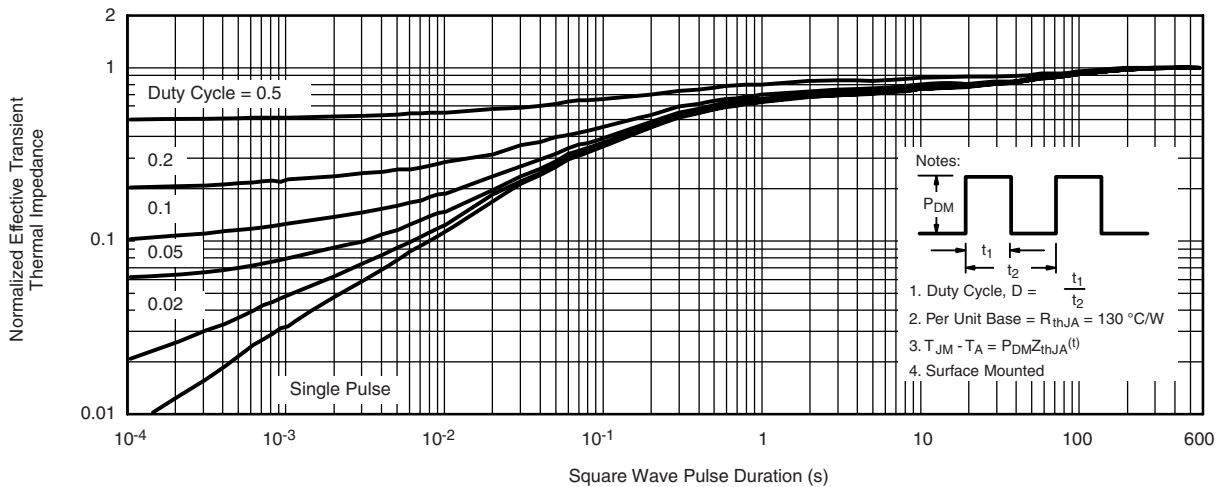
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient



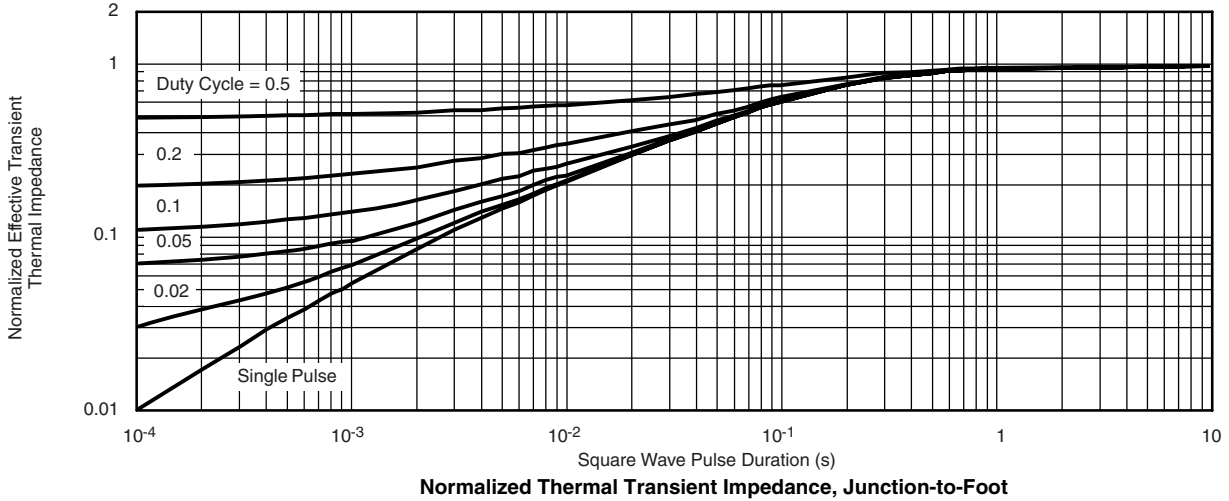
Normalized Thermal Transient Impedance, Junction-to-Ambient

- Notes:
- Duty Cycle, $D = \frac{t_1}{t_2}$
 - Per Unit Base = $R_{thJA} = 130 \text{ }^\circ\text{C/W}$
 - $T_{JM} - T_A = P_{DM}Z_{thJA}^{(t)}$
 - Surface Mounted

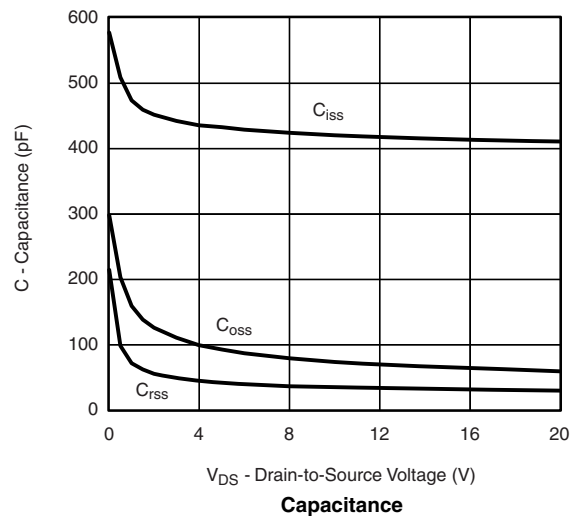
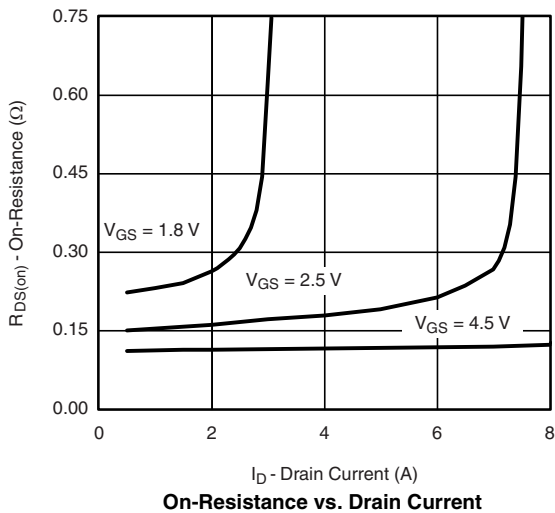
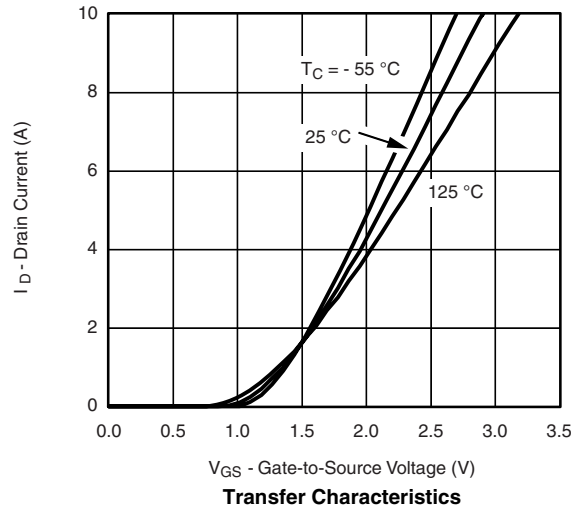
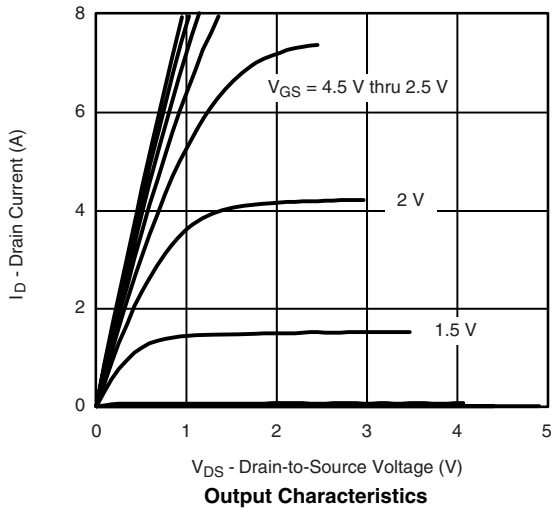


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N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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

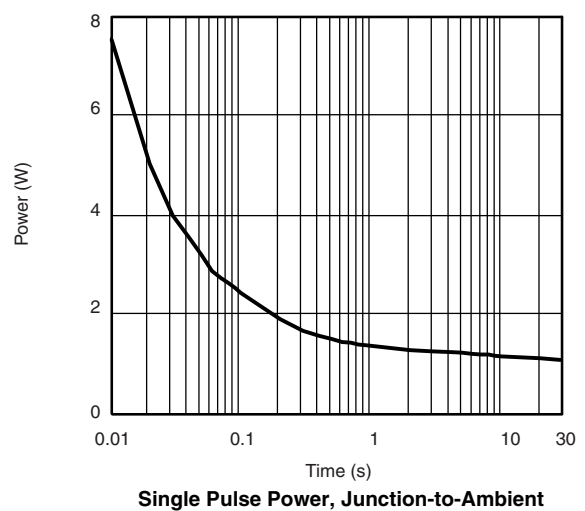
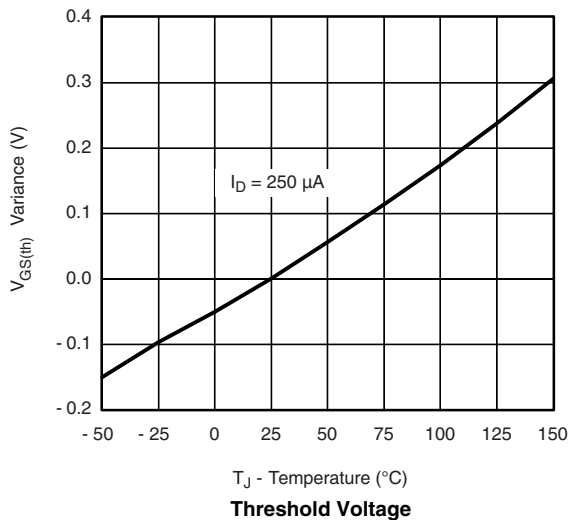
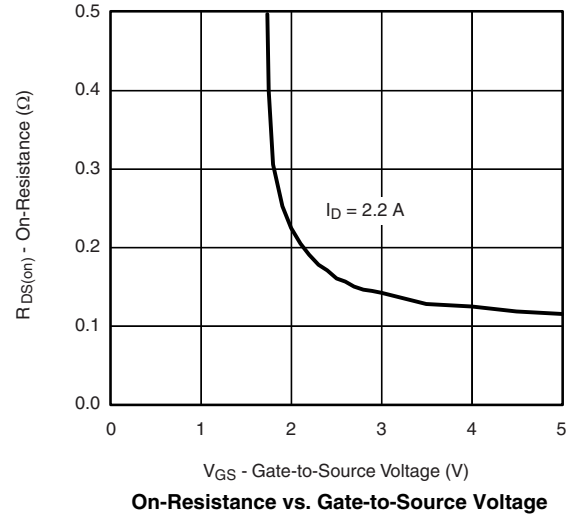
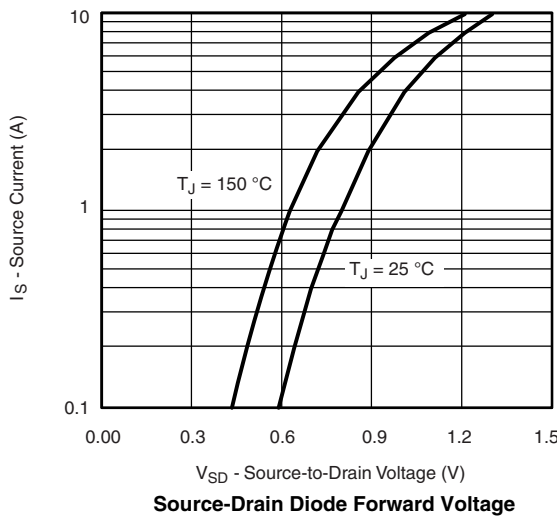
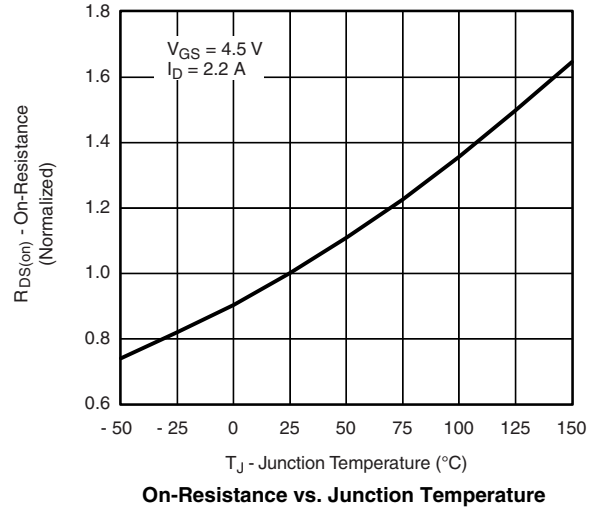
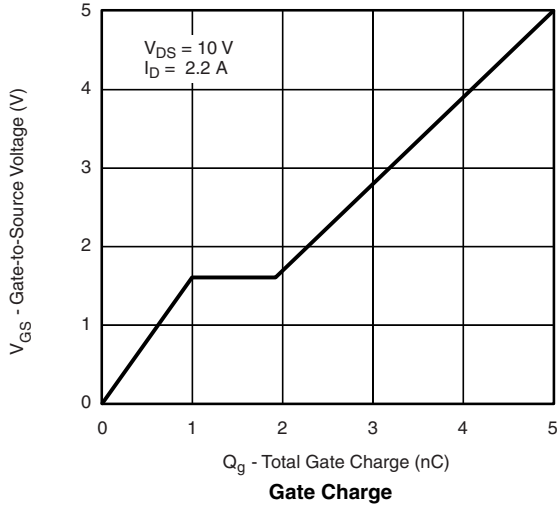


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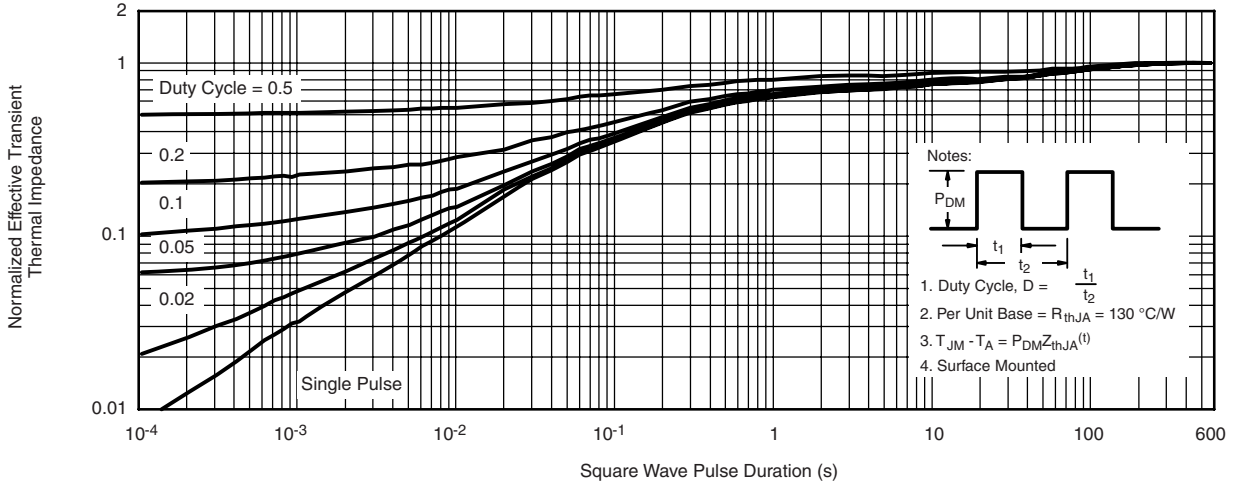


P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

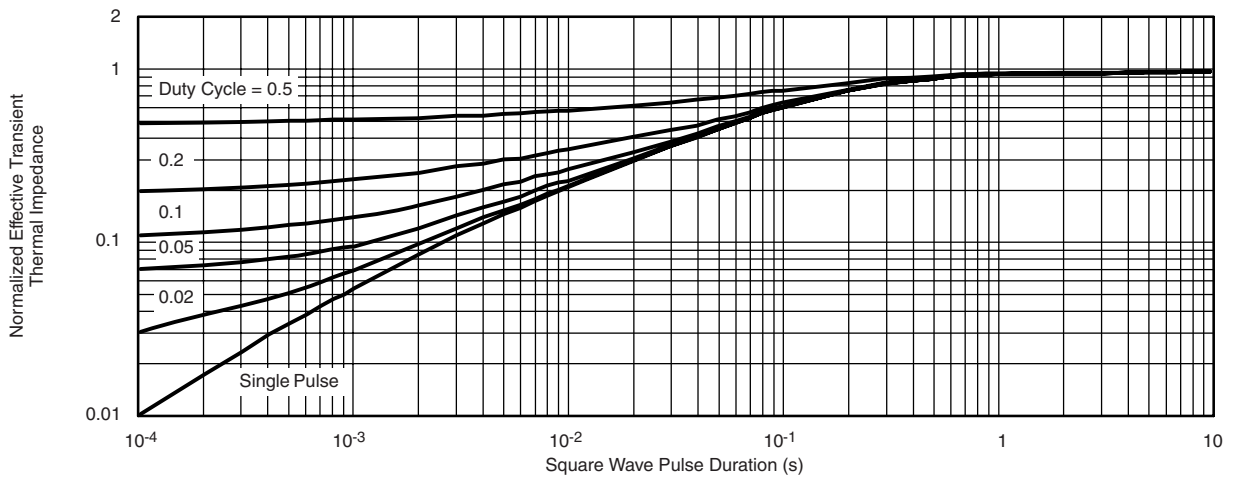




P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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