

N- and P-Channel 1.8 V (G-S) MOSFET

PRODUCT SUMMARY			
	V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)
N-Channel	12	0.235 at V _{GS} = 4.5 V	1.3
		0.280 at V _{GS} = 2.5 V	1.2
		0.340 at V _{GS} = 1.8 V	1.0
P-Channel	- 12	0.535 at V _{GS} = - 4.5 V	- 0.86
		0.880 at V _{GS} = - 2.5 V	- 0.67
		1.26 at V _{GS} = - 1.8 V	- 0.56

FEATURES

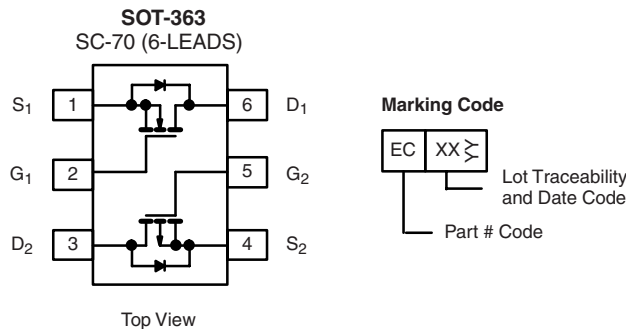
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFETs
- Thermally Enhanced SC-70 Package
- Fast Switching to Minimize Gate and Switching Losses
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Baseband dc-to-dc Converter Switch for Portable Electronics



Ordering Information: Si1557DH-T1-E3 (Lead (Pb)-free)
Si1557DH-T1-GE3 (Lead (Pb)-free and Halogen-free)

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}	12		- 12		V	
Gate-Source Voltage	V _{GS}	± 8					
Continuous Drain Current (T _J = 150 °C) ^a	I _D	T _A = 25 °C	1.3	1.2	- 0.86	- 0.77	A
		T _A = 85 °C	0.9	0.8	- 0.62	- 0.55	
Pulsed Drain Current	I _{DM}	3		- 2			
Continuous Source Current (Diode Conduction) ^a	I _S	0.5	0.39	- 0.5	- 0.39		
Maximum Power Dissipation ^a	P _D	T _A = 25 °C	0.6	0.47	0.6	0.47	W
		T _A = 85 °C	0.3	0.25	0.3	0.25	
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}	170	210	°C/W
	Steady State		220	265	
Maximum Junction-to-Foot (Drain)	Steady State	R _{thJF}	105	125	

Notes:

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

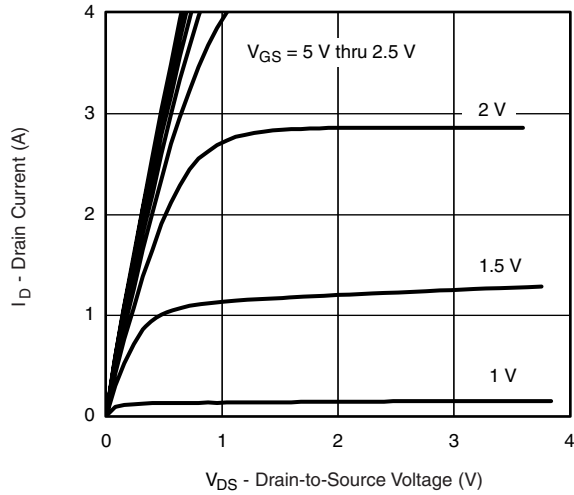
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted							
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Static							
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 100\ \mu\text{A}$	N-Ch	0.45		1	V
		$V_{DS} = V_{GS}, I_D = -100\ \mu\text{A}$	P-Ch	-0.45		1	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\ \text{V}, V_{GS} = \pm 8\ \text{V}$	N-Ch P-Ch			± 100 ± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 9.6\ \text{V}, V_{GS} = 0\ \text{V}$	N-Ch			1	μA
		$V_{DS} = -9.6\ \text{V}, V_{GS} = 0\ \text{V}$	P-Ch			-1	
		$V_{DS} = 9.6\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 85\text{ }^\circ\text{C}$	N-Ch			5	
		$V_{DS} = -9.6\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 85\text{ }^\circ\text{C}$	P-Ch			-5	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\ \text{V}, V_{GS} = 4.5\ \text{V}$	N-Ch	3			A
		$V_{DS} \leq -5\ \text{V}, V_{GS} = -4.5\ \text{V}$	P-Ch	-2			
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 4.5\ \text{V}, I_D = 1.2\ \text{A}$	N-Ch		0.195	0.235	Ω
		$V_{GS} = -4.5\ \text{V}, I_D = -0.77\ \text{A}$	P-Ch		0.445	0.535	
		$V_{GS} = 2.5\ \text{V}, I_D = 1.0\ \text{A}$	N-Ch		0.230	0.280	
		$V_{GS} = -2.5\ \text{V}, I_D = -0.6\ \text{A}$	P-Ch		0.735	0.880	
		$V_{GS} = 1.8\ \text{V}, I_D = 0.2\ \text{A}$	N-Ch		0.284	0.340	
		$V_{GS} = -1.8\ \text{V}, I_D = -0.2\ \text{A}$	P-Ch		1.05	1.26	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 5\ \text{V}, I_D = 1.2\ \text{A}$	N-Ch		0.8		S
		$V_{DS} = -5\ \text{V}, I_D = -0.77\ \text{A}$	P-Ch		1.2		
Diode Forward Voltage ^a	V_{SD}	$I_S = 0.39\ \text{A}, V_{GS} = 0\ \text{V}$	N-Ch		0.8	1.2	V
		$I_S = -0.39\ \text{A}, V_{GS} = 0\ \text{V}$	P-Ch		-0.8	-1.2	
Dynamic^b							
Total Gate Charge	Q_g	N-Channel $V_{DS} = 6\ \text{V}, V_{GS} = 4.5\ \text{V}, I_D = 1.2\ \text{A}$ P-Channel $V_{DS} = -6\ \text{V}, V_{GS} = -4.5\ \text{V}, I_D = -0.1\ \text{A}$	N-Ch		0.8	1.2	nC
Gate-Source Charge	Q_{gs}		N-Ch		0.15		
Gate-Drain Charge	Q_{gd}		P-Ch		0.3		
Turn-On Delay Time	$t_{d(on)}$	N-Channel $V_{DD} = 6\ \text{V}, R_L = 12\ \Omega$ $I_D \cong 0.5\ \text{A}, V_{GEN} = 4.5\ \text{V}, R_g = 6\ \Omega$ P-Channel $V_{DD} = -6\ \text{V}, R_L = 12\ \Omega$ $I_D \cong -0.5\ \text{A}, V_{GEN} = -4.5\ \text{V}, R_g = 6\ \Omega$	N-Ch		15	25	ns
Rise Time	t_r		N-Ch		25	40	
			P-Ch		30	45	
Turn-Off Delay Time	$t_{d(off)}$		N-Ch		25	40	
			P-Ch		15	25	
Fall Time	t_f		N-Ch		10	15	
		P-Ch		10	15		
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 0.39\ \text{A}, dl/dt = 100\ \text{A}/\mu\text{s}$	N-Ch		20	40	
		$I_F = -0.39\ \text{A}, dl/dt = 100\ \text{A}/\mu\text{s}$	P-Ch		25	40	

Notes:

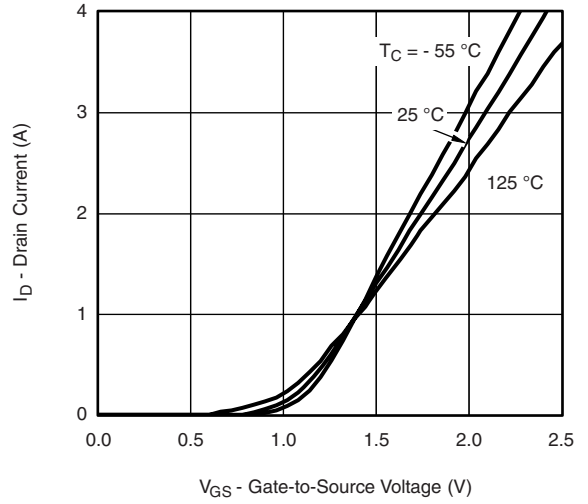
- a. Pulse test; pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

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.

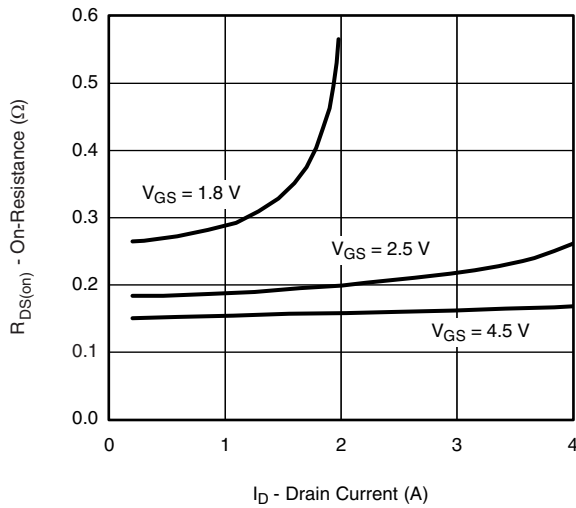
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



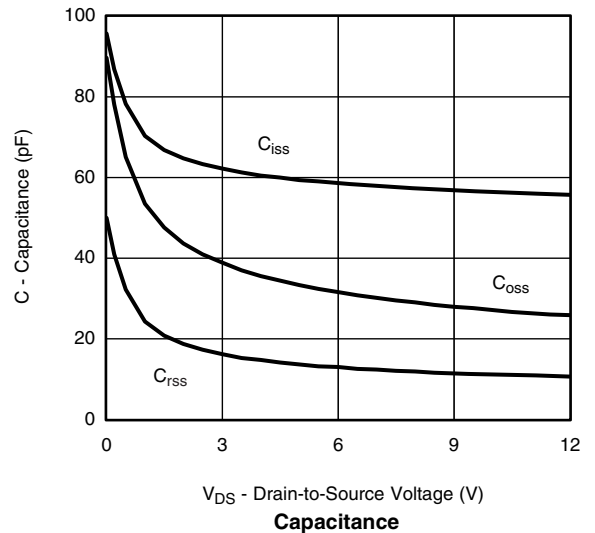
Output Characteristics



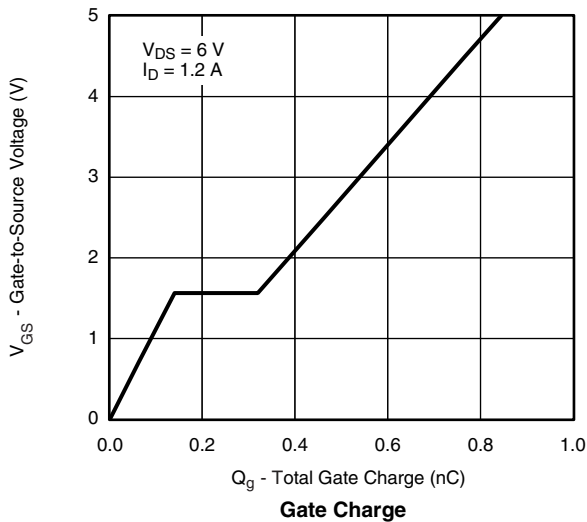
Transfer Characteristics



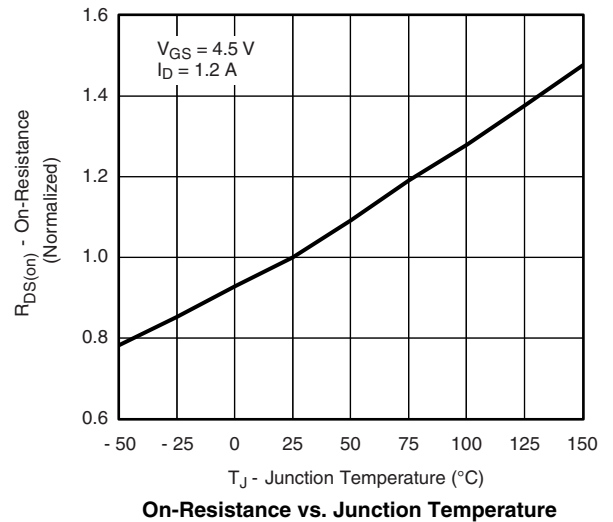
On-Resistance vs. Drain Current



Capacitance

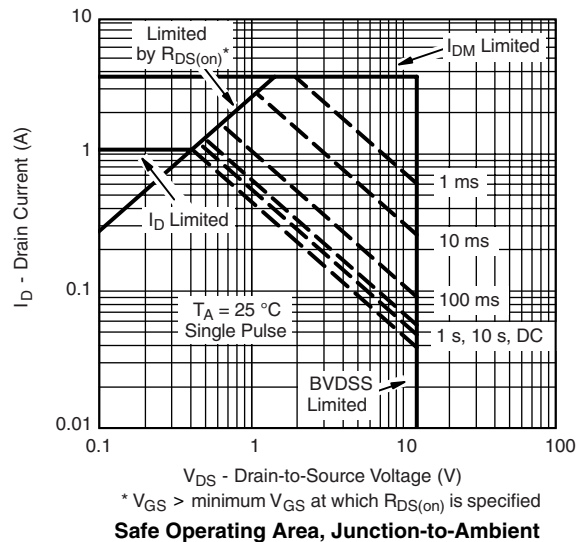
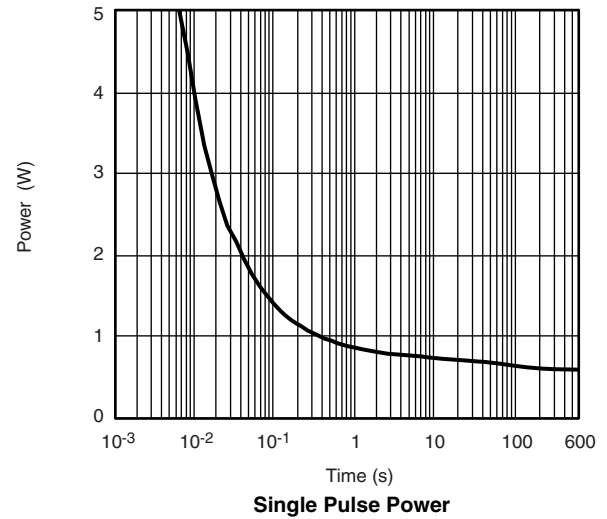
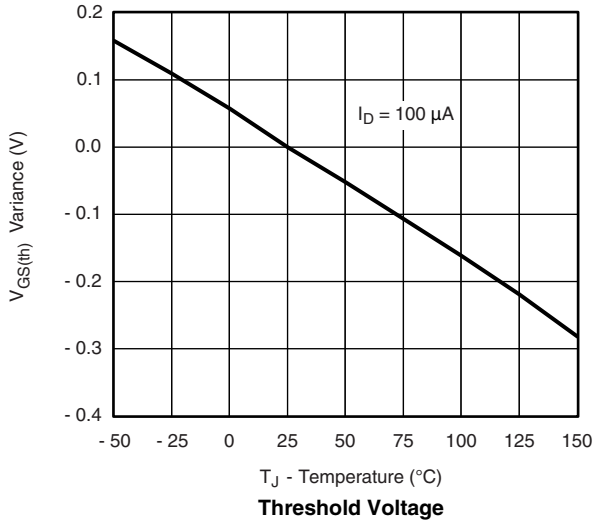
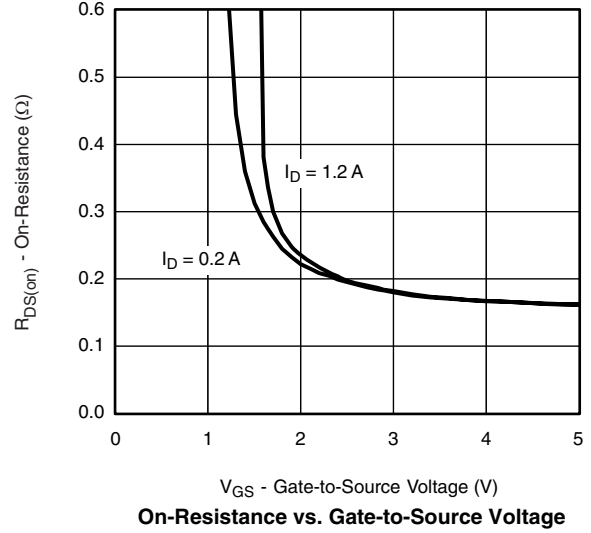
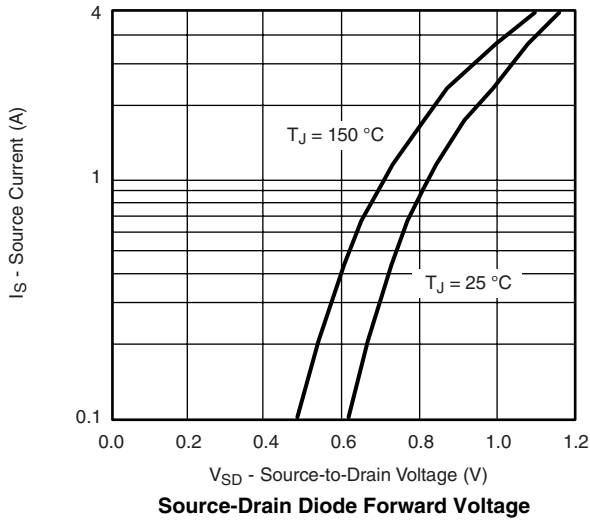


Gate Charge

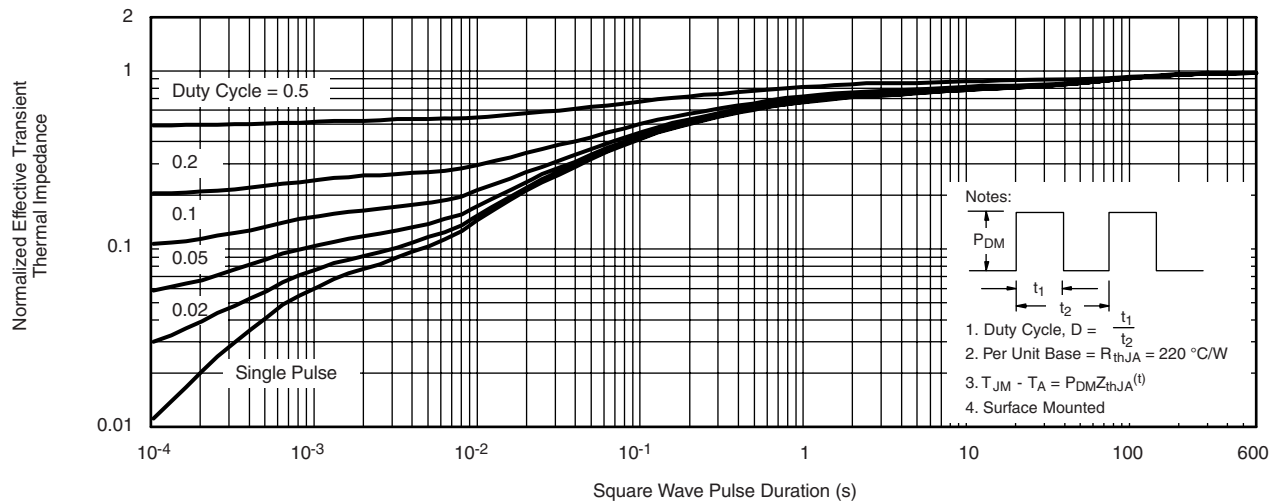


On-Resistance vs. Junction Temperature

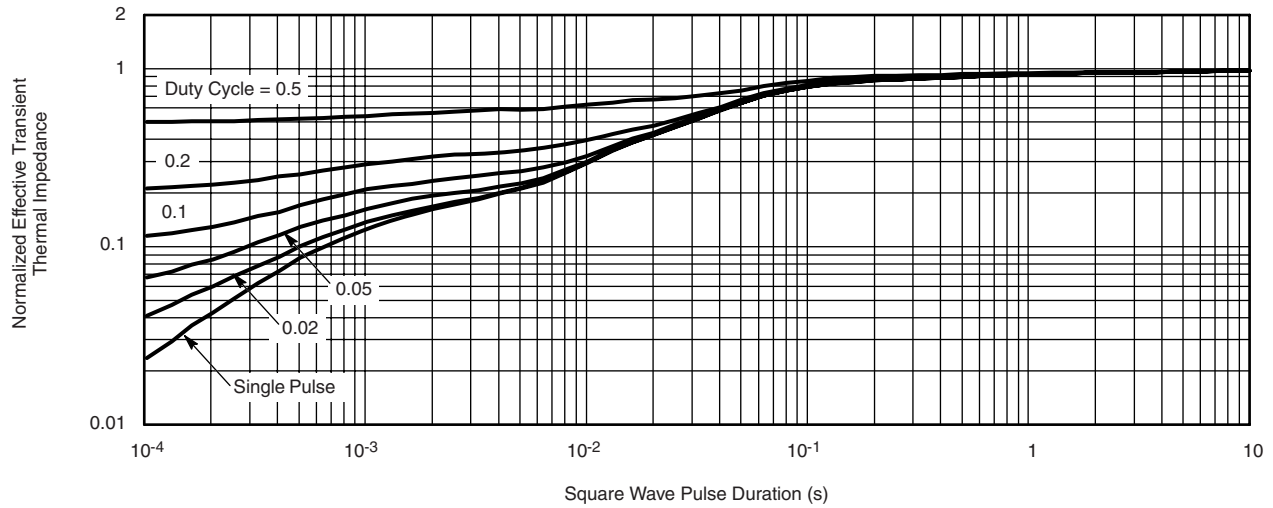
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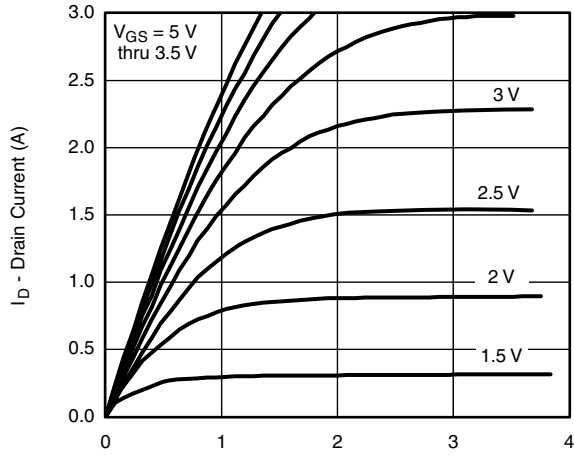


Normalized Thermal Transient Impedance, Junction-to-Ambient

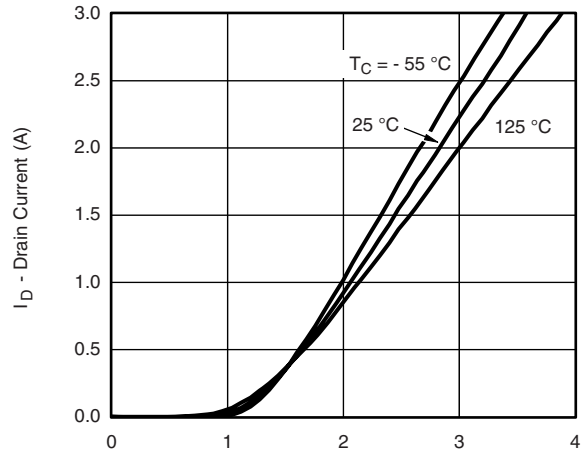


Normalized Thermal Transient Impedance, Junction-to-Foot

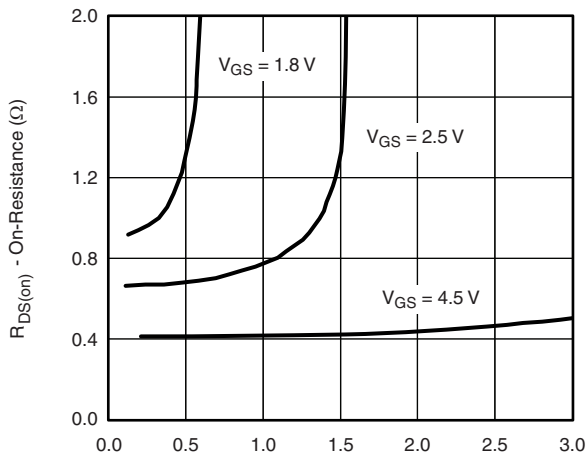
P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



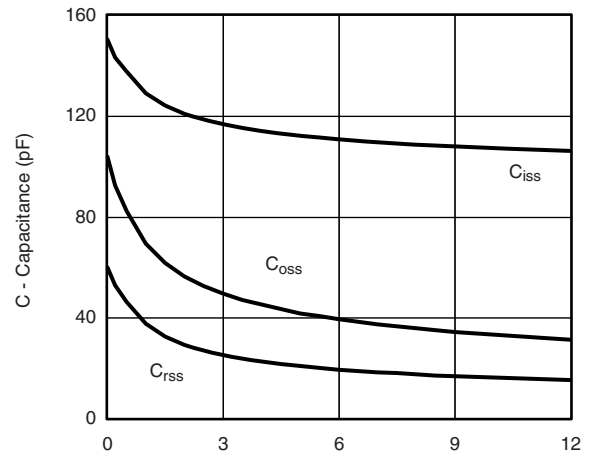
V_{DS} - Drain-to-Source Voltage (V)
Output Characteristics



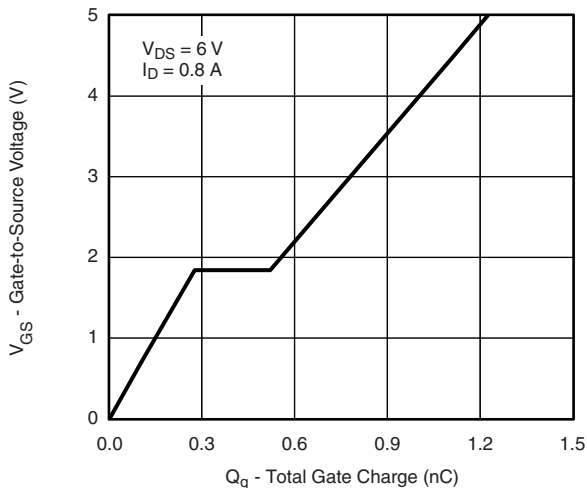
V_{GS} - Gate-to-Source Voltage (V)
Transfer Characteristics



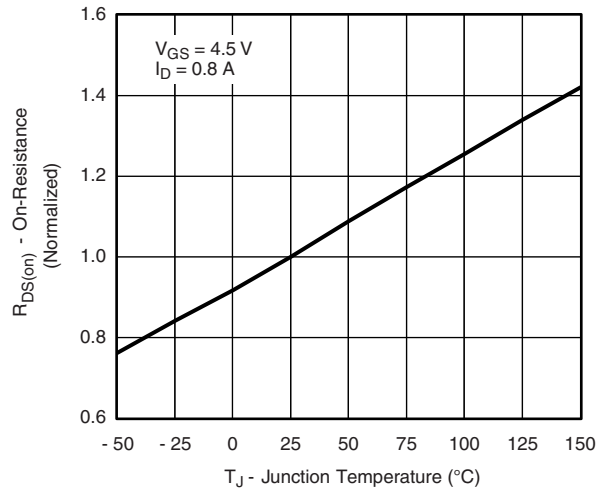
I_D - Drain Current (A)
On-Resistance vs. Drain Current



V_{DS} - Drain-to-Source Voltage (V)
Capacitance

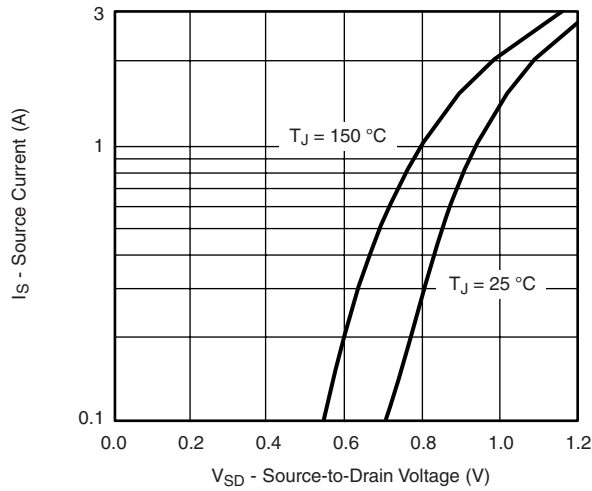


Q_g - Total Gate Charge (nC)
Gate Charge

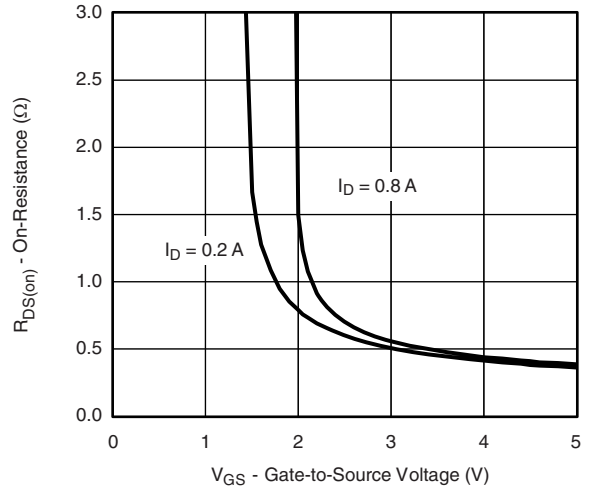


T_J - Junction Temperature ($^\circ\text{C}$)
On-Resistance vs. Junction Temperature

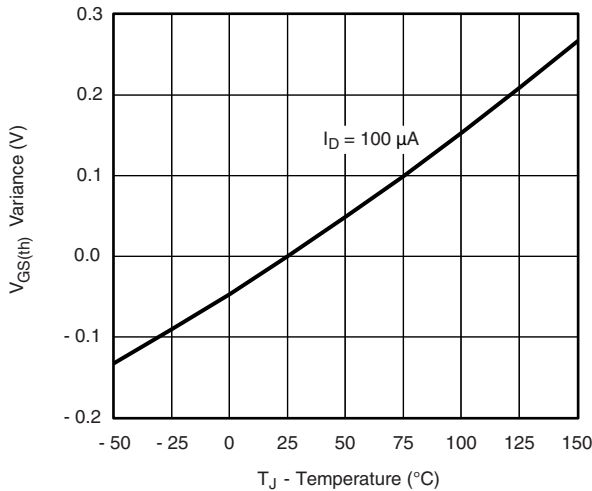
P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



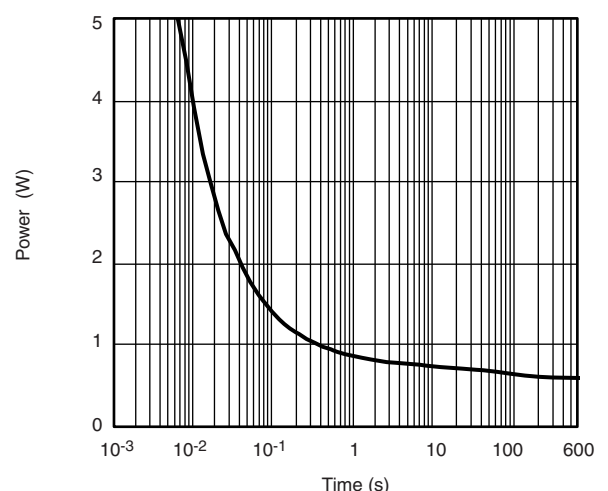
Source-Drain Diode Forward Voltage



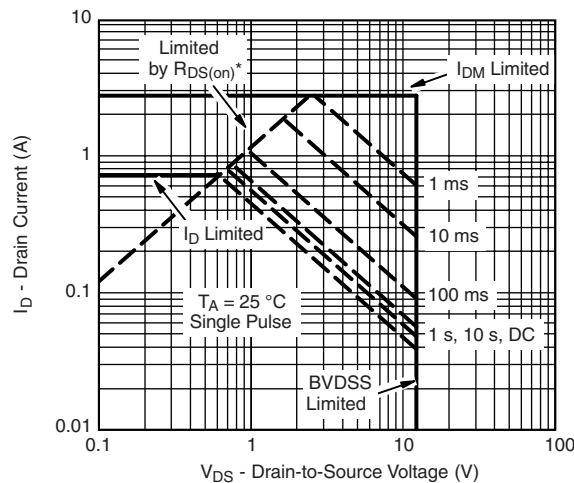
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



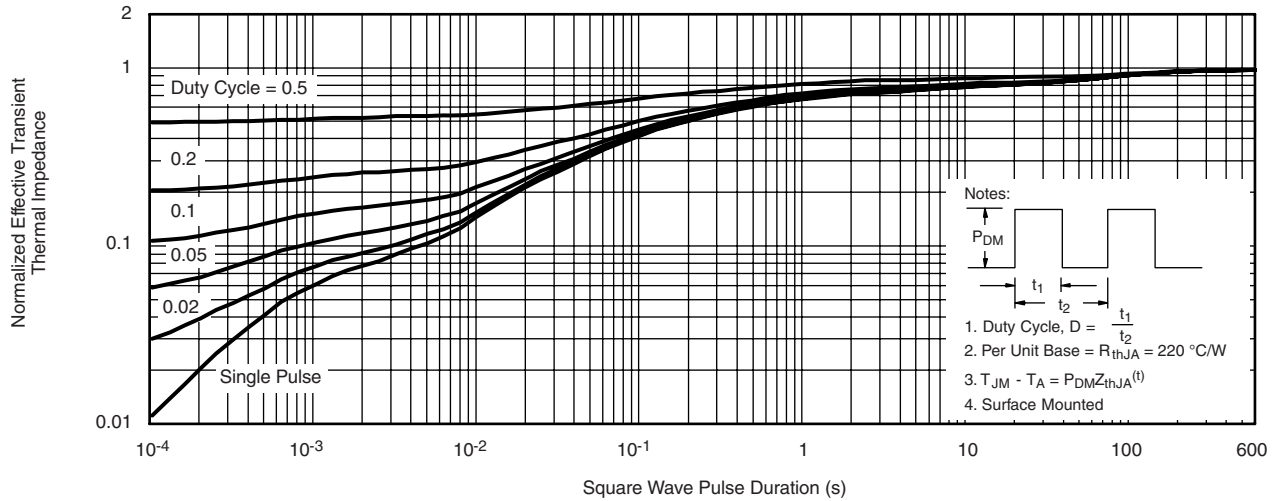
Single Pulse Power



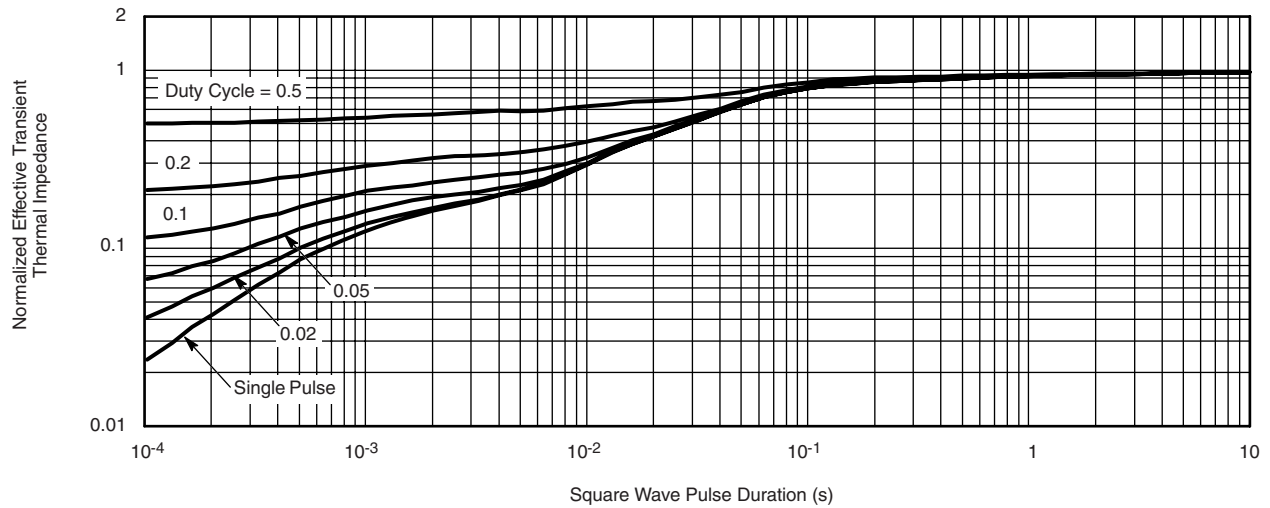
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

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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