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

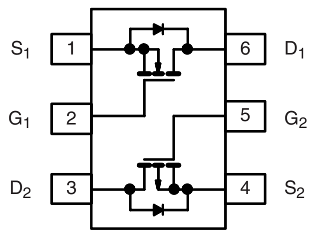
- **Halogen-free According to IEC 61249-2-21 Definition**
- TrenchFET® Power MOSFETs
- Thermally Enhanced SC-70 Package
- Fast Switching to Minimize Gate and Switching Losses
- Compliant to RoHS Directive 2002/95/EC

Pb-free
RoHS COMPLIANT
HALOGEN FREE Available

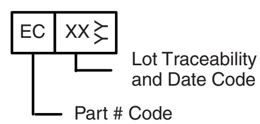
APPLICATIONS

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

SOT-363
SC-70 (6-LEADS)



Top View



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 5 s	N-Channel Steady State	P-Channel 5 s	P-Channel Steady State	Unit
Drain-Source Voltage		V_{DS}	12		- 12		V
Gate-Source Voltage		V_{GS}	± 8				V
Continuous Drain Current (T_J = 150 °C)[a]	T_A = 25 °C	I_D	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]	T_A = 25 °C	P_D	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	

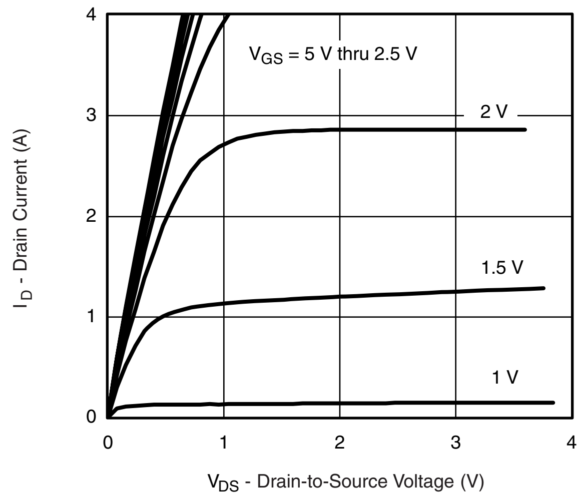
Notes:
a. Surface mounted on 1" x 1" FR4 board.

SPECIFICATIONS T_J = 25 °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 µA	N-Ch	0.45		1	V
		$V_{DS} = V_{GS}$, I_D = - 100 µA	P-Ch	- 0.45		1	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 8 V	N-Ch			± 100	nA
			P-Ch			± 100	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 9.6 V, V_{GS} = 0 V	N-Ch			1	µA
		V_{DS} = - 9.6 V, V_{GS} = 0 V	P-Ch			- 1	
		V_{DS} = 9.6 V, V_{GS} = 0 V, T_J = 85 °C	N-Ch			5	
		V_{DS} = - 9.6 V, V_{GS} = 0 V, T_J = 85 °C	P-Ch			- 5	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq$ 5 V, V_{GS} = 4.5 V	N-Ch	3			A
		$V_{DS} \leq$ - 5 V, V_{GS} = - 4.5 V	P-Ch	- 2			
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 1.2 A	N-Ch		0.195	0.235	Ω
		V_{GS} = - 4.5 V, I_D = - 0.77 A	P-Ch		0.445	0.535	
		V_{GS} = 2.5 V, I_D = 1.0 A	N-Ch		0.230	0.280	
		V_{GS} = - 2.5 V, I_D = - 0.6 A	P-Ch		0.735	0.880	
		V_{GS} = 1.8 V, I_D = 0.2 A	N-Ch		0.284	0.340	
		V_{GS} = - 1.8 V, I_D = - 0.2 A	P-Ch		1.05	1.26	
Forward Transconductance[a]	g_{fs}	V_{DS} = 5 V, I_D = 1.2 A	N-Ch		0.8		S
		V_{DS} = - 5 V, I_D = - 0.77 A	P-Ch		1.2		
Diode Forward Voltage[a]	V_{SD}	I_S = 0.39 A, V_{GS} = 0 V	N-Ch		0.8	1.2	V
		I_S = - 0.39 A, V_{GS} = 0 V	P-Ch		- 0.8	- 1.2	
Dynamic[b]							
Total Gate Charge	Q_g	N-Channel V_{DS} = 6 V, V_{GS} = 4.5 V, I_D = 1.2 A P-Channel V_{DS} = - 6 V, V_{GS} = - 4.5 V, I_D = - 0.1 A	N-Ch		0.8	1.2	nC
			P-Ch		1.1	1.8	
Gate-Source Charge	Q_{gs}		N-Ch		0.15		
			P-Ch		0.3		
Gate-Drain Charge	Q_{gd}		N-Ch		0.20		
			P-Ch		0.25		
Turn-On Delay Time	$t_{d(on)}$	N-Channel V_{DD} = 6 V, R_L = 12 Ω $I_D \cong$ 0.5 A, V_{GEN} = 4.5 V, R_g = 6 Ω P-Channel V_{DD} = - 6 V, R_L = 12 Ω $I_D \cong$ - 0.5 A, V_{GEN} = - 4.5 V, R_g = 6 Ω	N-Ch		15	25	ns
			P-Ch		17	25	
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 A, dI/dt = 100 A/µs	N-Ch		20	40	
		I_F = - 0.39 A, dI/dt = 100 A/µs	P-Ch		25	40	

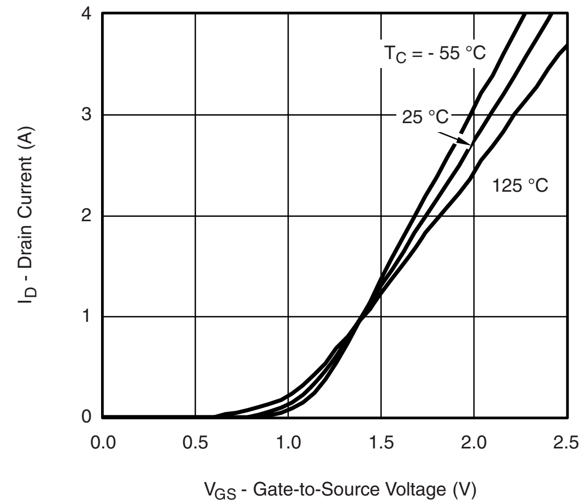
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

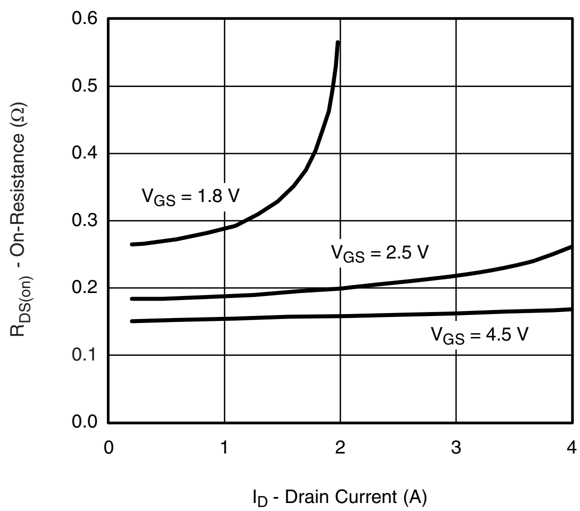
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



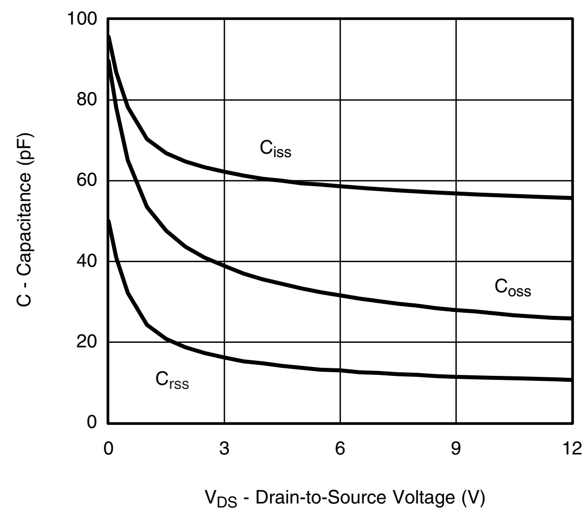
Output Characteristics



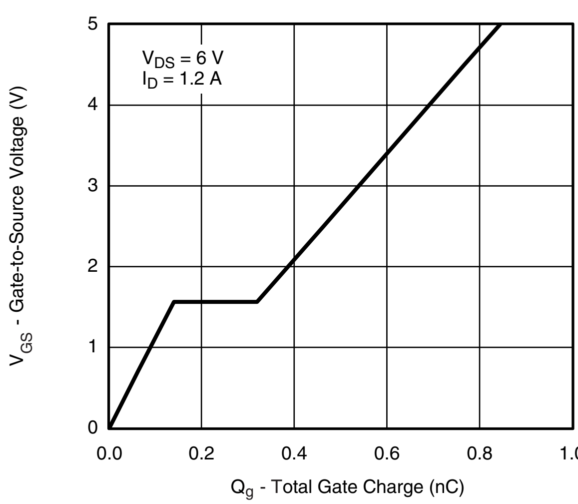
Transfer Characteristics



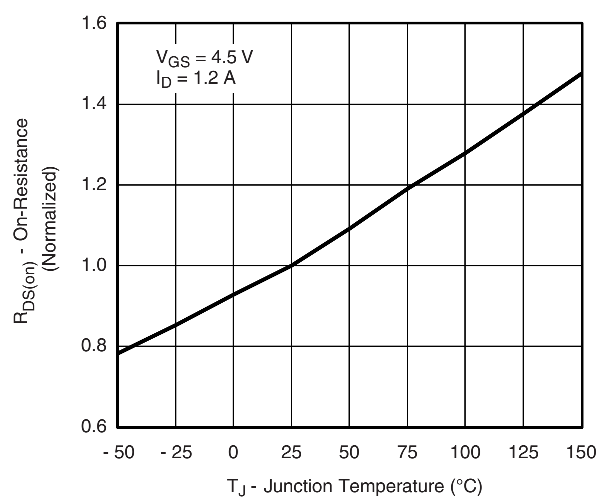
On-Resistance vs. Drain Current



Capacitance

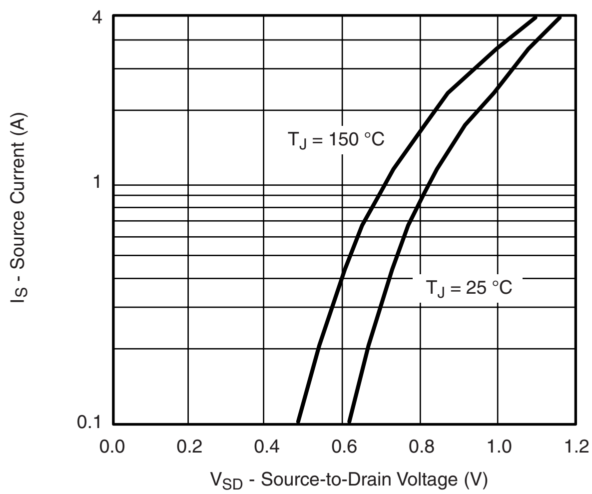


Gate Charge

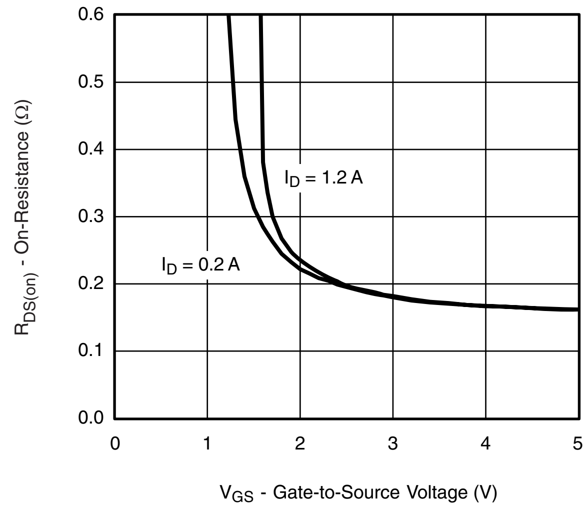


On-Resistance vs. Junction Temperature

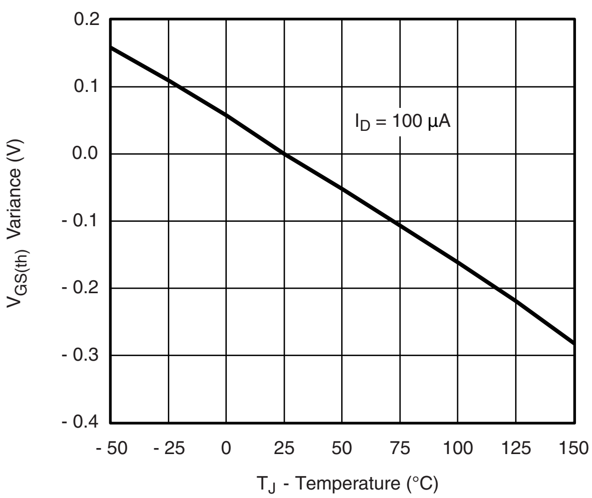
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



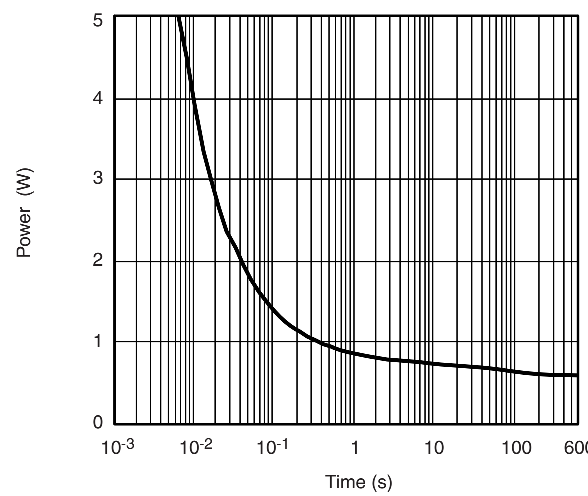
Source-Drain Diode Forward Voltage



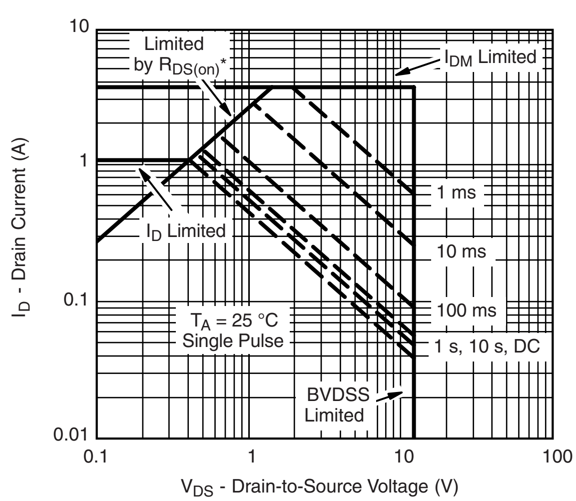
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



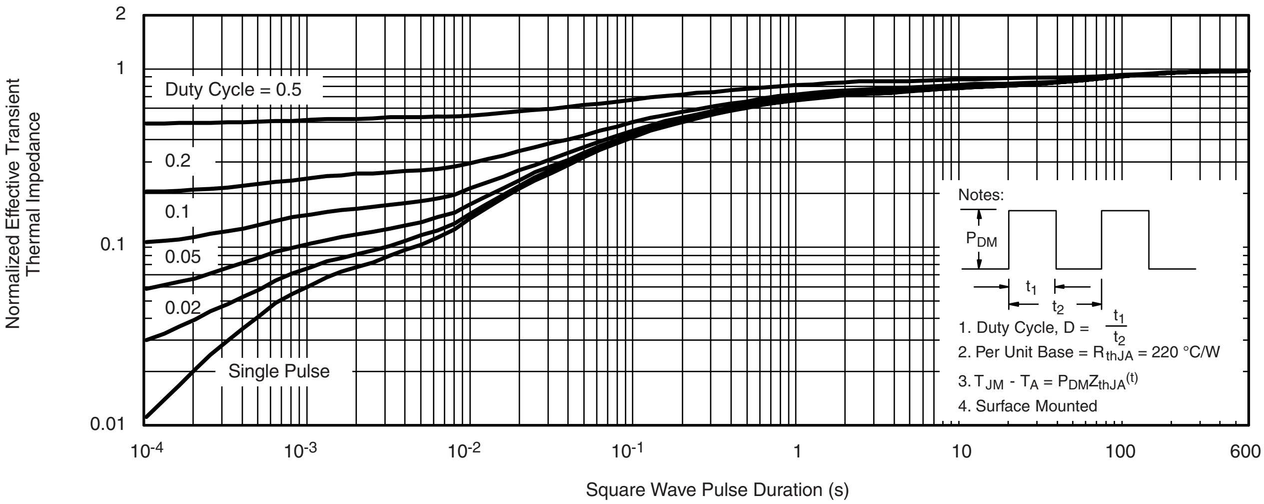
Single Pulse Power



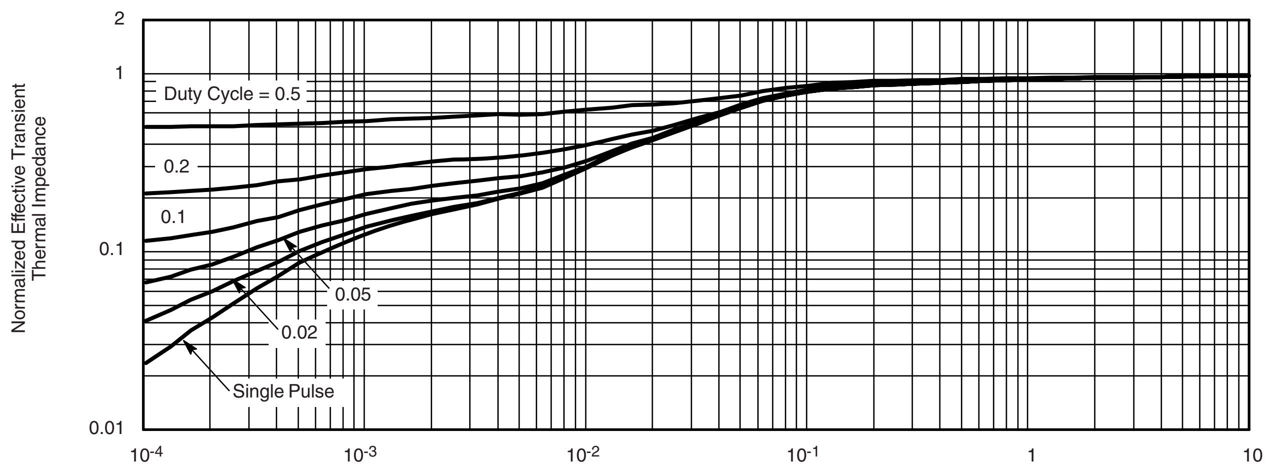
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

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

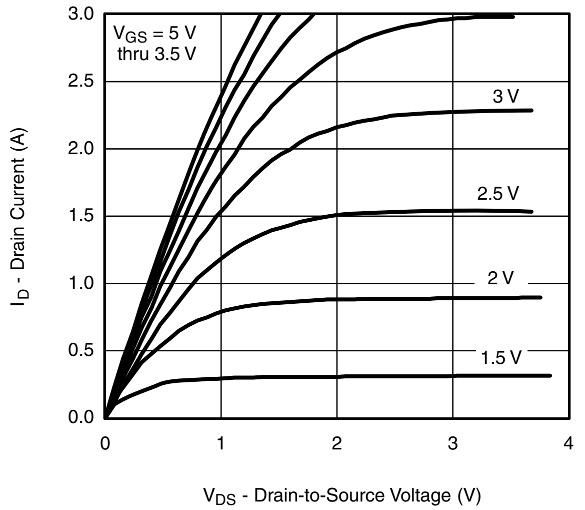


Normalized Thermal Transient Impedance, Junction-to-Ambient

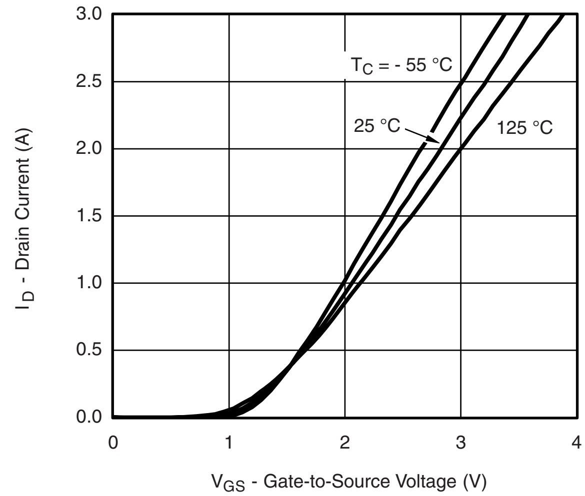


Normalized Thermal Transient Impedance, Junction-to-Foot

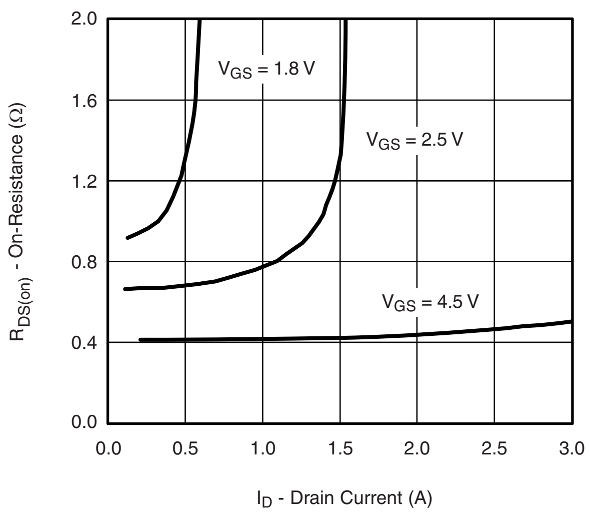
P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



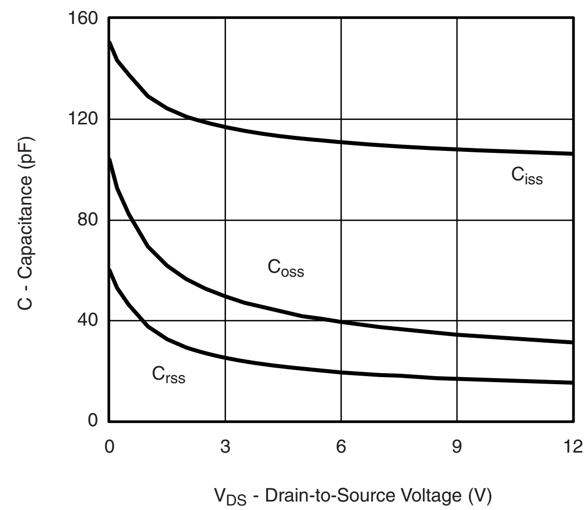
Output Characteristics



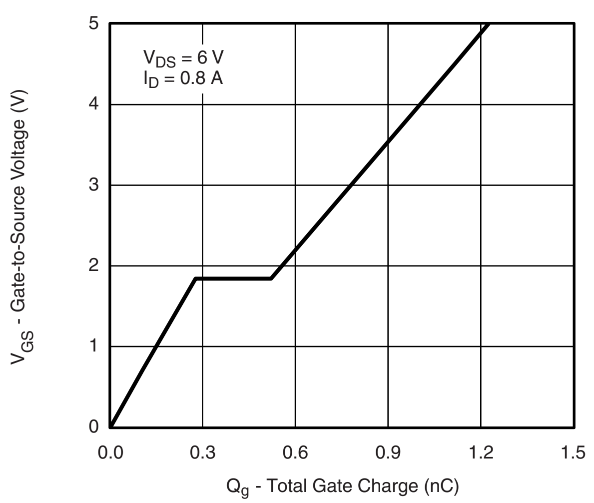
Transfer Characteristics



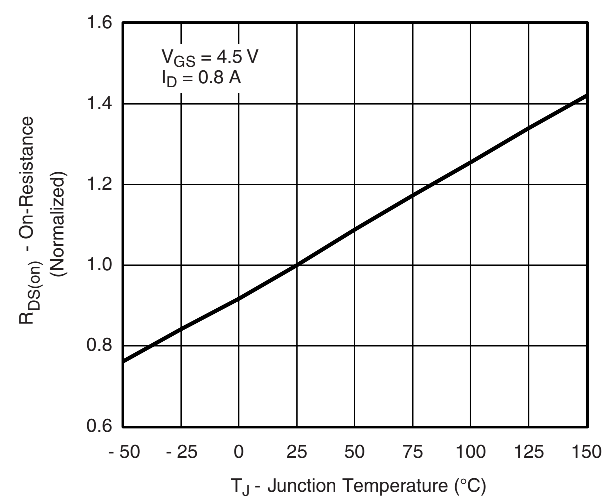
On-Resistance vs. Drain Current



Capacitance

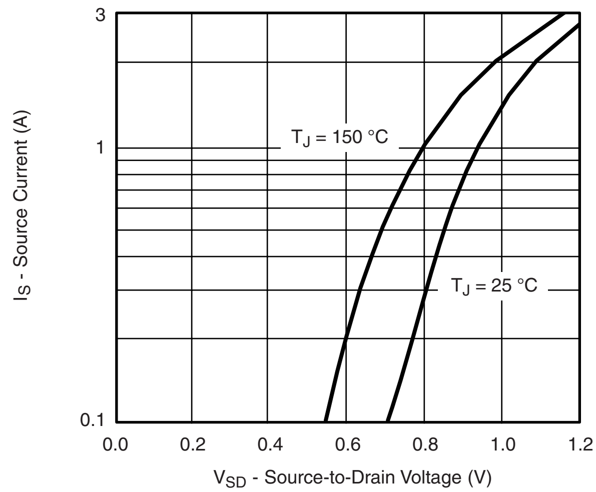


Gate Charge

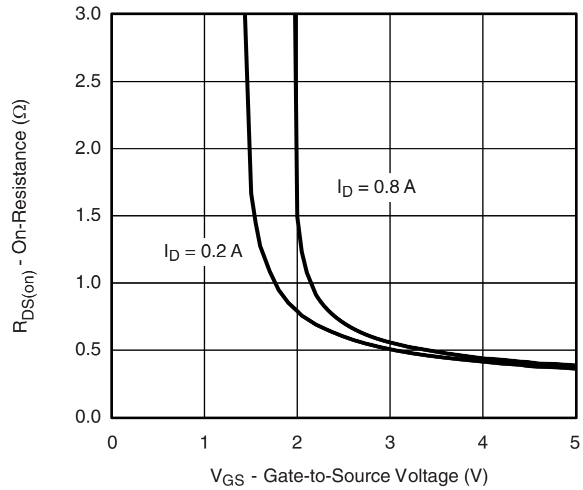


On-Resistance vs. Junction Temperature

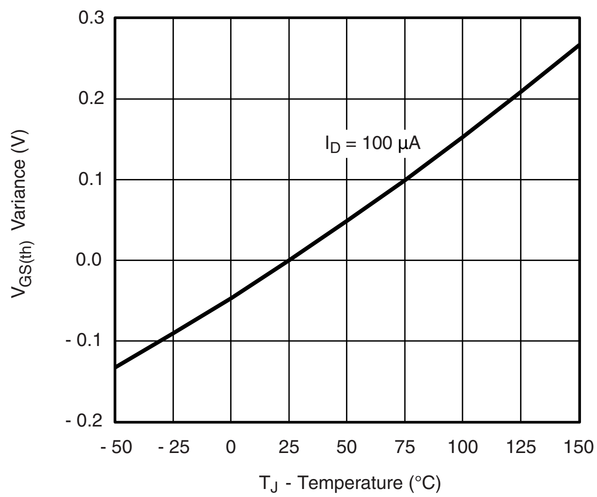
P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



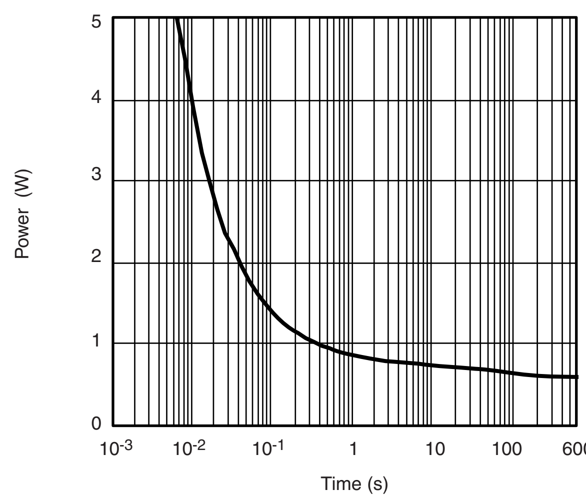
Source-Drain Diode Forward Voltage



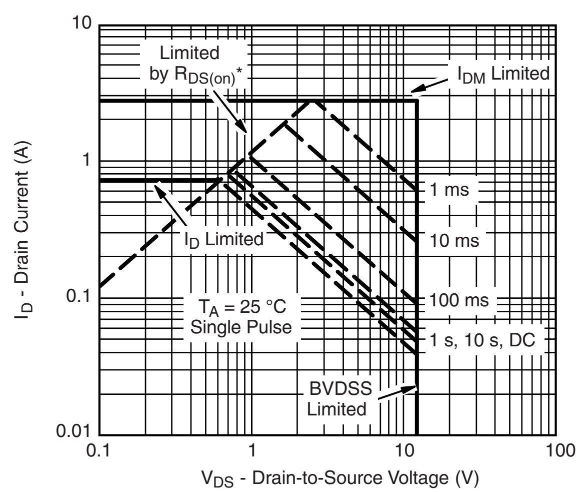
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power



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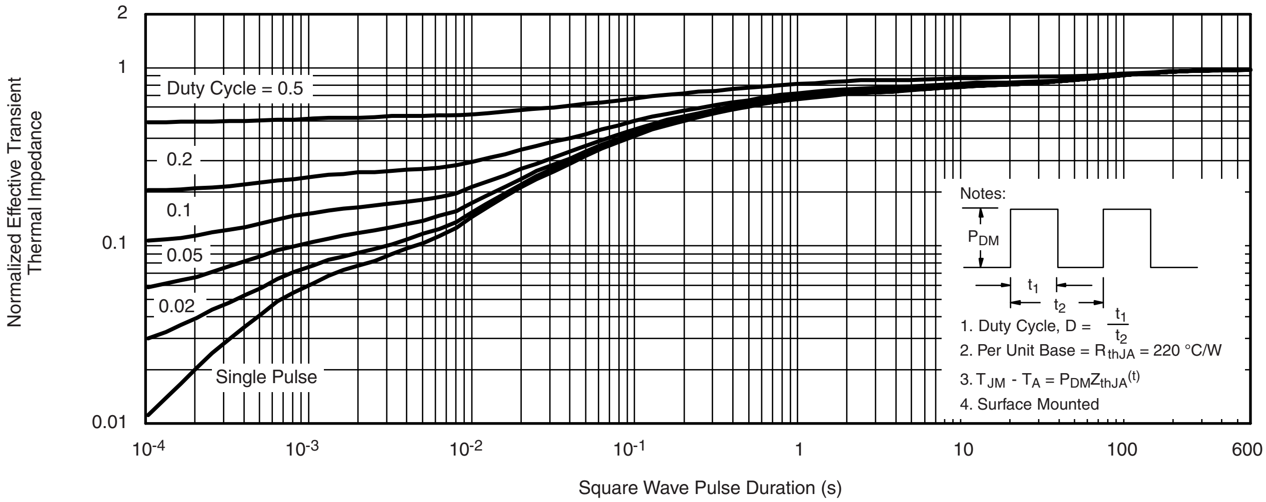
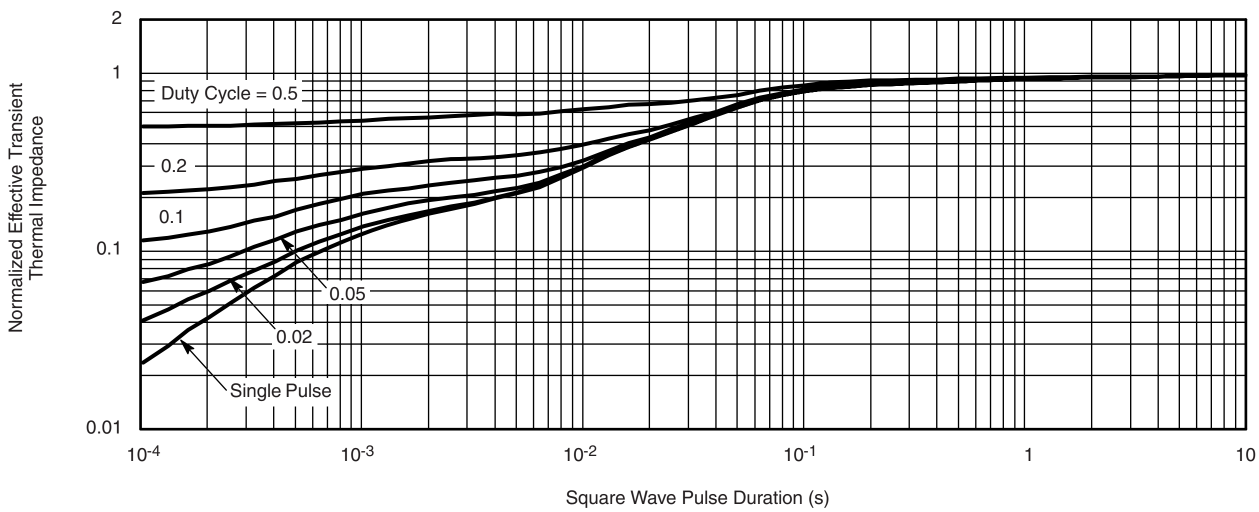
Safe Operating Area, Junction-to-Ambient

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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