

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

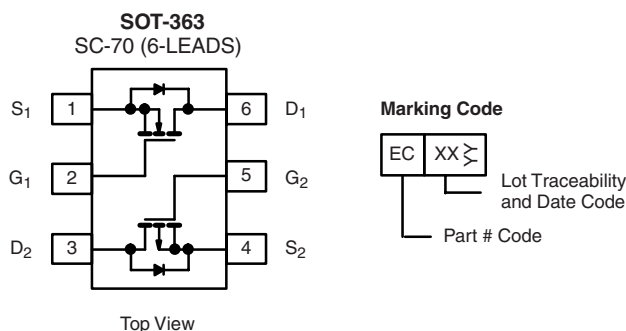
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFETs
- Thermally Enhanced SC-70 Package
- Fast Switching to Minimize Gate and Switching Losses
- Compliant to RoHS Directive 2002/95/EC



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	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	R _{thJA}	170	210	°C/W
		220	265	
Maximum Junction-to-Foot (Drain)	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 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 P-Ch			± 100 ± 100	nA	
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} ≥ 5 V, V _{GS} = 4.5 V	N-Ch	3			A	
		V _{DS} ≤ - 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	N-Ch P-Ch		0.8 1.1	1.2 1.8	nC	
Gate-Source Charge	Q _{gs}		N-Ch P-Ch		0.15 0.3			
Gate-Drain Charge	Q _{gd}	P-Channel V _{DS} = - 6 V, V _{GS} = - 4.5 V, I _D = - 0.1 A	N-Ch P-Ch		0.20 0.25			
Turn-On Delay Time	t _{d(on)}	N-Channel V _{DD} = 6 V, R _L = 12 Ω I _D ≅ 0.5 A, V _{GEN} = 4.5 V, R _g = 6 Ω	N-Ch P-Ch		15 17	25 25	ns	
Rise Time	t _r		N-Ch P-Ch		25 30	40 45		
Turn-Off Delay Time	t _{d(off)}		P-Channel V _{DD} = - 6 V, R _L = 12 Ω	N-Ch P-Ch		25 15		40 25
Fall Time	t _f		I _D ≅ - 0.5 A, V _{GEN} = - 4.5 V, R _g = 6 Ω	N-Ch P-Ch		10 10		15 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		

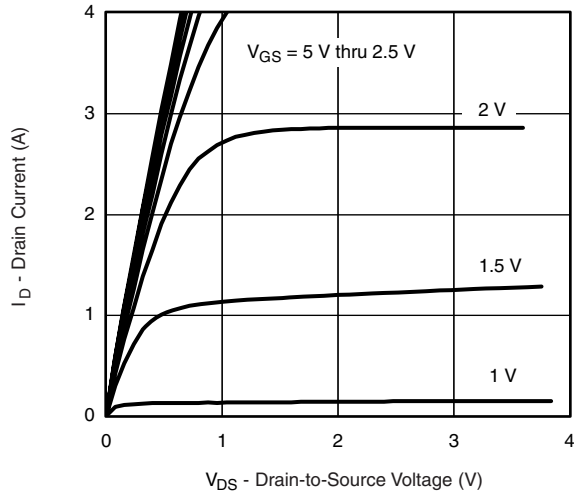
Notes:

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

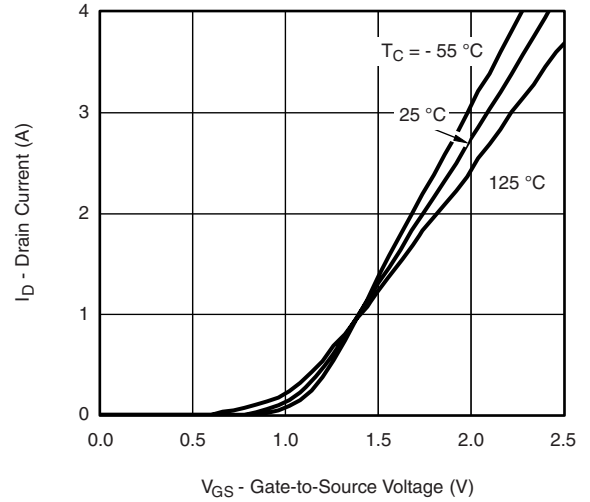
b. Guaranteed by design, not subject to production testing.

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.

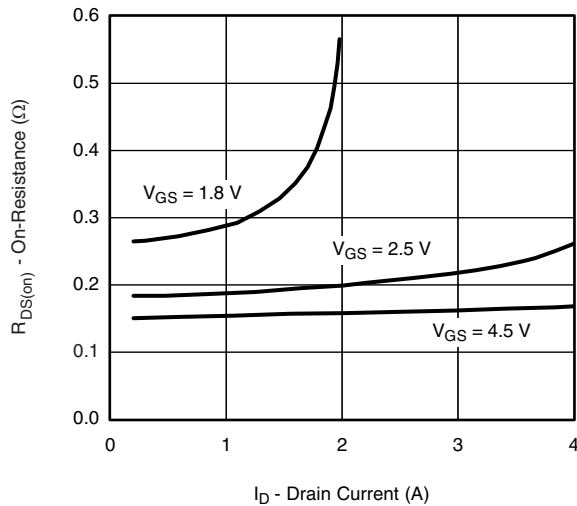
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



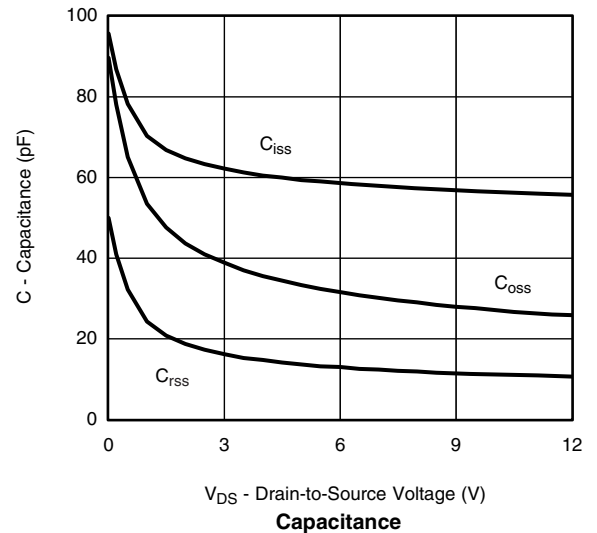
Output Characteristics



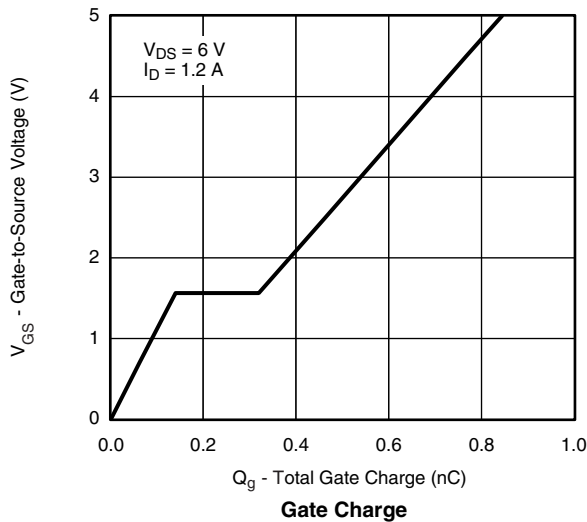
Transfer Characteristics



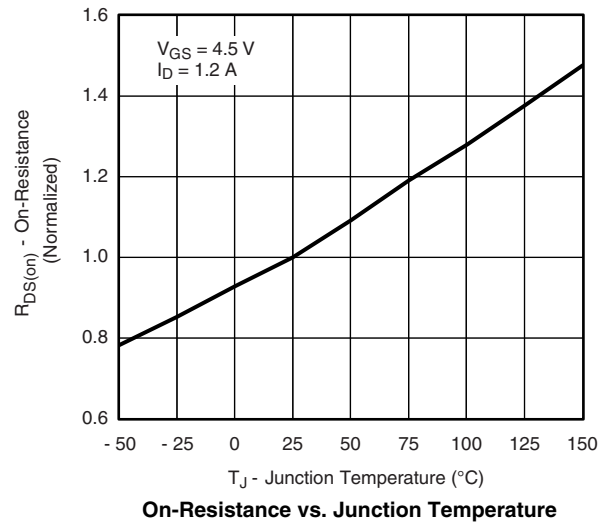
On-Resistance vs. Drain Current



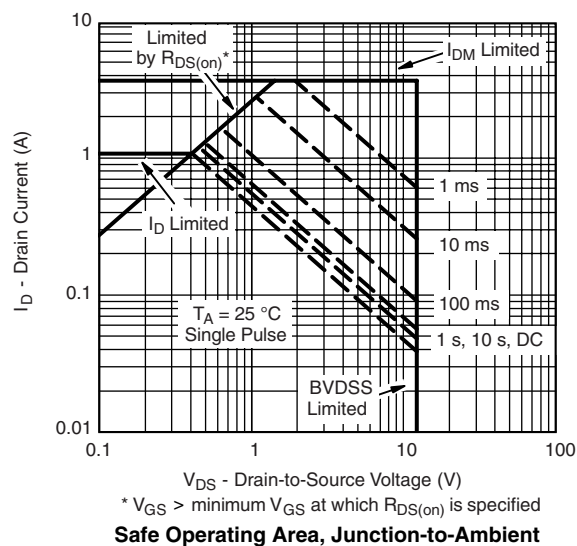
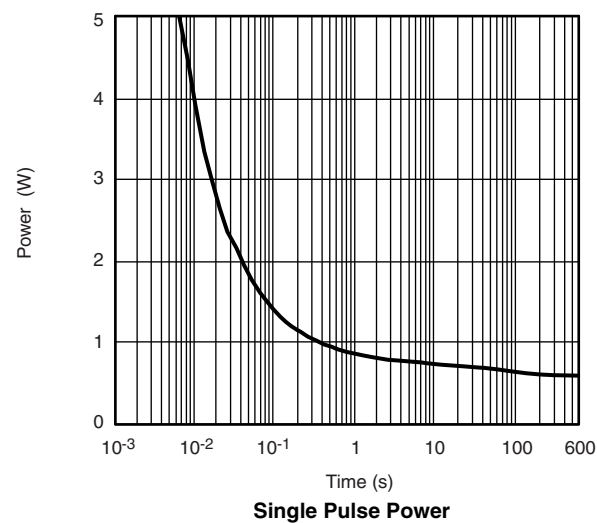
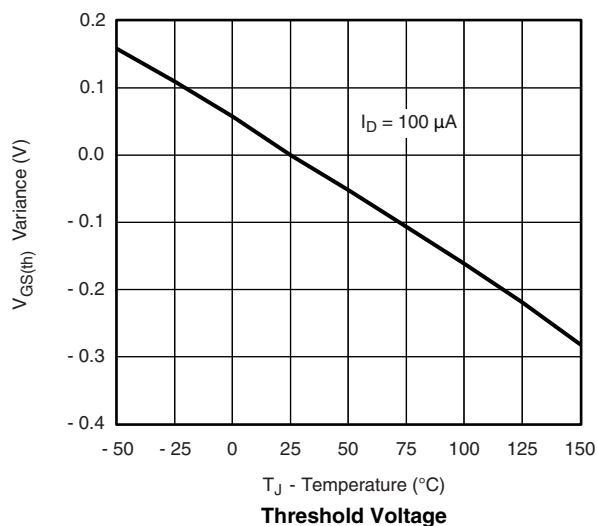
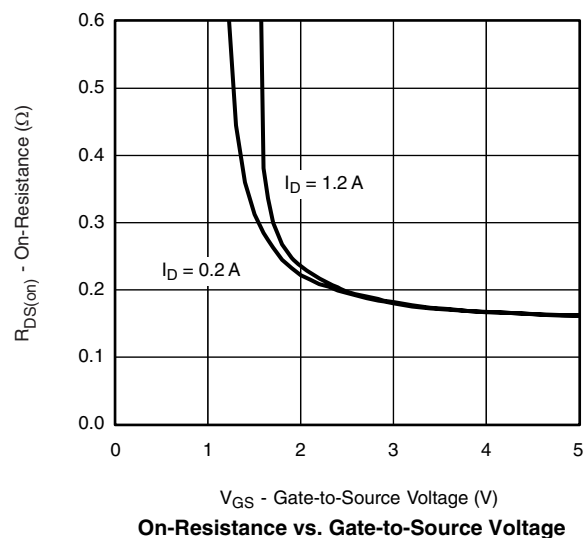
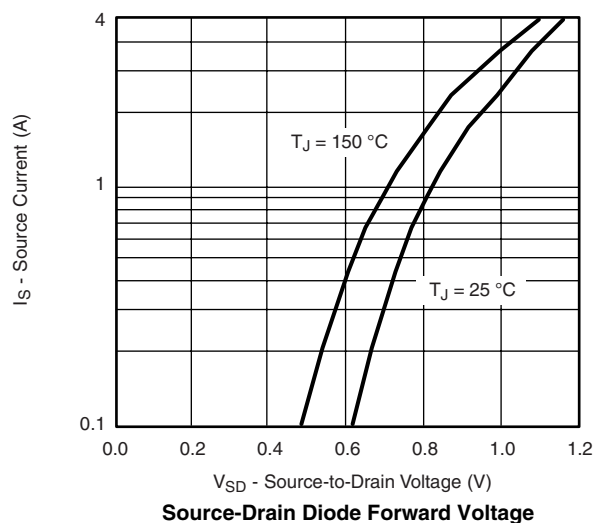
Capacitance



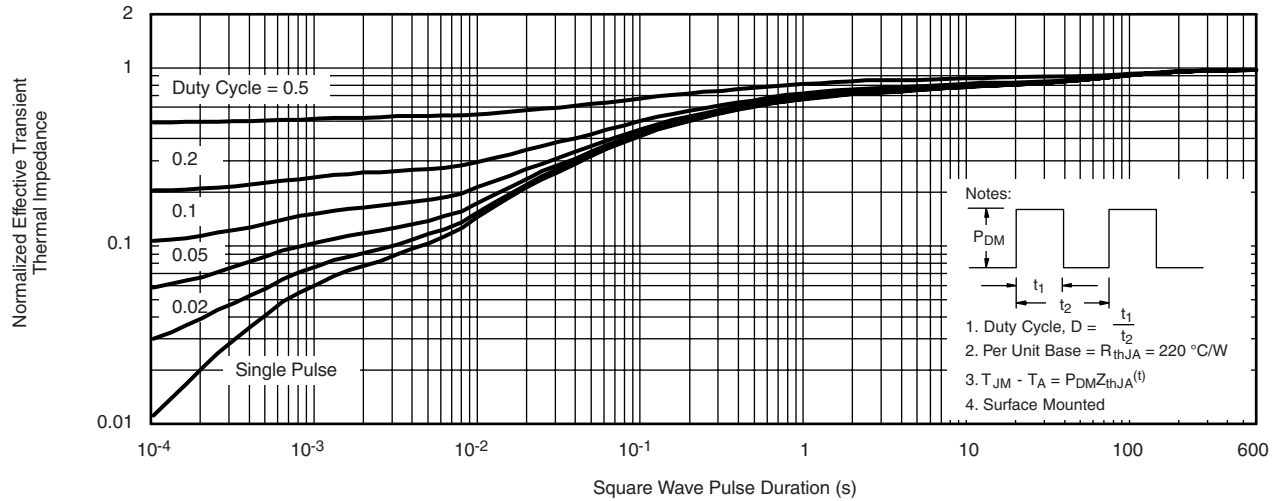
Gate Charge



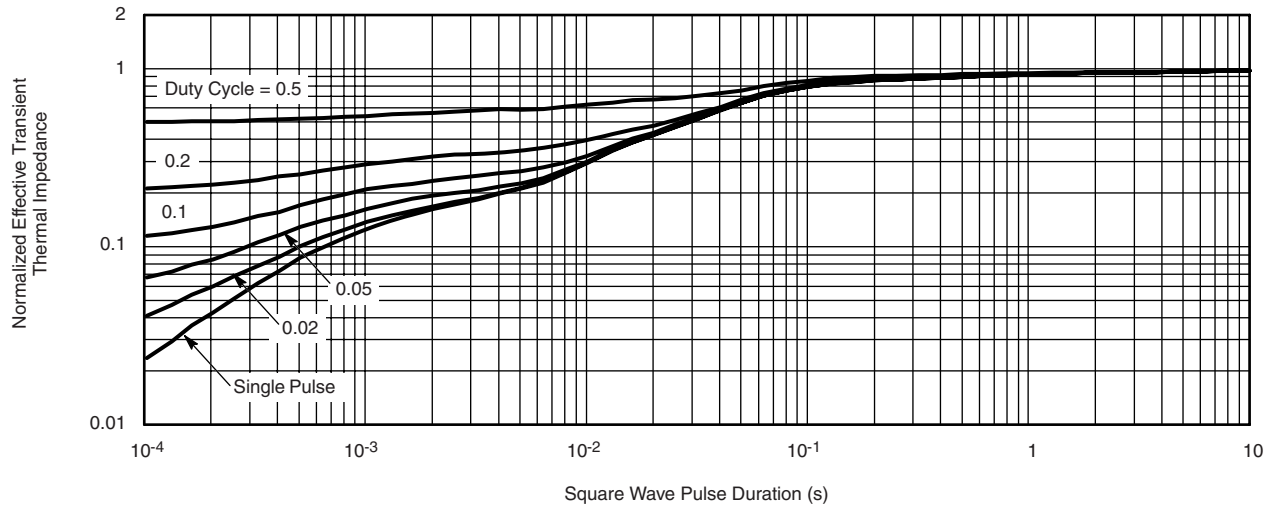
On-Resistance vs. Junction Temperature

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

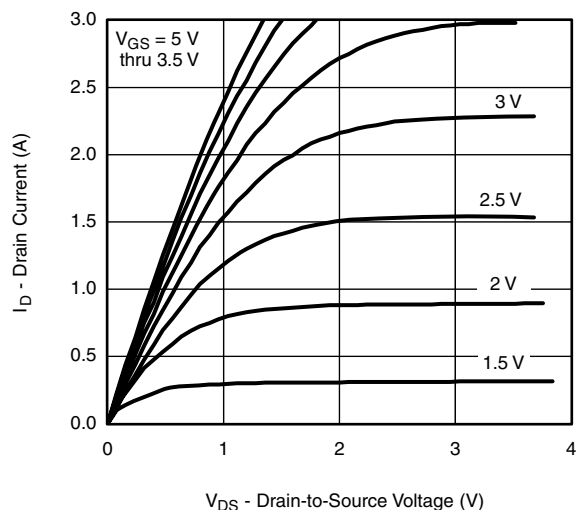
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



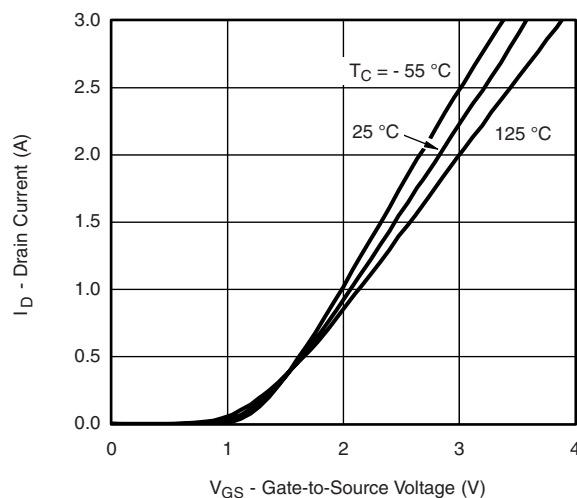
Normalized Thermal Transient Impedance, Junction-to-Ambient



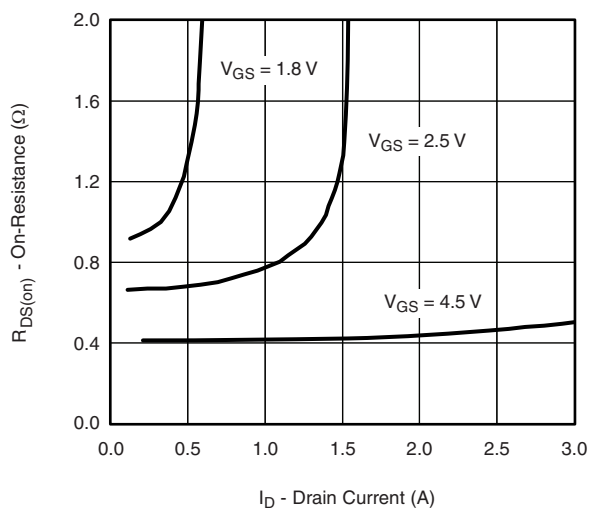
Normalized Thermal Transient Impedance, Junction-to-Foot

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

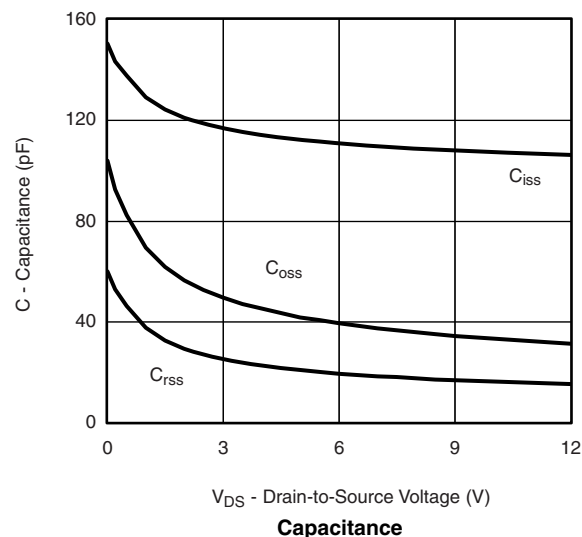
V_{DS} - Drain-to-Source Voltage (V)
Output Characteristics



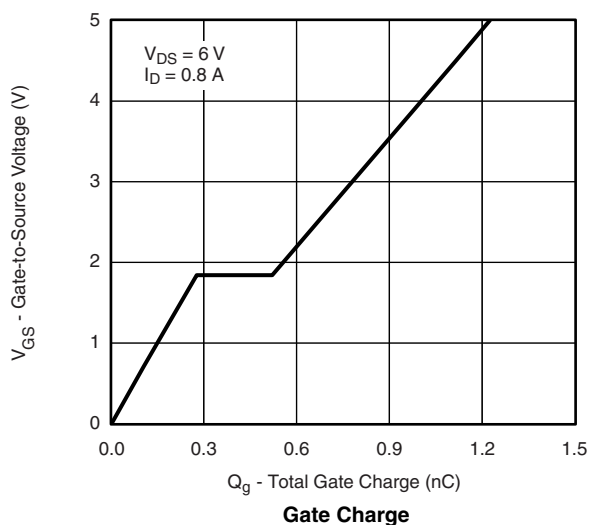
V_{GS} - Gate-to-Source Voltage (V)
Transfer Characteristics



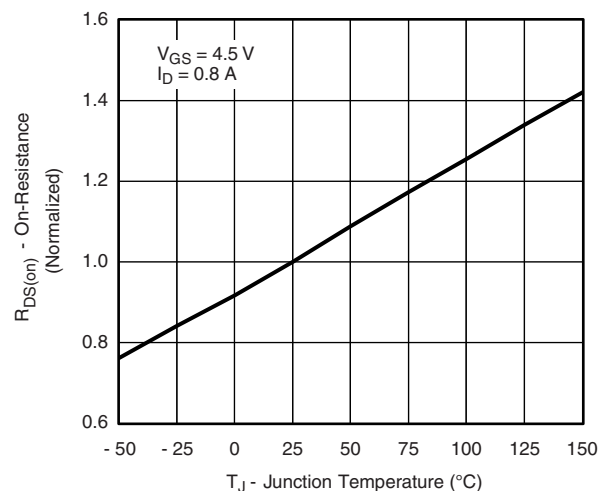
I_D - Drain Current (A)
On-Resistance vs. Drain Current



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

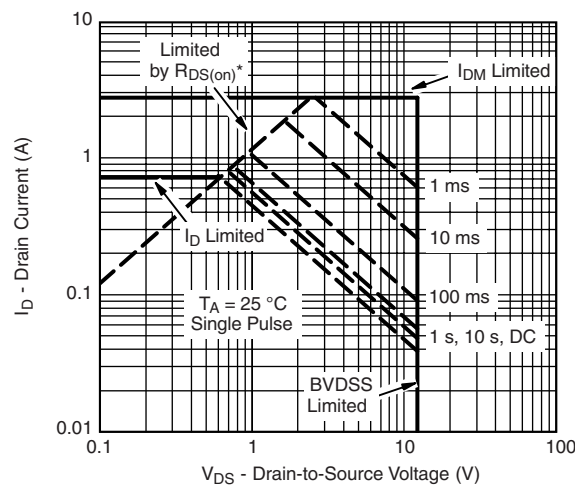
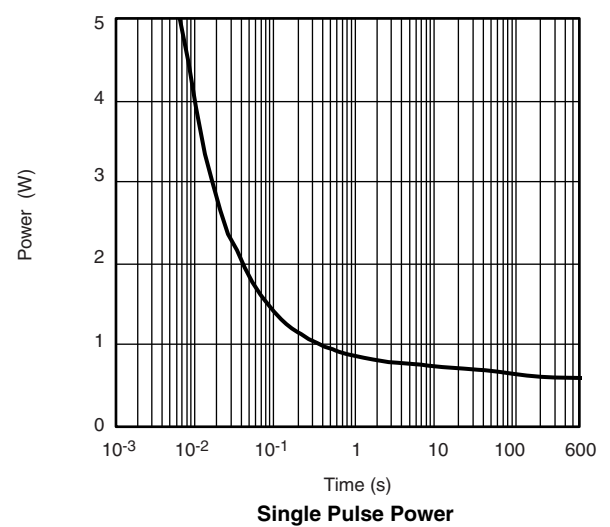
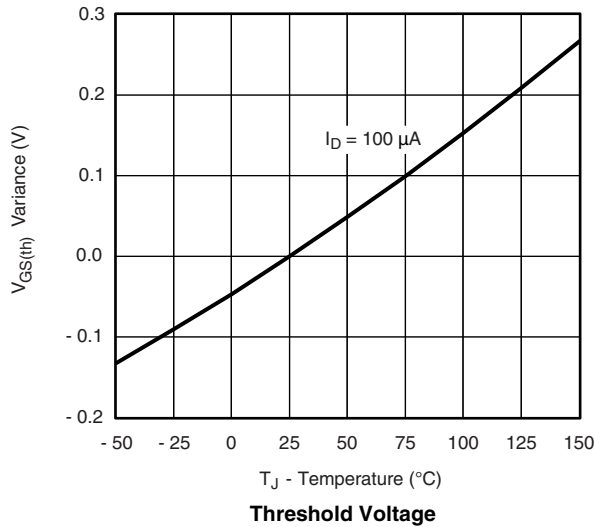
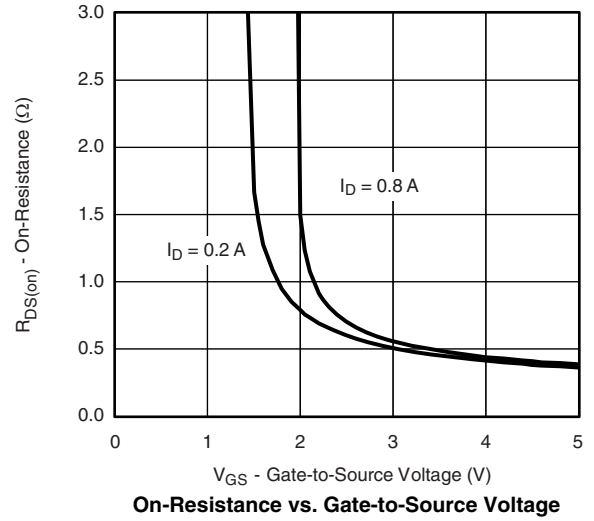
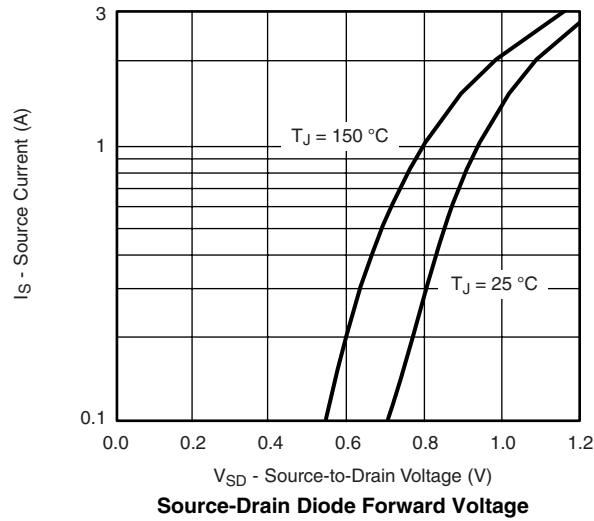


Q_g - Total Gate Charge (nC)
Gate Charge



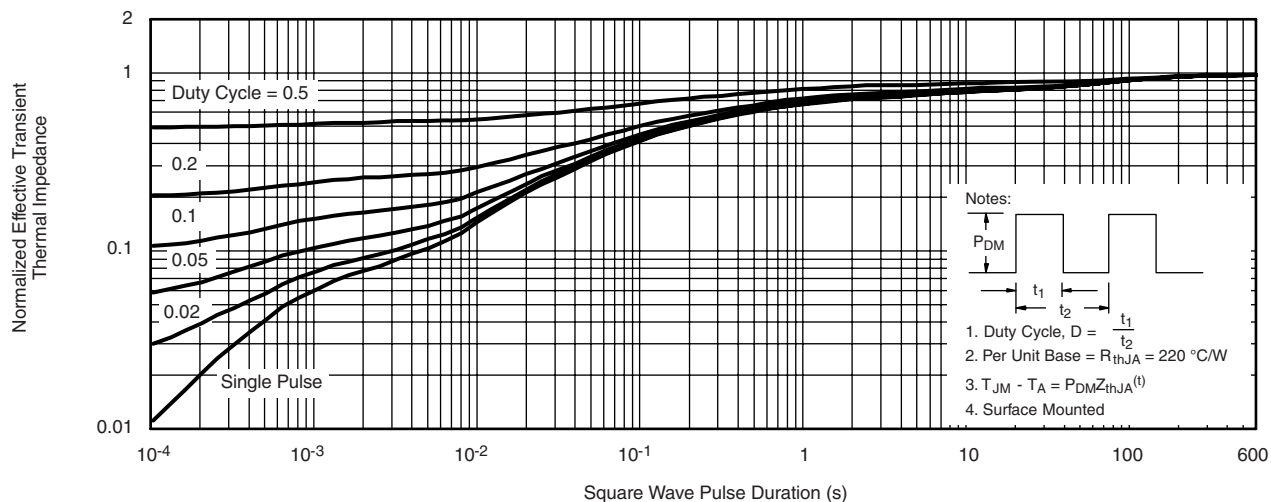
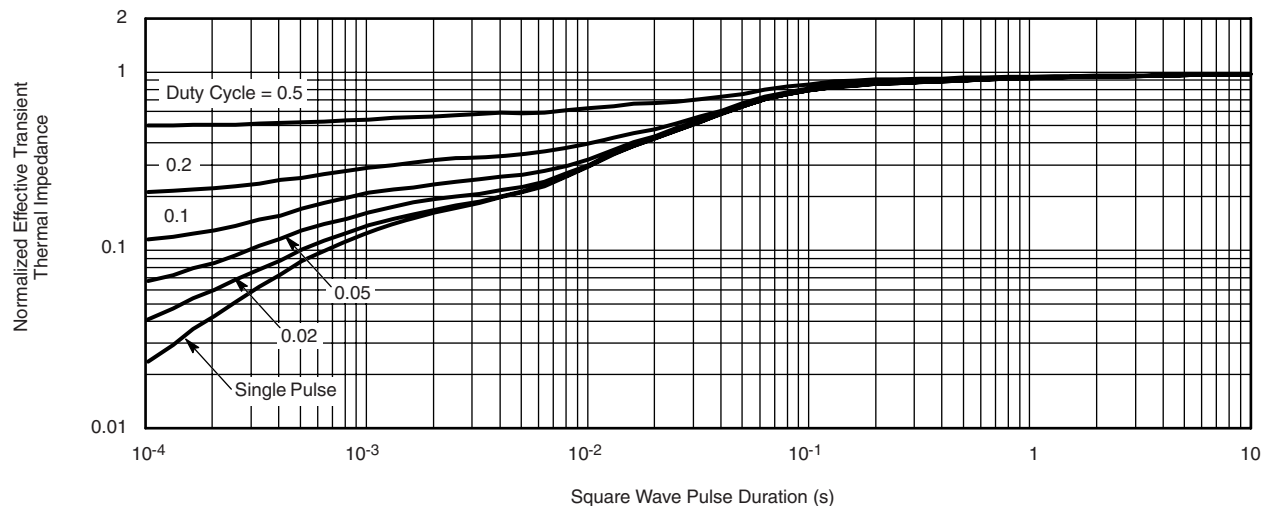
T_J - Junction Temperature ($^{\circ}\text{C}$)
On-Resistance vs. Junction Temperature

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



* $V_{GS} >$ 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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