



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

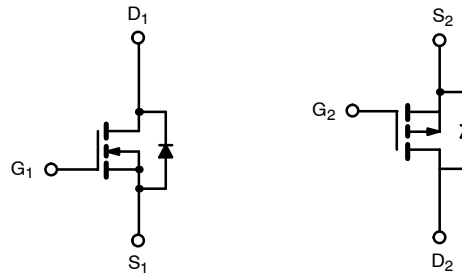
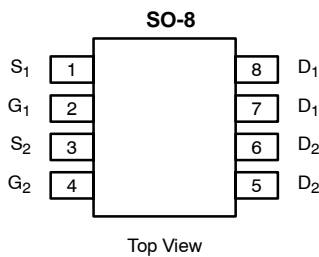
PRODUCT SUMMARY			
	V _{DS} (V)	r _{DS(on)} (Ω)	I _D (A)
N-Channel	20	0.0145 @ V _{GS} = 10 V	9.6
		0.017 @ V _{GS} = 4.5 V	8.6
P-Channel	-20	0.033 @ V _{GS} = -4.5 V	-6.2
		0.050 @ V _{GS} = -2.5 V	-5

FEATURES

- TrenchFET® Power MOSFET

APPLICATIONS

- Level Shift
- Load Switch



Ordering Information: Si4511DY
Si4511DY-T1 (with Tape and Reel)
Si4511DY—E3 (Lead (Pb)-Free)
Si4511DY-T1—E3 (Lead (Pb)-Free with Tape and Reel)

ABSOLUTE MAXIMUM RATINGS (T _A = 25°C UNLESS OTHERWISE NOTED)							
Parameter	Symbol	N-Channel		P-Channel		Unit	
		10 sec.	Steady State	10 sec.	Steady State		
Drain-Source Voltage	V _{DS}	20		-20		V	
Gate-Source Voltage	V _{GS}	±16		±12			
Continuous Drain Current (T _J = 150°C) ^{a, b}	T _A = 25°C	9.6	7.2	-6.2	-4.6	A	
	T _A = 70°C	7.7	5.8	-4.9	-3.7		
Pulsed Drain Current	I _{DM}	40		-40		A	
Continuous Source Current (Diode Conduction) ^{a, b}	I _S	1.7	0.9	-1.7	0.9		
Maximum Power Dissipation ^{a, b}	T _A = 25°C	2	1.1	2	1.1	W	
	T _A = 70°C	1.3	0.7	1.3	0.7		
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55 to 150				°C	

THERMAL RESISTANCE RATINGS							
Parameter	Symbol	N-Channel		P-Channel		Unit	
		Typ	Max	Typ	Max		
Maximum Junction-to-Ambient ^a	t ≤ 10 sec	50	62.5	50	62.5	°C/W	
	Steady-State	85	110	90	110		
Maximum Junction-to-Foot (Drain)	Steady-State	R _{thJF}	30	40	30		35

Notes
a. Surface Mounted on FR4 Board.
b. t ≤ 10 sec

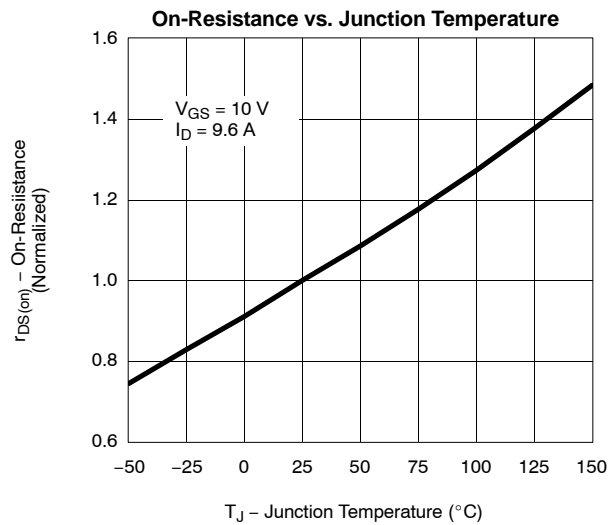
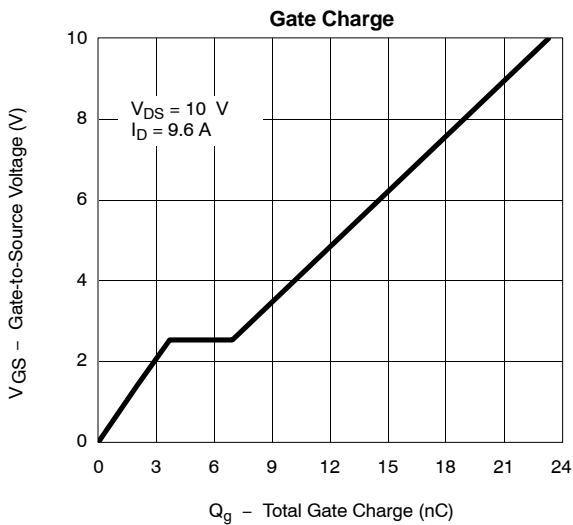
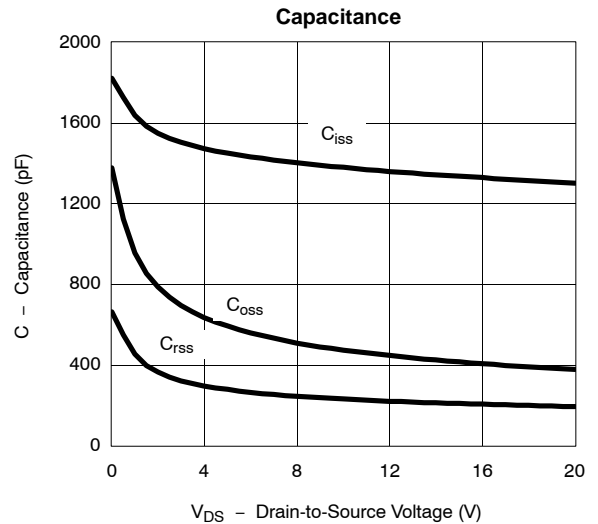
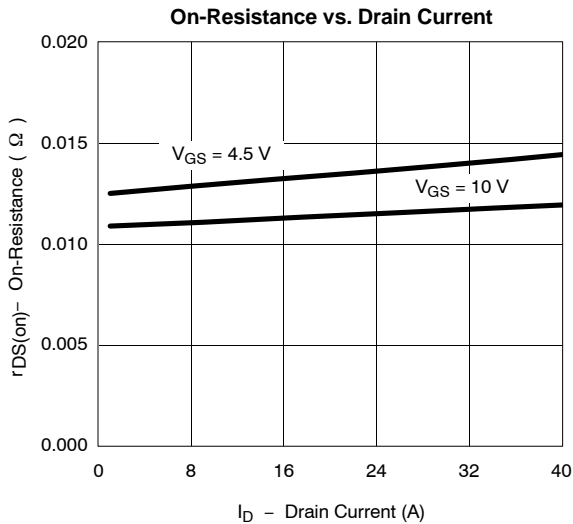
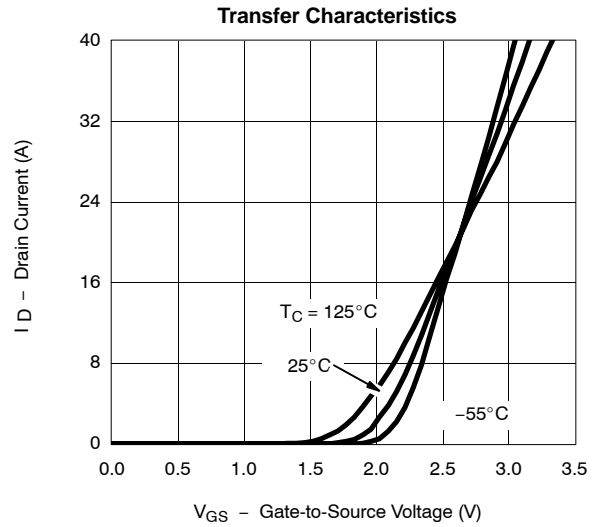
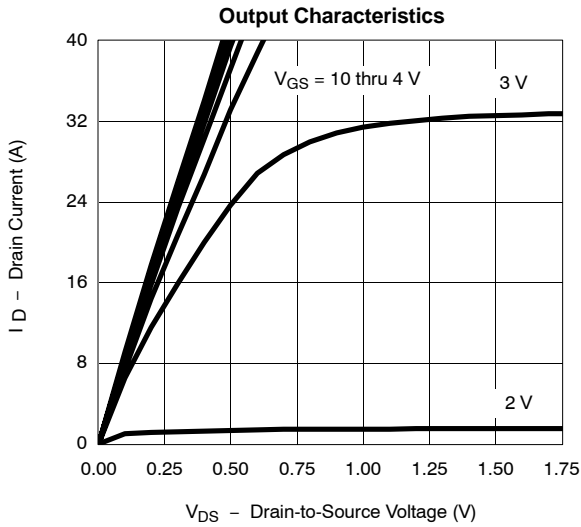
SPECIFICATIONS (T _J = 25 °C UNLESS OTHERWISE NOTED)								
Parameter	Symbol	Test Condition		Min	Typ ^a	Max	Unit	
Static								
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	N-Ch	0.6		1.8	V	
		V _{DS} = V _{GS} , I _D = -250 μA	P-Ch	-0.6		1.4		
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±16 V	N-Ch			±100	nA	
		V _{DS} = 0 V, V _{GS} = ±12 V	P-Ch			±100		
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V	N-Ch			1	μA	
		V _{DS} = -16 V, V _{GS} = 0 V	P-Ch			-1		
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 55 °C	N-Ch			5		
		V _{DS} = -16 V, V _{GS} = 0 V, T _J = 55 °C	P-Ch			-5		
On-State Drain Current ^b	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 10 V	N-Ch	40			A	
		V _{DS} = -5 V, V _{GS} = -4.5 V	P-Ch	-40				
Drain-Source On-State Resistance ^b	r _{DS(on)}	V _{GS} = 10 V, I _D = 9.6 A	N-Ch		0.0115	0.0145	Ω	
		V _{GS} = -4.5 V, I _D = -6.2 A	P-Ch		0.022	0.033		
		V _{GS} = 4.5 V, I _D = 8.6 A	N-Ch		0.0135	0.017		
		V _{GS} = -2.5 V, I _D = -5 A	P-Ch		0.035	0.050		
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 9.6 A	N-Ch		33		S	
		V _{DS} = -15 V, I _D = -6.2 A	P-Ch		17			
Diode Forward Voltage ^b	V _{SD}	I _S = 1.7 A, V _{GS} = 0 V	N-Ch		0.8	1.2	V	
		I _S = -1.7 A, V _{GS} = 0 V	P-Ch		-0.8	-1.2		
Dynamic^a								
Total Gate Charge	Q _g	N-Channel V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 9.6 A P-Channel V _{DS} = -10 V, V _{GS} = -4.5 V, I _D = -6.2 A	N-Ch		11.5	18	nC	
			P-Ch		17	20		
Gate-Source Charge	Q _{gs}		N-Ch		3.7			
			P-Ch		4.1			
Gate-Drain Charge	Q _{gd}		N-Ch		3.3			
			P-Ch		4.3			
Turn-On Delay Time	t _{d(on)}	N-Channel V _{DD} = 10 V, R _L = 10 Ω I _D ≅ 1 A, V _{GEN} = 10 V, R _g = 6 Ω P-Channel V _{DD} = -10 V, R _L = 10 Ω I _D ≅ -1 A, V _{GEN} = -4.5 V, R _g = 6 Ω	N-Ch		12	20	ns	
			P-Ch		25	40		
Rise Time	t _r		N-Ch		12	20		
			P-Ch		30	45		
Turn-Off Delay Time	t _{d(off)}		N-Ch		55	85		
			P-Ch		70	105		
Fall Time	t _f		N-Ch		15	25		
			P-Ch		50	75		
Source-Drain Reverse Recovery Time	t _{rr}		I _F = 1.7 A, di/dt = 100 A/μs	N-Ch		50		100
			I _F = -1.7 A, di/dt = 100 A/μs	P-Ch		40		80

Notes

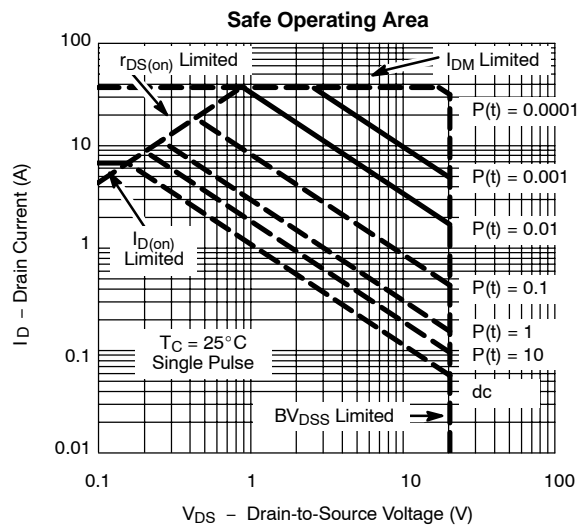
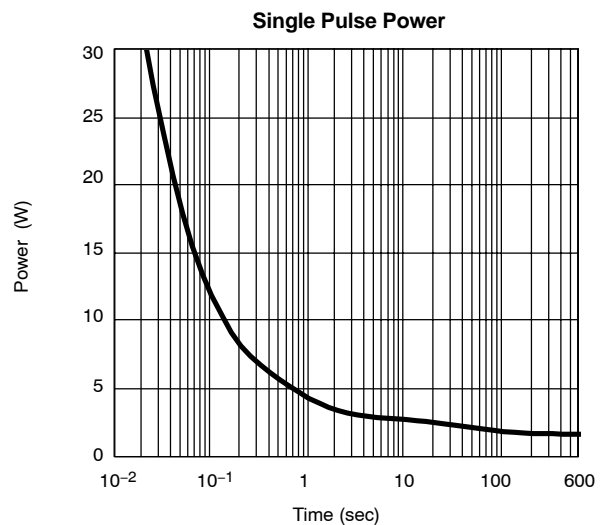
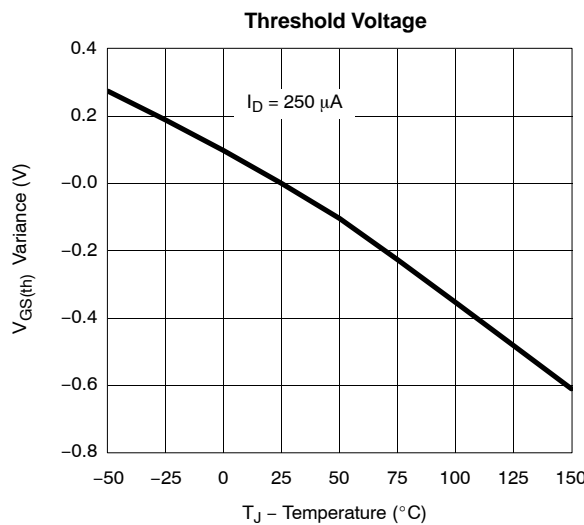
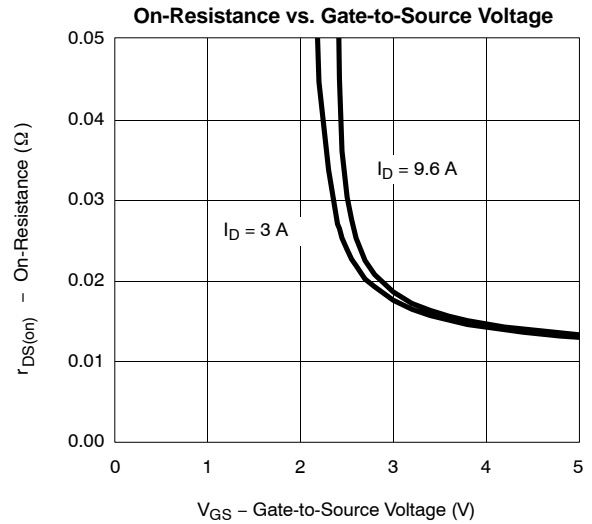
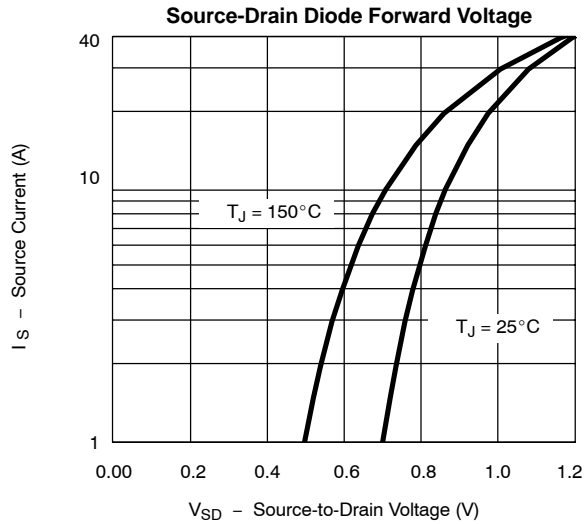
- a. Guaranteed by design, not subject to production testing.
 b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.



TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) N-CHANNEL

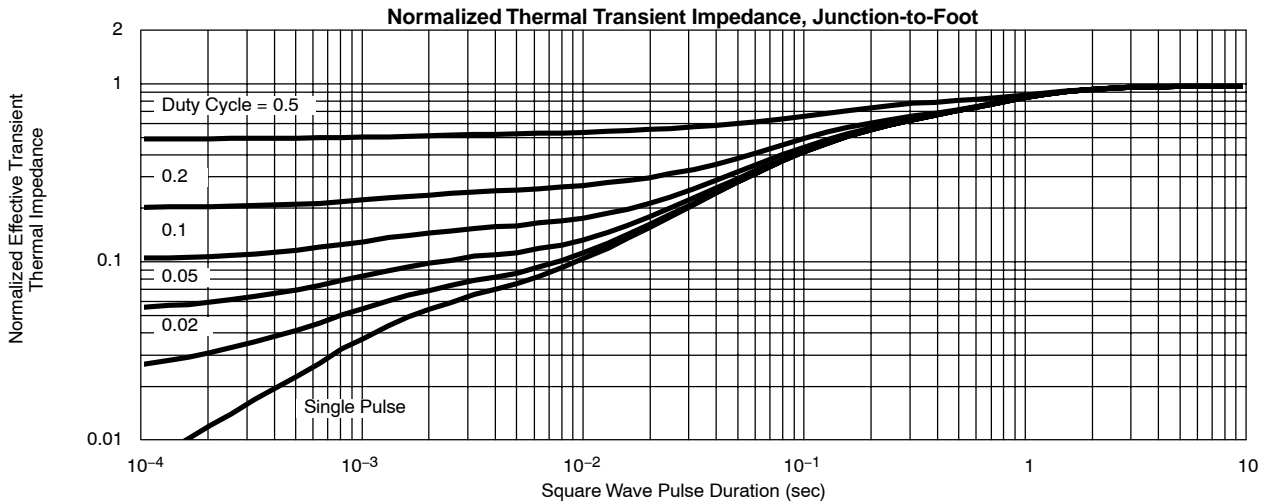
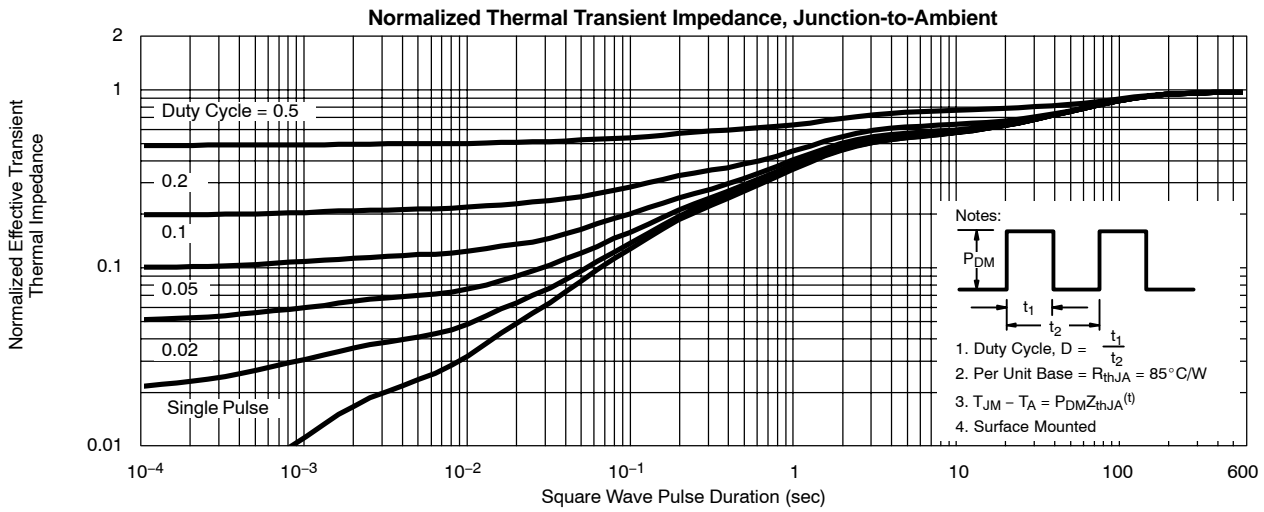


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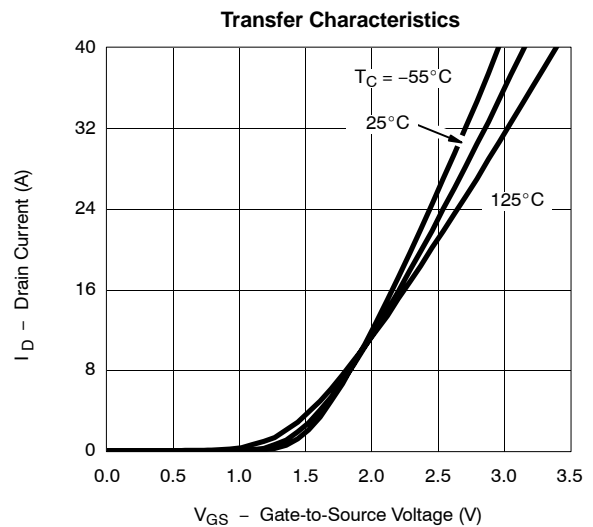
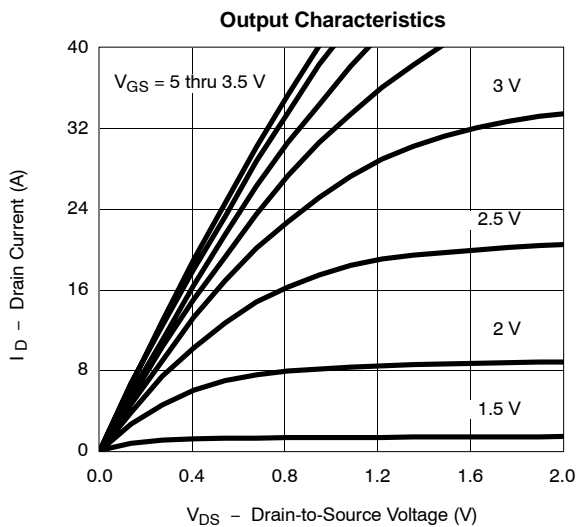




TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED) N-CHANNEL



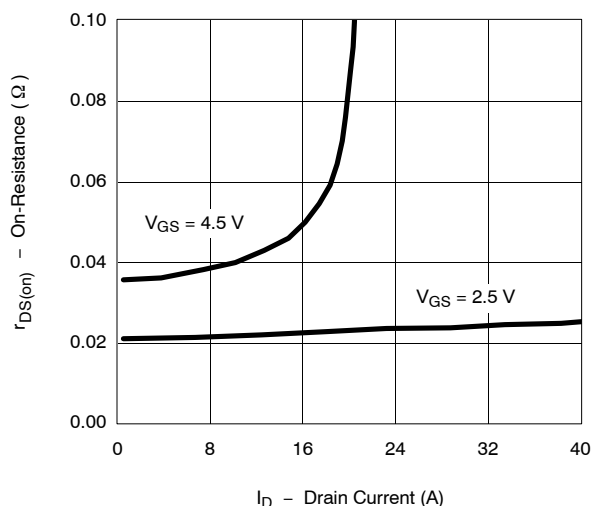
TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED) P-CHANNEL



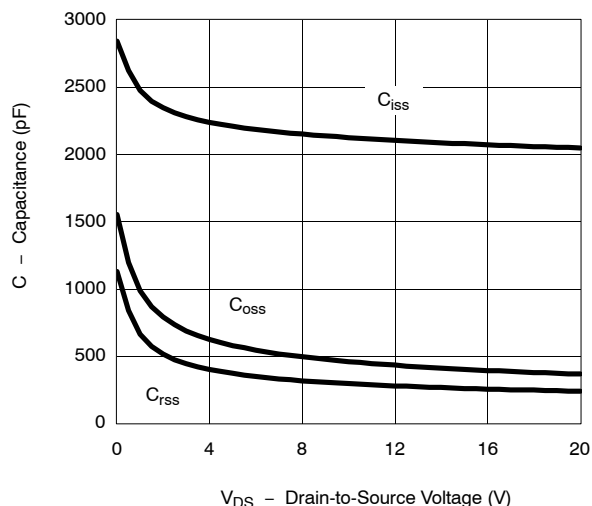
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P-CHANNEL

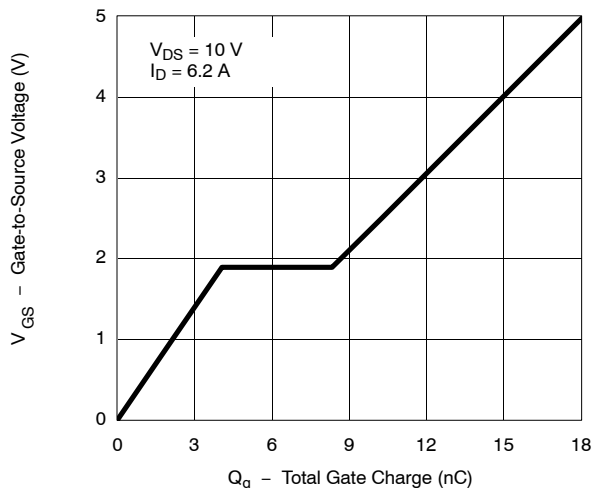
On-Resistance vs. Drain Current



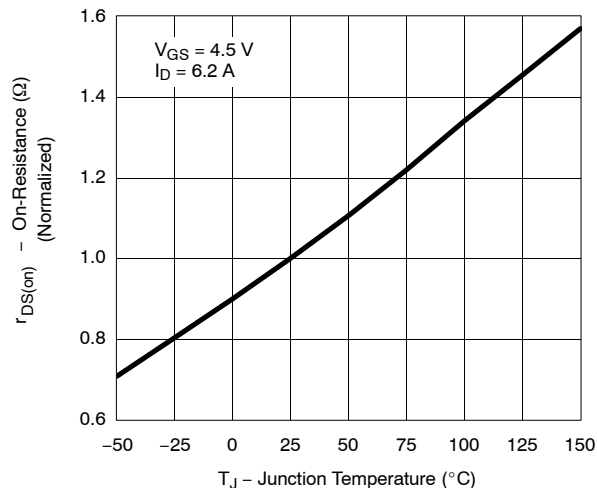
Capacitance



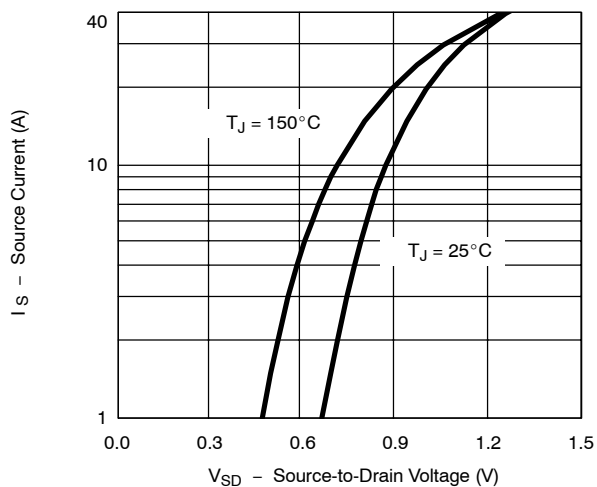
Gate Charge



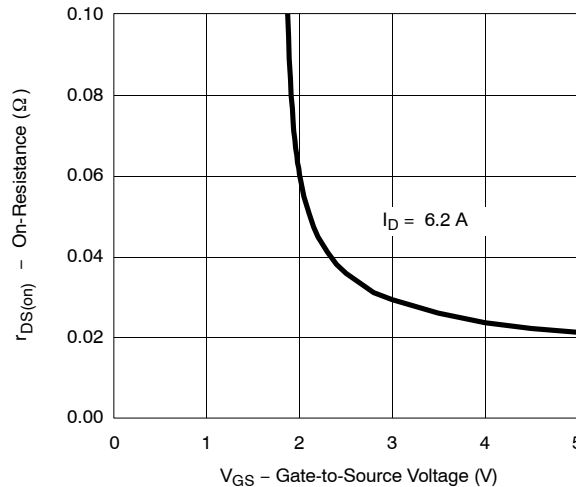
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

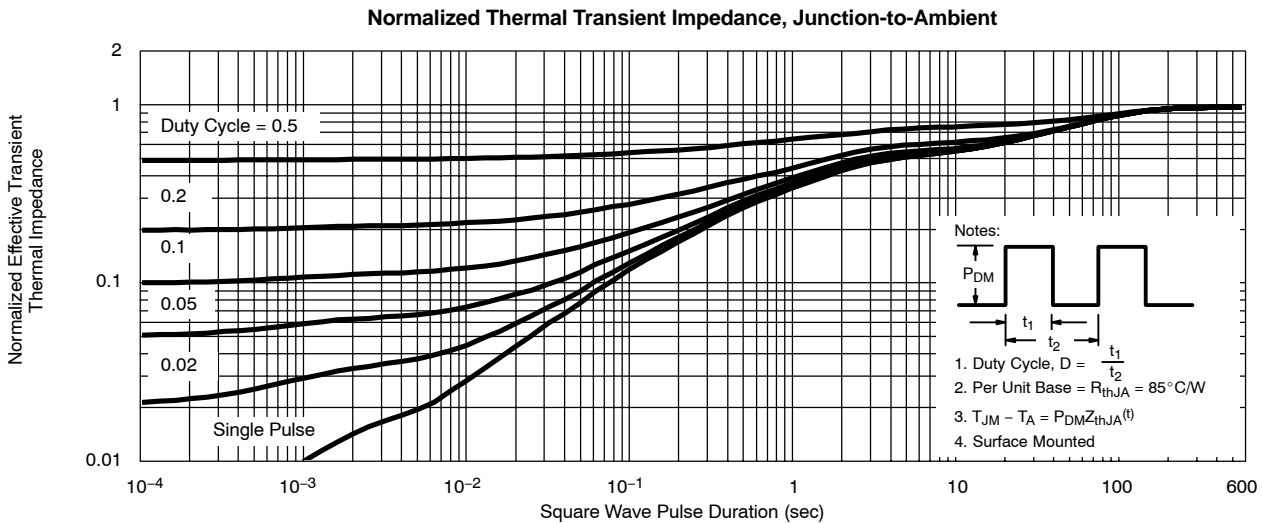
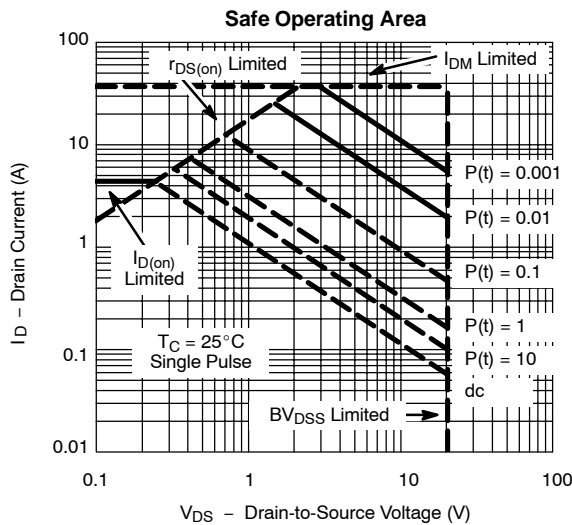
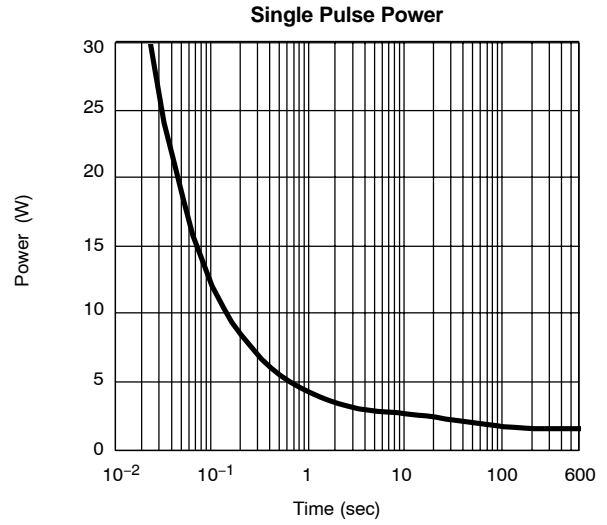
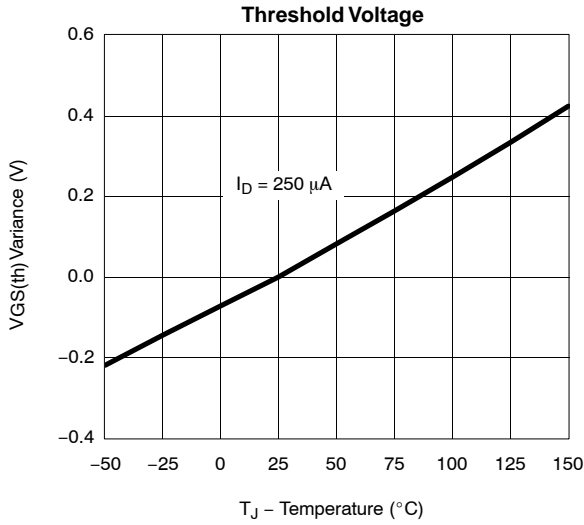


On-Resistance vs. Gate-to-Source Voltage





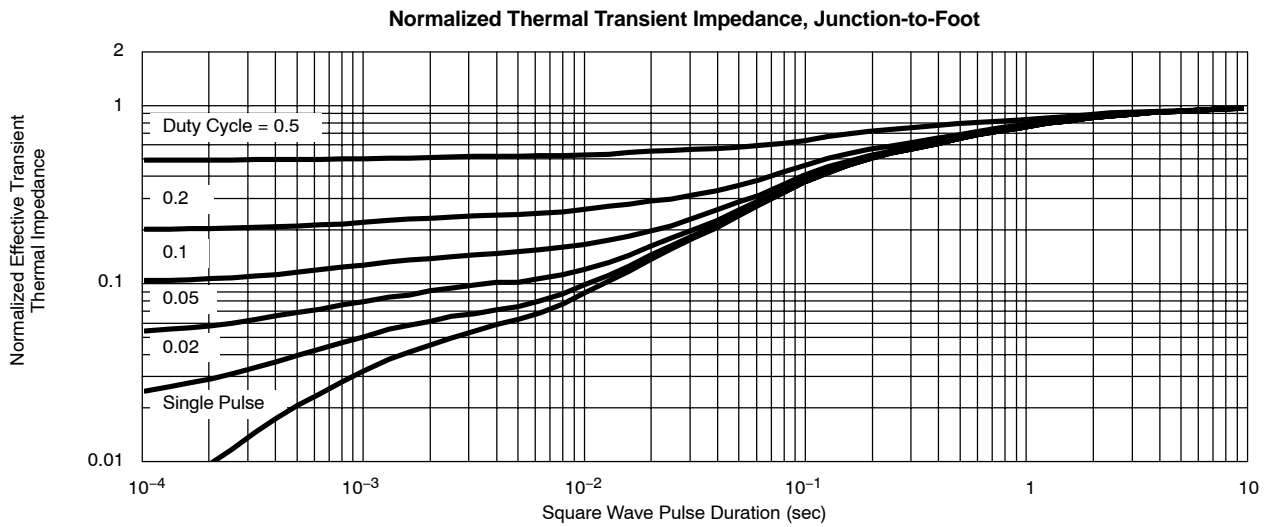
TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED) P-CHANNEL





TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

P-CHANNEL





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