



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

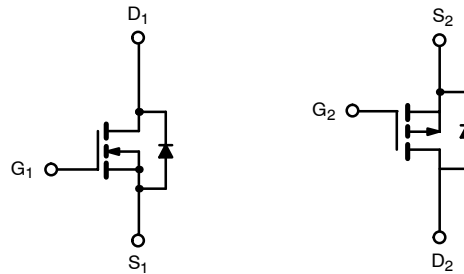
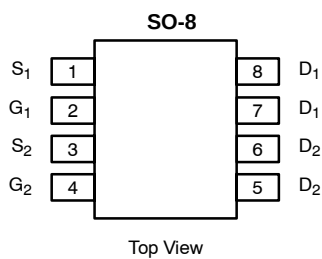
PRODUCT SUMMARY			
	V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
N-Channel	20	0.0145 @ $V_{GS} = 10$ V	9.6
		0.017 @ $V_{GS} = 4.5$ V	8.6
P-Channel	-20	0.033 @ $V_{GS} = -4.5$ V	-6.2
		0.050 @ $V_{GS} = -2.5$ V	-5

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	I _D	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		
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	P _D	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	$t \leq 10$ sec	R_{thJA}	50	62.5	50	62.5	$^\circ\text{C/W}$
	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. $t \leq 10$ 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	

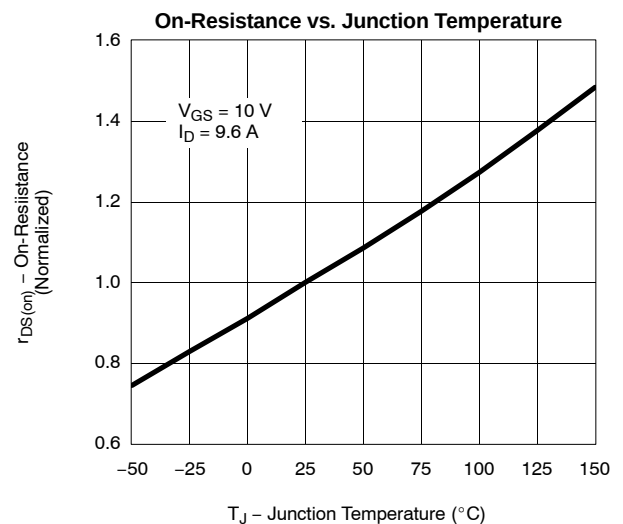
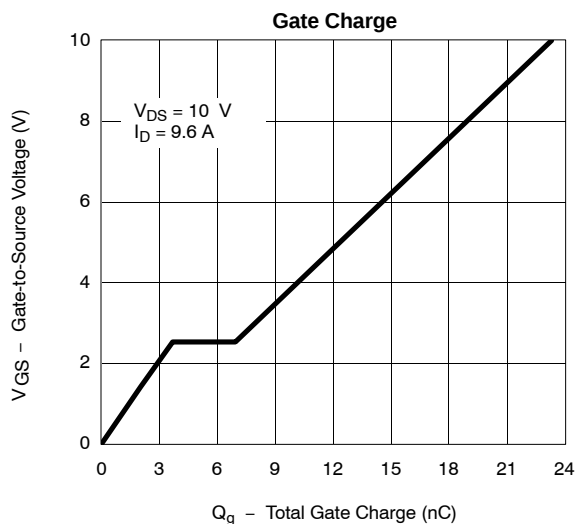
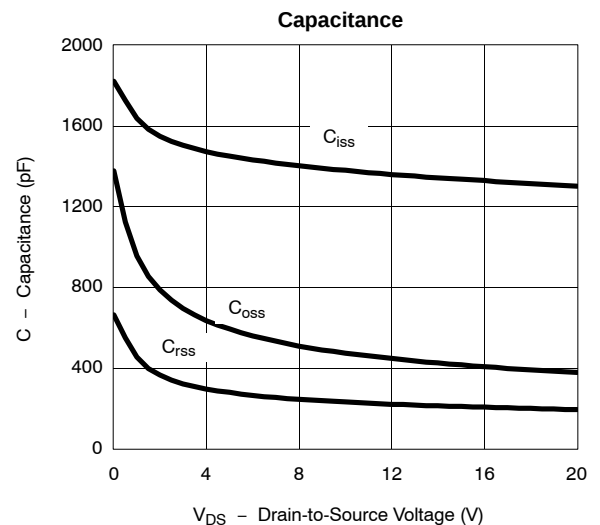
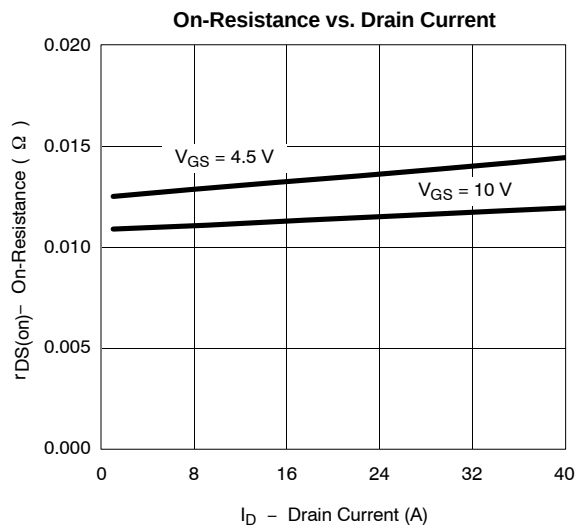
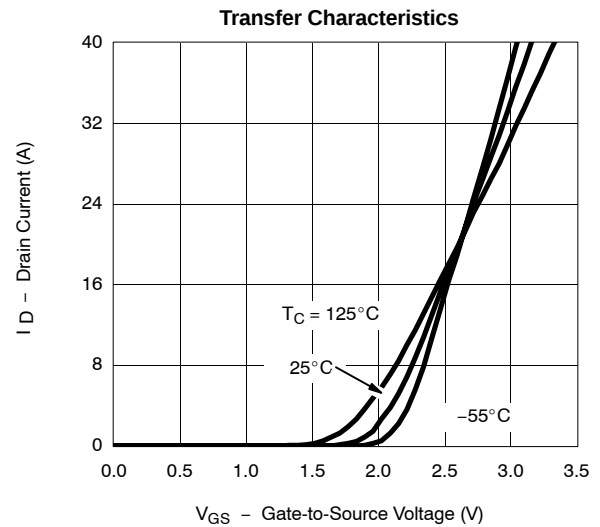
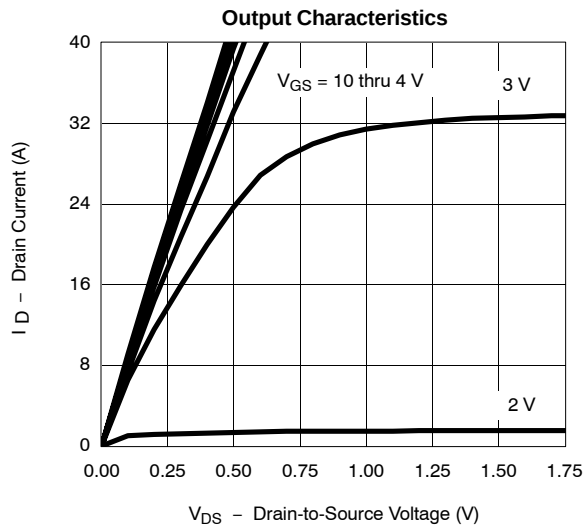
Notes

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



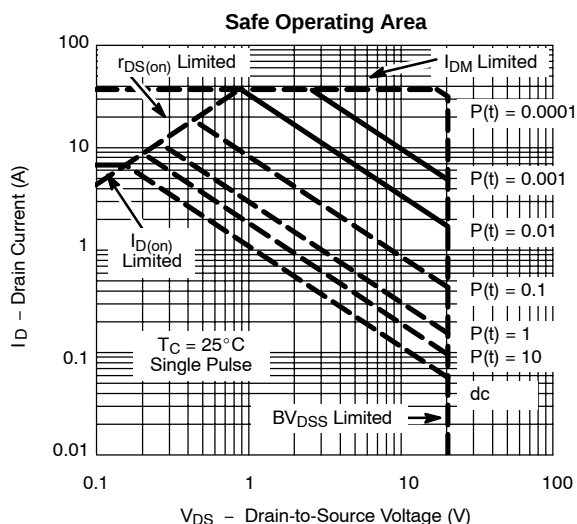
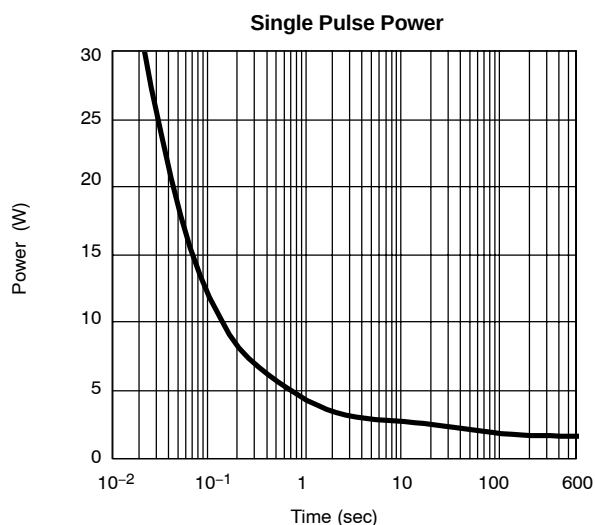
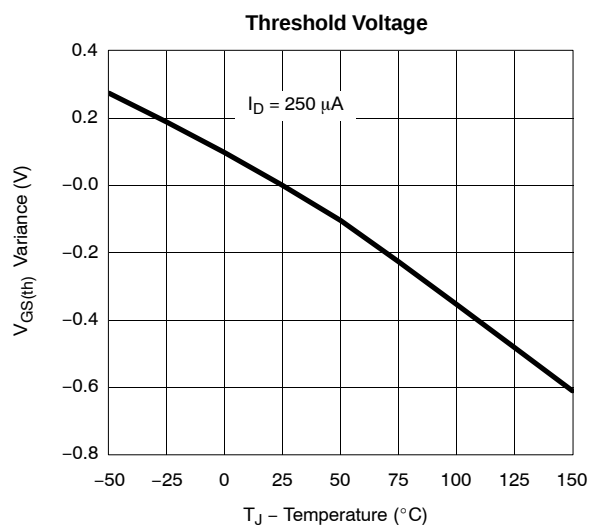
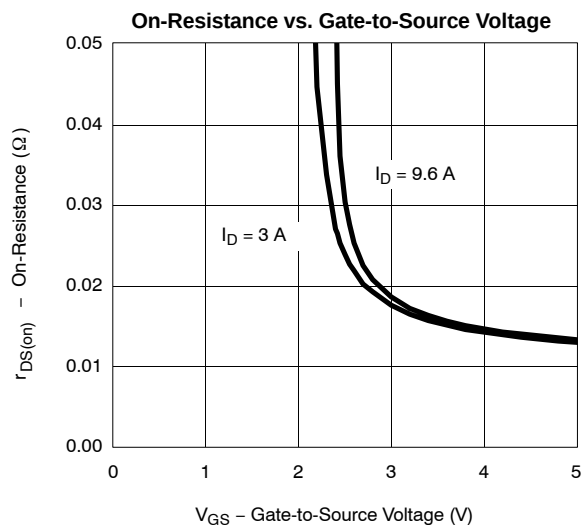
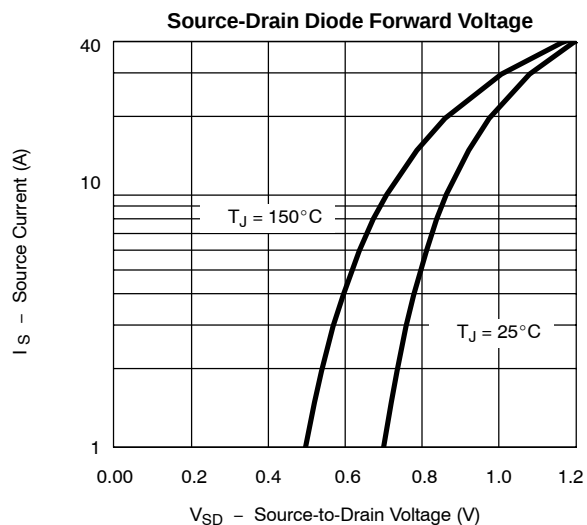
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

N-CHANNEL



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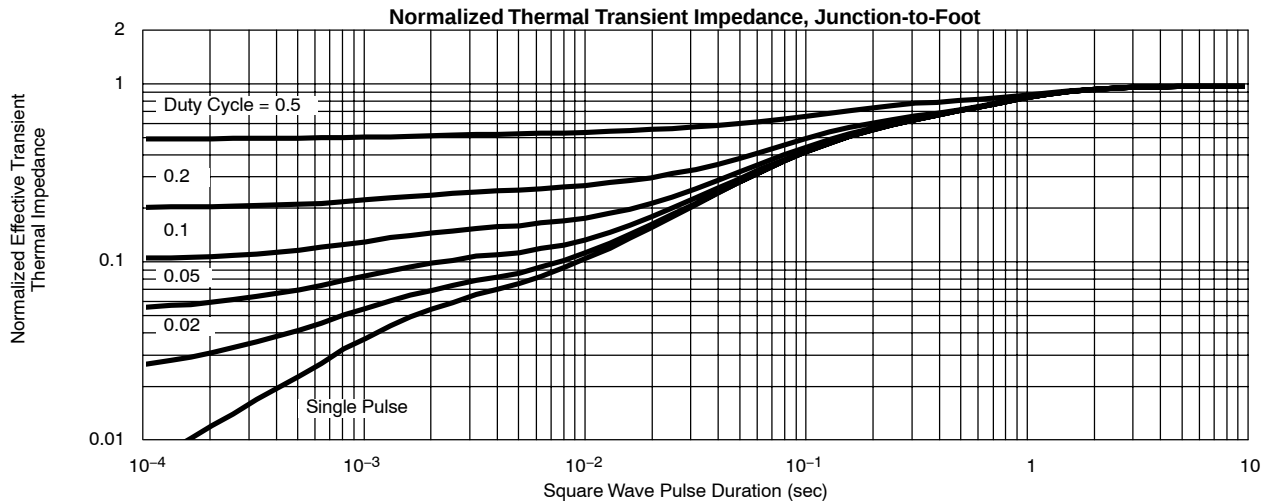
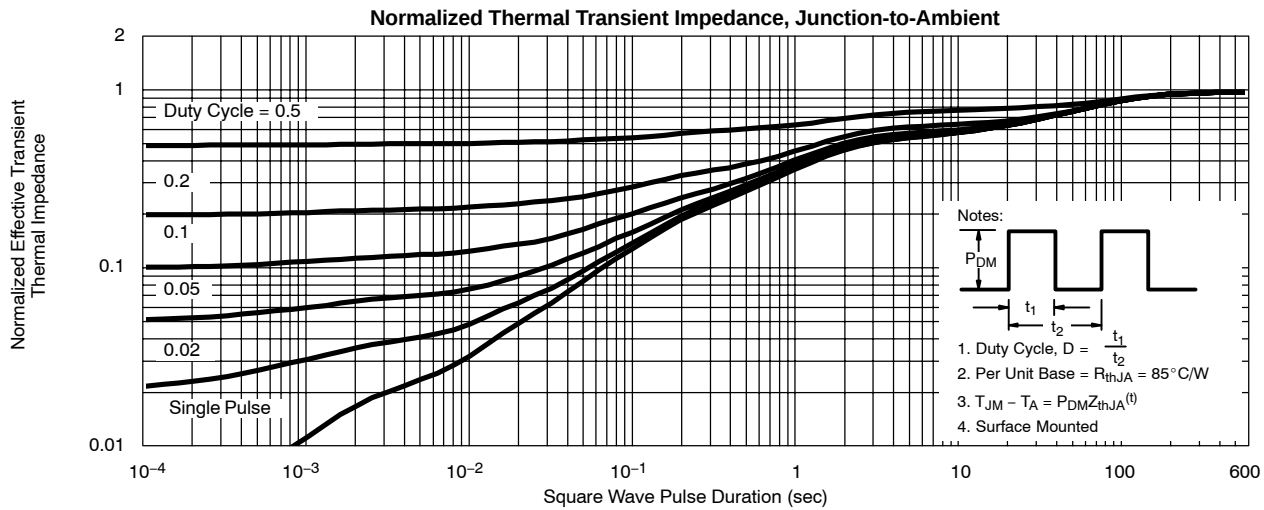
N-CHANNEL





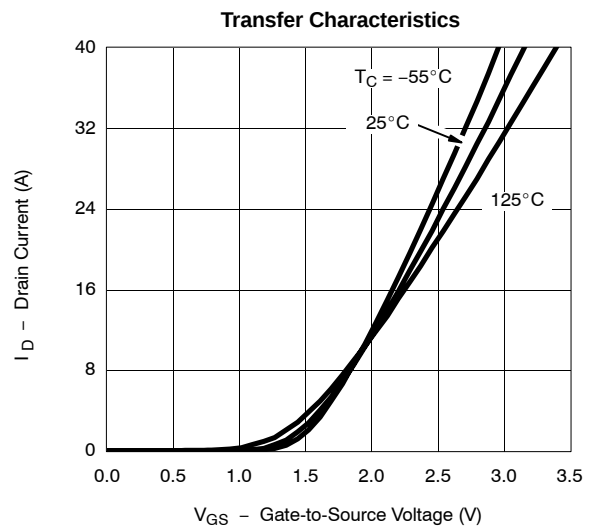
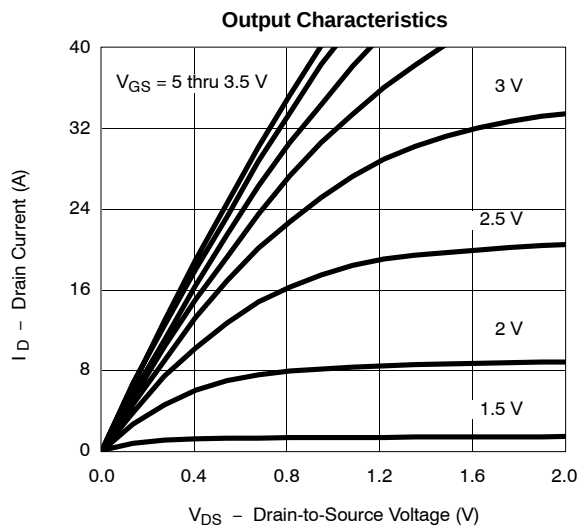
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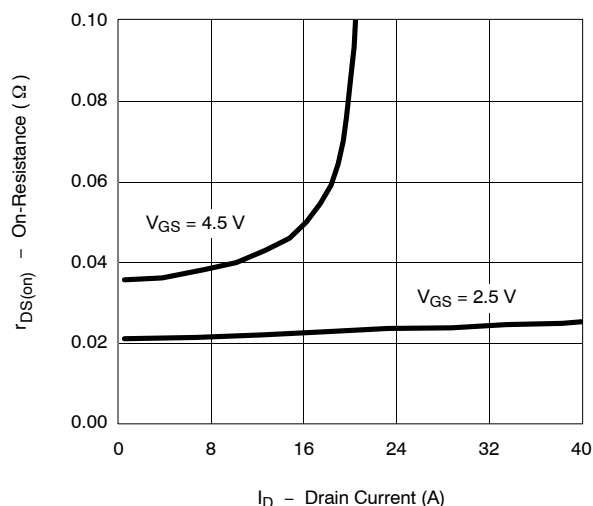
P-CHANNEL



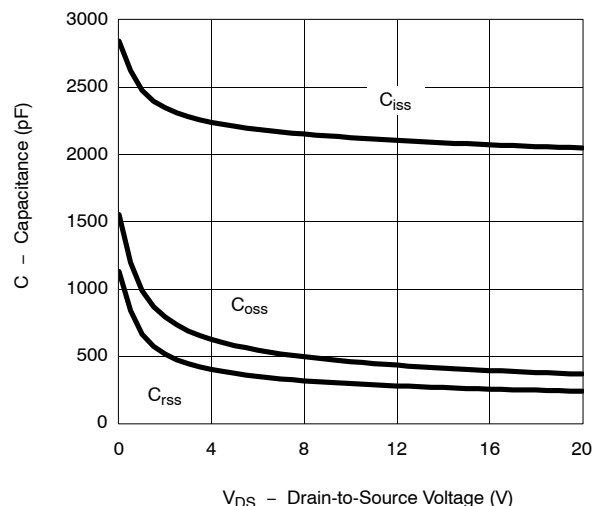
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P-CHANNEL

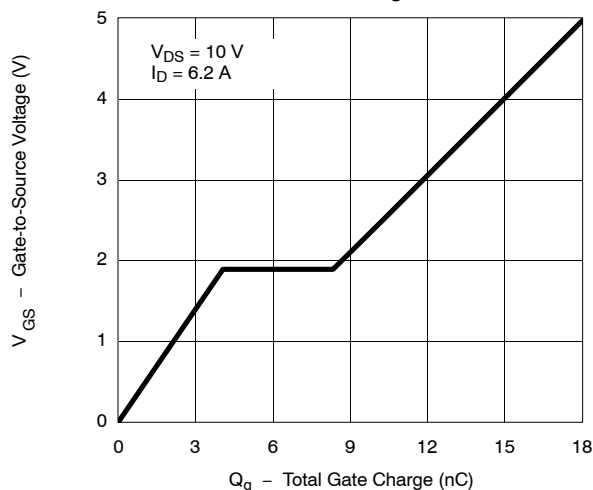
On-Resistance vs. Drain Current



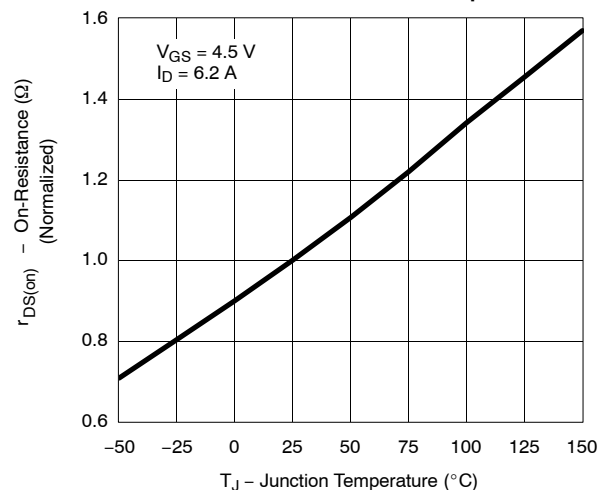
Capacitance



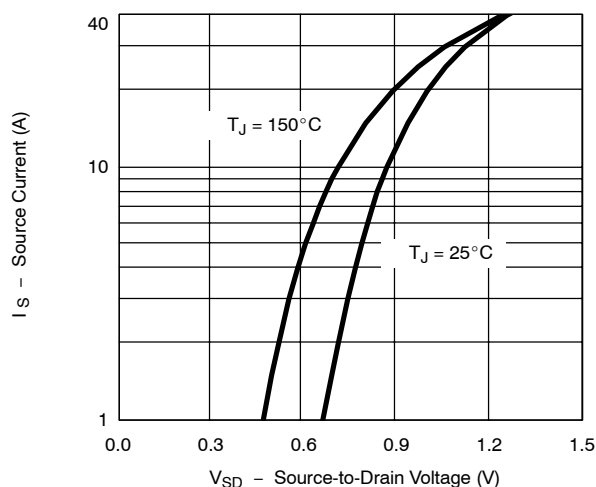
Gate Charge



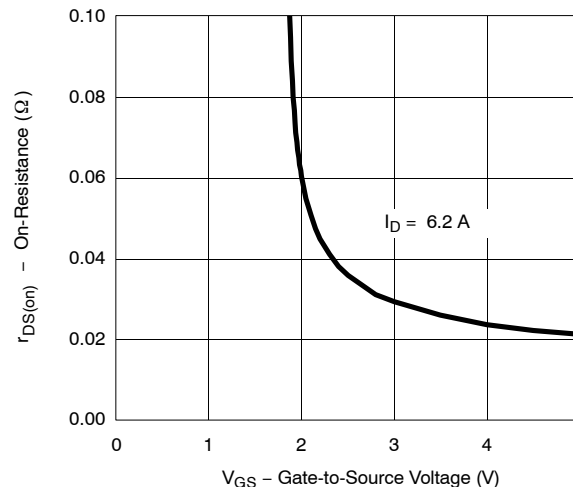
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage



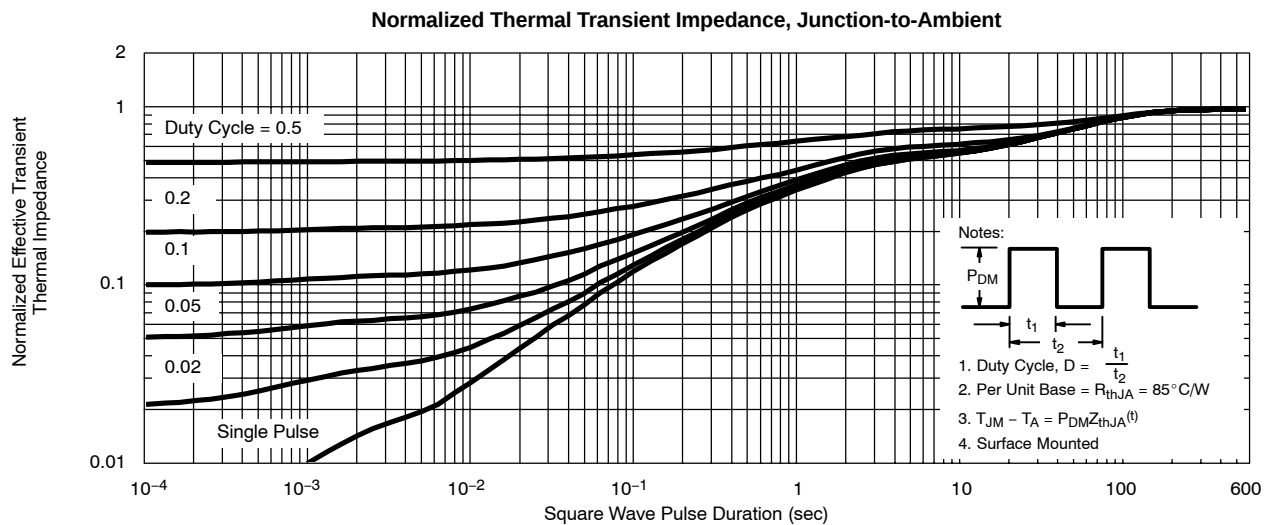
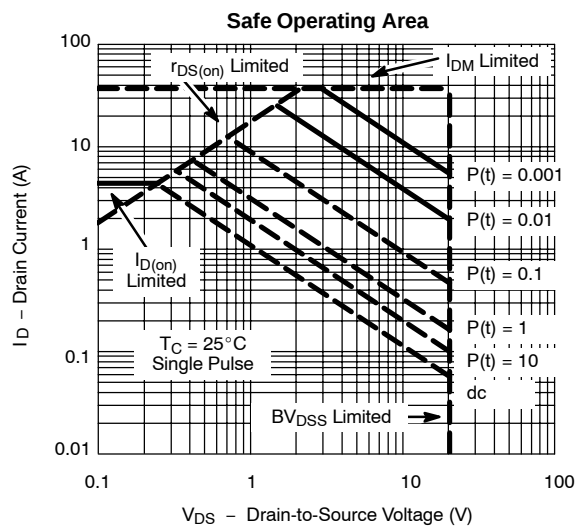
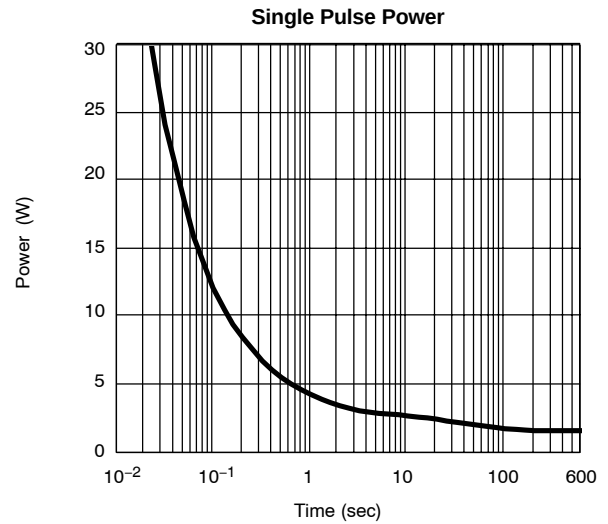
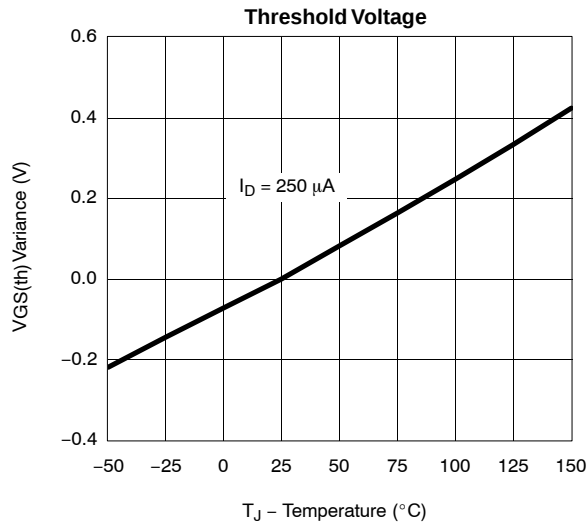
On-Resistance vs. Gate-to-Source Voltage





TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

P-CHANNEL



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