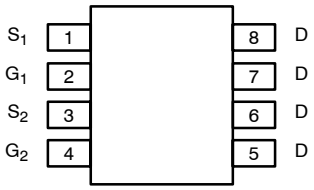
Complementary MOSFET Half-Bridge (N- and P-Channel)

PRODUCT SUMMARY			
	V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
N-Channel	20	0.020 @ V_{GS} = 4.5 V	9.1
		0.030 @ V_{GS} = 2.5 V	7.5
P-Channel	−20	0.060 @ V_{GS} = −4.5 V	−5.3
		0.100 @ V_{GS} = −2.5 V	−4.1

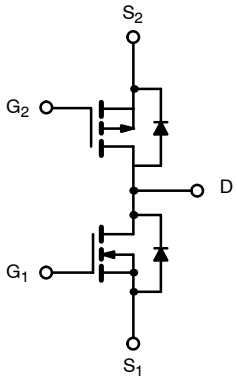
FEATURES

- TrenchFET® Power MOSFET

SO-8



Top View



Ordering Information: Si4500BDY
Si4500BDY-T1 (with Tape and Reel)
Si4500BDY—E3 (Lead (Pb)-Free)
Si4500BDY-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}	±12		±12		
Continuous Drain Current (T_J = 150°C)[a, b]	T_A = 25°C	I_D	9.1	6.6	−5.3	−3.8	A
	T_A = 70°C		7.3	5.3	−4.9	−3.1	
Pulsed Drain Current		I_{DM}	30		−20		
Continuous Source Current (Diode Conduction)[a, b]		I_S	2.1	1.1	−2.1	−1.1	
Maximum Power Dissipation[a, b]	T_A = 25°C	P_D	2.5	1.3	2.5	1.3	W
	T_A = 70°C		1.6	0.8	1.6	0.8	
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	R_{thJA}	40	50	41	50	°C/W
	Steady-State		75	95	75	95	
Maximum Junction-to-Foot (Drain)	Steady-State	R_{thJF}	20	22	23	26	

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

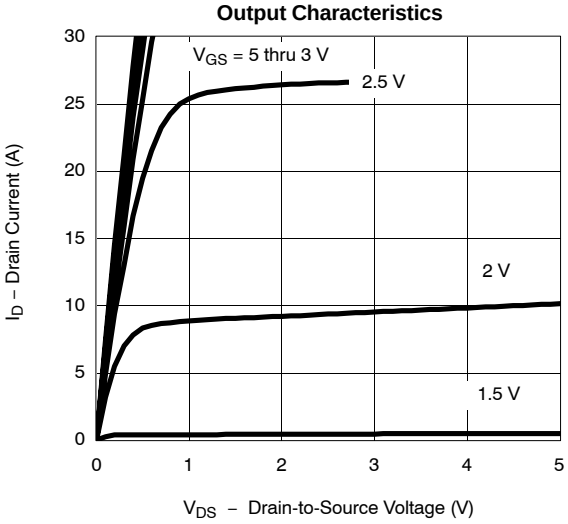
SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)

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		1.5	V
		V_{DS} = V_{GS}, I_D = −250 µA	P-Ch	−0.6		−1.5	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±12 V	N-Ch			±100	nA
			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} = 4.5 V	N-Ch	30			A
		V_{DS} = −5 V, V_{GS} = −4.5 V	P-Ch	−20			
Drain-Source On-State Resistance[b]	$r_{DS(on)}$	V_{GS} = 4.5 V, I_D = 9.1 A	N-Ch		0.016	0.020	Ω
		V_{GS} = −4.5 V, I_D = −5.3 A	P-Ch		0.048	0.060	
		V_{GS} = 2.5 V, I_D = 3.3 A	N-Ch		0.024	0.030	
		V_{GS} = −2.5 V, I_D = −1 A	P-Ch		0.082	0.100	
Forward Transconductance[b]	g_{fs}	V_{DS} = 15 V, I_D = 9.1 A	N-Ch		29		S
		V_{DS} = −15 V, I_D = −5.3 A	P-Ch		11		
Diode Forward Voltage[b]	V_{SD}	I_S = 2.1 A, V_{GS} = 0 V	N-Ch		0.8	1.2	V
		I_S = −2.1 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 = 9.1 A P-Channel V_{DS} = −10 V, V_{GS} = −4.5 V, I_D = −5.3 A	N-Ch		11	17	nC
			P-Ch		6.0	9	
Gate-Source Charge	Q_{gs}		N-Ch		2.5		
			P-Ch		1.3		
Gate-Drain Charge	Q_{gd}		N-Ch		3.2		
			P-Ch		1.6		
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		35	50	ns
			P-Ch		20	30	
Rise Time	t_r		N-Ch		50	80	
			P-Ch		35	60	
Turn-Off Delay Time	$t_{d(off)}$		N-Ch		31	50	
			P-Ch		55	85	
Fall Time	t_f		N-Ch		15	30	
			P-Ch		35	60	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = 2.1 A, di/dt = 100 A/µs	N-Ch		30	60	
		I_F = −2.1 A, di/dt = 100 A/µs	P-Ch		25	50	

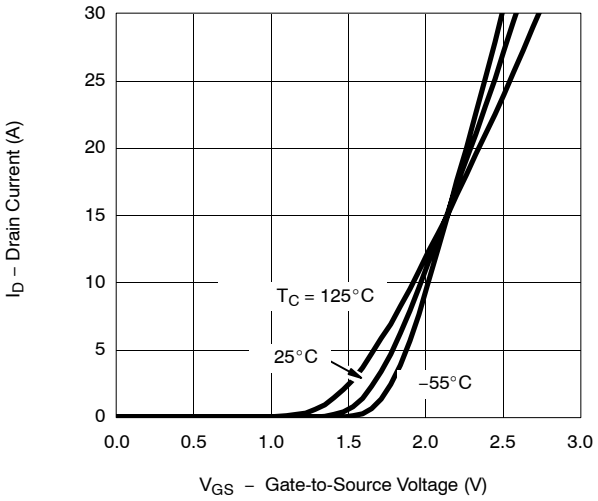
Notes
a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.

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

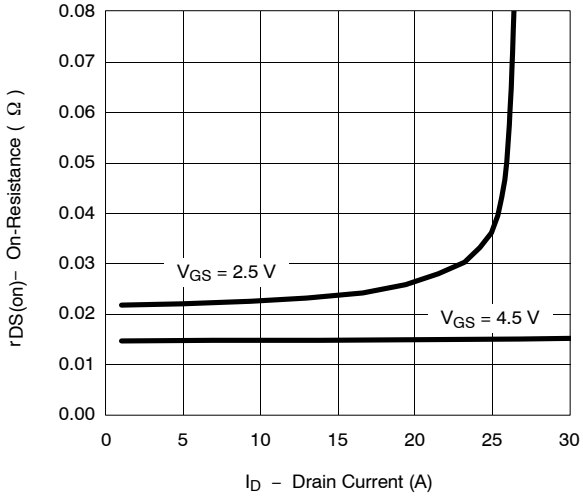
Output Characteristics



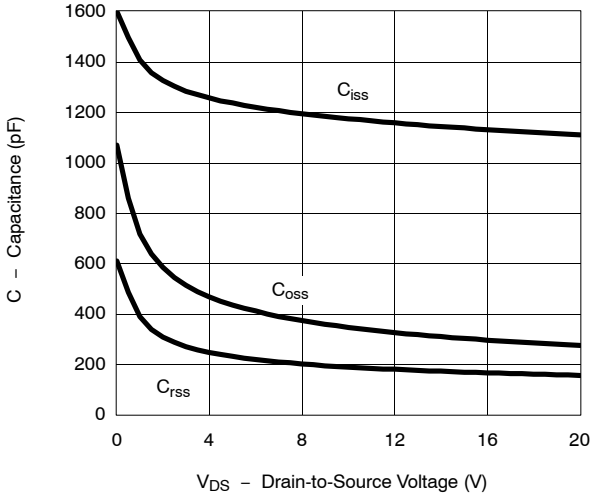
Transfer Characteristics



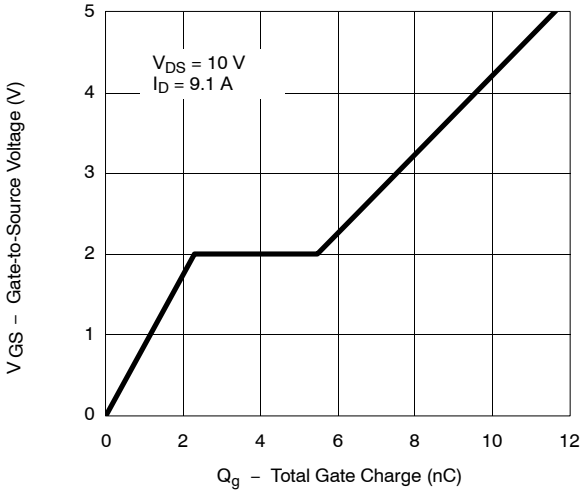
On-Resistance vs. Drain Current



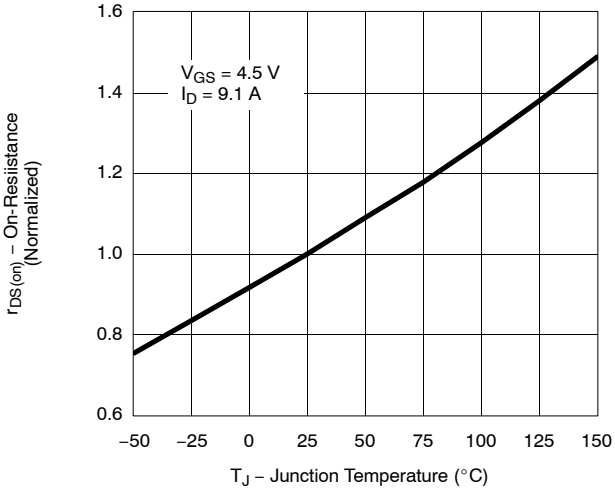
Capacitance



Gate Charge

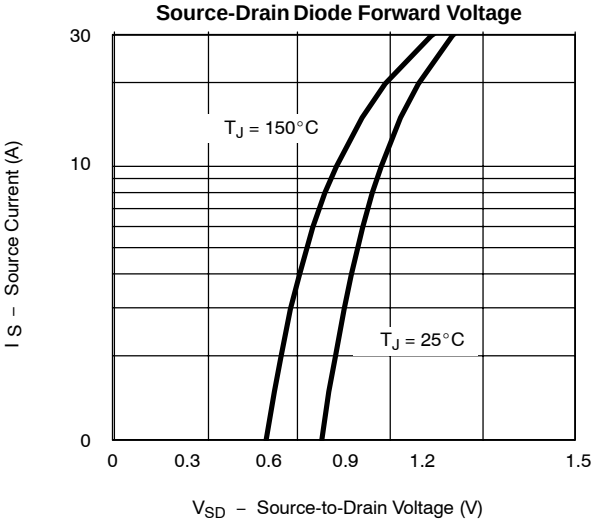


On-Resistance vs. Junction Temperature

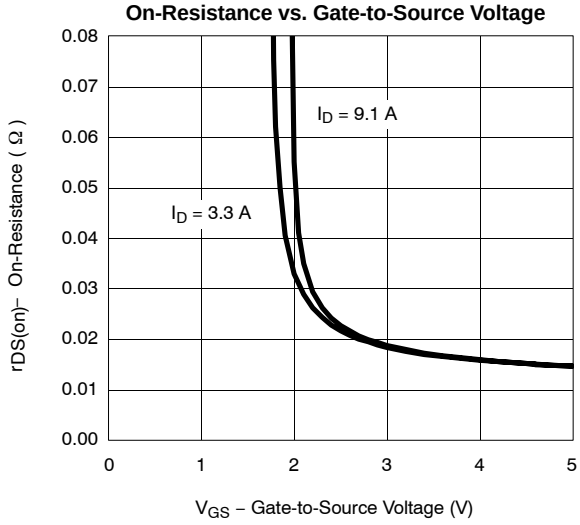


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) N-CHANNEL

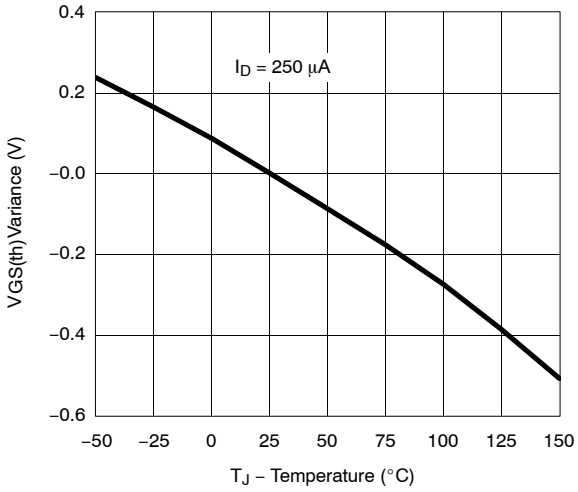
Source-Drain Diode Forward Voltage



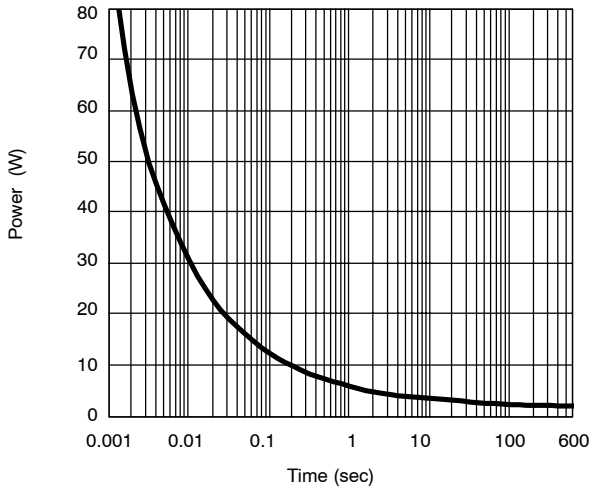
On-Resistance vs. Gate-to-Source Voltage



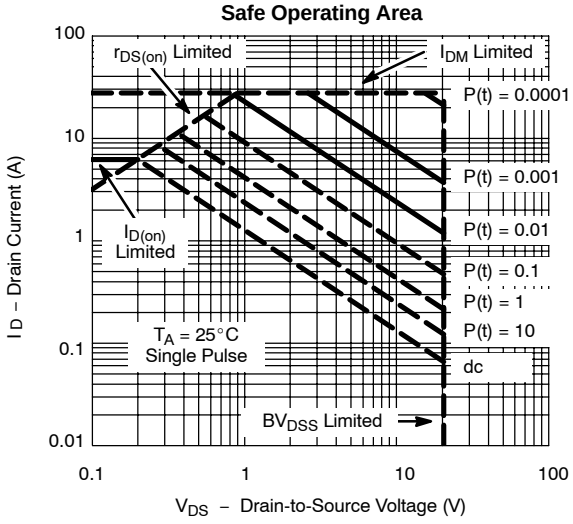
Threshold Voltage



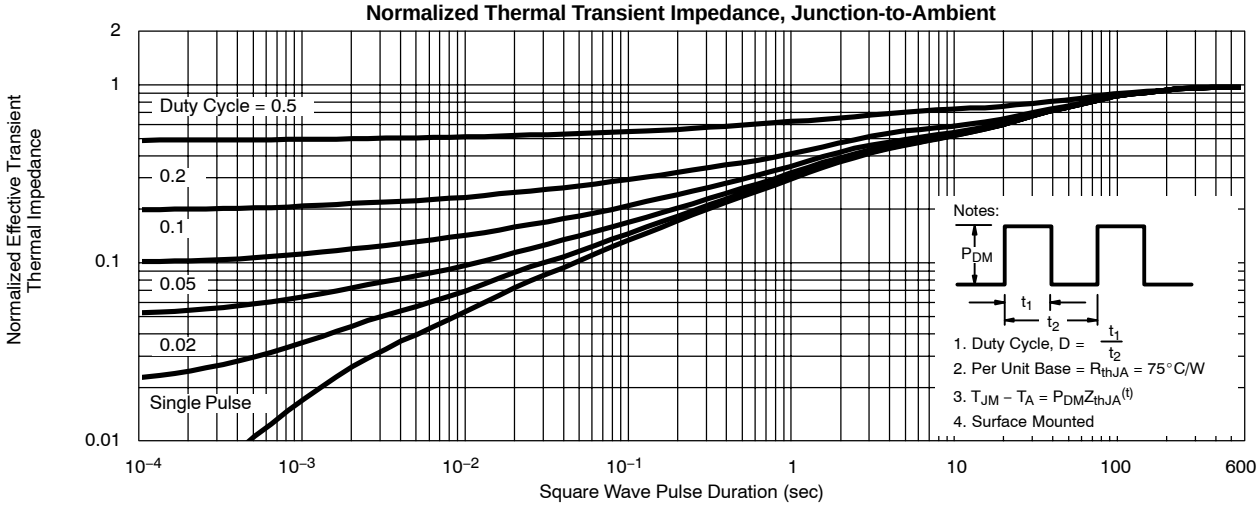
Single Pulse Power

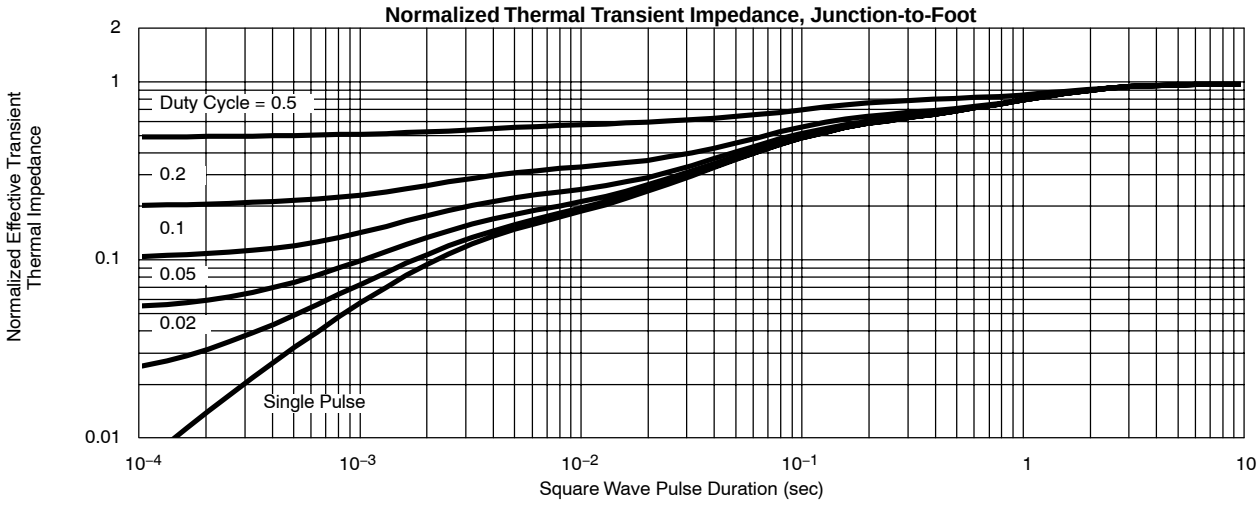


Safe Operating Area

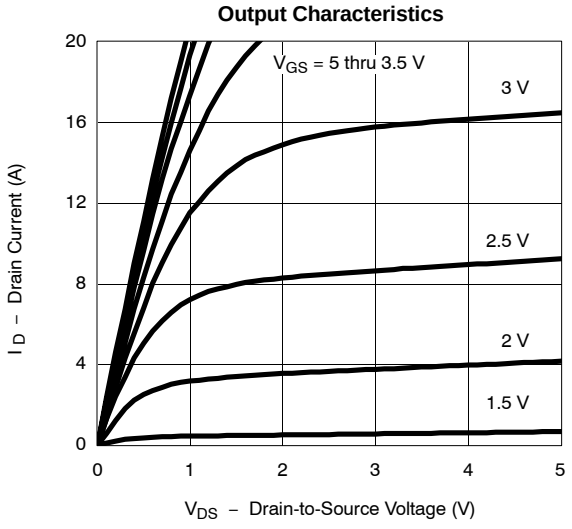


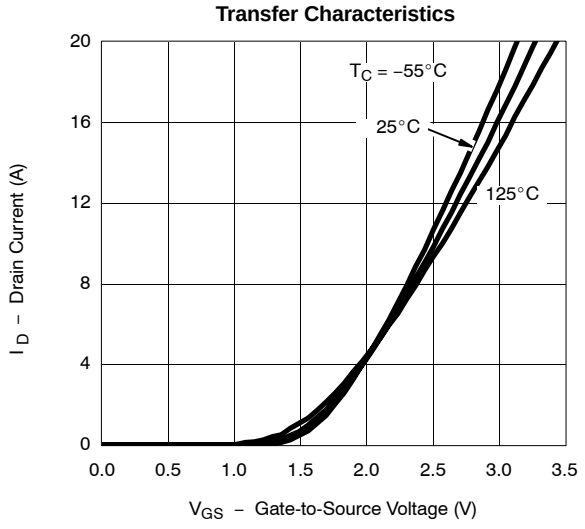
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) N-CHANNEL





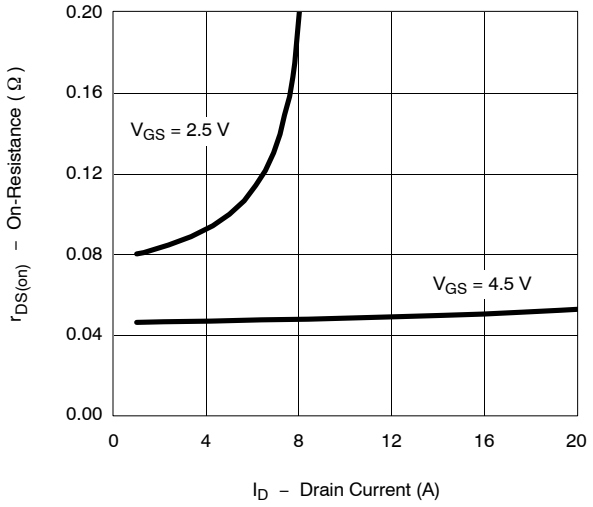
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) P-CHANNEL



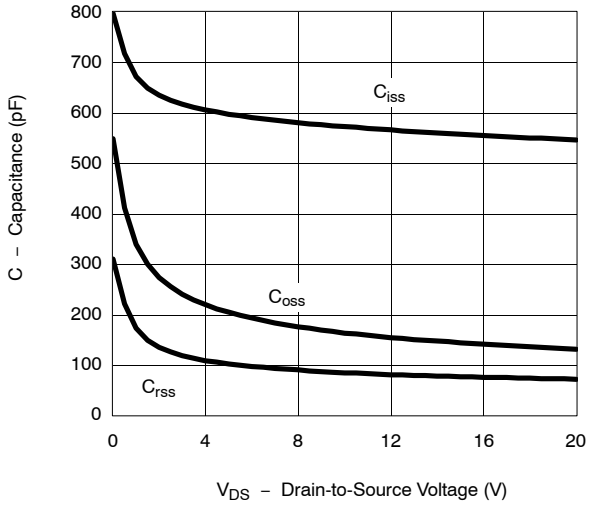


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) P-CHANNEL

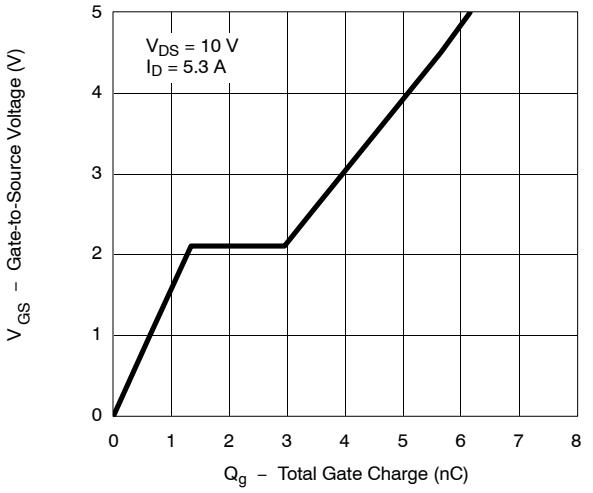
On-Resistance vs. Drain Current



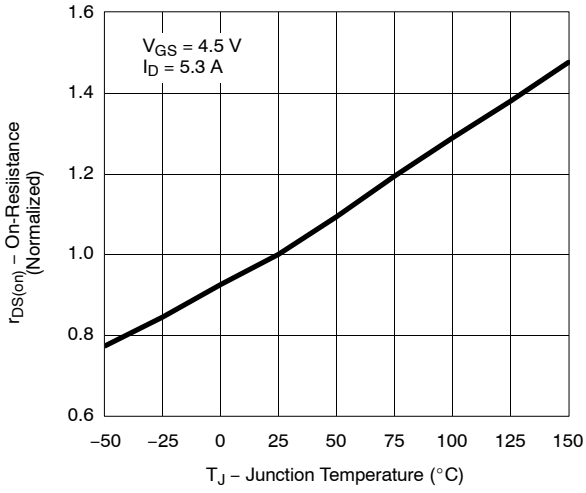
Capacitance



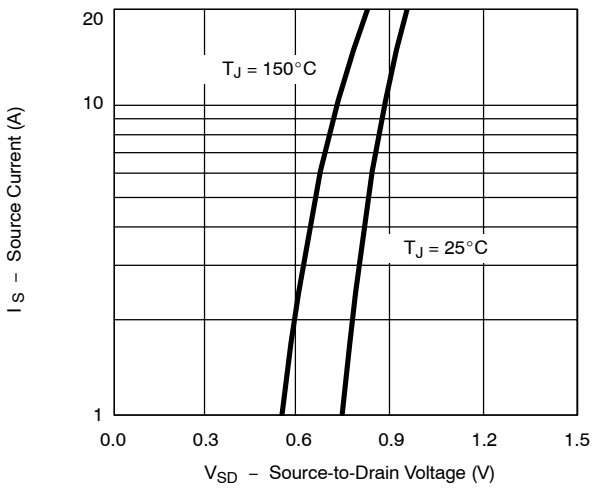
Gate Charge



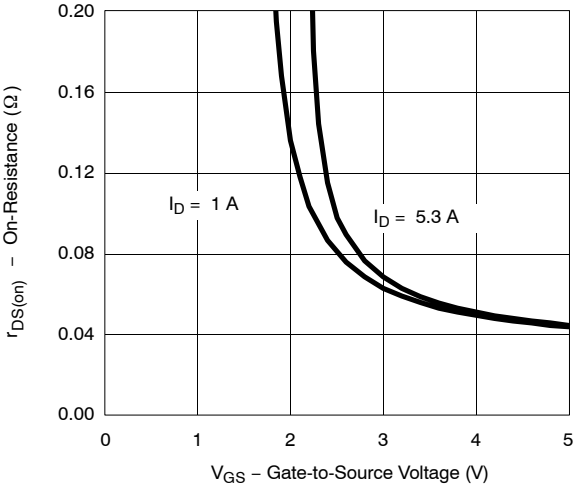
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

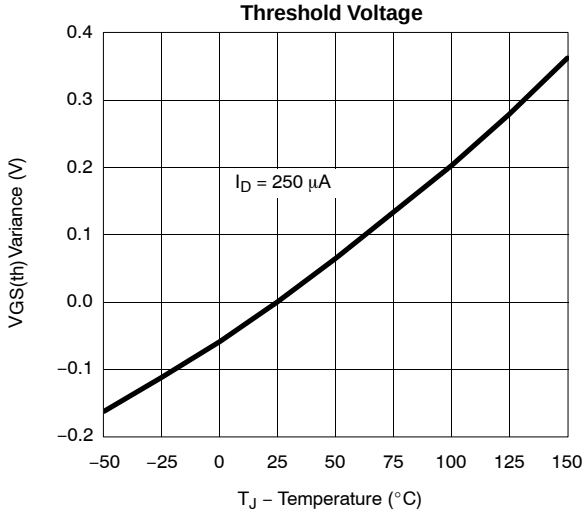


On-Resistance vs. Gate-to-Source Voltage

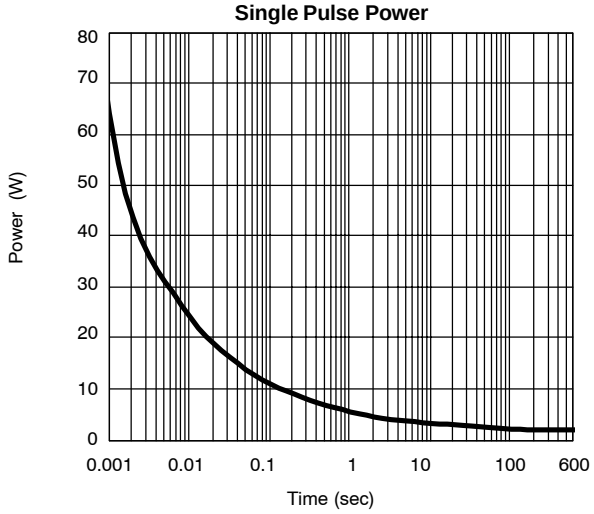


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) P-CHANNEL

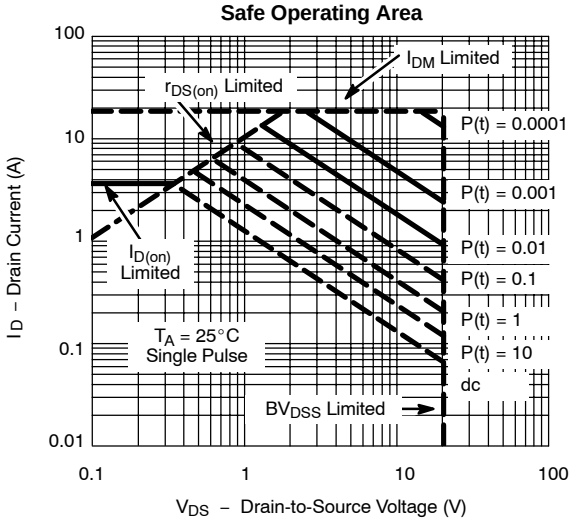
Threshold Voltage



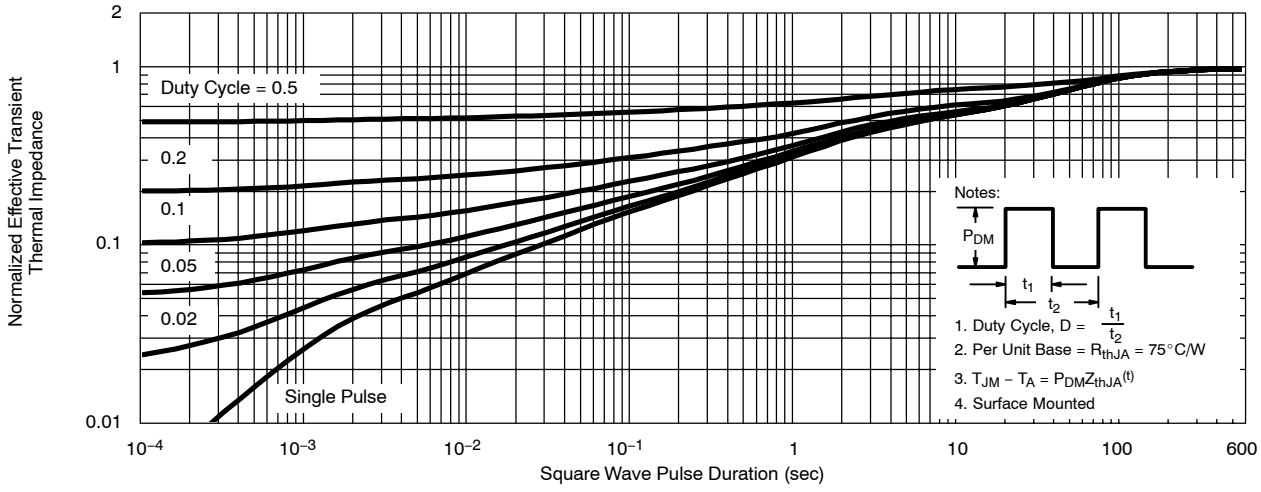
Single Pulse Power



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



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