N- and P-Channel 12-V (D-S) MOSFET

PRODUCT SUMMARY			
	V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
N-Channel	12	0.017 @ V_{GS} = 4.5 V	11.8
		0.025 @ V_{GS} = 2.5 V	9.8
P-Channel	-12	0.032 @ V_{GS} = -4.5 V	-8.9
		0.053 @ V_{GS} = -2.5 V	-6.9

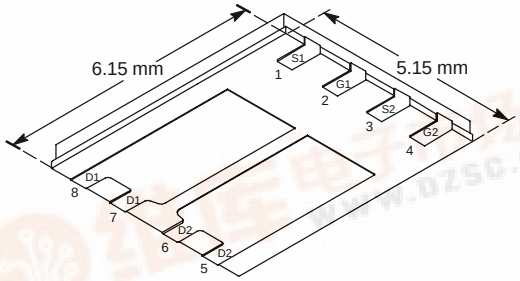
FEATURES

- TrenchFET® Power MOSFET
- New Low Thermal Resistance PowerPAK™ Package with Low 1.07-mm Profile
- PWM Optimized for High Efficiency

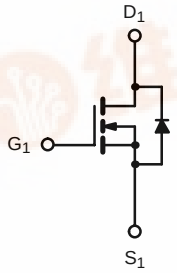
APPLICATIONS

- Point-of-Load Synchronous Rectifier
  - 5-V or 3.3-V BUS Step Down
  - Q_g Optimized for 500-kHz Operation
- Synchronous Buck, Shoot-Thru Resistant

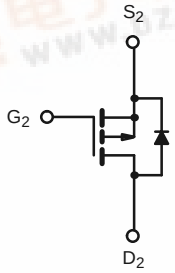
PowerPAK™ SO-8



Bottom View



N-Channel MOSFET



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)

Parameter		Symbol	N-Channel		P-Channel		Unit
			10 secs	Steady State	10 secs	Steady State	
Drain-Source Voltage		V_{DS}	12		-12		V
Gate-Source Voltage		V_{GS}	±8		±8		
Continuous Drain Current (T_J = 150°C)[a]	T_A = 25°C	I_D	11.8	7.6	-8.9	-5.7	A
	T_A = 70°C		9.5	6.1	-7.1	-4.6	
Pulsed Drain Current		I_{DM}	20				
Continuous Source Current (Diode Conduction)[a]		I_S	2.9	1.1	-2.9	-1.1	
Maximum Power Dissipation[a]	T_A = 25°C	P_D	3.5	1.4	3.5	1.4	W
	T_A = 70°C		2.2	0.9	2.2	0.9	
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}	26	35	26	35	°C/W
	Steady State		60	85	60	85	
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	3.9	5.5	3.9	5.5	

Notes:
a. Surface Mounted on 1" x 1" FR4 Board.

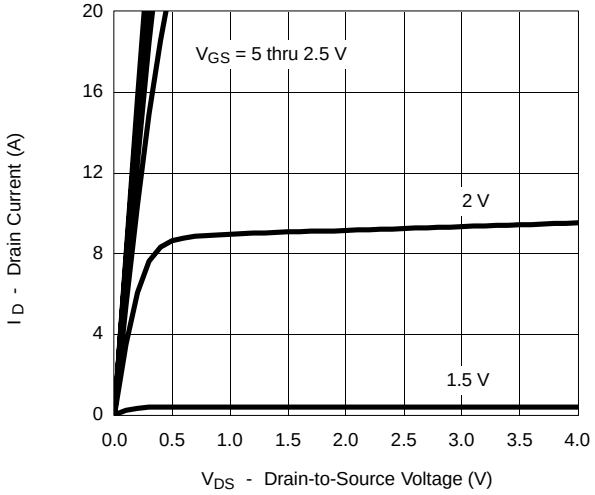
SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition		Min	Typ	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} = ±8 V	N-Ch			±100	nA
		V_{DS} = 0 V, V_{GS} = ±8 V	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 = 55°C	N-Ch			5	
		V_{DS} = -9.6 V, V_{GS} = 0 V, T_J = 55°C	P-Ch			-5	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} ≥ 5 V, V_{GS} = 4.5 V	N-Ch	20			A
		V_{DS} ≤ -5 V, V_{GS} = -4.5 V	P-Ch	-20			
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 4.5 V, I_D = 11.8 A	N-Ch		0.014	0.017	Ω
		V_{GS} = -4.5 V, I_D = -8.9 A	P-Ch		0.026	0.032	
		V_{GS} = 2.5 V, I_D = 9.8 A	N-Ch		0.020	0.025	
		V_{GS} = -2.5 V, I_D = -6.9 A	P-Ch		0.043	0.053	
Forward Transconductance[a]	g_{fs}	V_{DS} = 5 V, I_D = 11.8 A	N-Ch		32		S
		V_{DS} = -5 V, I_D = -8.9 A	P-Ch		23		
Diode Forward Voltage[a]	V_{SD}	I_S = 2.9 A, V_{GS} = 0 V	N-Ch		0.77	1.2	V
		I_S = -2.9 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 = 11.8 A P-Channel V_{DS} = -6 V, V_{GS} = -4.5 V, I_D = -8.9 A	N-Ch		11.5	17	nC
			P-Ch		13	20	
Gate-Source Charge	Q_{gs}		N-Ch		3.2		
			P-Ch		4.1		
Gate-Drain Charge	Q_{gd}		N-Ch		2.5		
			P-Ch		1.9		
Gate Resistance	R_G		N-Ch		1.7		Ω
			P-Ch		3.5		
Turn-On Delay Time	$t_{d(on)}$	N-Channel V_{DD} = 6 V, R_L = 6 Ω I_D ≅ 1 A, V_{GEN} = 4.5 V, R_G = 6 Ω P-Channel V_{DD} = -6 V, R_L = 6 Ω I_D ≅ -1 A, V_{GEN} = -4.5 V, R_G = 6 Ω	N-Ch		30	45	ns
			P-Ch		35	55	
Rise Time	t_r		N-Ch		50	75	
			P-Ch		42	65	
Turn-Off Delay Time	$t_{d(off)}$		N-Ch		60	90	
			P-Ch		54	85	
Fall Time	t_f		N-Ch		25	40	
			P-Ch		17	30	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = 2.9 A, di/dt = 100 A/µs	N-Ch		40	80	
		I_F = -2.9 A, di/dt = 100 A/µs	P-Ch		40	80	

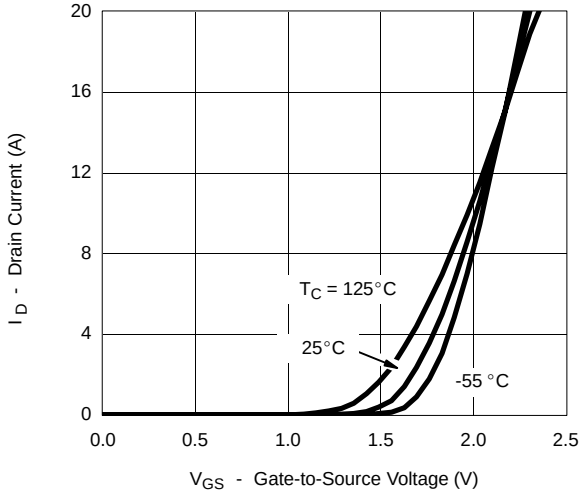
Notes
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.

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

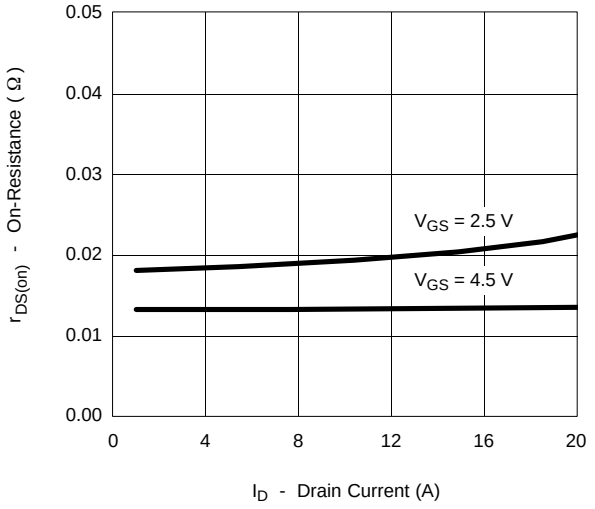
Output Characteristics



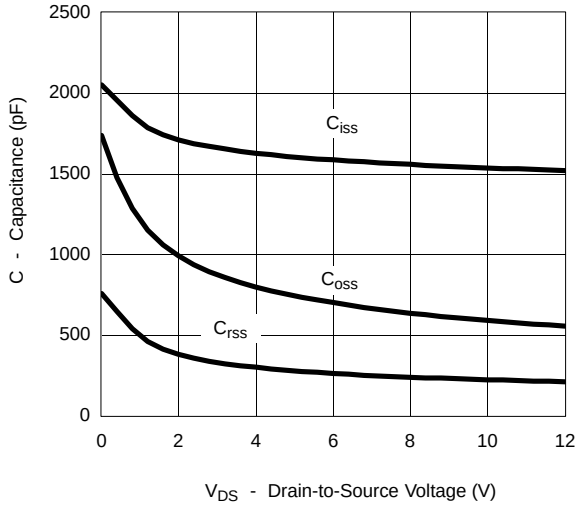
Transfer Characteristics



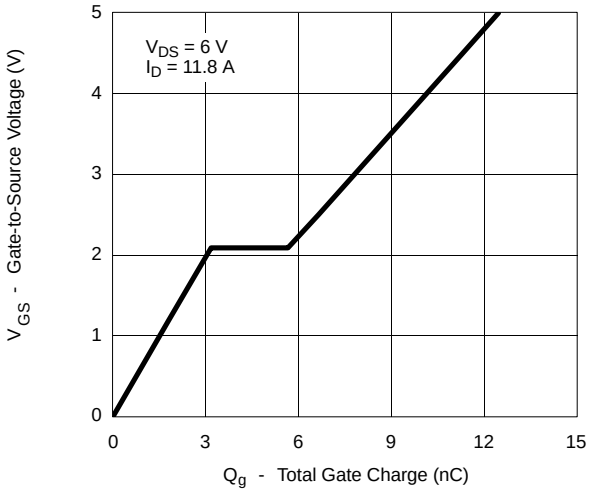
On-Resistance vs. Drain Current



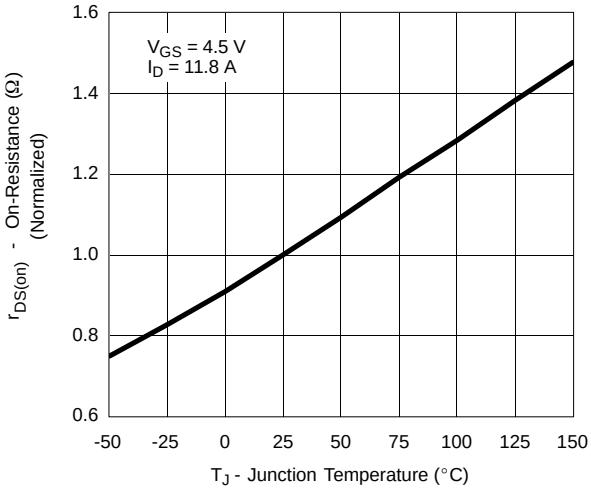
Capacitance



Gate Charge

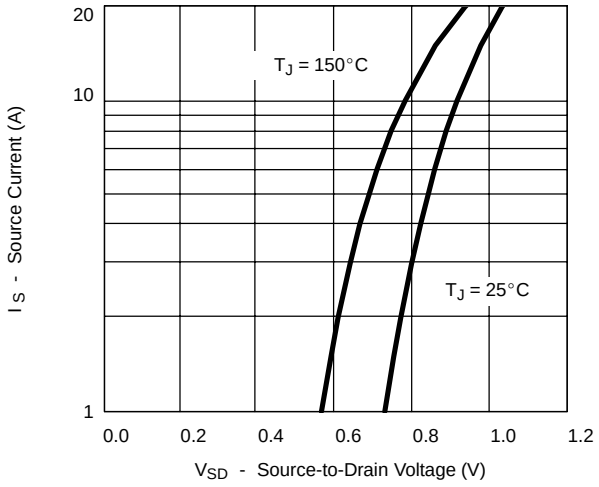


On-Resistance vs. Junction Temperature

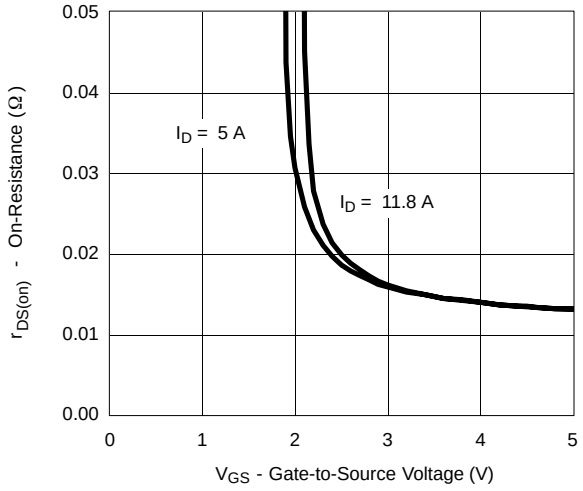


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) N-CHANNEL

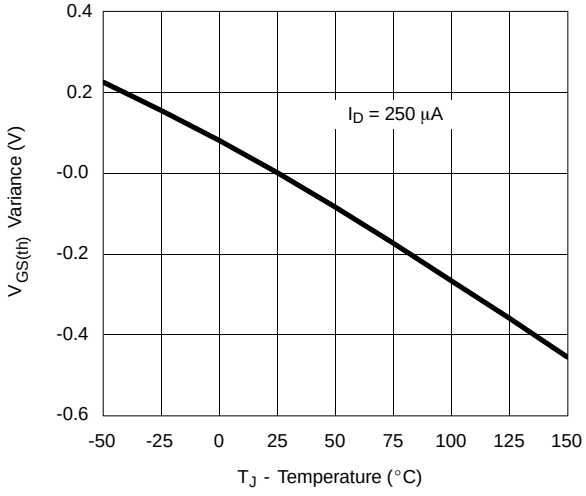
Source-Drain Diode Forward Voltage



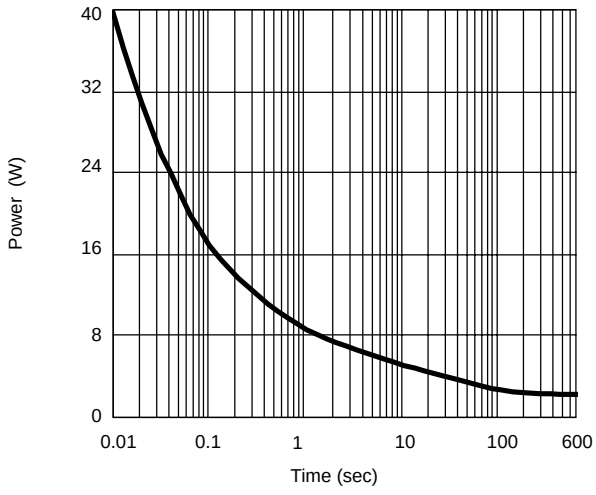
On-Resistance vs. Gate-to-Source Voltage



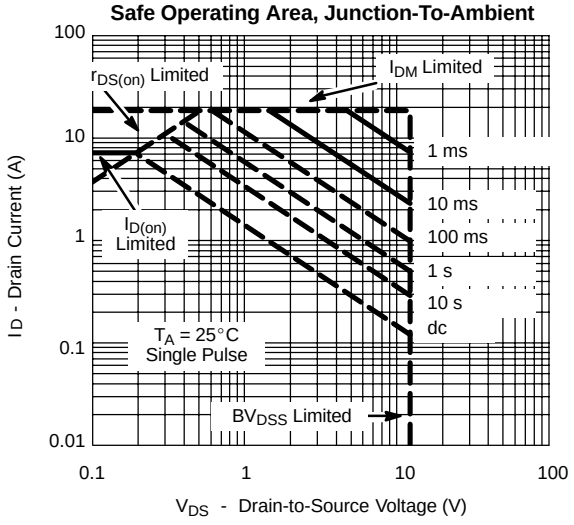
Threshold Voltage



Single Pulse Power

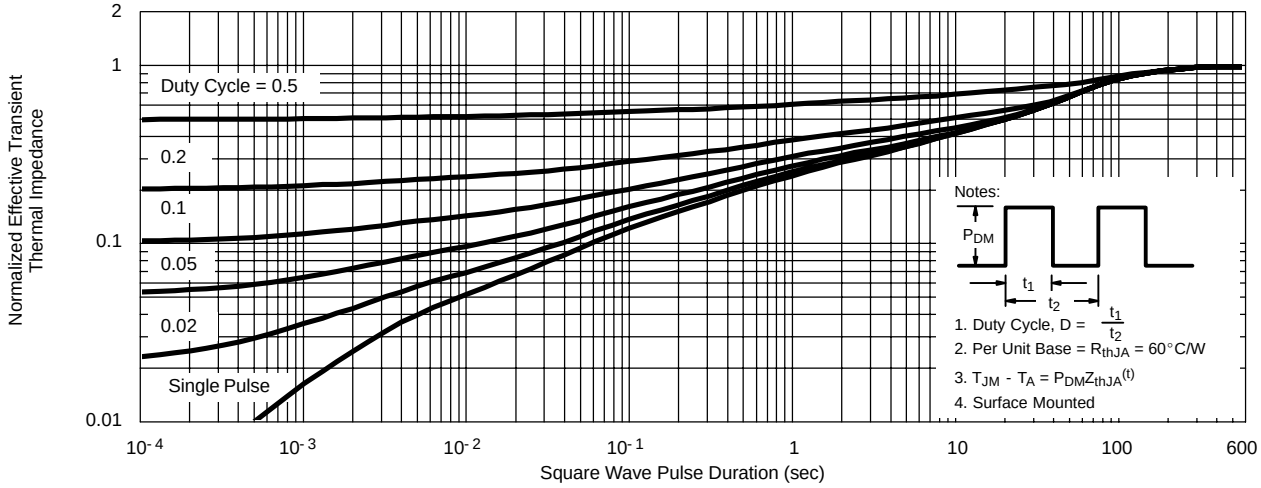


Safe Operating Area, Junction-To-Ambient

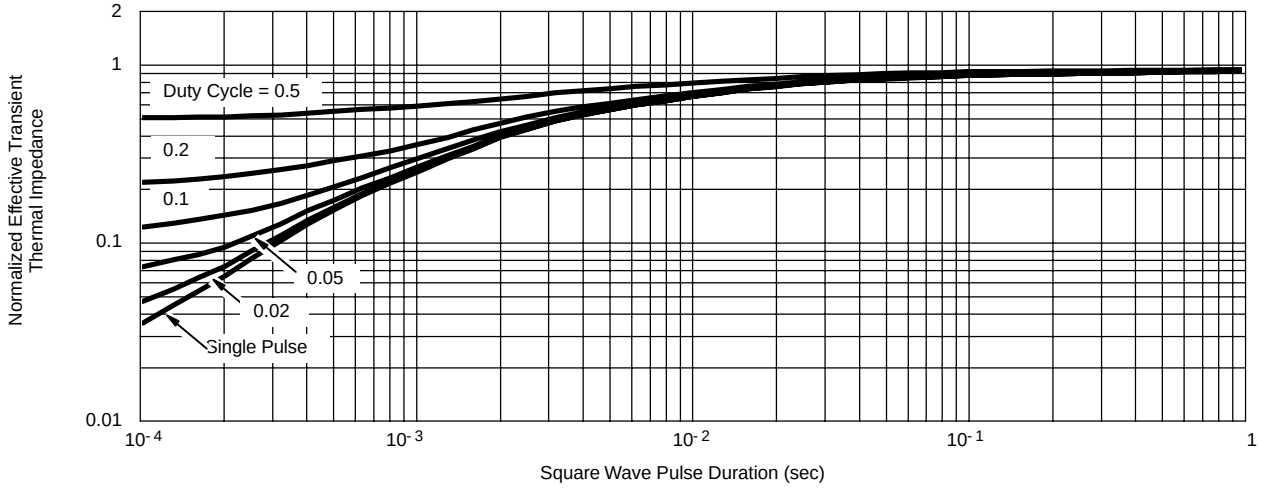


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) N-CHANNEL

Normalized Thermal Transient Impedance, Junction-to-Ambient

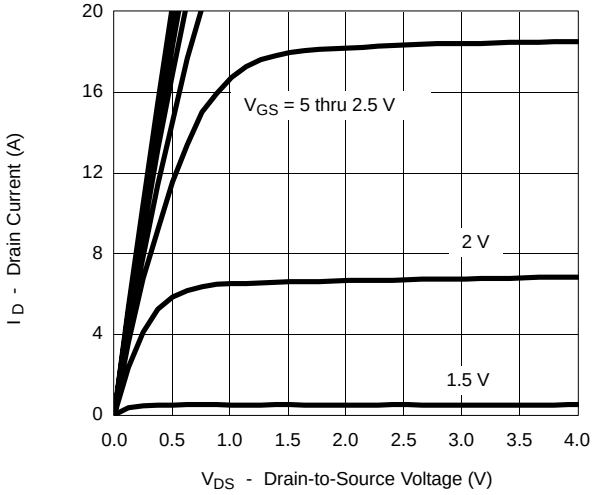


Normalized Thermal Transient Impedance, Junction-to-Case

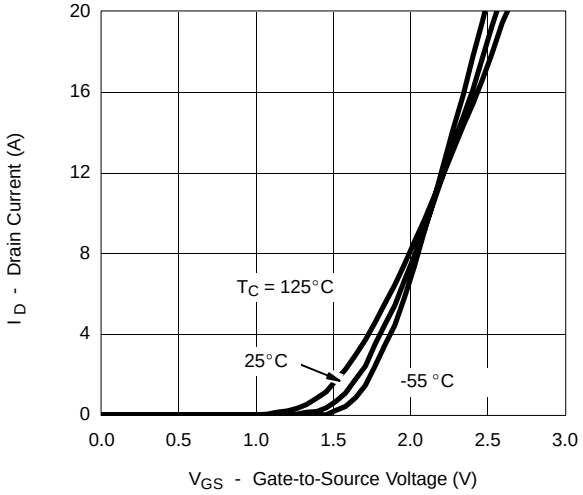


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) P-CHANNEL

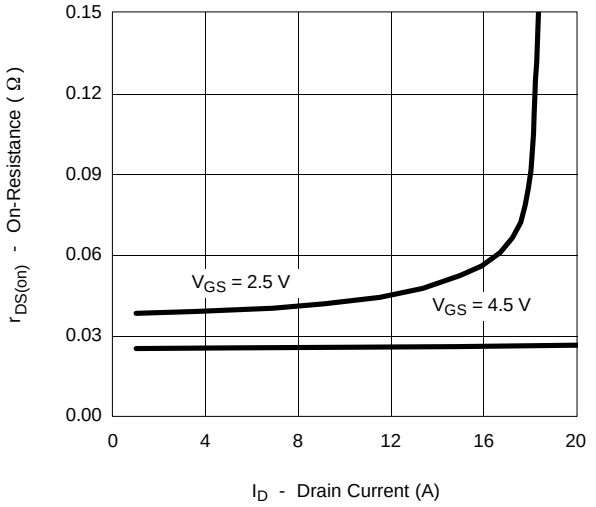
Output Characteristics



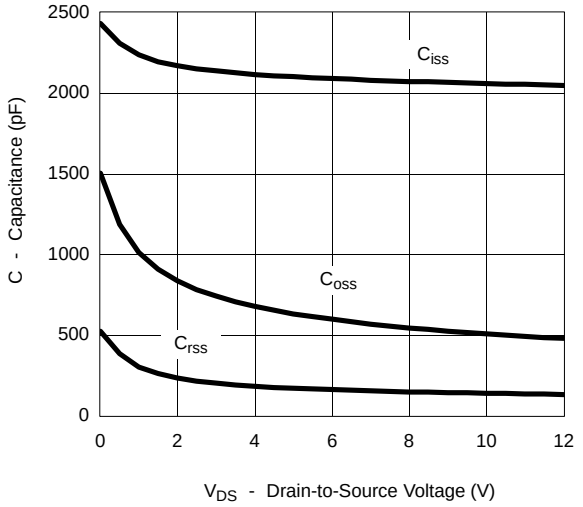
Transfer Characteristics



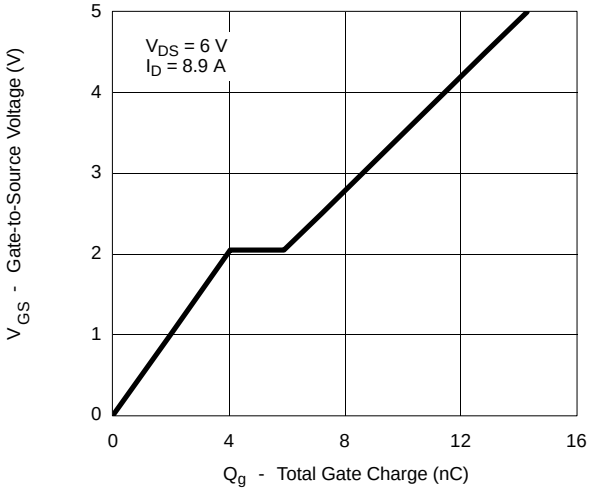
On-Resistance vs. Drain Current



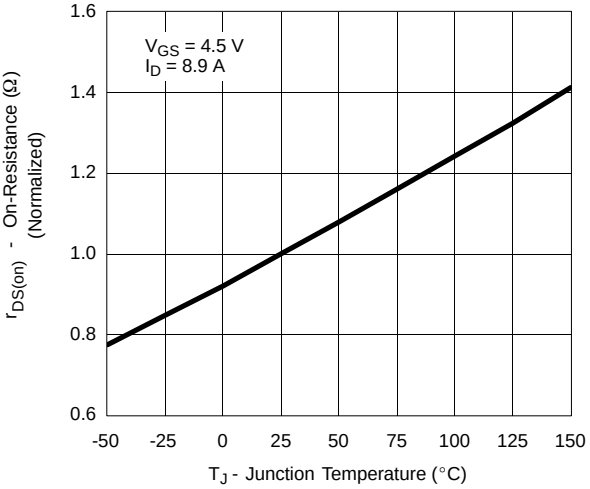
Capacitance



Gate Charge

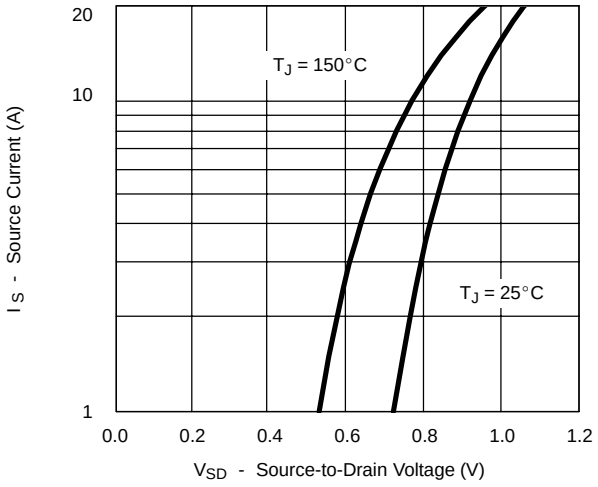


On-Resistance vs. Junction Temperature

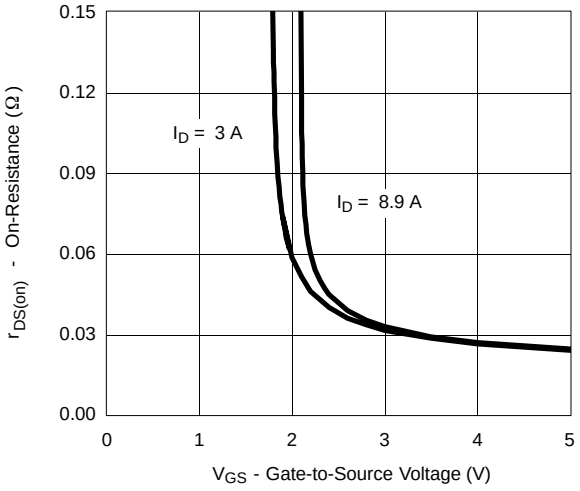


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) P-CHANNEL

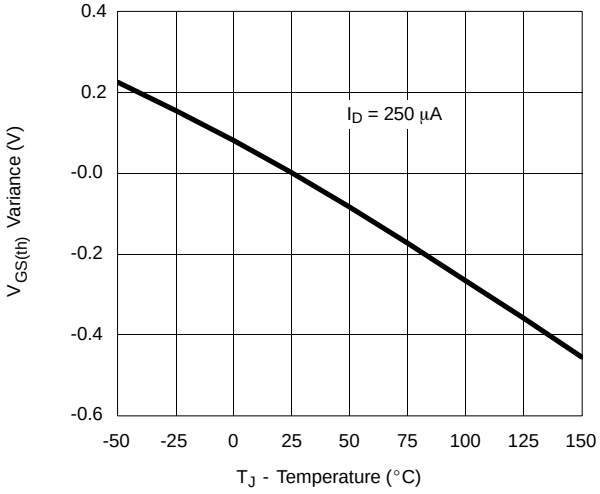
Source-Drain Diode Forward Voltage



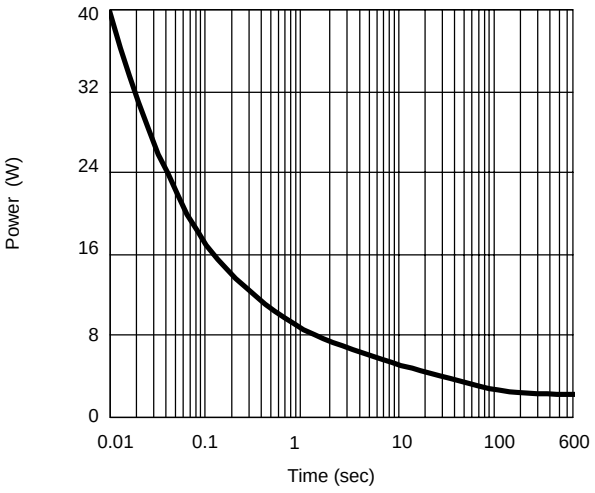
On-Resistance vs. Gate-to-Source Voltage



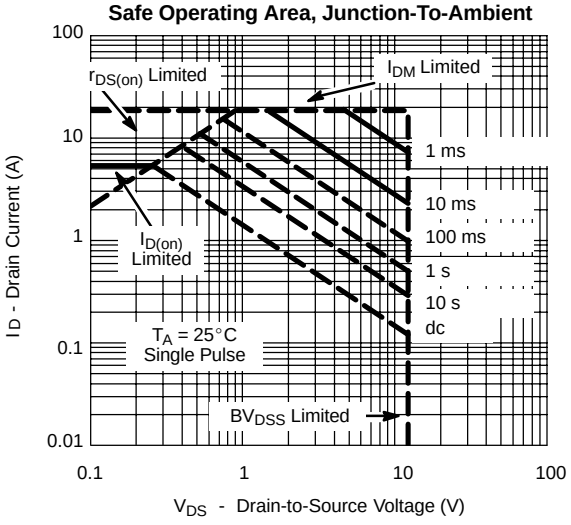
Threshold Voltage



Single Pulse Power

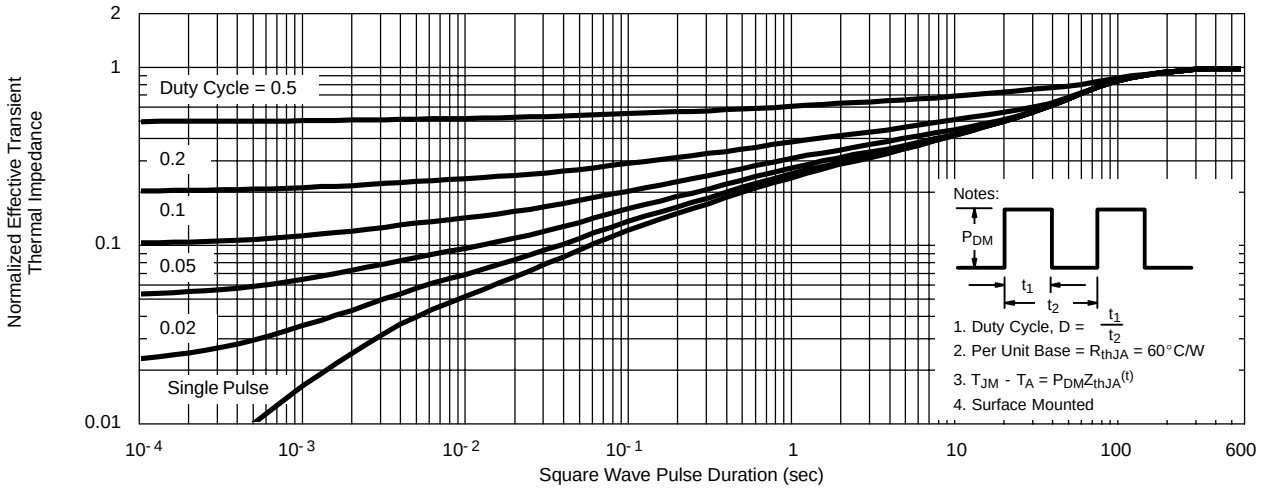


Safe Operating Area, Junction-To-Ambient



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

Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case