



UF630

Power MOSFET

200V, 9A N-CHANNEL POWER MOSFET

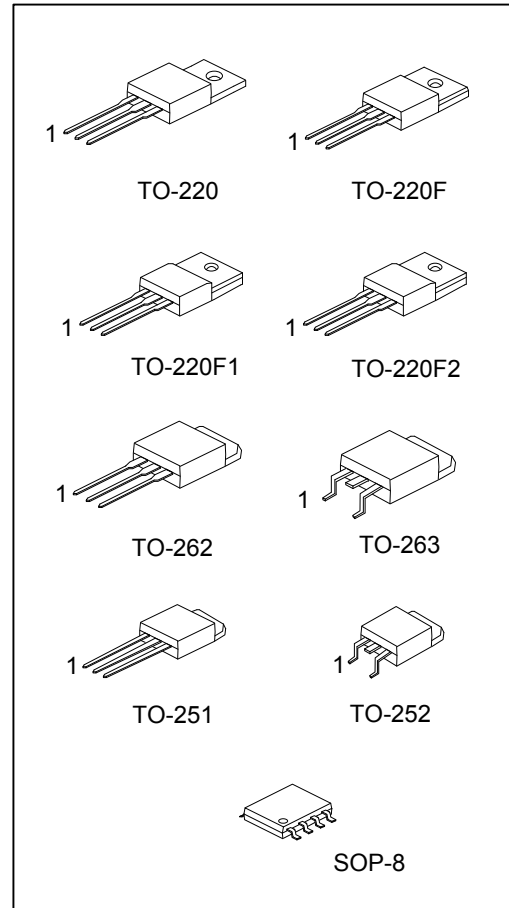
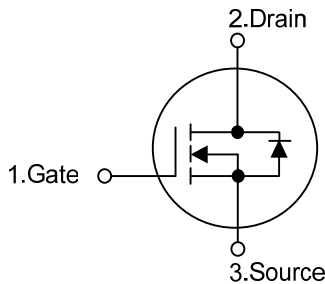
■ DESCRIPTION

The N-Channel enhancement mode silicon gate power MOSFET is designed for high voltage, high speed power switching applications such as switching regulators, switching converters, solenoid, motor drivers, relay drivers.

■ FEATURES

- * $R_{DS(ON)} < 0.4\Omega @ V_{GS} = 10V, I_D = 5.0A$
- * Ultra Low Gate Charge (typical 19 nC)
- * Low Reverse Transfer Capacitance ($C_{RSS} = \text{typical } 80 \text{ pF}$)
- * Fast Switching Capability
- * Avalanche Energy Specified
- * Improved dv/dt Capability

■ SYMBOL



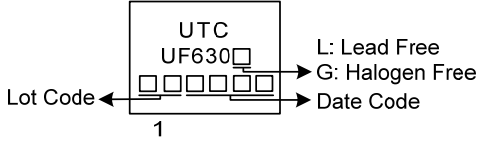
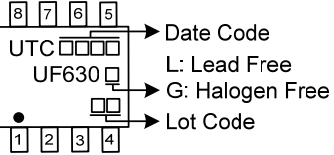
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UF630L-TA3-T	UF630G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UF630L-TF1-T	UF630G-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	Tube
UF630L-TF2-T	UF630G-TF2-T	TO-220F2	G	D	S	-	-	-	-	-	Tube
UF630L-TF3-T	UF630G-TF3-T	TO-220F	G	D	S	-	-	-	-	-	Tube
UF630L-TM3-T	UF630G-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
UF630L-TN3-R	UF630G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UF630L-T2Q-T	UF630G-T2Q-T	TO-262	G	D	S	-	-	-	-	-	Tube
UF630L-TQ2-T	UF630G-TQ2-T	TO-263	G	D	S	-	-	-	-	-	Tube
UF630L-TQ2-R	UF630G-TQ2-R	TO-263	G	D	S	-	-	-	-	-	Tape Reel
UF630L-S08-R	UF630G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

Note: Pin Assignment: G: Gate D: Drain S: Source

<p>UF630G-TA3-T</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2, TF3: TO-220F, TM3: TO-251, TN3: TO-252, T2Q: TO-262, TQ2: TO-263, S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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■ MARKING

TO-220 / TO-220F / TO-220F1 TO-220F2 / TO-252 / TO-262 / TO-263	SOP-8
	

■ ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	200	V
Drain-Gate Voltage ($R_{GS} = 20\text{k}\Omega$, $T_J = 25^\circ\text{C} \sim 125^\circ\text{C}$)		V_{DGR}	200	V
Gate-Source Voltage		V_{GSS}	± 20	V
Continuous Drain Current		I_D	9	A
Pulsed Drain Current (Note 2)		I_{DM}	36	A
Single Pulse Avalanche Energy (Note 3)		E_{AS}	150	mJ
Power Dissipation	TO-220/TO-262 TO-263	P_D	73	W
	TO-220F1/ TO-220F		38	
	TO-220F2		42	
	TO-251/ TO-252		46	
	SOP-8		2.5	
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Repetitive Rating : Pulse width limited by T_J .

3. $L = 4\text{mH}$, $I_{AS} = 8.3\text{A}$, $V_{DD} = 20\text{V}$, $R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F1 TO-220F/TO-220F2 TO-262/TO-263	θ_{JA}	62.5	$^\circ\text{C/W}$
	TO-251/ TO-252		100.3	
	SOP-8		83	
Junction to Case	TO-220/TO-262 TO-263	θ_{JC}	1.71	$^\circ\text{C/W}$
	TO-220F1/ TO-220F		3.31	
	TO-220F2		2.98	
	TO-251/ TO-252		2.7	
	SOP-8		50	

■ ELECTRICAL SPECIFICATIONS (T_C=25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
OFF CHARACTERISTICS								
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} = 0V, I _D = 250μA	200			V	
On-State Drain Current (Note 1)		I _{D(ON)}	V _{DS} > I _{D(ON)} × R _{DS(ON)MAX} , V _{GS} = 10V	9			A	
Drain-Source Leakage Current		I _{DSS}	V _{DS} = Rated BV _{DSS} , V _{GS} = 0V			10	μA	
Gate-Source Leakage Current	Forward	I _{GSS}	V _{GS} = 20V, V _{DS} = 0V			100	nA	
	Reverse		V _{GS} = -20V, V _{DS} = 0V			-100	nA	
ON CHARACTERISTICS								
Gate Threshold Voltage		V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 250μA	2		4	V	
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} = 10V, I _D = 5A		0.25	0.4	Ω	
DYNAMIC CHARACTERISTICS								
Input Capacitance		C _{ISS}	V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz		600		pF	
Output Capacitance		C _{OSS}				250		pF
Reverse Transfer Capacitance		C _{RSS}				80		pF
SWITCHING CHARACTERISTICS								
Turn-On Delay Time		t _{D(ON)}	V _{DD} = 90V, I _D ≈ 9A, R _{GS} = 9.1Ω, V _{GS} = 10V, R _L = 9.6Ω (Note 1, 2)			30	ns	
Turn-On Rise Time		t _R				50		ns
Turn-Off Delay Time		t _{D(OFF)}				50		ns
Turn-Off Fall Time		t _F				40		ns
Total Gate Charge		Q _G		V _{GS} = 10V, I _D = 9A, V _{DS} = 0.8 × Rated BV _{DSS}		19	30	nC
Gate-Source Charge		Q _{GS}	I _{G(REF)} = 1.5mA		10		nC	
Gate-Drain Charge		Q _{GD}			9		nC	
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS								
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} = 0V, I _S = 9.0A			2	V	
Maximum Continuous Drain-Source Diode Forward Current		I _S				9	A	
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				36	A	
Reverse Recovery Time		t _{rr}	I _S = 9.0A, di _S /dt = 100A/μs		450		ns	
Reverse Recovery Charge		Q _{rr}	(Note 1)		3		μC	

Notes: 1. Pulse Test: Pulse width ≤300μs, Duty cycle ≤2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

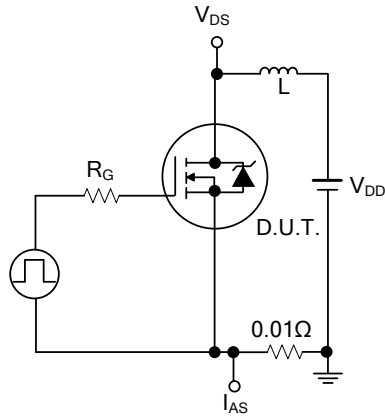


Fig1. Unclamped Energy Test Circuit

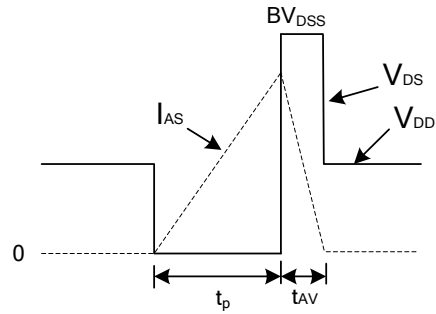


Fig.2 Unclamped Energy Waveforms

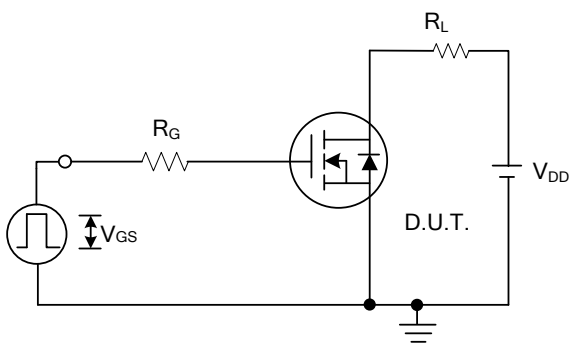


Fig.3 Switching Time Test Circuit

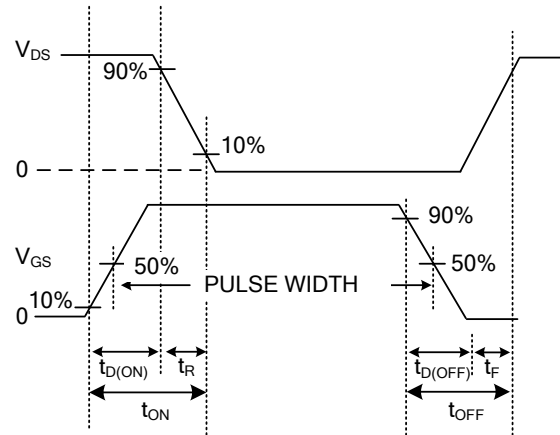


Fig.4 Resistive Switching Waveforms

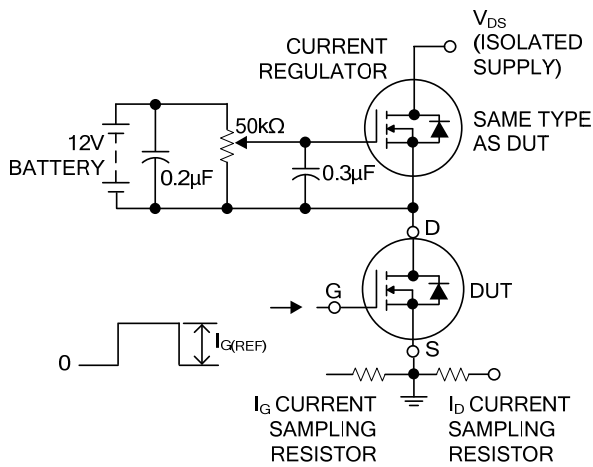


Fig.5 Gate Charge Test Circuit

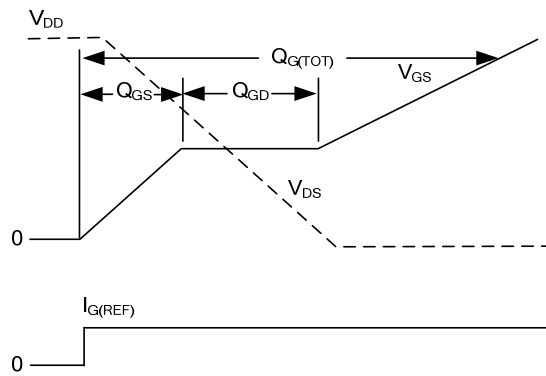
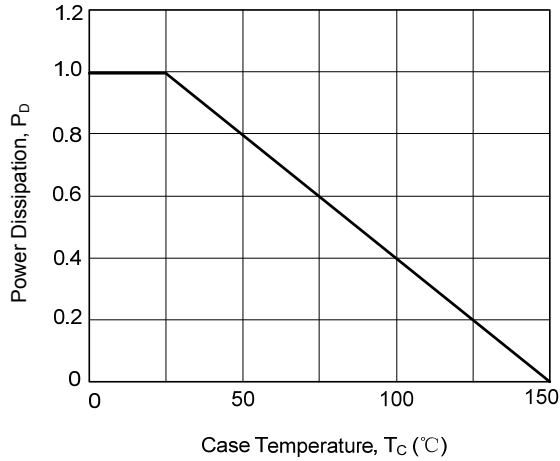


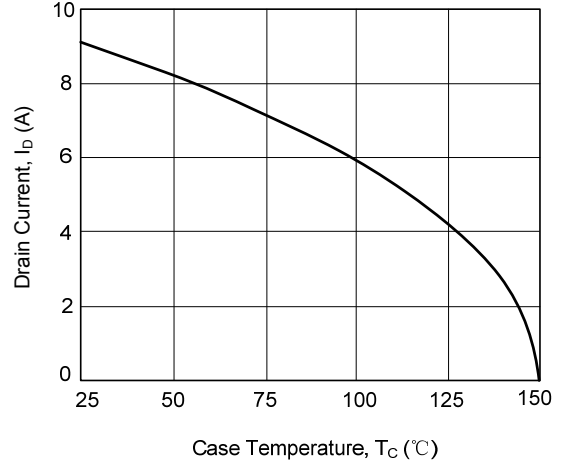
Fig.6 Gate Charge Waveforms

TYPICAL CHARACTERISTICS

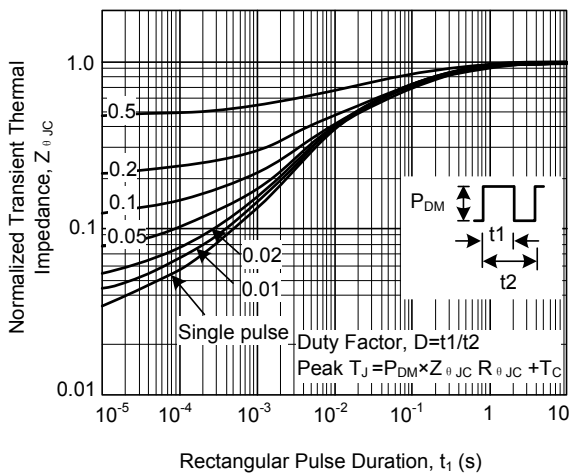
Normalized Power Dissipation vs. Case Temperature



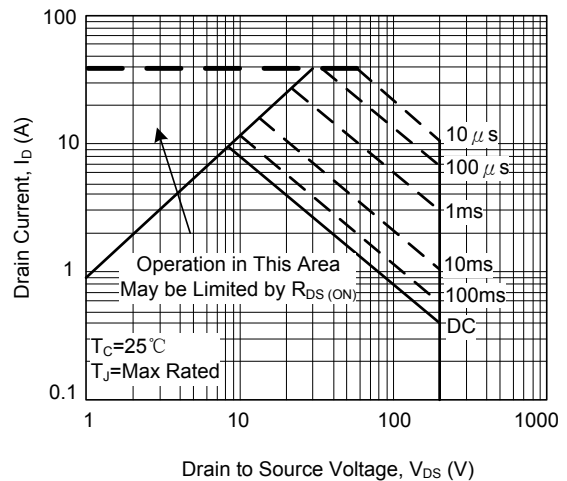
Maximum Continuous Drain Current vs. Case Temperature



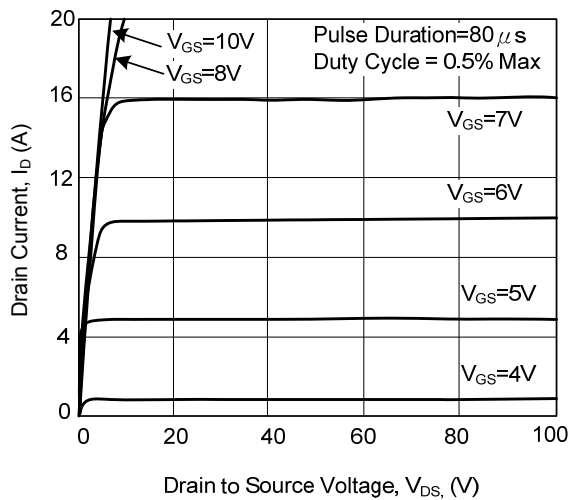
Normalized Transient Thermal Impedance



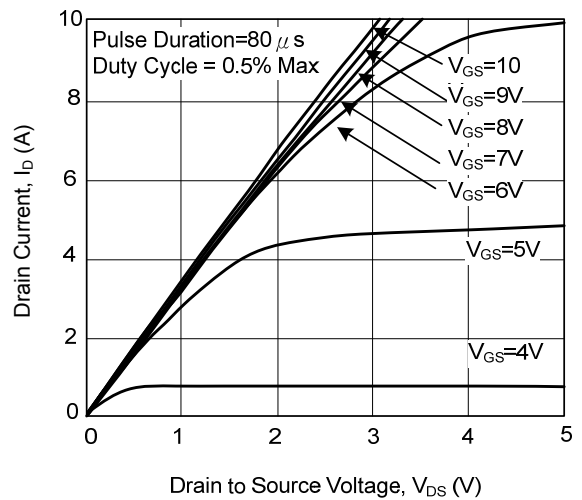
Forward Bias Safe Operating Area



Output Characteristics

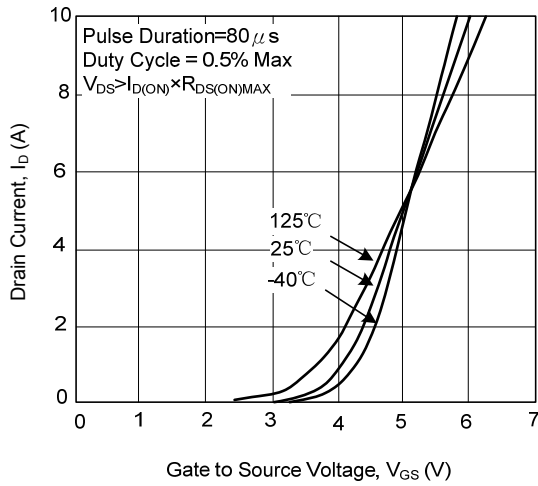


Saturation Characteristics

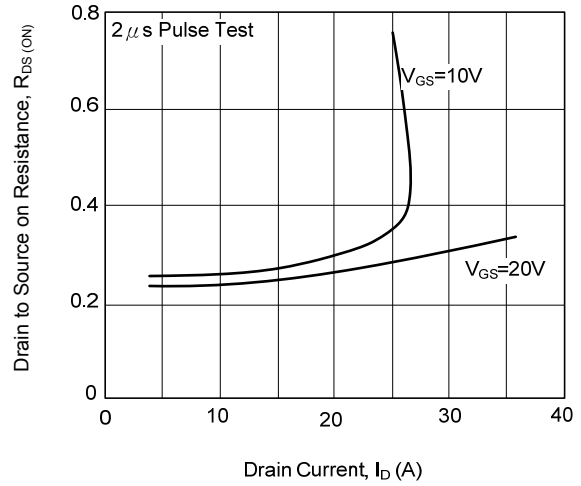


TYPICAL CHARACTERISTICS (Cont.)

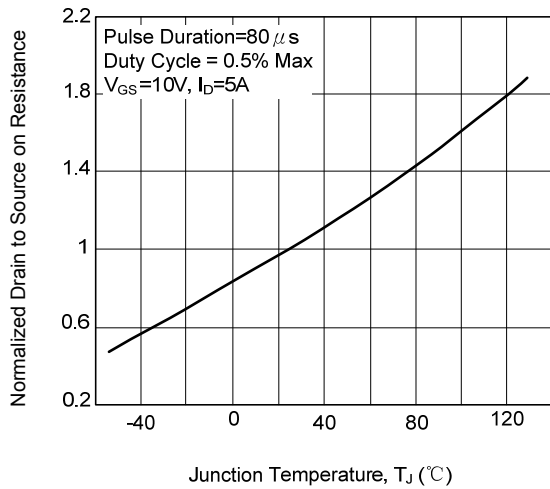
Transfer Characteristics



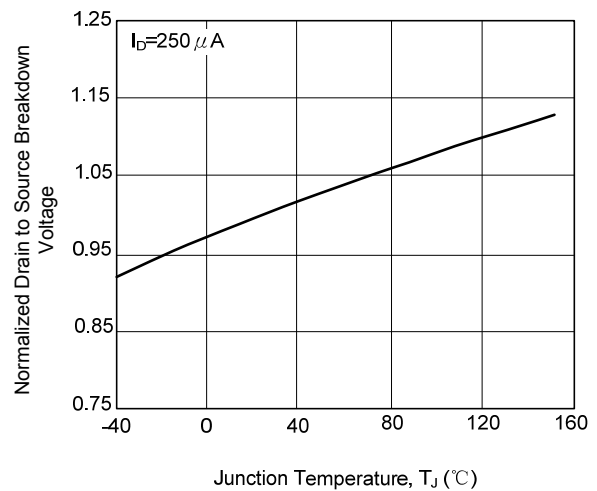
Drain to Source on Resistance vs. Gate Voltage and Drain Current



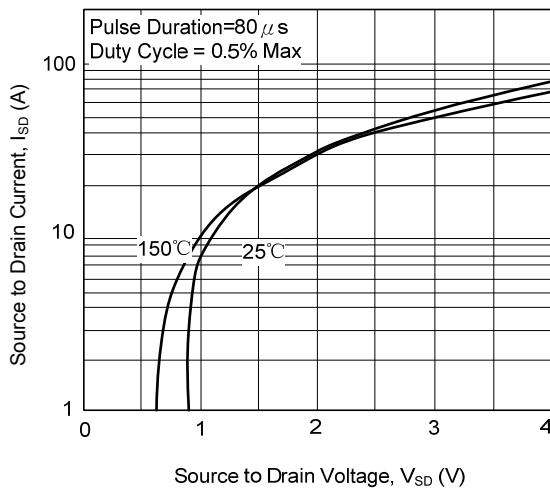
Normalized Drain to Source on Resistance vs. Junction Temperature



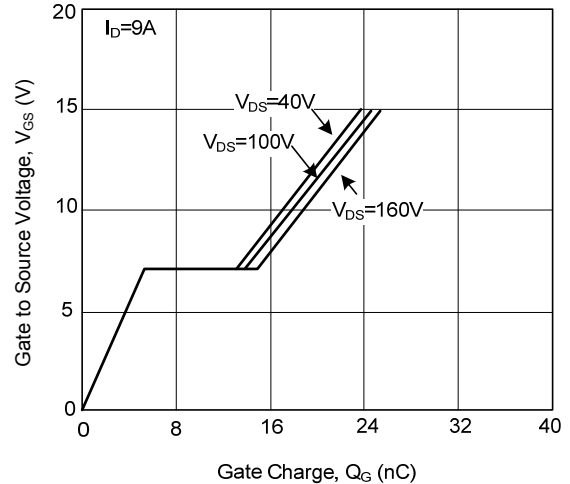
Normalized Drain to Source Breakdown Voltage vs. Junction Temperature



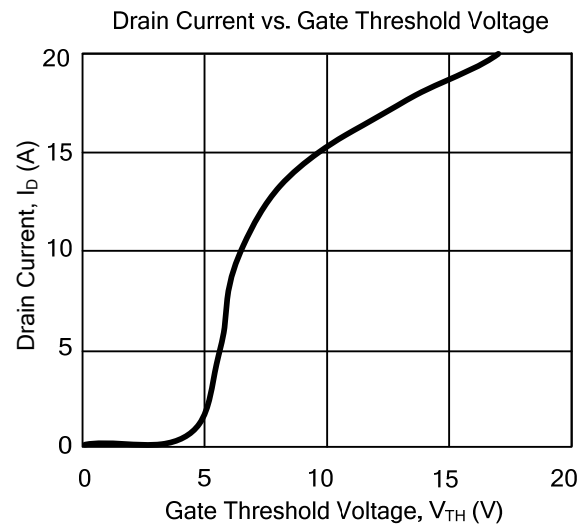
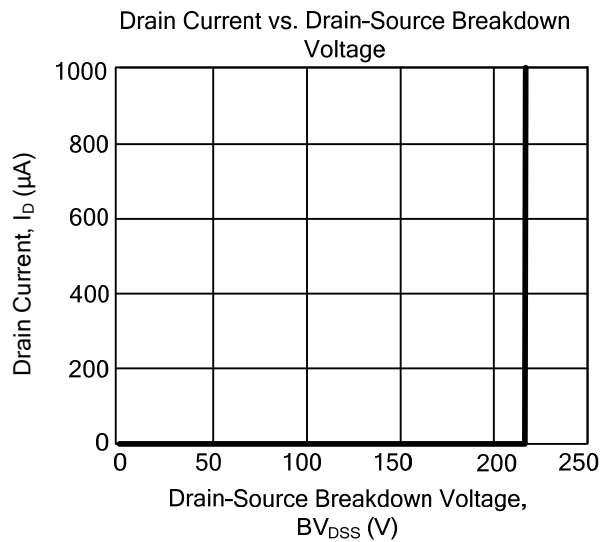
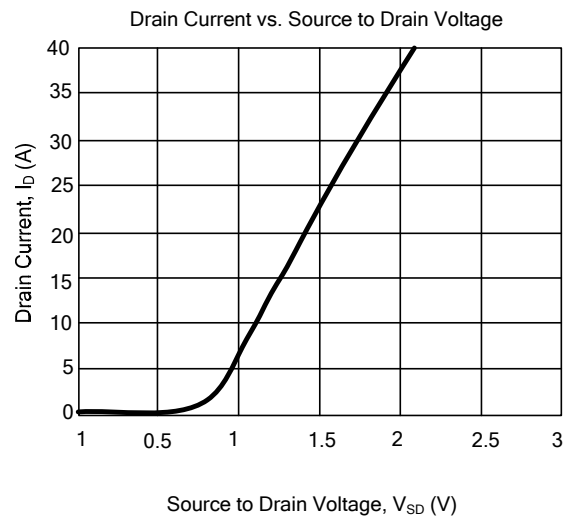
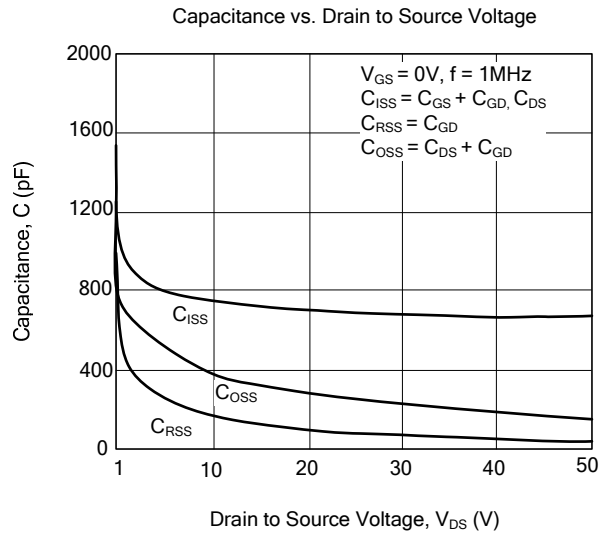
Source to Drain Diode Voltage



Gate to Source Voltage vs. Gate Charge



■ TYPICAL CHARACTERISTICS (Cont.)



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