



UF630

Power MOSFET

200V, 9A N-CHANNEL POWER MOSFET

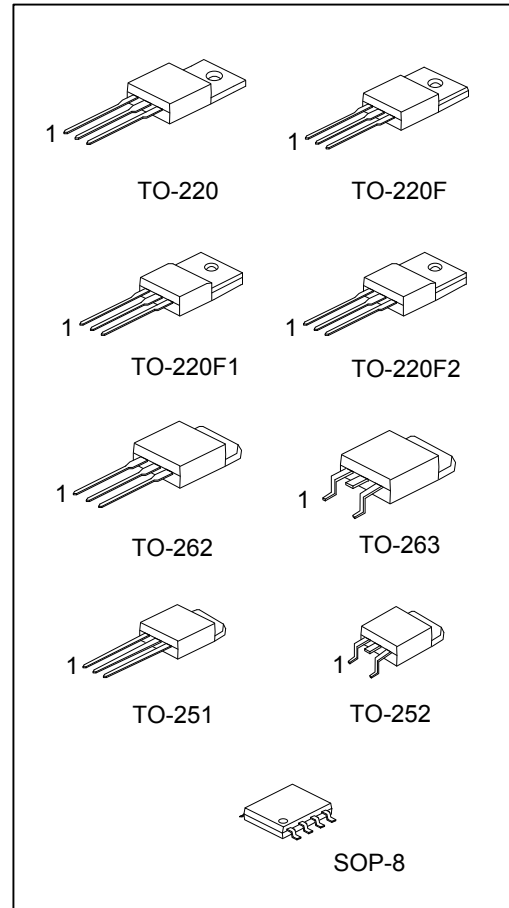
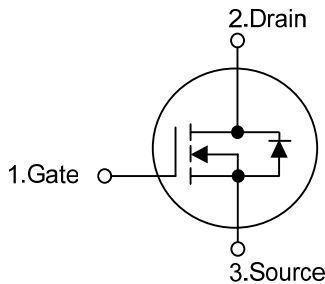
■ DESCRIPTION

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 ($C_{RSS} =$ typical 80 pF)
- * Fast Switching Capability
- * Avalanche Energy Specified
- * Improved dv/dt Capability

■ SYMBOL



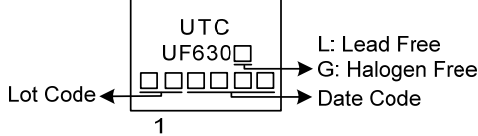
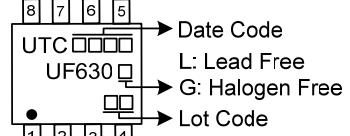
■ ORDERING INFORMATION

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
 <p>Diagram showing marking on a TO-220 package. The marking includes 'UTC', 'UF630', and a lot code '1'. Arrows indicate: 'L: Lead Free' (pointing to 'L'), 'G: Halogen Free' (pointing to 'G'), and 'Date Code' (pointing to the date code area).</p>	 <p>Diagram showing marking on an SOP-8 package. The marking includes 'UTC', 'UF630', and a lot code. Arrows indicate: 'Date Code' (pointing to the date code area), 'L: Lead Free' (pointing to 'L'), 'G: Halogen Free' (pointing to 'G'), and 'Lot Code' (pointing to the lot code area).</p>

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■ 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		θ_{JC}	
TO-220/TO-262 TO-263	3.31			
TO-220F1/ TO-220F	2.98			
TO-220F2	2.7			
TO-251/ TO-252	50			
SOP-8				

■ 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	V _{GS} = 20V, V _{DS} = 0V			100	nA
	Reverse				-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,		19	30	nC
Gate-Source Charge	Q _{GS}	V _{DS} = 0.8 × Rated BV _{DSS}		10		nC
Gate-Drain Charge	Q _{GD}	I _{G(REF)} = 1.5mA		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

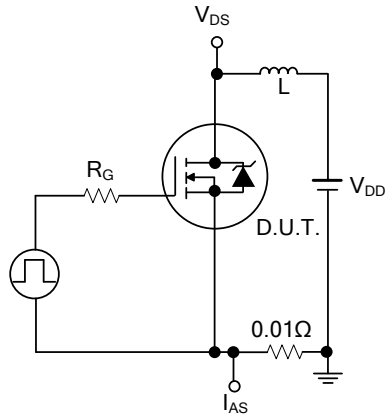


Fig1. Unclamped Energy Test Circuit

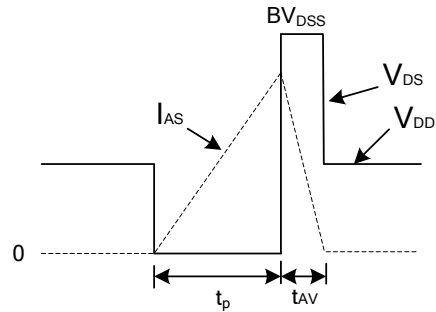


Fig.2 Unclamped Energy Waveforms

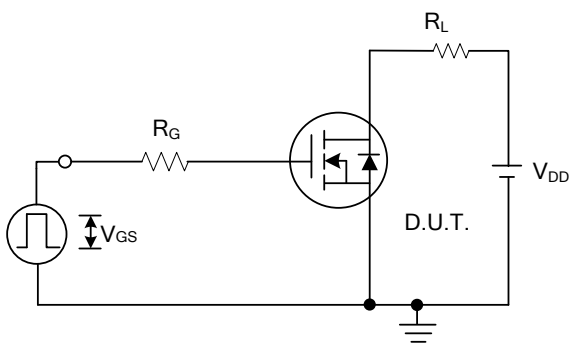


Fig.3 Switching Time Test Circuit

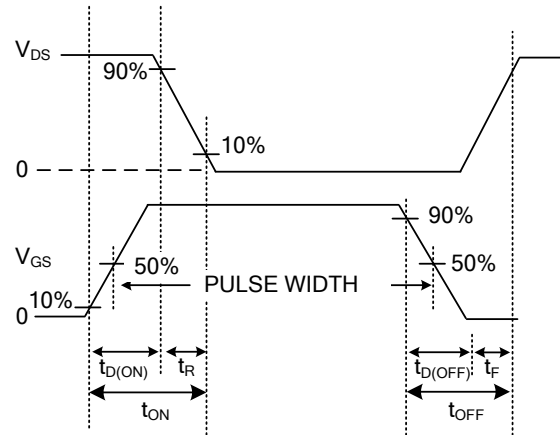


Fig.4 Resistive Switching Waveforms

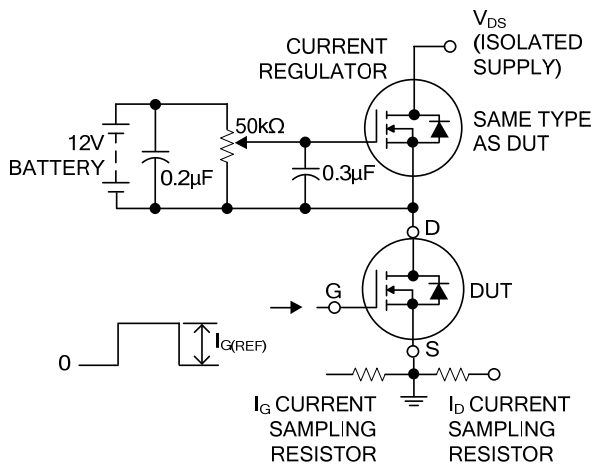


Fig.5 Gate Charge Test Circuit

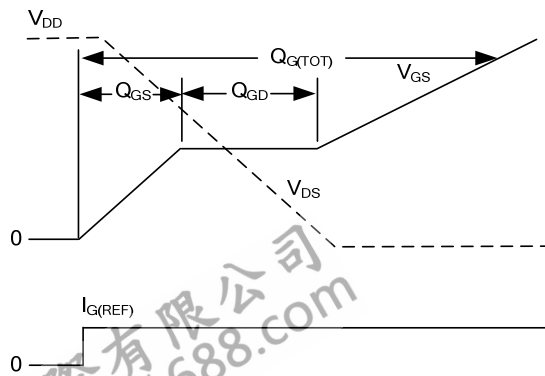
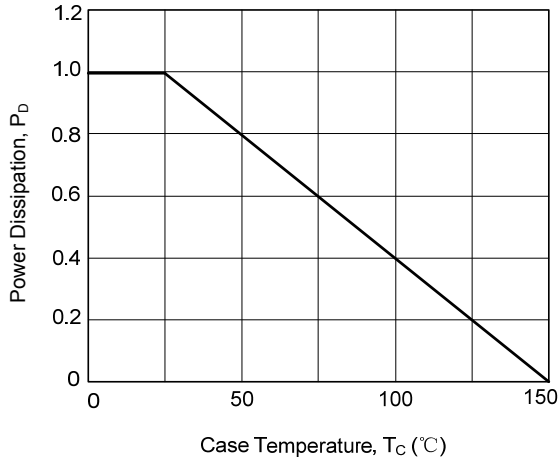


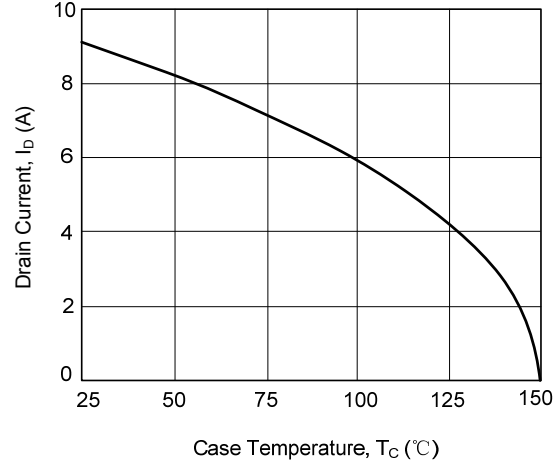
Fig.6 Gate Charge Waveforms

TYPICAL CHARACTERISTICS

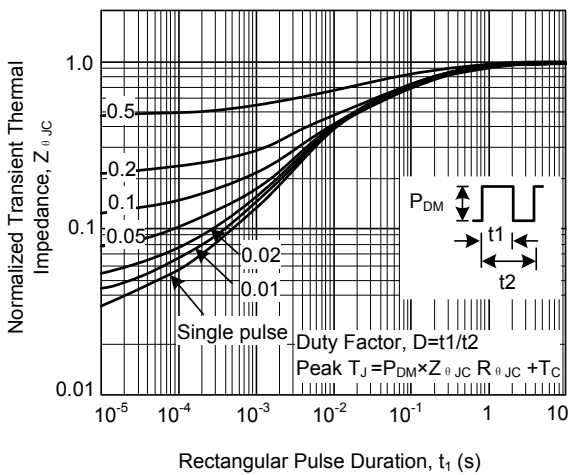
Normalized Power Dissipation vs. Case Temperature



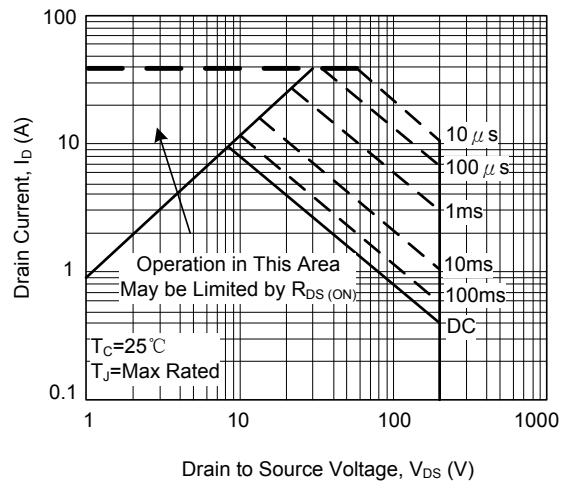
Maximum Continuous Drain Current vs. Case Temperature



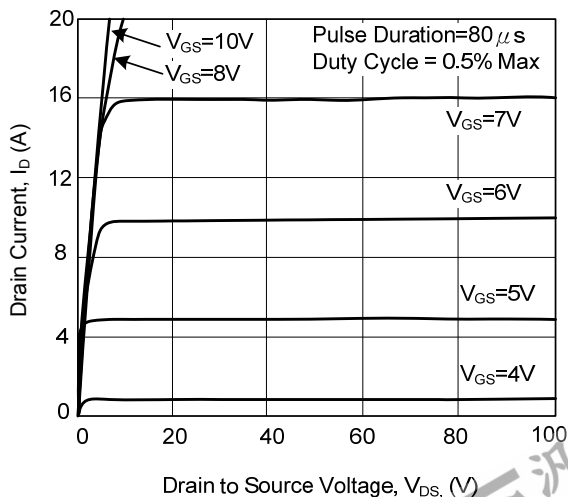
Normalized Transient Thermal Impedance



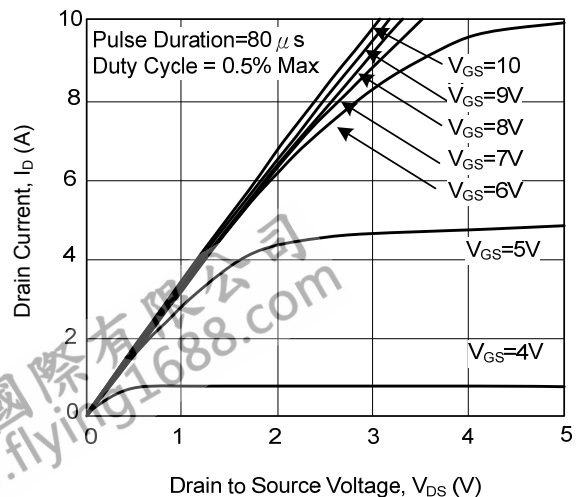
Forward Bias Safe Operating Area



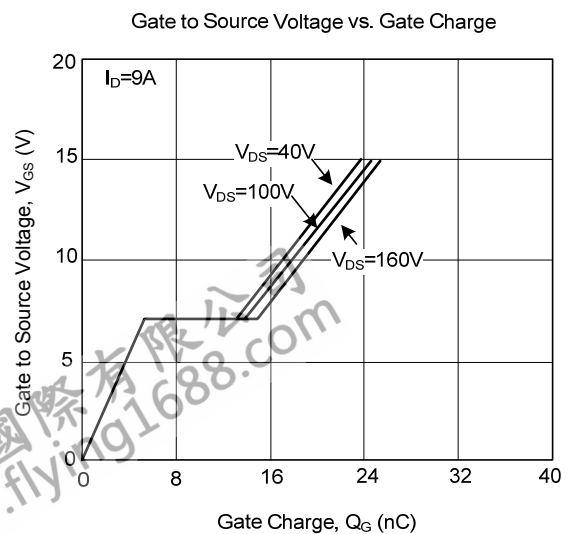
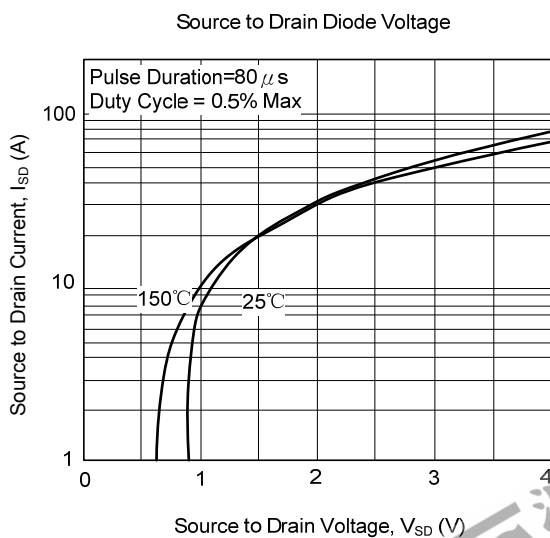
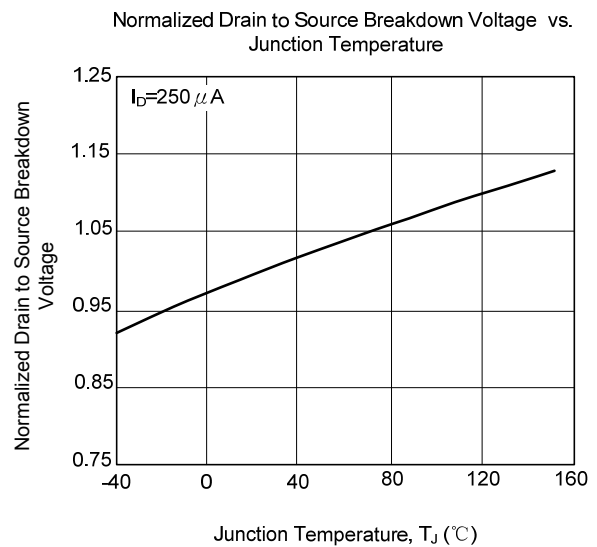
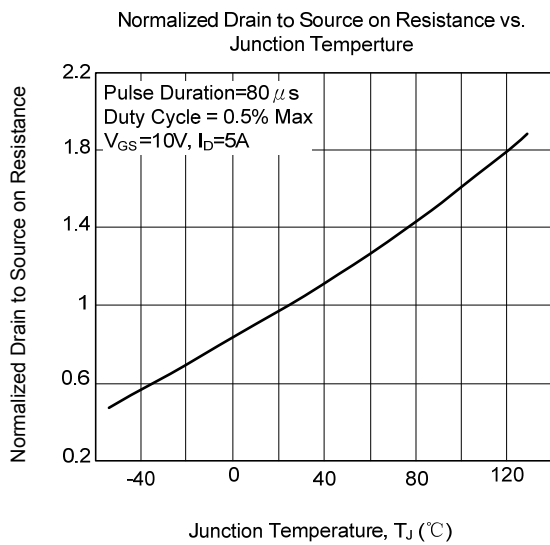
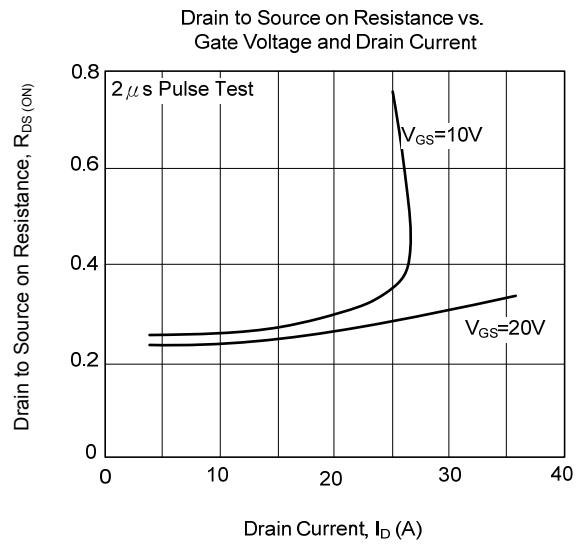
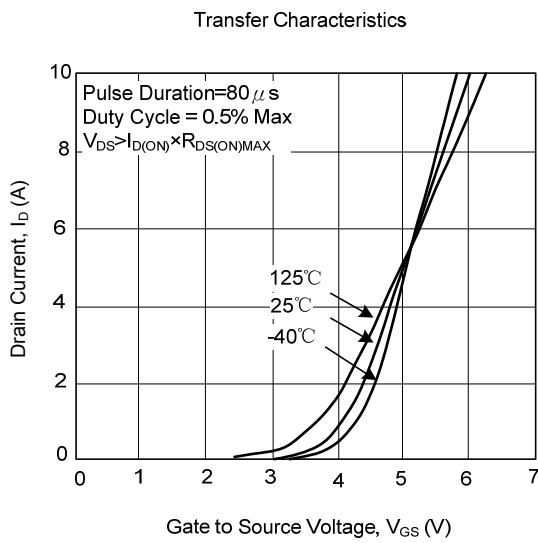
Output Characteristics



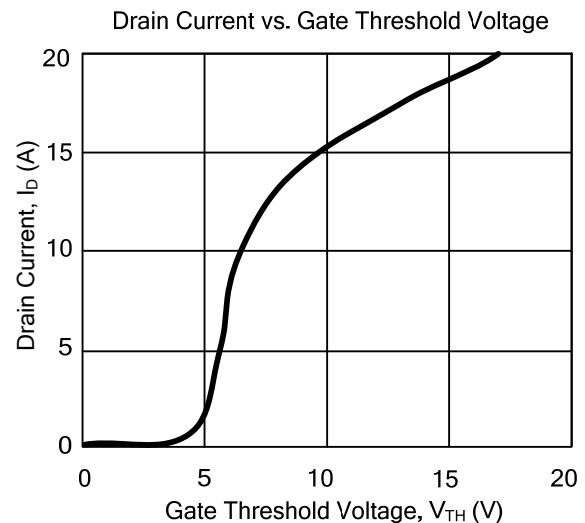
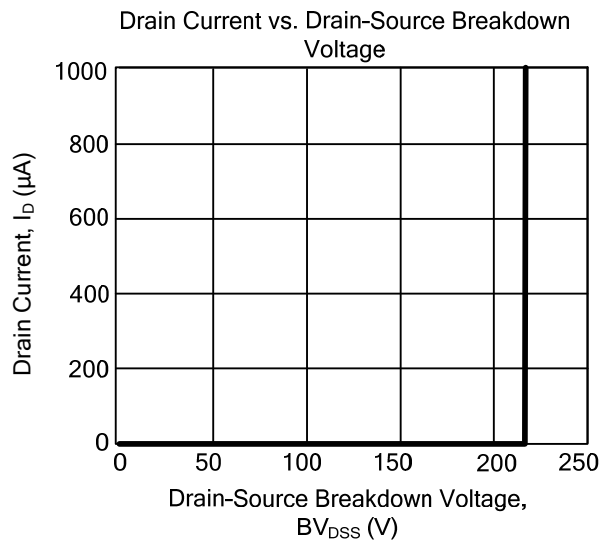
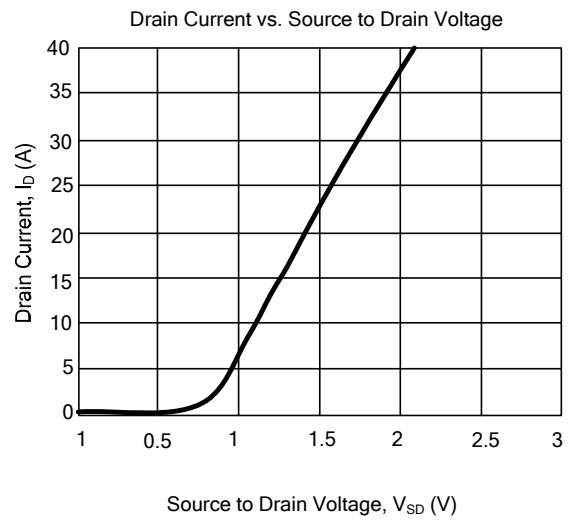
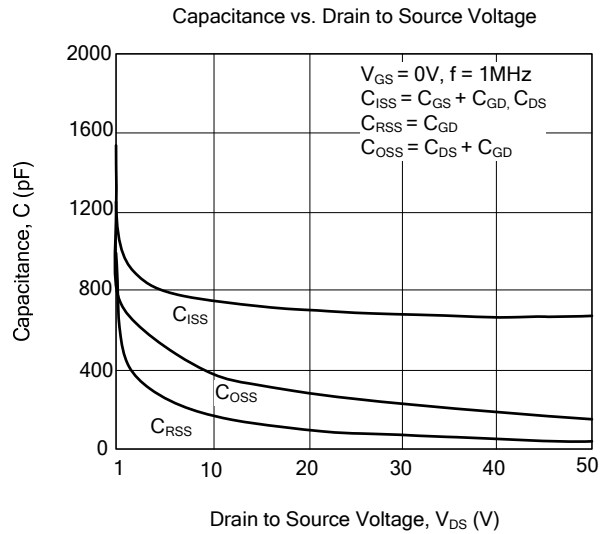
Saturation Characteristics



TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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