



## UF730

Power MOSFET

### 5.5 Amps, 400 Volts N-CHANNEL POWER MOSFET

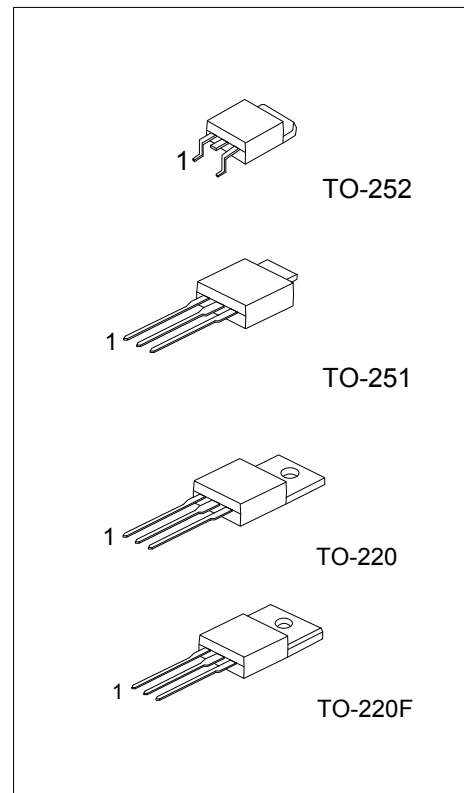
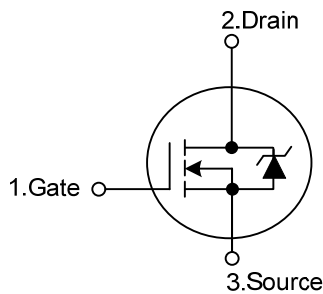
#### DESCRIPTION

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

- \*  $R_{DS(ON)} = 1\Omega @ V_{GS} = 10V$
- \* Avalanche Energy Specified
- \* Rugged - SOA is Power Dissipation Limited
- \* Fast Switching Capability
- \* Linear Transfer Characteristics
- \* High Input Impedance

#### SYMBOL



#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UF730L-TA3-T	UF730G-TA3-T	TO-220	G	D	S	Tube
UF730L-TF3-T	UF730G-TF3-T	TO-220F	G	D	S	Tube
UF730L-TM3-T	UF730G-TM3-T	TO-251	G	D	S	Tube
UF730L-TN3-R	UF730G-TN3-R	TO-252	G	D	S	Tape Reel
UF730L-TN3-T	UF730G-TN3-T	TO-252	G	D	S	Tube

<p>UF730L-TA3-T</p> <p>(1)Packing Type (2)Package Type (3)Lead Free</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F TM3: TO-251, TN3: TO-252 (3) G: Halogen Free, L: Lead Free</p>
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■ ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V <sub>DSS</sub>	400	V
Drain-Gate Voltage (R <sub>GS</sub> = 20kΩ) (T <sub>J</sub> = 25°C ~ 125°C)		V <sub>DGR</sub>	400	V
Gate-Source Voltage		V <sub>GSS</sub>	±20	V
Continuous Drain Current		I <sub>D</sub>	5.5	A
Pulsed Drain Current (Note 1)		I <sub>DM</sub>	22	A
Single Pulse Avalanche Energy (Note 2)		E <sub>AS</sub>	300	mJ
Power Dissipation	TO-220	P <sub>D</sub>	73	W
	TO-220F		38	
	TO-251 / TO-252		48	
Junction Temperature		T <sub>J</sub>	+150	°C
Storage Temperature		T <sub>STG</sub>	-55 ~ +150	°C

Note: 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.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction-to-Ambient	TO-220	θ <sub>JA</sub>	62.5	°C/W
	TO-220F		62.5	
	TO-251 / TO-252		110	
Junction-to-Case	TO-220	θ <sub>JC</sub>	1.71	°C/W
	TO-220F		3.31	
	TO-251 / TO-252		2.6	

■ ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C, unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	400			V
On-State Drain Current (Note 3)	I <sub>D(ON)</sub>	V <sub>DS</sub> > I <sub>D(ON)</sub> × R <sub>DS(ON)MAX</sub> , V <sub>GS</sub> = 10V	5.5			A
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = Rated BV <sub>DSS</sub> , V <sub>GS</sub> = 0V			25	μA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V			±100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	2.0		4.0	V
Static Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	I <sub>D</sub> = 3.0A, V <sub>GS</sub> = 10V		0.8	1.0	Ω
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1MHz		600		pF
Output Capacitance	C <sub>OSS</sub>			150		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			40		pF
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> = 200V, I <sub>D</sub> ≈ 5.5A, R <sub>GS</sub> = 12Ω, R <sub>L</sub> = 35Ω (Note 3, 4)		10	17	ns
Turn-On Rise Time	t <sub>R</sub>			20	29	ns
Turn-Off Delay Time	t <sub>D(OFF)</sub>			35	56	ns
Turn-Off Fall Time	t <sub>F</sub>			15	24	ns
Total Gate Charge	Q <sub>G</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 5.5A,		20	35	nC
Gate-Source Charge	Q <sub>GS</sub>	V <sub>DS</sub> = 0.8 × Rated BV <sub>DSS</sub>		3.0		nC
Gate-Drain Charge	Q <sub>GD</sub>	I <sub>G(REF)</sub> = 1.5mA		10		nC

■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS</b>						
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0V, I_{SD} = 5.5A,$			1.6	V
Maximum Continuous Drain-Source Diode Forward Current	$I_S$				5.5	A
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$				22	A
Reverse Recovery Time	$t_{RR}$	$I_{SD} = 5.5A, dI_{SD}/dt = 100A/\mu s$	140	300	660	ns
Reverse Recovery Charge	$Q_{RR}$	(Note 3)	0.93	2.1	4.3	$\mu C$

- Notes:
1. Repetitive Rating : Pulse width limited by  $T_J$
  2.  $L = 20mH, I_{AS} = 5.5A, V_{DD} = 50V, R_G = 25 \Omega,$  Starting  $T_J = 25^\circ C$
  3. Pulse Test: Pulse width  $\leq 300\mu s,$  Duty cycle  $\leq 2\%$
  4. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

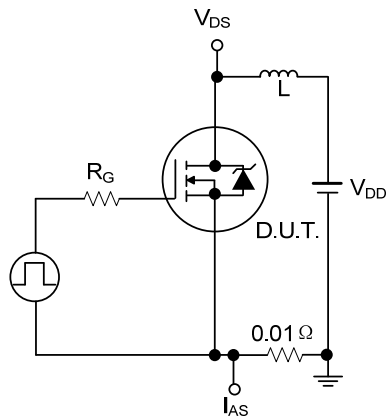


Figure 1A. Unclamped Energy Test Circuit

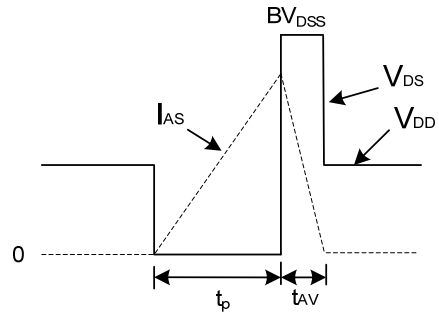


Figure 1B. Unclamped Energy Waveforms

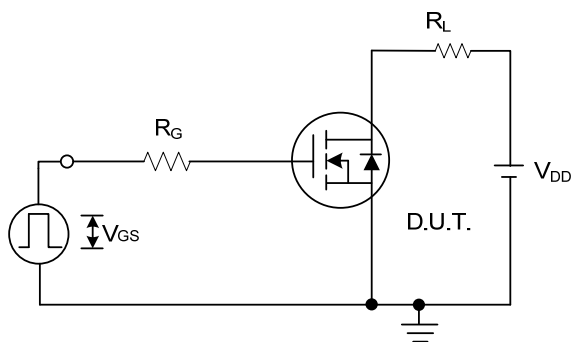


Figure 2A. Switching Time Test Circuit

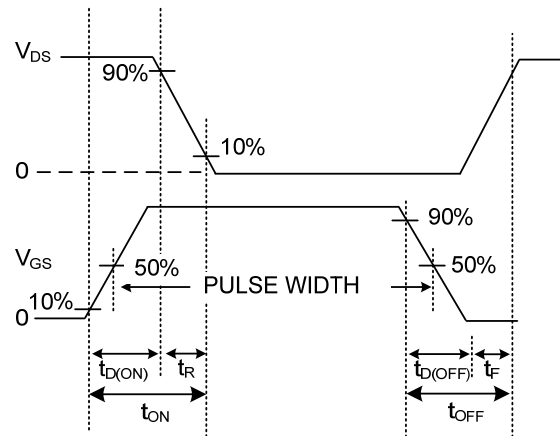


Figure 2B. Resistive Switching Waveforms

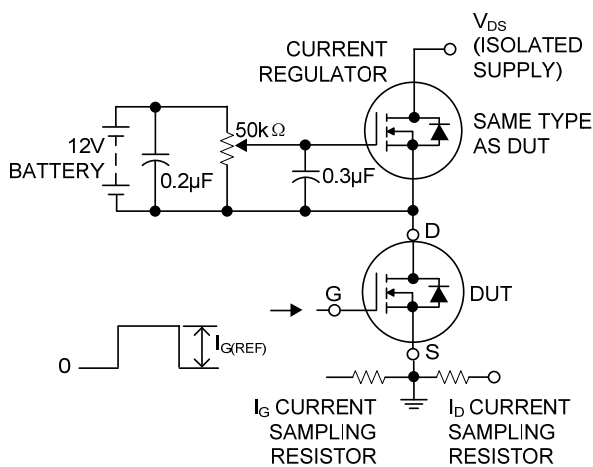


Figure 3A. Gate Charge Test Circuit

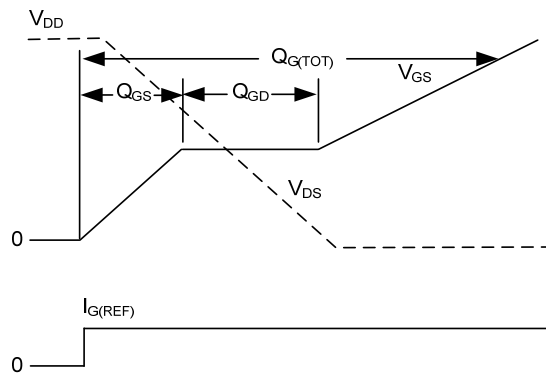
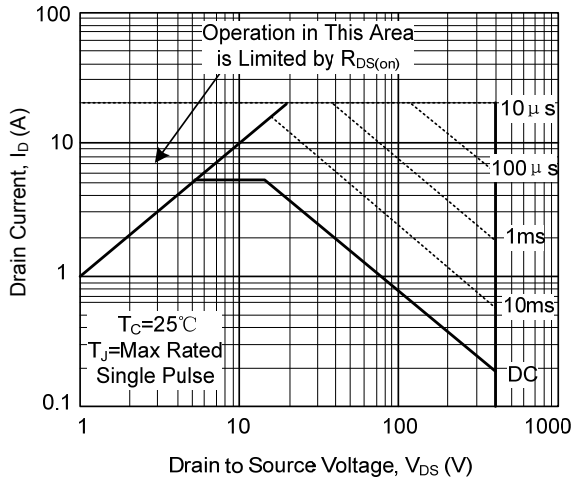


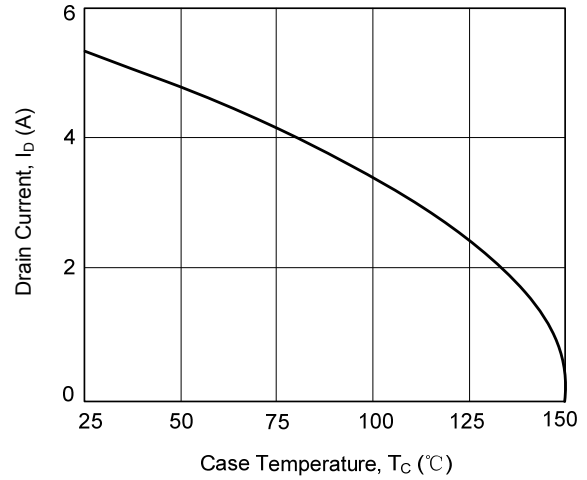
Figure 3B. Gate Charge Waveforms

## TYPICAL CHARACTERISTICS

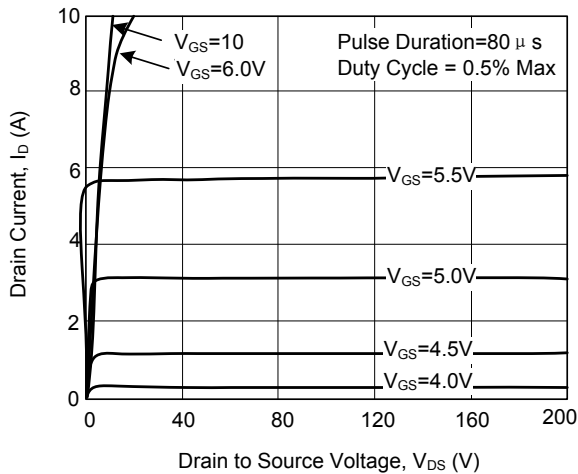
Forward Bias Safe Operating Area



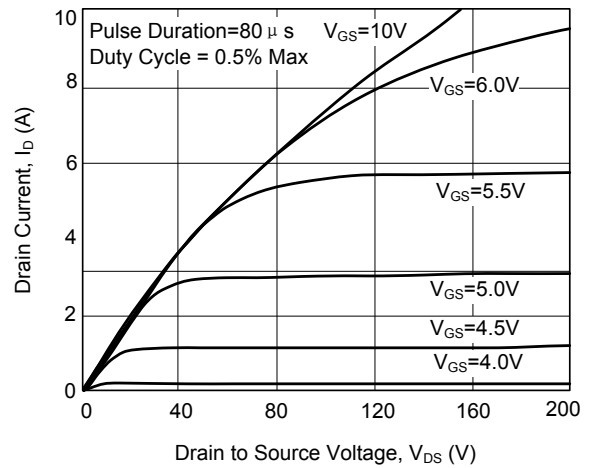
Maximum Continuous Drain Current vs. Case Temperature



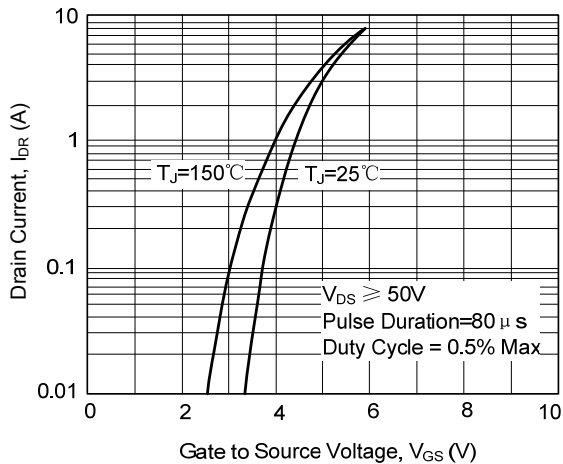
Output Characteristics



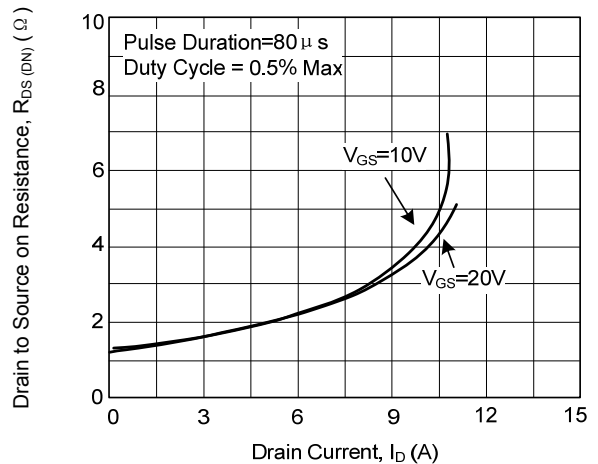
Sturation Characteristics



Transfer Characteristics

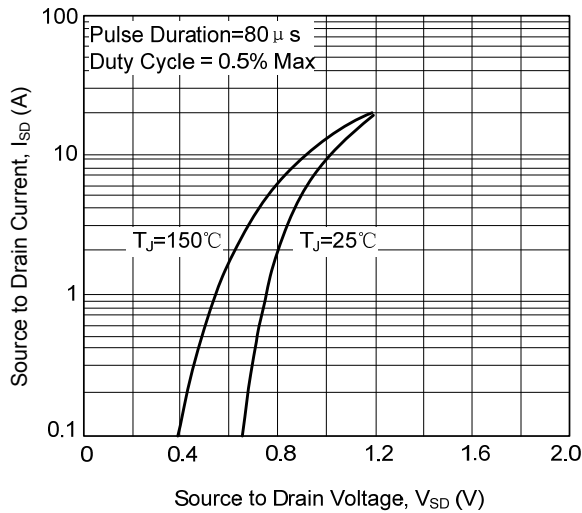


Drain to Source on Resistance vs. Gate Voltage and Drain Current

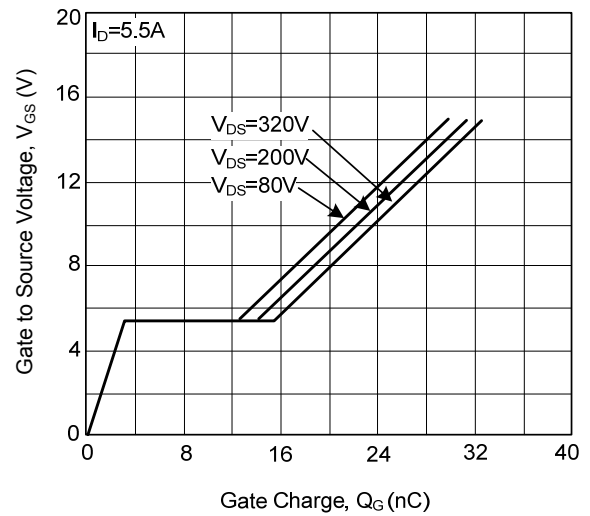


## TYPICAL CHARACTERISTICS

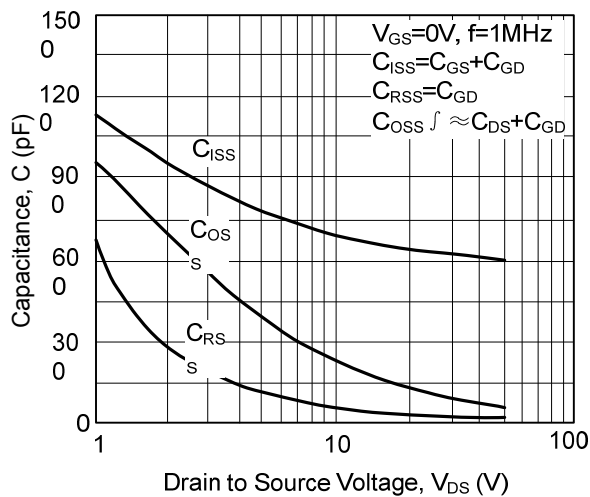
Source to Drain Diode Voltage



Gate to Source Voltage vs. Gate Charge



Capacitance vs. Drain to Source Voltage



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