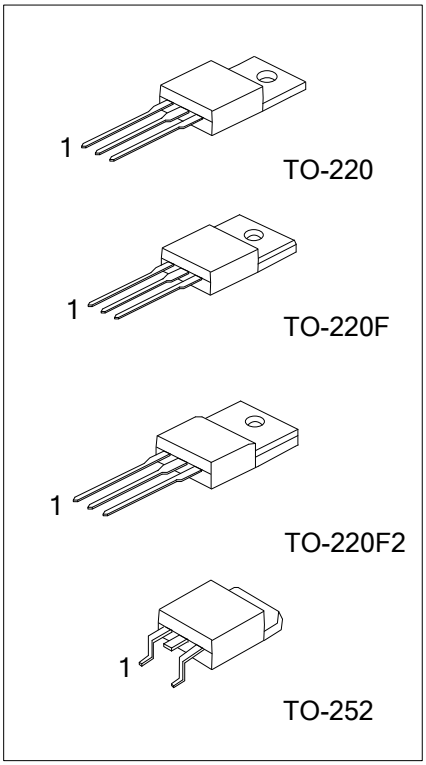
4.5A, 500V, 1.5Ω, N-CHANNEL POWER MOSFET



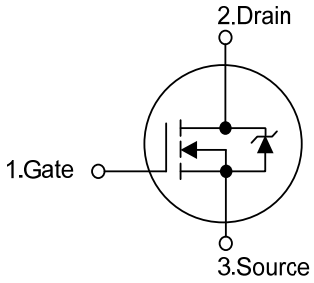
■ DESCRIPTION

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

* $R_{DS(ON)}$<1.5Ω @ I_D=2.5A
* Single Pulse Avalanche Energy Rated
* Rugged- SOA is Power Dissipation Limited
* Fast Switching Speeds
* Linear Transfer Characteristics
* High Input Impedance

■ SYMBOL



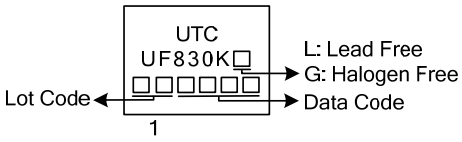
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UF830KL-TA3-T	UF830KG-TA3-T	TO-220	G	D	S	Tube
UF830KL-TF3-T	UF830KG-TF3-T	TO-220F	G	D	S	Tube
UF830KL-TF2-T	UF830KG-TF2-T	TO-220F2	G	D	S	Tube
UF830KL-TN3-R	UF830KG-TN3-R	TO-252	G	D	S	Tape Reel

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

UF830KL-TA3-T (1)Packing Type (2)Package Type (3)Lead Free	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F, TF2: TO-220F2, TN3: TO-252 (3) L: Lead Free, G: Halogen Free

■ MARKING INFORMATION

PACKAGE	MARKING
TO-220 TO-220F TO-220F2 TO-252	

■ ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, Unless Otherwise Specified.)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain to Source Voltage (T_J=25°C ~125°C)		V_{DS}	500	V
Drain to Gate Voltage (R_{GS}=20kΩ, T_J=25°C ~125°C)		V_{DGR}	500	V
Gate to Source Voltage		V_{GS}	±30	V
Drain Current	Continuous	I_D	4.5	A
	Pulsed	I_{DM}	18	A
Power Dissipation (T_C = 25°C)	TO-220	P_D	73	W
	TO-220F		38	W
	TO-220F2		40	W
	TO-252		50	
Single Pulse Avalanche Energy Rating (Note 2)		E_{AS}	300	mJ
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°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. V_{DD}=50V, starting T_J =25°C, L=25mH, R_G=25Ω, peak I_{AS}=4.5A

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F2	θ_{JA}	62.5	°C/W
	TO-252		110	
Junction to Case	TO-220	θ_{Jc}	1.71	°C/W
	TO-220F		3.31	
	TO-220F2		3.125	°C/W
	TO-252		2.5	

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

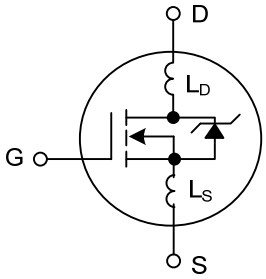
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	500			V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS}=V_{DS}, I_D=250μA	2.0		4.0	V
On-State Drain Current (Note 1)	$I_{D(ON)}$	V_{DS}>$I_{D(ON)}$×$R_{DS(ON)MAX}$, V_{GS}=10V	4.5			A
Drain-Source Leakage Current	I_{DSS}	V_{DS}= Rated BV_{DSS}, V_{GS}=0V			25	μA
		V_{DS}=0.8×Rated BV_{DSS} V_{GS}=0V, T_J= 125°C			250	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±30V			±100	nA
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	I_D=2.5A, V_{GS}=10V (Note 2)		1.23	1.5	Ω
Forward Transconductance (Note 1)	g_{FS}	V_{DS}≥10V, I_D=2.7A	2.5	4.2		S
Turn-On Delay Time	$t_{D(ON)}$	V_{DD}=30V, I_D≈0.5A R_{GS}=12Ω, R_L =54Ω (Note 2)		48	60	ns
Turn-On Rise Time	t_R			48	60	ns
Turn-Off Delay Time	$t_{D(OFF)}$			40	53	ns
Turn-Off Fall Time	t_F			44	60	ns
Total Gate Charge	Q_G	V_{GS}=10V, I_D=1.3A V_{DS}=50V $I_{G(REF)}$=100μA (Note 3)		14	32	nC
Gate-Source Charge	Q_{GS}			5.4		nC
Gate-Drain Charge	Q_{GD}			6		nC
Input Capacitance	C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz		590		pF
Output Capacitance	C_{OSS}			80		pF
Reverse Transfer Capacitance	C_{RSS}			15		pF

Notes: 1. Pulse Test: Pulse width≤300μs, Duty Cycle≤2%.
2. MOSFET Switching Times are Essentially Independent of Operating Temperature.
3. Gate Charge is Essentially Independent of Operating Temperature.

■ INTERNAL PACKAGE INDUCTANCE

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Internal Drain Inductance					
Measured from the contact screw on tab to center of die	L_D		3.5		nH
Measured from the drain lead(6mm from package) to center of die			4.5		nH
Internal Source Inductance					
Measured from the source lead(6mm from header) to source bond pad	L_S		7.5		nH

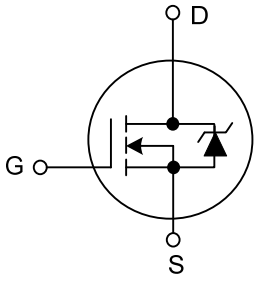
Remark: Modified MOSFET symbol showing the internal devices inductances as below.



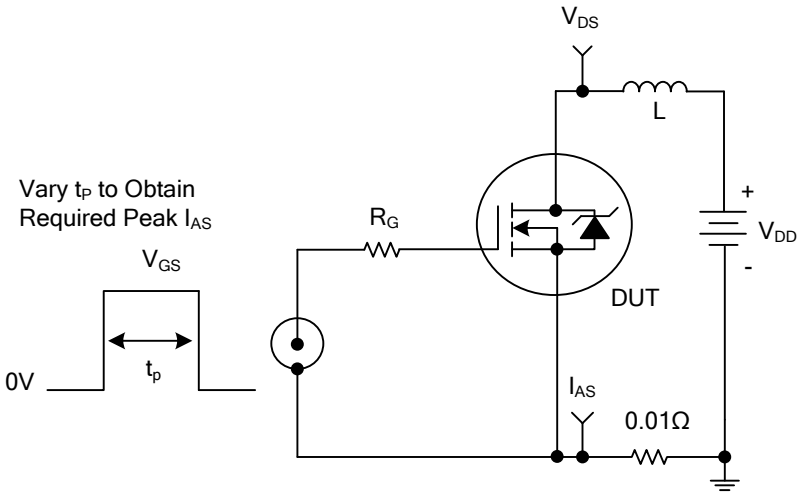
■ SOURCE TO DRAIN DIODE SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Source to Drain Diode Voltage	V_{SD}	T_J=25°C,I_{SD}=4.5A, V_{GS}=0V(Note 1)			1.6	V
Continuous Source to Drain Current	I_{SD}	(Note 2)			5.5	A
Pulse Source to Drain Current	I_{SDM}				18	A
Reverse Recovery Time	t_{rr}	T_J=25°C, I_{SD}=4.5A, dI/dt=100A/μs	180	350	760	ns
Reverse Recovery Charge	Q_{RR}	T_J=25°C, I_{SD}=4.5A, dI/dt=100A/μs	0.96	2.2	4.3	μC

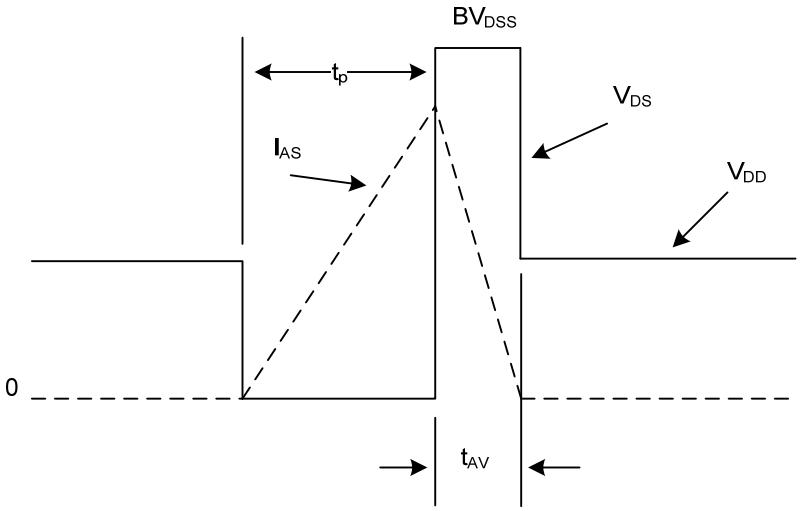
Notes: 1. Pulse Test: Pulse width≤300μs, Duty Cycle≤2%.
2. Modified MOSFET symbol showing the integral reverse P-N junction diode as below.



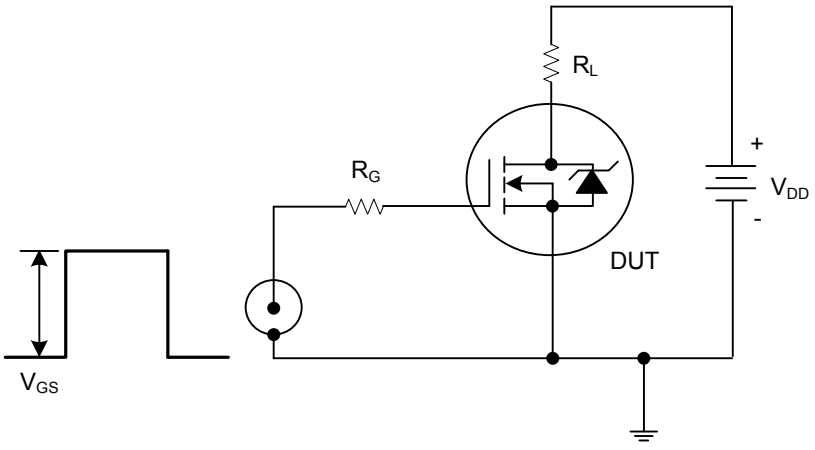
■ TEST CIRCUITS AND WAVEFORMS



Unclamped Energy Test Circuit

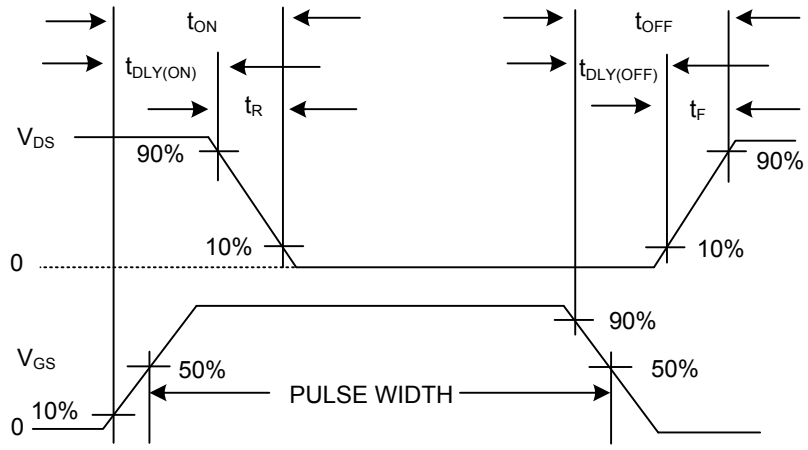


Unclamped Energy Waveforms

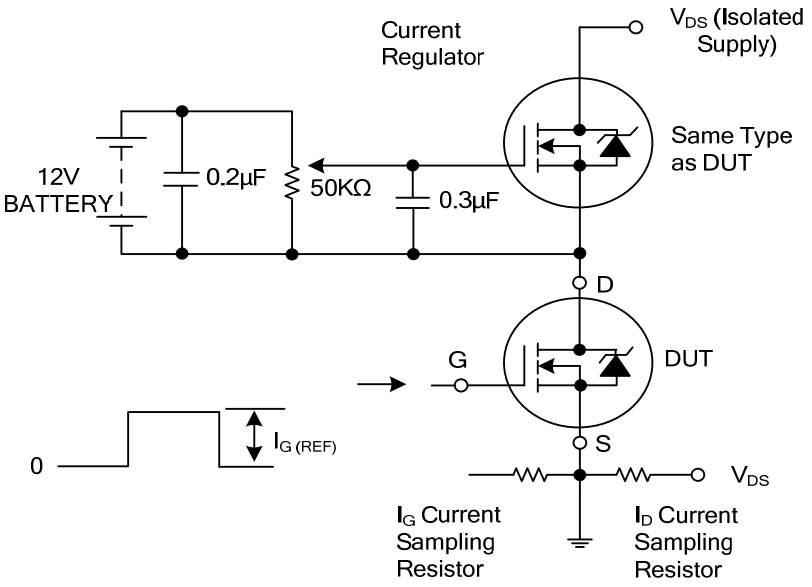


Switching Time Test Circuit

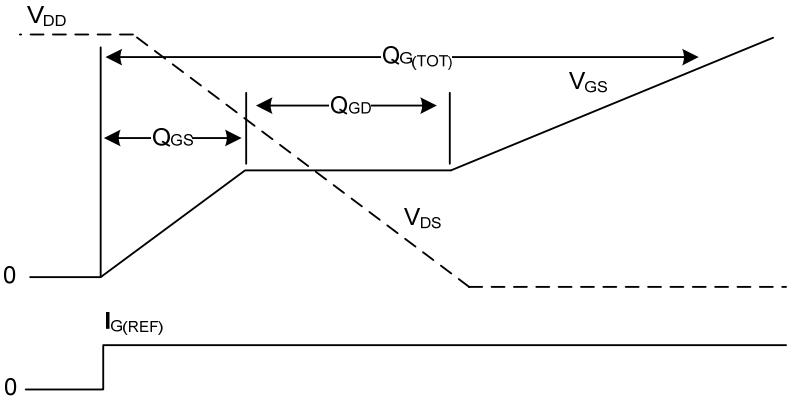
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



Resistive Switching Waveforms



Gate Charge Test Circuit



Gate Charge Waveforms