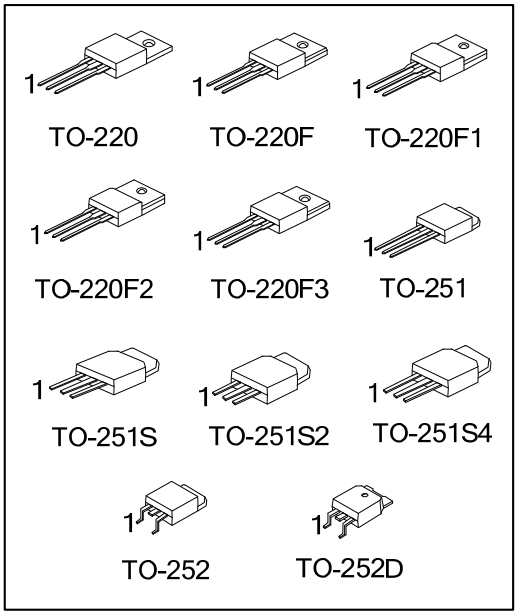
4.5A, 500V, 1.5Ω, N-CHANNEL POWER MOSFET



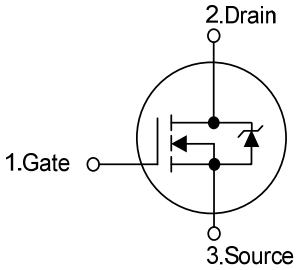
■ DESCRIPTION

The UTC **UF830K-TA** is a N-Channel enhancement mode silicon gate power MOSFET is designed high voltage, high speed power switching applications such as switching regulators, switching converters, solenoid, motor drivers, relay drivers.

■ FEATURES

* $R_{DS(ON)}$ < 1.8Ω @ V_{GS} = 10V, I_D = 2.5 A
* Single Pulse Avalanche Energy Rated
* Rugged- SOA is Power Dissipation Limited
* Fast Switching Speeds
* Linear Transfer Characteristics
* High Input Impedance

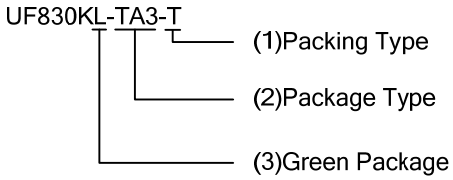
■ SYMBOL



■ ORDERING INFORMATION

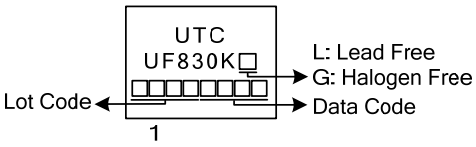
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UF830KL-TA3-T	UF830KG-TA3-T	TO-220	G	D	S	Tube
UF830KL-TF3-T	UF830KG-TF3-T	TO-220F	G	D	S	Tube
UF830KL-TF1-T	UF830KG-TF1-T	TO-220F1	G	D	S	Tube
UF830KL-TF2-T	UF830KG-TF2-T	TO-220F2	G	D	S	Tube
UF830KL-TF3T-T	UF830KG-TF3T-T	TO-220F3	G	D	S	Tube
UF830KL-TM3-T	UF830KG-TM3-T	TO-251	G	D	S	Tube
UF830KL-TMS-T	UF830KG-TMS-T	TO-251S	G	D	S	Tube
UF830KL-TMS2-T	UF830KG-TMS2-T	TO-251S2	G	D	S	Tube
UF830KL-TMS4-T	UF830KG-TMS4-T	TO-251S4	G	D	S	Tube
UF830KL-TN3-R	UF830KG-TN3-R	TO-252	G	D	S	Tape Reel
UF830KL-TND-R	UF830KG-TND-R	TO-252D	G	D	S	Tape Reel

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



(1) T: Tube, R: Tape Reel
(2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF1: TO-220F2, TF3T: TO-220F3, TM3: TO-251, TMS: TO-251S, TMS2: TO-251S2, TMS4: TO-251S4, TN3: TO-252, TND: TO-252D
(3) L: Lead Free, G: Halogen Free and Lead Free

■ MARKING



■ 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_G=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
Peak Diode Recovery dv/dt (Note 3)		dv/dt	2	V/ns
Power Dissipation (T_C = 25°C)	TO-220	P_D	73	W
	TO-220F/TO-220F1 TO-220F3		38	W
	TO-220F2		40	W
	TO-251/TO-251S TO-251S2/ TO-251S4 TO-252/TO-252D		46	W
Single Pulse Avalanche Energy Rating (Note 2)		E_{AS}	80	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. L = 8mH, I_{AS} = 4.5A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. I_{SD} ≤ 4.5A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

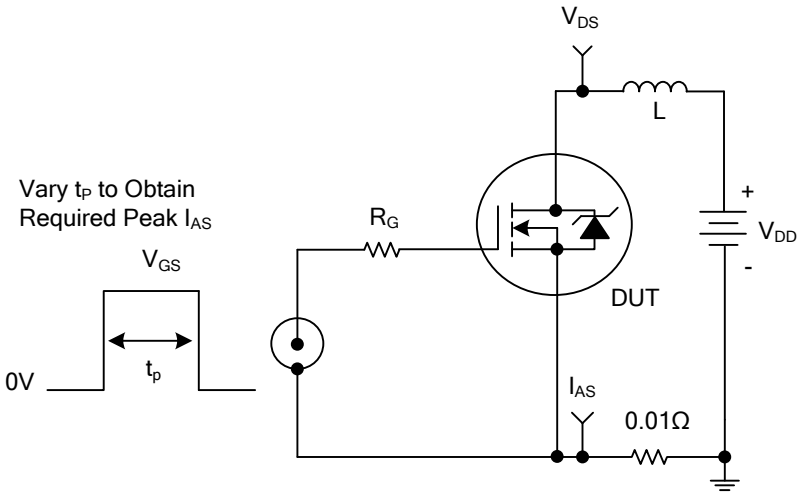
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2 TO-220F3	$θ_{JA}$	62.5	°C/W
	TO-251/TO-251S TO-251S2/ TO-251S4 TO-252/TO-252D		100.3	°C/W
Junction to Case	TO-220	$θ_{JC}$	1.71	°C/W
	TO-220F/TO-220F1 TO-220F3		3.31	°C/W
	TO-220F2		3.125	°C/W
	TO-251/TO-251S TO-251S2/ TO-251S4 TO-252/TO-252D		2.7	°C/W

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

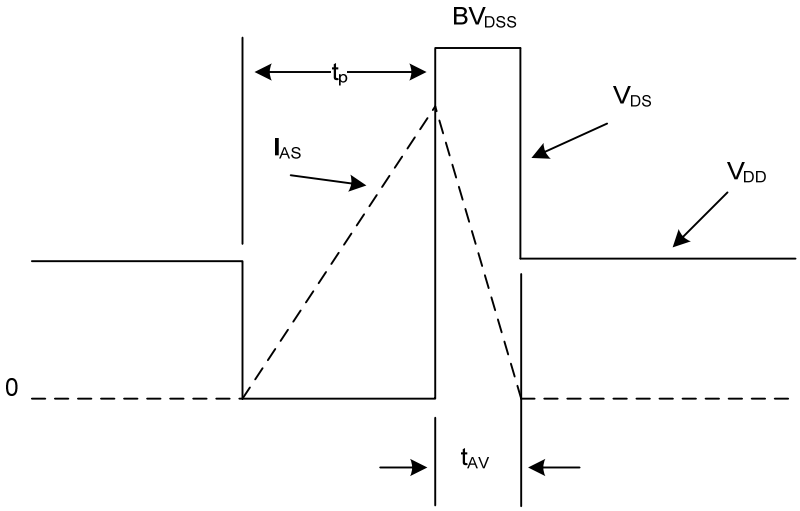
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	500			V
On-State Drain Current (Note 1)	$I_{D(ON)}$	V_{DS}>$I_{D(ON)}$×$R_{DS(ON)MAX}$, V_{GS}=10V	4.5			A
Drain-Source Leakage Current	I_{DSS}	V_{DS}= Rated BV_{DSS}, 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
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS}=V_{DS}, I_D=250μA	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	I_D=2.5A, V_{GS}=10V (Note 2)			1.8	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz		260		pF
Output Capacitance	C_{OSS}			56		pF
Reverse Transfer Capacitance	C_{RSS}			7		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	V_{GS}=10V, I_D=1.3A, V_{DD}=50V I_G=100μA (Note 3)		45		nC
Gate-Source Charge	Q_{GS}			4		nC
Gate-Drain Charge	Q_{GD}			4		nC
Turn-On Delay Time	$t_{D(ON)}$	V_{DD}=30V, V_{GS}=10V, I_D=0.5A, R_G=25Ω (Note 2)		36		ns
Turn-On Rise Time	t_R			29		ns
Turn-Off Delay Time	$t_{D(OFF)}$			110		ns
Turn-Off Fall Time	t_F			29		ns
SOURCE TO DRAIN DIODE SPECIFICATIONS						
Source to Drain Diode Voltage (T_J=25°C)	V_{SD}	I_{SD}=4.4A, V_{GS}=0V (Note 1)			1.6	V
Continuous Source to Drain Current	I_S	(Note 4)			4.5	A
Pulse Source to Drain Current	I_{SD}				18	A
Reverse Recovery Time	t_{rr}	V_{GS} = 0V, I_S = 4.5A, dI_F / dt =100A/μs (Note 1)		450		nS
Reverse Recovery Charge	Q_{RR}			3		μC

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.
4. Modified MOSFET symbol showing the integral reverse P-N junction diode as below.

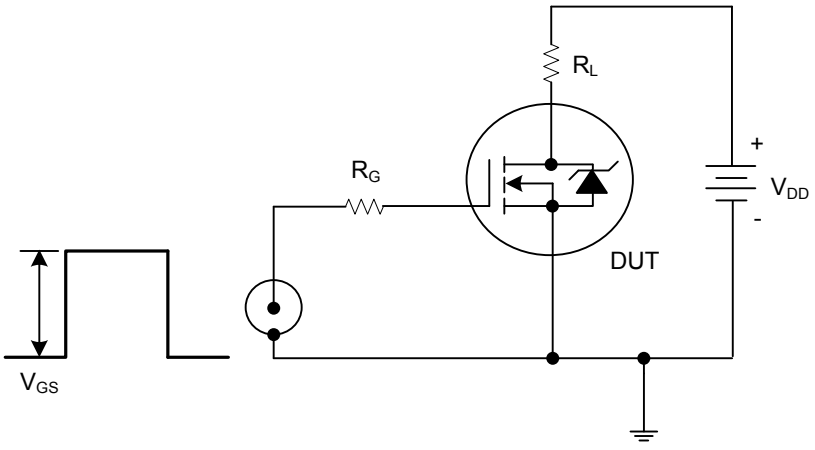
■ TEST CIRCUITS AND WAVEFORMS



Unclamped Energy Test Circuit

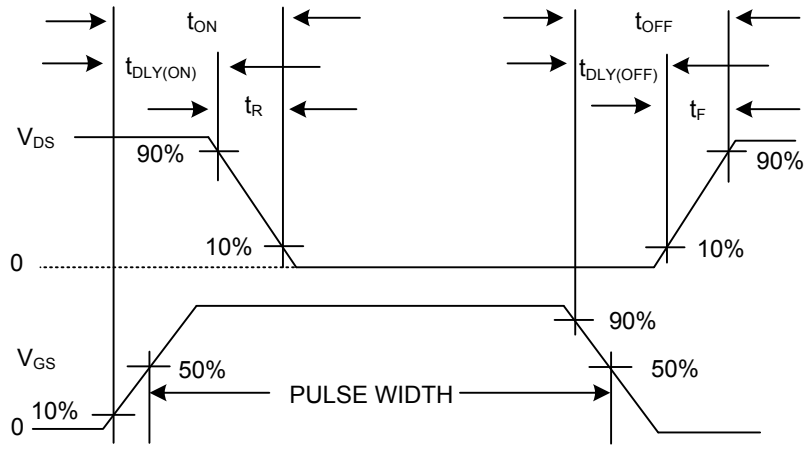


Unclamped Energy Waveforms

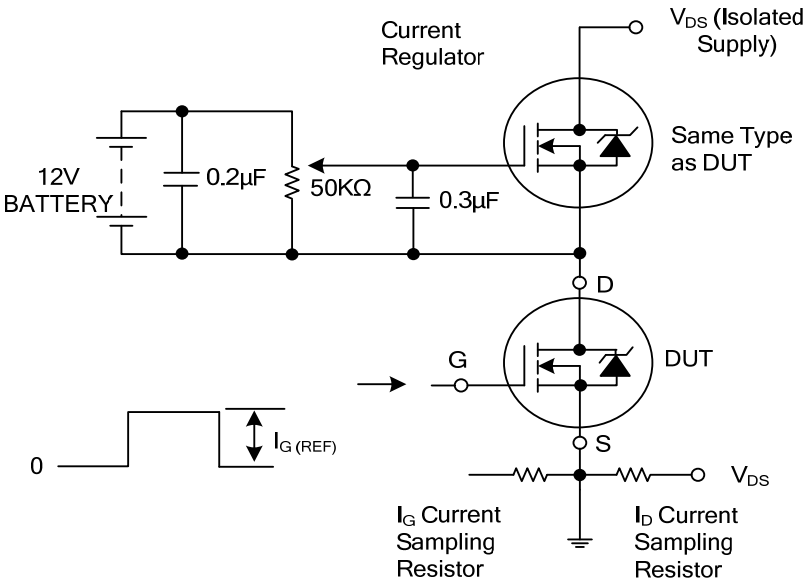


Switching Time Test Circuit

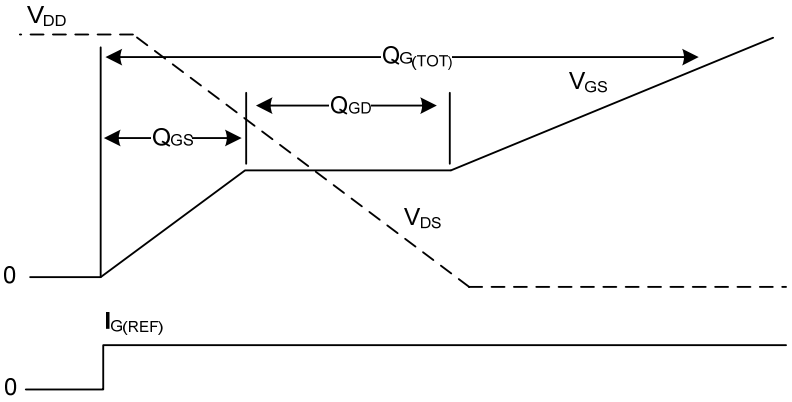
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



Resistive Switching Waveforms



Gate Charge Test Circuit



Gate Charge Waveforms