



## UF830-CB

Preliminary

Power MOSFET

### 4.5A, 500V N-CHANNEL POWER MOSFET

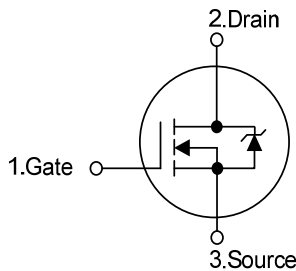
#### DESCRIPTION

The UTC **UF830-CB** 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

- \*  $R_{DS(ON)} < 1.5\Omega @ V_{GS} = 10V, I_D = 2.5 A$
- \* Single Pulse Avalanche Energy Rated
- \* Rugged- SOA is Power Dissipation Limited
- \* Fast Switching Speeds
- \* Linear Transfer Characteristics
- \* High Input Impedance

#### SYMBOL

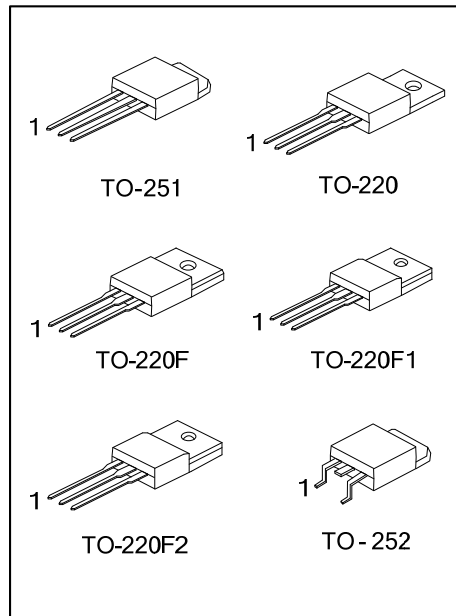


#### ORDERING INFORMATION

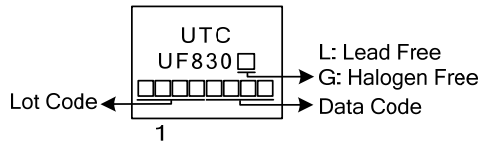
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UF830L-TA3-T	UF830G-TA3-T	TO-220	G	D	S	Tube
UF830L-TF1-T	UF830G-TF1-T	TO-220F1	G	D	S	Tube
UF830L-TF2-T	UF830G-TF2-T	TO-220F2	G	D	S	Tube
UF830L-TF3-T	UF830G-TF3-T	TO-220F	G	D	S	Tube
UF830L-TM3-R	UF830G-TM3-R	TO-251	G	D	S	Tape Reel
UF830L-TN3-R	UF830G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>UF830L-TA3-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, TM3: TO-251, TN3: TO-252 (3) L: Lead Free, G: Halogen Free and Lead Free</p>
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### MARKING



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■ ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ , Unless Otherwise Specified.)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain to Source Voltage ( $T_J=25^\circ\text{C} \sim 125^\circ\text{C}$ )		$V_{DS}$	500	V
Drain to Gate Voltage ( $R_G=20\text{k}\Omega$ , $T_J=25^\circ\text{C} \sim 125^\circ\text{C}$ )		$V_{DGR}$	500	V
Gate to Source Voltage		$V_{GS}$	$\pm 30$	V
Drain Current	Continuous	$I_D$	4.5	A
	Pulsed	$I_{DM}$	18	A
Single Pulse Avalanche Energy Rating (Note 3)		$E_{AS}$	106	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.22	V/ns
Power Dissipation	$T_C = 25^\circ\text{C}$	TO-220	73	W
		TO-220F/TO-220F1	38	W
		TO-220F2	40	W
		TO-251/TO-252	46	W
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 maximum junction temperature.

3.  $L = 10\text{mH}$ ,  $I_{AS} = 4.6\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$

4.  $I_{SD} \leq 4.5\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

■ THERMAL DATA

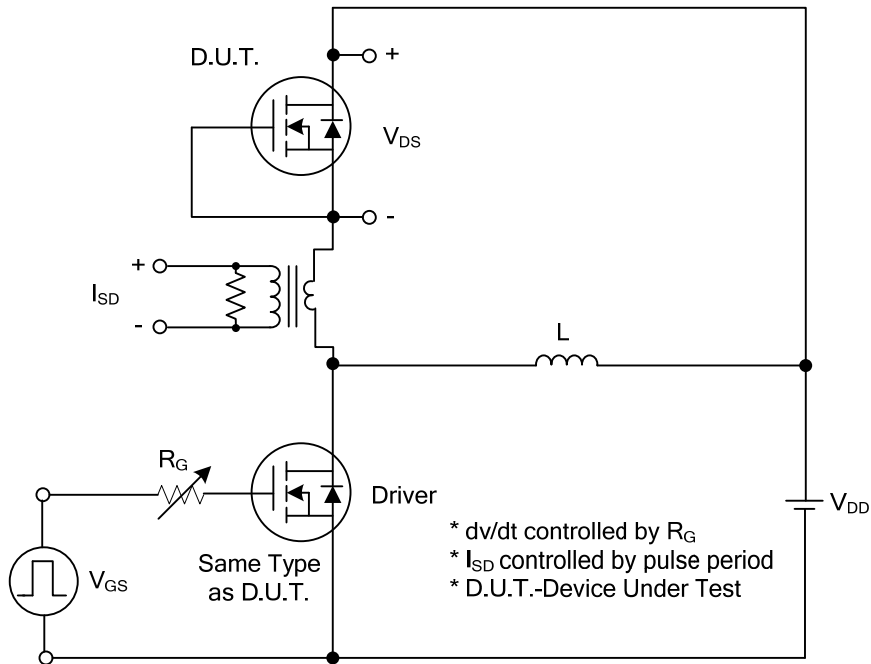
PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
	TO-220F1/TO-220F2			
	TO-251/TO-252			
Junction to Case	TO-220	$\theta_{JC}$	1.71	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		3.31	
	TO-220F2		3.125	
	TO-251/TO-252		2.7	

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

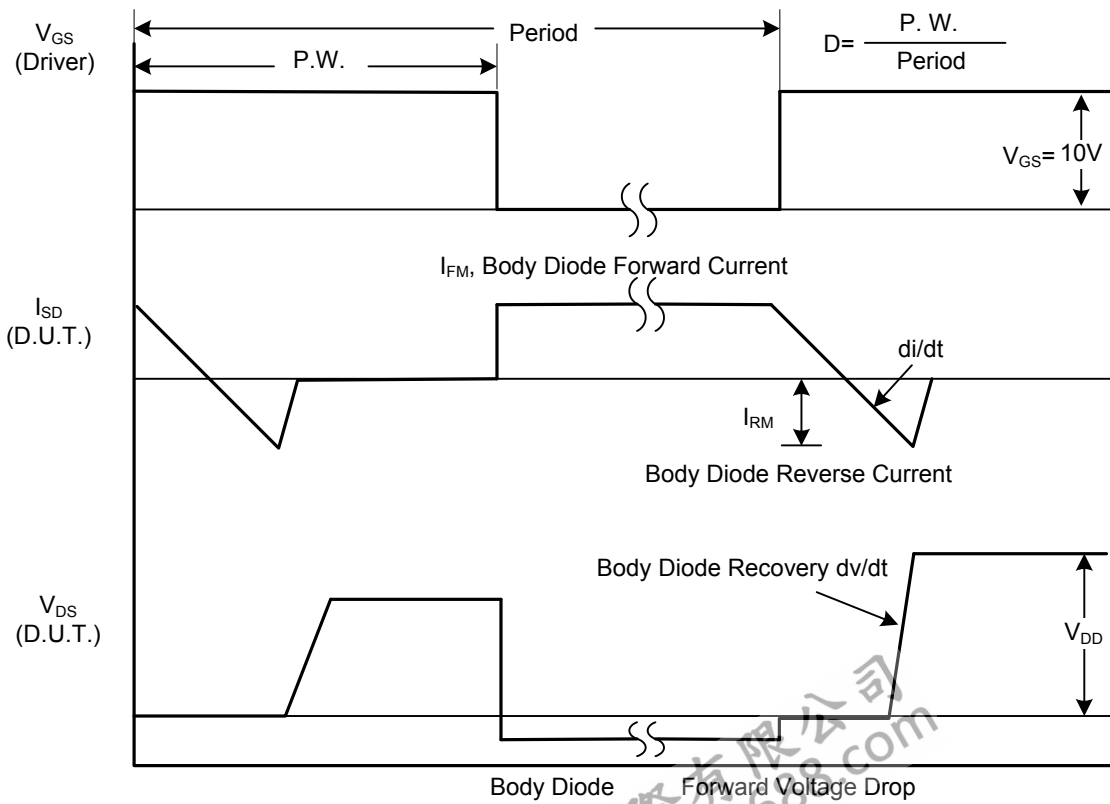
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	500			V
On-State Drain Current (Note 1)	I <sub>D(ON)</sub>	V <sub>DS</sub> >I <sub>D(ON)</sub> ×R <sub>DS(ON)MAX</sub> , V <sub>GS</sub> =10V	4.5			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> =±30V			±100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> =V <sub>DS</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> =2.5A, V <sub>GS</sub> =10V (Note 2)			1.5	Ω
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz		580		pF
Output Capacitance	C <sub>OSS</sub>			64		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			4		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =1.3A I <sub>G</sub> = 100μA (Note1, 2)		30		nC
Gate-Source Charge	Q <sub>GS</sub>			3.2		nC
Gate-Drain Charge	Q <sub>GD</sub>			2		nC
Turn-On Delay Time	t <sub>D(ON)</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =10V, I <sub>D</sub> =0.5A, R <sub>G</sub> =25Ω (Note1, 2)		37		ns
Turn-On Rise Time	t <sub>R</sub>			7.5		ns
Turn-Off Delay Time	t <sub>D(OFF)</sub>			100		ns
Turn-Off Fall Time	t <sub>F</sub>			21		ns
<b>SOURCE TO DRAIN DIODE SPECIFICATIONS</b>						
Continuous Source to Drain Current	I <sub>S</sub>				4.5	A
Pulse Source to Drain Current	I <sub>SD</sub>				18	A
Source to Drain Diode Voltage (T <sub>J</sub> =25°C)	V <sub>SD</sub>	I <sub>SD</sub> =4.5A, V <sub>GS</sub> =0V			1.4	V
Reverse Recovery Time	t <sub>rr</sub>	V <sub>GS</sub> = 0V, I <sub>S</sub> = 4.5A, dI <sub>F</sub> / dt = 100A/μs		235		nS
Reverse Recovery Charge	Q <sub>RR</sub>			1.04		μC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 2%.  
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

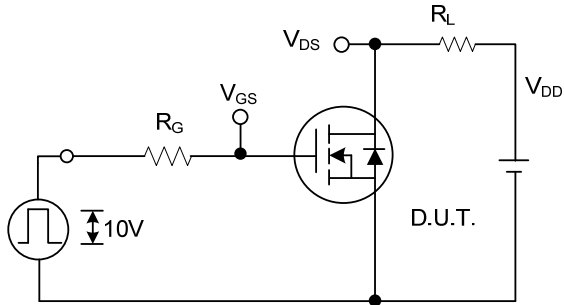


Peak Diode Recovery  $dv/dt$  Test Circuit

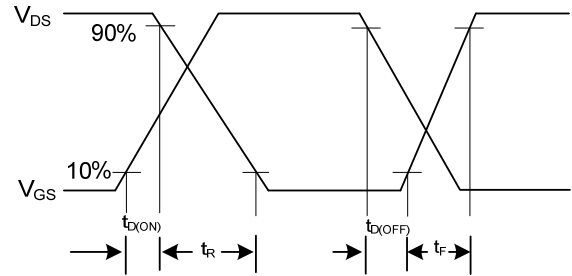


Peak Diode Recovery  $dv/dt$  Waveforms

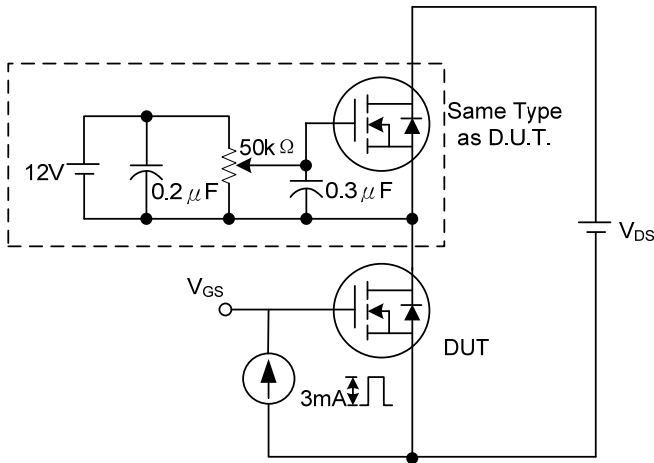
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



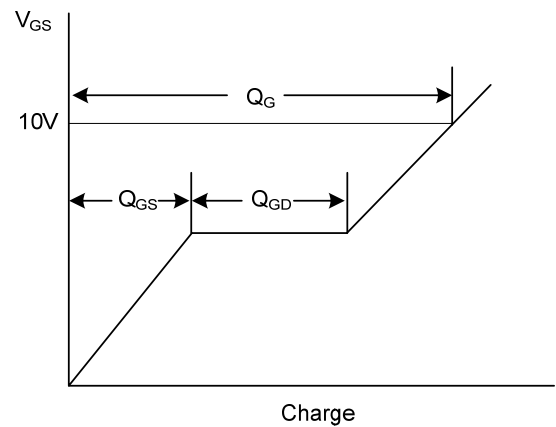
Switching Test Circuit



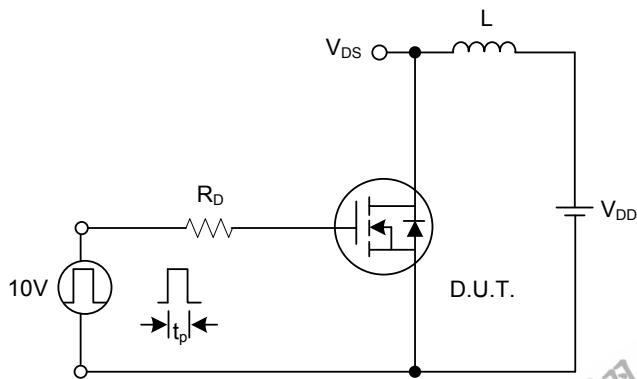
Switching Waveforms



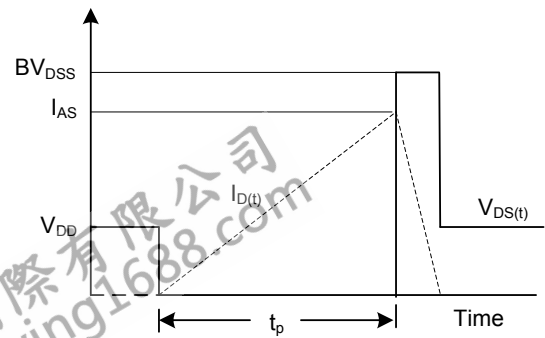
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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