



# UF450

**Power MOSFET**

## 14A, 500V N-CHANNEL POWER MOSFET

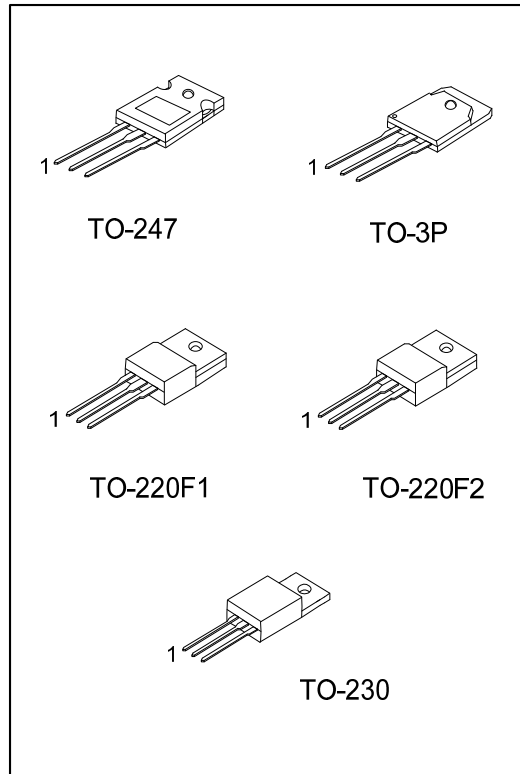
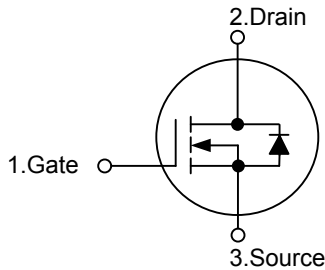
■ **DESCRIPTION**

The **UF450** uses advanced UTC technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with low gate voltages. This device is suitable for use as a load switch, in PWM applications, motor controls, inverters, choppers, audio amplifiers and high energy pulse circuits.

■ **FEATURES**

- \*  $R_{DS(ON)} < 0.4\Omega @ V_{GS} = 10V$
- \* Ultra Low Gate Charge (Max. 150nC )
- \* Low Reverse Transfer Capacitance (  $C_{RSS} = \text{Typical } 340pF$  )
- \* 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	
UF450L-TF1-T	UF450G-TF1-T	TO-220F1	G	D	S	Tube
UF450L-TF2-T	UF450G-TF2-T	TO-220F2	G	D	S	Tube
UF450L-T47-T	UF450G-T47-T	TO-247	G	D	S	Tube
UF450L-TC3-T	UF450G-TC3-T	TO-230	G	D	S	Tube
UF450L-T3P-T	UF450G-T3P-T	TO-3P	G	D	S	Tube

<p>UF450L-T47-T</p> <p>(1)Packing Type (2)Package Type (3)Lead Free</p>	<p>(1) T: Tube (2) TF1: TO-220F1, TF2: TO-220F2, T47: TO-247 TC3: TO-230, T3P: TO-3P (3) L: Lead Free, G: Halogen Free</p>
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### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	$V_{DSS}$	500	V
Gate to Source Voltage	$V_{GSS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	14	A
Pulsed Drain Current (Note 2)	$I_{DM}$	56	A
Avalanche Current (Note 2)	$I_{AR}$	14	A
Single Pulse Avalanche Energy (Note 3)	$E_{AS}$	760	mJ
Power Dissipation ( $T_C=25^\circ\text{C}$ )	TO-220F1	36	W
	TO-220F2	38	
	TO-247	190	
	TO-230	147	
	TO-3P	215	
Peak Diode Recovery dv/dt (Note 4)	dv/dt	3.5	V/ns
Junction Temperature	$T_J$	+150	$^\circ\text{C}$
Strong 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. Pulse width limited by  $T_{J(MAX)}$

3.  $V_{DD}=50\text{V}$ , starting  $T_J=25^\circ\text{C}$ ,  $L=7.0\text{mH}$ ,  $I_{AS}=14\text{A}$ ,  $R_G=25\Omega$

4.  $I_{SD}\leq 14\text{A}$ ,  $di/dt\leq 130\text{A}/\mu\text{s}$ ,  $V_{DD}\leq BV_{DSS}$ ,  $T_J\leq 150^\circ\text{C}$

### ■ THERMAL DATA

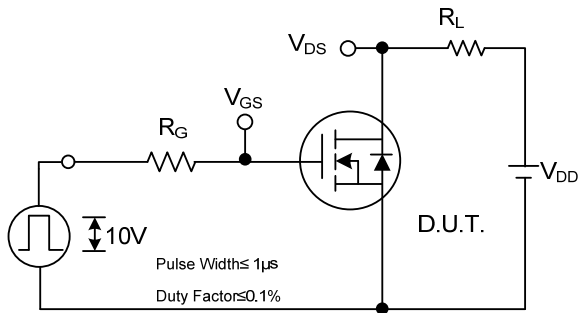
PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
		40	
Junction to Case	$\theta_{JC}$	3.47	$^\circ\text{C}/\text{W}$
		3.29	
		0.65	
		0.85	
		0.58	

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

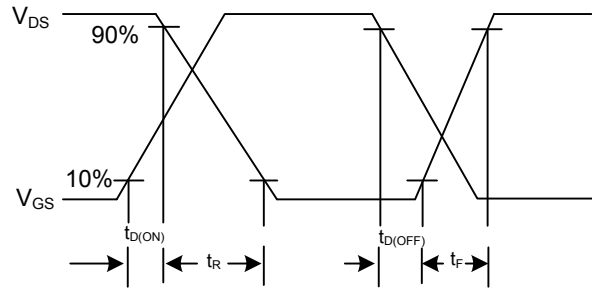
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0 V, I <sub>D</sub> =250μA	500			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =500V, V <sub>GS</sub> =0V			25	μA
		V <sub>DS</sub> =400V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C			250	μA
Gate-Source Leakage Current	Forward	I <sub>GSS</sub>	V <sub>GS</sub> =20V			100
	Reverse					
Breakdown Voltage Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Reference to 25°C, I <sub>D</sub> =1.0mA		0.63		V/°C
<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>	V <sub>GS</sub> =10V, I <sub>D</sub> =8.4A		0.31	0.4	Ω
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz		2600		pF
Output Capacitance	C <sub>OSS</sub>			720		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			340		pF
<b>SWITCHING PARAMETERS (Note 1)</b>						
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> =400V, V <sub>GS</sub> =10V, I <sub>D</sub> =14A (Note 1,2)			150	nC
Gate Source Charge	Q <sub>GS</sub>				20	nC
Gate Drain Charge	Q <sub>GD</sub>				80	nC
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =250V, I <sub>D</sub> =14A, R <sub>G</sub> =6.2Ω, R <sub>D</sub> =17Ω (Note 1,2)		17		ns
Turn-ON Rise Time	t <sub>R</sub>			47		ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			92		ns
Turn-OFF Fall-Time	t <sub>F</sub>			44		ns
<b>SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =14A, V <sub>GS</sub> =0V			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	I <sub>S</sub>				14	A
Maximum Pulsed Drain-Source Diode Forward Current	I <sub>SM</sub>				56	A
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =14A, di/dt≤100A/μs,		540	810	ns
Reverse Recovery Charge	Q <sub>RR</sub>	V <sub>DD</sub> ≤50V (Note 1)		4.8	7.2	μC

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

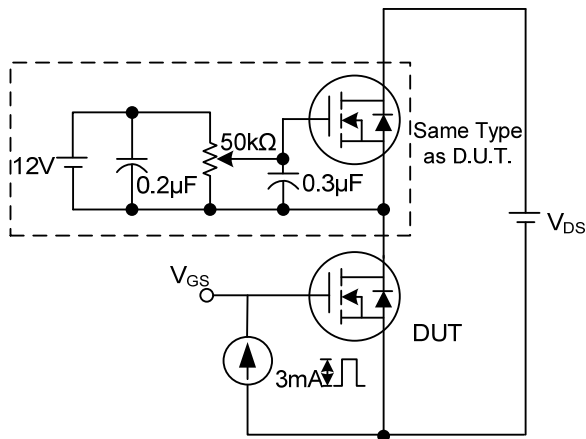
■ TEST CIRCUITS AND WAVEFORMS



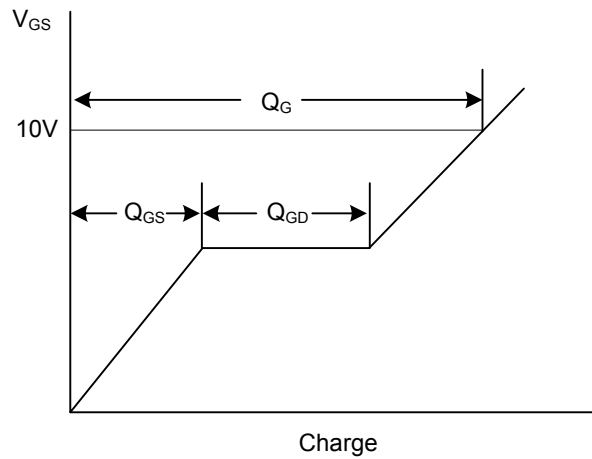
Switching Test Circuit



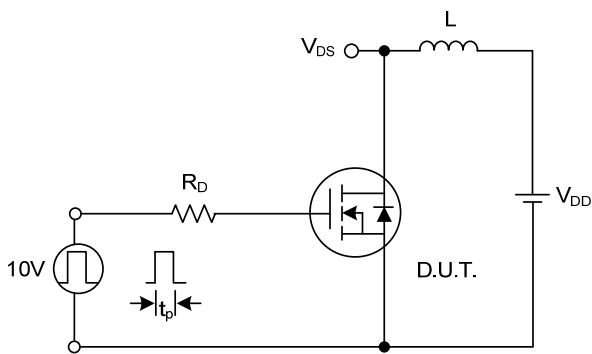
Switching Waveforms



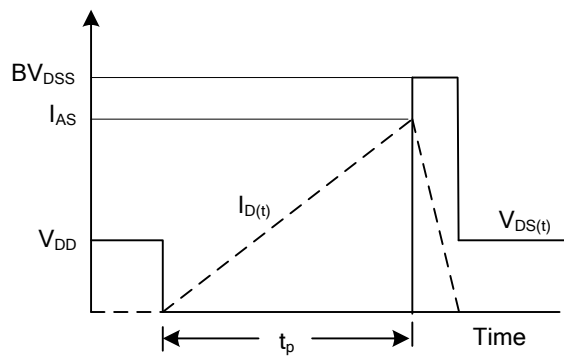
Gate Charge Test Circuit



Gate Charge Waveform

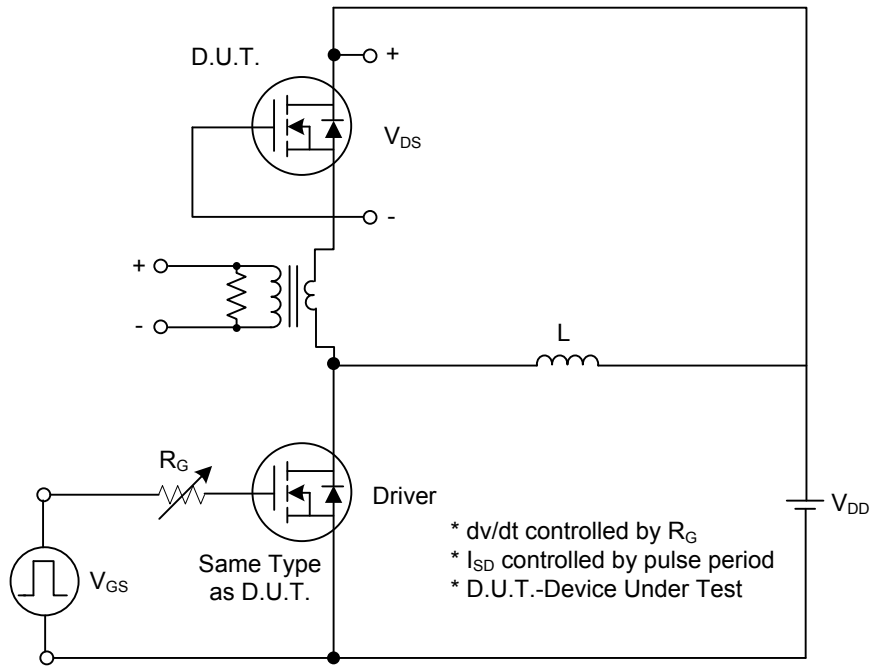


Unclamped Inductive Switching Test Circuit

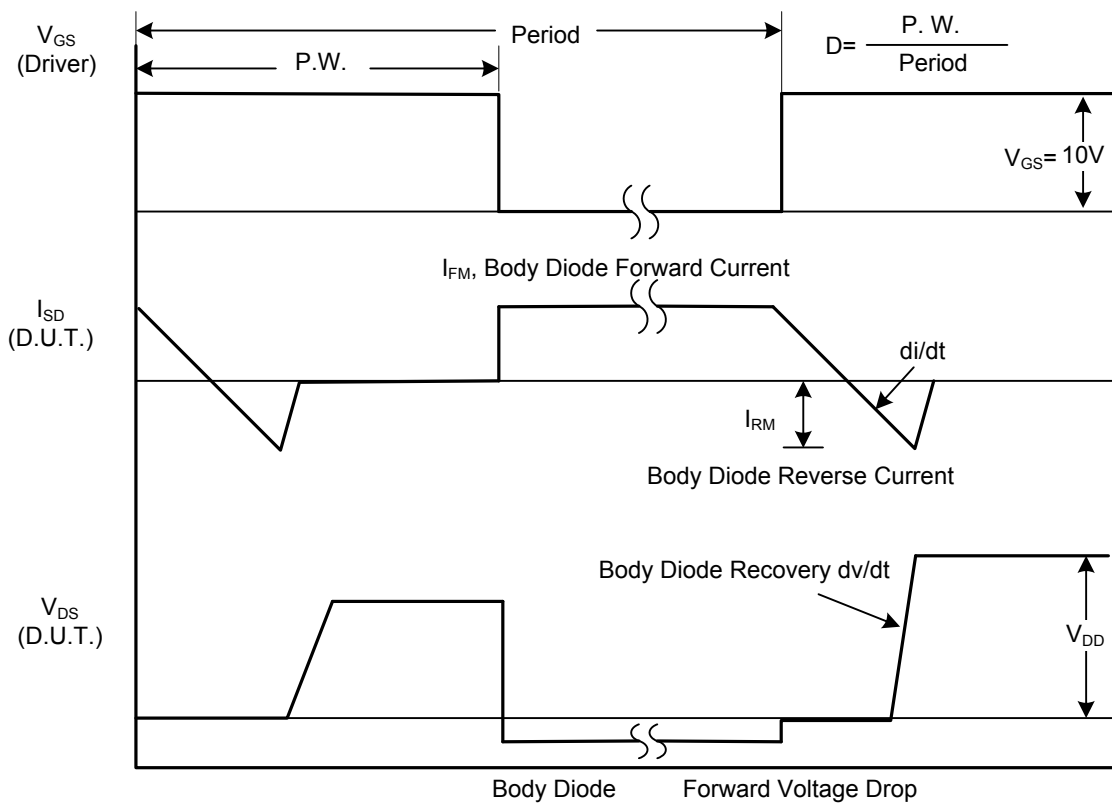


Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

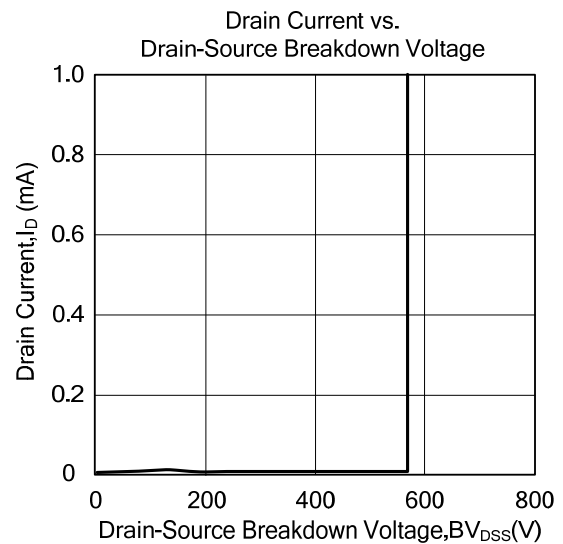
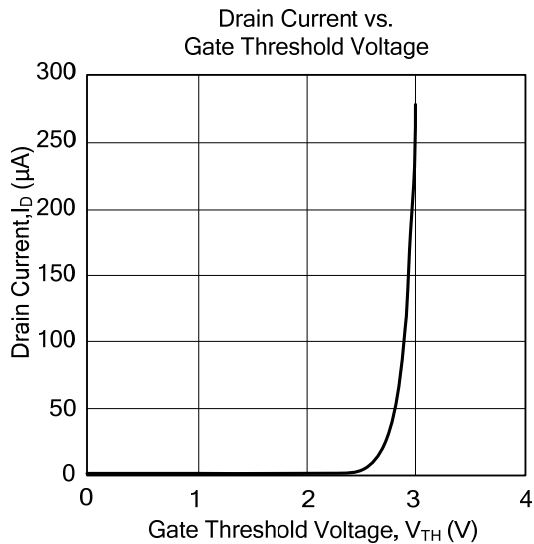
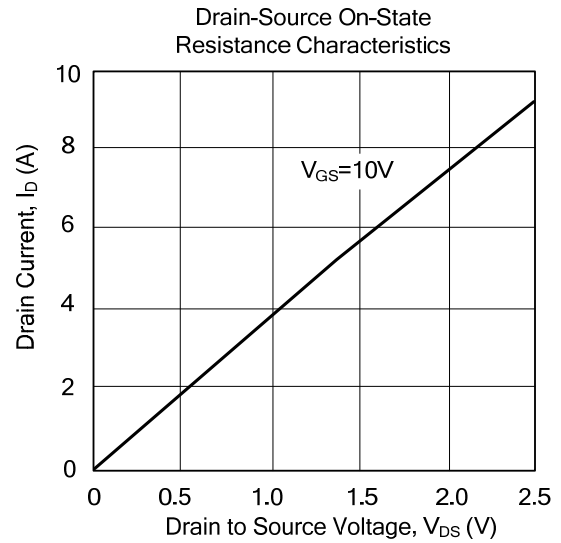
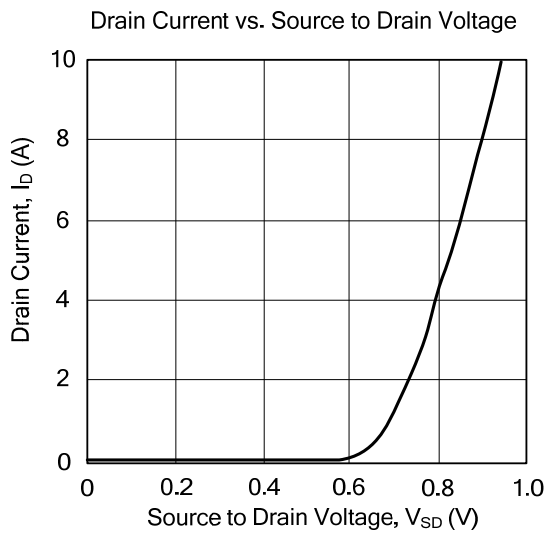


Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms

## ■ TYPICAL CHARACTERISTICS



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