



# UFZ44

*Power MOSFET*

## 50 A, 60 V N-CHANNEL POWER MOSFET

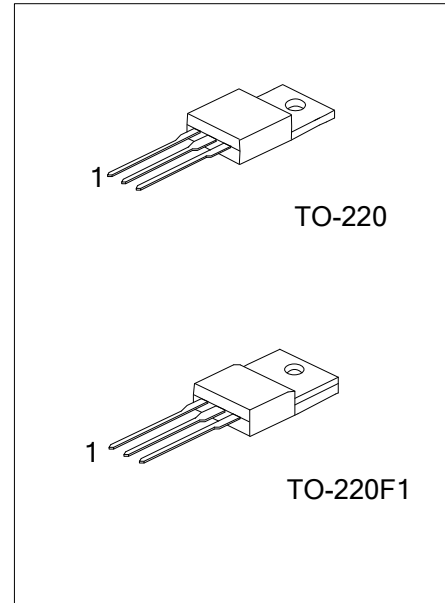
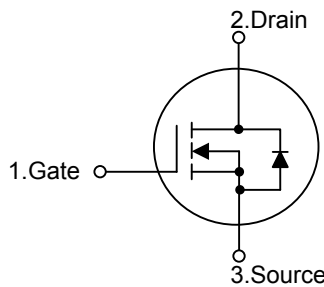
■ DESCRIPTION

The UTC **UFZ44** is an N-channel mode Power MOSFET, using UTC's advanced technology to provide customers with a minimum on-state resistance, superior switching performance, cost-effectiveness and ruggedized device design.

■ FEATURES

- \*  $R_{DS(ON)} < 28m\Omega @ V_{GS}=10V, I_D=31A$
- \* High Switching Speed
- \* Improved dv/dt Capability

■ SYMBOL



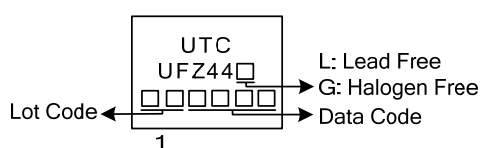
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UFZ44L-TA3-T	UFZ44G-TA3-T	TO-220	G	D	S	Tube
UFZ44L-TF1-T	UFZ44G-TF1-T	TO-220F1	G	D	S	Tube

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

<p>UFZ44L-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) T: Tube</p> <p>(2) TA3: TO-220, TF1: TO-220F1</p> <p>(3) L: Lead Free, G: Halogen Free and Lead Free</p>
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■ MARKING



■ ABSOLUTE MAXIMUM RATINGS ( $T_C=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			$V_{DSS}$	60	V
Gate-Source Voltage			$V_{GSS}$	$\pm 20$	V
Drain Current	Continuous, $V_{GS}$ at 10V	$T_C=25^\circ\text{C}$ (Note 2)	$I_D$	50	A
		$T_C=100^\circ\text{C}$		36	A
	Pulsed (Note 3)		$I_{DM}$	200	A
Single Pulsed Avalanche Energy (Note 4)			$E_{AS}$	100	mJ
Peak Diode Recovery $dv/dt$ (Note 5)			$dv/dt$	4.5	V/ns
Power Dissipation	$T_C=25^\circ\text{C}$	TO-220	$P_D$	150	W
		TO-220F1		70	W
Linear De-rating Factor				1.0	W/ $^\circ\text{C}$
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. Current limited by the package, (die current = 51 A).
3. Repetitive rating; pulse width limited by maximum junction temperature.
4.  $V_{DD} = 25\text{ V}$ , starting  $T_J = 25\text{ }^\circ\text{C}$ ,  $L = 44\text{ }\mu\text{H}$ ,  $R_G = 25\text{ }\Omega$ ,  $I_{AS} = 51\text{ A}$ .
5.  $I_{SD} \leq 51\text{ A}$ ,  $di/dt \leq 250\text{ A}/\mu\text{s}$ ,  $V_{DD} \leq V_{DS}$ ,  $T_J \leq 175\text{ }^\circ\text{C}$ .

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F1	$\theta_{JA}$	62	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	$\theta_{JC}$	1.0	$^\circ\text{C}/\text{W}$
	TO-220F1		1.78	$^\circ\text{C}/\text{W}$

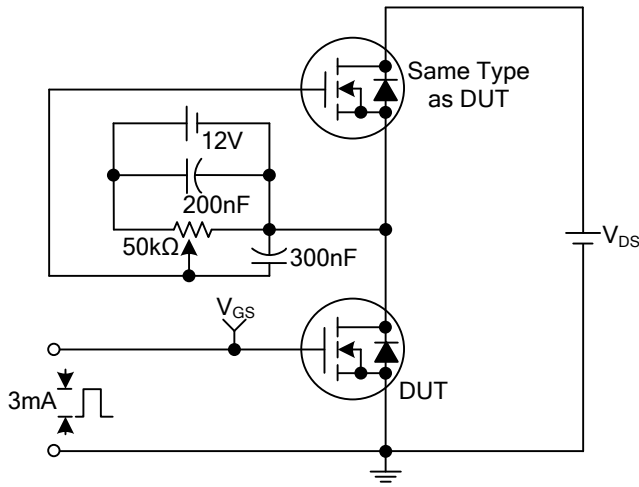
■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	60			V
Breakdown Voltage Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Reference to 25°C, I <sub>D</sub> =1mA		0.060		V/°C
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V			25	μA
		V <sub>DS</sub> =48V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C			250	
Gate- Source Leakage Current	Forward	V <sub>GS</sub> =+20V			+100	nA
	Reverse	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>	V <sub>GS</sub> =10V, I <sub>D</sub> =31A (Note 2)			28	mΩ
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz		1900		pF
Output Capacitance	C <sub>OSS</sub>			920		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			170		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	Q <sub>G</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =48V, I <sub>D</sub> =51A (Note 2)			67	nC
Gate to Source Charge	Q <sub>GS</sub>				18	nC
Gate to Drain Charge	Q <sub>GD</sub>				25	nC
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =30V, I <sub>D</sub> =51A, R <sub>G</sub> =9.1Ω, R <sub>D</sub> =0.55 Ω (Note 2)		14		ns
Rise Time	t <sub>R</sub>			110		ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			45		ns
Fall-Time	t <sub>F</sub>			92		ns
Internal Drain Inductance	L <sub>D</sub>	Between lead, 6 mm (0.25") from package and center of die contact		4.5		nH
Internal Source Inductance	L <sub>S</sub>			7.5		nH
<b>SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	I <sub>S</sub>	MOSFET symbol showing the integral reverse p - n junction diode			50	A
Maximum Body-Diode Pulsed Current	I <sub>SM</sub>				200	A
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =51A, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C(Note 2)			2.5	V
Body Diode Reverse Recovery Time	t <sub>RR</sub>	I <sub>F</sub> =51A, dI/dt=100A/μs, T <sub>J</sub> =25°C		120	180	ns
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>			0.53	0.80	nC
Forward Turn-On Time	t <sub>ON</sub>	Intrinsic turn-on time is negligible (turn-on is dominated by L <sub>S</sub> and L <sub>D</sub> )				

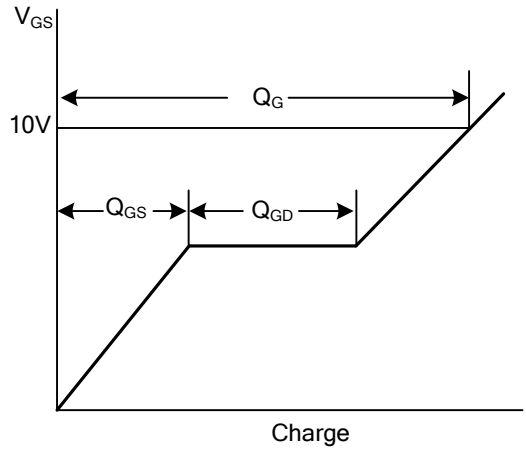
Notes: 1. Repetitive Rating: Pulse width limited by maximum junction temperature.  
 2. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

## TEST CIRCUITS AND WAVEFORMS

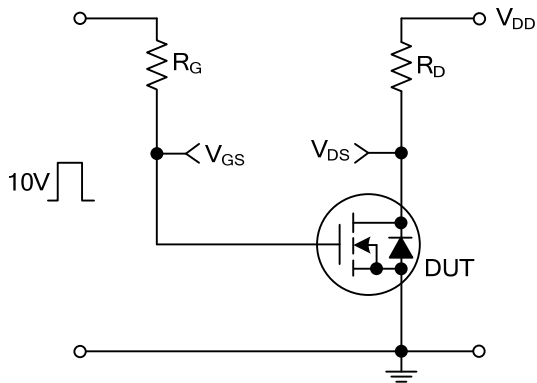
Gate Charge Test Circuit



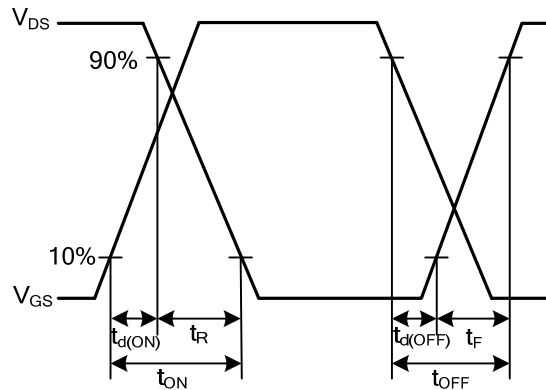
Gate Charge Waveforms



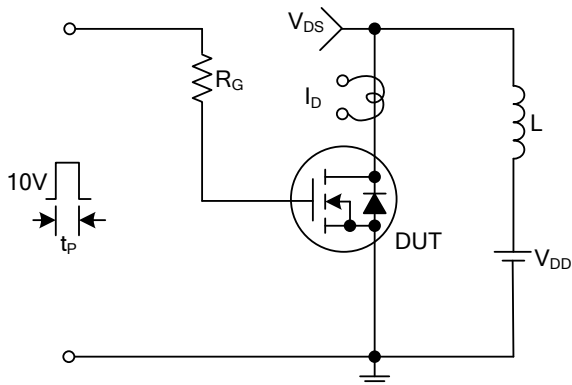
Resistive Switching Test Circuit



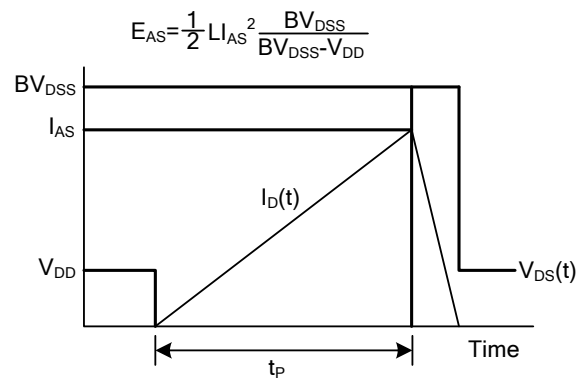
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit

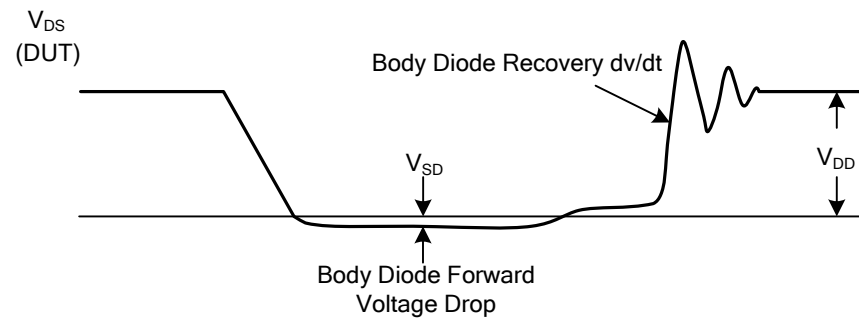
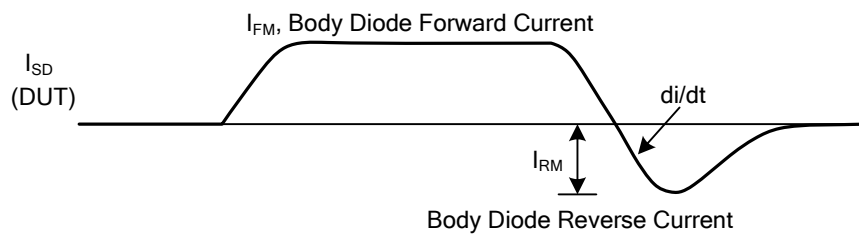
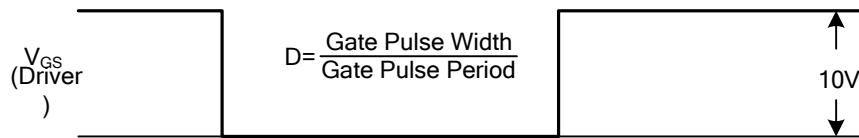
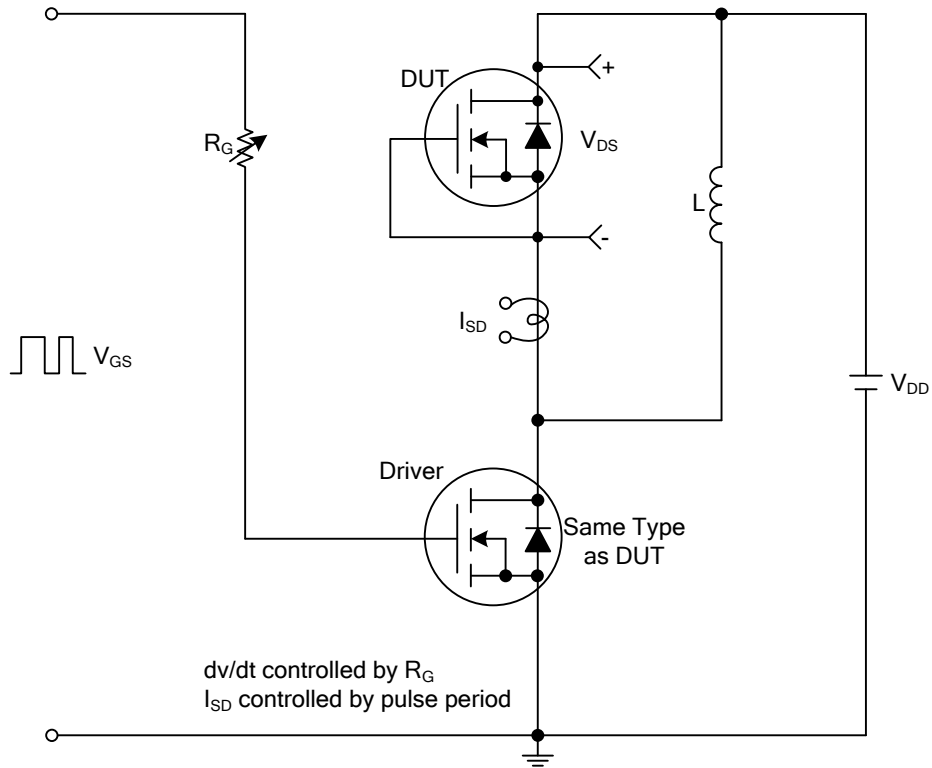


Unclamped Inductive Switching Waveforms

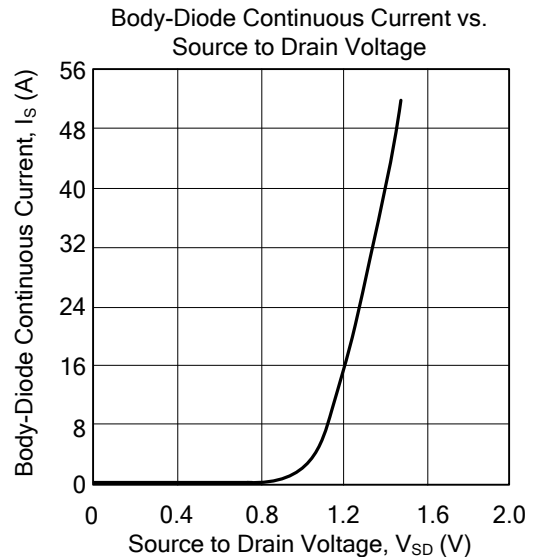
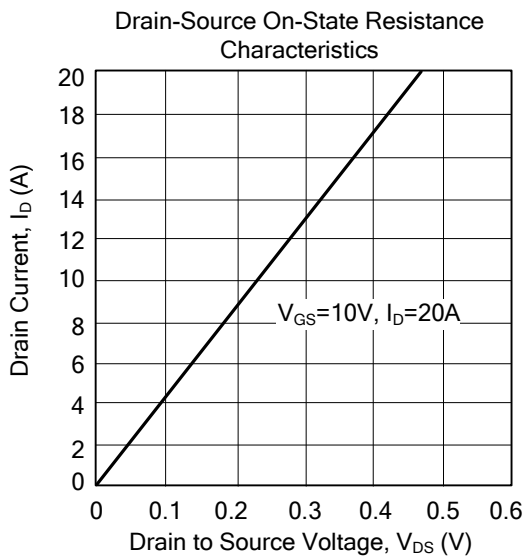
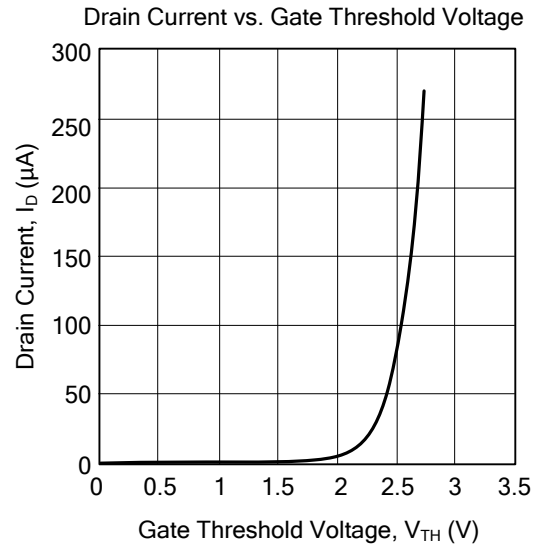
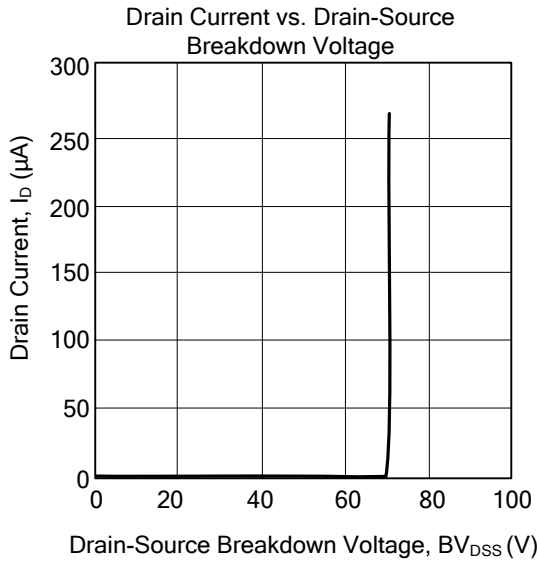


■ TEST CIRCUITS AND WAVEFORMS(Cont.)

Peak Diode Recovery dv/dt Test Circuit & Waveforms



## TYPICAL CHARACTERISTICS



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