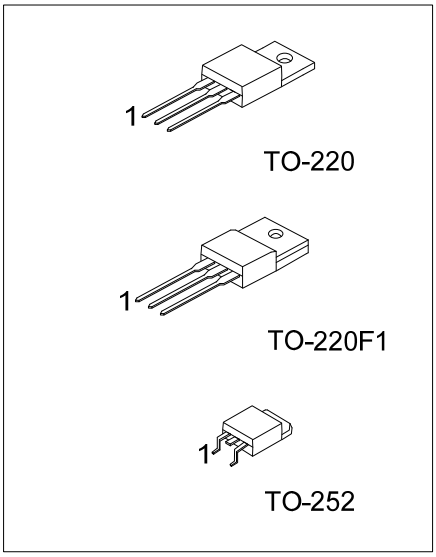
UFZ44

Power MOSFET

50A, 60V N-CHANNEL POWER MOSFET



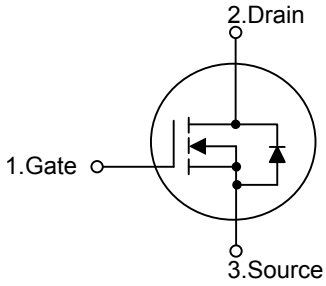
■ DESCRIPTION

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 ruggedizd device design.

■ FEATURES

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

■ SYMBOL



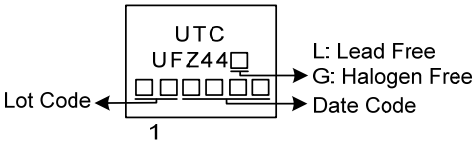
■ ORDERING INFORMATION

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
UFZ44L-TN3-R	UFZ44G-TN3-R	TO-252	G	D	S	Tape Reel

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

UFZ44G-TA3-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise specified)

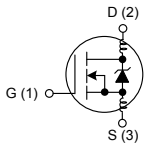
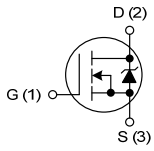
PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V_{DSS}	60	V
Gate-Source Voltage			V_{GSS}	±20	V
Drain Current	Continuous, V_{GS} at 10V	T_C=25°C (Note 2)	I_D	50	A
		T_C=100°C		36	A
	Pulsed (Note 3)		I_{DM}	200	A
Single Pulsed Avalanche Energy (Note 4)			E_{AS}	100	mJ
Peak Diode Recovery dv/dt (Note 5)			dv/dt	4.5	V/ns
Power Dissipation	T_C=25°C	TO-220	P_D	150	W
		TO-220F1		70	W
		TO-252		90	W
Linear De-rating Factor				1.0	W/°C
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. Current limited by the package, (die current = 51 A).
3. Repetitive rating; pulse width limited by maximum junction temperature.
4. V_{DD} = 25 V, starting T_J = 25 °C, L = 44 μH, R_G = 25 Ω, I_{AS} = 51 A.
5. I_{SD} ≤51 A, dI/dt ≤ 250 A/μs, V_{DD} ≤ V_{DS}, T_J ≤ 175 °C.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F1	θ_{JA}	62.5	°C/W
	TO-252		110	°C/W
Junction to Case	TO-220	θ_{JC}	0.83	°C/W
	TO-220F1		1.78	°C/W
	TO-252		1.38	°C/W

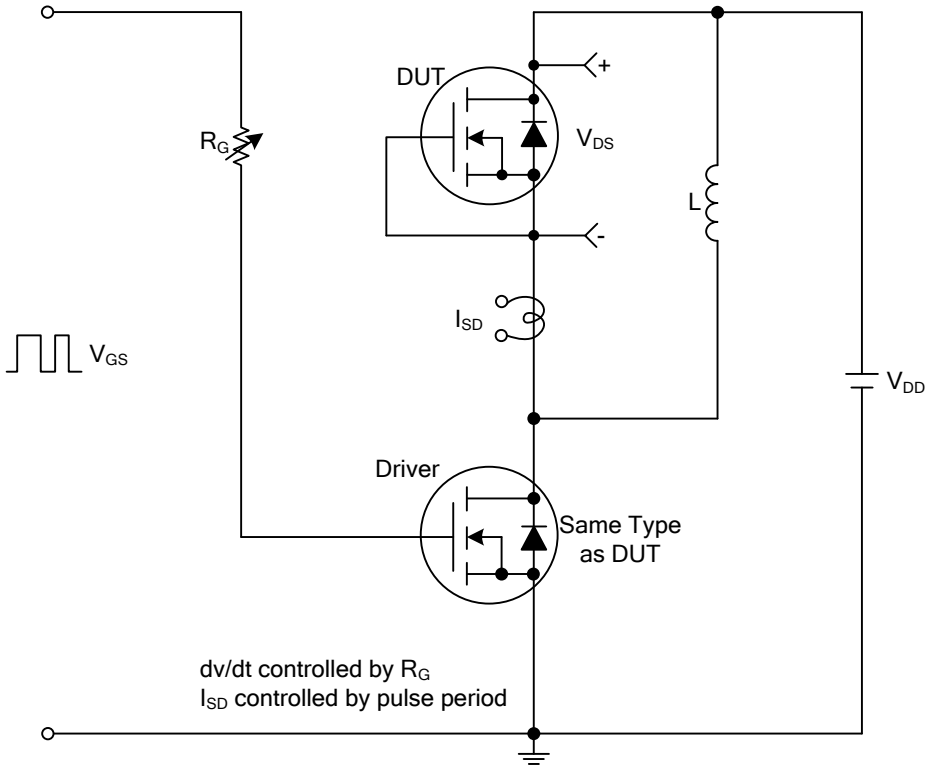
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

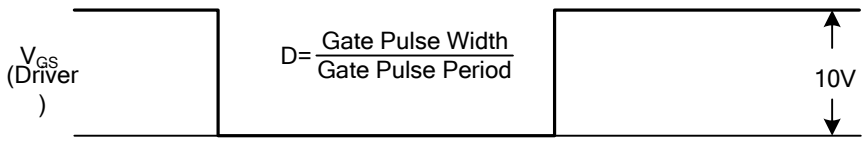
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	60			V
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS}/\triangle T_J$	Reference to 25°C, I_D=1mA		0.060		V/°C
Drain-Source Leakage Current		I_{DSS}	V_{DS}=60V, V_{GS}=0V			25	μA
			V_{DS}=48V, V_{GS}=0V, T_J=125°C			250	
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V			+100	nA
	Reverse		V_{GS}=-20V,			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=31A (Note 2)			28	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		1900		pF
Output Capacitance		C_{OSS}			920		pF
Reverse Transfer Capacitance		C_{RSS}			170		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{GS}=10V, V_{DS}=48V, I_D=51A (Note 2)			67	nC
Gate to Source Charge		Q_{GS}				18	nC
Gate to Drain Charge		Q_{GD}				25	nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=30V, I_D=51A, R_G=9.1Ω, R_D=0.55 Ω (Note 2)		14		ns
Rise Time		t_R			110		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			45		ns
Fall-Time		t_F			92		ns
Internal Drain Inductance		L_D	Between lead, 6 mm (0.25") from package and center of die contact 		4.5		nH
Internal Source Inductance		L_S			7.5		nH
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S	MOSFET symbol showing the integral reverse p - n junction diode 			50	A
Maximum Body-Diode Pulsed Current		I_{SM}				200	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=51A, V_{GS}=0V, T_J=25°C(Note 2)			2.5	V
Body Diode Reverse Recovery Time		t_{rr}	I_F=51A, dI/dt=100A/μs, T_J=25°C		120	180	ns
Body Diode Reverse Recovery Charge		Q_{rr}			0.53	0.80	nC
Forward Turn-On Time		t_{ON}	Intrinsic turn-on time is negligible (turn-on is dominated by L_S and L_D)				

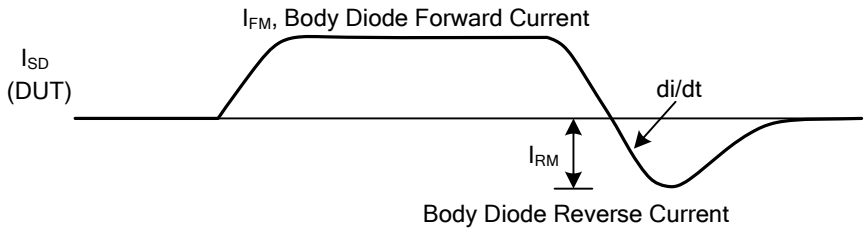
Notes: 1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

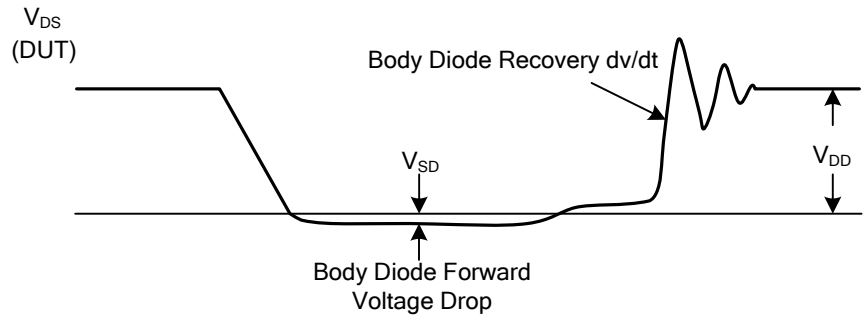
■ TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test Circuit & Waveforms



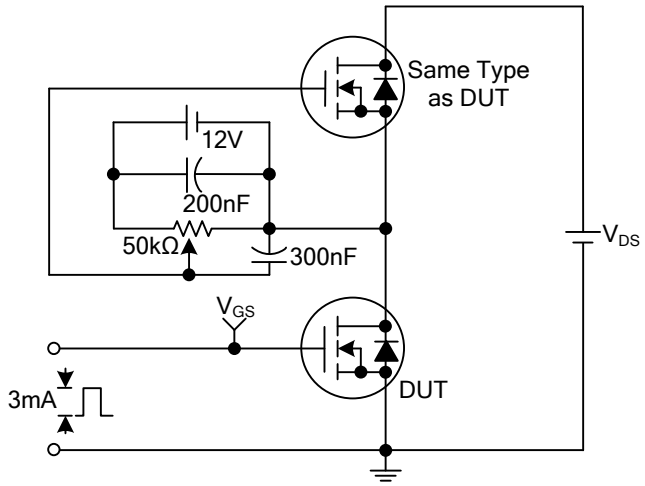




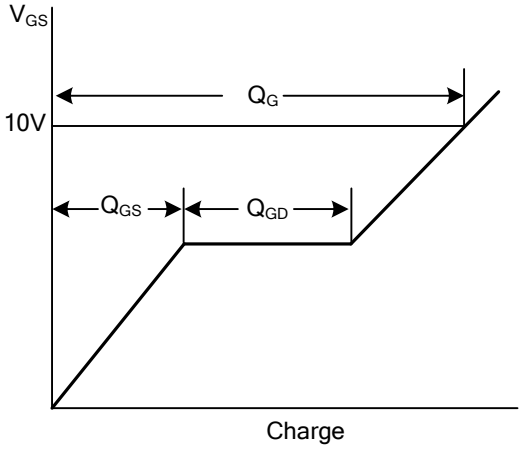


■ TEST CIRCUITS AND WAVEFORMS

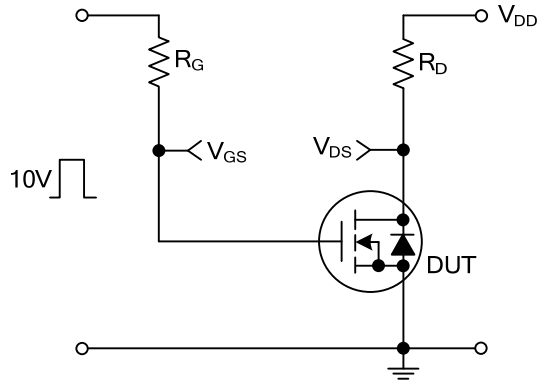
Gate Charge Test Circuit



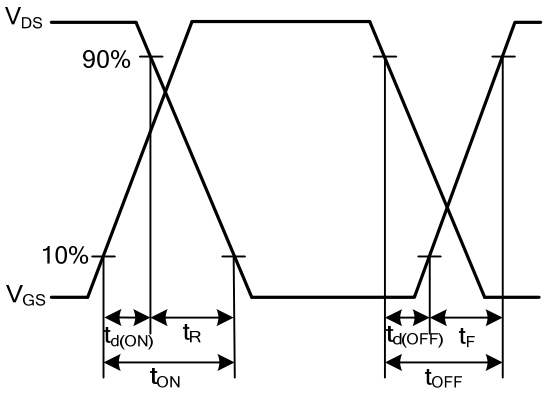
Gate Charge Waveforms



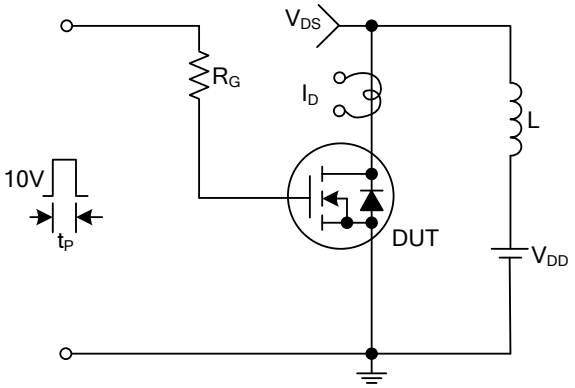
Resistive Switching Test Circuit



Resistive Switching Waveforms

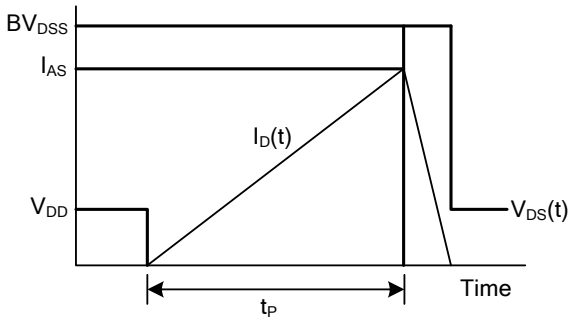


Unclamped Inductive Switching Test Circuit



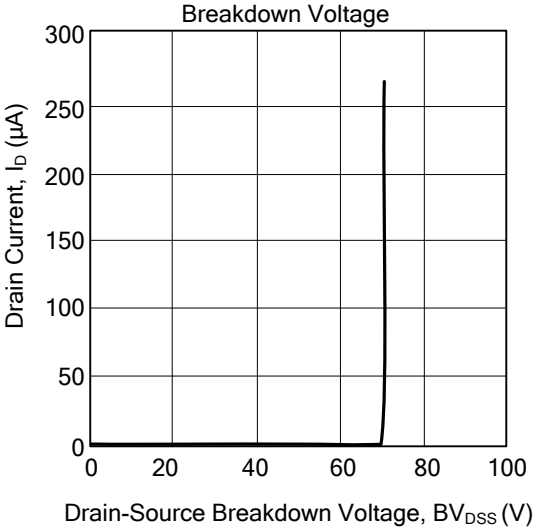
Unclamped Inductive Switching Waveforms

$$E_{AS}=\frac{1}{2}LI_{AS}^{2}\frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$

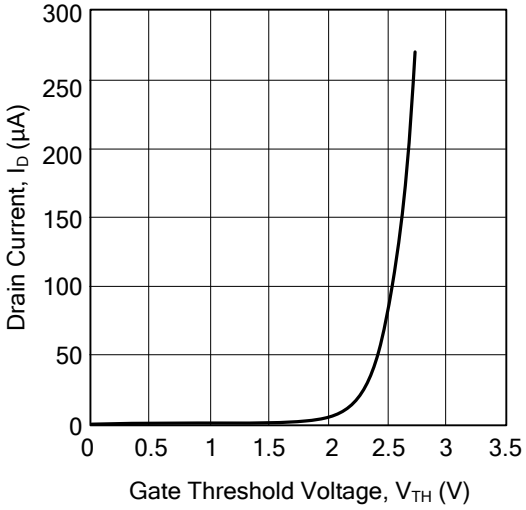


■ TYPICAL CHARACTERISTICS

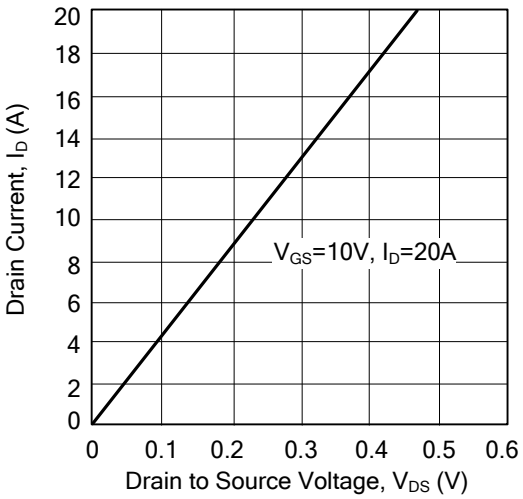
Drain Current vs. Drain-Source Breakdown Voltage



Drain Current vs. Gate Threshold Voltage



Drain-Source On-State Resistance Characteristics



Body-Diode Continuous Current vs. Source to Drain Voltage