



**FUF9Z24-Q**

Preliminary

**Power MOSFET**

**-12A, -55V P-CHANNEL  
POWER MOSFET**

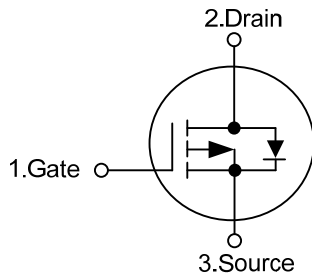
■ DESCRIPTION

The UTC **FUF9Z24-Q** is a P-channel power MOSFET using UTC's advanced technology to provide the customers with high switching speed, cost-effectiveness and minimum on-state resistance. It can also withstand high energy in the avalanche.

■ FEATURES

- \*  $R_{DS(ON)} \leq 150 \text{ m}\Omega$  @  $V_{GS} = -10V, I_D = -7.2A$
- \* High Switching Speed

■ SYMBOL



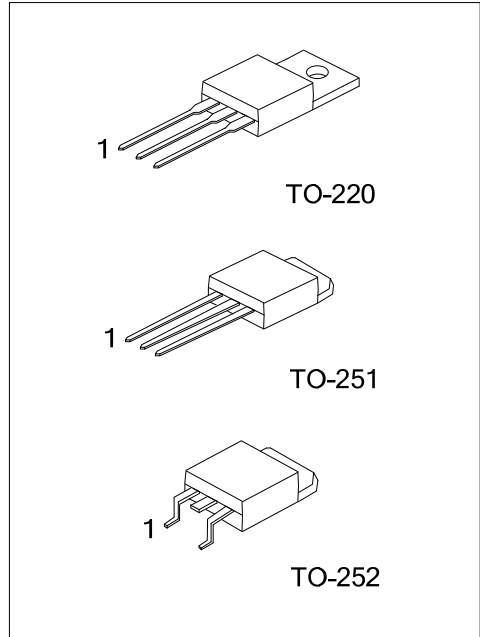
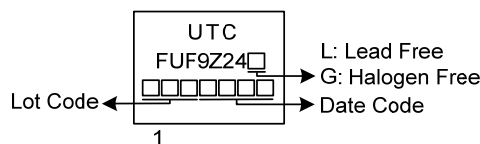
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
FUF9Z24L-TA3-T	FUF9Z24G-TA3-T	TO-220	G	D	S	Tube
FUF9Z24L-TM3-T	FUF9Z24G-TM3-T	TO-251	G	D	S	Tube
FUF9Z24L-TN3-R	FUF9Z24G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>FUF9Z24G-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TM3: TO-251, TN3: TO-252</p> <p>(3) G: Halogen Free and Lead Free, L: 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		$V_{DSS}$	-55	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Drain Current	Continuous	$I_D$	-12	A
	Pulsed	$I_{DM}$	-24	A
Single Pulsed Avalanche Energy (Note 3)		$E_{AS}$	244	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.35	V/ns
Power Dissipation	TO-220	$P_D$	51	W
	TO-251/TO-252		30	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.  $L = 30\text{mH}$ ,  $I_{AS} = -4.0\text{A}$ ,  $V_{DD} = -25\text{V}$ ,  $R_G = 25\Omega$  Starting  $T_J = 25^\circ\text{C}$

4.  $I_{SD} \leq -12\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		110	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	$\theta_{JC}$	2.45	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		4.16 (Note)	$^\circ\text{C}/\text{W}$

Note: Device mounted on FR-4 substrate  $P_c$  board, 2oz copper, with 1inch square copper plate.

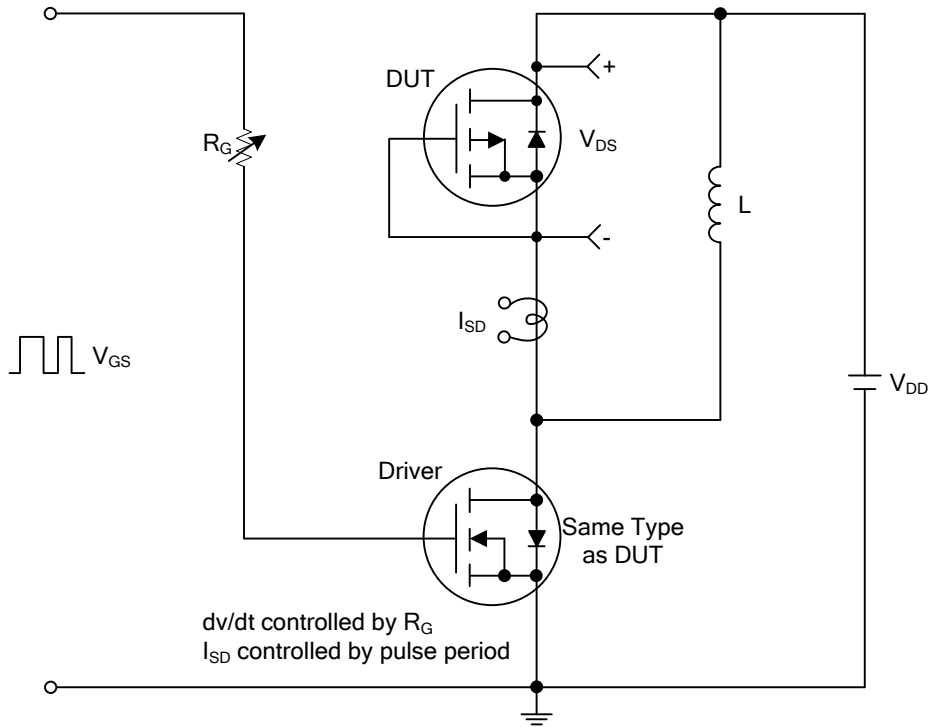
■ ELECTRICAL CHARACTERISTICS ( $T_J=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage		$BV_{DSS}$	$I_D=-250\mu\text{A}$ , $V_{GS}=0\text{V}$	-55			V
Drain-Source Leakage Current		$I_{DSS}$	$V_{DS}=-55\text{V}$ , $V_{GS}=0\text{V}$			-1	$\mu\text{A}$
Gate-Source Leakage Current	Forward	$I_{GSS}$	$V_{GS}=+20\text{V}$			+10	nA
	Reverse		$V_{GS}=-20\text{V}$			-10	nA
<b>ON CHARACTERISTICS</b>							
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS}=V_{GS}$ , $I_D=-250\mu\text{A}$	-2.0		-4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	$V_{GS}=-10\text{V}$ , $I_D=-7.2\text{A}$			150	m $\Omega$
<b>DYNAMIC PARAMETERS</b>							
Input Capacitance		$C_{ISS}$	$V_{GS}=0\text{V}$ , $V_{DS}=-25\text{V}$ , $f=1.0\text{MHz}$ (Note 2)		526		pF
Output Capacitance		$C_{OSS}$			170		pF
Reverse Transfer Capacitance		$C_{RSS}$			43		pF
<b>SWITCHING PARAMETERS</b>							
Total Gate Charge(Note 1)		$Q_G$	$V_{DS}=-44\text{V}$ , $V_{GS}=-10\text{V}$ , $I_D=-12\text{A}$		9.78		nC
Gate to Source Charge		$Q_{GS}$			2.46		nC
Gate to Drain Charge		$Q_{GD}$			5.12		nC
Turn-ON Delay Time(Note 1)		$t_{D(ON)}$	$V_{DD}=-30\text{V}$ , $I_D=-12\text{A}$ , $R_G=25\Omega$		9.8		ns
Rise Time		$t_R$			22		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			34		ns
Fall-Time		$t_F$			25		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS (Note 2)</b>							
Maximum Body-Diode Continuous Current		$I_S$				-12	A
Maximum Body-Diode Pulsed Current		$I_{SM}$				-24	A
Drain-Source Diode Forward Voltage		$V_{SD}$	$V_{GS}=0\text{V}$ , $I_S=-12\text{A}$ (Note 1)			-1.4	V
Body Diode Reverse Recovery Time(Note 1)		$t_{rr}$	$V_{GS}=0\text{V}$ , $I_S=-12\text{A}$		121		ns
Body Diode Reverse Recovery Charge		$Q_{rr}$	$di_F/dt=100\text{A}/\mu\text{s}$		416		nC

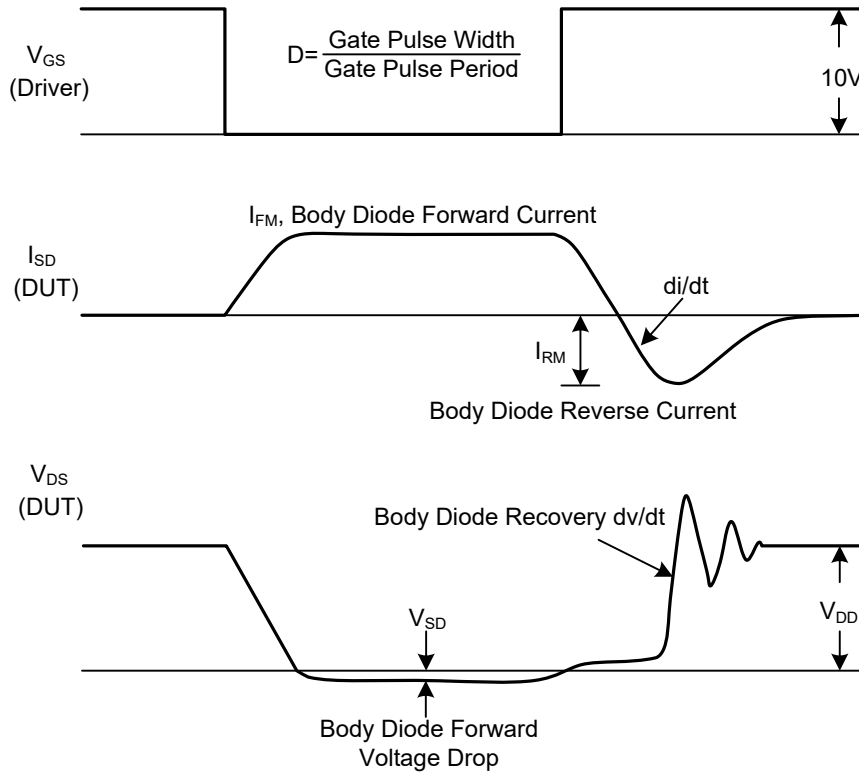
Notes: 1. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$ .

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



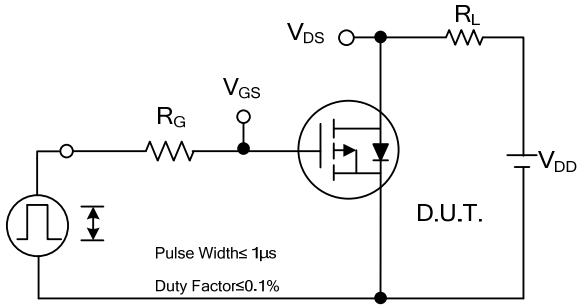
Peak Diode Recovery dv/dt Test Circuit



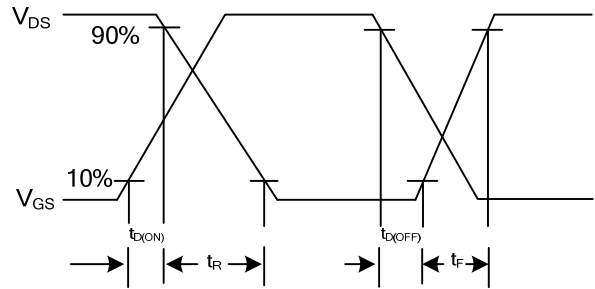
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

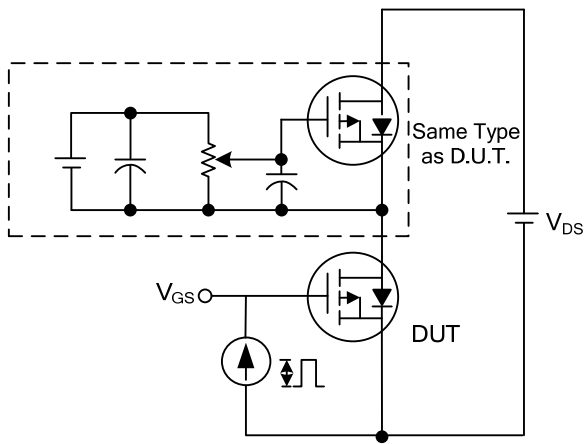
TEST CIRCUITS AND WAVEFORMS



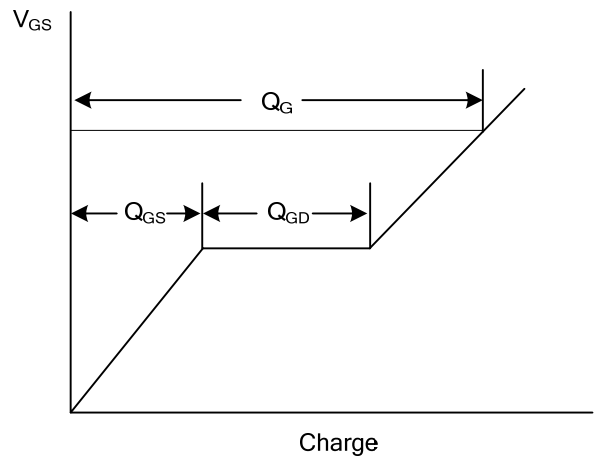
Switching Test Circuit



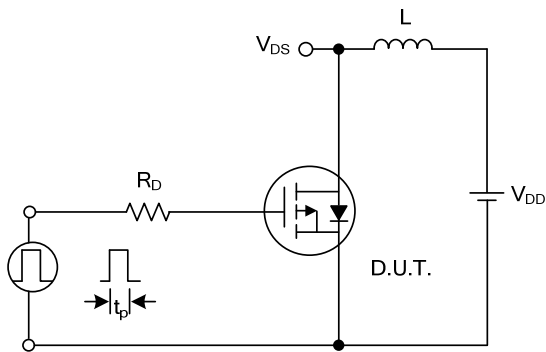
Switching Waveforms



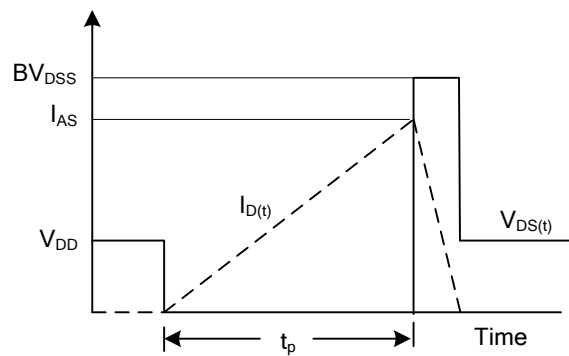
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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