



UF9Z24-Q

Preliminary

Power MOSFET

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

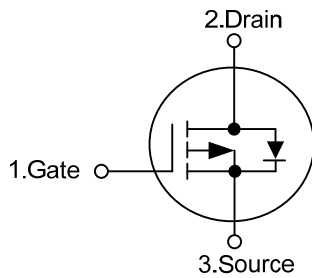
DESCRIPTION

The UTC **UF9Z24-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

- * $R_{DS(ON)} \leq 144 \text{ m}\Omega$ @ $V_{GS} = -10V, I_D = -12A$
- * High switching speed
- * Low gate charge

SYMBOL



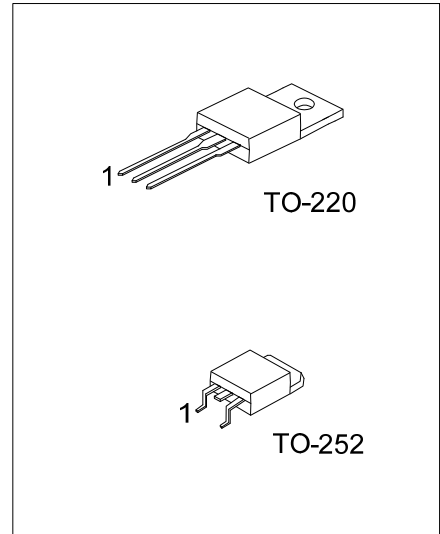
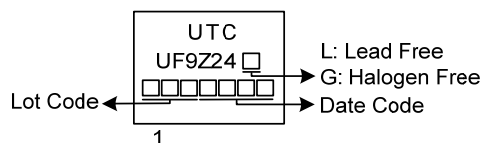
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UT9Z24L-TA3-T	UT9Z24G-TA3-T	TO-220	G	D	S	Tube
UT9Z24L-TN3-R	UT9Z24G-TN3-R	TO-252	G	D	S	Tape Reel

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

	<p>(1) Packing Type (1) T: Tube, R: Tape Reel</p> <p>(2) Package Type (2) TA3: TO-220, TN3: TO-252</p> <p>(3) Green Package (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}	± 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	2.95	V/ns
Power Dissipation	TO-220	P_D	51	W
	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. $I_{SD} \leq -12.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-252		110	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	1.25	$^\circ\text{C}/\text{W}$
	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.

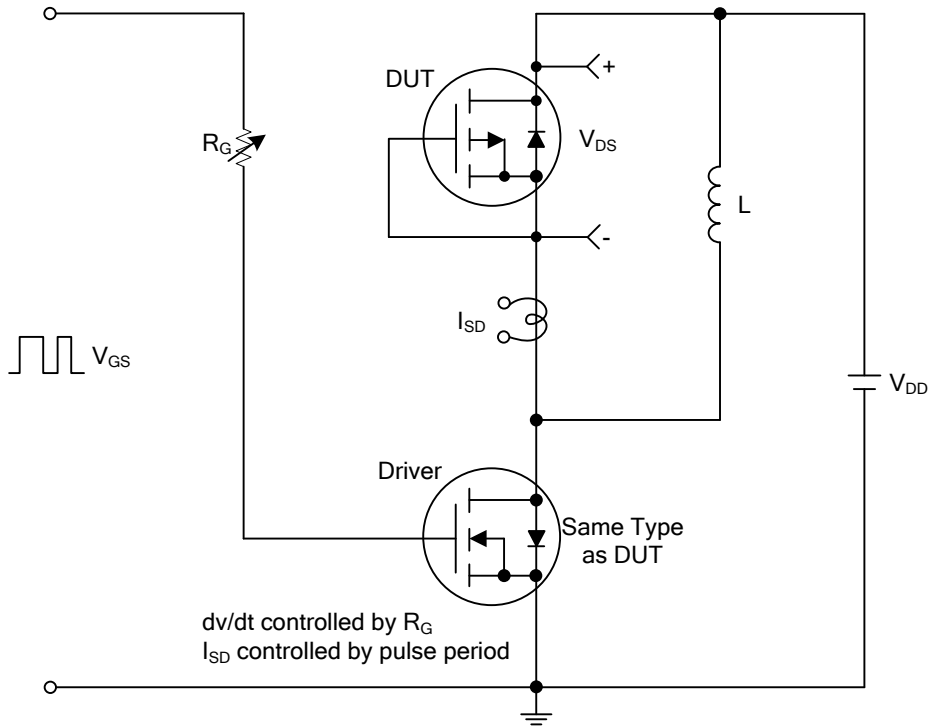
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D =-250μA, V _{GS} =0V	-55			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =-55V, V _{GS} =0V			-1	μA
Gate-Source Leakage Current	Forward	I _{GSS} V _{GS} =+20V V _{GS} =-20V			+100	nA
	Reverse				-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 =-12A			144	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =-25V, f=1.0MHz (Note 2)		519		pF
Output Capacitance	C _{OSS}			180		pF
Reverse Transfer Capacitance	C _{RSS}			47		pF
SWITCHING PARAMETERS						
Total Gate Charge(Note 1)	Q _G	V _{DS} =-44V, V _{GS} =-10V, I _D =-12A (Note 1, 2)		12.8		nC
Gate to Source Charge	Q _{GS}			2.6		nC
Gate to Drain Charge	Q _{GD}			7.4		nC
Turn-ON Delay Time(Note 1)	t _{D(ON)}	V _{DD} =-30V, V _{GS} =-10V, I _D =-12A, R _G =25Ω (Note 1, 2)		6.5		ns
Rise Time	t _R			21.4		ns
Turn-OFF Delay Time	t _{D(OFF)}			29		ns
Fall-Time	t _F			26		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS (Note 2)						
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} =0V, I _S =-12A (Note 1)			-1.4	V
Body Diode Reverse Recovery Time(Note 1)	t _{rr}	V _{GS} =0V, I _S =-12A		118		ns
Body Diode Reverse Recovery Charge	Q _{rr}	dI _F /dt=100A/μs		266		nC

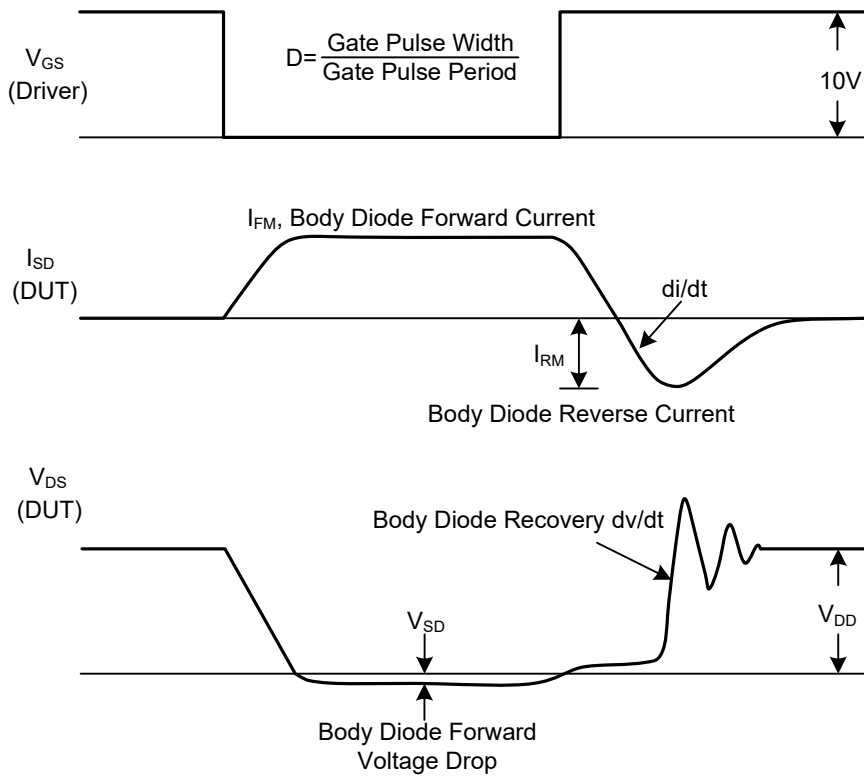
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



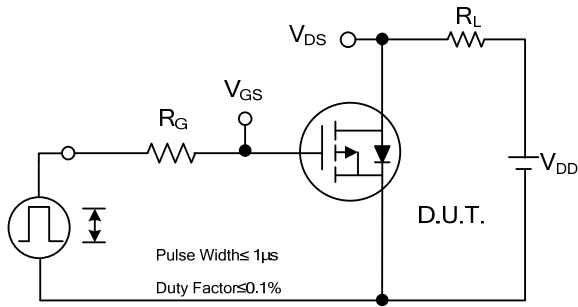
Peak Diode Recovery dv/dt Test Circuit



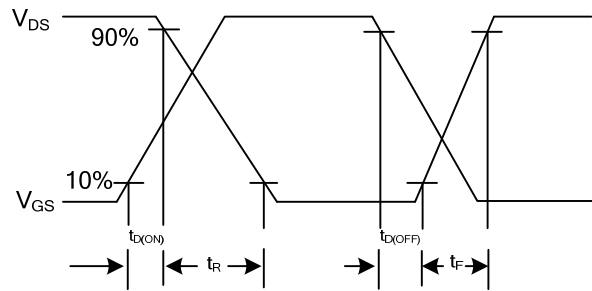
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

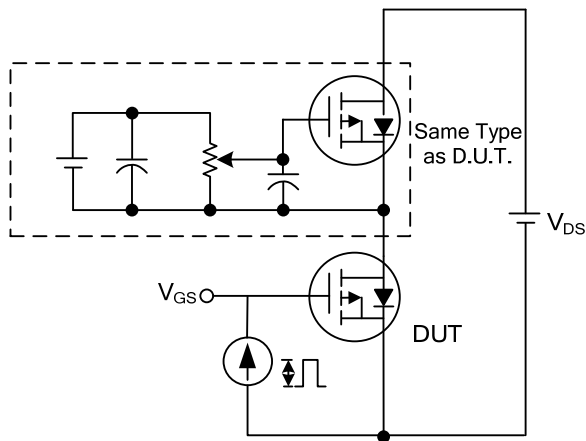
■ TEST CIRCUITS AND WAVEFORMS



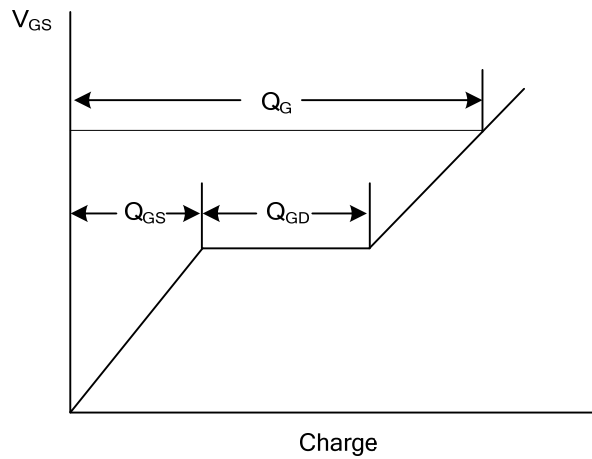
Switching Test Circuit



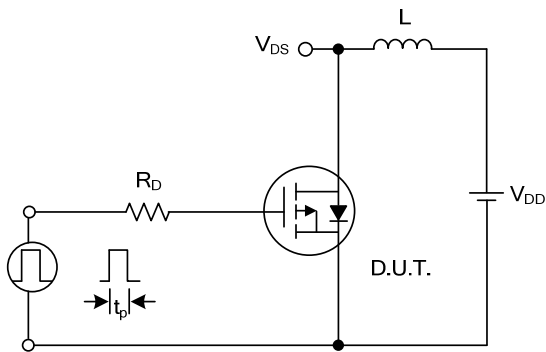
Switching Waveforms



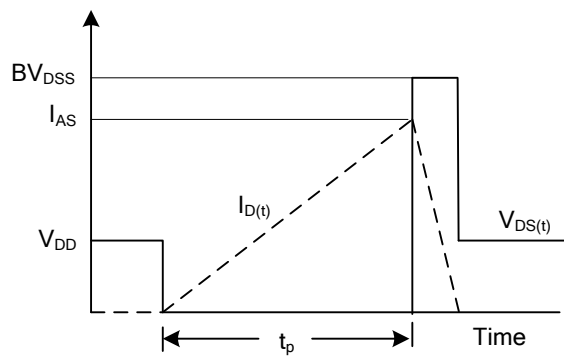
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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