

**24NM90-Q**

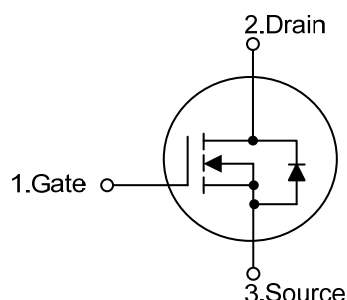
Preliminary

Power MOSFET**24A, 900V N-CHANNEL
SUPER-JUNCTION MOSFET****DESCRIPTION**

The **UTC 24NM90-Q** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at AC-DC converters for power applications.

FEATURES

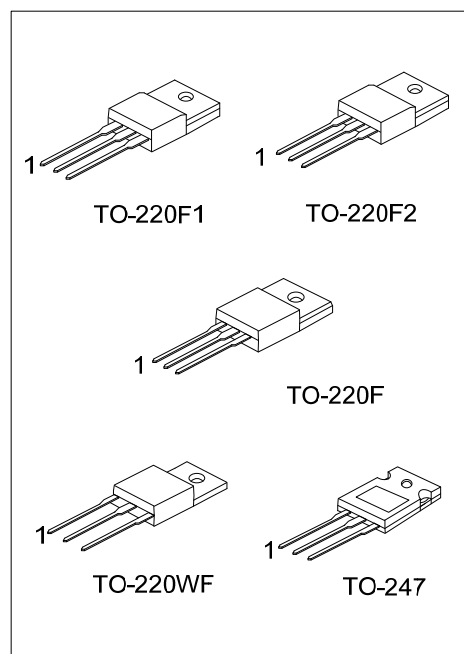
- * $R_{DS(ON)} \leq 0.3 \Omega$ @ $V_{GS}=10V$, $I_D=12A$
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness

SYMBOL**ORDERING INFORMATION**

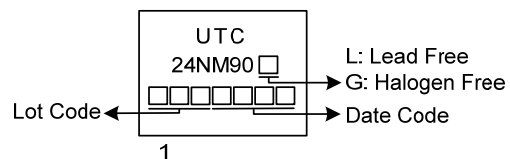
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
24NM90L-TW1-T	24NM90G-TW1-T	TO-220WF	G	D	S	Tube
24NM90L-TF1-T	24NM90G-TF1-T	TO-220F1	G	D	S	Tube
24NM90L-TF2-T	24NM90G-TF2-T	TO-220F2	G	D	S	Tube
24NM90L-TF3-T	24NM90G-TF3-T	TO-220F	G	D	S	Tube
24NM90L-T47-T	24NM90G-T47-T	TO-247	G	D	S	Tube

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

24NM90G-TW1-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube (2) TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2 TW1: TO-220WF, T47: TO-247 (3) G: Halogen Free and Lead Free, L: Lead Free
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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_{DS}	900	V
Gate-Source Voltage		V_{GS}	± 30	V
Drain Current	Continuous	I_D	24	A
	Pulsed (Note 2)	I_{DM}	72	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	648	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.8	V/ns
Power Dissipation	TO-220F/TO-220F1	P_D	38	W
	TO-220F2/TO-220WF			
	TO-247		260	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. $L = 100\text{mH}$, $I_{AS} = 3.6\text{A}$, $V_{DD} = 90\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD} \leq 24\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F/TO-220F1	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	TO-220F2/TO-220WF			
	TO-247		40	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-220F/TO-220F1	θ_{JC}	3.28	$^{\circ}\text{C}/\text{W}$
	TO-220F2/TO-220WF			
	TO-247		0.48	$^{\circ}\text{C}/\text{W}$

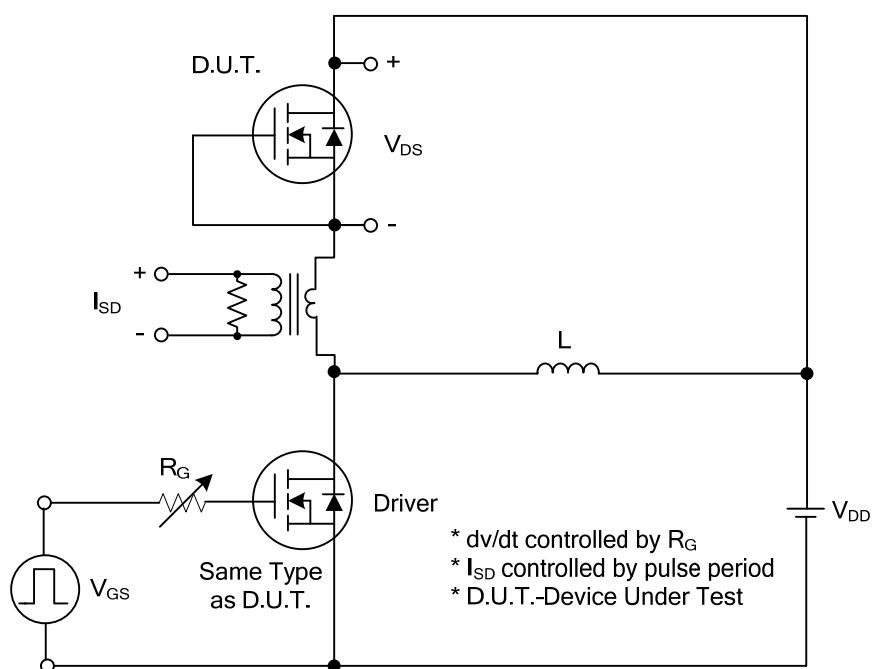
■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	900			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =900V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±30V, V _{DS} =0V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.5		4.5	V
Static Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =12A			0.3	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =50V, f=1MHz		2000		pF
Output Capacitance	C _{OSS}			210		pF
Reverse Transfer Capacitance	C _{RSS}			5		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q _G	V _{DS} =720V, V _{GS} =10V, I _D =24A (Note 1, 2)		100		nC
Gate-Source Charge	Q _{GS}			22		nC
Gate-Drain Charge	Q _{DD}			45		nC
Turn-On Delay Time	t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =24A, R _G =25Ω (Note 1, 2)		28		ns
Turn-On Rise Time	t _R			30		ns
Turn-Off Delay Time	t _{D(OFF)}			210		ns
Turn-Off Fall Time	t _F			85		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				24	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				72	A
Drain-Source Diode Forward Voltage	V _{SD}	I _S =24A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time	t _{rr}	I _S =24A, V _{GS} =0V,		615		nS
Body Diode Reverse Recovery Charge	Q _{rr}	dl _F /dt=100A/μs		13		μC

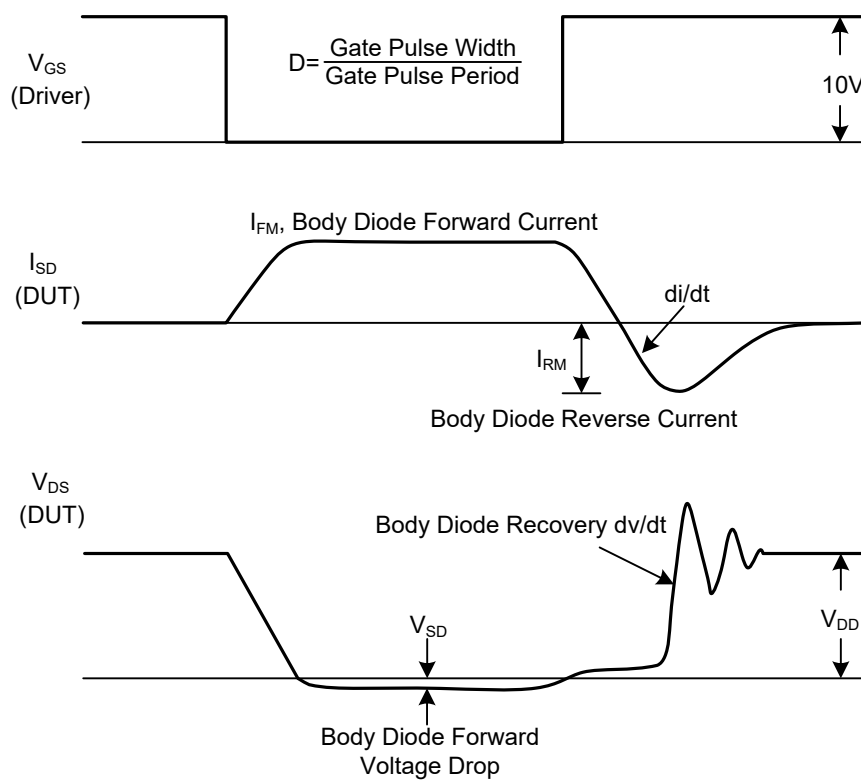
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

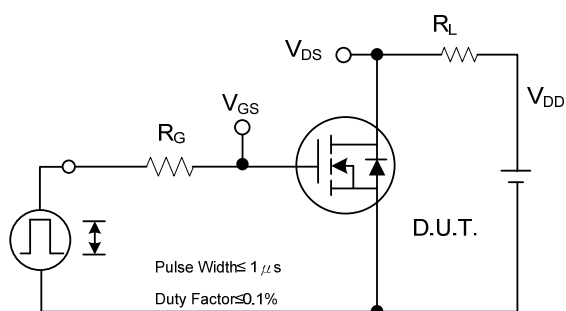


Peak Diode Recovery dv/dt Test Circuit

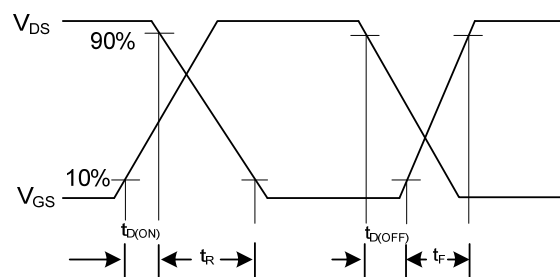


Peak Diode Recovery dv/dt Waveforms

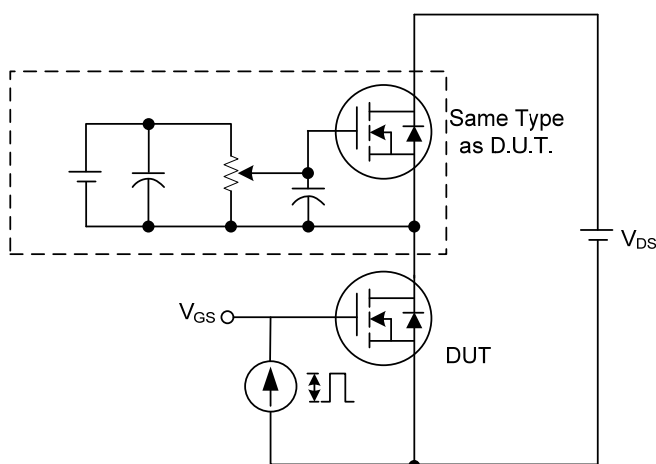
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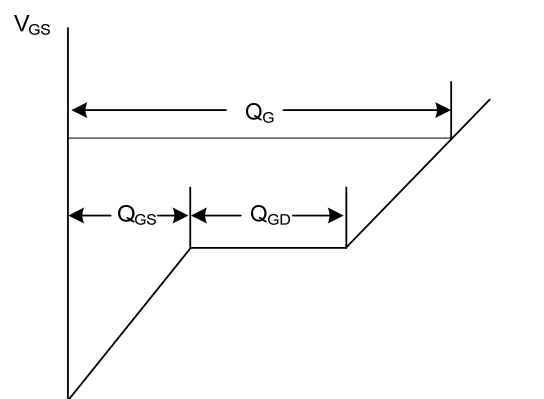
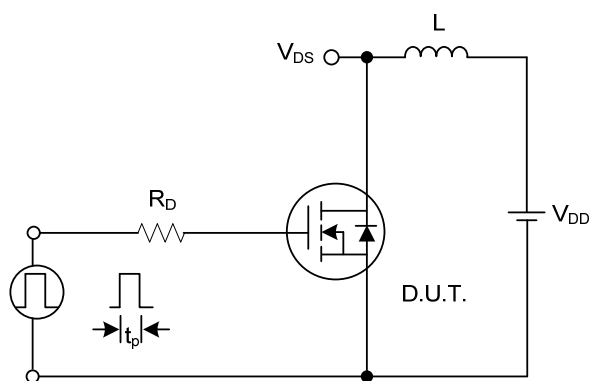
Switching Test Circuit



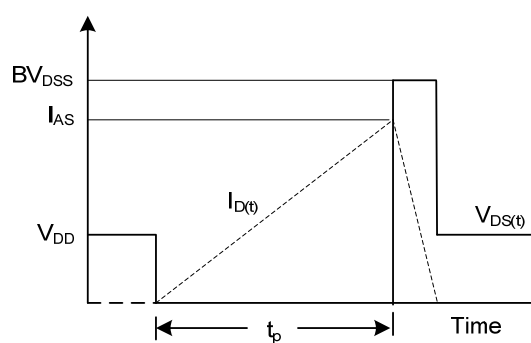
Switching Waveforms



Gate Charge Test Circuit

Charge
Gate Charge Waveform

Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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