

**40NM90-Q**

Preliminary

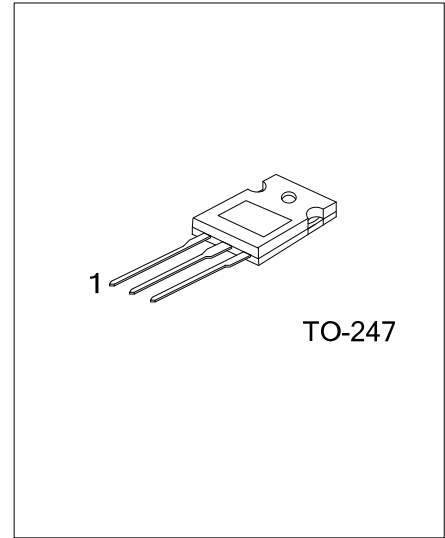
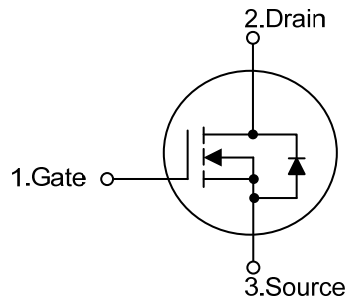
Power MOSFET

**40A, 900V N-CHANNEL
SUPER-JUNCTION MOSFET****DESCRIPTION**

The UTC 40NM90-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

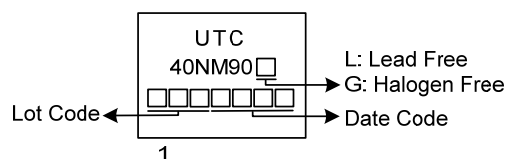
- * $R_{DS(ON)} \leq 165 \text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=20\text{A}$
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness

SYMBOL**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
40NM90L-T47-T	40NM90G-T47-T	TO-247	G	D	S	Tube

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

40NM90G-T47-T (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube (2) 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 _{DSS}	900	V
Gate-Source Voltage			V _{GSS}	±30	V
Drain Current	Continuous	T _C =25°C	I _D	40	A
		T _C =100°C		26	A
	Pulsed (Note 2)		I _{DM}	120	A
Avalanche Energy	Single Pulsed (Note 3)		E _{AS}	1800	mJ
Peak Diode Recovery dv/dt (Note 4)			dv/dt	9.5	V/ns
Power Dissipation			P _D	300	W
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. Repetitive Rating: Pulse width limited by maximum junction temperature.

3. $L=100\text{mH}$, $I_{AS}=6.0\text{A}$, $V_{DD}=90\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD} \leq 30\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ **THERMAL DATA**

PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	θ_{JA}	40	$^{\circ}\text{C}/\text{W}$
Junction to Case	θ_{JC}	0.41	$^{\circ}\text{C}/\text{W}$

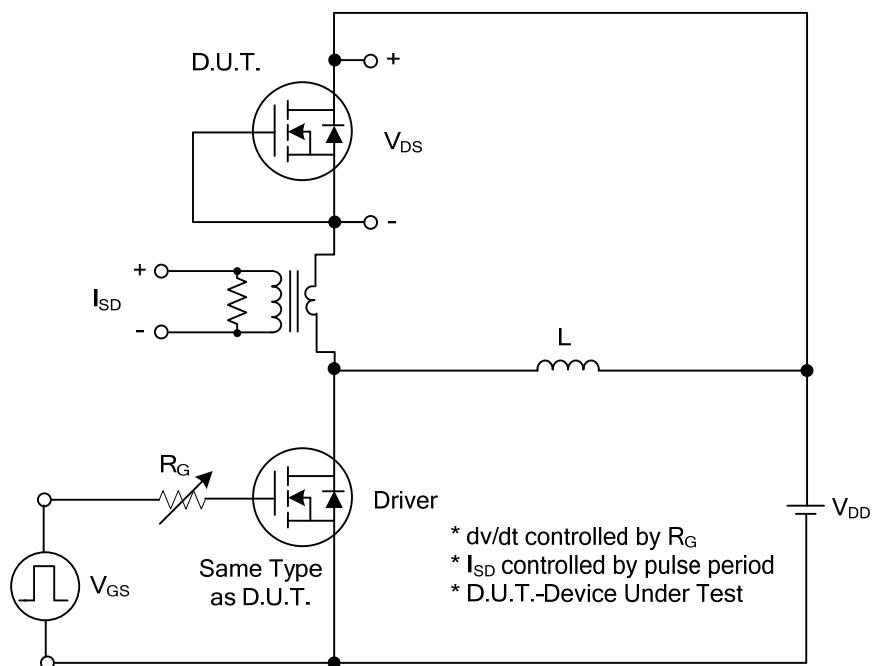
■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	900			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=900V, V_{GS}=0V$			10	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 30V, V_{DS}=0V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5		4.5	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$			165	m Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{GS}=0V, V_{DS}=50V, f=1MHz$		3955		pF
Output Capacitance	C_{OSS}			320		pF
Reverse Transfer Capacitance	C_{RSS}			1.5		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q_G	$V_{DS}=720V, V_{GS}=10V, I_D=40A$ (Note 1, 2)		140		nC
Gate-Source Charge	Q_{GS}			28		nC
Gate-Drain Charge	Q_{DD}			60		nC
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=100V, V_{GS}=10V, I_D=40A,$ $R_G=3.3\Omega$ (Note 1, 2)		21		ns
Turn-On Rise Time	t_R			22		ns
Turn-Off Delay Time	$t_{D(OFF)}$			98		ns
Turn-Off Fall Time	t_F			82		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				40	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				120	A
Drain-Source Diode Forward Voltage	V_{SD}	$I_S=40A, V_{GS}=0V$			1.4	V
Body Diode Reverse Recovery Time	t_{rr}	$I_S=30A, V_{GS}=0V,$		1000		nS
Body Diode Reverse Recovery Charge	Q_{rr}	$dI_F/dt=100A/\mu s$		24.5		μC

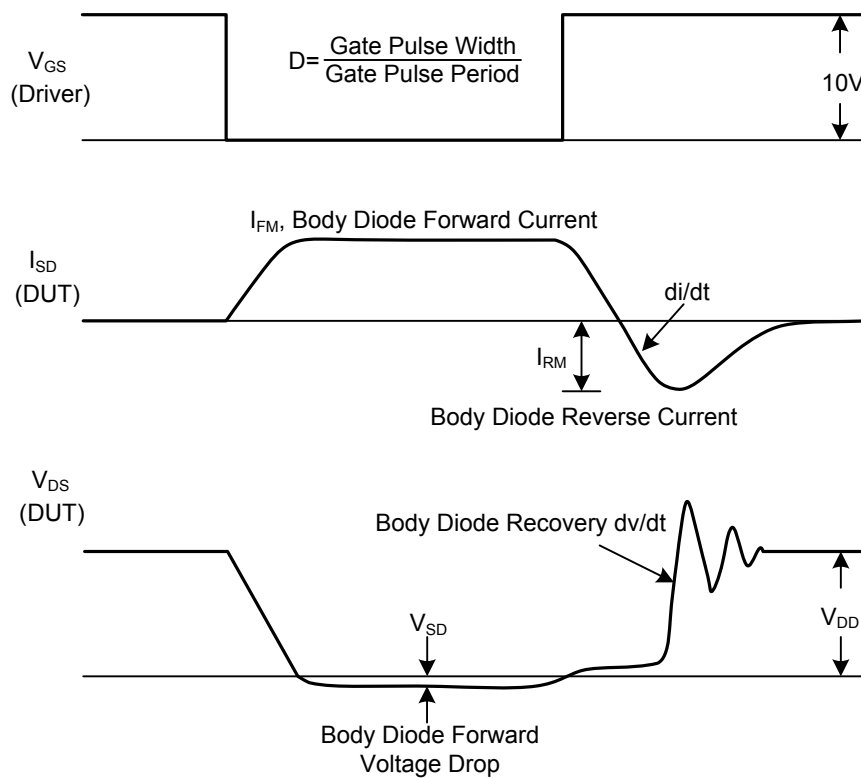
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

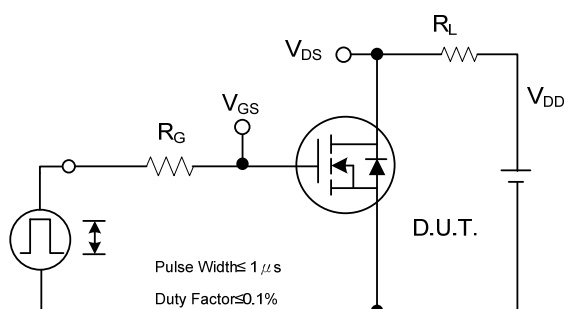


Peak Diode Recovery dv/dt Test Circuit

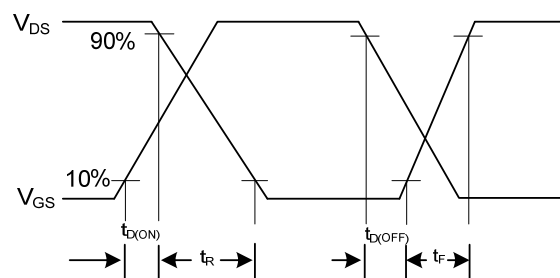


Peak Diode Recovery dv/dt Waveforms

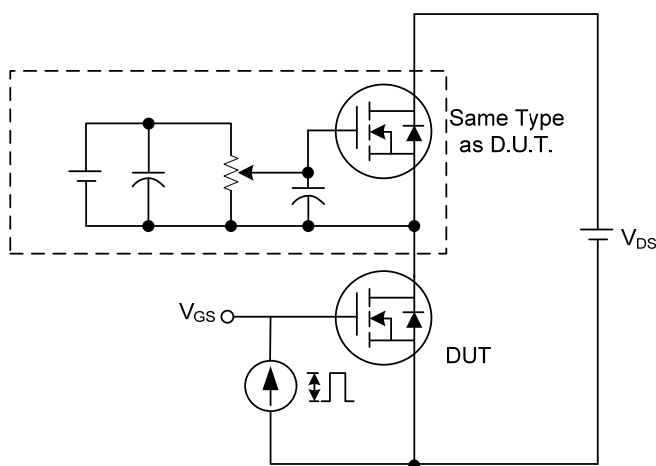
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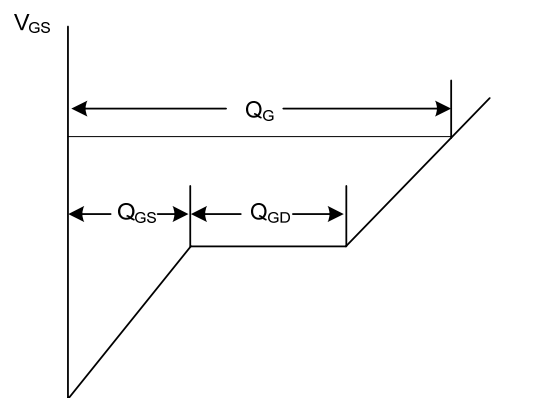
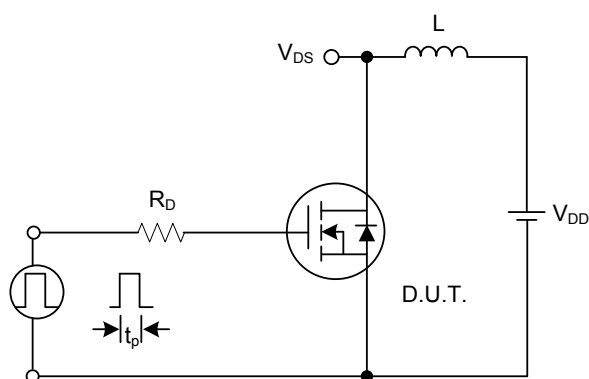
Switching Test Circuit



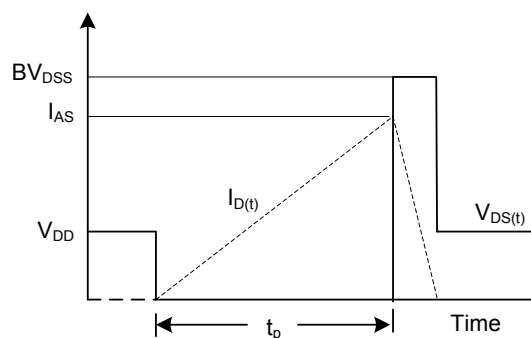
Switching Waveforms



Gate Charge Test Circuit

Charge
Gate Charge Waveform

Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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