

10NM90

Power MOSFET

10A, 900V N-CHANNEL SUPER-JUNCTION MOSFET

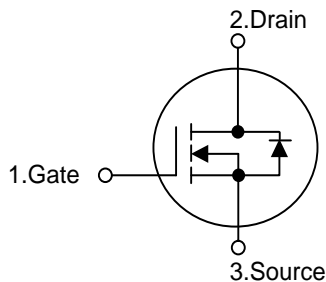
DESCRIPTION

The UTC 10NM90 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

- * $R_{DS(ON)} \leq 1.0 \Omega @ V_{GS}=10V, I_D=5.0A$
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness

SYMBOL

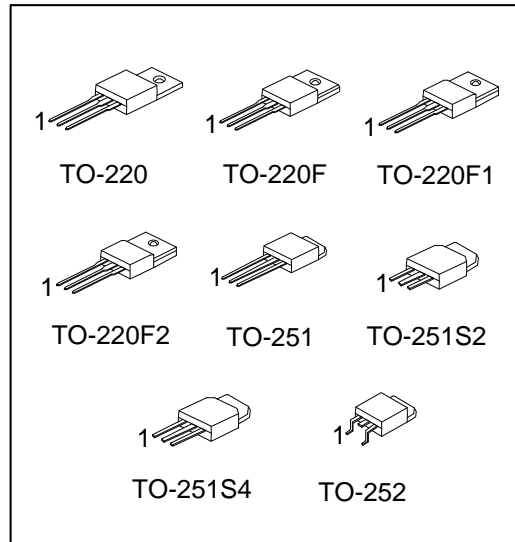


ORDERING INFORMATION

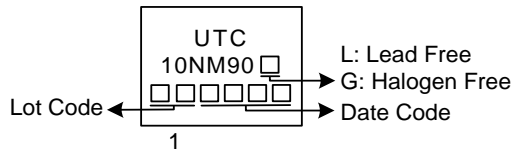
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
10NM90L-TA3-T	10NM90G-TA3-T	TO-220	G	D	S	Tube
10NM90L-TF1-T	10NM90G-TF1-T	TO-220F1	G	D	S	Tube
10NM90L-TF2-T	10NM90G-TF2-T	TO-220F2	G	D	S	Tube
10NM90L-TF3-T	10NM90G-TF3-T	TO-220F	G	D	S	Tube
10NM90L-TM3-T	10NM90G-TM3-T	TO-251	G	D	S	Tube
10NM90L-TMS2-T	10NM90G-TMS2-T	TO-251S2	G	D	S	Tube
10NM90L-TMS4-T	10NM90G-TMS4-T	TO-251S4	G	D	S	Tube
10NM90L-TN3-R	10NM90G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>10NM90G-TA3-T</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2, TF3: TO-220F, TM3: TO-251, TMS2: TO-251S2, TMS4: TO-251S4, TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V _{DSS}	900	V
Gate-Source Voltage		V _{GSS}	±30	V
Continuous Drain Current	Continuous	I _D	10	A
Pulsed Drain Current	Pulsed (Note 2)	I _{DM}	40	A
Avalanche Current (Note 2)		I _{AR}	2.4	A
Single Pulsed Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	458	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.24	V/ns
Power Dissipation	TO-220	P _D	84	W
	TO-220F/TO-220F1 TO-220F2		30	W
	TO-251/TO-25S2 TO-251S4/TO-252		70	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 = 159mH, I_{AS} = 2.4A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C.

4. I_{SD} ≤ 10A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C.

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F/TO-220F2	θ _{JA}	62.5	°C/W
	TO-251/TO-25S2 TO-251S4/TO-252		110	°C/W
Junction to Case	TO-220	θ _{JC}	1.49	°C/W
	TO-220F/TO-220F1 TO-220F2		4.17	°C/W
	TO-251/TO-25S2 TO-251S4/TO-252		1.79 (Note)	°C/W

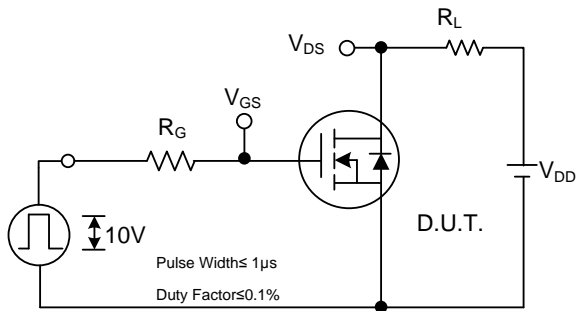
■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

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	Forward	$V_{GS} = 30V, V_{DS} = 0V$			100	nA
	Reverse		$V_{GS} = -30V, V_{DS} = 0V$		-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	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 5.0A$			1.0	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{GS}=0V, V_{DS}=25V, f=1.0MHz$		840		pF
Output Capacitance	C_{OSS}			240		pF
Reverse Transfer Capacitance	C_{RSS}			4		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q_G	$V_{DS}=50V, I_D=1.3A, I_G=100\mu A$ $V_{GS}=10V$ (Note 1,2)		55		nC
Gate to Source Charge	Q_{GS}			5.5		nC
Gate to Drain Charge	Q_{GD}			17		nC
Turn-ON Delay Time (Note 1)	$t_{D(ON)}$	$V_{DD} = 30V, I_D = 0.5A, R_G = 25\Omega,$ $V_{GS}=10V$ (Note 1,2)		50		nS
Rise Time	t_R			95		nS
Turn-OFF Delay Time	$t_{D(OFF)}$			365		nS
Fall-Time	t_F			70		nS
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				10	A
Maximum Body-Diode Pulsed Current	I_{SM}				40	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_S=10A, V_{GS}=0V$			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t_{rr}	$I_S=10A, V_{GS}=0V,$ $dI_F/dt=100A/\mu s$		580		nS
Body Diode Reverse Recovery Charge	Q_{rr}			8.8		μC

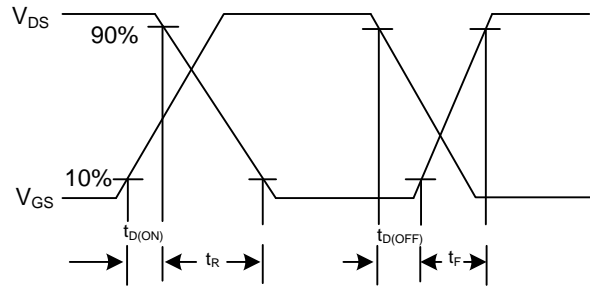
Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating ambient temperature.

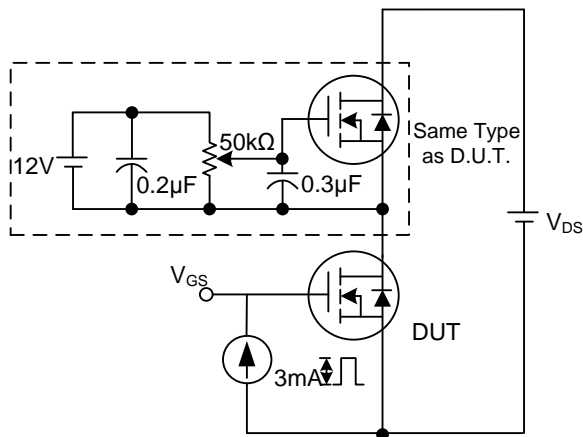
TEST CIRCUITS AND WAVEFORMS (Cont.)



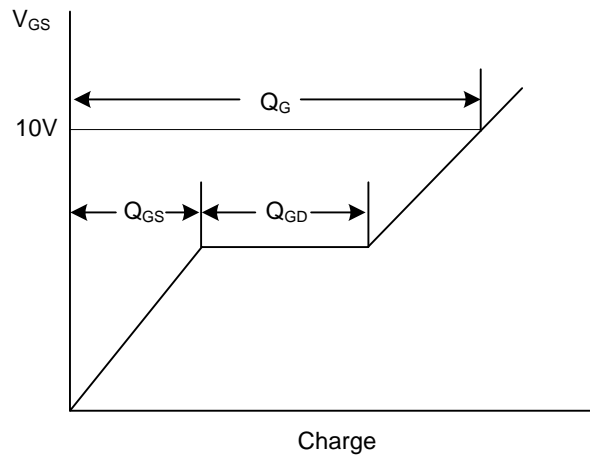
Switching Test Circuit



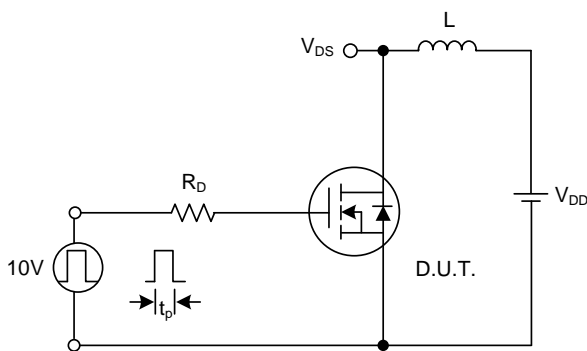
Switching Waveforms



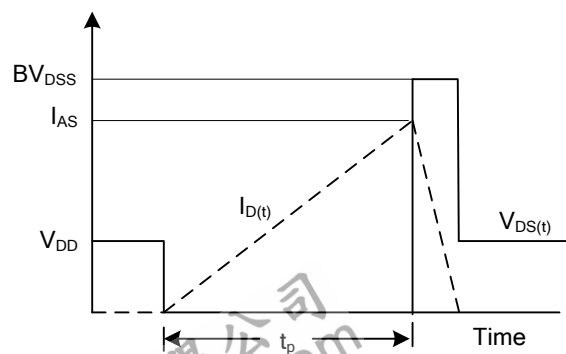
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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