



10NM90

Preliminary

Power MOSFET

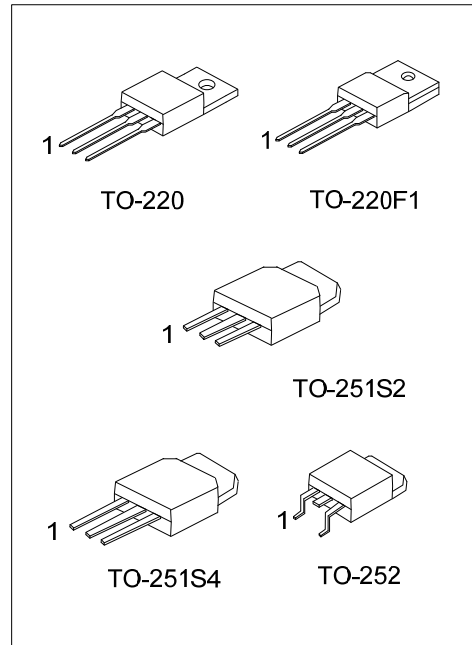
**10A, 900V N-CHANNEL
SUPER-JUNCTION MOSFET**

■ DESCRIPTION

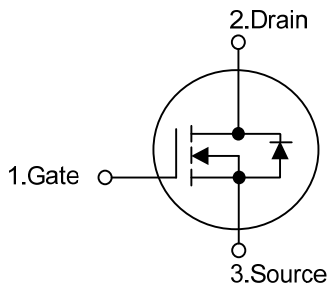
The **UTC 10NM90** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at DC-DC, AC-DC converters for power applications.

■ FEATURES

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



■ SYMBOL



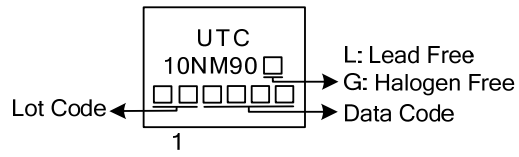
■ ORDERING INFORMATION

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-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>10NM90L-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, TF1: TO-220F1, TMS2: TO-251S2 TMS4: TO-251S4, TN3: TO-252</p> <p>(3) L: Lead Free, G: Halogen Free and 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}	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	158	W
	TO-220F1		50	W
	TO-25S2/TO-251S4		70	W
	TO-252			
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. $L = 159\text{mH}$, $I_{AS} = 2.4\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$.

4. $I_{SD} \leq 10\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$.

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F1	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-25S2/TO-251S4		110	$^\circ\text{C}/\text{W}$
	TO-252			
Junction to Case	TO-220	θ_{JC}	0.79	$^\circ\text{C}/\text{W}$
	TO-220F1		2.5	$^\circ\text{C}/\text{W}$
	TO-25S2/TO-251S4		1.79	$^\circ\text{C}/\text{W}$
	TO-252			

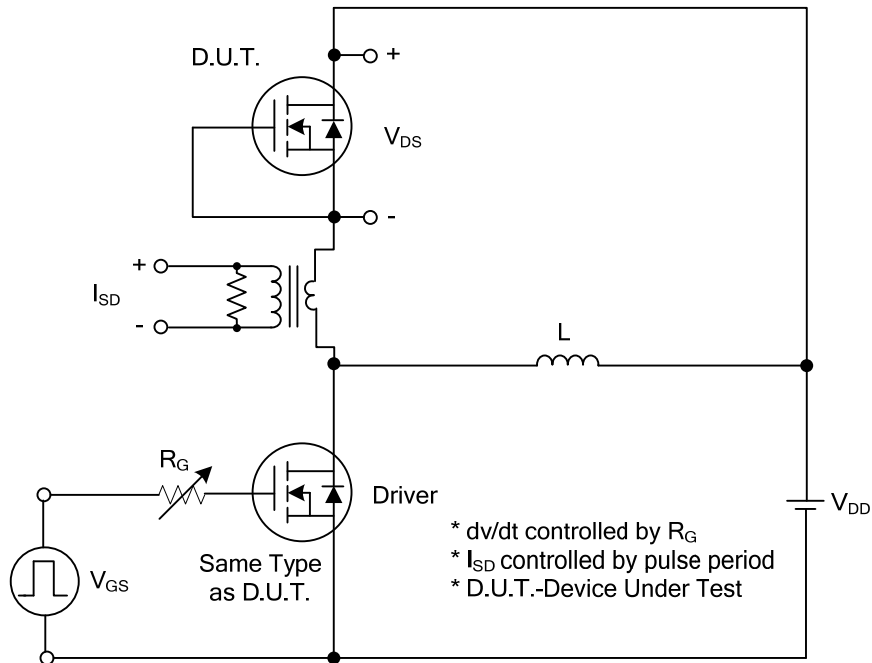
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
OFF CHARACTERISTICS								
Drain-Source Breakdown Voltage		BV _{DSS}	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	Forward	I _{GSS}	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 = 250μA	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 =100μA 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 =25Ω, 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/μs		580		nS	
Body Diode Reverse Recovery Charge		Q _{rr}				8.8		μC

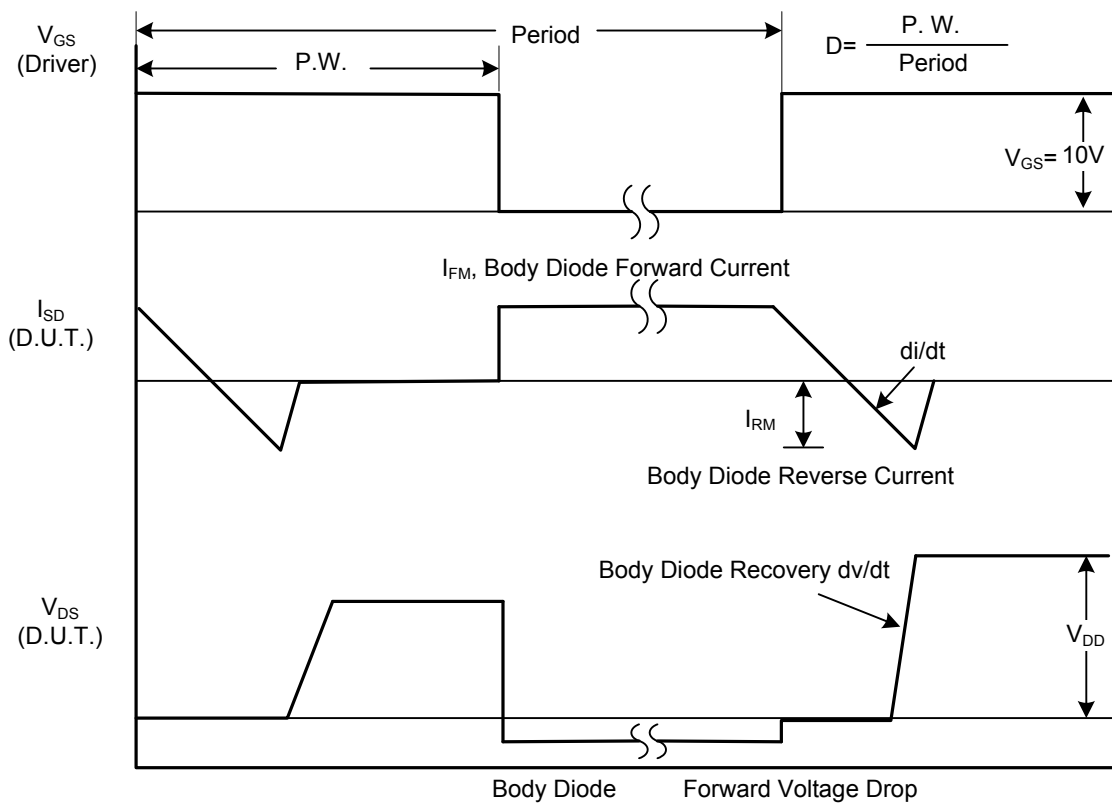
Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS

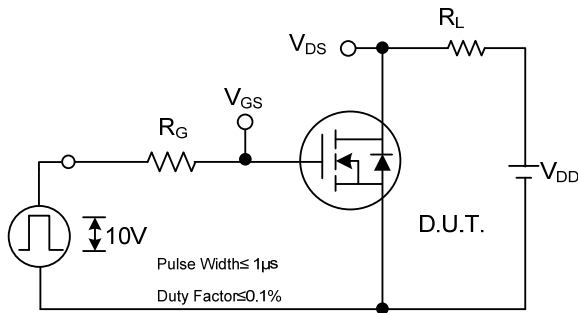


Peak Diode Recovery dv/dt Test Circuit

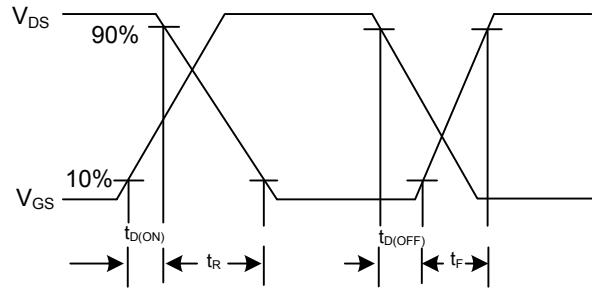


Peak Diode Recovery dv/dt Waveforms

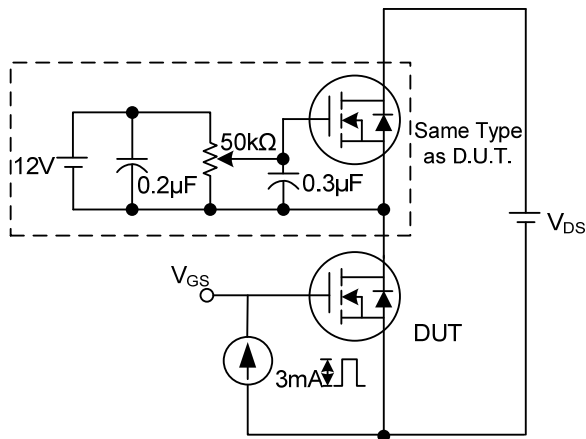
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



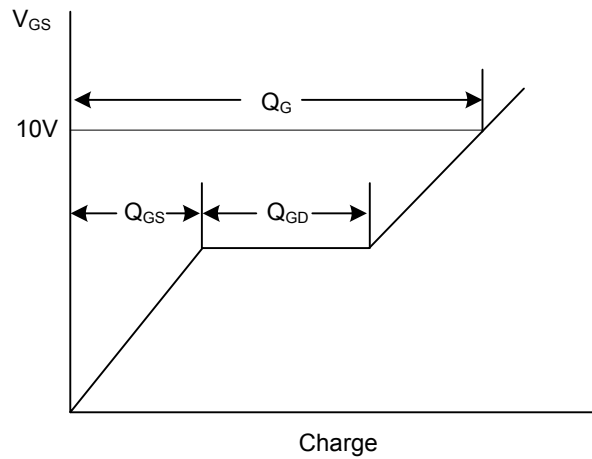
Switching Test Circuit



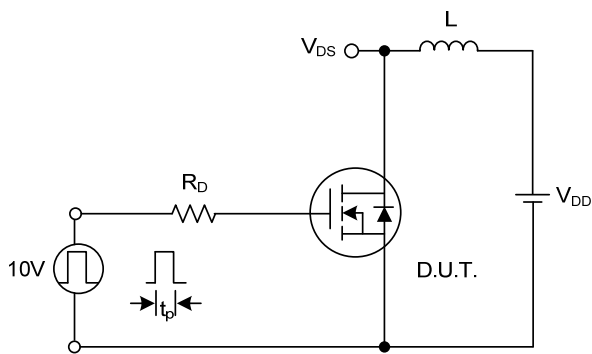
Switching Waveforms



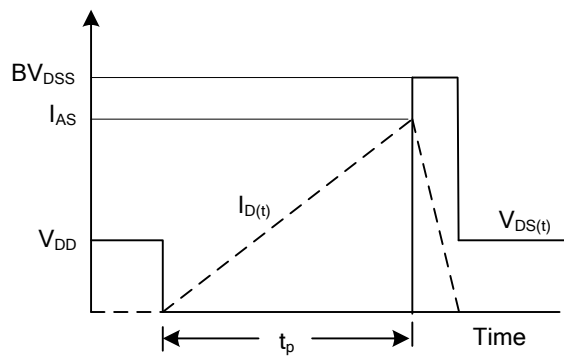
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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