



3NM90Z-Q

Preliminary

Power MOSFET

3.0A, 900V N-CHANNEL SUPER-JUNCTION MOSFET

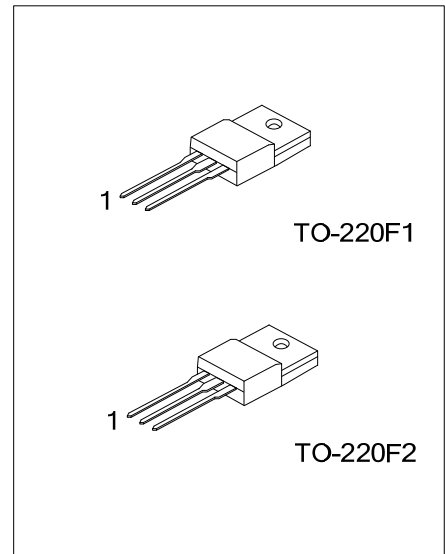
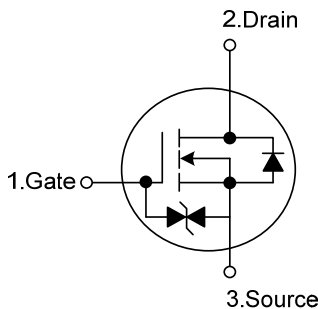
■ DESCRIPTION

The **UTC 3NM90Z-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

- * $R_{DS(ON)} \leq 3.6 \Omega @ V_{GS}=10V, I_D=1.5A$
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness

■ SYMBOL



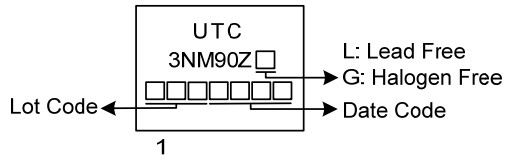
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
3NM90ZL-TF1-T	3NM90ZG-TF1-T	TO-220F1	G	D	S	Tube
3NM90ZL-TF2-T	3NM90ZG-TF2-T	TO-220F2	G	D	S	Tube

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

<p>3NM90ZG-TF1-T</p>	<p>(1) Packing Type (1) T: Tube</p> <p>(2) Package Type (2) TF1: TO-220F1, TF2: TO-220F2</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}	900	V	
Gate-Source Voltage		V_{GSS}	± 20	V	
Drain Current	Continuous	I_D	$T_C=25^\circ\text{C}$	3	A
			$T_C=100^\circ\text{C}$	2	A
	Pulsed (Note 2)		I_{DM}	9	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	90	mJ	
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.7	V/ns	
Power Dissipation		P_D	13	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. $L = 159\text{mH}$, $I_{AS} = 1.05\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 3.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	θ_{JC}	9.61	$^\circ\text{C}/\text{W}$

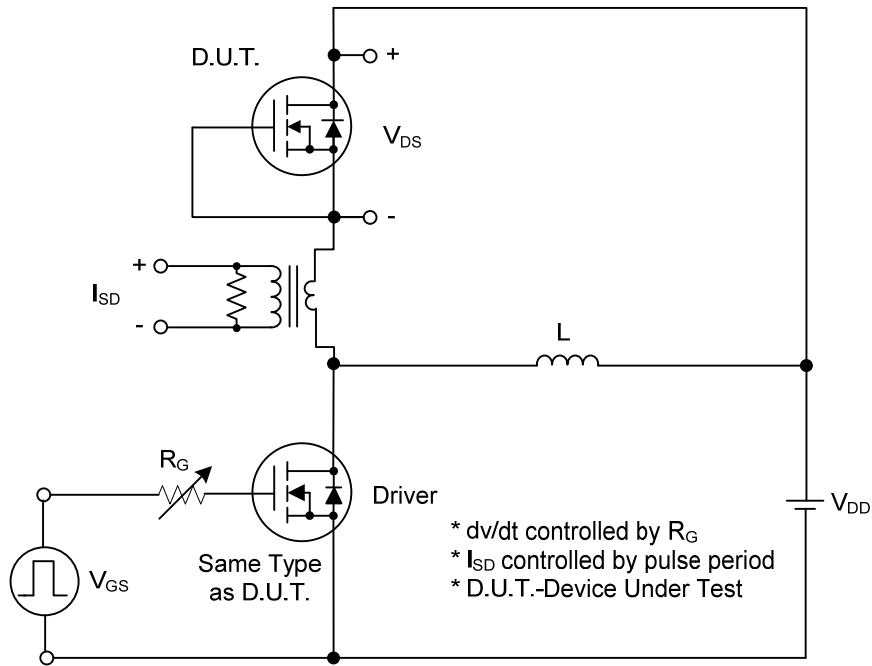
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

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	I _{GSS}	V _{GS} =±20V, V _{DS} =0V			±10	μA
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 =1.5A			3.6	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =50V, f=1MHz		223		pF
Output Capacitance	C _{OSS}			42		pF
Reverse Transfer Capacitance	C _{RSS}			2.5		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q _G	V _{DS} =720V, V _{GS} =10V, I _D =3.0A (Note 1, 2)		19		nC
Gate-Source Charge	Q _{GS}			5.6		nC
Gate-Drain Charge	Q _{DD}			6.4		nC
Turn-On Delay Time	t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =3.0A, R _G =25Ω (Note 1, 2)		3.9		ns
Turn-On Rise Time	t _R			15		ns
Turn-Off Delay Time	t _{D(OFF)}			18		ns
Turn-Off Fall Time	t _F			26		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				3	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				9	A
Drain-Source Diode Forward Voltage	V _{SD}	I _S =3.0A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time	t _{rr}	I _S =3.0A, V _{GS} =0V, dI _F /dt=100A/μs		269		nS
Body Diode Reverse Recovery Charge	Q _{rr}				1.7	

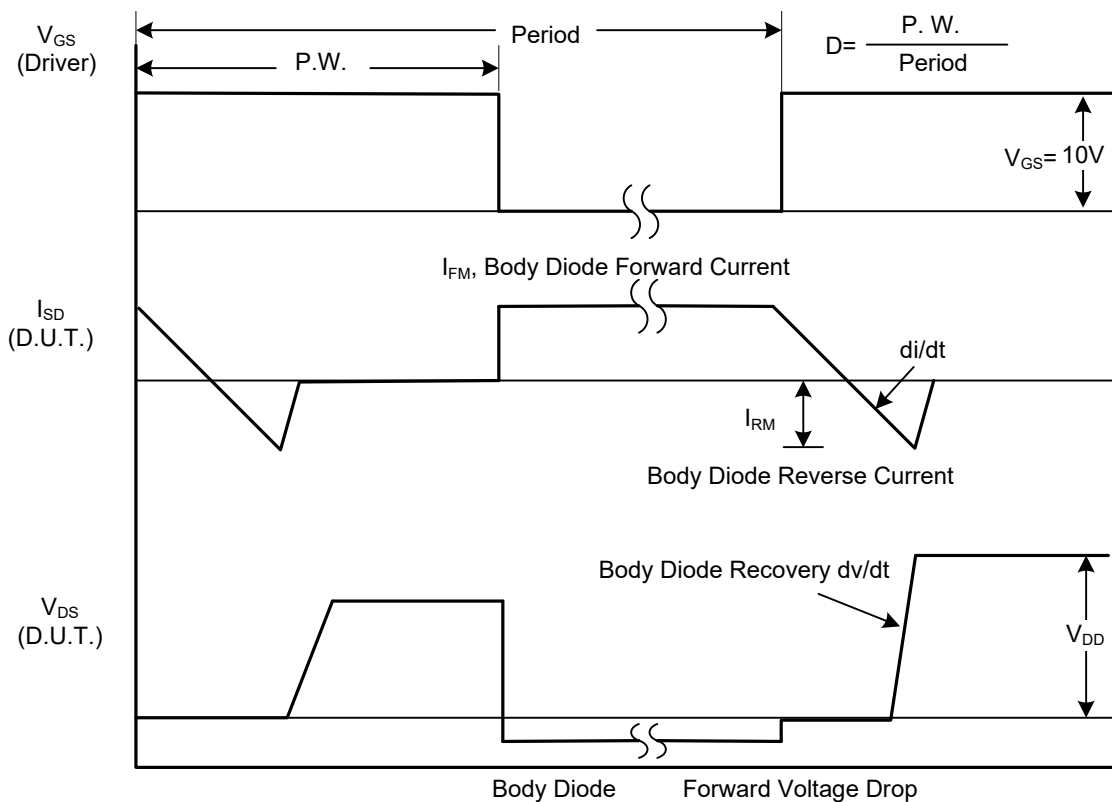
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

- TEST CIRCUITS AND WAVEFORMS
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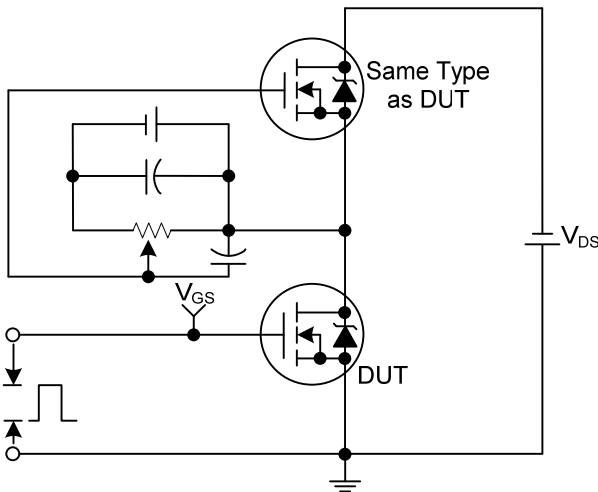


Peak Diode Recovery dv/dt Test Circuit

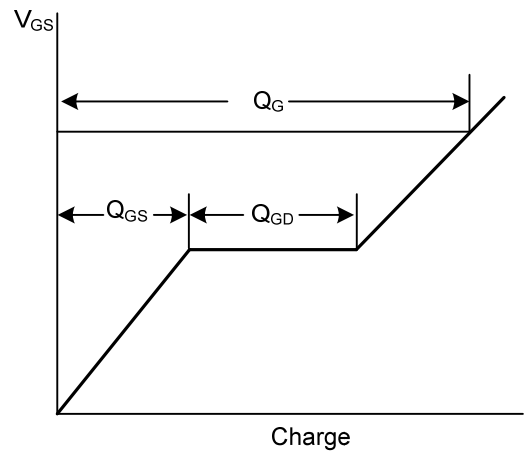


Peak Diode Recovery dv/dt Waveforms

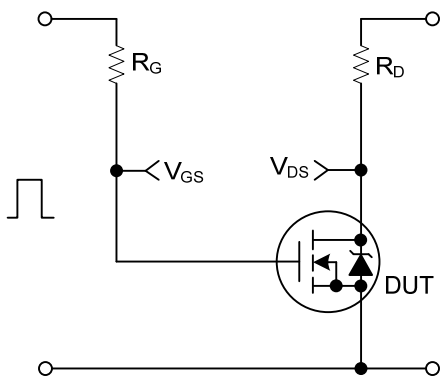
■ TEST CIRCUITS AND WAVEFORMS



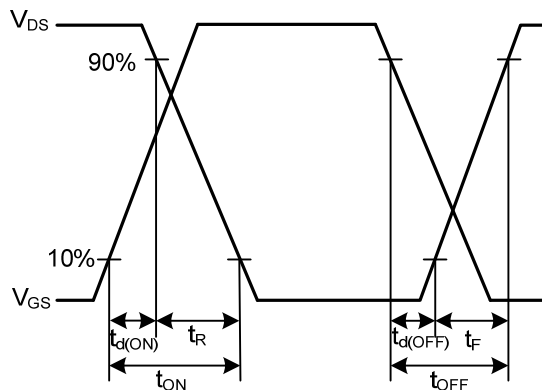
Gate Charge Test Circuit



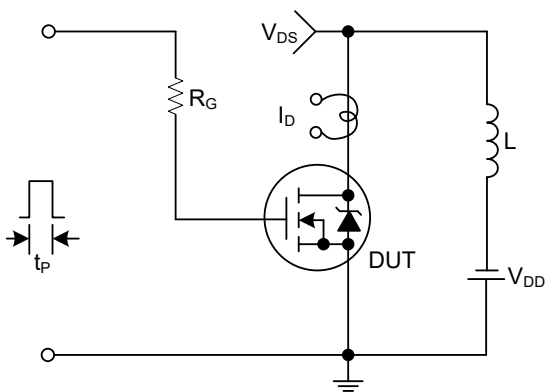
Gate Charge Waveforms



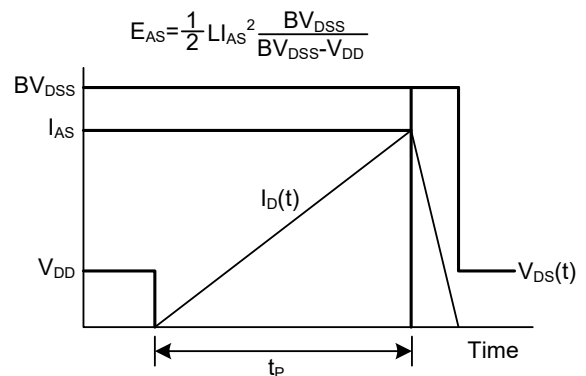
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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