



4N90Z

Preliminary

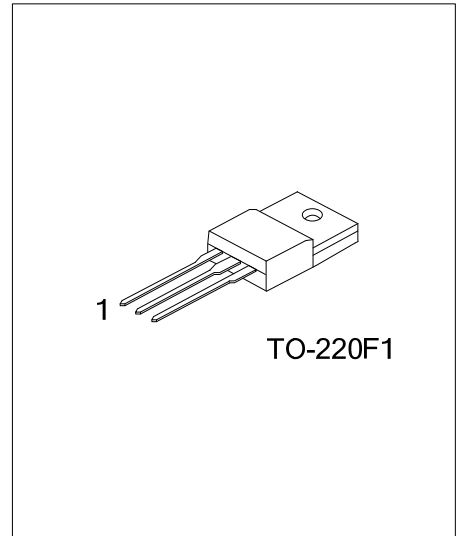
Power MOSFET

4.0 Amps, 900 Volts N-CHANNEL POWER MOSFET

DESCRIPTION

The UTC **4N90Z** is a N-channel enhancement MOSFET adopting UTC's advanced technology to provide customers with DMOS, planar stripe technology. This technology is designed to meet the requirements of the minimum on-state resistance and perfect switching performance. It also can withstand high energy pulse in the avalanche and communication mode.

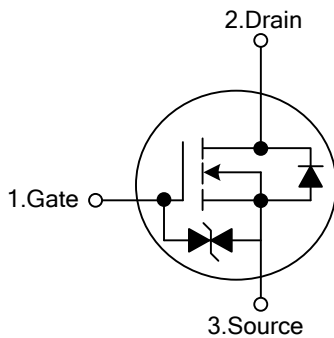
The UTC **4N90Z** is particularly applied in high efficiency switch mode power supplies.



FEATURES

- * $R_{DS(ON)} \leq 2.2 \Omega$ @ $V_{GS}=10V$, $I_D=2.0A$
- * High switching speed
- * 100% avalanche tested
- * Improved dv/dt capability
- * With ESD Protected

SYMBOL



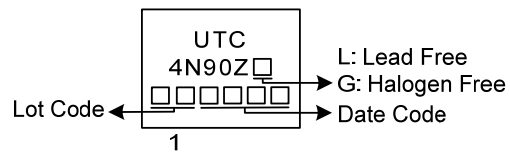
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
4N90ZL-TF1-T	4N90ZG-TF1-T	TO-220F1	G	D	S	Tube

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

<p>4N90ZG-TF1-T</p> <ul style="list-style-type: none">(1) Packing Type(2) Package Type(3) Green Package	<p>(1) T: Tube</p> <p>(2) TF1: TO-220F1</p> <p>(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 to Source Voltage		V _{DSS}	900	V
Gate to Source Voltage		V _{GSS}	±20	V
Avalanche Current (Note 2)		I _{AR}	4	A
Continuous Drain Current	Continuous	I _D	4	A
	Pulsed (Note 2)	I _{DM}	16	A
Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	380	mJ
	Repetitive (Note 2)	E _{AR}	14	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation (T _C =25°C)		P _D	38	W
Derate above 25°C			0.304	W/°C
Operating 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. $L = 48\text{mH}$, $I_{AS} = 4.0\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 4.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	θ_{JC}	3.25	$^\circ\text{C}/\text{W}$

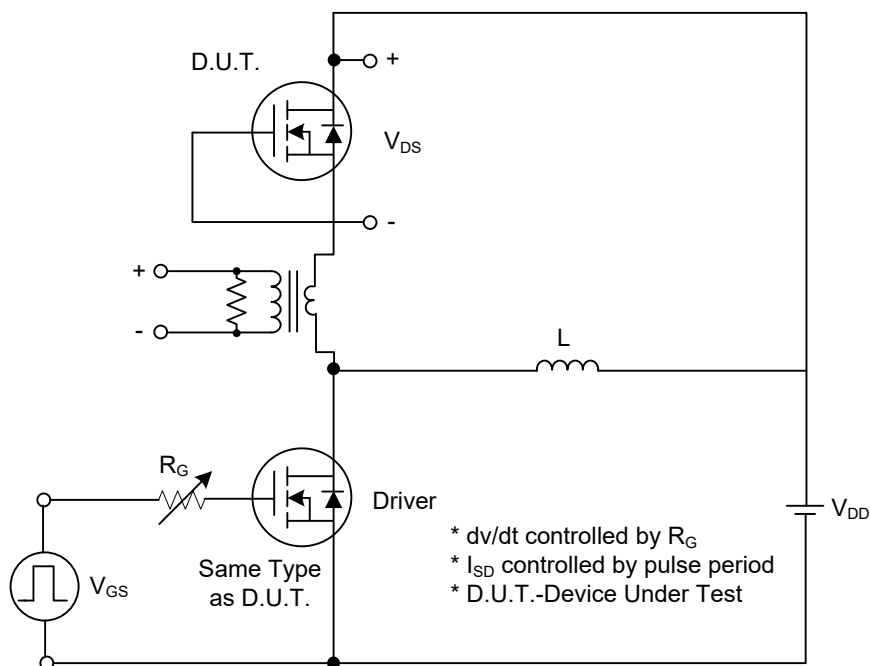
■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250μA	900			V
Breakdown Voltage Temperature Coefficient		ΔBV _{DSS} /ΔT _J	I _D =250μA, Referenced to 25°C		1.05		V/°C
Drain-Source Leakage Current		I _{DSS}	V _{DS} =900V, V _{GS} =0V			10	μA
			V _{DS} =720V, T _C =125°C			100	μA
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =+20V, V _{DS} =0V			+5	μA
	Reverse	I _{GSS}	V _{GS} =-20V, V _{DS} =0V			-5	μA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	3.0		5.0	V
Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =2.0A			2.2	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		1000	1400	pF
Output Capacitance		C _{OSS}			49	85	pF
Reverse Transfer Capacitance		C _{RSS}			13	18	pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =50V, V _{GS} =10V, I _D =1.3A (Note 1,2)		33		nC
Gate-Source Charge		Q _{GS}			9.0		nC
Gate-Drain Charge		Q _{GD}			9.5		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =30V, I _D =0.5A, R _G =25Ω (Note 1,2)		70		ns
Turn-ON Rise Time		t _R			120		ns
Turn-OFF Delay Time		t _{D(OFF)}			170		ns
Turn-OFF Fall Time		t _F			90		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				4	A
Maximum Body-Diode Pulsed Current		I _{SM}				16	A
Drain-Source Diode Forward Voltage		V _{SD}	I _S =4.0A, V _{GS} =0V			1.4	V

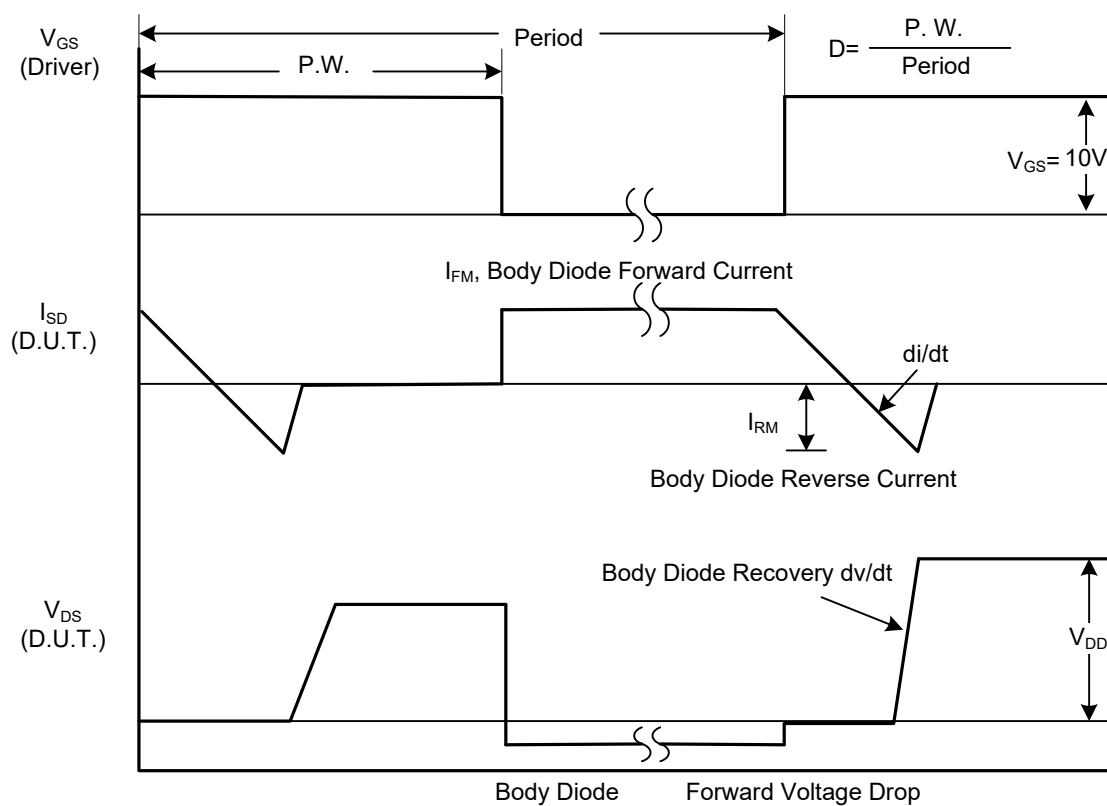
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

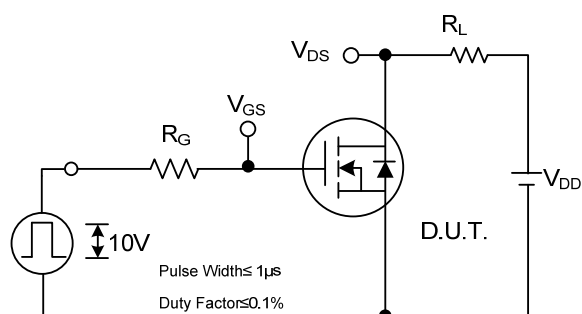


Peak Diode Recovery dv/dt Test Circuit

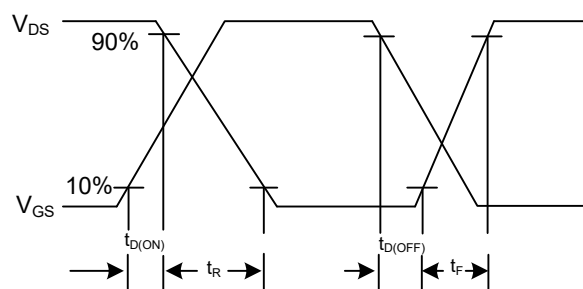


Peak Diode Recovery dv/dt Waveforms

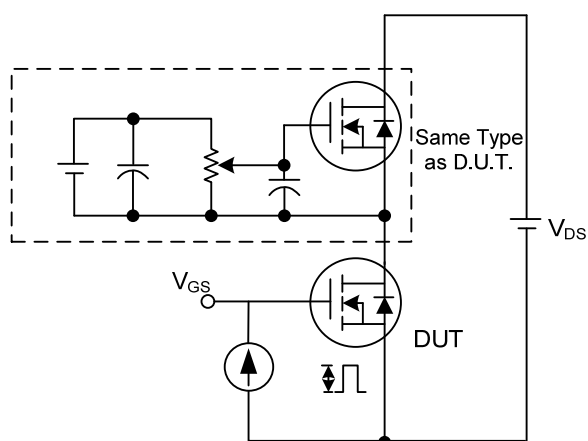
■ TEST CIRCUITS AND WAVEFORMS



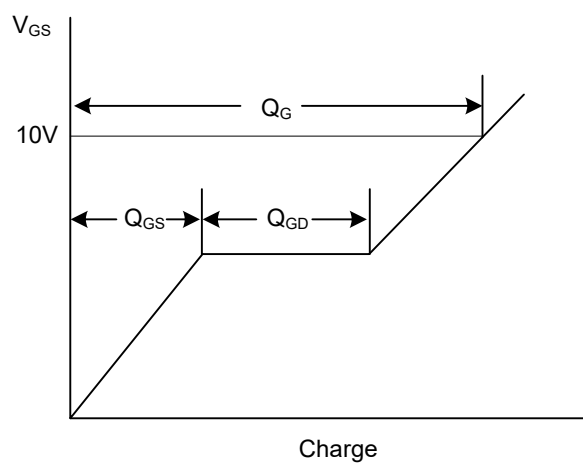
Switching Test Circuit



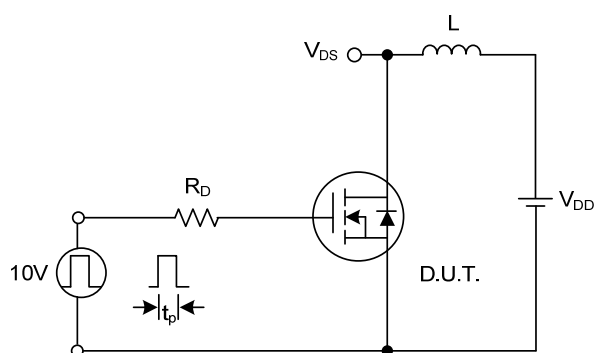
Switching Waveforms



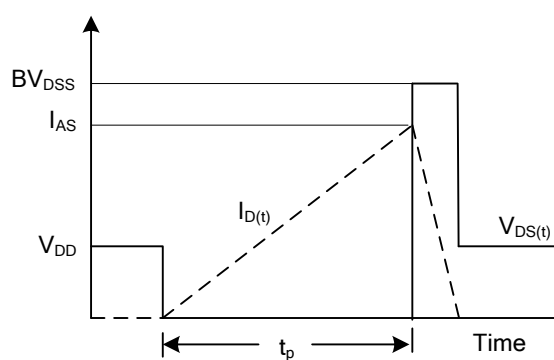
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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