



9NK90Z

Preliminary

POWER MOSFET

9.0A, 900V N-CHANNEL POWER MOSFET

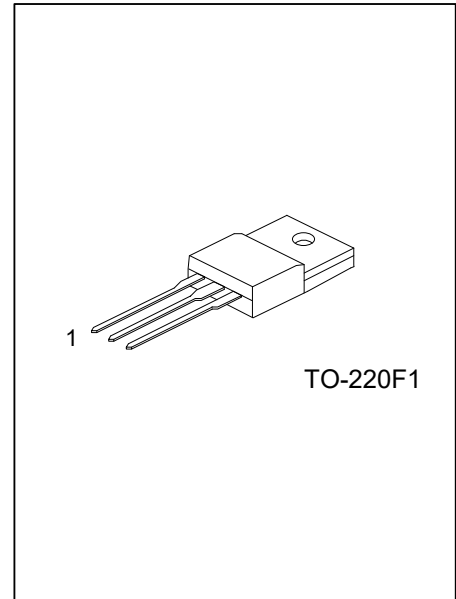
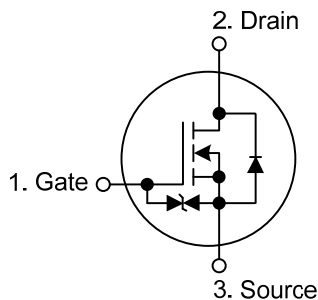
DESCRIPTION

The UTC **9NK90Z** is a silicon N-channel MOSFET, it uses UTC's advanced technology to provide the customers with a minimum on state resistance, high switching speed and low gate charge.

FEATURES

- * $R_{DS(ON)} \leq 1.5 \Omega$ @ $V_{GS}=10V$, $I_D=4.5A$
- * High switching speed
- * Low input capacitance
- * With ESD protection

SYMBOL



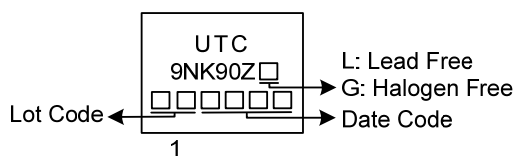
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
9NK90ZL-TF1-T	9NK90ZG-TF1-T	TO-220F1	G	D	S	Tube

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

9NK90ZG-TF1-T (1) Packing Type (2) Package Type (3) Green Package		(1) T: Tube (2) TF1: TO-220F1 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING



■ **ABSOLUTE MAXIMUM RATING** ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	V_{DSS}	900	V
Gate-Source Voltage	V_{GSS}	± 20	V
Drain Current	DC	I_D	9
	Pulsed (Note 2)	I_{DM}	27
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	841
Peak Diode Recovery dv/dt (Note 4)	dv/dt	1.25	V/ns
Power Dissipation	P_D	43	W
Junction Temperature	T_J	+150	$^{\circ}\text{C}$
Storage Temperature Range	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. $L=100\text{mH}$, $I_{AS} = 4.1\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$.

4. $I_{SD} \leq 9.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, 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}	2.91	$^{\circ}\text{C}/\text{W}$

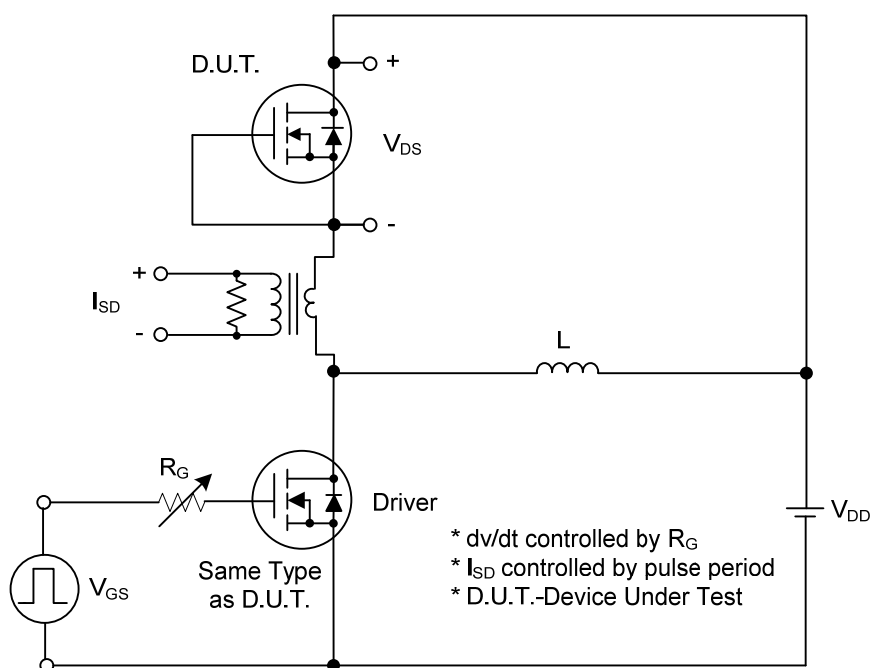
■ **ELECTRICAL CHARACTERISTICS** ($T_A=25^\circ\text{C}$ unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =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} =+20V, V _{DS} =0V			+10	μA
	Reverse		V _{GS} =-20V, V _{DS} =0V			-10	μA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	3.0		5.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =4.5A			1.5	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =50V, f=1.0MHz		2040		pF
Output Capacitance		C _{OSS}			111		pF
Reverse Transfer Capacitance		C _{RSS}			14.3		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =720V, V _{GS} =10V, I _D =9.0A (Note 1, 2)		68		nC
Gate to Source Charge		Q _{GS}			25.2		nC
Gate to Drain Charge		Q _{GD}			20.5		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =9.0A, R _G =25Ω (Note 1, 2)		39		ns
Rise Time		t _R			24.8		ns
Turn-OFF Delay Time		t _{D(OFF)}			145		ns
Fall-Time		t _F			55.2		ns
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				9	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				27	A
Diode Forward Voltage		V _{SD}	I _F =9.0A, V _{GS} =0V			1.4	V
Reverse Recovery Time		t _{rr}	I _S =9.0A, V _{GS} =0V,		768		μs
Reverse Recovery Charge (Note 1)		Q _{rr}	dI _F /dt = 100 A/μs		6.9		uC

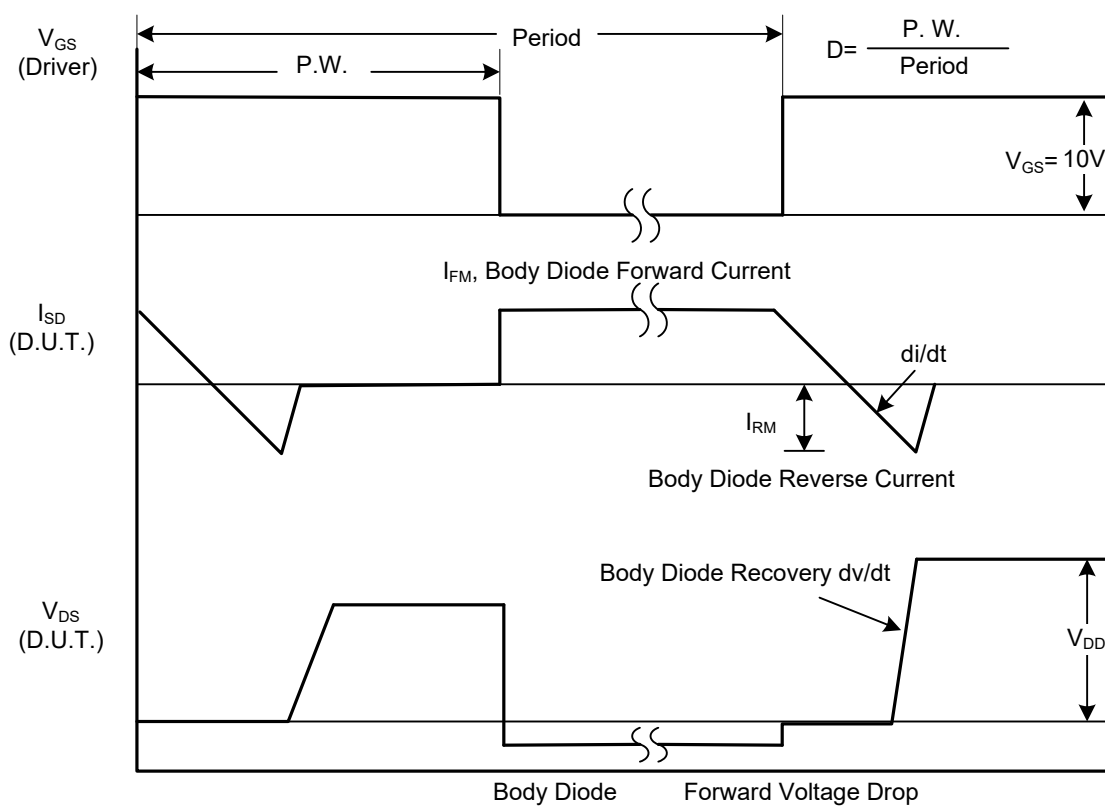
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

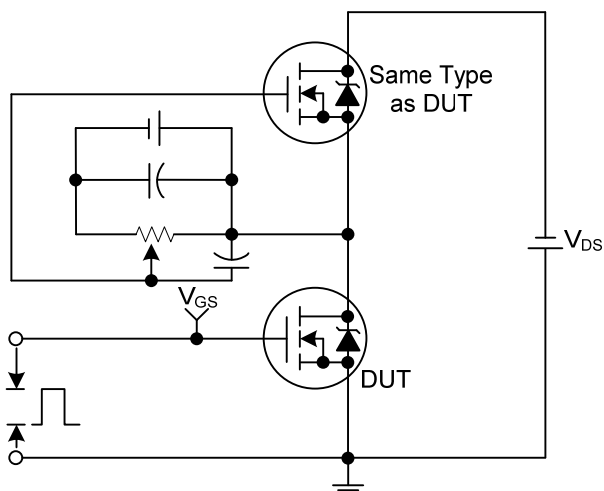


Peak Diode Recovery dv/dt Test Circuit

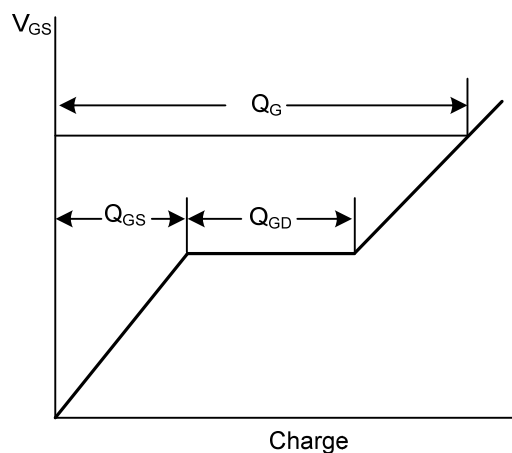


Peak Diode Recovery dv/dt Waveforms

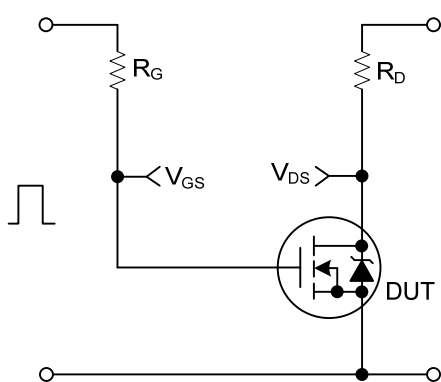
■ TEST CIRCUITS AND WAVEFORMS



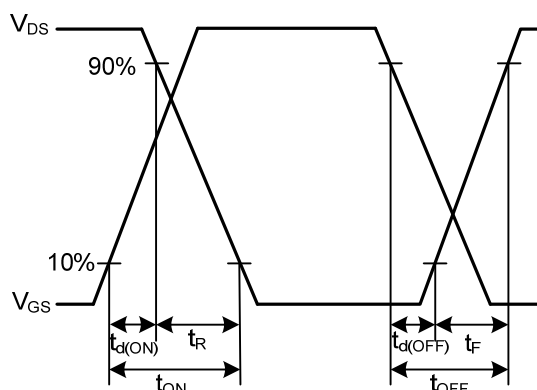
Gate Charge Test Circuit



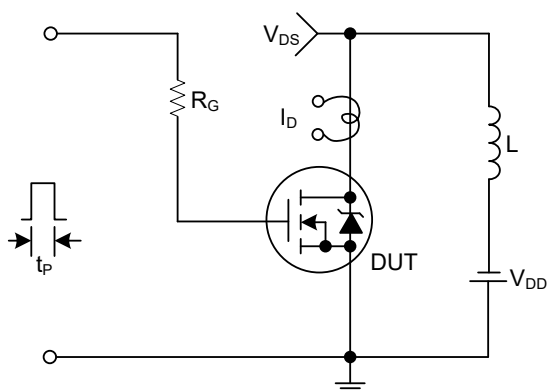
Gate Charge Waveforms



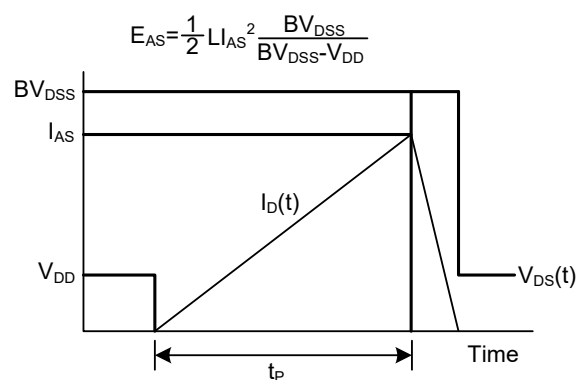
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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