

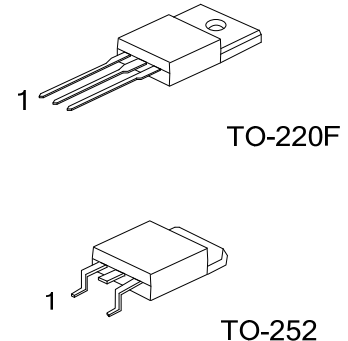
**2N90**

Preliminary

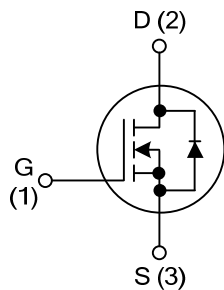
Power MOSFET**2 Amps, 900 Volts
N-CHANNEL POWER MOSFET****DESCRIPTION**

The UTC **2N90** is an N-channel mode Power FET using UTC's advanced technology to provide costumers with planar stripe and DMOS technology. This technology specialized in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **2N90** is universally applied in high efficiency switch mode power supply.

**FEATURES**

- * 2.2A, 900V, $R_{DS(on)} = 7.2\Omega @ V_{GS} = 10V$
- * Typically 5.5 pF low C_{rss}
- * High switching speed
- * Typically 12 nC low gate charge
- * Improved dv/dt capability
- * 100% avalanche tested

SYMBOL**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
2N90L-TF3-T	2N90G-TF3-T	TO-220F	G	D	S	Tube
2N90L-TN3-R	2N90G-TN3-R	TO-252	G	D	S	Tape Reel

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

2N90L-TF3-T (1)Packing Type (2)Package Type (3)Lead Free	(1) T: Tube, R: Tape Reel (2) TF3: TO-220F, TN3: TO-252 (3) G: Halogen Free, L: Lead Free
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■ ABSOLUTE MAXIMUM RATINGS ($T_C=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage (Note 1)		V_{DSS}	900	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	2.2	A
	Pulsed (Note 1)	I_{DM}	8.8	A
Avalanche Current (Note 1)		I_{AR}	2.2	A
Avalanche Energy	Single Pulsed (Note 2)	E_{AS}	170	mJ
	Repetitive (Note 1)	E_{AR}	8.5	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.0	V/ns
Power Dissipation	TO-220F	P_D	25	W
	TO-252		43	W/ $^{\circ}\text{C}$
Junction Temperature		T_J	+150	$^{\circ}\text{C}$
Storage Temperature Range		T_{STG}	-55~+150	$^{\circ}\text{C}$

■ THERMAL CHARACTERISTICS

PARAMETER	PACKAGE	SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F	θ_{JA}	62.5	$^{\circ}\text{C/W}$
	TO-252		110	$^{\circ}\text{C/W}$
Junction to Case	TO-220F	θ_{JC}	5	$^{\circ}\text{C/W}$
	TO-252		2.85	$^{\circ}\text{C/W}$

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

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	$I_D=250\mu A, V_{GS}=0V$	900			V
Breakdown Voltage Temperature Coefficient		$\Delta BV_{DSS}/\Delta T_J$	Reference to 25°C, $I_D=250\mu A$		1.0		V/°C
Drain-Source Leakage Current		I_{DSS}	$V_{DS}=900V, V_{GS}=0V$			10	μA
			$V_{DS}=720V, T_C=125^\circ C$			100	
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		$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	3.0		5.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	$V_{GS}=10V, I_D=1.1A$		5.6	7.2	Ω
Forward Transconductance (Note 4)		g_{FS}	$V_{DS}=50V, I_D=1.1A$		2.0		S
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	$V_{GS}=0V, V_{DS}=25V, f=1.0MHz$		390	500	pF
Output Capacitance		C_{OSS}			45	60	pF
Reverse Transfer Capacitance		C_{RSS}			5.5	7.0	pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 4,5)		Q_G	$V_{GS}=10V, V_{DS}=720V, I_D=2.2A$		12	15	nC
Gate to Source Charge (Note 4,5)		Q_{GS}			2.8		nC
Gate to Drain Charge (Note 4,5)		Q_{GD}			6.1		nC
Turn-ON Delay Time (Note 4,5)		$t_{D(ON)}$	$V_{DD}=450V, I_D=2.2A, R_G=25\Omega$		15	40	ns
Rise Time (Note 4,5)		t_R			35	80	ns
Turn-OFF Delay Time (Note 4,5)		$t_{D(OFF)}$			20	50	ns
Fall-Time (Note 4,5)		t_F			30	70	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I_S				2.2	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				8.8	A
Drain-Source Diode Forward Voltage		V_{SD}	$I_S=2.2A, V_{GS}=0V$			1.4	V
Reverse Recovery Time (Note 4)		t_{RR}	$I_S=2.2A, V_{GS}=0V, dI_F/dt=100A/\mu s$		400		ns
Reverse Recovery Charge (Note 4)		Q_{RR}			1.6		μC

Note: 1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. $L = 65\text{mH}$, $I_{AS} = 2.2\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

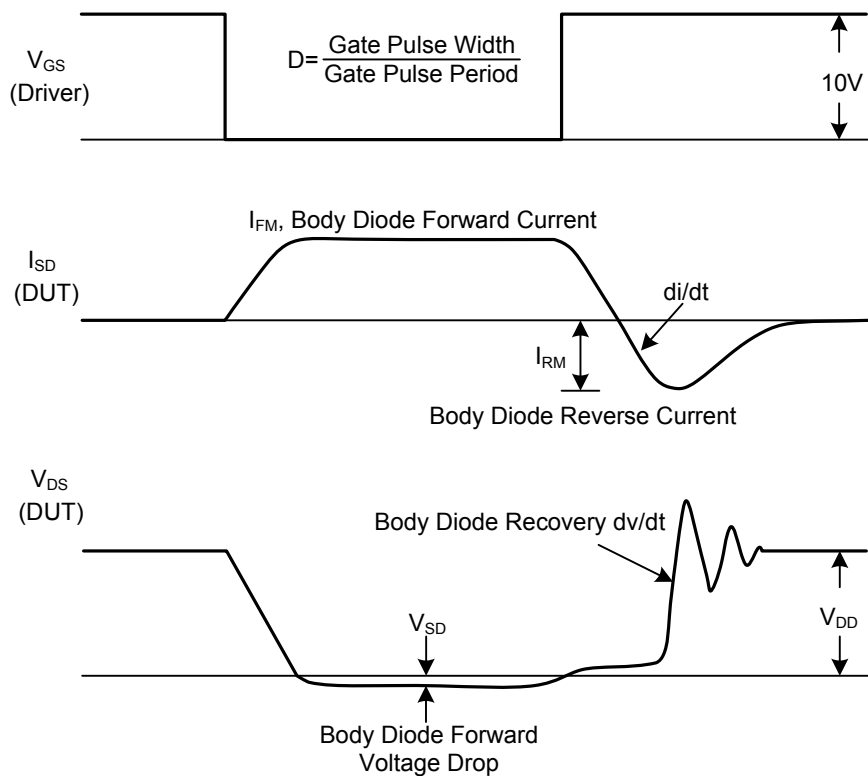
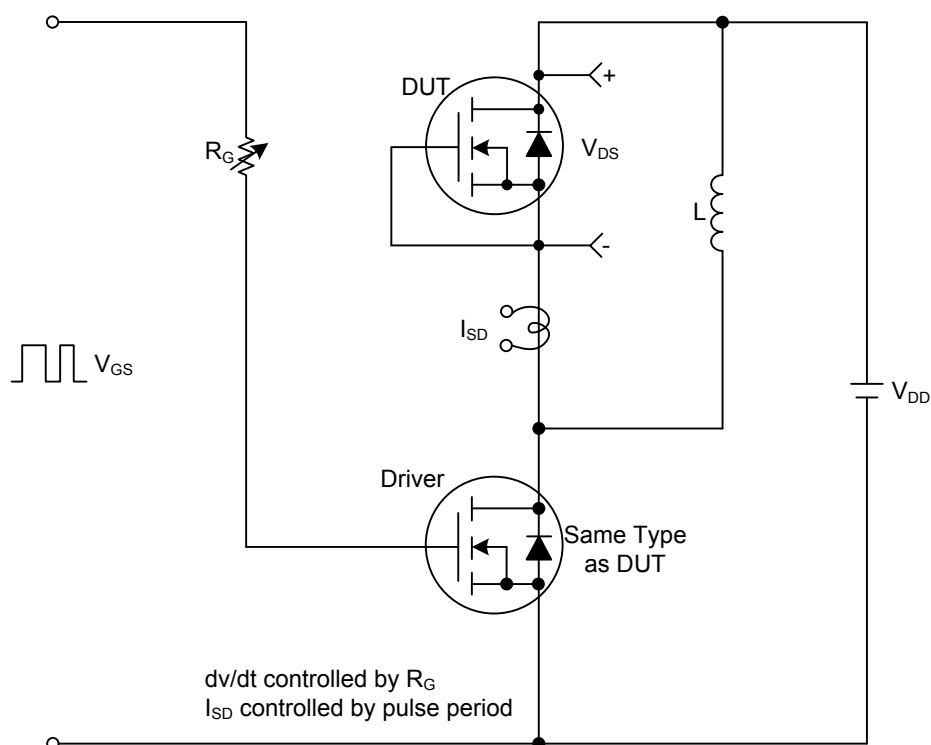
3. $I_{SD} \leq 2.2\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

4. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$

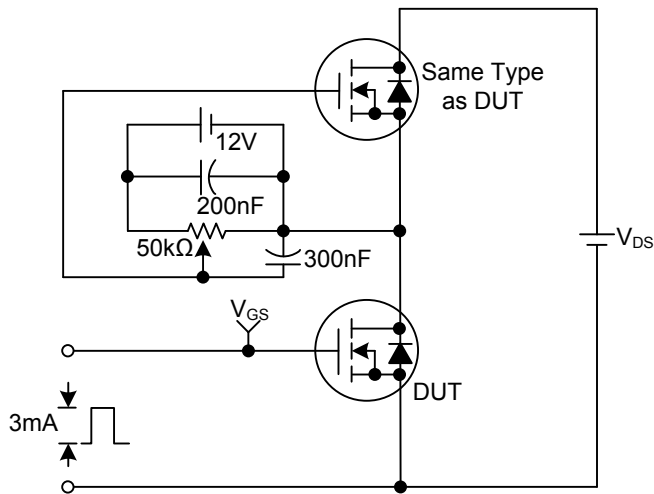
5. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

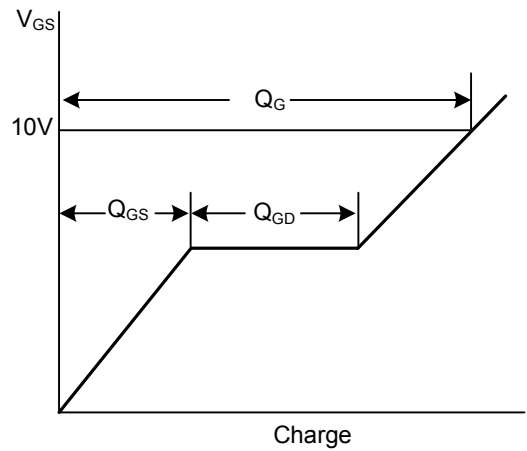
Peak Diode Recovery dv/dt Test Circuit & Waveforms



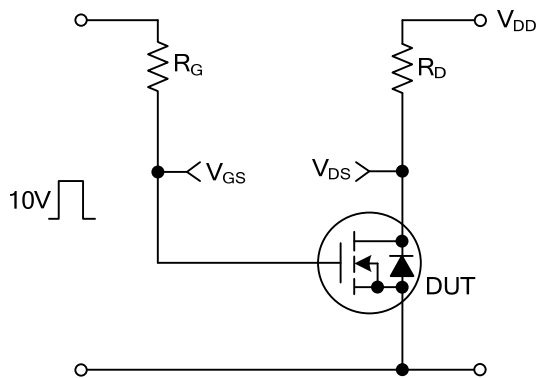
Gate Charge Test Circuit



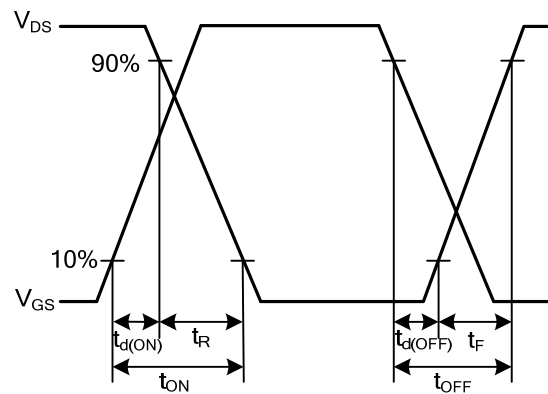
Gate Charge Waveforms



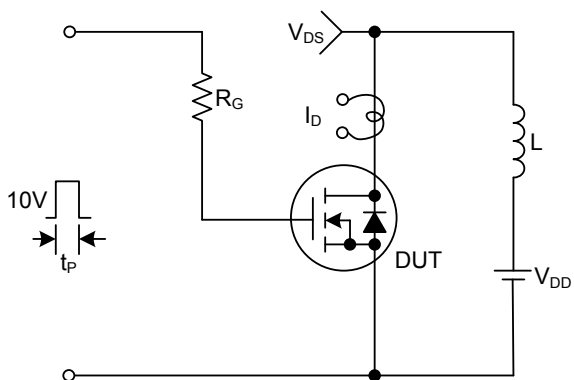
Resistive Switching Test Circuit



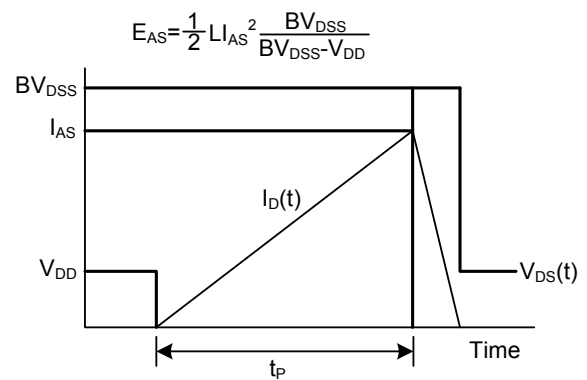
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



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