



2N90

Preliminary

Power MOSFET

2A, 900V N-CHANNEL POWER MOSFET

DESCRIPTION

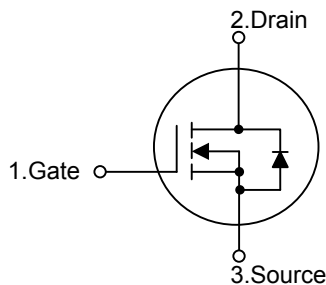
The UTC **2N90** is an N-channel mode power MOSFET using UTC's advanced technology to provide costumers with planar stripe and DMOS technology. This technology specialized in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche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

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

FEATURES

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

SYMBOL

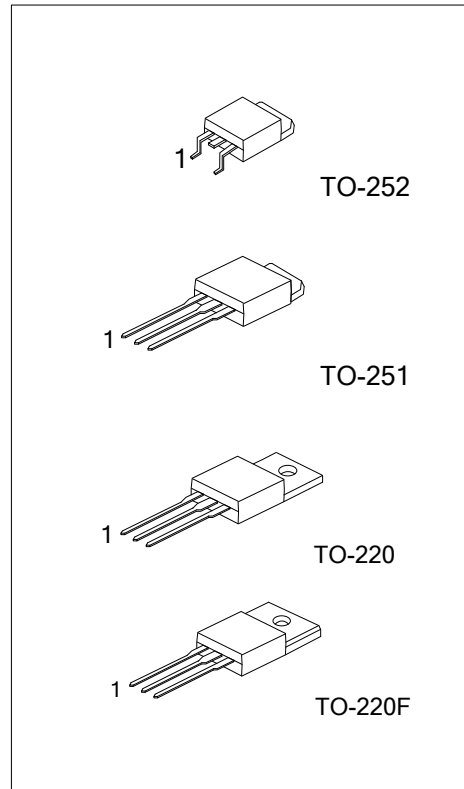


ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
2N90L-TA3-T	2N90G-TA3-T	TO-220	G	D	S	Tube
2N90L-TF3-T	2N90G-TF3-T	TO-220F	G	D	S	Tube
2N90L-TM3-T	2N90G-TM3-T	TO-251	G	D	S	Tube
2N90L-TN3-R	2N90G-TN3-R	TO-252	G	D	S	Tape Reel
2N90L-TN3-T	2N90G-TN3-T	TO-252	G	D	S	Tube

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

<p>2N90L-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Lead Free</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TF3: TO-220F, TM3: TO-251, TN3: TO-252</p> <p>(3) G: Halogen Free, L: Lead Free</p>
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■ ABSOLUTE MAXIMUM RATINGS ($T_c=25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage (Note 2)		V_{DSS}	900	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	2.2	A
	Pulsed (Note 2)	I_{DM}	8.8	A
Avalanche Current (Note 2)		I_{AR}	2.2	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	170	mJ
	Repetitive (Note 2)	E_{AR}	8.5	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.0	V/ns
Power Dissipation	TO-220	P_D	85	W
	TO-220F		25	
	TO-251/ TO-252		43	
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55~+150	$^\circ\text{C}$

Note: 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. $L = 65\text{mH}$, $I_{AS} = 2.2\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
4. $I_{SD} \leq 2.2\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

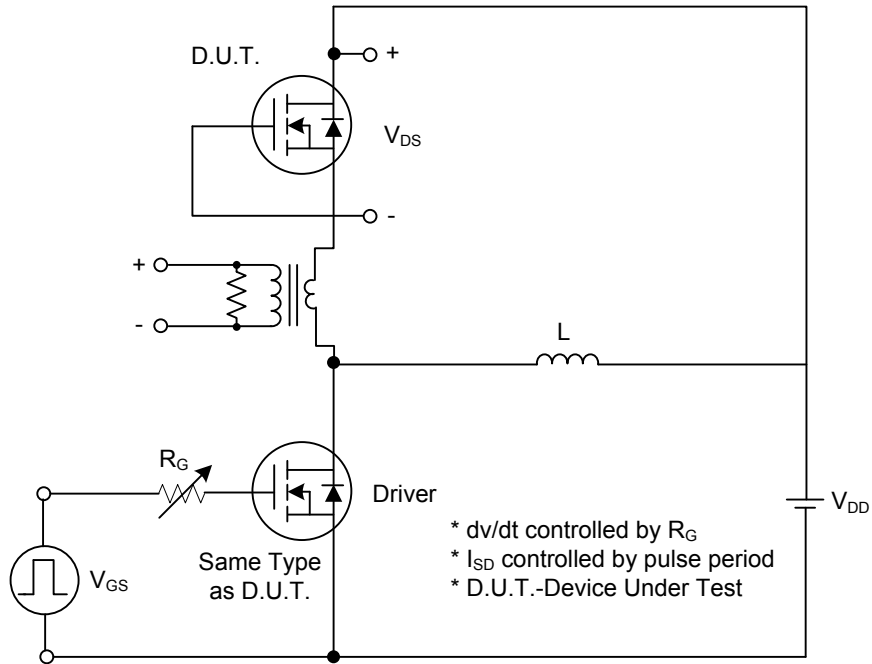
PARAMETER	PACKAGE	SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-251/ TO-252		110	
Junction to Case	TO-220F	θ_{JC}	1.47	$^\circ\text{C}/\text{W}$
	TO-220F		5	
	TO-251/ TO-252		2.85	

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

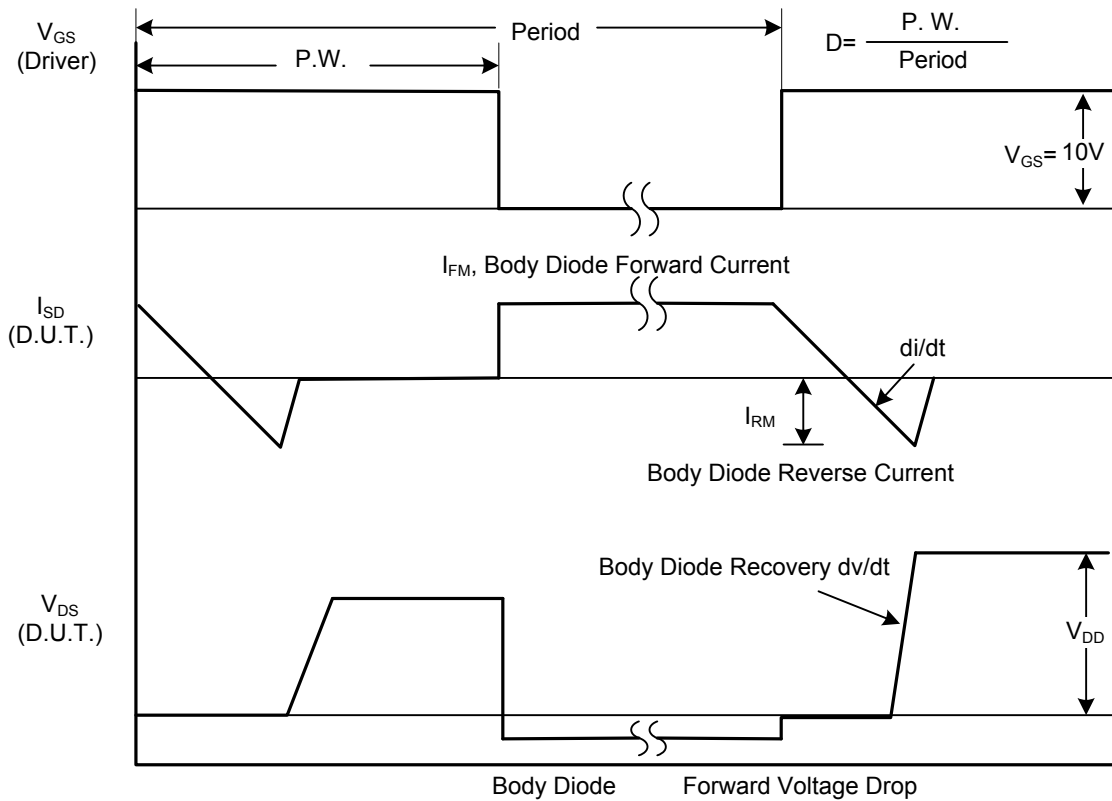
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	900			V
Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /ΔT _J	Reference to 25°C, I _D =250μA		1.0		V/°C
Drain-Source Leakage Current	I _{DSS}	V _{DS} =900V, V _{GS} =0V			10	μA
		V _{DS} =720V, T _C =125°C			100	
Gate- Source Leakage Current	Forward	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	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	g _{FS}	V _{DS} =50V, I _D =1.1A (Note 1)		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	Q _G	V _{GS} =10V, V _{DS} =720V, I _D =2.2A (Note 1,2)		12	15	nC
Gate to Source Charge	Q _{GS}			2.8		nC
Gate to Drain Charge	Q _{GD}			6.1		nC
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =450V, I _D =2.2A, R _G =25Ω (Note 1,2)		15	40	ns
Rise Time	t _R			35	80	ns
Turn-OFF Delay Time	t _{D(OFF)}			20	50	ns
Fall-Time	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	t _{rr}	I _S =2.2A, V _{GS} =0V, dI _F /dt=100A/μs		400		ns
Reverse Recovery Charge	Q _{RR}	(Note 1)		1.6		μC

Note: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%
 2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

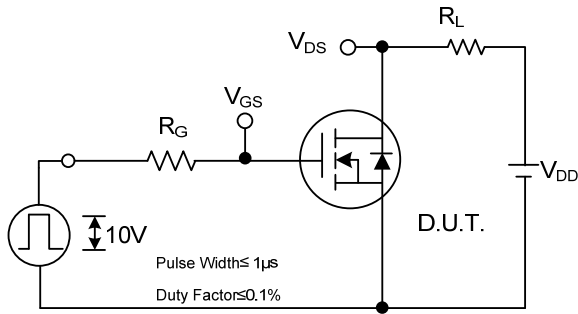


Peak Diode Recovery dv/dt Test Circuit

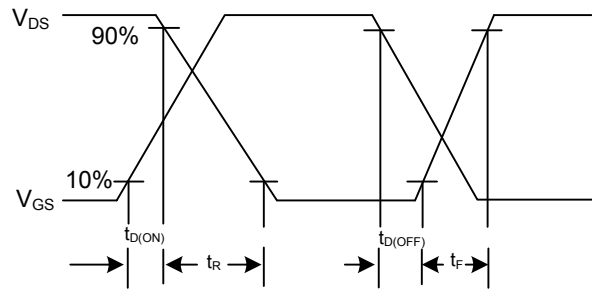


Peak Diode Recovery dv/dt Waveforms

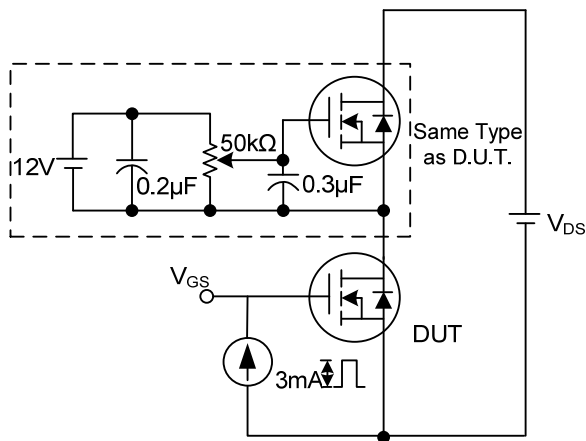
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



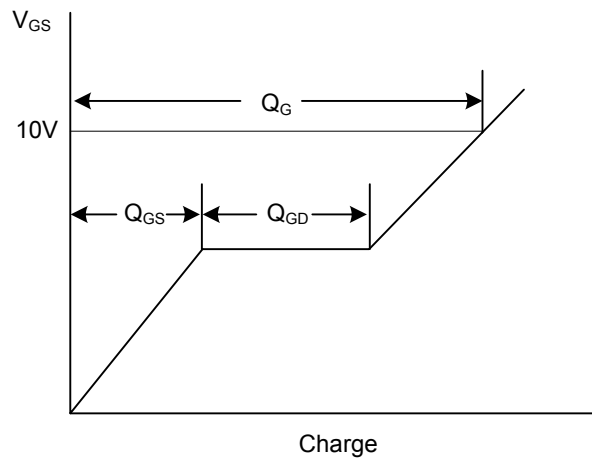
Switching Test Circuit



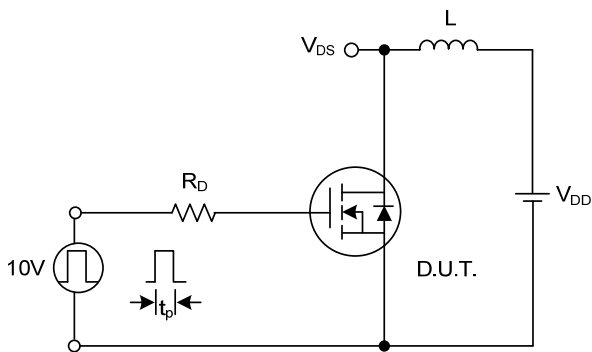
Switching Waveforms



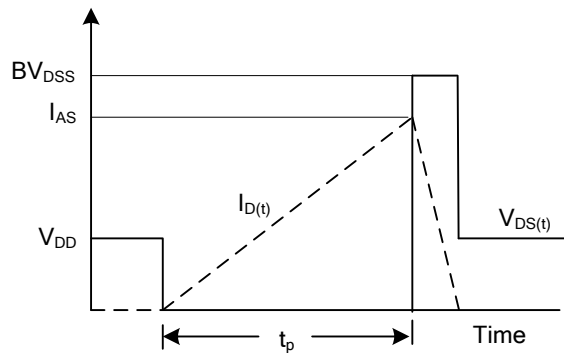
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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