

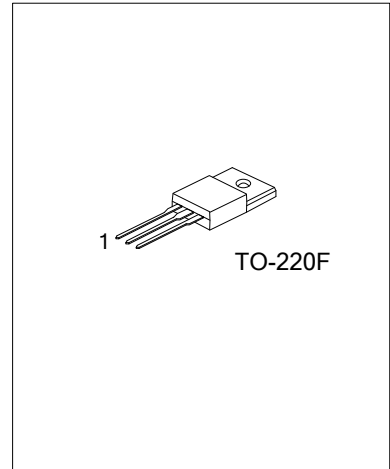
**3N50Z**

Preliminary

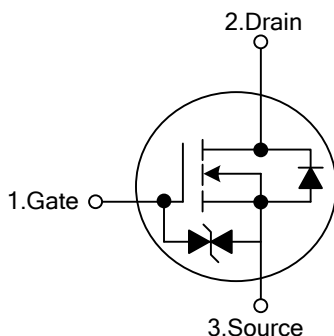
Power MOSFET**3A, 500V N-CHANNEL
POWER MOSFET****DESCRIPTION**

The UTC **3N50Z** is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **3N50Z** is generally applied in high efficiency switch mode power supplies, active power factor correction and electronic lamp ballasts based on half bridge topology.

**FEATURES**

- * $R_{DS(ON)} = 3.2\Omega$ @ $V_{GS} = 10V$
- * High Switching Speed
- * 100% Avalanche Tested

SYMBOL**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
3N50ZL-TF3-T	3N50ZG-TF3-T	TO-220F	G	D	S	Tube

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

3N50ZL-TF3-T (1) Packing Type (2) Package Type (3) Lead Free	(1) T: Tube (2) TF3: TO-220F (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		V _{DSS}	500	V
Gate-Source Voltage		V _{GSS}	±30	V
Drain Current	Continuous (T _C =25°C)	I _D	3 (Note 5)	A
	Pulsed (Note 2)	I _{DM}	12 (Note 5)	A
Avalanche Current (Note 2)		I _{AR}	3	A
Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	200	mJ
	Repetitive (Note 4)	E _{AR}	6.2	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation (T _C =25°C)		P _D	25	W
Derate above 25°C			0.2	W/°C
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. $L = 40\text{mH}$, $I_{AS} = 3\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

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

5. Drain current limited by maximum junction temperature

■ **THERMAL DATA**

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	θ_{JC}	4.9	$^\circ\text{C}/\text{W}$

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

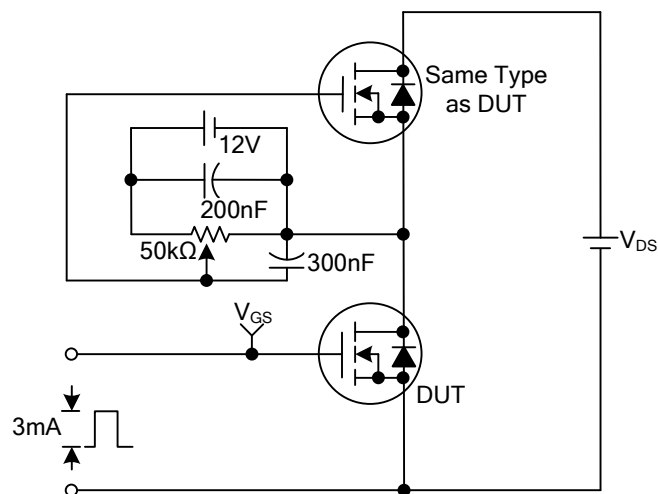
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	500			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =500V, V _{GS} =0V			1	μA
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =+30V, V _{DS} =0V			+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 =250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =1.5A		2.2	3.2	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		280	365	pF
Output Capacitance		C _{OSS}			50	65	pF
Reverse Transfer Capacitance		C _{RSS}			8.5	11	pF

■ ELECTRICAL CHARACTERISTICS(Cont.)

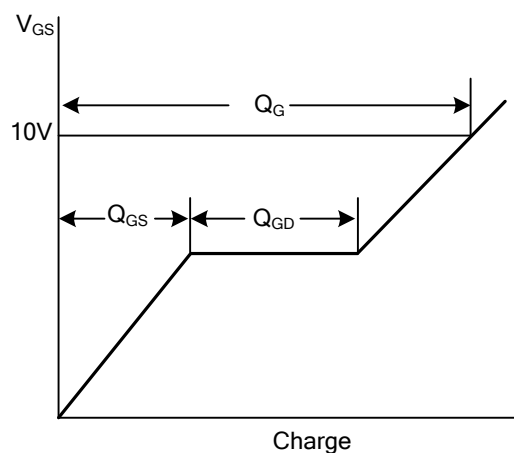
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	$V_{GS}=10V, V_{DS}=400V, I_D=3A$ (Note 1, 2)		10	13	nC
Gate to Source Charge	Q_{GS}			1.5		nC
Gate to Drain Charge	Q_{GD}			5.5		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=250V, I_D=3A, R_G=25\Omega$ (Note 1, 2)		10	30	ns
Rise Time	t_R			25	60	ns
Turn-OFF Delay Time	$t_{D(OFF)}$			35	80	ns
Fall-Time	t_F			25	60	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				3	A
Maximum Body-Diode Pulsed Current	I_{SM}				12	A
Drain-Source Diode Forward Voltage	V_{SD}	$I_S=3A, V_{GS}=0V$			1.4	V
Body Diode Reverse Recovery Time	t_{rr}	$I_S=3A, V_{GS}=0V,$ $dl_F/dt=100A/\mu s$ (Note 1)		170		ns
Body Diode Reverse Recovery Charge	Q_{RR}			0.7		μC

Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$
2. Essentially independent of operating temperature

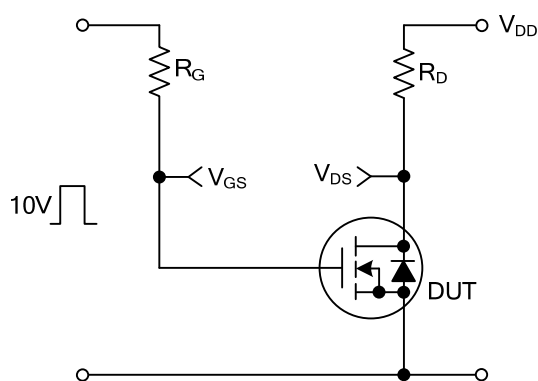
■ TEST CIRCUITS AND WAVEFORMS



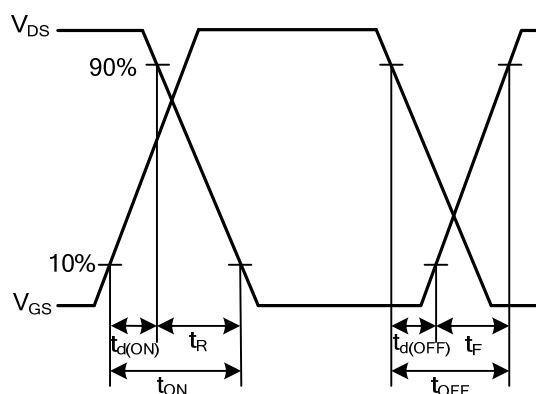
Gate Charge Test Circuit



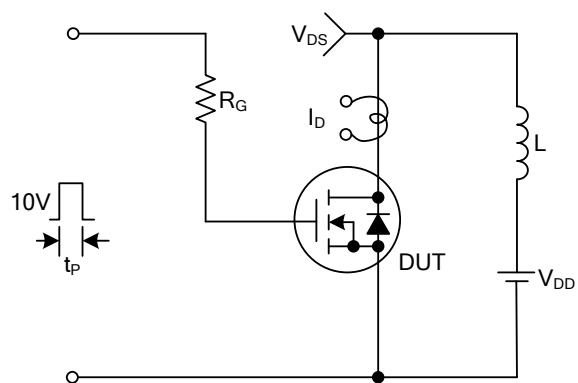
Gate Charge Waveforms



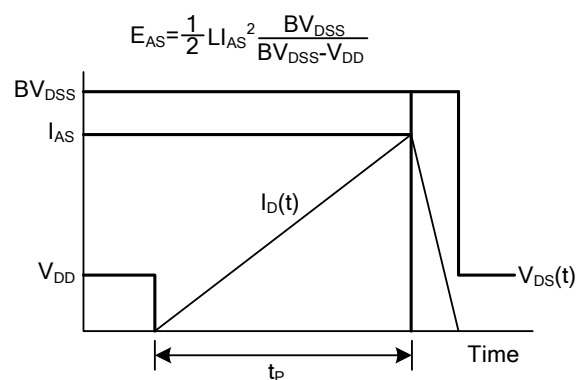
Resistive Switching Test Circuit



Resistive Switching Waveforms

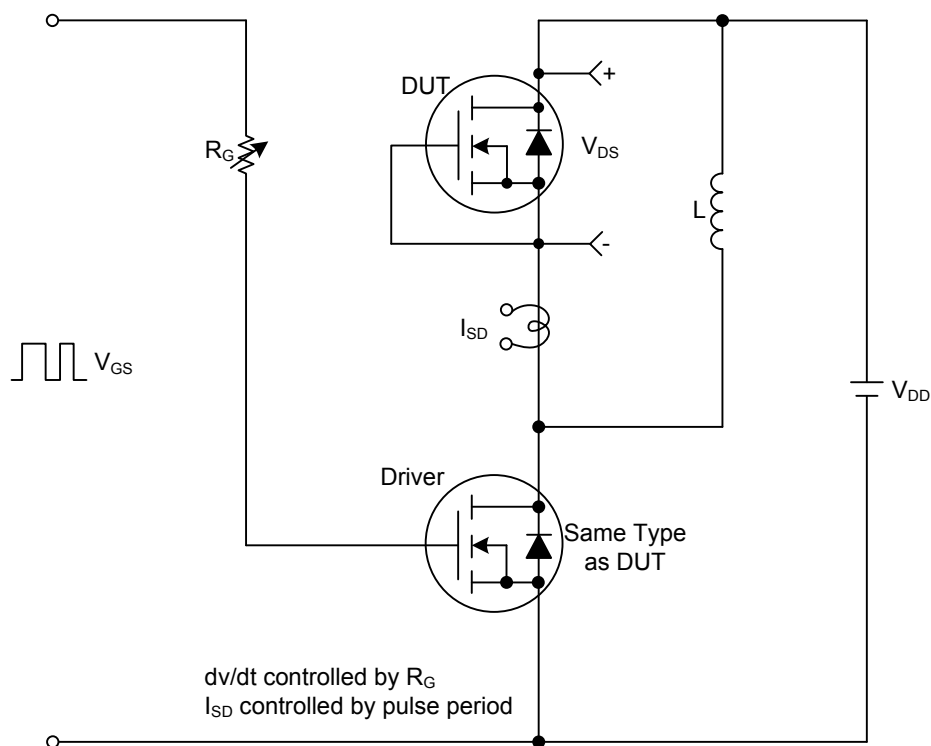


Unclamped Inductive Switching Test Circuit

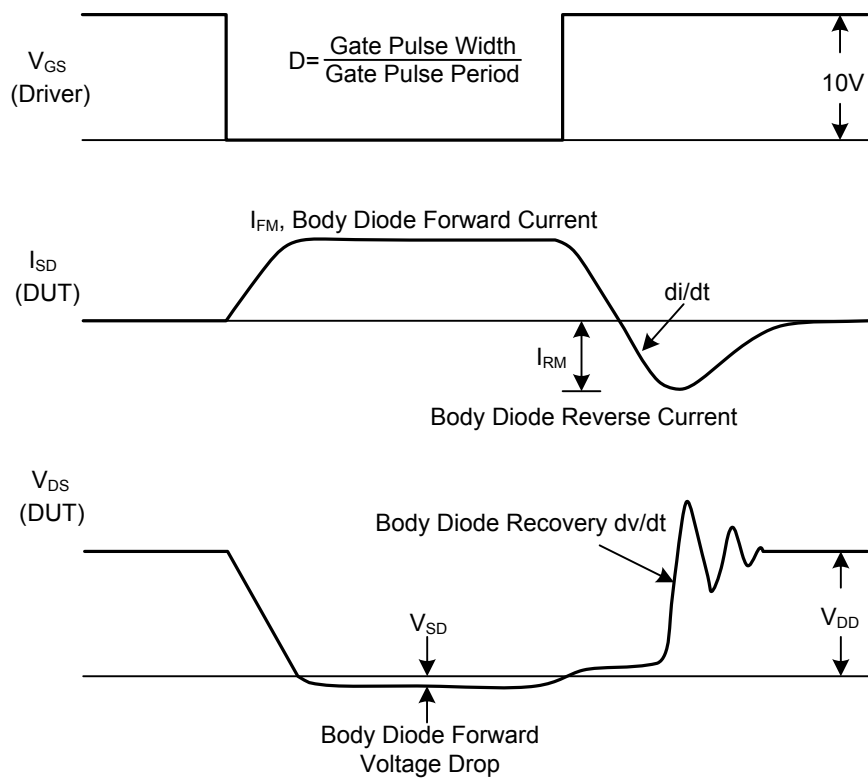


Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS(Cont.)



Peak Diode Recovery dv/dt Test Circuit & Waveforms



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