

UNISONIC TECHNOLOGIES CO., LTD

3N50 Power MOSFET

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

DESCRIPTION

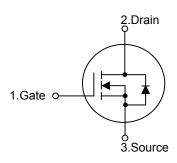
The UTC 3N50 is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC 3N50 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 Ω @ V_{GS} =10V
- * High Switching Speed
- * 100% Avalanche Tested

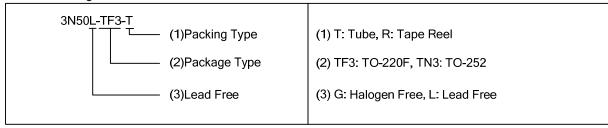
SYMBOL

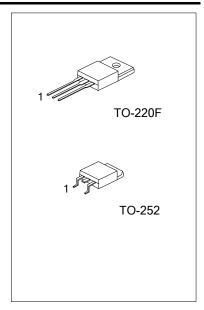


ORDERING INFORMATION

Ordering Number		Doolsono	Pin	Daakina			
Lead Free	Halogen Free	Package	1	2	3	Packing	
3N50L-TF3-T	3N50G-TF3-T	TO-220F	G	D	S	Tube	
3N50L-TN3-R	3N50G-TN3-R	TO-252	G	D	S	Tape Reel	

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





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■ **ABSOLUTE MAXIMUM RATINGS** (T_C=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain-Source Voltage		V_{DSS}	500	V	
Gate-Source Voltage		V_{GSS}	±30	V	
Dunin Cumant	Continuous (T _C =25°C)	I _D	3 (Note 5)	Α	
Drain Current	Pulsed (Note 2)	I _{DM}	12 (Note 5)	Α	
Avalanche Current (Note	2)	I _{AR}	3	Α	
Availanche Current (Note	Single Pulsed (Note 3)	E _{AS}	200	mJ	
Avaianche Energy	Repetitive (Note 4)	E _{AR}	6.2	mJ	
Peak Diode Recovery dv	/dt (Note 4)	dv/dt	4.5	V/ns	
TO-220F			25	۱۸/	
Power Dissipation (T _C =2	TO-252		50	W	
TO-220F		P_D	0.2	1449.0	
Derate above 25°C	TO-252		0.4	W/°C	
Junction Temperature		TJ	+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 = 40mH, I_{AS} = 3A, V_{DD} = 50V, R_G = 25 Ω , Starting T_J = 25 $^{\circ}$ C
- 4. $I_{SD} \le 3A$, $di/dt \le 200A/\mu s$, $V_{DD} \le BV_{DSS}$, Starting $T_J = 25^{\circ}C$
- 5. Drain current limited by maximum junction temperature

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT	
lunction to Ambient	TO-220F	0	62.5	°C/W	
Junction to Ambient	TO-252	θ_{JA}	110		
lunation to Coop	TO-220F	0	4.9	°C/W	
Junction to Case	TO-252	AlC	θ _{JC} 2.5		

3N50

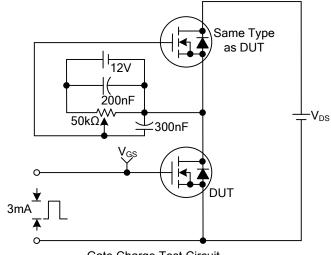
■ **ELECTRICAL CHARACTERISTICS** (T_C=25°C, unless otherwise noted)

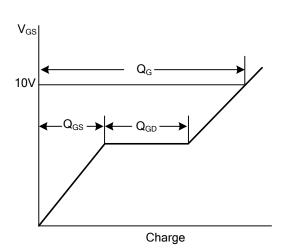
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	$I_D = 250 \mu A, V_{GS} = 0 V$	500			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =500V, V _{GS} =0V			1	μΑ
Cata Source Leakage Current	Forward	I _{GSS}	V_{GS} =+30V, V_{DS} =0V			+100	nA
Gate- Source Leakage Current	Reverse		V_{GS} =-30V, V_{DS} =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu A$	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}			280	365	pF
Output Capacitance		C _{OSS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		50	65	pF
Reverse Transfer Capacitance		C_{RSS}			8.5	11	рF
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	(Note 1, 2)		5.5		nC
Turn-ON Delay Time		$t_{D(ON)}$			10	30	ns
Rise Time		t_R	V_{DD} =250V, I_{D} =3A, R_{G} =25 Ω		25	60	ns
Turn-OFF Delay Time		t _{D(OFF)}	(Note 1, 2)		35	80	ns
Fall-Time		t_{F}			25	60	ns
SOURCE- DRAIN DIODE RATIN	IGS AND (CHARACTERI	STICS				
Maximum Body-Diode Continuous Current		I _S				3	Α
Maximum Body-Diode Pulsed Cu	ırrent	I _{SM}				12	Α
Drain-Source Diode Forward Vol	tage	V_{SD}	I _S =3A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery T	ime	t _{rr}	I _S =3A, V _{GS} =0V,		170		ns
Body Diode Reverse Recovery C	harge	Q_{RR}	dI _F /dt=100A/μs (Note 1)		0.7		μC

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

^{2.} Essentially independent of operating temperature

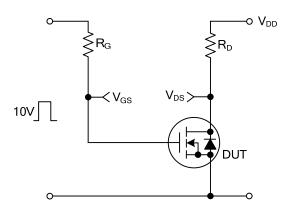
TEST CIRCUITS AND WAVEFORMS



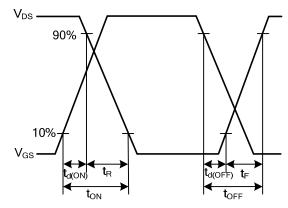


Gate Charge Test Circuit

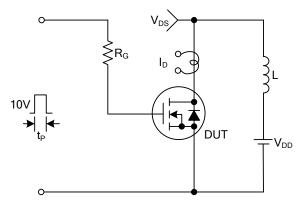
Gate Charge Waveforms



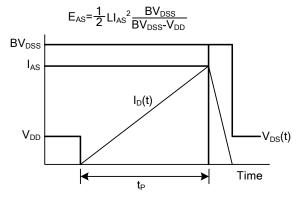
Resistive Switching Test Circuit



Resistive Switching Waveforms

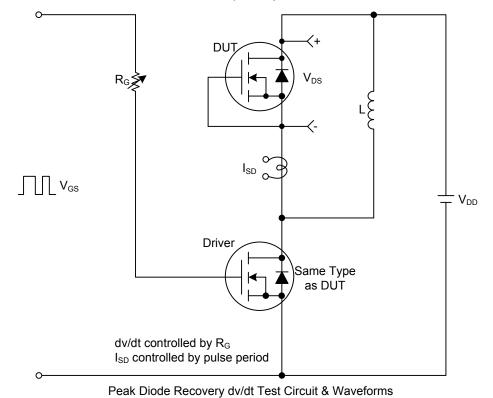


Unclamped Inductive Switching Test Circuit

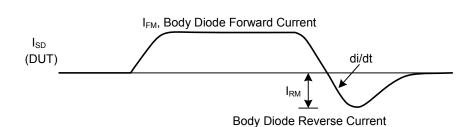


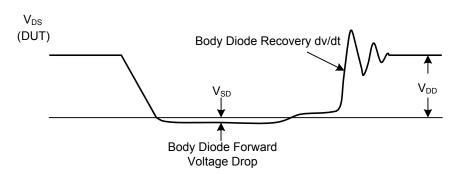
Unclamped Inductive Switching Waveforms

TEST CIRCUITS AND WAVEFORMS(Cont.)



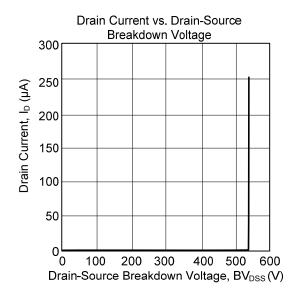
 $D = \frac{\text{Gate Pulse Width}}{\text{Gate Pulse Period}}$ (Driver)

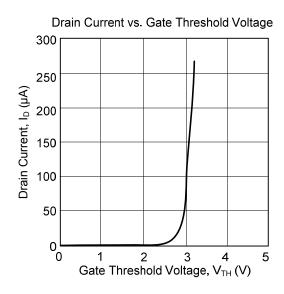


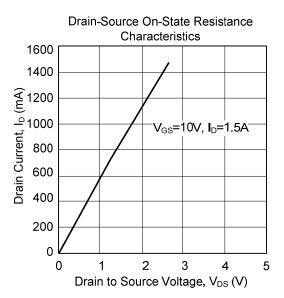


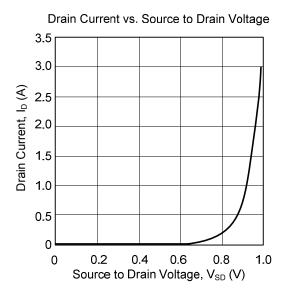
 $V_{\text{GS}} \\$

■ TYPICAL CHARACTERISTICS









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