



## 18N50

Power MOSFET

### 18A, 500V N-CHANNEL POWER MOSFET

#### DESCRIPTION

The UTC **18N50** is an N-channel enhancement mode power MOSFET using UTC's advanced planar stripe and DMOS technology to provide perfect performance.

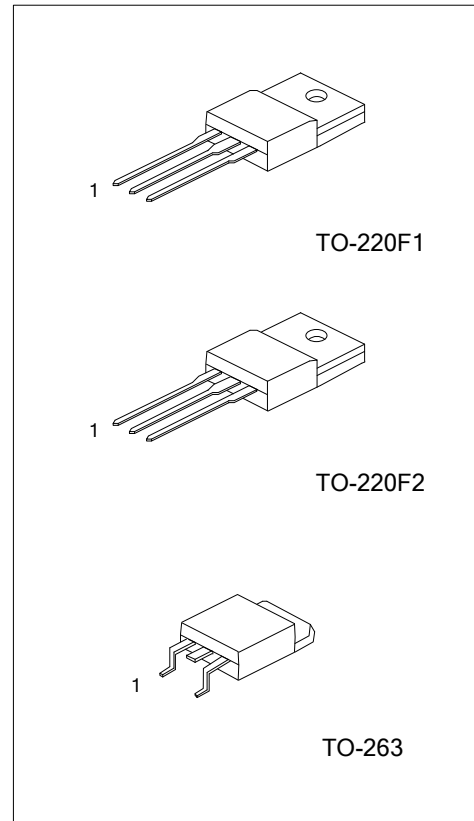
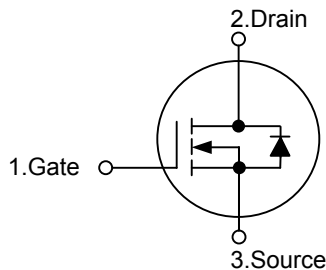
This technology can withstand high energy pulse in the avalanche and commutation mode. It can provide minimum on-state resistance and high switching speed.

This device is generally applied in active power factor correction and high efficient switched mode power supplies.

#### FEATURES

- \*  $R_{DS(ON)}=0.32\Omega @ V_{GS}=10V$
- \* High switching speed
- \* Typically 45nC low gate charge
- \* 100% avalanche tested
- \* Typically 25pF low  $C_{RSS}$
- \* Improved dv/dt capability

#### SYMBOL



#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
18N50L-TF1-T	18N50G-TF1-T	TO-220F1	G	D	S	Tube
18N50L-TF2-T	18N50G-TF2-T	TO-220F2	G	D	S	Tube
18N50L-TQ2-T	18N50G-TQ2-T	TO-263	G	D	S	Tube
18N50L-TQ2-R	18N50G-TQ2-R	TO-263	G	D	S	Tape Reel

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

<p>18N50L - TF1 - 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) TF1: TO-220F1, TF2: TO-220F2, TQ2: TO-263</p> <p>(3) G: Halogen Free, L: Lead Free</p>
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■ ABSOLUTE MAXIMUM RATINGS (unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain to Source Voltage		$V_{DSS}$	500	V
Gate to Source Voltage		$V_{GSS}$	±30	V
Drain Current	Continuous	$I_D$	18	A
	Pulsed (Note 2)	$I_{DM}$	72 (Note 5)	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	945	mJ
	Repetitive (Note 2)	$E_{AR}$	23.5	mJ
Avalanche Current (Note 2)		$I_{AR}$	18	A
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220F1	$P_D$	38.5	W
	TO-220F2		40.5	
	TO-263		23.5	
Junction Temperature		$T_J$	+150	°C
Storage Temperature		$T_{STG}$	-55 ~ +150	°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.  $L=5.2\text{mH}$ ,  $I_{AS}=18\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$

4.  $I_{SD}\leq 18\text{A}$ ,  $di/dt\leq 200\text{A}/\mu\text{s}$ ,  $V_{DD}\leq BV_{DSS}$ , Starting  $T_J=25^\circ\text{C}$

5. Drain current limited by maximum junction temperature

■ THERMAL DATA

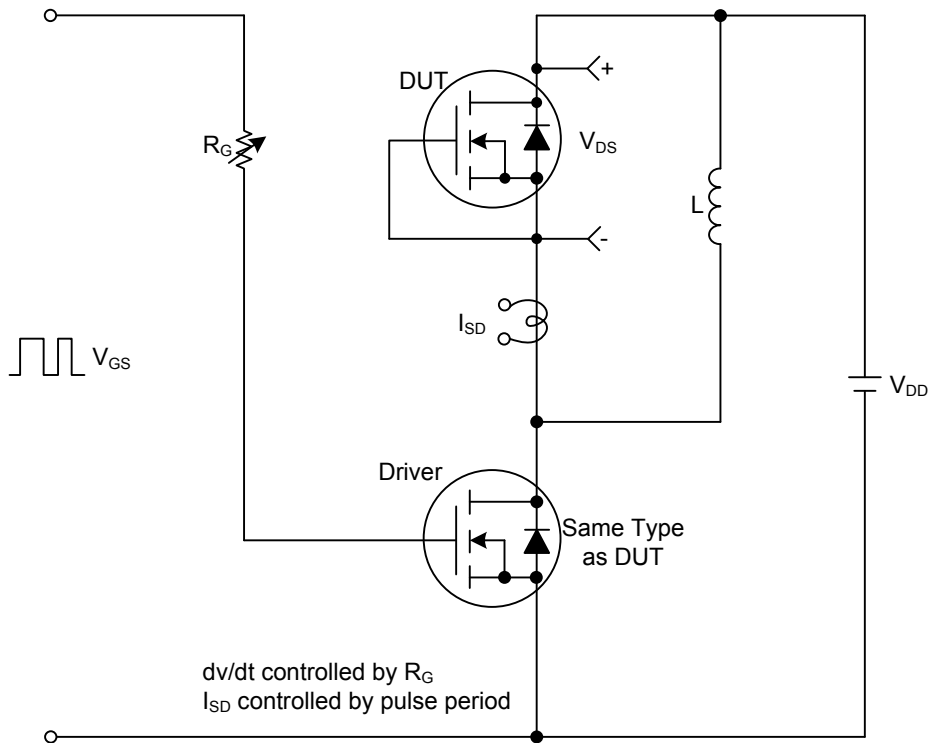
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		$\theta_{JA}$	62.5	°C/W
Junction to Case	TO-220F1	$\theta_{Jc}$	3.3	°C/W
	TO-220F2		3.0	
	TO-263		0.53	

■ ELECTRICAL CHARACTERISTICS (T<sub>c</sub>=25°C, unless otherwise specified)

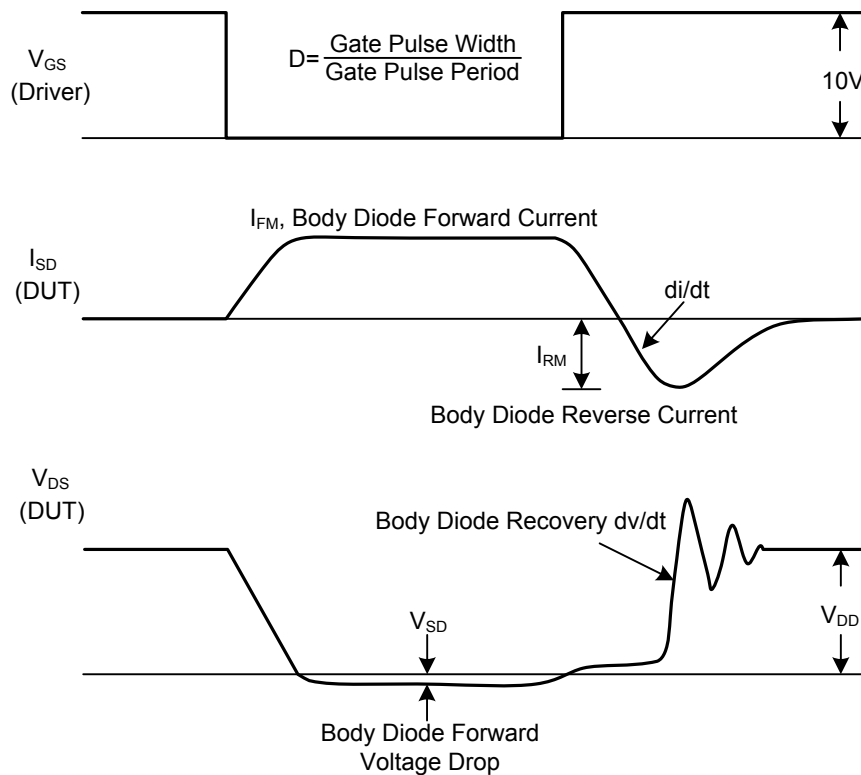
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	500			V
Breakdown Voltage Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	I <sub>D</sub> =250μA, Referenced to 25°C		0.5		V/°C
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =500V, V <sub>GS</sub> =0V			1	μA
		V <sub>DS</sub> =400V, T <sub>C</sub> =125°C			10	μA
Gate-Source Leakage Current	Forward	I <sub>GSS</sub>			100	nA
	Reverse					
					-100	
		V <sub>GS</sub> = -30 V, V <sub>DS</sub> = 0 V				
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.0		4.0	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =9A		0.24	0.32	Ω
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =40V, I <sub>D</sub> =9A (Note 1)		25		S
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz		2200	2860	pF
Output Capacitance	C <sub>OSS</sub>			330	430	pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			25	40	pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> =400V, V <sub>GS</sub> =10V, I <sub>D</sub> =18A (Note 1,2)		45	60	nC
Gate-Source Charge	Q <sub>GS</sub>			12.5		nC
Gate-Drain Charge	Q <sub>GD</sub>			19		nC
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =250V, I <sub>D</sub> =18A, R <sub>G</sub> =25Ω (Note 1,2)		55	120	ns
Turn-ON Rise Time	t <sub>R</sub>			165	340	ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			95	200	ns
Turn-OFF Fall Time	t <sub>F</sub>			90	190	ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	I <sub>S</sub>				18	A
Maximum Body-Diode Pulsed Current	I <sub>SM</sub>				72	A
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =18A, V <sub>GS</sub> =0V			1.4	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =18A,		500		ns
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	dI <sub>F</sub> /dt=100A/μs (Note 1)		5.4		μC

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

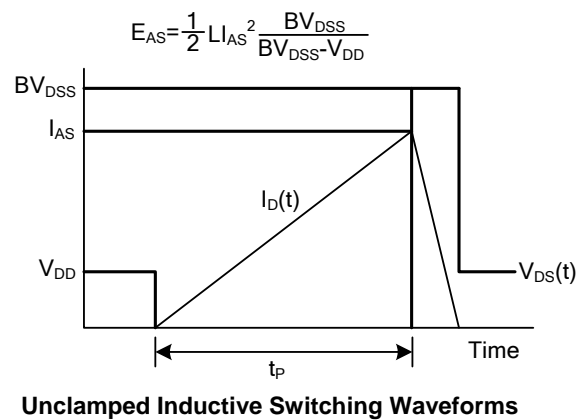
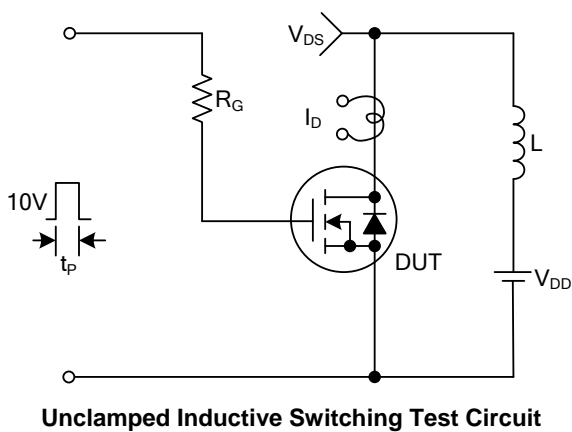
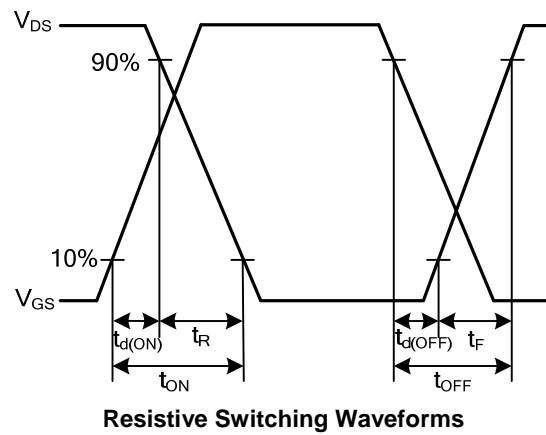
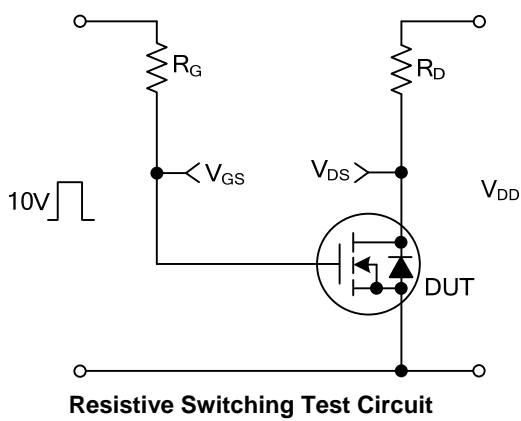
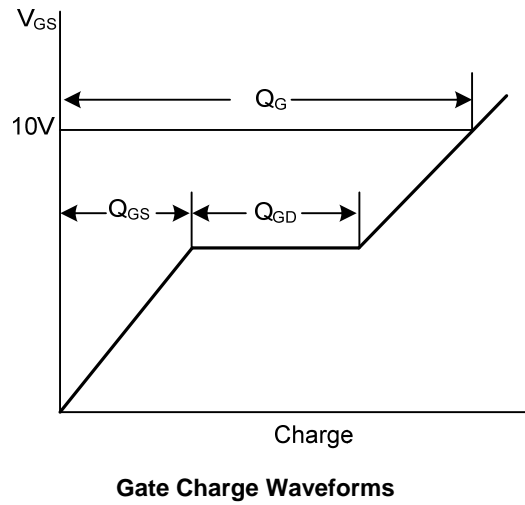
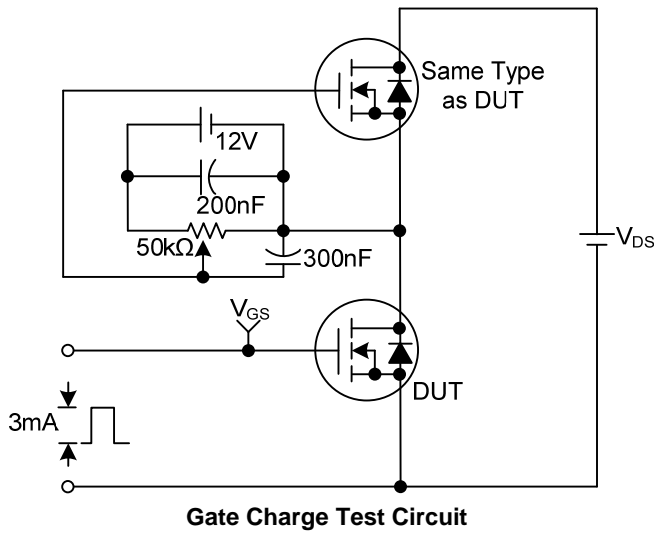
## ■ TEST CIRCUITS AND WAVEFORMS



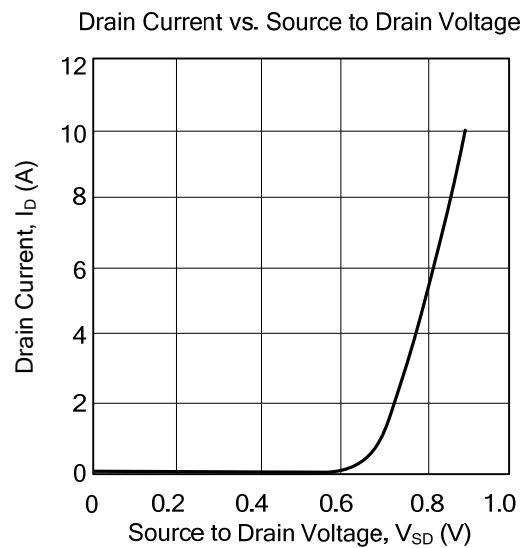
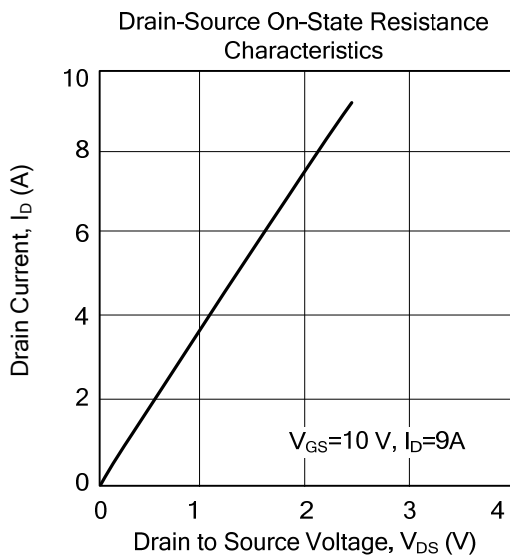
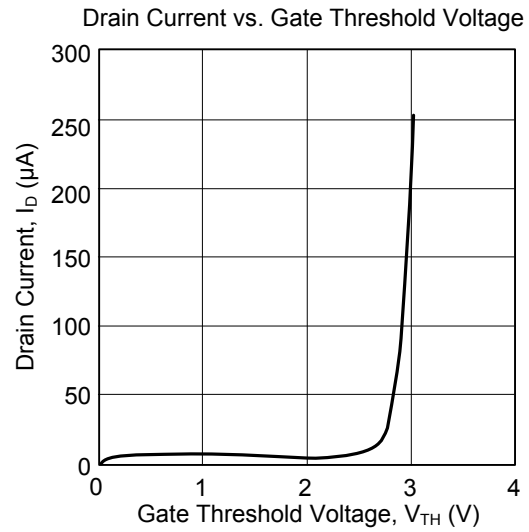
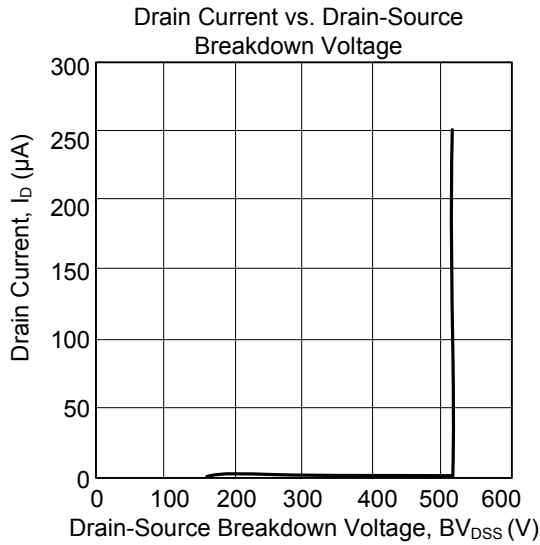
**Peak Diode Recovery dv/dt Test Circuit & Waveforms**



## TEST CIRCUITS AND WAVEFORMS(Cont.)



## TYPICAL CHARACTERISTICS



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