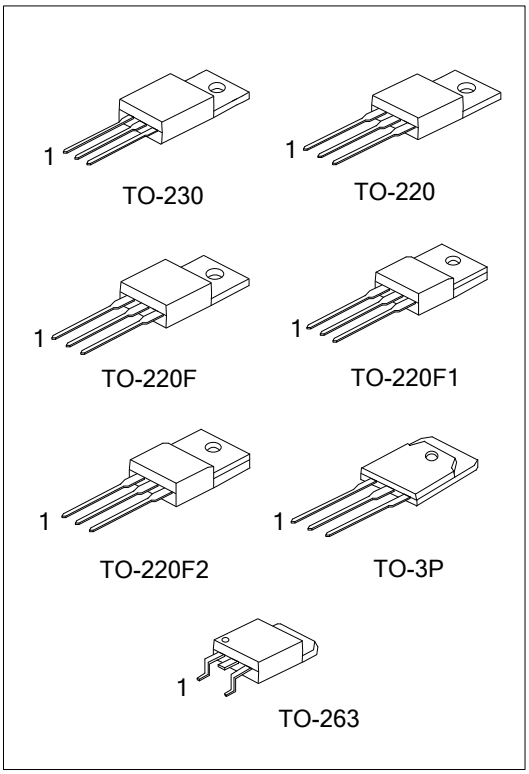
18A, 500V N-CHANNEL POWER MOSFET



■ DESCRIPTION

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

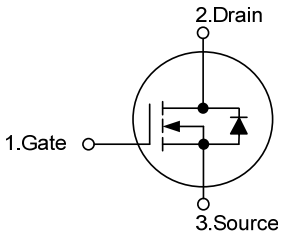
This technology can withstand high energy pulse in the avalanche and commutation mode. It can provide minimum on-state resistance and high switching speed.

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

■ FEATURES

* $R_{DS(ON)}$ < 0.32Ω @ V_{GS}=10V, I_D=9A
* High switching speed
* 100% avalanche tested

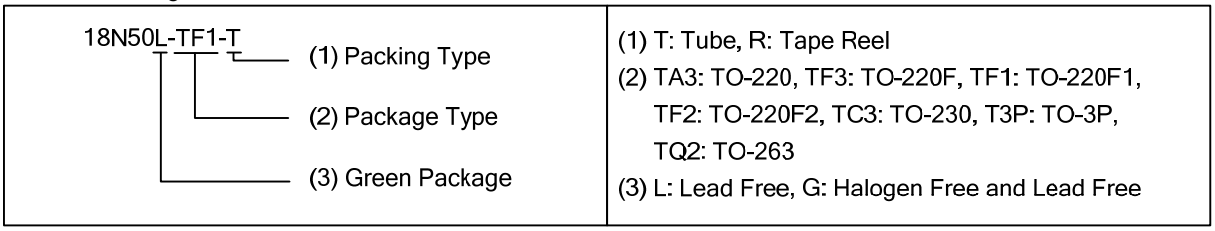
■ SYMBOL



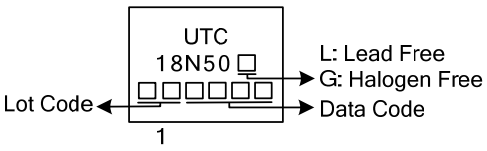
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
18N50L-TA3-T	18N50G-TA3-T	TO-220	G	D	S	Tube
18N50L-TF3-T	18N50G-TF3-T	TO-220F	G	D	S	Tube
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-TC3-T	18N50G-TC3-T	TO-230	G	D	S	Tube
18N50L-T3P-T	18N50G-T3P-T	TO-3P	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



■ MARKING



■ 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
Drain Current	Continuous	I_D	18	A
	Pulsed (Note 2)	I_{DM}	72	A
Avalanche Current (Note 2)		I_{AR}	13	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	845	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.2	V/ns
Power Dissipation	TO-220/TO-230 TO-263	P_D	235	W
	TO-220F/TO-220F TO-220F1		40	W
	TO-3P		380	W
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=10mH, I_{AS}=13A, V_{DD}=50V, R_G=25 Ω, Starting T_J = 25°C
4. I_{SD}≤18A, di/dt≤200A/μs, V_{DD}≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

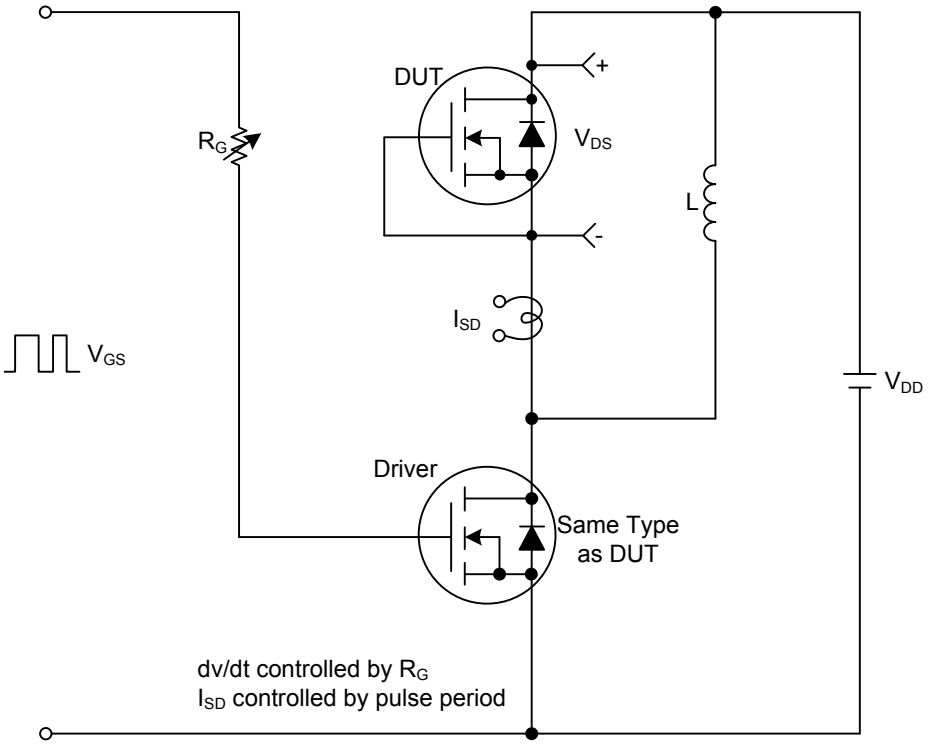
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-230 TO-263	$θ_{JA}$	62.5	°C/W
	TO-3P		30	°C/W
Junction to Case	TO-220/TO-230 TO-263	$θ_{Jc}$	0.53	°C/W
	TO-220F/TO-220F/ TO-220F1		3.13	
	TO-3P		0.33	

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

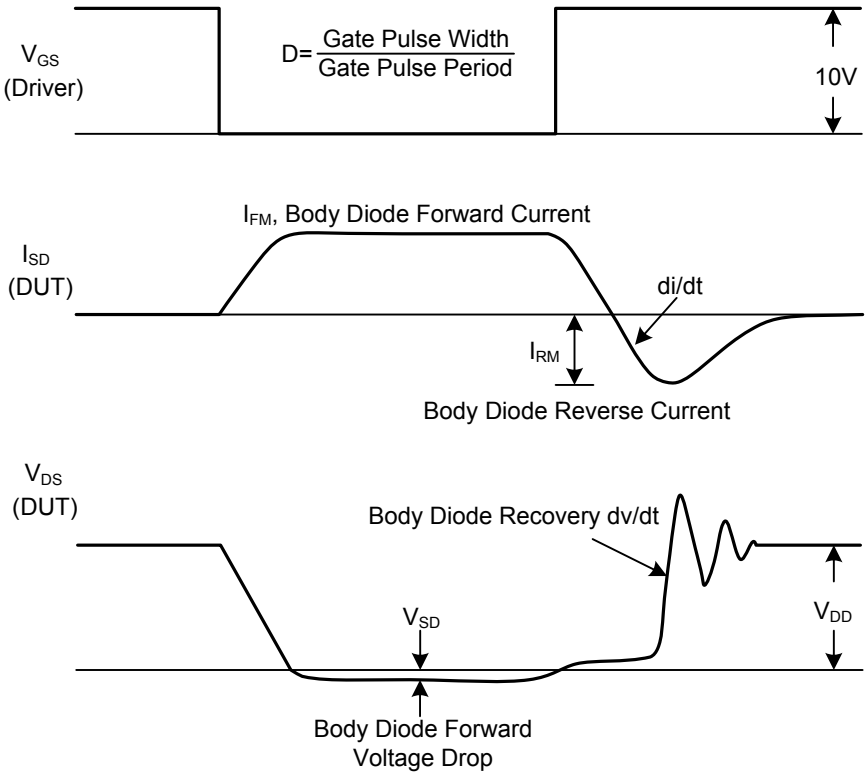
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA	500			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=500V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS} = 30 V, V_{DS} = 0 V			100	nA
	Reverse		V_{GS} = -30 V, V_{DS} = 0 V			-100	
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	2.0		4.0	V
Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=9.0A			0.32	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{DS}=25V,V_{GS}=0V,f=1.0MHz		2240		pF
Output Capacitance		C_{OSS}			290		pF
Reverse Transfer Capacitance		C_{RSS}			41		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=50V, V_{GS}=10V, I_D=1.3A, I_D=100μA (Note 1, 2)		200		nC
Gate to Source Charge		Q_{GS}			15.5		nC
Gate to Drain Charge		Q_{GD}			46.8		nC
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$	V_{DS}=30V, V_{GS}=10V, I_D=0.5A, R_G=25Ω (Note 1, 2)		110		ns
Rise Time		t_R			240		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			618		ns
Fall-Time		t_F			327		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				18	A
Maximum Body-Diode Pulsed Current		I_{SM}				72	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=18A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)		t_{rr}	I_S=18A, V_{GS}=0V, dI_F/dt=100A/μs		380		nS
Body Diode Reverse Recovery Charge		Q_{rr}			5.4		μC

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

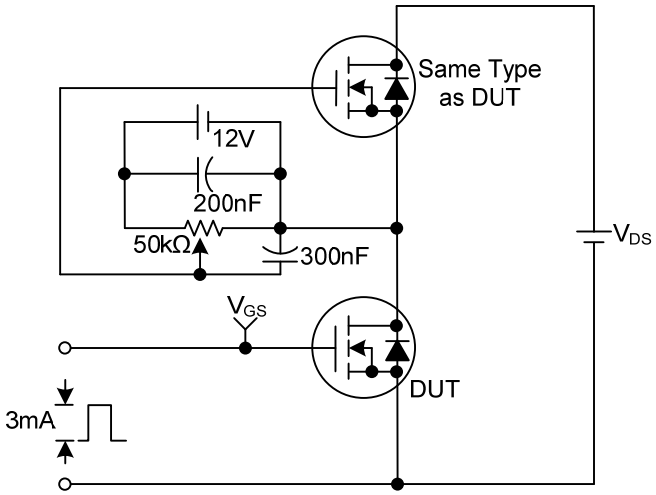
■ TEST CIRCUITS AND WAVEFORMS



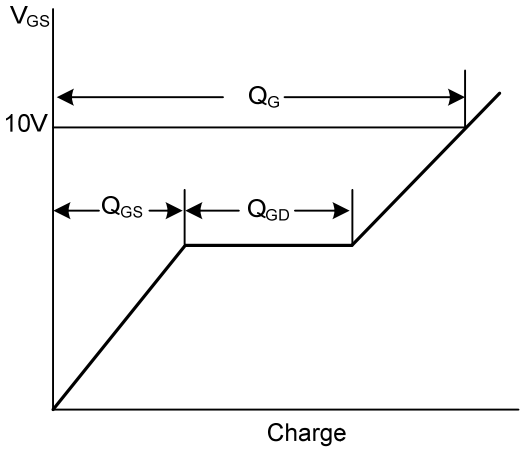
Peak Diode Recovery dv/dt Test Circuit & Waveforms



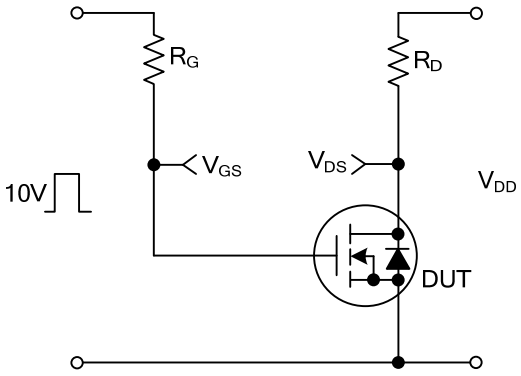
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



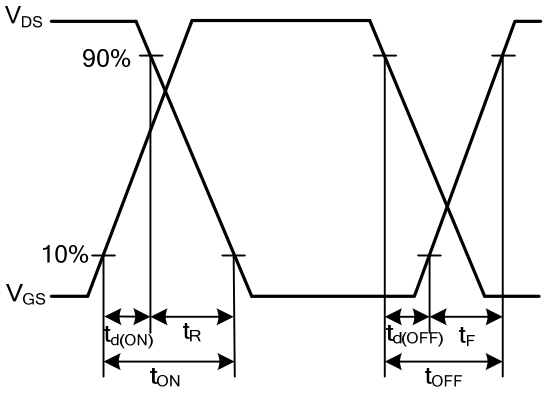
Gate Charge Test Circuit



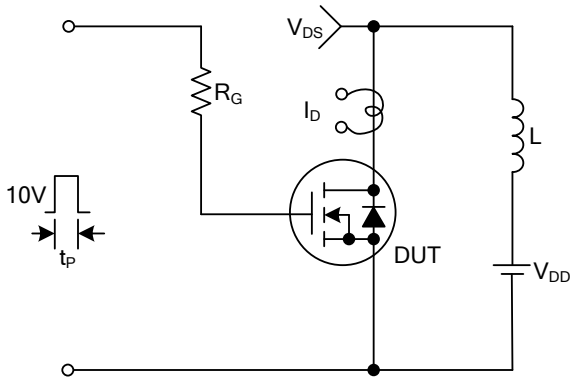
Gate Charge Waveforms



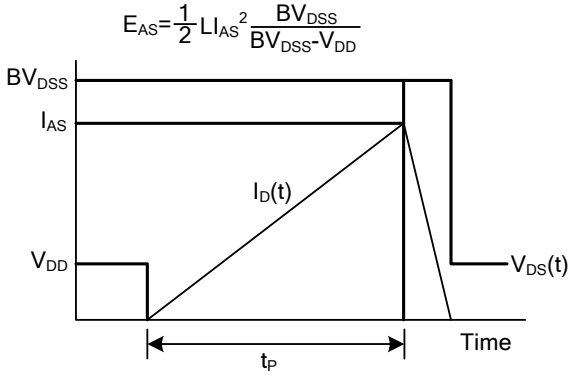
Resistive Switching Test Circuit



Resistive Switching Waveforms



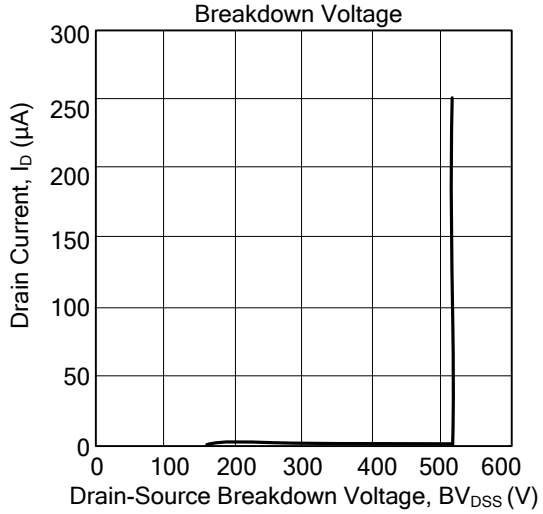
Unclamped Inductive Switching Test Circuit



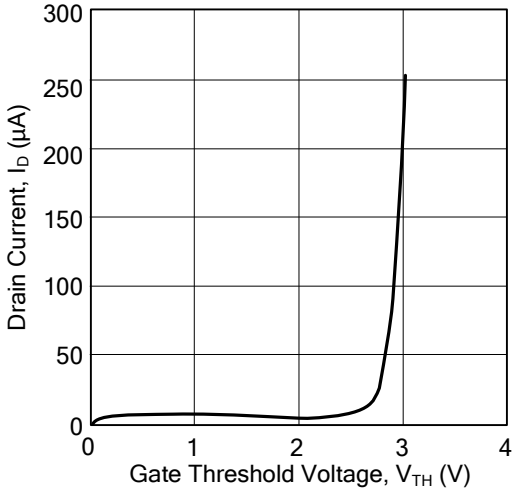
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

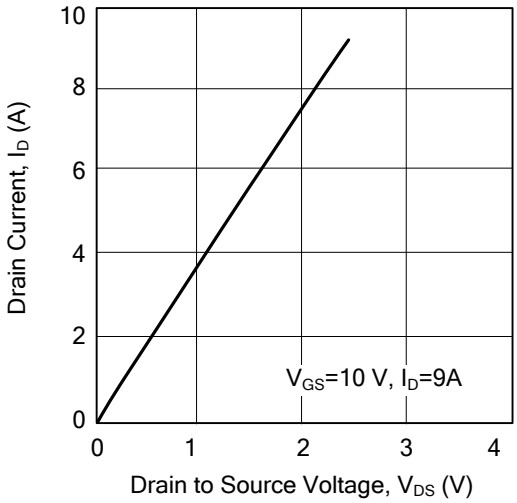
Drain Current vs. Drain-Source Breakdown Voltage



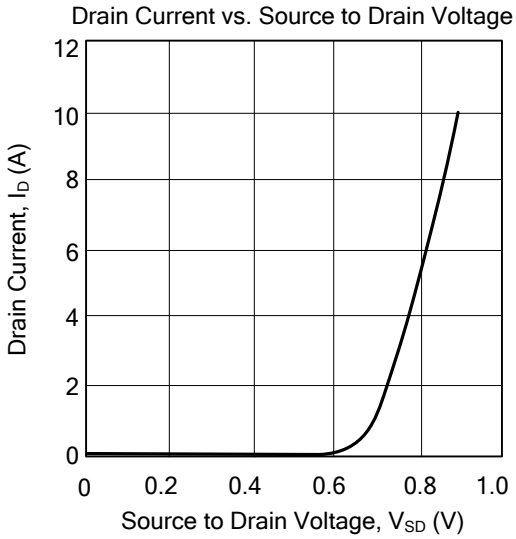
Drain Current vs. Gate Threshold Voltage



Drain-Source On-State Resistance Characteristics



Drain Current vs. Source to Drain Voltage



Maximum Safe Operating Area