



11N50

Preliminary

Power MOSFET

500V N-CHANNEL MOSFET

DESCRIPTION

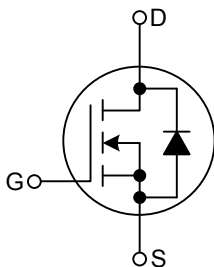
The **UTC 11N50** is an N-channel enhancement mode Power FET. It uses UTC advanced planar stripe, DMOS technology to provide customers perfect switching performance, minimal on-state resistance. It also can withstand high energy pulse in the avalanche and commutation mode.

The **UTC 11N50** is universally applied in electronic lamp ballasts based on half bridge topology, high efficiency switched mode power supplies, active power factor correction, etc.

FEATURES

- * Low Gate Charge: 43nC (TYP.)
- * 11A, 500V, $R_{DS(ON)}=0.55\Omega @ V_{GS}=10V$
- * Fast Switching
- * Low C_{RSS} : 25pF (TYP.)
- * With 100% Avalanche Tested
- * Improved dv/dt Capability
- * Fast Recovery Body Diode: 90ns (TYP.)

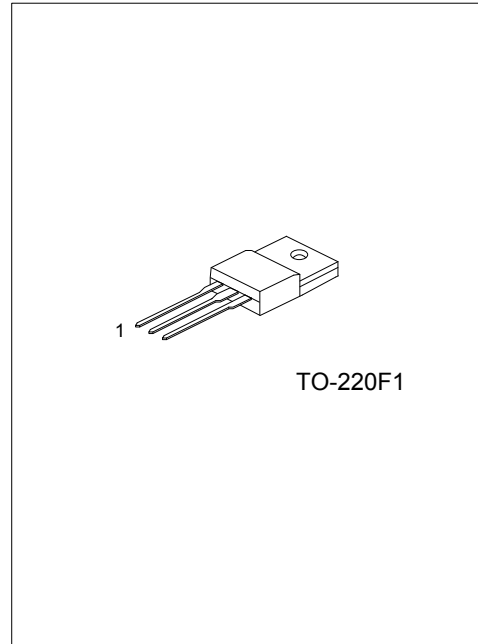
SYMBOL



ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
11N50L- TF1-T	11N50G-TF1-T	TO-220F1	G	D	S	Tube

<p>11N50L-TF1-T</p>	<p>(1) T: Tube</p> <p>(2) TF1: TO-220F1</p> <p>(3) L: Lead Free, G: Halogen Free</p>
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■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Drain to Source Voltage	V_{DSS}	500	V
Gate to Source Voltage	V_{GSS}	± 30	V
Continuous Drain Current	$T_C=25^\circ\text{C}$	I_D	11 (Note 1)
	$T_C=100^\circ\text{C}$	I_D	7 (Note 1)
Pulsed Drain Current (Note 2)	I_{DM}	44 (Note 1)	A
Single Pulsed Avalanche Energy(Note 3)	E_{AS}	670	mJ
Peak Diode Recovery dv/dt (Note 4)	dv/dt	4.5	V/ns
Total Power Dissipation	$T_C=25^\circ\text{C}$	P_D	48
	Derate above 25°C		0.39
Operating Junction Temperature	T_J	-55 ~ +150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55 ~ +150	$^\circ\text{C}$

Note: 1. Drain current limited by maximum junction temperature

2. Repetitive Rating : Pulse width limited by maximum junction temperature

3. $L=10\text{mH}$, $I_{AS}=11\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

4. $I_{SD} \leq 11\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$

5. 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.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	θ_{JC}	2.58	$^\circ\text{C}/\text{W}$

■ 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}	$V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$	500			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu\text{A}$, Referenced to 25°C		0.5		$\text{V}/^\circ\text{C}$
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=500\text{V}$, $V_{GS}=0\text{V}$			10	μA
		$V_{DS}=500\text{V}$, $T_J=125^\circ\text{C}$			100	μA
Gate-Source Leakage Current	I_{GSS}	$V_{DS}=0\text{V}$, $V_{GS}=\pm 30\text{V}$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	2.0		4.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=5.5\text{A}$		0.48	0.55	Ω
Forward Transconductance	g_{FS}	$V_{DS}=40\text{V}$, $I_D=5.5\text{A}$ (Note 1)		15		S
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{DS}=25\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHz}$		1515	2055	pF
Output Capacitance	C_{OSS}			185	235	pF
Reverse Transfer Capacitance	C_{RSS}			25	30	pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	$V_{DS}=400\text{V}$, $V_{GS}=10\text{V}$, $I_D=11\text{A}$ (Note 1, 2)		43	55	nC
Gate-Source Charge	Q_{GS}			8		nC
Gate-Drain Charge	Q_{GD}			19		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=250\text{V}$, $I_D=11\text{A}$, $R_G=3\Omega$ (Note 1, 2)		24	57	ns
Turn-ON Rise Time	t_R			70	150	ns
Turn-OFF Delay Time	$t_{D(OFF)}$			120	250	ns
Turn-OFF Fall Time	t_F			75	160	ns

Note: 1. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$

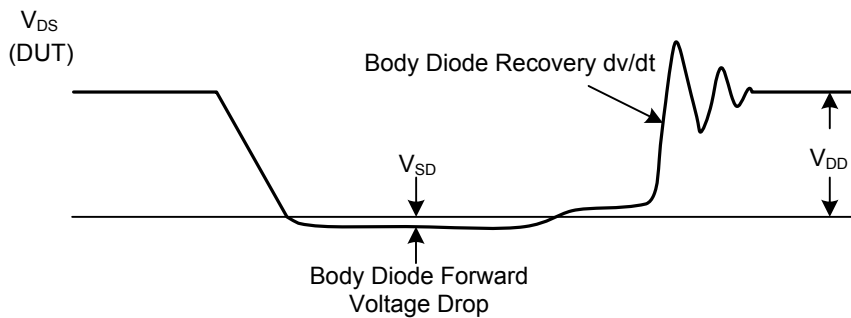
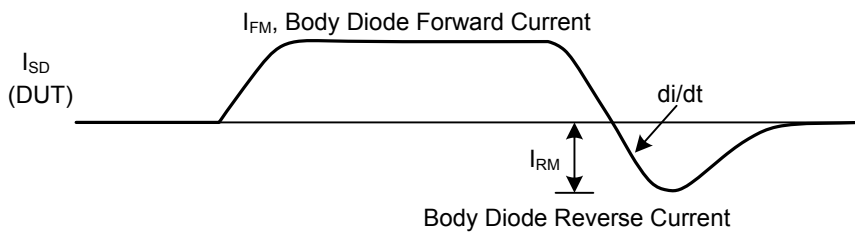
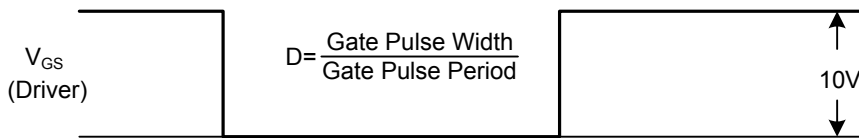
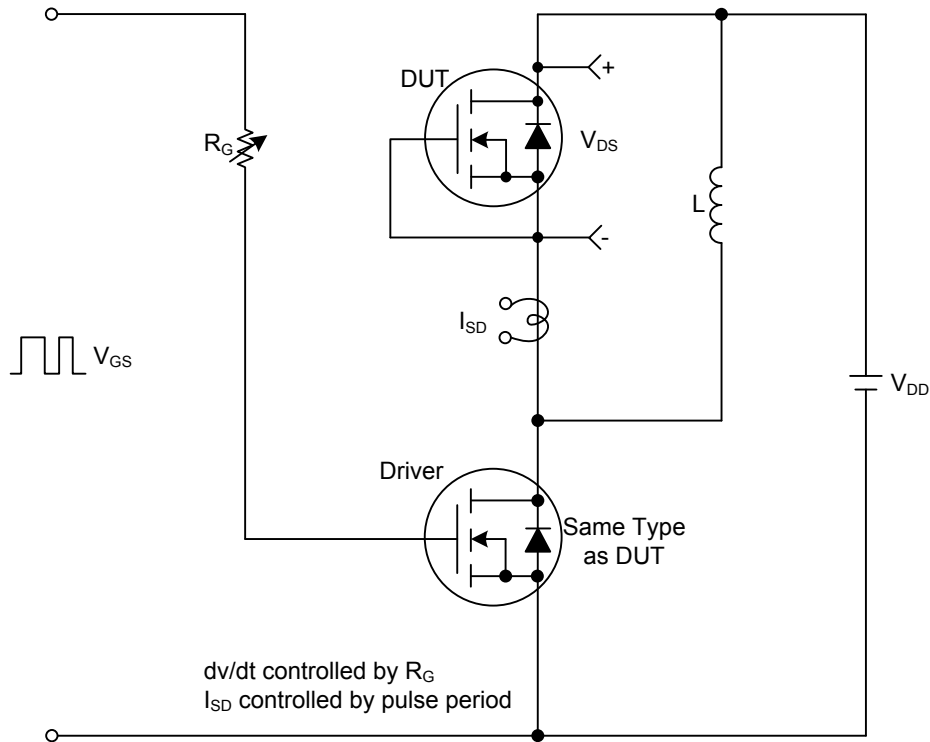
2. Essentially independent of operating temperature

■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				11	A
Maximum Body-Diode Pulsed Current	I_{SM}				44	A
Drain-Source Diode Forward Voltage	V_{SD}	$I_S = 11A, V_{GS} = 0V$			1.4	V
Body Diode Reverse Recovery Time	t_{RR}	$V_{GS} = 0V, I_S = 11A,$		90		ns
Body Diode Reverse Recovery Charge	Q_{RR}	$dI_F/dt = 100A/\mu s^4$		1.5		μC

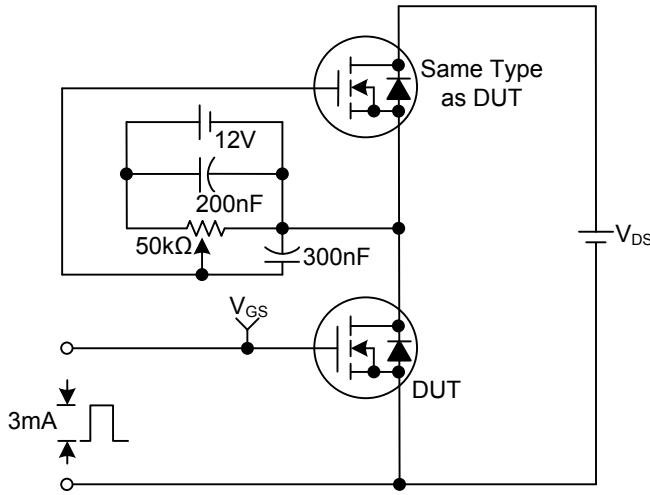
■ TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test Circuit & Waveforms

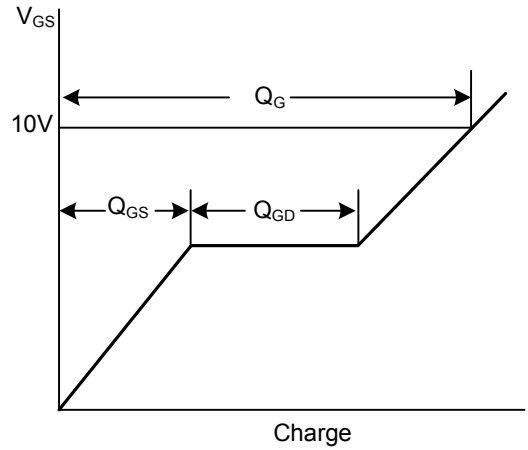


■ TEST CIRCUITS AND WAVEFORMS (Cont.)

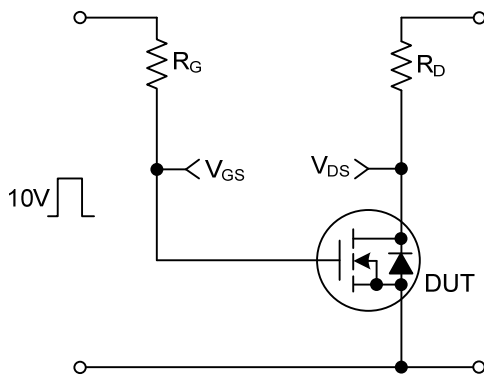
Gate Charge Test Circuit



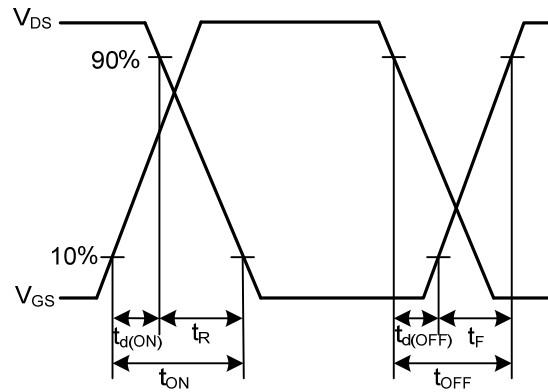
Gate Charge Waveforms



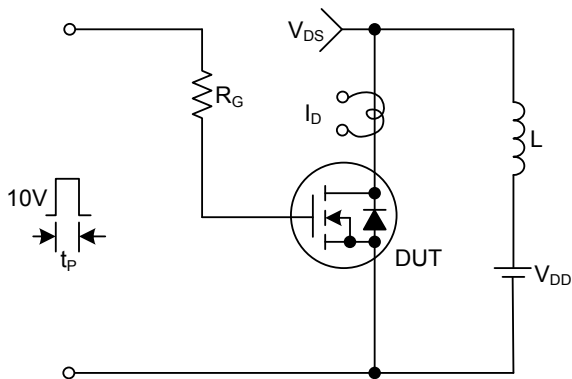
Resistive Switching Test Circuit



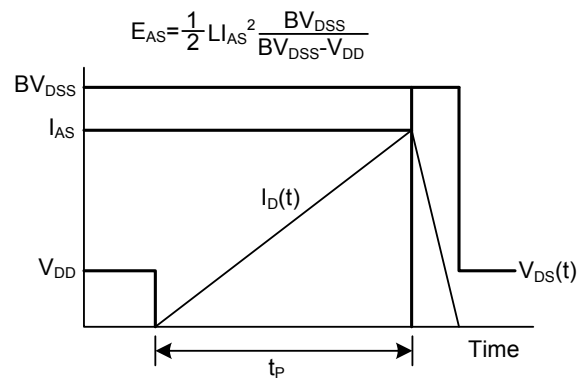
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



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