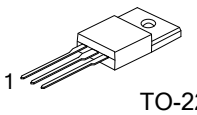
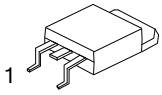
2 Amps, 500 Volts
N-CHANNEL POWER MOSFET



TO-220F



TO-252

■ DESCRIPTION

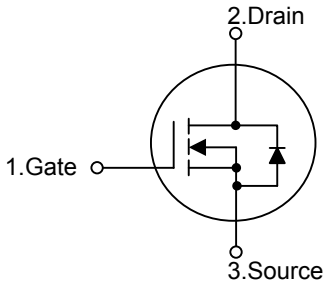
The UTC **2N50** is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **2N50** is generally applied in high efficiency switch mode power supplies, active power factor correction and electronic lamp ballasts based on half bridge topology.

■ FEATURES

* 2A, 500V, $R_{DS(ON)}$= 5Ω @ V_{GS}=10V
* High Switching Speed
* 100% Avalanche Tested

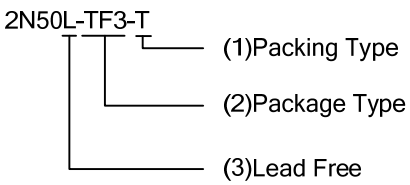
■ SYMBOL



■ ORDERING INFORMATION

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

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



(1) T: Tube, R: Tape Reel

(2) TF3: TO-220F, TN3: TO-252

(3) G: Halogen Free, L: Lead Free

■ 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 (T_C=25°C)		I_D	2 *	A
	Pulsed (Note 1)		I_{DM}	8 *	A
Avalanche Current (Note 1)			I_{AR}	2	A
Avalanche Energy	Single Pulsed		E_{AS}	82	mJ
	Repetitive (Note 3)		E_{AR}	3.3	mJ
Power Dissipation	T_C=25°C	TO-220F	P_D	23	W
		TO-252		50	
	Derate above 25°C	TO-220F		0.18	W/°C
		TO-252		0.4	
Junction Temperature			T_J	+150	°C
Storage Temperature			T_{STG}	-55~+150	°C

Note: 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.
* Drain current limited by maximum junction temperature

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F	θ_{JA}	62.5	°C/W
	TO-252		110	
Junction to Case	TO-220F	θ_{JC}	5.5	°C/W
	TO-252		2.5	

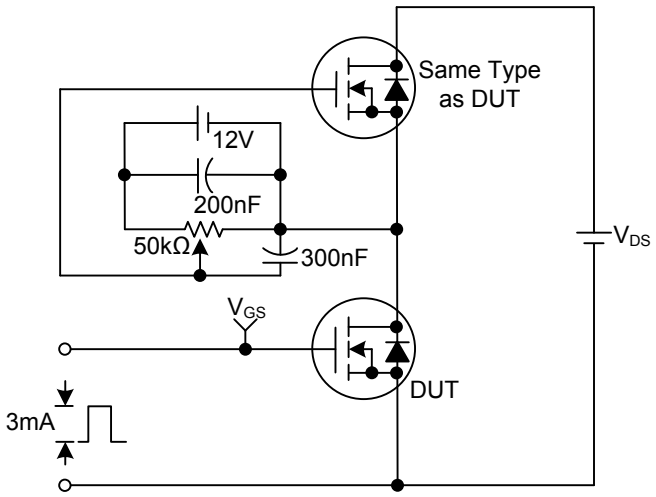
■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise noted)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	500			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=500V, V_{GS}=0V			25	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=1A		3.1	5	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		236		pF
Output Capacitance		C_{OSS}			40		pF
Reverse Transfer Capacitance		C_{RSS}			22		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{GS}=10V, V_{DS}=400V, I_D=2A (Note 3, 4)		20	25	nC
Gate to Source Charge		Q_{GS}			2	3	nC
Gate to Drain Charge		Q_{GD}			12	15	nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=250V, I_D=2A, R_G=25Ω (Note 3, 4)		10		ns
Rise Time		t_R			20		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			60		ns
Fall-Time		t_F			20		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				2	A
Maximum Body-Diode Pulsed Current		I_{SM}				8	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=2A, V_{GS}=0V			1.2	V
Body Diode Reverse Recovery Time		t_{RR}	I_S=2A, V_{GS}=0V, dI_F/dt=100A/μs (Note 3)		300		ns
Body Diode Reverse Recovery Charge		Q_{RR}			2.1		μC

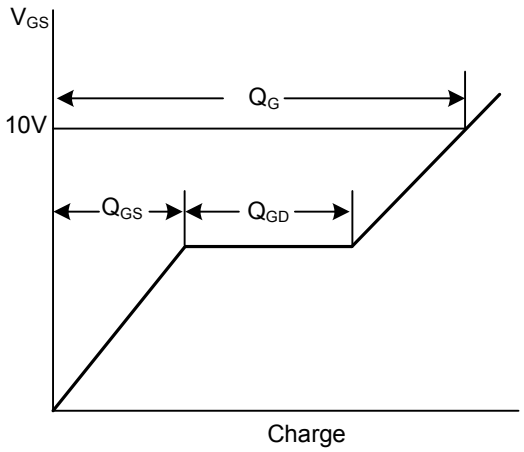
Notes: 1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. I_{SD} ≤ 2A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
3. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%
4. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

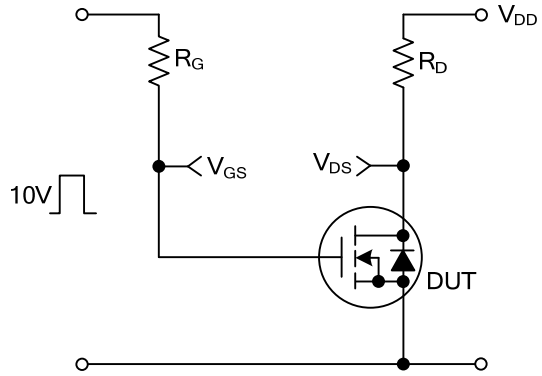
Gate Charge Test Circuit



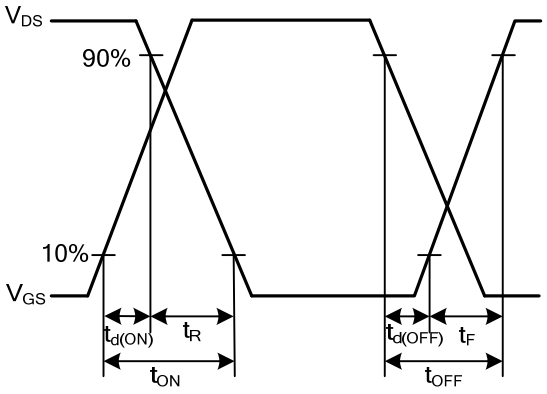
Gate Charge Waveforms



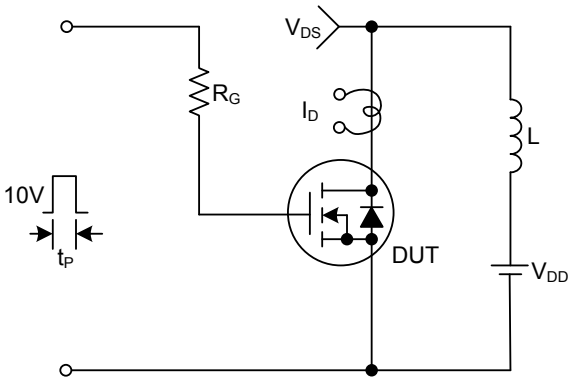
Resistive Switching Test Circuit



Resistive Switching Waveforms

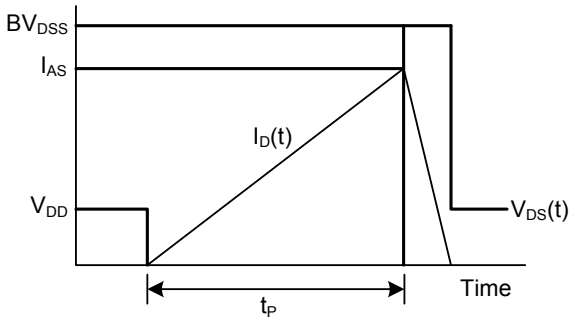


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

$$E_{AS}=\frac{1}{2}LI_{AS}^{2}\frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$



Peak Diode Recovery dv/dt Test Circuit & Waveforms