



12N50-CB

Preliminary

Power MOSFET

12A, 500V N-CHANNEL
POWER MOSFET

■ DESCRIPTION

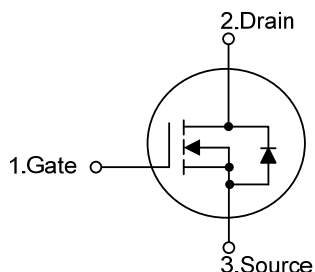
The UTC **12N50-CB** is a N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **12N50-CB** is generally applied in high efficiency switch mode power supplies, active power factor correction and electronic lamp ballasts based on half bridge topology.

■ FEATURES

- * $R_{DS(ON)} \leq 0.52\Omega$ @ $V_{GS}=10V$, $I_D=6.0A$
- * High Switching Speed
- * 100% Avalanche Tested

■ SYMBOL

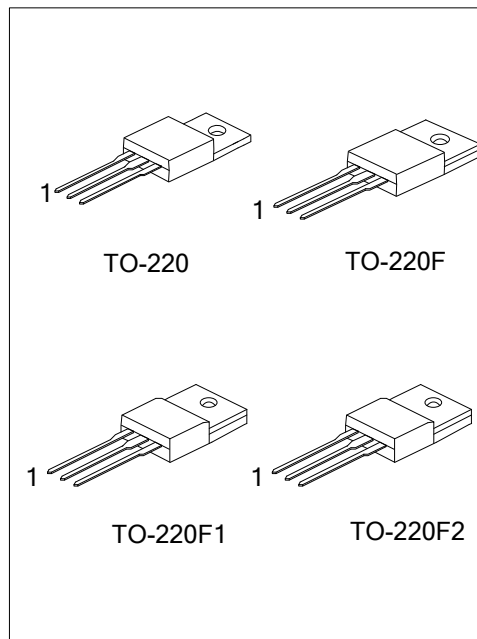


■ ORDERING INFORMATION

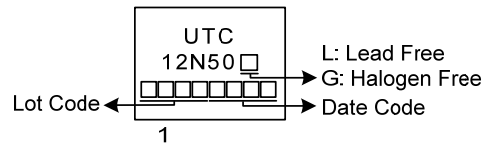
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
12N50L-TA3-T	12N50G-TA3-T	TO-220	G	D	S	Tube
12N50L-TF1-T	12N50G-TF1-T	TO-220F1	G	D	S	Tube
12N50L-TF2-T	12N50G-TF2-T	TO-220F2	G	D	S	Tube
12N50L-TF3-T	12N50G-TF3-T	TO-220F	G	D	S	Tube

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

<p>12N50G-TA3-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) T: Tube</p> <p>(2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
--	--



■ MARKING



■ ABSOLUTE MAXIMUM RATINGS ($T_C=25^{\circ}\text{C}$, 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	12	A
	Pulsed (Note 2)	I_{DM}	48	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	115	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.5	V/ns
Power Dissipation	TO-220	P_D	160	W
	TO-220F/TO-220F1		50	W
	TO-220F2		54	W
Junction Temperature		T_J	+150	$^{\circ}\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^{\circ}\text{C}$

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. $L = 10\text{mH}$, $I_{AS} = 4.8\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD} \leq 12\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ THERMAL DATA

PARAMETER	PACKAGE	SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	0.78	$^{\circ}\text{C}/\text{W}$
	TO-220F/TO-220F1		2.5	$^{\circ}\text{C}/\text{W}$
	TO-220F2		2.31	$^{\circ}\text{C}/\text{W}$

■ ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$, unless otherwise specified)

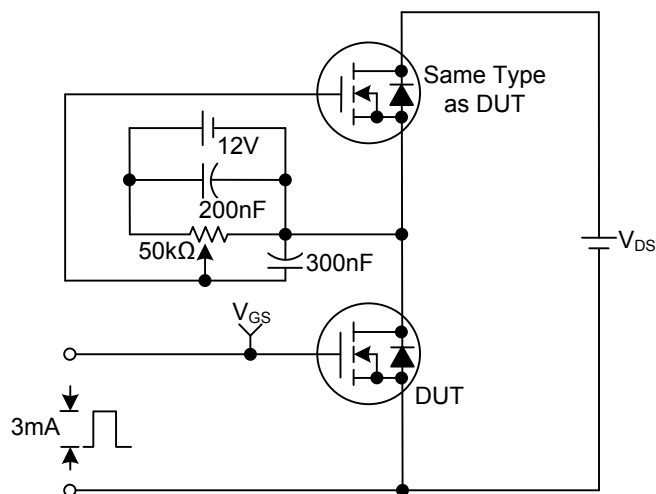
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	500			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =500V, V _{GS} =0V			10	μA
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =+30V, V _{DS} =0V			+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 =6.0A			0.52	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		1360		pF
Output Capacitance		C _{OSS}			150		pF
Reverse Transfer Capacitance		C _{RSS}			6		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =50V, V _{GS} =10V, I _D =1.3A I _G =100μA (Note 1, 2)		86		nC
Gate to Source Charge		Q _{GS}			9		nC
Gate to Drain Charge		Q _{GD}			8		nC
Turn-ON Delay Time (Note 1)		t _{D(ON)}	V _{DD} =30V, V _{GS} =10V, I _D =0.5A, R _G =25Ω (Note 1, 2)		60		ns
Rise Time		t _R			48		ns
Turn-OFF Delay Time		t _{D(OFF)}			260		ns
Fall-Time		t _F			56		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				12	A
Maximum Body-Diode Pulsed Current		I _{SM}				48	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =12A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)		t _{rr}	I _S =12A, V _{GS} =0V		250		ns
Reverse Recovery Charge		Q _{rr}	dI _F /dt=100A/μs		3		μC

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

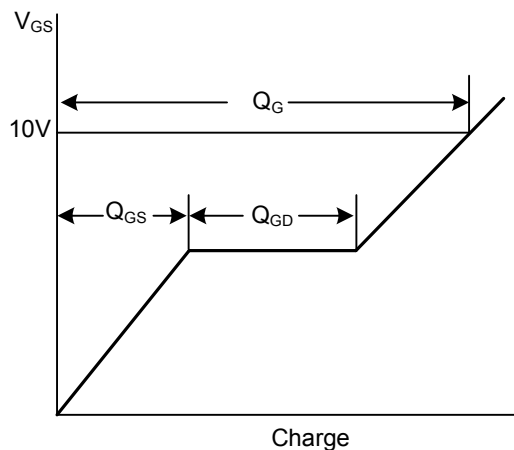
2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

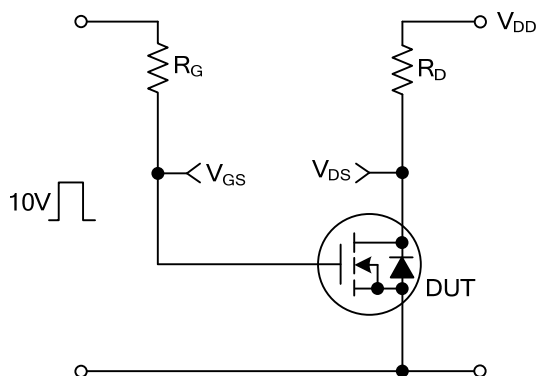
Gate Charge Test Circuit



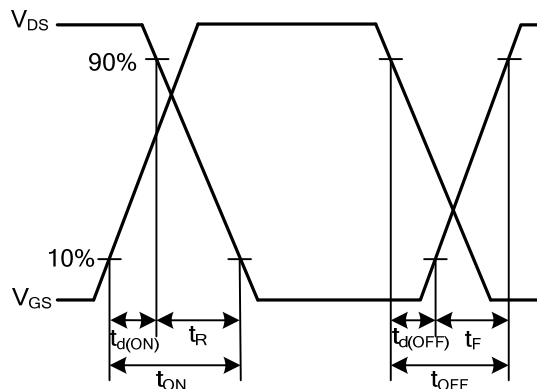
Gate Charge Waveforms



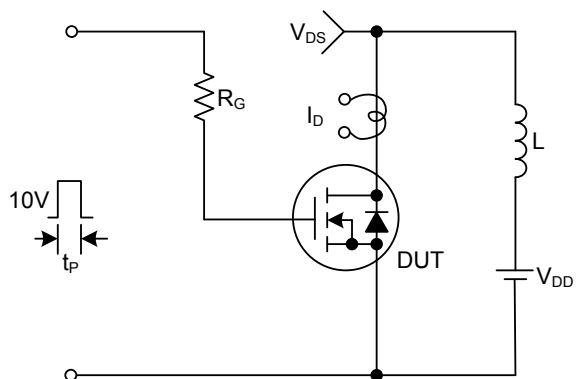
Resistive Switching Test Circuit



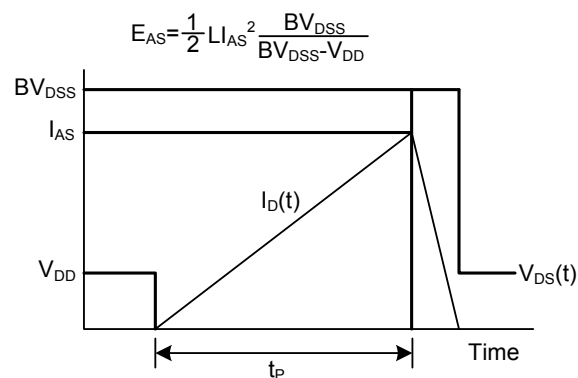
Resistive Switching Waveforms



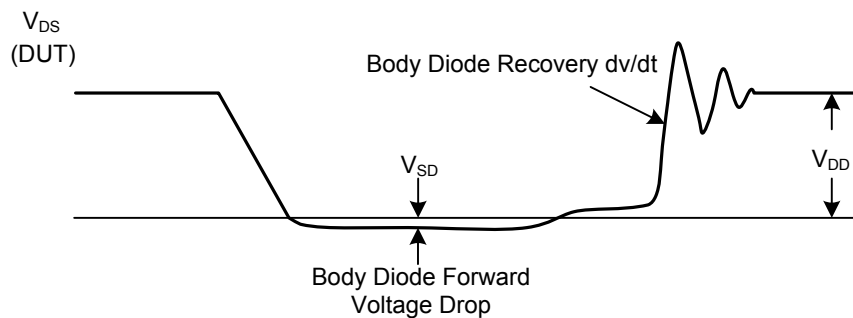
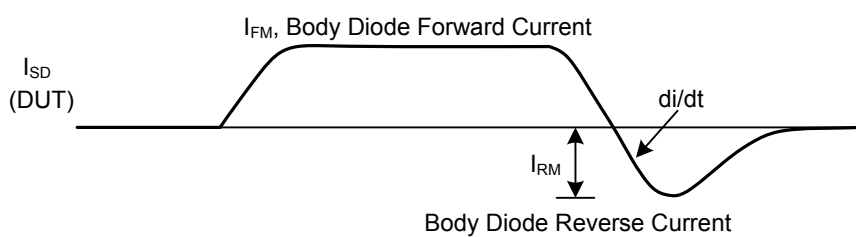
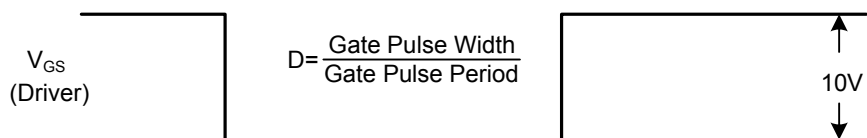
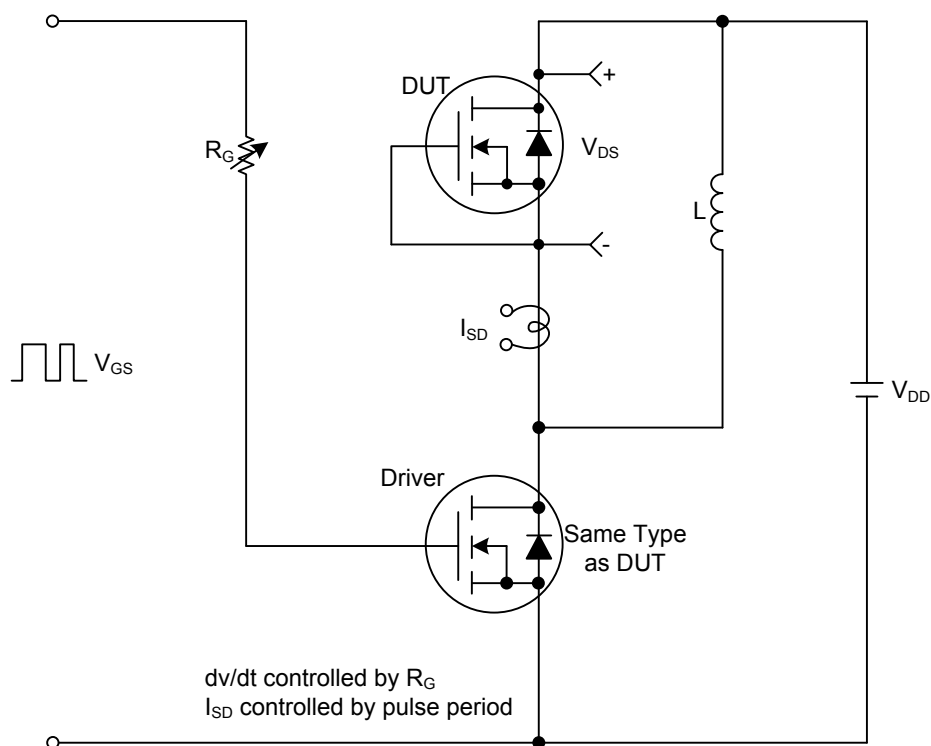
Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



■ TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test Circuit & Waveforms

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.