



5N50-CB

Preliminary

Power MOSFET

5.0A, 500V N-CHANNEL POWER MOSFET

DESCRIPTION

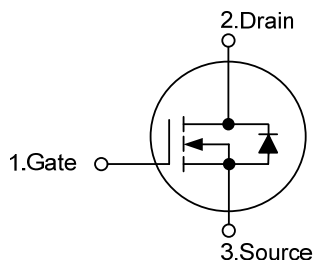
The UTC **5N50-CB** is a N-channel power MOSFET adopting UTC's advanced technology to provide customers with DMOS, planar stripe technology. This technology is designed to meet the requirements of the minimum on-state resistance and perfect switching performance. It also can withstand high energy pulse in the avalanche and communication mode.

The UTC **5N50-CB** can be used in applications, such as active power factor correction, high efficiency switched mode power supplies, electronic lamp ballasts based on half bridge topology.

FEATURES

- * $R_{DS(ON)} < 1.6\Omega @ V_{GS}=10V, I_D=2.5A$
- * 100% avalanche tested
- * High switching speed

SYMBOL

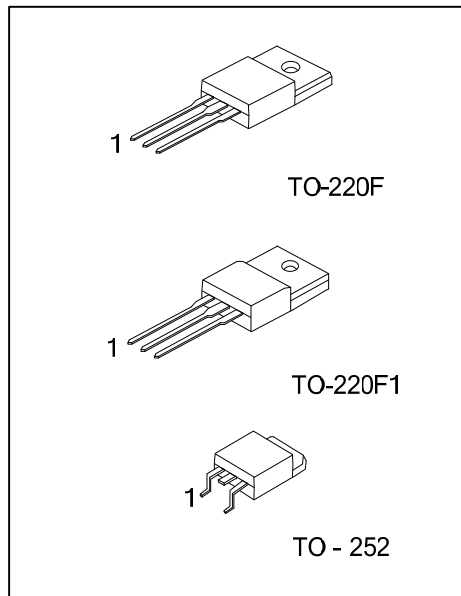


ORDERING INFORMATION

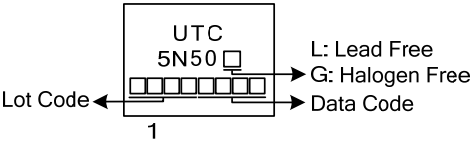
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
5N50L-TF3-T	5N50G-TF3-T	TO-220F	G	D	S	Tube
5N50L-TF1-T	5N50G-TF1-T	TO-220F1	G	D	S	Tube
5N50L-TN3-R	5N50G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>5N50L-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TF3: TO-220F, TF1: TO-220F1, TN3: TO-252</p> <p>(3) L: Lead Free, G: Halogen Free and Lead Free</p>
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MARKING



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■ 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	5	A
	Pulsed (Note 2)	I_{DM}	20	A
Avalanche Current (Note 2)		I_{AR}	4.6	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	106	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.17	V/ns
Power Dissipation	TO-220F/TO-220F1	P_D	38	W
	TO-252		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. $L = 10\text{mH}$, $I_{AS} = 4.6\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 5\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220F/TO-220F1	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-252		110	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220F/TO-220F1	θ_{JC}	3.29	$^\circ\text{C}/\text{W}$
	TO-252		2.31	$^\circ\text{C}/\text{W}$

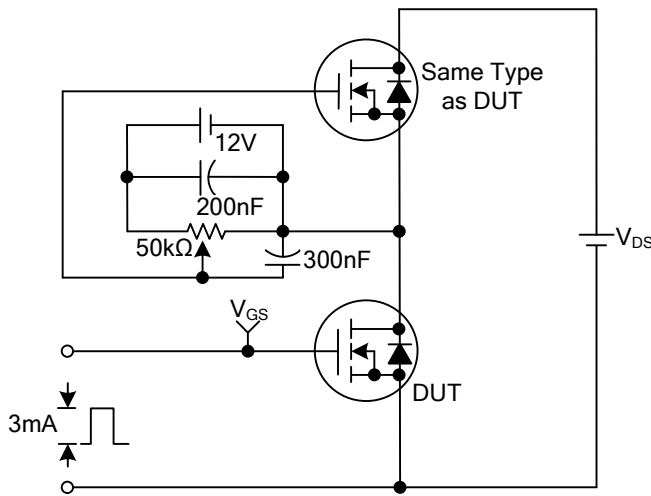
■ ELECTRICAL CHARACTERISTICS (T_c=25°C, unless otherwise specified)

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			1	μA
Gate- Source Leakage Current	Forward	I _{GSS}			100	nA
	Reverse					
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 =2.5A			1.6	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		630		pF
Output Capacitance	C _{OSS}			65		pF
Reverse Transfer Capacitance	C _{RSS}			50		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)		18		nC
Gate to Source Charge	Q _{GS}			4		nC
Gate to Drain Charge	Q _{GD}			3		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)		50		ns
Rise Time	t _R			25		ns
Turn-OFF Delay Time	t _{D(OFF)}			125		ns
Fall-Time	t _F			25		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				5	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				20	A
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	I _S =5A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)	t _{rr}	I _S =5A, V _{GS} =0V, dI _F /dt=100A/μs (Note 1)		345		ns
Reverse Recovery Charge	Q _{rr}				1.58	

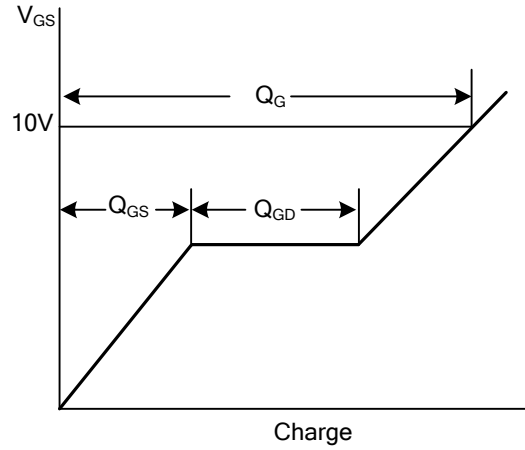
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

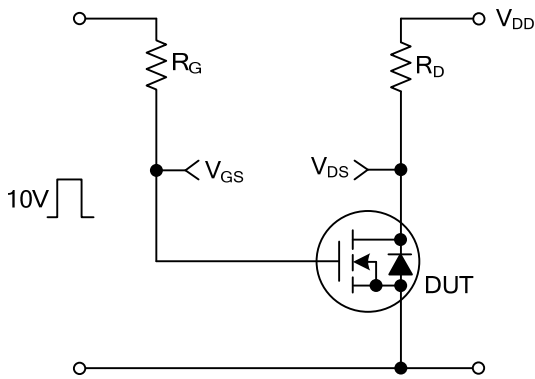
TEST CIRCUITS AND WAVEFORMS (Cont.)



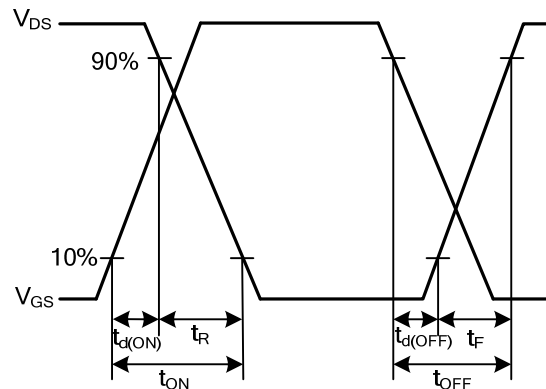
Gate Charge Test Circuit



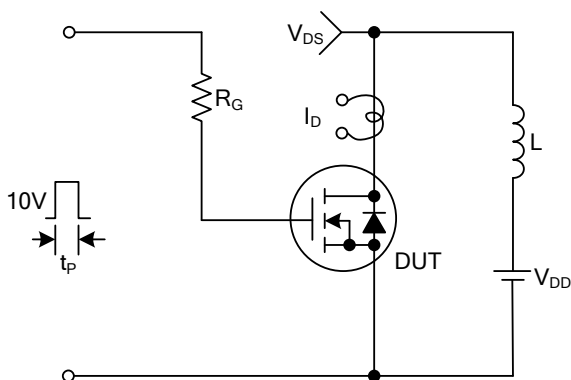
Gate Charge Waveforms



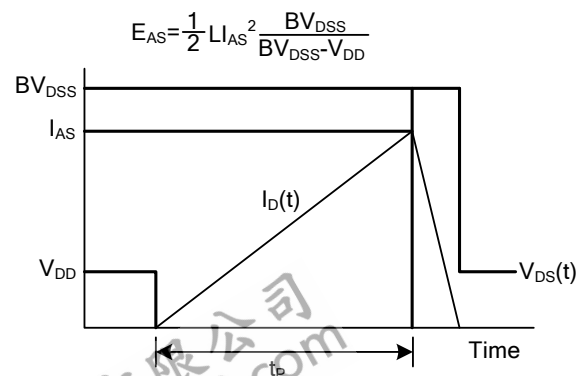
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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