



22A, 200V N-CHANNEL POWER MOSFET

DESCRIPTION

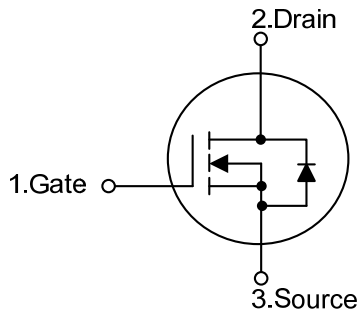
The UTC **22N20** is an N-channel enhancement mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology is specialized in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **22N20** is universally applied in low voltage such as automotive, high efficiency switching for DC/DC converters and DC motor control.

FEATURES

- * Fast switching
- * $R_{DS(on)} = 0.14\Omega @ V_{GS} = 10V$
- * Typically 20nC low gate charge
- * 100% avalanche tested
- * Typically 25pF Low C_{RSS}
- * Improved dv/dt capability

SYMBOL

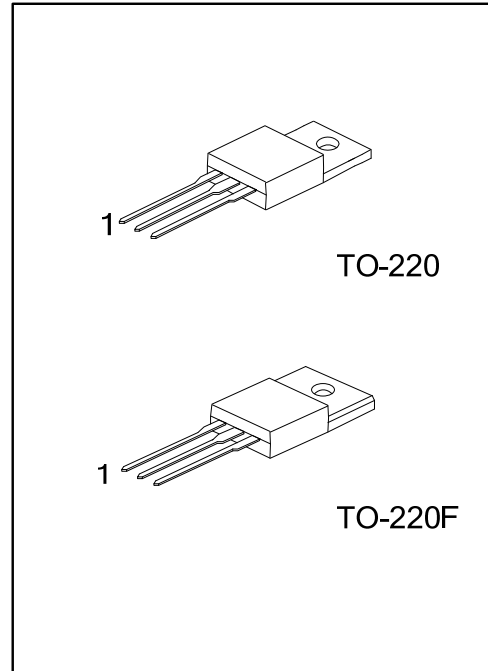


ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
22N20L-TA3-T	22N20G-TA3-T	TO-220	G	D	S	Tube
22N20L-TF3-T	22N20G-TF3-T	TO-220F	G	D	S	Tube

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

<p>22N20L-TA3-R</p>	<p>(1) R: Tape Reel, T: Tube</p> <p>(2) TA3: TO-220, AF3: TO-220F</p> <p>(3) G: Halogen Free, L: Lead Free</p>
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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}	200	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous ($T_C=25^\circ\text{C}$)	I_D	22	A
	Pulsed (Note 2)	I_{DM}	88	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	250	mJ
Power Dissipation ($T_C=25^\circ\text{C}$)	TO-220	P_D	156	W
	TO-220F		50	
Derate above 25°C	TO-220		1.25	W/ $^\circ\text{C}$
	TO-220F		0.4	
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55~+150	$^\circ\text{C}$

Note: 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. $L = 0.85\text{mH}$, $I_{AS} = 21\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	0.8	$^\circ\text{C}/\text{W}$
	TO-220F		2.5	

■ 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}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	200			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to 25°C , $I_D=250\mu\text{A}$		0.25		V/ $^\circ\text{C}$
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=200\text{V}$, $V_{GS}=0\text{V}$			1	μA
		$V_{DS}=160\text{V}$, $T_C=125^\circ\text{C}$			10	
Gate- Source Leakage Current	Forward	$V_{GS}=+30\text{V}$, $V_{DS}=0\text{V}$			+100	nA
	Reverse	$V_{GS}=-30\text{V}$, $V_{DS}=0\text{V}$			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	3.0		5.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=11\text{A}$		0.12	0.14	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS}=0\text{V}$, $V_{DS}=25\text{V}$, $f=1.0\text{MHz}$		1700	2200	pF
Output Capacitance	C_{OSS}		220	290	pF	
Reverse Transfer Capacitance	C_{RSS}		30	40	pF	
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	$V_{GS}=10\text{V}$, $V_{DS}=160\text{V}$, $I_D=22\text{A}$ (Note 1, 2)		27	35	nC
Gate to Source Charge	Q_{GS}		5.8		nC	
Gate to Drain Charge	Q_{GD}		11.2		nC	
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=100\text{V}$, $I_D=22\text{A}$, $R_G=25\Omega$ (Note 1, 2)		35	80	ns
Rise Time	t_R		300	610	ns	
Turn-OFF Delay Time	$t_{D(OFF)}$		130	270	ns	
Fall-Time	t_F		180	370	ns	

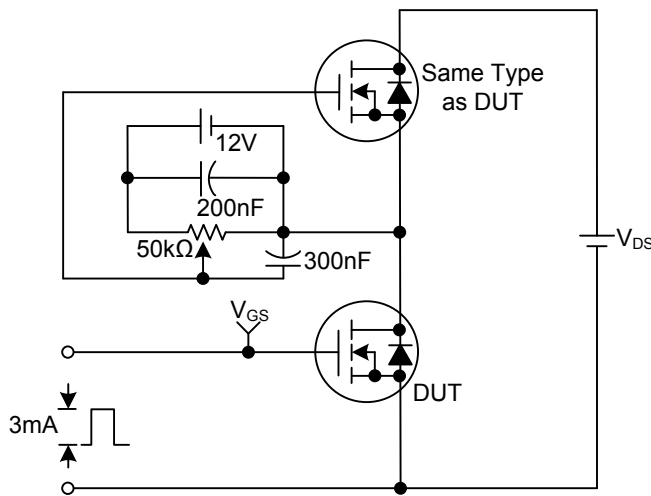
■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				22	A
Maximum Body-Diode Pulsed Current	I_{SM}				88	A
Drain-Source Diode Forward Voltage	V_{SD}	$I_S=22A, V_{GS}=0V$			1.5	V

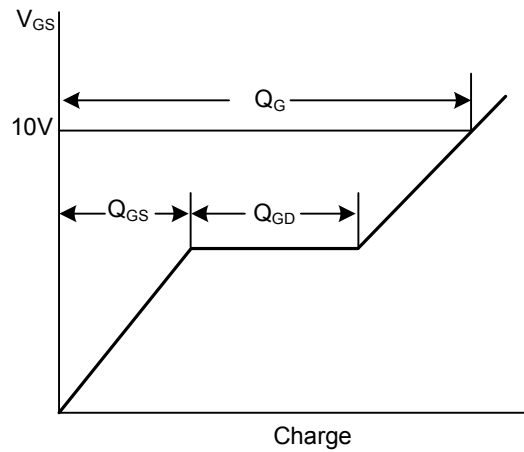
Note: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$
 2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

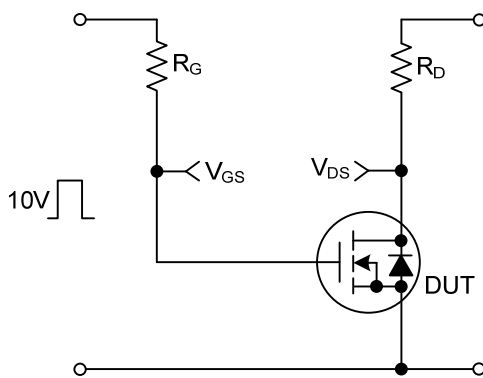
Gate Charge Test Circuit



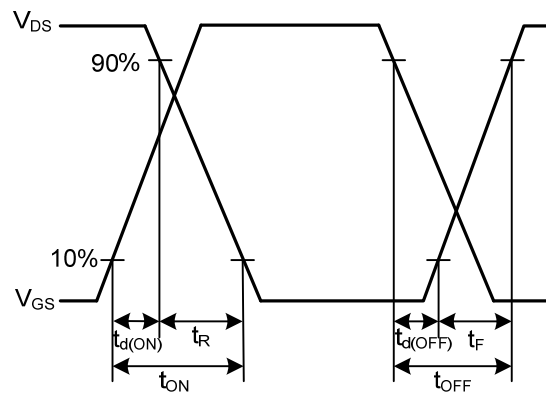
Gate Charge Waveforms



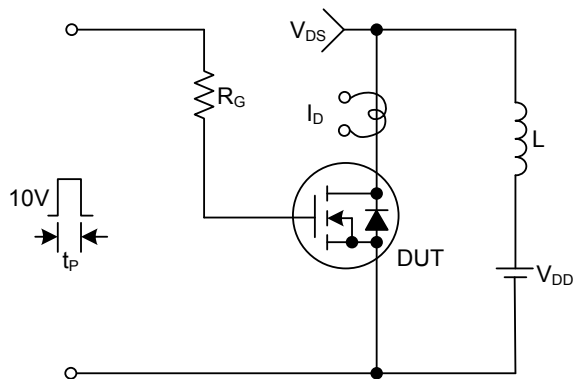
Resistive Switching Test Circuit



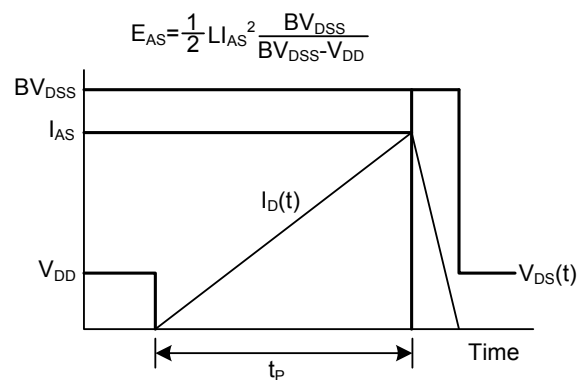
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit

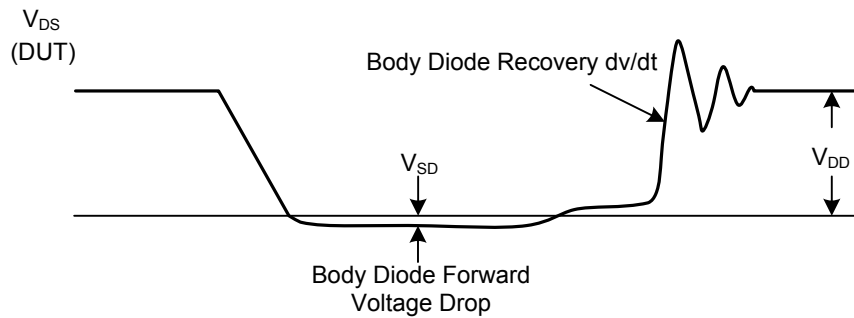
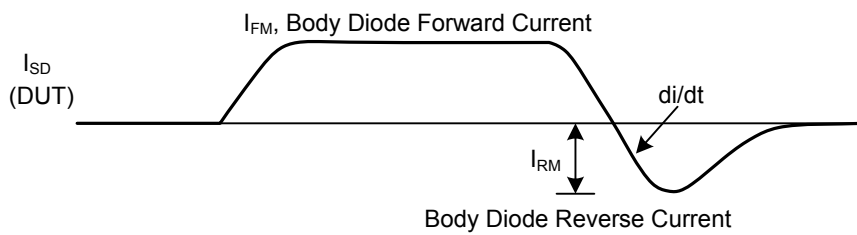
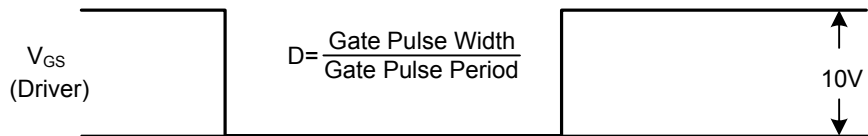
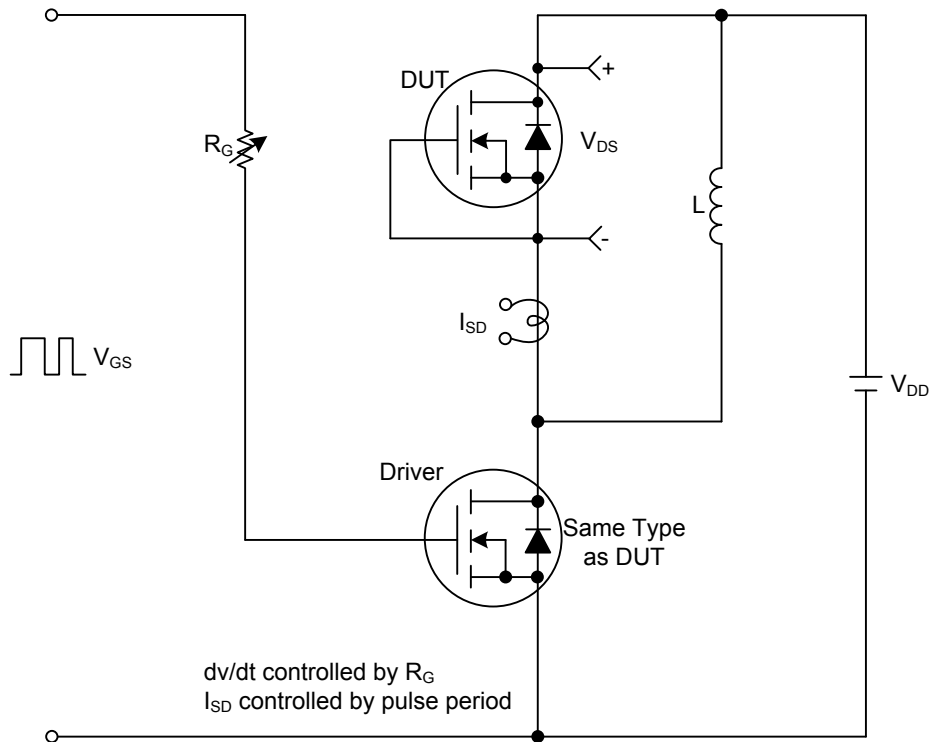


Unclamped Inductive Switching Waveforms



■ TEST CIRCUITS AND WAVEFORMS(Cont.)

Peak Diode Recovery dv/dt Test Circuit & Waveforms



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