

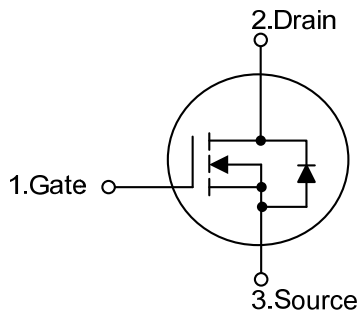
**22N20****Preliminary****Power MOSFET****22A, 200V N-CHANNEL
POWER MOSFET****DESCRIPTION**

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

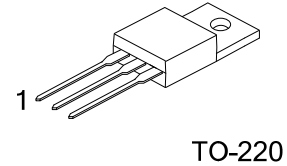
- * Fast switching
- * $R_{DS(on)} < 0.14\Omega$ @ $V_{GS} = 10V$, $I_D = 11A$
- * Typically 20nC low gate charge
- * 100% avalanche tested
- * Typically 25pF Low C_{RSS}
- * Improved dv/dt capability

SYMBOL**ORDERING INFORMATION**

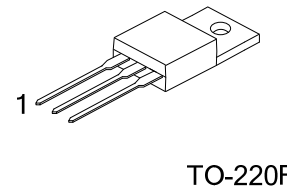
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
22N20L-TA3-T	22N20G-TA3-T	TO-220	G	D	S	Tube
22N20L-TF3-T	22N20G-TF3-T	TO-220F	G	D	S	Tube

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

22N20L-TA3-T (1) Packing Type (2) Package Type (3) Green Package	(1) R: Tape Reel (2) TA3: TO-220, TF3: TO-220F (3) L: Lead Free, G: Halogen Free and Lead Free
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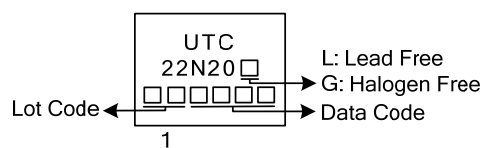


TO-220



TO-220F

■ MARKING



■ **ABSOLUTE MAXIMUM RATINGS** ($T_C=25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DS}	200	V
Gate-Source Voltage		V_{GS}	± 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	$^\circ\text{C}$

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

■ **THERMAL DATA**

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

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

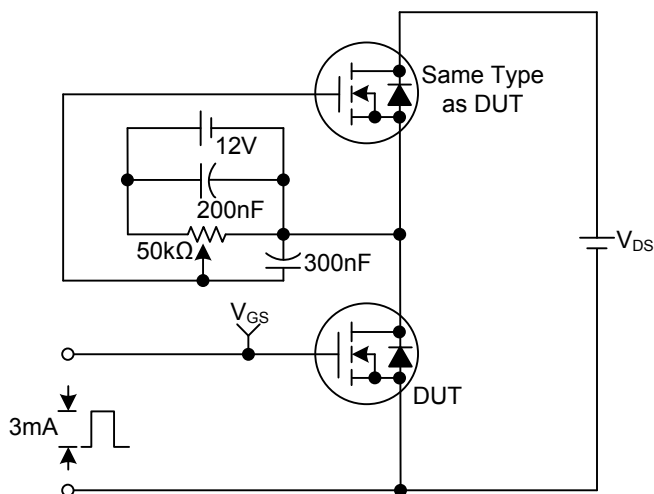
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	200			V
Breakdown Voltage Temperature Coefficient		ΔBV _{DSS} /ΔT _J	Reference to 25°C, I _D =250μA		0.25		V/°C
Drain-Source Leakage Current		I _{DSS}	V _{DS} =200V, V _{GS} =0V			1	μA
			V _{DS} =160V, T _C =125°C			10	
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 =11A		0.12	0.14	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		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} =10V, V _{DS} =160V, I _D =22A (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} =100V, I _D =22A, R _G =25Ω (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
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

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

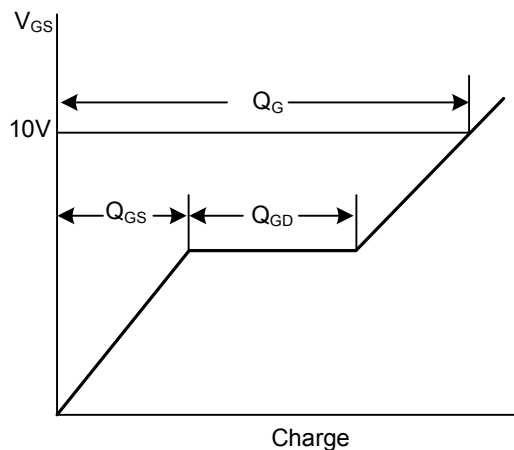
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

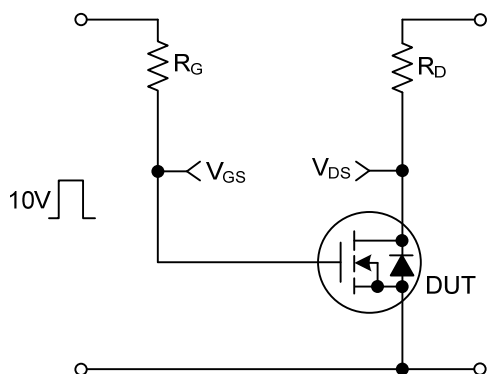
Gate Charge Test Circuit



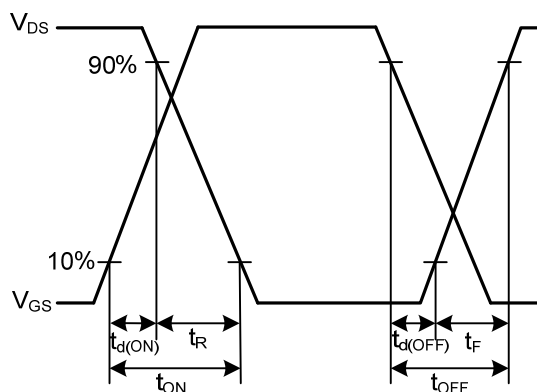
Gate Charge Waveforms



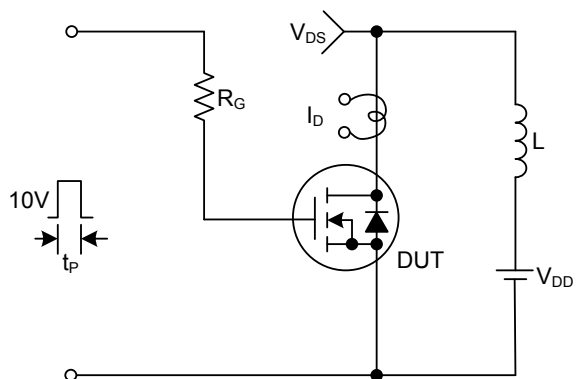
Resistive Switching Test Circuit



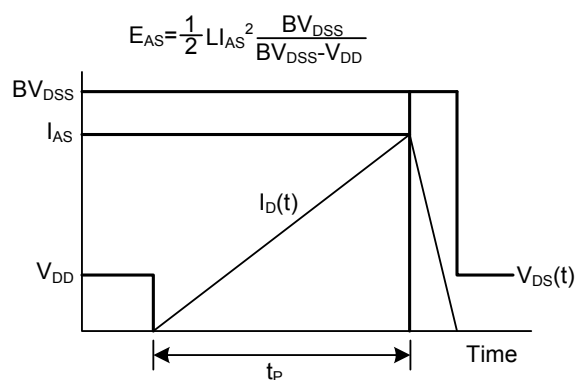
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit

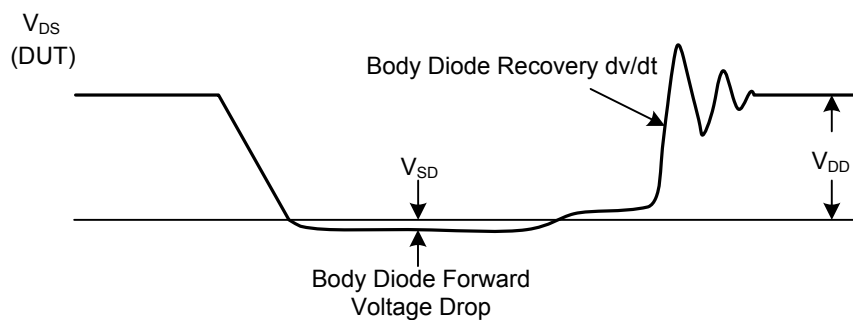
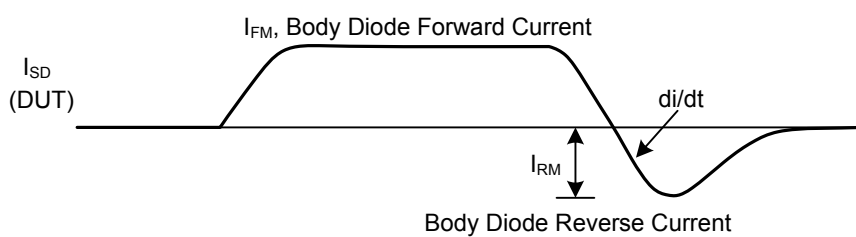
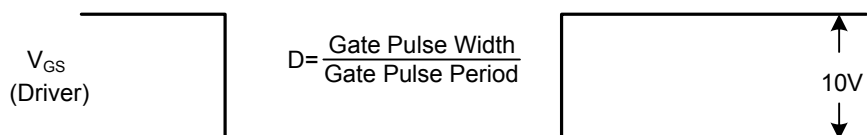
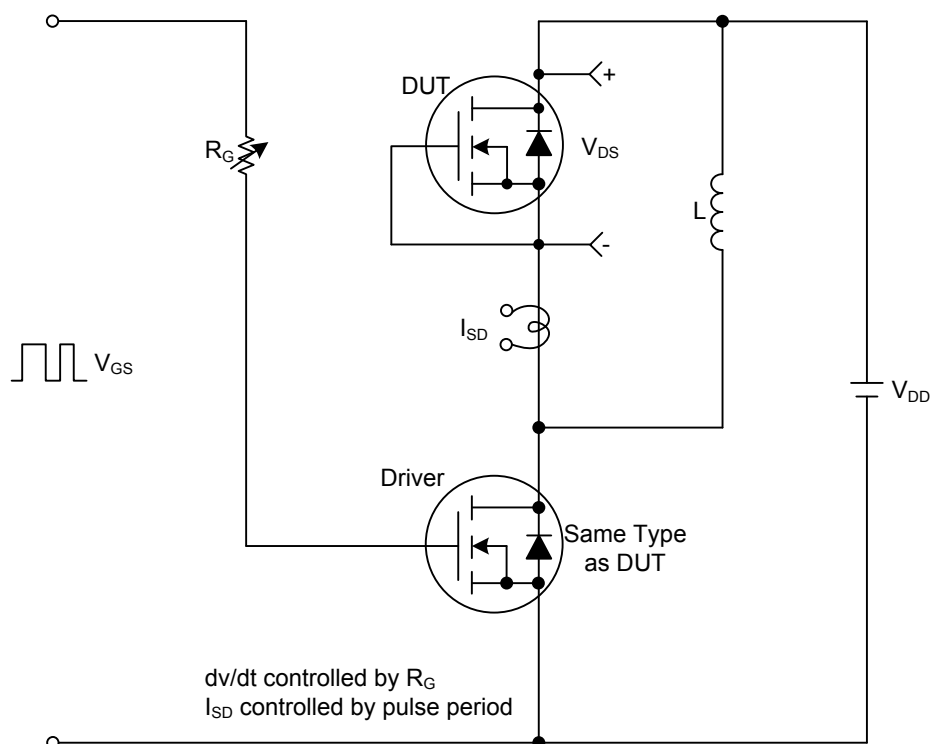


Unclamped Inductive Switching Waveforms



■ TEST CIRCUITS AND WAVEFORMS (Cont.)

Peak Diode Recovery dv/dt Test Circuit & Waveforms



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