



7N20

Power MOSFET

7.0A, 200V N-CHANNEL POWER MOSFET

DESCRIPTION

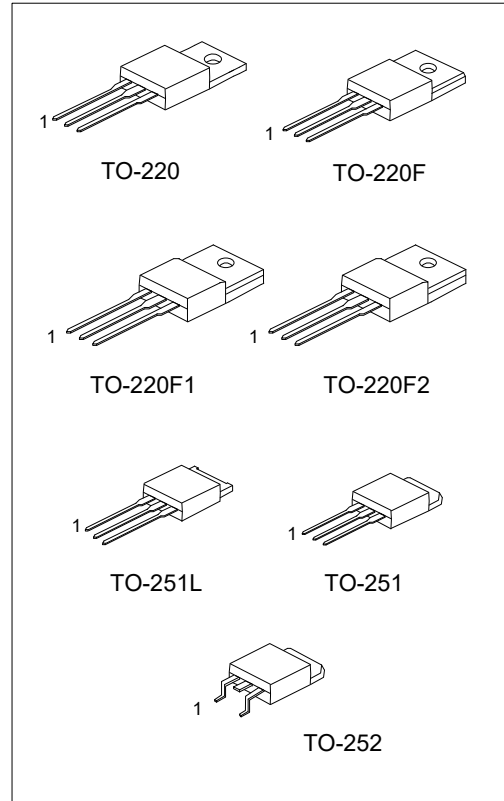
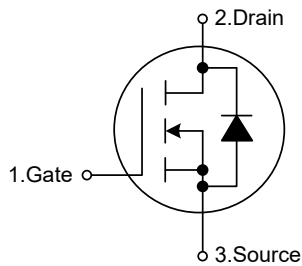
The UTC **7N20** is an N-Channel enhancement mode power MOSFET, providing customers with excellent switching performance and minimum on-state resistance. This device can also withstand high energy pulse in the avalanche and the commutation mode.

The UTC **7N20** is generally applied in low voltage applications, such as DC motor controls, audio amplifiers and high efficiency switching AC/DC converters.

FEATURES

- * $R_{DS(ON)} \leq 0.69 \Omega$ @ $V_{GS}=10V$, $I_D=3.5A$
- * Low Gate Charge: 5.8nC (TYP.)
- * Low C_{RSS} : 10 pF (TYP.)
- * Fast Switching
- * Improved dv/dt Capability

SYMBOL



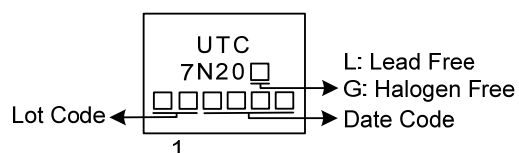
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7N20L-TA3-T	7N20G-TA3-T	TO-220	G	D	S	Tube
7N20L-TF1-T	7N20G-TF1-T	TO-220F1	G	D	S	Tube
7N20L-TF2-T	7N20G-TF2-T	TO-220F2	G	D	S	Tube
7N20L-TF3-T	7N20G-TF3-T	TO-220F	G	D	S	Tube
7N20L-TM3-T	7N20G-TM3-T	TO-251	G	D	S	Tube
7N20L-TMA-T	7N20G-TMA-T	TO-251L	G	D	S	Tube
7N20L-TN3-R	7N20G-TN3-R	TO-252	G	D	S	Tape Reel

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

7N20G-TA3-T (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2, TF3: TO-220F, TM3: TO-251, TMA: TO-251L, TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free
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■ MARKING



■ 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}	± 25	V
Continuous Drain Current	$T_C=25^{\circ}\text{C}$	I_D	7	A
Pulsed Drain Current (Note 2)		I_{DM}	28	A
Avalanche Current (Note 2)		I_{AR}	7	A
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	62.5	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	11	V/ns
Power Dissipation	TO-220	P_D	90	W
	TO-220F/TO-220F1 TO-220F2		27	W
	TO-251/TO-251L TO-252		45	W
Operating Junction Temperature		T_J	$-40 \sim +150$	$^{\circ}\text{C}$
Storage Temperature		T_{STG}	$-55 \sim +150$	$^{\circ}\text{C}$

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. $L = 2.5\text{mH}$, $I_{AS} = 7.0\text{A}$, $V_{DD} = 25\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD} \leq 7.0\text{A}$, $di/dt \leq 300\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	TO-251/TO-251L TO-252		110	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	1.38	$^{\circ}\text{C}/\text{W}$
	TO-220F/TO-220F1/TO-220F2		4.62	$^{\circ}\text{C}/\text{W}$
	TO-251/TO-251L TO-252		2.77 (Note)	$^{\circ}\text{C}/\text{W}$

Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

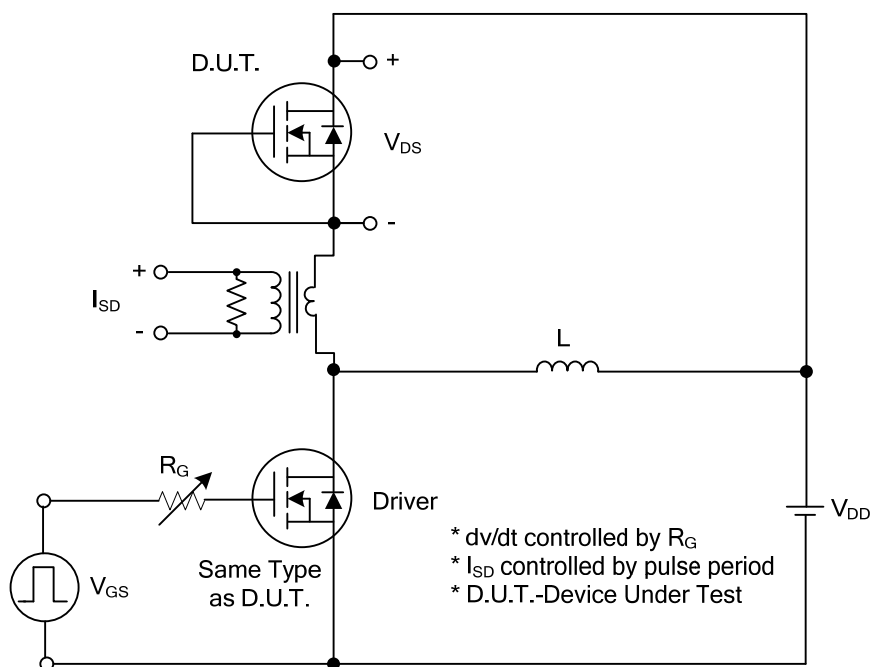
ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	200			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =200V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±25V, V _{DS} =0V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} = V _{GS} , I _D =250μA	1.0		3.0	V
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =3.5A		0.58	0.69	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		190	250	pF
Output Capacitance	C _{OSS}			60	75	pF
Reverse Transfer Capacitance	C _{RSS}			10	13	pF
SWITCHING PARAMETERS						
Total Gate Charge	Q _G	V _{GS} =10V, V _{DS} =100V, I _D =7A (Note 1,2)		5.8	7.5	nC
Gate Source Charge	Q _{GS}			1.4		nC
Gate Drain Charge	Q _{GD}			2.5		nC
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =50V, I _D =7A, R _G =25Ω (Note 1,2)		7	25	ns
Turn-ON Rise Time	t _R			24	60	ns
Turn-OFF Delay Time	t _{D(OFF)}			13	35	ns
Turn-OFF Fall-Time	t _F			19	50	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				7	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				28	A
Drain-Source Diode Forward Voltage	V _{SD}	I _S =7A, V _{GS} =0V			1.5	V
Reverse Recovery Time	t _{rr}	I _S =7A, V _{GS} =0V		128		ns
Reverse Recovery Charge	Q _{rr}	di/dt=200A/μs (Note 1)		635		nC

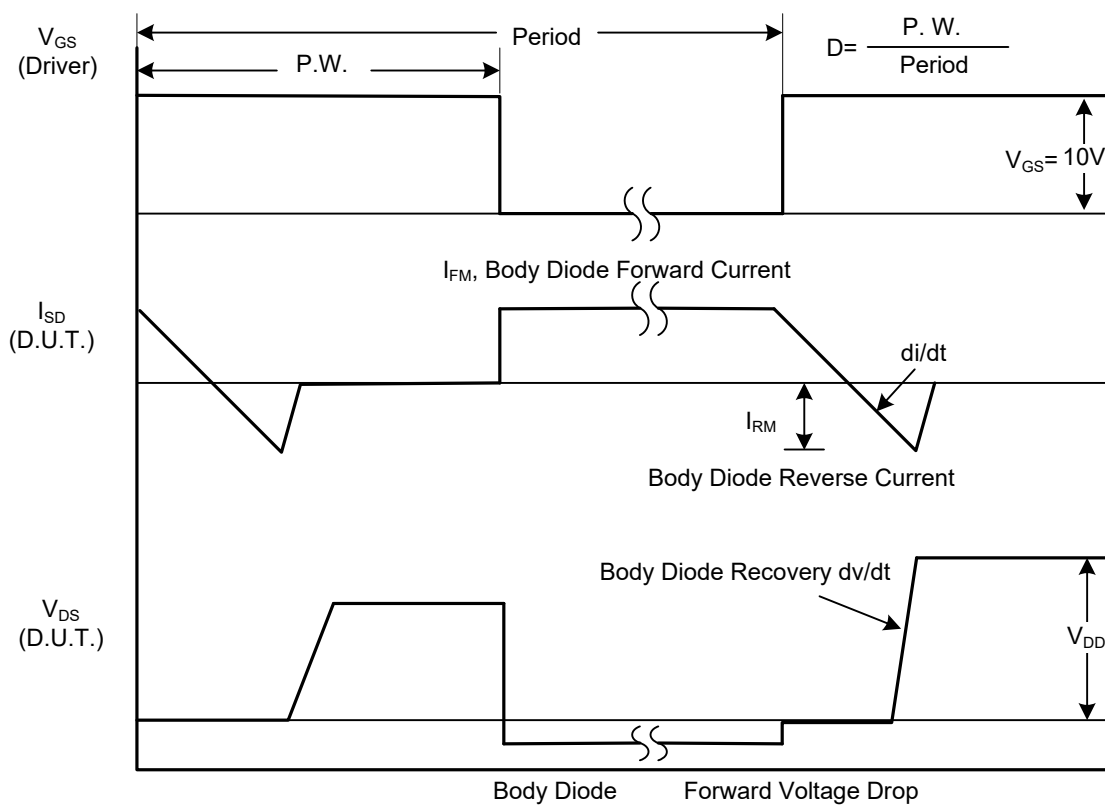
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

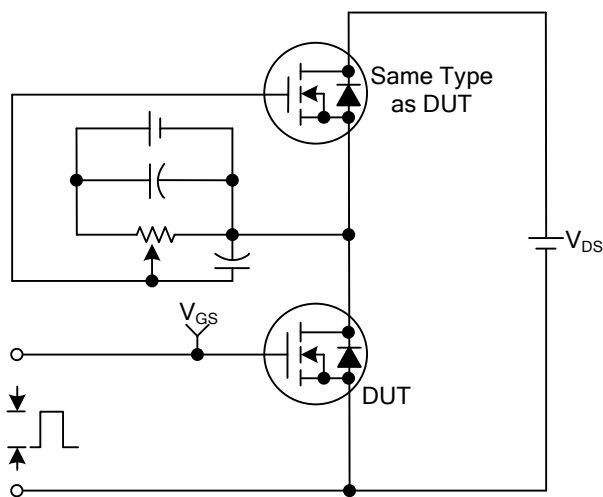


Peak Diode Recovery dv/dt Test Circuit

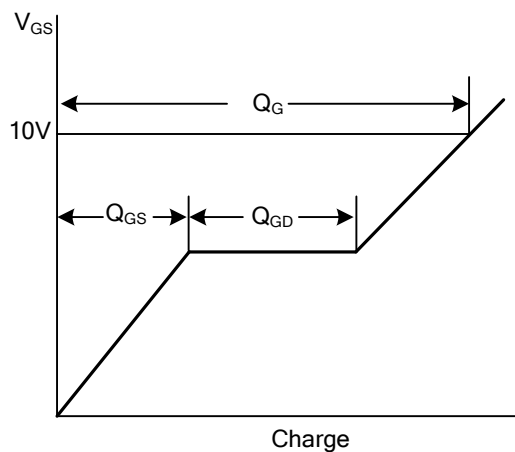


Peak Diode Recovery dv/dt Waveforms

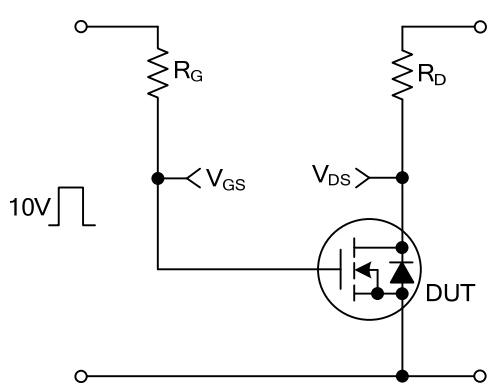
■ TEST CIRCUITS AND WAVEFORMS



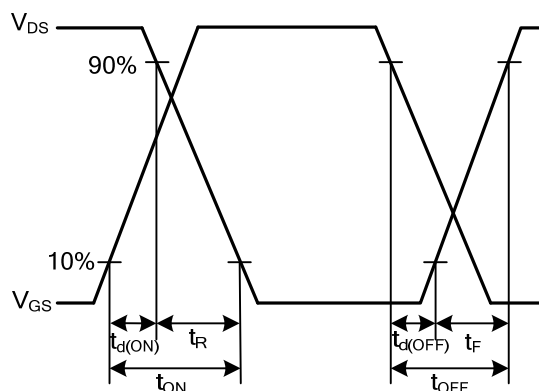
Gate Charge Test Circuit



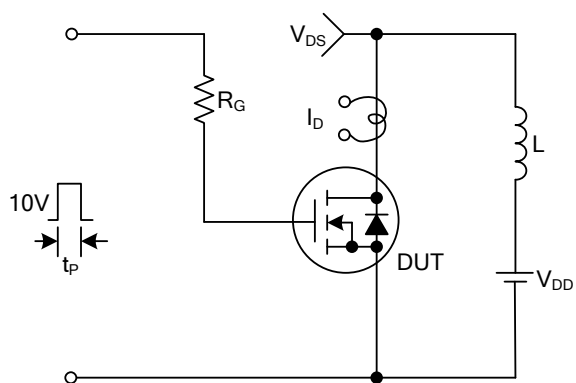
Gate Charge Waveforms



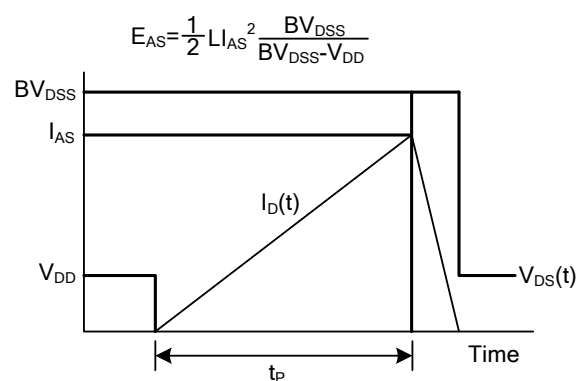
Resistive Switching Test Circuit



Resistive Switching Waveforms

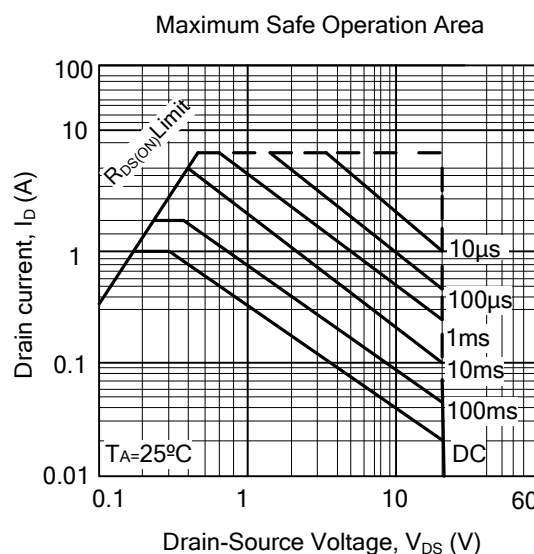
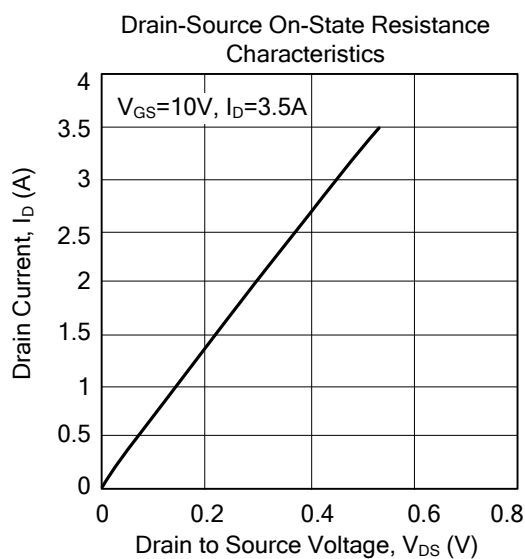
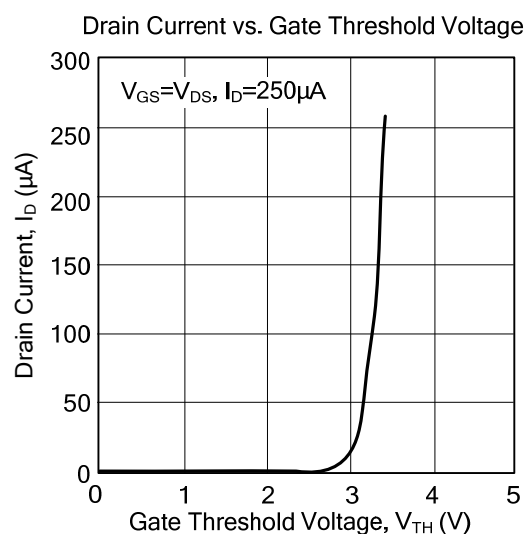
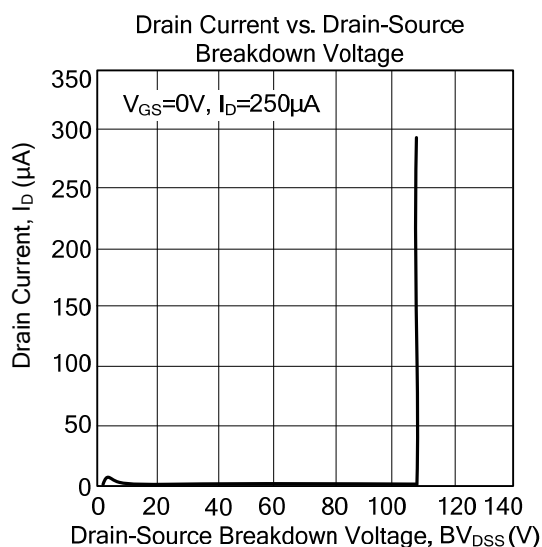


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



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