



**7N20**

**Power MOSFET**

**7.0A, 200V N-CHANNEL  
POWER MOSFET**

■ **DESCRIPTION**

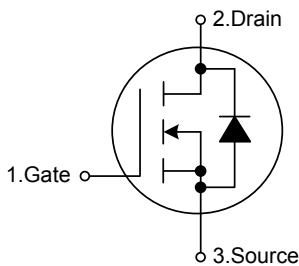
The UTC **7N20** is an N-Channel enhancement mode power MOSFET, providing customers with excellent switching performance and minimum on-state resistance. This device can also withstand high energy pulse in the avalanche and the commutation mode.

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

■ **FEATURES**

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

■ **SYMBOL**

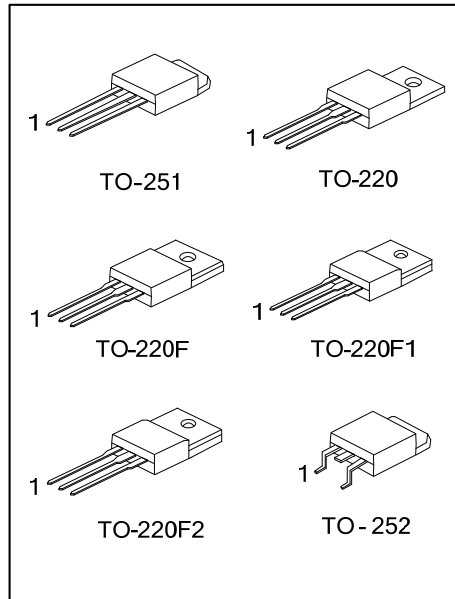


■ **ORDERING INFORMATION**

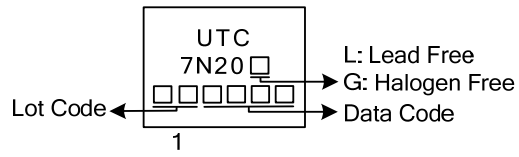
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7N20L-TA3-T	7N20G-TA3-T	TO-220	G	D	S	Tube
7N20L-TF1-T	7N20G-TF1-T	TO-220F1	G	D	S	Tube
7N20L-TF3-T	7N20G-TF3-T	TO-220F2	G	D	S	Tube
7N20L-TF3-T	7N20G-TF3-T	TO-220F	G	D	S	Tube
7N20L-TM3-R	7N20G-TM3-R	TO-251	G	D	S	Tape Reel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

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

<p>7N20L-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) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, TM3: TO-251, 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		$V_{DSS}$	200	V
Gate-Source Voltage		$V_{GSS}$	$\pm 25$	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		39	W
	TO-220F2		45	W
	TO-251/TO-252		2.5	W
Operating 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.  $L=2.5\text{mH}$ ,  $I_{AS}=7.0\text{A}$ ,  $V_{DD}=25\text{V}$ ,  $R_G=25\Omega$  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	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
	TO-220F1/TO-220F2			
	TO-251/TO-252			
Junction to Case	TO-220	$\theta_{JC}$	1.38	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		3.2	$^\circ\text{C}/\text{W}$
	TO-220F2		2.78	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		2.4	$^\circ\text{C}/\text{W}$

Note: When mounted on the minimum pad size recommended (PCB Mount).

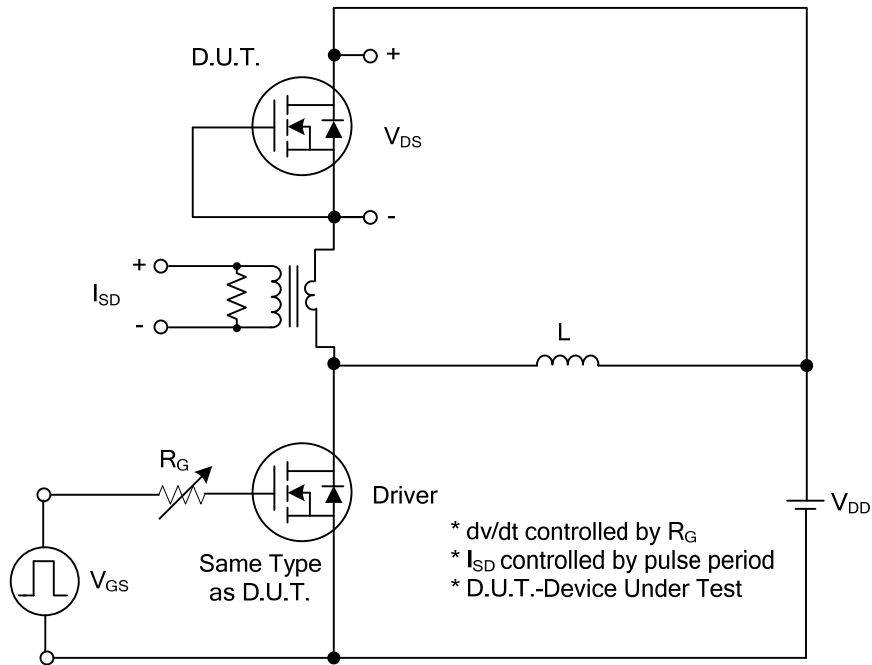
■ ELECTRICAL CHARACTERISTICS (T<sub>C</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	200			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =200V, V <sub>GS</sub> =0V			1	μA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±25V, V <sub>DS</sub> =0V			±100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1		3	V
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =3.5A		0.58	0.69	Ω
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz		190	250	pF
Output Capacitance	C <sub>OSS</sub>			60	75	pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			10	13	pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	Q <sub>G</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =100V, I <sub>D</sub> =7A (Note 1,2)		5.8	7.5	nC
Gate Source Charge	Q <sub>GS</sub>			1.4		nC
Gate Drain Charge	Q <sub>GD</sub>			2.5		nC
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =7A, R <sub>G</sub> =25Ω (Note 1,2)		7	25	ns
Turn-ON Rise Time	t <sub>R</sub>			24	60	ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			13	35	ns
Turn-OFF Fall-Time	t <sub>F</sub>			19	50	ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Continuous Drain-Source Diode Forward Current	I <sub>S</sub>				7	A
Maximum Pulsed Drain-Source Diode Forward Current	I <sub>SM</sub>				28	A
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =7A, V <sub>GS</sub> =0V			1.5	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>S</sub> =7A, V <sub>GS</sub> =0V		128		ns
Reverse Recovery Charge	Q <sub>RR</sub>	di/dt=200A/μs (Note 1)		635		nC

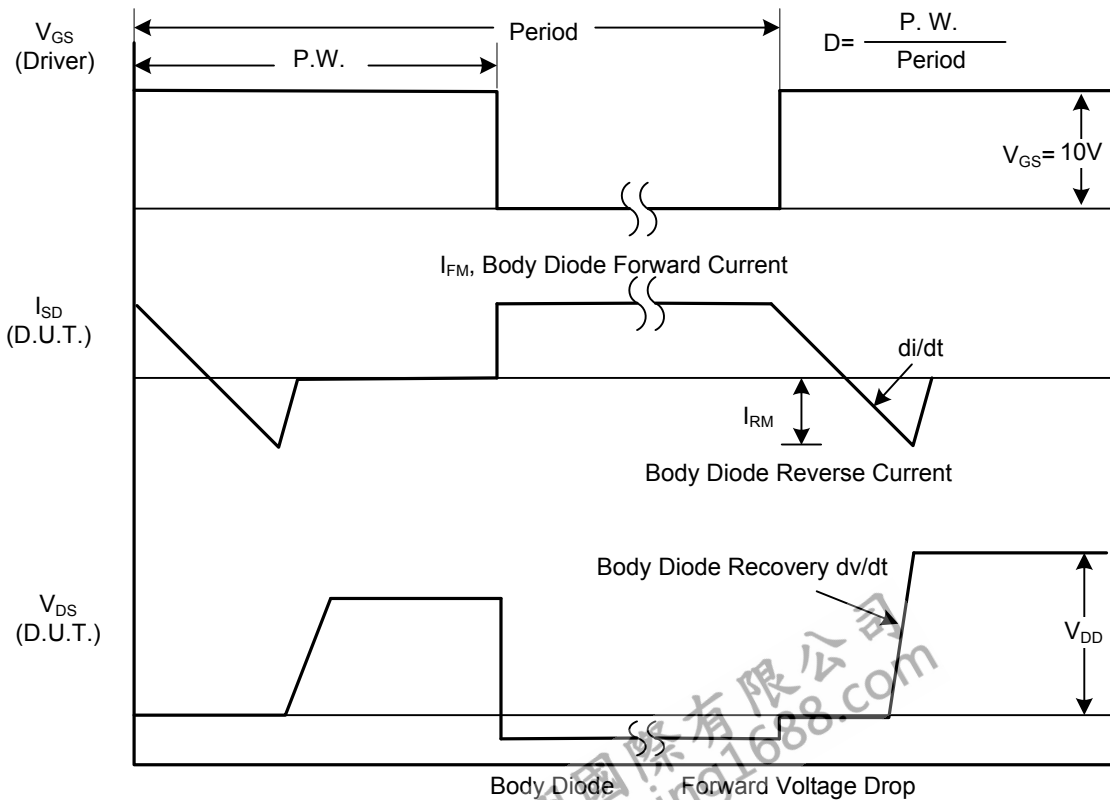
Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

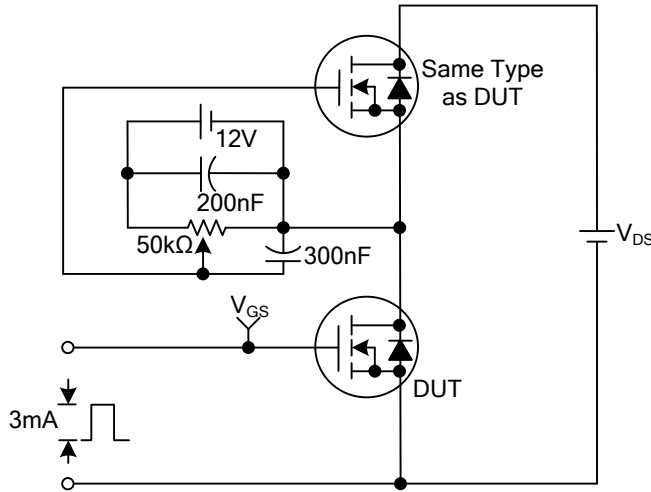


Peak Diode Recovery  $dv/dt$  Test Circuit

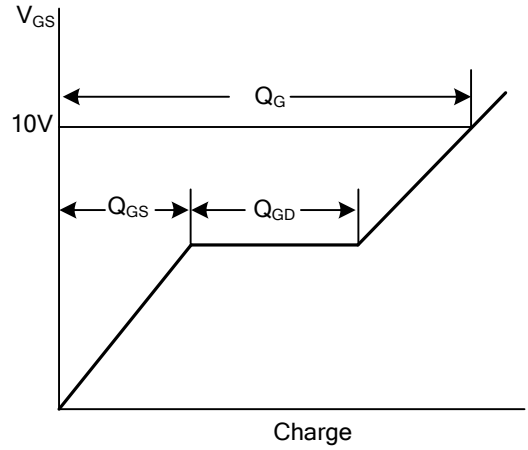


Peak Diode Recovery  $dv/dt$  Waveforms

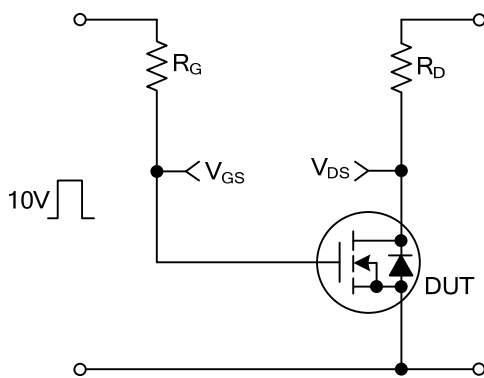
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



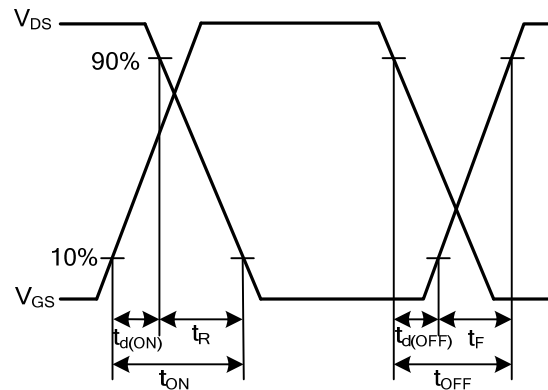
Gate Charge Test Circuit



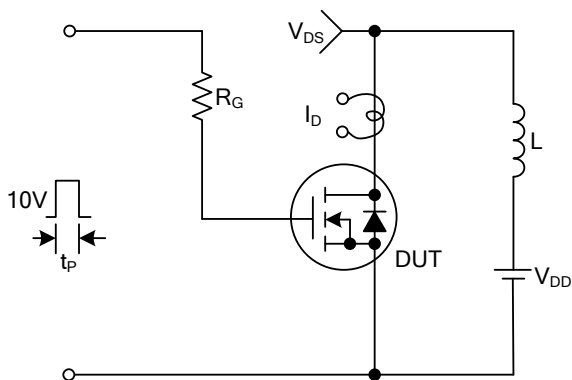
Gate Charge Waveforms



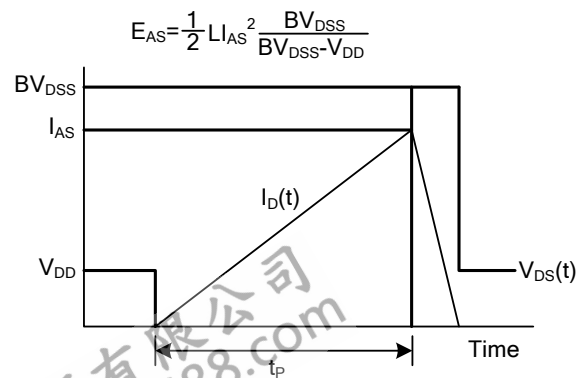
Resistive Switching Test Circuit



Resistive Switching Waveforms

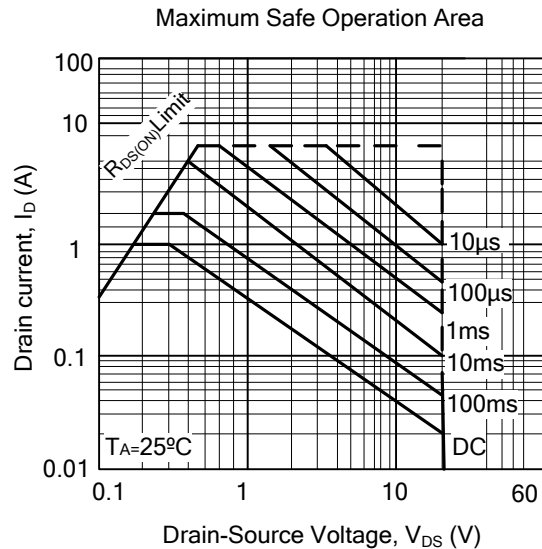
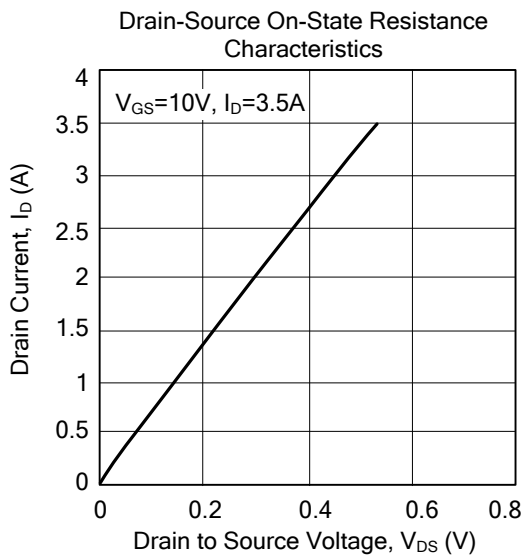
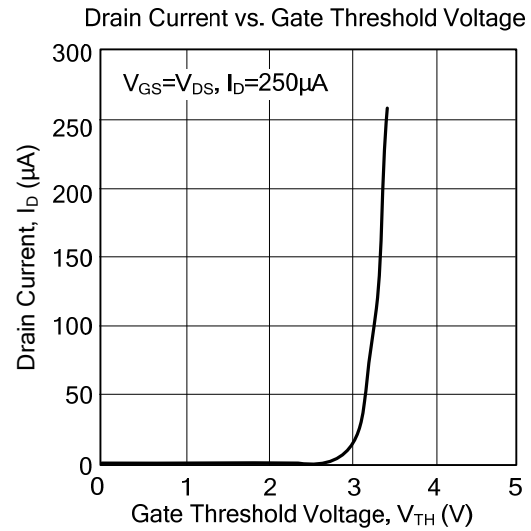
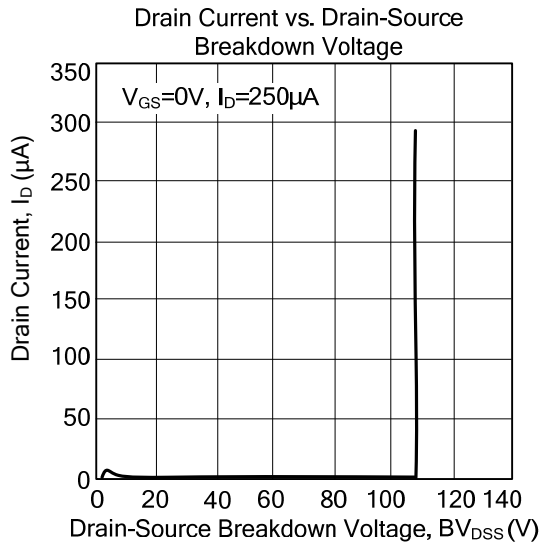


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



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