



## 7N20

Power MOSFET

### 7A, 200V N-CHANNEL POWER MOSFET

#### DESCRIPTION

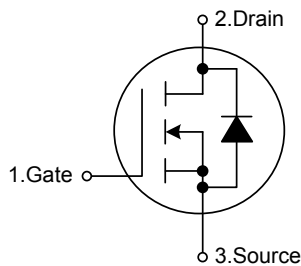
The UTC **7N20** is an N-Channel enhancement mode power MOSFET, providing customers with excellent switching performance and minimum on-state resistance. This device can also withstand high energy pulse in the avalanche and the commutation mode.

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.)
- \*  $R_{DS(ON)}=0.58\Omega @V_{GS}=10V$
- \* Fast Switching
- \* Improved dv/dt Capability

#### SYMBOL

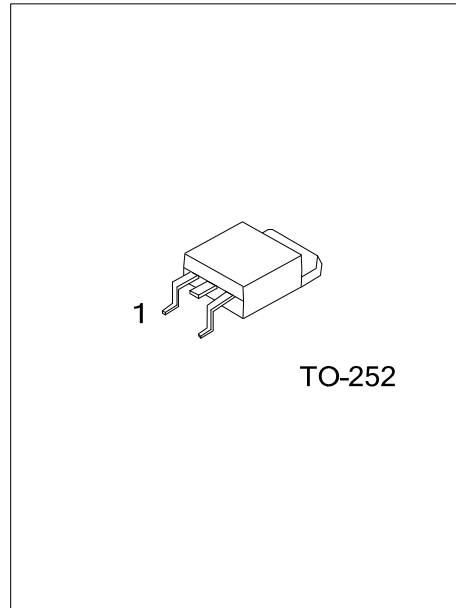


#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7N20L-TN3-R	7N20G-TN3-R	TO-252	G	D	S	Tape Reel
7N20L-TN3-T	7N20G-TN3-T	TO-252	G	D	S	Tube

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

<p>7N20L-TN3-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Lead Free</p>	<p>(1) R: Tape Reel, T: Tube</p> <p>(2) TN3: TO-252</p> <p>(3) G: Halogen Free, L:Lead Free</p>
--	---



■ 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
Power Dissipation	$P_D$	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.  $L = 2.5\text{mH}$ ,  $I_{AS} = 7\text{A}$ ,  $V_{DD} = 25\text{V}$ ,  $R_G = 25\Omega$  Starting  $T_J = 25^\circ\text{C}$
4.  $I_{SD} \leq 7.3\text{A}$ ,  $di/dt \leq 300\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	50	$^\circ\text{C}/\text{W}$

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

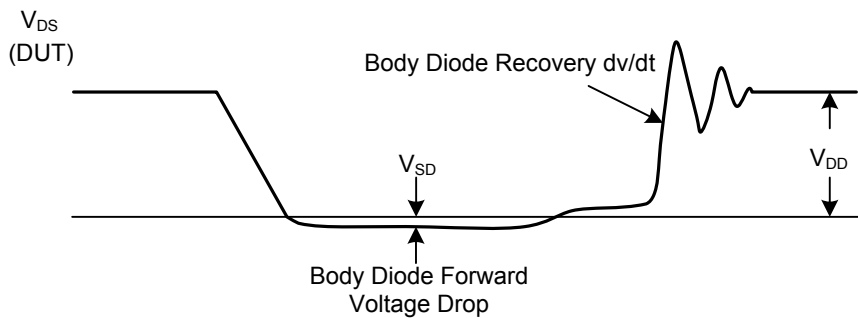
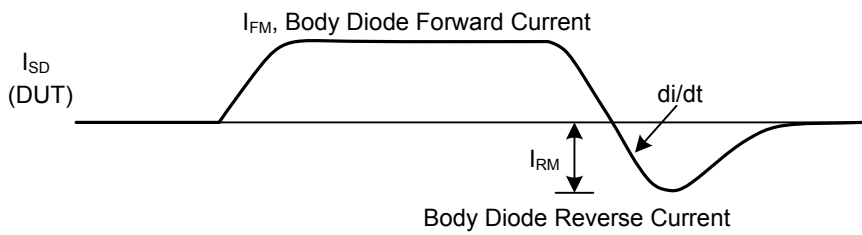
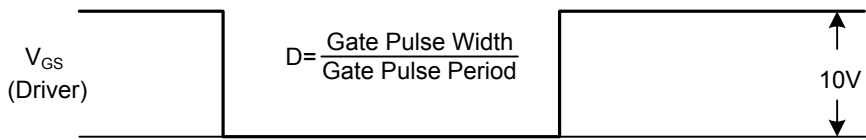
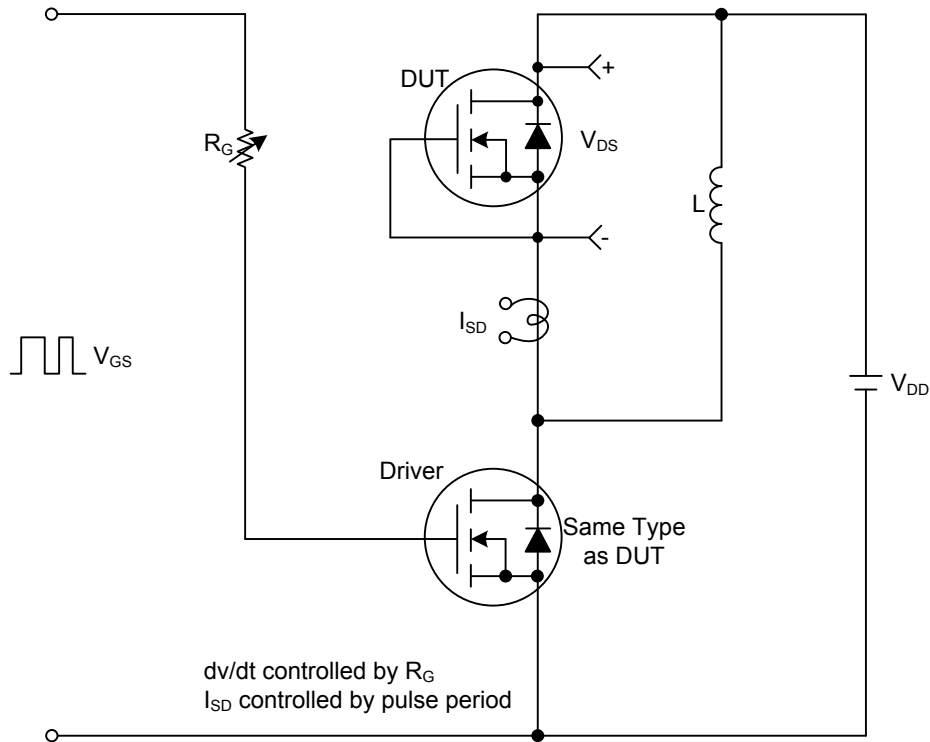
■ ELECTRICAL CHARACTERISTICS ( $T_C=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0\text{V}$ , $I_D = 250\mu\text{A}$	200			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS} = 200\text{V}$ , $V_{GS} = 0\text{V}$			1	$\mu\text{A}$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS} = \pm 25\text{V}$ , $V_{DS} = 0\text{V}$			$\pm 100$	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$	1		3	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{V}$ , $I_D = 3.5\text{A}$		0.58	0.69	$\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{DS} = 25\text{V}$ , $V_{GS} = 0\text{V}$ , $f = 1.0\text{MHz}$	190		250	pF
Output Capacitance	$C_{OSS}$			60	75	pF
Reverse Transfer Capacitance	$C_{RSS}$			10	13	pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	$Q_G$	$V_{GS} = 10\text{V}$ , $V_{DS} = 100\text{V}$ , $I_D = 7\text{A}$ (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	$t_{D(ON)}$	$V_{DD} = 50\text{V}$ , $I_D = 7\text{A}$ , $R_G = 25\Omega$ (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
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
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	$V_{SD}$	$I_S = 7\text{A}$ , $V_{GS} = 0\text{V}$			1.5	V

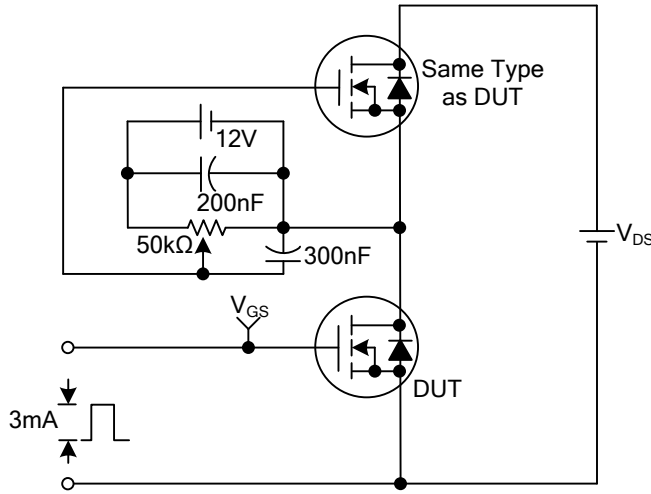
- Notes: 1. Pulse Test : Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$   
2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

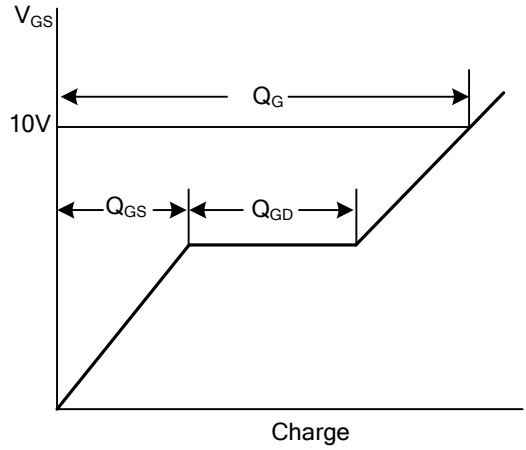
Peak Diode Recovery dv/dt Test Circuit & Waveforms



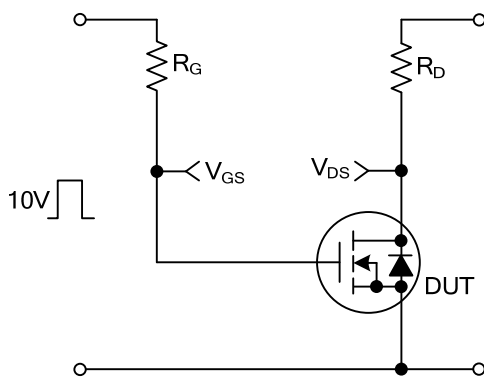
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



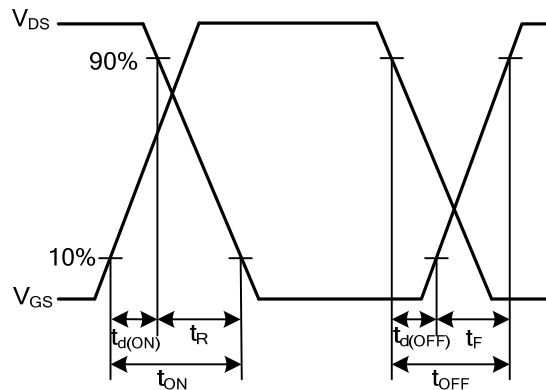
Gate Charge Test Circuit



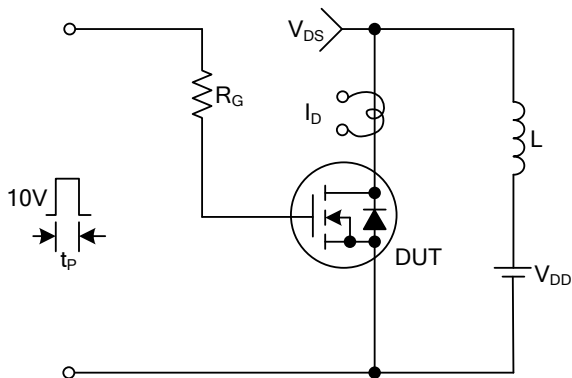
Gate Charge Waveforms



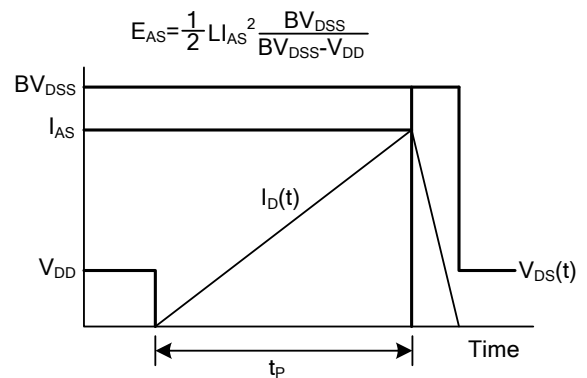
Resistive Switching Test Circuit



Resistive Switching Waveforms

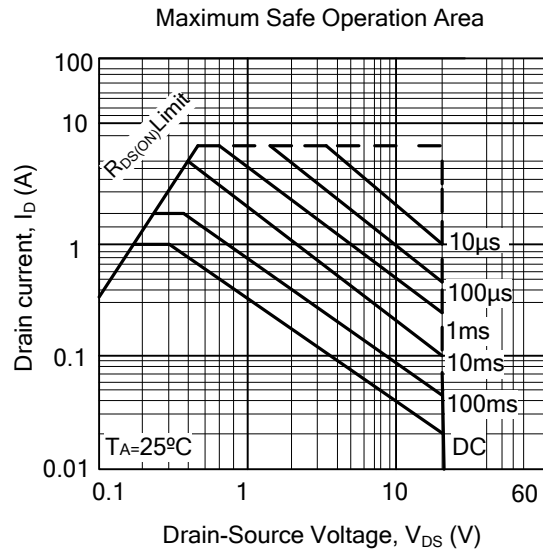
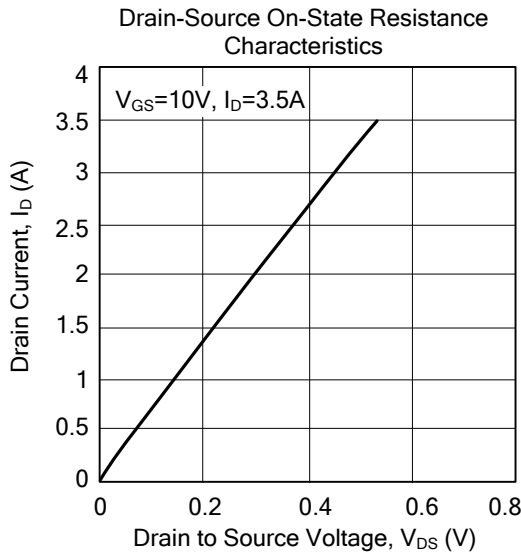
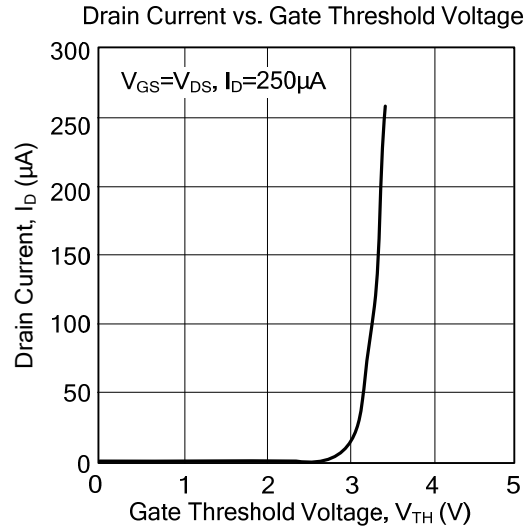
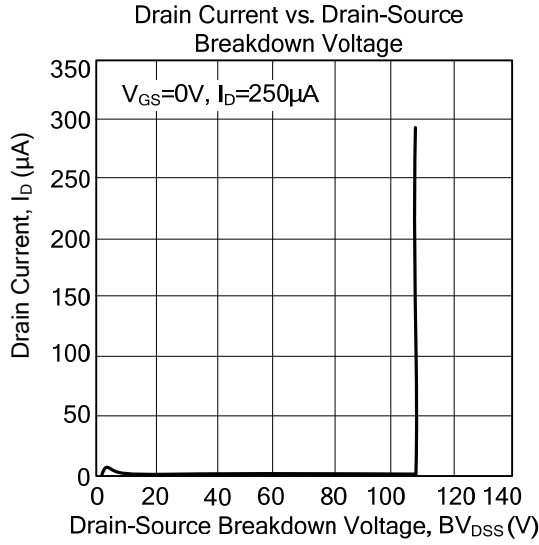


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.