



# 12N10

Power MOSFET

## 12A, 100V N-CHANNEL POWER MOSFET

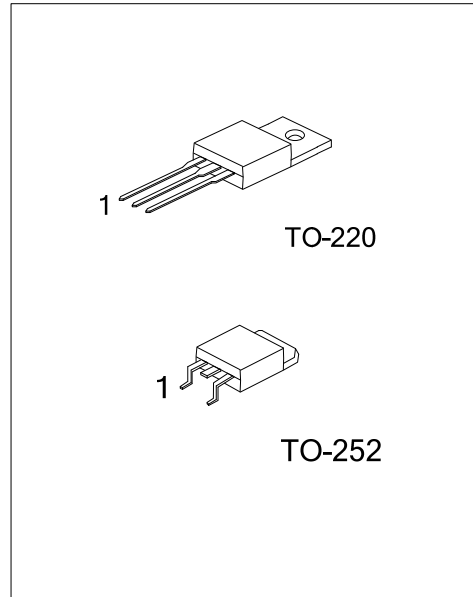
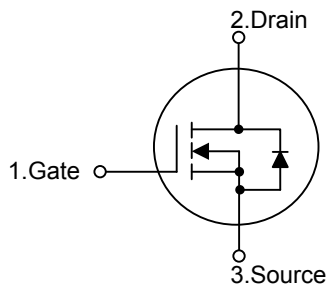
### DESCRIPTION

The UTC 12N10 is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with minimum on-state resistance for extremely high dense cell design, rugged avalanche characteristics and less critical alignment steps.

### FEATURES

- \*  $R_{DS(on)} < 0.18\Omega @ V_{GS} = 10V$
- \* High switching speed
- \* Low gate charge

### SYMBOL



### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
12N10L-TA3-T	12N10G-TA3-T	TO-220	G	D	S	Tube
12N10L-TN3-T	12N10G-TN3-T	TO-252	G	D	S	Tube
12N10L-TN3-R	12N10G-TN3-R	TO-252	G	D	S	Tape Reel

<p>12N10L-TA3-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Lead Free</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TN3: TO-252</p> <p>(3) L: Lead Free, G: Halogen Free</p>
--	---

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

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain-Source Voltage ( $V_{GS}=0$ )		$V_{DSS}$	100	V	
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V	
Drain Current	Continuous	$I_D$	$T_C=25^\circ\text{C}$	12	A
			$T_C=100^\circ\text{C}$	8.5	A
	Pulsed (Note 2)		$I_{DM}$	48	A
Power Dissipation	TO-220	$P_D$	73	W	
	TO-252		30		
Avalanche Energy (Note 3)		$E_{AS}$	100	mJ	
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. Pulse width limited by safe operating area  
 3. Starting  $T_J = 25^\circ\text{C}$ ,  $I_D = 12\text{A}$ ,  $V_{DD} = 50\text{V}$

## ■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	$\theta_{JA}$	62.5	$^\circ\text{C/W}$
	TO-252		100	
Junction to Case	TO-220	$\theta_{JC}$	1.71	$^\circ\text{C/W}$
	TO-252		5	

## ■ 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	$BV_{DSS}$	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	100			V	
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=\text{Max rating}$ , $V_{GS}=0\text{V}$			1	$\mu\text{A}$	
Gate- Source Leakage Current		$I_{GSS}$			+100	nA	
					-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-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$ , $I_D=6\text{A}$		0.15	0.18	$\Omega$	
<b>DYNAMIC PARAMETERS</b>							
Input Capacitance	$C_{ISS}$	$V_{GS}=0\text{V}$ , $V_{DS}=25\text{V}$ , $f=1.0\text{MHz}$		430		pF	
Output Capacitance	$C_{OSS}$				90		pF
Reverse Transfer Capacitance	$C_{RSS}$				20		pF
<b>SWITCHING PARAMETERS (Note 1,2)</b>							
Total Gate Charge	$Q_G$	$V_{GS}=10\text{V}$ , $V_{DD}=80\text{V}$ , $I_D=12\text{A}$		7.5	10	nC	
Gate to Source Charge	$Q_{GS}$				2.5		nC
Gate to Drain Charge	$Q_{GD}$				3.0		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=30\text{V}$ , $I_D=1\text{A}$ , $R_G=9.1\Omega$ , $V_{GS}=10\text{V}$ (Fig. 1)		12	24	ns	
Rise Time	$t_R$				7	14	ns
Turn-OFF Delay Time	$t_{D(OFF)}$				18	35	ns
Fall-Time	$t_F$				3	6	ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>							
Maximum Body-Diode Continuous Current	$I_S$				12	A	
Maximum Body-Diode Pulsed Current	$I_{SM}$				48	A	
Drain-Source Diode Forward Voltage (Note 1)	$V_{SD}$	$I_S=12\text{A}$ , $V_{GS}=0\text{V}$			1.2	V	

- Notes: 1. Pulsed: pulse duration=300 $\mu\text{s}$ , duty cycle 1.5%  
 2. Essentially independent of operating temperature

## TEST CIRCUITS AND WAVEFORMS

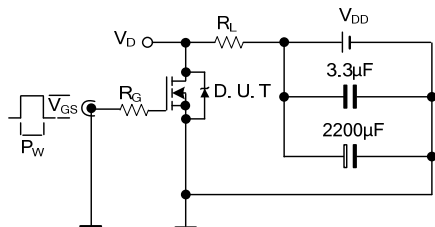


Fig. 1 Switching Times Test Circuit for Resistive Load

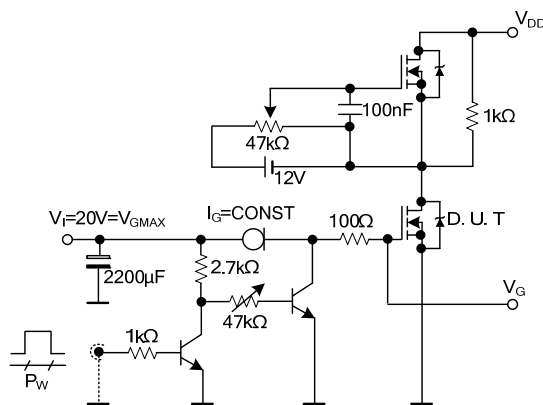


Fig. 2 Gate Charge Test Circuit

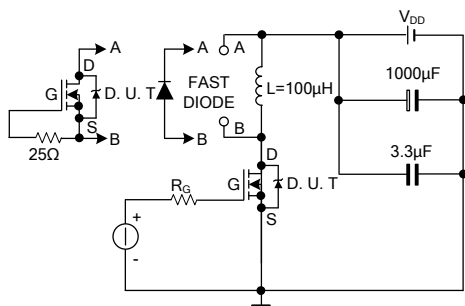


Fig. 3 Test Circuit for Inductive Load Switching and Diode Recovery Times

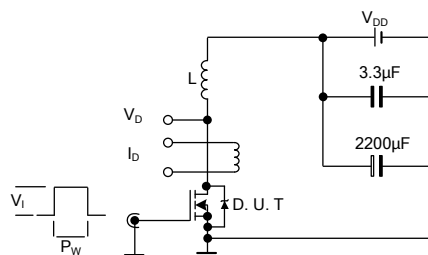


Fig. 4 Unclamped Inductive Load Test Circuit

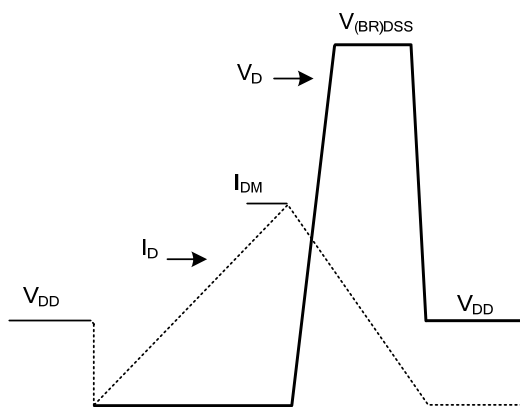
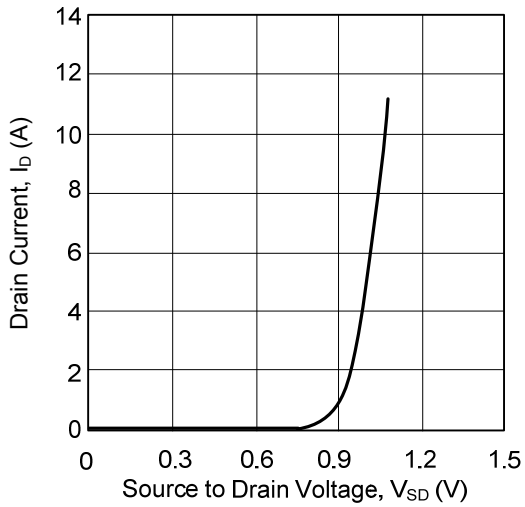


Fig. 5 Unclamped Inductive Waveform

## ■ TYPICAL CHARACTERISTICS

Drain Current vs. Source to Drain Voltage



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.