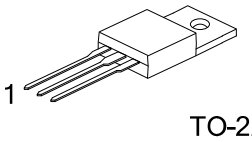
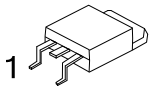
12N10

Power MOSFET

12A, 100V N-CHANNEL POWER MOSFET



TO-220



TO-252

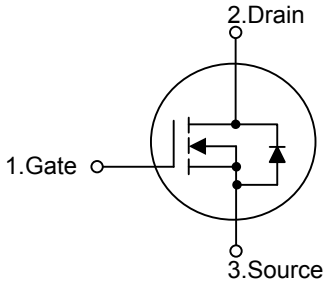
■ DESCRIPTION

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

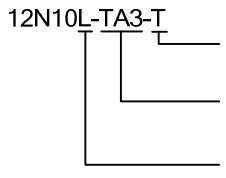
* $R_{DS(on)}$<0.18Ω @V_{GS} =10V
* High switching speed
* Low gate charge

■ 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



(1) T: Tube, R: Tape Reel
(2) TA3: TO-220, TN3: TO-252
(3) L: Lead Free, G: Halogen Free

■ ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, unless otherwise specified)

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage (V_{GS}=0)			V_{DSS}	100	V
Gate-Source Voltage			V_{GSS}	±20	V
Drain Current	Continuous	T_C=25°C	I_D	12	A
		T_C=100°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	°C
Storage Temperature			T_{STG}	-55 ~ +150	°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°C, I_D = 12A, V_{DD} = 50V

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	θ_{JA}	62.5	°C/W
	TO-252		100	
Junction to Case	TO-220	θ_{JC}	1.71	°C/W
	TO-252		5	

■ ELECTRICAL CHARACTERISTICS (T_C=25°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	100			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=Max rating, V_{GS}=0V			1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	1		3	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=6A		0.15	0.18	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		430		pF
Output Capacitance		C_{OSS}			90		pF
Reverse Transfer Capacitance		C_{RSS}			20		pF
SWITCHING PARAMETERS (Note 1,2)							
Total Gate Charge		Q_G	V_{GS}=10V, V_{DD}=80V, I_D=12A		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}=30V, I_D=1A, R_G=9.1Ω, V_{GS}=10V (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
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
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=12A, V_{GS}=0V			1.2	V

Notes: 1. Pulsed: pulse duration=300μs, duty cycle 1.5%
2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

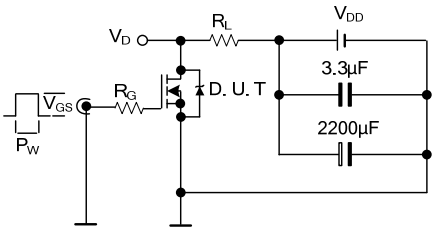


Fig. 1 Switching Times Test Circuit for Resistive Load

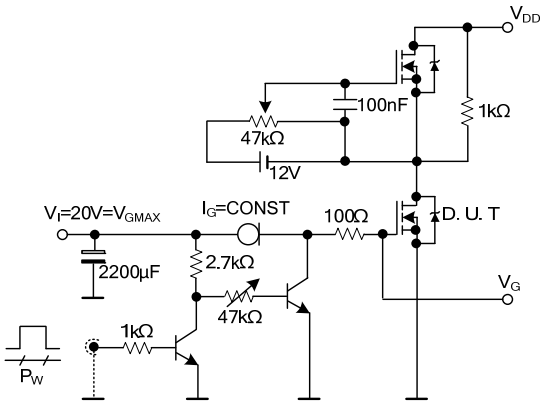


Fig. 2 Gate Charge Test Circuit

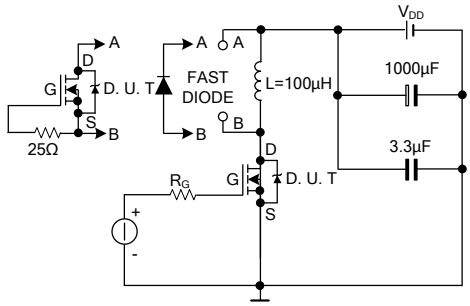


Fig. 3 Test Circuit for Inductive Load Switching and Diode Recovery Times

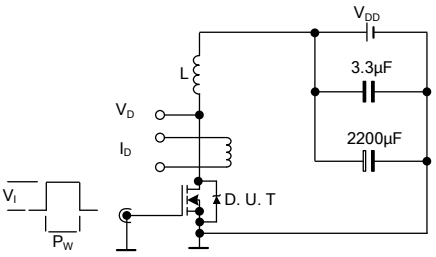


Fig. 4 Unclamped Inductive Load Test Circuit

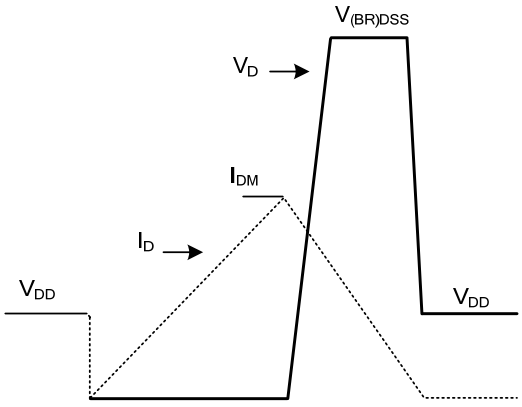


Fig. 5 Unclamped Inductive Waveform

■ TYPICAL CHARACTERISTICS