



12N30

Preliminary

Power MOSFET

12A, 300V N-CHANNEL POWER MOSFET

DESCRIPTION

The UTC **12N30** is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology specializes in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

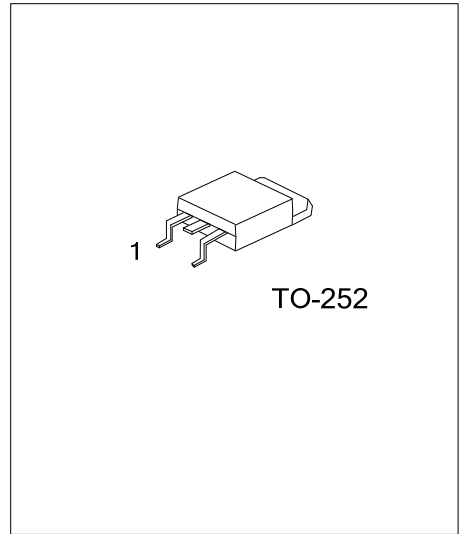
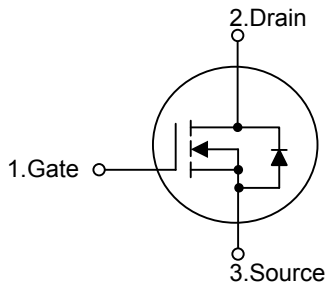
The UTC **12N30** is universally applied in electronic lamp ballast based on half bridge topology and high efficient switched mode power supply.

FEATURES

* $R_{DS(ON)}=0.34\Omega @ V_{GS}=10V$

* High switching speed

SYMBOL



ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
12N30L-TN3-R	12N30G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>12N30L-TN3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Lead Free</p>	<p>(1) T: Tube</p> <p>(2) TN3: TO-252</p> <p>(3) G: Halogen Free, L: Lead Free</p>
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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}	300	V
Gate-Source Voltage		V_{GSS}	± 20	V
Drain Current	Continuous ($T_C=25^\circ\text{C}$)	I_D	12	A
	Pulsed (Note 2)	I_{DM}	48	A
Single Pulsed Avalanche Energy		E_{AS}	474	mJ
Power Dissipation		P_D	83	W
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. Starting $T_J=25^\circ\text{C}$, $I_{AS}=12\text{A}$, $V_{DD}=50\text{V}$, $L=6.58\text{mH}$.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62.5	$^\circ\text{C/W}$
Junction to Case	θ_{JC}	1.5	$^\circ\text{C/W}$

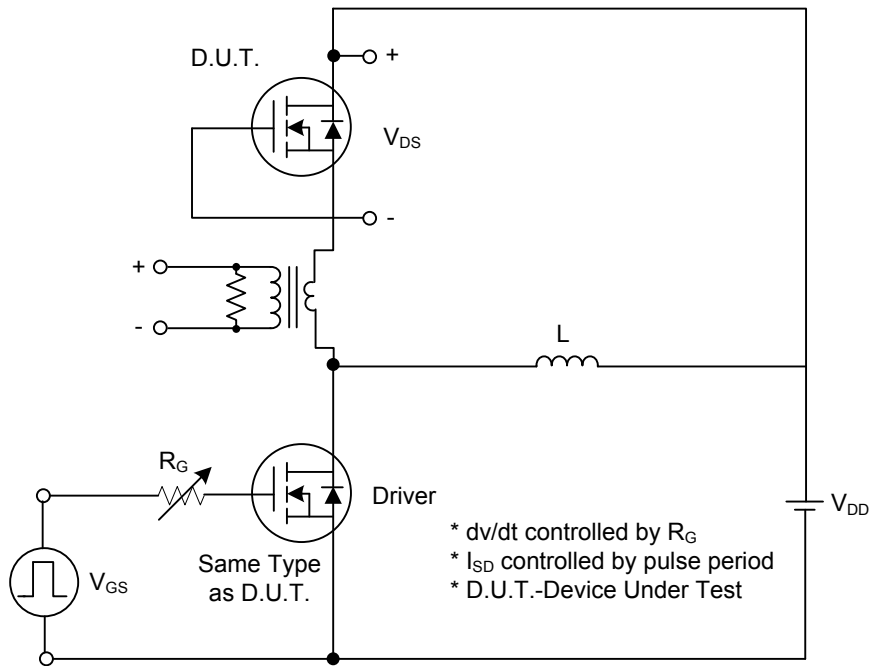
■ ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	300			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=300\text{V}$, $V_{GS}=0\text{V}$			1	μA
Gate- Source Leakage Current	Forward	I_{GSS} $V_{GS}=+20\text{V}$, $V_{DS}=0\text{V}$			+100	nA
	Reverse		$V_{GS}=-20\text{V}$, $V_{DS}=0\text{V}$			-100
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=12\text{A}$		0.34	0.47	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS}=0\text{V}$, $V_{DS}=25\text{V}$, $f=1.0\text{MHz}$			3000	pF
Output Capacitance	C_{OSS}				900	pF
Reverse Transfer Capacitance	C_{RSS}				400	pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	$V_{DD}=150\text{V}$, $V_{GS}=10\text{V}$, $I_D=12\text{A}$ (Note 1, 2)		24		nC
Gate-Source Charge	Q_{GS}			5		nC
Gate-Drain Charge	Q_{GD}			5.6		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=30\text{V}$, $I_D=12\text{A}$, $R_G=25\Omega$ (Note 1, 2)		30	50	ns
Rise Time	t_R			105	150	ns
Turn-OFF Delay Time	$t_{D(OFF)}$			480	750	ns
Fall-Time	t_F			140	200	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V_{SD}	$I_S=12\text{A}$, $V_{GS}=0\text{V}$			1.4	V
Maximum Body-Diode Continuous Current	I_S				12	A
Maximum Body-Diode Pulsed Current	I_{SM}				48	A

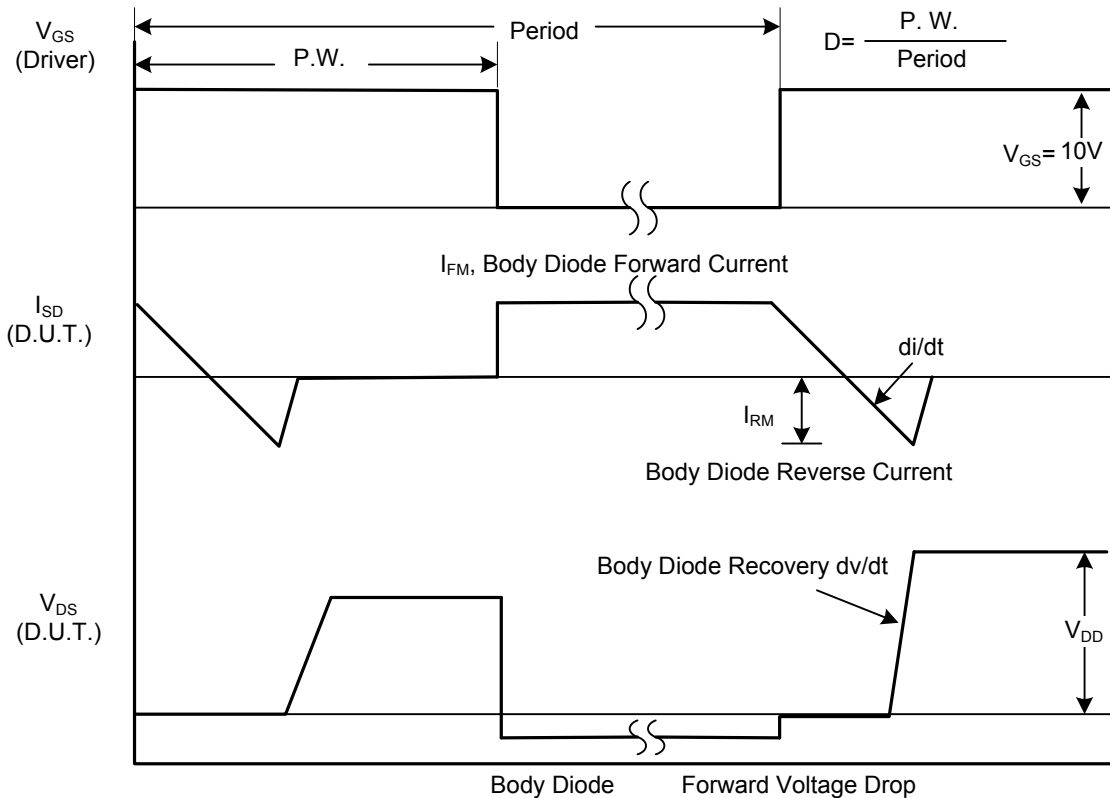
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

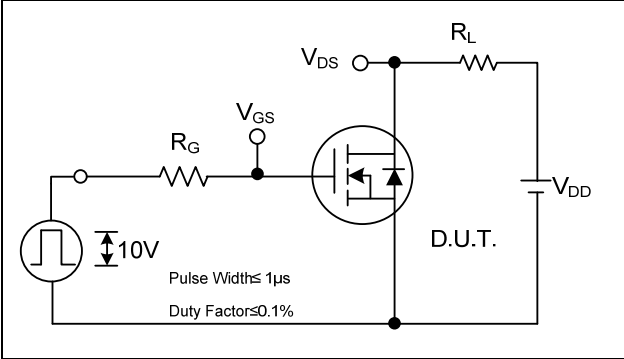
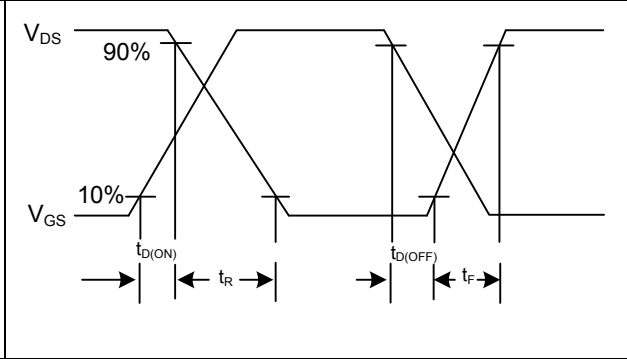
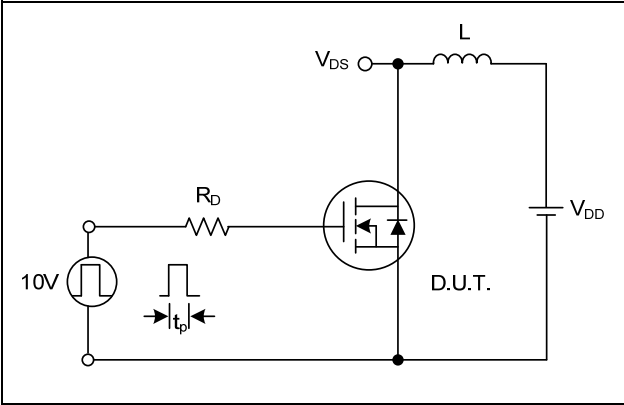
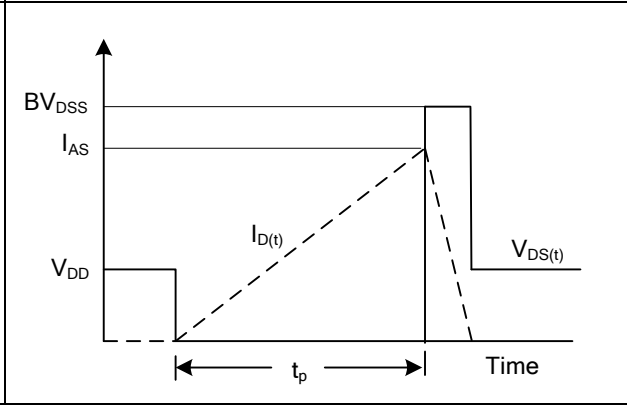


Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS

 <p>A circuit diagram for a switching test. It features a pulse generator on the left providing a 10V pulse with a width of $\leq 1\mu\text{s}$ and a duty factor of $\leq 0.1\%$. The pulse is connected to the gate of a MOSFET (D.U.T.) through a gate resistor R_G. The drain of the MOSFET is connected to a load resistor R_L and a DC supply V_{DD}. The drain-source voltage V_{DS} is measured across the load resistor.</p>	 <p>A graph showing the switching waveforms for V_{DS} and V_{GS}. The V_{GS} signal is a square wave with a 10% rise time and a 90% fall time. The V_{DS} signal shows a linear rise during the turn-on phase and a linear fall during the turn-off phase. Key time intervals are labeled: $t_{D(ON)}$ (delay to turn on), t_R (rise time), $t_{D(OFF)}$ (delay to turn off), and t_F (fall time).</p>
<p>Switching Test Circuit</p>	<p>Switching Waveforms</p>
 <p>A circuit diagram for unclamped inductive switching. A 10V pulse generator is connected to the gate of a MOSFET (D.U.T.) through a resistor R_D. The drain of the MOSFET is connected to an inductor L and a DC supply V_{DD}. The drain-source voltage V_{DS} is measured across the inductor. A pulse width t_p is indicated for the gate signal.</p>	 <p>A graph showing the unclamped inductive switching waveforms. The drain current $I_{D(t)}$ (dashed line) rises linearly from 0 to a peak value I_{AS} during the pulse width t_p. The drain-source voltage $V_{DS(t)}$ (solid line) remains at V_{DD} until the current reaches I_{AS}, then falls linearly to 0. The maximum drain-source voltage is labeled BV_{DSS}.</p>
<p>Unclamped Inductive Switching Test Circuit</p>	<p>Unclamped Inductive Switching Waveforms</p>

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