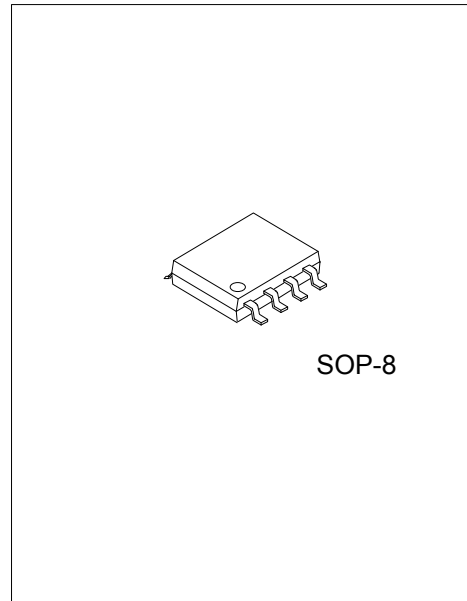




ULP3091

CMOS IC

PRIMARY SIDE CONTROL CONSTANT CURRENT POWER SWITCH



DESCRIPTION

The **ULP3091** is a high performance primary-side controller for low power AC/DC off-line applications. It can provide accurate constant current regulation without the need of an opto-coupler or reference device.

Built-in safe operation circuitry is provided such as cycle-by-cycle current limit, output short-circuit/open-circuit protection and soft start.

FEATURES

- *Primary-side Control No Opto -Coupler And TL431 Needed
- *Application Voltage Range:90Vac~264Vac
- *Internal Integration 730V Power MOSFET
- *Accurate Constant-Current(CC) Control , Output Current in $\pm 5\%$
- *Lowest Component Number Needed
- * Internal LEB
- * Open/Short-LED Protection
- *V_{DD} Over-Voltage Protection (OVP)
- *V_{DD} Under-Voltage Lockout (UVLO)

APPLICATIONS

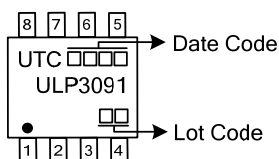
- * LED Lighting System

ORDERING INFORMATION

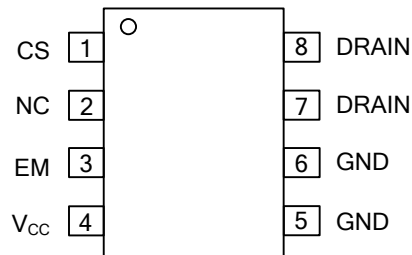
Ordering Number	Package	Packing
ULP3091G-S08-R	SOP-8	Tape Reel

<p>ULP3091G-S08-R</p> <ul style="list-style-type: none"> (1)Packing Type (2)Package Type (3)Green Package 	<ul style="list-style-type: none"> (1) R: Tape Reel (2) S08: SOP-8 (3) G: Halogen Free and Lead Free
--	---

MARKING



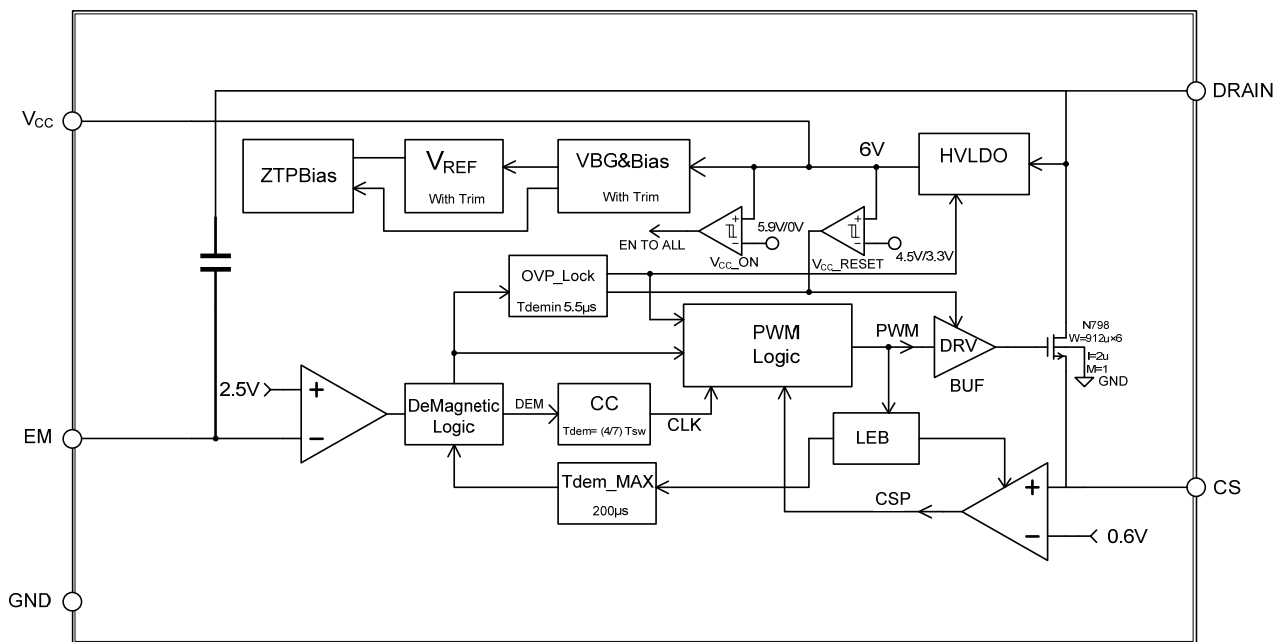
PIN CONFIGURATION



PIN DESCRIPTION

PIN NO	PIN Name	DESCRIPTION
1	CS	Primary side peak current sense
2	NC	No connection
3	EM	Improve signal sense
4	V _{CC}	Power supply
5, 6	GND	Ground
7, 8	DRAIN	Power MOS drain side

BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
V _{CC} to GND Voltage	V _{CC}	-0.3 ~ 6	V
EM to GND Voltage	V _{EM}	-0.3 ~ 6	V
CS to GND Voltage	V _{SC}	-0.3 ~ 7	V
Drain to GND Voltage	V _{DRAIN}	-0.3 ~ 730	V
Junction Temperature	T _J	+150	°C
Operating Temperature	T _{OPR}	-20 ~ +125	°C
Storage Temperature	T _{STG}	-55 ~ +150	°C

Note: 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.

■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ _{JA}	100	°C/W

■ ELECTRICAL CHARACTERISTICS (V_{CC}=6V, T_A = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply current	I _{CC}	I _{OUT} = 10mA		-250		uA
Internal power supply Voltage	V _{CC}			6		V
Current Sense threshold Voltage	V _{CS}			620		mV
Leading edge blank time	T _{LEB}			450		ns
Minus demagnetize Time	T _{DEM MIN}			5		uS
Maximum duty cycle	D _{MAX}			42		%
Power MOS on resistance	R _{DS(ON)}			30		Ω
Power MOS drain to source break Down Voltage	B _{VD_SS}			730		V
V _{CC} under voltage lock out Voltage	V _{UVLO}			4		V
Maximum demagnetize Time	T _{DEM(MAX)}			150		us

■ FUNCTIONAL DESCRIPTION

The **ULP3091** is a precision AC-DC PWM controller for offline constant current LED lighting. Application voltage range is 90Vac ~ 264Vac. It can provide accurate constant current regulation ($\pm 5\%$) through primary-side control, with integrated 730V Power MOSFET and without the need of an opto-coupler and TL431.

Built-in safe operation circuitry is provided such as cycle-by-cycle current limit, output short-circuit/open-circuit protection and soft start.

Start Up and Control

There is a high voltage JFET in **ULP3091**. After system powered up, the JFET is opened, Internal V_{CC} is charged up. When the V_{CC} pin voltage reaches the turn on threshold, the internal circuits start working. Then the **ULP3091** starts the MOSFET driver.

ULP3091 works under Discontinuous Conduction Mode (DCM). The output current is controlled by the response Voltage of primary side.

$$I_O = 2/7 \times N \times I_P$$

I_O : output current, N: transformer circle ratio, I_P : primary side peak current

Work frequency

The switch frequency is controlled by the load. No external component needed. Under the DCM, the maximum output power is :

$$P_O = 1/2 \times L_P \times F_{SW} \times I_P^2$$

$$F_{SW} = \frac{4}{7 \times T_{DEMAG}}$$

I_P : primary side peak current

L_P : primary side inductance value

F_{SW} : Work frequency

P_O : output power

T_{DEMAG} : demagnetize time

Current detection and LEB

The inductor current is sensed through sensing resistor connected to CS pin, thus achieves high precision output current control, excellent line and load regulation and cycle-by-cycle current limit. The peak current of Power MOSFET can be calculated by the equation:

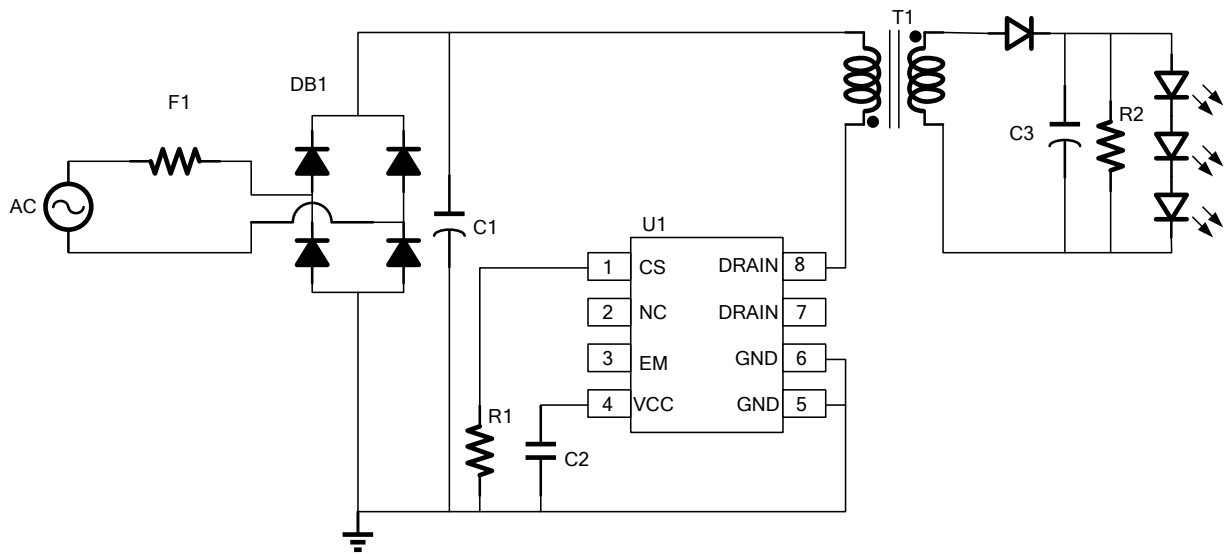
$$I_P \approx \frac{V_{REF}}{R_{CS}}$$

V_{REF} : Internal reference voltage, typically 0.6V

R_{CS} : The current sensing resistor value

Internal LEB (Leading edge blank) circuit. remove interference of the peak current at powering-on moment.

■ TYPICAL APPLICATION CIRCUIT



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.