

**UTC** UNISONIC TECHNOLOGIES CO., LTD

**USR1101** 

Preliminary

LINEAR INTEGRATED CIRCUIT

# **5V/12V SYNCHRONOUS BUCK PWM DC-DC** CONTROLLER

#### DESCRIPTION

The UTC USR1101 is a high efficiency synchronous buck PWM controller, with operating at fixed 300kHz frequency, Internal soft-start, frequency compensation networks and integrates all of the control, output adjustment, monitoring and protection functions into a single package.

Adjustable over-current protection (OCP) monitors the voltage drop across the  $R_{DS(ON)}$  of the lower MOSFET for synchronous buck PWM DC-DC controller.

#### **FEATURES**

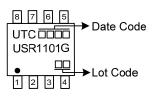
- \* Operating with 5V or 12V supply voltage
- \* Drives all low cost N-channel MOSFETs
- \* PWM control mode
- \* 300kHz fixed frequency
- \* Internal soft-start
- \* Over-current fault monitor on MOSFET, no current sense resistor required
- \* RoHS compliant and 100% lead (Pb)-free

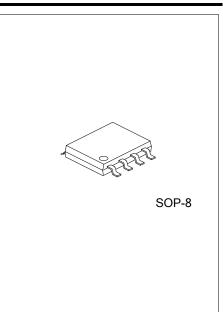
#### **ORDERING INFORMATION**

Ordering Number	Package	Packing
USR1101G-S08-R	SOP-8	Tape Reel

USR1101 <u>G</u> - <u>S08</u> -R	
(1)Packing Type	(1) R: Tape Reel
(2)Package Type	(2) S08: SOP-8
(3)Green Package	(3) G: Halogen Free and Lead Free

#### MARKING

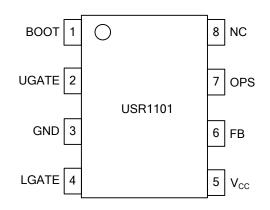




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# PIN CONFIGURATION



# PIN DESCRIPTION

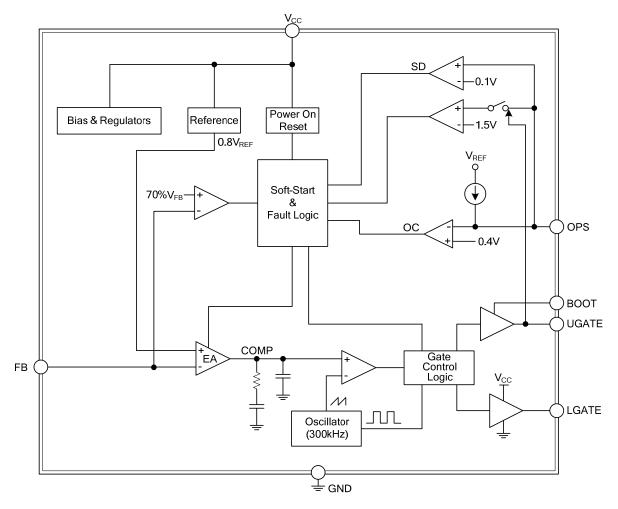
PIN NO.	PIN NAME	DESCRIPTION	
1	BOOT	High-Side gate drive boost	
2	UGATE	Upper gate driver output	
3	GND	Ground	
4	LGATE	Lower gate drive output	
5	Vcc	Supply voltage	
6	FB	Feedback voltage	
7	OPS	Over-current setting and shutdown	
8	NC	No bonding	



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# BLOCK DIAGRAM





## ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sub>CC</sub>	16	V
Power Dissipation (T <sub>A</sub> =25°C) (Note 1)	PD	0.625	W
Storage Temperature	T <sub>STG</sub>	-65~150	°C
Junction Temperature	TJ	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 DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ <sub>JA</sub>	160	°C/W

### RECOMMENDED OPERATING CONDITIONS (Note 2)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sub>CC</sub>	5±5%,12±10%	V
Ambient Temperature	T <sub>A</sub>	0~70	°C
Junction Temperature	TJ	0~125	°C

Notes: 1.  $\theta_{JA}$  is measured in the natural convection at  $T_A=25^{\circ}C$  on a low effective thermal conductivity test board of JEDEC 51-3 thermal measurement standard.

2. The device is not guaranteed to function outside its operating conditions.

### ■ **ELECTRICAL CHARACTERISTICS** (V<sub>CC</sub>=5V/12V, T<sub>A</sub>=25°C, unless otherwise specified)

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PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT		
V <sub>cc</sub> Supply Current								
Nominal Supply Current	I <sub>CC</sub>	UGATE and LGATE Open		6	15	mA		
Power-On Reset								
POR Threshold	V <sub>CCRTH</sub>	V <sub>CC</sub> Rising		4.1	4.5	V		
Hysteresis	V <sub>CCHYS</sub>		0.35	0.5		V		
Switcher Reference								
Reference Voltage	V <sub>REF</sub>	V <sub>CC</sub> =12V	0.784	0.8	0.816	V		
Oscillator								
Free Running Frequency	f <sub>OSC</sub>	V <sub>CC</sub> =12V	250	300	350	kHz		
Ramp Amplitude	$\Delta V_{OSC}$	V <sub>CC</sub> =12V		1.5		$V_{P-P}$		
PWM Controller Gate Drivers (V <sub>CC</sub> =12V)								
Dead Time	T <sub>DT</sub>				100	ns		
Protection								
FB Under-Voltage Trip	$\Delta_{FBUVT}$	FB Falling	70	75	80	%		
OC Current Source	l <sub>oc</sub>			40	45	μA		
Soft-Start Interval	T <sub>SS</sub>			2.5		ms		



## APPLICATION INFORMATION

### ОСР

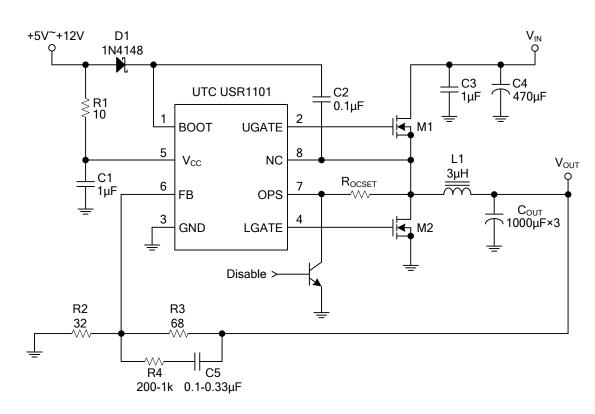
Sense the low-side MOSFET's R<sub>DS(ON)</sub> to set over-current trip point.

Connecting a resistor ( $R_{OCSET}$ ) from this pin to the source of the upper MOSFET and the drain of the lower MOSFET sets the over-current trip point.  $R_{OCSET}$ , an internal 40µA current source, and the lower MOSFET on resistance,  $R_{DS(ON)}$ , set the converter over-current trip point ( $I_{OCSET}$ ) according to the following equation:

$$locset = \frac{40 \mu A \times Rocset - 0.4V}{R_{DS(ON)} \text{ of the lower MOSFET}}$$

### Shutdown

Pulling low the OPS pin by a small single transistor can shutdown the UTC **USR1101** PWM controller as shown in typical application circuit.



# 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.

