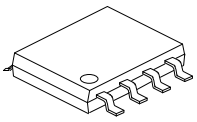
USR1101 **Preliminary** ***LINEAR INTEGRATED CIRCUIT***

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



SOP-8

■ 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

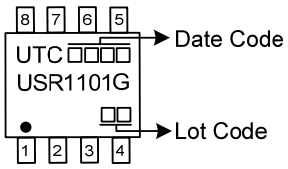
* Operating with 5V or 12V supply voltage
* Drives all low cost N-channel MOSFETs
* PWM control mode
* 300kHz fixed frequency
* Internal soft-start
* Over-current fault monitor on MOSFET, no current sense resistor required
* RoHS compliant and 100% lead (Pb)-free

■ ORDERING INFORMATION

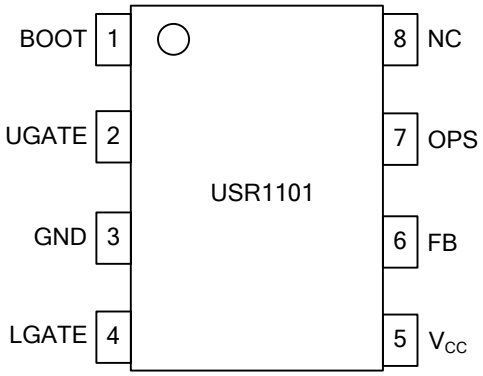
Ordering Number	Package	Packing
USR1101G-S08-R	SOP-8	Tape Reel

USR1101G-S08-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) S08: SOP-8 (3) G: Halogen Free and Lead Free

■ MARKING



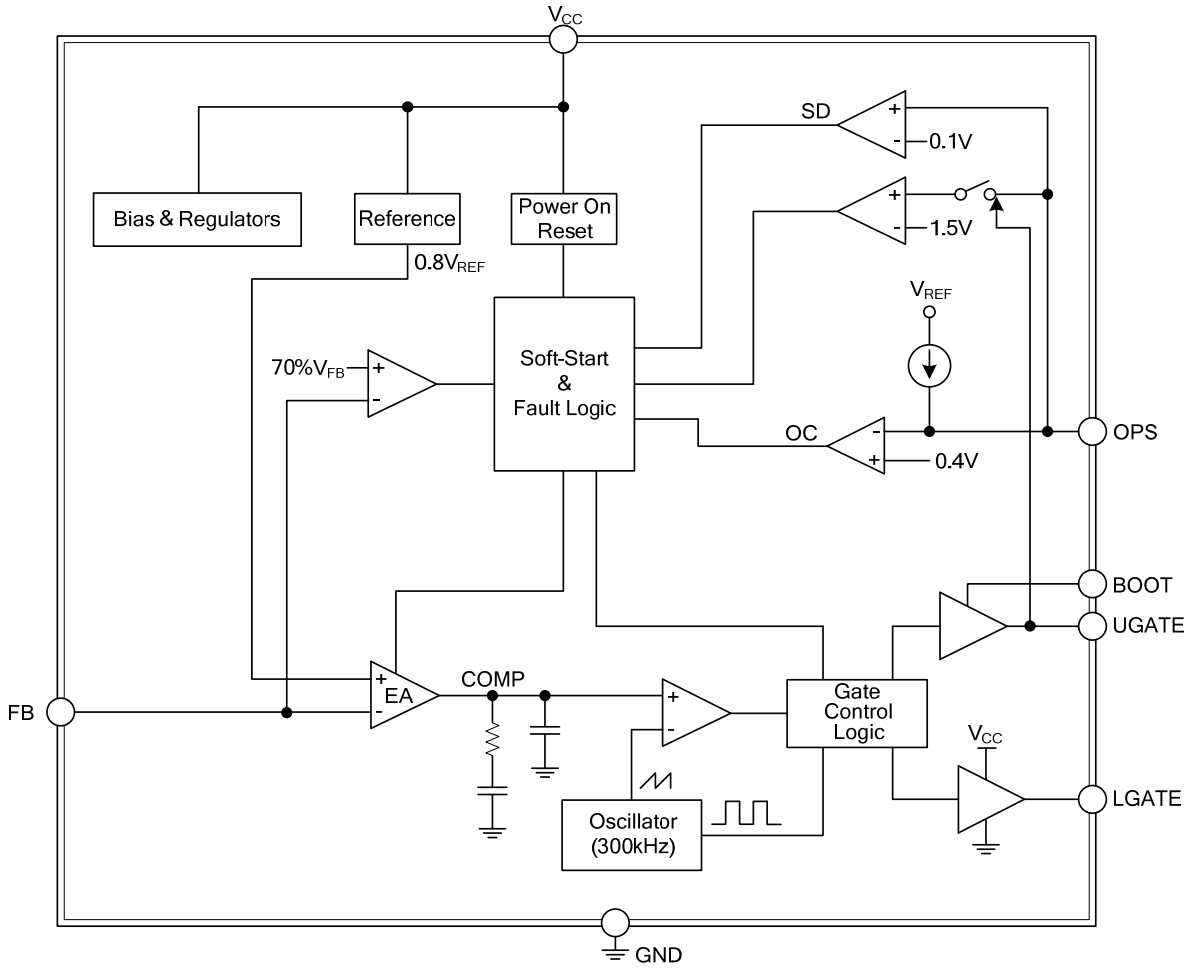
■ PIN CONFIGURATION



■ PIN DESCRIPTION

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

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	16	V
Power Dissipation (T_A=25°C) (Note 1)	P_D	0.625	W
Storage Temperature	T_{STG}	-65~150	°C
Junction Temperature	T_J	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_{JA}	160	°C/W

■ RECOMMENDED OPERATING CONDITIONS (Note 2)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	5±5%,12±10%	V
Ambient Temperature	T_A	0~70	°C
Junction Temperature	T_J	0~125	°C

Notes: 1. θ_{JA} is measured in the natural convection at T_A=25°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_{CC}=5V/12V, T_A=25°C, unless otherwise specified)

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

■ APPLICATION INFORMATION

OCP

Sense the low-side MOSFET's $R_{DS(ON)}$ 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:

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

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