



## USR1021

Preliminary

LINEAR INTEGRATED CIRCUIT

### 3A SYNCHRONOUS BUCK REGULATOR

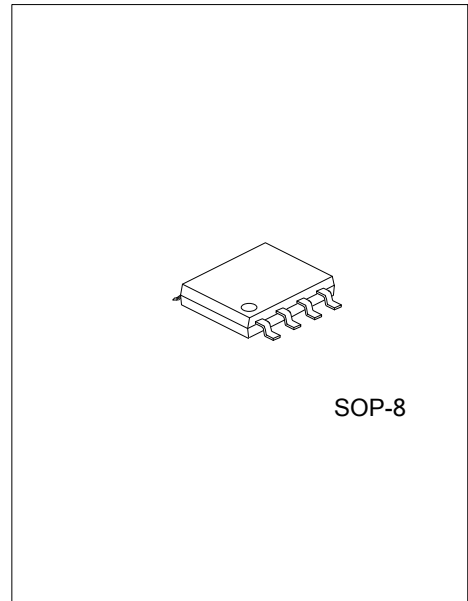
#### DESCRIPTION

The UTC **USR1021** is a high efficiency, 3A synchronous buck regulator. The UTC **USR1021** works from a 6V to 18V in put voltage range, and provides up to 3A of continuous output current with an output voltage adjustable down to 0.8V.

The UTC **USR1021** comes in an SOP-8 packages and is rated over a -40°C~+85°C ambient temperature range.

#### FEATURES

- \* 6V~18V operating input voltage range
- \* High efficiency
- \* Internal soft start
- \* 1.5% initial output accuracy
- \* Output voltage adjustable to 0.8V
- \* 3A continuous output current
- \* Cycle-by-cycle current limit
- \* 500kHz PWM operation
- \* Thermal shutdown
- \* Short-circuit protection



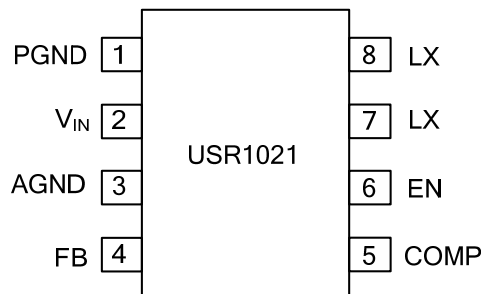
#### ORDERING INFORMATION

Ordering Number		Package Packing	
Lead Free	Halogen Free		
USR1021L-S08-R USR1021L-S08-R	21G-S08-R	SOP-8	Tape Reel
USR1021L-S08-T	USR1021G-S08-T	SOP-8	Tube

Note: xx : Output Voltage, refer to Marking Information.

<p>USR1021L-S08-R</p> <ul style="list-style-type: none"> <li>(1)Packing Type</li> <li>(2)Package Type</li> <li>(3)Halogen Free</li> </ul>	<ul style="list-style-type: none"> <li>(1) R: Tape Reel, T: Tube</li> <li>(2) S08: SOP-8</li> <li>(3) L: Lead Free, G: Halogen Free</li> </ul>
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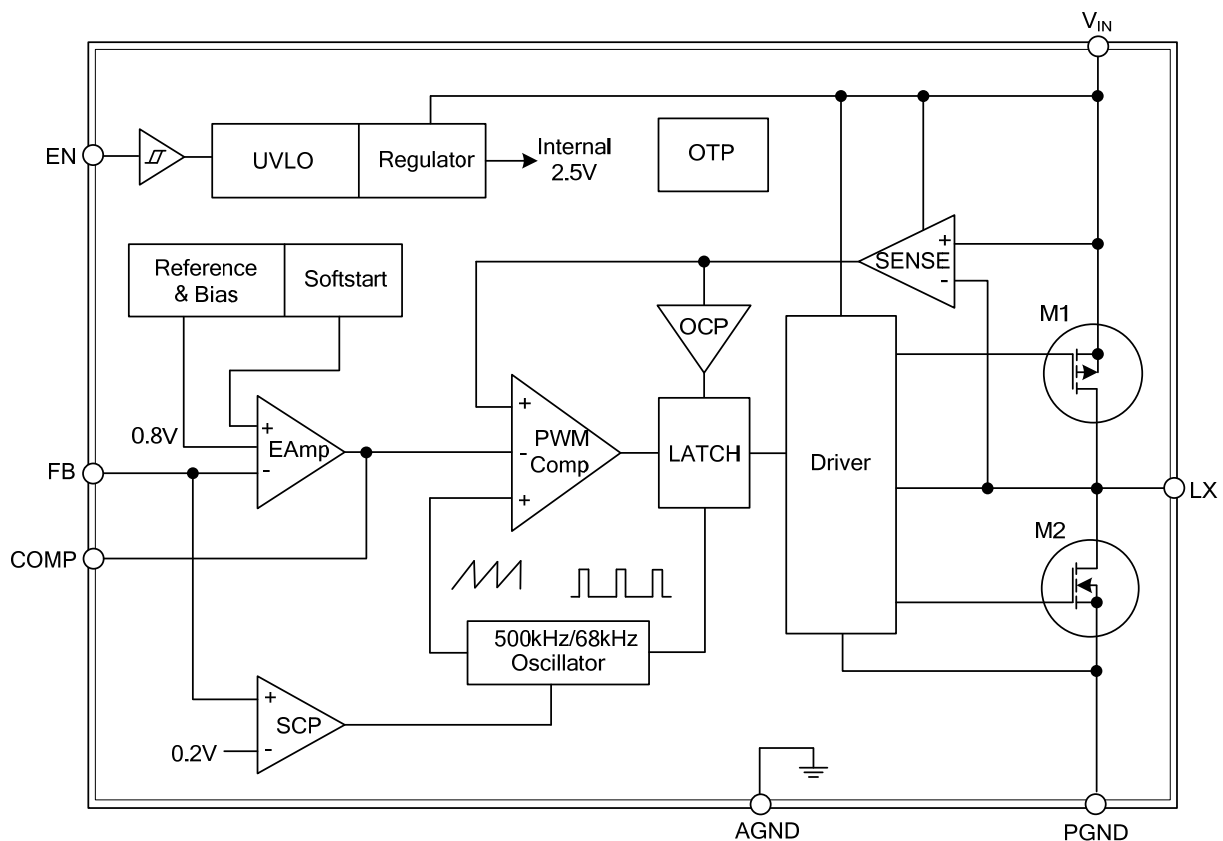
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	PGND	Power ground
2	V <sub>IN</sub>	Supply voltage input
3	AGND	Reference connectio for controller section
4	F B	Feedback voltage
5	COMP	Compensation pin
6	EN	Enable pin
7, 8	LX	Switch pin

■ BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATING

PARAMETER SYMBOL		RATINGS	UNIT
Supply Voltage	$V_{IN}$	18	V
LX to AGND		$-0.7 \sim V_{IN} + 0.3$ V	
EN to AGND		$-0.3 \sim V_{IN} + 0.3$ V	
FB to AGND		$-0.3 \sim 6.0$	V
COMP to AGND		$-0.3 \sim 6.0$	V
PGND to AGND		$-0.3 \sim +0.3$	V
Junction Temperature	$T_J +$	150	°C
Storage Temperature	$T_{STG}$	$-65 \sim +150$	°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 (Note 2)	$\theta_{JA}$	87	°C/W

### ■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{IN}$	6~18	V
Output Voltage Range		$0.8 \sim V_{IN}$ V	
Ambient Temperature	$T_A$	$-40 \sim +85$	°C

### ■ ELECTRICAL CHARACTERISTICS

( $T_A=25^\circ\text{C}$ ,  $V_{IN}=V_{EN}=12\text{V}$ ,  $V_{OUT}=3.3\text{V}$ , unless otherwise specified) (Note 3)

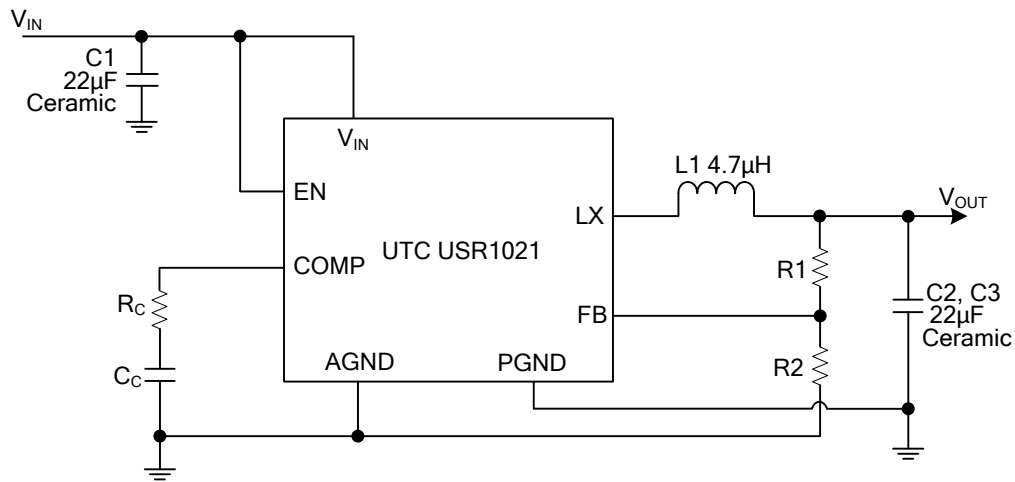
PARAMETER SYMBOL		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	$V_{IN}$		6		18	V
Supply Current (Quiescent)	$I_{IN}$	$I_{OUT}=0$ , $V_{FB}=1.2\text{V}$ , $V_{EN}>2\text{V}$		3.5	5	mA
Shutdown Supply Current	$I_{OFF}$	$V_{EN}=0\text{V}$		1	10	$\mu\text{A}$
Feedback Voltage	$V_{FB}$	$T_A=25^\circ\text{C}$	0.788	0.8	0.812	V
Load Regulation				0.5		%
Line Regulation				1		%
Feedback Voltage Input Current	$I_{FB}$				200	nA
EN Input Threshold	$V_{EN}$	Off Threshold			0.6	V
		On Threshold	2			V
SS Time		$C_{SS}=16\text{nF}$		2		ms
<b>MODULATOR</b>						
Frequency f	$f_o$		400	500	600	kHz
Maximum Duty Cycle	$D_{MAX}$		85			%
Controllable Minimum On Time	$T_{MIN}$				150	ns
Current Sense Transconductance				7		A/V
Error Amplifier Transconductance			180			$\mu\text{A/V}$
<b>PROTECTION</b>						
Current Limit	$I_{LIMIT}$		3.5	4.5		A
Over-Temperature Shutdown Limit		$T_J$ Rising	150			°C
		$T_J$ Falling		100		°C

Notes: 1. Devices are inherently ESD sensitive, handling precautions are required. Human body model rating: 1.5 k $\Omega$  in series with 100pF.

2. The value of  $\theta_{JA}$  is measured with the device mounted on a 1-in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The value in any given application depends on the user's specific board design.

3. Specification in BOLD indicate an ambient temperature range of  $-40^\circ\text{C} \sim +85^\circ\text{C}$ . These specifications are guaranteed by design.

■ TYPICAL APPLICATION CIRCUIT



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