



## UCP0510

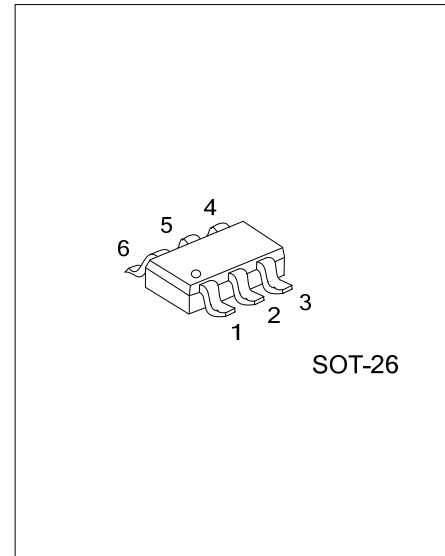
Preliminary

CMOS IC

### REGULATED CHARGE PUMP

#### DESCRIPTION

The UTC **UCP0510** Charge Pump is a Micro Power switched-capacitor voltage converter that delivers a regulated output. No external inductor is required for operation. Using three small capacitors, the UTC **UCP0510** can deliver up to 100mA to the voltage regulated output. The UTC **UCP0510** features very low quiescent current and high efficiency over a large portion of its load range making this device ideal for battery-powered applications. Furthermore, the combination of few external components and small package size keeps the total converter board area to a minimum in space restricted applications. The UCP0510 operates in an output-regulated voltage doubling mode. The regulator uses a pulse-skipping technique to provide a regulated output from a varying input supply. The UTC **UCP0510** contains a thermal management circuit to protect the device under continuous output short circuit conditions.



#### FEATURES

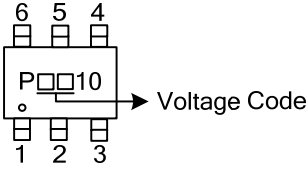
- \* Step-Up Voltage Converter
- \* Input Voltage Range
  - UCP0510-50**: 2.7V to 5V
  - UCP0510-45**: 2.7V to 4.5V
- \* Micro Power consumption: 13  $\mu$ A
- \* Regulated 5V, 4.5V $\pm$ 4% Output
- \* 5V Output Current
  - 100mA with  $V_{IN} \geq 3.0V$
  - 50mA with  $V_{IN} \geq 2.7V$
- \* 4.5V Output Current
  - 100mA with  $V_{IN} \geq 3.0V$
  - 50mA with  $V_{IN} \geq 2.7V$
- \* Peak Current 250mA for 100ms
- \* High Frequency 450 kHz operation
- \* Shutdown Mode Draws Less Than 1  $\mu$ A
- \* Short-Circuit/Over-Temperature Protection

#### ORDERING INFORMATION

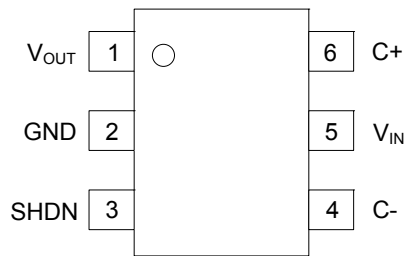
Ordering Number		Package	Packing
Lead Free	Halogen Free		
UCP0510G-xx-AG6-R	UCP0510G-xx-AG6-R	SOT-26	Tape Reel

UCP0510G-xx-AG6-R	(1)Packing Type	(1) R: Tape Reel
	(2)Package Type	(2) AG6: SOT-26
	(3)Output Voltage Code	(3) xx: refer to Marking Information
	(4)Green Package	(4) G: Halogen Free and Lead Free, L: Lead Free

### MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-26	45: 4.5V 50: 5.0V	

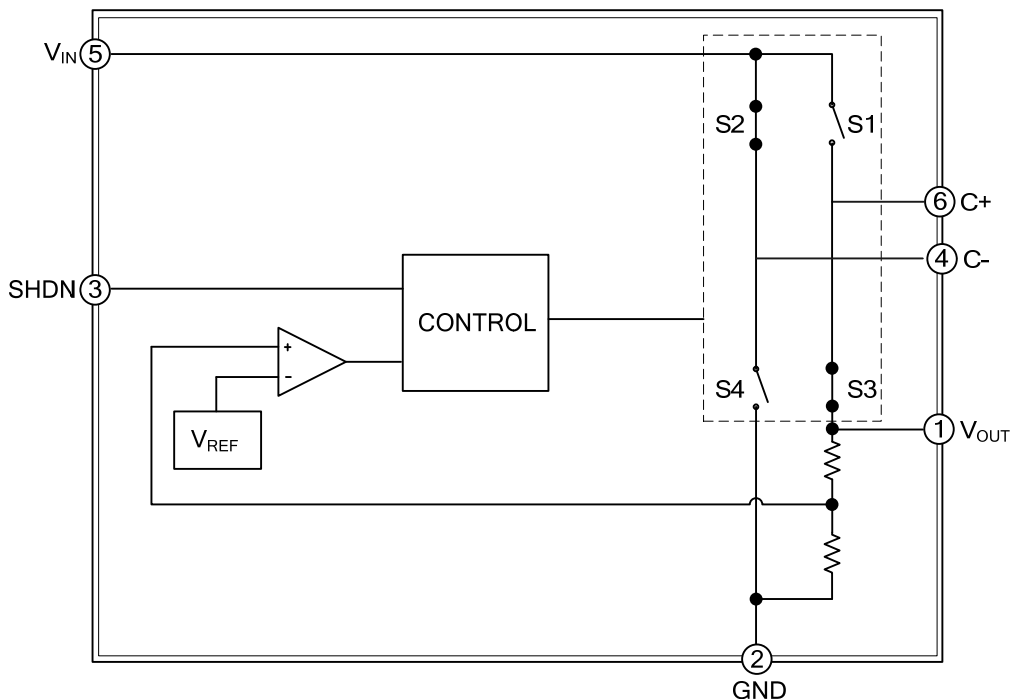
### PIN CONFIGURATION



### PIN DISCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	V <sub>OUT</sub>	Regulated output pin. Bypass this pin to ground with low equivalent series resistance (ESR) capacitor.
2	GND	Ground connection.
3	SHDN	Shutdown input. Active low signal disables the converter.
4	C-	Flying capacitor negative terminal.
5	V <sub>IN</sub>	Input supply pin. Bypass this pin to ground with low-ESR capacitor.
6	C+	Flying capacitor positive terminal.

### BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Output Voltage	$V_{OUT}$	-0.3 ~ 6	V
Input Voltage	$V_{IN}$	-0.3 ~ 6	V
SHDN Voltage	$V_{SHDN}$	-0.3 ~ 6	V
Operating Junction Temperature Range	$T_J$	-40 ~ +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.

### ■ ELECTRICAL CHARACTERISTICS

( $V_{IN} = 3.6V$ ,  $T_A = 25^\circ C$ ,  $C_{FLY}=1\mu F$ ,  $C_{IN}=10\mu F$ ,  $C_{OUT}=10\mu F$ , unless otherwise specified)

#### UTC UCP0510-50

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{IN}$	$V_{IN}$	$V_{OUT} = 5.0V$	2.7		$V_{OUT}$	V
Output Voltage	$V_{OUT}$	$2.7V < V_{IN} < 5V, I_{OUT} \leq 50mA$	4.8	5.0	5.2	V
		$3.0V < V_{IN} < 5V, I_{OUT} \leq 100mA$	4.8	5.0	5.2	V
No Load Supply Current <sup>1</sup>	$I_Q$	$2.7V < V_{IN} < 5V, I_{OUT} = 0mA, SHDN = V_{IN}$		25	100	$\mu A$
Shutdown Supply Current	$I_{SHDN}$	$2.7V < V_{IN} < 3.6V, I_{OUT} = 0mA, SHDN = 0$		0.01	1	$\mu A$
		$3.6V < V_{IN} < 5V, I_{OUT} = 0mA, SHDN = 0$			2.5	
Ripple Voltage	$V_{RIPPLE}$	$V_{IN} = 3V, I_{OUT} = 50mA$		25		$mV_{P-P}$
		$V_{IN} = 3V, I_{OUT} = 100mA$		30		
Oscillator Frequency	$f_{OSC}$	Oscillator Free Running		450		KHz
SHDN Input Threshold High	$V_{IH}$		1.5			V
SHDN Input Threshold Low	$V_{IL}$				0.3	V
SHDN Input Current High	$I_{IH}$	$SHDN = V_{IN}$	-1		1	$\mu A$
SHDN Input Current Low	$I_{IL}$	$SHDN = GND$	-1		1	$\mu A$
$V_{OUT}$ Turn-on time	$t_{ON}$	$V_{IN} = 3V, I_{OUT} = 0mA$		0.2		ms
Short-circuit current <sup>2</sup>	$I_{SC}$	$V_{IN} = 3V, V_{OUT} = GND, SHDN = 3V$		300		mA
Efficiency	$\eta$	$V_{IN} = 2.7V, I_{OUT} = 50mA$		83		%

#### UTC UCP0510-45

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{IN}$	$V_{IN}$	$V_{OUT} = 4.5V$	2.7		$V_{OUT}$	V
Output Voltage	$V_{OUT}$	$2.7V < V_{IN} < 4.5V, I_{OUT} \leq 50mA$	4.32	4.5	4.68	V
		$3.0V < V_{IN} < 4.5V, I_{OUT} \leq 100mA$	4.32	4.5	4.68	V
No Load Supply Current <sup>3</sup>	$I_Q$	$2.7V < V_{IN} < 4.5V, I_{OUT} = 0mA, SHDN = V_{IN}$		25	100	$\mu A$
Shutdown Supply Current	$I_{SHDN}$	$2.7V < V_{IN} < 3.6V, I_{OUT} = 0mA, SHDN = 0$		0.01	1	$\mu A$
		$3.6V < V_{IN} < 4.5V, I_{OUT} = 0mA, SHDN = 0$			2.5	
Ripple Voltage	$V_{RIPPLE}$	$V_{IN} = 3V, I_{OUT} = 50mA$		25		$mV_{P-P}$
		$V_{IN} = 3V, I_{OUT} = 100mA$		30		
Oscillator Frequency	$f_{OSC}$	Oscillator Free Running		450		KHz
SHDN Input Threshold High	$V_{IH}$		1.5			V
SHDN Input Threshold Low	$V_{IL}$				0.3	V
SHDN Input Current High	$I_{IH}$	$SHDN = V_{IN}$	-1		1	$\mu A$
SHDN Input Current Low	$I_{IL}$	$SHDN = GND$	-1		1	$\mu A$
$V_{OUT}$ Turn-on time	$t_{ON}$	$V_{IN} = 3V, I_{OUT} = 0mA$		0.2		ms
Short-circuit current <sup>2</sup>	$I_{SC}$	$V_{IN} = 3V, V_{OUT} = GND, SHDN = 3V$		300		mA
Efficiency	$\eta$	$V_{IN} = 2.7V, I_{OUT} = 50mA$		83		%

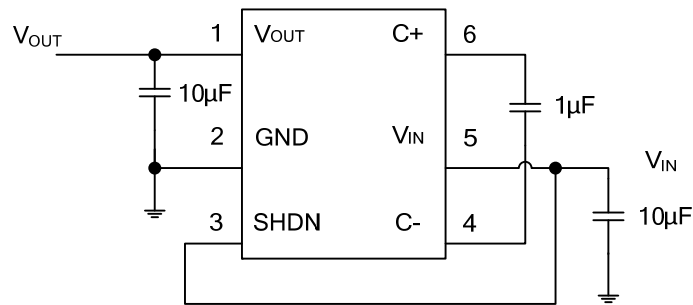
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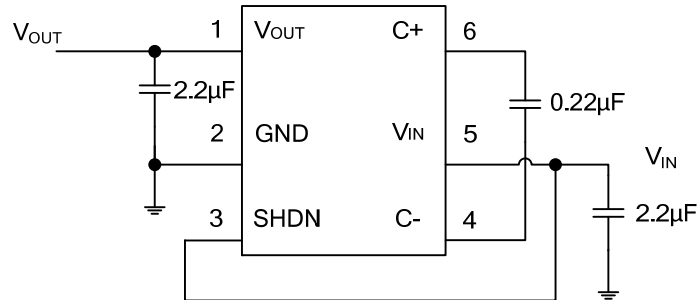
2. Under short-circuit conditions, the device may enter over temperature protection mode.

3.  $V_{OUT}$  is pulled up to 5.0V to prevent switching.

■ TYPICAL APPLICATION CIRCUIT



5V,100mA supply power



5V,60mA supply power

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