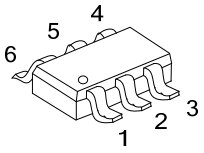
REGULATED CHARGE PUMP



SOT-26

■ 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

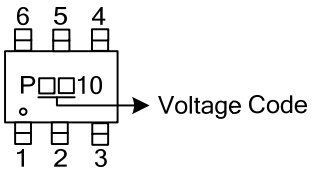
* Step-Up Voltage Converter
* Input Voltage Range
  UCP0510-50: 2.7V to 5V
  UCP0510-45: 2.7V to 4.5V
* Micro Power consumption: 13 μA
* Regulated 5V, 4.5V±4% Output
* 5V Output Current
  100mA with V_{IN} ≥ 3.0V
  50mA with V_{IN} ≥ 2.7V
* 4.5V Output Current
  100mA with V_{IN} ≥ 3.0V
  50mA with V_{IN}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

■ ORDERING INFORMATION

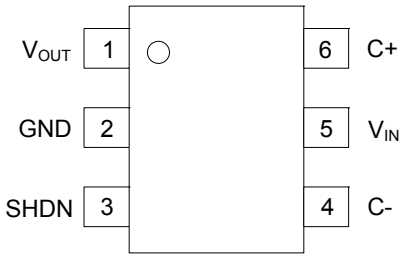
Ordering Number		Package	Packing
Lead Free	Halogen Free		
UCP0510G-xx-AG6-R	UCP0510G-xx-AG6-R	SOT-26	Tape Reel

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

■ MARKING INFORMATION

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

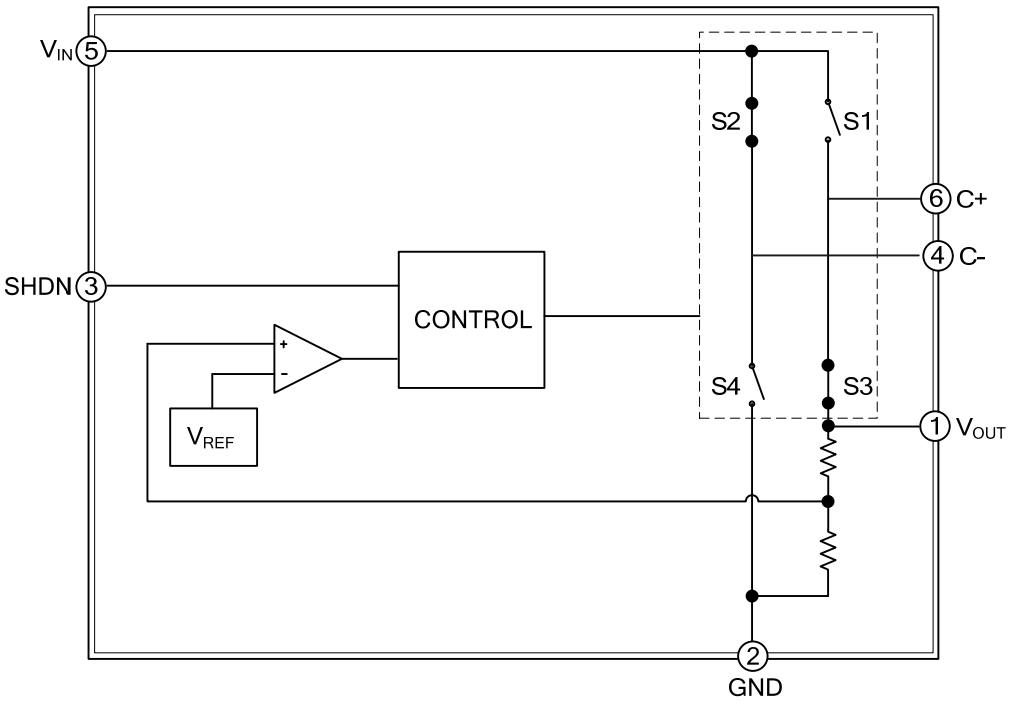
■ PIN CONFIGURATION



■ PIN DISCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	V_{OUT}	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_{IN}	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°C, C_{FLY}=1uF, C_{IN}=10uF, C_{OUT}=10uF, unless otherwise specified)

UTC UCP0510-50

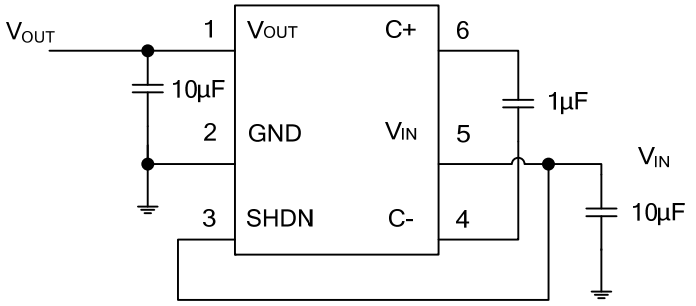
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{IN}	V_{IN}	V_{OUT} =5.0V	2.7		V_{OUT}	V
Output Voltage	V_{OUT}	2.7V<V_{IN}<5V, I_{OUT}≤ 50mA	4.8	5.0	5.2	V
		3.0V<V_{IN}<5V,I_{OUT} ≤ 100mA	4.8	5.0	5.2	V
No Load Supply Current[1]	I_Q	2.7V<V_{IN}<5V,I_{OUT}=0mA,SHDN=V_{IN}		25	100	uA
Shutdown Supply Current	I_{SHDN}	2.7V<V_{IN}<3.6V,I_{OUT}=0mA,SHDN=0		0.01	1	μA
		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	uA
SHDN Input Current Low	I_{IL}	SHDN=GND	-1		1	uA
V_{OUT} Turn-on time	t_{ON}	V_{IN}=3V,I_{OUT}=0mA		0.2		ms
Short-circuit current[2]	I_{SC}	V_{IN}=3V,V_{OUT}=GND,SHDN=3V		300		mA
Efficiency	η	V_{IN}=2.7V,I_{OUT} = 50mA		83		%

UTC UCP0510-45

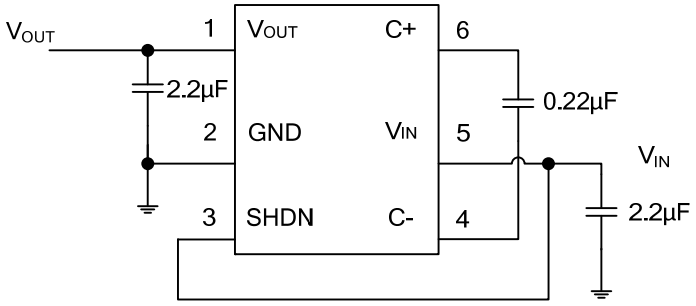
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{IN}	V_{IN}	V_{OUT} =4.5V	2.7		V_{OUT}	V
Output Voltage	V_{OUT}	2.7V<V_{IN}<4.5V, I_{OUT}≤ 50mA	4.32	4.5	4.68	V
		3.0V<V_{IN}<4.5V,I_{OUT} ≤ 100mA	4.32	4.5	4.68	V
No Load Supply Current[3]	I_Q	2.7V<V_{IN}<4.5V,I_{OUT}=0mA,SHDN=V_{IN}		25	100	uA
Shutdown Supply Current	I_{SHDN}	2.7V<V_{IN}<3.6V,I_{OUT}=0mA,SHDN=0		0.01	1	μA
		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	uA
SHDN Input Current Low	I_{IL}	SHDN=GND	-1		1	uA
V_{OUT} Turn-on time	t_{ON}	V_{IN}=3V,I_{OUT}=0mA		0.2		ms
Short-circuit current[2]	I_{SC}	V_{IN}=3V,V_{OUT}=GND,SHDN=3V		300		mA
Efficiency	η	V_{IN}=2.7V,I_{OUT} = 50mA		83		%

Notes: 1. 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.
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