



## L5200

CMOS IC

### LOW NOISE, REGULATED CHARGE PUMP DC/DC CONVERTERS

#### DESCRIPTION

The UTC **L5200-xx** series are low noise, constant frequency charge pump DC/DC converters and designed to increase efficiency in white LED application. The operating voltage range is 2.7V ~  $V_{OUT}$  input with up to 100mA of output current. Low external parts counts (one flying capacitor and two small bypass capacitors at  $V_{IN}$  and  $V_{OUT}$ ) make the UTC **L5200-xx** series ideally suited for small, battery-powered applications.

A charge-pump architecture maintains constant switching frequency to zero load and reduces both output and input ripple. The UTC **L5200-xx** series have thermal shutdown capability to escape the device damaged from a continuous short-circuit. With built-in soft-start circuitry to prevents excessive current flow at  $V_{IN}$  during start-up. High switching frequency enables the use of small ceramic capacitors. A low-current shutdown feature disconnects the load from  $V_{IN}$  and reduces quiescent current to  $<1\mu A$ .

The **L5200-ADJ** is available in MSOP-8 package and **L5200-fixed** in SOT-26 and TSOT-26 package.

#### FEATURES

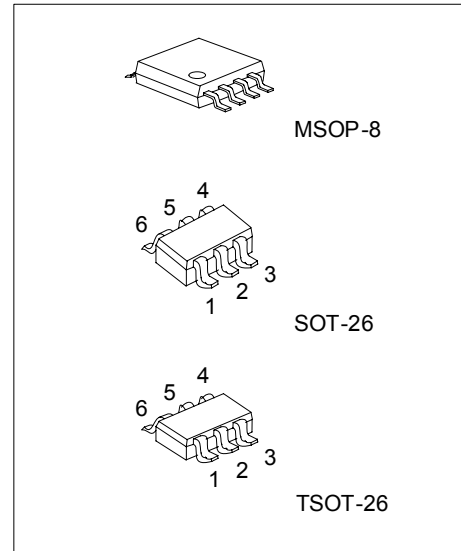
- \* Low Noise Constant Frequency Operation
- \* Output Current: 100mA
- \* 2MHz Switching Frequency
- \* 4.5V/5.0V Fixed Output Voltage
- \*  $V_{IN}$  Range: 2.7V ~  $V_{OUT}$
- \* Automatic Soft-Start.
- \* No Inductors
- \* Less than 1 $\mu A$  of Shutdown Current

#### ORDERING INFORMATION

Ordering Number		Package	Packing
Normal	Lead Free Plating		
L5200-AD-SM1-R	L5200L-AD-SM1-R	MSOP-8	Tape Reel
L5200-AD-SM1-T	L5200L-AD-SM1-T	MSOP-8	Tube
L5200-xx-AG6-R	L5200L-xx-AG6-R	SOT-26	Tape Reel
L5200-xx-AH6-R	L5200L-xx-AH6-R	TSOT-26	Tape Reel

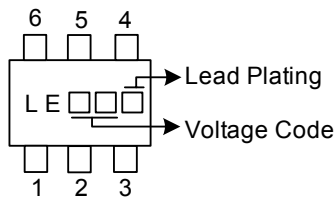
Note: xx :output voltage

<p>L5200L-AD-SM1-R</p>	<p>(1)Packing Type (2)Package Type (3)Output Voltage (4)Lead Plating</p>	<p>(1) R: Tape Reel T: Tube (2) SM1: MSOP-8, AG6: SOT-26, AH6: TSOT-26 (3) AD: ADJ, xx: 45:4.5V, 50:5.0V (4) L: Lead Free Plating Blank: Pb/Sn</p>
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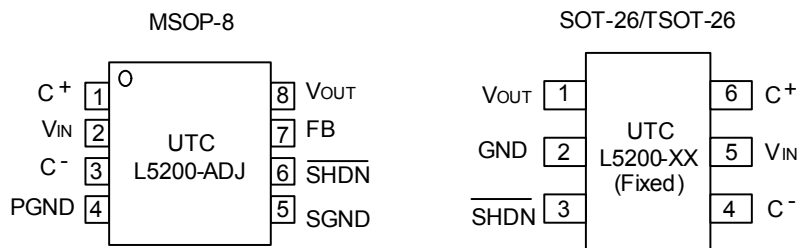


\*Pb-free plating product number: L5200L

■ MARKING (For SOT-26/TSOT-26)



■ PIN CONFIGURATIONS



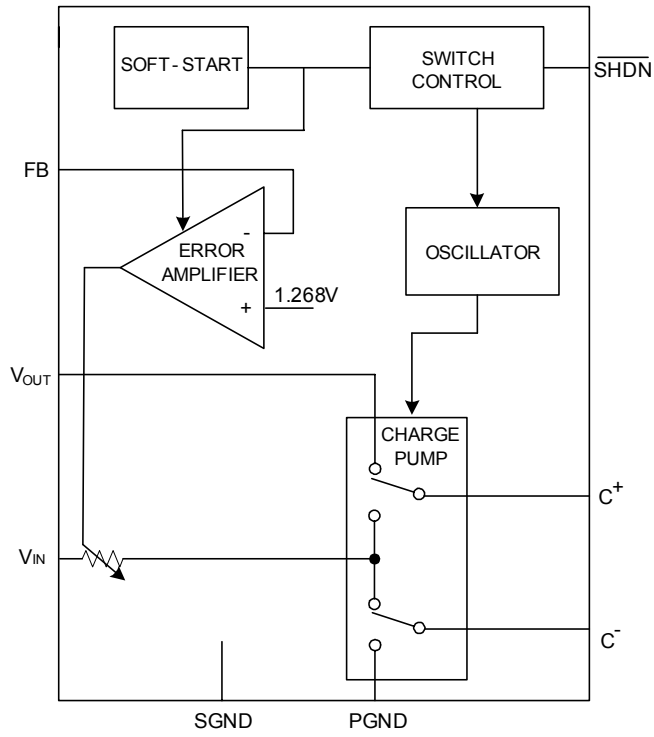
■ PIN DESCRIPTION

PIN NO.		PIN NAME	FUNCTION
L5200-ADJ MSOP-8	L5200-xx SOT-26/TSOT-26		
1	6	C+	Flying Capacitor Positive Terminal
2	5	V <sub>IN</sub>	Input Supply Voltage, should be bypassed with a 1μF~4.7μF low ESR ceramic capacitor.
3	4	C-	Flying Capacitor Negative Terminal
4, 5	2	GND	Ground terminal, should be tied to a ground plane for best performance
6	3	$\overline{\text{SHDN}}$	Shutdown Mode, Active-Low Input. A low on $\overline{\text{SHDN}}$ disables the L5200 series. $\overline{\text{SHDN}}$ must not be allowed to float.
7	X	FB	Feedback Input Pin for Adjustable output. An output divider should be connected from V <sub>OUT</sub> to FB to program the output voltage.
8	1	V <sub>OUT</sub>	Regulated Output Voltage, should be bypassed with a 1μF~4.7μF low ESR ceramic capacitor as close as possible to the pin for best performance

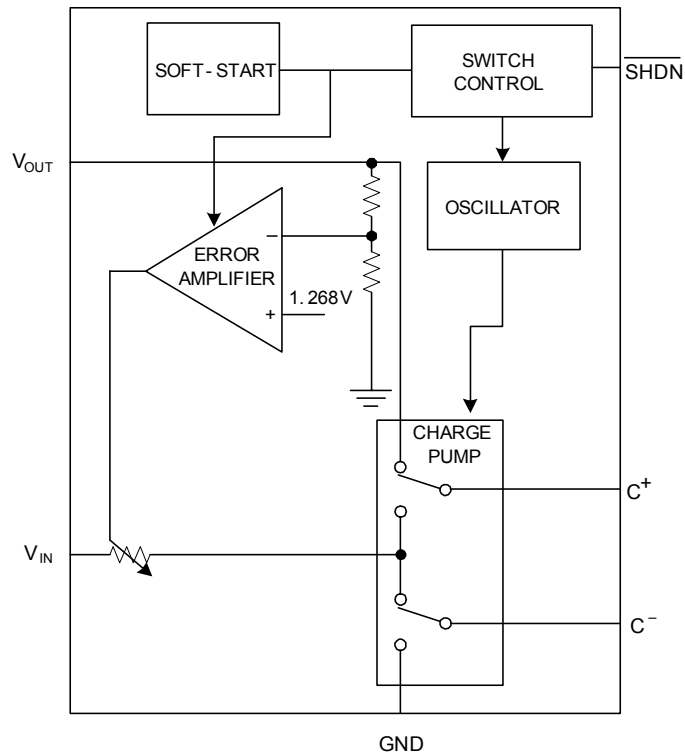
X : The pin is Inexistent for SOT-26 and TSOT-26 package.

■ BLOCK DIAGRAM

**UTC L5200 Adjustable version (MSOP-8)**



**UTC L5200 fixed version (SOT-26/TSOT-26)**



### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage(to GND)	$V_{IN}$	-0.3 ~ 6	V
Charge Pump Voltage(to GND)	$V_{OUT}$	-0.3 ~ 5.5	V
Shutdown Voltage(to GND)	$V_{SHDN}$	-0.3 ~ ( $V_{IN}+0.3$ )	V
Maximum DC Output Current (Note 1)	$I_{OUT}$	150	mA
$V_{OUT}$ Short-Circuit Duration		Indefinite	
Operating Temperature	$T_{OPR}$	-20 ~ +85	
Storage Temperature	$T_{STG}$	-40 ~ +150	

Note 1: Based on long-term current density limitations.

2: Stressed above Absolute Maximum Ratings may impair life or cause permanent damage to the device.

3. The device is guaranteed to meet performance specification within 0 ~+70 operating temperature range and assured by design from -20 ~+85 , characteristic and correlation with static process control.

### ■ ELECTRICAL CHARACTERISTICS

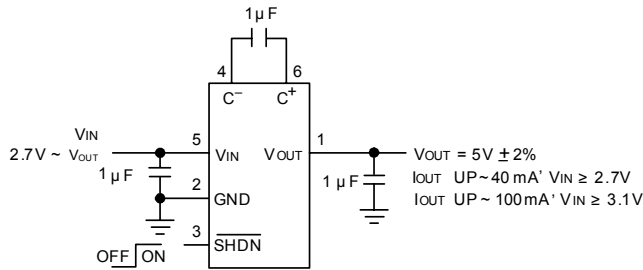
( $T_a = 25$  ,  $V_{IN} = 3.6V$ ,  $C_{FLY} = 1\mu F$ ,  $C_{IN} = 1\mu F$ ,  $C_{OUT} = 1\mu F$ , unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Input Supply Voltage Range	$V_{IN}$		* 2.7		$V_{OUT}$	V	
Output Voltage	L5200-4.5V	$V_{OUT}$ $I_{OUT} \leq 100mA$		4.41	4.5	4.59	V
	L5200-5.0V		* 4.9	5	5.1	V	
Shutdown Input Threshold	$V_{IH}$		* 1.3			V	
	$V_{IL}$		*		0.4	V	
Feedback Voltage (For L5200-ADJ)	$V_{FB}$		* 1.217	1.268	1.319	V	
Output Ripple Voltage(For L5200-fixed)	$V_R$	$V_{IN} = 3V$ , $I_{OUT} = 100mA$		30		mV <sub>P-P</sub>	
Operating Supply Current	$I_{CC}$	$I_{OUT} = 0mA$ , $\overline{SHDN} = V_{IN}$	*	3.5	8	mA	
Shutdown Current	$I_{SHDN}$	$\overline{SHDN} = 0V$ , $V_{OUT} = 0V$	*		1	$\mu A$	
Shutdown Input Current	$I_{IH}$	$\overline{SHDN} = V_{IN}$	* -1		1	$\mu A$	
	$I_{IL}$	$\overline{SHDN} = 0V$	* -1		1	$\mu A$	
Feedback Input Current (For L5200-ADJ)	$I_{FB}$	$V_{FB} = 1.4V$	* -50		50	nA	
Open-Loop Output Resistance	$R_{OL}$	$V_{IN} = 3V$ , $I_{OUT} = 100mA$ $V_{FB} = 0V$ ( $R_{OL} \equiv (2V_{IN} - V_{OUT})/I_{OUT}$ )		9.2		$\Omega$	
Switching Frequency	$F_{OSC}$		1	2		MHz	
Efficiency (For UTC L5200-fixed)	$\eta$	$V_{IN} = 3V$ , $I_{OUT} = 50mA$		80		%	
Soft Start Time	$t_{ON}$	$V_{IN} = 3V$ , $I_{OUT} = 0mA$ 10%~90%		0.8		ms	

Note: \* stand for specifications which apply over the designed operating temperature range.

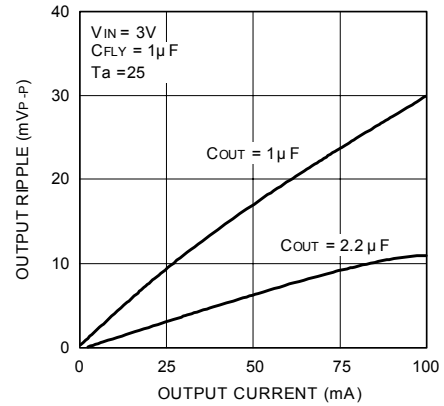
## TYPICAL APPLICATION CIRCUIT

Regulated 5V Output from a 2.7V ~ V<sub>OUT</sub> Input

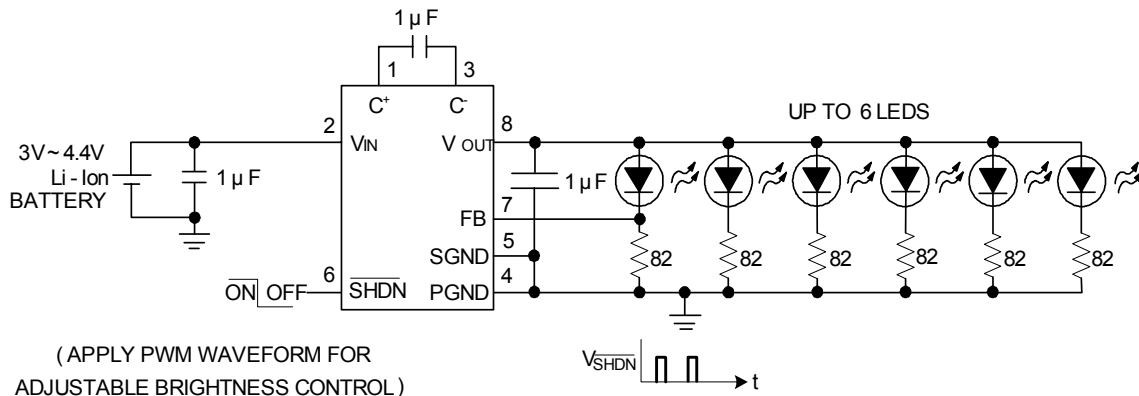


UTC L5200-5.0V

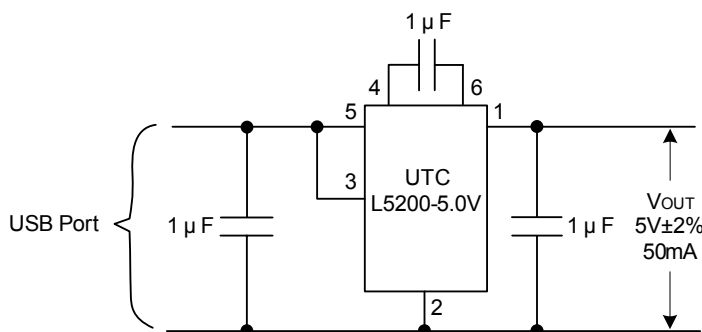
Output Ripple Voltage vs Load Current



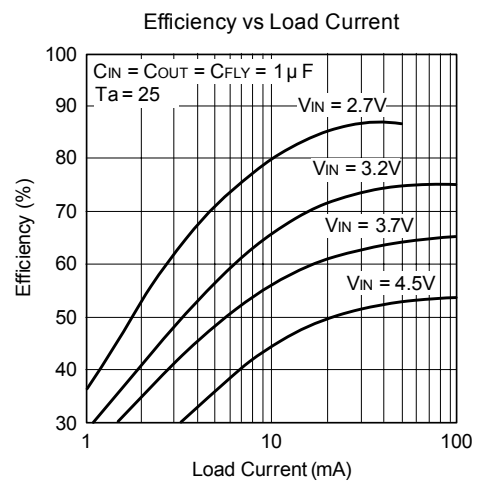
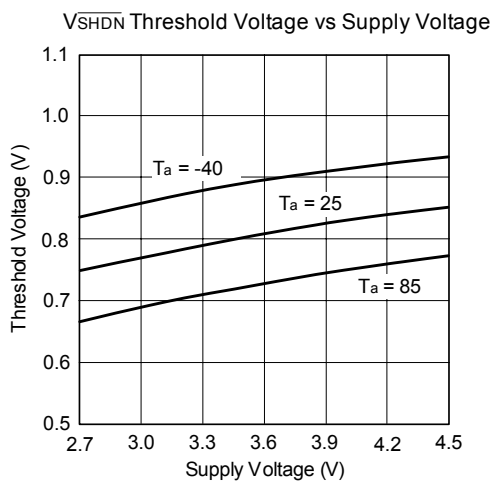
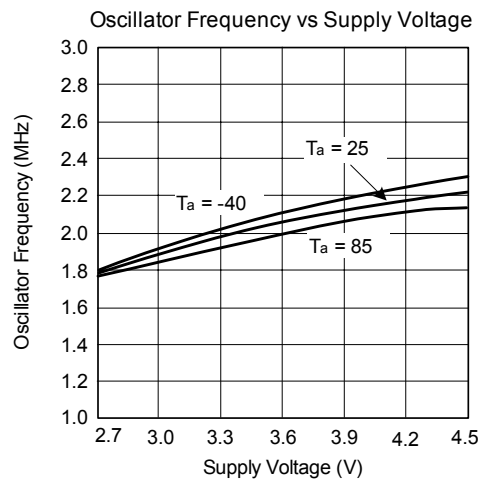
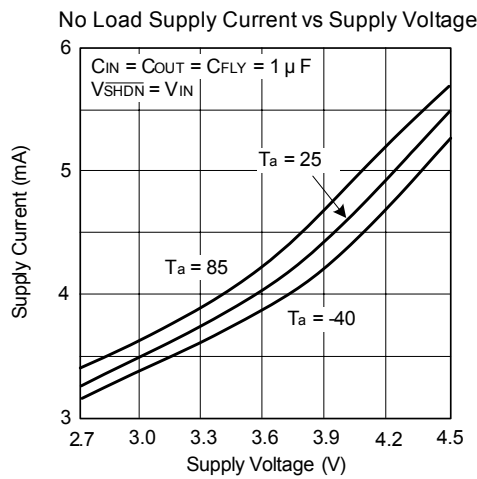
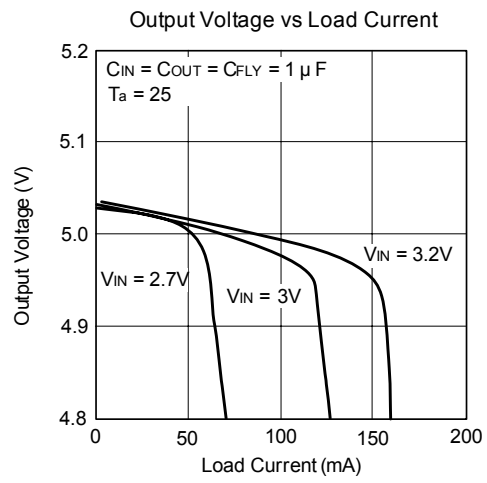
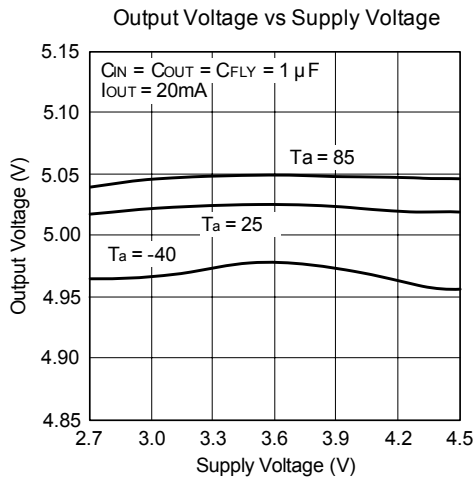
White or Blue LED Driver with LED Current Control (UTC L5200-ADJ)



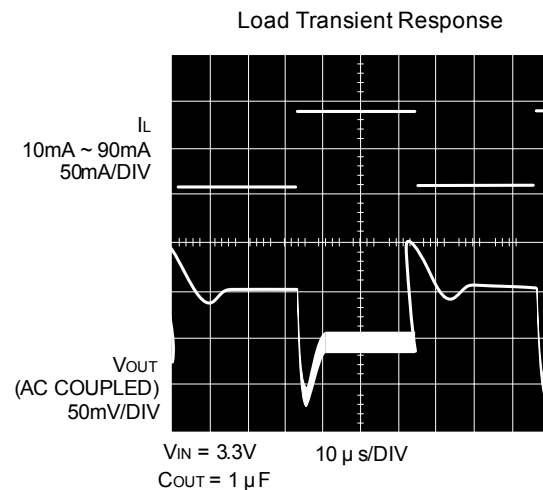
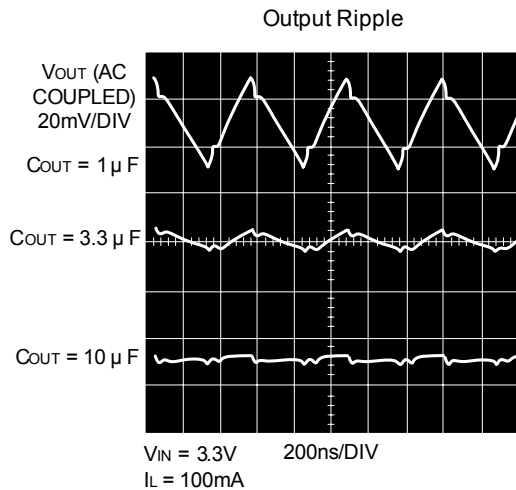
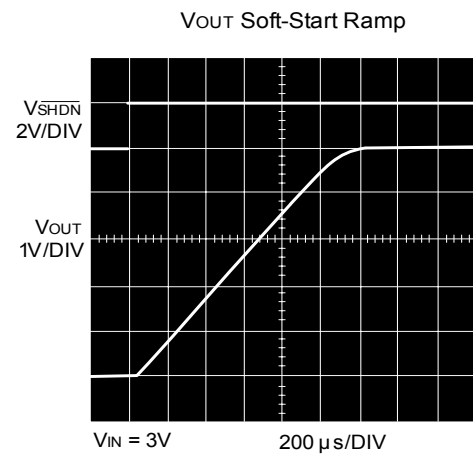
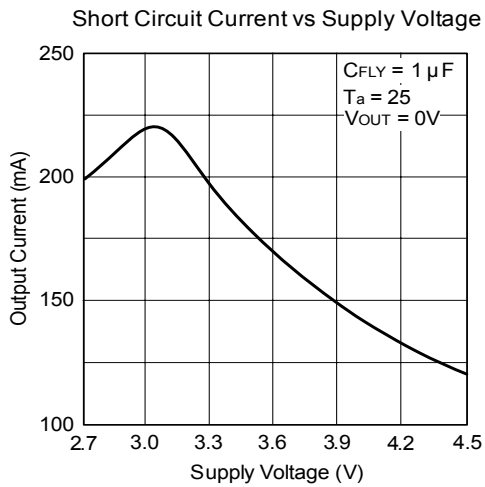
USB Port to Regulated 5V Power Supply ( UTC L5200-5.0V)



■ TYPICAL CHARACTERISTICS (L5200-5.0V)



■ TYPICAL CHARACTERISTICS (L5200-5.0V) (cont.)



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