



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

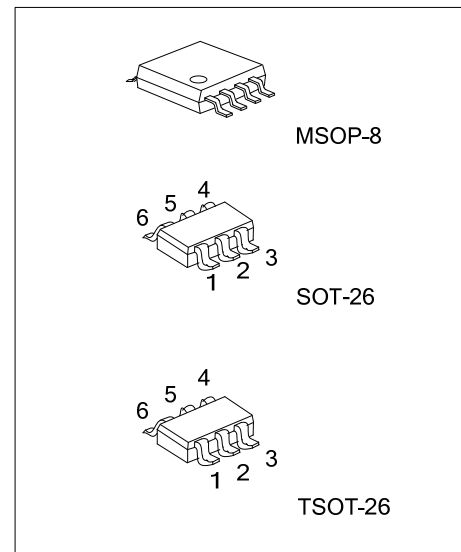
- * Low Noise Constant Frequency Operation
- * Output Current: 100mA
- * 2MHz Switching Frequency
- * 4.5V/5.0V Fixed Output Voltage
- * V_{IN} Range: 2.7V ~ V_{OUT}
- * Automatic Soft-Start.
- * No Inductors
- * Less than 1 μA of Shutdown Current

ORDERING INFORMATION

Ordering Number	Package	Packing
L5200L-xx-SM1-R	MSOP-8	Tape Reel
L5200L-xx-AG6-R	SOT-26	Tape Reel
L5200L-xx-AH6-R	TSOT-26	Tape Reel

Note: xx: Output Voltage, Refer to Marking Information

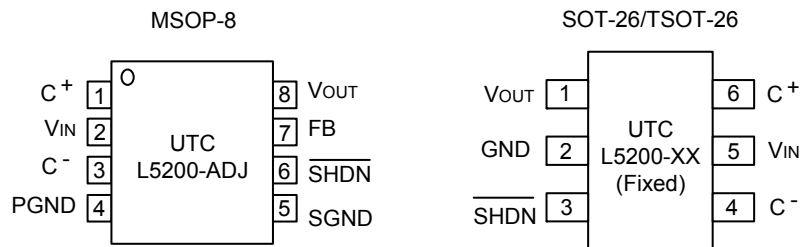
<p>L5200G-xx-SM1-R</p> <p>(1) Packing Type (2) Package Type (3) Output Voltage (4) Green Package</p>	<p>(1) R: Tape Reel (2) SM1: MSOP-8, AG6: SOT-26, AH6: TSOT-26 (3) xx: refer to Marking Information (4) G: Halogen Free and Lead Free</p>
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MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
MSOP-8	AD :ADJ	<p> 8 7 6 5 UTC □□□□ → Date Code L5200G → Output Voltage □□□□ → Lot Code 1 2 3 4 </p>
SOT-26 TSOT-26	45: 4.5V 50: 5.0V	<p> 6 5 4 LE □□G → Voltage Code 1 2 3 </p>

PIN CONFIGURATIONS



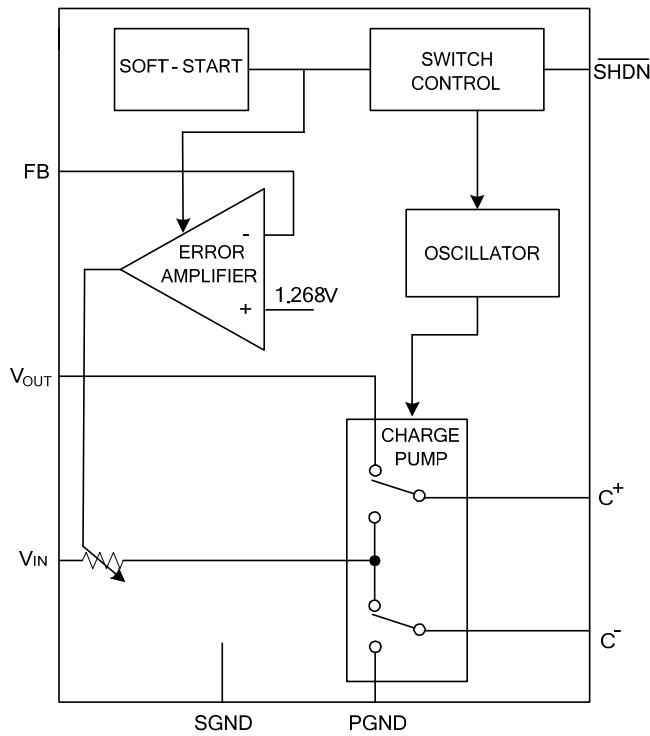
PIN DESCRIPTION

PIN NO.		PIN NAME	FUNCTION
L5200-ADJ	L5200-xx		
MSOP-8	SOT-26/TSOT-26		
1	6	C+	Flying Capacitor Positive Terminal
2	5	V _{IN}	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	SHDN	Shutdown Mode, Active-Low Input. A low on SHDN disables the L5200 series. SHDN must not be allowed to float.
7	X	FB	Feedback Input Pin for Adjustable output. An output divider should be connected from V _{OUT} to FB to program the output voltage.
8	1	V _{OUT}	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

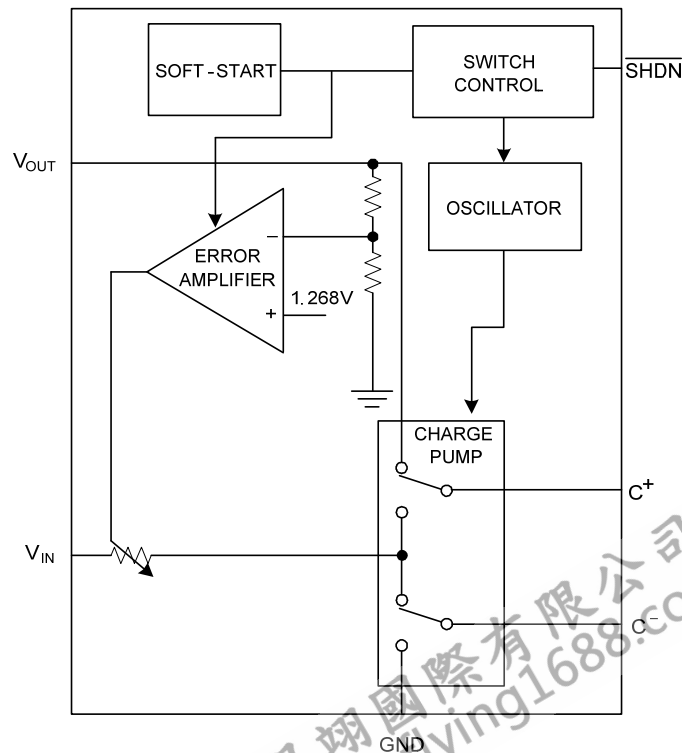
X : The pin is Inexistent for SOT-26 and TSOT-26 package.

■ 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	°C
Storage Temperature	T_{STG}	-40 ~ +150	°C

Notes 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°C~+70°C operating temperature range and assured by design from -20°C~+85°C, characteristic and correlation with static process control.

■ ELECTRICAL CHARACTERISTICS

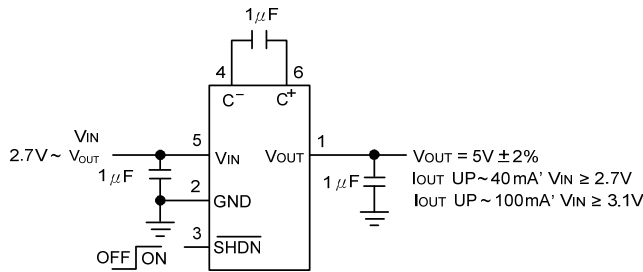
($T_A = 25^\circ\text{C}$, $V_{IN} = 3.6\text{V}$, $C_{FLY} = 1\mu\text{F}$, $C_{IN} = 1\mu\text{F}$, $C_{OUT} = 1\mu\text{F}$, unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Input Supply Voltage Range	V_{IN}		*	2.7		V_{OUT} V	
Output Voltage	V_{OUT}	$I_{OUT} \leq 100\text{mA}$		4.41	4.5	4.59	V
				*	4.9	5	5.1
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	$V_{IN} = 3\text{V}$, $I_{OUT} = 100\text{mA}$		30		mV _{P-P}	
Operating Supply Current	I_{CC}	$I_{OUT} = 0\text{mA}$, $SHDN = V_{IN}$	*	1.7	5	mA	
Shutdown Current	I_{SHDN}	$SHDN = 0\text{V}$, $V_{OUT} = 0\text{V}$	*		1	μA	
Shutdown Input Current	I_{IH}	$SHDN = V_{IN}$	*	-1	1	μA	
	I_{IL}	$SHDN = 0\text{V}$	*	-1	1	μA	
Feedback Input Current (For L5200-ADJ)	I_{FB}	$V_{FB} = 1.4\text{V}$	*	-50	50	nA	
Open-Loop Output Resistance	R_{OL}	$V_{IN} = 3\text{V}$, $I_{OUT} = 100\text{mA}$ $V_{FB} = 0\text{V}$ ($R_{OL} \equiv (2V_{IN} - V_{OUT})/I_{OUT}$)		9.2		Ω	
Switching Frequency	F_{OSC}			1		MHz	
Efficiency (For UTC L5200-fixed)	η	$V_{IN} = 3\text{V}$, $I_{OUT} = 50\text{mA}$		80		%	
Soft Start Time	t_{ON}	$V_{IN} = 3\text{V}$, $I_{OUT} = 0\text{mA}$ 10%~90%		0.8		ms	

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

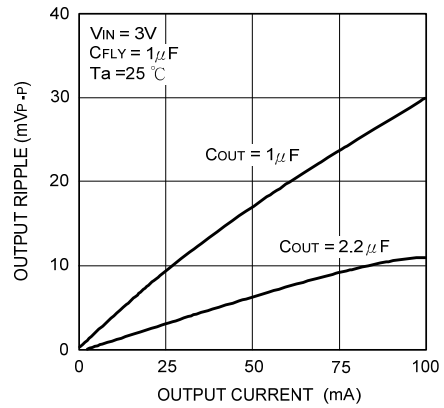
TYPICAL APPLICATION CIRCUIT

Regulated 5V Output from a 2.7V ~ V_{OUT} Input

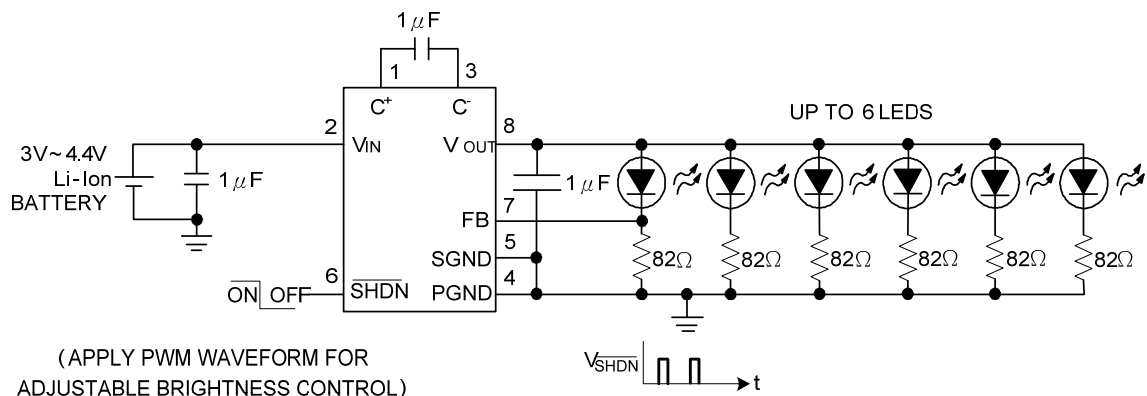


UTC L5200-5.0V

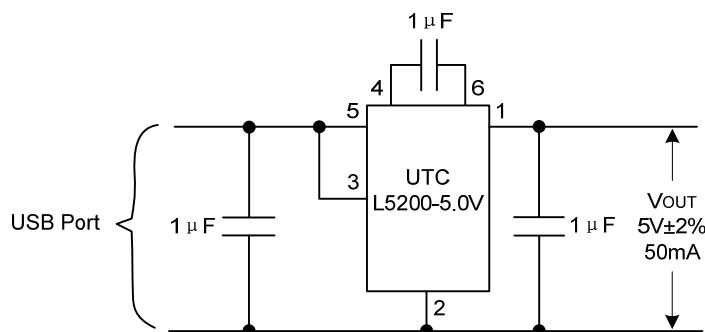
Output Ripple Voltage vs Load Current



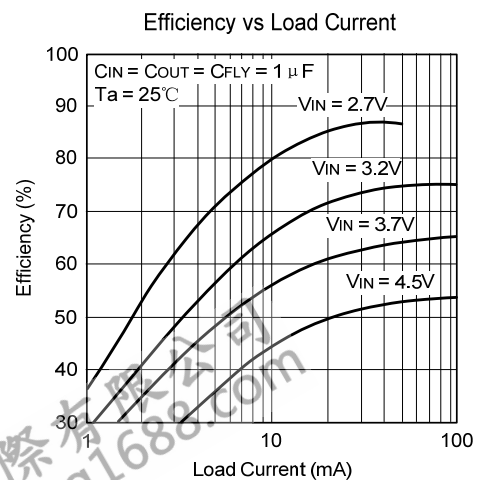
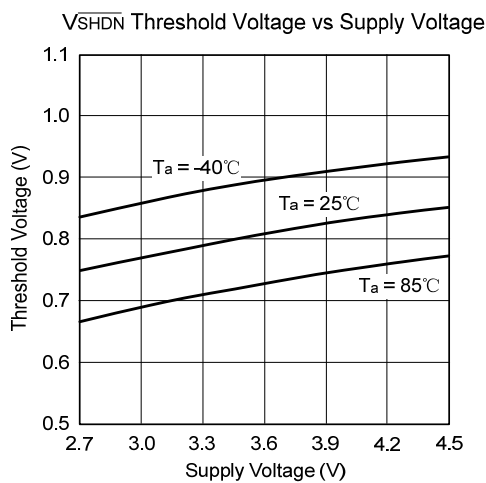
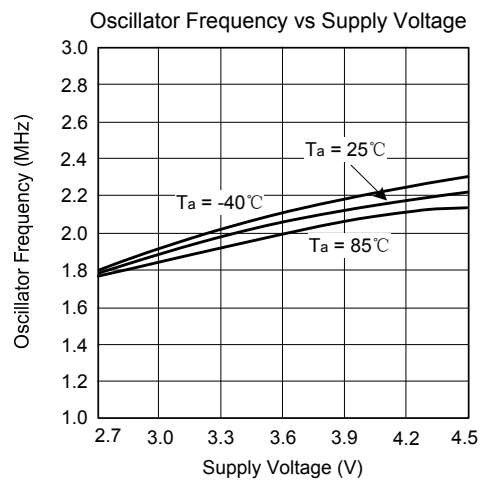
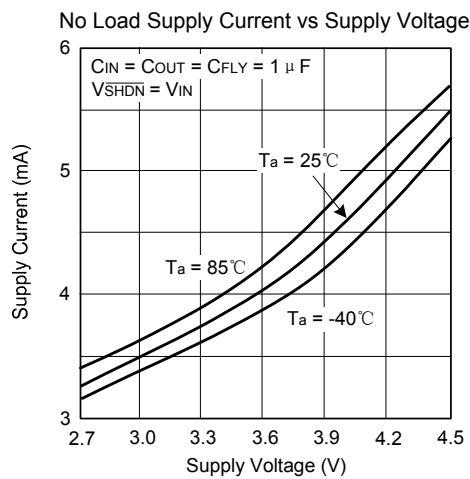
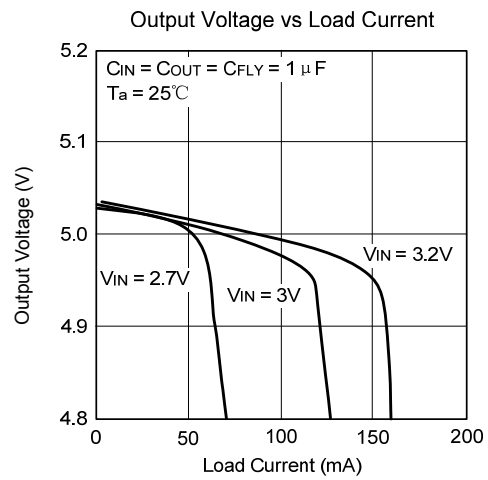
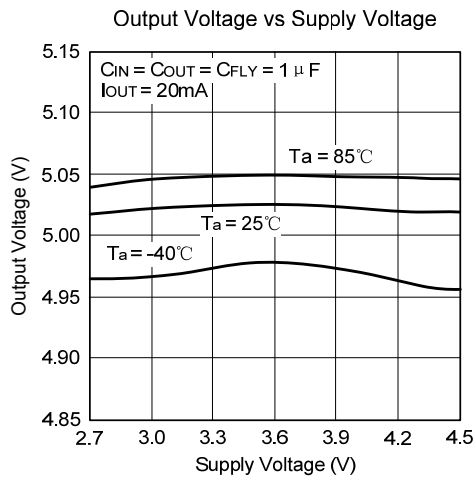
White or Blue LED Driver with LED Current Control (UTC L5200-ADJ)



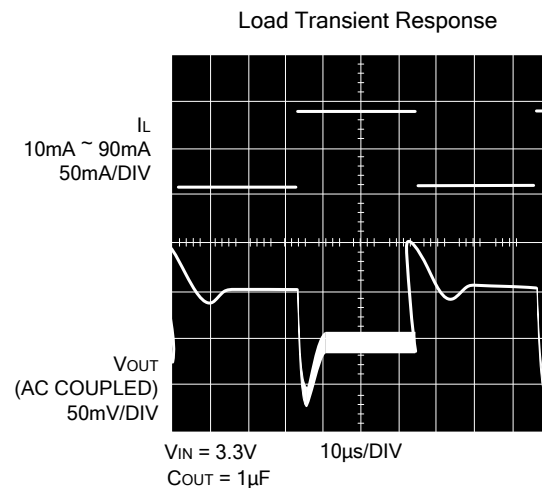
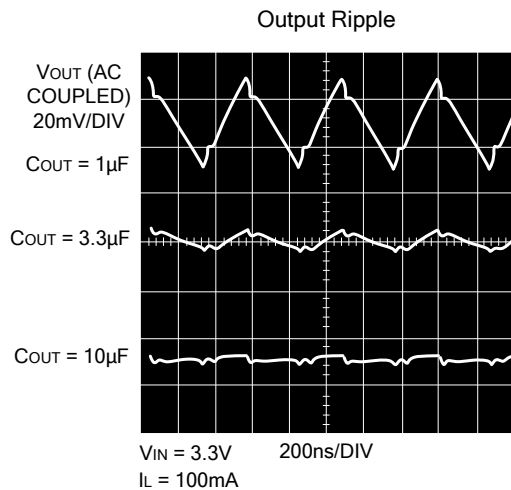
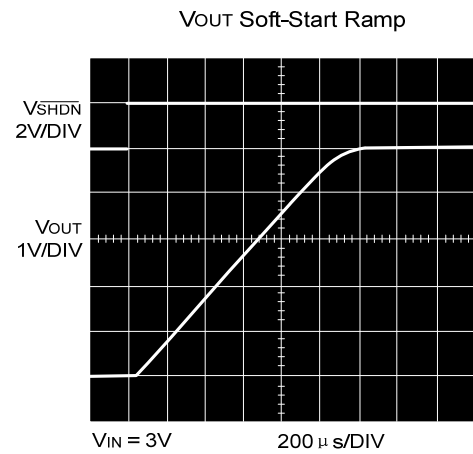
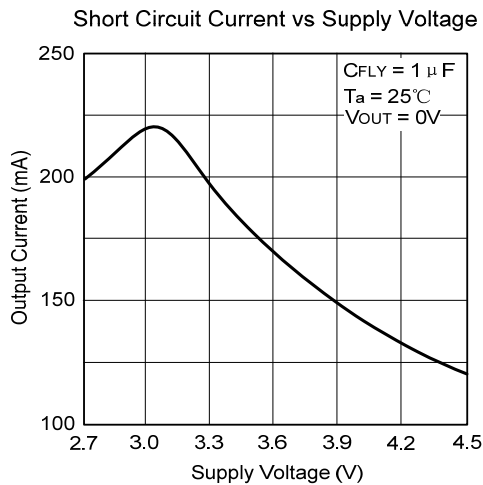
USB Port to Regulated 5V Power Supply (UTC L5200-5.0V)



TYPICAL CHARACTERISTICS (L5200-5.0V)



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



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