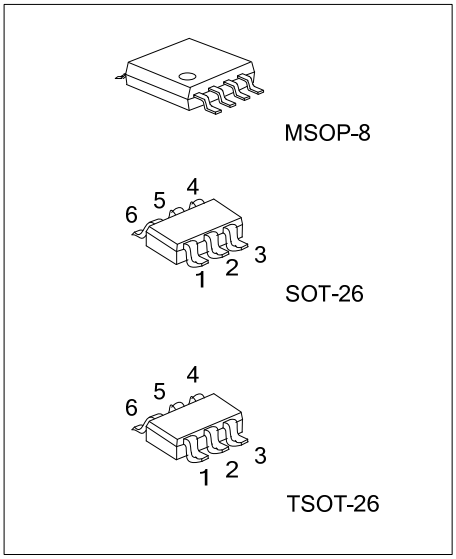
L5200

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 <1μA.

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 1μA of Shutdown Current

■ ORDERING INFORMATION

Ordering Number	Package	Packing
L5200L-AD-SM1-R	MSOP-8	Tape Reel
L5200L-45-AG6-R	SOT-26	Tape Reel
L5200L-50-AH6-R	TSOT-26	Tape Reel

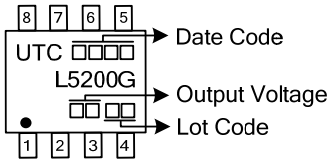
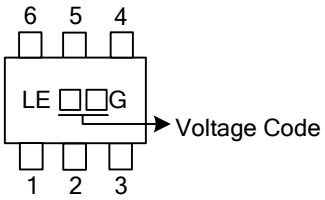
Note: xx: Output Voltage, Refer to Marking Information

L5200G-xx-SM1-R

(1)Packing Type
(2)Package Type
(3)Output Voltage
(4)Green Package

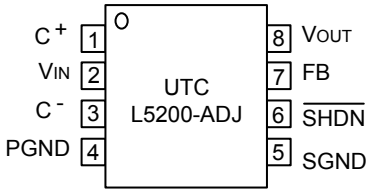
(1) R: Tape Reel
(2) SM1: MSOP-8, AG6: SOT-26, AH6: TSOT-26
(3) xx: refer to Marking Information
(4) G: Halogen Free and Lead Free

■ MARKING INFORMATION

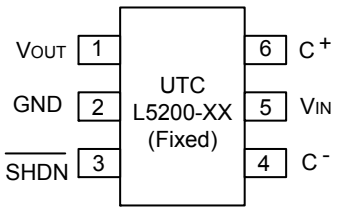
PACKAGE	VOLTAGE CODE	MARKING
MSOP-8	45: 4.5V 50: 5.0V AD :ADJ	
SOT-26 TSOT-26		

■ PIN CONFIGURATIONS

MSOP-8



SOT-26/TSOT-26



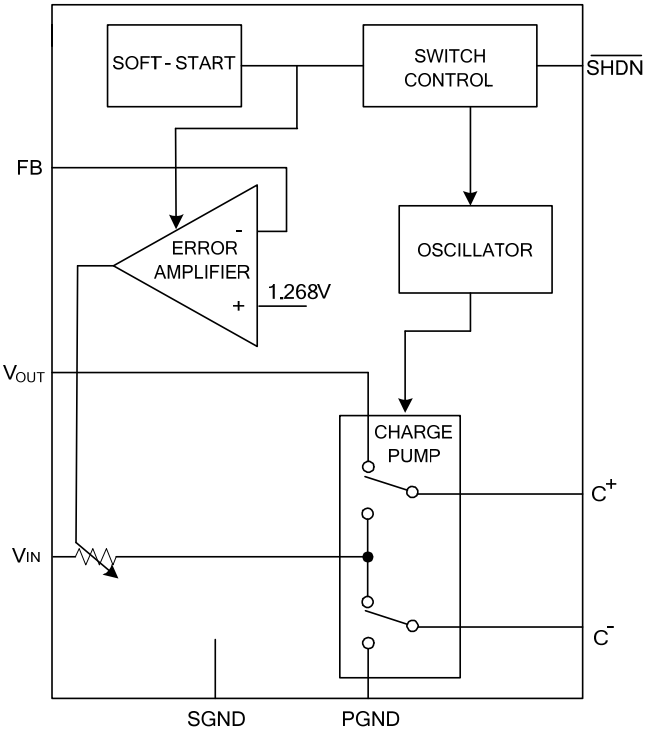
■ PIN DESCRIPTION

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	$\overline{SHDN}$	Shutdown Mode, Active-Low Input. A low on $\overline{SHDN}$ disables the L5200 series. $\overline{SHDN}$ 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

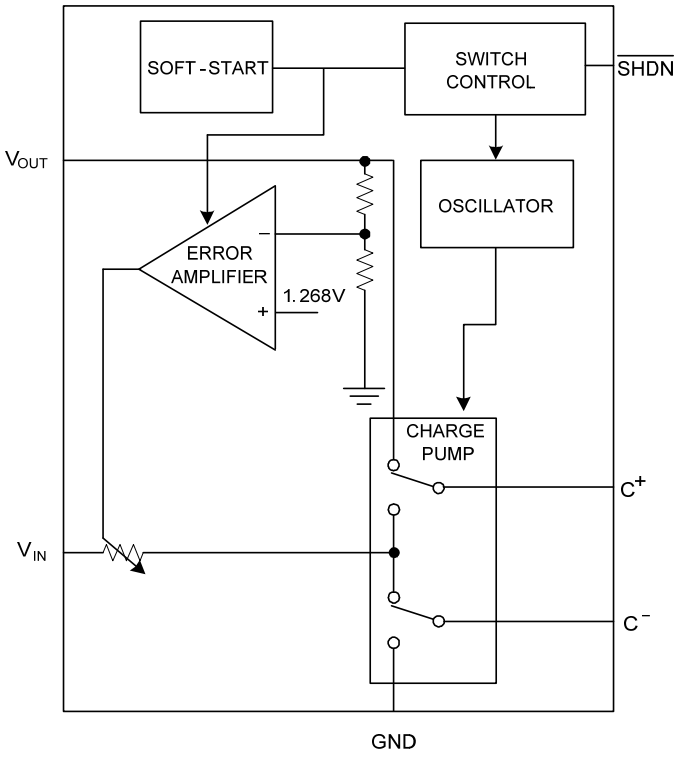
X : The pin is Inexistent for SOT-26 and TSOT-26 package.

■ 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)	$V_{\overline{SHDN}}$	-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℃~+70℃ operating temperature range and assured by design from -20℃~+85℃, characteristic and correlation with static process control.

■ ELECTRICAL CHARACTERISTICS

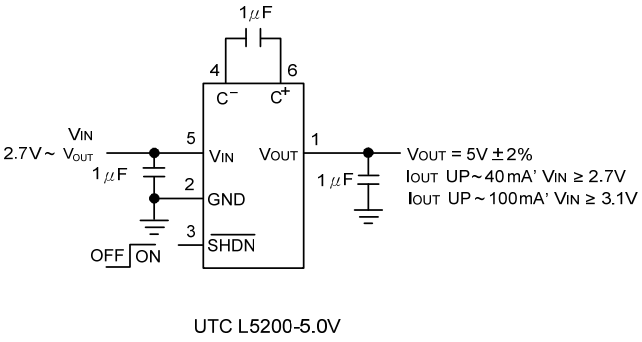
(T_A =25°C, V_{IN} =3.6V, C_{FLY}=1μF, C_{IN}=1μF, C_{OUT}=1μF, unless otherwise specified.)

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}			4.41	4.5	4.59	V
	L5200-5.0V		I_{OUT}≤100mA	*	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_{P-P}
Operating Supply Current		I_{CC}	I_{OUT}=0mA, $\overline{SHDN}$ =V_{IN}	*		1.7	5	mA
Shutdown Current		$I_{\overline{SHDN}}$	$\overline{SHDN}$ =0V, V_{OUT}=0V	*			1	μA
Shutdown Input Current		I_{IH}	$\overline{SHDN}$ =V_{IN}	*	-1		1	μA
		I_{IL}	$\overline{SHDN}$ =0V	*	-1		1	μA
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} ≡ ($2V_{IN}$ – V_{OUT})/I_{OUT})			9.2		Ω
Switching Frequency		F_{OSC}				1		MHz
Efficiency (For UTC **L5200-fixed**)		η	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.

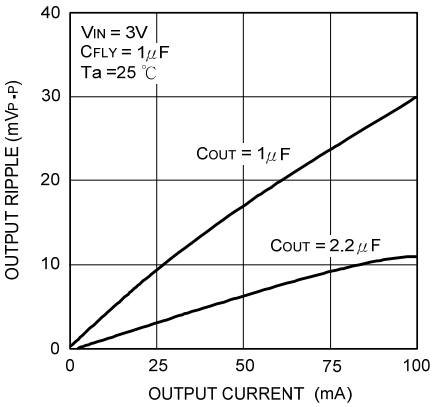
■ TYPICAL APPLICATION CIRCUIT

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

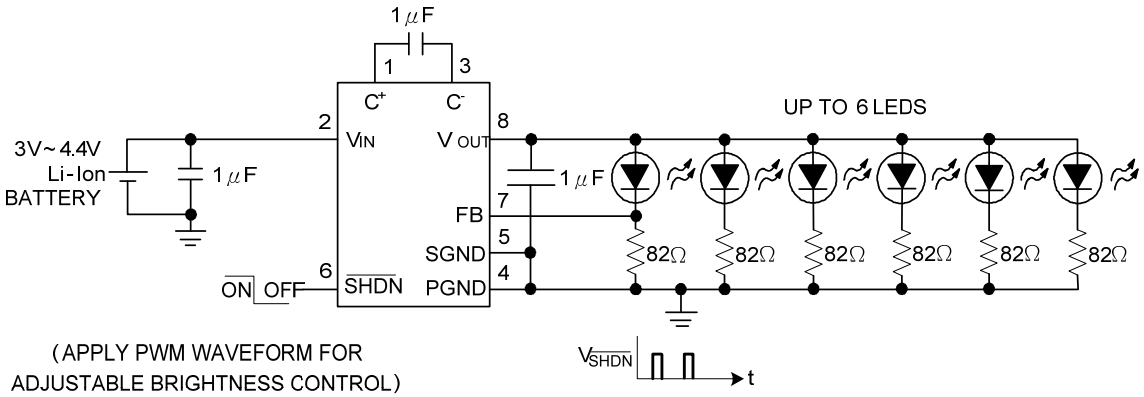


UTC L5200-5.0V

Output Ripple Voltage vs Load Current

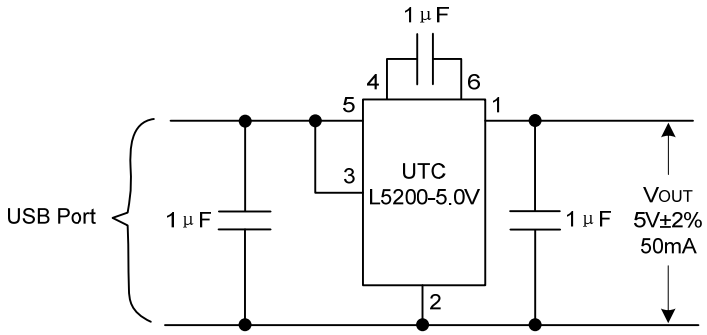


White or Blue LED Driver with LED Current Control (UTC L5200-ADJ)



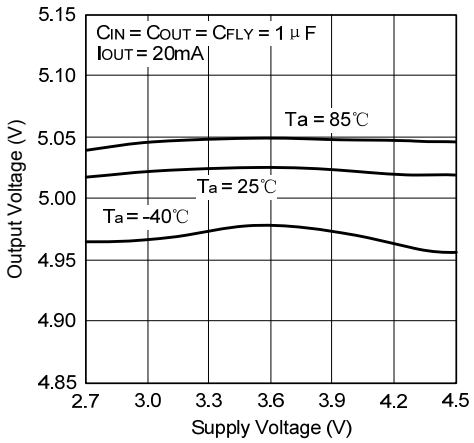
(APPLY PWM WAVEFORM FOR ADJUSTABLE BRIGHTNESS CONTROL)

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

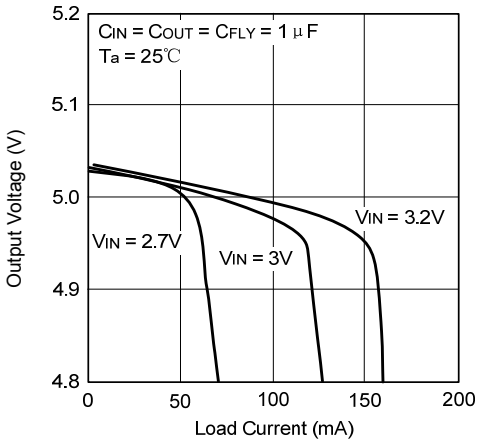


■ TYPICAL CHARACTERISTICS (L5200-5.0V)

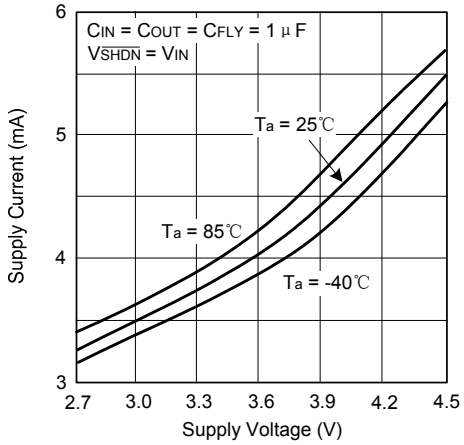
Output Voltage vs Supply Voltage



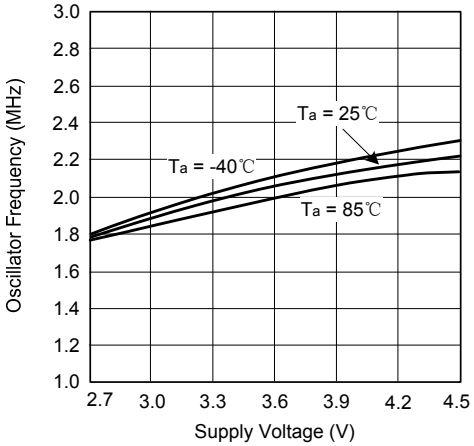
Output Voltage vs Load Current



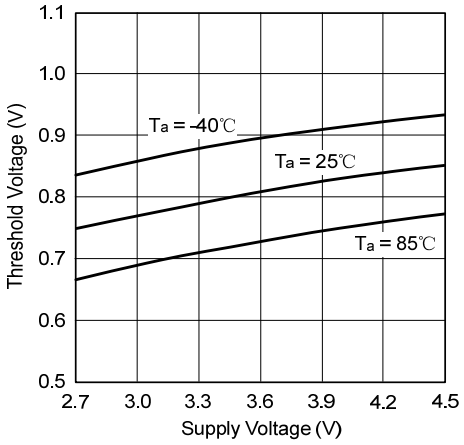
No Load Supply Current vs Supply Voltage



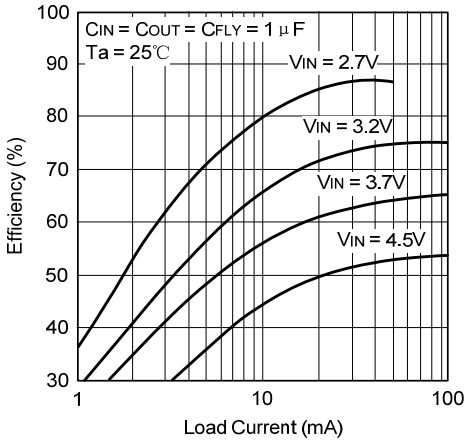
Oscillator Frequency vs Supply Voltage



$V_{\overline{SHDN}}$ Threshold Voltage vs Supply Voltage

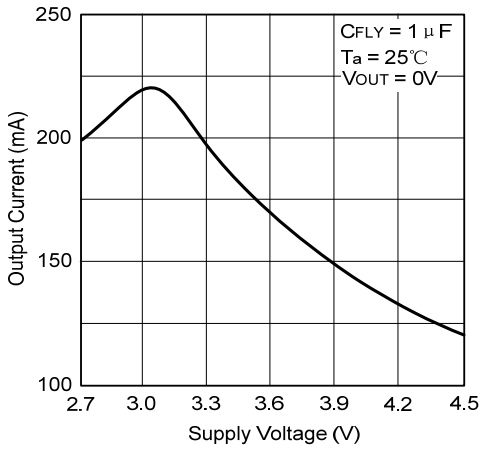


Efficiency vs Load Current

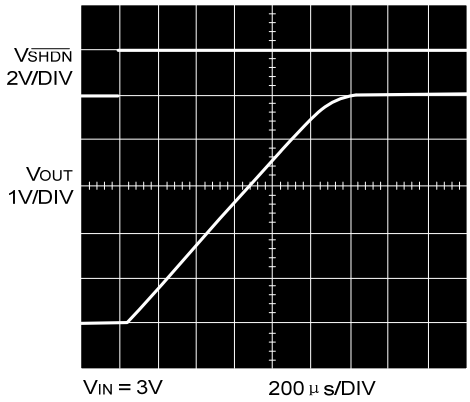


■ TYPICAL CHARACTERISTICS (L5200-5.0V) (cont.)

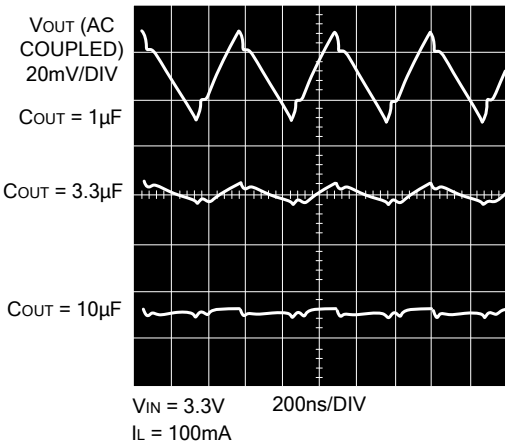
Short Circuit Current vs Supply Voltage



VOUT Soft-Start Ramp



Output Ripple



Load Transient Response