



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

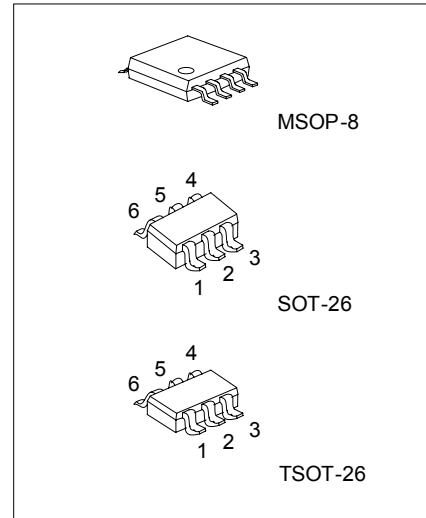
- * Low Noise Constant Frequency Operation
- * Output Current: 100mA
- * 2MHz Switching Frequency
- * 4.5V/5.0V Fixed Output Voltage
- * V_{IN} Range: 2.7V ~ V_{OUT}
- * Automatic Soft-Start.
- * No Inductors
- * Less than 1 μA of Shutdown Current

ORDERING INFORMATION

| Ordering Number | | Package | Packing |
|-----------------|-------------------|---------|-----------|
| 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 |

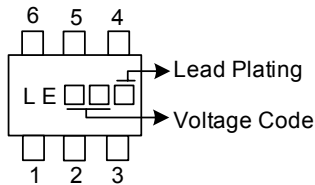
Note: xx :output voltage

| | |
|---|---|
| <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> |
|---|---|

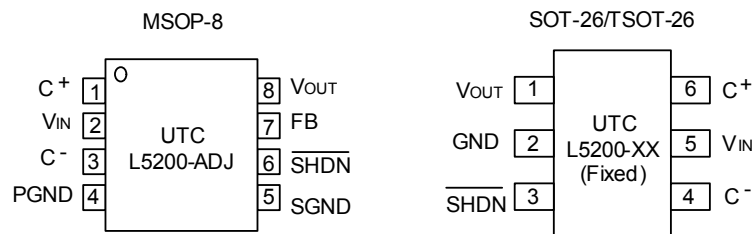


*Pb-free plating product number: L5200L

MARKING (For SOT-26/TSOT-26)



PIN CONFIGURATIONS



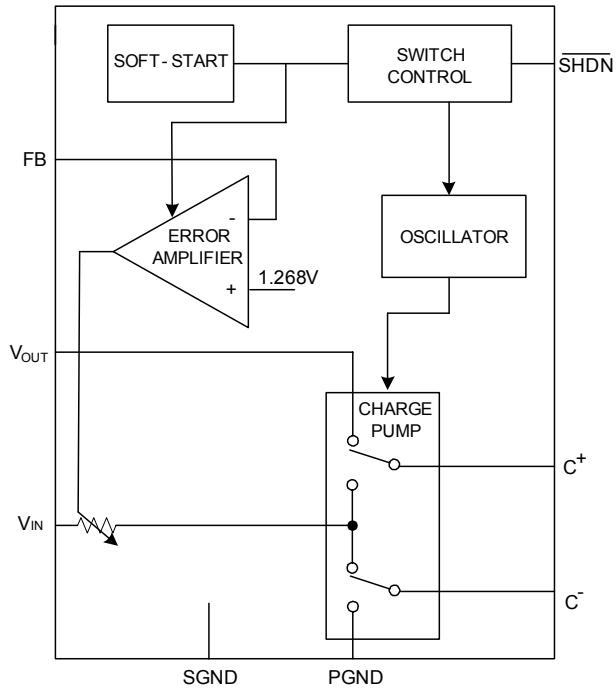
PIN DESCRIPTION

| 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 _{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 | $\overline{\text{SHDN}}$ | 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 _{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 |

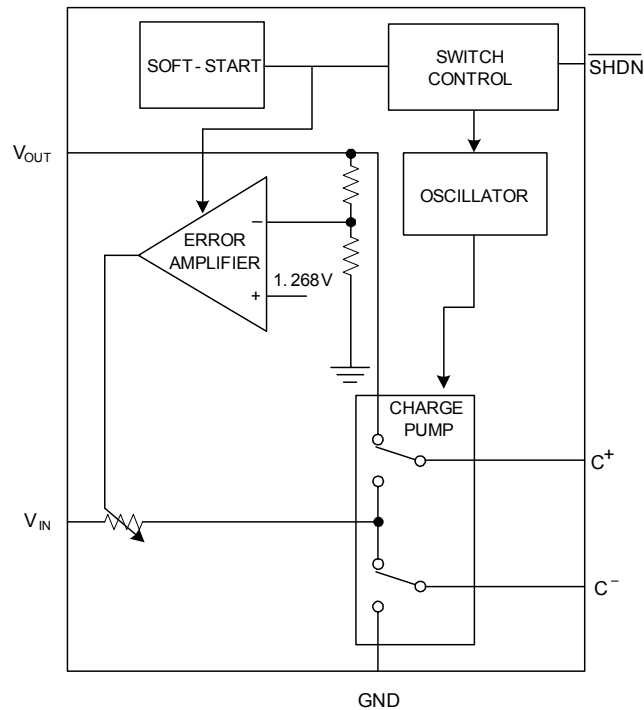
X : The pin is Inexistent for SOT-26 and TSOT-26 package.

■ 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 | |
| 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

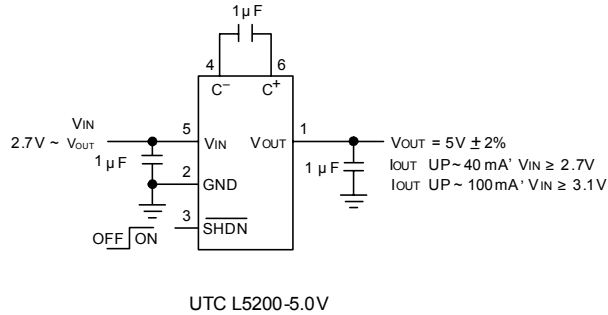
($T_a = 25$, $V_{IN} = 3.6V$, $C_{FLY} = 1\mu F$, $C_{IN} = 1\mu F$, $C_{OUT} = 1\mu F$, unless otherwise specified.)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|------------|---|----------------------|-------|-------|-------------------|
| Input Supply Voltage Range | V_{IN} | | * | 2.7 | | V |
| Output Voltage | V_{OUT} | L5200-4.5V | | 4.41 | 4.5 | 4.59 |
| | | L5200-5.0V | $I_{OUT} \leq 100mA$ | * | 4.9 | 5 |
| 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 |
| Output Ripple Voltage(For L5200-fixed) | V_R | $V_{IN} = 3V$, $I_{OUT} = 100mA$ | | 30 | | mV _{P.P} |
| Operating Supply Current | I_{CC} | $I_{OUT} = 0mA$, $\overline{SHDN} = V_{IN}$ | * | 3.5 | 8 | mA |
| Shutdown Current | I_{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} | $V_{IN} = 3V$, $I_{OUT} = 100mA$ $V_{FB} = 0V$ ($R_{OL} \equiv (2V_{IN} - V_{OUT})/I_{OUT}$) | | 9.2 | | Ω |
| Switching Frequency | F_{OSC} | | | 1 | 2 | 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 |

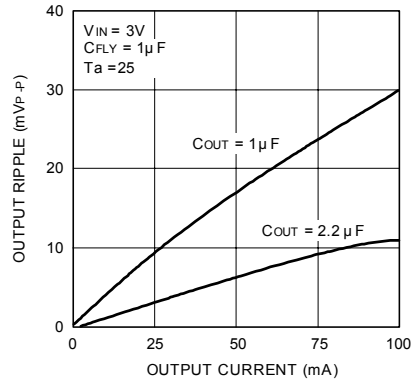
Note: * stand for specifications which apply over the designed operating temperature range.

TYPICAL APPLICATION CIRCUIT

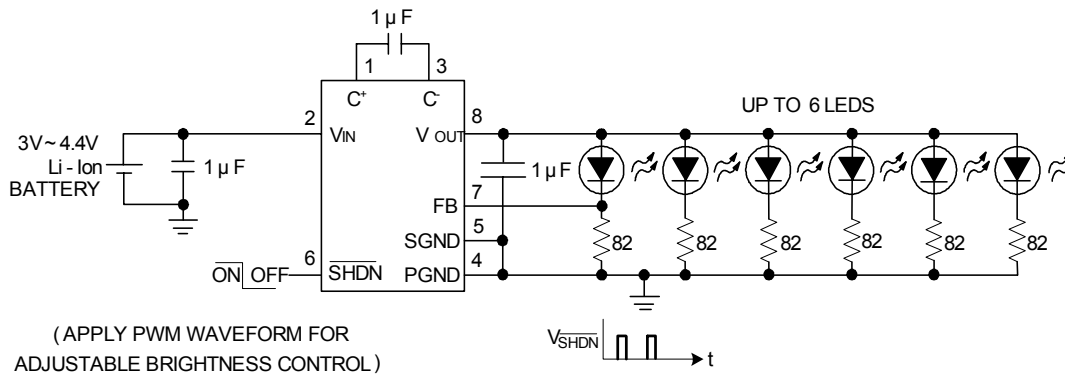
Regulated 5V Output from a 2.7V ~ V_{OUT} Input



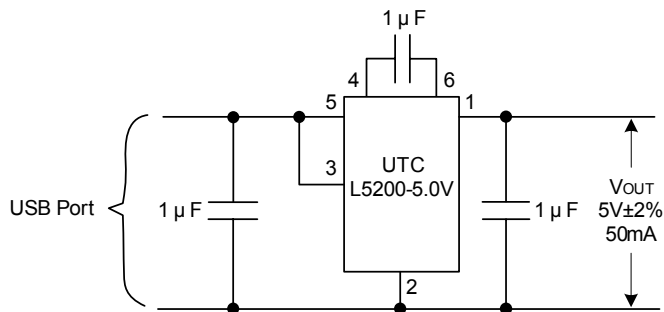
Output Ripple Voltage vs Load Current



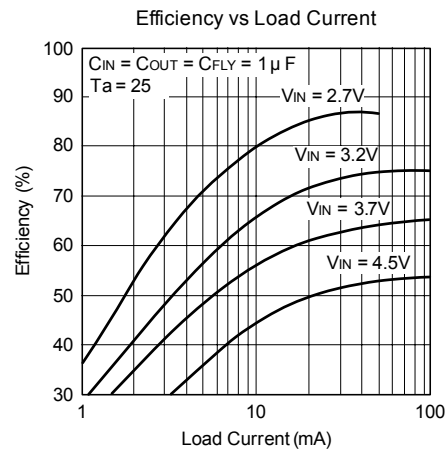
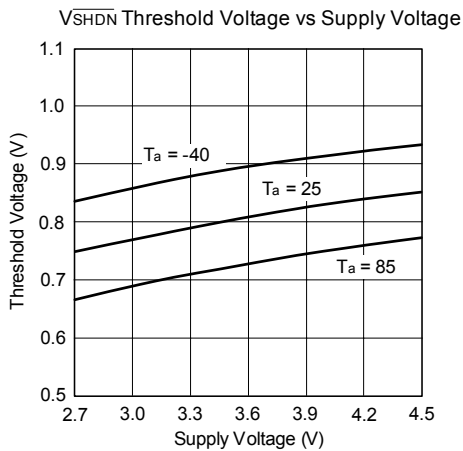
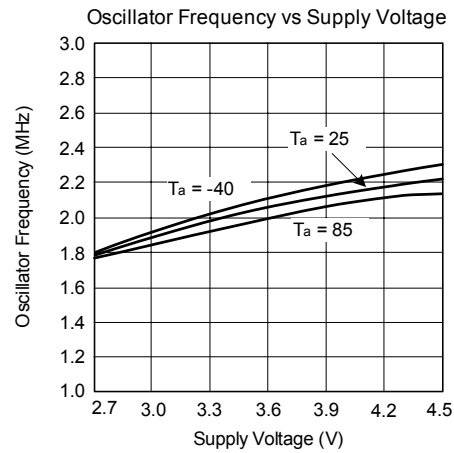
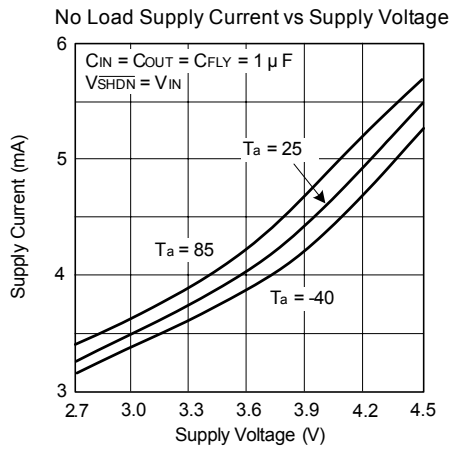
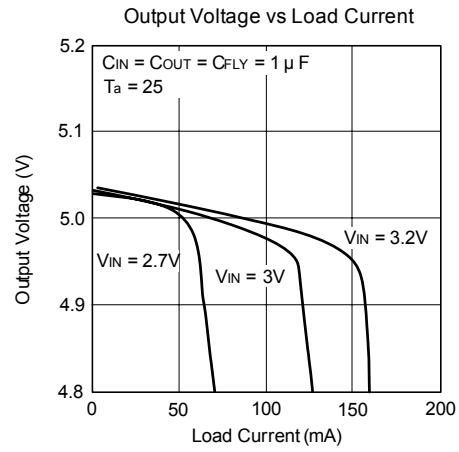
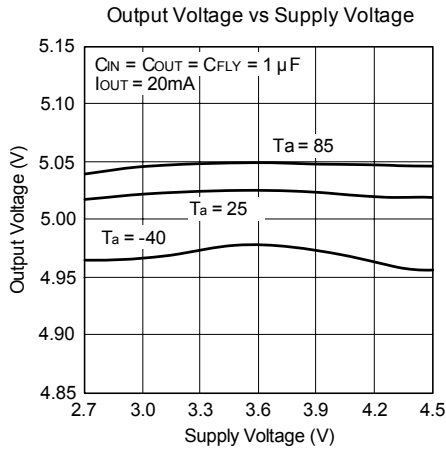
White or Blue LED Driver with LED Current Control (UTC L5200-ADJ)



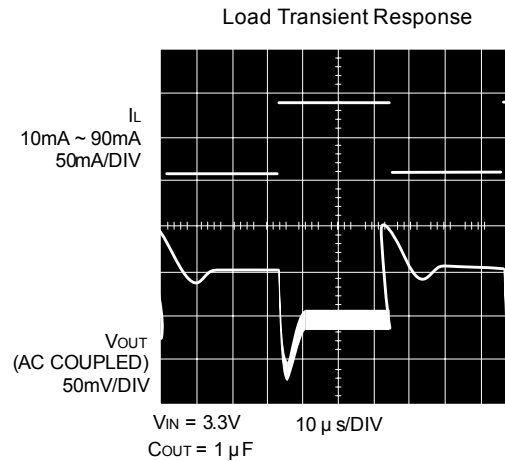
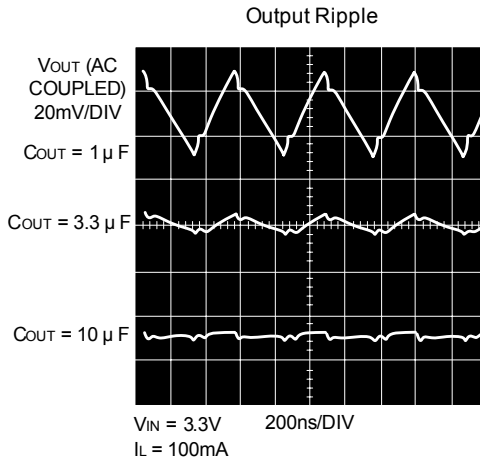
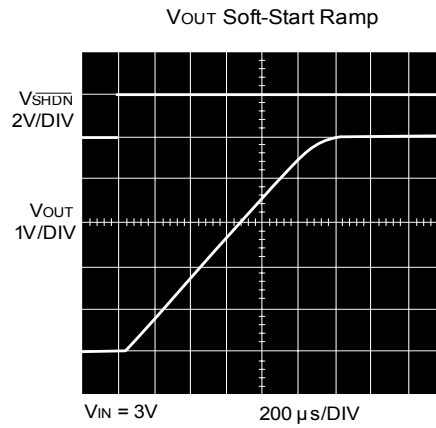
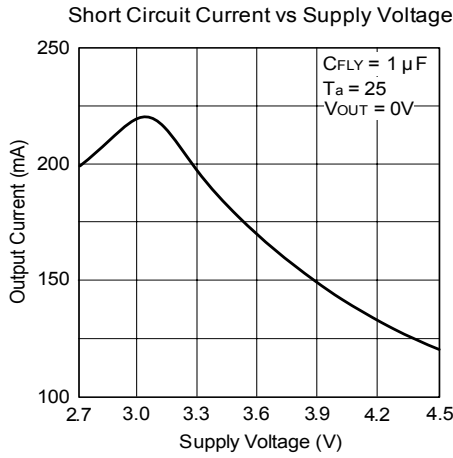
USB Port to Regulated 5V Power Supply (UTC L5200-5.0V)



TYPICAL CHARACTERISTICS (L5200-5.0V)



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



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