Description

The RLCP3208 is a constant frequency, 6-pin SOT23-6 current mode step-up converter intended for small, low power applications. The RLCP3208 switches at 1.2MHz and allows the use of tiny, low cost capacitors and inductors. Internal soft-start results in small inrush current and extends battery life. The RLCP3208 features automatic shifting to pulse frequency modulation mode at light loads. The RLCP3208 includes under-voltage lockout, current limiting, and thermal overload protection to prevent damage in the event of an output overload.

Features

➢ Integrated 80mΩ Power MOSFET
➢ 2.5V to 24V Input Voltage
➢ 1.2MHz Fixed Switching Frequency
➢ Internal 4A Switch Current Limit
➢ Adjustable Output Voltage
➢ Internal Compensation
➢ Up to 28V Output Voltage
➢ Automatic Pulse Frequency Modulation Mode at Light Loads
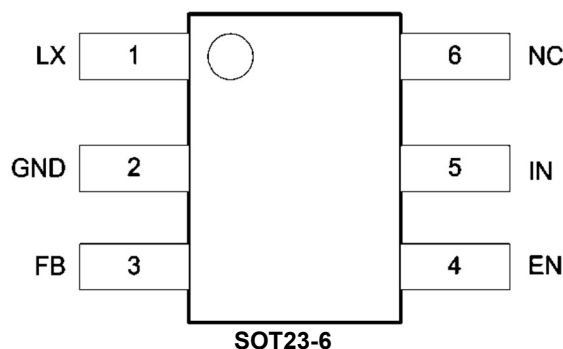➢ Up to 93% Efficiency
➢ SOT23-6 Package

Applications

➢ Battery-Powered Equipment
➢ Set-Top Boxed
➢ LCD Bais Supply
➢ DSL and Cable Modems and Routers
➢ Networking cards powered from PCI or PCI express slots
➢ Portable Media Player (PMP)

Typical Application
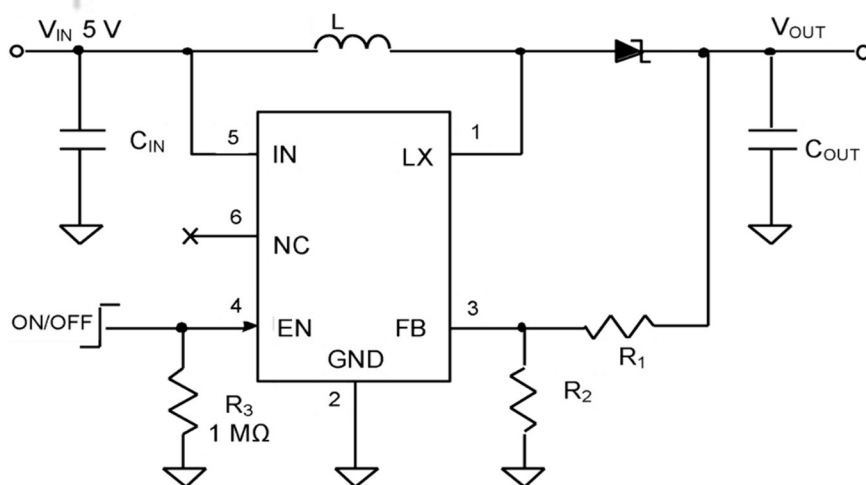
Pin Description

SOT23-6

The package of RLCP3208 is SOT23-6, with pin assignment shown in following table:

Pin Name	Pin Number	Description
LX	1	The switching node, LX is the drain of the internal MOSFET switch. Connect the power inductor and output rectifier to LX.
GND	2	Ground pin.
FB	3	Feedback pin. Connect a resistor R1 between VOUT and FB, and a resistor R2 between FB and GND to program the output voltage: VOUT=0.6V*(R1/R2+1)
EN	4	Regulator On/Off Control Input. A high input at EN turns on the converter, and a low input turns it off. When not used, connect EN to the input supply for automatic startup.
IN	5	Input pin. Decouple this pin to GND pin with 1μF ceramic cap.
NC	6	No Connect

order Information

Part NO	Package	Reel/ PCS
RLCP3208ST6/R6	SOT23-6	3000

Absolute Maximum Ratings(Note 1)

Item	Min	Max	Unit
VIN,EN Voltages	-0.3	26	V
FB Voltage	-0.3	6	V
LX Voltage	-0.3	30	V
Operating Temperature Range	-40	+85	℃
Storage Temperature Range	-65	+150	℃

Item	Value	Unit
Junction Temperature(**Note2**)	160	℃
Lead Temperature(Soldering,10s)	300	℃
ESD HBM(Human Body Mode)	2	KV
Power Dissipation	0.6	W
Thermal Resistance Θjc	130	℃/W
Thermal Resistance θJA	250	℃/W

Recommended Operating Condition (Note 3)
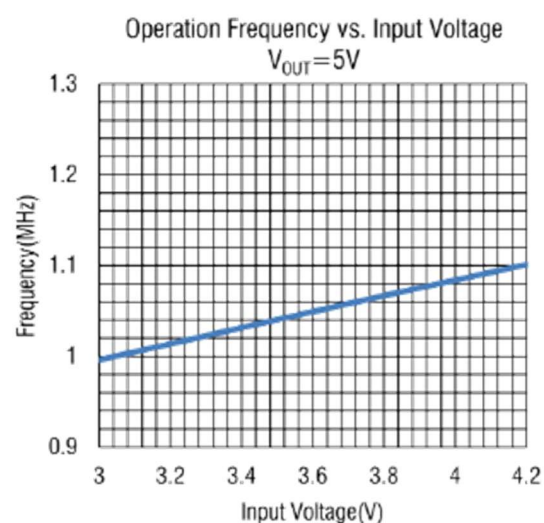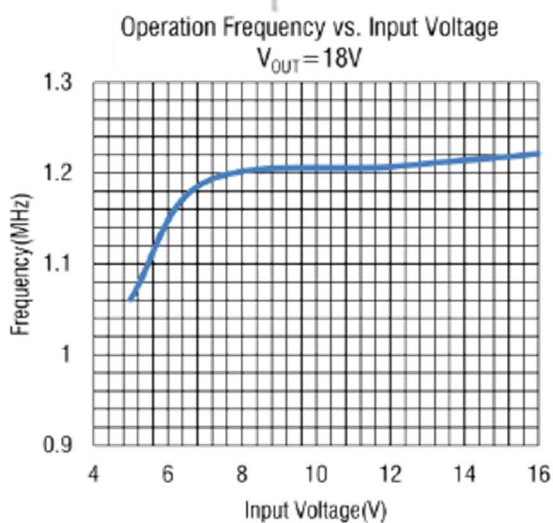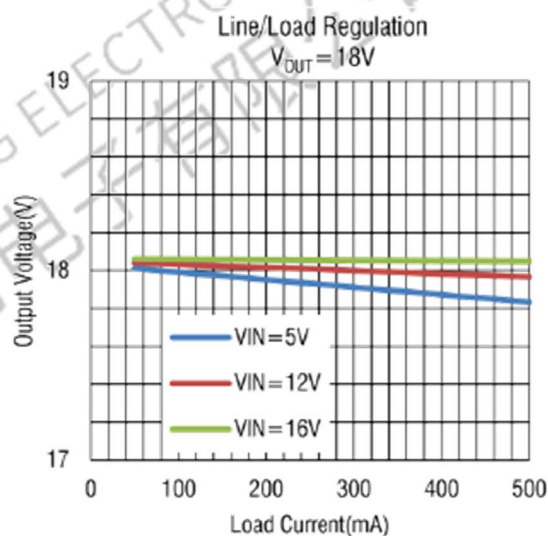
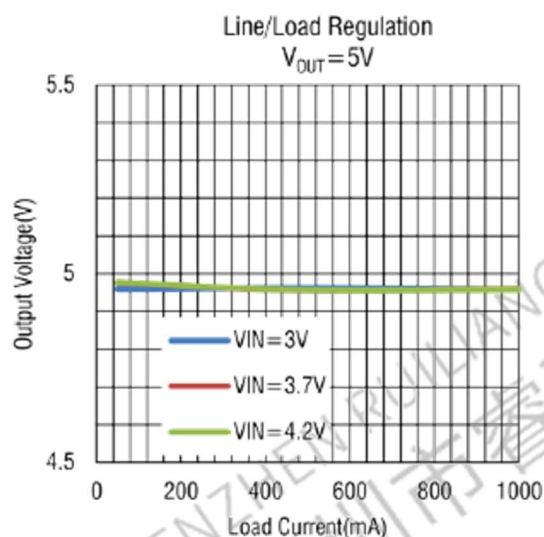(VIN=VEN=5V,TA = 25°C, unless otherwise noted.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Input Voltage		2.5		24	V
Under Voltage Lockout				2.4	V
Under Voltage Lockout Hysteresis			100		mV
Current(Shutdown)	V_{EN}=0V		0.1	1	µA
Quiescent Current(PFM)	V_{FB}=0.7V, No switch		70	150	µA
Quiescent Current(PWM)	V_{FB}=0.5V, switch		1.0	2.0	mA
Switching Frequency			1.2		MHz
Maximum Duty Cycle	V_{FB}=0V	90			%
EN Input High Voltage		1.5			V
EN Input Low Voltage				0.4	V
FB Voltage		0.588	0.6	0.612	V
SW On Resistance			80	150	mΩ
SW Current Limit	Vin=5V,Duty cycle=50%		4		A
SW Leakage	Vsw=20V			1	µA
Thermal Shutdown			155		℃

Note 1: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.
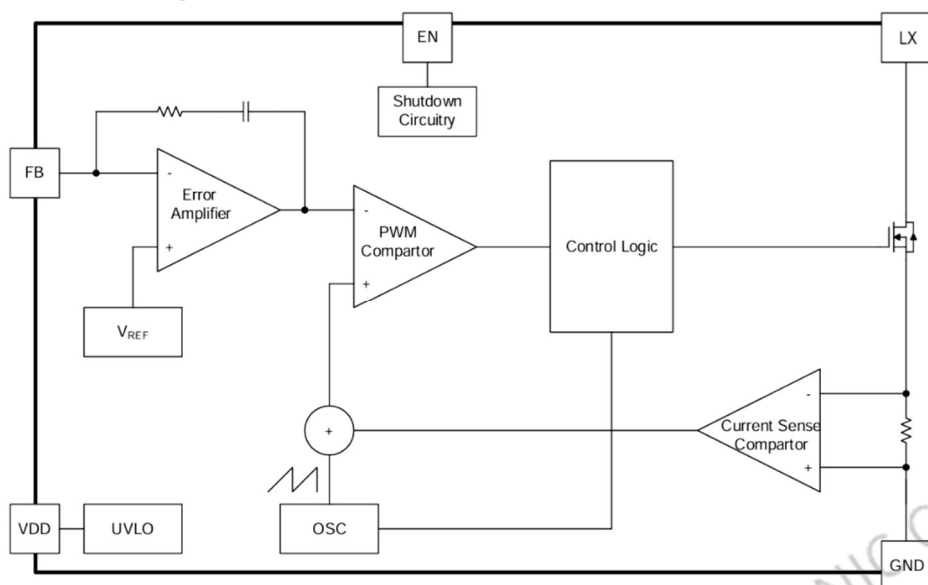
Note 2: TJ is calculated from the ambient temperature TA and power dissipation PD according to the following formula: TJ = TA + (PD) x (250°C/W).

Note 3: 100% production test at 25°C. Specifications over the temperature range are guaranteed by design and characterization.

Typical Characteristics(VIN =5V, TA = +25º C, unless otherwise noted.)

Efficiency vs. Load Current V_OUT=5V

Efficiency vs. Load Current V_OUT=18V

Line/Load Regulation V_OUT=5V

Line/Load Regulation V_OUT=18V

Operation Frequency vs. Input Voltage V_OUT=18V

Operation Frequency vs. Input Voltage V_OUT=5V

Functional Block Diagram

Functional Description

The RLCP3208 uses a fixed frequency, peak current mode boost regulator architecture to regulate voltage at the feedback pin. The operation of the RLCP3208 can be understood by referring to the block diagram of Figure 2. At the start of each oscillator cycle the MOSFET is turned on through the control circuitry. To prevent sub-harmonic oscillations at duty cycles greater than 50 percent, a stabilizing ramp is added to the output of the current sense amplifier and the result is fed into the negative input of the PWM comparator. When this voltage equals The output voltage of the error amplifier the power MOSFET is turned off. The voltage at the output of the error amplifier is an amplified version of the difference between the 0.6V bandgap reference voltage and the feedback voltage. In this way the peak current level keeps the output in regulation. If the feedback voltage starts to drop, the output of the error amplifier increases. These results in more current to flow through the power MOSFET, thus increasing the power delivered to the output. The RLCP3208 has internal soft start to limit the amount of input current at startup and to also limit the amount of overshoot on the output.

Applications Information

The internal reference VREF is 0.6V(Typical).The output voltage is divided by aresistor divider,R1 and R2 to the FB pin. Theoutput voltage is given by:

$$V_{OUT} = 0.6 \times \left(1 + \frac{R1}{R2}\right)$$

Inductor Selection

The recommended inductance range is 4.7uH to 22uH. Inductor selection mainly considers smaller DCR resistance to ensure higher efficiency.

Input Capacitor Selection

Input and output ceramic capacitors of 22Mf are recommended for RLCP3208 applications. For better voltage filtering, ceramic capacitors with low ESR are recommended. X5R and X7R types are suitable because of their wider voltage and temperature ranges.

Capacitor Selection

The capacitance value of the input capacitor and output capacitor is recommended to be more than 22uF. In order to obtain a smaller output ripple, it is recommended to use a ceramic capacitor for the output. Pin 5 needs a 1uF capacitor for voltage regulation, it is recommended to use a ceramic capacitor.

Diode Selection

Schottky diode is a good choice for RLCP3208 because of its low forward voltage drop and fast reverses recovery. Using Schottky diode can get better efficiency. The high speed rectification is also a good characteristic of Schottky diode for high switching frequency.

PCB Layout

Input capacitors and output capacitors as close as possible to the chip pins. The power path from VIN to inductor and to VOUT should be as short as possible and and as thick as possible. The LX pin has a high frequency switching signal, pay attention to isolation from other components on the PCB board.

RLCP3208

Package Outline Dimensions (SOT23-6)
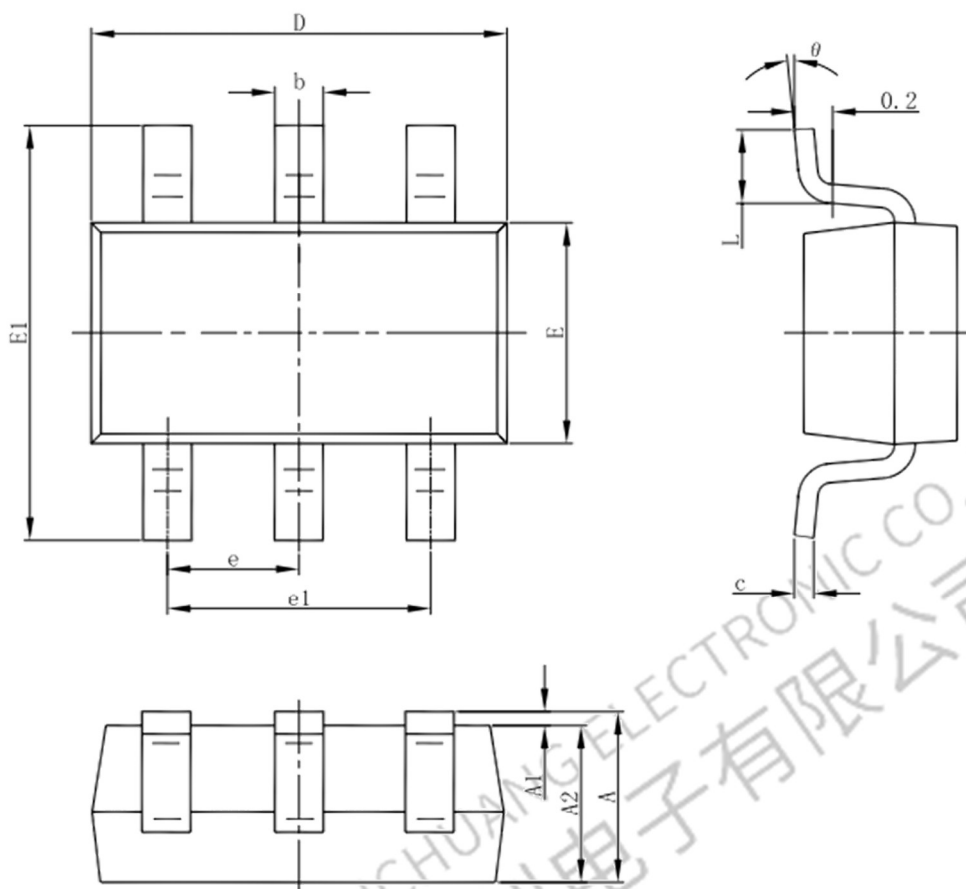
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

SHENZHEN RUILIANCHUANG
ELECTRONIC CO.,LTD

V1.3

Important Note

As the RLC product continues to improve gradually, we may experience significant changes. RLC reserves the right to correct, modify, enhance, and amend the products and services they provide, as well as the right to discontinue any product or service. Before placing an order, customers should obtain the latest information to verify that it is current and complete. All products sold must comply with RLC's terms and conditions in order to ensure proper processing of orders. RLC guarantees that the products they sell conform to the terms and conditions applicable to semiconductor sales. Only under this guarantee does RLC consider it necessary to employ testing and quality control measures for their products. Unless mandated by applicable laws requiring strict compliance, there is no obligation for testing all product parameters. RLC does not assume responsibility for customer product design or application. The materials provided contain circuit examples and usage methods solely for reference purposes; they do not guarantee suitability for volume production designs. Additionally, these materials may contain errors that could result in damages incurred by customers; therefore, RLC disclaims any liability in such cases. Customers are advised to use products within the limits specified in these materials while paying particular attention to absolute maximum ratings, operating voltages, and voltage characteristics. Any use of products outside of these specifications absolves RLC from responsibility; customers must accept full responsibility themselves. To minimize risks associated with customer-designed applications, adequate design safety measures should be implemented. When using RLC products, please ensure compliance with relevant laws and regulations pertaining to your country or region regarding application standards as well as testing requirements related to safety performance. For exports of RLC products overseas, it is essential that you adhere strictly to foreign exchange regulations and transaction laws throughout all necessary procedures involved in exportation processes. In case of disposal of any abandoned RLC product(s), please follow appropriate rules and regulations for proper disposal.

RLC products are not designed to be radiation - resistant. Based on the intended usage, customers can incorporate radiation protection measures during the product design process. Under normal circumstances, RLC products do not harm human health. However, since they contain chemicals and heavy metals, do not put them in your mouth. Additionally, the fracture surfaces of wafers and chips can be sharp. When touching them with bare hands, please be careful to avoid injury.Semiconductor products have a certain probability of failure or malfunction. To prevent disruptions and social damages resulting from personal accidents, fire accidents, etc., as well as to avoid malfunctions, customers are required to be responsible for comprehensive design, implementing fire - spread prevention measures, and safety design against misoperation. Please conduct a full assessment of the entire system, and customers can determine its applicability on their own.

This material also includes content related to the company's copyright and know - how. The records in this material are not intended to promise or guarantee the implementation and use of the company's and third - party intellectual property and other rights. Without the permission of our company, it is strictly prohibited to reprint, copy any part of this work, or disclose the material information to third parties.

RLC shall not be held responsible for any damage or harm that occurs which is not related to the product itself, as well as for any infringement of third - party rights such as intellectual property rights. For more details about this material, please contact our sales office.