



TX4310B

Low Noise, Regulated Charge Pump DC/DC Converter

Update version Rve: 1.1
20180917

overview

The TX4310B is a low noise, constant frequency (1.2MHz) switched capacitor voltage doubler.

The TX4310B generates a regulated output voltage from a 1.8V to 5V input.

Low external component count (one flying capacitor and two small bypass capacitors at VDD and VOUT) makes the chip ideal for battery powering small applications.

The charge-pump architecture maintains a constant switching frequency for no-load regulated output and reduces output and input ripple.

The chip has over-temperature protection and can withstand a continuous short circuit from VOUT to GND.

A built-in soft-start circuit prevents inrush current during start-up.

The chip is packaged in SOT23-6.

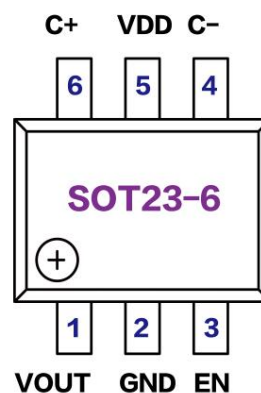
Product features

- Input voltage: 1.8-5V • Fixed: 3.3V
- output $\pm 4\%$ • Output current: 250mA(VIN=3V) •
- Shutdown current: <1uA • Short circuit protection • Soft start • No inductance • Low noise, constant frequency

Application field

- Network system
- Medical equipment
- Aerospace application
- Consumer Electronics
- White LED backlight
- Li-ion battery backup power
- 3V to 5V conversion
- Smart card reader

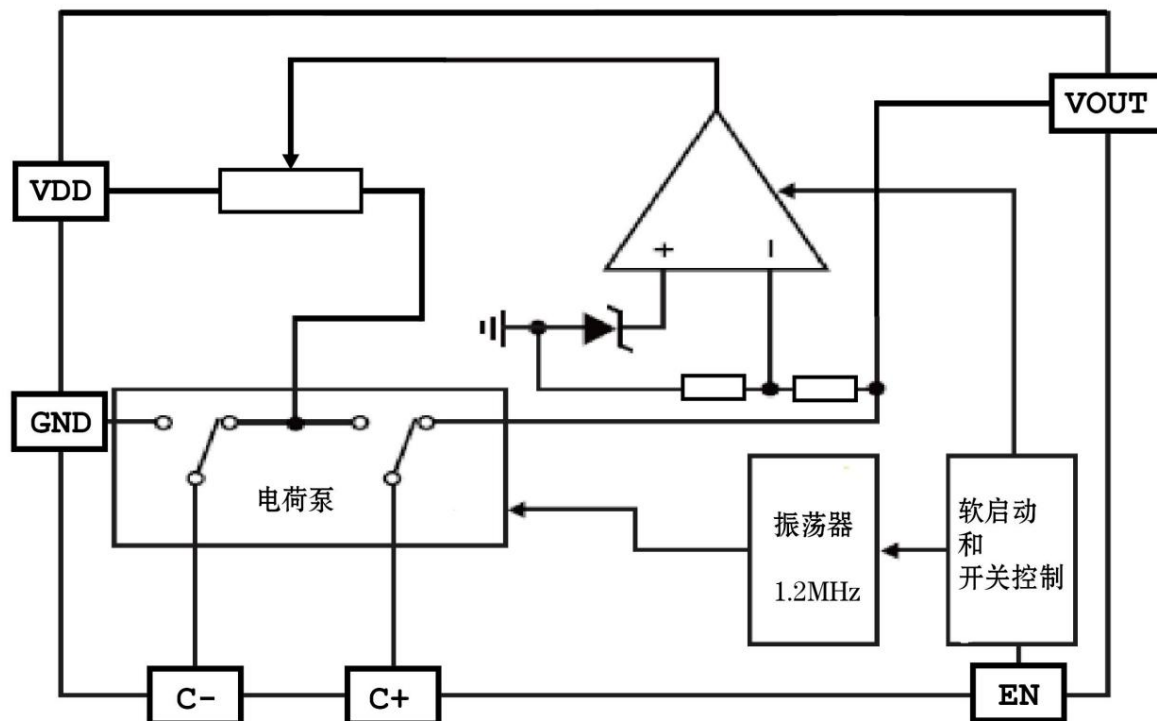
Pin definition



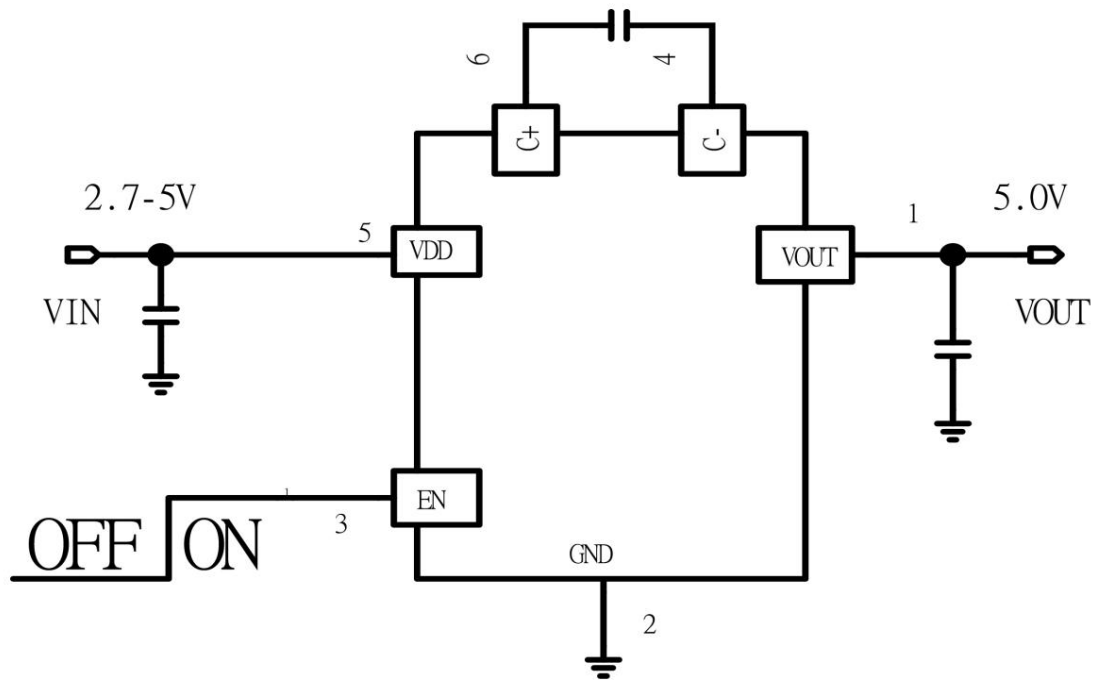
Pin function description

pin number	character	Pin Description
1	VOUT	voltage output
2	GND	chip ground
3	EN	chip enable (active high), not allowed to float
4	C-	capacitor negative terminal
5	VDD	chip power supply
6	C+	capacitor positive terminal

Circuit diagram



schematic diagram



Extreme Application Parameters

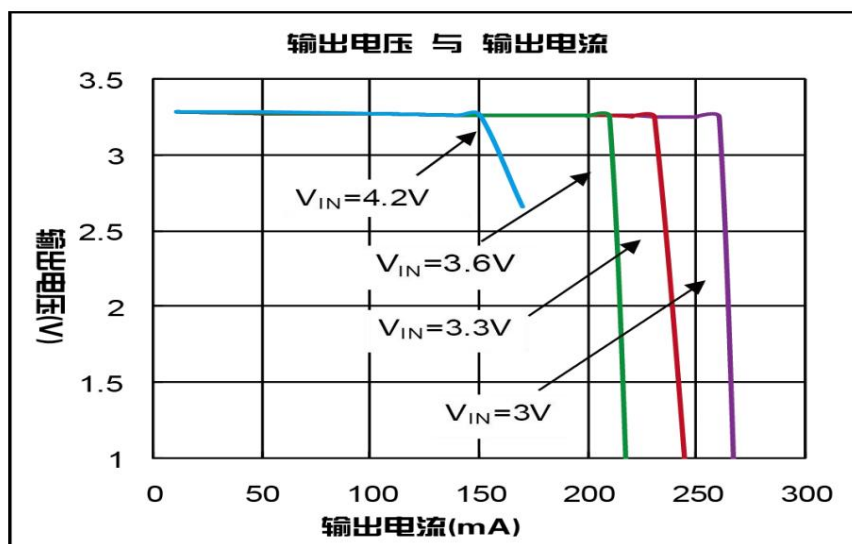
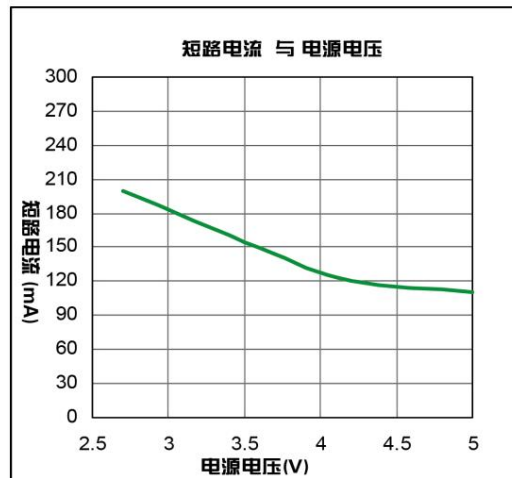
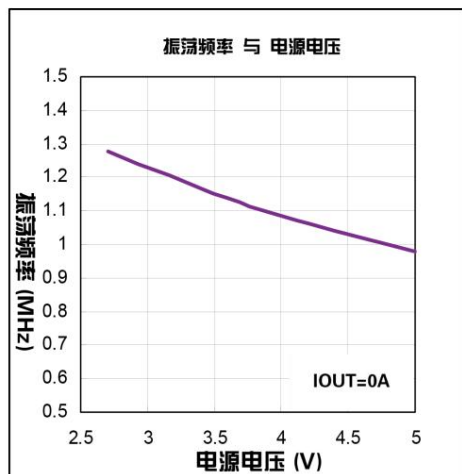
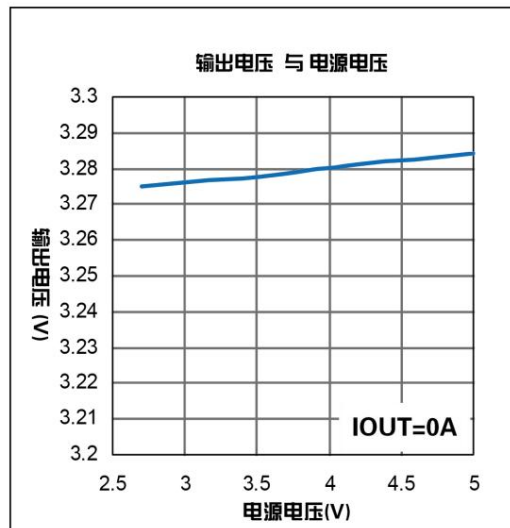
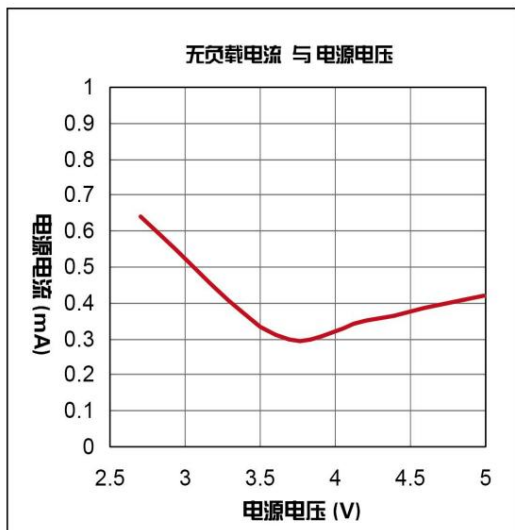
Parameter Name	Label	Supply	Test adjustment	MIN	-0.3	TYPE.	MAX	Unit
Voltage Enable	VDD						6	IN
Pin Voltage Output	VEN				-0.3		6	IN
Voltage Output	VOUT				-0.3		3.5	IN
Current Operating	IOUT					300		mA
Temperature		FACING			-40		85	°C
Junction						150		°C
Temperature Storage Temperature	T_STG				-65		150	°C
soldering temperature	T_SD	welding, about 10 seconds				265		°C
electrostatic withstand voltage value	V_ESD						2000	IN

Note 1: The limit parameter means that exceeding the working range specified in the above table may cause damage to the device. while working Operating under the above extreme conditions may affect the reliability of the device.

Electrical characteristic test conditions: VDD=VEN=3.6V, CIN=COUT=10uF, TA=25°C, unless otherwise specified

	label	condition	Min Typ	Max Unit		
Parameters	VDD		1.8		5	IN
Voltage Range	VOUT		3.17 3.3	3.43		IN
Output Voltage	ISHDN	VEN = 0V, VOUT = 0V		0.2		uA
Shutdown Current No-load	INO-LOAD	IOUT = 0mA, VIN = 2.7V		0.65		mA
Input Current	EFFI	VIN = 2.7V, IOUT = 80mA		83		%
Conversion Efficiency Switching Frequency	dark	VIN = 3.2V, IOUT = 100mA		1.2		MHz

Curve Characteristics

Operating Conditions: $T_A = 25^\circ\text{C}$, unless otherwise specified.

Application Guide

The TX4310B uses a switched capacitor charge pump to boost VDD to a regulated output voltage. Regulation is achieved by sensing the output voltage through an internal resistor divider and adjusting the charge pump output current based on the error signal. Two-phase non-overlapping clocks activate the charge-pump switches. During the first clock phase, the capacitor is charged by VDD. During the second phase of the clock, the chip is connected in series with VDD and connected to VOUT. This sequence of charging and discharging the flying capacitor is repeated at a free-running frequency of 1.2MHz (typical). In shutdown mode, all circuits are turned off and the chip only draws leakage current from the VDD supply. Also, VOUT is disconnected from VDD. The EN pin is a CMOS input with a threshold voltage of approximately 0.8V. When a logic low level is applied to the EN pin, the chip is in shutdown state. Since the EN pin is a high-impedance CMOS input, it must not be left floating. To ensure a defined state, it must always be driven with valid logic levels.

The short-circuit

protection chip has built-in short-circuit current limiting. In case of short circuit, the output current will be limited to about 300mA automatically. The soft-start chip

has a built-in

soft-start circuit to prevent excessive VDD current during startup. Soft-start time pre-Programming is about 2.5ms, so the start-up current depends mainly on the output capacitor. Input

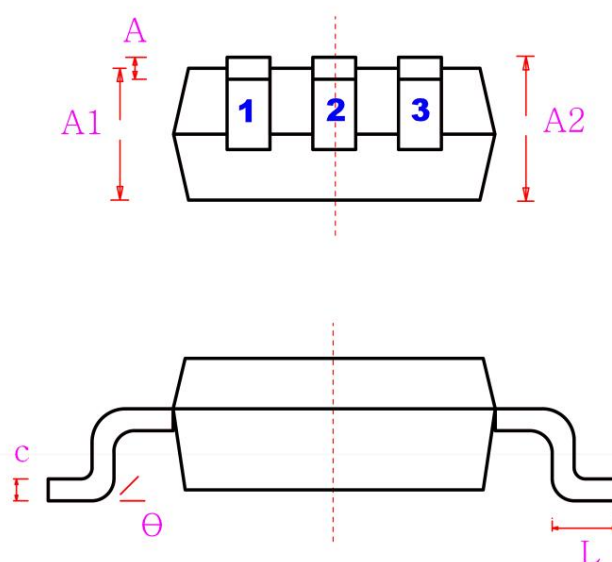
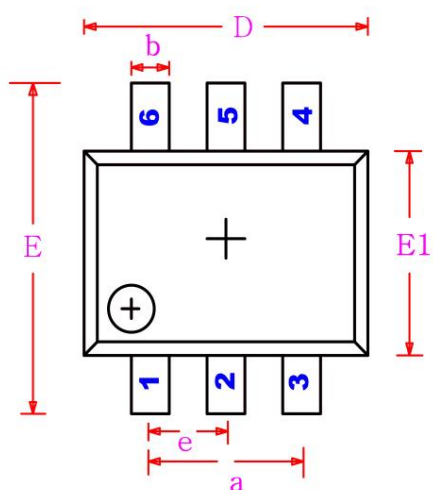
Output Capacitor Selection The

type and value of the capacitor used with the chip determines several important parameters such as regulator control loop stability, output ripple, charge pump strength, and minimum start-up time. In order to reduce noise and ripple, it is recommended to use low ESR (<0.1 Ω) ceramic capacitors for input and output capacitors. These capacitors are chosen to be 10 μ F or larger. Tantalum and aluminum capacitors are not recommended because of their high ESR.

Bootstrap

capacitor Note: Never use polarized capacitors such as tantalum or aluminum capacitors because their voltage may reverse when the chip starts up. Bootstrap capacitors should always use low ESR ceramic capacitors. The bootstrap capacitor controls the strength of the charge pump. In order to achieve the rated output current, for the flying capacitor, at least 2.2 μ F of capacitance is required. Layout considerations: Due to the high switching frequency and large transient current generated by the chip, care needs to be taken when laying out the circuit board. The ground plane and all capacitors should be shorted as much as possible to improve performance and ensure proper regulation under all conditions.

Package information SOT23-6



character	Metric Imperial			
	min	max	min	max
D	2.820	3.020	0.111	0.119
AND	2.650	2.950	0.104	0.116
E1	1.500	1.700	0.059	0.067
It is	0.950(BSC)		0.037(BSC)	
a	1.800	2.000	0.071	0.079
A	0.000	0.100	0.000	0.004
A1	1.050	1.150	0.041	0.045
A2	1.050	1.250	0.041	0.049
L	0.3	0.6	0.012	0.024
c	0.100	0.200	0.004	0.008
i	0°	8°	0°	8°