



# TX4310B

Low Noise, Regulated Charge Pump DC/DC Converter

updated version Rv: 1.1  
20180917

## Overview

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

The TX4310B produces a stable output voltage from a 1.8V to 5V input.

The low number of external components (one flying capacitor and two small bypass capacitors at VDD and VOUT) makes the chip ideal for small, battery-powered applications.

The charge pump architecture maintains a constant switching frequency to achieve a no-load regulated output and reduce output and input ripple.

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

Built-in soft-start circuit prevents inrush current during startup.

The chip is packaged in SOT23-6.

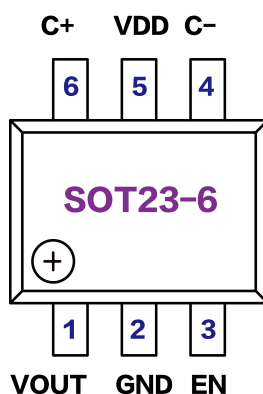
## Features

- ☐ Input voltage: 1.8-5V
- ☐ Fixed: 3.3V output  $\pm 4\%$
- ☐ Output current: 250mA (VIN=3V)
- ☐ Shutdown current:  $<1\mu\text{A}$
- ☐ Short circuit protection
- ☐ soft start
- ☐ No inductor
- ☐ Low noise, constant frequency

## Application areas

- ☒ Network Systems
- ☒ medical equipment
- ☒ Aerospace applications
- ☒ Consumer electronics products
- ☒ White LED backlight
- ☒ Lithium-ion battery backup power
- ☒ 3V to 5V conversion
- ☒ smart card reader

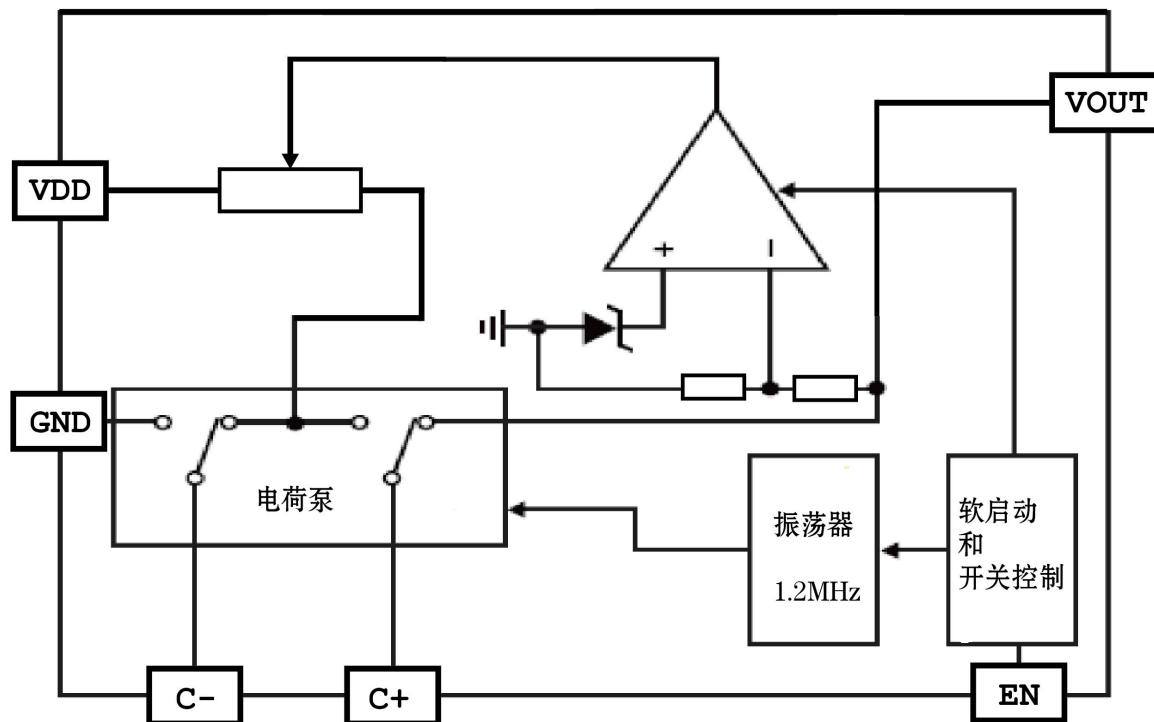
## Pin definition



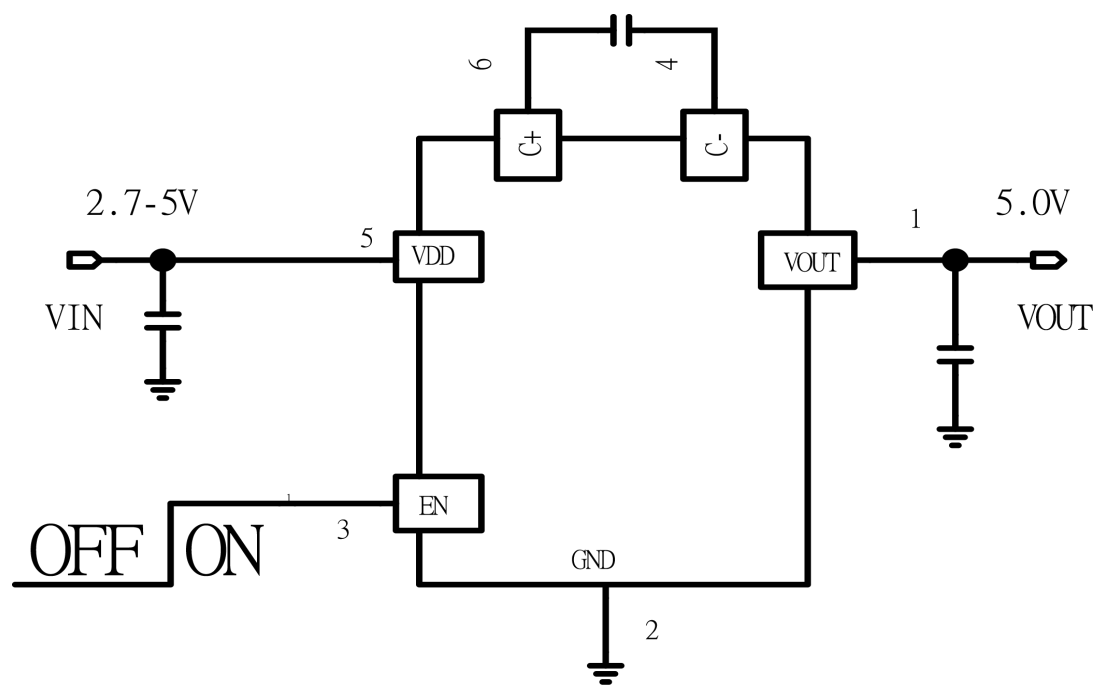
## Pin function description

Pin number	character	Pin description
1	VOUT	Voltage output
2	GND	Chip ground
3	EN	Chip enable (active high level), floating is not allowed
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	test debugger	MIN	TYP.	MAX	Unit
voltage	VDD		- 0.3	-	6	V
Enable pin voltage	VEN		- 0.3		6	V
The output voltage	VOUT		- 0.3		3.5	V
Output current	IOUT			300		mA
Operating temperature	TA		- 40		85	°C
Junction temperature				150		°C
storage temperature	T_STG		- 65	-	150	°C
Welding temperature	T_SD	Welding, about 10 seconds		265		°C
Static electricity withstand voltage value	V_ESD				2000	V

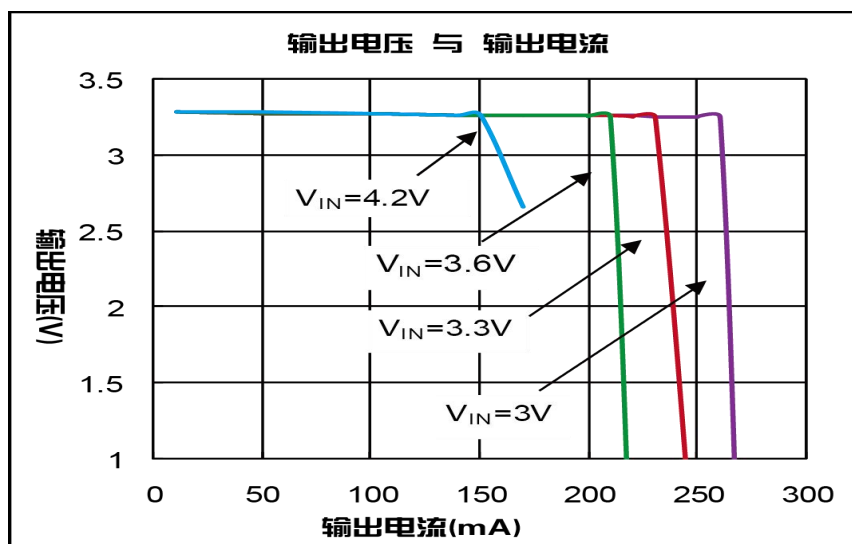
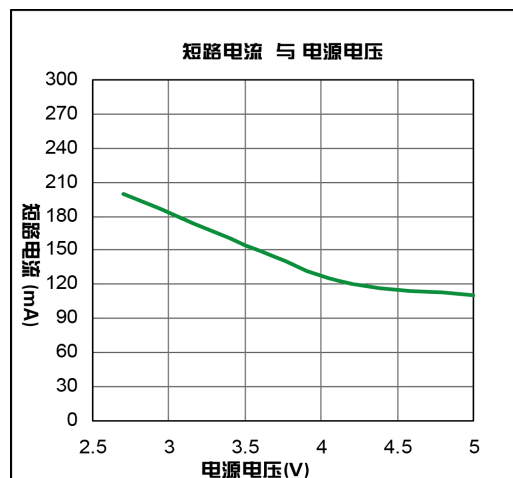
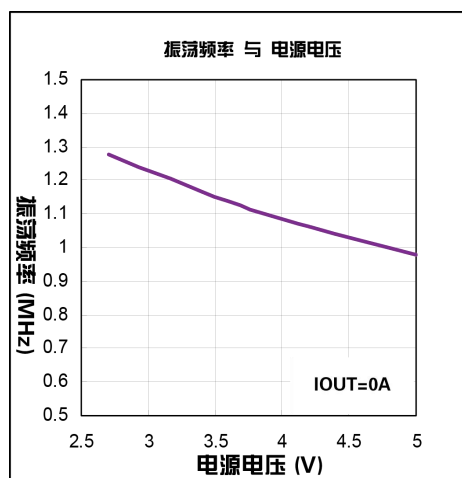
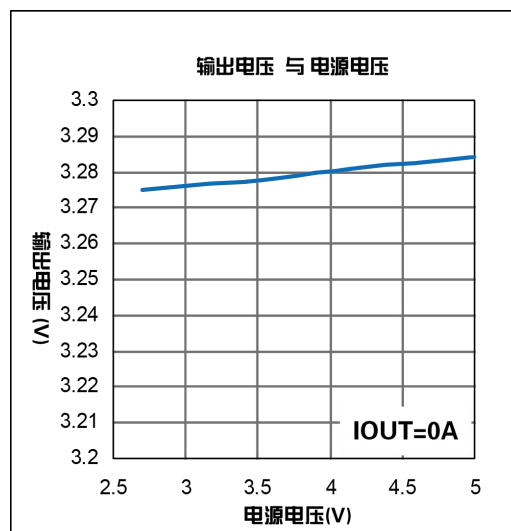
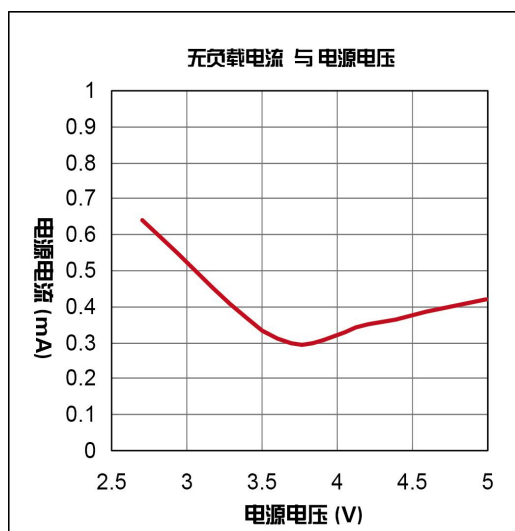
Note 1: Limit parameters mean that exceeding the operating range specified in the above table may cause device damage. Working under the above extreme conditions may affect the reliability of the device.

**Electrical characteristics** Test Conditions: VDD=VEN=3.6V, CIN=COU=10uF, TA=25°C, Unless otherwise indicated

parameter	label	condition	minimum value	Typical value	Maximum	unit
voltage range	VDD		1.8		5	V
The output voltage	VOUT		3.17	3.3	3.43	V
shutdown current	ISHDN	VEN = 0V, VOUT = 0V		0.2		uA
No-load input current	INO-LOAD	IOUT = 0mA, VIN = 2.7V		0.65		mA
Conversion efficiency	EFFI	VIN = 2.7V, IOUT = 80mA		83		%
On-off level	Fosc	VIN = 3.2V, IOUT = 100mA		1.2		MHz

## Curve characteristics

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



## Application Guide

TX4310B Use a switched capacitor charge pump to VDDboost to a stable output voltage. Regulation is achieved by detecting the output voltage through an internal resistor divider and adjusting the charge pump output current based on the error signal. two phases Non-overlapping clocks activate the charge pump switches. During the first clock phase, the capacitor is given by VDDCharge. During the second phase of the clock, the chip communicates with VDDin series and connected to VOUT. This timing of charging and discharging the flying capacitor is based on 1.2MHz(Typical) free running frequency is repeated. In shutdown mode, all circuits are turned off and the chip only operates from VDDThe power supply draws leakage current. also, VOUT and VDD disconnect. ENpin is a threshold voltage of approximately 0.8V of CMOSenter. when ENWhen a logic low is applied to the pin, the chip is in a shutdown state. because ENThe pin is high impedance CMOSinput, so it must not be left floating. To ensure a defined state, valid logic levels must always be used for driving.

### Short circuit protection

The chip has built-in short circuit current limit. In the event of a short circuit, the output current is automatically limited to 300mA about.

### soft start

The chip has built-in soft-start circuitry to prevent VDDExcessive current. The soft start time is preprogrammed to be approximately 2.5ms, so the starting current mainly depends on the output capacitor.

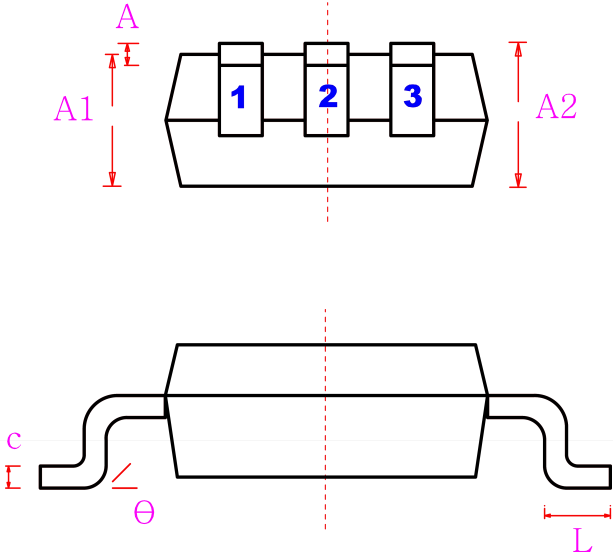
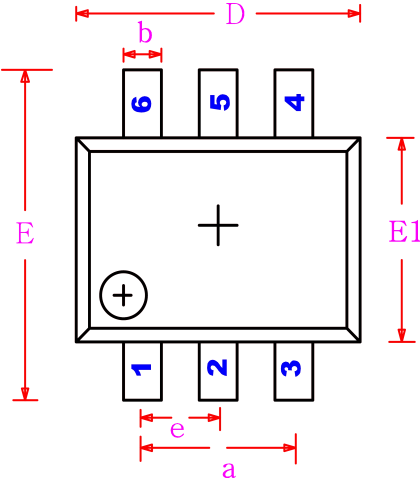
### Input and output capacitor selection

The type and value of capacitors used with the chip determines several important parameters such as regulator control loop stability, output ripple, charge pump strength and minimum startup time. In order to reduce noise and ripple, it is recommended that the input and output capacitors use low ESR ( $<0.1\Omega$ ) ceramic capacitors. Choose 10 $\mu$ F or larger for these capacitors. 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 since the chip's voltage may reverse when it boots up. Bootstrap capacitors should always use low ESR ceramic capacitors. The bootstrap container controls the strength of the charge pump. In order to achieve the rated output current, for fast capacitors, at least 2.2 $\mu$ F of capacitance is required. Layout considerations: Due to the high switching frequency and large transient current generated by the chip, you need to be careful when laying out the circuit board. Ground planes and all capacitors should be kept as short as possible to improve performance and ensure proper regulation under all conditions.

Package information SOT23-6



character	Metric		imperial	
	smallest	maximum	smallest	maximum
D	2.820	3.020	0.111	0.119
E	2.650	2.950	0.104	0.116
E1	1.500	1.700	0.059	0.067
e	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
θ	0°	8°	0°	8°