TX422 3

High efficiency, 5A 1.2MHZ/DC-DC boost chip

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Overview

- TX4223 Is a high efficiency, PWM Switch type DC-DC Convert the drive.
- Chip built-in 5A , 0.07ohm Power switch MOS Tube, can provide up to 8V The output voltage.
- Highest efficiency up to 93% . Chip up to 1.2MHz Switching frequency to achieve small inductance and capacitance, while providing excellent dynamics response.
- The chip has built-in soft-start and loop compensation, a system that can work stably with few external components .

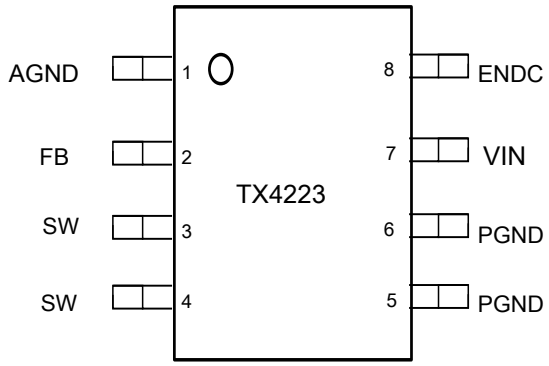
Features

- 2.5V-6V Input voltage range
- Up to 5A Switching current
- Maximum output voltage 8V , SW Foot pressure up to
1 ● 2V Low on-resistance, high efficiency 93%
1.2MHz Fixed switching frequency
- Built-in soft start
- Undervoltage lockout with hysteresis
- Built-in over temperature protection
- Built-in soft start and loop compensation
- Turn-off current as low as 1 microampere
- ESOP8 Package

shoFiteld of use

- Loudspeaker, card audio, etc.
- Low-voltage audio system, USB , 2.1/2.0
- Multimedia audio · radio
- GPS
- K Gebao
- Digital camera
- Tablet PC, palm game console

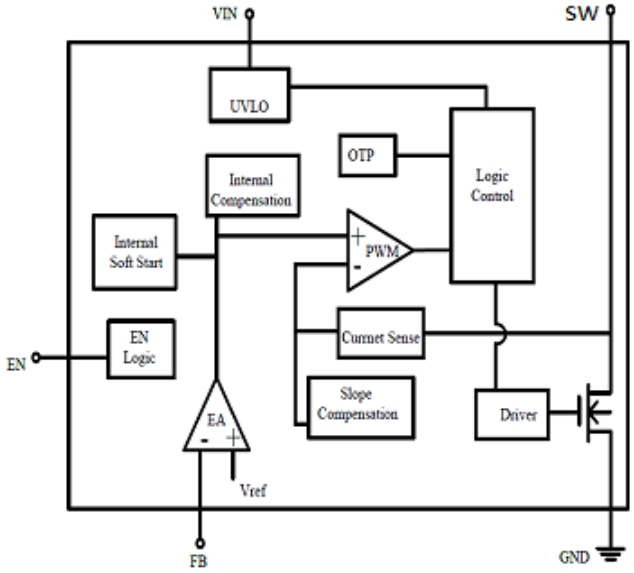
Package pin diagram ESOP8



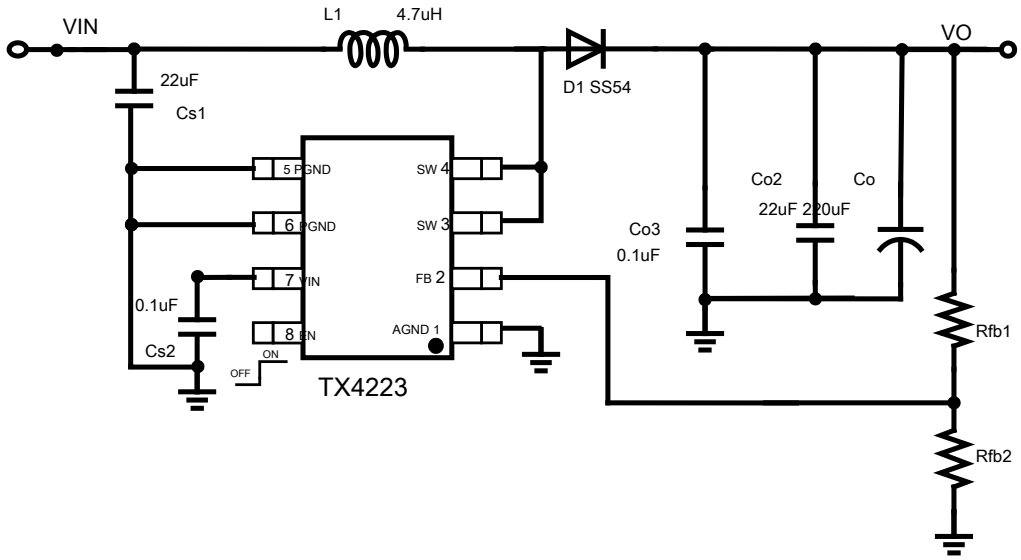
Pin function description

AGND	1		Analog ground
FB	2	I	Output voltage feedback pin
SW	3,4	O	Switch output
PGND	5 , 6		Power ground
VIN	7	I	power input
ENDC	8	I	Chip enable signal input pin, high level open

Circuit block diagram



typical application



Extreme application parameters

name	description		parameter
VCC	Supply voltage	Boost input voltage	2.5V to 6.5V
		Boost output voltage	2.5V to 12V
V_I	Input voltage		VCC - 0.3V to VCC + 0.3V
T_A	Ambient working temperature		- 4 0°C to + 8 5℃
T_J	Junction operating temperature		- 4 0°C to + 150 °C
T_{stg}	Storage temperature		-65 ℃ to + 1 50℃
	Welding temperature		240°C, 10S.

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

Recommended working conditions parameter table

parameter	description		Minimum maximum unit		
Vo	Boost output voltage		VIN	10	V
VIH	High level input voltage	EN	1.5		V
VIL	Low-level input voltage	EN	0	0.4	V
TA	Working temperature		-40	85	°C

Electric special Sex

parameter	description	condition	Minimum	Typical value	Max	unit
VIN	Input voltage range		2.5		6	V
Vout	Boost output range				10	V
Isby	Chip quiescent current	Vin=3V, No Switching		100		μA
Isd	Chip off current	Vin=3.7V , EN=0V		0.1	1	μA
VFB	Feedback voltage			0.6		V
Ilim	Peak inductor current limit system			5		A
Fosc	Oscillator frequency			1.2		MHz
Rdson	NMOS On resistance			0.07		Ohm
VEN	Enable threshold voltage		1.5			V
OTP	Over temperature protection point		130			°C
Isw	SW Foot leakage current				1	uA

Application Guide

Output voltage setting

As shown in the typical application diagram, the output voltage is determined by the voltage divider connected to the feedback pin Rfb1, Rfb2 Setting, feedback pin voltage V for 0.6V , The output voltage can be set as follows:

$$Vo = (Rfb1Rfb2 + 1) * 0.6$$

larger Rfb1, Rfb2 Can reduce static power consumption, choose the right Rfb1, Rfb2 To ensure that the Vo No more than 10V .

The choice of power inductor

In definite Vin , Vo In this case, the inductance determines the rising and falling slopes of the inductor current. Inductor current ripple rate r:

$$r = \frac{\Delta iL}{i_{L\_avg}} = \frac{Ro * (1 - D)^2 * D}{L * f}$$

among them Ro Is the equivalent impedance of the output load, f for TX4223 The switching frequency. function r=f (D)in 1/3 There is a maximum value.

Under other conditions unchanged, the current ripple rate r And inductance L Is inversely proportional to ensure that the system is working CCM , Must meet r ≤2 , Thus get the minimum value of inductance

$$L_{min} = \frac{Ro * (1 - D)^2 * D}{2 * f}$$

However, if the inductor current ripple rate is too small, it will lead to a large inductance and inductor volume. A minimum ripple rate must be determined to obtain Maximum inductance Lmax .

On the other hand, a large ripple rate causes a large effective value of capacitor current to affect efficiency, and a compromise between the two is required. Experience s r=0.3~0.5 Is a suitable value. Small in use ESR In the case of capacitors, the current ripple rate can be increased to reduce the inductor volume. To avoid saturation of the inductor, the rated current of the inductor must be greater than the overcurrent limit point of the chip. TX4223 Typical peak current limit 5A .

Recommended Use 2.2uH ~ 4.7uH, Saturation current exceeds 5A Power inductors.

Power input and output capacitance Cs s Choice

The constant switching of the power switch tube of the boost regulator will produce ripples at the input of the system. The magnitude of the ripple depends on the actual ap Flow size, input impedance of the system, and PCB wiring. An input capacitor must be used to reduce this ripple. Under typical conditions 10uF or 22uF It is enough. If the input impedance is large (for example, the input wiring is very long), the input capacitance should be increased. The lithium battery is connected to the inductor, not directly connected to the chip pin, we will call the battery connected to the inductor terminal for the time being VBAT . Due to boos Source and amplifier

From that VBAT Terminal to get current, so the trace needs to be as short and thick as possible to ensure that the trace can withstand the current. Because the loss is too large; VBAT Terminal also needs a larger energy storage capacitor to make VBAT The voltage is more stable. Recommended Use 220uF Electrolytic capacitor and 10uF Tantalum capacitors are connected in parallel. Place it as close as possible to the inductor. If applied in the output power 5 Below watts, in order to save cost and PCB Area, can be used only 22uF-47 uF Tantalum capacitor is sufficient.

Selection of output diode

The choice of output diode depends on the output voltage and output current. The average current of the diode is equal to the output current of the system. The rated current of the diode must be greater than the output current, and the loss on the diode is proportional to the forward voltage drop of the diode, which should be s Diode with small forward voltage drop. In the diode turn-off stage, the reverse voltage of the diode is the output voltage, and the reverse withstand voltage should be great Output voltage diode.

Depending on different applications, recommended SS32 Or Schottky diodes with higher withstand voltage and higher current.

Boost output capacitor Cout s Choice

In the application of amplifier, the bypass design of the power supply is very important, especially for the noise performance of the application scheme and the suppressior performance. TX4223 A proper boost output capacitor is needed to ensure its high efficiency and reduce output ripple. Boost output capacitor adopts Low impedance ceramic capacitors, as close as possible to the output diode, because any resistance, capacitance and inductance in the circuit may affect the power conv The efficiency of exchange. One 220uF Or a larger electrolytic capacitor placed near the output diode will get a better filtering effect. Recommended Use 220uF Electrolytic capacitor and 10uF Tantalum capacitors are connected in parallel.

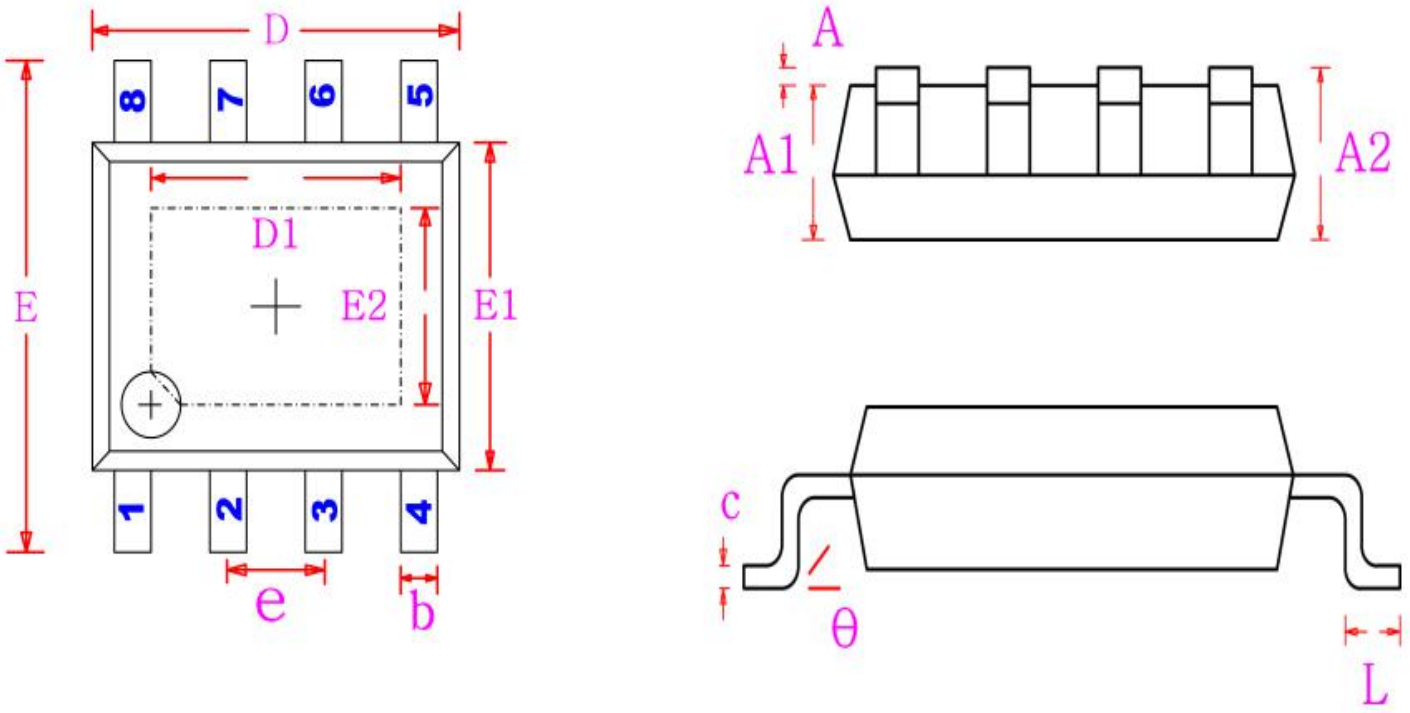
Overview of protection function modes

TX4223 Built-in functions such as overheat protection and overvoltage protection can effectively protect the chip from damage under abnormal working conditions. Be the The internal junction temperature exceeds 130 ℃, the chip will turn off until the junction temperature is lower than 120 ℃, the chip enters the normal working state again.

Chip power consumption and heat dissipation design

In progress PCB When designing, fully consider TX4223 cooling problem. Single-sided board requires copper foil to be attached to the patch layer and TX4223 Exposed copper foil at the heat sink to facilitate IC The heat sink is in good contact with PCB The board copper foil is in contact to achieve a good heat dissipation effect. Multi-panel, requires copper foil to be attached to the top and bottom layers TX4223 Exposed copper foil at the heat sink, in addition to IC The substrate and the surrounding area are punched with vias to achieve a good heat dissipation effect.
If the chip still does not meet the requirements, you need to increase the load impedance, reduce the power supply voltage or reduce the ambient temperature to solve the

Package information ESOP8



character	Metric		Imperial	
	The smallest	maximum	The smallest	maximum
D	4.7	5.1	0.185	0.2
D1	3.202	3.402	0.126	0.134
E	5.8	6.2	0.228	0.244
E1	3.8	4	0.15	0.157
E2	2.313	2.513	0.091	0.099
e	1.27		0.05	
b	0.33	0.51	0.013	0.02
A	0.05	0.25	0.004	0.01
A1	1.35	1.55	0.053	0.061
A2	1.35	1.75	0.053	0.069
L	0.4	1.27	0.016	0.050
c	0.17	0.25	0.006	0.01
θ	0°	8°	0°	8°