BST14006

1. Product Overview

The BST14006 is a PWM DC/DC step-down regulator. It has a wide input range of 4V-40V and is widely used in applications from industrial to automotive for power regulation of unregulated power supplies. The regulator has a standby current of 30μA in sleep mode, which is suitable for battery-operated systems. The ultra-low full-temperature 3μA current further extends the battery life in shutdown mode. The operating frequency is fixed at 2.1MHz and the BST14006X has a fixed operating frequency of 1.1 MHz, allowing the use of small external components while still having a low output ripple voltage. The soft-start and compensation circuits are implemented internally, which allows the device to be used with minimized external components. The BST14006 is optimized for load currents up to 600mA with a typical feedback voltage of 0.765V. The device has built-in protection features such as over-temperature protection, over-current protection, and short-circuit protection. The BST14006 is available in a CLCC06 package. The BST14006X and BST14006 Y are available in a DFN06 package.

2. Features

- Input voltage range: 4V~40V.
- Up to 600mA output current.
- 30μA ultra-low quiescent current.
- High voltage enable input.
- BST14006 \14006YDFN6E has a switching frequency of 2.1MHz, and BST14006X DFN6E has a switching frequency of 1.1MHz.
- Internal soft start.
- Internal compensation.
- Support high duty cycle operation.
- 3μA shutdown current at full temperature.
- Over-temperature protection, over-current protection and short-circuit protection.
- BST14006 is available in CLCC06 package, while BST14006X and BST14006 Y are available in DFN06 package.

3. Functional Block Diagram

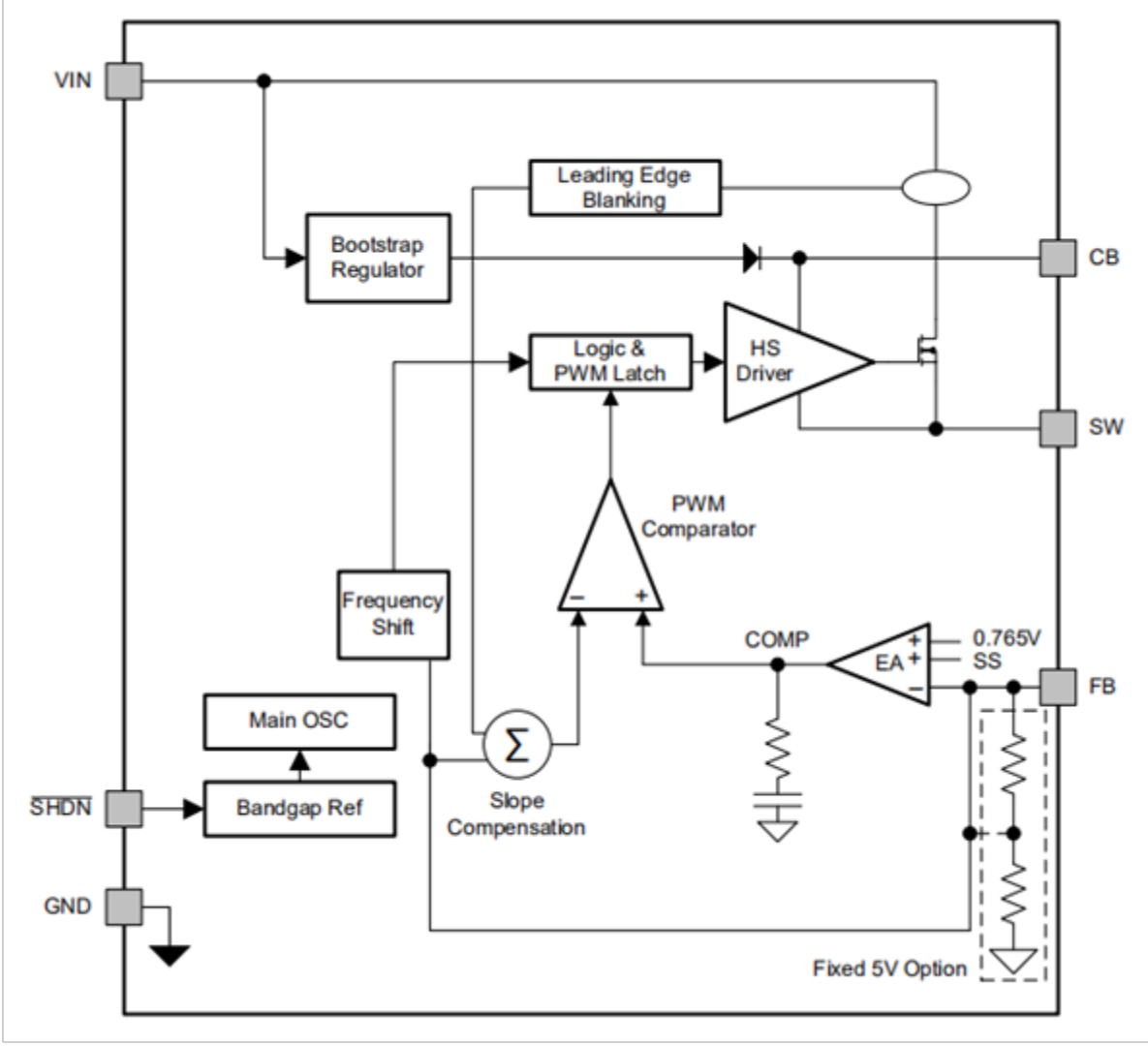


Figure 1. Functional Block Diagram

4. Pin Information

Pin Assignment Diagram

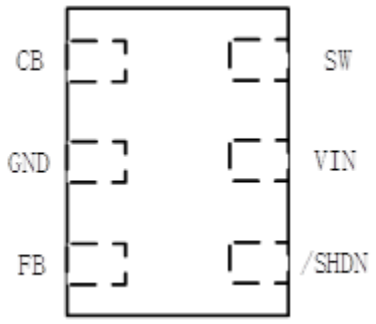


Figure 2. BST14006 pinout diagram

Pin Description

Table 1. 1Pin Description

Pins		Function	describe
name	serial number		
CB	1	I	SW FET gate bias voltage. Connect Cboot between CB and SW
GND	2	G	Ground connection
FB	3	I	The feedback divider ratio is set by V OUT = V FB (1+(R1/R2))
/SHDN	4	I	Enable pin (high voltage tolerant). Internal pull-up current source. Pull below 1.2V to shut down. Pin can be left floating, enabled by default. Input undervoltage lockout adjustable with two resistors.
VIN	5	I	Power supply input voltage pin. Internal power supply and drain node input for the internal high-side MOSFET
SW	6	O	Switching node. Connects the inductor, diode and Cboot capacitor

5. Absolute Maximum Ratings and Recommended Operating Ranges

Absolute Maximum Ratings

Input voltage (VIN to GND)……-0.3V～+45V
Input voltage (SHDN to GND)……-0.3V～+45V
Input voltage (FB to GND)……-0.3V～+7V
Input voltage (CB to SW)……-0.3V～+7V
Output voltage (SW to GND)……-1V～+45V
Output voltage (SW to GND, less than 30ns transient)……-2V～+45V
Working junction temperature (T_J)……-40°C～+150°C

Note 1: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to any Absolute Maximum Rating conditions for extended periods may affect device reliability and lifetime.
Note 2: This IC includes overtemperature protection to protect the device during momentary overload conditions. When the overtemperature protection is activated, the junction temperature will exceed 150°C. Continuous operation above the specified maximum operating junction temperature may impair device reliability.

6. Electrical characteristics parameters

Table 2. Electrical properties

characteristic	symbol	condition (Unless otherwise specified, V_{IN} = 12V , TA = 25°C)	Minimum	typical	maximum	unit
Input						
Input voltage	V_{IN}		4	-	40	V
Shutdown current	I_{SHDN}	VEN = 0V	-	1	3	μA
Quiescent Current	Q	No load, V_{IN} = 12V	-	28	-	μA
Undervoltage protection	*UVLO*	Rising Threshold	-	-	4	V
		Falling Threshold	3	-	-	
Enable end						
Rising Threshold Voltage	$V_{SHDN-Th re}$		1.05	1.25	1.38	V
Enable input current	I_{SHDN_PIN}	2.3V	-	-4.2	-	μA
		0.9V	-	-1	-	
Enable input hysteresis current	I_{SHDN_HYS}		-	-3	-	μA
High-side MOSFET						
On-resistance	R_{DS_ON}	VIN = 12V, CB to SW = 5.8V	-	600	-	mΩ
Feedback						
Feedback voltage	V_{FB}		0.747	0.765	0.782	V
Current Limit						
Current Limit	I_{LIMIT}	V_{IN} = 12 V, T_J = 25°C	-	1200	-	m A
S W end						
Switching frequency	f	BST14006 BST14006YDFN6E	1 785	2 100	2415	k Hz
		BST14006XDFN6E	9 35	1 100	1 285	
Minimum on-time	T_{ON_MIN}	f_{SW} = 2.1MHz (BST14006) f_{SW} = 1.1MHz (BST14006X)	-	1 30	-	n s

7. Dimensions

Encapsulation

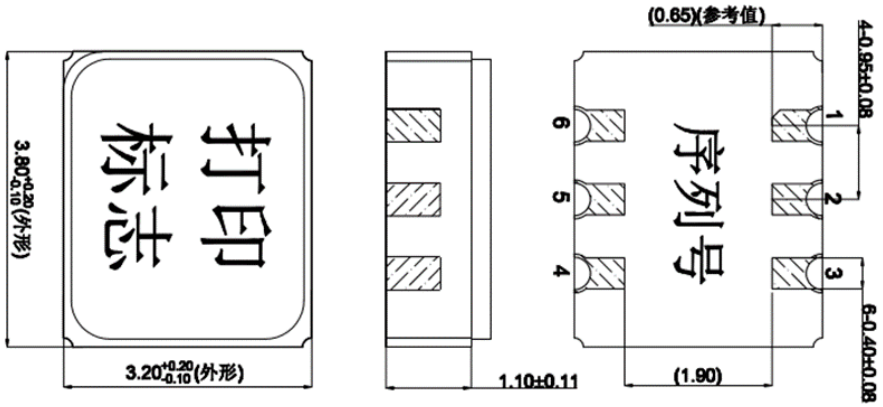
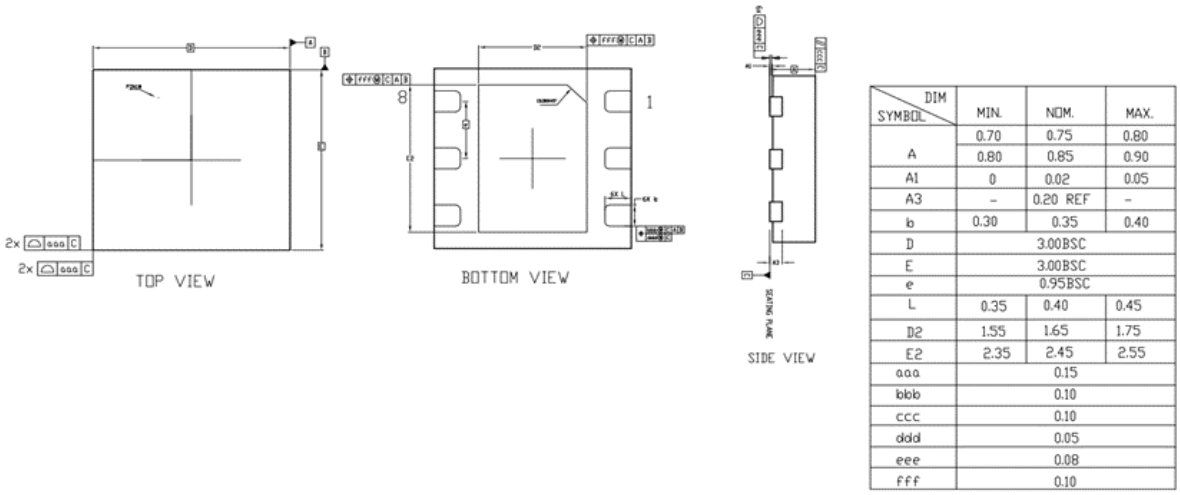


Figure 3. 3Ceramic package dimensions

Unit is mm

Dimension symbols	Numeric		
	Minimum	Nominal	maximum
D	2.90	—	3. 50
E	3. 6 0	—	4. 10
A	0.90	—	1.30
e	—	0.95	—
b	0.25	—	0.55
c	—	0.65	—
F	—	1.90	—



DIM / SYMBOL	MIN.	NOM.	MAX.
	0.70	0.75	0.80
A	0.80	0.85	0.90
A1	0	0.02	0.05
A3	-	0.20 REF	-
b	0.30	0.35	0.40
D	3.00BSC		
E	3.00BSC		
e	0.95BSC		
L	0.35	0.40	0.45
D2	1.55	1.65	1.75
E2	2.35	2.45	2.55
aaa	0.15		
bbb	0.10		
ccc	0.10		
ddd	0.05		
eee	0.08		
fff	0.10		

Figure 4. Plastic package dimensions

8. Ordering Information

Table 1. Product Ordering Information

Serial number	model	Package	Packaging materials	Device level	Detailed specifications	Product Status
2	BST 14006XDFN6E	DFN6	Plastic packaging	Military temperature level	Q/BST 50294-2023	Mass production

Note 1:
Q/B /B1 grade devices meet GJB 597 A -1996 or GJB 597B-2012 Screening requirements for Q/B /B1 levels of the General Specifications for Semiconductor Integrated Circuits .
Military temperature grade devices meet the screening requirements of Q/BST 50294-2023 "General Specifications for Huawei Military Temperature Grade Products" , and their operating environment temperature range should be -55 ℃ ～+ 125 ℃ .
Note 2: The product ordering information is for our existing products or devices that have been confirmed to be developed. We can develop devices in other packaging forms according to user needs.