

BST54428

1. Product Overview

The BST54428 is an adaptive on-time COT mode synchronous buck converter. The BST54428 helps system designers complete a power bus regulator set for a variety of end devices with a cost-effective, low component count, low standby current solution. The main control loop of the BST54428 uses COT mode control, which provides fast transient response without the need for external compensation components. Adaptive on-time control supports seamless transitions between pulse width modulation (PWM) mode at higher loads and skip cycle operation at light loads. The output voltage can be set between 0.76V and 7V. The device also features an adjustable soft-start time.

2. Product Features

- COT mode enables fast transient response.
- Low output ripple, supports ceramic output capacitors.
- Wide VIN input voltage range: 4.5V to 18V.
- Output voltage range: 0.76V to 7V.
- High accuracy of initial bandgap reference.
- Adjustable soft start.
- Pre-bias soft start.
- 650kHz switching frequency (Fsw).
- Cycle-by-cycle overcurrent limiting.
- Automatically skip cycles under light load to achieve high efficiency.

1. Functional Block Diagram

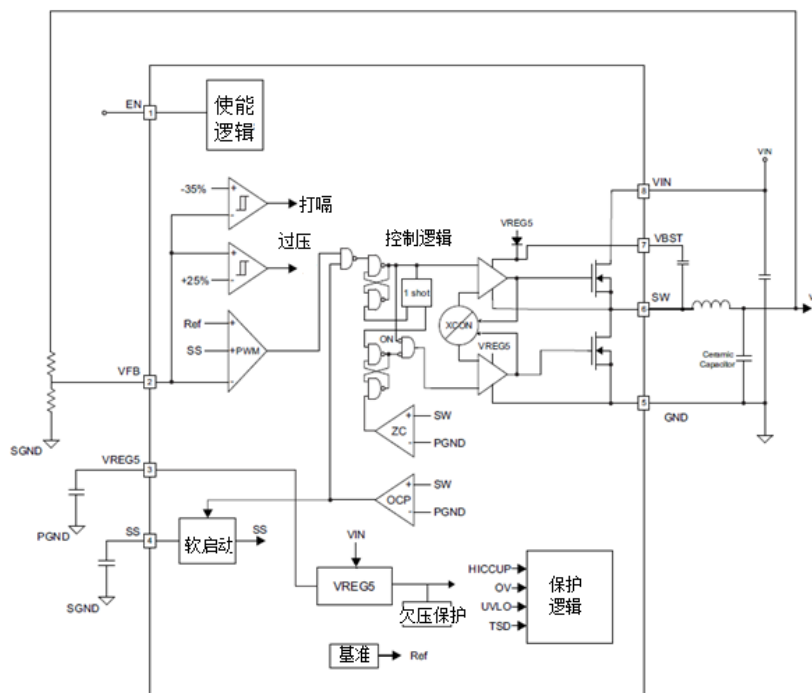


Figure 1. Functional Block Diagram

3. Pin Information

Pin Assignment Diagram

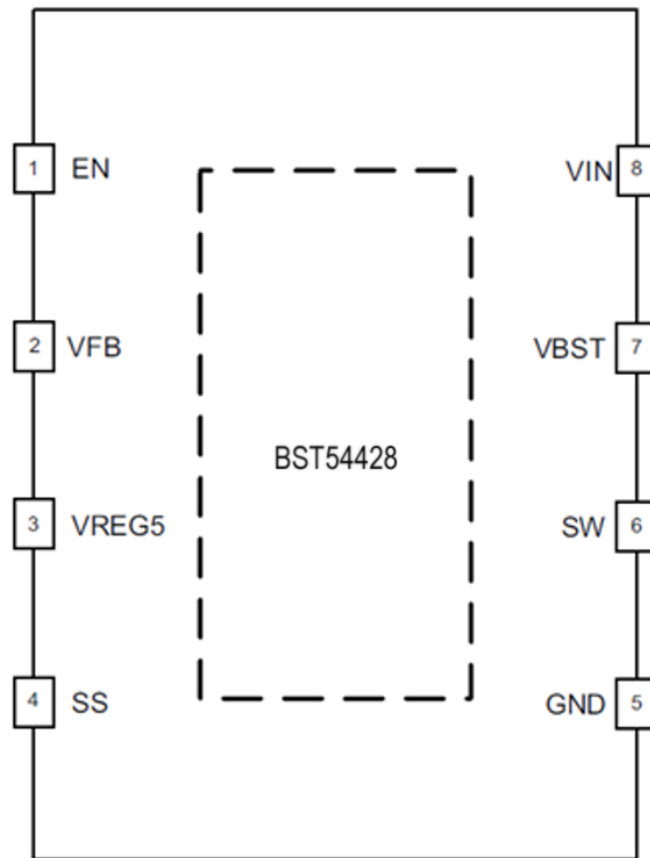


Figure 2. BST54428 series pinout

Pin Description

Table 1. Pin Description

Pin number	symbol	Function
1	EN	Enable terminal.
2	VFB	Feedback input, connected to the output voltage divider terminal.
3	VREG5	Internal analog supply voltage.
4	SS	Soft start terminal.
5	GND	land.
6	SW	Flip the node and connect it where the upper and lower tubes meet.
7	VBST	High-side tube drive voltage source.
8	VIN	Voltage source.

4. Absolute Maximum Ratings and Recommended Operating Ranges

Absolute Maximum Ratings

		Minimum	Maximum	unit
VI Input Voltage	V IN EN	-0.3	2 0	V
	V BST	-0.3	2 6	
	B ST-SW	-0.3	6.5	
	V FB SS	-0.3	6.5	
	S W	- 2	2 0	
VO Output voltage	V REG5	-0.3	6.5	
Operating junction temperature T J		-40	1 75	°C
Storage temperature		- 6 5	150	

Recommended working range

	Minimum	Maximum	unit
Input voltage, VI	4.5	18	V
Output current (IOUT)	0	4	A
Operating ambient temperature (TA)	- 55	125	°C

Note: Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device.

5. Electrical characteristics parameters

Table 2. Electrical properties

characteristic	symbol	condition (Unless otherwise specified, $V_{IN}=12V$, $-55^{\circ}C \leq T_A \leq 125^{\circ}C$)	Limit value			unit
			Minimum	Typical Value	Maximum	
Working quiescent current	I_{VIN}	EN=5V, $V_{FB} = 0.8V$		800	1400	μA
Shutdown supply current	I_{VNSDN}	EN=0V		3	10	μA
EN input high level voltage	V_{EN}	EN terminal	1.6		-	V
EN input low level voltage	V_{EN}	EN terminal	-		0.6	V
EN pin to ground resistance	R_{EN}	$V_{EN} = 12V$	200	400	800	k Ω
FB threshold voltage	V_{FBTH}	Continuous Mode	751		779	mV
FB input current	I_{VFB}	$V_{FB} = 0.8V$, $T_A = 25^{\circ}C$	-1		1	μA
VREG5 output voltage	V_{VREG5}	$6V < V_{IN} < 18V$ $0 < I_{VREG5} < 5mA$	5	5.2	5.5	V
VREG5 output current	I_{VREG5}	$V_{IN}=6V$, $V_{REG5}=4V$	20		-	mA
High-side switch resistance	$R_{DS(on)}$	$V_{BST-SW} = 5.5V$	-	50	100	m Ω
Output current limit	I_{OCL}	$T_A = 25^{\circ}C$, $L_{out} = 1.5\mu H$	6.7	7.3	8.9	A
SS charging current	I_{SSC}	$V_{SS}=1V$	4.2	6	7.8	μA
SS discharge current	I_{SSD}	$V_{SS}=0.5V$	1.5	3.3	-	mA
UVLO Threshold Voltage	V_{UVLO}	V_{REG5} wake-up voltage	3.45	3.75	4.05	V
		Hysteresis	0.13	0.32	0.48	V
Minimum closing time	$t_{OFF(MIN)}$	$T_A = 25^{\circ}C$, $V_{FB} = 0.7V$	-	260	310	ns
Minimum opening time	$t_{ON(MIN)}$	$T_A = 25^{\circ}C$, $V_{IN}=12V, V_{O}=1.05V$		150	300	ns

6. Dimensions

Plastic PSOP8 package (military temperature)

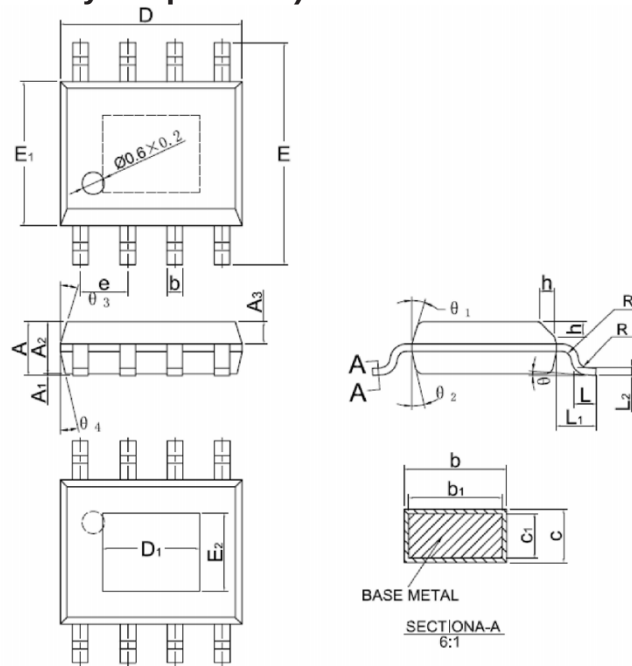


Figure 3. Plastic package PSOP8 package size diagram

Unit is mm

Dimension symbols	Numeric		
	Minimum	Nominal	maximum
A	1.35	1.55	1.75
A1	0.00	-	0.10
A2	1.25	1.40	1.65
A3	0.50	0.60	0.70
b	0.38	-	0.51
b 1	0.37	0.42	0.47
c	0.18	-	0.25
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.17	1.27	1.37
L	0.45	0.60	0.80
L1	1.04REF		
L2	0.25 BSC		
R	0.07	-	-
R1	0.07	-	-
h	0.3	0.4	0.5

Ceramic CLCC8 package

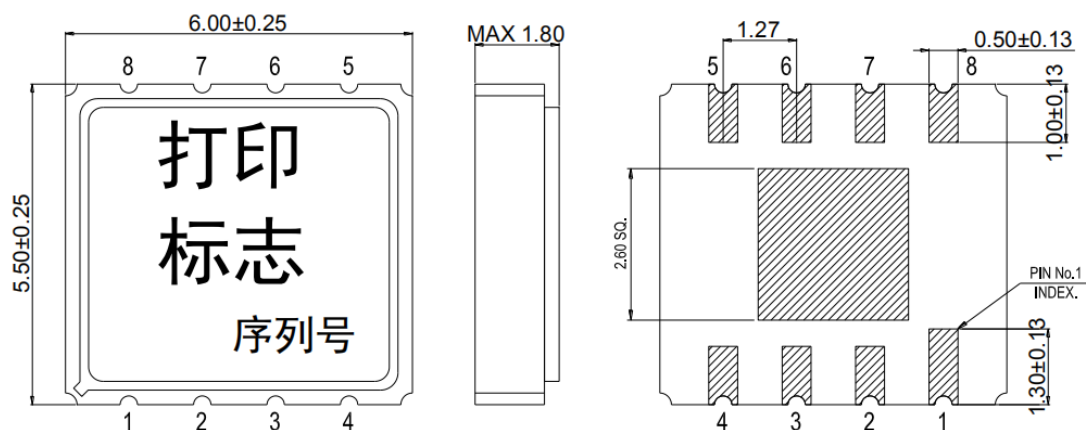


Figure 4. Ceramic CLCC8 package dimensions

Plastic PSO P8 package (N1 grade)

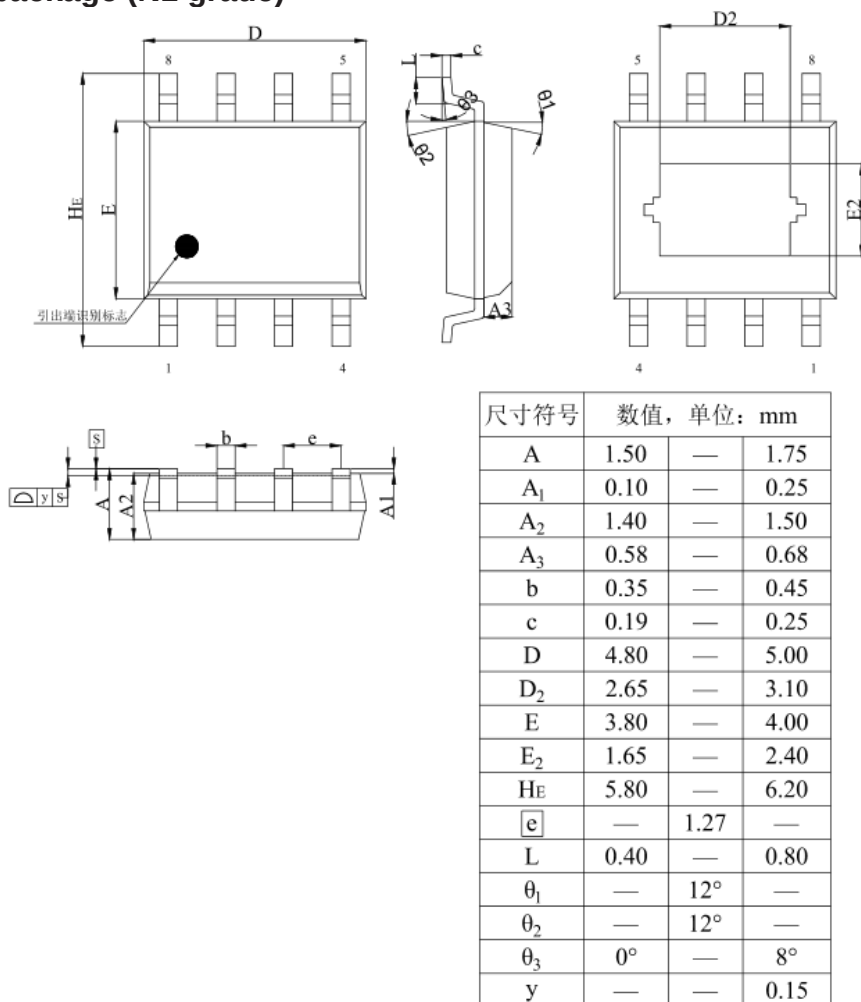


Figure 5. Plastic package E SOP8 dimensions

7. Ordering Information

Table 3. Product ordering information

Serial number	model	Package	Packaging materials	Device level	Detailed specifications	Product Status
1	BST54428	CLCC8	ceramics	Class B	Q/BST 3009 5 -2021	Mass production
2	BST54428 PSOP8E	PSOP8	plastic	Military Temperature	Q/BST 502 89 -2023	Mass production
3	BST54428 PSOP8M3	PSOP8	plastic	N1 Level		Identification

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.
- N /N1 level devices meet the N /N1 level screening requirements of GJB 7400 "General Specification for Semiconductor Integrated Circuits for Qualified Manufacturer Certification "
- Military temperature grade devices meet the screening requirements of Q / BST40020-2018 "General Specifications for Huawei Military Temperature Grade Products", and their operating environment temperature range should be -55 °C ~+ 125 °C.

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.