

BST4644

1. Product Overview

The BST4644 is a four-channel DC/DC step-down regulator that can provide 4A of current per output. The outputs can be connected in parallel to form an array to provide up to 16A of load capacity. The package integrates the switch controller, power FETs, inductor and other peripheral components. The BST4644 can be operated in a 4V to 14V or 2.375V to 14V. The BST4644 operates over a wide input voltage range (using an external bias supply), and supports output voltages from 0.6V to 5.5V.

2. Product Features

- Provides four-channel 4A current output buck regulator.
- Wide input voltage range: 4V to 14V.
- 2.375V to 14V (using external bias).
- 0.6V to 5.5V output voltage.
- High efficiency up to 92%.
- $\pm 1.5\%$ total output voltage regulation.
- Current mode control, fast transient response.
- Can be connected in parallel to provide higher output current.
- Output voltage tracking.
- Internal temperature detection signal output.
- External frequency syncable.
- Overvoltage, overcurrent and overtemperature protection.
- 9 mm×1.5 mm×5.03mm PBGA package.

3. Functional Block Diagram

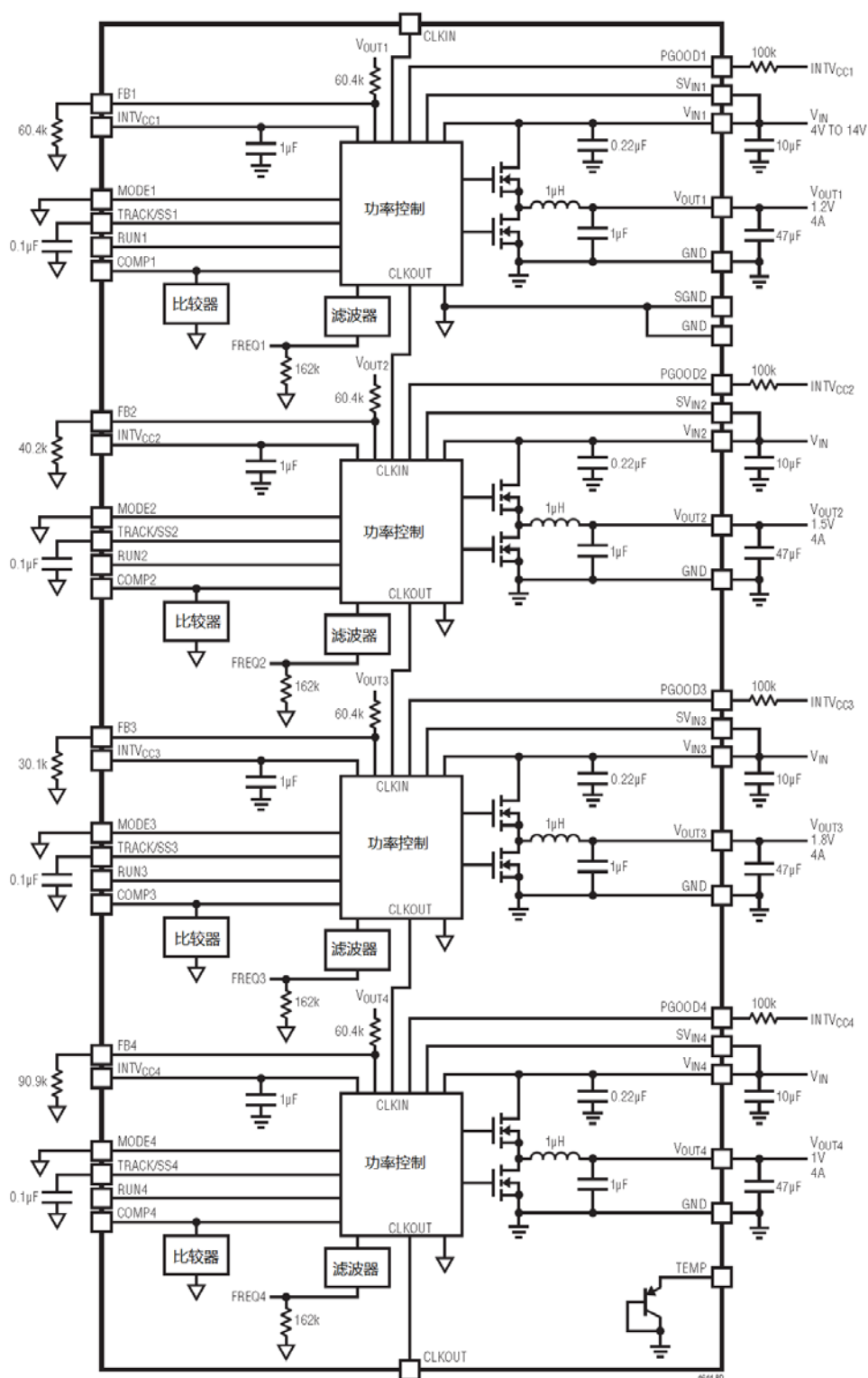


Figure 1. Functional Block Diagram

4. Pin Information

Pin Assignment Diagram

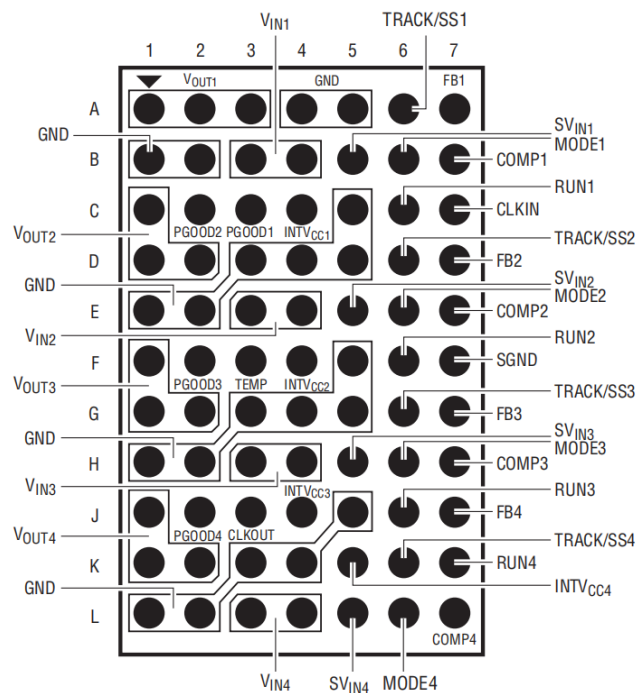


Figure 2. BST 4644 pinout diagram

Pin Description

Table 1. Pin Description

Pins	Pin Name	Functional Description
A1 , A2 , A3	VOUT1	Channel 1 output voltage
C1, D1, D2	VOUT2	Channel 2 output voltage
F1, G1, G2	VOUT3	Channel 3 output voltage
J1, K1, K2	VOUT4	Channel 4 output voltage
A4-A5, B1-B2, C5, D3-D5, E1-E2, F5, G3-G5, H1-H2, J5, K3-K4, L1-L2	GND	Power Ground
B3, B4	VIN1	Channel 1 power input voltage
E3, E4	VIN 2	Channel 2 power input voltage
H3, H4	VIN 3	Channel 3 power input voltage
L3, L4	VIN 4	Channel 4 power input voltage
C3	PGOOD1	Channel 1 Power Good Indicator
C2	PGOOD 2	Channel 2 Power Good Indicator
F2	PGOOD 3	Channel 3 Power Good Indicator
J2	PGOOD 4	Channel 4 Power Good Indicator
J3	CLKOUT	Frequency Output
C4	INTVCC1	Channel 1 internal regulator output
F4	INTVCC2	Channel 2 internal regulator output
J4	INTVCC3	Channel 3 internal regulator output
K 5	INTVCC4	Channel 4 internal regulator output
B5	SVIN1	Channel 1 analog input voltage
E5	SVIN2	Channel 2 analog input voltage
H5	SVIN3	Channel 3 analog input voltage
L5	SVIN4	Channel 4 analog input voltage
A6	TRAK/SS1	Channel 1 output voltage follower /soft start
D6	TRAK/SS2	Channel 2 output voltage follower /soft start
G6	TRAK/SS 3	Channel 3 output voltage follower /soft start
K6	TRAK/SS 4	Channel 4 output voltage follower /soft start
B6	MODE1	Channel 1 mode selection
E6	MODE 2	Channel 2 mode selection
H6	MODE 3	Channel 3 mode selection
L6	MODE 4	Channel 4 mode selection
C6	RUN1	Channel 1 Enable
F6	RUN 2	Channel 2 Enable
J6	RUN 3	Channel 3 Enable
K7	RUN 4	Channel 4 Enable
A7	FB1	Channel 1 output voltage feedback
D7	FB 2	Channel 2 output voltage feedback
G7	FB 3	Channel 3 output voltage feedback
J7	FB 4	Channel 4 output voltage feedback
B7	COMP1	Channel 1 External Compensation
E7	COMP 2	Channel 2 External Compensation
H7	COMP 3	Channel 3 External Compensation
L7	COMP 4	Channel 4 External Compensation
C7	CLKIN	External synchronization frequency input
F7	SGND	Analog Ground
F3	TEMP	Temperature detection

5. Absolute Maximum Ratings and Recommended Operating Ranges

Absolute Maximum Ratings

$V_{IN}, S V_{IN}$ (per channel)	-0.3V ~ 15V
V_{OUT} (per channel)	- 0.3V~ $S V_{IN} / 6V$
RUN (per channel)	-0.3V~ SV_{IN}
$INTV_{CC}$ (per channel)	- 0.3V~ 3.6V
PGOOD,MODE,TACK/ SS,FB (each channel)	- 0.3V~ $INTV_{CC}$
CLKIN	- 0.3V~ $INTV_{CC}$
Internal operating temperature range	-55°C~+125°C
Storage ambient temperature (T_{stg}).....	-65°C~+150°C

Recommended working range

Input voltage range	4V~14V
Operating ambient temperature (T_A)	-55°C~ 125°

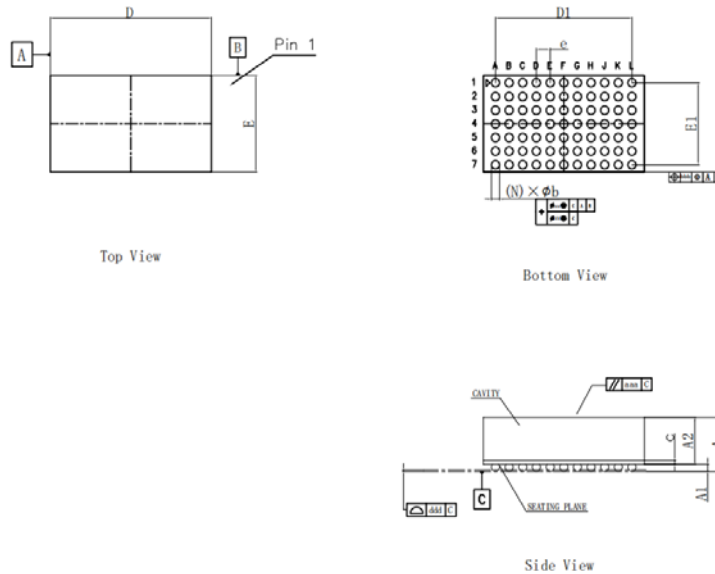
C Note: Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device.

6. Electrical characteristics parameters

Table 2. Electrical properties

characteristic	symbol	Condition (Unless otherwise specified, $V_{IN}=S_{VIN}=R_{UN}=12V$, $C_{IN}=22\mu F$, $C_{OUT}=100\mu F$, $-40^{\circ}C \leq T_A \leq 85^{\circ}C$)	Group A Grouping	Limit value Minimum maximum		unit
Input DC voltage	V_{IN}, S_{VIN}		A1 A2 A3	4	14	
Output voltage	$V_{OUT(DC)}$	$C_{IN}=22\mu F$, $C_{OUT}=100\mu F$, $R_{FB}=40.2k$, MODE= $INTV_{CC}$, $V_{IN}=4V \sim 14V$, $I_{OUT}=0A \sim 4A$ $T_A= -40^{\circ}C$, $25^{\circ}C$		1.460	1.540	
		$C_{IN}=22\mu F$, $C_{OUT}=100\mu F$, $R_{FB}=40.2k$, MODE= $INTV_{CC}$, $V_{IN}=4V \sim 14V$, $I_{OUT}=0A \sim 2A$ $T_A=85^{\circ}C$				
RUN Pin Threshold	V_{RUN}	V_{RUN} rises		1.1	1.3	V
Input bias current	$I_{Q(SVIN)}$	$V_{IN}=12V$, $V_{OUT}=1.5V$, MODE= $INTV_{CC}$ $V_{IN}=12V$, $V_{OUT}=1.5V$, MODE=GND Shutdown, RUN=0, $V_{IN}=12V$		-	18	mA
				-	6	mA
				-	20	μA
				-		
Input Current	$I_{S(VIN)}$	$V_{IN}=12V$, $V_{OUT}=1.5V$, $I_{OUT}=4A$, $T_A= -40^{\circ}C$, $25^{\circ}C$		0.5	0.8	A
Output continuous current range	$I_{OUT(DC)}$	$V_{IN}=12V$, $V_{OUT}=1.5V$, $T_A= -40^{\circ}C$, $25^{\circ}C$		0	4	A
Line Regulation	$\Delta V_{OUT} / V_{OUT}$	$V_{OUT}=1.5V$, $V_{IN}=4V \sim 14V$, $I_{OUT}=0A$		-0.15	0.15	%/V
Load Regulation	$\Delta V_{OUT} / V_{OUT}$	$V_{OUT}=1.5V$, $I_{OUT}=0A \sim 4A$ $T_A= -40^{\circ}C$, $25^{\circ}C$		-0.5	0.5	%/A
FB pin voltage	V_{FB}	$I_{OUT}=0A$		0.588	0.612	V
Track pin soft-start pull-up current	$I_{TRACK/SS}$	$TRACK / SS = 0V$		1	4	μA
V_{IN} undervoltage protection	$V_{IN(UVLO)}$	V_{IN} drops V_{IN} Hysteresis		2.4	3.2	V
				0	500	mV
PGOOD terminal trigger threshold	V_{PGOOD}	V_{FB} corresponds to the corresponding output V_{FB} reverse slope V_{FB} positive slope		-15	-6	%
				6	15	%
PGOOD Leakage Current	I_{PGOOD}	$V_{PGOOD}=3.3V$		-	2	μA
PGOOD Low Voltage	V_{PGL}	$I_{PGOOD}=1mA$		-	0.1	V
Internal V_{CC} voltage	V_{INTVCC}	$SV_{IN}=4V \sim 14V$		3.1	3.4	V
CLKIN Threshold	$CLKIN$		0.5	0.9	V	
Oscillation frequency	f		A9 A10 A11	0.7	1.3	MH z
Opening time	t_{START}	$C_{OUT}=100\mu F$, no load, $TRACK / SS =0.01\mu F$, $V_{IN}=12V$, $V_{OUT}=1.5V$	-	5	ms	
Functional testing		Supply voltage = 12V	A7 A8A A8B	-		
Note: A1, A2, A3 groups are for static tests at 25°C, 85 °C , -40°C respectively; A9, A10, A11 groups are for switch tests at 25°C, 85°C, -40°C respectively; A7, A8A, A8B groups are for functional tests at 25°C, 85°C, -40°C respectively.						

7. Dimensions



Unit is mm

Dimension symbols	Numeric		
	Minimum	Nominal	maximum
A	4.880	5.030	5.180
A 2	4.310	4.410	4.510
A1	0.570	0.620	0.670
c	0.370	0.410	0.450
D	14.90 0	1 5.000	15.100
D1	-	12.700	-
E	8.900	9.000	9.100
E1	-	7.620	-
b	0.710	0.760	0.810
e	-	1.270	-

8. Ordering Information

Table 3. Product ordering information

Serial number	model	Package	Packaging materials	Device level	Detailed specifications	Product Status
1	BST4644PBGA77I	P BGA77	Plastic packaging	Industrial Grade	Q/BST 50471-2023	Mass production
2	BST4644PBGA77E	P BGA77	Plastic packaging	Military Temperature	Q/BST 50364-2023	Mass production
3	BST4644PBGA77A8	P BGA77	Plastic packaging	L-Class	Q/BST 50532-2024	Mass production

Note 1:

L devices meet GJB 2438B-2017 Screening requirements of the General Specification for Hybrid Integrated Circuits.

I/ Industrial temperature devices meet Q / BST40022-2021 According to the screening requirements of "HUAWEI Industrial Temperature Zone Product General Specifications", the operating environment temperature range should be -40°C~+85°C.

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.