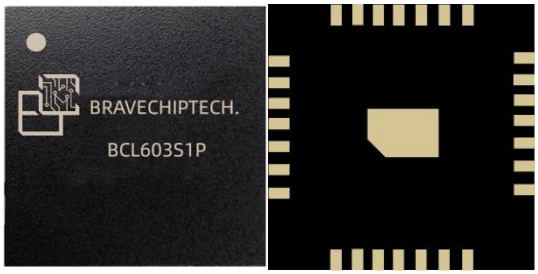
BCL603S1P Smart Ring Chiplet Datasheet



Features

- It integrates more than 20 devices such as BLE chips, LDO, PMIC and resistors
- Working voltage: 2.0V to 3.6V
- It can provide up to 19 GPIO ports, 2 I2C channels, 2 SPI channels, and support the mounting of PPG, NTC, IMU, NFC, LED and other peripherals and sensors
- Support BLE 5.2, embed the low-power Bluetooth protocol stack and GATT service
- It is embedded with the smart ring firmware and supports connection and use with the ChipletRing App
- The ARM Cortex-M0 32-bit core has a main frequency of up to 64MHz and a CPU operating power consumption of 60uA/MHz
- It has 64KB of SRAM, among which the Bluetooth protocol stack occupies 20KB, and supports the operation of various algorithms such as heart rate, blood oxygen, blood pressure, sleep, step counting, and 3DoF
- With 512KB of Flash, historical record data can be retained for more than 7 days
- Transmission power: -20 DBM to +4dBm
- High receiving sensitivity: -96 DBM
- The peak current for transmission and reception is less than 4.6mA
- The dormant current is less than 1μA
- The broadcast status current of the ring at 1-second intervals is less than 130uA
- The state current for blood oxygen measurement is less than 1.8mA
- The ring can last for more than five days
- Operating temperature range: -40℃ to 80℃

Application

- Smart Health ring
- XR space interactive controller
- Wearable devices
- Anti-loss device
- Data transparent module
- Miniaturized Bluetooth device

Number	Package Type	Type
BCL603S1P	（4×4mm）	Reel

Description

BCL603S1P is a high-performance and ultra-low power consumption Chiplet dedicated chip for smart rings. It adopts a 4mm wide LGA package form. Smart rings can be designed with a two-layer board FPC, reducing the BOM number by 30% and

ensuring a yield of over 95% when bending PCBA.

It provides a dedicated communication protocol and algorithm library for smart rings. Support secondary development and customized protocol development

Revision record：

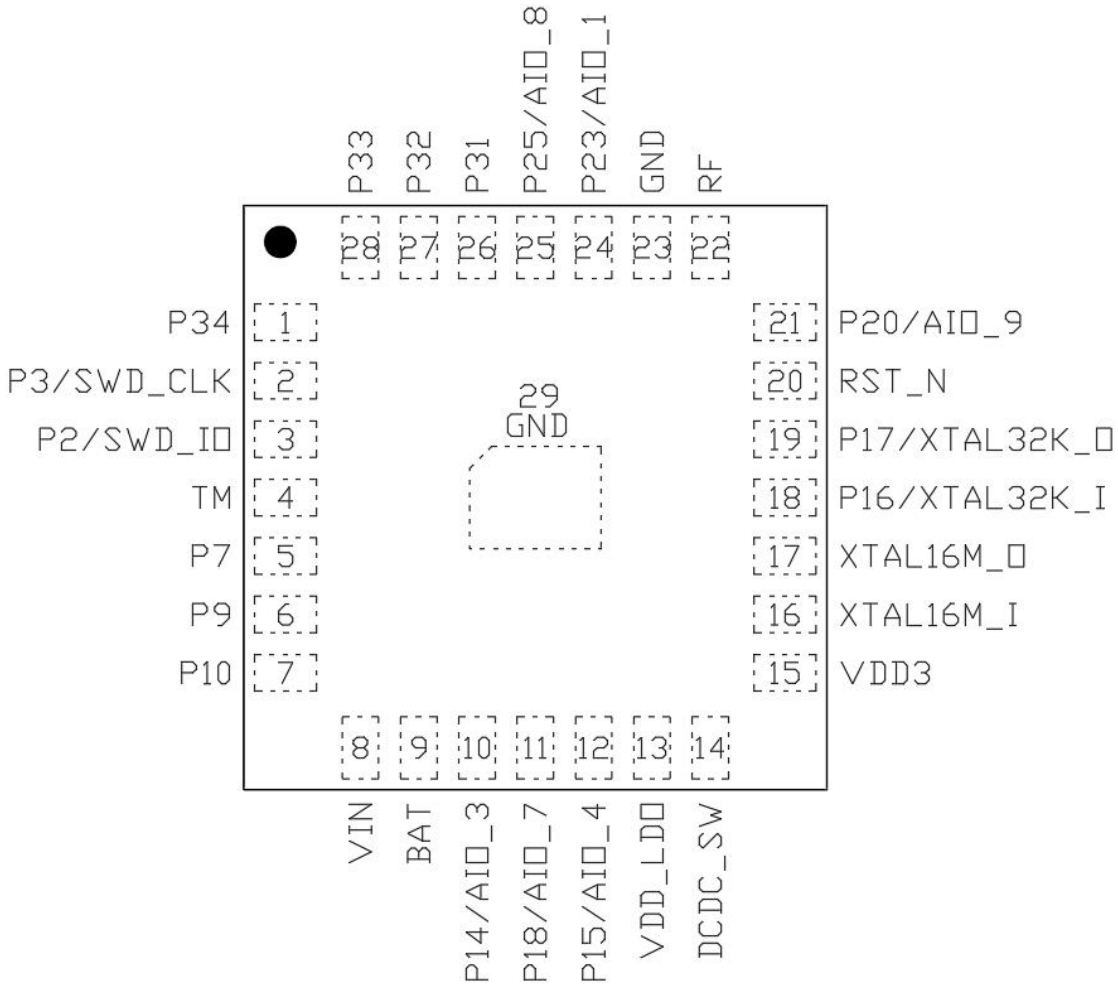
Version	Name	Date	Description
V1.0	Chris	2023.05.22	Original version

Catalogue

1、 Introduction

The BCL603S1P integrates BLE chips, LDO, PMIC, crystal oscillators and key resistors and capacitors by adopting Chiplet technology. It is specifically designed for smart ring applications, significantly reducing product size, improving production yield and simplifying clock and RF design.

2、 Pin description

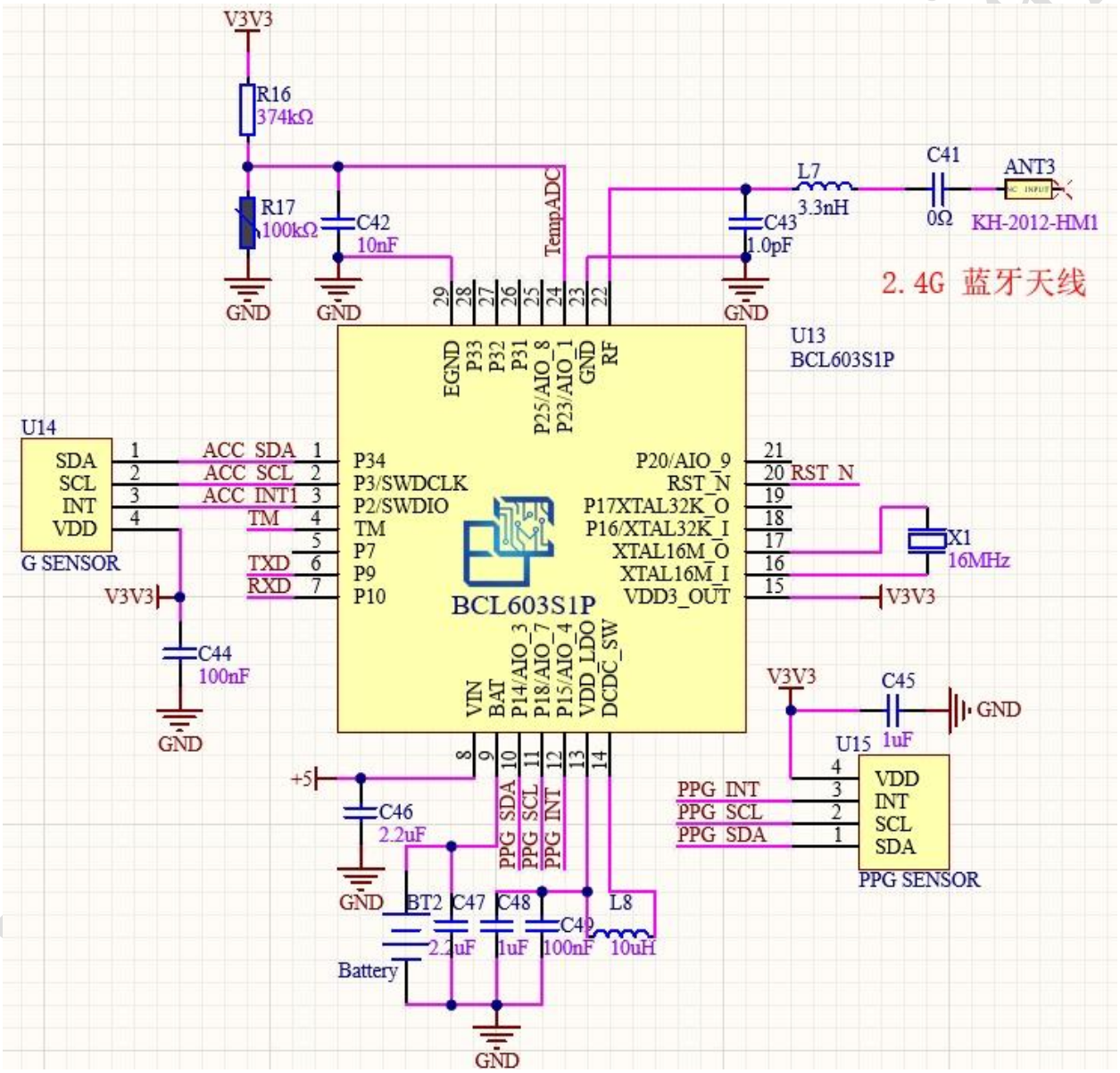


Pin Number	Pin Name	Type	Description
1	P34	I/O	General I/O
2	P3/SWD_CLK	Debugging	General I/O Serial debug clock input for debugging and programming
3	P2/SWD_IO	Debugging	General I/O Serial debugging I/O for debugging and programming
4	TM	I/O	Test mode enabled

5	P7	I/O	General I/O
6	P9	I/O	General I/O
7	P10	I/O	General I/O
8	VIN	Power	电源输入
9	BAT	Power	电池引脚
10	P14/AIO_3	Analog input	General I/O It can be configured as ADC input
11	P18/AIO_7	Analog input	General I/O It can be configured as ADC input
12	P15/AIO_4	Analog input	General I/O It can be configured as ADC input
13	VDD_LDO	I/O	External inductor
14	DCDC_SW	I/O	External inductor
15	VDD3	Power	Digital power supply, powered by BLE core
16	XTAL16M_I	I/O	16MHz crystal oscillator input
17	XTAL16M_O	I/O	16MHz crystal oscillator output
18	P16/XTAL32K_I	I/O	General I/O 32.768KHz crystal oscillator input
19	P17/XTAL32K_O	I/O	General I/O 32.768KHz crystal oscillator output
20	RST_N	I/O	Pin reset
21	P20/AIO_9	Analog input	General I/O It can be configured as ADC input
22	RF	RF	Single-ended radio antenna connection end
23	GND	Power	Power supply grounding
24	P23/AIO_1	Analog input	General I/O It can be configured as ADC input
25	P25/AIO_8	Analog input	General I/O It can be configured as ADC input
26	P31	I/O	General I/O

27	P32	I/O	General I/O
28	P33	I/O	General I/O
29	GND	Power	The bottom pad of the chip and the power supply are grounded

3、 Typical circuit



4、 Electrical Characteristics

Symbol	Conditions	Min	Value	Max	Unit
Power Supply Voltage	/	1.7	3.3	3.6	V

VCC					
IO Voltage	/	0	3.3	VCC	V
Operating temperature	/	-40	25	80	℃
Storage temperature	/	-55	/	120	℃
IO input low level	/	0	/	0.4	V
IO input high level	/	0	/	VCC	V
IO output low level	5mA	0	/	0.6	V
IO output high level	5mA	3.3	/	VCC	V
Wireless modulation mode	GFSK				
Frequency range	/	2.402	/	2.480	Ghz
Number of channels	/	/	40	/	/
Air speed	/	1	/	2	Mbps
Rf port impedance	/	/	50	/	Ohm
Transmitting power	/	/	0	+4	Dbm
Emission current	/	/	5.4	/	mA
Receiving current	/	/	5.3	/	mA
Receiving sensitivity	/	/	-95	-96	dbm
Ring resting current	3.7V		1		uA
Ring standby current	3.7V	/	130	/	uA
Ring operating current	3.7V	/	1.8	/	mA
Ring using time	/	5	5	9	Day
Ring standby time	/	/	30	/	Day
Operating humidity	/	10%	30%	90%	/
Storage humidity	/	5%	30%	90%	/

5、 Package Dimensions