

FR8008A Datasheet

Bluetooth Low Energy SOC with SIG Mesh integrated

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Description

FR8008A is a SOC (system on chip) for rapid development of Bluetooth Low Energy related products. It contains Bluetooth V5.0 (LE Mode) fully compliant system with Freqchip designed firmware and software stack. Users can develop various applications based on embedded 32-bits high performance MCU.

With Freqchip's innovational technology, FR8008A integrates, PMU (Li-battery charger + LDO), QSPI flash ROM with XIP mode, IIC, UART, GPIO, ADC, USB OTG, PWM all in a single chip, which provides customer with:

1. competitive power consumption
2. stable connection
3. low-cost BOM

The Bluetooth Smart firmware includes the L2CAP service layer protocols, Security Manager (SM), Attribute Protocol (ATT), the Generic Attribute Profile (GATT) and the Generic Access Profile (GAP). Furthermore, application profiles such as Proximity, Health Thermometer, Heart Rate, Blood Pressure, Glucose, Human Interface Device (HID) and SDK (include drivers, OS API, etc.) are supported. The SDK has integrated SIG Mesh for networking application.

Features

- Compliant with Bluetooth Specification V5.0 LE, support 2M, 1M, 500K and 125K data rate
- Embedded 32-bits Processor
 - up to 96Mhz speed
- Internal mask 150KB ROM, up to 64KB SRAM
- Internal 512KB Flash ROM for user space software and data
- Integrated Battery Charger
- Integrated DC-DC Regulator
- Interface:
 - GPIO
 - UART
 - SPI/QSPI

- I2C
- PWM
- USB OTG
- ROM Software:
 - BLE Profile & Protocol: GATT, LM, LC, etc.
 - Driver API
 - SIG Mesh

Applications

- Mouse and keyboard
- Bluetooth Wearable
- SIG Mesh application
- smart locks
- domestic appliances
- etc.

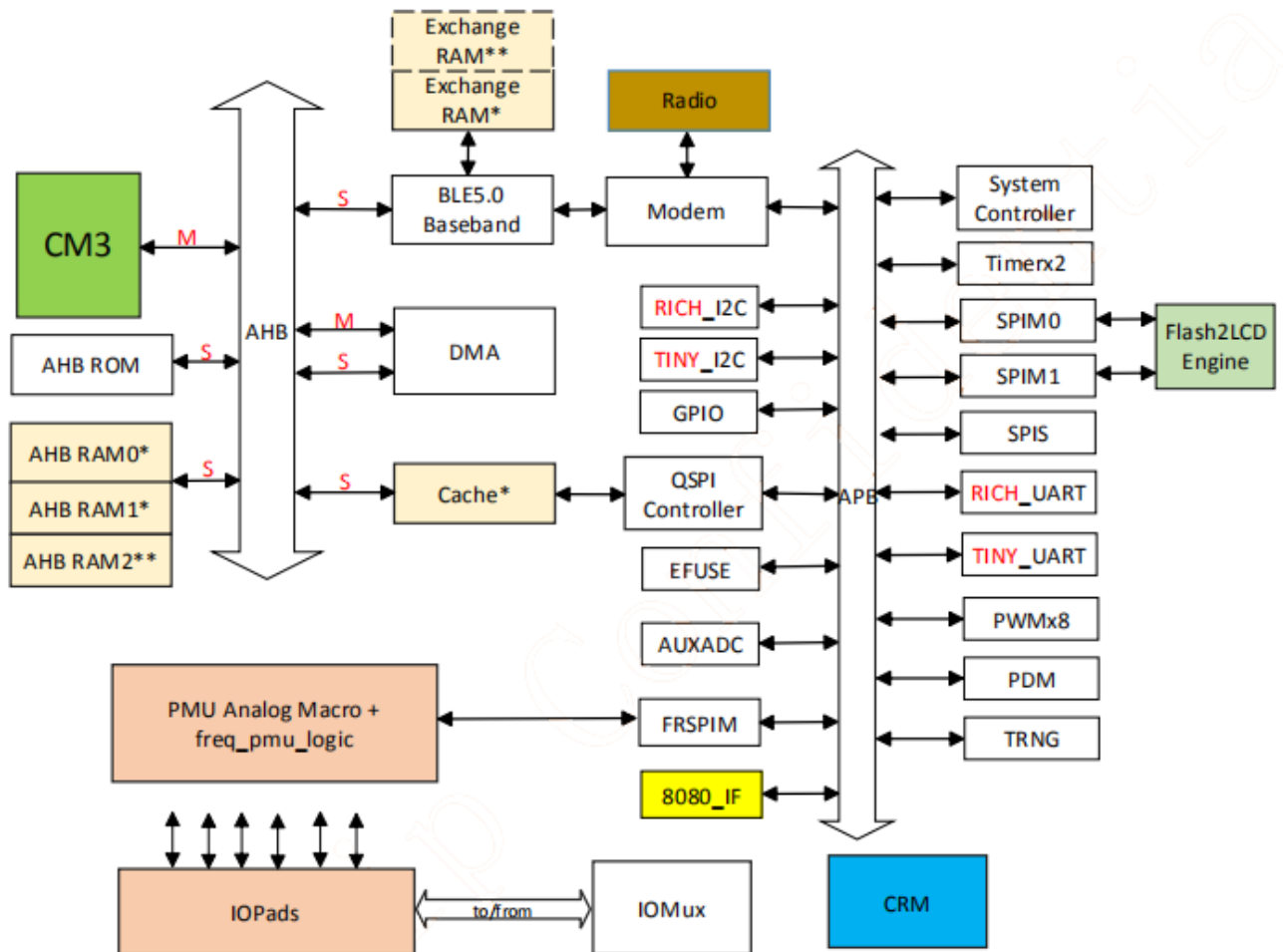
Ordering Information

FR8008A -40°C ~ +105°C

QFN48, 6.0*6.0*0.75, 0.4pitch

1. Hardware Details

1.1 Block Diagram



1.2 Bluetooth Radio

- On-chip balun (50Ω impedance in TX and RX modes)
- No external trimming is required in production
- Qualified to Bluetooth v5.0 LE specification
- Up to 10dBm RF transmit power
- -98dBm (1M) receiver sensitivity in LDO mode
- Integrated channel filters
- Digital demodulator for improved sensitivity and co-channel rejection
- Real time digitized RSSI

1.3 Bluetooth Controller

- All device classes support (Broadcaster, Central, Observer, Peripheral)
- All packet types (Advertising / Data / Control)
- Encryption (AES / CCM)
- Bit stream processing (CRC, Whitening)
- Frequency hopping calculation
- Low power modes supporting internal 32.0 kHz RC oscillator or external 32.768 kHz crystal
- Supports power down of the baseband during the protocol's idle periods

1.4 Peripheral Interfaces

- UART port for Debugging and AT Commands
- IIC interface to support external EEPROM or other devices (like G-SENSOR)
- Two channels QSPI interface, clock is up to 48Mhz
- Up to 34 general purpose IOs (34 IOs can be set in interrupt mode)
- General purpose 10-bits ADC used for ADKey and other analog input
- 8-channel PWM controller, with dead time control
- General purpose programmable timer for various task
- Watchdog used for tracking unexpected exception

1.5 Integrated Power Control and Regulation

- Embedded Power-On-Reset
- On-chip high efficiency switch-mode power supply, 1.8v to 4.3v input direct from battery and programmable output voltage
- On-chip Low Dropout (LDO) Linear Regulator for internal Digital, RF and Analog circuit
- Power management features include software shutdown and hardware wake-up
- Power-on-reset cell detects low supply voltage

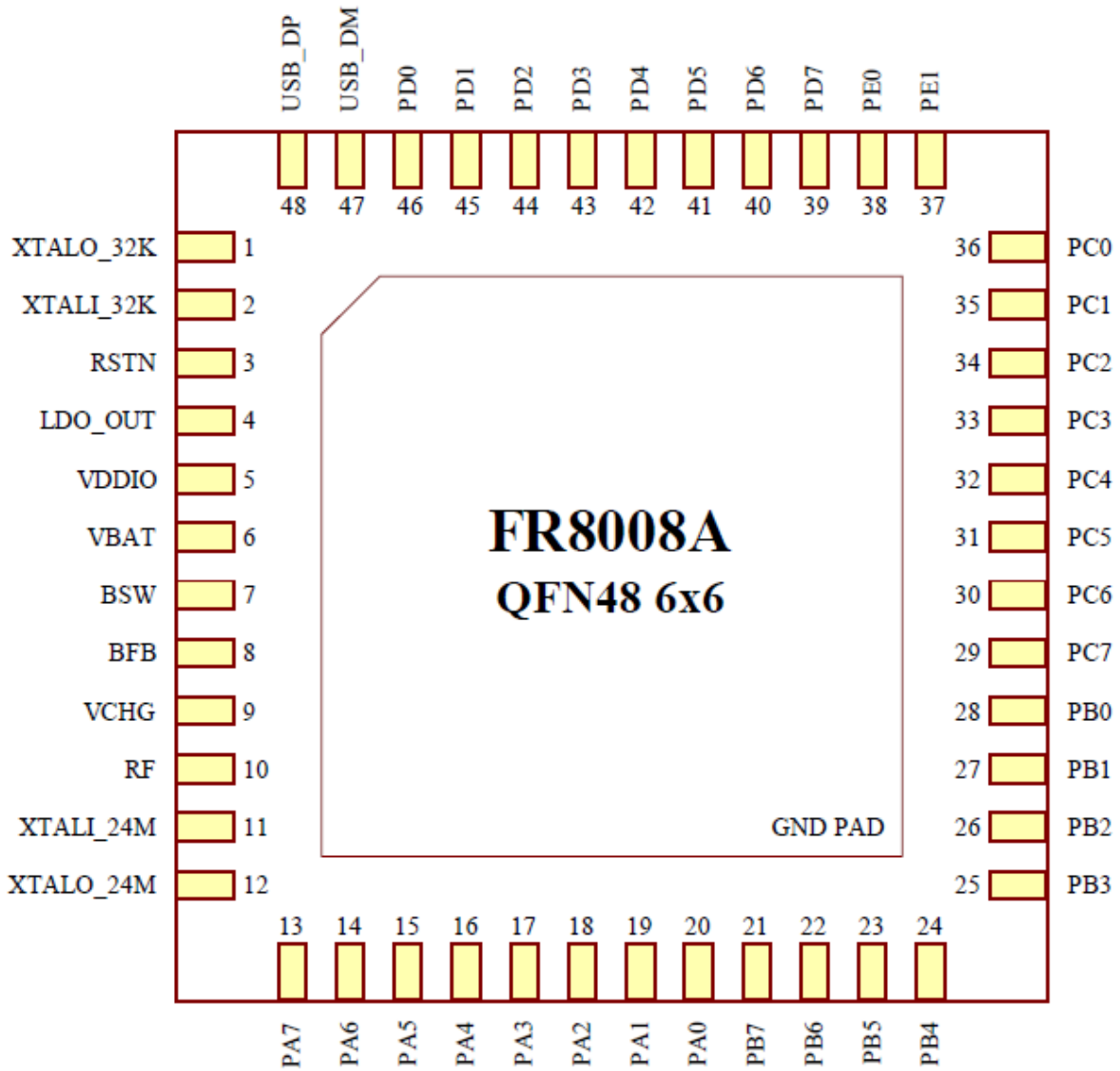
- Internal voltage level detector

1.6 Battery Charger

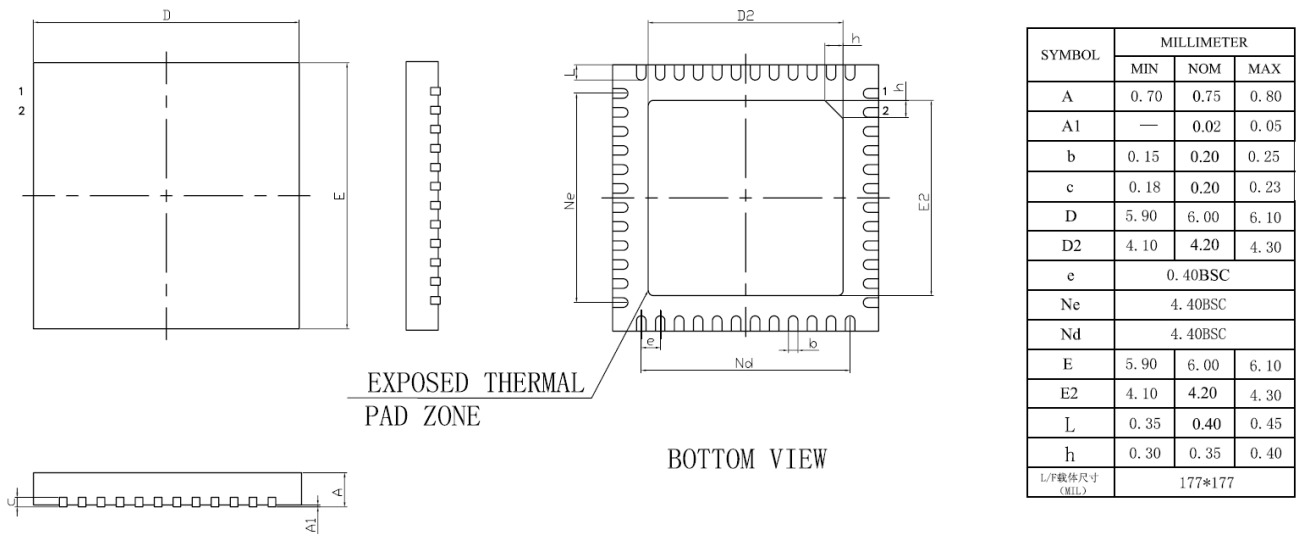
- Lithium ion/Lithium polymer battery charger
- Embedded LVD(low voltage detect)
- Programmable charging current. Fast charging support up to 200mA with no external components

2. Package and Pin Information

2.1 Package



2.2 Package Physical Dimensions



2.3 Pins Description

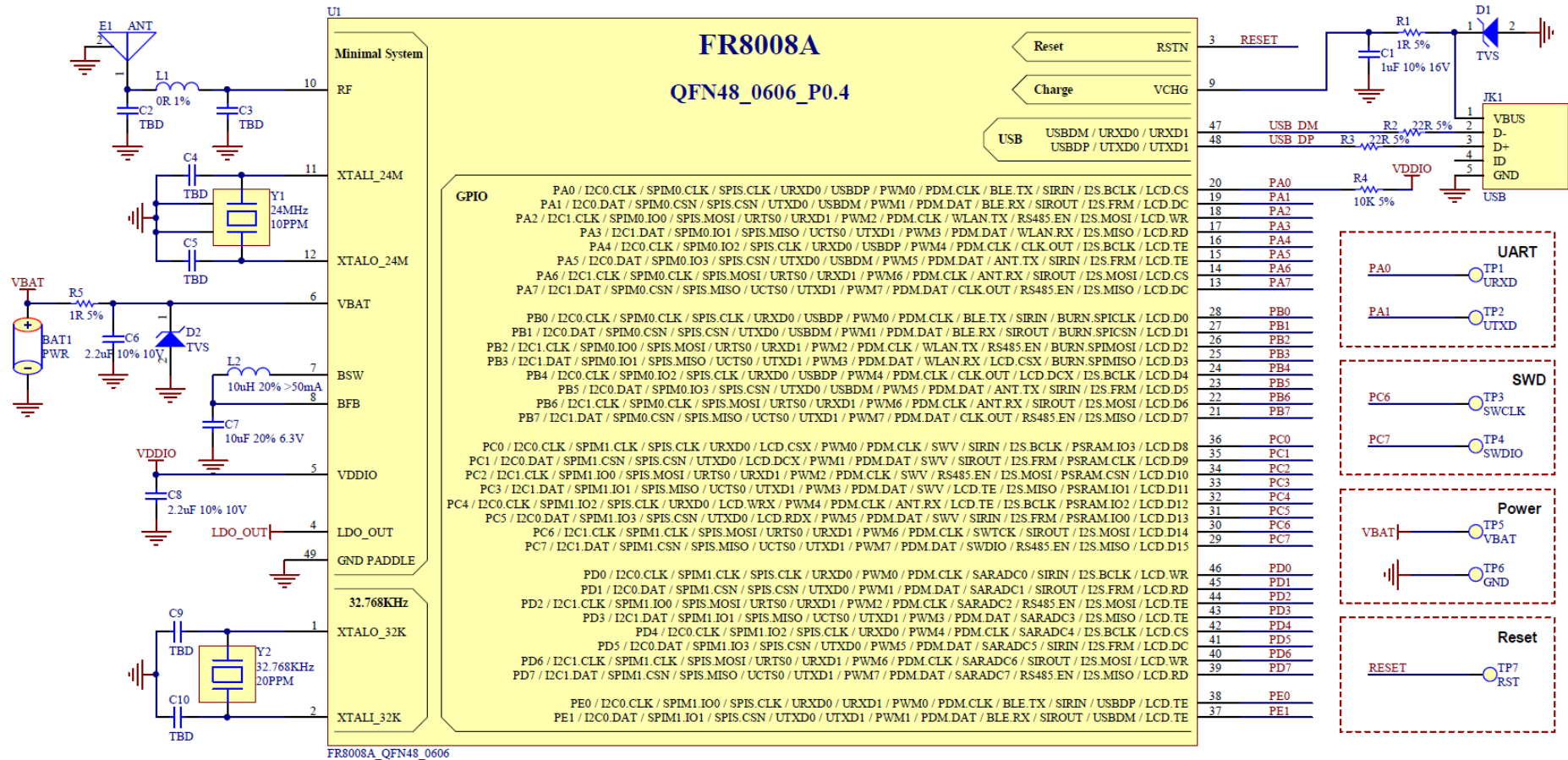
FR8008A is a CMOS device. Floating level on input signals will cause unstable device operation and abnormal current consumption. Pull-up or Pull-down resistors should be used appropriately for input or bidirectional pins.

Notation	Description
AI	Analog input
AO	Analog output
IO	Bidirectional(digital)
PWR	Power
GND	Ground

Pin No.	Pin Name	Type	Description
1	XTALO_32K	AO	32KHz Crystal oscillator output
2	XTALI_32K	AI	32KHz Crystal oscillator input
3	RSTN	AI	Global reset (low active)
4	LDO_OUT	AO	Analog linear regulator output with on/off switch control
5	VDDIO	AO	Analog linear regulator output
6	VBAT	PWR	Battery positive supply input or charger output
7	BSW	AO	BUCK Switch output
8	BFB	AI	BUCK feedback input
9	VCHG	AI	Charger supply input

10	RF	AI/O	RF input and output
11	XTALI_24M	AO	24MHz Crystal oscillator input
12	XTALO_24M	AI	24MHz Crystal oscillator output
13	PA7	IO	Multi-function input/output digital IO
14	PA6	IO	Multi-function input/output digital IO
15	PA5	IO	Multi-function input/output digital IO
16	PA4	IO	Multi-function input/output digital IO
17	PA3	IO	Multi-function input/output digital IO
18	PA2	IO	Multi-function input/output digital IO
19	PA1	IO	Multi-function input/output digital IO
20	PA0	IO	Multi-function input/output digital IO
21	PB7	IO	Multi-function input/output digital IO
22	PB6	IO	Multi-function input/output digital IO
23	PB5	IO	Multi-function input/output digital IO
24	PB4	IO	Multi-function input/output digital IO
25	PB3	IO	Multi-function input/output digital IO
26	PB2	IO	Multi-function input/output digital IO
27	PB1	IO	Multi-function input/output digital IO
28	PB0	IO	Multi-function input/output digital IO
29	PC7	IO	Multi-function input/output digital IO
30	PC6	IO	Multi-function input/output digital IO
31	PC5	IO	Multi-function input/output digital IO
32	PC4	IO	Multi-function input/output digital IO
33	PC3	IO	Multi-function input/output digital IO
34	PC2	IO	Multi-function input/output digital IO
35	PC1	IO	Multi-function input/output digital IO
36	PC0	IO	Multi-function input/output digital IO
37	PE1	IO	Multi-function input/output digital IO
38	PE0	IO	Multi-function input/output digital IO
39	PD7	IO	Multi-function input/output digital IO
40	PD6	IO	Multi-function input/output digital IO
41	PD5	IO	Multi-function input/output digital IO
42	PD4	IO	Multi-function input/output digital IO
43	PD3	IO	Multi-function input/output digital IO
44	PD2	IO	Multi-function input/output digital IO
45	PD1	IO	Multi-function input/output digital IO
46	PD0	IO	Multi-function input/output digital IO
47	USB_DM	IO	USB DATA-
48	USB_DP	IO	USB DATA+

2.4 Application circuit



3. Electrical Characteristics

3.1 Absolute Maximum Ratings

Continuous operation at or beyond these conditions may permanently damage the device.

Rating		Min	Max	Unit
Storage Temperature		-40	125	°C
Core Supply Voltage		0.9	1.2	V
I/O Voltage	VDDIO	1.6	3.3	V
Supply Voltage	VBAT	1.8	4.3	V
	VCHG	4.75	5.25	V

3.2 Recommended Operating Conditions

Operating Condition		Min	Typ	Max	Unit
Operating Temperature Range		-40	25	105	°C
Core Supply Voltage		0.9	1.1	1.2	V
I/O Voltage	VDDIO	1.6	2.9	3.3	V
Supply Voltage	VBAT	1.8	3.3	4.3	V
Charge input voltage	VCHG	4.75	5	5.25	V

3.3 Power Consumption

Operation Mode	Average	Max	Unit
TX peek current (0dB)		6.2	mA
RX peek current		6.5	mA
Deep sleep current (include 64K retention RAM)	<5		μA
Power off	<1		μA

3.4 Crystal oscillator

Clock Source	Min	Typ	Max	Unit
Main Crystal OSC(24Mhz) for Bluetooth RF application				
Clock Frequency	24	24	24	MHz
Tolerance		+/-10		ppm

Contact Information

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Feedback:

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