BX_RF04|RF04L

BT 5.0 – BLE / MESH SoC

Features

Complies with Bluetooth 5.0 with 1M / 2M bps data rates.

Radio Transceiver

- -93 dBm RX sensitivity at 1Mbps mode
- -90 dBm RX sensitivity at 2Mbps mode
- RF output power levels: -20dBm, 0dBm, 3dBm and 8dBm
- 50dB RSSI dynamic range

Supply Current

- 4.3mA in RX and 4.4mA in TX with On Chip DCDC Converter@4.3V
- 5.5mA in RX and 5.7mA in TX with On Chip DCDC Converter@3.3V

Ultralow Current Mode

- Sleep current : 2.5uA ~ 6uA， SRAM (16 KB ~ 208 KB) retention
- Average current: 20uA， during 1.28 sec cycle time (Active / Sleep)
  Notice: Active (Broadcasting ADV) / Sleep (208 KB SRAM retention)

Analog Interfaces

- **1** Battery monitoring function from 5.5V to 2.0V
- **2** External channel of ADC (ENOB = 10) with average capability (Oversampling up to ENOB = 12)
- Temperature sensor from -40℃ to 125℃

Digital Interfaces

- Up to **14** GPIOs
- 1 Internal Quad-SPI Flash interface
- 1 General SPI interface
  - Support both SPIM / SPIS Mode
- 2 UART -
  Flow control up to 1Mbps and supports all the baud rate under 1Mbps, IRDA is supported
- 2 IIC -
  Master / Slave programmable and speed up to 1Mbps
- 2 Timers and 1 Watch-dog Timer
- 5 PWM Outputs

Integrated 32-bit MCU

- Clock frequency: 16MHz, **32MHz (Major)** , 48MHz, 64MHz, 80MHz and **96MHz (Max)**
- CPU Benchmarking : 2.07 Coremark / MHz
- SWD debug interface
- AHB / APB bus matrix with speed up to 96MHz

Memories

- 4Mb Flash
- 128 KB ROM (Boot ROM and BLE stack)
- 208 KB SRAM
  - Composed of **6 pages of 32KB** and **1 page of 16KB** , with retention capability
  - Each 32KB can be set into retention state separately and exchange memory for BLE connection data
  - 16KB of 4 way cache controller for external SPI flash which enable CPU run on the external SPI flash, this 16KB cache can be also used as system SRAM when cache is disabled

Power Management

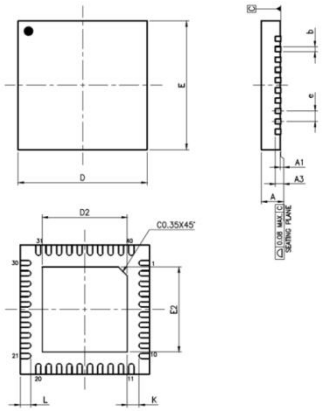
- 2.3-5.0V power input
- One 1.2V Integrated DCDC buck converter
- One 1.8V LDO with 40mA output
- Two 3.3V LDO with 50mA & 25mA output each

Cryptographic Engine

- ECC
- AES-128

Package

- QFN40 (5 X 5 mm²)



PKG CODE	VQFN			
SYMBOLS	MIN.	NOM.	MAX.	UNIT
A	0.80	0.85	0.90	mm
A1	0.00	0.02	0.05	
A3		0.203 REF		
B	0.15	0.20	0.25	
D		5.00 BSC		
E		5.00 BSC		
e		0.40 BSC		
K	0.20	-	-	
Lead Frame PAD SIZE	153 X 15* MIL			
SYMBOLS	MIN.	NOM.	MAX.	UNIT
D2	3.25	3.30	3.35	mm
E2	3.25	3.30	3.35	
L	0.35	0.4	0.45	

Module

- BX2400-mRF04c-S1a

Size	Pin out	IO	Component			TX PWR	RX SEN	Interface	Functions
23.5*16.75 mm² (2 layer)	25 Pins	14 GPIO	33 pcs (Standard)	Option	1 pcs (Added)	0 dBm (default)	-93dBm @1Mbps	(1) SWD (2) UART (3) IIC (4) SPI	(1) 5V/3.3V (2) RTC (3) RST (4) DC Bucker
		2 Ext. ADC			9 pcs (Reduced)	8 dBm (Max)	-90dBm @2Mbps		

Pin Description

Pin	Symbol	Type	Description	Pin	Symbol	Type	Description
1	P02	DIO	FUNC_IO02/GPIO02	22	VDD_AWO	PO	VDD_AWO output
2	P03	DIO	spim0_cs0/SPIS_CS/FUNC_IO01/GPIO03	23	P22	DIO	FUNC_IO20/GPIO22
3	P04	DIO	spim0_clk/SPIS_CLK/FUNC_IO02/GPIO04	24	P23	DIO	FUNC_IO21/GPIO23
4	P05	DIO	spim0_miso/SPIS_MISO/FUNC_IO03/GPIO05	25	XTAL32KP	AI	32.768 kHz Crystal input (+)
5	P06	DIO	spim0_mosi/SPIS_MOSI/FUNC_IO04/GPIO06	26	XTAL32KN	AI	32.768 kHz Crystal input (-)
6	P15	DIO	FUNC_IO13/GPIO15	27	VDD_3V2	PO	Supply to external 3.3V
7	P16	DIO	FUNC_IO14/GPIO16	28	VDD_BAT2	PI	Guard ring power supply
8	P17	DIO	FUNC_IO15/GPIO17	29	VDD_VCO	PI	VCO power supply
9	P12	DIO	FUNC_IO10/GPIO12	30	LOOP_C	AIO	PLL loop filter external capacitor.
10	P13	DIO	FUNC_IO11/GPIO13	31	VDD_CP	PI	PLL power supply
11	VDD_SRAM	PO	VDD_SRAM output	32	VDD_RF1	PI	RF power supply
12	VDD_3V1	PO	Supply to external 3.3V	33	RF_P	AIO	RF input/output
13	VDD_1V8	PO	Supply to external 1.8V	34	RF_N	AIO	RF input/output
14	VDD_DIG	PI	Digital circuit power supply	35	VDD_A	PI	Power supply for an analog circuit
15	GND_D	GND	Ground for digital circuit	36	VDD_BAT1	PI	ADC power supply
16	VDD_1V2	PO	DC/DC Converter output	37	P30	AI	ADC Input Channel 0
17	VDD_BAT	PI	Battery supply voltage	38	P34	AI	ADC Input Channel 4
18	Ext Reset	DI	Pull low internally. High active.	39	XTAL32MP	AI	32 MHz Crystal input (+)
19	P00	DIO	swck/GPIO00	40	XTAL32MN	AI	32 MHz Crystal input (-)
20	P01	DIO	swd/GPIO01	IC Ground pad		GND	Backside GND plane. Must be connected to the GND.
21	VDD_CPU	PO	VDD_CPU output				

NOTE: AI : analog input AO : analog output AIO : analog input/output

DI : digital input DIO : digital input/output PI : power input PO : power output

Operating Temperature

- RF04 : -25℃ to 85℃
- RF04L : -40℃ to 85℃

Ver 2.5