Bluetooth Low Energy SoC

DESCRIPTIONS

The SUM7051 is a System on Chip (SoC) fully compliant with BLE 5.0 Spec. It integrates a low power, high performance 2.4GHz transceiver, a 32-bit RISC MCU up to 64 MHz, and rich interface peripherals. The SOC's memory system includes 128 KB ROM, 48 KB retention SRAM, 16 KB Cache SRAM, and up to 2 Mb flash. To help customers to reduce BOM cost, The SUM7051 integrates Balun, DCDC, 32 KHz RC oscillator and charger. Under certain circumstances, The SUM7051 can work with one external crystal only. The SUM7051 offers abundant SDK with the function of over-the-air (OTA) firmware updating.

FEATURES

- 32-bit RSIC MCU
  - Max. speed up to 64 MHz
  - integrate MPU
  - equipped with SWD debug interface
- Memory
  - Up to 2 Mb in-system flash memory
  - Totally 56 KB system SRAM, including 16 KB cache-shared SRAM.
  - 128 KB ROM
- Peripherals
  - 17 GPIOs with programmable IO MUX function mapping
  - PWM/TIMER/WATCHDOG
  - UART/SPI/I2C
  - KEYPAD/QUADRATURE DECODER
  - IR transceiver
  - DMA controller
  - 5-channel 12-bit GPADC
  - Support DMIC and AMIC with microphone bias
  - Internal temperature sensor
  - Support 4 capacitive touch keys
  - Support external NTC temperature sensor
- Clocking
  - Support 12 MHz/16 MHz/24 MHz/32 MHz XTAL
  - Internal low power 32 KHz RC oscillator
  - Support external 32 KHz XTAL
  - Internal 54 MHz high frequency RC oscillator, optional 27.12/13.56 MHz output for HF applications.
  - Integrate Real timer counter (RTC)
- Power management
  - Wide Operating Voltage Range: 1.7 V ~ 5.5 V
  - Integrate DCDC
  - Battery voltage monitor
  - Linear Li-on battery charger
  - Multiple low power modes

- BLE features
  - Fully compliant with BLE 5.0 Spec
  - Support SIG Mesh
  - Hardware AES-128 encryption/decryption
  - Support advertiser, master, slave, and observer
  - Support all BLE data rates: 2 Mbps, 1 Mbps, 500 Kbps and 125 Kbps
- RF Features
  - Single-end RF pin
  - Sensitivity:
    -94 dBm@2 Mbps
    -97 dBm@1 Mbps
    -102 dBm@500 Kbps
    -105 dBm@125 Kbps
  - TX power max to 8 dBm, 30 dB power range
  - -36 dBm harmonic emissions at max power 8 dBm output
  - RX mode current under 5.2 mA@1Mbps (DCDC mode)
  - TX mode current under 5.1 mA@1Mbps (0dBm, DCDC mode)
- Low power current data
  - Deep sleep mode with 32 KHz RC shut off: < 300 nA, GPIO/KEYPAD wake up.
  - Deep sleep mode with 32 KHz RC on: < 400 nA, GPIO/KEYPAD/RTC wake up.
  - Sleep mode with 48 KB SRAM retention: < 3.5 μA
  - Average current at 3.0 V supply with 0dBm broadcast per second: 12 μA
  - Average current at 3.0 V supply with BLE connection per second < 8 μA
- Operating temperature -40℃ ~ 85℃ or 105℃
- Package: QFN4 x 4-32

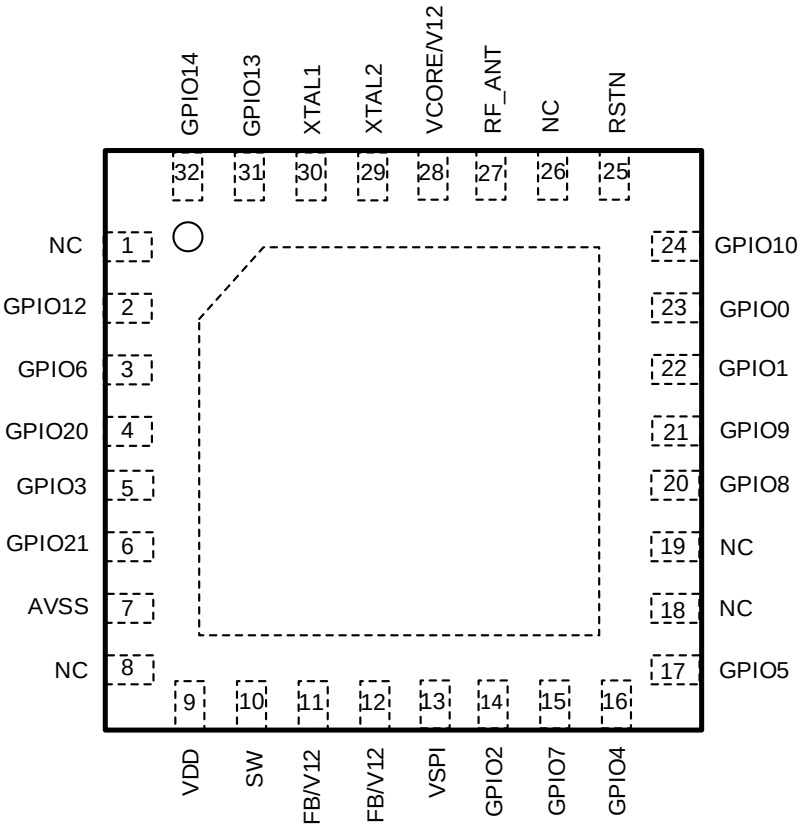
APPLICATIONS

- Internet of Things(IoT)
  - Home automation
  - Sensor networks
  - Building automation
  - Industrial
  - Retail tags and labels
- Personal area networks
  - Health/fitness sensor and monitor devices
  - Medical devices
  - Key fobs and bracelet
- Interactive entertainment devices
  - Remote controls
  - Gaming controllers
- Beacons
- Asset tags
- Remote control toys
- Computer peripherals and I/O devices
  - Mouse
  - Gaming

ORDER INFORMATION

Model	Package	Ordering Number	Packing Option
SUM7051	QFN4 × 4-32	SUM7051F512QNB32	Tape and Reel

PIN CONFIGURATION (Top View)



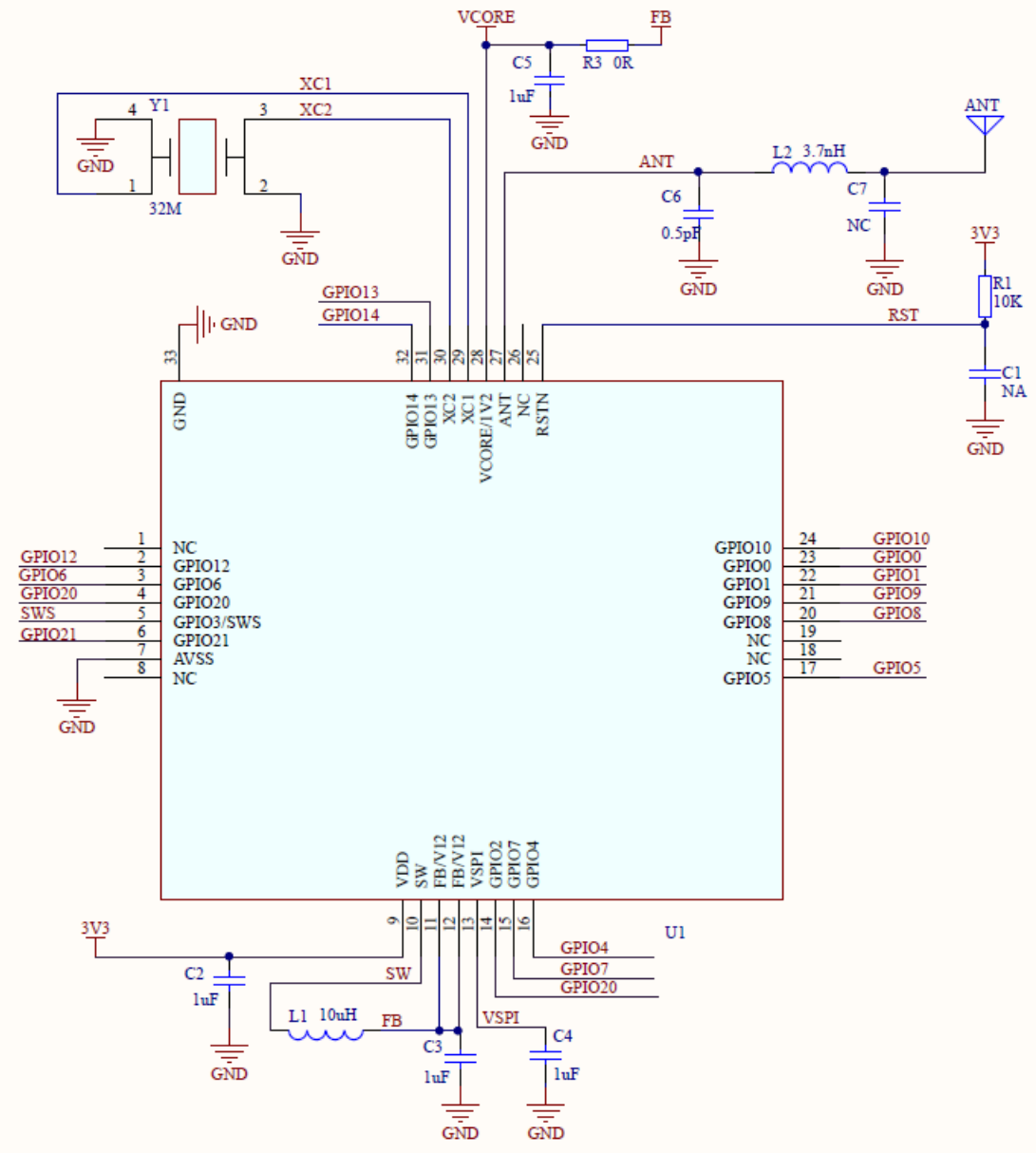
QFN4 × 4-32

PIN FUNCTION

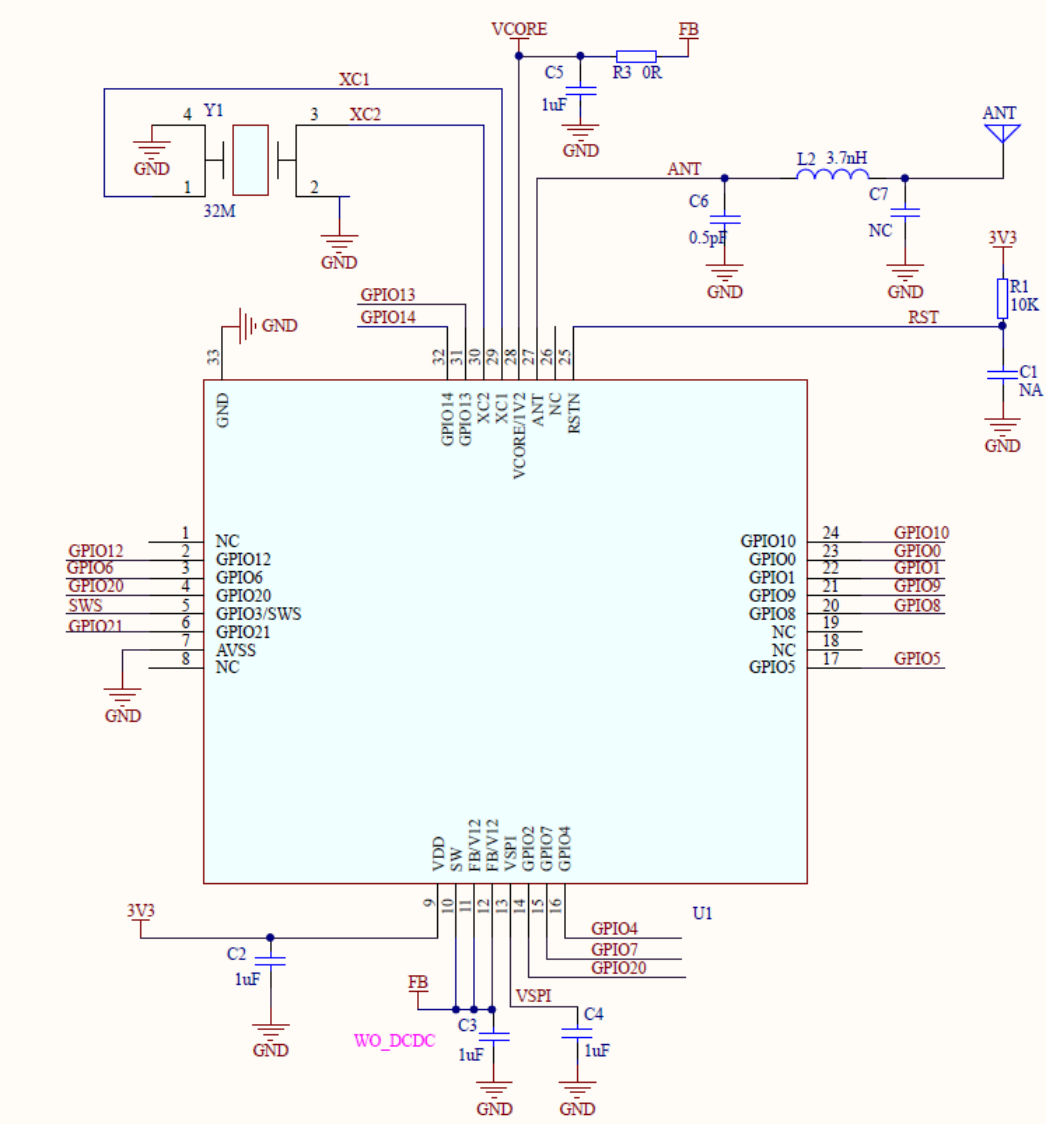
No.	Pin Name	Description	Function 0	Function 1	Function 2	Function 3	Function 4	Function 5	Function 6	Function 7	Function 8	Function 9	Function 10	Function 11	Function 12	Function 13	Function 14	Function 15	Function 16	Function 17
1,8,18, 19,26	NC																			
2	GPIO12	General-Purpose Input/Output, shared with GPADC/LPCOMP/CTK	GPIO 12	RFU	i2c_scl	uart_ctsn	ir_rxd	spi_clk	pwm4	qdec_x_a	kp_in_7	kp_in_6	RFU	gpt_clk	gpt_pwm 0	gpt_out_ trigger0	swd_io	hf1_clk	RFU	pdm_clk
3	GPIO6	General-Purpose Input/Output	swd_clk	GPIO 6	i2c_scl	uart_txd	ir_rxd	spi_clk	pwm6	qdec_x_a	kp_in_1	kp_out_1	RFU	gpt_in_ trigger0	gpt_pwm 0	gpt_out_ trigger0	swd_io	hf0_clk	RFU	pdm_clk
4	GPIO20	General-Purpose Input/Output	GPIO 20	RFU	i2c_scl	uart_ctsn	ir_rxd	spi_cs2	pwm4	qdec_y_a	kp_in_8	kp_in_7	RFU	gpt_in_ trigger0	gpt_pwm 2	gpt_out_ trigger2	swd_io	hf0_clk	RFU	pdm_clk
5	GPIO3	General-Purpose Input/Output	uart_rxd	GPIO 3	i2c_sda	uart_txd	ir_txd	spi_di2	pwm3	qdec_y_b	kp_out_3	kp_in_3	RFU	gpt_in_ trigger3	gpt_pwm 3	gpt_out_ trigger3	swd_clk	hf1_clk	RFU	pdm_ data
6	GPIO21	General-Purpose Input/Output, shared with NTC Sensor/GPADC	GPIO 21	RFU	i2c_sda	uart_rxd	ir_txd	spi_di2	pwm5	qdec_y_b	kp_out_5	kp_in_8	RFU	gpt_in_ trigger1	gpt_pwm 3	gpt_out_ trigger3	swd_clk	hf1_clk	RFU	pdm_ data
7	AVSS	GND																		
9	VDD	VDD supply, 1.7 V~3.6 V																		
10	SW	Used for external inductor (BUCK)																		
11,12	FB/V12	VDD feedback for BUCK																		
13	VSPI	I/O supply for flash																		
14	GPIO2	General-Purpose Input/Output	uart_txd	GPIO 2	i2c_scl	uart_rxd	ir_rxd	spi_cs2	pwm2	qdec_y_a	kp_out_2	kp_in_2	RFU	gpt_in_ trigger2	gpt_pwm 2	gpt_out_ trigger2	swd_io	lf_clk	RFU	pdm_clk
15	GPIO7	General-Purpose Input/Output	swd_io	GPIO 7	i2c_sda	uart_rtsn	ir_txd	spi_cs0	pwm7	qdec_x_b	kp_in_2	kp_out_2	RFU	gpt_in_ trigger1	gpt_pwm 1	gpt_out_ trigger1	swd_clk	lf_clk	RFU	pdm_ data
16	GPIO4	General-Purpose Input/Output	uart_rtsn	GPIO 4	i2c_scl	uart_ctsn	ir_rxd	spi_cs1	pwm4	qdec_z_a	kp_out_4	kp_in_4	RFU	gpt_in_ trigger4	gpt_pwm 4	gpt_out_ trigger4	swd_io	lf_clk	RFU	pdm_clk
17	GPIO5	General-Purpose Input/Output	uart_ctsn	GPIO 5	i2c_sda	uart_rxd	ir_txd	spi_di1	pwm5	qdec_z_b	kp_in_0	kp_out_0	RFU	gpt_clk	gpt_pwm 5	gpt_out_ trigger5	swd_clk	hf0_clk	RFU	pdm_ data
20	GPIO8	General-Purpose Input/Output	RFU	GPIO 8	i2c_scl	uart_rxd	ir_rxd	spi_di0_d o	pwm0	qdec_y_a	kp_in_3	kp_out_3	RFU	gpt_in_ trigger2	gpt_pwm 2	gpt_out_ trigger2	swd_io	hf1_clk	RFU	pdm_clk

21	GPIO9	General-Purpose Input/Output	RFU	GPIO 9	i2c_sda	uart_ctsn	ir_txd	spi_dcx	pwm1	qdec_y_b	kp_in_4	kp_out_4	RFU	gpt_in_trigger3	gpt_pwm3	gpt_out_trigger3	swd_clk	hf1_clk	RFU	pdm_data
22	GPIO1	General-Purpose Input/Output	GPIO 1	RFU	i2c_sda	uart_ctsn	ir_txd	spi_di3	pwm1	qdec_x_b	kp_out_1	kp_in_1	RFU	gpt_in_trigger1	gpt_pwm1	gpt_out_trigger1	swd_clk	hf1_clk	RFU	pdm_data
23	GPIO0	General-Purpose Input/Output	GPIO 0	RFU	i2c_scl	uart_rtsn	ir_rxd	spi_cs3	pwm0	qdec_x_a	kp_out_0	kp_in_0	RFU	gpt_in_trigger0	gpt_pwm0	gpt_out_trigger0	swd_io	hf0_clk	RFU	pdm_clk
24	GPIO10	General-Purpose Input/Output, shared with PADC/LPCOMP/CTK	GPIO 10	RFU	i2c_scl	uart_txd	ir_rxd	spi_di0_do	pwm2	qdec_z_a	kp_in_5	kp_out_5	RFU	gpt_in_trigger4	gpt_pwm4	gpt_out_trigger4	swd_io	hf0_clk	RFU	pdm_clk
25	RSTN	Global chip enable/resetn, low level reset																		
27	RF_ANT	RF In/Out																		
28	VCORE/V12	Core supply																		
29	XTAL2	High frequency crystal output,16M/24M/26M/32M																		
30	XTAL1	High frequency crystal input,16M/24M/26M/32M																		
31	GPIO13	General-Purpose Input/Output, shared with GPADC/LPCOMP/CTK/XTAL32K_1	GPIO 13	RFU	i2c_sda	uart_rxd	ir_txd	spi_di1	pwm5	qdec_x_b	kp_in_8	kp_in_7	RFU	gpt_in_trigger0	gpt_pwm1	gpt_out_trigger1	swd_clk	hf0_clk	RFU	pdm_data
32	GPIO14	General-Purpose Input/Output, shared with GPADC/LPCOMP/CTK/XTAL32K_0	GPIO 14	RFU	i2c_scl	uart_txd	ir_rxd	spi_cs1	pwm6	qdec_y_a	kp_out_5	kp_in_8	RFU	gpt_in_trigger1	gpt_pwm2	gpt_out_trigger2	swd_io	lf_clk	RFU	pdm_clk

APPLICATION CIRCUITS 1

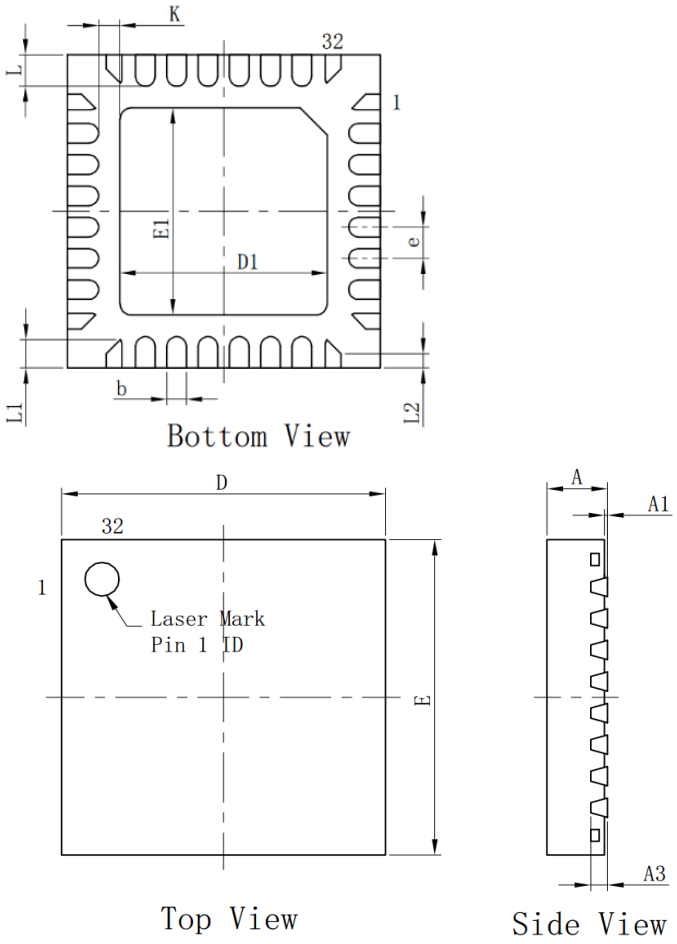


APPLICATION CIRCUITS 2



PACKAGE DIMENSION

QFN4×4-32



Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
D		4.0 BSC	
E		4.0 BSC	
D1	2.55	2.65	2.75
E1	2.55	2.65	2.75
A	0.70	0.75	0.80
A1	0	-	0.05
A2	-	0.55	-
A3		0.203 REF	
b	0.15	0.20	0.25
e		0.40 TYP	
K	0.20	-	-
L	0.30	0.40	0.50
L1	0.31	0.36	0.41
L2	0.13	0.18	0.23