REALTEK

RTL8762AK-CG

BLUETOOTH LOW ENERGY SOC

DATASHEET
(CONFIDENTIAL: Development Partners Only)

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USING THIS DOCUMENT

This document is intended for the software engineer's reference and provides detailed programming information.

Though every effort has been made to ensure that this document is current and accurate, more information may have become available subsequent to the production of this guide.

REVISION HISTORY

Revision	Release Date	Summary
1.0	2015/07/7	First release.

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1. General Description

The RTL8762AK is an ultra-low power system on chip solution for Bluetooth low energy applications. The RTL8762AK combines the excellent performance of a leading RF transceiver with ARM Cortex M0, 256KB eflash, 80KB RAM, and rich powerful supporting features and peripherals. The RTL8762AK integrates a sigma-delta ADC, programmable gain amplifier and microphone bias circuit for voice command application. The RTL8762AK embeds IR transceiver, hardware keyscan, and Quad-decoder on a single IC. The RTL8762AK comes with QFN56 package.

2. Features

General

- Ultra low power consumption with intelligent PMU

- Support the Bluetooth 4.2 core specification

- Integrate MCU to execute Bluetooth protocol stack

- Support fully multiple Low Energy states

- Support LE L2CAP Connection Oriented Channel Support

- Support LE low duty directed advertising

- Support LE data length extension feature

- Support OTA (Over-the-Air) programming mechanism for firmware upgrade

- Support internal 32KHz OSC or external 32KHz clock input for low power mode

- Support GAP, ATT/GATT, SMP, L2CAP

- Generic Applications for GAP Central, Peripheral, Observer and Broadcaster Roles

Platform

- ARM Cortex-M0 (Maximum 52MHz)

- 256KB embedded flash

- 80KB RAM

- 2KB e-fuse

- Support AES128/192/256 encrypt/decrypt engine

Bluetooth Transceiver

- Fast AGC control to improve receiving dynamic range

- Support Bluetooth Low Energy PHY

Peripheral Interfaces

- Flexible General Purpose IOs (31GPIOs with 56QFN)

- Three configurable LED pins

- Hardware Keyscan

- Quad-decoder x3

- Embed IR transceiver

- Real-time counters (RTC)

- Support 3wire/2wire SPI

- Support Low power comparator

- Timer x 8

- I2C x 2

- PWM x 4

- Support 40MHz XTAL

- Support audio ADC for voice command application

Application

- Keyboard

- Mouse

- TV Remote Controller

- LE HID

Package

- 56-pin 7mmx7mm QFN

3. Block Diagram

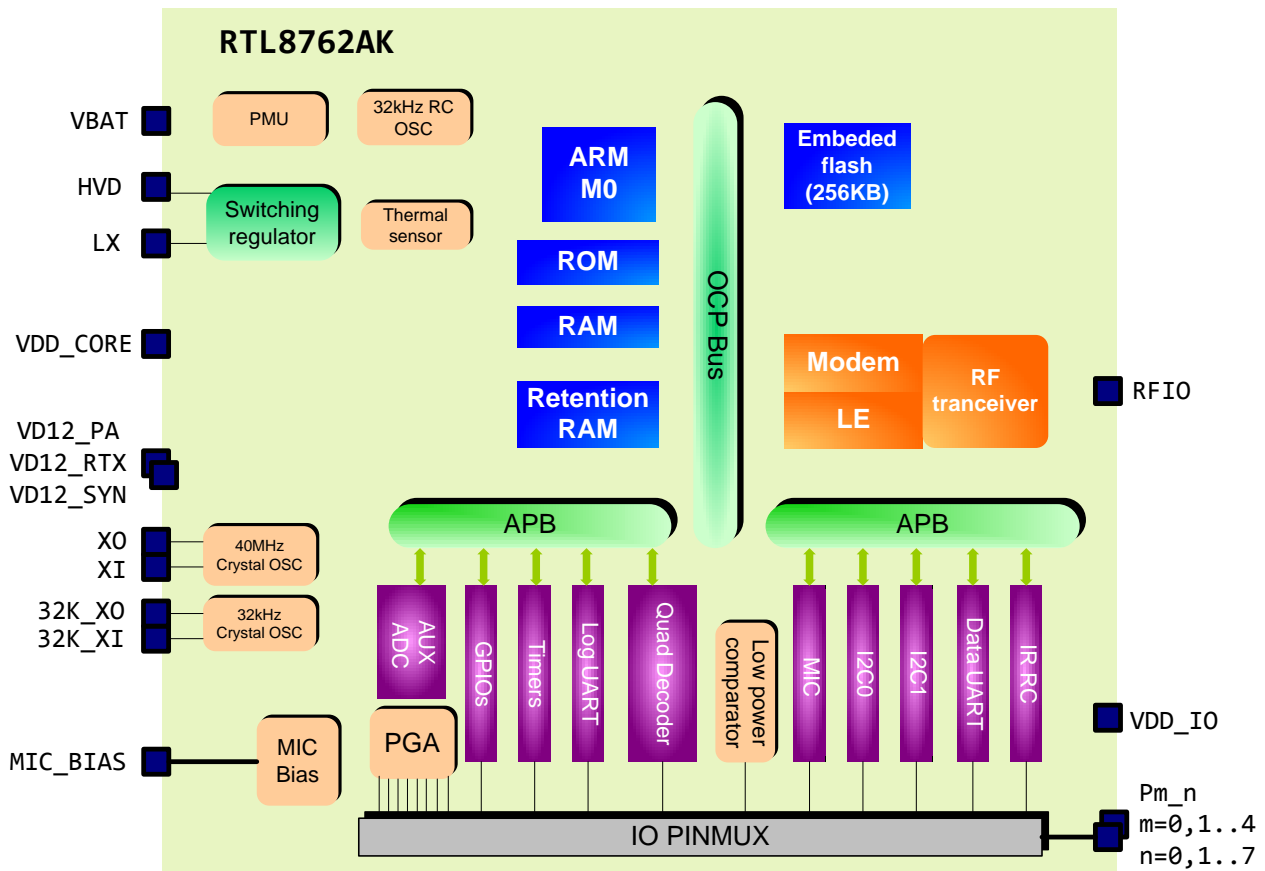

Figure 1.   Block Diagram
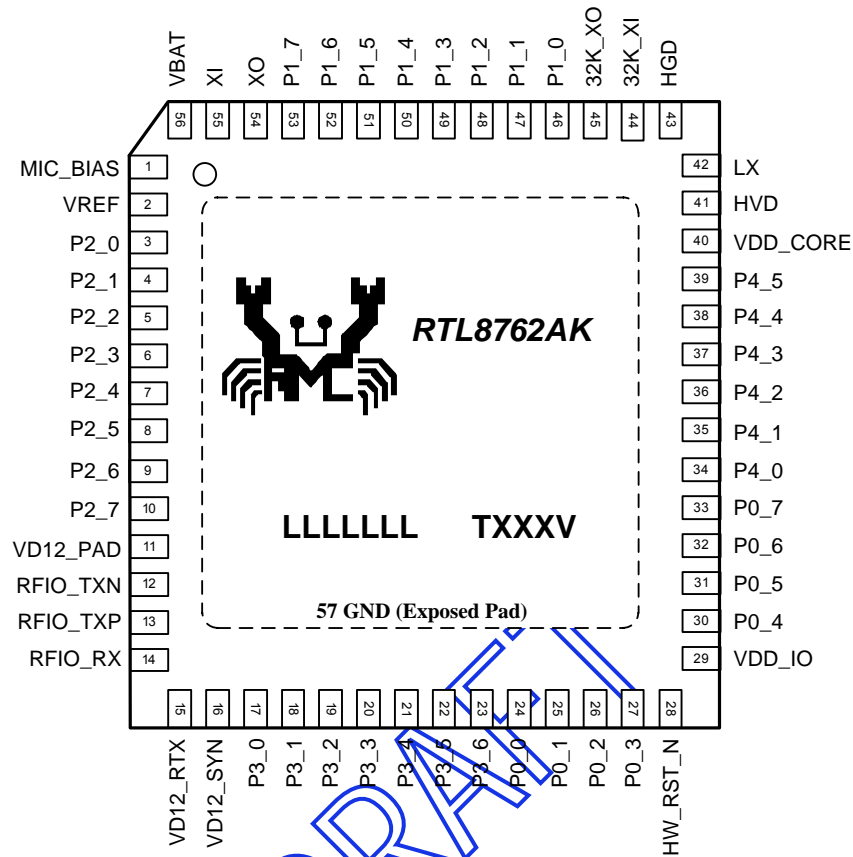
4. Pin Assignments

Figure 2. Pin Assignments

4.1. Package Identification

Green package is indicated by the 'G' in GXXXXV (Figure 2).

5. Pin Descriptions

The following signal type codes are used in the tables:

    I: Input   O: Output

    P: Power

5.1. RF Interface

Table 1. RF Interface

Symbol	Type	Pin No	Description
RFIO_RX	I	14	BT RX signal / BT TX signal(low power mode)
RFIO_TXN	O	12	BT TX signal (for high power mode)
RFIO_TXP	O	13	BT TX signal (for high power mode)

5.2. XTAL and System Interface

Table 2. XTAL Interface

Symbol	Type	Pin No	Description
32K_XI	I	44	32k crystal input or external 32k clock input
32K_XO	O	45	32k crystal output
XI	I	55	40MHz crystal input or external 40MHz clock input
XO	O	54	40MHz crystal output
HW_RST_N	I	28	Hardware reset pin, low active

5.3. General Purpose IOs

Table 3. General Purpose IOs

Symbol	Type	Pin No	Description
P0_0	IO	24	General purpose IO
P0_1	IO	25	General purpose IO
P0_2	IO	26	General purpose IO, 20mA driving capability
P0_3	IO	27	General purpose IO, 20mA driving capability
P0_4	IO	30	General purpose IO, 20mA driving capability
P0_5	IO	31	General purpose IO, 20mA driving capability
P0_6	IO	32	General purpose IO
P0_7	IO	33	General purpose IO
P1_0	IO	46	General purpose IO, SWDIO(default)
P1_1	IO	47	General purpose IO, SWDCLK(default)
P1_2	IO	48	General purpose IO
P1_3	IO	49	General purpose IO

Symbol	Type	Pin No	Description
P1_4	IO	50	General purpose IO
P1_5	IO	51	General purpose IO
P1_6	IO	52	General purpose IO
P1_7	IO	53	General purpose IO
P2_0	IO	3	General purpose IO
P2_1	IO	4	General purpose IO
P2_2	IO	5	General purpose IO
P2_3	IO	6	General purpose IO
P2_4	IO	7	General purpose IO
P2_5	IO	8	General purpose IO
P2_6	IO	9	General purpose IO
P2_7	IO	10	General purpose IO
P3_0	IO	17	General purpose IO
P3_1	IO	18	General purpose IO, UART_RX(default)
P3_2	IO	19	General purpose IO
P3_3	IO	20	General purpose IO
P3_4	IO	21	General purpose IO
P3_5	IO	22	General purpose IO
P3_6	IO	23	General purpose IO
P4_0	IO	34	General purpose IO, SPI0_CLK(default)
P4_1	IO	35	General purpose IO, SPI0_MISO(default)
P4_2	IO	36	General purpose IO, SPI0_MOSI(default)
P4_3	IO	37	General purpose IO, SPI0_CS_N(default)
P4_4	IO	38	General purpose IO

5.4. Power Pins

Table 4. Power Pins

Symbol	Type	Pin No	Description
VREF	P	2	ADC reference voltage (decouple)
VD12_PAD	P	11	supply 1.2V power for PA
VD12_RTX	P	15	supply 1.2V power for RF transceiver
VD12_SYN	P	16	supply 1.2V power for synthesizer
VDD_IO	P	29	supply 1.8V~3.3V power for digital IO PADs
VDD_CORE	P	40	supply 1.2V power for digital core
HVD	P	41	supply 2.6~3.3V power for Switching regulator input
LX	P	42	Switching regulator output
HGD	P	43	Ground for switching regulator
VBAT	P	56	Battery voltage input
MIC_BIAS	P	1	Microphone bias

6. Electrical and Thermal Characteristics

6.1. Temperature Limit Ratings

Table 5.   Temperature Limit Ratings

Parameter	Minimum	Maximum	Units
Storage Temperature	-55	+125	°C
Ambient Operating Temperature	0	+70	°C
Junction Temperature	0	+125	°C

6.2. Power Supply DC Characteristics

Table 6.   Power Supply DC Characteristics

Symbol	Parameter	Minimum	Typical	Maximum	Units
VBAT	Single power source of whole chip	1.8	3	3.6	V
VDD_CORE VD12_PA VD12_RTX VD12_SYN	1.2V Core and RFAFE Supply Voltage	1.10	1.2	1.32	V
VDD_IO[Note]	Power for digital IO PADs	1.8	-	3.6	V
HVD	Power for switching regulator	1.8	-	3.6	V

Note: VDD_IO≤VBAT

6.3. Digital IO Pin DC Characteristics

Table 7. 3.3V IO Pin DC Characteristics

Symbol	Parameter	Minimum	Normal	Maximum	Units
V_{IH}	Input high voltage	2.0	3.3	3.6	V
V_{IL}	Input low voltage	-	0	0.9	V
V_{OH}	Output high voltage	2.97	-	3.3	V
V_{OL}	Output low voltage	0	-	0.33	V

Table 8. 2.8V IO Pin DC Characteristics

Symbol	Parameter	Minimum	Normal	Maximum	Units
V_{IH}	Input high voltage	1.8	2.8	3.1	V
V_{IL}	Input low voltage	-	0	0.8	V
V_{OH}	Output high voltage	2.5	-	3.1	V
V_{OL}	Output low voltage	0	-	0.28	V

6.4. Power Consumption

6.4.1. Low Power Mode

Table 9. Low Power Mode

| Power mode	Always on registers	32k RCOSC/XTAL	Retention SRAM	CPU	Wakeup method	Current consumption (VBAT=3V)
Power down	ON	OFF	OFF	OFF	Wakeup by GPIO	TBD
Hibernate	ON	ON	OFF	OFF	Wakeup by GPIO or RTC	TBD
Deep LPS	ON	ON	Retention	OFF	Wakeup by GPIO, timer	TBD

6.4.2. Active Mode

Table 10. Active Mode

Power Mode	Current Consumption (VBAT=3V)
Active RX mode	TBD
Active TX mode	TBD

7. Mechanical Dimensions

Plastic Quad Flat No Lead Package 56 Leads 7x7mm^2 Outline
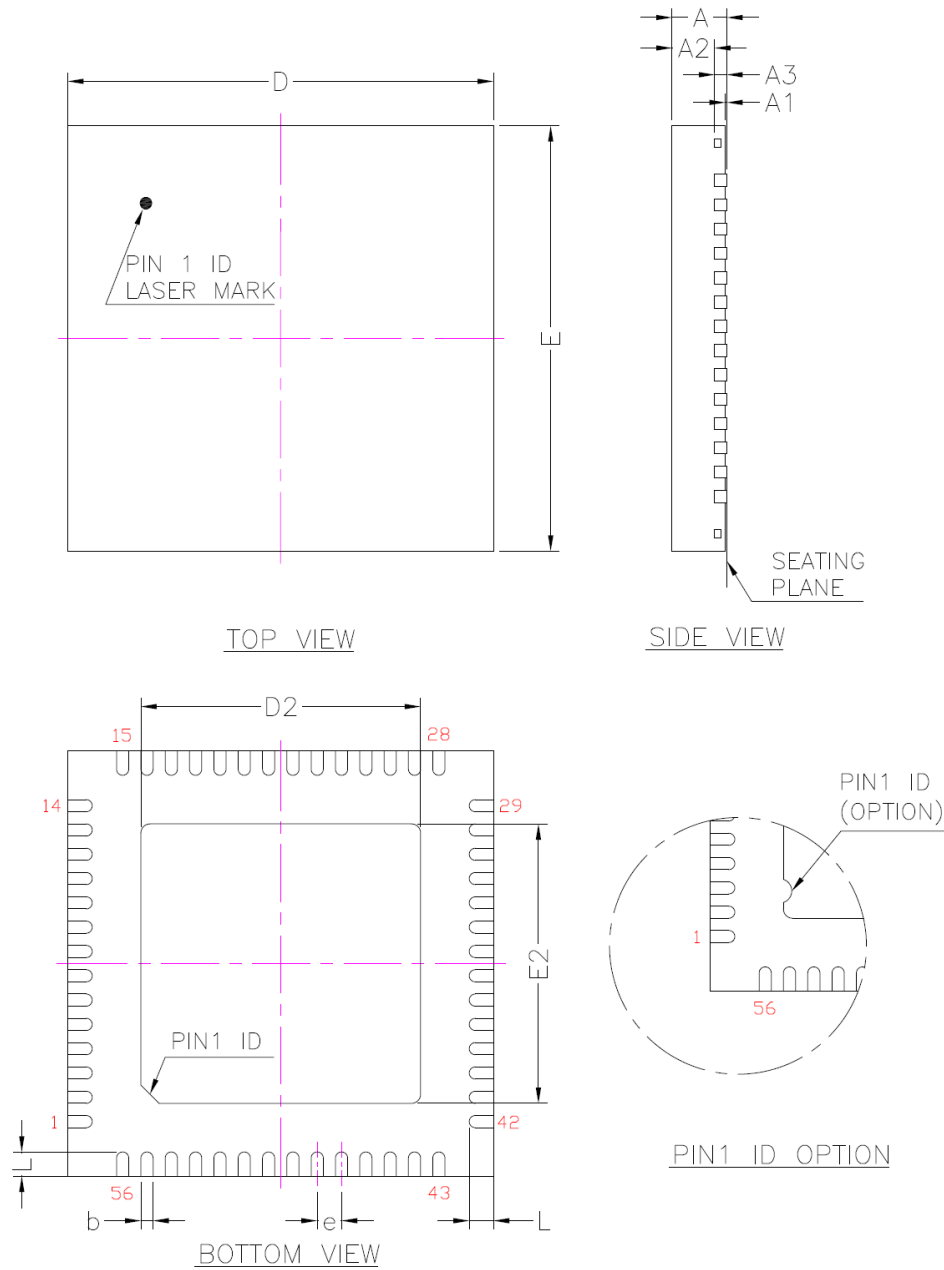
7.1. Mechanical Dimensions Notes

Symbol	Dimension in mm			Dimension in inch		
	Min	Nom	Max	Min	Nom	Max
A	0.80	0.85	0.90	0.031	0.033	0.035
A_1	0.00	0.02	0.05	0.000	0.001	0.002
A_2	---	0.65	0.70	---	0.026	0.028
A_3	0.2 REF			0.008 REF		
b	0.15	0.20	0.25	0.006	0.008	0.010
D/E	7.00 BSC			0.276 BSC		
D_2/E_2	4.35	4.60	4.85	0.171	0.181	0.191
e	0.40 BSC			0.016 BSC		
L	0.30	0.40	0.50	0.012	0.016	0.020

Notes：

1. CONTROLLING DIMENSION：MILLIMETER(mm).
2. REFERENCE DOCUMENTL：JEDEC MO-220.

8. Ordering Information

Table 11. Ordering Information

Part Number	Package	Status
RTL8762AK-CG	QFN-56, 'Green' Package	MP

Note: See page 5 for package identification.

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