

SENTRY

AC410x family + BT-V2.0

User's Manual

SENTRY

TABLE OF CONTENTS

1. INTRODUCTION AND BLOCK DIAGRAM.....	2
1.1. GENERAL INTRODUCTION	2
1.2. BLOCK DIAGRAM.....	3
2. MAIN FEATURES AND APPLICATION.....	4
2.1. SYSTEM KEY FEATURE.....	4
2.2. APPLICATION.....	4
3. TECHNICAL SPECIFICATIONS.....	5
3.1. AC410X FAMILY CHARACTERISTICS	5
3.2. BT-V2.0 BLUETOOTH MODULE CHARACTERISTICS	7
4. BT-V2.0 BLUETOOTH MODULE MECHANICAL DIMENSIONS AND ELECTRICAL FEATURE	8
4.1. BT-V2.0 SCHEMATIC.....	8
4.2. BT-V2.0 PIN ASSIGNMENT	8
4.3. BT-V2.0 OUTLINE:(MM).....	9
4.4. BT-V2.0 PCB LOCATION	10
5. RECOMMENDED REFLOW TEMPERATURE PROFILE.....	12
6. RELATED RECOMMENDED	13
7. DOCUMENT HISTORY	14

SENTRY

1. Introduction and Block Diagram

1.1. General Introduction

BT-V2.0(BK3513) is a Bluetooth 2.1 class 2 modules which is a high performance, cost effective, low power and compact solution. The Bluetooth class 2 module provides a complete 2.4GHz Bluetooth system based on BK3513 chip which is a single chip radio and baseband IC for Bluetooth 2.4GHz systems. This module is fully compliant to Bluetooth v2.1 for audio communications.

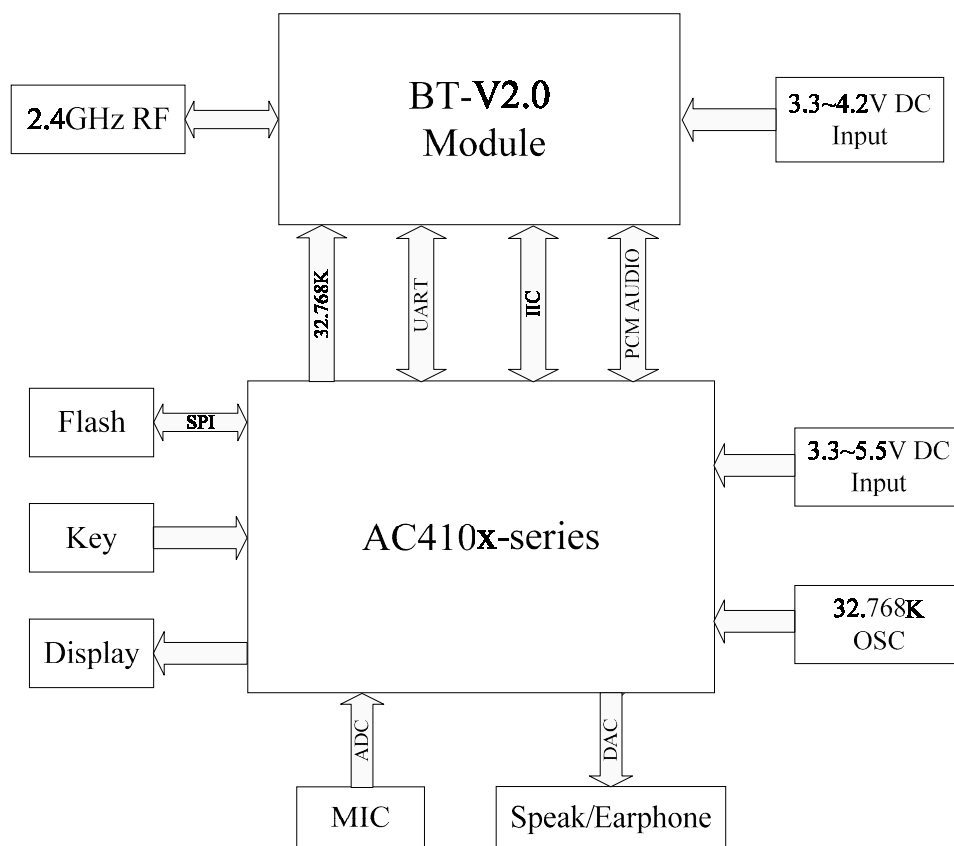
The AC410x family is a low-power, high-performance microprocessor with 96KB SRAM, which incorporates a 32-bit RISC CPU, a high-speed digital signal processor(DSP) and rich peripheral circuits. Key features of the AC410x family include:

- 36 Programmable GPIO.
- Support Watch Dog (WDT) and RTC.
- 24 Interrupt Sources and 4 interrupt priority level.
- Support idle/standby/sleep low power mode and IO wakeup.
- Two 8bit and two 16bit Timer/Counters, supports PWM mode and capture function.
- 16bit stereo DAC with Headphone Amplifier.
- 16bit ADC with Microphone Amplifier.
- Two full-duplex UART, and UART0 supports DMA.
- Two SPI controller supports master and slave, and DMA.
- Two SD master controller supports DMA.
- One full speed USB2.0 controller which supports master and slave.
- One IIC and one IIS controller.

The AC410x family is a powerful microprocessor with rich peripheral resources which provides a highly flexible and cost effective solution to many embedded control applications.

SENTRY

1.2. Block Diagram



SENTRY

2. Main Features and Application

2.1. System Key Feature

- Bluetooth Class2 operation (up to 10 meters range).
- Mono codec with 1 microphone inputs.
- Radio includes integrated balun 5-band fully configurable EQ.
- compliant with the Bluetooth V2.1 protocol.
- support the Bluetooth protocol framework:
 - HANDS-FREE PROFILE (HFP : HF);
 - ADVANCED AUDIO DISTRIBUTION PROFILE (A2DP : SNK);
 - AUDIO/VIDEO REMOTE CONTROL PROFILE (AVRCP : CT);
- support the SBC decoding, support for stereo output with 16KHz/32KHz/44.1KHz/48KHz sample rate
- support the mobile music player switching songs, playing or pausing music
- support the echo cancellation and noise suppression
- support incoming call answer / reject, voice reporting calling number, adjusting the volume
- support active connections and simple pairing;

2.2. Application

- Mono headsets
- Wired Mono headsets and headphones
- Wireless telephone and stereo headphones
- Portable speakers
- Mp3 player and PMP
- Car Audio
- Other portable devices

SENTRY

3. Technical Specifications

3.1. AC410x family Characteristics

3.1.1 General Specification

Number	Items	Description
1	MCU	32-bit RISC CPU
2	Chipset	AC410x family
3	Packaging	LQFP64 · LQFP48 · QFN32 · SOP28 · SSOP24
4	Voltage	3V3~5V5
5	Temperature	-20 ~ +80 °C
6	Storage Temperature	-40 ~ +85 °C

3.1.2 Electrical Characteristics

AC410x family	Item	Min	Typ	Max	Unit	Note
State	Working voltage	+3.3	+4.2V	+5.5V	V	Call and music
	Working current	--	28mA	--	mA	
	Standby current	--	100uA	--	uA	
Power supply : +4.2V						

3.1.3 Mono Codec: Analogue to Digital Converter

Analogue to Digital Converter						
Parameter	Conditions		Min	Typ	Max	Note
Resolution			--	--	16	Bits
Input Sample Rate, F_{SAMPLE}			8	--	48	kHz
SNR	$f_{in}=1\text{kHz}$ $B/W=20\text{Hz}-F_{sample}/2$ (20kHz max) A-Weighted $THD+N<0.1\%$ $2.0V_{pk-pk}$ input	F_{SAMPLE}				
		8kHz	--	87	--	dB
		16kHz	--	87	--	dB
		32kHz	--	87	--	dB
		44.1kHz	--	87	--	dB
		48kHz	--	87	--	dB

THD +N	f _{in} =1kHz B/W=20Hz- Fsample/2 (20kHz max)	F _{SAMPLE}				
		8kHz	--	0.08	--	%
	2.0V _{pk-pk} input	48kHz	--	0.08	--	%
Analogue Gain	Analogue setting = 12dB to54dB in 1.5dB steps		12	--	54	dB
Mono separation (crosstalk)			--	-80	--	dB

3.1.4 Mono Codec: Digital to Analogue Converter

Analogue to Digital Converter							
Parameter	Conditions		Min	Typ	Max	Note	
Resolution	---		--	--	16	Bits	
Output Sample Rate, F _{SAMPLE}	--		8	--	96	kHz	
SNR	f _{in} =1kHz B/W=20Hz-20kHz A-Weighted THD+N<0.1% 0dBFS input	F _{SAMPLE}	Load				
		48kHz	100kΩ	--	87	--	dB
		48kHz	32kΩ	--	87	--	dB
		48kHz	16kΩ	--	87	--	dB
THD+N	f _{in} =1kHz B/W=20Hz-20kHz 0dBFS input	F _{SAMPLE}	Load				
		8kHz	100kΩ	--	0.0035	--	%
		8kHz	32kΩ	--	0.05	--	%
		8kHz	16kΩ	--	0.1	--	%
		48kHz	100kΩ	--	0.0035	--	%
		48kHz	32kΩ	--	0.05	--	%
		48kHz	16kΩ	--	0.1	--	%
Analogue Gain	Analogue Gain Resolution = 3dB		-42	--	0	dB	
Mono separation (crosstalk)			--	-80	--	dB	

3.1.5 Auxiliary ADC

Auxiliary ADC		Min	Typ	Max	Unit
Resolution		--	16	--	Bits
Input voltage range ^(a)		--	3.0	--	V
Accuracy (Guaranteed monotonic)	INL	-1	--	1	LSB
	DNL	0	--	1	LSB

Offset	-1	--	1	LSB
Gain error	-1	--	1	%
Input bandwidth	--	41.5	--	kHz
Conversion time	--	14	--	μs
Sample rate ^(b)	--	--	83k	Samples/s

(a)LSB size = VDD_AUX/1023

(b)The auxiliary ADC is accessed through a VM function. The sample rate given is achieved as part of this function.

3.2. BT-V2.0 Bluetooth Module Characteristics

3.2.1 General Specification

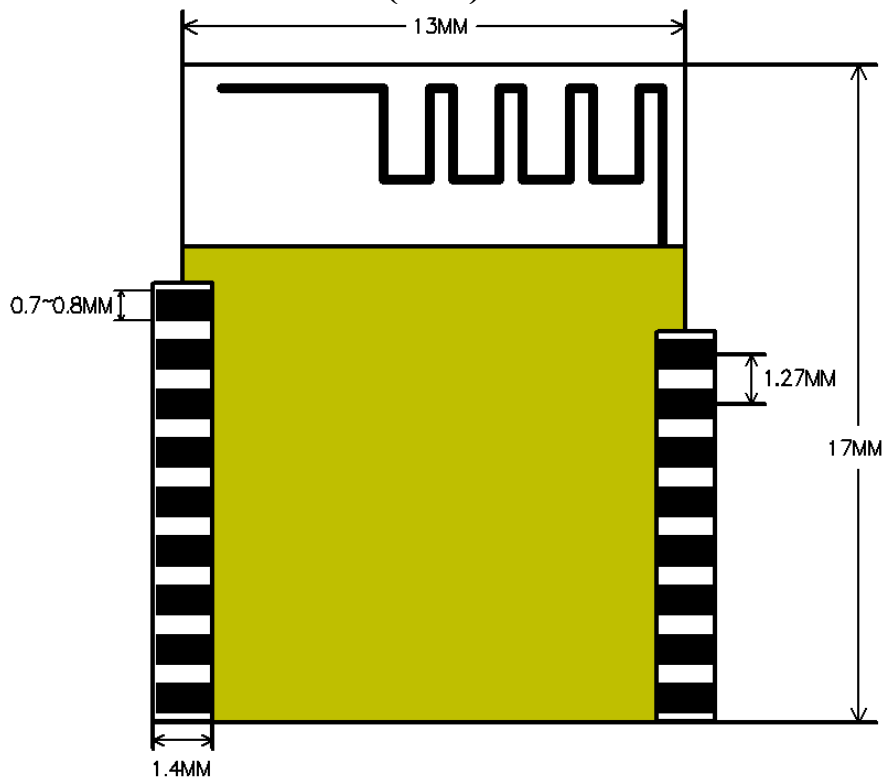
Number	Items	Description
1	Bluetooth Standard	Bluetooth v2.1 Standard
2	Chipset	BK3513
3	Dimension	17mm x 13mm x 2mm
4	Voltage	3V3~4V2
5	Temperature	-20 ~ +60 °C
6	Storage Temperature	-40 ~ +85 °C
7	Frequency Range	2402 ~ 2480MHz
8	Maximum RF Transmit Power	8dBm
9	Receive Sensitivity	-85dBm
10	Bluetooth® Profile Supported	A2DP,AVRCP,HFP

3.2 .2 Power Consumption

BT-V2.0	Item	Min	Typ	Max	Unit	Note
State	Working voltage	+3.3V	+3.3V	+4.2V	V	
	Working current		28mA		mA	Call and music
	Standby current		150uA		uA	
			Power supply : +3.3V			

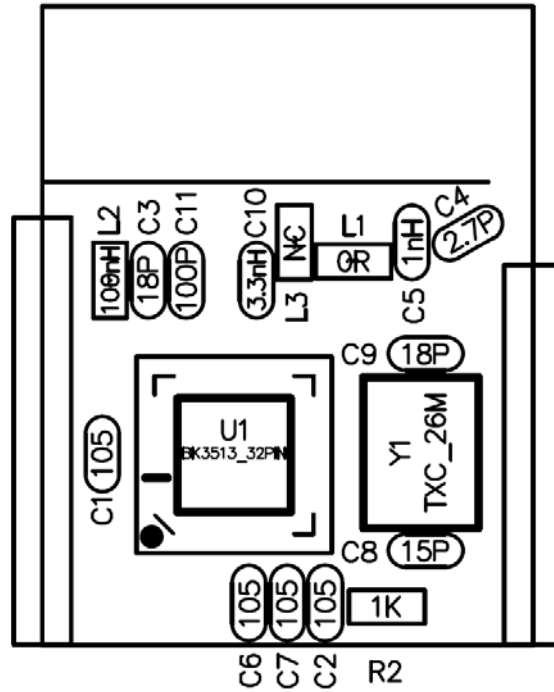
Pin No.	Name	Functions	Description
1	GND	VSS	GND
2	FM-ANT		FM ANT
3	FM-L	Analog	FM left-channel Output
4	FM-R	Analog	FM right-channel Output
5	HOST-WAKE	Output	To wakeup host. Output to host.
6	BT-RX	Input	UART RX data input
7	BT-TX	Output	UART TX data output
8	PCM-SDI	Input	PCM data input
9	PCM-SDO	Output	PCM data output
10	PCM-CLK	Input	PCM data clk
11	PCM-SYNC	Input	PCM data sync
12	BT-VBAT	Power	Power supply input
13	32K-XO	Input	32.768 kHz clock input
14	GND	VSS	Power GND
15	LDO-EN	Input	Request source clock active
16	IIC-DAT	Input/Output	I2C Data signal
17	IIC-CLK	Input	I2C Clock signal

4.3. BT-V2.0 outline:(mm)

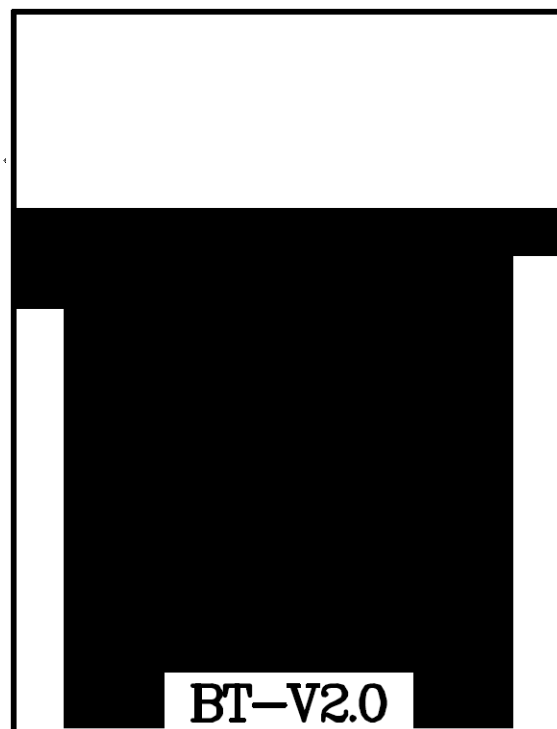


4.4. BT-V2.0 PCB Location

Top Location:



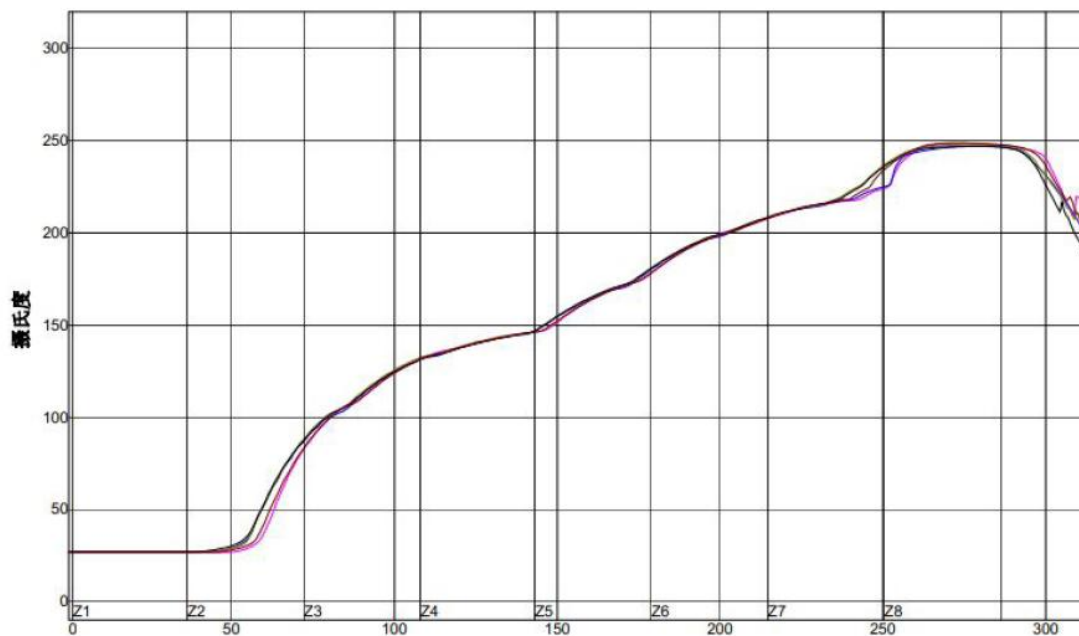
Bottom Location:



5. Recommended Reflow Temperature Profile

The module must go through 125°C baking for at least 9 hours before SMT AND

IRreflow process.



PWI= 82%	最高上升斜率		最高下降斜率		恒温时间150至217C		回流时间 /217C		最高温度		总共时间 /217C	
2	2.58	72%	-1.36	82%	87.43	-9%	72.59	42%	248.61	72%	72.59	42%
3	2.38	58%	-1.45	77%	89.27	-2%	73.13	44%	247.17	43%	73.13	44%
4	2.45	63%	-1.76	62%	87.96	-7%	71.91	40%	248.17	63%	71.91	40%
5	2.39	59%	-2.09	45%	87.88	-7%	68.87	30%	247.17	43%	68.87	30%
6	2.50	67%	-1.85	57%	87.88	-7%	72.15	41%	248.90	78%	72.15	41%
温差	0.20		0.73		1.84		4.26		1.73		4.26	

6. Related recommended

- If you want to use the MIC function, in order to achieve the best sound effects, please don't take MIC And SPK is placed in the same plane, preferably vertically placed
- Full metal shell will greatly shorten the Bluetooth transmission distance
- Bluetooth antenna below PCB plate not copper

7. Document History

Revision	Date	History
V1.0	2014.12.17	
V1.1	2014.03.14	Delete the Application Reference Design

FCC Statement:

This equipment has been tested and found to comply with the limits for Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: Modifications to this product will void the user's authority to operate this equipment.

RF Radiation Exposure Statement:

1. This Transmitter must not be co - located or operating in conjunction with any other antenna or transmitter.
2. This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

FCC Information to OEM integrator

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user manual of the end product.

The user manual which is provided by OEM integrators for end users must include the following information in a prominent location.

1. To comply with FCC RF exposure compliance requirements, the antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co - located or operating in conjunction with any other antenna or transmitter, except in accordance with FCC multi - transmitter product procedures.
2. Only those antennas with same type and lesser gain filed under this FCC ID number can be used with this device.
3. The regulatory label on the final system must include the statement: "Contains FCC ID: 2ACP4-SPBPT or using electronic labeling method as documented in KDB 784748.
4. The final system integrator must ensure there is no instruction provided in the user manual or customer documentation indicating how to install or remove the transmitter module except such device has implemented two - ways authentication between module and the host system