

Revision History

Rev	History	Issue Date	Remark
100	Initial issue	May, 2015	Preliminary
101	Renew Bill of Material	June, 2016	Modify RF matching component value changes
102	Renew Bill of Material	Aug, 2016	Subjoin 32K type A8105

General Description:

This BLE module is a high performance and

2.4GHz GFSK system-on-chip (SOC)
wireless transceiver.

With on chip fraction-N synthesizer, it can support the application of data rate from 4Kbps to 2Mbps and frequency hopping system.

This device integrates high speed pipeline 8051 MCU, *16K/32K Bytes In-system programmable flash memory, 2KB SRAM, various powerful functions and excellent performance of a leading 2.4GHz FSK/GFSK RF transceiver.

It can be operated with wide voltage from 2.0V ~ 3.6V.

It has various operating modes, making it highly suited for systems where ultra-low power consumption is required.

Remark *:

Version 16K_SMD8105-A07

Version 32K_SMD8105-A08

Features:

- Frequency Range: 2402 ~ 2480 MHz ISM (channel spacing is 2MHz).
- Modulate mode: GFSK.
- Support the application of data rate from 4Kbps to 2Mbps.
- Using AES-128 CCM encryption algorithm.

- All packets are using the 24-bit CRC checksum.
- Automatically adapt to the fast frequency hopping.
- Bluetooth 4.0 Single mode.
- Power supply @2.0V~3.6V
- Very Low Power Operation.
- Outline: 18.3 x 15.9 mm

Applications:

- Lighting control.
- Temperature detection .
- Wearable devices.
- UART interface control.
- SPI interface control.

Module Electrical Specifications:

Item	Specification	Remark
Supply voltage	2.0V~3.6V	
Current consumption	0.8uA @Deep Sleep mode 3mA @Stand-by mode 9.5mA @PLL mode 18mA @Rx mode 23.5mA @Tx mode (Pout = 6dBm)	typical
Frequency	2402 – 2480 MHz	ISM band
Transmit output power	-4.21 dBm @ room temperature	Typical Annotation1
Rx sensitivity	-92 dBm (typical) @ 1Mbps mode	BER ≤ 1E-3
Modulation	GFSK	
Interface	19 pin 1.27mm header	
Dimension	18.3mm(L) x 15.9mm(W) mm2 with Antenna (PCB thickness is 0.8mm)	
Operating temperature	-40 ~ 85 °C	

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Annotation1:

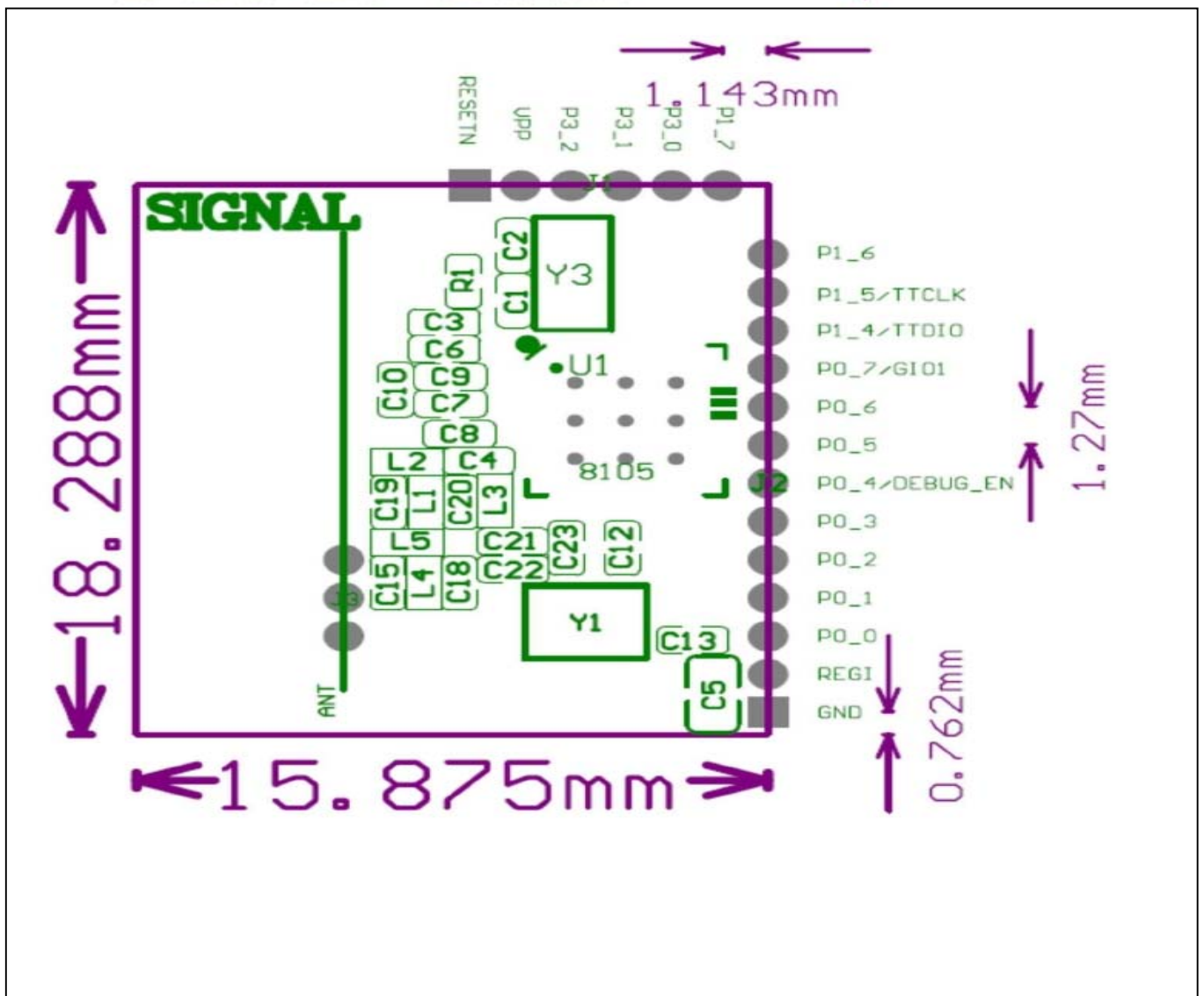
1. Tx output power = -4.21dBm,

Register: [082C] Tx test(TBG: 6, PAC: 3, TXCS: Low Current) value:0X5E.

2. TX output power can be set by Register: [082C] Tx test.

Module dimension drawing (Top view)

Module PCB size & Module Pin Assignments:



Module Pin Functions:

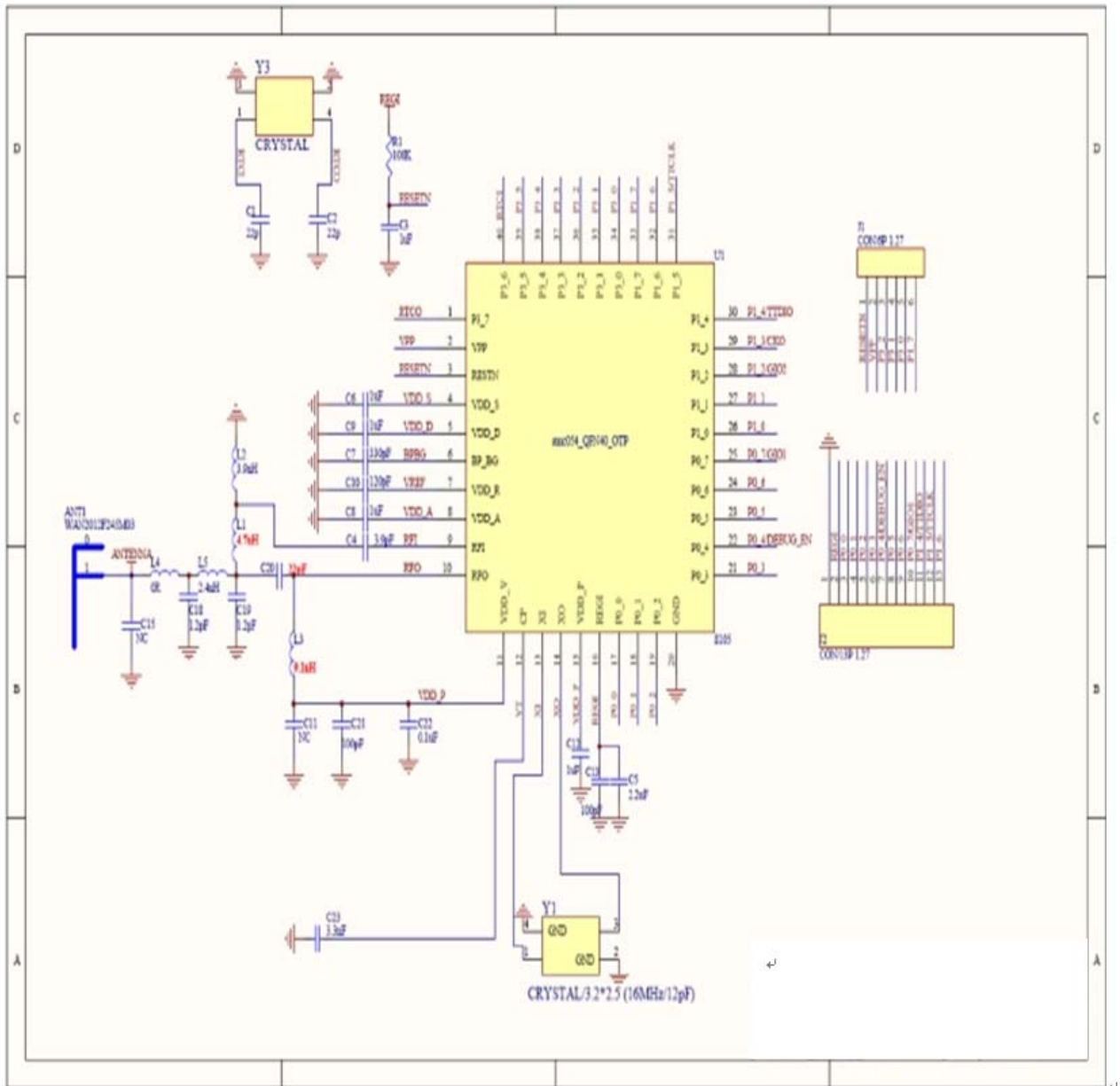
J1:

Pin No.	Symbol	Function Description	Remark
1	RESET	RESETN.	
2	VPP	High voltage pin used for OTP ROM program.	
3	P 3_2	INT0/ADC0.	
	P 3_1	UART0_TX/ADC7.	
5	P 3_0	UART0_RX/ADC6.	
6	P 1_7	PWM1/ADC5.	

J2:

Pin No.	Symbol	Function Description	Remark
1	GND	Ground.	
2	REG1	RF Module supply voltage supply input.	2.0 ~ 3.6V
3	P 0_0	SPI_SCLK/IN0.	
4	P 0_1	SPI_MOSI/CS0.	
5	P 0_2	SPI_MISO/RS0.	
6	P 0_3	SPI_SSEL/RT0.	
7	P 0_4	GPIO/ICE mode.	
8	P 0_5	I2C_SCL.	
9	P 0_6	I2C_SDA.	
10	P 0_7	INT2/GIO1.	
11	P 1_4	TTAG_TTDIO AMICCOM CONFIDENTIAL.	
12	P 1_5	TTAG_TTCLK.	
13	P 1_6	PWM0/ADC4	

Module Application Circuit:



Module Bill of Material:

Item	Component	Description	Size	Value	Tol.	Manufacturer	Manufacturer Number
1	C1, C2 C20	C0G ceramic capacitor	0402	22pF	±5%	Murata	GRM1555C1H150JA01
2	C3, C6, C8, C9, C12		0402	1uF	±10%		
3	C4	C0G ceramic capacitor	0402	3.9pF	± 0.25pF	Murata	GRM1555C1H3R9CA01
4	C5		0603	2.2uF	±20%		
5	C7	C0G ceramic capacitor	0402	330pF	±5%	Murata	GRM1555C1H331JA01
6	C10	C0G ceramic capacitor	0402	120pF	±5%	Murata	GRM1555C1H121JA01
7	C13, C21	C0G ceramic capacitor	0402	100pF	±5%	Murata	GRM1555C1H101JA01
8	C18 C19	C0G ceramic capacitor	0402	1.2pF	± 0.25pF	Murata	GRM1555C1H1R2CA01
9	C22		0402	0.1uF	±10%		
10	C23		0402	3.3nF	±10%		
11	L1	Chip inductor	0402	4.7nH	±0.3nH	Murata	LQG15HS4N7S02
12	L2	Chip inductor	0402	3.9nH	±0.3nH	Murata	LQG15HS3N9S02
13	L3	Chip inductor	0402	9.1nH	±5%	Murata	LQG15HS9N1J02
14	L5	Chip inductor	0402	2.4nH	±0.3nH	Murata	LQG15HS2N4S02
15	L4	Chip resistor	0402	0 ohm			
16	R1	Chip resistor	0402	100K ohm	±5%		
17	U1		QFN 40(5x5)	A8105		Amicom	<u>Annotation2</u>
18	Y1	Crystal	3.2 x2.5mm	16MHz, CL =12pF	±20ppm	YIC	<u>Annotation1</u>
19	Y3	Crystal	7.0 x1.5mm 3.2 x1.5mm	32.768KHz CL = 12.5pF	±20ppm	YIC	

Annotation1:

1. A8105 has built-in crystal loading. User can set VCOSC[5:0] to meet crystal loading. Requirement.

2. Recommend VCOSC = 20, if crystal load = 12pF.

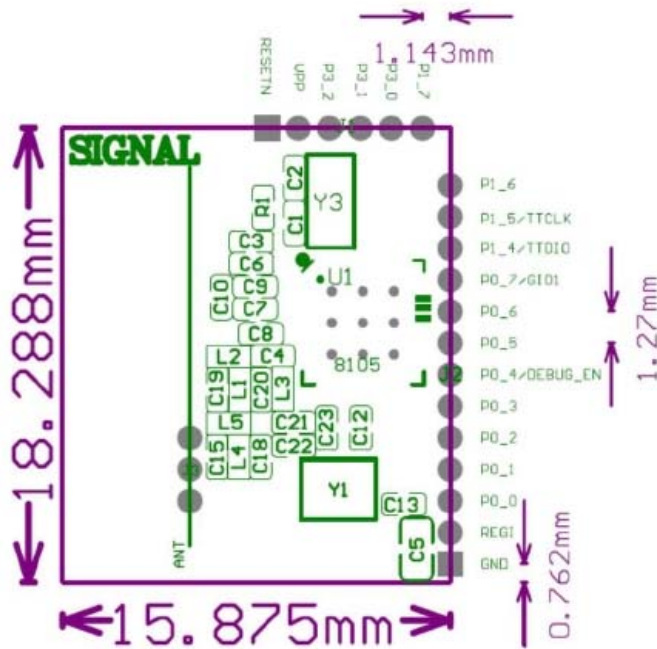
Recommend VCOSC = 13, if crystal load = 9pF.

Annotation2:

1. A81X05F4001AQ5A 16K.

2. A81X05F5001AQ5A 32K.

Module Application:



BLE to Uart

Tx(P3_1)
 Rx(P3_0)
 Busy(P0_0)
 Enable(P0_1)⇒
 1. NC/Pull Hi_Sleep
 2. GND/Pull Low_Working

BLE to Temperature

ADC_1(P1_7)
 ADC_2(P3_2)

BLE to LED control_1

PWM(P1_6)
 ADC(P3_2)

BLE to LED control_2

SPI_SCLK(P0_0)
 SPI_MOSI(P0_1)
 SPI_MISO(P0_2)
 SPI_SSSEL(P0_3)
 ADC(P3_2) T=0.8mm

REG1⇒ VCC 3V

GND⇒ GND

UART Mode 9600, 8, N, 1

Module_Tx	UART Tx, No Protocol	
Module_Rx	One time max byte is 100 byte including 0x0D, 0x0A. Module_Busy pin will changes from L to H, if UART Rx recievers 0x0D, 0x0A.	
Module_EN	Module_Busy	Description
L	L	Module Ready
L	H	Module Busy
H	X	Module Sleep

FCC Part 15 Compliance Statement

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.

changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains FCC ID: 2AA7CBUZCONMD".

Note: The OEM integrator is responsible for ensuring that the host product which is installed and operating with the module is in compliant with Part 15B unintentional Radiator requirements, please note that For a Class B digital device or peripheral, the instructions furnished the user manual of the end-user product shall include the following or similar statement, placed in a prominent location in the text of the host product manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to 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 into an outlet on a circuit different from that to which the receiver is connected.*
- Consult the dealer or an experienced radio/TV technician for help.*

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

The module is limited to installation in mobile application; A separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and difference antenna configurations.

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Industry Canada Compliance Statement

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Please notice that if the IC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains IC: 11838A- BUZCONMD .

L'étiquette d'homologation d'un module d'Innovation, Sciences et Développement économique Canada devra être posée sur le produit hôte à un endroit bien en vue, en tout temps. En l'absence d'étiquette, le produit hôte doit porter une étiquette sur laquelle figure le numéro d'homologation du module d'Innovation, Sciences et Développement économique Canada, précédé du mot « contient », ou d'une formulation similaire allant dans le même sens et qui va comme suit : Contient IC : 11838A- BUZCONMD est le numéro d'homologation du module.

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

Cet équipement est conforme aux limites d'exposition aux radiations IC CNR-102 établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.