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SHENZHEN OGEMRAY TECHNOLOGY CO., LTD

GWF-KM26

Product Specification

(2.4GHz/72.2Mbps 802.11 b/g/n)

ITEM: GWF-KM26
VERSION: V1.0
DATE: 2016-11-15

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1. Product Introduction

1.1 Overview

GWF-KM26 adopted ESP8266EX platform, the chip work at 2.4G frequency. ESP8266EX is among the most integrated Wi-Fi chips in the industry. Measuring just 5mm*5mm, ESP8266EX requires minimal external circuitry and integrates a 32-bit Tensilica MCU, which features extra low power consumption and 16-bit RISC, the main frequency support 80MHz and 160MHz. With RTOS, it integrate WiFi MAC/BB/RF/PA/LNA/on-board antenna.

GWF-KM26 support IEEE802.11 b/g/n standard. Using TCP/IP complete protocol stack, user can use the module to add WiFi network function, it will also establish independent network controller.

ESP8266EX is a high-efficiency SOC, it offer the unprecedented practicality by low cost, which offer unlimited possibilities for WiFi technology applied to other control system.

ESP8266EX is a complete and self-contained WiFi solutions, it can not only run independently, but also work when carried on other host MCU. If ESP8266EX is loaded application as the only application processor, it will be set up from external flash. Built-in with high speed buffer memory, it is conducive to enhance system performance and reduce RAM demand.

In other case, ESP8266EX take charge of accessing to WiFi adapter, we can add it to any MCU design, it is easy and convenient. Just need to thorough SPI/SDIO interface or I2C/UART interface.

Great capacity for management and memory function make it integrate sensors or other application by GPIO, which occupy the least system resource.

With highly integrated on-chip features and minimal external discrete component count, the chip offers reliability, compactness and robustness critical in end products.

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1.2 Features

- Support 2.4GHz, 802.11b/g/n
- Integrate Tensilica L106 low consumption 32-bit MCU, the main frequency support 80MHz and 160MHz. With RTOS.
- Built-in 10-bit high-precision ADC.
- TCP/IP protocol stack.
- Integrate TR switch, balun, LNA, power amplifier and matching network.
- With PLL, AVR and power management part, 20 dBm output power in 802.11b mode.
- A-MPDU, A-MSDU, 0.4 s protection interval.
- Support WPA/WPA2 Security mode.
- Support AT remote upgrade and OTA upgrade.
- Support STA/AP/STA+AP work mode
- Support Smart-Config function (Android& iOS device)
- HSPI, UART, I2C, I2S, IR Remote Control, PWM, GPIO
- Deep sleep current is 10 μ A , turn-off current is less than 5 μ A .
- Wake up, connect and transfer data in 2ms.

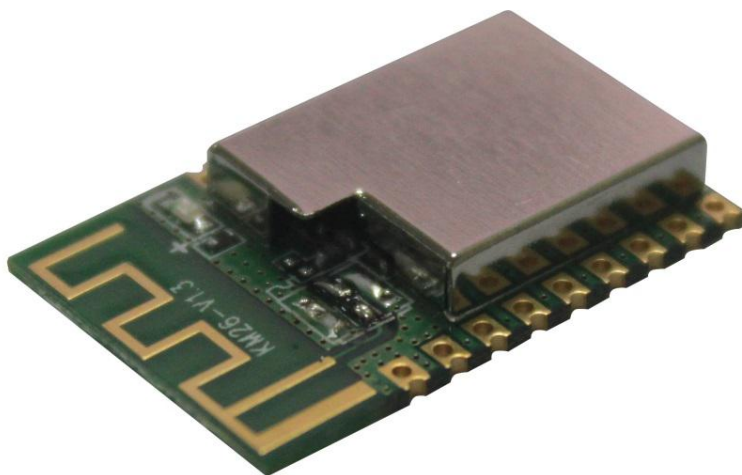


Figure 1-1 GWF-KM26





1.3 Product Diagram

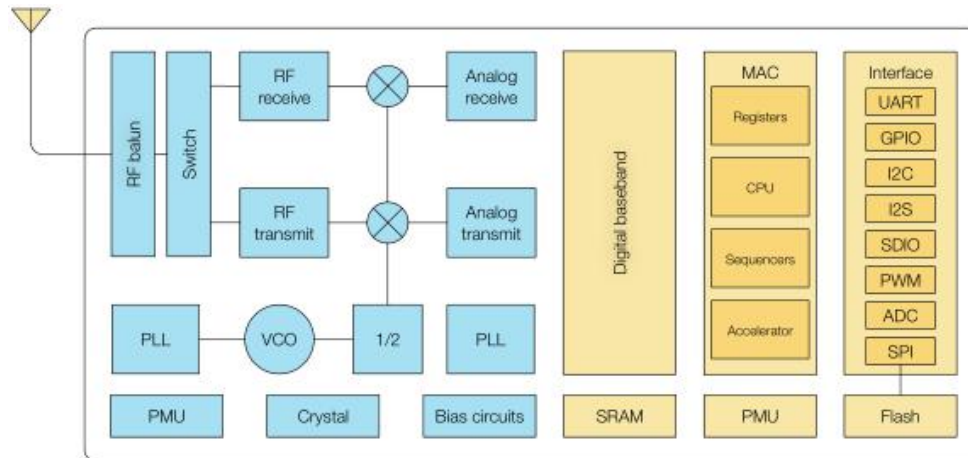


Figure 1-2 ESP8266EX Functional block diagram

1.4 Appearance

GWF- KM26 dimension is 24.3mm*16mm*3.65mm (As shown in the figure below). The SPI flash capacity is 8 Mbit packaging SOP-208 mil.

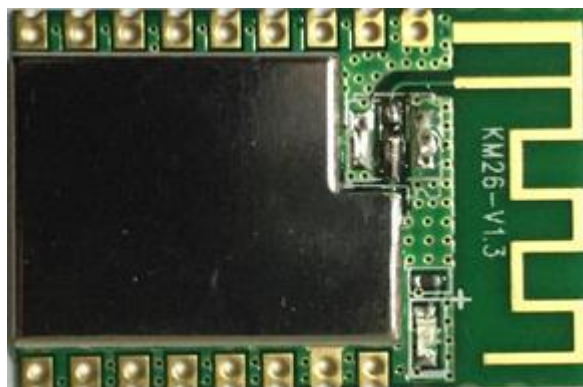


Figure 1-3 GWF-KM26 Front View



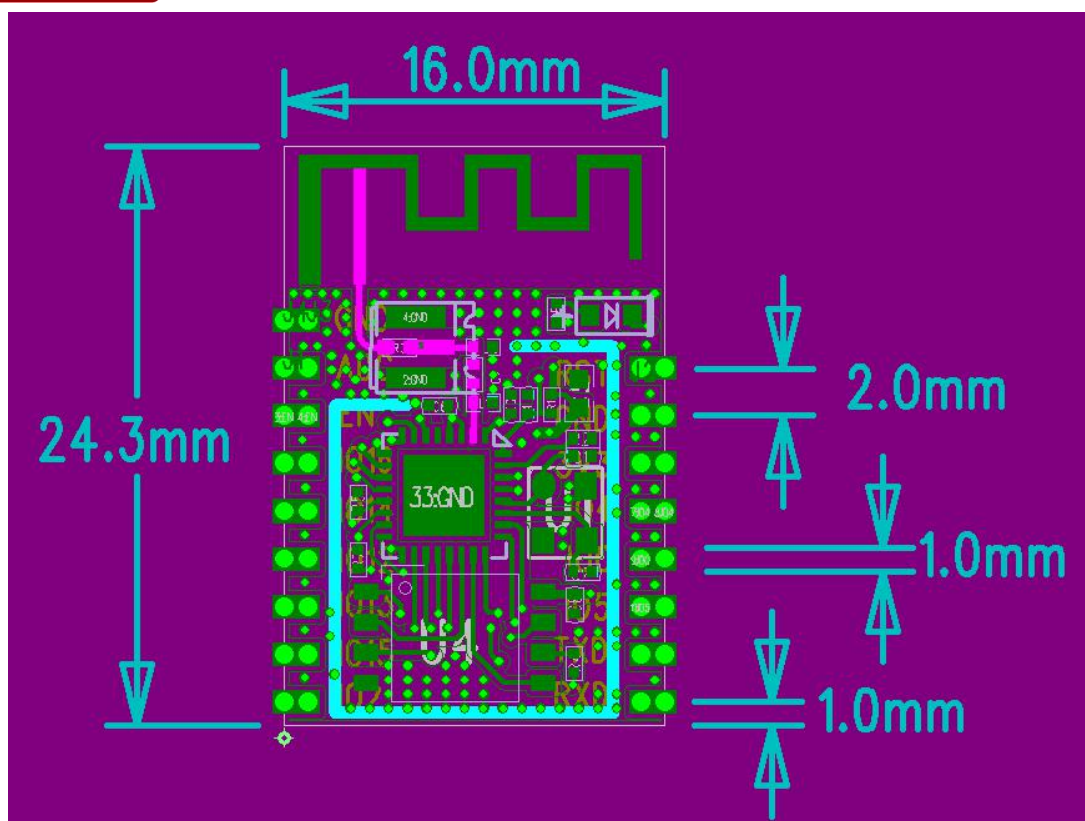


Figure 1- 4 Dimension

1.5 Specification

Table 1- 1 GWF-KM26 Specification

Protocol and Interface Standard	
WiFi Standard	IEEE 802.11b/g/n
Data Interface	UART/HSPI/I2C/I2S/IR Remote Control
	GPIO/PWM
I/O Interface	9 GPIO
LED	When the LED flash slow, the module is not access to WiFi. When LED is on, the module has been accessed to WiFi.
Memory	
SPI Flash	8 Mbit
WiFi Features	





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WiFi work mode	STA/AP/STA+AP/Smart Config
RF Security mode	WPA, WPA2
Encryption type	WEP/TKIP/AES
WiFi RF Parameter	
Frequency	2.4GHz-2.5GHz (2412MHz-2462MHz)
TX PWR	802.11b (CCK) 11Mbps: 20+/-1.5dBm
	802.11g (OFDM) 54Mbps: 15.5+/-1.5dBm
	802.11n(HT20@MCS7) 72.2Mbps: 14.5+/-1.5dBm
Running Current	
Power Supply	3.0~3.6V(3.3V)
Running Current	80mA (average value)
Working Condition	
Work Temperature	-10°C to +60°C
Storage Temperature	Normal Temperature
Work Humidity	5% to 95%(no condensing)
Physical Specification	
PCBA dimension	24.3mm*16mm*3.65mm
RF Range	
Indoor: 45m; Outdoor: 150m(To be depended on the real environment)	

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1.6 Interface Definition

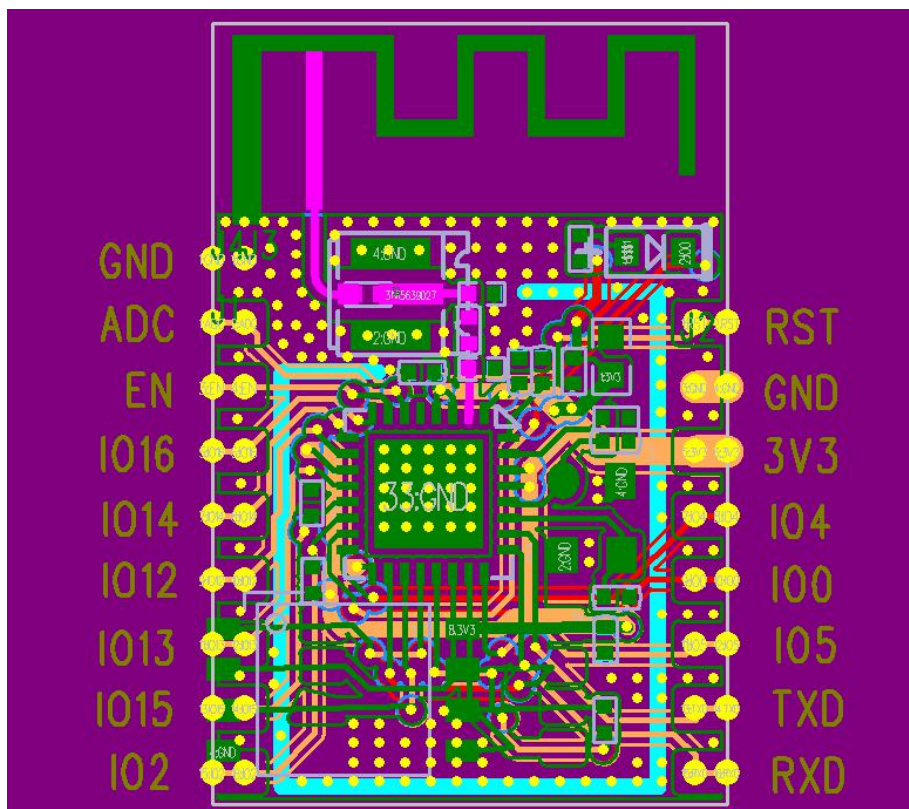


Figure 1-5 Pin

Table 1-2 GWF-KM26 Pin Definition

No.	Pin	Function Instruction
1	GND	GND
2	ADC	A/D result, input voltage range: 0~1V, value range: 0~1024
3	EN	Chip enable interface, active high enable.
4	IO16	GPIO16; Connecting it to RST pin to wake up deep sleep mode.
5	IO14	GPIO14; HSPI_CLK
6	IO12	GPIO12; HSPI_MISO
7	IO13	GPIO13; HSPI_MOSI; UART0_CTS





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8	IO15	GPIO15; MTDO; HSPICS; UART0_RTS
9	IO2	GPIO2; UART1_TXD
10	RXD	UART0_RXD; GPIO3
11	TXD	UART0_TXD; GPIO1
12	IO5	GPIO5
13	IO0	GPIO0
14	IO4	GPIO4
15	3V3	3.3V Power Supply
16	GND	GND
17	RST	Reset

Table 1- 3 Pin Mode

Mode	GPIO15	GPIO0	GPIO2
UART download mode	Low	Low	High
Flash Boot mode	Low	High	High

Table 1- 4 Pin Instruction

Interface	Pin	Function Instruction
PWM	IO12(R), (G),IO13(B)	To control color, buzzer, relay, motor and so on.
IR	IO14(IR_T), IO5(IR_R)	IR Remote Control interface is implemented by software, the interface use NEC coding and modem, 38KHz carrier modulation
ADC	TOUT	To detect VDD3P3 (Pin3,Pin4) power voltage an TOUT(Pin6) and input voltage(can't be use at the same time); Sensor application.
I2C	IO14(SCL), IO2(SDA)	To connect to external sensor and display.
UART	UART0: TXD(U0TXD), RXD(U0RXD), (RTS), IO13(CTS)	To connect to external device UART interface. Download U0TXD+U0RXD or GPIO2+U0RXD. Communication (UART0): U0TXD, U0RXD, MTDO(U0RTS), MTCK(U0CTS) Debug: UART1_TXD (GPIO2),it can be served as debug information print.





	UART1: IO2(TXD)	UART0 output printing information by ESP8266EX in default. Developers can use the internal exchange function of UART to interchange U0TXD, U0RXD and U0RTS, U0CTS at the time of initialization, To connect MTDO and MTCK to corresponding UART of external MCU.
I2S	I2S Input: IO12 (I2SI_DATA) ; IO13 (I2SI_BCK); IO14 (I2SI_WS); I2S Output: IO15 (I2SO_BCK); IO3 (I2SO_DATA); IO2 (I2SO_WS).	It is utilized for audio collection, process and transmission.

1.7 Electrical Features

Table 1-5 Electrical features

Rated Value	Condition	Range	Unit
VCC	IPC/JEDEC J-STD-020	+3.0 to +3.6	V
VESD	ESD Protection (HBM)	2000	V

1.8 Digital Port Features

Table 1-6 Data port features

Port	Typical Value	Minimum	Typical Value	Maximum	Unit
Input Logical Level Low	VIL	-0.3		0.25VDD	V
Input Logical Level High	VIH	0.75VDD		VDD+0.3	V
Output Logical Level Low	VOL	N		0.1VDD	V
Output Logical Level High	VOH	0.8VDD		N	V





2. Hardware Design Notice

2.1 Application Diagram

The module support general UART and network standard. Built-in TCP/IP protocol stack, users can use the module to add network function. It also can establish independent internet controller to realize data transmission between UART and WiFi internet. Using GWF-KM26 WiFi module, traditional UART device could be connected to the WiFi network without changing any configuration, to provide complete and quick solutions for UART device. There are two methods to control external devices, the first is that external MCU control WiFi module UART. Secondly, KM26 controls external devices by its self-contained UART.

The following is application diagram:

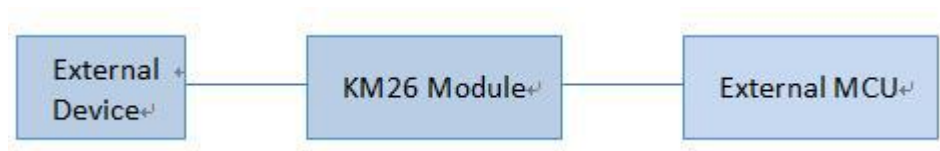


Figure 2- 1 Application Diagram

2.2 GPIO

There are 9 GPIO in the module, the minimum interrupt response time is 1ms, these GPIO could be configured by software directly like UART, LED, IR control.

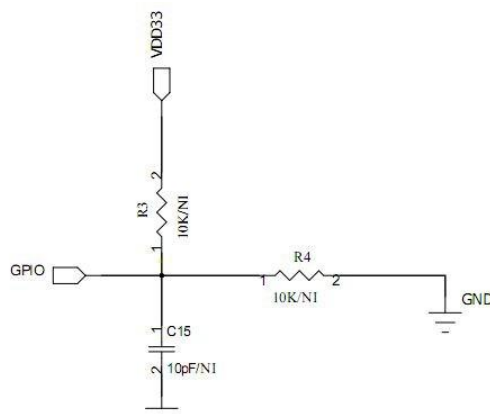


Figure 2-2 GPIO reference design



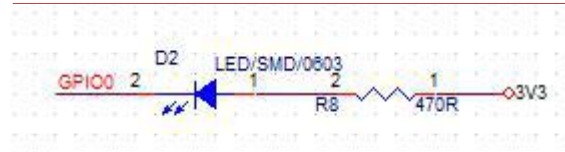


Figure 2- 3 LED reference design

To control LED brightness by adjusting resistance value of R8.

Note: If the LED is in semi-bright for a long time, please try to reset.

2.3 UART

Table 2- 1 UART pin definition

UART interface			
Pin	Pin name	I/O	Instruction
10	RXD	I	UART_RXD(UART Receive Data)
11	TXD	O	UART_TXD (UART Transmit Data)

GWF-KM26 default configuration

10 pin for UART RXD

11 pin for UART TXD

Hyper terminal, Tera or Secure CRT can be regarded as communication tools for UART interface debug.

The UART setting is 115200; 8-N-1.

The following figure is a reference design selection.



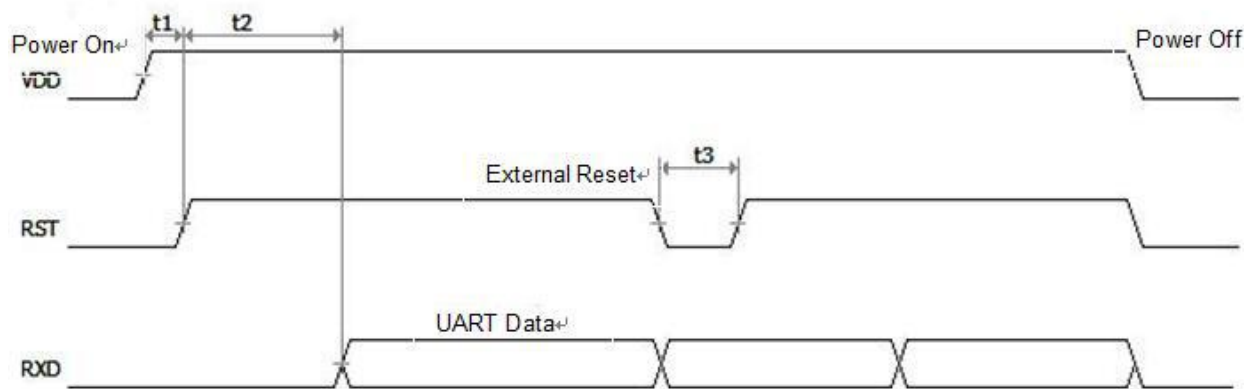
Figure 2- 4 UART reference design

2.4 Design requirement of practical application

2.4.1 Reset Sequence

KM26 need to reset external reset signal (Active Low),external reset sequence as shown in the figure below:





T3: 30ms ~50ms

Figure 2- 5 KM26 external reset sequence

2.5

Power Supply Interface

Table 2- 2 Power supply pin definition

Power Supply Interface			
Pin No.	Pin	I/O	Instruction
16	GND	Power	Ground
15	VCC	Power	3.3V Input

Because module need low ripple DC power supply, please design the power module accurately, otherwise, it may lead to RF performance degradation.

2.6 RF Input and Output Interface

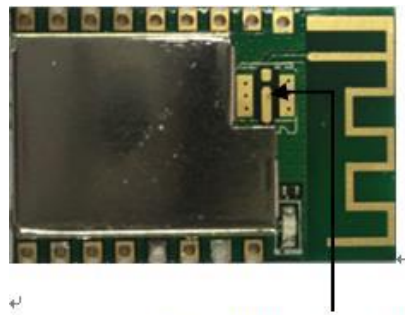
A. Using on-board antenna, we need to place 1nH inductance, remain IPEX empty.





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Place 1nH inductance on the place
when using the on board antenna

Figure 2-6 On-board antenna

2440.000MHz H

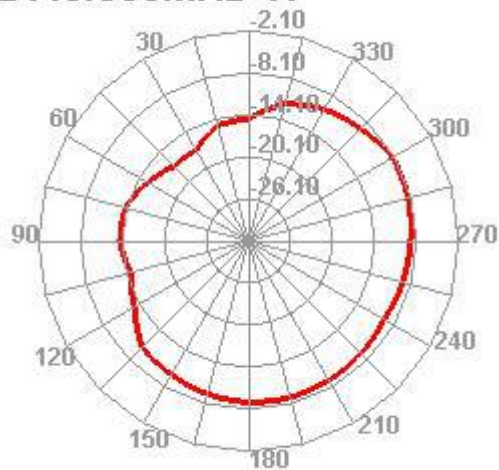


Figure 2-7 Antenna pattern

Peak gain: -1dBi; average gain: -3dBi

B. External antenna is connected to IPEX by RF cable, we should not add inductance to the board.

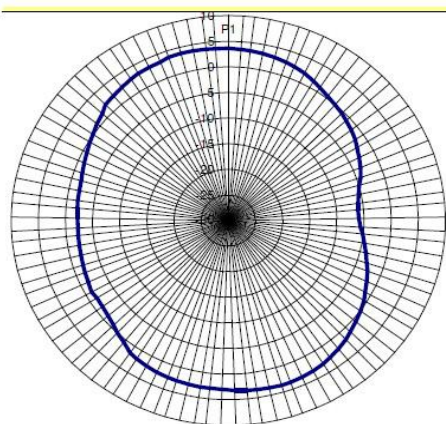




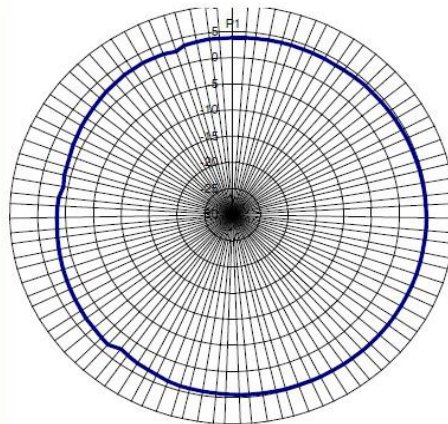
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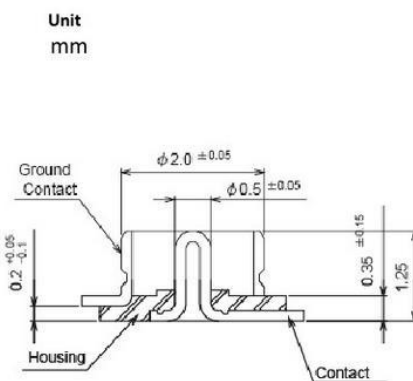
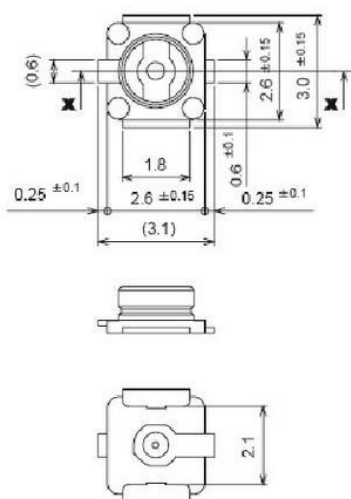
Patterns taken with Model N2420 mounted on 90mm x 90mm x 2.2mm thick, ABS Plastic sheet using 1.6mm double sided tape.



Measured Azimuth Radiation Pattern



Measured Elevation Radiation Pattern



Notes:

1. Compatible with IPEX MHF, MHFII and Hirose U.FL
2. Housing: LCP, UL94V-0, white
3. Contact: Brass, gold plating
4. Ground Contact: phosphor bronze, gold plating



Above figure is suggested antenna (Airgain P / N: N2420) and its antenna pattern.

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2.7 Dimension

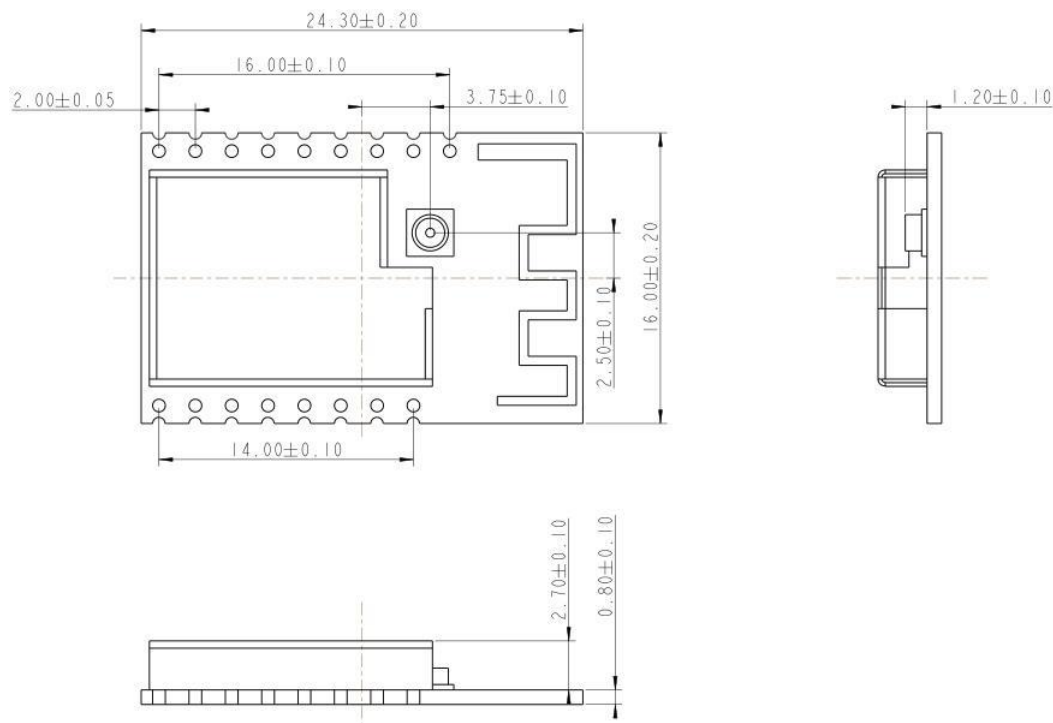


Figure 2- 8 Dimens



2.8 No wiring area

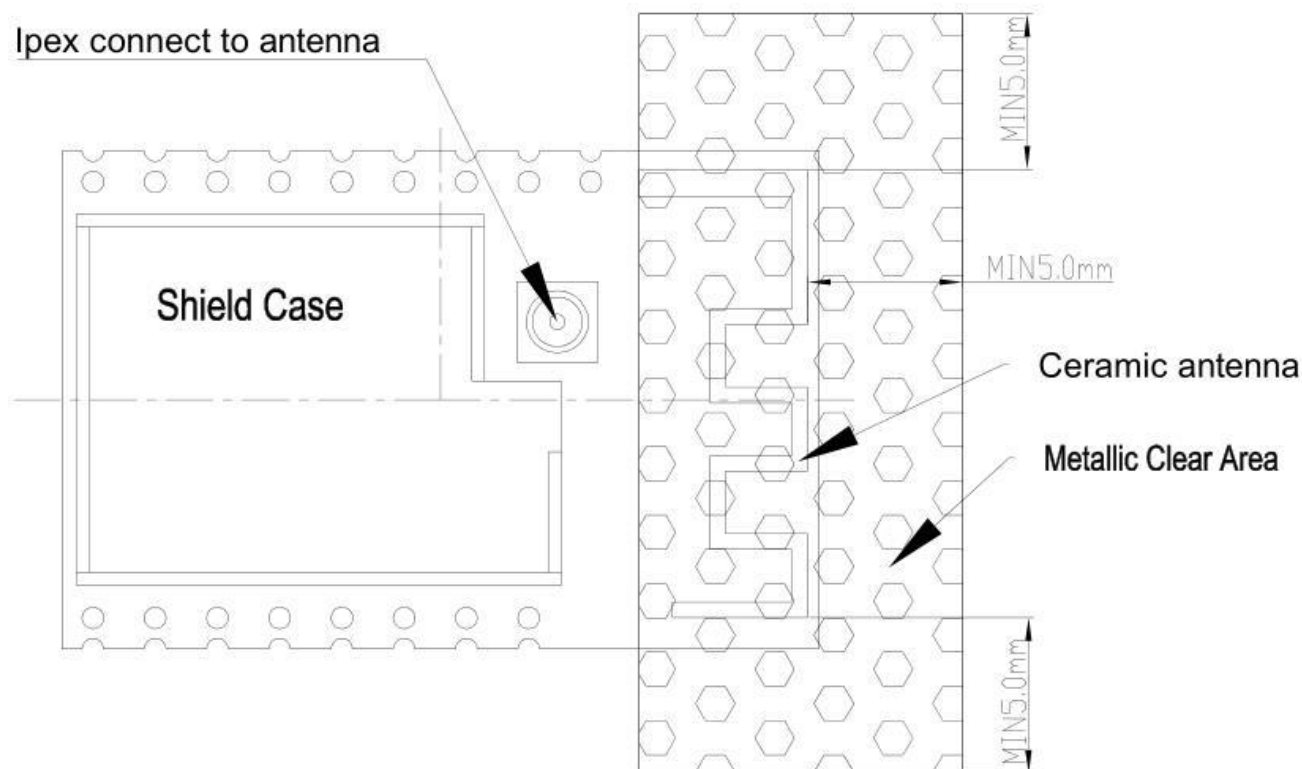


Figure 2-9 No wiring area

3. Approval and Certification

Table 3- 1 Approval and Certification

Certification	Approval
FCC part15	Ongoing
CE	Ongoing
RoHS	Pass





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

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.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

15.105 Information to the user.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the 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 minimum distance 20cm between the radiator and your body.

Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The module should not be installed and operated simultaneously with other radios except additional RF exposure was evaluated for simultaneous transmission.

The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination.

The firmware setting is not accessible by the end user.

The final end product must be labelled in a visible area with the following:

“Contains Transmitter Module **YWT-KM26**”