

**GOOWI**

**GWLE1024A**  
**Bluetooth Low Energy Module**  
**Data Sheet**

**(Document Number:GWLE-1024A-01B)**

GooWi Technology Co., Ltd

# GOOWI

## GWLE1024A Module

CSR1024

Rev1.0

Qct. 2016

### Device Features

- A small and cost effective Bluetooth® Low Energy System
- Bluetooth® specification v4.2
- CSRmesh connectivity:internet of Things control
- Support for Bluetooth v4.2 specification features:Master and slave operation,including encryption
- Integrated Bluetooth low energy stack: GAP ,L2CAP,Security manager,Generic attribute protocol,Attribute profile,Bluetooth low energy technology profile support
- RSSI monitoring for proximity applications
- Programmable general purpose
- 10-bti Aux ADC
- 15 digital flexible PIOs
- 1 analogue AIOs
- UART
- I2C master controller
- SPI master interface
- Debug SPI interface for programming
- 4 x quadrature decoders
- PWM 3D shutter control
- 5 x LED pwms
- Keyboard scanner
- LCD glass drive
- IR encoder
- Battery monitor
- 6 power modes
- 256KB internal flash
- Wake-up power management from any PIO
- Power management features include software shutdown and hardware wake-up
- AES-128
- Watchdog timer
- Chip antenna
- Operation temperature -30 to 85

## General Description

GWLE1024A from GooWi is a single-mode Bluetooth low energy module. It's for low power sensors and accessories, such as health device, active 3D glasses. GWLE1024A offers all Bluetooth low energy features: radio, stack, profiles. GWLE1024A also provides flexible hardware interface to connect sensors, simple user interfaces and even driver display device directly.

GooWi setups the software development platform in the lab, provides the full software and customization service to our valuable customers.

## Applications

- Health and medical
- Security and proximity
- Sports and fitness
- Entertainment
- Human interface device
- Smart Home

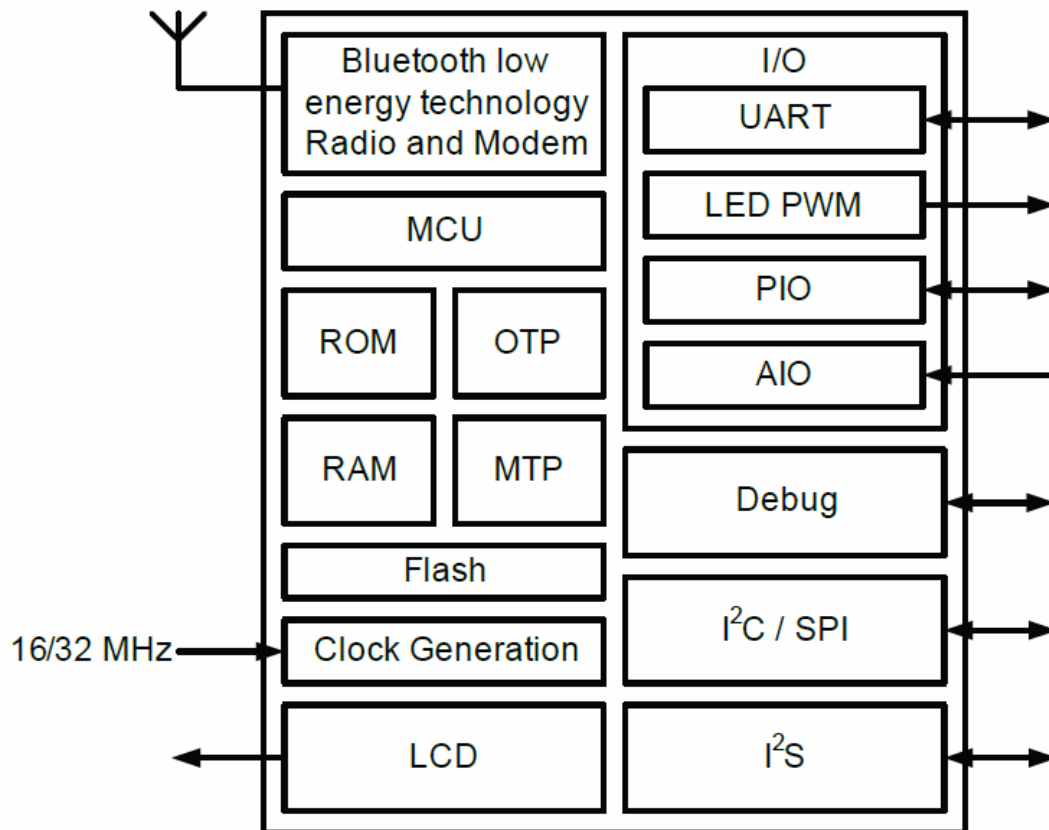
## Version History

Version No	Author	Date	Remark
Rev1.0	alvin	2016-10-10	Init Version

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## System Architecture



## Specifications

Operating Frequency Band	2.4GHz ~ 2.48GHz unlicensed ISM band
Bluetooth Specification	V4.2
Output Power	4dBm
Operating Voltage	1.4V-3.6V
Host Interface	UART/I2C/SPI
Dimension	11.5mm (L) x 8.5 (W) mm x 2.5 (H) mm

NOTES: Specifications are subject to change without prior notice

## Electrical Characteristics

### Absolute Maximum Ratings

Rating	Min	Max	Unit
Storage temperature	-40	85	°C
Battery (VDD_BAT) operation(a)	0	3.6	V
I/O supply voltage ( VDD_IO )	0	3.6	V
Other terminal voltages	0	3.6	V

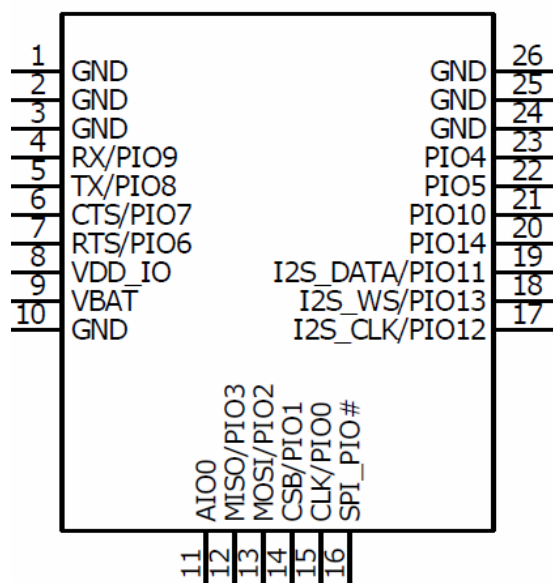
### Recommended Operation Conditions

Operating Condition	Min	Typ	Max	Unit
Operating temperature range	-30	20	85	°C
Battery (VDD_BAT) operation	1.4	3.0	3.6	V
I/O supply voltage (VDD_IO)	1.4	3.0	3.6	V

### AIO

Input Voltage Levels	Min	Typ	Max	Unit
Input voltage	0	-	1.26	V

## Pin Definition



Pin No	Name	Type	Supply Domain	Function	Remark
1	GND	GND	GND	Ground	
2	GND	GND	GND	Ground	
3	GND	GND	GND	Ground	
4	RX/PIO9	Bi-directional	VDD_IO	Digital:Bidirectional with programmable strength internal pull-up/pull-down and LCD glass driving capability General programmable I/O line9.	
5	TX/PIO8	Bi-directional	VDD_IO	Digital: Bidirectional with programmable strength internal pull-up/pull-down and LCD glass driving capability General programmable I/O line8.	
6	CTS/PIO7	Bi-directional	VDD_IO	Digital: Bidirectional with programmable strength internal pull-up/pull-down and LCD glass driving capability General programmable I/O line7.	
7	RTS/PIO6	Bi-directional	VDD_IO	Digital: Bidirectional with programmable strength internal pull-up/pull-down and LCD glass driving capability General programmable I/O line6.	

8	VDD_IO	Bi-directional	VDD_IO	Positive supply for digital I/O ports PIO[14:0] and SPI_PIO#.	
9	VBAT	Bi-directional	VBAT	Positive supply from the battery.	
10	GND	GND	GND	Ground	
11	AIO0	Bi-directional	VDD_AUX	Analogue programmable input line.	
12	MISO /PIO3	Bi-directional	VDD_IO	Digital: Bidirectional with programmable strength internal pull-up/pull-down and LCD glass driving capability	
				General programmable I/O line3.	
13	MOSI /PIO2	Bi-directional	VDD_IO	Digital: Bidirectional with programmable strength internal pull-up/pull-down and LCD glass driving capability	
				General programmable I/O line2.	
14	CSB/PIO1	Bi-directional	VDD_IO	Digital: Bidirectional with programmable strength internal pull-up/pull-down and LCD glass driving capability	
				General programmable I/O line1.	
15	CLK/PIO0	Bi-directional	VDD_IO	Digital: Bidirectional with programmable strength internal pull-up/pull-down and LCD glass driving capability	
				General programmable I/O line0.	
16	SPI_PIO#	Bi-directional	VDD_IO	Selects debug SPI on PIO(3:0)	
17	I2S_CLK /PIO12	Bi-directional	VDD_IO	Digital: Bidirectional with programmable strength internal pull-up/pull-down and LCD glass driving capability	
				General programmable I/O line12.	
18	I2S_WS /PIO13	Bi-directional	VDD_IO	Digital: Bidirectional with programmable strength internal pull-up/pull-down and LCD glass driving capability	
				General programmable I/O line13.	
19	I2S_DATA /PIO11	Bi-directional	VDD_IO	Digital: Bidirectional with programmable strength internal pull-up/pull-down and LCD glass driving capability	
				General programmable I/O line11.	
20	PIO14	Bi-directional	VDD_IO	Digital: Bidirectional with programmable strength internal pull-up/pull-down and LCD glass driving capability	
				General programmable I/O line14.	



21	PIO10	Bi-directional	VDD_IO	Digital: Bidirectional with programmable strength internal pull-up/pull-down and LCD glass driving capability	
				General programmable I/O line10.	
22	PIO5	Bi-directional	VDD_IO	Digital: Bidirectional with programmable strength internal pull-up/pull-down and LCD glass driving capability	
				General programmable I/O line5.	
23	PIO4	Bi-directional	VDD_IO	Digital: Bidirectional with programmable strength internal pull-up/pull-down and LCD glass driving capability	
				General programmable I/O line4.	
24	GND	GND	GND	Ground	
25	GND	GND	GND	Ground	
26	GND	GND	GND	Ground	

## PIO Configuration Options

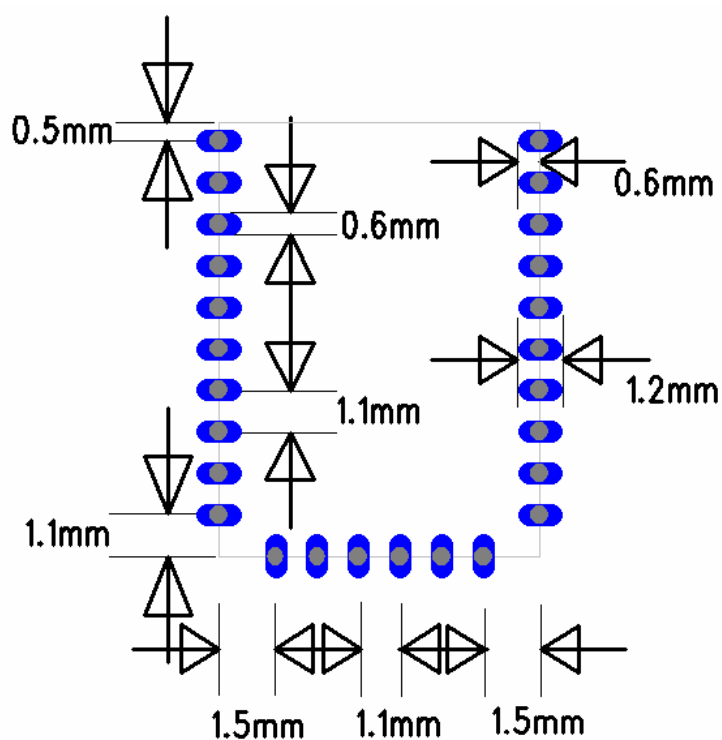
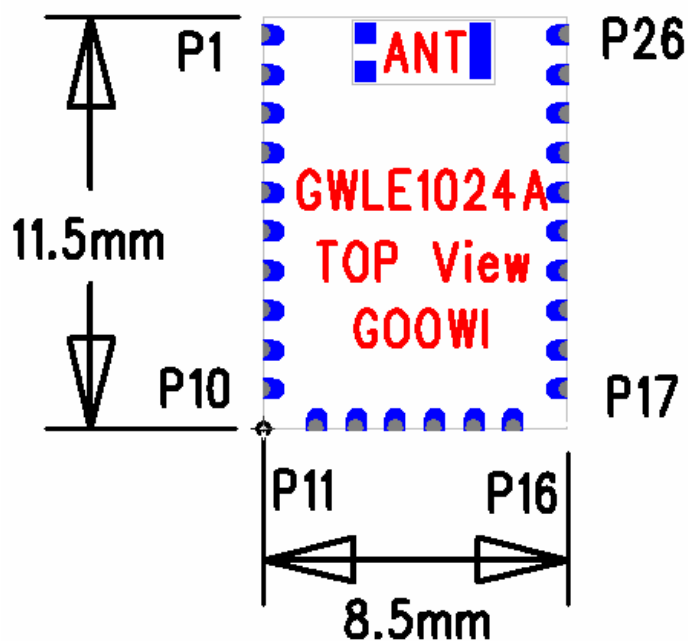
PIO Pin	Digital Microphone	I <sup>2</sup> S	I <sup>2</sup> C Master Only	SPI		Debug SPI	H4 UART		Quadrature Decoder Input <sup>(1)</sup>		LCD		LED/PWM <sup>(2)</sup>	KeyScan		IR Encoder (Output)	GSIU					Radio		TMRCTR	
				Slave Only	Inc Master		Data	Flow	A	B	Common	Segment		Drive	Sense		TX	RX	EXT TMR CTR	ANA MON CLK	EXT CLK OUT	RX ADC (SDORC)	TX Data Buffer	Timer 0	Timer 1
PIO[14]	MIC_DATA_IN	-	SCL	CLK, CS, SDA	DATA	-	TX	RTS	Y	Y	COM2	Y	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y	Y
PIO[13]	MIC_CLK_OUT	QS_WS	SDA	CLK, CS, SDA	DATA	-	RX	CTS	Y	Y	COM1	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y	Y	Y
PIO[12]	MIC_DATA_IN	QS_CLK	SCL	CLK, CS, SDA	DATA	-	TX	RTS	Y	Y	COM0	3	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y	Y
PIO[11]	MIC_CLK_OUT	QS_DATA	SDA	CLK, CS, SDA	DATA	-	RX	CTS	Y	Y	COM3	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y	Y	Y
PIO[10]	MIC_DATA_IN	-	SCL	CLK, CS, SDA	DATA	-	TX	RTS	Y	Y	COM2	Y	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y	Y
PIO[9]	MIC_CLK_OUT	-	SDA	CLK, CS, SDA	DATA	-	RX	CTS	Y	Y	COM1	Y	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y	Y
PIO[8]	MIC_DATA_IN	-	SCL	CLK, CS, SDA	DATA	-	TX	RTS	Y	Y	COM0	2	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y	Y
PIO[7]	MIC_CLK_OUT	QS_WS	SDA	CLK, CS, SDA	DATA	-	RX	CTS	Y	Y	COM3	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y	Y	Y
PIO[6]	MIC_DATA_IN	QS_CLK	SCL	CLK, CS, SDA	DATA	-	TX	RTS	Y	Y	COM2	Y	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y	Y
PIO[5]	MIC_CLK_OUT	QS_DATA	SDA	CLK, CS, SDA	DATA	-	RX	CTS	Y	Y	COM1	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y	Y	Y
PIO[4]	MIC_DATA_IN	-	SCL	CLK, CS, SDA	DATA	-	TX	RTS	Y	Y	COM0	1	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y	Y
PIO[3]	MIC_CLK_OUT	QS_WS	SDA	CLK, CS, SDA	DATA	Y	RX	CTS	Y	Y	COM3	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y	Y	Y
PIO[2]	MIC_DATA_IN	QS_CLK	SCL	CLK, CS, SDA	DATA	Y	TX	RTS	Y	Y	COM2	Y	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y	Y
PIO[1]	MIC_CLK_OUT	QS_DATA	SDA	CLK, CS, SDA	DATA	Y	RX	CTS	Y	Y	COM1	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y	Y	Y
PIO[0]	-	-	SCL	CLK, CS, SDA	DATA	Y	TX	RTS	Y	Y	COM0	0	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y	Y

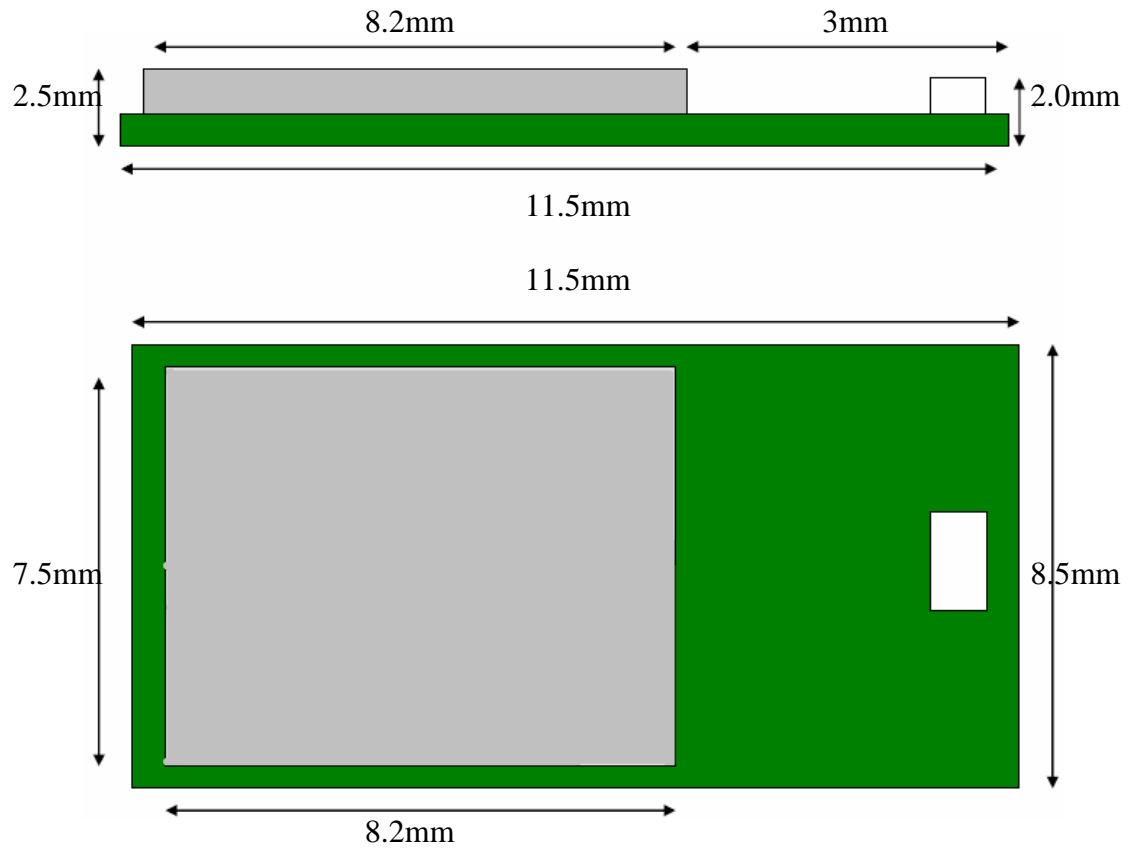
**Notes:**

<sup>(1)</sup> Quadrature Decoder input A and B both require 4 PIOs to be assigned.

<sup>(2)</sup> LED/PWM require 5 PIOs to be assigned to access all functionality.

## Mechanical Dimension

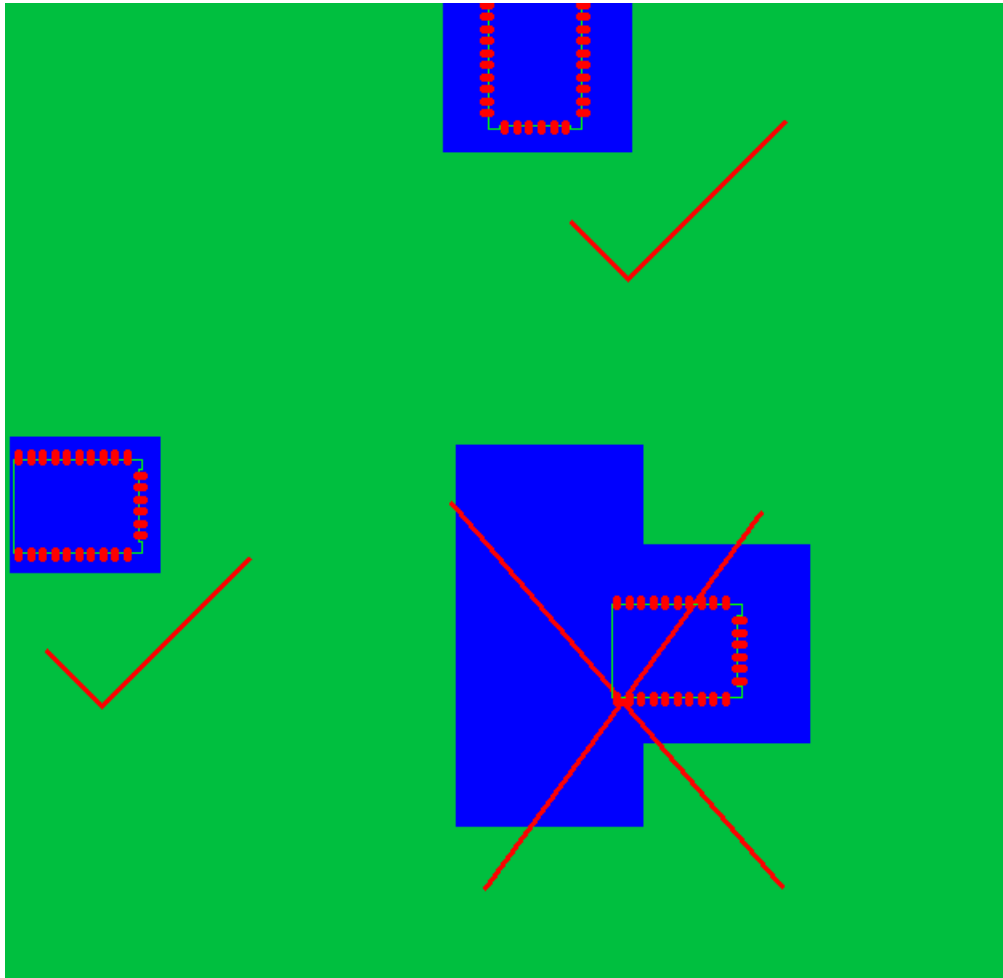




## PCB Layout Guidelines

Here we mainly describe the RF part layout consideration.

### Placement of the module and antenna



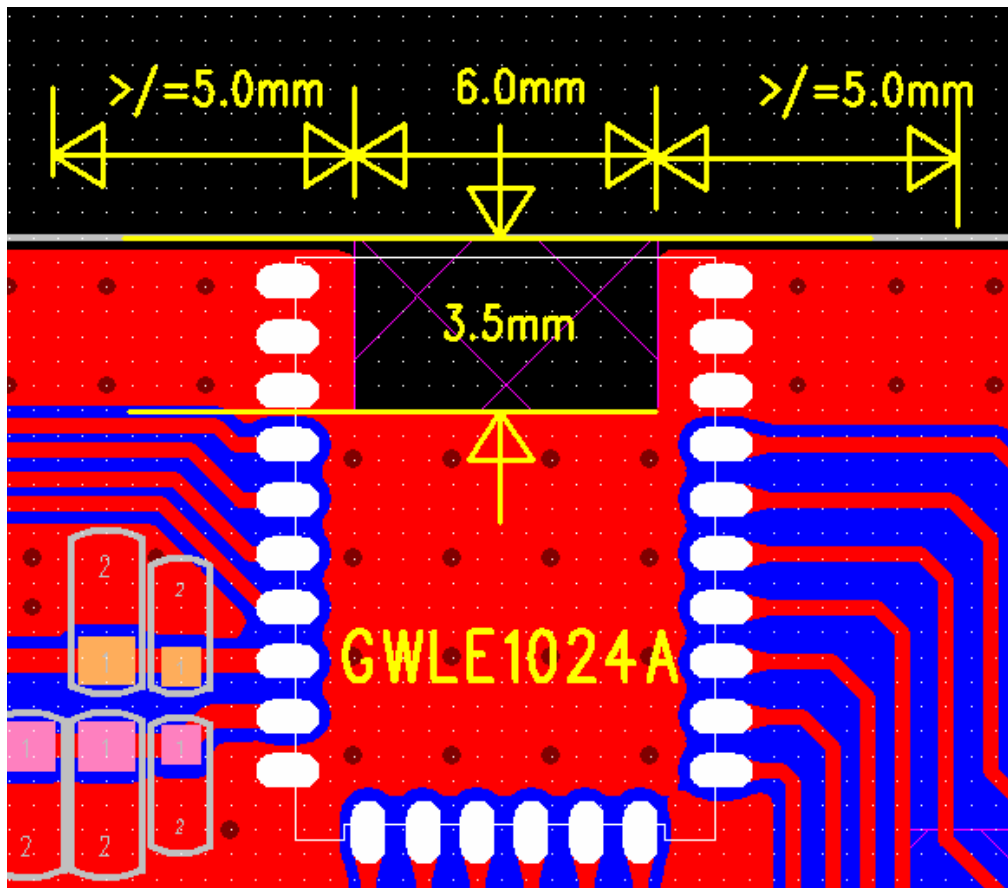
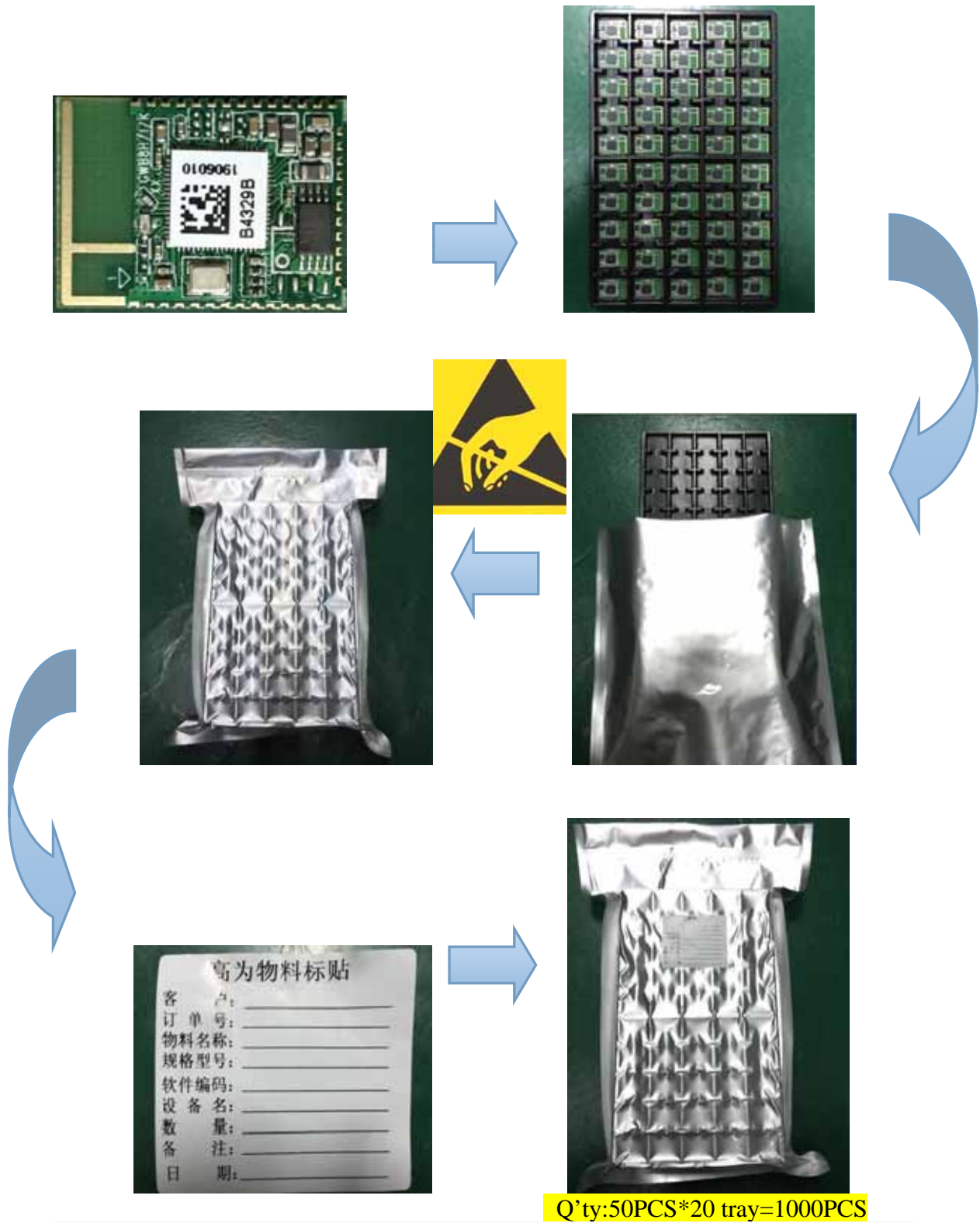


Figure 1: Example layout

The following list is aimed to avoid EMC problems caused by RF part of the module.

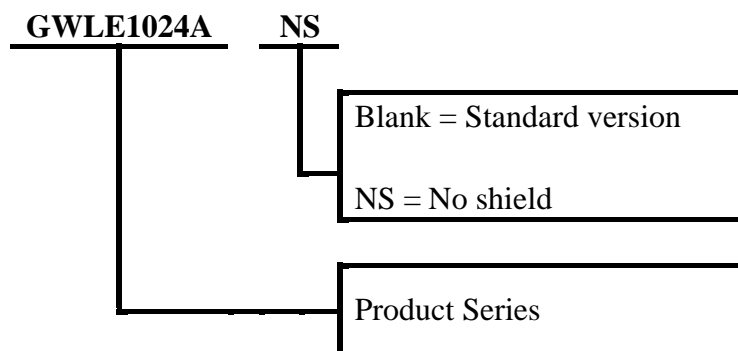
- Do not remove copper from the PCB more than needed. Use ground filling as much as possible. However remove small floating islands after copper pour.
- Do not place a ground plane underneath the antenna. The grounding areas under the module should be designed as shown in Figure 1.
- When using overlapping ground areas use conductive vias separated max. 3 mm apart at the edge of the ground areas. This prevents RF to penetrate inside the PCB. Use ground vias extensively all over the PCB. All the traces in (and on) the PCB are potential antennas.
- Avoid loops.
- Ensure that signal lines have return paths as short as possible. With sensitive analog signals, such as analog audio, use solid ground plane and make sure that the return path for the signal lines is low impedance and follows the signal lines all the way.

## Package



Pumping air into vacuum state, anti-static packaging (This photos are for reference only)

# Ordering Information



## Document Reference

Document	Reference,Date
BlueCore5 Charger Description and Calibration Procedure Application Note	CS-113282-ANP,2007
CSR1024 LGA Data Sheet	CS-304306-DS-3
Core Specification of the Bluetooth System	V4.0, 17 December 2009
GooWi GWLE1024A reference schematic	GWLE1024A