

AIROC™ Bluetooth® LE module

General description

The CYW20822-P4xxI040 is a fully integrated Bluetooth® LE wireless module. The CYW20822-P4xxI040 includes an onboard crystal oscillator, passive components, flash memory, and the CYW20822 silicon device.

The CYW20822-P4xxI040 supports peripheral functions (ADC and PWM), UART, I²C, and SPI communication, and a PDM interface. The CYW20822-P4xxI040 includes a royalty-free Bluetooth® stack compatible with Bluetooth® 5.0 core spec in a 20.2 × 10.5 × 2.3 mm package.

The CYW20822-P4xxI040 includes 1 MB of embedded flash memory and is pre-loaded with EZ-Serial firmware.

The CYW20822-P4xxI040 is fully qualified by Bluetooth® SIG and is targeted at applications requiring cost-optimized Bluetooth® wireless connectivity.

The CYW20822-P4xxI040 is offered in two certified versions: CYW20822-P4TAI040 and CYW20822-P4EPI040. The CYW20822-P4TAI040 includes an integrated trace antenna. The CYW20822-P4EPI040 supports an external antenna through a RF solder pad output.

Module description

- Module size: 20.2 × 10.5 × 2.3 mm
- Bluetooth® 5.0 core spec qualified module
 - QDID: TBD
 - Declaration ID: TBD
- Certified to FCC, ISED, MIC, and CE regulations
- Castelated solder pad connections for ease-of-use
- 1-MB embedded on-module serial flash memory
- Up to 12 GPIOs
- Temperature range: -45°C to +85°C
- 16-MHz Arm® Cortex®-M0 microcontroller unit MCU
- Maximum TX output power
 - +4 dBm for Bluetooth® Low Energy
 - Bluetooth® LE connection range of up to 250 meters at 4 dBm^[1]
- RX sensitivity:
 - Bluetooth® Low Energy: -101 dBm @ 125 kbps

Power consumption

- Bluetooth® LE current consumption
 - RX current: 1.3 mA @ -95 dBm
 - TX current: 3 mA @ 0 dBm
 - Retention: 2 µA @ 32 KB RAM
 - Hibernation: 0.8 µA

Note

1. Connection range tested module-to-module in full line-of-sight environment, free of obstacles or interference sources with output power of +4 dBm @ 125 kbps. Actual range will vary based on end product design, environment, receive sensitivity, and transmit output power of the central device.

Functional capabilities

Functional capabilities

- 8 × 16-bit PWMs
- 12 × GPIOs
- Quadrature decoder
- Analog comparator
- 2× peripheral UART
- 2× SPI
- 2× I2C
- ADC (10-bit application ADC with one differential input or three single-ended inputs)
- Hardware security engine

Benefits

CYW20822-P4xxI040 provides all necessary components required to operate Bluetooth® LE communication standards.

- Proven ready-to-use hardware design
- Cost optimized for applications without space constraints
- Nonvolatile memory for self-sufficient operation and over-the-air updates
- Bluetooth® SIG listed with QDID and declaration ID
- Fully certified module eliminates the time needed for design, development, and certification processes
- Pre-loaded EZ-Serial firmware provides an easy-to-use command interface to configure and use the module

More information

Infineon provides a wealth of data at www.infineon.com to help you to select the right module for your design, and to help you to quickly and effectively integrate the module into your design.

References

- Overview: [AIROC™ Bluetooth® LE & Bluetooth® portfolio](#), [Module portfolio](#)
- Development kits:
- CYW920822M2P4TAI040-EVK, CYW20822-P4TAI040 evaluation board
 - CYW920822M2P4EPI040-EVK, CYW20822-P4EPI040 evaluation board
- EZ-Serial firmware:
 - User guide of EZ-Serial firmware for CYW20822-P4xxI040
- Knowledge base articles
 - [KBA97095](#) - EZ-Bluetooth® LE module placement
 - [KBA213976](#) - FAQ for Bluetooth® LE and regulatory certifications with EZ-BLE modules
 - [KBA210802](#) - Queries on Bluetooth® LE qualification and declaration processes
 - [KBA218122](#) - 3D Model Files for EZ-BLE/EZ-BT modules

Technical support

Technical support

- **Infineon community:** Whether you are a customer, partner, or a developer interested in the latest innovations, the developer community offers you a place to learn, share, and engage with both Infineon experts and other embedded engineers around the world.
- Visit our **support** page and contact a **local sales representatives**. If you are in the United States, you can talk to our technical support team by calling our toll-free number: +1-800-541-4736. Select option 2 at the prompt.

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1 Overview

1.1 Functional block diagram

Figure 1 illustrates the CYW20822-P4xxI040 functional block diagram.

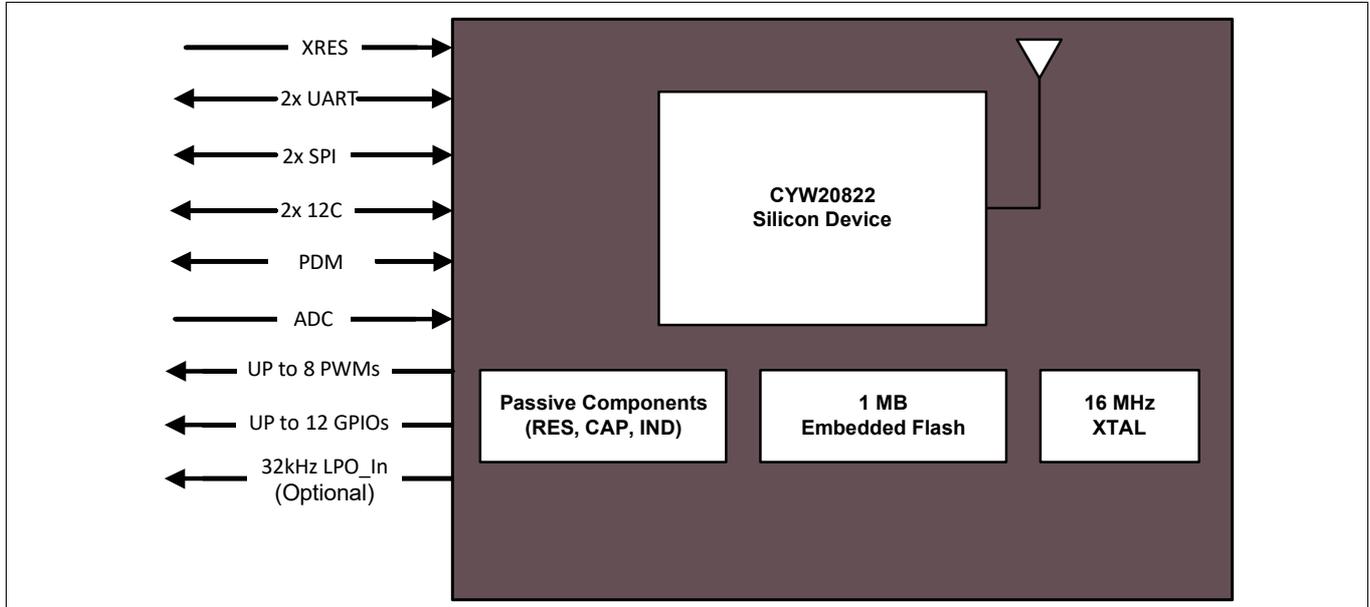


Figure 1 Functional block diagram (GPIOs)

1.2 Module description

The CYW20822-P4xxI040 module is a complete module designed to be soldered to the application’s main board.

1.2.1 Module dimensions and drawing

Infineon reserves the right to select components from various vendors to achieve the Bluetooth® module functionality. Such selections will still guarantee that all mechanical specifications and module certifications are maintained. Designs should be held within the physical dimensions shown in the mechanical drawings in Figure 2. All dimensions are in millimeters (mm).

Table 1 Module design dimensions

Dimension item		Specification
Module dimensions	Length (X)	10.5 ± 0.15 mm
	Width (Y)	20.2 ± 0.15 mm
Antenna connection location dimensions	Length (X)	10.6 mm
	Width (Y)	6.35 mm
PCB thickness	Height (H)	0.80 ± 0.05 mm
Shield height	Height (H)	1.45-mm typical
Maximum component height	Height (H)	1.45-mm typical
Total module thickness (bottom of module to highest component)	Height (H)	2.3-mm typical

Overview

See **Figure 2** for the mechanical reference drawing for CYW20822-P4xxI040.

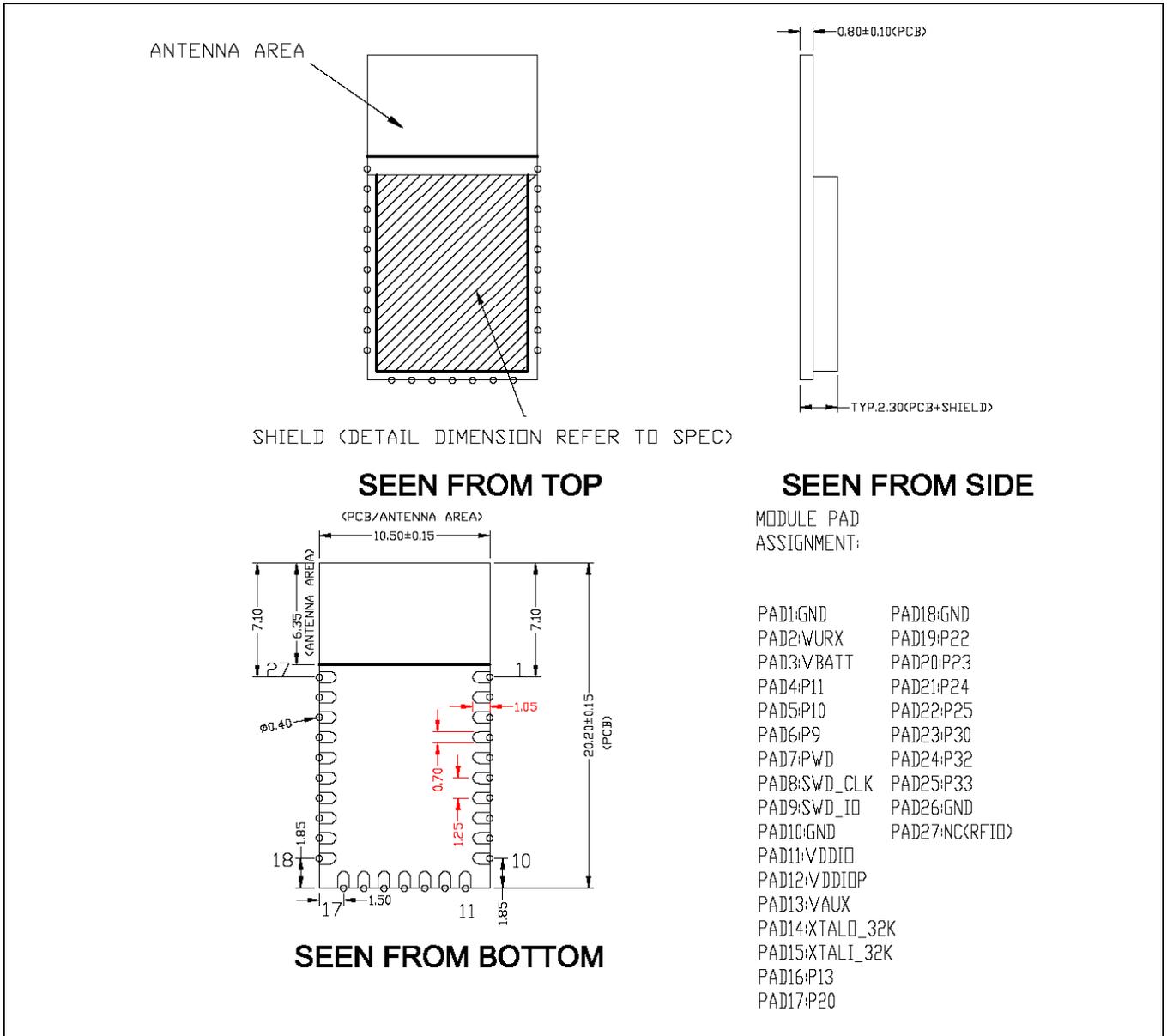


Figure 2 **Module mechanical drawing**

2 Pad connection interface

As shown in the bottom view of **Figure 2**, the CYW20822-P4xxI040 connects to the host board via solder pads on the backside of the module. **Table 2** and **Figure 3** detail the solder pad length, width, and pitch dimensions of the CYW20822-P4xxI040 module.

Table 2 Connection description

Part number	Name	Connections	Connection type	Pad length dimension	Pad width dimension	Pad pitch
CYW20822-P4TAI040	SP	27	Solder pads	1.05 mm	0.7 mm	1.25 mm
CYW20822-P4EPI040	SP	27	Solder pads	1.05 mm	0.7 mm	1.25 mm

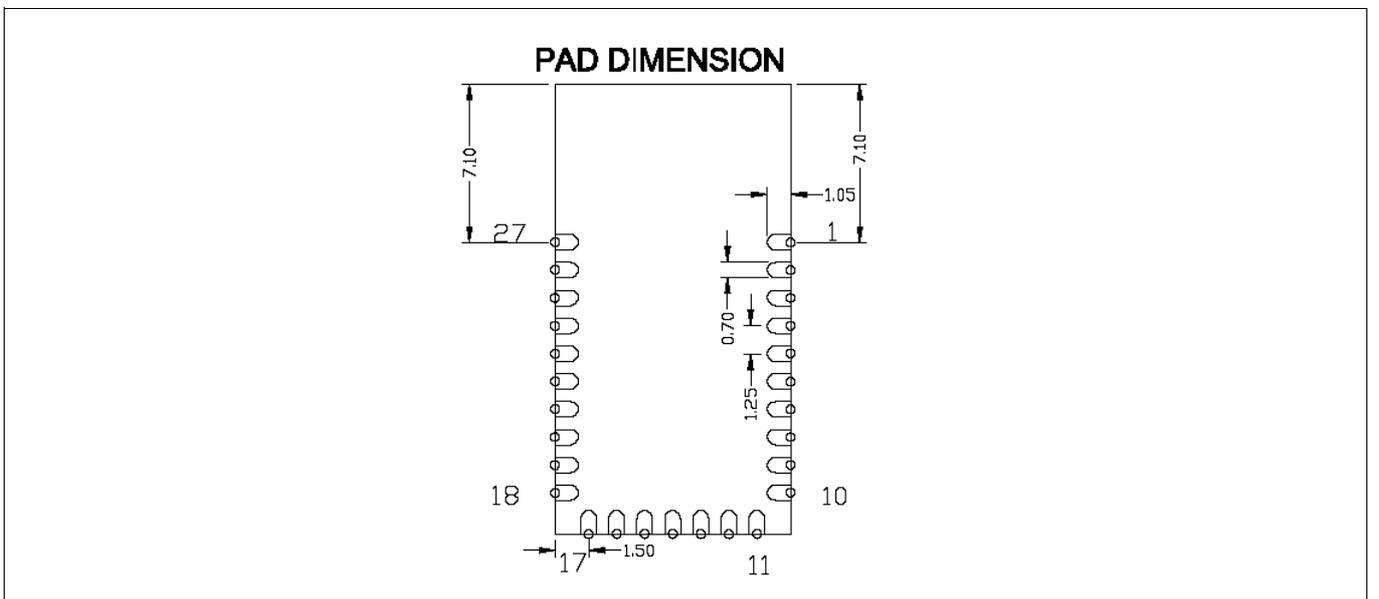


Figure 3 Solder pad dimensions (seen from bottom)

To maximize RF performance, the host layout should follow these recommendations:

1. Antenna Area Keepout: The host board directly below the antenna area of the module (see **Figure 2**) must not contain ground or signal traces. This keepout area requirement applies to all layers of the host board.
2. Module Placement: The ideal placement of the Bluetooth® module is in a corner of the host board with the PCB trace antenna located at the far corner. This placement minimizes the additional recommended keepout area stated in item 2. Refer to **AN96841** for module placement best practices.

Pad connection interface

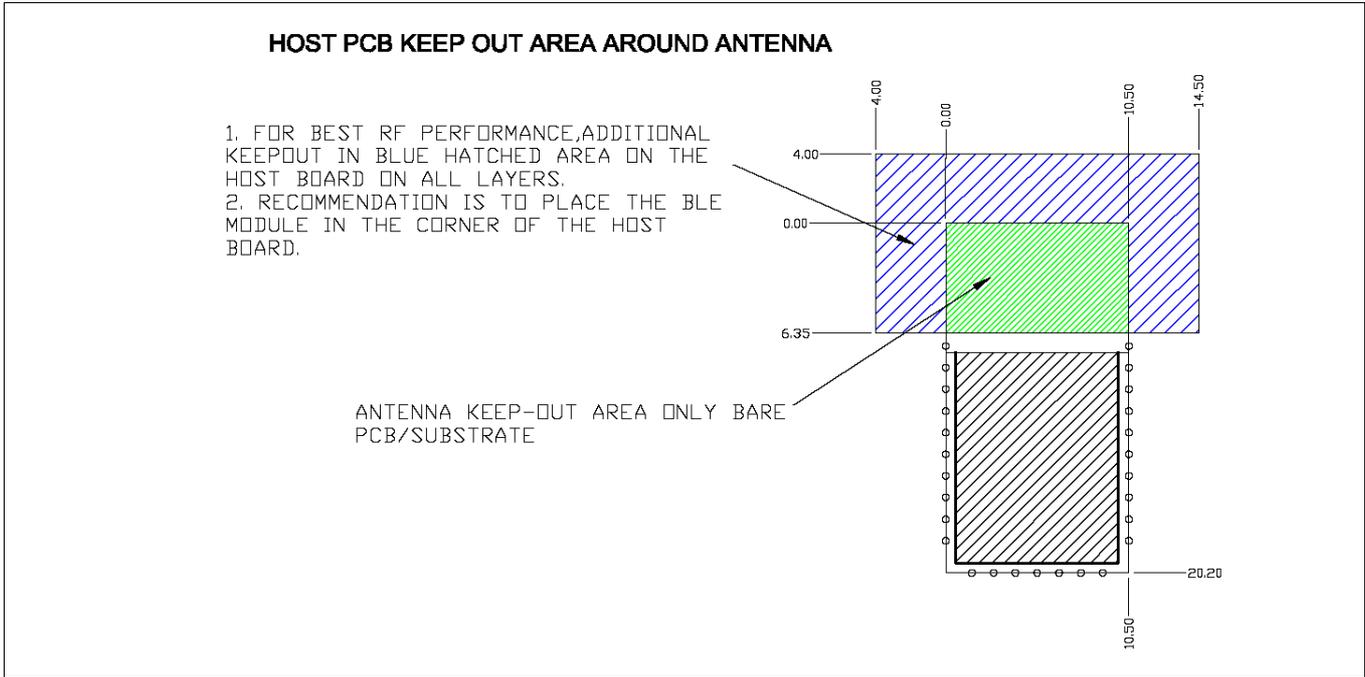


Figure 4 Recommended host PCB keepout area around the CYW20822-P4xxI040 antenna

3 Recommended host PCB layout

Figure 5, Figure 6, Figure 7, and Table 3 provide details that can be used for the recommended host PCB layout pattern for the CYW20822-P4xxI040. Dimensions are in millimeters unless otherwise noted. Pad length of 1.26 mm (0.64 mm from center of the pad on either side) shown in Figure 4 is the minimum recommended host pad length. The host PCB layout pattern can be completed using either Figure 5, Figure 6, or Figure 7. It is not necessary to use all figures to complete the host PCB layout pattern.

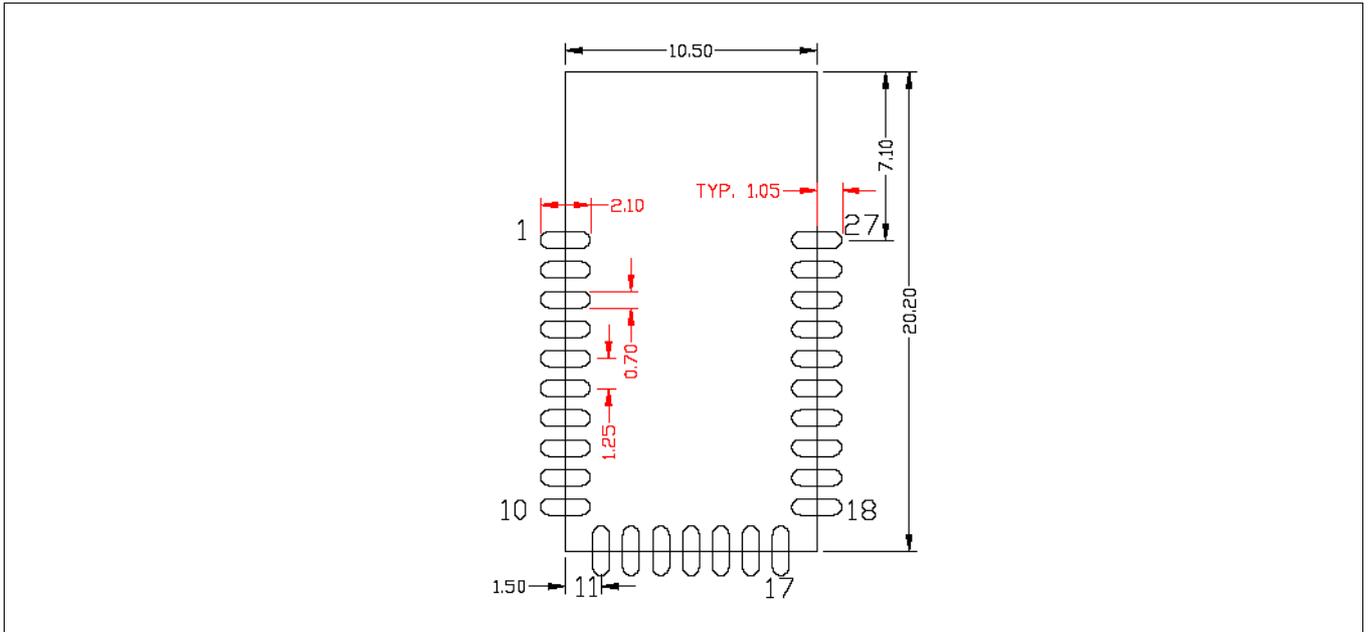


Figure 5 CYW20822-P4xxI040 host layout (dimensioned)

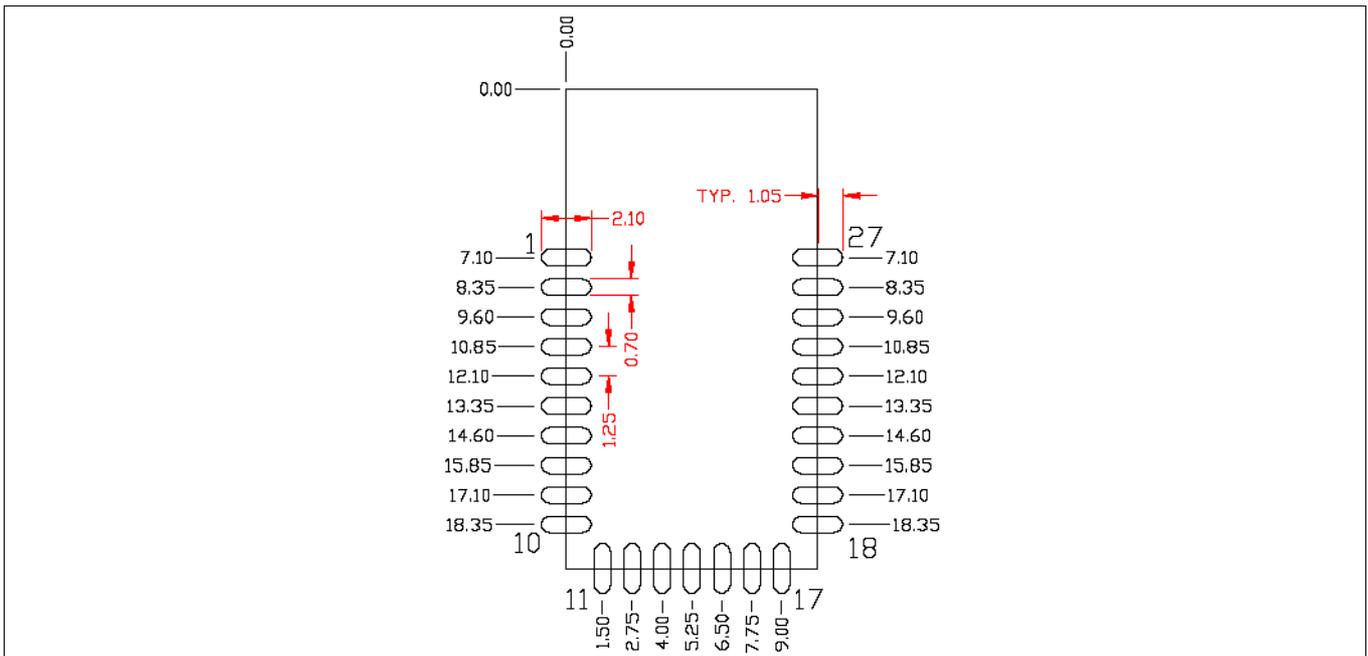


Figure 6 CYW20822-P4xxI040 host layout (relative to origin)

Recommended host PCB layout

Table 3 provides the center location for each solder pad on the CYW20822-P4xxI040. All dimensions are referenced to the center of the solder pad. Refer to **Figure 7** for the location of each module solder pad.

Table 3 **Module solder pad location**

Solder pad (Center of pad)	Location (X,Y) from Origin (mm)	Dimension from Origin (mil)
1	(0, 7.10)	(0, 279.53)
2	(0, 8.35)	(0, 328.74)
3	(0, 9.6)	(0, 377.95)
4	(0, 10.85)	(0, 427.16)
5	(0, 12.10)	(0, 476.38)
6	(0, 13.35)	(0, 525.59)
7	(0, 14.60)	(0, 574.80)
8	(0, 15.85)	(0, 624.01)
9	(0, 17.10)	(0, 673.23)
10	(0, 18.35)	(0, 722.44)
11	(1.5,20.20)	(59.06, 795.27)
12	(2.75,20.20)	(108.27, 795.27)
13	(4.00,20.20)	(157.48, 795.27)
14	(5.25,20.20)	(206.69, 795.27)
15	(6.50,20.20)	(255.91, 795.27)
16	(7.75,20.20)	(305.12, 795.27)
17	(9.00,20.20)	(354.33, 795.27)
18	(10.5,18.35)	(413.39, 722.44)
19	(10.5,17.10)	(413.39, 673.23)
20	(10.5,15.85)	(413.39, 624.01)
21	(10.5,14.60)	(413.39, 574.80)
22	(10.5,13.35)	(413.39, 525.59)
23	(10.5,12.10)	(413.39, 476.38)
24	(10.5,10.85)	(413.39, 427.16)
25	(10.5,9.6)	(413.39, 377.95)
26	(10.5,8.35)	(413.39, 328.74)
27	(10.5,7.10)	(413.39, 279.53)

Recommended host PCB layout

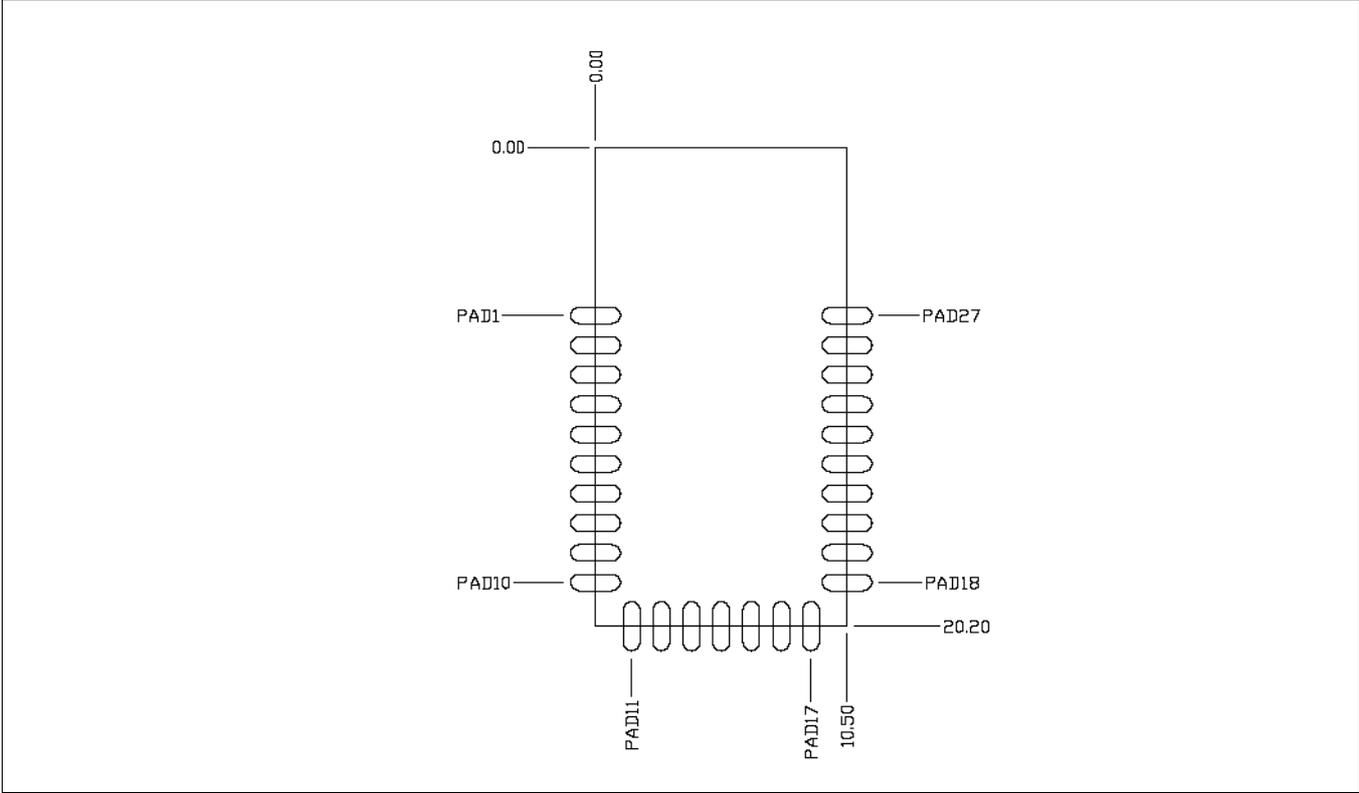


Figure 7 Solder pad reference location

4 Functional description

The CYW20822-P4XXI040 module is based on the CYW20822 SoC, which includes a Bluetooth® 5 solution and an RF wakeup receiver. The block diagram of the CYW20822-P4XXI040 module is shown in **Figure 8**.

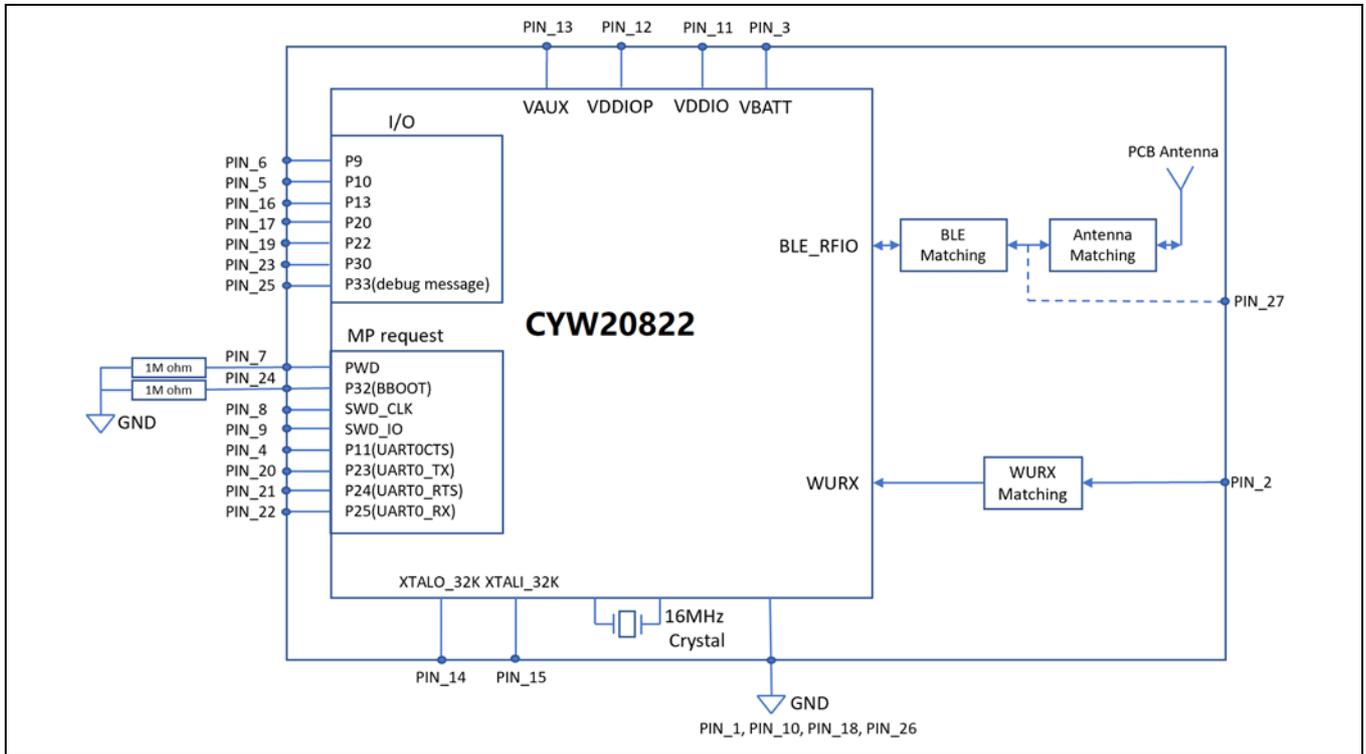


Figure 8 Module block diagram

4.1 Power management

The power management unit provides I/O power supplies to the CYW20822 module. PMU generates power supply outputs: VDDIOP, and an auxiliary supply VAUX used internally by the PMU (refer to **Table 4**).

Table 4 PMU external pins

Pin	Description
V _{BATT}	Battery input. Battery voltages from 1.1 V to 3.3 V can be used. Must be connected to a battery or external supply.
V _{DDIOP}	V _{DDIOP} is PMU generated 1.8-V IO supply output.
V _{AUX}	Auxiliary supply output of typical value 3.2 V, used internally by the PMU.
V _{DDIO}	Power supply input for digital and analog I/O circuits.

The PMU provides multiple brownout interrupts to enable more reliable operation.

Functional description

4.1.1 PMU configurations

Configure the PMU correctly to ensure correct operation. The following modes of operation are supported by the PMU:

- One external power supply or battery with external I/O supply:
- For applications that cannot support fixed 1.8 V I/O supply (see **Figure 9**).
 - Connect VBATT to VDDIO
 - Connect VAUX to VDDIOP
 - Disable I/O supply generation

GPIO voltage = VBATT
 VBATT min = 1.8 V
 VBATT max = 3.3 V

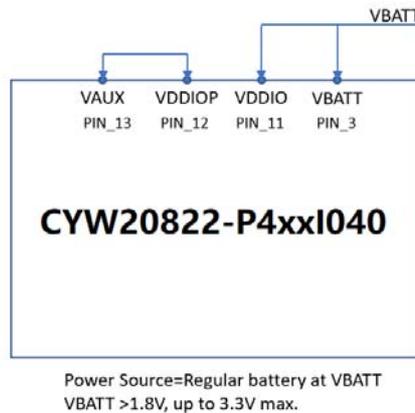


Figure 9 Regular battery, External I/O supply

- One external power supply or battery with internally generated I/O supply:
- For applications that can use a fixed 1.8 V I/O supply for better power consumption or VBATT ≤ 1.8 V (see **Figure 10**).
 - Connect VDDIOP to VDDIO

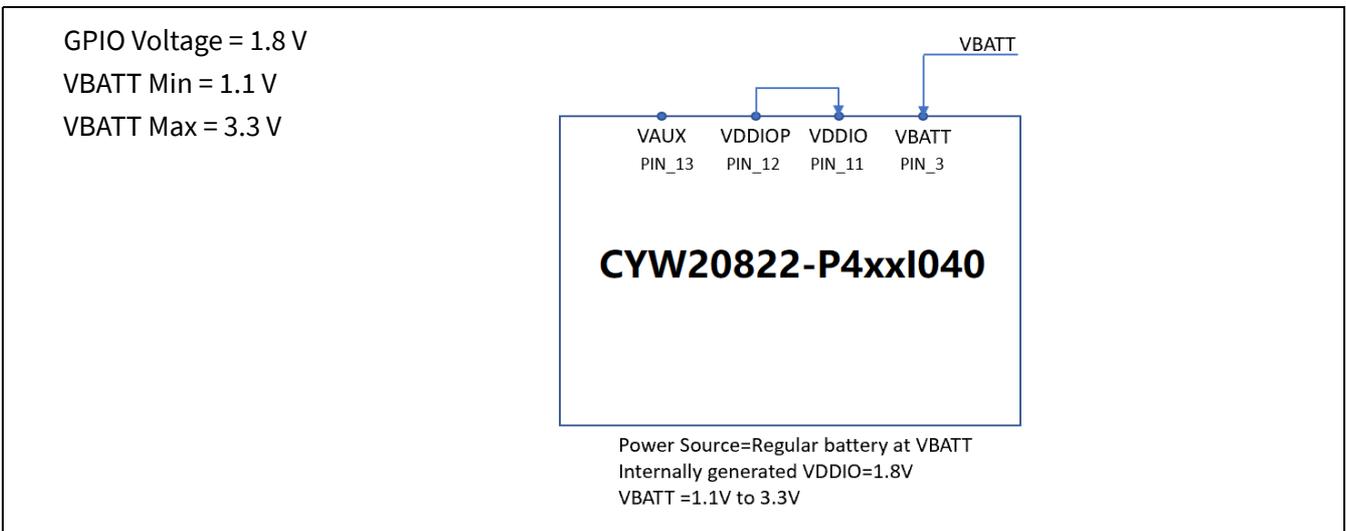


Figure 10 Regular battery, Internal I/O supply

5 Pin assignments

5.1 CYW20822-P4XXI040 module pinout

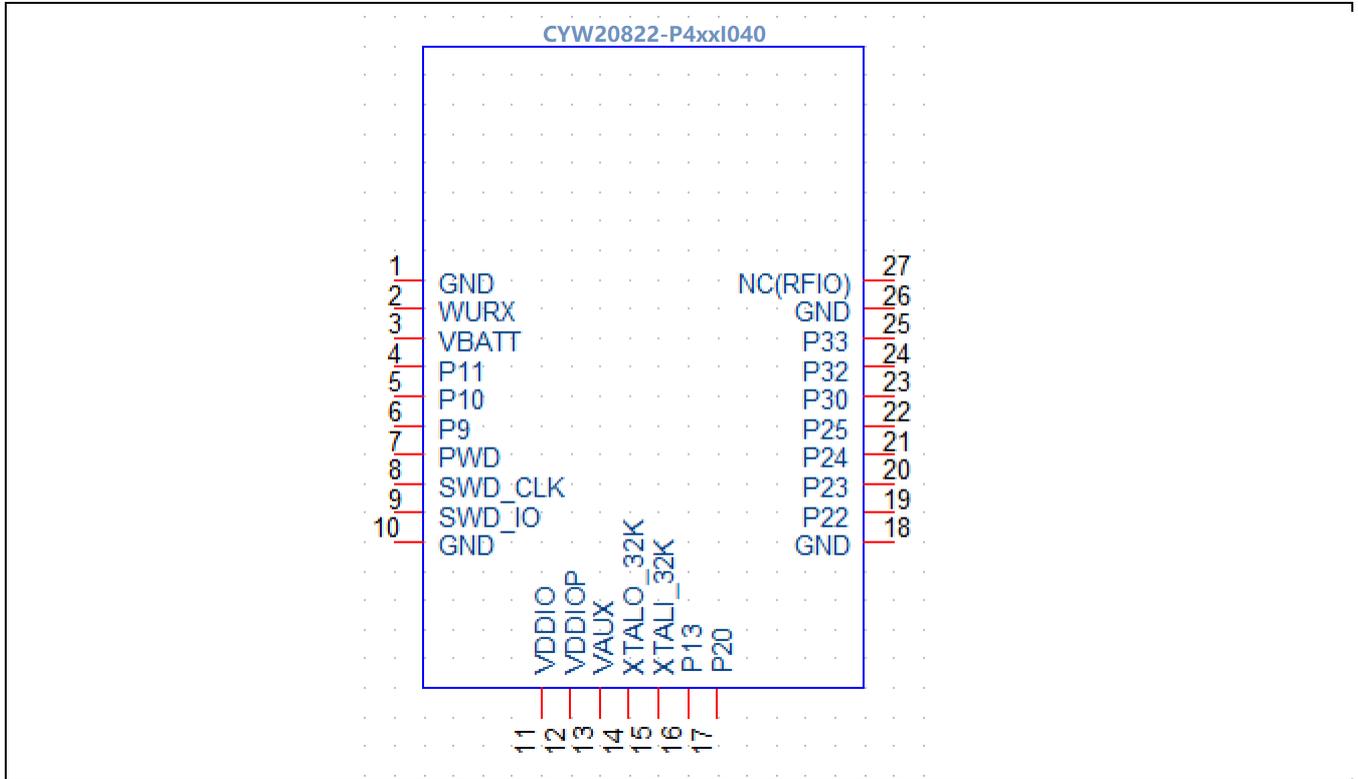


Figure 11 Module pin definition

Table 5 Pin type definitions

Pin Type	Definition
I/O	Signal Input Output
RF	Radio Frequency
PWR	Power supply
A	Analog
NC	No connection, must be open
GND	Ground

Pin assignments

Table 6 CYW20822-P4XXI040 module pin description

Pin Number	Name	Type	Description
1	GND	PWR	Ground reference
2	WURX	RF	Wakeup receiver RF input
3	VBATT	PWR	Battery supply
4	P11	I/O	Programmable Digital I/O ADC Input The default definition is UART0_CTS.
5	P10	I/O	Programmable Digital I/O ADC Input The default definition is SPIO_CS.
6	P9	I/O	Programmable Digital I/O ADC Input The default definition is I2C0_SCK.
7	PWD	I/O	Power Down Input (Active High) Must connect to a 1 MΩ pull-down resistor.
8	SWD_CLK	I/O	Serial wire debug clock
9	SWD_IO	I/O	Serial wire debug data
10	GND	PWR	Ground reference
11	VDDIO	PWR	Digital I/O power supply input
12	VDDIOP	PWR	1.8 V I/O power supply output generated by switcher, connected to VAUX if unused
13	VAUX	PWR	Reserved for switching regulator internal use
14	XTALO_32k	A	32.768 kHz crystal oscillator output
15	XTALI_32k	A	32.768 kHz crystal oscillator input
16	P13	I/O	Programmable Digital I/O The default definition is SPIO_MISO.
17	P20	I/O	Programmable Digital I/O The default definition is SPIO_CLK.
18	GND	PWR	Ground reference
19	P22	I/O	Programmable Digital I/O The default definition is SPIO_MOSI.
20	P23	I/O	Programmable Digital I/O The default definition is UART0_TX.
21	P24	I/O	Programmable Digital I/O The default definition is UART0_RTS.
22	P25	I/O	Programmable Digital I/O The default definition is UART0_RX.
23	P30	I/O	Programmable Digital I/O The default definition is I2C0_SDA.
24	P32	I/O	Programmable Digital I/O BBoot , must connect to a 1 MΩ pull-down resistor.
25	P33	I/O	Programmable Digital I/O The default definition is UART1_TX, to provide SW debug message output
26	GND	PWR	Ground reference
27	NC (RFIO)	NC	No connection Reserved for 2.4 GHz Single-ended RF I/O for Bluetooth radio external antenna connection (50 Ω).

6 Electrical characteristics

Table 7 Maximum electrical ratings

Parameter	Description	Min	Typ	Max	Unit
V _{BATT}	Battery supply ^[2]	-0.2	-	3.4	V
V _{DDIO}	I/O supply	-0.2	-	3.4	V
V _{IO}	I/O pin	-0.2	-	3.4	V
T _{STORE}	Storage temperature	-40	-	+85	°C

Table 8 Recommended operating conditions

Parameter	Description	Min	Typ	Max	Unit
V _{DDIO}	I/O supply	1.7	1.8	3.3	V
V _{BATT}	Battery supply	1.1 ^[3]	-	3.3	V
V _{PP25}	OTP programming voltage ^[4]	2.3	2.5	2.7	V
V _{IO}	I/O pin	-0.2		V _{DDIO} + 0.2	V
	Crystal Osc - 32.768 kHz	-500		500	ppm
T _J	Operating junction temperature	-40	25	+85	°C

Table 9 GPIO characteristics

Parameter	Description	Min	Typ	Max	Unit
V _{IH}	Input	V _{IO} -0.5	V _{IO}	V _{IO}	V
V _{IL}	Input	-0.2	0	0.2	
V _{OH}	Output (2-mA load)	-	V _{IO} -0.2	-	
V _{OL}	Output (2-mA load)	-	0.2	-	

Table 10 Power consumption

Parameter	Conditions	Min	Typ	Max	Unit
Active RX	Sensitivity at -95 dBm	-	1	-	mA
Active TX @ 4 dBm	Output power at 4 dBm	-	4	-	mA
Active TX @ 0 dBm	Output power at 0 dBm	-	2.5	-	μA
Active TX @ -10 dBm	Output power at -10 dBm	-	1.4	-	mA
Retention (32-KB RAM)	1-second connection interval in low power idle mode	-	2	-	μA
Hibernation	-	-	0.8	-	μA

Notes

2. VBATT minimum slew rate is 0.3 V/ms.
3. VBATT minimum supply after boot is 1.0 V.
4. VPP25 is physically connected to VDDIO. Set VDDIO to within VPP25 range when programming the OTP.

Electrical characteristics

Table 10 **Power consumption** *(continued)*

Parameter	Conditions	Min	Typ	Max	Unit
Hibernation with Wakeup Receiver		–	0.95	–	μA
SoC off		–	300	–	μA

7 Mechanical drawing

7.1 Module dimensions

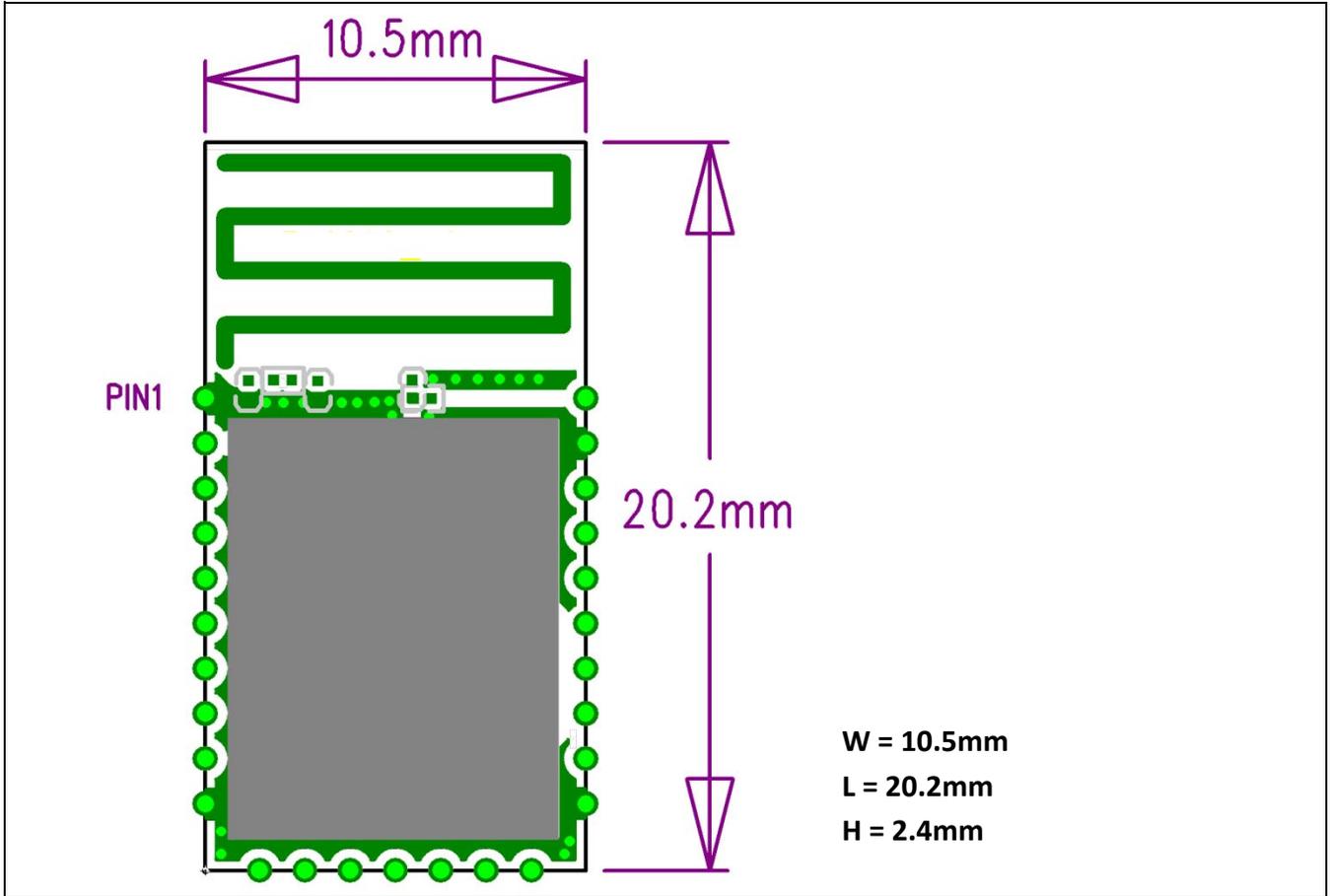


Figure 12 CYW20822-P4XXI040 module with antenna dimensions

7.2 Recommended PCB footprint

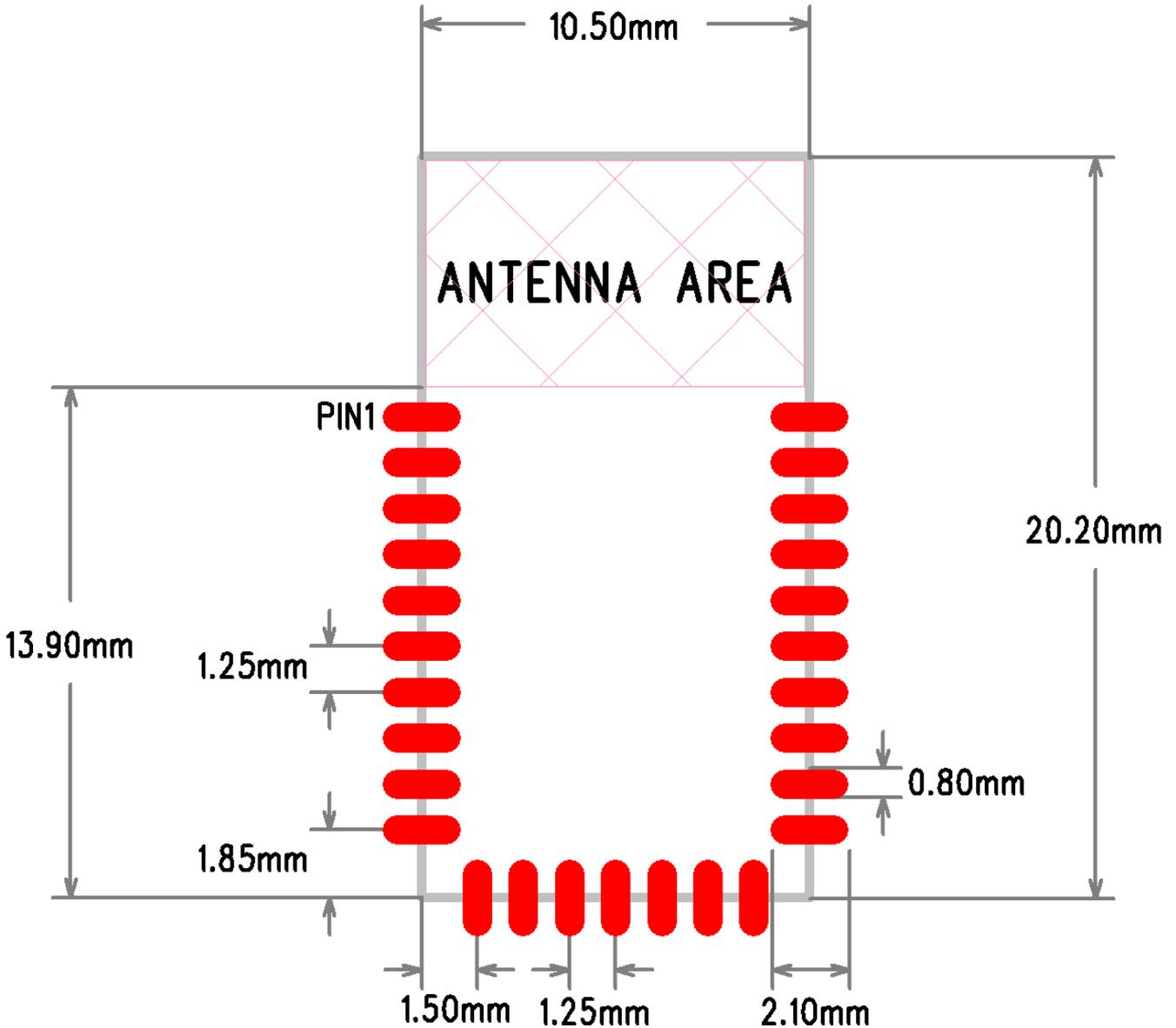


Figure 13 CYW20822-P4XXI040 module - Recommended PCB footprint

Note: The PCB board below the antenna area must be kept empty on all PCB layers to avoid affecting the antenna impedance.

8 Antenna Performance

8.1 Trace antenna specifications

Item	Description
Frequency range	2400-2500MHz
Peak gain	4.21-dBi typical
Return loss	10-dB minimum

Trace antenna performance

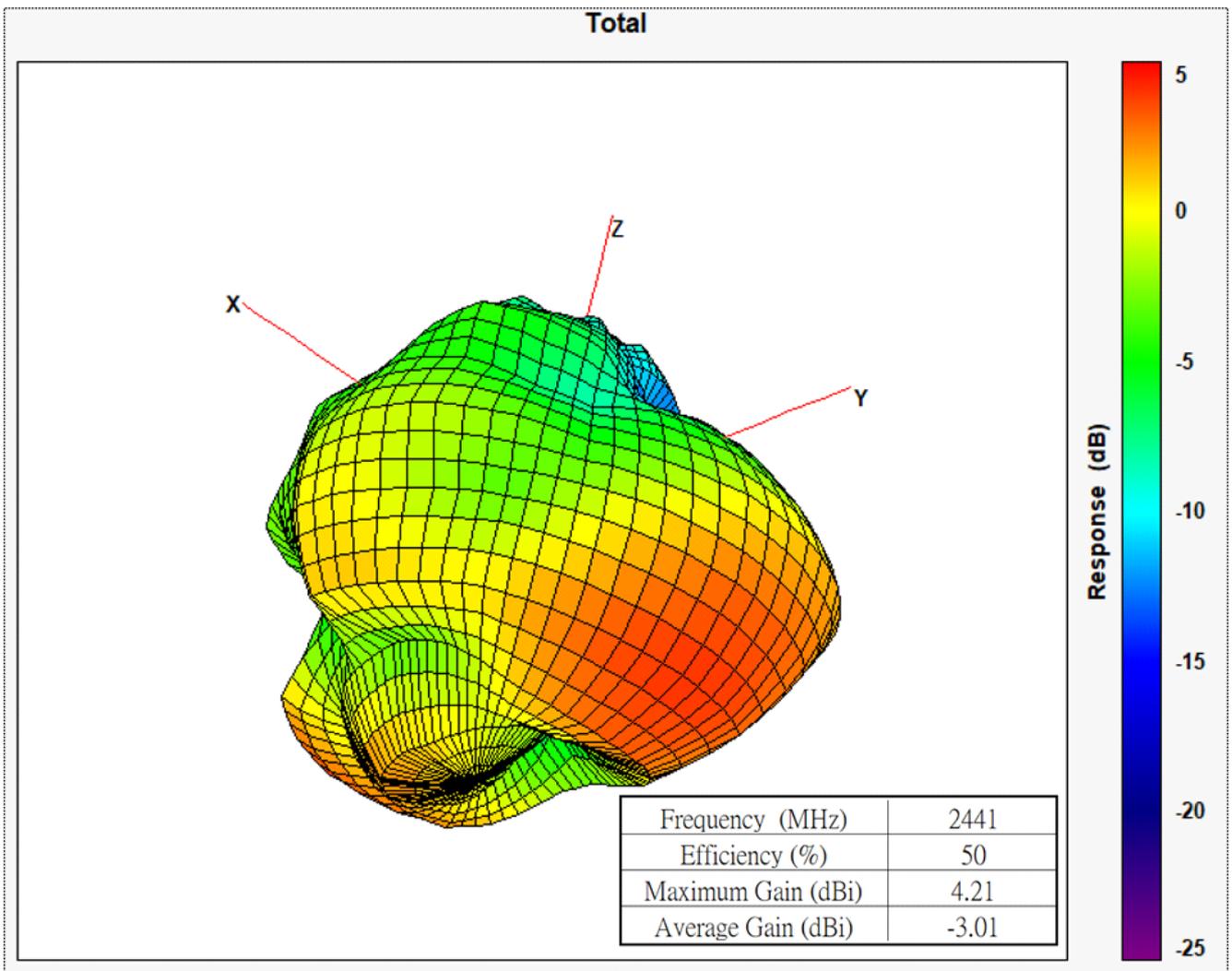


Figure 14 CYW20822-P4XXI040 PCB antenna radiation pattern and characteristics

8.2 External antenna performance: Pulse W1010

Frequency [GHz]	Gain [dBi]	Impedance [Nom]	VSWR	Polarization	Electrical Length	Radiation
2.4 - 2.5	2.0	50 Ω	≤ 2.0	Vertical	1/4, di-pole	Omni

9 Environmental specifications

9.1 Environmental compliance

This CYW20822-P4xxI040 Bluetooth® LE module is produced in compliance with the Restriction of Hazardous Substances (RoHS) and Halogen-Free (HF) directives. The Infineon module and components used to produce this module are RoHS and HF compliant.

9.2 RF certification

The CYW20822-P4xxI040 module will be certified under the following RF certification standards at production release.

- FCC: WAP822I04
- CE
- ISED: 7922A-822I04
- MIC: TBD

9.3 Safety certification

The CYW20822-P4xxI040 module complies with the following safety regulations:

- Underwriters Laboratories, Inc. (UL): Filing E331901
- CSA
- TUV

9.4 Environmental conditions

Table 11 describes the operating and storage conditions for the Bluetooth® LE module.

Table 11 Environmental conditions for CYW20822-P4xxI040

Description	Minimum specification	Maximum specification
Operating temperature	-45°C	85°C
Operating humidity (relative, non-condensation)	5%	85%
Thermal ramp rate	-	3°C/minute
Storage temperature	-40 °C	85°C
Storage temperature and humidity	-	85°C at 85%
ESD: Module integrated into end system components ^[5]	-	15 kV Air 2.0 kV Contact

9.5 ESD and EMI protection

Exposed components require special attention to ESD and electromagnetic interference (EMI).

A grounded conductive layer inside the device enclosure is suggested for EMI and ESD performance. Any openings in the enclosure near the module should be surrounded by a grounded conductive layer to provide ESD protection and a low-impedance path to ground.

Device handling: Proper ESD protocol must be followed in manufacturing to ensure component reliability.

Note

5. This does not apply to the RF pins (ANT).

10 Regulatory information

10.1 FCC

FCC NOTICE:

The device CYW20822-P4xxI040 complies with Part 15 of the FCC Rules. The device meets the requirements for modular transmitter approval as detailed in FCC public Notice DA00-1407. transmitter 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.

CAUTION:

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Infineon may void the user's authority to operate the equipment.

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 module is only FCC authorized for the specific rule FCC 15.247 listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification, final host product requires Part 15 Subpart B compliance testing with the modular transmitter installed.

LABELING REQUIREMENTS:

The Original Equipment Manufacturer (OEM) must ensure that FCC labeling requirements are met. This includes a clearly visible label on the outside of the OEM enclosure specifying the appropriate Infineon FCC identifier for this product as well as the FCC Notice above. The FCC identifier is FCC ID: WAP822I04.

In any case the end product must be labeled exterior with "Contains FCC ID: WAP822I04".

ANTENNA WARNING:

This device is tested with a standard SMA connector and with the antenna listed in [Table 7](#). When integrated in the OEMs product, these fixed antennas require installation preventing end-users from replacing them with non-approved antennas. Any antenna not in the following table must be tested to comply with FCC Section 15.203 for unique antenna connectors and Section 15.247 for emissions.

Regulatory information**RF EXPOSURE:**

To comply with FCC RF Exposure requirements, the Original Equipment Manufacturer (OEM) must ensure to install the approved antenna in the previous.

The preceding statement must be included as a CAUTION statement in manuals, for products operating with the approved antenna in **Table 7**, to alert users on FCC RF Exposure compliance. Any notification to the end user of installation or removal instructions about the integrated radio module is not allowed.

The radiated output power of CYW20822-P4xxI040 with the trace antenna is far below the FCC radio frequency exposure limits. Nevertheless, use CYW20822-P4xxI040 in such a manner that minimizes the potential for human contact during normal operation.

End users may not be provided with the module installation instructions. OEM integrators and end users must be provided with transmitter operating conditions for satisfying RF exposure compliance.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 10mm between the radiator & your body.

10.2 ISED

Innovation, Science and Economic Development Canada (ISED) Certification

CYW20822-P4xxI040 is licensed to meet the regulatory requirements of Innovation, Science and Economic Development Canada (ISED),

License: IC: 7922A-822I04

Manufacturers of mobile, fixed, or portable devices incorporating this module are advised to clarify any regulatory questions and ensure compliance for SAR and/or RF exposure limits. Users can obtain Canadian information on RF exposure and compliance from www.ic.gc.ca.

This device has been designed to operate with the antennas listed in **Table 7**, having a maximum gain of -0.5 dBi. Antennas not included in this list or having a gain greater than -0.5 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms. The antenna used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

ISED NOTICE:

The device CYW20822-P4xxI040 including the built-in trace antenna complies with Canada RSS-GEN Rules. The device meets the requirements for modular transmitter approval as detailed in RSS-GEN. 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.

L'appareil CYW20822-P4xxI040, y compris l'antenne intégrée, est conforme aux Règles RSS-GEN de Canada.

L'appareil répond aux exigences d'approbation de l'émetteur modulaire tel que décrit dans RSS-GEN.

L'opération est soumise aux deux conditions suivantes: (1) Cet appareil ne doit pas causer d'interférences nuisibles, et (2) Cet appareil doit accepter toute interférence reçue, y compris les interférences pouvant entraîner un fonctionnement indésirable.

ISED INTERFERENCE STATEMENT FOR CANADA

This device complies with Innovation, Science and Economic Development (ISED) Canada licence-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.

Regulatory information

Cet appareil est conforme à la norme sur l'innovation, la science et le développement économique (ISED) norme RSS exempte 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.

ISED RADIATION EXPOSURE STATEMENT FOR CANADA

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 10 mm between the radiator and your body.

Cet équipement est conforme aux limites d'exposition aux radiations ISED prévues pour un environnement incontrôlé. Cet équipement doit être installé et utilisé avec un minimum de 10 mm de distance entre la source de rayonnement et votre corps.

LABELING REQUIREMENTS:

The Original Equipment Manufacturer (OEM) must ensure that ISED labeling requirements are met. This includes a clearly visible label on the outside of the OEM enclosure specifying the appropriate Infineon IC identifier for this product as well as the ISED Notices above. The IC identifier is TBD. In any case, the end product must be labeled in its exterior with "Contains IC: TBD"

10.3 European declaration of conformity

Hereby, Infineon declares that the Bluetooth® module CYW20822-P4xxI040 complies with the essential requirements and other relevant provisions of Directive 2014. As a result of the conformity assessment procedure described in Annex III of the Directive 2014, the end-customer equipment should be labeled as follows:



All versions of the CYW20822-P4xxI040 in the specified reference design can be used in the following countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, The Netherlands, the United Kingdom, Switzerland, and Norway.

Regulatory information

10.4 MIC Japan

CYW20822-P4xxI040 is certified as a module (certification number TBD). End products that integrate CYW20822-P4xxI040 do not need additional MIC Japan certification for the end product.

End product can display the certification label of the embedded module.

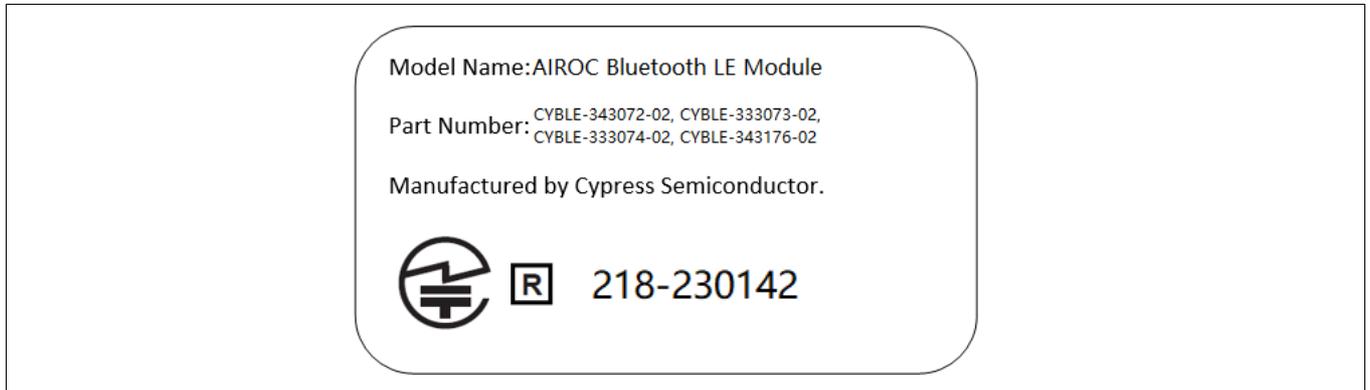


Figure 15 MIC label

Packaging

11 Packaging

Table 12 Solder Reflow peak temperature

Module part number	Package	Maximum peak temperature	Maximum time at peak temperature	No. of cycles
CYW20822-P4TAI040	27-pad SMT	260°C	30 seconds	2
CYW20822-P4EPI040	27-pad SMT	260°C	30 seconds	2

Table 13 Package Moisture Sensitivity Level (MSL), IPC/JEDEC J-STD-2

Module part number	Package	MSL
CYW20822-P4TAI040	27-pad SMT	MSL 3
CYW20822-P4EPI040	27-pad SMT	MSL 3

The CYW20822-P4xxI040 is offered in tape and reel packaging. **Figure 16** details the tape dimensions used for the CYW20822-P4xxI040.

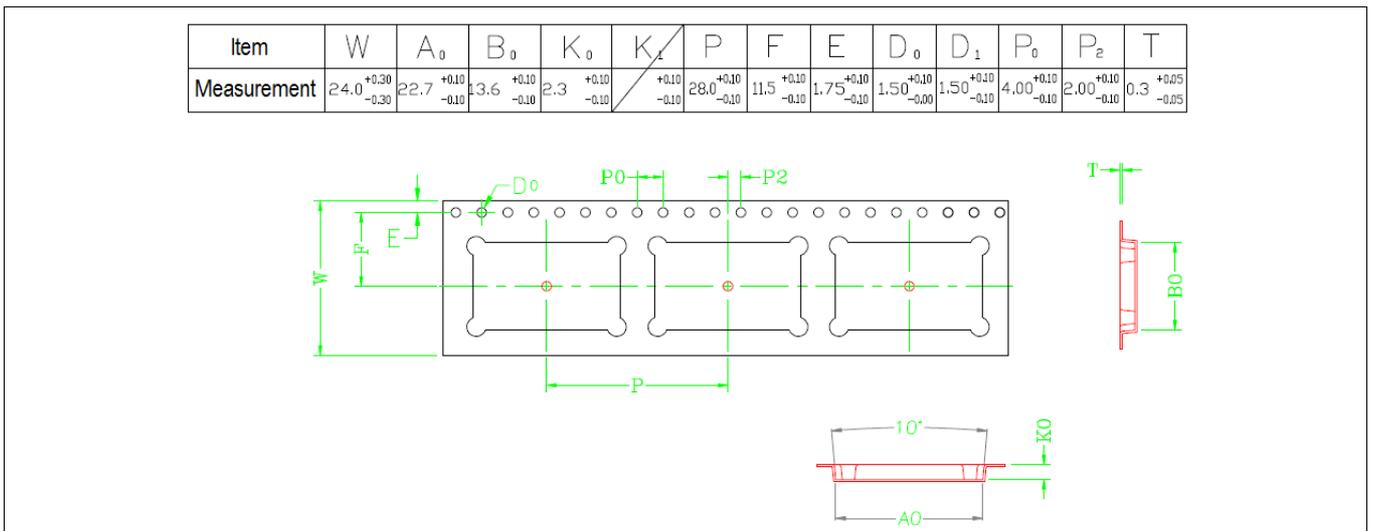


Figure 16 CYW20822-P4xxI040 tape dimensions

Figure 17 details the orientation of the CYW20822-P4xxI040 in the tape as well as the direction for unreeling.

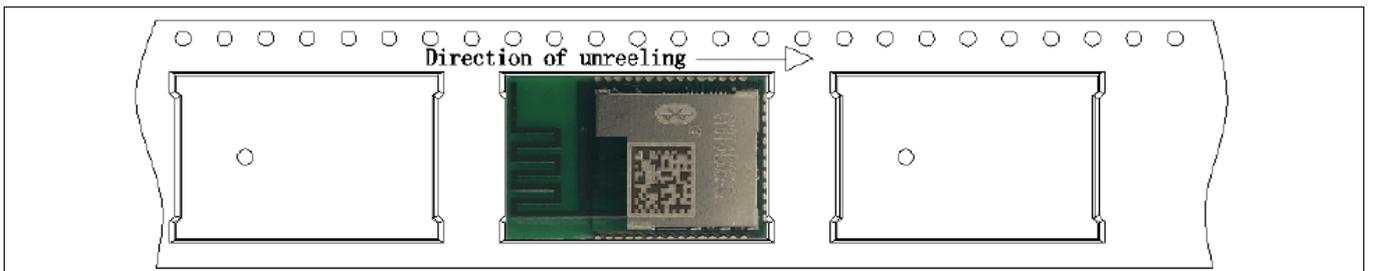


Figure 17 Component orientation in tape and unreeling direction

Packaging

Figure 18 details reel dimensions used for the CYW20822-P4xxI040.

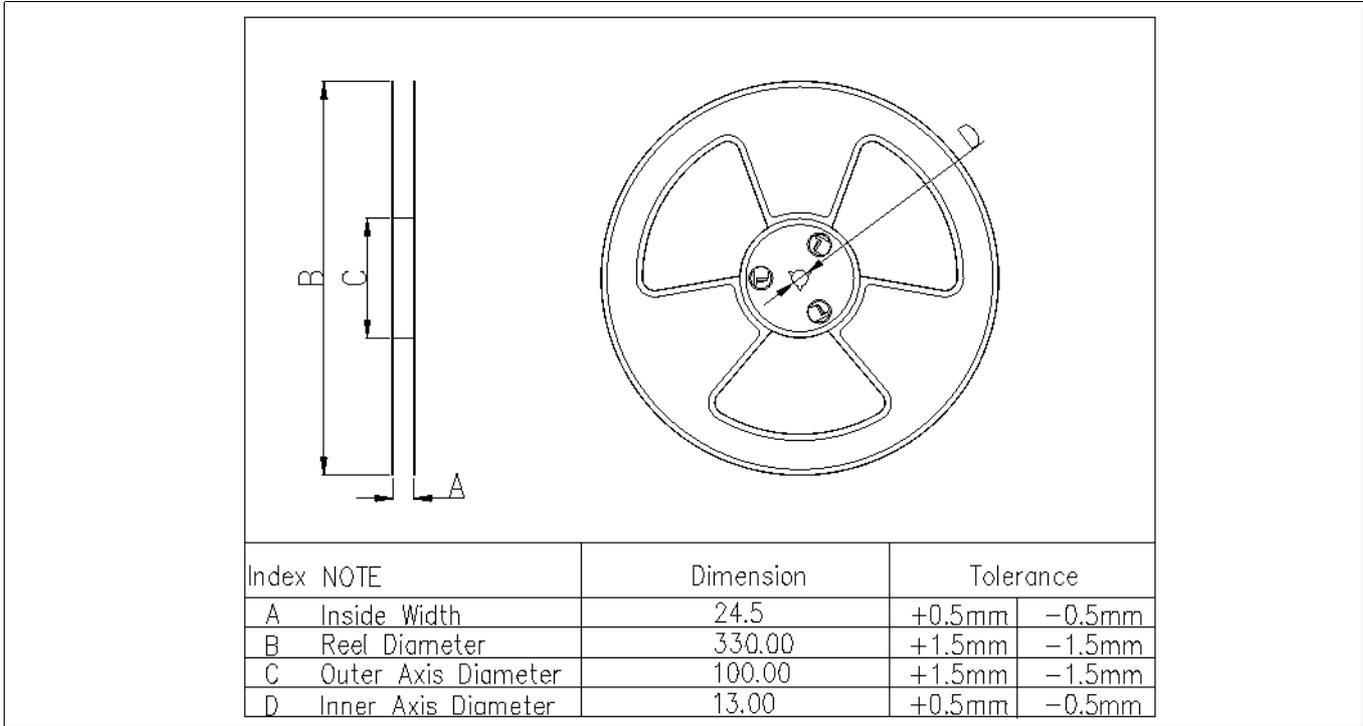


Figure 18 Reel dimensions

Ordering information

12 Ordering information

Table 14 lists the CYW20822-P4xxI040 part number and features. **Table 15** lists the reel shipment quantities for the CYW20822-P4xxI040.

Table 14 Ordering information

Part number	CPU speed (MHz)	Flash size (MB)	RAM size (KB)	UART	I ² C	PWM	Antenna	Package	Packaging
CYW20822-P4TAI040	16	1	128	Yes	Yes	8	Trace	27-SMT	Tape and reel
CYW20822-P4EPI040	16	1	128	Yes	Yes	8	Pad	27-SMT	Tape and reel

Table 15 Tape and reel package quantity and minimum order amount

Description	Minimum reel quantity	Maximum reel quantity	Comments
Reel quantity	500	500	Ships in 500 unit reel quantities.
Minimum order quantity (MOQ)	500	-	-
Order increment (OI)	500	-	-

The CYW20822-P4xxI040 is offered in tape and reel packaging. The CYW20822-P4xxI040 ships in a reel size of 500.

For additional information and a complete list of Infineon Wireless products, contact your local Infineon sales representative. To locate the nearest Infineon office, visit our website.

U.S. headquarters address	198 Champion Court, San Jose, CA 95134
U.S. headquarter contact info	(408) 943-2600
Website address	https://www.infineon.com

13 Acronyms

Table 16 Acronyms used in this document

Acronym	Description
ADC	analog-to-digital converter
ADV	advertising
ALU	arithmetic logic unit
AMUXBUS	analog multiplexer bus
API	application programming interface
Arm®	advanced RISC machine, a CPU architecture
BLE	Bluetooth® Low Energy
Bluetooth® SIG	Bluetooth® Special Interest Group
BW	bandwidth
CAN	Controller Area Network, a communications protocol
CE	European Conformity
CMRR	common-mode rejection ratio
CPU	central processing unit
CRC	cyclic redundancy check, an error-checking protocol
CSA	Canadian Standards Association
ECC	error correcting code
ECO	external crystal oscillator
EEPROM	electrically erasable programmable read-only memory
EMI	electromagnetic interference
EMIF	external memory interface
EOC	end of conversion
EOF	end of frame
ESD	electrostatic discharge
FCC	Federal Communications Commission
FET	field-effect transistor
FIR	finite impulse response, see also IIR
FPB	flash patch and breakpoint
FS	full-speed
GPIO	general-purpose input/output, applies to a PSoC pin
HCI	host controller interface
HVI	high-voltage interrupt, see also LVI, LVD
I/O	input/output, see also GPIO, DIO, SIO, USBIO
I2C, or IIC	Inter-Integrated Circuit, a communications protocol
IC	integrated circuit
IC	Industry Canada
IDAC	current DAC, see also DAC, VDAC
IDE	integrated development environment

Acronyms

Table 16 Acronyms used in this document *(continued)*

Acronym	Description
IIR	infinite impulse response, see also FIR
ILO	internal low-speed oscillator, see also IMO
IMO	internal main oscillator, see also ILO
INL	integral nonlinearity, see also DNL
IPOR	initial power-on reset
IPSR	interrupt program status register
IRQ	interrupt request
ITM	instrumentation trace macrocell
KC	Korea Certification
LCD	liquid crystal display
LIN	Local Interconnect Network, a communications protocol.
LNA	low noise amplifier
LR	link register
LUT	lookup table
LVD	low-voltage detect, see also LVI
LVI	low-voltage interrupt, see also HVI
LVTTL	low-voltage transistor-transistor logic
MAC	multiply-accumulate
MCU	microcontroller unit
MIC	Ministry of Internal Affairs and Communications (Japan)
MISO	master-in slave-out
NC	no connect
NMI	nonmaskable interrupt
NRZ	non-return-to-zero
NVIC	nested vectored interrupt controller
NVL	nonvolatile latch, see also WOL
Opamp	operational amplifier
PA	power amplifier
PAL	programmable array logic, see also PLD
PC	program counter
PCB	printed circuit board
PGA	programmable gain amplifier
PHUB	peripheral hub
PHY	physical layer
PICU	port interrupt control unit
PLA	programmable logic array
PLD	programmable logic device, see also PAL
PLL	phase-locked loop
PMDD	package material declaration data sheet
POR	power-on reset

Acronyms

Table 16 Acronyms used in this document *(continued)*

Acronym	Description
PRES	precise power-on reset
PRS	pseudo random sequence
PS	port read data register
PSoC®	Programmable System-on-Chip™
PSRR	power supply rejection ratio
PWM	pulse-width modulator
QDID	qualification design ID
RAM	random-access memory
RISC	reduced-instruction-set computing
RMS	root-mean-square
RTC	real-time clock
RTL	register transfer language
RTR	remote transmission request
RX	receive
S/H	sample and hold
SAR	successive approximation register
SC/CT	switched capacitor/continuous time
SCL	I2C serial clock
SDA	I2C serial data
SINAD	signal to noise and distortion ratio
SIO	special input/output, GPIO with advanced features. See GPIO.
SMT	surface-mount technology; a method for producing electronic circuitry in which the components are placed directly onto the surface of PCBs
SOC	start of conversion
SOF	start of frame
SPI	Serial Peripheral Interface, a communications protocol
SR	slew rate
SRAM	static random access memory
SRES	software reset
STN	super twisted nematic
SWD	serial wire debug, a test protocol
SWV	single-wire viewer
TD	transaction descriptor, see also DMA
THD	total harmonic distortion
TIA	transimpedance amplifier
TN	twisted nematic
TRM	technical reference manual
TTL	transistor-transistor logic
TUV	Germany: Technischer Überwachungs-Verein (Technical Inspection Association)
TX	transmit

Acronyms

Table 16 Acronyms used in this document *(continued)*

Acronym	Description
UART	Universal Asynchronous Transmitter Receiver, a communications protocol
UDB	universal digital block
USB	Universal Serial Bus
USBIO	USB input/output, PSoC pins used to connect to a USB port
VDAC	voltage DAC, see also DAC, IDAC
WDT	watchdog timer
WOL	write once latch, see also NVL
WRES	watchdog timer reset
XRES	external reset I/O pin
XTAL	crystal

14 Document conventions

14.1 Units of measure

Table 17 Units of measure

Symbol	Unit of Measure
°C	degrees Celsius
dB	decibel
dBm	decibel-milliwatts
fF	femtofarads
Hz	hertz
KB	1024 bytes
kbps	kilobits per second
Khr	kilohour
kHz	kilohertz
kΩ	kilo ohm
ksps	kilosamples per second
LSB	least significant bit
Mbps	megabits per second
MHz	megahertz
MΩ	mega-ohm
Msps	megasamples per second
μA	microampere
μF	microfarad
μH	microhenry
μs	microsecond
μV	microvolt
μW	microwatt
mA	milliampere
ms	millisecond
mV	millivolt
nA	nanoampere
ns	nanosecond
nV	nanovolt
Ω	ohm
pF	picofarad
ppm	parts per million
ps	picosecond
s	second
sps	samples per second
sqrtHz	square root of hertz
V	volt



Revision history

Revision history

Document version	Date of release	Description of changes
**		Initial release.

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