



TYCH01 Module Datasheet

Version: 20250205

Online Version

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TYCH01 module is a Wi-Fi and Bluetooth Low Energy (LE) combo module developed by Tuya Smart. This module is suitable for 12V to 3.3V level serial communication. This module has a highly integrated wireless radio frequency (RF) chip W701-VA2-CG with built-in Wi-Fi stacks and various library functions.

1. Overview

TYCH01 combines a low-power KM4 microcontroller unit (MCU), WLAN MAC, and 1T1R (1 transmitter/1 receiver) design. This module provides output frequency up to 100 MHz, 256 KB embedded SRAM, 2 MB flash memory, and configurable GPIOs that can function as digital peripherals for diverse applications.

TYCH01 is a real-time operating system (RTOS), integrated with all Wi-Fi MAC and TCP/IP libraries. All these resources can help you develop your own embedded Wi-Fi products.

1.1. Features

- Built-in low-power KM4 MCU that also acts as an application processor.
- Clock rate of 100 MHz.
- Operating voltage: 5-12V.
- Peripheral: 1 universal asynchronous receiver/transmitter (UART).
- Wi-Fi and Bluetooth connectivity
- IEEE 802.11b/g/n20 compliant.
- Channels 1-14@2.4 GHz (CH1-11 for US/CA and CH1-13 for EU/CN).
- Support security protocols, including WEP, WPA, WPA2, and WPA2 PSK (AES).
- Support Bluetooth LE 4.2.
- Support Wi-Fi Easy Connect (EZ mode) pairing mode on Android and iOS devices.
- Onboard PCB antenna.
- Operating temperature range: -20°C to +85°C.

1.2. Applications

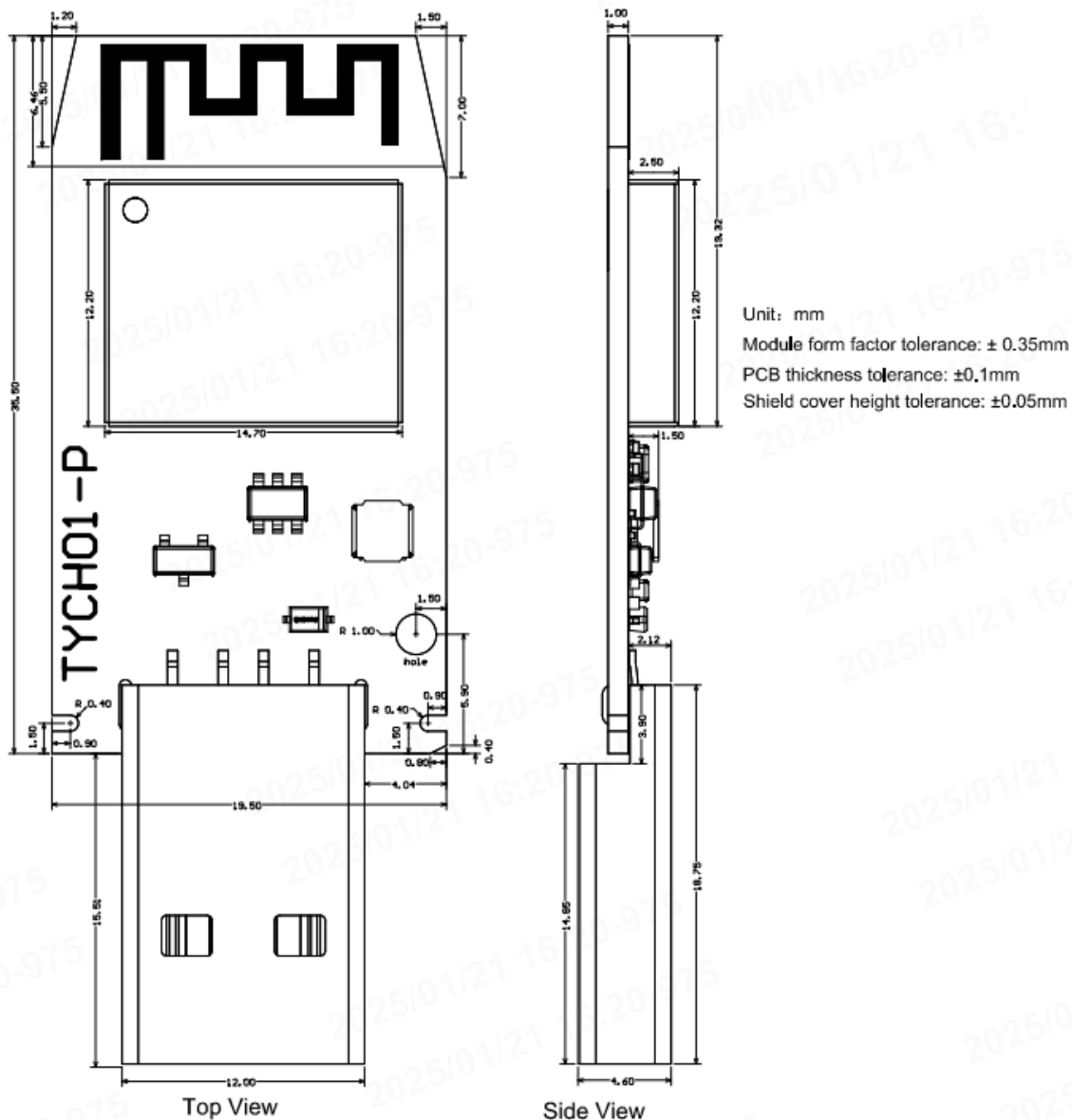
- Smart building
- Smart home and electrical appliance
- Smart socket and light
- Industrial wireless control
- Baby monitor
- IP camera

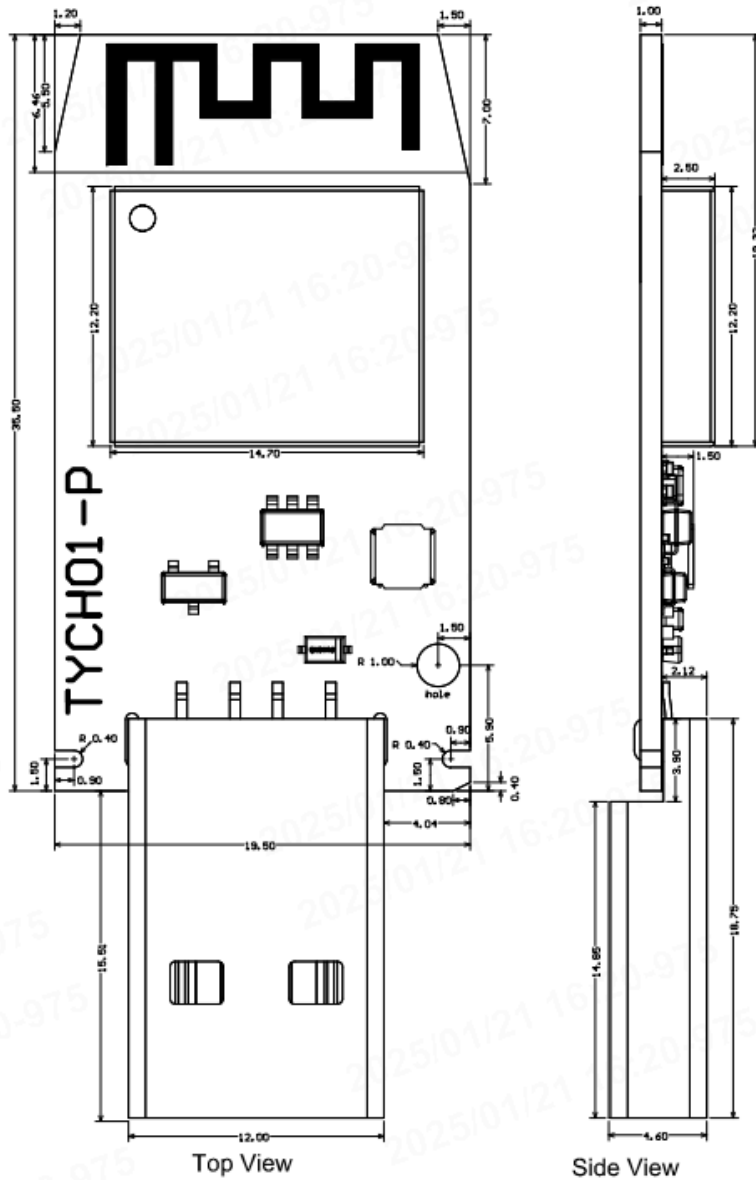
- Smart bus

2. Module interfaces

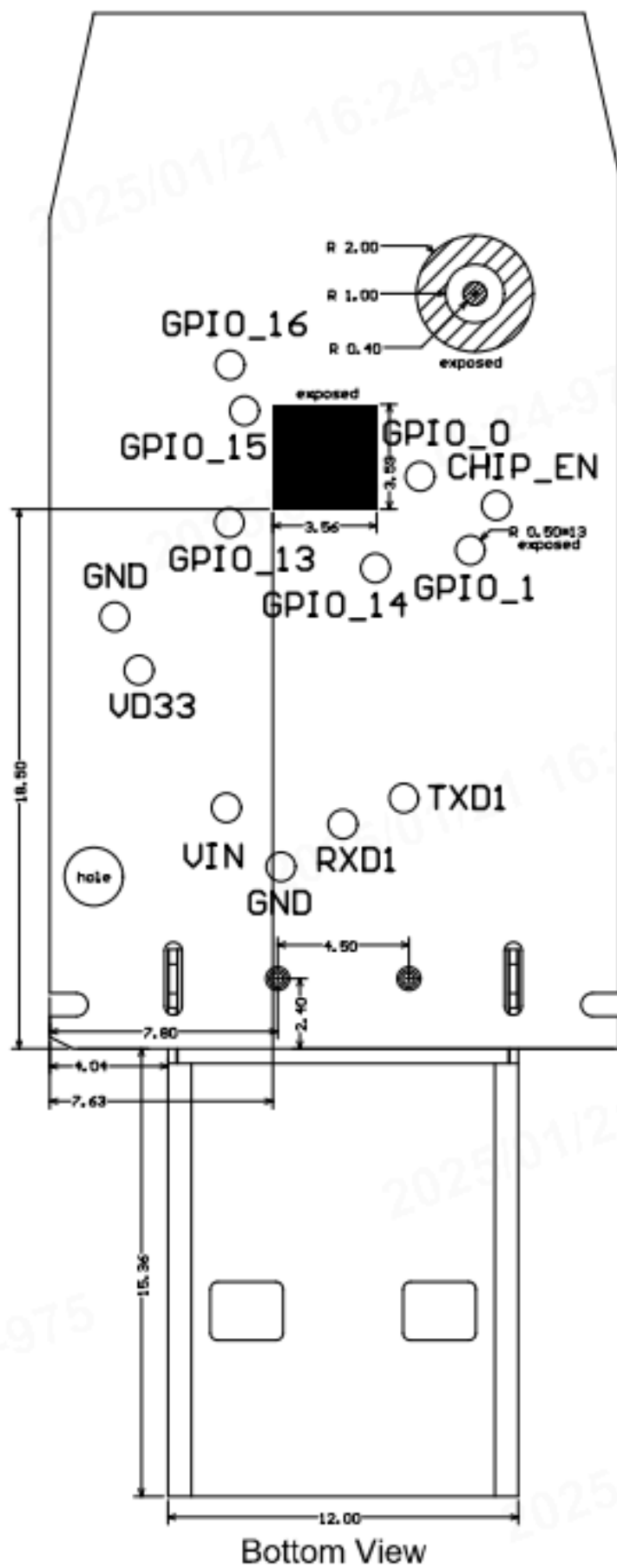
2.1. Dimensions and footprint

The TYCH01 module dimensions are $19.5\text{ mm} \pm 0.35\text{ mm (W)} \times 35.5 \pm 0.35\text{ mm (L)} \times 3.5 \pm 0.15\text{ mm (H)}$. The PCB thickness is $1.0\text{ mm} \pm 0.1\text{ mm}$. The following figure shows the module dimensions:





Unit: mm
Module form factor tolerance: $\pm 0.35\text{mm}$
PCB thickness tolerance: $\pm 0.1\text{mm}$
Shield cover height tolerance: $\pm 0.05\text{mm}$



2.2. Pin definition

Pin No.	Symbol	I/O type	Description
1	GND	P	Ground pin
2	TXD1	I/O	UART0_TXD , the TX user port for transmitting data.
3	RXD1	I/O	UART0_RXD , the RX user port for receiving data.
4	VIN	P	Power supply pin (12V).

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P indicates the power pin, and I/O indicates the input and output pin.

3. Electrical parameters

3.1. Absolute electrical parameters

Parameter	Description	Min value	Max value	Unit
T _s	Storage temperature	−40	125	°C
V _{BAT}	Supply voltage	−0.3	18	V
Electrostatic discharge voltage (human body model)	T _{AMB} −25°C	-	2	kV
Electrostatic discharge voltage (machine model)	T _{AMB} −25°C	-	0.5	kV

3.2. Normal operating conditions

Parameter	Description	Min value	Typical value	Max value	Unit
T _a	Operating temperature	−20	-	85	°C
V _{BAT}	Supply voltage	5	-	12	V
V _{IL}	I/O low-level input	−0.3	-	0.8	V
V _{IH}	I/O high-level input	2.47	-	3.6	V

Parameter	Description	Min value	Typical value	Max value	Unit
VOL	I/O low-level output	-	-	0.34	V
VoH	I/O high-level output	2.64	-	3.4	V
I _{max}	I/O drive current	-	-	16	mA
C _{pad}	Input pin capacitor	-	2	-	pF

- Power consumption during continuous transmission (TX)

Symbol	Mode	Average power	Average value	Peak (Typical) value	Unit
IRF	802.11b, 1 Mbit/s	17 dBm	226	344	mA
IRF	802.11b, 11 Mbit/s	17 dBm	210	348	mA
IRF	802.11g, 6 Mbit/s	17 dBm	217	348	mA
IRF	802.11g, 54 Mbit/s	15 dBm	154	312	mA
IRF	802.11n, BW20 MCS0	17 dBm	217	312	mA
IRF	802.11n, BW20 MCS7	14 dBm	145	300	mA

- Power consumption during continuous reception (RX)

Symbol	Mode	Average value	Peak (Typical) value	Unit
IRF	802.11b, 11 Mbit/s	58.1	96	mA
IRF	802.11g, 54 Mbit/s	63.1	104	mA
IRF	802.11n, HT20 MCS7	63.2	104	mA

3.3. Operating power consumption

Working mode	Status (Ta = 25°C)	Average value	Peak (Typical) value	Unit
Pairing in EZ mode	The module is being paired in EZ mode.	13.5	304	mA
Connected and idle mode	The module is connected to the network.	9.88	232	mA
Connected and operating mode	The module is connected to the network.	9.96	304	mA
Disconnected mode	The module is disconnected from the network.	11	312	mA

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The peak duration is approximately 5 μ s. The above parameters vary depending on different firmware features.

4. RF parameters

4.1. Basic RF features

Parameter	Description
Operating frequency	2.412 to 2.462 GHz
Wi-Fi standard	IEEE 802.11b/g/n (channels 1–11) <ul style="list-style-type: none">• IEEE 802.11b: 1, 2, 5.5, and 11 Mbit/s
Data transmission rate	<ul style="list-style-type: none">• IEEE 802.11g: 6, 9, 12, 18, 24, 36, 48, and 54 Mbit/s• IEEE 802.11n: HT20 MCS0-7
Antenna type	PCB antenna

4.2. Transmitter (TX) performance

Continuous transmission performance

Parameter	Min value	Typical value	Max value	Unit
RF average output power, 802.11b CCK mode, 11 Mbit/s	-	17.5	-	dBm
RF average output power, 802.11g OFDM mode, 54 Mbit/s	-	14.5	-	dBm
RF average output power, 802.11n OFDM mode, MCS7	-	13.5	-	dBm

Frequency error	-20	-	20	ppm
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4.3. Receiver (RX) performance

RX sensitivity

Parameter	Min value	Typical value	Max value	Unit
PER < 8%, RX sensitivity, 802.11b DSSS mode, 1 Mbit/s	-	-96	-	dBm
PER < 10%, RX sensitivity, 802.11g OFDM mode, 54 Mbit/s	-	-75	-	dBm
PER < 10%, RX sensitivity, 802.11n OFDM mode, MCS7	-	-72	-	dBm

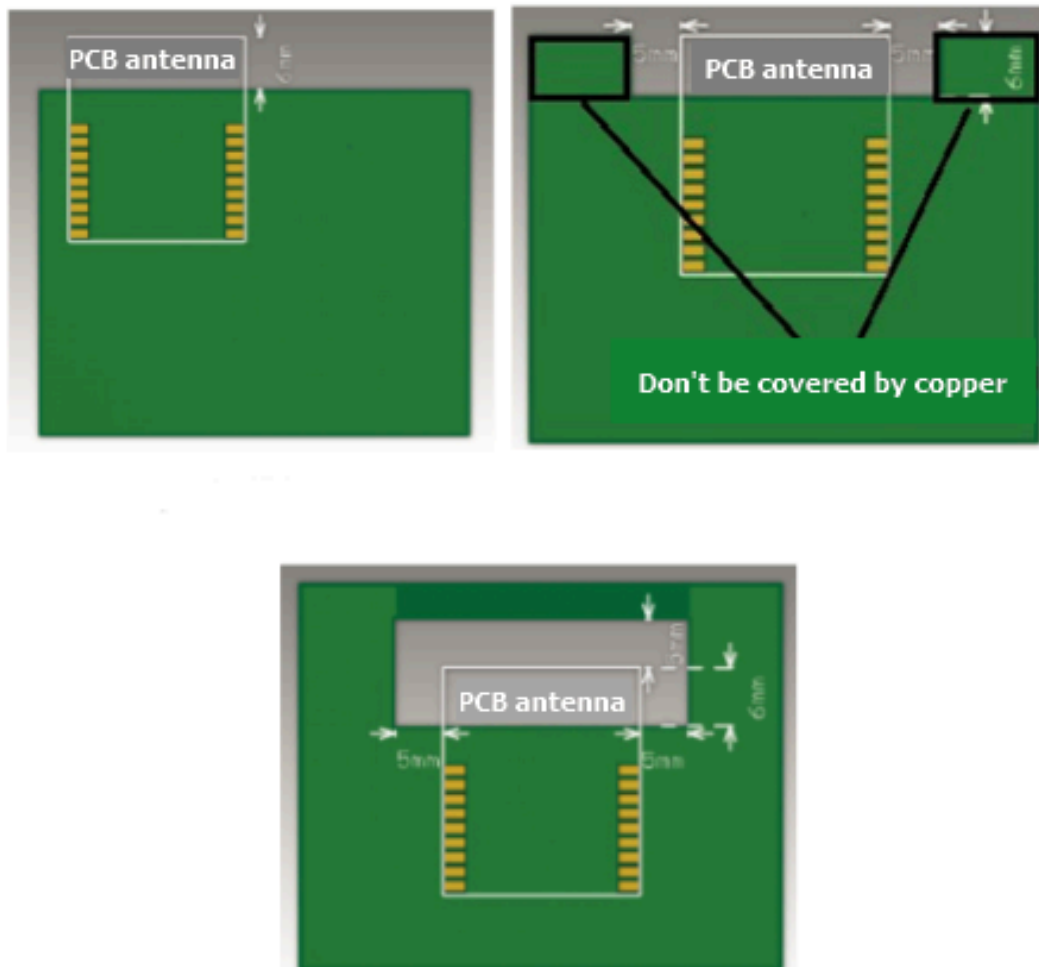
5. Antenna information

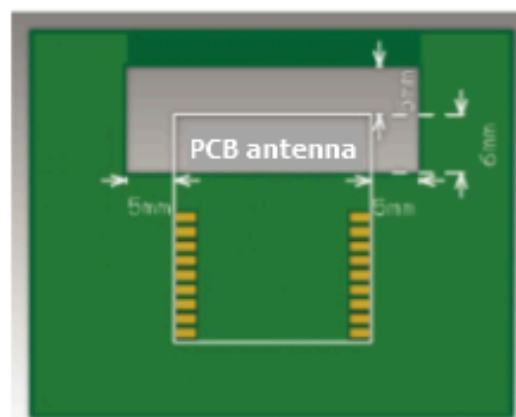
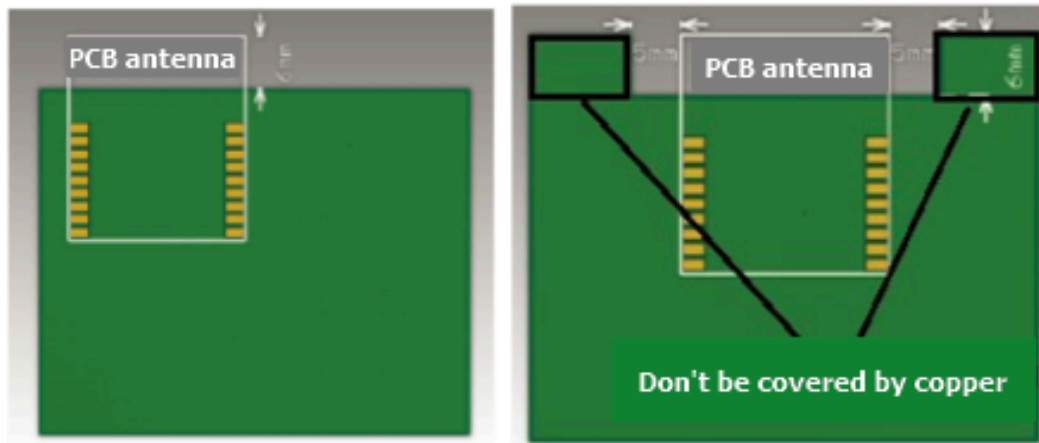
5.1. Antenna type

This module has an onboard PCB antenna with a peak gain of 3.16 dBi.

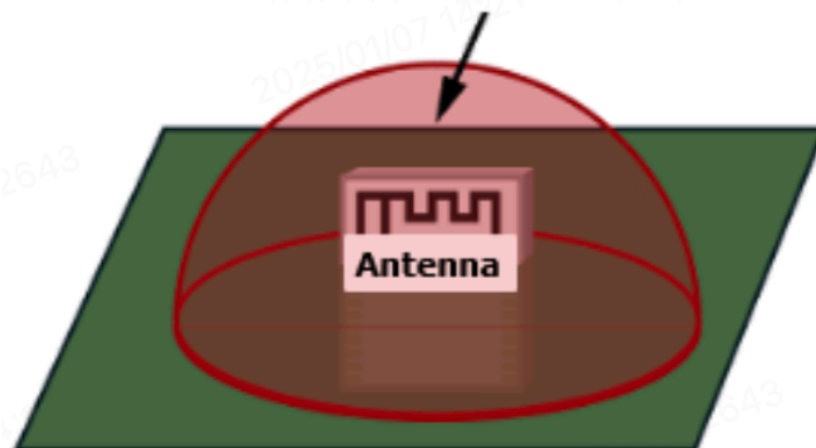
5.2. Antenna interference reduction

When a PCB antenna is used on a Wi-Fi module, we recommend that the module antenna is at least 15 mm away from other metal components. This can optimize the Wi-Fi performance. Make sure that the enclosure surrounding the antenna is not traced or filled with copper. Otherwise, the RF performance might be degraded.





**Do not place any metal in the red area above the antenna.
The recommended diameter of the circular arc is greater than 3 cm.**



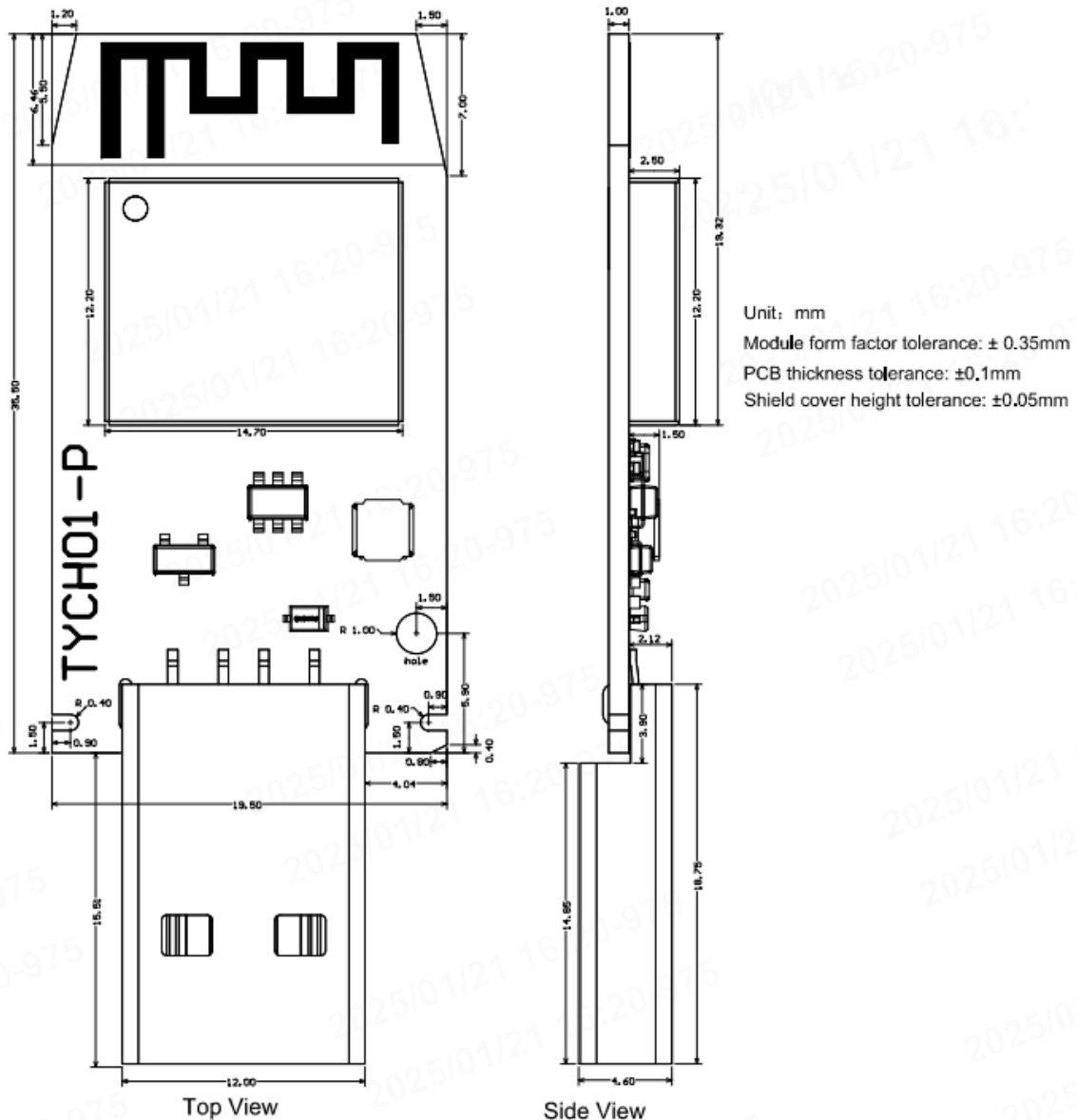
5.3. Specifications of antenna connector

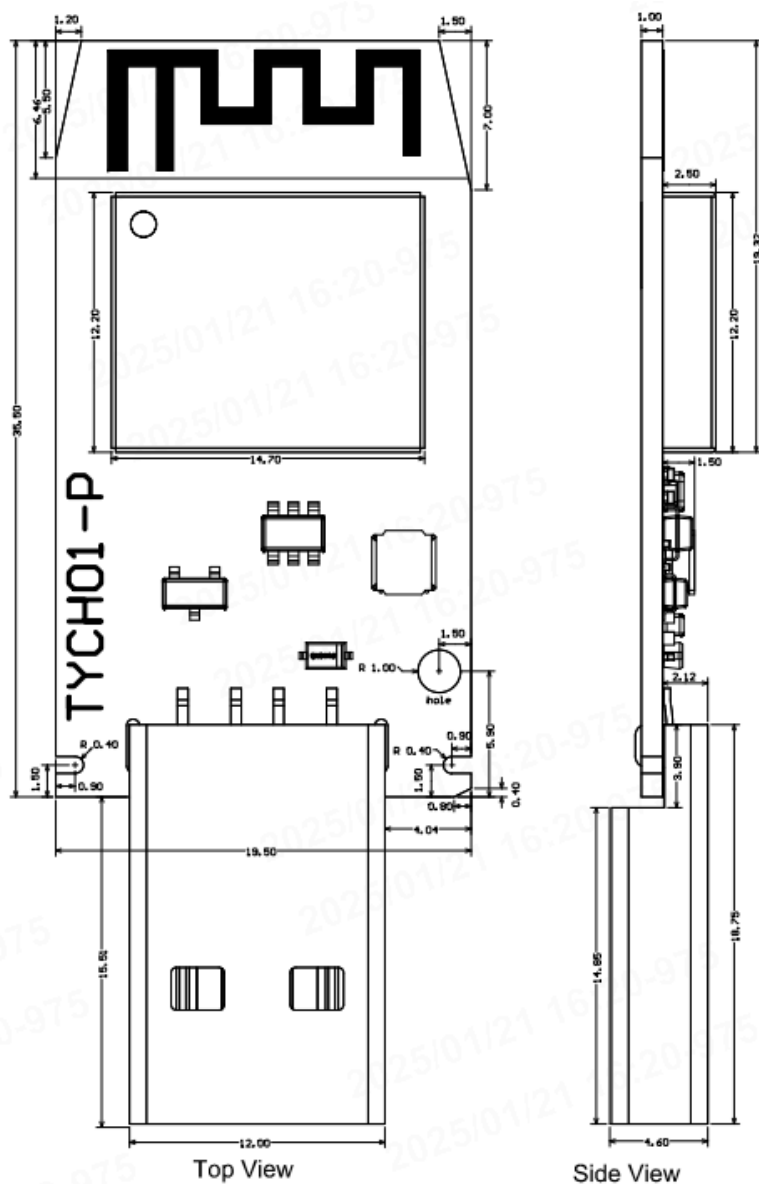
This module does not have an antenna connector.

6. Packing and production instructions

6.1. Mechanical dimensions

The TYCH01 module dimensions are $19.5\text{ mm} \pm 0.35\text{ mm (W)} \times 35.5 \pm 0.35\text{ mm (L)} \times 3.5 \pm 0.15\text{ mm (H)}$. The PCB thickness is $1.0\text{ mm} \pm 0.1\text{ mm}$. The following figure shows the module dimensions:



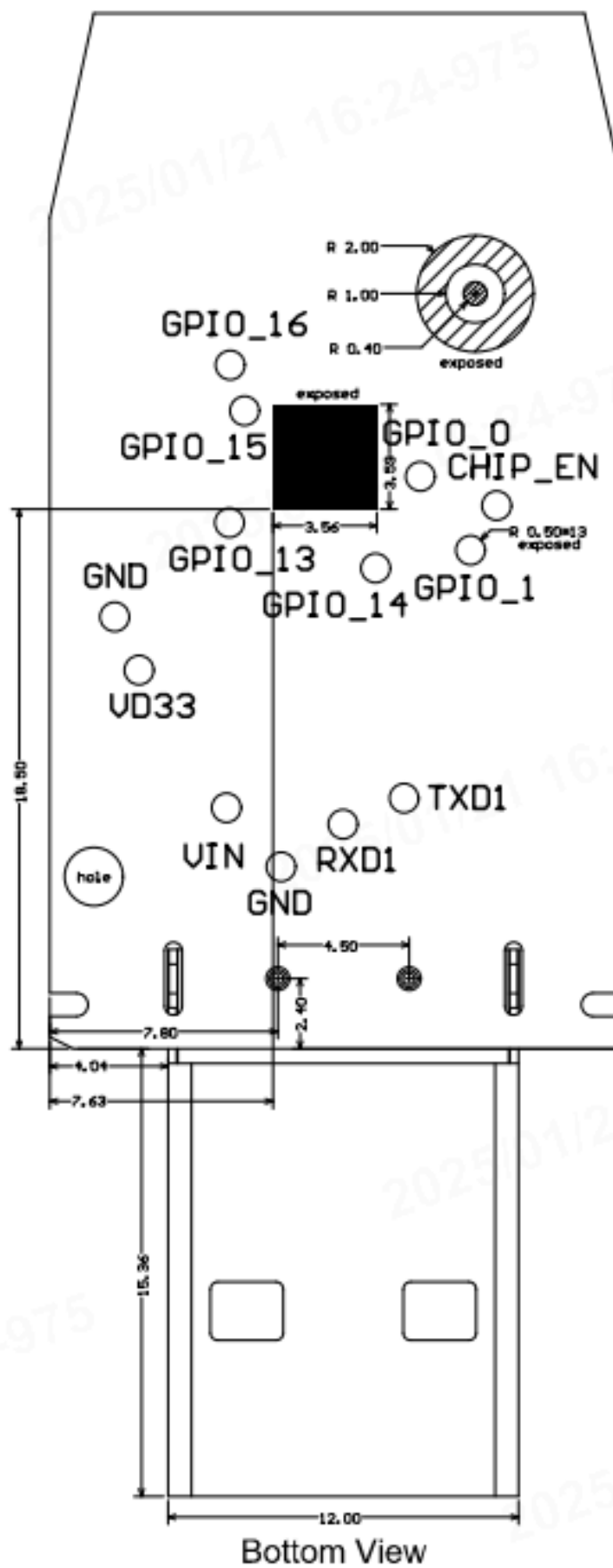


Unit: mm

Module form factor tolerance: $\pm 0.35\text{mm}$

PCB thickness tolerance: $\pm 0.1\text{mm}$

Shield cover height tolerance: $\pm 0.05\text{mm}$



6.2. Production instructions

A delivered module must meet the following storage requirements:

- The moisture-proof bag must be placed in an environment where the temperature is below 30°C and the relative humidity is lower than 85%.
- The shelf life of a dry-packaged product is 6 months from the date when the product is packaged and sealed.

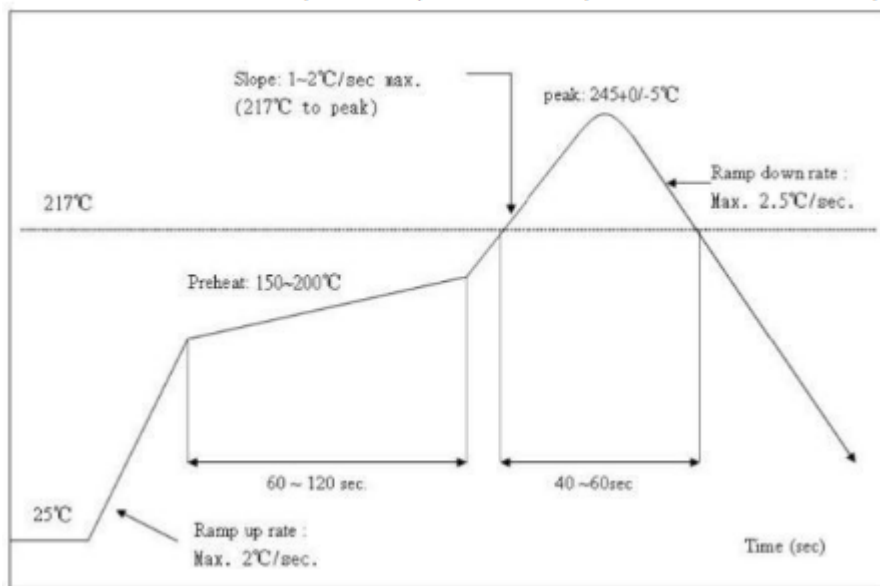


- ▶ During the whole production process, operators at each station must wear electrostatic rings.
- ▶ During operation, keep the module away from water or dirt.


6.3. Recommended oven temperature curve

Perform the SMT process according to the following temperature curve of reflow soldering. The peak temperature is 245°C.

Refer to IPC/JEDEC standard; Peak Temperature: <245°C; Number of Times: ≤2 times;



6.4. Storage conditions

	Caution This bag contains MOISTURE-SENSITIVE DEVICES	LEVEL <div style="border: 1px solid black; padding: 5px; display: inline-block;">3</div> <small>If blank, see adjacent bar code label</small>
<p>1. Calculated shelf life in sealed bag: 12 months at $<40^{\circ}\text{C}$ and $<90\%$ relative humidity (RH)</p>		
<p>2. Peak package body temperature: <u>260</u> $^{\circ}\text{C}$ <small>If blank, see adjacent bar code label</small></p>		
<p>3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must be</p>		
<p>a) Mounted within: <u>168</u> hours of factory conditions <small>If blank, see adjacent bar code label</small> $\leq 30^{\circ}\text{C}/60\% \text{ RH}$, or</p>		
<p>b) Stored per J-STD-033</p>		
<p>4. Devices require bake, before mounting, if:</p>		
<p>a) Humidity Indicator Card reads $>10\%$ for level 2a - 5a devices or $>60\%$ for level 2 devices when read at $23 \pm 5^{\circ}\text{C}$</p>		
<p>b) 3a or 3b are not met</p>		
<p>5. If baking is required, refer to IPC/JEDEC J-STD-033 for bake procedure</p>		
<p>Bag Seal Date: <u>See Production Date</u> <small>If blank, see adjacent bar code label</small></p>		
<p>Note: Level and body temperature defined by IPC/JEDEC J-STD-020</p>		

7. Appendix: Statement

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this device. 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: This device has been tested and found to comply with the limits for a Class B digital device, according to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This device generates, uses, and can radiate radio frequency energy and, if not installed and used following 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 device does cause harmful interference to radio or television reception, which can be determined by turning the device 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 device and receiver.
- Connect the device 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.

Radiation Exposure Statement

The module is limited to installation in fixed applications.

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment. This device should be installed and operated with a minimum distance of 20cm between the radiator and your body.

Important Note

This radio module must not be installed to co-locate and operating simultaneously with other radios in the host system except following FCC multi-transmitter product procedures. Additional testing and device authorization may be required to operate simultaneously with other radios.

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 host product manufacturer is responsible for compliance with any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

The end-user manual shall include all required regulatory information/warnings as shown in this manual, including “This product must be installed and operated with a minimum distance of 20 cm between the radiator and user body”.

This device has got an FCC ID: 2ANDL-TYCH01. The end product must be labeled in a visible area with the following: “Contains Transmitter Module FCC ID: 2ANDL-TYCH01”.

This device is intended only for OEM integrators under the following conditions:

The antenna must be installed such that 20cm is maintained between the antenna and users, and the transmitter module may not be co-located with any other transmitter or antenna.

As long as the 2 conditions above are met, further transmitter tests will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Declaration of Conformity European Notice



Hereby, Hangzhou Tuya Information Technology Co., Ltd declares that this module product is in compliance with essential requirements and other relevant provisions of Directive 2014/53/EU, 2011/65/EU. A copy of the Declaration of conformity can be found at <https://www.tuya.com>.



This product must not be disposed of as normal household waste, in accordance with the EU directive for waste electrical and electronic equipment (WEEE-2012/19/EU). Instead, it should be disposed of by returning it to the point of sale, or to a municipal recycling collection point.

The device could be used with a separation distance of 20cm to the human body.