



# **WBRV Module Datasheet**

Version: 20251229

Online Version

## Contents

|                                                             |           |
|-------------------------------------------------------------|-----------|
| <b>1. Overview</b>                                          | <b>2</b>  |
| 1.1. Features                                               | 2         |
| 1.2. Applications                                           | 3         |
| <b>2. Module interfaces</b>                                 | <b>4</b>  |
| 2.1. Dimensions and footprint                               | 4         |
| 2.2. Pin definition                                         | 4         |
| <b>3. Electrical parameters</b>                             | <b>10</b> |
| 3.1. Absolute electrical parameters                         | 10        |
| 3.2. Working conditions                                     | 10        |
| 3.3. RF power consumption                                   | 11        |
| 3.4. Working power consumption                              | 12        |
| <b>4. RF parameters</b>                                     | <b>15</b> |
| 4.1. Basic RF features                                      | 15        |
| 4.2. TX performance                                         | 15        |
| 4.3. RX performance                                         | 16        |
| <b>5. Antenna</b>                                           | <b>18</b> |
| 5.1. Antenna type                                           | 18        |
| 5.2. Antenna interference reduction                         | 18        |
| <b>6. Packaging information and production instructions</b> | <b>19</b> |
| 6.1. Mechanical dimensions                                  | 19        |
| 6.2. Recommended PCB layout                                 | 21        |
| 6.3. Production instructions                                | 25        |
| 6.4. Recommended oven temperature curve                     | 27        |
| 6.5. Storage conditions                                     | 29        |
| <b>7. MOQ and packaging information</b>                     | <b>30</b> |
| <b>8. Appendix: Statement</b>                               | <b>31</b> |

WBRV is a low-power embedded Wi-Fi+Bluetooth voice module that Tuya has developed. It consists of a highly integrated RF chip (RTL8720CF-VU2+CI1302), with an embedded Wi-Fi network protocol stack and varied library functions.

## 1. Overview

WBRV is a Wi-Fi AI module that supports voice control. It integrates the Tuya AI platform, enables interaction through voice, and connects to major AI platforms via the Tuya AI Agent. It supports large language models such as Doubao, DeepSeek, Qwen, OpenAI, and Gemini. It features button wake-up, wake-word activation, and free talk capabilities, providing users with a vivid and engaging AI voice interaction experience. It is suitable for smart products in voice interaction scenarios.

With the maximum CPU clock rate of 100MHz, WBRV also contains a low-power KM4 microcontroller unit (MCU), WLAN MAC, a 1T1R WLAN module, 384-KB static random-access memory (SRAM), 4-MB flash memory, and extensive peripherals. WBRV is an RTOS platform that integrates all function libraries of the Wi-Fi MAC and TCP/IP protocols. You can develop embedded Wi-Fi products as required.

### 1.1. Features

- Embedded low-power KM4 MCU, which can also function as an application processor, clock rate: 100 MHz
- Working voltage: 3.6 to 5.5 V
- Peripherals: 11 GPIOs, 1 universal asynchronous receiver/transmitter (UART-5V), and 1 log asynchronous receiver/transmitter (UART), 1xMIC Interface, 1xSpeaker Interface
- Wi-Fi/Bluetooth connectivity
- 802.11 B/G/N20
- Channels 1 to 14 at 2.4 GHz (CH1-11 for US/CA, CH1-13 for EU/CN)
- Support WEP/WPA/WPA2/WPA2 PSK (AES) security modes
- Support Bluetooth 5.4 Low Energy
- Support SmartConfig for Android and iOS devices
- Onboard PCB antenna
- Passed CE and FCC certification
- Working temperature: -40 to +85°C

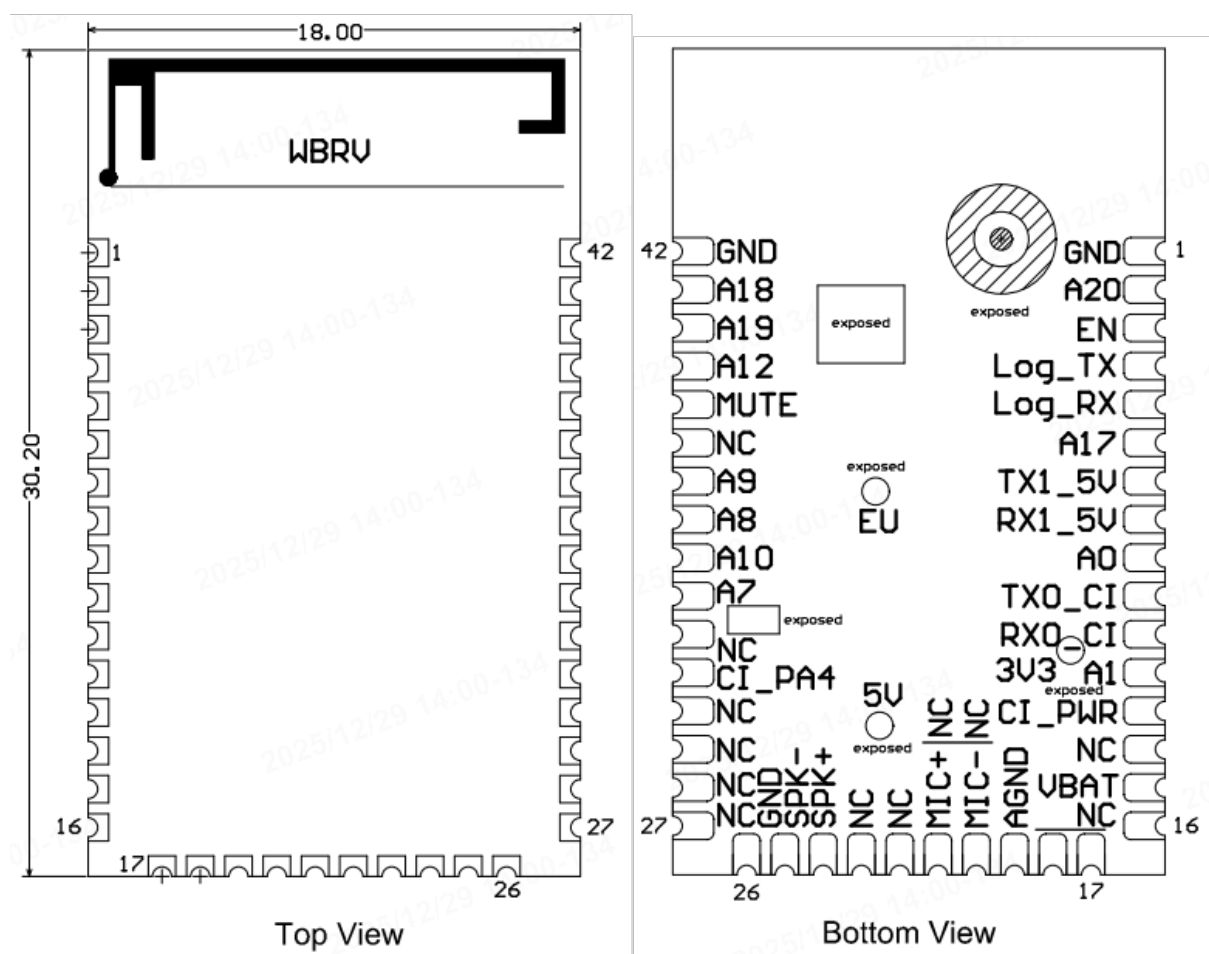
## 1.2. Applications

- Intelligent building
- Smart household and home appliances
- Smart socket and light
- Industrial wireless control
- Baby monitor
- Network camera
- Intelligent bus

## 2. Module interfaces

### 2.1. Dimensions and footprint

As shown in the following figure, WBRV has three rows of pins and with a 1.4 mm pin spacing. The WBRV dimensions (H x W x L) are  $18\pm0.35$  mm (W) $\times 30.2\pm0.35$  mm (L)  $\times 3.0\pm0.15$  mm (H). The default dimensional tolerance is  $\pm0.35$  mm.



### 2.2. Pin definition

| Pin number | Symbol | I/O type | Function                        |
|------------|--------|----------|---------------------------------|
| 1          | GND    | P        | Power supply reference ground   |
| 2          | A20    | I/O      | GPIOA_20, hardware PWM, IC Pin1 |

| Pin number | Symbol | I/O type | Function                                                                                                      |
|------------|--------|----------|---------------------------------------------------------------------------------------------------------------|
| 3          | EN     | I/O      | Module enable pin, active low, has been pulled up to high level, and the user can control this pin externally |
| 4          | Log_TX | I/O      | GPIOA_16, UART_Log_TX (Used for outputting serial port information), can be configured as a common GPIO       |
| 5          | Log_TX | I/O      | GPIOA_15, UART_Log_RX (Used for receiving serial port information), can be configured as a common GPIO        |
| 6          | A17    | I/O      | GPIOA_17, hardware PWM, IC Pin38                                                                              |
| 7          | TX1_5V | I/O      | GPIOA_14, UART1_TXD (MCU serial port interface), 5V level                                                     |

| Pin number | Symbol | I/O type | Function                                                                                                                                       |
|------------|--------|----------|------------------------------------------------------------------------------------------------------------------------------------------------|
| 8          | RX1_5V | I/O      | GPIOA_13,<br>UART1_RXD (MCU<br>serial port<br>interface), 5V<br>level                                                                          |
| 9          | A0     | I/O      | GPIOA_0,<br>General-purpose<br>IO, pull high to<br>enter<br>programming<br>mode at startup,<br>external pull-up is<br>not allowed, IC<br>Pin15 |
| 10         | TX0_CI | I/O      | Firmware flashing<br>port TX0 of the<br>audio chip                                                                                             |
| 11         | RX0_CI | I/O      | Firmware flashing<br>port RX0 of the<br>audio chip                                                                                             |
| 12         | A1     | I/O      | GPIOA_1, pull<br>high to enter test<br>mode at startup,<br>external pull-up is<br>not allowed, IC<br>Pin16                                     |

| Pin number | Symbol | I/O type | Function                                                                                           |
|------------|--------|----------|----------------------------------------------------------------------------------------------------|
| 13         | CI_PWR | P        | The power control enable pin of the voice chip, active high, corresponding to A11 on RTL8720CF-VU2 |
| 14         | NC     | -        | NC                                                                                                 |
| 15         | VBAT   | P        | Module power input pin, with a power supply range of 3.6-5.5V                                      |
| 16         | NC     | -        | NC                                                                                                 |
| 17         | NC     | -        | NC                                                                                                 |
| 18         | NC     | -        | NC                                                                                                 |
| 19         | AGND   | P        | Analog ground pin                                                                                  |
| 20         | MIC-   | AI       | Negative input of microphone                                                                       |
| 21         | MIC+   | AI       | Positive input of microphone                                                                       |
| 22         | NC     | -        | NC                                                                                                 |
| 23         | NC     | -        | NC                                                                                                 |
| 24         | SPK+   | AO       | Positive output of audio                                                                           |
| 25         | SPK-   | AO       | Negative output of audio                                                                           |
| 26         | GND    | P        | Power supply reference ground                                                                      |
| 27         | NC     | -        | NC                                                                                                 |
| 28         | NC     | -        | NC                                                                                                 |
| 29         | NC     | -        | NC                                                                                                 |
| 30         | NC     | -        | NC                                                                                                 |

| Pin number | Symbol | I/O type | Function                                                                                   |
|------------|--------|----------|--------------------------------------------------------------------------------------------|
| 31         | CI_PA4 | I/O      | For debugging purposes only. Not for customer use                                          |
| 32         | NC     | -        | NC                                                                                         |
| 33         | A7     | I/O      | GPIOA_7, A normal GPIO that can be reused as SPI_CS, corresponding to Pin 21 on the IC.    |
| 34         | A10    | I/O      | GPIOA_10, A normal GPIO that can be reused as SPI_MISO, corresponding to Pin 24 on the IC. |
| 35         | A8     | I/O      | GPIOA_8, A normal GPIO that can be reused as SPI_SCK, corresponding to Pin 22 on the IC.   |
| 36         | A9     | I/O      | GPIOA_9, A normal GPIO that can be reused as SPI_MOSI, corresponding to Pin 23 on the IC.  |
| 37         | NC     | -        | NC                                                                                         |

| Pin number | Symbol | I/O type | Function                                                                       |
|------------|--------|----------|--------------------------------------------------------------------------------|
| 38         | MUTE   | O        | The enable pin for the built-in audio power amplifier.<br>Not for customer use |
| 39         | A12    | I/O      | GPIOA_12, hardware PWM, IC Pin26                                               |
| 40         | A19    | I/O      | GPIOA_19, hardware PWM, IC Pin40                                               |
| 41         | A18    | I/O      | GPIOA_18, hardware PWM, IC Pin39                                               |
| 42         | GND    | P        | Power supply reference ground                                                  |

**Note::** P indicates power supply pins and I/O indicates input/output pins.

### 3. Electrical parameters

#### 3.1. Absolute electrical parameters

| Parameter                      | Description          | Minimum value | Maximum value | Unit |
|--------------------------------|----------------------|---------------|---------------|------|
| Ts                             | Storage temperature  | −55           | 125           | °C   |
| VBAT                           | Power supply voltage | −0.3          | 5.5           | V    |
| ESD voltage (human body model) | TAMB-25°C            | -             | 2             | KV   |
| ESD voltage (machine model)    | TAMB-25°C            | -             | 0.5           | KV   |

#### 3.2. Working conditions

| Parameter | Description          | Minimum value | Typical value | Maximum value | Unit |
|-----------|----------------------|---------------|---------------|---------------|------|
| Ta        | Working temperature  | −40           | -             | 85            | °C   |
| VDD       | Power supply voltage | 3.6           | -             | 5.5           | V    |
| VIL       | I/O low-level input  | -             | -             | 0.8           | V    |
| VIH       | I/O high-level input | 2.0           | -             | -             | V    |
| VOL       | I/O low-level output | -             | -             | 0.4           | V    |

| Parameter        | Description           | Minimum value | Typical value | Maximum value | Unit |
|------------------|-----------------------|---------------|---------------|---------------|------|
| VOH              | I/O high-level output | 2.4           | -             | -             | V    |
| I <sub>max</sub> | I/O drive current     | -             | -             | 16            | mA   |
| C <sub>pad</sub> | Input pin capacitance | -             | 2             | -             | pF   |

### 3.3 Working power consumption

| Working mode                               | Working status, Ta = 25°C                                                                    | Average value | Maximum value (Typical value) | Unit |
|--------------------------------------------|----------------------------------------------------------------------------------------------|---------------|-------------------------------|------|
| Quick network connection state (Bluetooth) | The module is in the fast network connection state and the Wi-Fi indicator flashes fast      | 61            | 272                           | mA   |
| Quick network connection state (AP)        | The module is in the hotspot network connection state and the Wi-Fi indicator flashes slowly | 59            | 272                           | mA   |

| Working mode                                             | Working status, Ta = 25°C                                                                  | Average value | Maximum value (Typical value) | Unit |
|----------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------|-------------------------------|------|
| Quick network connection state (EZ)                      | The module is in the fast network connection state and the Wi-Fi indicator flashes fast    | 62            | 280                           | mA   |
| No operation during network connection                   | The module is connected to the network and the Wi-Fi indicator is always on                | 51            | 260                           | mA   |
| Operations are being performed during network connection | The module is connected to the network and the Wi-Fi indicator is always on                | 59            | 268                           | mA   |
| Weakly connected                                         | The module and the hotspot are weakly connected and the Wi-Fi indicator light is always on | 62            | 264                           | mA   |

| Working mode    | Working status, Ta = 25°C                                                       | Average value | Maximum value (Typical value) | Unit |
|-----------------|---------------------------------------------------------------------------------|---------------|-------------------------------|------|
| Disconnected    | The module is in disconnected state and the Wi-Fi indicator light is always off | 57            | 268                           | mA   |
| Module disabled | The EN pin of the module is connected to the ground.                            | 1.5           | 1.6                           | uA   |

## 4. RF parameters

### 4.1. Basic RF features

| Parameter              | Description                              |
|------------------------|------------------------------------------|
| Frequency range        | 2.400 to 2.4835 GHz                      |
| Wi-Fi standard         | IEEE 802.11b/g/n (channels 1 to 14)      |
| Bluetooth standard     | Bluetooth 5.4                            |
| Data transmission rate | 11b: 1, 2, 5.5, 11 (Mbps)                |
| Data transmission rate | 11g: 6, 9, 12, 18, 24, 36, 48, 54 (Mbps) |
| Data transmission rate | 11n: HT20 MC S 0 to 7                    |
| Antenna type           | PCB antenna with a peak gain of 1.25 dBi |

## 4.2 RX performance

| Parameter                                       | Minimum value | Typical value | Maximum value | Unit |
|-------------------------------------------------|---------------|---------------|---------------|------|
| PER<8%, RX sensitivity, 802.11b CCK Mode 1M     | -             | -97           | -             | dBm  |
| PER<10%, RX sensitivity, 802.11g OFDM Mode 54M  | -             | -75           | -             | dBm  |
| PER<10%, RX sensitivity, 802.11n OFDM Mode MCS7 | -             | -72           | -             | dBm  |
| PER<10%, RX sensitivity, Bluetooth 4.2 1M       | -             | -93           | -             | dBm  |

## 5. Antenna

### 5.1. Antenna type

WBRV uses an onboard PCB antenna with a peak gain of 1.25 dBi.

### 5.2. Antenna interference reduction

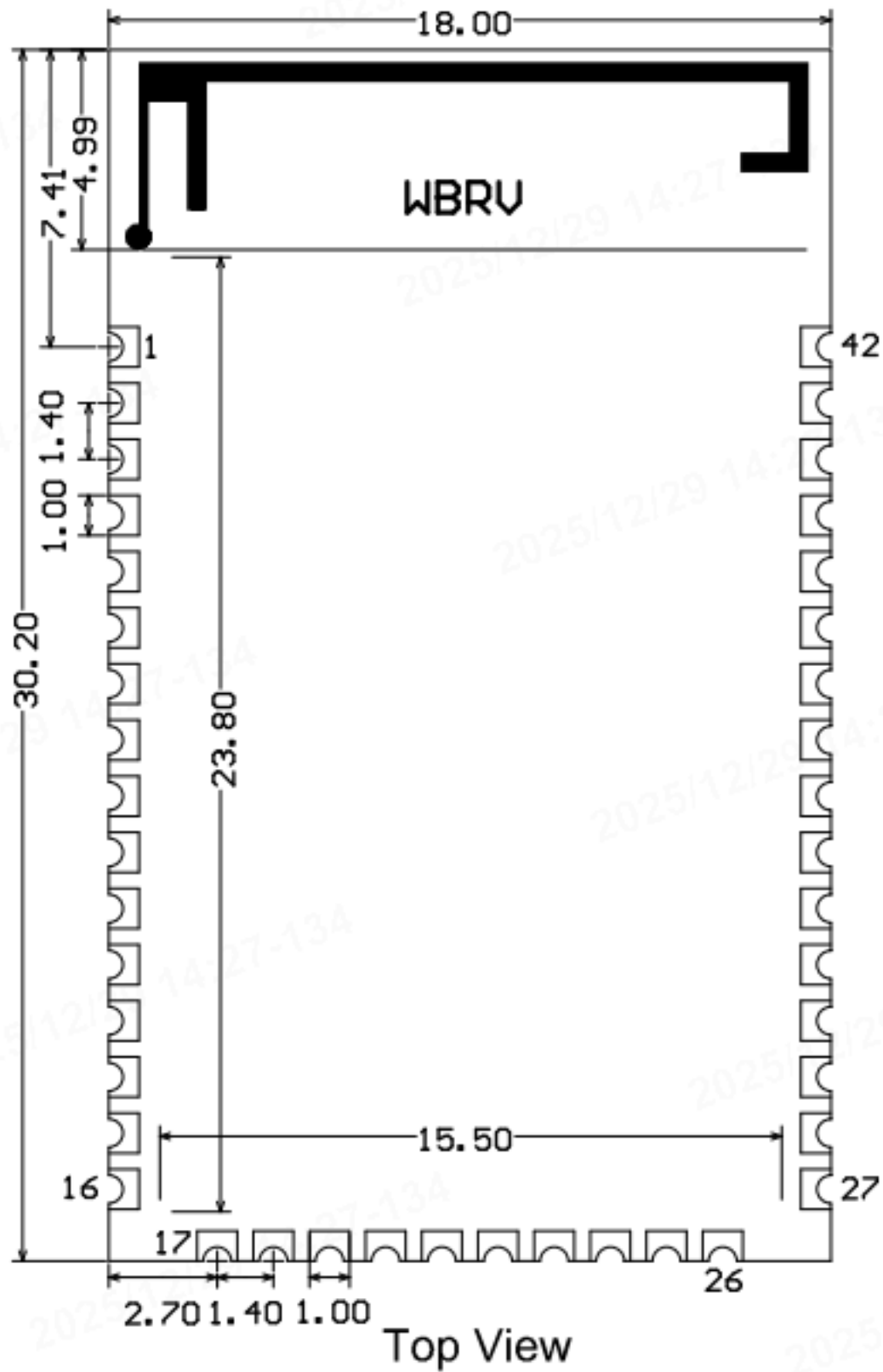
To ensure optimal Wi-Fi performance when the Wi-Fi module uses an onboard PCB antenna, it is recommended that the antenna be at least 15 mm away from other metal parts.

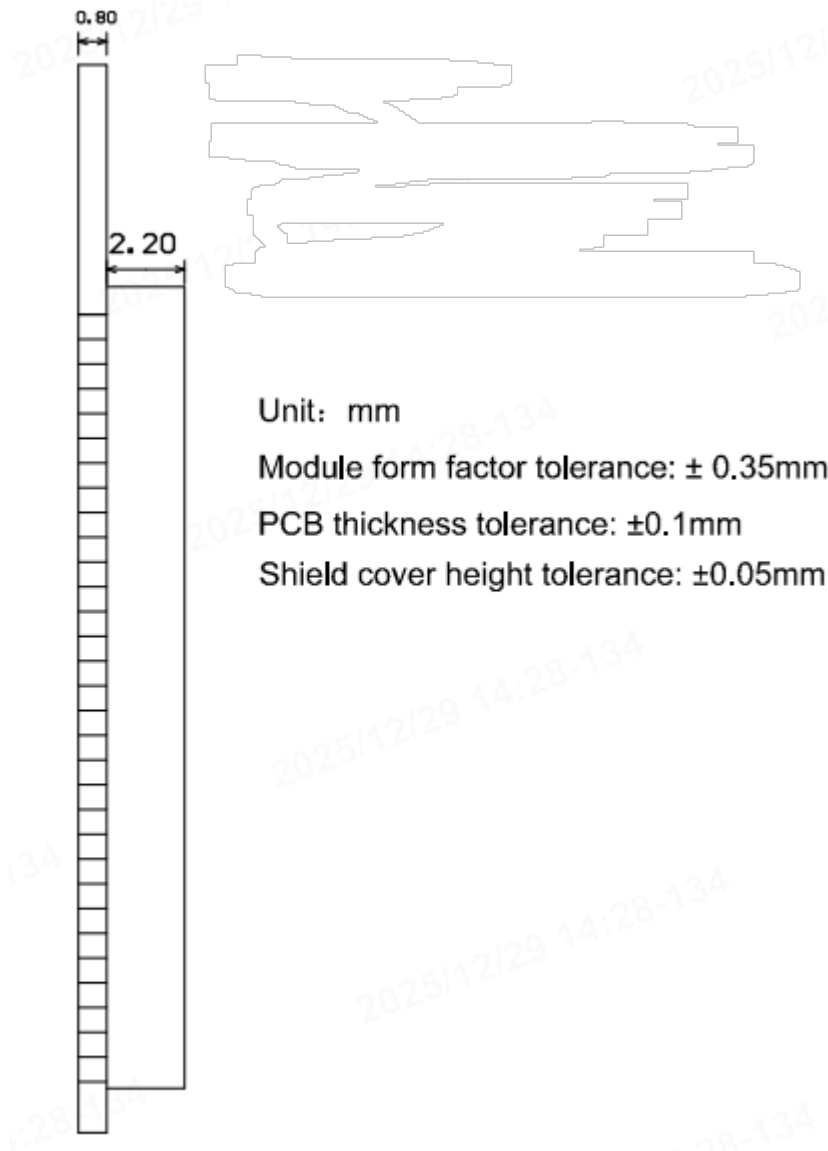
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## 6. Packaging information and production instructions

### 6.1. Mechanical dimensions

As shown in the following figure, the mechanical dimensions of the PCB of WBRV are  $18\pm0.35$  mm (W) $\times$  $30.2\pm0.35$  mm (L)  $\times$  $0.8\pm0.1$  mm (H).





Unit: mm

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

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

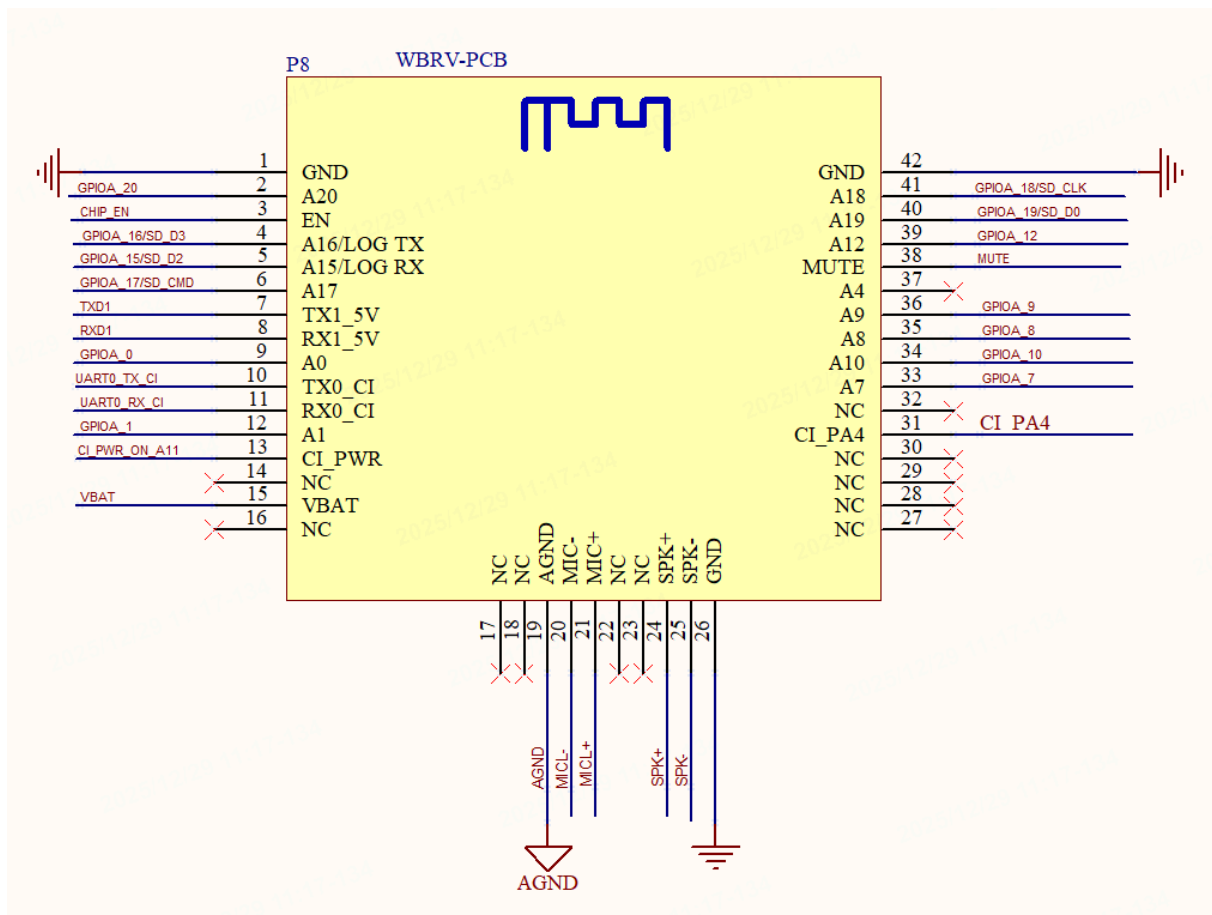
Shield cover height tolerance:  $\pm 0.05\text{mm}$

Side View

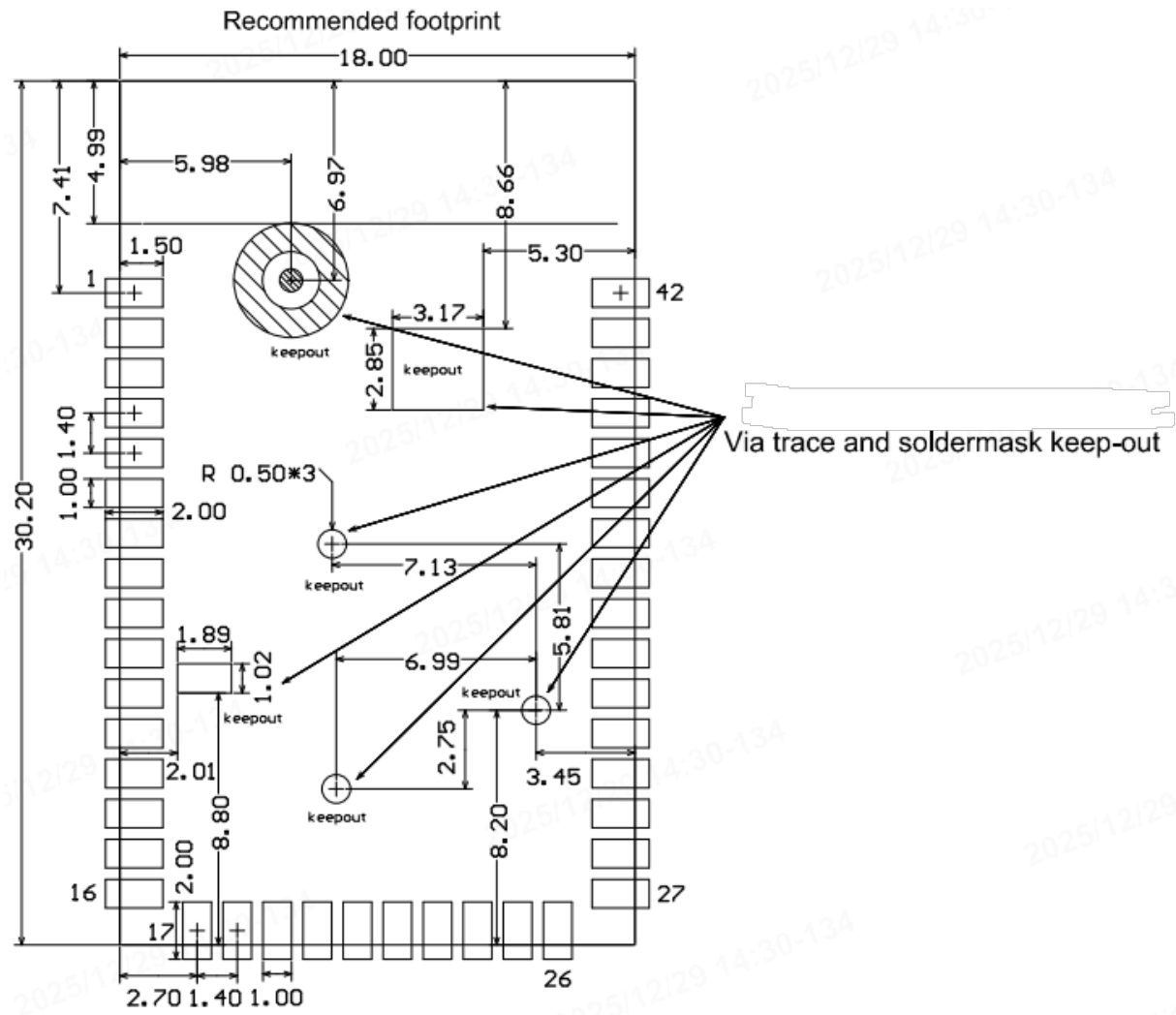
**Note:** The default dimensional tolerance is  $\pm 0.35\text{ mm}$ . If you have specific requirements on dimensions, make them clear in the datasheet after communication.

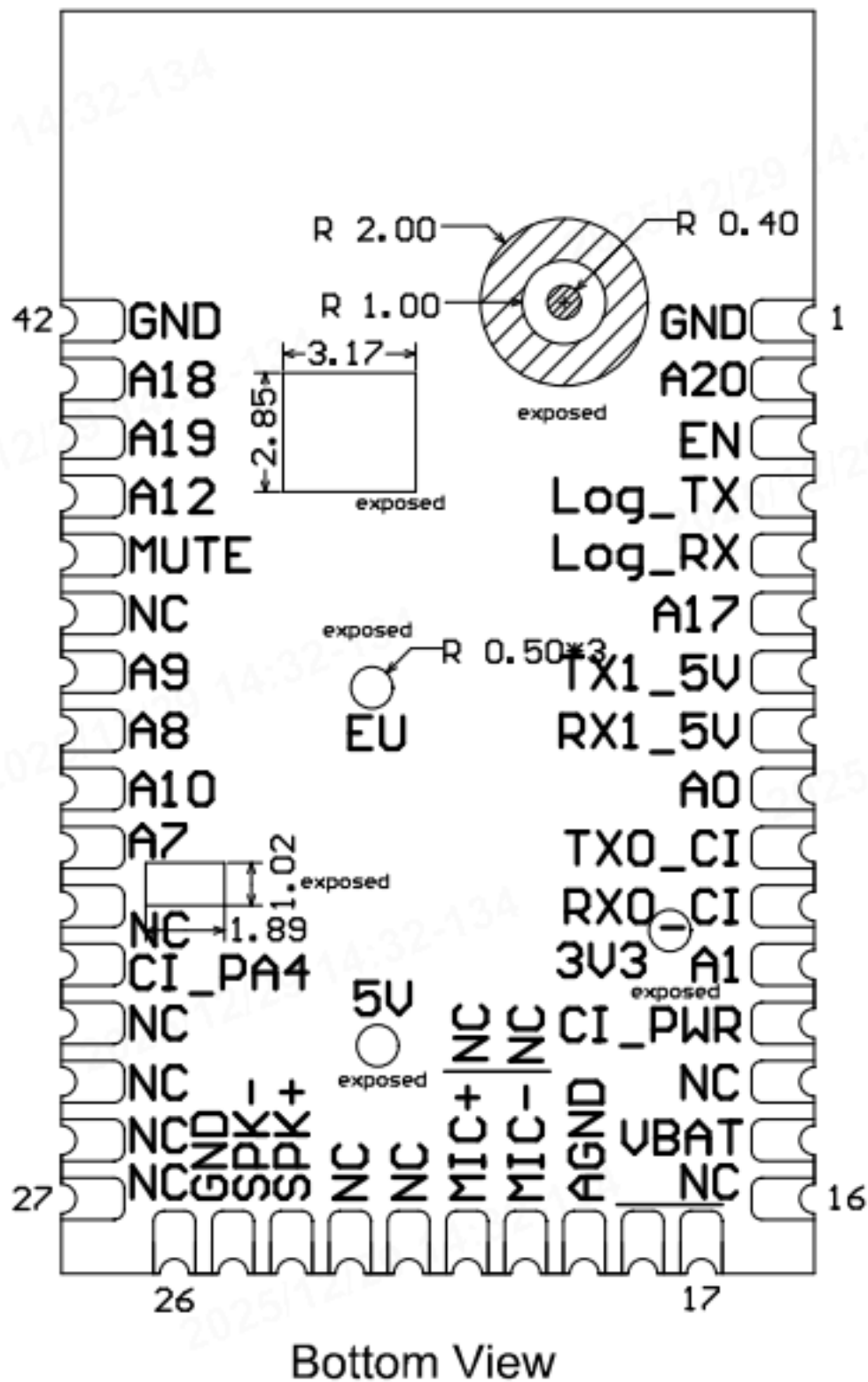
## 6.2. Recommended PCB layout

The following figure is a schematic diagram of WBRV which shows how pins correspond to each other.



WBRV PCB Layout is shown as below:

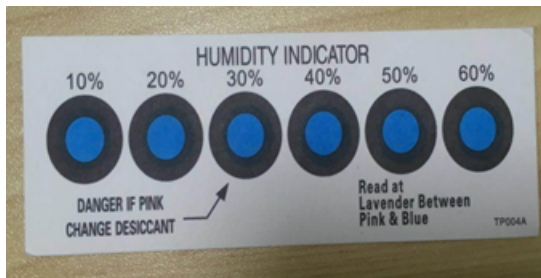


*i*

The area indicated as **keep-out** in the diagram above does not require tinning and should not have any traces routed through it.

### 6.3. Production instructions

- For the modules that can be packaged with the surface-mount technology (SMT) or in in-line form, you can select either of them according to the PCB design solutions of customers. If a PCB is designed to be SMT-packaged, package the module with the SMT. If a PCB is designed to use an in-line package, use wave soldering. Complete soldering within 24 hours after the module is unpacked. Otherwise, we recommend that you place the module in a drying cupboard with a relative humidity level below 10%, or pack the module in vacuum again. Then, record the packing time and duration of exposure. The total exposure time cannot exceed 168 hours.
- Instruments or devices required for the SMT process:
  - Surface mount system
  - SPI
  - Reflow soldering machine
  - Thermal profiler
  - Automated optical inspection (AOI) device
- Instruments or devices required for the wave soldering process:
  - Wave soldering device
  - Wave soldering fixture
  - Constant-temperature soldering iron
  - Tin bar, tin wire, and flux
  - Thermal profiler
- Instruments or devices required for the baking process:
  - Cabinet oven
  - Electrostatic discharge (ESD) protection and heat-resistant trays
  - ESD protection and heat-resistant gloves
- A delivered module must meet the following storage requirements:
  - The moisture-proof bag must be placed in an environment where the temperature is below 40°C and the relative humidity is lower than 90%.
  - The shelf life of a dry-packaged product is 12 months from the date when the product is packaged and sealed.
  - A humidity indicator card (HIC) is put in the sealed package.



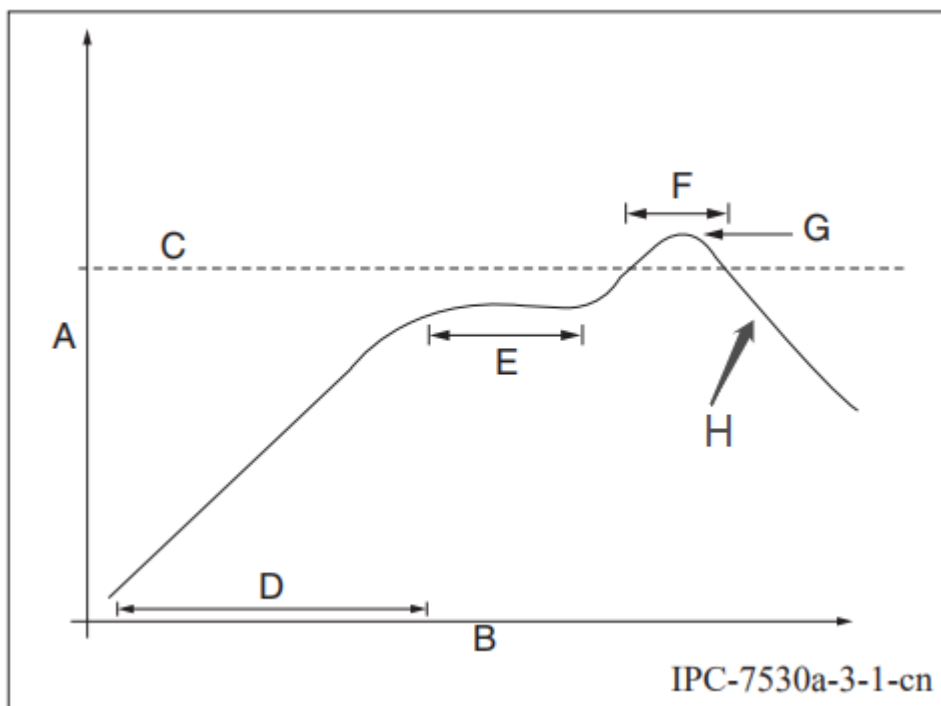
- The module needs to be baked in the following cases:
- The vacuum packaging bag is damaged before unpacking.
- After unpacking, no HIC is found in the packaging bag.
- After unpacking, the HIC indicates a humidity level of 10% or higher. In this case, the circle turns pink on the HIC.
- The total exposure time has lasted for over 168 hours since unpacking.
- More than 12 months have passed since the first sealing of the bag.
- The baking parameter settings are described below:
- Baking temperature: 40°C for reel packaging with relative humidity  $\leq 5\%$ . And 125°C for tray packaging with relative humidity  $\leq 5\%$  (use a heat-resistant tray, rather than a plastic container).
- Baking time: 168 hours for reel packaging and 12 hours for tray packaging.
- Temperature for triggering an alert: 50°C for reel packaging and 135°C for tray packaging.
- Production can begin after a module has cooled down to below 36°C under natural conditions.
- If a module remains unused for over 168 hours after being baked, it needs to be baked again.
- If a batch of modules is not baked after exposure for more than 168 hours, do not use wave soldering to solder them. Because these modules are level-3 moisture-sensitive devices, they are very likely to get damp when exposed beyond the allowable time. In this case, if they are soldered at high temperatures, device failure or poor soldering performance might occur.
- In the whole production process, take electrostatic discharge (ESD) protective measures.
- To guarantee the pass rate, we recommend that you use the SPI and AOI to monitor the quality of solder paste printing and mounting.

## 6.4. Recommended oven temperature curve

Select a proper soldering technique according to the process. For more information, refer to the recommended oven temperature curve of either reflow soldering or wave soldering. The set temperatures might deviate from the actual temperature measurements. All temperatures shown in this module datasheet are obtained through actual measurements.

### Technique 1: SMT process (recommended oven temperature curve of reflow soldering)

Set the oven temperatures according to the following curve.



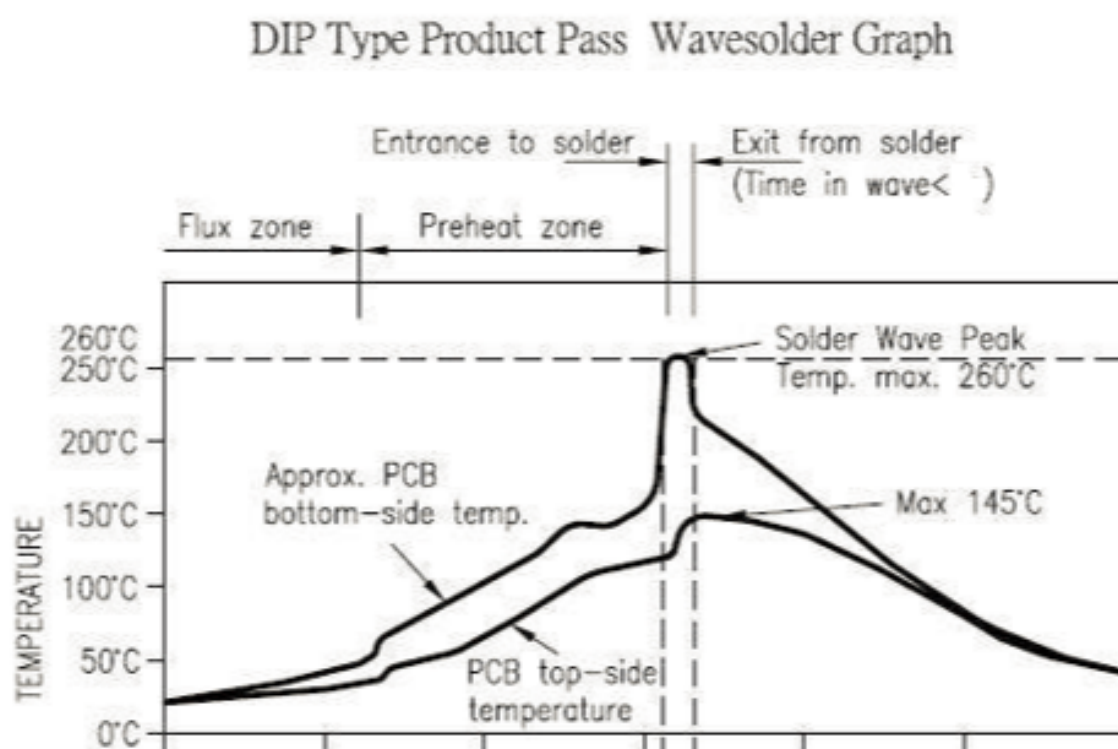
- A: temperature axis
- B: time axis
- C: alloy liquidus temperature from 217°C to 220°C
- D: ramp-up slope from 1°C/s to 3°C/s
- E: keep a constant temperature from 150°C to 200°C for a time period of 60s to 120s
- F: temperature above liquidus temperature for 50s to 70s
- G: peak temperature from 235°C to 245°C
- H: ramp-down slope from 1°C/s to 4°C/s

i

The curve above is based on solder paste SAC305. For more information about other solder pastes, see the recommended oven temperature curve in the specified solder paste specifications.

### Technique 2: Wave soldering process (oven temperature curve of wave soldering)

Set the oven temperatures according to the following temperature curve of wave soldering. The peak temperature is  $260^{\circ}\text{C} \pm 5^{\circ}\text{C}$ .



#### Suggestions on wave soldering

#### Suggestions on manual repair soldering

|                              |                 |                       |                    |
|------------------------------|-----------------|-----------------------|--------------------|
| Preheat temperature          | 80°C to 130°C   | Soldering temperature | 360°C $\pm$ 20°C   |
| Preheat duration             | 75s to 100s     | Soldering duration    | Less than 3s/point |
| Contact duration at the peak | 3s to 5s        | N/A                   | N/A                |
| Solder tank temperature      | 260°C $\pm$ 5°C | N/A                   | N/A                |

|                 |                            |     |     |
|-----------------|----------------------------|-----|-----|
| Ramp-up slope   | $\leq 2^{\circ}\text{C/s}$ | N/A | N/A |
| Ramp-down slope | $\leq 6^{\circ}\text{C/s}$ | N/A | N/A |

## 6.5. Storage conditions

|                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                         |                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                            | <p><b>Caution</b></p> <p>This bag contains</p> <p><b>MOISTURE-SENSITIVE DEVICES</b></p> | <p>LEVEL</p> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p><b>3</b></p> </div> <p><small>If blank, see adjacent bar code label</small></p> |
| <p>1. Calculated shelf life in sealed bag: 12 months at <math>&lt;40^{\circ}\text{C}</math> and <math>&lt;90\%</math> relative humidity (RH)</p>                                                                                                                                                                                                                                                            |                                                                                         |                                                                                                                                                                             |
| <p>2. Peak package body temperature: <u>260</u> <math>^{\circ}\text{C}</math></p> <p style="text-align: right;"><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</p> <p style="text-align: right;"><small>If blank, see adjacent bar code label</small></p> <p style="padding-left: 40px;"><math>\leq 30^{\circ}\text{C}/60\% \text{ RH}</math>, 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 <math>&gt;10\%</math> for level 2a - 5a devices or <math>&gt;60\%</math> for level 2 devices when read at <math>23 \pm 5^{\circ}\text{C}</math></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 style="text-align: center;"><b>See Production Date</b></p> <p>Bag Seal Date: _____</p> <p style="text-align: right;"><small>If blank, see adjacent bar code label</small></p>                                                                                                                                                                                                                            |                                                                                         |                                                                                                                                                                             |
| <p><b>Note: Level and body temperature defined by IPC/JEDEC J-STD-020</b></p>                                                                                                                                                                                                                                                                                                                               |                                                                                         |                                                                                                                                                                             |

## 7. MOQ and packaging information

| Product model | MOQ (pcs) | Shipping packaging | Modules per reel | Reels per carton |
|---------------|-----------|--------------------|------------------|------------------|
| WBRV          | 4,400     | Tape and reel      | 1,100            | 4                |

## 8. Appendix: Statement

### Important Notice to OEM integrators

1. This module is limited to OEM installation ONLY.
2. This module is limited to installation in mobile or fixed applications, according to Part 2.1091(b).
3. The separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and different antenna configurations
4. For FCC Part 15.31 (h) and (k): The host manufacturer is responsible for additional testing to verify compliance as a composite system. When testing the host device for compliance with Part 15 Subpart B, the host manufacturer is required to show compliance with Part 15 Subpart B while the transmitter module(s) are installed and operating. The modules should be transmitting and the evaluation should confirm that the module's intentional emissions are compliant (i.e. fundamental and out of band emissions). The host manufacturer must verify that there are no additional unintentional emissions other than what is permitted in Part 15 Subpart B or emissions are complaint with the transmitter(s) rule(s). The Grantee will provide guidance to the host manufacturer for Part 15 B requirements if needed.

### Important Note

Notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify to Tuya that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the TUYA, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

**End Product Labeling** When the module is installed in the host device, the FCC label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: "Contains FCC ID: 2ANDL-WBRV" . The FCC ID can be used only when all FCC compliance requirements are met.

**Antenna Installation** (1) The antenna must be installed such that 20 cm is maintained between the antenna and users, (2) The transmitter module may not be co-located with any other transmitter or antenna. (3) Only antennas of the same type and with equal or less gains as shown below may be used with this module. Other types of antennas and/or higher gain antennas may require additional authorization for operation.

| Antenna type | BT/Wlan 2.4G |
|--------------|--------------|
| PCB          | 1.25dBi      |

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

**Manual Information to the End User** The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

**Federal Communication Commission Interference 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. 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 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.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

**List of applicable FCC rules** This module has been tested and found to comply with part 15 requirements for Modular Approval. The modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) 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. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

This device is intended only for OEM integrators under the following conditions:  
(For module device use)

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

As long as 2 conditions above are met, further transmitter test 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.

**Radiation Exposure Statement** This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should

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be installed and operated with minimum distance 20 cm between the radiator & your body.