WBR3 Module Datasheet

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WBR3 is a low-power embedded Wi-Fi+Bluetooth module that Tuya has developed. It consists of a highly integ
VA2-CG), with an embedded Wi-Fi network protocol stack and varied library functions.

Overview

With the maximum CPU clock rate of 100MHz, WBR3 also contains a low-power KM4 microcontroller unit (MC
WLAN module, 256-KB static random-access memory (SRAM), 2-MB flash memory, and extensive peripherals

WBR3 is an RTOS platform that integrates all function libraries of the Wi-Fi MAC and TCP/IP protocols. You ca
Fi products as required.

Features

- Embedded low-power KM4 MCU, which can also function as an application processor, clock rate: 100 MH
- Working voltage: 3.0 to 3.6 V
- Peripherals: 9 GPIOs, 1 universal asynchronous receiver/transmitter (UART), and 1 log transmitter
- 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 4.2 Low Energy
  - Up to +20 dBm output power in 802.11b mode
  - Support SmartConfig for Android and iOS devices

- Onboard PCB antenna
- Passed CE and FCC certification
- Working temperature: -20 to +85°C

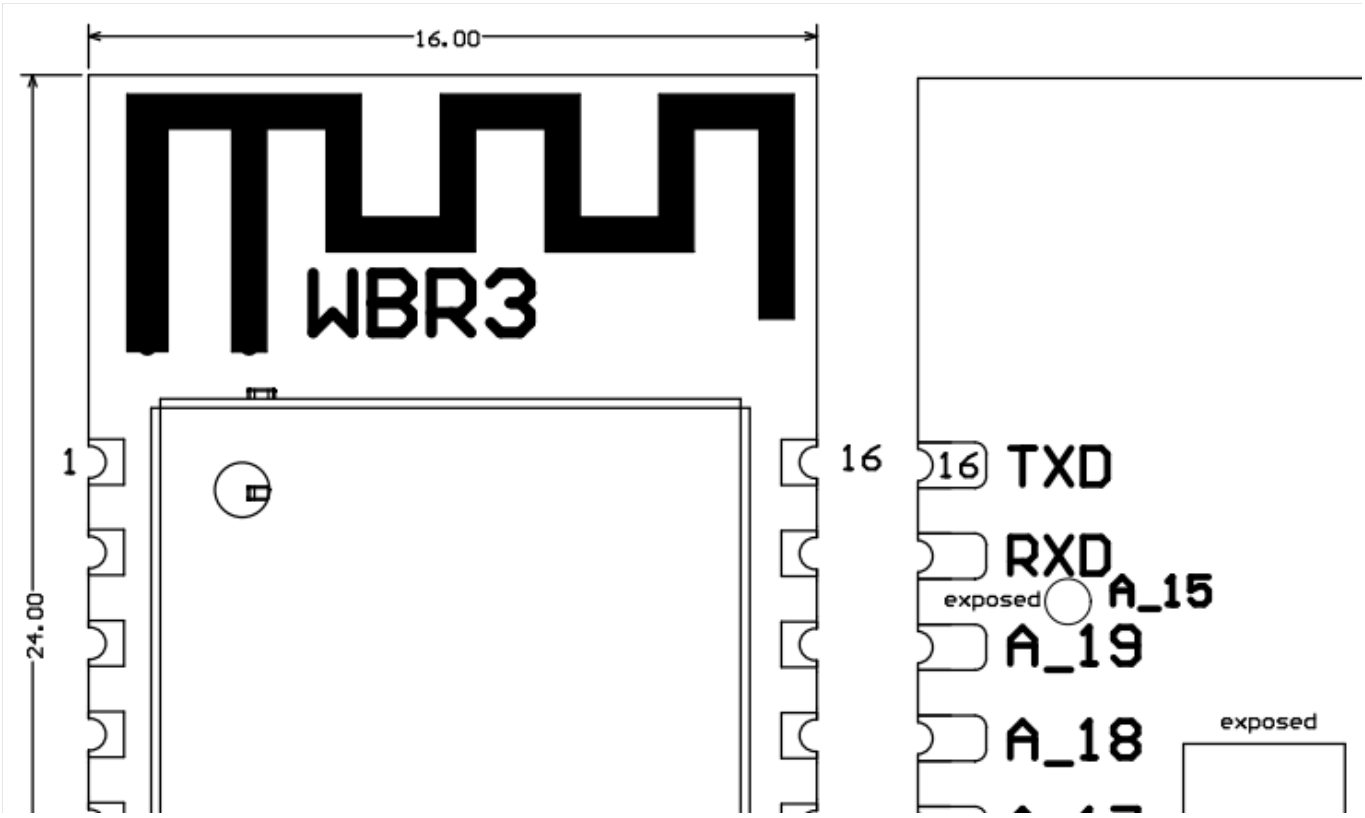
Applications

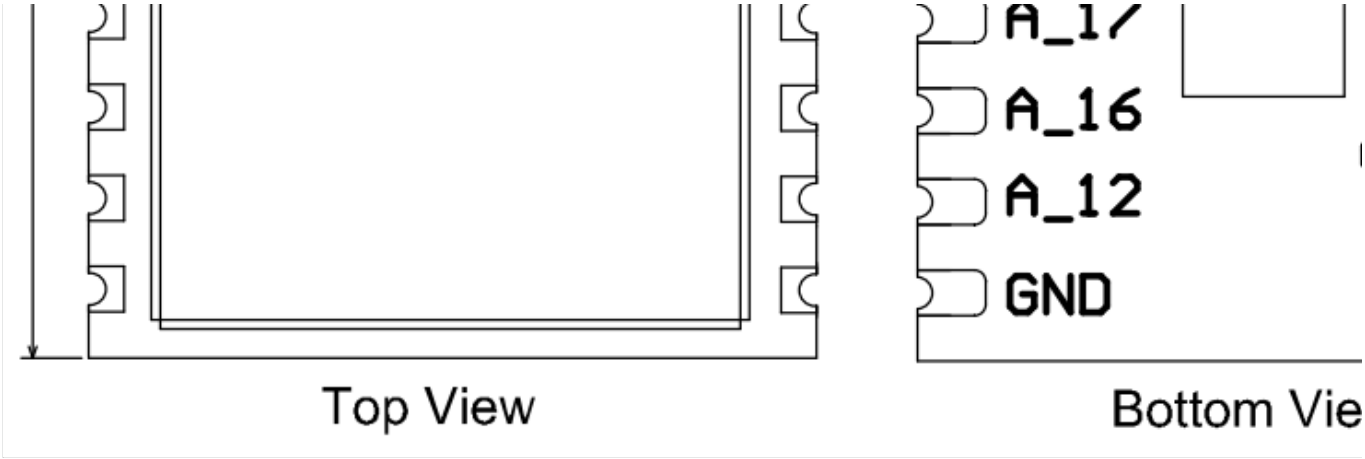
- Intelligent building
- Smart household and home appliances
- Smart socket and light
- Industrial wireless control
- Baby monitor
- Network camera
- Intelligent bus

Module interfaces

Dimensions and footprint

As shown in the following figure, WBR3 has two rows of pins and each row includes 8 pins with a 2 mm pin spa dimensions (H x W x L) are 2.9 mm x 16 mm x 24 mm. The default dimensional tolerance is ±0.35 mm.





Pin definition

Pin number	Symbol	I/O type	Function
1	NC	/	The pin is pulled up to be compatible with other modules
2	A_7	I/O	GPIOA_7, hardware PWM, IC Pin 21
3	EN	I/O	Enabling pin, which works at the high level and is pulled up and c externally
4	A_11	I/O	GPIOA_11, hardware PWM, IC Pin 25
5	A_2	I/O	GPIOA_2, hardware PWM, IC Pin 18
6	A_3	I/O	GPIOA_3, hardware PWM, IC Pin 19
7	A_4	I/O	GPIOA_4, hardware PWM, IC Pin 20
8	VCC	P	Power supply pin (3.3V)
9	GND	P	Power supply reference ground
10	A_12	I/O	GPIOA_12, hardware PWM, IC Pin 26
11	A_16	I/O	GPIOA_16, UART_Log_TXD, which is used for displaying the mo information and can be configured as a common GPIO

Pin number	Symbol	I/O type	Function
12	A_17	I/O	GPIOA_17, hardware PWM, IC Pin 38
13	A_18	I/O	GPIOA_18, hardware PWM, IC Pin 39
14	A_19	I/O	GPIOA_19, hardware PWM, IC Pin 40
15	RXD	I/O	GPIOA_13, UART0_RXD, which is used as a user-side serial inte
16	TXD	I/O	GPIOA_14, UART0_TXD, which is used as a user-side serial inte

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

Electrical parameters

Absolute electrical parameters

Parameter	Description	Minimum value	Maximum value	U
Ts	Storagetemperature	-40	105	°
VDD	Power supply voltage	-0.3	3.6	V
ESD voltage (human body model)	TAMB-25℃	-	2	K
ESD voltage (machine model)	TAMB-25℃	-	0.5	K

Working conditions

Parameter	Description	Minimum value	Typical value	Maximum value	Unit
Ta	Working temperature	-20	-	85	℃

Parameter	Description	Minimum value	Typical value	Maximum value	Unit
VDD	Power supply voltage	3.0	-	3.6	V
V_{IL}	I/O low-level input	-	-	0.8	V
V_{IH}	I/O high- level input	2.0	-	-	V
V_{OL}	I/O low-level output	-	-	0.4	V
V_{OH}	I/O high-level output	2.4	-	-	V
I_{max}	I/O drive current	-	-	16	mA
C_{pad}	Input pin capacitance	-	2	-	pF

RF power consumption

- TX power consumption:

Symbol	Mode	Power	Average value	Peak value (Typical value)	Ur
IRF	11b 11 Mbps	17 dBm	217	268	m
IRF	11b 11 Mbps	18 dBm	231	283	m
IRF	11g 54 Mbps	15 dBm	159	188	m
IRF	11g 54 Mbps	17.5 dBm	177	213	m
IRF	11n BW20 MCS7	13 dBm	145	167	m
IRF	11n BW20 MCS7	16.5 dBm	165	193	m

- RX power consumption:

Symbol	Mode	Average value	Peak value (Typical value)	Unit

Symbol	Mode	Average value	Peak value (Typical value)	Unit
IRF	11B 11M	63	65	mA
IRF	11G 54M	65	67	mA
IRF	11N HT20 MCS7	65	67	mA

Working power consumption

Working Mode	Working Status (Ta = 25°C)	Average value	Peak value (T
EZ	The module is in fast network configuration state, Wi-Fi	75	324
Connected and idle state	The module is connected to the network and the Wi-Fi indicator is always on	64	314
Network and operating	The module is connected to the network, Wi-Fi	66	305
Disconnected status	The module is offline and the Wi-Fi indicator is dark	66	309

RF parameters

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)

Parameter	Description
Bluetooth standard	Bluetooth 4.2
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 gain of 2.5 dBi

TX performance

Parameter	Minimum value	Tyical value	Maxin
Average RF output power, 802.11b CCK Mode, 1 Mbit/s	-	17.5	-
Average RF output power, 802.11g OFDM mode, 54 Mbit/s	-	14.5	-
Average RF output power, 802.11n OFDM mode MCS7	-	13.5	-
Average RF output power, Bluetooth 4.2, 1 Mbit/s	-	6.5	-
Frequency error	-20	-	20
EVM@802.11b CCK 11 Mbps Mode 17.5 dBm	-	-	-10
EVM@802.11g OFDM 54 Mbps Mode 14.5 dBm	-	-	-29
EVM@802.11n OFDM MCS7 Mode 13.5 dBm	-	-	-30

RX performance

Parameter	Minimum value	Typical value	Maximu

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

Antenna

Antenna type

WBR3 uses an onboard PCB antenna with a gain of 2.5 dBi.

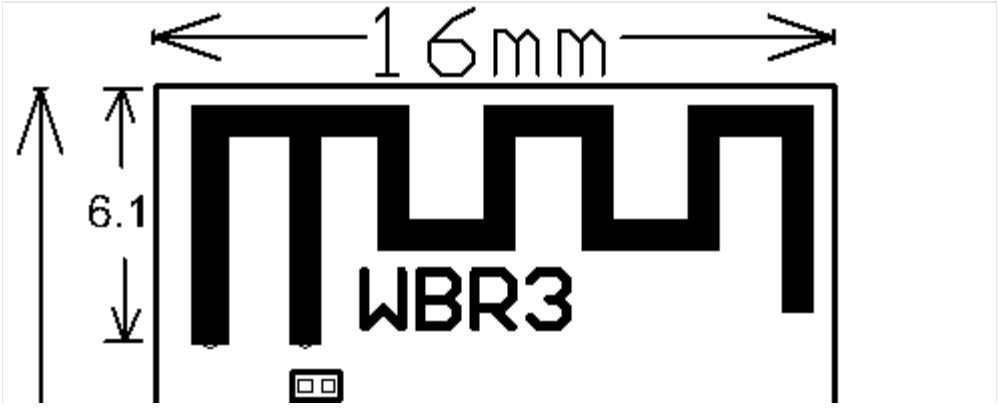
Antenna interference reduction

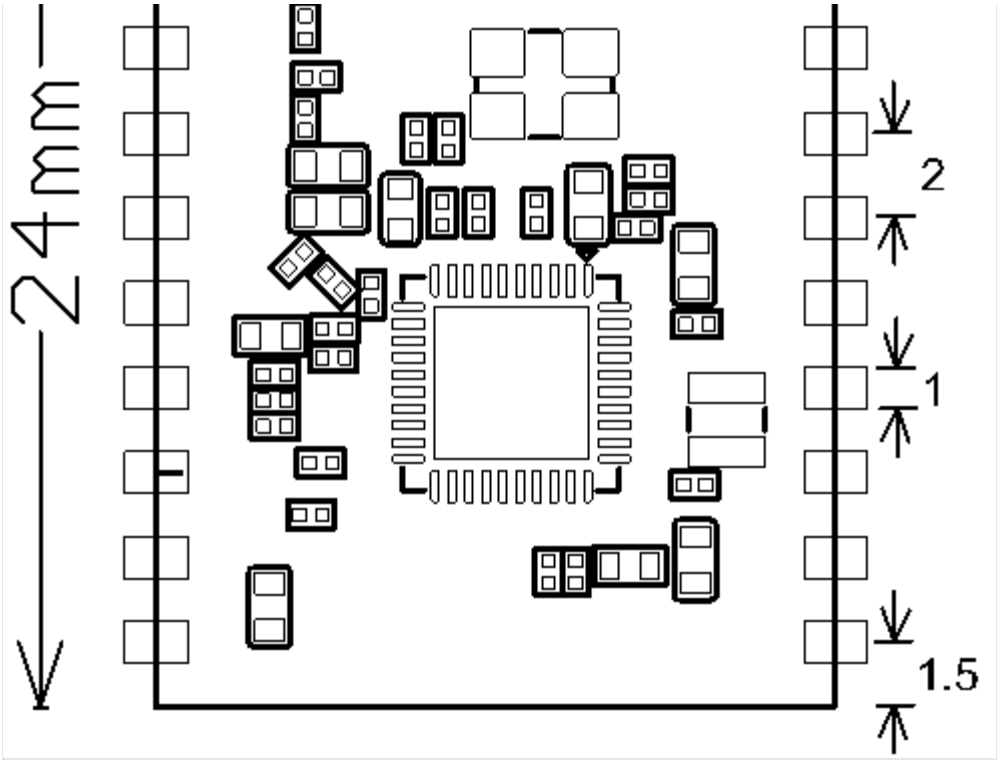
To ensure optimal Wi-Fi performance when the Wi-Fi module uses an onboard PCB antenna, it is recommende least 15 mm away from other metal parts.

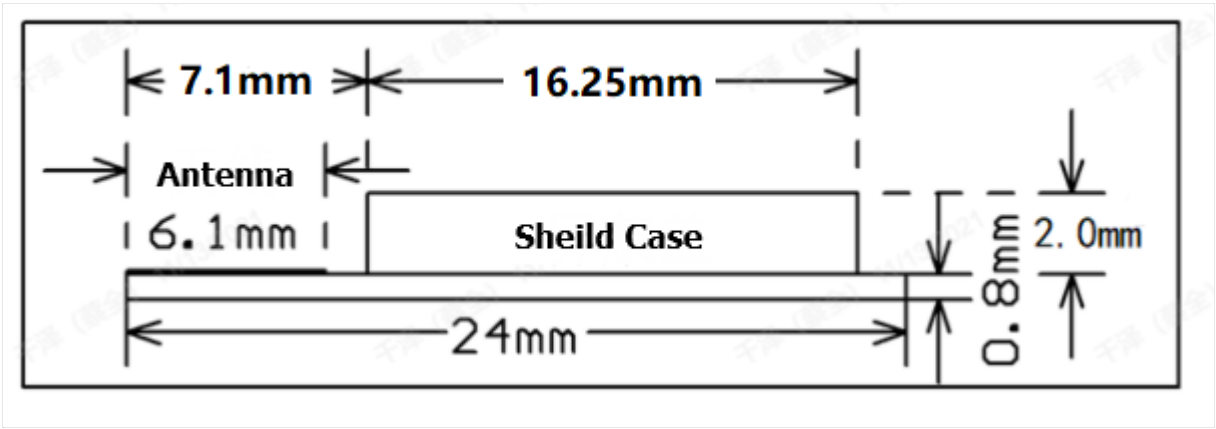
Packaging information and production instructions

Mechanical dimensions

As shown in the following figure, the mechanical dimensions of the PCB of WBR3 are 16±0.35 mm (W)×24±0. (H).



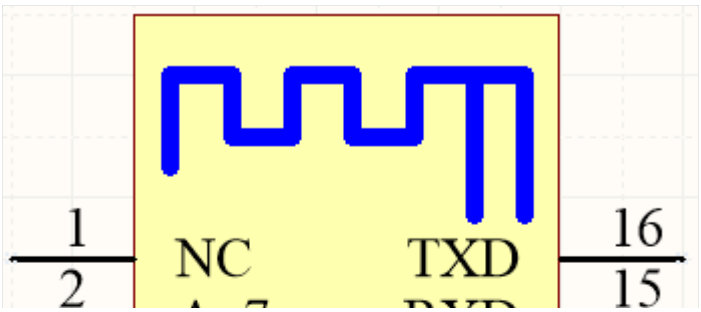


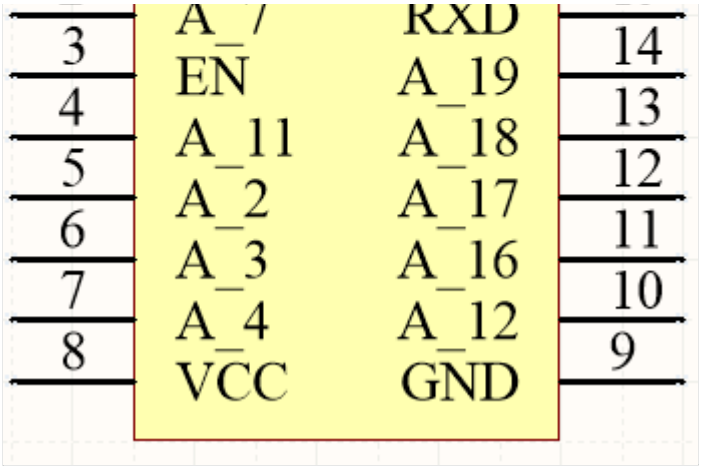


Note: The default dimensional tolerance is ±0.35 mm. If you have specific requirements on dimensions, ma datasheet after communication.

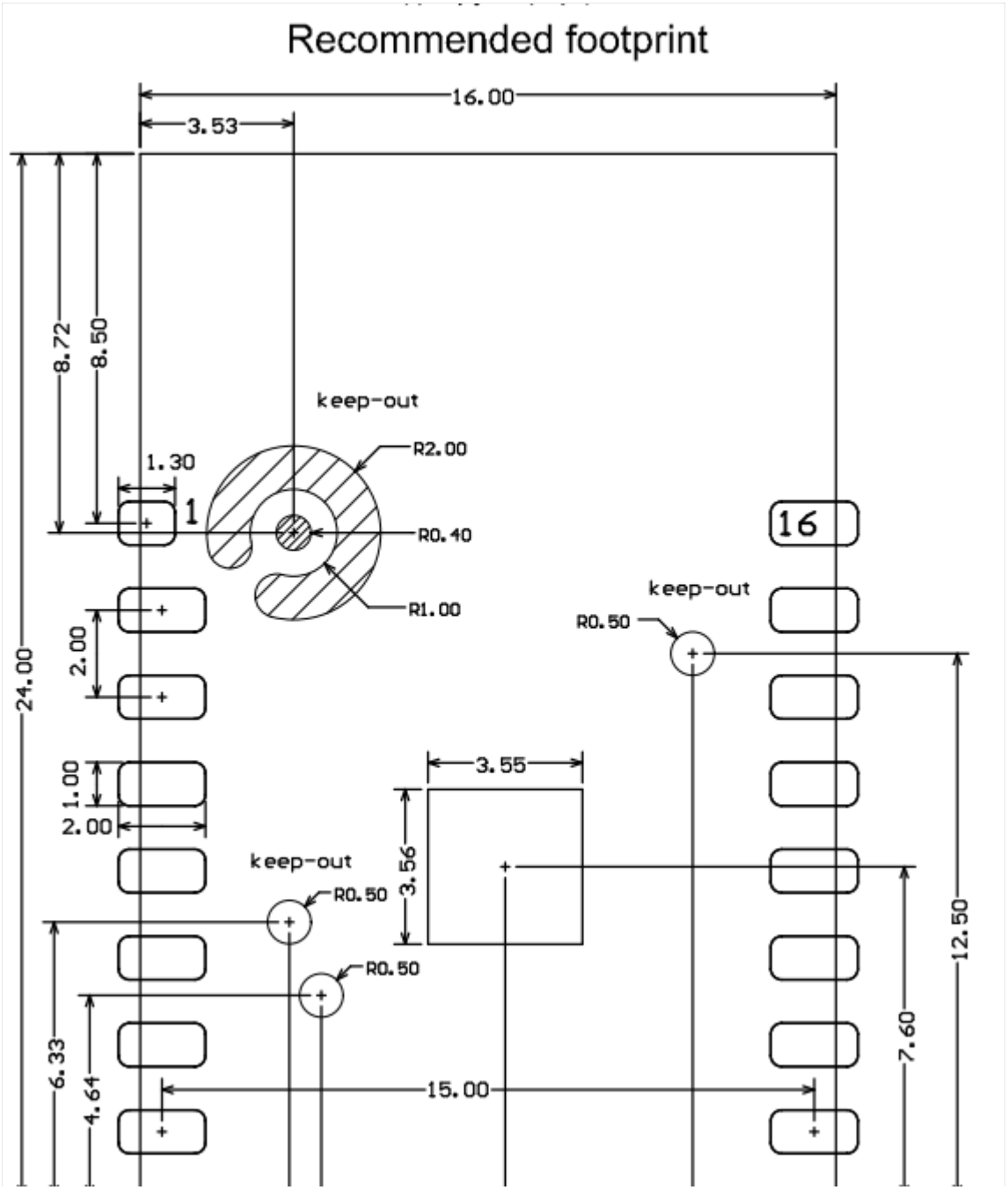
Recommended PCB layout

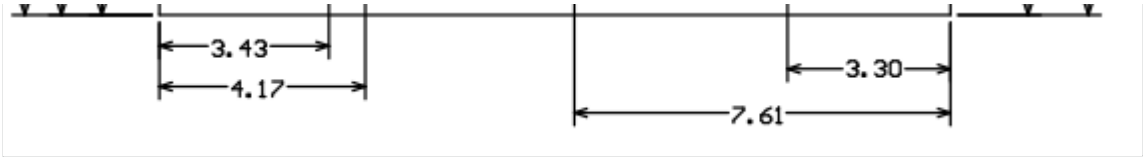
The following figure is a schematic diagram of WBR3 which shows how pins correspond to each other.





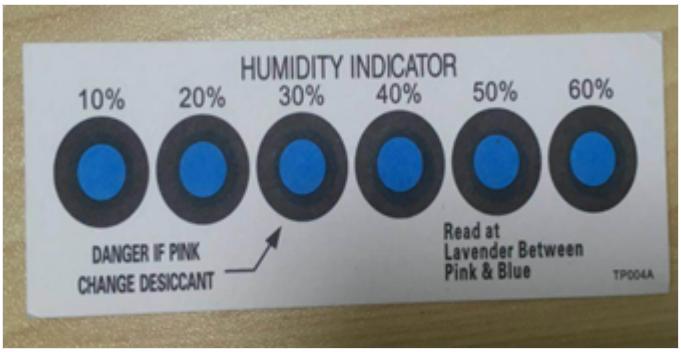
WBR3 PCB Layout is shown as below:





Production instructions

1. The Tuya SMT module should be mounted by the SMT device. After being unpacked, it should be soldere
   Otherwise, it should be put into the drying cupboard where the RH is not greater than 10%; or it needs to
   vacuum again and the exposure time needs to be recorded (the total exposure time cannot exceed 168 h
   - SMT devices:
     - Mounter
     - SPI
     - Reflow soldering machine
     - Thermal profiler
     - Automated optical inspection (AOI) equipment
   - Baking devices:
     - Cabinet oven
     - Anti-electrostatic and heat-resistant trays
     - Anti-electrostatic and heat-resistant gloves
2. Storage conditions for a delivered module:
   - The moisture-proof bag must be placed in an environment where the temperature is below 40°C and th
     lower than 90%.
   - The shelf life of a dry-packaged product is 12 months from the date when the product is packaged and
   - There is a humidity indicator card (HIC) in the packaging bag.



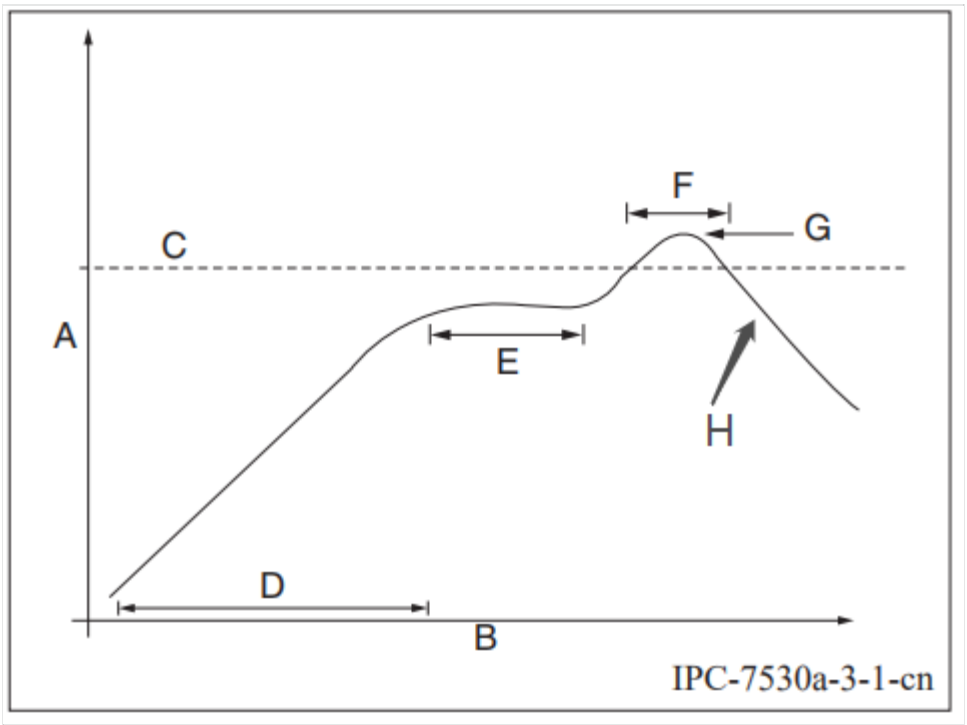
3. The module needs to be baked in the following cases:
   - The packaging bag is damaged before unpacking.
   - There is no HIC in the packaging bag.
   - After unpacking, circles of 10% and above on the HIC become pink.
   - The total exposure time has lasted for over 168 hours since unpacking.

- More than 12 months have passed since the sealing of the bag.

4. Baking settings:
   - Temperature: 60°C and ≤ 5% RH for reel package and 125°C and ≤5% RH for tray package (please us rather than plastic container)
   - Time: 48 hours for reel package and 12 hours for tray package
   - Alarm temperature: 65°C for reel package and 135°C for tray package
   - Production-ready temperature after natural cooling: < 36°C
   - Re-baking situation: If a module remains unused for over 168 hours after being baked, it needs to be b
   - If a batch of modules is not baked within 168 hours, do not use the reflow soldering to solder them. Be Level-3 moisture-sensitive devices, they are very likely to get damp when exposed beyond the allowab they are soldered at high temperatures, it may result in device failure or poor soldering.
5. In the whole production process, take electrostatic discharge (ESD) protective measures.
6. To guarantee the passing rate, it is recommended that you use the SPI and AOI to monitor the quality of s mounting.

Recommended oven temperature curve

Set oven temperatures according to the following temperature curve of reflow soldering. The peak temperature

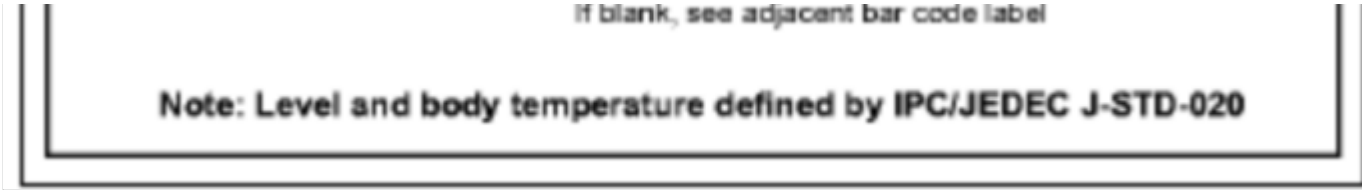


- A: Temperature axis
- B: Time axis
- C: Liquidus temperature: 217 to 220°C
- D: Ramp-up slope: 1 to 3°C/s

- E: Duration of constant temperature: 60 to 120s; the range of constant temperature: 150 to 200°C
- F: Duration above the liquidus: 50 to 70s
- G: Peak temperature: 235 to 245°C
- H: Ramp-down slope: 1 to 4°C/s

> **Note**: The above curve is just an example of the solder paste SAC305. For more details about other so refer to Recommended oven temperature curve in the solder paste specifications.

Storage conditions



MOQ and packaging information

Product model	MOQ (pcs)	Shipping packaging method	The number of modules per reel
WBR3	3600	Tape reel	900

Appendix: Statement

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance c
authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) Th
harmful interference, and (2) this device must accept any interference received, including interference that may
operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuan
Rules. These limits are designed to provide reasonable protection against harmful interference in a residential
equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordanc
may cause harmful interference to radio communications. However, there is no guarantee that interference will
installation. If this equipment does cause harmful interference to radio or television reception, which can be det
equipment off and on, the user is encouraged to try to correct the interference by one or more of the following

- 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.

Radiation Exposure Statement

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

accordance with FCC multi-transmitter product procedures. Additional testing and equipment authorization ma simultaneously with other radios.

The availability of some specific channels and/or operational frequency bands are country dependent and are 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 to any other FCC rules that apply to the host not transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with installed.

The end-user manual shall include all required regulatory information/warning as shown in this manual, includi installed and operated with a minimum distance of 20 cm between the radiator and user body.

This device has got an FCC ID: 2ANDL-WBR3. The final end product must be labeled in a visible area with the Transmitter Module FCC ID: 2ANDL-WBR3".

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

1. The antenna must be installed such that 20cm 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 the 2 conditions above are met, further transmitter tests will not be required. However, the OEM inte 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 wi and other relevant provisions of Directive 2014/53/EU,2011/65/EU. A copy of the Declaration of conformity car https://www.tuya.com.

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

point.

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Yes No

Language

English