

Wi-Fi and Bluetooth Module

CB2S Module Datasheet

1 Product overview

CB2S is built in with a 32-bit MCU whose running speed can be up to 120 MHz, a 2-MB flash memory, and a 256-KB RAM, so as to support the Tuya IoT cloud connection. The MCU instructions specially extended for signal processing can effectively implement audio encoding and decoding.

Besides, it has rich peripherals, such as PWM and UART. There are 5 channels of 32-bit PWM output, making the chip very suitable for high-quality LED control.

1.1 Features

- Built in with the low-power 32-bit CPU, which can also function as an application processor
- The clock rate: 120 MHz
- Working voltage: 3.0 to 3.6V
- Peripherals: 5 PWMs and 1 UART
- Wi-Fi connectivity
 - 802.11 b/g/n
 - Channels 1 to 14@2.4 GHz
 - Support WEP, WPA/WPA2, WPA/WPA2 PSK (AES), WPA3 security modes
 - Up to +16 dBm output power in 802.11b mode
 - Support STA/AP/STA+AP working mode
 - Support SmartConfig and AP network configuration manners for Android and iOS devices
 - Onboard PCB antenna with a gain of 0 dBi
 - Working temperature: -40°C to 85°C
- Bluetooth connectivity
 - Support the Bluetooth LE V5.2
 - Support the transmit power of 6 dBm in the Bluetooth mode
 - Complete Bluetooth coexistence interface
 - Onboard PCB antenna with a gain of 0 dBi

1.2 Applications

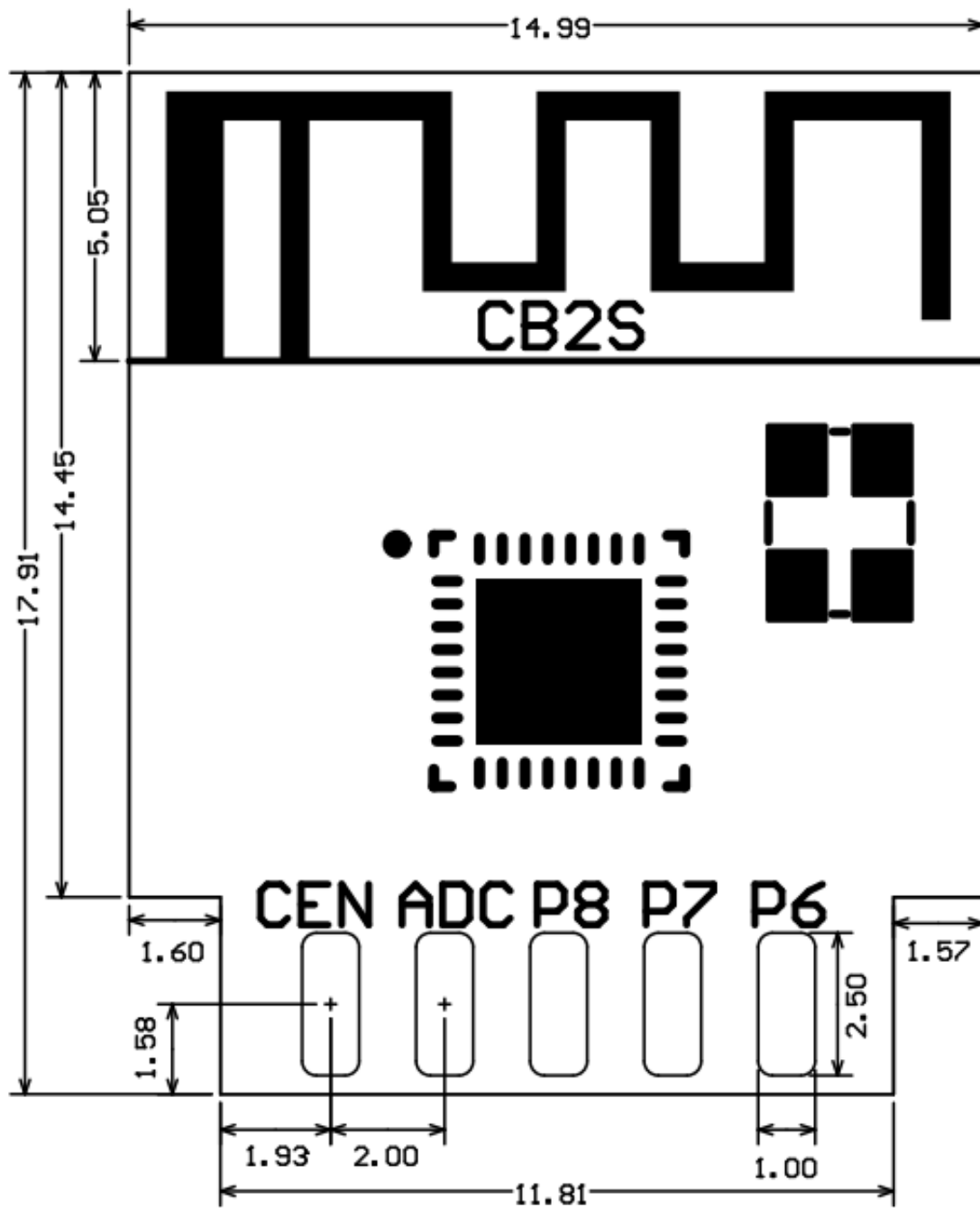
- Intelligent building

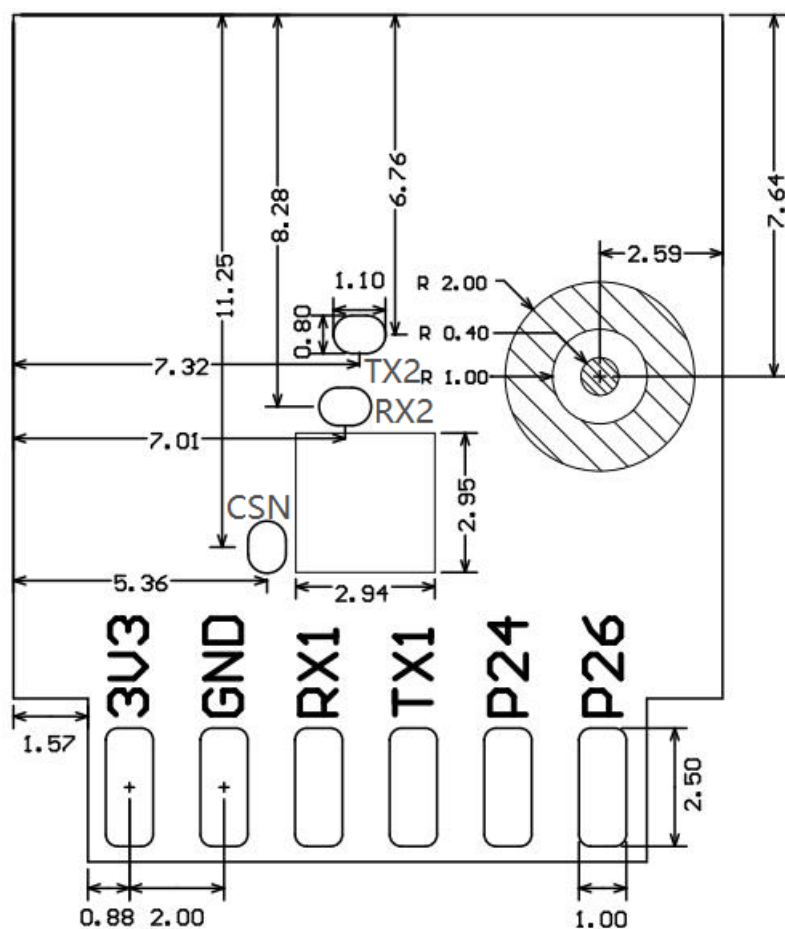
- Smart household and home appliances
- Smart socket and light
- Industrial wireless control
- Baby monitor
- Network camera
- Intelligent bus

2 Module interfaces

2.1 Dimensions and package

The dimensions of CB2S are 14.99 ± 0.35 mm (W) $\times$ 17.91 ± 0.35 mm (L) $\times$ 2.8 ± 0.15 mm (H). The dimensions of CB2S are as follows:





2.2 Pin definition

Pin number	Symbol	I/O type	Function
1	3V3	P	Power supply 3V3
2	P6	I/O	Support hardware PWM and correspond to P6 of the IC

Pin number	Symbol	I/O type	Function
3	GND	P	Power supply reference ground
4	P7	I/O	Support hardware PWM and correspond to P7 of the IC
5	RX1	I/O	UART_RX1 , which is used for receiving user data and corresponds to P10 of the IC. Do not pull it up. By default, the MCU serial port should be in low-level or high-impedance state.
6	P8	I/O	Support hardware PWM and correspond to P8 of the IC

Pin number	Symbol	I/O type	Function
7	TX1	I/O	UART_TX1 , which is used for transmitting user data and corresponds to P11 of the IC. Do not pull it up. By default, the MCU serial port should be in low-level or high-impedance state.
8	ADC	I/O	ADC, which corresponds to P23 of the IC
9	P24	I/O	Support hardware PWM and correspond to P24 of the IC
10	CEN	I/O	Reset pin
11	P26	I/O	Support hardware PWM and correspond to P26 of the IC

Pin number	Symbol	I/O type	Function
Test point	RX2	I/O	UART_RX2, which corresponds to P1 of the IC. This pin is not allowed to use.
Test point	TX2	I/O	UART_TX2, which is used for outputting logs and corresponds to P0 of the IC

Pin number	Symbol	I/O type	Function
Test point	CSN	I/O	Mode selection pin. If it is connected to the ground before being powered on, enter the firmware test mode. If it is not connected or connected to VCC before being powered on, enter the firmware application mode. It corresponds to P21 of the IC.

Note:

- P indicates a power supply pin and I/O indicates an input/output pin.
- For the MCU solution, see [CBx Module](#).

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	3.9	V
Static electricity discharge voltage (human body model)	TAMB-25°C	-4	4	KV
Static electricity discharge voltage (machine model)	TAMB-25°C	-200	200	V

3.2 Normal working conditions

Parameter	Description	Minimum value	Typical value	Maximum value	Unit
Ta	Working temperature	-40	-	85	°C
VBAT	Power supply voltage	3	3.3	3.6	V

Parameter	Description	Minimum value	Typical value	Maximum value	Unit
VOL	I/O low level output	VSS	-	VSS+0.3	V
VOH	I/O high level output	VBAT-0.3	-	VBAT	V
I _{max}	I/O drive current	-	6	20	mA

3.3 RF power consumption

Working status	Mode	Rate	Transmit power/receive	Average value	Peak value (Typical value))	Unit
Transmit	11b	11Mbps	+16dBm	81	240	mA
Transmit	11g	54Mbps	+15dBm	82	238	mA
Transmit	11n	MCS7	+14dBm	85	234	mA
Receive	11b	11Mbps	Constantly receive	73	82	mA
Receive	11g	54Mbps	Constantly receive	75	82	mA
Receive	11n	MCS7	Constantly receive	75	82	mA

3.4 Working current

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	63	245	mA
Quick network connection state (AP)	The module is in the hotspot network connection state and the Wi-Fi indicator flashes slowly	80	270	mA
Quick network connection state (EZ)	The module is in the fast network connection state and the Wi-Fi indicator flashes fast	78	246	mA
Network connected state	The module is connected to the network and the Wi-Fi indicator is always on	25	342	mA
Network disconnected state	The module is disconnected and the Wi-Fi indicator is always off	63	242	mA

Working mode	Working status, Ta = 25°C	Average value	Maximum value (Typical value)	Unit
Module disabled	The CEN pin of the module is connected to the ground.	330	-	μA

4 RF parameters

4.1 Basic RF features

Parameter	Description
Working frequency	2.412 to 2.484 GHz
Wi-Fi standard	IEEE 802.11 b/g/n (channels 1 to 14)
Data transmission rate	11b: 1, 2, 5.5, 11 (Mbps)
	11g: 6, 9, 12, 18, 24, 36, 48, 54 (Mbps)
	11n: HT20 MCS 0 to 7
	11n: HT40 MCS 0 to 7
Antenna type	PCB antenna

4.2 Wi-Fi transmission performance

Parameter	Minimum value	Typical value	Maximum value	Unit
Average RF output power, 802.11b CCK Mode 11M	-	16	-	dBm
Average RF output power, 802.11g OFDM Mode 54M	-	15	-	dBm
Average RF output power, 802.11n OFDM Mode MCS7	-	14	-	dBm

Parameter	Minimum value	Typical value	Maximum value	Unit
Frequency error	-20	-	20	ppm

4.3 Wi-Fi receiving performance

Parameter	Minimum value	Typical value	Maximum value	Unit
PER<8%, RX sensitivity, 802.11b DSSS Mode 11M	-	-88	-	dBm
PER<10%, RX sensitivity, 802.11g OFDM Mode 54M	-	-74	-	dBm
PER<10%, RX sensitivity, 802.11n OFDM Mode MCS7	-	-73	-	dBm
PER<10%, RX sensitivity, Bluetooth LE 1M	-	-96	-	dBm

4.4 Bluetooth transmission performance

Parameter	Minimum value	Typical value	Maximum value	Unit
Working frequency	2402	-	2480	MHz
Air rate	-	1	-	Mbps
Transmit power	-20	6	20	dBm
Frequency error	-150	-	150	KHz

4.5 Bluetooth receiving performance

Parameter	Minimum value	Typical value	Maximum value	Unit
RX sensitivity	-	-96	-	dBm
Maximum RF signal input	-10	-	-	dBm
Inter-modulation	-	-	-23	dBm
Co-channel suppression ratio	-	10	-	dB

5 Antenna information

5.1 Antenna type

CB2S uses the PCB antenna.

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.

To prevent adverse impact on the antenna radiation performance, avoid copper or traces within the antenna area on the PCB.

Warning & Statement

This module meets the requirements of Part 15 Subpart B, Part 15 Subpart C, FCC CFR Title 47 Part 2.

Integration is strictly limited to fixed categorized end-products where a separation distance of at least 20 cm between the radiating part and any human body can be assured during normal operating conditions.

This module only allows connection antenna in the instruction manual. If other antennas are used, re-evaluation is required.

This module is test stand-alone, if more another modules work together with this module, please evaluation the multiple RF exposure.

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.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: 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 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.

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2AV7W- CB2S or Contains FCC ID: 2AV7W- CB2S ",

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

This equipment must be installed and operated with minimum distance 20cm between radiator & your body

IMPORTANT NOTE:

Integration is strictly limited to mobile/fixed categorized end-products where a separation distance of at least 20 cm between the radiating part and any human body can be assured during normal operating conditions.

IMPORTANT NOTE:

In the event that these conditions can not 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 can not 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.

IMPORTANT NOTE:

This module is intended for OEM integrator only and the OEM integrators are instructed to ensure that the end user has no manual instructions to remove or install the device. The OEM integrator is still responsible for the FCC compliance requirement of the end product, which integrates this module.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following “Contains FCC ID: 2AV7W-CB2S ” .If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: 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.

Warnings:

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence exempt RSS(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.

Cet appareil contient un ou des émetteurs/récepteurs exempts de licence conformes aux RSS exempts de licence d'Innovation, Sciences et Développement économique Canada.

Le fonctionnement est soumis 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.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

This radio transmitter (identify the device by certification number, or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio (identifier le dispositif par son numéro de certification ou son numéro de modèle s'il fait partie du matériel de catégorie I) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

This equipment should be installed and operated with minimum distance 20cm between radiator & your body.

Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.

IMPORTANT NOTE:

Integration is strictly limited to mobile/fixed categorized end-products where a separation distance of at least 20 cm between the radiating part and any human body can be assured during normal operating conditions.

IMPORTANT NOTE:

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter).then the IC authorization is no longer considered valid and the IC ID can not 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 IC authorization.

IMPORTANT NOTE:

This module is intended for OEM integrator only and the OEM integrators are instructed to ensure that the end user has no manual instructions to remove or install the device. The OEM integrator is still responsible for the IC compliance requirement of the end product, which integrates this module.

LABEL OF THE END PRODUCT:

If the IC number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains IC : 26051-CB2S

If the size of the end product is smaller than 8x10cm, then additional IC statement is required to be available in the users manual: Cet appareil contient un ou des émetteurs/récepteurs exempts de licence conformes aux RSS exempts de licence d'Innovation, Sciences et Développement économique Canada.

Le fonctionnement est soumis 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.

Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.