MDWBRCU1 Adapter Board Datasheet

Version: 20230621

Online Version

Contents

1 Overview

MDWBRCU1 is a Wi-Fi and Bluetooth Low Energy (LE) combo adapter board developed by Tuya Smart. It consists of a highly integrated wireless RF chip RTL8720CF with built-in Wi-Fi stacks and various library functions. It combines a low-power KM4 microcontroller unit (MCU), WLAN MAC, and 1T1R (1 transmitter/1 receiver) design. It 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 various applications.
MDWBRCU1 is a real-time operating system (RTOS), integrated with all Wi-Fi MAC and TCP/IP libraries. You can develop your own embedded Wi-Fi products.

1.1 Features

- Built-in low-power KM4 MCU that provides output frequency up to 100 MHz and also acts as an application processor.
- Wi-Fi and Bluetooth connectivity
  - IEEE 802.11 b/g/n20.
  - Channels 1-14@2.4GHz (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.
  - The maximum output power is +20 dBm for IEEE 802.11b transmission.
  - Support Wi-Fi Easy Connect (EZ mode) pairing mode on Android and iOS devices.
- Onboard PCB antenna.
- It has passed CE and FCC certifications.
- Operating temperature: -20°C to +85°C.

1.2 Applications

- Smart building
- Smart home and electrical appliance
- Smart socket and light
- Industrial wireless control

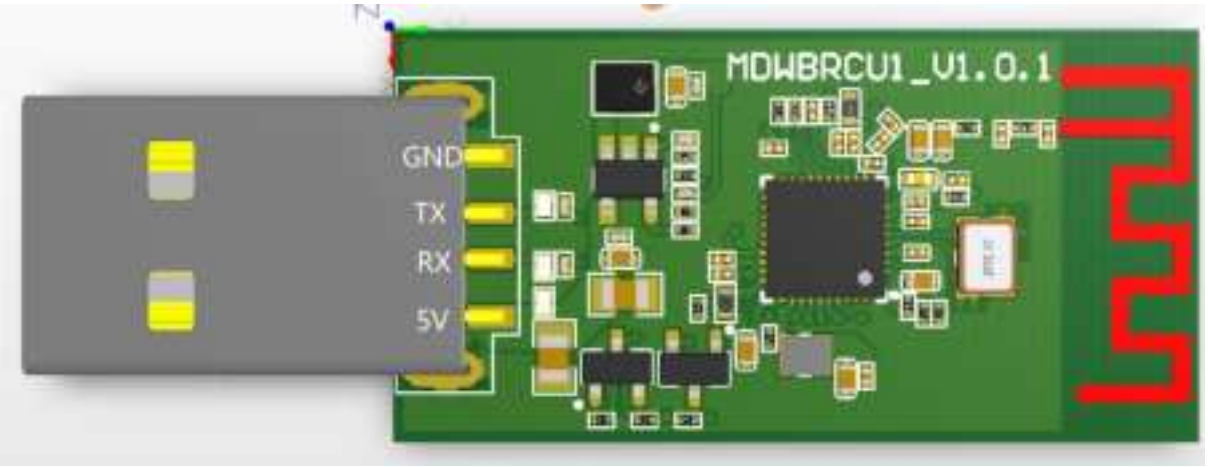
- Baby monitor
- IP camera
- Smart bus

It needs to be connected to a specific circuit to use, and it will not work when connected to a computer.

2 MDWBRCU1 interfaces

2.1 Dimensions and footprint

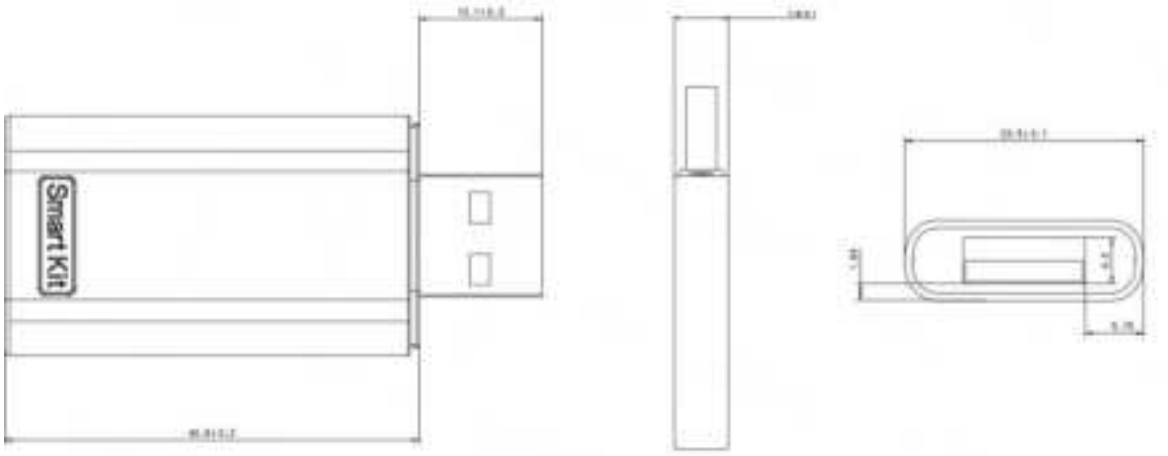
MDWBRCU1 uses USB serial communication. The following figure shows the positions of serial ports:



Pin	Symbol	I/O type	Feature
1	GND	P	Ground pin.
2	TX	I/O	TX pin for serial communication.
3	RX	I/O	RX pin for serial communication.
4	5V	P	5V power input pin.

> **Note**: P indicates the power pin, and I/O indicates the input and output pin.

The following figure shows the dimensions of the finished product shell:


Smart Kit

3 Electrical parameters

3.1 Electrical parameters

Description	Min value	Max value	Unit
Input voltage range	4.5	5.5	V
Operating ambient temperature	-20	85	°C
Operating ambient humidity	0%	90%	RH
Storage ambient temperature	-20	85	°C

3.2 Radio frequency (RF) power

- **Power consumption during TX continuous transmission**

Symbol	Mode	Power	Average value	Peak (Typical)	Unit
IRF	802.11b, 11 Mbit/s	+17 dBm	177	214	mA
IRF	802.11g, 54 Mbit/s	+15 dBm	154	186	mA
IRF	802.11n, BW20 MCS7	+14 dBm	154	186	mA

- **Power consumption during RX continuous reception**

Symbol	Mode	Average value	Peak (Typical)	Unit
IRF	802.11b, 11 Mbit/s	40.6	59.6	mA
IRF	802.11g, 54 Mbit/s	40.6	58.8	mA

Symbol	Mode	Average value	Peak (Typical)	Unit
IRF	802.11n, HT20 MCS7	40.5	58.8	mA

3.3 Power consumption in working mode

Working mode	Status (Ta = 25°C)	Average value	Peak (Typical)	Unit
Pairing in EZ mode	The module is in EZ mode. The Wi-Fi network status indicator blinks quickly.	41.9	222	mA
Connected and idle mode	The module is connected to the cloud. The Wi-Fi network status indicator is steady on.	17.1	212	mA
Connected and operating mode	The module is connected to the cloud. The Wi-Fi network status indicator is steady on.	40.2	206	mA

Working mode	Status (Ta = 25°C)	Average value	Peak (Typical)	Unit
Disconnected mode	The module is disconnected from the cloud. The Wi-Fi network status indicator is steady off.	54.7	218	mA

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 LE standard	Bluetooth LE 4.2
Data transmission rate	
	IEEE 802.11b: 1, 2, 5.5, and 11 Mbit/s
	IEEE 802.11g: 6, 9, 12, 18, 24, 36, 48, and 54 Mbit/s
	IEEE 802.11n: HT20 MCS0-7
Antenna type	Onboard PCB antenna with a gain of 0.29 dBi.

4.2 Transmitter (TX) performance

- **TX continuous transmission performance**

Parameter	Min value	Typical value	Max value	Unit
RF average output power, 802.11b CCK mode, 11M	-	17	-	dBm
RF average output power, 802.11g OFDM mode, 54M	-	14	-	dBm
RF average output power, 802.11n OFDM mode, MCS7	-	13	-	dBm
RF average output power, Bluetooth LE 4.2,1M	-	6.5	-	dBm
Frequency error	-20	-	20	ppm

Parameter	Min value	Typical value	Max value	Unit
EVM@802.11b CCK 11 Mbit/s mode, 17.5 dBm	-	-	-15	dB
EVM@802.11g OFDM 54 Mbit/s mode, 14.5 dBm	-	-	-33	dB
EVM@802.11n OFDM MCS7 mode, 13.5 dBm	-	-	-33	dB

- **Receiver (RX) performance**

Parameter	Min value	Typical value	Max value	Unit
PER < 8%, RX sensitivity, 802.11b CCK mode, 11M	-	-97	-	dBm
PER < 10%, RX sensitivity, 802.11g OFDM mode, 54M	-	-75	-	dBm
PER < 10%, RX sensitivity, 802.11g OFDM mode, MCS7	-	-72	-	dBm
PER < 10%, RX sensitivity, Bluetooth LE 4.2, 1M	-	-93	-	dBm

5 Appendix: Statement

FCC Caution: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 device 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 radiated 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.

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

This equipment should be installed and operated with minimum distance 20cm from your body.

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 from the human body.

ISED Statement

This Class [B] digital apparatus complies with Canadian CAN ICES-3(B).
Cet appareil numérique de la classe [B] est conforme à la norme NMB-3(B)du Canada.

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.

2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage;

2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This equipment complies with ISED RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and any part of your body.

Pour se conformer aux exigences de conformité CNR 102 RF exposition, une distance de séparation d'au moins 20 cm doit être maintenue entre l'antenne de cet appareil ettoutes les personnes.