Wi-Fi Module User Manual

Model: WT1HB12
V 1.5

1. Product Overview

1.1. Introduction

BroadLink WT1HB12 is the industrial leading 2.4Ghz 802.11 b/g/n embedded Wi-Fi module which delivers unmatched performance and codeless development in a compact package, providing a quick, easy and cost effective way for developers and manufacturers to add Wi-Fi connectivity for home automation, lighting control, energy efficiency and other IOT applications.

WT1HBS12 combines a 2.4Ghz 802.11 b/g/n radio transceiver with MAC, baseband processing and optimized Wi-Fi protocols, configuration profile and network stack It supports UART communication with other devices and can be widely used in applications like smart home, remote monitoring and medical care. It is an ideal solution for developers and manufacturers with limited RF and embedded programming expertise as it significantly reduces RF design time and removes the burden of testing and certification.

WT1HBS12 integrates a 32-bit RISC processor and an 8 Mbit flash which is capable for most of control-type IoT application.

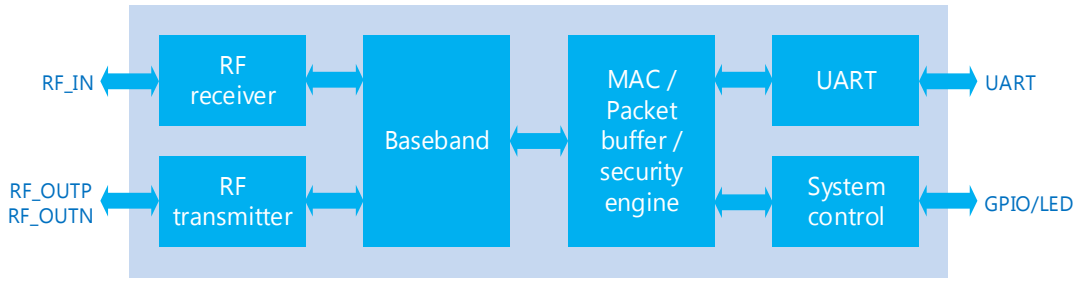


Figure 1. WT1SBSL block diagram

2. Specifications

2.1. Absolute maximum ratings

Symbol	Description	Min.	Max.	Units
Ts	Storage temperature	-40	125	℃
TAMBIENT	Ambient Temperature	-10	70	℃
Vdd	Supply voltage	0	16	V
Vio	Voltage on IO pin	-0.28	3.63	V
VESD	HBM (human body model)		2000	V

2.2. Power Characteristics

Symbol	Rating	MIN	TYP	MAX	Unit
VDD	12V Supply Voltage	9		16	V
VDD33	3.3V Supply Voltage	2.97	3.3	3.63	
VDD12	1.2V Supply Voltage	1.14	1.2	1.26	V
VDD15	1.5V Supply Voltage	1.425	1.5	1.575	V

2.3. DC characteristics

Symbol	Parameter	Conditions	MIN	MAX	Unit
V_{IL}	Input Low Voltage	LVTTL	-0.28	0.6	V
V_{IH}	Input High Voltage		3.5	5.5	V
V_{T-}	Schmitt Trigger Negative Going Threshold Voltage	LVTTL	0.68	1.36	V
V_{T+}	Schmitt Trigger Positive Going Threshold Voltage		1.36	1.7	V
V_{OL}	Output Low Voltage	$\|I_{OL}\|$ = 1.6~14 mA	-0.28	0.4	V
V_{OH}	Output High Voltage	$\|I_{OH}\|$ = 1.6~14 mA	3	3.6	V
R_{PU}	Input Pull-Up Resistance	PU=high, PD=low	40	190	KΩ
R_{PD}	Input Pull-Down Resistance	PU=low, PD=high	40	190	KΩ

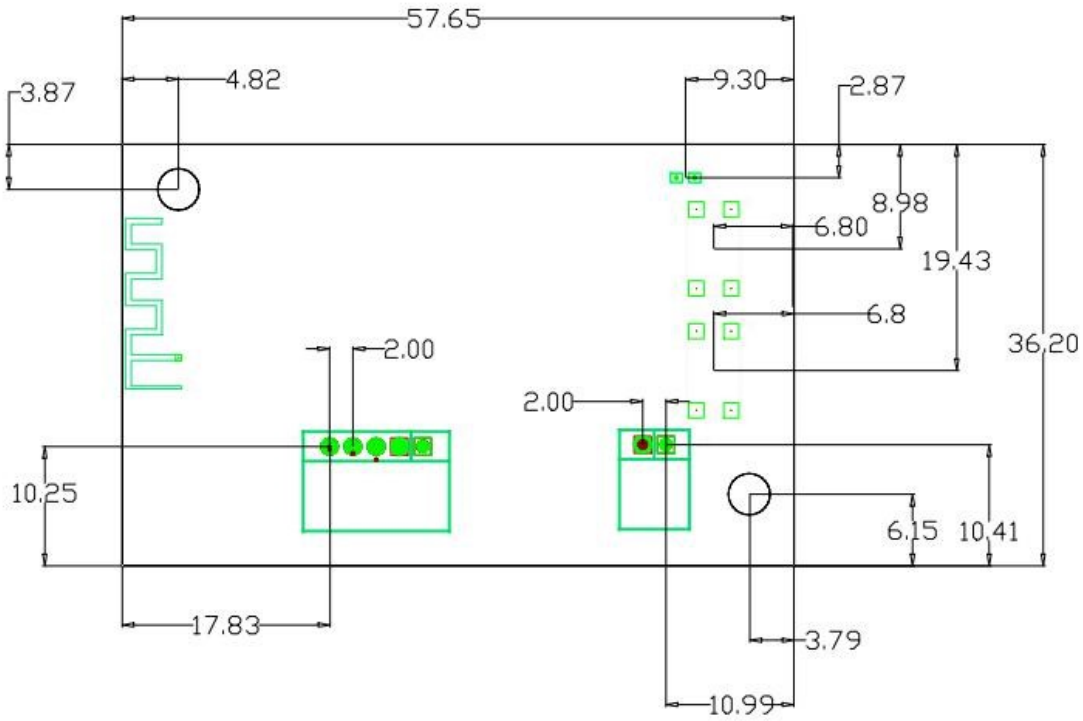
2.4. Current consumption

Description	Performance	
	TYP	Unit
Sleep mode	2	mA
IDLE mode	25	mA
RX Active, HT40, MCS7	50	mA
RX Power saving, DTIM=1	8	mA
TX HT40, MCS7 @15dBm	70	mA
TX CCK, 11Mbps @18dBm	80	mA

Note: All result is measured at the antenna port and VDD is 12V

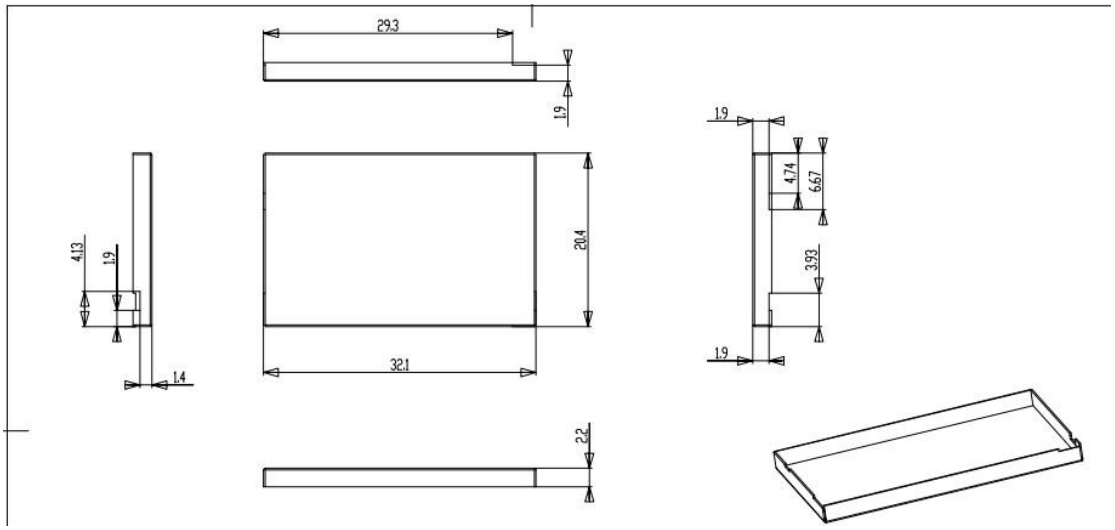
2.5. Dimensions

Module



Tolerance: (L±0.2)*(W±0.2)*(H±10%) (unit: mm)

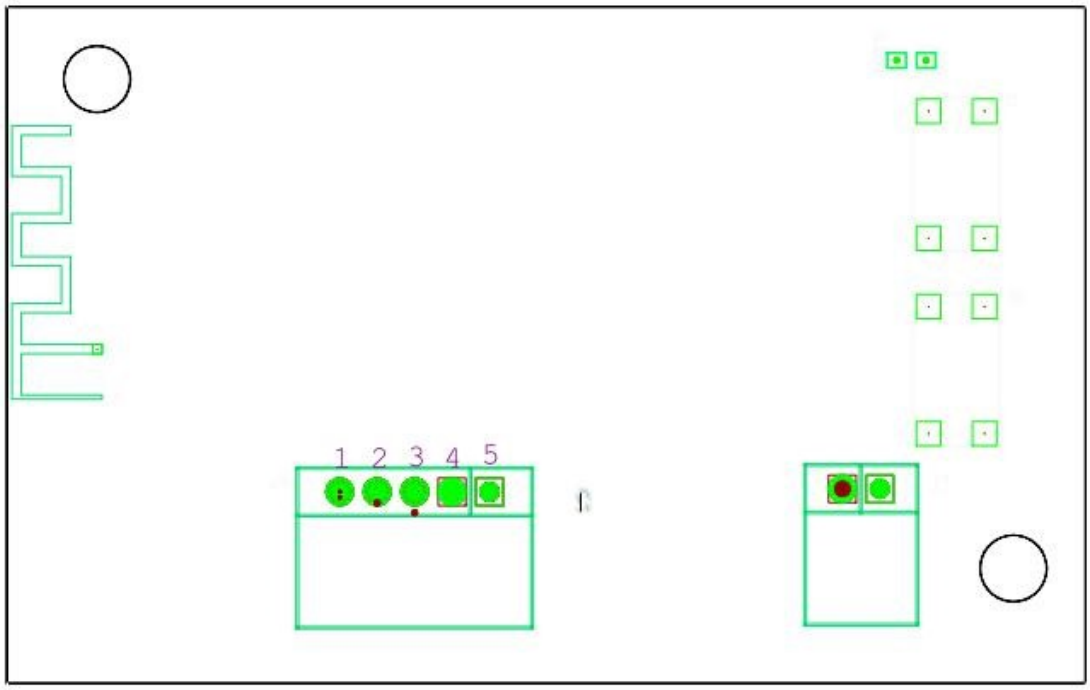
Shield case



Tolerance: (L±0.1)*(W±0.1)*(H±0.1) (unit: mm)

3. Module Interface

3.1. PIN Definitions

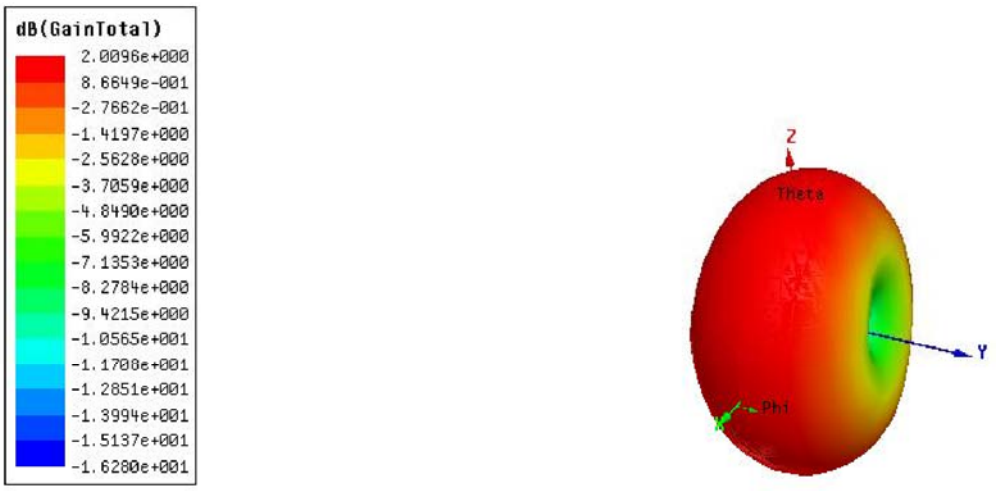


PIN	PIN NAME	DESCRIPTION	TYPE	NOTE
Pin1	UART0_TX	UART0 send data	O	UART0 Only used for UART DCDC works when EN > 1.5V
Pin2	UART0_RX	UART0 receive data	I	
Pin3	EN	Enable DCDC	I	
Pin4	GND	GND	POWER	
Pin5	VDD	Power input	POWER	

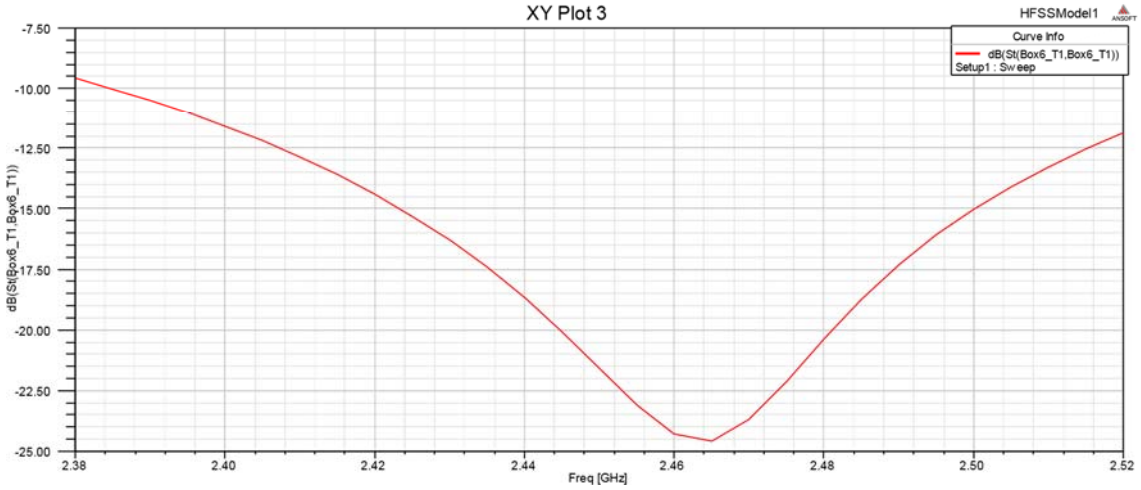
1. The TX and RX of UART0 are used for communication with external processor. Please refer to Chapter 2.3 DC Characteristics for more information of output power level for UART.
2. The module has built-in RC reset and watchdog circuit.

3.2. PCB Antenna

The module supports PCB antenna. Within the range of 2.4-2.5GHz, the antenna output S11 is less than -10dB and gain of antenna is about 2dBi.



天线增益仿真辐射图



The actual performance of S11 may vary due to PCB production and dielectric constant difference of FR-4 board.

Appendix A Glossary（Quentin respible）

ADC Analog-to -Digital Converter
AES Advanced Encryption Standard
ANT Antenna
AP Wireless Access Point
BPSK Binary Phase Shift Keying
DBPSK Differential binary phase shift keying
DC Direct Current
CCK Complementary Code Keying
CDM Charge Device Model
DHCP Dynamic Host Configuration Protocol
CMOS Complementary Metal Oxide Semiconductor
DNS Determination of non-significance
DQPSK Differential quadrature phase shift keying
DSSS Demand assigned signaling and switching subsystem
DTIM Digital Transmission Interface Module
EMSP Enhanced Modular Signal Processor
ESD Electrostatic Discharge
EVM Error Vector Magnitude
FCC Federal Communications Commission
FER Floating Error
GND Ground
GPIO General Purpose Input/Output
HBM Human body model
IEEE Institute of Electrical and Electronics Engineers
IO Input/Output
IOT Individual operation test
IPv4 Internet Protocol version 4
LED Light-emitting diode
LVTTL Low Voltage Transistor Transistor Logic
MAC Medium Access Control layer
MCS Modulation and coding scheme
MCU Microcontroller Unit
MIMO Multiple-Input Multiple-Output
MSL Multilayer Switching Protocol
NC Numerical Control
NRST Negative Reset
OFDM Orthogonal Frequency Division Multiplexing
OSC Oscillator
PCB Printed Circuit Board
PIFA Planar inverted F antenna
QPSK Quadrature Phase Shift Keyin
RC Resistance- capacitance
RF Radio Frequency

RISC Reduced Instruction Set Computer
RoHS Restriction of Hazardous Substances
RX Receiver
SDIO Serial Digital Input/Output
SoC System on Chip
SPDT Single-Pole Double-Throw
SPI Serial Peripheral Interface

STA Spanning Tree Algorithm
TCP Transfer Control Protocol
TKIP Temporal Key Integrity Protocol
TX Transmitter
IP Internet Protocol
UART Universal Asynchronous Receiver/Transmitter
UDP User Datagram Protocol
UFL
a miniature coaxial RF connector for high-frequency signals
manufactured by Hirose Electric Group
VSWR Voltage Standing Wave Ratio
WEP Wired Equivalent Privacy
WEPA Welded Electronic Packaging Association
WEP64 64 bit Wired Equivalent Privacy
WEP128 128 bit Wired Equivalent Privacy
WPA2 Wi-Fi Protected Access 2
XTAL External Crystal Oscillator
QAM Quadrature Amplitude Modulation
802.11 b/g/n The IEEE 802.11 b/g/n

This device complies with Part 15 of the FCC Rules / Industry Canada licence-exempt RSS standard(s). 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.

Le présent appareil est conforme aux CNR d'Industrie 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, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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

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 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.

MPE Requirements
To satisfy FCC / IC RF exposure requirements, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during device operation.
To ensure compliance, operations at closer than this distance is not recommended.

Les antennes installées doivent être situées de facon à ce que la population ne puisse y être exposée à une distance de moin de 20 cm. Installer les antennes de facon à ce que le personnel ne puisse approcher à 20 cm ou moins de la position centrale de l' antenne.
La FCC des éltats-unis stipule que cet appareil doit être en tout temps éloigné d'au moins 20 cm des personnes pendant son functionnement

Region Selection
Limited by local law regulations, version for North America does not have region selection option.

Information for the OEM Integrators
This device is intended for OEM integrators only. Please see the full grant of equipment document for restrictions.

Label Information to the End User by the OEM or Integrators
If the FCC ID of this module is not visible when it is installed inside another device, then the outside of the device into which the module is installed must be label with "Contains FCC ID: 2ACDZ-WT1HB12 and IC: 21239-WT1HB12 "