YL1023
User manual

IEEE 802.11a/b/g/n/ac Wireless LAN and Bluetooth Combo Stamp Module

1. General Description

The YL1023 IEEE 802.11 a/b/g/n/ac SDIO Wi-Fi with Bluetooth 4.2 combo stamp module is a highly integrated wireless local area network (WLAN) solution to let users enjoy the digital content through the latest wireless technology without using the extra cables and cords. It combines with Bluetooth 4.2 and provides a complete 2.4GHz Bluetooth system which is fully compliant to Bluetooth 4.2 and v2.1 that supports EDR of 2Mbps and 3Mbps for data and audio communications. It enables a high performance, cost effective, low power, compact solution that easily fits onto the SDIO and UART stamp module.

Compliant with the IEEE 802.11a/b/g/n/ac standard, YL1023 uses Direct Sequence Spread Spectrum (DSSS), Orthogonal Frequency Division Multiplexing (OFDM), BPSK, QPSK, CCK and QAM baseband modulation technologies.

A high level of integration and full implementation of the power management functions specified in the IEEE 802.11 standard minimize system power requirements by using YL1023.

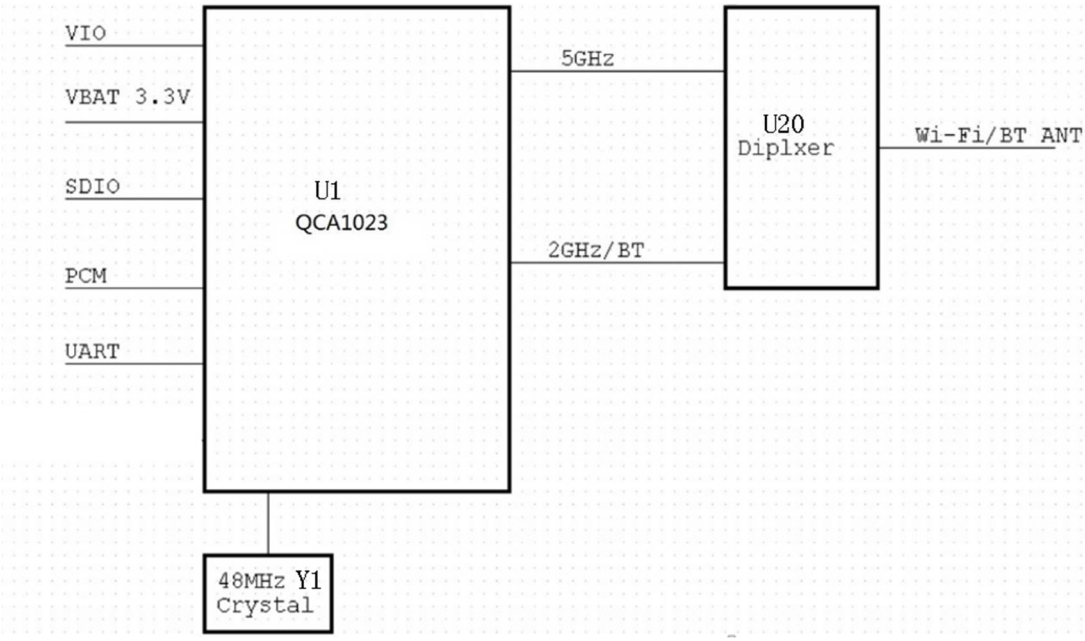
YL1023 module adopts QCA1023 single chip solution. The module design is based on the QCA1023 solution.

2. Key Features

1. High speed wireless connection up to 433Mbps for Wi-Fi
2. 1(Transmit) ×1(Receive) Wi-Fi and Bluetooth 4.2
3. Low power consumption and high performance
4. Enhanced wireless security
5. Fully qualified Bluetooth 4.2
6. Enhanced Data Rate(EDR) compliant for both 2Mbps and 3Mbps supported

3. Block Diagram

A simplified block diagram of theYL1023 module is depicted in the figure below。



4. Specifications Table

Model Name	**YL1023**
Description	Wireless LAN &Bluetooth Stamp Module
WLAN Standard	IEEE 802.11 a/b/g/n/ac
Bluetooth Standard	Bluetooth 2.1+Enhanced Data Rate (EDR)+ BT4.2
Major Chipset	QCA1023
Host Interface	Wi-Fi : SDIO, BT :UART
Dimensions	12mm * 12mm * 2.0mm
Operating Conditions	
Voltage	power supply for host:3.3V
Temperature	-40℃~85℃
Storage temperature	-45℃~135℃
Electrical Specifications	
Frequency Range	WLAN: 2.4 GHz ISM Bands 2.412-2.484 GHz 5G:5.150~5.250GHz, 5.250~5.350GHz, 5.50~5.70GHz 5.725~5.845GHz Bluetooth: 2402~2480MHz
Modulation	DSSS, OFDM, DBPSK, DQPSK, CCK, 16-QAM, 64-QAM,256-QAM for WLAN GFSK (1Mbps), Π/4 DQPSK (2Mbps) and 8DPSK (3Mbps)

	for Bluetooth
Output Power	WLAN: 802.11b: 0.063387W (11Mbps) 802.11g: 0.081096W (54Mbps) 802.11n @2.4GHz: 0.076384W (HT20 MCS7) 802.11n @2.4GHz: 0.078886W (HT40 MCS7) 802.11a @5GHz: 0.038815W (54Mbps) 802.11a @5GHz: 0.035727W (VHT20 MCS7) 802.11ac @5GHz: 0.035075W (VHT20 MCS7) 802.11ac @5GHz: 0.035075W (VHT40 MCS8) 802.11ac @5GHz: 0.016406W (VHT80 MCS9)
Receive Sensitivity	802.11b:-80 dBm (11Mbps) 802.11g:-80 dBm (54Mbps) 802.11n @2.4GHz:-80 dBm (HT20 MCS7) 802.11n @2.4GHz:-80 dBm (HT40 MCS7) 802.11a @5GHz:-80 dBm (54Mbps) 802.11a @5GHz:-80 dBm (VHT20 MCS7) 802.11ac @5GHz:-80 dBm (VHT20 MCS7) 802.11ac @5GHz:-80 dBm (VHT40 MCS8) 802.11ac @5GHz:-80 dBm (VHT80 MCS9) BT: BER < 0.1% (IQXEL80 Tx -70 Bm)
Data Rates	WLAN 802.11b: 1, 2, 5.5, 11Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n: up to 75Mbps-single 802.11n: up to 150Mbps 802.11ac:up to 96Mbps (20MHz channel) 802.11ac:up to 200Mbps (40MHz channel) 802.11ac:up to 433Mbps (80MHz channel) Bluetooth Bluetooth 2.1+EDR data rates of 1,2, and 3Mbps
Security	◆ WAPI ◆ WEP 64-bit and 128-bit encryption with H/W TKIP processing ◆ WPA/WPA2(Wi-Fi Protected Access) ◆ AES-CCMP hardware implementation as part of 802.11i security standard

5. Electrical Characteristics

5.1 Absolute Maximum Ratings

Symbol	Parameter	Maximum	Unit
VDD	3.3V power supply voltage	3.65	V
VDDIO	Voltage supply for GPIO	4.0	V
RF_{in}	Maximum RF input (reference to 50 Ω)	TBD	dBm

5.2 Recommended Operating Conditions

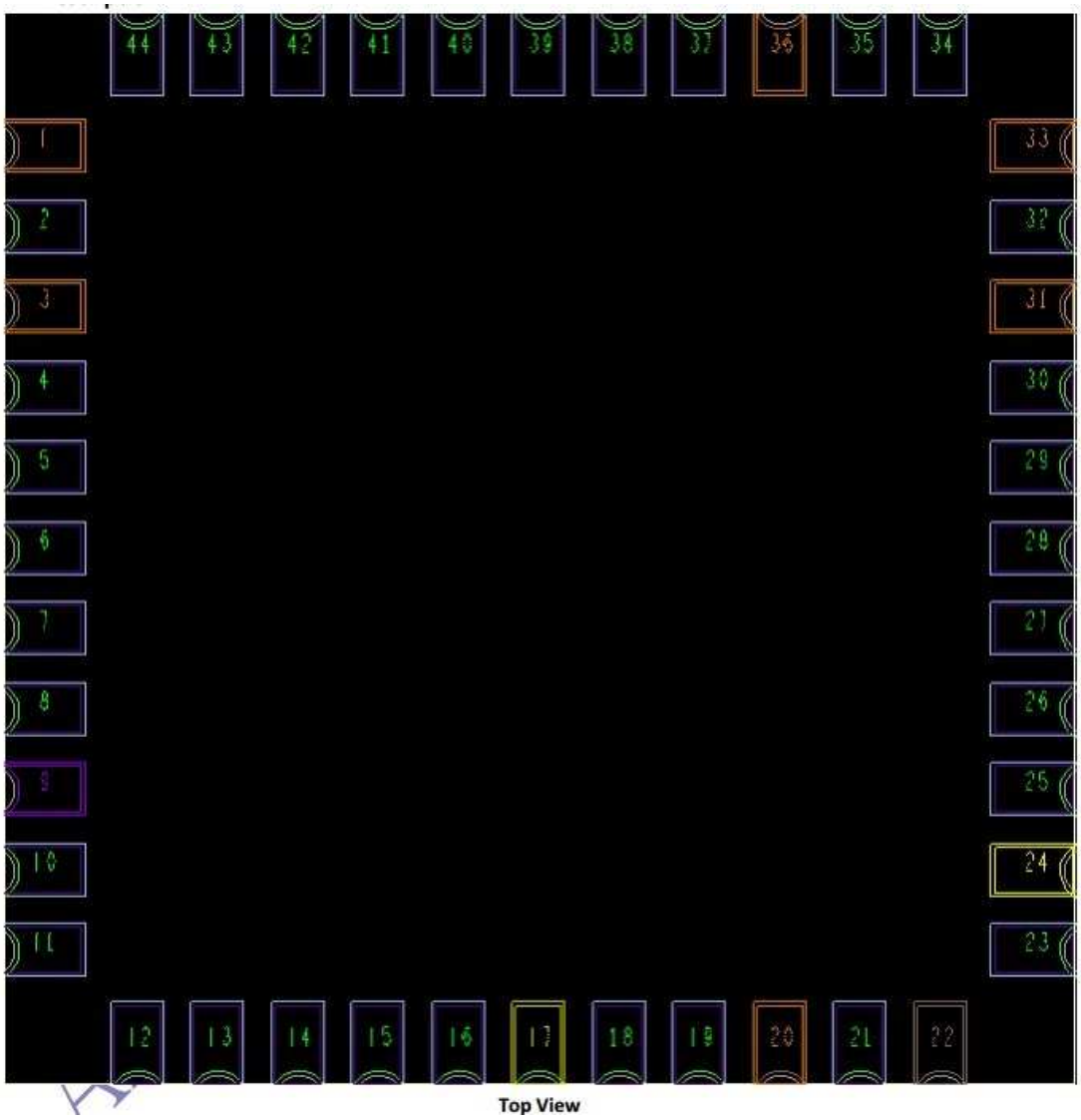
Symbol	Parameter	Rating	Unit
VDD	3.3V power supply voltage	3.135~3.465	V
VDDIO	Voltage supply for GPIO	1.71~3.46	V

5.4 GPIO DC Characteristics

Symbol	Parameter	Minimum	Typical	Maximum	Unit
V_{IH}	Input high voltage	0.7-VIO	--	VIO+0.3	V
V_{IL}	Input low voltage	-0.3	--	0.3-VIO	V
V_{OH}	Output high voltage	VIO-0.4	--	VIO	V
V_{OL}	Output low voltage	0	--	0.4	V

6. Pin Definition

Pin Description



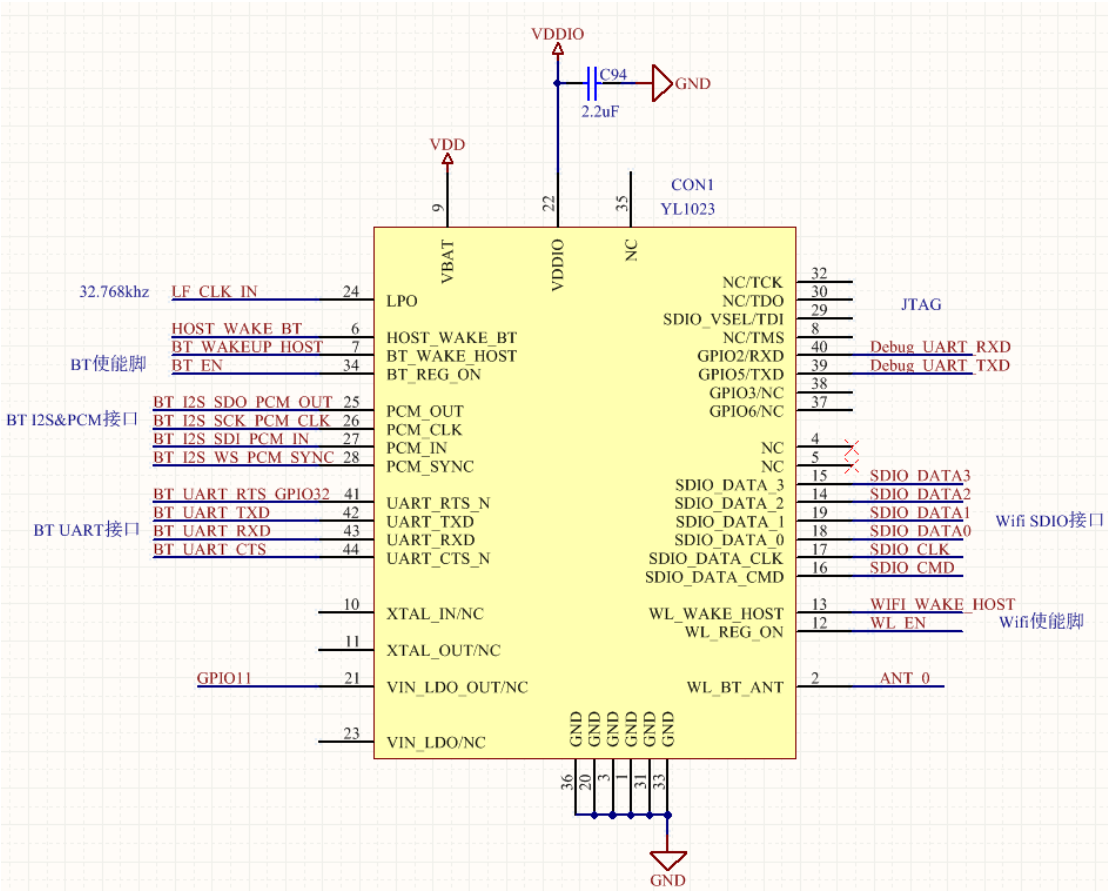
Top View

Pin No.	Definition	Basic Description Type	Type
1	GND	GROUND	GND
2	WL_BT_ANT	Wi-Fi/BT RF signal	I/O
3	GND	GROUND	GND
4	NC	Floating Pin, No connect to anything.	Floating
5	NC	Floating Pin, No connect to anything.	Floating
6	Host_Wakeup_BT/GPIO34	Host wakeup BT device	IN
7	BT_wakeup_Host	BT Device wakeup Host	I/O
8	TMS	Reserve for EJTAG	I/O
9	VDD	DC power supply +3.3V input	VCC
10	NC	Floating Pin, No connect to anything.	Floating
11	NC	Floating Pin, No connect to anything.	Floating
12	WL_EN	GPIO pin to on/off the Wi-Fi function by software. Active high. Reserve pull	IN

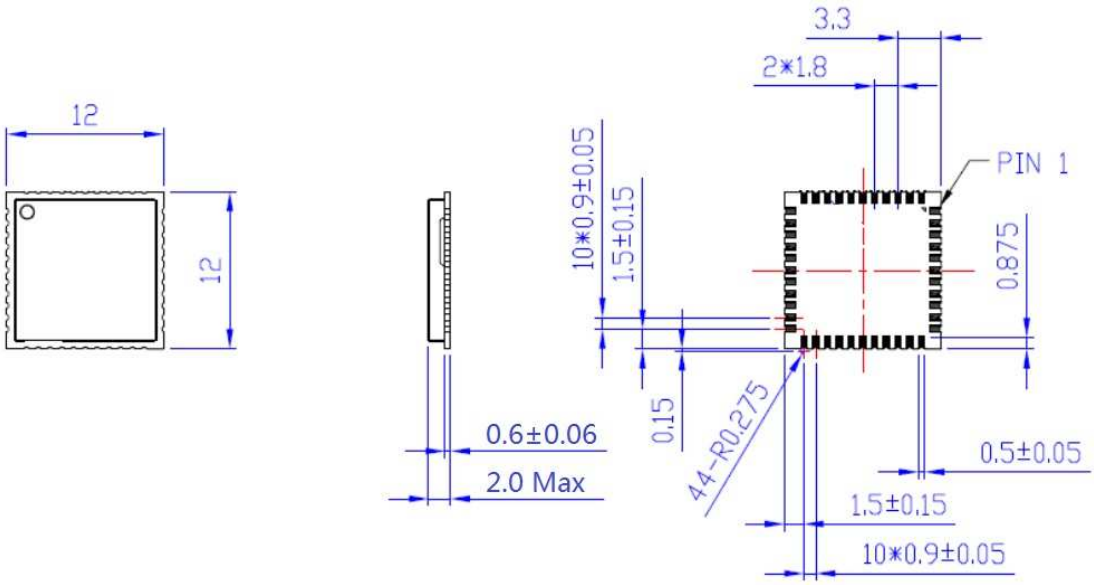
		high 100K resistor and shunt 100pF capacitor to GND on platform.	
13	WL_wakeup_Host/GPIO35	WLAN device wakeup host	OUT
14	SDIO_DATA2	SDIO Data Line 2	I/O
15	SDIO_DATA3	SDIO Data Line 3	I/O
16	SDIO_CMD	SDIO Command Input	I/O
17	SDIO_CLK	SDIO Clock Input	IN
18	SDIO_DATA0	SDIO Data Line 0	I/O
19	SDIO_DATA1	SDIO Data Line 1	I/O
20	GND	GROUND	GND
21	CLK_REQ/GPIO11	Clock request output	DO
22	VDDIO	1.8V-3.3V VDDIO supply for WLAN and BT	VCC
23	NC	Floating Pin, No connect to anything.	Floating
24	LPO	External low-power 32.768KHz clock input.	IN
25	PCM_OUT	PCM synchronous data output, connected to PCM_IN on the host.	OUT
26	PCM_CLK	PCM Clock	I/O
27	PCM_IN	PCM synchronous data input, connected to PCM_OUT on the host.	IN
28	PCM_SYNC	PCM synchronous data SYNC	I/O
29	TDI	Reserve for EJTAG	IN
30	TDO	Reserve for EJTAG	OUT
31	GND	GROUND	GND
32	TCK	Reserve for EJTAG	GND
33	GND	GROUND	GND
34	BT_EN	GPIO pin to on/off the BT function by software. Active high. Reserve pull high 100K resistor and shunt 100pF capacitor to GND on host.	IN
35	NC	Floating Pin, No connect to anything.	Floating
36	GND	GROUND	GND
37	NC	Floating Pin, No connect to anything.	Floating
38	NC	Floating Pin, No connect to anything.	Floating
39	Debug_UART_TXD	TXD for Wi-Fi Uart_debug only, connected to RXD of the host.	OUT
40	Debug_UART_RXD	RXD for Wi-Fi Uart_debug only, connected to TXD of the host.	IN
41	UART_RTS	UART Ready To Send, connected to CTS on the host.	OUT
42	UART_TXD	UART Transmit Data, connected to RXD on	OUT

		the host.	
43	UART_RXD	UART Receive Data, connected to TXD on the host.	IN
44	UART_CTS	UART Clear To Send, connected to RTS on the host.	IN

7 Schematics



8 Mechanical Information



Tolerances unless otherwise specified : ±0.15mm

IC Statement

This device complies with RSS247 of Industry Canada. Cet appareil se conforme à RSS247 de Canada d'Industrie. This device complies with Industry Canada license-exempt RSS standard(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. appareils radio exempts de licence. Son fonctionnement est sujet aux deux conditions suivantes: (1) le dispositif ne doit pas produire de brouillage prejudiciable, et (2) ce dispositif doit accepter tout brouillage recu, y compris un brouillage susceptible de provoquer un fonctionnement indesirable.

The device should be installed and operated with distance more than 20cm between the radiator and your body.
L'appareil doit être installé et utilisé avec une distance plus de 20 cm entre le radiate et votre corps.

Notice for 5 GHz devices
Caution:
(i) the device for operation in the band 5150 - 5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
(ii) the maximum antenna gain permitted for devices in the bands 5250 - 5350 MHz and 5470 - 5725 MHz shall comply with the e.i.r.p. limit: and
(iii) the maximum antenna gain permitted for devices in the band 5725 - 5825 MHz shall comply with the e.i.r.p. limits specified for point-to-point and non point-to-point operation as appropriate.
(iv) Users should also be advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250 - 5350 MHz and 5650 - 5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

FCC Statement

Warning: Changes or modifications to this unit 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 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.**

5 GHz devices only

High power radars are allocated as primary users of the 5.25 to 5.35 GHz and 5.65 to 5.85 GHz bands. These radar stations can cause interference with and/or damage this device. No configuration controls are provided for this wireless equipment allowing any change in the frequency of operations outside the FCC grant of authorization for US operation according to Part 15.407 of the FCC rules.

FCC RF exposure statement:

"FCC RF Radiation Exposure Statement Caution: To maintain compliance with the FCC's RF exposure guidelines, place the product at least 20cm from nearby persons."

"The device must not be co-located or operating in conjunction with any other antenna or transmitter."