

Wireless Module 802.11ac/a/b/g/n

WYSBHVXG

WYSAGVDXG

WYSEGVDXG

Overview



WYSBHVXG



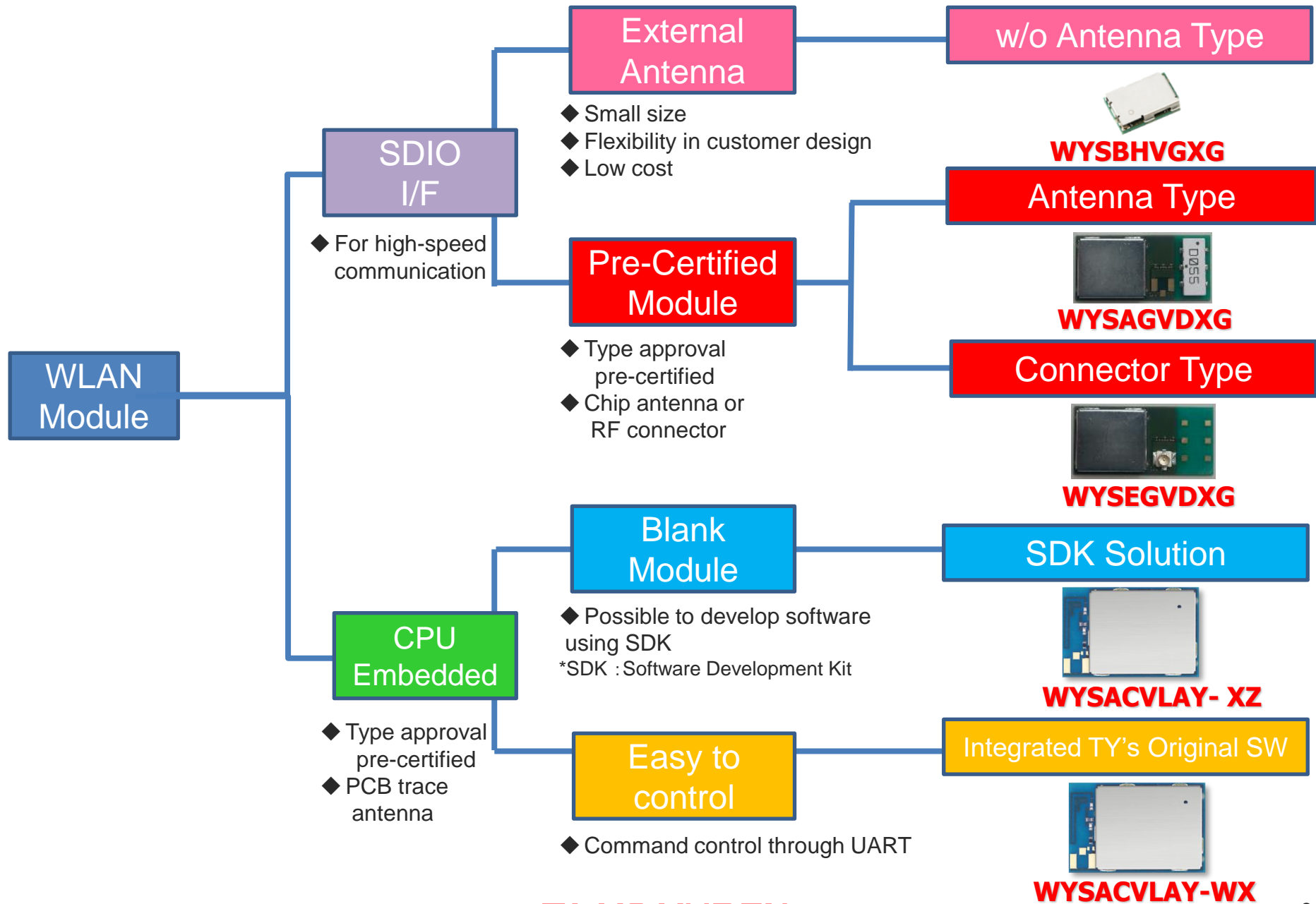
WYSAGVDXG



WYSEGVDXG

Jul. 2020 Version 1.1

TAIYO YUDEN Wireless LAN Module Line Up



List of Relevant Documents

The documents below are available on our WEB site.

- Overview
This shows outlines of the targeted modules. This document.
- Data Report
This shows details of the module specifications.
- Application Note
This is guideline for designing end products with the module.
- Evaluation Board/Kit Manual
This is operation manual of the evaluation board to evaluate our modules.
- FAQ
This shows answers for frequently asked questions.

These materials are downloadable by accessing the following URL and proceed to the related page of each module.

TAIYO YUDEN Wireless Module Lineup

<https://www.yuden.co.jp/ut/product/category/module/lineup/#WLAN>

Wireless Module

802.11ac/a/b/g/n + *Bluetooth*[®] 4.2

WYSBHVGXG

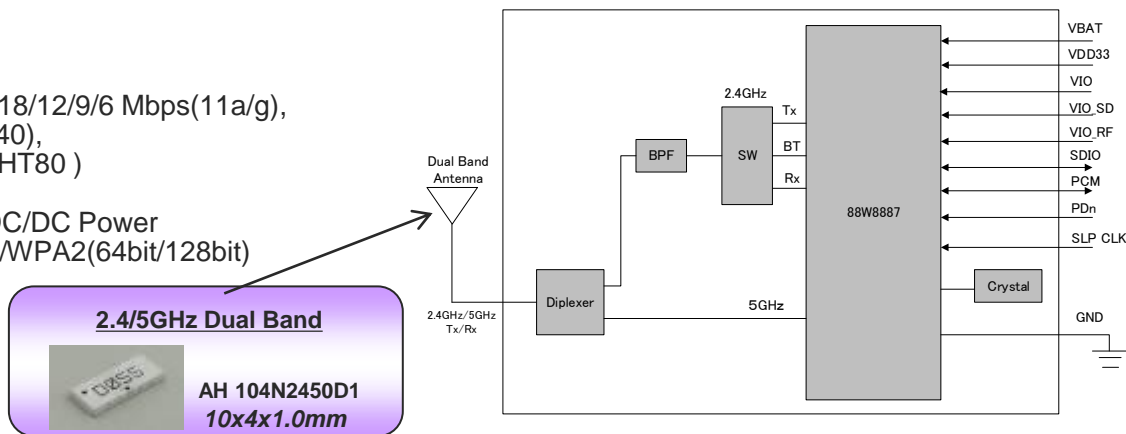


WYSBHVXG: 802.11ac 1x1+Bluetooth® v4.2 Module

Features

- SMD type module.
- Supports IEEE802.11ac/a/b/g/n + Bluetooth® v4.2
- Low standby current (with low power operation)
- Transmit data rate : 11/5.5/2/1 Mbps(11b), 54/48/36/24/18/12/9/6 Mbps(11a/g), 150~6.5 Mbps (11n, MCS7~0, HT20/40), 433.3 ~ 29.3 Mbps (11ac MCS9~0, VHT80)
- Interface : SDIO3.0, PCM
- Built-in Diplexer, 2G-PA, 5G-PA, 5G-LNA, OTP, X'tal, DC/DC Power
- Security: TKIP, WEP, AES, CCMP, CMAC, WAPI, WPA/WPA2(64bit/128bit)
- Outline: 12.6 x 8.9 x 1.9(Max) mm
- Package: Metal case package
- RoHS Conformity

Block Diagram

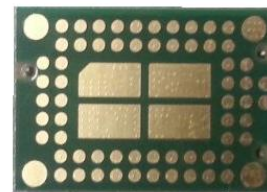
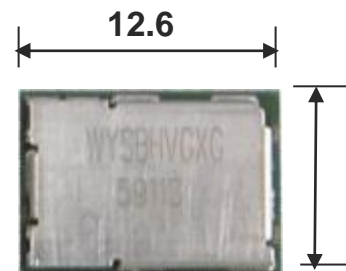


General Electrical Specification

Parameter	Description	Min.	Typ.	Max.	Units
Frequency Range	11b / g / n (HT20/HT40)	2412		2472	MHz
	11a / ac (HT80)	5180		5825	MHz
	BT / BLE	2402		2480	MHz
Operation Voltage	VDD33	3.0	3.3	3.3	V
	VIO		1.8/ 3.3		V
TX Output Power	11b/11g/11n-2G(HT20/HT40)	10 / 10 / 10	12 / 12 / 12	14 / 14 / 14	dBm
	11a/11n-5GHT20/HT40/11ac	10 / 10 / 8 / 6	12 / 12 / 10 / 8	14 / 14 / 12 / 10	
	BT / BLE	-6	0	4	
RX Sensitivity	11b/11g/11n-2G(20TH/40TH)		-87/-73/-69/-66	-76 / -65 / -64/-61	dBm
	11a/11n-5G(20TH/40TH)/11ac		-71/-68/-65/-57	-65 / -64/-61 /-51	
	BT / BLE		-86/-86	-70 / -70	
Power Consumption	Burst Mode Tx 11b (Duty=46.8%)		488		mW
	11ac RX 5G		358		mW
	Sleep Mode		1.8		mW
General Operation Temperature Range		-30	25	85	degC

Outline

Unit: mm



Note: The Bluetooth® word mark and logos are owned by the Bluetooth SIG, Inc. and any use of such marks by TAIYO YUDEN CO.,LTD. is under license.

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W_SBHVGXG: Wireless LAN Module Evaluation Kit

The evaluation kit WKSBBHVGXG comes with a single board computer called ESPRESSObin, which is equipped with ARM Cortex-A53 processor, in addition to an evaluation board.

The module can be operated using ESPRESSObin.

WKSBBHVGXG Kit includes:

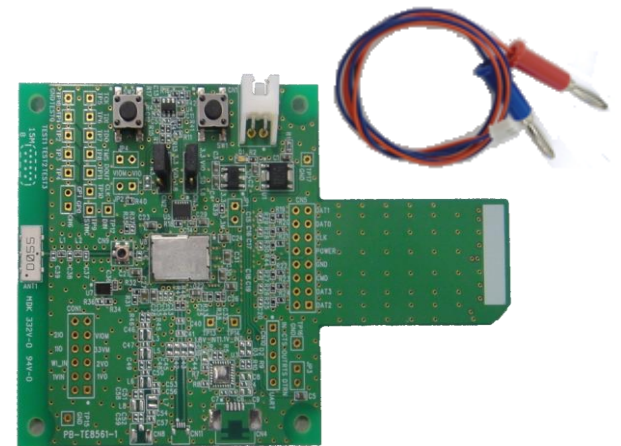
No.	Item	Description	Qty
1	WBSBBHVGXG	Evaluation board of WLAN module WYSBBHVGXG with SDIO interface	1
2	Red & Blue Cable	Power supply cable for WBSBBHVGXG	1
3	ESPRESSObin	Marvell Armada 3700LP (88F3720) dual core ARM Cortex A53 processor up to 1.2GHz.	1
4	AC Adapter	Power supply cable for ESPRESSObin	1
5	USB Memory	For booting ESPRESSObin	1
6	USB Cable		1
7	SD – Micro SD Conversion Cable	SDIO conversion for EVB and ESPRESSObin	1
8	Registration card	For instructions on how to obtain device driver for WYSBBHVGXG	1



WKSBBHVGXG

WBSBBHVGXG Board includes:

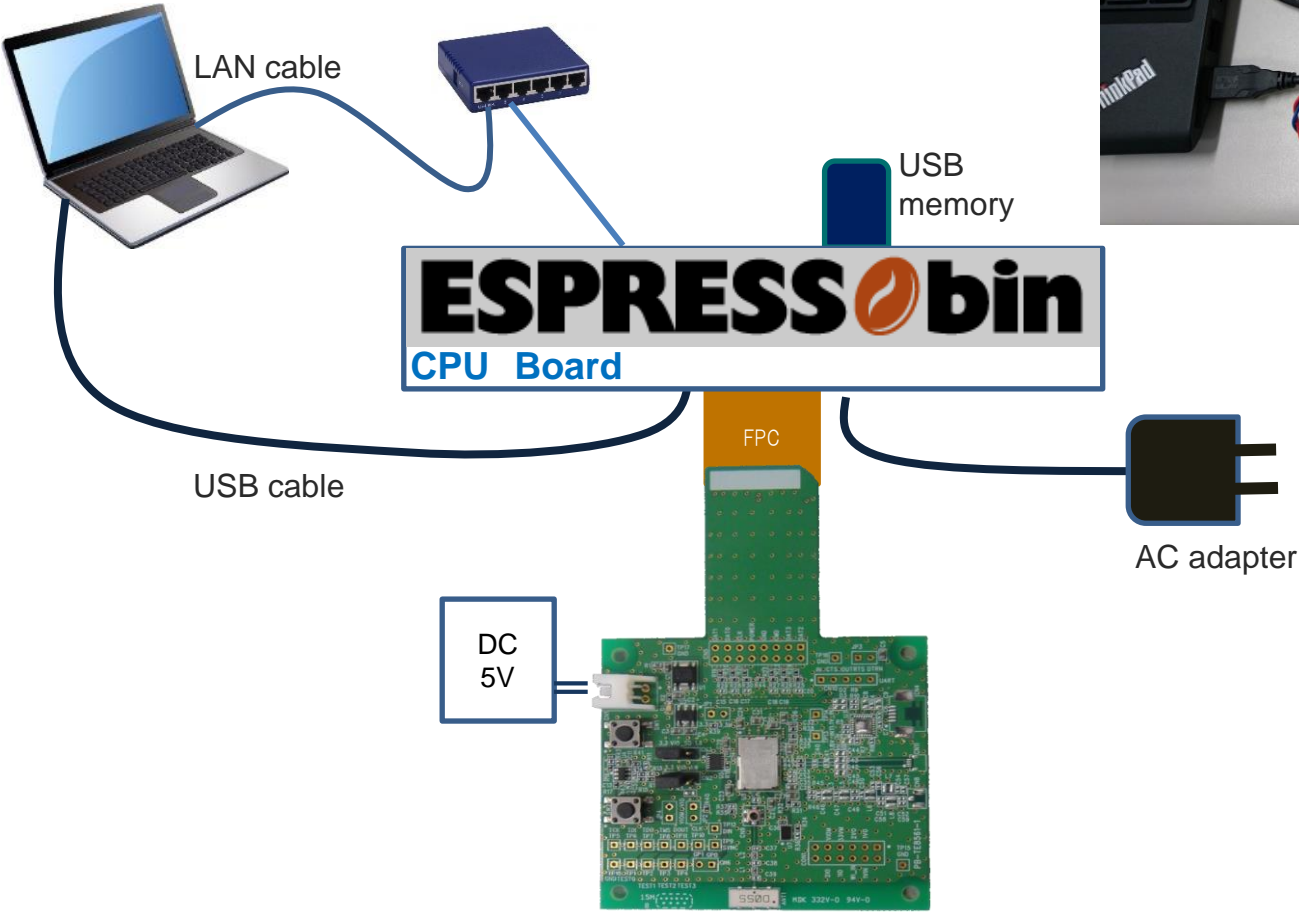
No.	Item	Description	Qty
1	WBSBBHVGXG	Evaluation board of WLAN module WYSBBHVGXG with SDIO interface	1
2	Red & Blue Cable	Power supply cable	1
3	Registration card	For instructions on how to obtain device driver for WYSBBHVGXG	1



WBSBBHVGXG

Example of hardware configuration for evaluation

【Connection Diagram】



Evaluation Board: WBSBHVXG

TAIYO YUDEN

Supplemental Product Information

WLAN Module Operating Environment

We offer tools and software for two types of simple evaluation environments.

- For PC with Linux Fedora18 with software development option and SDIO interface
- For Evaluation Kit with ESPRESSObin (ARM Cortex A53).
 - * **SDIO is required for PC. Although SDIO and SD Memory Card have the same slot shape, they are not compatible. WLAN Module and Evaluation Board will not work if they are connected to SD Memory Card slot.**
 - * We recommend to use ESPRESSObin come with our Evaluation Kit rather than PC.

What will be provided when the Evaluation Board (WBSBHVXG) or Evaluation Kit (KSBHVXG) is purchased

- Lab-tool User Guide: RF Control Tool Guide
- Lab-tool: RF Control Tool
- WLAN Device Driver Software for Linux PC, Fedora18
- WLAN/Bluetooth RF test application (GUI for RF test)
 - * There is a possibility that any provisions of software, etc. may be prohibited by export control depending on the customer's country or application.
 - * WBSBHVXG (module itself) purchased from online distributor does not include any above documents and software. To get them, you need to purchase WBSBHVXG (Evaluation Board) or KSBHVXG (Evaluation Kit).
 - * ***To obtain the device driver's source code, it is necessary to conclude an SLA, Software License Agreement, with us.***

Anyone can access other documents at the following site:

English: <https://www.yuden.co.jp/ut/product/category/module/lineup/wysbhvgxg>

Japanese: <https://www.yuden.co.jp/jp/product/category/module/lineup/wysbhvgxg>

Wireless Module

802.11ac/a/b/g/n + *Bluetooth*[®] 4.2

WYSAGVDXG

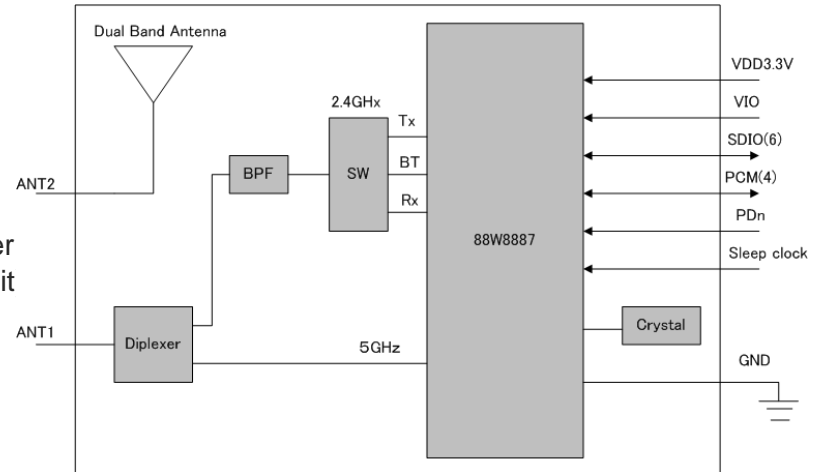


WYSAGVDXG : 802.11ac 1x1+Bluetooth® v4.2 Module

Features

- Supports IEEE802.11ac/a/b/g/n + Bluetooth® v4.2
- Low standby current (with advanced power save and sleep mode)
- Transmit Data Rate:
 - 11/5.5/2/1 Mbps(11b), 54/48/36/24/18/12/9/6 Mbps(11a/g),
 - 150~6.5 Mbps (11n, MCS7~0, HT20/40),
 - 433.3~29.3 Mbps (11ac MCS9~0, VHT80)
- Interface: SDIO
- Built-in Diplexer, 2G-PA, 5G-PA, 5G-LNA, OTP, RF Clock & DC/DC Power
- Security: TKIP, WEP, AES, CCMP, CMAC, WAPI,WPA/WPA2(64bit/128bit)
- Outline: 24.0 x 11.5 x 2.0 (Max) mm, SMD Type, Metal case shielding
- On-board Dual Band Chip Antenna
- Certification: FCC, ISED and MIC Regulation
- ETSI EN 300 328 / EN301 893 v2.1.1 conducted test report available
- RoHS Compliant

Block Diagram

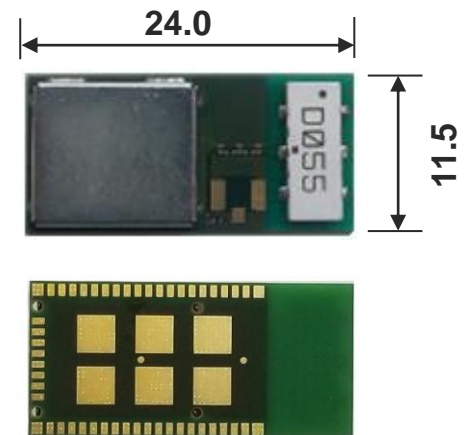


General Electrical Specification

Parameter	Description	Min.	Typ.	Max.	Units
Frequency Range	11b / g / n (HT20/HT40)	2412		2472	MHz
	11a/n / ac (HT20/HT40/HT80)	5180		5825	MHz
	BT/BLE	2402		2480	MHz
Operation Voltage	VDD33	3.0	3.3	3.6	V
	VIO	1.62/3.0	1.8/3.3	1.98/3.6	
TX Output Power	11b/11g/11n-2G(HT20/HT40)	10/10/10/8	12/12/12/10	14/14/14/12	dBm
	11a/n-5G(HT20/HT40)/ac (VHT80)	10/10/8/6	12/12/10/8	14/14/12/10	
	BT/BLE	-6/-6	0/0	2/2	
RX Sensitivity	11b/11g/11n-2G(HT20/HT40)	-	-87/-73/-69/-66	-76/-65/-64/-61	dBm
	11a/n-5G(HT20/HT40)/ac (VHT80)	-	-71/-68/-65/-57	-65/-64/-61/-51	
	BT / BLE	-	-86/-86	-70/-70	
Power Consumption	Burst Mode TX 11b (Duty=46.8%)	-	488		mW
	11ac RX 5G		358		mW
	Sleep Mode		1.8		mW
General Operation Temperature Range (Shielding case surface temperature)		-30	25	85	deg-C

Outline

Unit: mm



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TAIYO YUDEN

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The evaluation kit WKSAGVDXG comes with a single board computer called ESPRESSObin, which is equipped with ARM Cortex-A53 processor, in addition to an evaluation board.

The module can be operated using ESPRESSObin.

WKSAGVDXG Kit includes:

No.	Item	Description	Qty
1	WBSAGVDXG	Evaluation Board of WLAN module WYSAGVDXG with SDIO interface	1
2	Red & Blue Cable	Power Supply Cable for WBSAGVDXG	1
3	ESPRESSObin	Marvell Armada 3700LP (88F3720) dual core ARM Cortex A53 processor up to 1.2GHz.	1
4	AC Adapter	Power Supply Cable for ESPRESSObin	1
5	USB Memory	For booting ESPRESSObin	1
6	USB Cable		1
7	SD – micro SD Conversion Cable	SDIO conversion for EVB and ESPRESSObin	1
8	Registration card	For instructions on how to obtain Device Driver for WYSAGVDXG	1



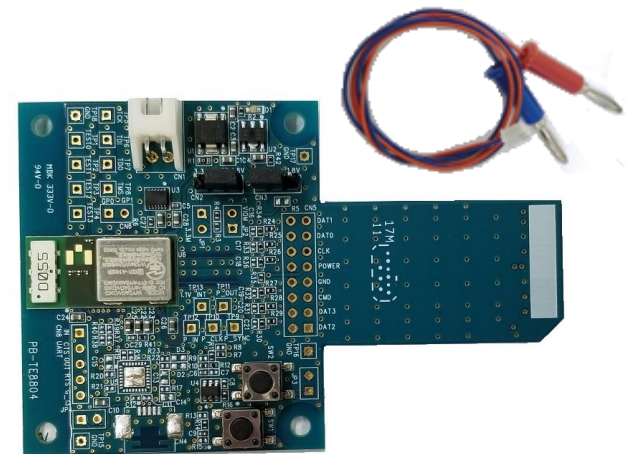
Evaluation Board:
WBSAGVDXG

CPU Board:
ESPRESSObin

WKSAGVDXG

WBSAGVDXG Board includes:

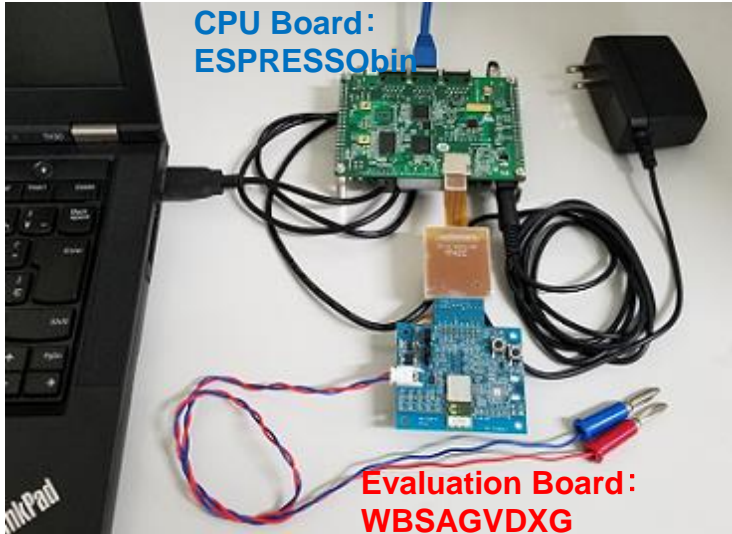
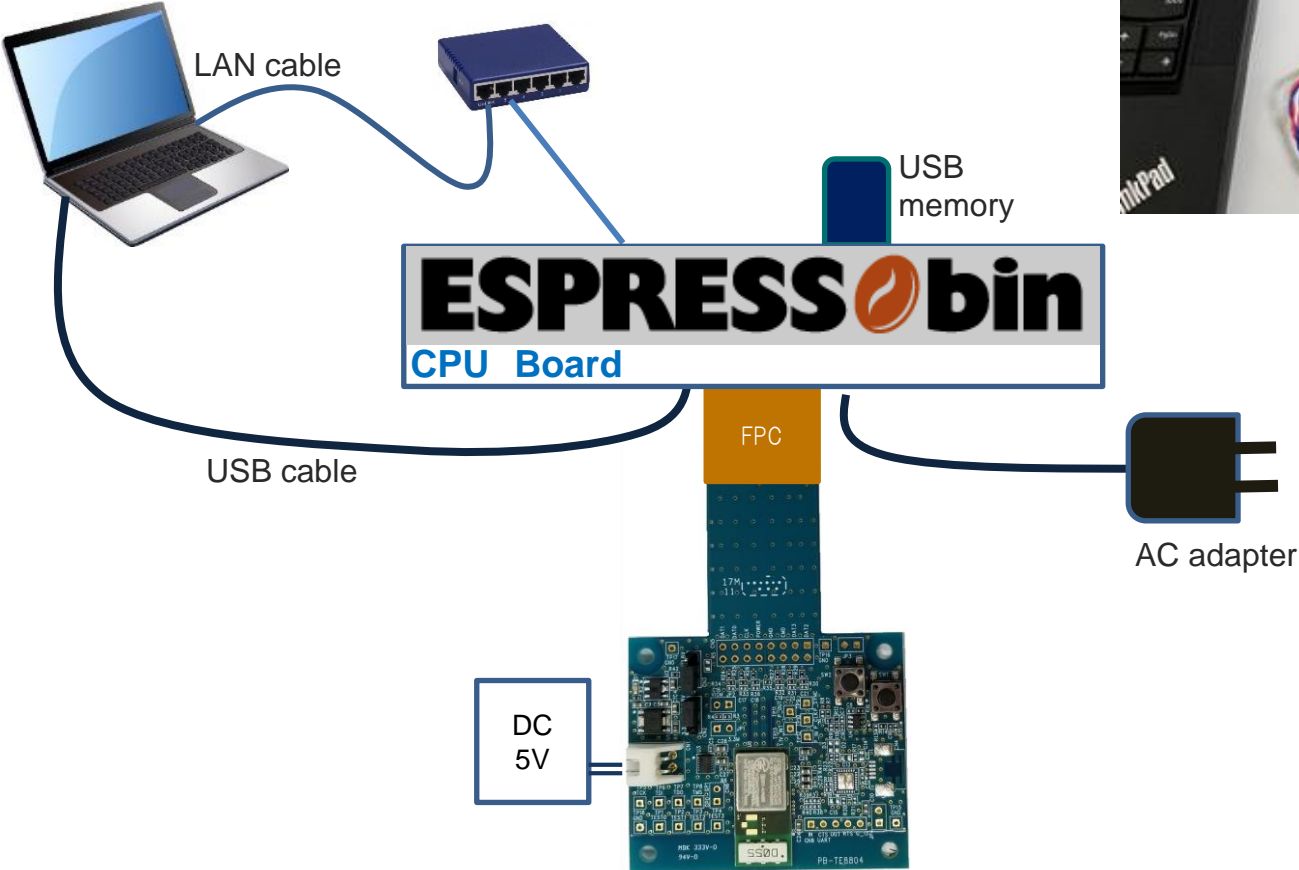
No.	Item	Description	Qty
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2	Red & Blue Cable	Power Supply Cable	1
3	Registration card	For instructions on how to obtain Device Driver for WYSAGVDXG	1



WBSAGVDXG

Example of hardware configuration for evaluation

【Connection Diagram】



Evaluation Board: WBSAGVDXG

Supplemental Product Information

WLAN Module Operating Environment

We offer tools and software for two types of simple evaluation environments.

- For PC with Linux Fedora18 with software development option and SDIO interface
 - For Evaluation Kit with ESPRESSObin (ARM Cortex A53).
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What will be provided when the Evaluation Board (WBSAGVDXG) or Evaluation Kit (WKSAGVDXG) is purchased

- Lab-tool User Guide: RF Control Tool Guide
 - Lab-tool: RF Control Tool
 - WLAN Device Driver Software for Linux PC, Fedora18
 - WLAN/Bluetooth RF test application (GUI for RF test)
- * There is a possibility that any provisions of software, etc. may be prohibited by export control depending on the customer's country or application.
- * WYSAGVDXG (module itself) purchased from online distributor does not include any above documents and software. To get them, you need to purchase WBSAGVDXG (Evaluation Board) or WKSAGVDXG (Evaluation Kit).
- * ***To obtain the device driver's source code, it is necessary to conclude an SLA, Software License Agreement, with us.***

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Wireless Module

802.11ac/a/b/g/n + *Bluetooth*[®] 4.2

WYSEGVDXG

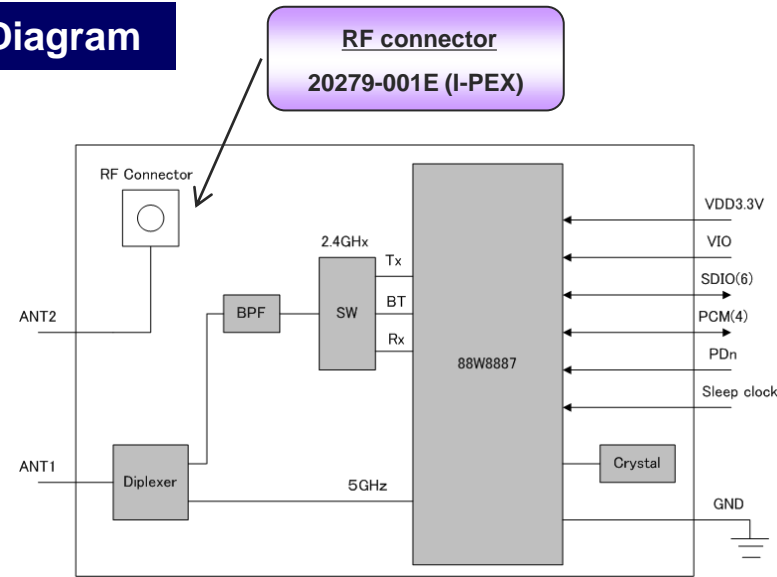


WYSEGVDXG : 802.11ac 1x1+Bluetooth® v4.2 Module

Features

- Standard: IEEE802.11ac/a/b/g/n + Bluetooth® v4.2
- Low standby current (with advanced power save and sleep mode)
- Transmit Data Rate:
 - 11/5.5/2/1 Mbps(11b), 54/48/36/24/18/12/9/6 Mbps(11a/g),
 - 150~6.5 Mbps (11n, MCS7~0, HT20/40)
 - 433.3~29.3 Mbps (11ac MCS9~0, VHT80)
- Channel Number : 1~13ch (11b/g/n), W52/W53/W56/W58(11a/n/ac), 79(BT)
- Interface: SDIO
- Built-in Diplexer, 2G-PA, 5G-PA, 5G-LNA, OTP, RF clock, DC/DC Power
- Security: TKIP, WEP, AES, CCMP, CMAC, WAPI,WPA/WPA2(64bit/128bit)
- Outline: 24.0 x 11.5 x 2.0 (Max) mm, SMD Type, Metal case shielding
- Certification: FCC, ISED and MIC Regulation
- Antenna list : [External Antenna List](#)
- RoHS Compliant

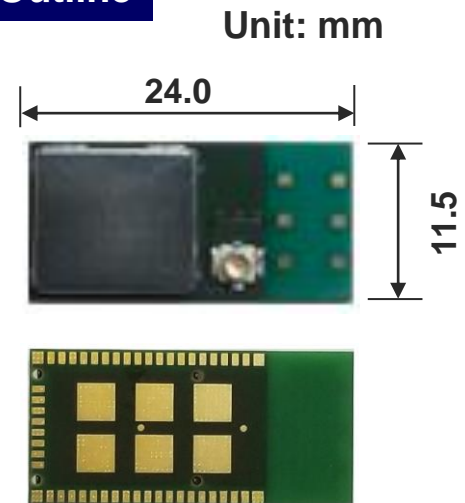
Block Diagram



General Electrical Specification

Parameter	Description	Min.	Typ.	Max.	Units
Frequency Range	11b / g / n (HT20/HT40)	2412		2472	MHz
	11a/n / ac (HT20/HT40/HT80)	5180		5825	MHz
	BT/BLE	2402		2480	MHz
Operation Voltage	VDD33	3.0	3.3	3.6	V
	VIO	1.62/3.0	1.8/3.3	1.98/3.6	
TX Output Power	11b/11g/11n-2G(HT20/HT40)	10/10/10/8	12/12/12/10	14/14/14/12	dBm
	11a/n-5G(HT20/HT40)/ac (VHT80)	10/10/8/6	12/12/10/8	14/14/12/10	
	BT/BLE	-6/-6	0/0	2/2	
RX Sensitivity	11b/11g/11n-2G(HT20/HT40)	-	-87/-73/-69/-66	-76/-65/-64/-61	dBm
	11a/n-5G(HT20/HT40)/ac (VHT80)	-	-71/-68/-65/-57	-65/-64/-61/-51	
	BT / BLE	-	-86/-86	-70/-70	
Power Consumption	Burst Mode TX 11b (Duty=46.8%)	-	488		mW
	11ac RX 5G		358		mW
	Sleep Mode		1.8		mW
General Operation Temperature Range (Shielding case surface temperature)		-30	25	85	deg-C

Outline

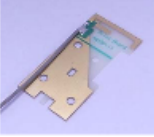




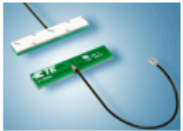





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External Antenna List for WYSEGVDXG

WYSEGVDXG Certified External Antenna List

Rev.5

Manufacturer	SANSEI ELECTRIC			GLEAD	Molex		
Part Number	STDANTEM0-009	STDANTEM0-001	ANTDC-081B0	WIFI_PAD2400NO_P408_P90MM	2042810100	1461870100	1461530100
Picture Image							
Antenna Category	Dipole	Dipole	Dipole	Dipole	Dipole	Dipole	Dipole
Antenna Type	PCB	PCB	Pole	FPC	FPC	PCB	FPC
Connector	U.FL/MHF	U.FL/MHF	U.FL/MHF	U.FL/MHF	U.FL/MHF	U.FL/MHF	U.FL/MHF
Dimensions(mm)	52.0 x 5.0 x 1.0	37.0 x 18.0 x 0.5	80.5 x φ9.35	40.0 x 8.0	35.0 x 11.0	40.95 x 9.0	34.9 x 9.0
Cable Length(mm)	0~	0~	120	100/150/200/250/300	100/150/200/250/300	100/150/200/250/300	100/150/200/250/300
Peak Gain	-1.0(dBi)@2.4GHz +1.1(dBi)@5GHz	+1.4(dBi)@2.4GHz +2.8(dBi)@5GHz	+1.4(dBi)@2.4GHz +1.3(dBi)@5GHz	+0.8(dBi)@2.4GHz +3.8(dBi)@5GHz	+2.0(dBi)@2.4GHz +3.3(dBi)@5GHz	+3.2(dBi)@2.4GHz +4.5(dBi)@5GHz	+3.0(dBi)@2.4GHz +4.5(dBi)@5GHz
Feature	Non-directional	Wideband	Wideband	-	Mount type : Adhesive	-	Mount type : Adhesive
Valid Country	Japan			Japan	Japan		

Manufacturer	Ethertronics		TE Connectivity					
Part Number	1001932PT	1001932FT	2118309-1	2118060-1	2344654	2344655	2344656	2344657
Picture Image								
Antenna Category	Dipole	Dipole	Dipole	Dipole	Dipole	Dipole	Dipole	Dipole
Antenna Type	PCB	FPC	PCB	PCB	PCB	PCB	FPC	FPC
Connector	U.FL/MHF	U.FL/MHF	U.FL/MHF	U.FL/MHF	U.FL/MHF	U.FL/MHF	U.FL/MHF	U.FL/MHF
Dimensions(mm)	35.2 x 8.5 x 0.4	35.2 x 8.5 x 0.15	40.0 x 8.0 x 1.0	29.60 x 41.24 x 0.304	30.00 x 9.50 x 1.00	33.00 x 8.00 x 1.00	33.00 x 9.50	35.00 x 8.00
Cable Length(mm)	100	100	120	350	50/100/150/200	50/100/150/200	50/100/150/200	50/100/150/200
Peak Gain	+2.5(dBi)@2.4GHz +4.5(dBi)@5GHz	+2.5(dBi)@2.4GHz +4.4(dBi)@5GHz	+3.3(dBi)@2.4GHz +6.9(dBi)@5GHz	+3.7(dBi)@2.4GHz +5.6(dBi)@5GHz	+2.2(dBi)@2.4GHz +6.3(dBi)@5GHz	+1.5(dBi)@2.4GHz +6.7(dBi)@5GHz	+2.4(dBi)@2.4GHz +6.9(dBi)@5GHz	+2.4(dBi)@2.4GHz +4.5(dBi)@5GHz
Feature	Mount type : Adhesive	Mount type : Adhesive	High-gain, Wideband	Low-profile, Wideband	Wideband	Low-profile, Wideband	Wideband	Wideband
Valid Country	Japan / U.S.A. / Canada		Japan					

- WYSEGVDXG has been radio-certified in the combination with these antennas.
- The antenna characteristics above may not be assured when you integrate it in your product.
- Please consult each antenna manufacturer for technical support for designing end product.
- When purchasing antenna in the list above, please contact each antenna manufacturer or its distributor.

W_SEGVDXG: Wireless LAN Module Evaluation Kit

The evaluation kit WKSEGVDXG comes with a single board computer called ESPRESSObin, which is equipped with ARM Cortex-A53 processor, in addition to an evaluation board.

The module can be operated using ESPRESSObin.

WKSEGVDXG Kit includes:

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1	WBSEGVDXG	Evaluation board of WLAN module WYSEGVDXG with SDIO interface	1
2	Red & Blue Cable	Power supply cable for WBSEGVDXG	1
3	ESPRESSObin	Marvell Armada 3700LP (88F3720) dual core ARM Cortex A53 processor up to 1.2GHz.	1
4	AC Adapter	Power supply cable for ESPRESSObin	1
5	USB Memory	For booting ESPRESSObin	1
6	USB Cable		1
7	SD – micro SD Conversion Cable	SDIO conversion for EVB and ESPRESSObin	1
8	Registration card	For instructions on how to obtain Device Driver for WYSEGVDXG	1



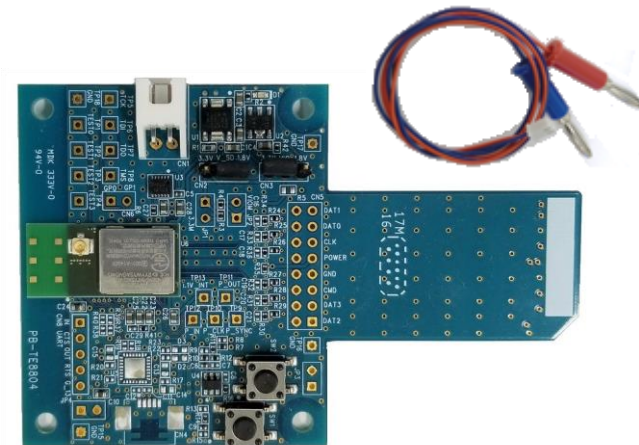
Evaluation Board: WBSEGVDXG

CPU Board: ESPRESSObin

WKSEGVDXG

WBSEGVDXG Board includes:

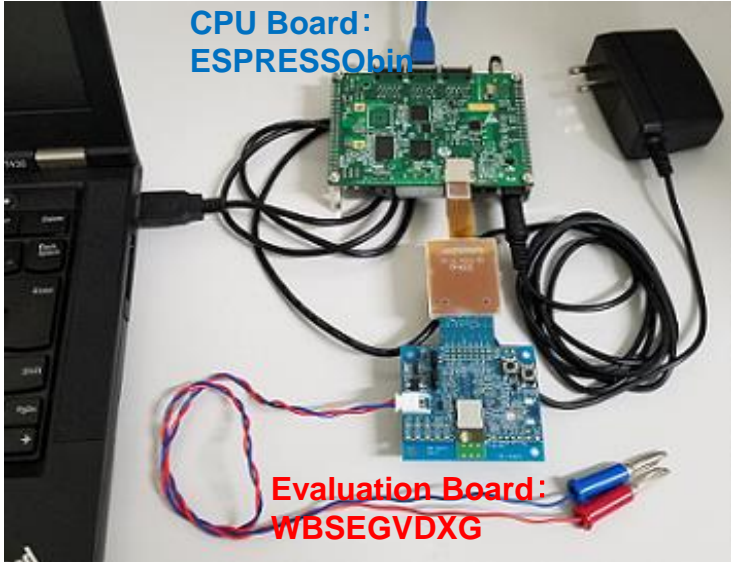
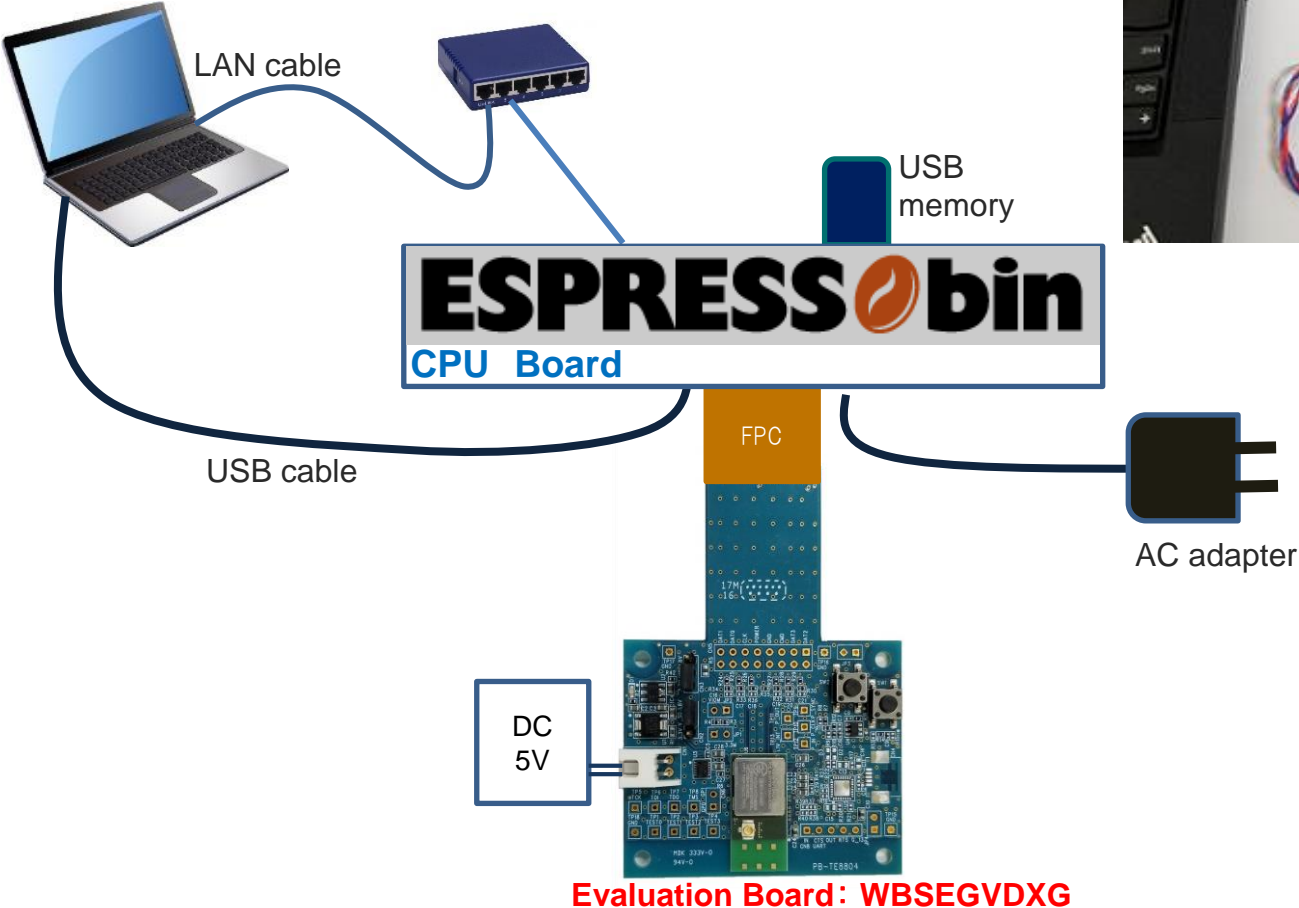
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WBSEGVDXG

Example of hardware configuration for evaluation

【Connection Diagram】



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Anyone can access other documents at the following site:

English: <https://www.yuden.co.jp/ut/product/category/module/lineup/wysegvdxg>

Japanese: <https://www.yuden.co.jp/jp/product/category/module/lineup/wysegvdxg>

Wireless Module
802.11ac/a/b/g/n + *Bluetooth*[®] 4.2

Software Support

Software Support for 802.11ac/a/b/g/n Modules

- After signing on to the SLA, Software License Agreement, TAIYO YUDEN provides the source code package of Linux (Ubuntu) base.

* The wording of SLA cannot be modified.

- List of drivers and documents that can be obtained after conclusion of the SLA.

Device Driver :For Ubuntu16.04 OS

1 Linux configuration tools

2 Linux WLAN and BT driver and Firmware

RF control tool (Lab-tool): For Windows and Linux OS

1 Windows Lab-tool

2 Linux bridge tool, Linux driver and Firmware

3 User guide

- Procedures for SLA

1) Please submit the name of the signer, company name, name and e-mail address of contact person and application information.

2) Sign on to the document provided by TAIYO YUDEN and return it to us.

The contract is completed if there is no defect.

3) TAIYO YUDEN will contact your contact person for supporting your download from our WEB site.

→ TAIYO YUDEN will notify you when any updates occur on the drivers.

- The source code package cannot be redistributed to any third parties.

- Customers can develop software based on this source code.

TAIYO YUDEN may be able to introduce our software partner for entrusting your software development. Please kindly contact TAIYO YUDEN for further information.

Software Structure

The software provided after conclusion of SLA

Sample Application

- uaputl , mlanutl (Configuration tools)

WLAN Device driver

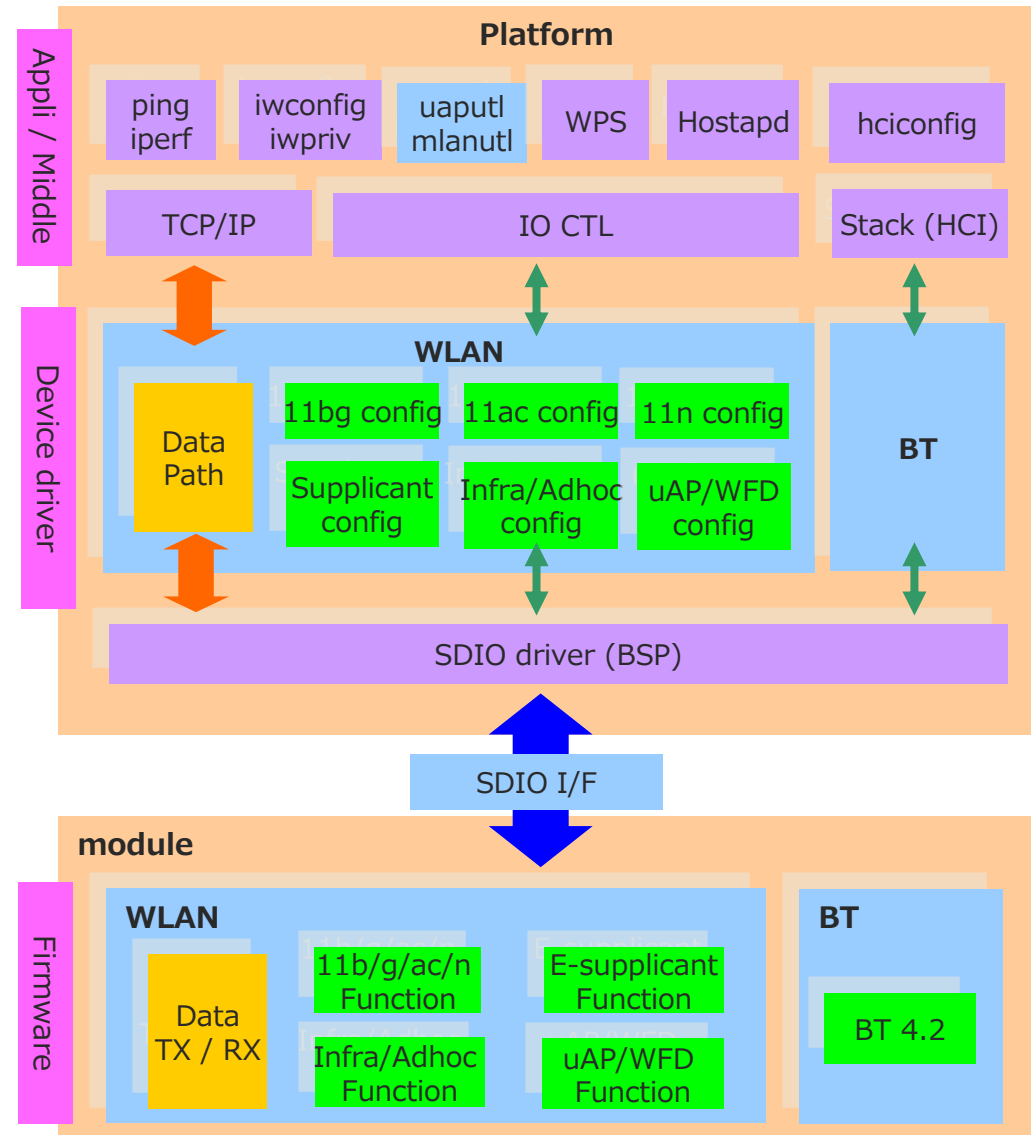
- Data path:
Communicate data such as TCP or UDP
- 11bg config/11ac config/11n config:
Configure each parameter such as CH/Rate/band/mode
- Supplicant config:
Configure the generated key by supplicant of middleware
- Infra/Adhoc config:
Configure the Infra or Adhoc mode
- uAP/WFD config:
Configure the uAP or WFD mode

Bluetooth Device driver

- Bluetooth driver

Firmware

- Data TX/RX:
Transmit and receive data on the air, such as TCP or UDP
- 11b/g/a/n function:
Execute the function of such as CH/Rate/Band/Mode
- E-supplicant function:
Generate the key of WPA/WPA2
- Infra/Adhoc function:
Execute the function of Infra or Adhoc mode
- uAP/WFD function:
Execute the function of uAP or WFD mode
- Bluetooth 4.2



*WFD : Wi-Fi Direct , E-supplicant : Embedded supplicant

Software Feature Set

General

- 1 Spatial stream (1x1)
- 802.11b Data rates of 1,2 ,5.5 and 11 Mbps
- 802.11a/g Data rates 6 - 48, and 54 Mbps
- 802.11n Data rates up to 300 Mbps (MCS0 to 15)
- 802.11ac Data rates up to 433 Mbps (MCS0 to 9)
- 802.11d International roaming
- 802.11e QoS block ack
- 802.11h Transmit power control, DFS
- 802.11i WPA / WPA2 and 802.11X
- Infrastructure and Ad-hoc mode
- Security WEP 64 and 128-bit, TKIP and AES CCMP for WPA / WPA2
- WMM Support, WMM PS (UAPSD)
- IEEE Power Save, Auto Deep Sleep / Host Sleep
- Embedded Supplicant
- Support for TX and RX of AMPDU and AMSDU-4k packets
- Support for Only TX of AMSDU-8k packets
- Background Scan, Vendor specific IE

Access point

- Multi-BSS support (2 BSS)
- Association support up to 10 stations
- Automatic channel selection (ACS)

Simultaneous AP-STA Operation

- AP-STA functionality
- Independent security configurations on different interfaces
- Enhanced power save (AP-STA simultaneous power save)

Wi-Fi Direct/P2P

- Autonomous Group Owner mode (GO)
- P2P Client mode
- P2P Client association with WLAN AP
- P2P Client power save
- P2P Client WMM PS (UAPSD)
- GO WMM PS / IEEE PS for associated P2P clients
- 8 client support, Provision discovery

Bluetooth

- BT 4.2, BT class 2
- Adaptive frequency hopping (AFH)
- Wake on BT
- Coexistence with Wi-Fi

Host Platform

- Laptop running Ubuntu 16

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