

SPECIFICATIONS

PRODUCT NAME : Single Band 1T1R Wi-Fi Module

MODEL NAME : TWFM-L303D-F

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	1. Antenna Characteristics	

1. Features

TWFM-L303D-F is the small size and low power module for IEEE 802.11b/g/n WLAN.
 TWFM-L303D -F is based Ralink RT5370 solution.

- IEEE 802.11 b/g/n Single Band WLAN infrastructure
- Size : 38.0mm x 24.0mm x 4.4mm
- Metal Press Antenna
- 2.4GHz internal PA
- 1T1R Mode with 150Mbps PHY Rate for Both Transmit and Receiving
- USB 2.0
- Supports drivers for Windows Vista, XP, 2000, Linux
- Security : WEP64/128, WPA, WPA2, TKIP, AES, WAPI
- Application : DTV, DVR, HD DVD Player, Blue-ray Disk Player, STB

2. Ordering Information

Model	Description
TWFM-L303D-F	Wi-Fi Module, Single Band 1T1R

3. Label marking



- | | |
|------------------------|--|
| ① Model No | ④ Product Lot No. : 1301A0401 |
| ② MAC Address BAR Code | - 13 : Year - 04 : Date |
| ③ MAC Address No. | - 01: Month - 01 : Manufactured |
| | - Revision No. : A Process |

4. Storage Test Conditions

Parameter	Min	Max	Unit
Storage Temperature	-10	+80	°C
Storage Humidity(40°C)	-	90	%

Caution : The specifications in Table 1 define levels at which permanent damage to the device can occur. Function operation is not guaranteed under these conditions.

Operating at absolute maximum conditions for extend periods can adversely affect the long-term reliability of the device.

▪ Other conditions

- 1) Do not use or store modules in the corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are contained.
Also, avoid exposure to moisture.
- 2) Store the modules is recommended where the temperature and relative humidity 5 to 40°C and 20 to 60%.
- 3) Assemble the modules within 6 months.
Check the soldering ability in case of 6 months over.

5. Operating Conditions

Parameter	Min	Typ	Max	Unit
Operating Temperature	0	-	+50	°C
Operating Humidity(40°C)	-	-	85	%
Supply Voltage	3.0	3.3	3.6	Vdc

6. Standard Test Conditions

The Test for electrical specification shall be performed under the following condition unless otherwise specified.

6-1. Ambient condition

Temperature	25 ± 5°C
Humidity	65 ± 5%

6-2. Power supply voltages

Input power	Supply Voltage
+3.3V	+3.3V ± 0.165V(5%)

6-3. Current consumption

Current Consumption	Min.	Typ.	Max.	Unit
TX Mode (MCS7)	-	280	-	mA
RX Mode	-	175	-	

7. Electrical Specifications

7-1. RF Characteristics for IEEE802.11b (11Mbps mode unless otherwise specified)

Items	Contents			
Specification	IEEE802.11b			
Mode	DSSS/CCK			
Channel frequency	2412 ~ 2462 MHz			
Data rate	1,2,5.5,11Mbps			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level(AVG)	10	12	14	dBm
Spectrum Mask				
1 st side lobes	-	-	-30	dBr
2 nd side lobes	-	-	-50	dBr
Modulation Accuracy (EVM)	-	-	35	%
Power On/Off ramp	-2.0	-	2.0	Usec
Freq. Tolerance	-25	0	25	ppm
Chip Clock Freq. Tolerance	-25	0	25	ppm
RX Characteristics	Min.	Typ.	Max.	Unit
Minimum Input Level Sens. (FER ≤ 8%)		-88	-76	dBm
Maximum Input Level (FER ≤ 8%)	-10	-	-	dBm

* Normal Condition : 25℃, VDD=5V.

* RF characteristics is board limit. It can differ according to standards

7-2. RF Characteristics for IEEE802.11g (54Mbps mode unless otherwise specified)

Items	Contents			
Specification	IEEE802.11g			
Mode	OFDM			
Channel frequency	2412~ 2462 MHz			
Data rate	6,9,12,18,24,36,48,54Mbps			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level(AVG)	7.5	9.5	11.5	dBm
Spectrum Mask				
at fc +/-11MHz	-	-	-20	dBr
at fc +/-20MHz	-	-	-28	dBr
at fc ≥ +/- 30MHz	-	-	-40	dBr
Constellation Error (EVM)	-	-	-25	dB
Freq. Tolerance	-20	0	20	ppm
Chip Clock Freq. Tolerance	-20	0	20	ppm
RX Characteristics	Min.	Typ.	Max.	Unit
Minimum Input Level Sens. (PER ≤ 10%)	-	-73	-65	dBm
Maximum Input Level (PER ≤ 10%)	-30	-	-	dBm

* Normal Condition : 25℃, VDD=5V.

* RF characteristics is board limit. It can differ according to standards

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7-3. RF Characteristics for IEEE802.11gn (MCS7 mode unless otherwise specified)

- HT20MHz Data Rate is 65Mbps, HT40MHz Data Rate is 135Mbps

Items	Contents			
Specification	IEEE802.11n – 2.4GHz			
Mode	OFDM			
Channel frequency	2412 ~ 2462 MHz (HT20) 2422 ~ 2452 MHz (HT40)			
Data rate	6.5, 13, 19.5, 26, 39, 52, 58.5, 65Mbps			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level(AVG) / HT20	7.5	9.5	11.5	dBm
Power Level(AVG) / HT40	6.5	8.5	10.5	dBm
Spectrum Mask				
at fc +/-11MHz	-	-	-20	dBr
at fc +/-20MHz	-	-	-28	dBr
at fc ≥ +/- 30MHz	-	-	-45	dBr
Constellation Error (EVM)	-	-	-28	dB
Freq. Tolerance(HT20 / HT40)	-20	0	20	ppm
Chip Clock Freq. Tolerance(HT20 / HT40)	-20	0	20	ppm
RX Characteristics	Min.	Typ.	Max.	Unit
Minimum Input Level Sens. (HT20, PER ≤ 10%)	-	-70	-64	dBm
Minimum Input Level Sens. (HT40, PER ≤ 10%)	-	-67	-62	dBm
Maximum Input Level (PER ≤ 10%)	-30	-	-	dBm

* Normal Condition : 25°C, VDD=5V.

* RF characteristics is board limit. It can differ according to standards

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8. Mechanical Characteristics

8-1. Outline view

Item	Test Conditions
Assembly	No defects of wiring, soldering and assembling
Appearance	No dirt, rust, corrosion or foreign material

8-2. Appearance structure

Item	Test Conditions
Dimension	As outline drawing
Mounting	As outline drawing
Weight	Approximately 4.75 ± 0.4 [g]

9. Software

9-1. Windows Utility

Execute the released windows utility installer.

- (1) Run RaUI.exe



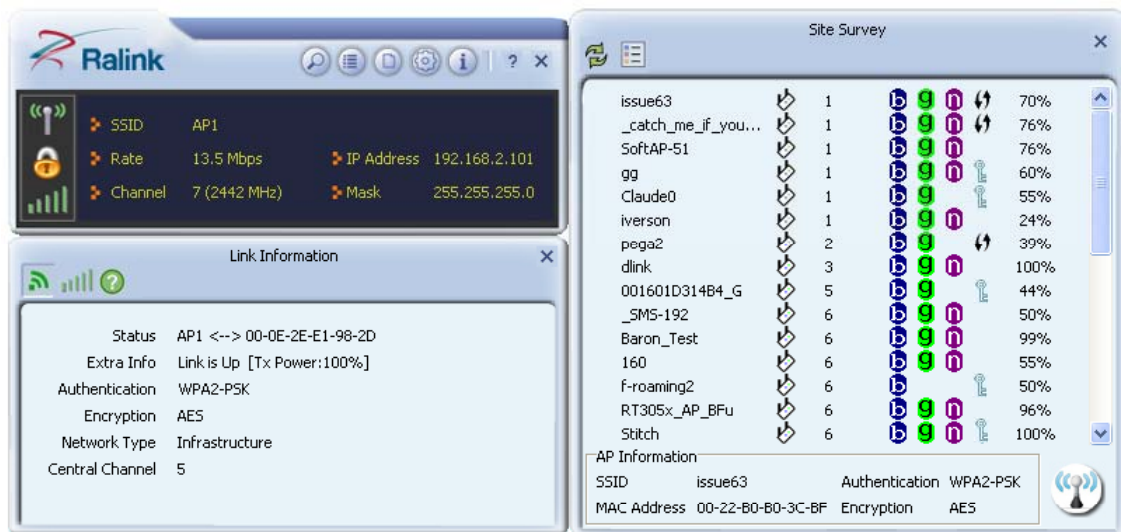
< Fig1.1 RaUI icon >

- (2) RaUI can co-exist with WZC. When coexisting with WZC, RaUI only provides monitoring functions, such as surveying the link status, network status, static counters, advanced features status, WMM status and WPS status.



< Fig1.2 Select WZC and RaUI >

- (3) When starting RaUI, the system will connect to the AP with best signal strength without setting a profile or matching a profile setting. It will issue a scan command to a wireless NIC. After two seconds, the AP list will be updated with the results of a BSS list scan.



< Fig1.3 RaUI section introduction >


(4) Button section.


- Site survey, Link information, Profile, Advanced, Information, About page.
- Help page.




< Fig1.4 Button section >

(5) When starting RaUI, a small Ralink icon appears in the notifications area of the taskbar, as shown in <Fig1.5>.

 : Indicates the connected and signal strength is good.

 : Indicates the connected and signal strength is normal.

 : Indicates that it is not yet connected.

 : Indicates that a wireless NIC can not be detected.

 : Indicates that the connection and signal strength is weak.

< Fig1.5 Ralink icon in system tray >

* Please refer to the help page in detail usage manual.

9-2. Linux Device Driver

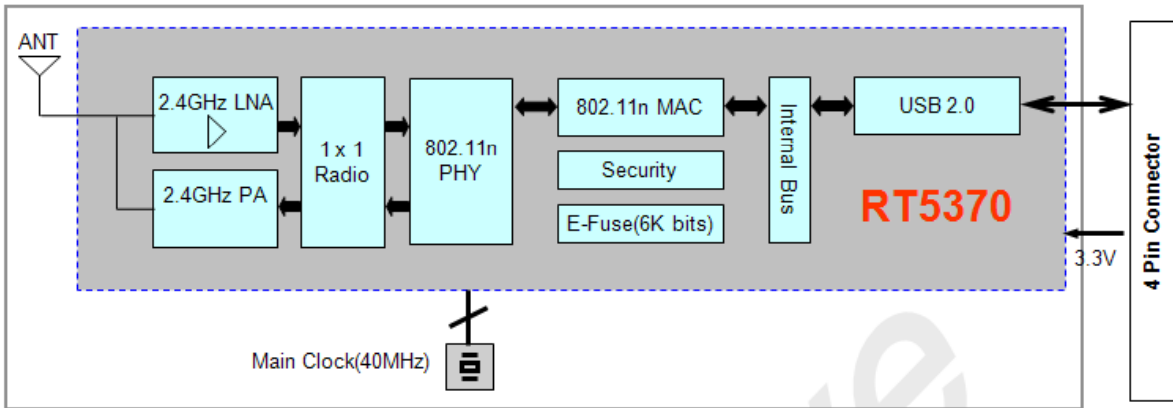
Before compiling the driver, you should change make file or makefile.inc to meet your target platform.

* Please refer to the release note in detail.

10. Environment Tests

Item	Test Conditions	Specifications
Heat Load Test	Initial values are measured at standard test condition. Leave samples in $60^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 96 ± 5 hours, and in standard test condition for 30 minutes, then take measurements within 1 hour. - Supply voltage : standard $\pm 5\%$	<ul style="list-style-type: none"> • Power Level : $\pm 4\text{dB Max}$ • Min. Input Level Sens. : $\pm 4\text{dB Max}$
Humidity Load Test	Initial values are measured at standard test condition. Leave samples in $40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, 90% RH for 96 ± 5 hours, and in standard test condition for 30 minutes, then take measurements within 1 hour. - Supply voltage : standard + 5%	
Cold Test	Initial values are measured at standard test condition. Leave samples in $-20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 96 ± 5 hours, and in standard ambient for 1 hour with standard power Supply then take measurements within 1 hour.	
Temperature Shock	Take measurements in standard test condition. Temp. : $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$ Duration : 30 min Ramp-up & Ramp-down for 5 min Cycle : 100cycle.	
Vibration Test	Initial value measure at standard test condition. Sweep rate : 1 single sweep/ minute Amplitude : 1.5 mm Frequency : 10-55Hz Duration : 1 Hours per direction (X,Y,Z)	
ESD Test	Initial values are measured at standard test condition. - Wafer (USB Connector) : $\pm 500\text{V}$, 10 times - Antenna & Cover : $\pm 1\text{kV}$, 10times	

11. Block Diagram

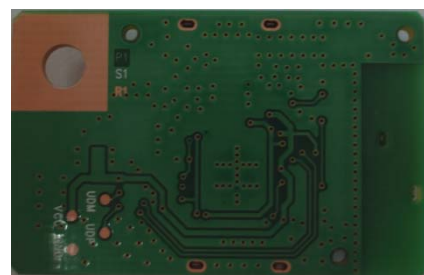


12. Pin Description

Pin No.	Pin Name	I/O	Pin Description
1	VDD	I	VDD 3.3V
2	USB_DN	I/O	USB Communication signal USB_DN
3	USB_DP	I/O	USB Communication signal USB_DP
4	GND	-	GND



< Top View >



< Bottom View >

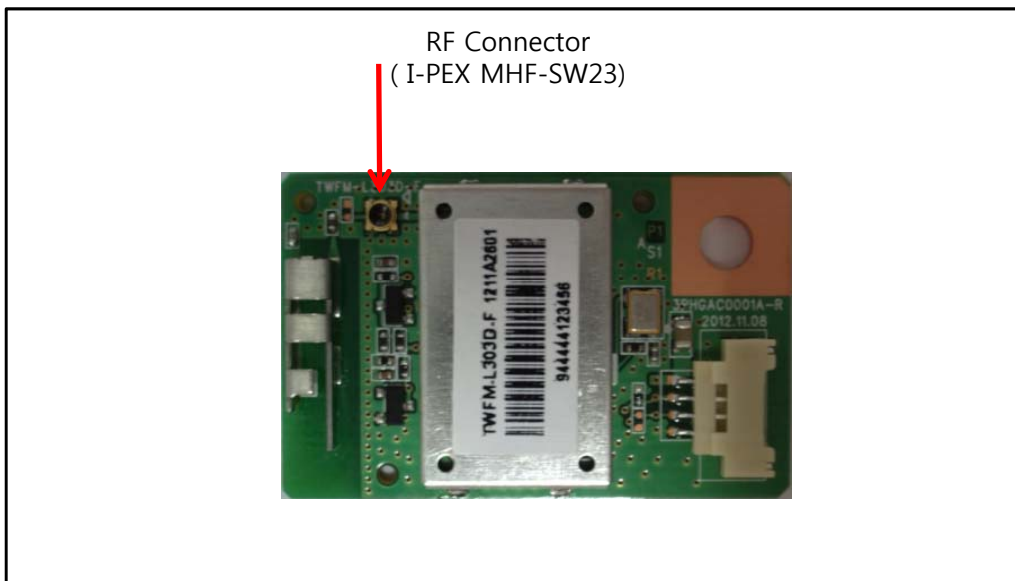
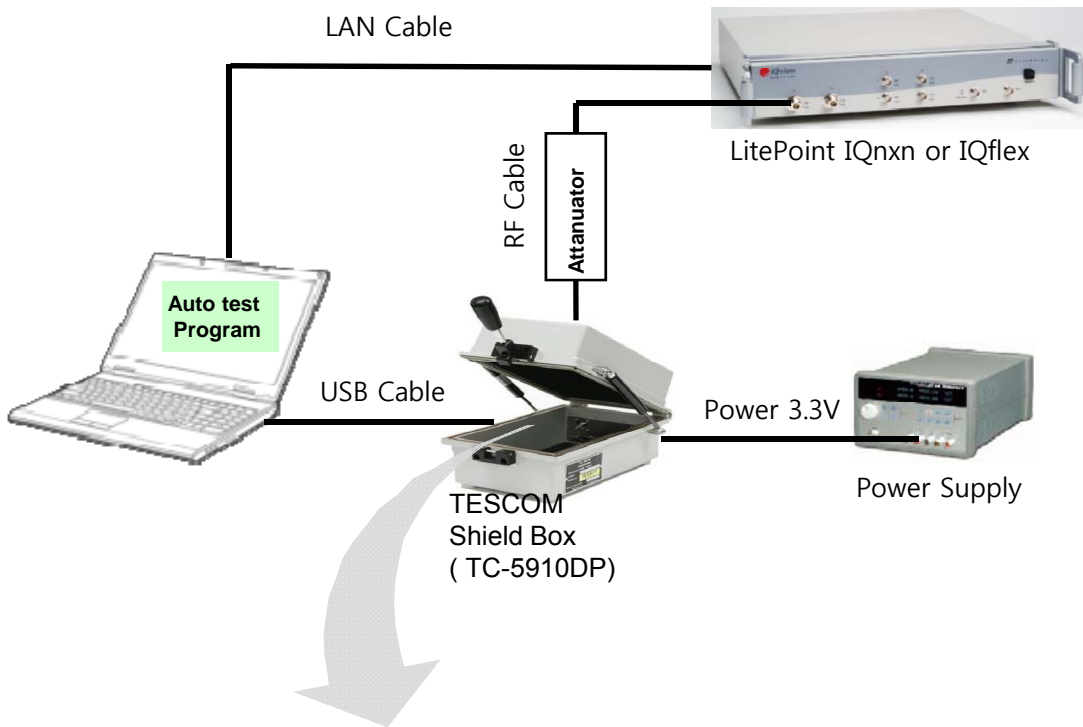
Note.

- 1) Recommend a Module install sequence for prevent USB device failure
 - Supply 3.3V power
 - Connect to data signal (USB_DP, USB_DN)
- 2) If remove the module, proceed in inverse sequence
- 3) Connector : 12507WR-04L(YEON HO)

13. Test Method

This is a conducted test method of Wi-Fi RF performance.

13-1. Test Condition.



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13-2. Test Set-up List.

- Instrument : LitePoint IQnxxn or IQflex
- Shield Box : Tescom TC-5910DP
- Driver Version : 5.102.98.12
- RF Cable : TESCOM 4011-0011
- Attenuator : Mini-Circuit 15542 10dB attenuator
- USB Cable, LAN Cable, RF Cable(I-PEX MHF-SW23)
- Power Supply

13-3. Test Flow

- Install the test set-up.
- Power OFF.
- Open the Shield box and install the DUT for test.
- Close the shield box.
- Power ON.
- Check the driver icon.
- Start testing.

#. Notes.

- Be careful that you can consider a RF cable LOSS.

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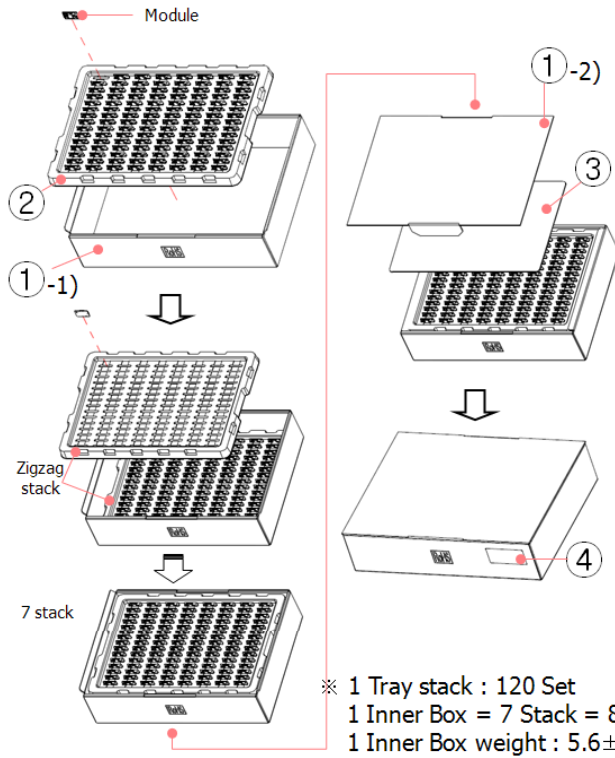
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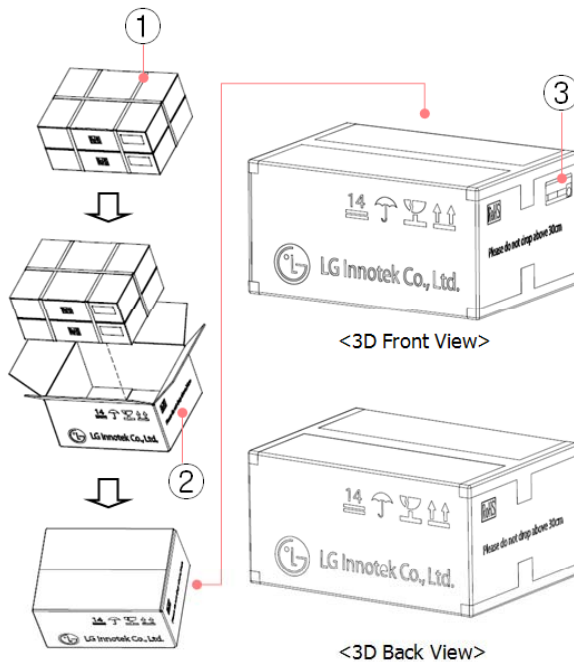
15. Packing Information

1) Inner Packing



PART	SPEC.
Product	1. Wi-Fi Module : 4.75±0.4[g]
① Inner Box 3BBCAD0113A-R	1. Part List 1) Body : CORRUGATED PAPER 3T 2) Cap : CORRUGATED PAPER 3T 2. Size : 512 x 378 x 121.5 [mm] 3. Weight : 480g
② Bundle Tray 3GTEEC0039A-H	1. Material : Antistatic PS 1.0T 2. Color : White 3. Size : 503 x 355 x 27 [mm] 4. Weight : 155g
③ Tray paper 3BBCAD0140A-H	1. Material : CORRUGATED PAPER 2. Size : 444 x 313 x 3 [mm] 3. Weight : 80g
④ Barcode Label 3320KP0053A	1. Material : Art Paper 2. Size : 100 x 46 [mm] 3. Color : white (Text : Black)

2) Carton Box Packing



PART	SPEC.
① PP Band 3340KB0001A	1. Material : PP 2. Size : 15mm 3. Color : Yellow
② Carton Box 3300KC0090D	1. Material : CORRUGATED PAPER, 5T 2. Size : 514 x 397 x 268 [mm] 3. Weight : 0.7kg
③ Barcode Label 3320KP0053A	1. Material : Art Paper 2. Size : 100 x 46 [mm] 3. Color : white (Text : Black)

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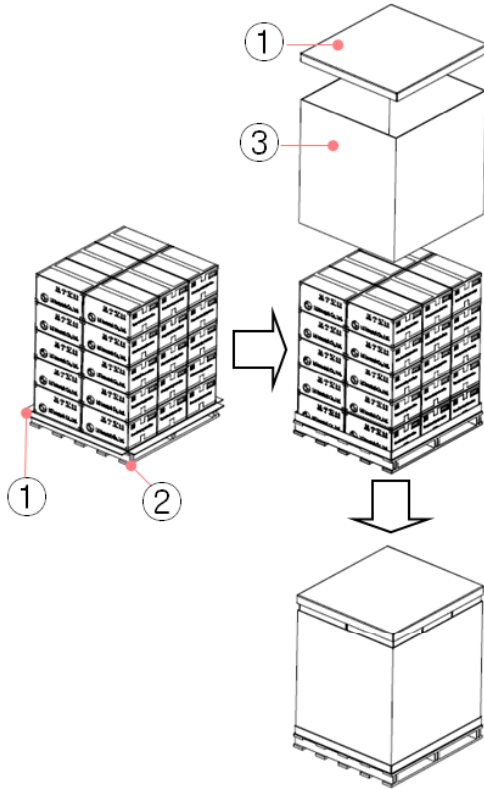
SPECIFICATION

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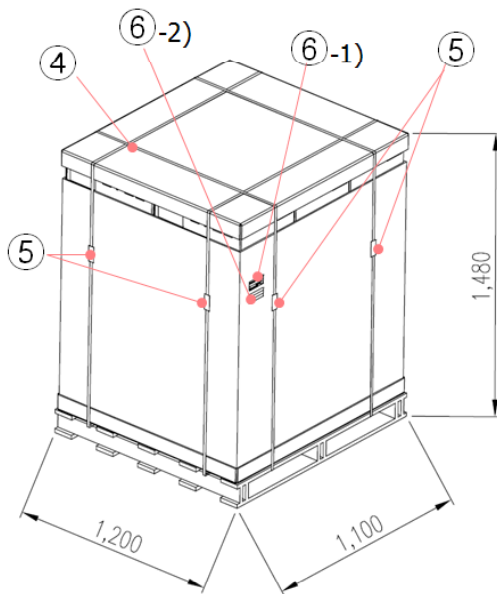
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3) Pallet Packing


PART	SPEC.
① Cap Box 3300KC0348B	1. Material : Paper (BA Flute Double-wall) 2. Size : 8T 3. Weight : 1.5kg
② Pallet 1) 3390KZ0073C 2) 3ZDNB00025A-R	1. Material & Weight 1) Steel 10.3kg 2) Ply Wood 12.5kg 2. Size : 1100 x 1200 x 120 [mm]
③ Shipping Box 3300KC0348A	1. Material : Paper (BA Flute Double-wall) 2. Size : 8T 3. Weight : 6kg



1 Pallet = 6x5 = 30 Carton
 = 1,680 Module x 30 = 50,400 Module
 ※ 1 Pallet Packing Weight : 382±30 kg

PART	SPEC.						
④ PP Band 3340KB0001A	1. Material : PP 2. Size : 15mm 3. Color : Yellow						
⑤ Clip 3220KC0004A	1. Material : Steel						
⑥ Barcode Label 3320KP0053A	1. Material : Art Paper 2. Size : 100 x 46 (mm) 3. Color : white (Text : Black) 4. Print 1) for Barcode 2) for Ship Information <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Destination</td> <td>TPV</td> </tr> <tr> <td>No./Total No.</td> <td>Pallet No : 1/3</td> </tr> <tr> <td>Country of Orizin</td> <td>MADE IN INDONESIA</td> </tr> </table>	Destination	TPV	No./Total No.	Pallet No : 1/3	Country of Orizin	MADE IN INDONESIA
Destination	TPV						
No./Total No.	Pallet No : 1/3						
Country of Orizin	MADE IN INDONESIA						

Appendix

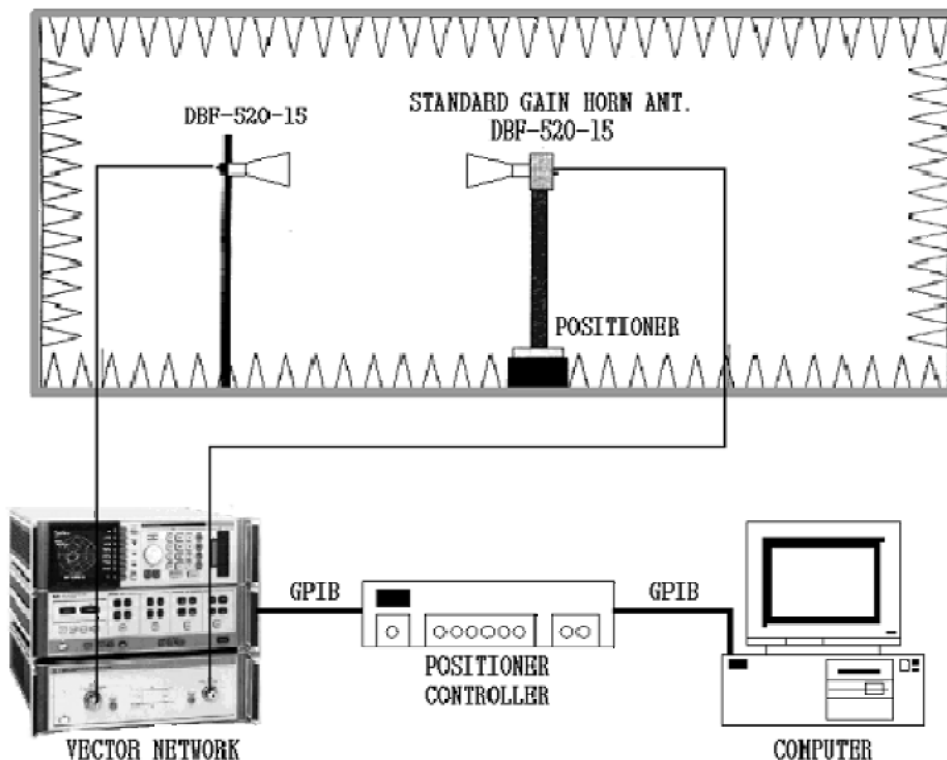
1. Antenna Characteristics

1) Features

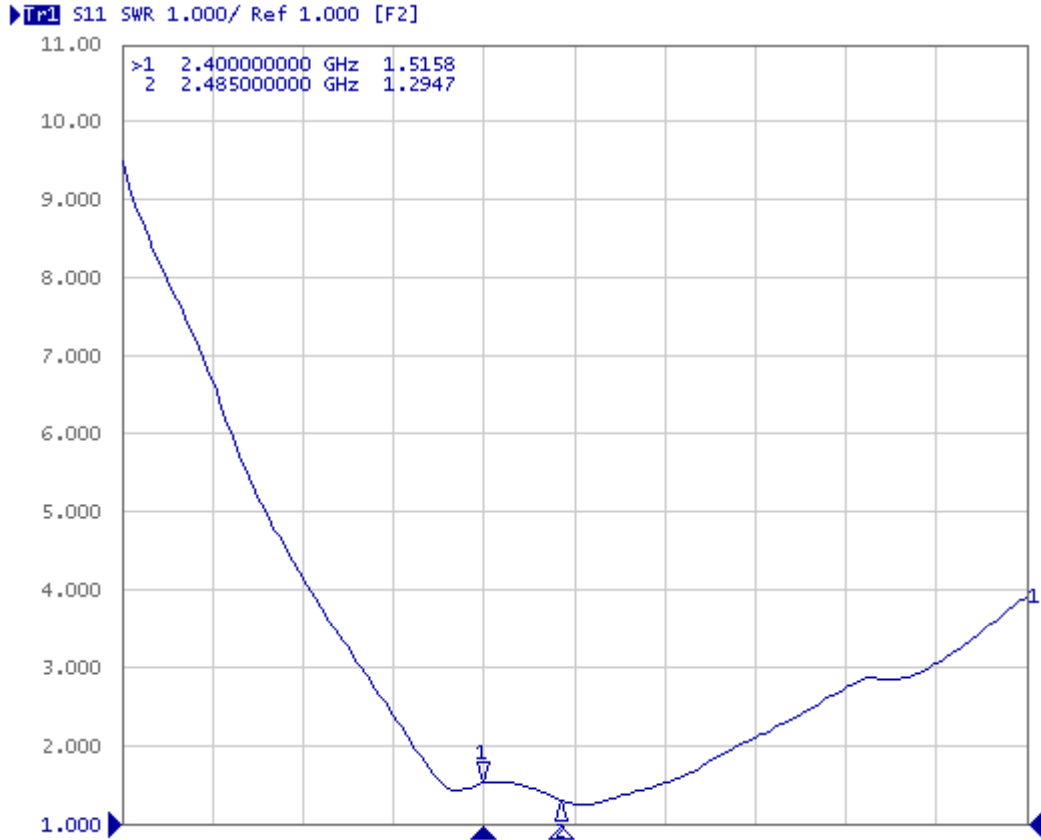
Antenna Performance				
Parameter	Min	Typ	Max	Unit
Frequency Range	2412	2445	2485	MHz
Directivity	-	Omni	-	-
Average Gain	-	-1.29	-	dBi
Peak Gain	-	1.84	-	
V.S.W.R	-	2.0:1	-	Under
Impedance	-	50	-	Ohm
Radiation Material	-	Tin plate	-	-

2) Test condition

- OTA 3D Chamber



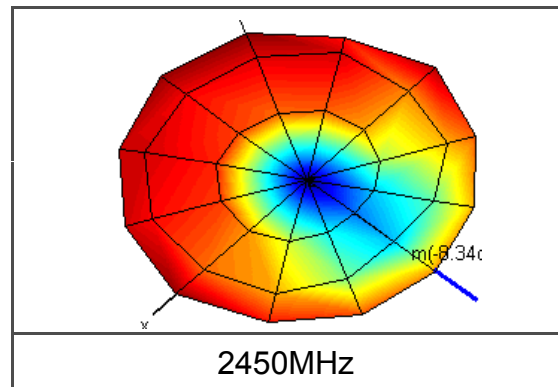
a. VSWR



b. Gain

Freq	Gavg	Gpeak	
MHz	dBi	dBi	deg
2412	-2.05	1.68	90
2450	-1.00	1.62	90
2485	-1.13	1.64	90

c. Radiation Pattern



User Information

To satisfy FCC exterior labeling requirements, the following text must be placed on the exterior of the end product.
Contains Transmitter module FCC ID: **YZP-TWFML303D**

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment. This device should be installed and operated with minimum distance 20cm between the radiating element of this device and the user. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

This device is intended only for OEM integrators and following statements shall be included to host user manual

- 1) The antenna must be installed such that 20cm is maintained between the antenna and users.
- 2) This module may not be co-located with any other transmitters or antennas.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements with this module installed. In the event that these conditions cannot be met, then the FCC authorizations are no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product including this module and obtaining separate FCC authorizations.

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 technical for help.
- 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 technical for help.

This device complies with Part 15 of the FCC's 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 undesirable operation.

This equipment may generate or use radio frequency energy. Changes or modifications to this equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual. The user could lose the authority to operate this equipment if an unauthorized change or modification is made.