Prüfbericht-Nr.: *Test report no.:*	**CN2281Z0 001**	**Auftrags-Nr.:** *Order no.:*	168367224	Seite 1 von 23 *Page 1 of 23*
Kunden-Referenz-Nr.: *Client reference no.:*	N/A	**Auftragsdatum:** *Order date:*	2022-04-01	
Auftraggeber: *Client:*	**Shenzhen RAKwireless Technology Co.,Ltd.** Room 506, Building B, New Compark, Pingshan First Road, Taoyuan Street, Nanshan District, Shenzhen, Guangdong, China			
Prüfgegenstand: *Test item:*	WiFi Module			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	AI7688H, AI7688H2 (Trademark: RAK)			
Auftrags-Inhalt: *Order content:*	FCC and IC approval			
Prüfgrundlage: *Test specification:*	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart C Section 15.207 CFR47 FCC Part 15: Subpart C Section 15.209 CFR47 FCC Part 2: Section 2.1091		RSS-247 Issue 2 February 2017 RSS-Gen Issue 5 February 2021 RSS-102 Issue 5 February 2021	

Wareneingangsdatum: *Date of sample receipt:*	2022-04-14	Please refer to photo documents
Prüfmuster-Nr.: *Test sample no.:*	A003243030	
Prüfzeitraum: *Testing period:*	2022-04-22 – 2022-05-11	
Ort der Prüfung: *Place of testing:*	TÜV Rheinland (Shenzhen) Co., Ltd.	
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shenzhen) Co., Ltd.	
Prüfergebnis*: *Test result*:*	Pass	

geprüft von: *tested by:*	X Alex Lan	**genehmigt von:** *authorized by:*	X Winnie Hou
Datum: *Date:* 2022-05-13	Signed by: Alex Lan	**Ausstellungsdatum:** *Issue date:* 2022-05-18	Signed by: Winnie Hou
Stellung / Position	Assistant Project Manager	**Stellung** / Position	Department Manager

Sonstiges / *Other:*

FCC ID: 2AF6B-AI7688H2
IC: 25908-AI7688H2 HVIN: AI7688H, AI7688H2

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery:*	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged:*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhalt
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specifications(s)		*F(ail) = failed a.m. test specifications(s)*	*N/A = not applicable*	*N/T = not tested*

TUV Rheinland (Shenzhen) Co., Ltd. 1601 R&D Room, 1602-1604, 17-18F, Building 7 Site C, Vanke Cloud City Phase I, Xingke First Street, Xili Street, Xili Community, Nanshan District, Shenzhen 518052, P.R. China
Mail: service@de.tuv.com Web: www.tuv.com

Test Summary

5.1.1 ANTENNA REQUIREMENT
RESULT: Pass

5.1.2 MAXIMUM CONDUCTED PEAK OUTPUT POWER
RESULT: Pass

5.1.3 CONDUCTED POWER SPECTRAL DENSITY
RESULT: Pass

5.1.4 99%DB BANDWIDTH
RESULT: Pass

5.1.5 6DB BANDWIDTH
RESULT: Pass

5.1.6 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHZ BANDWIDTH
RESULT: Pass

5.1.7 RADIATED SPURIOUS EMISSION
RESULT: Pass

5.1.8 CONDUCTED EMISSION ON AC MAINS
RESULT: Pass

6.1.1 ELECTROMAGNETIC FIELDS
RESULT: Pass

Contents

1 GENERAL REMARKS 4
1.1 COMPLEMENTARY MATERIALS 4
2 TEST SITES 4
2.1 TEST FACILITIES 4
2.2 LIST OF TEST AND MEASUREMENT INSTRUMENTS 5
2.3 TRACEABILITY 7
2.4 CALIBRATION 7
2.5 MEASUREMENT UNCERTAINTY 7
2.6 LOCATION OF ORIGINAL DATA 7
2.7 STATUS OF FACILITY USED FOR TESTING 7
3 GENERAL PRODUCT INFORMATION 8
3.1 PRODUCT FUNCTION AND INTENDED USE 8
3.2 RATINGS AND SYSTEM DETAILS 8
3.3 INDEPENDENT OPERATION MODES 9
3.4 NOISE GENERATING AND NOISE SUPPRESSING PARTS 9
3.5 SUBMITTED DOCUMENTS 9
4 TEST SET-UP AND OPERATION MODES 10
4.1 PRINCIPLE OF CONFIGURATION SELECTION 10
4.2 TEST OPERATION AND TEST SOFTWARE 10
4.3 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT 10
4.4 COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE 10
4.5 TEST SETUP DIAGRAM 11
5 TEST RESULTS 13
5.1 TRANSMITTER REQUIREMENT & TEST SUITES 13
5.1.1 Antenna Requirement 13
5.1.2 Maximum Conducted Peak Output Power 14
5.1.3 Conducted Power Spectral Density 15
5.1.4 99%dB Bandwidth 16
5.1.5 6dB Bandwidth 17
5.1.6 Conducted Spurious Emissions Measured in 100 kHz Bandwidth 18
5.1.7 Radiated Spurious Emission 19
5.1.8 Conducted Emission on AC Mains 20
6 SAFETY HUMAN EXPOSURE 21
6.1 RADIO FREQUENCY EXPOSURE COMPLIANCE 21
6.1.1 Electromagnetic Fields 21
7 PHOTOGRAPHS OF THE TEST SET-UP 23
8 LIST OF TABLES 23

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Photographs of the Test Set-up

Appendix B: Test Results of Conducted Testing

Appendix C: Test Results of Radiated Testing and conducted emission on AC mains

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.

No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, People's Republic of China

FCC Registration No.: 694916

IC Registration No.: 25069 and the CAB identifier is CN0078.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Radio Spectrum Testing				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Cal. until**
EXA Signal Analyzer, Multi-touch	Keysight	N9010B	MY60241175	28.09.2022
MXG X-Series RF Vector Signal Generator	Keysight	N5182B	MY61250137	28.09.2022
EXG X-Series Microwave Analog Signal Generator	Keysight	N5173B	MY61250141	28.09.2022
DC Power Supply	Keysight	E3642A	MY61276100	28.09.2022
Wireless Connectivity Tester	R&S	CMW270	102505	28.09.2022
Power Control Unit	Tonscend	JS0806-4ADC	N/A	28.09.2022
Automation Control Unit	Tonscend	JS0806-2	21C8060396	28.09.2022
Test Software	Tonscend	JS1120-3	N/A	N/A
Control PC	Lenovo	TianYi510S-071MB	YLX23JMF	N/A
Unwanted Emission Testing (TS9975)				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Cal. until**
EMI Test Receiver	R&S	ESR 7	102021	10.08.2022
Signal Analyzer	R&S	FSV 40	101439	09.08.2022
System Controller Interface	R&S	SCI-100	S10010038	N/A
Filterbank	R&S	Wlan	100759	09.08.2022
OSP	R&S	OSP 120	102040	N/A
Pre-amplifier	R&S	SCU08F1	08320031	09.08.2022
Amplifier	R&S	SCU-18F	180070	09.08.2022
Amplifier	R&S	SCU40A	100475	09.08.2022
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	08.08.2022
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	08.08.2022
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	08.08.2022
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	13.09.2022
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	22.06.2024
Conducted Emission on AC Mains				

Equipment	Manufacturer	Model No.	Serial No.	Cali. until
EMI Test Receiver	R&S	ESR3	102680	25.04.2023
Artificial Mains Network	R&S	ENV216	101445	25.04.2023
EMC32 test software	R&S	EMC32(Ver.10.50.00)	N/A	N/A

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Test	Parameters	Expanded uncertainty (U_{lab})	Expanded uncertainty (U_{cispr})
Conducted Emission	Level accuracy (9kHz to 150kHz) (150kHz to 30MHz)	± 3.70 dB ± 3.30 dB	± 3.8 dB ± 3.4 dB
Radiated Emission (3m SAC)	Level accuracy (30MHz to 1000MHz)	± 4.52 dB	± 6.3 dB
	Level accuracy (above 1000MHz)	± 4.37 dB	N/A

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B & C of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, People's Republic of China. is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUT is IEEE 802.11 b/g/n 2.4GHz 1T1R Wi-Fi Module.

The two models are identical except non-radio related DDR: model AI7688H has 128MB DDR and model AI7688H2 has 256MB DDR.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment	WiFi Module
Type Designation	AI7688H, AI7688H2
Trade Mark	RAK
FCC ID	2AF6B-AI7688H2
IC	25908-AI7688H2
HVIN	AI7688H, AI7688H2
Operating Voltage	3.3VDC (Supplied by socket of PCB borad)

Technical Specification of Wi-Fi 802.11 b/g/n	
Operating Frequency	2412 - 2462 MHz for 802.11b/g/n(HT20) 2422 - 2452 MHz for 802.11n(HT40)
Type of Modulation	DSSS(DBPSK/DQPSK/CCK) OFDM(BPSK/QPSK/16QAM/64QAM)
Data Rate	1/2/5.5/11 Mbps for 802.11b 6/9/12/18/24/36/48/54 Mbps for 802.11g MCS0 ~ MCS7 for 802.11n
Channel Number	11 channels for 802.11b/g/n(HT20) 7 channels for 802.11n(HT40)
Channel Separation	5 MHz
Number of Antenna:	1
Antenna Gain:	3.0dBi

Table 3: RF Channel and Frequency of Wi-Fi 802.11 b/g/n

RF Channel	802.11 b/g/n(HT20)	802.11 n(HT40)
	Frequency (MHz)	Frequency (MHz)
01	**2412**	/
02	2417	/
03	2422	**2422**
04	2427	2427
05	2432	2432
06	**2437**	**2437**
07	2442	2442
08	2447	2447
09	2452	**2452**
10	2457	/
11	**2462**	/

3.3 Independent Operation Modes

The basic operation modes are:

A. On
   1. Wi-Fi transmitting mode
      1) Low Channel
      2) Middle Channel
      3) High Channel

B. On, Wireless connecting mode (Wi-Fi)

C. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form
- Block Diagram
- FCC/IC Label and Location Info
- Operation Description
- Photo Document
- Schematics
- User Manual

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.10: 2013.
According to clause 3.1, all test were applied on model AI7688H2.

Table 4: List of Frequencies under Test, 802.11b/g/n

802.11b/g/n-HT20			
Test Channel	Channel Number	Frequency (MHz)	Remark
Low	1	2412	802.11b: 1Mbps 802.11g: 6Mbps 802.11n-HT20: MCS0
Middle	6	2437	
High	11	2462	
802.11n-HT40			
Test Channel	Channel number	Frequency (MHz)	Remark
Low	3	2422	802.11n-HT40: MCS0
Middle	6	2437	
High	9	2452	

Note: All test modes have been pre-scanning test and only the worst case of test mode.

4.3 Special Accessories and Auxiliary Equipment

Table 5: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N
Notebook	Lenovo	ThinkPad T480	N/A

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

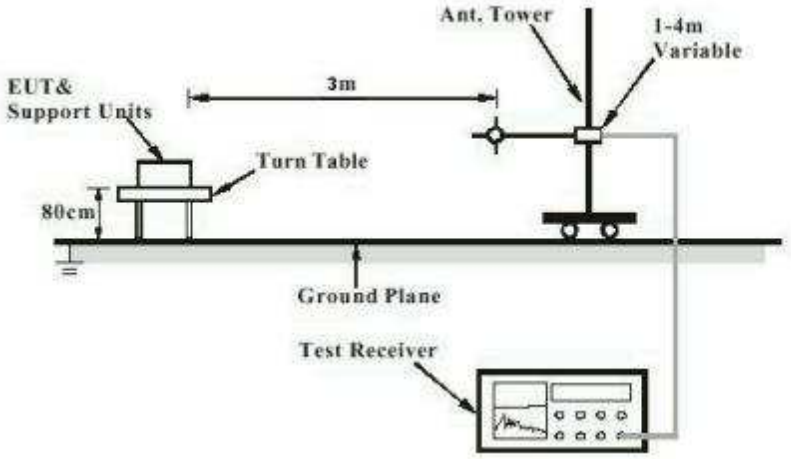


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

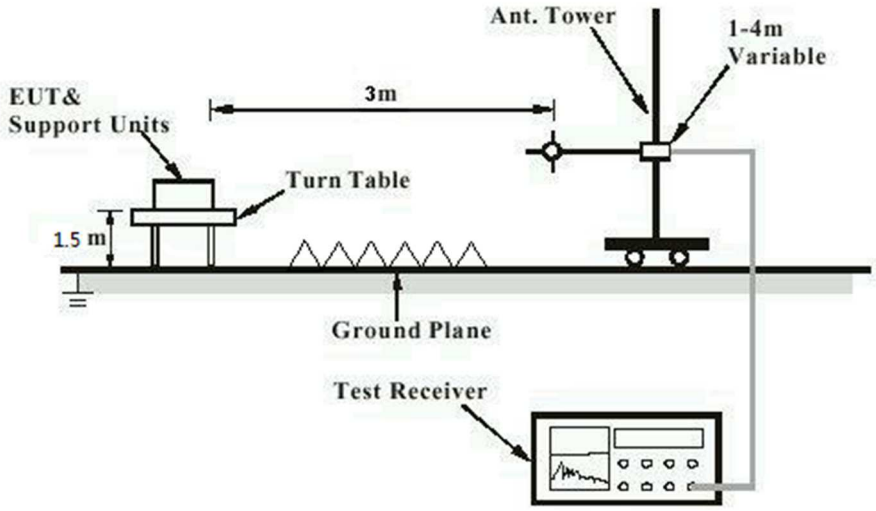


Diagram of Measurement Configuration for Mains Conduction Measurement

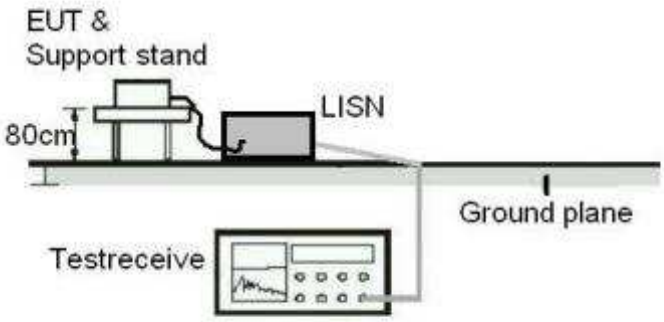
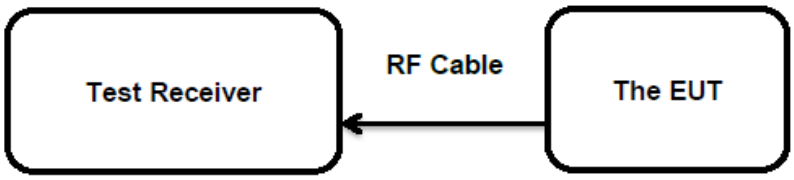


Diagram of Measurement Configuration for Conducted Transmitter Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(b)(4) and Part 15.203
Limit	:	the use of antennas with directional gains that do not exceed 6 dBi

According to the manufacturer declared, the EUT has one external antenna, the maximum directional gain of antenna is 3 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

5.1.2 Maximum Conducted Peak Output Power

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(b)(3) RSS-247 Clause 5.4(2)&(4)
Basic standard	:	ANSI C63.10: 2013
Limits	:	< 1 Watt (Maximum Conducted Peak Power) e.i.r.p. <4W
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-04-22
Input voltage	:	DC 3.3V
Operation mode	:	A.1
Test channel	:	Low / Middle / High
Ambient temperature	:	24.8 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

For details refer to following test result.

Table 6: Test Result of Maximum Conducted Peak Output Power

Test mode	Test channel (MHz)	Maximum Conducted Peak power (dBm)
802.11b	2412	15.04
	2437	18.77
	2462	14.05
802.11g	2412	18.48
	2437	21.30
	2462	18.25
802.11n-HT20	2412	16.38
	2437	21.34
	2462	17.08
802.11n-HT40	2422	14.40
	2437	22.42
	2452	14.48

Note: The cable loss is taken into account in results and the e.i.r.p. is 25.42 dBm and them less than 4W (36 dBm).

5.1.3 Conducted Power Spectral Density

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(e) RSS-247 Clause 5.2(2)
Basic standard	:	ANSI C63.10: 2013
Limits	:	8 dBm / 3kHz
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-04-22
Input voltage	:	DC 3.3V
Operation mode	:	A.1
Test channel	:	Low / Middle / High
Ambient temperature	:	24.8 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

For details refer to following test result.

Table 7: Test Result of Power Spectral Density

Test mode	Test channel (MHz)	Measured Peak Power Spectral Density (dBm/3KHz)
802.11b	2412	-4.61
	2437	-0.89
	2462	-5.65
802.11g	2412	-5.90
	2437	-4.18
	2462	-6.13
802.11n-HT20	2412	-9.05
	2437	-4.23
	2462	-7.54
802.11n-HT40	2422	-13.08
	2437	-5.20
	2452	-14.14

Note: The cable loss is taken into account in results.

For the measurement records, refer to the appendix B.

5.1.4 99%dB Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	RSS-Gen clause 6.7
Basic standard	:	ANSI C63.10: 2013
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-04-22
Input voltage	:	DC 3.3V
Operation mode	:	A.1
Test channel	:	Low / Middle / High
Ambient temperature	:	24.8 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

Table 8: Test Result of 99% Bandwidth

Test Mode	Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)
802.11b	2412	15.308	/
	2437	15.554	
	2462	16.598	
802.11g	2412	19.027	
	2437	17.611	
	2462	17.905	
802.11n (HT20)	2412	19.052	
	2437	17.834	
	2462	17.946	
802.11n (HT40)	2422	36.314	
	2437	36.248	
	2452	36.386	

For the measurement records, refer to the appendix B.

5.1.5 6dB Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(a)(2) RSS-247 Clause 5.2(a)
Basic standard	:	ANSI C63.10: 2013
Limits	:	> 500 KHz
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-04-22
Input voltage	:	DC 3.3V
Operation mode	:	A.1
Test channel	:	Low / Middle / High
Ambient temperature	:	24.8 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

For details refer to following test result.

Table 9: Test Result of 6dB Bandwidth

Test Mode	Frequency (MHz)	-6dB Bandwidth (MHz)	Limit (KHz)
802.11b	2412	9.060	> 500
	2437	9.510	
	2462	10.020	
802.11g	2412	16.320	
	2437	16.290	
	2462	16.290	
802.11n (HT20)	2412	16.290	
	2437	16.320	
	2462	16.350	
802.11n (HT40)	2422	34.500	
	2437	35.400	
	2452	36.180	

For the measurement records, refer to the appendix B.

5.1.6 Conducted Spurious Emissions Measured in 100 kHz Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(d) RSS-247 Clause 5.5
Basic standard	:	ANSI C63.10: 2013
Limits	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power); In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-04-22
Input voltage	:	DC 3.3V
Operation mode	:	A.1
Test channel	:	Low / Middle / High
Ambient temperature	:	24.8 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix B.

5.1.7 Radiated Spurious Emission

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(d) & FCC Part 15.205 RSS-247 Clause 3.3 & 5.5
Basic standard	:	ANSI C63.10: 2013
Limits	:	Refer to 15.209(a) of FCC part 15.247(d) RSS-Gen Table 4 & Table 5
Kind of test site	:	3m Semi-anechoic Chamber

Test Setup

Date of testing	:	2022-04-22 to 2022-05-06
Input voltage	:	DC 3.3V
Operation mode	:	A.1
Test channel	:	Low / Middle / High
Ambient temperature	:	22℃
Relative humidity	:	52 %
Atmospheric pressure	:	101 kPa

Remark:
Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix C.

5.1.8 Conducted Emission on AC Mains

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.207(a) RSS-Gen Clause 8.8
Basic standard	:	ANSI C63.10: 2013
Frequency range	:	0.15 – 30MHz
Limits	:	FCC Part 15.207(a) RSS-Gen Table 4
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-05-11
Input voltage	:	AC 120V, 60Hz
Operation mode	:	B
Earthing	:	Not connected
Ambient temperature	:	23.4 ℃
Relative humidity	:	54 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix C.

6 Safety Human Exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

RESULT: **Pass**

Test Specification

Test standard : CFR47 FCC Part 2: Section 2.1091
CFR47 FCC Part 1: Section 1.1310
FCC KDB Publication 447498 v06, section 7
RSS-102 Issue 5 February 2021, section 2.5.2

➢ **FCC requirements**

FCC requirement: Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 20cm normally can be maintained between the user and the device.

MPE Calculation Method according to KDB 447498 v06

Power Density: $S_{(mW/cm^2)}= PG/4\pi R^2$ or $EIRP/4\pi R^2$

Where:

S = power density (mW/cm^2)

P = power input to the antenna (mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (cm)

From the peak RF output power, the minimum mobile separation distance, d=20 cm, as well as the antenna gain, the RF power density can be calculated as below:

$S_{(mW/cm^2)}= PG/4\pi R^2$

a) EUT RF Exposure Evaluation standalone operations

Test Mode	Maximum conducted Power		Antenna Gain (dBi)	Measured e.i.r.p		$S_{(mW/cm^2)}= PG/4\pi R^2$	Limit (mW/cm^2)
	(dBm)	(mW)		(dBm)	(mW)		
2.4GHz Wi-Fi SISO	22.42	174.58	3.0	25.42	348.34	0.069	1.0

➢ **IC requirements:** The EUT shall comply with the requirement of RSS-102 section 2.5.2.

Exemption from Routine Evaluation Limits – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1.31 x 10^{-2} $f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;

- RF exposure evaluation exempted power: 2.670 W

a) EUT RF Exposure Evaluation standalone operations:

Test Mode	Measured Peak Power		Antenna Gain (dBi)	Measured e.i.r.p (mW)	
	(dBm)	(mW)		(dBm)	(mW)
2.4GHz Wi-Fi SISO	22.42	174.58	3.0	25.42	348.34

The e.i.r.p. is less than the RF exposure evaluation exempted power. So RF exposure evaluation is not required.

"RF Radiation Exposure Statement Caution: This Transmitter must be installed to provide a separation distance of at least 20 cm from all persons."

7 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix A.

8 List of Tables

Table 1: List of Test and Measurement Equipment 5
Table 2: Technical Specification of EUT 8
Table 3: RF Channel and Frequency of Wi-Fi 802.11 b/g/n 9
Table 4: List of Frequencies under Test, 802.11b/g/n 10
Table 5: List of Accessories and Auxiliary Equipment 10
Table 6: Test Result of Maximum Conducted Peak Output Power 14
Table 7: Test Result of Power Spectral Density 15
Table 8: Test Result of 99% Bandwidth 16
Table 9: Test Result of 6dB Bandwidth 17

Appendix B: Test Results of Conducted Testing

APPENDIX B: TEST RESULTS OF CONDUCTED TESTING 1
APPENDIX B.1: CONDUCTED POWER SPECTRAL DENSITY 2
APPENDIX B.2: 99% BANDWIDTH 6
APPENDIX B.3: 6DB BANDWIDTH 10
APPENDIX B.4: CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHZ BANDWIDTH 14
Conducted Spurious Emission *14*
Band edge *27*

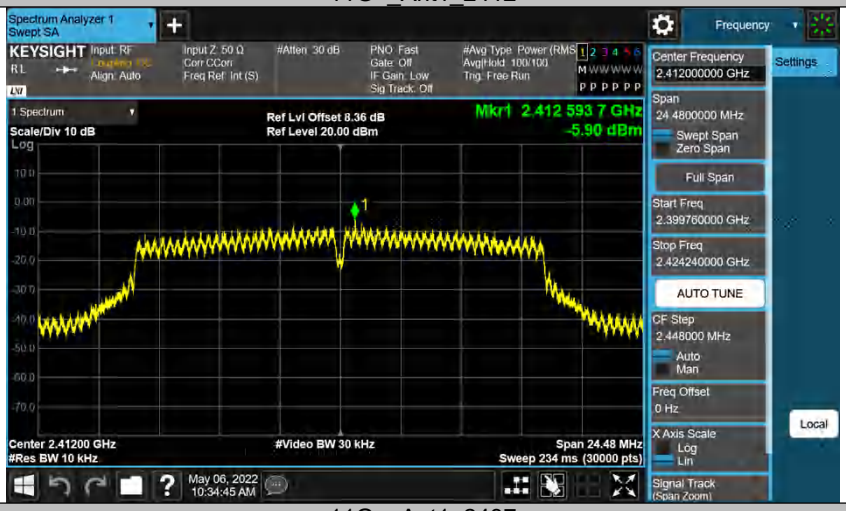
Appendix B.1: Conducted Power Spectral Density

11B _Ant1_2412

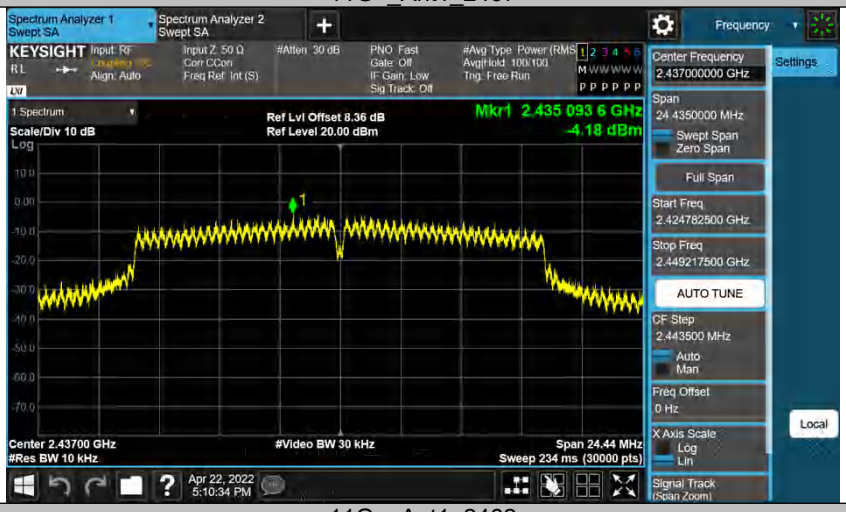
11B _Ant1_2437

11B _Ant1_2462

11G _Ant1_2412

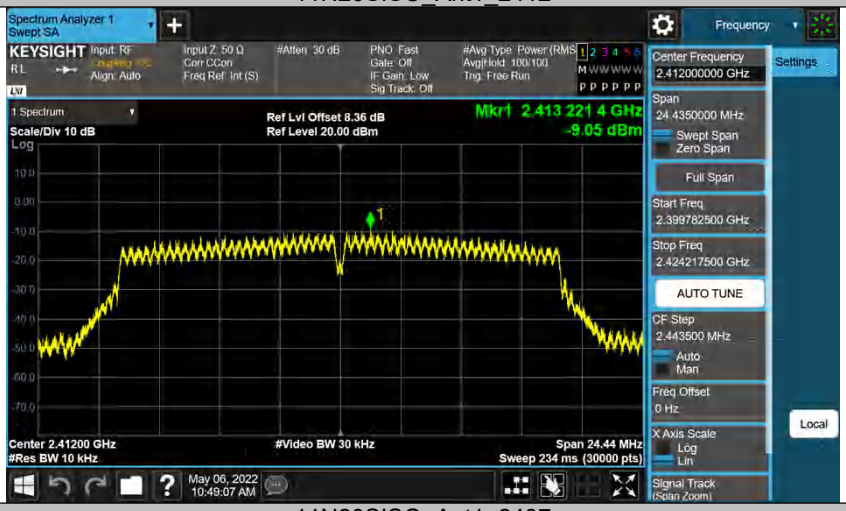


11G _Ant1_2437

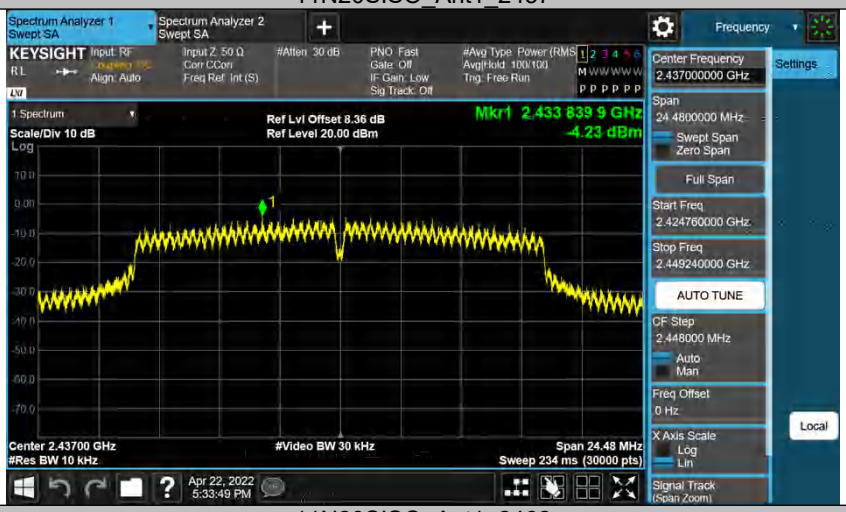


11G _Ant1_2462

11N20SISO_Ant1_2412

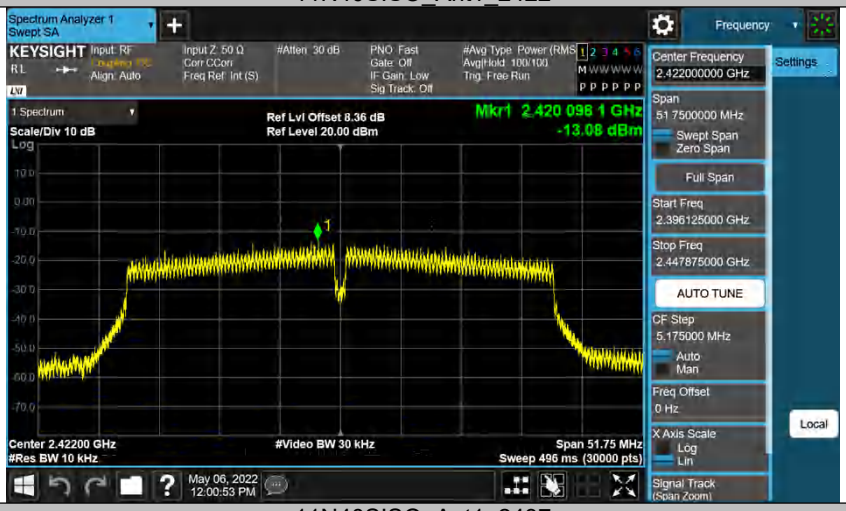


11N20SISO_Ant1_2437

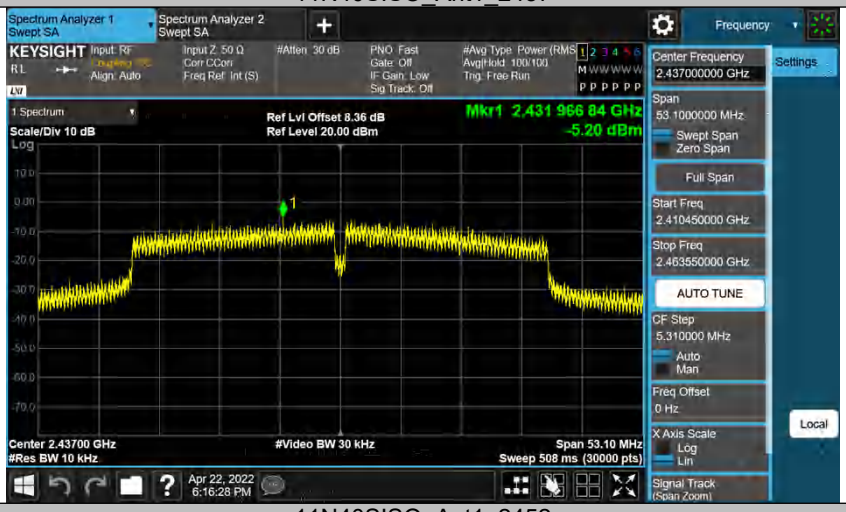


11N20SISO_Ant1_2462

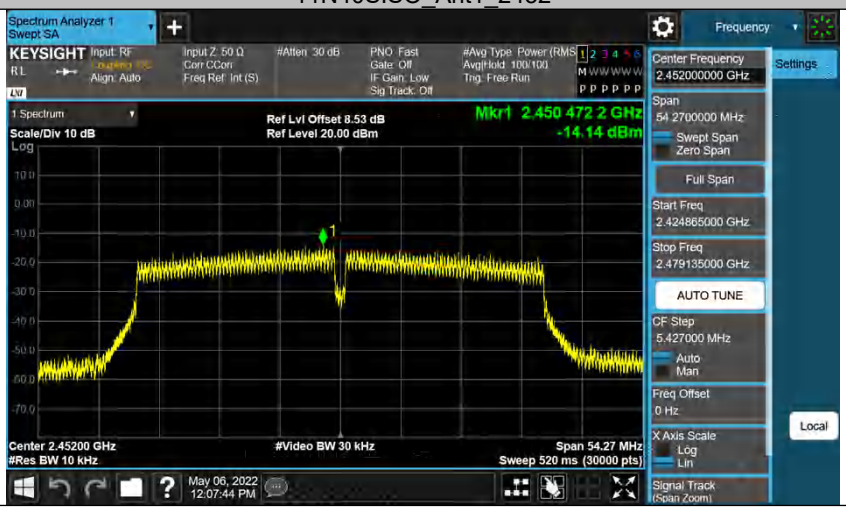
11N40SISO_Ant1_2422



11N40SISO_Ant1_2437

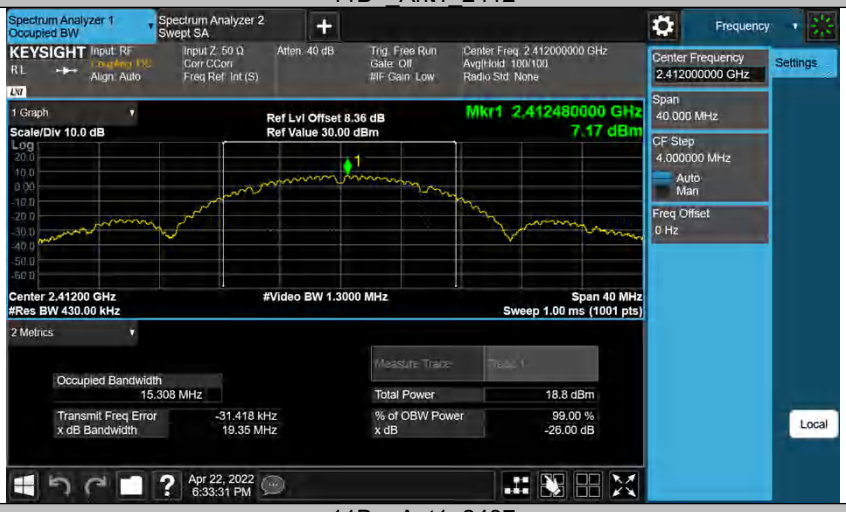


11N40SISO_Ant1_2452



Appendix B.2: 99% Bandwidth

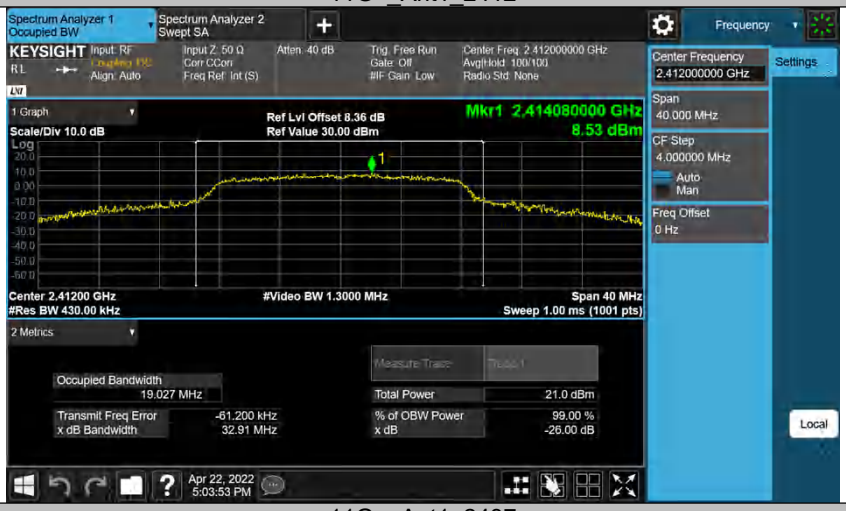
11B _Ant1_2412



11B _Ant1_2437

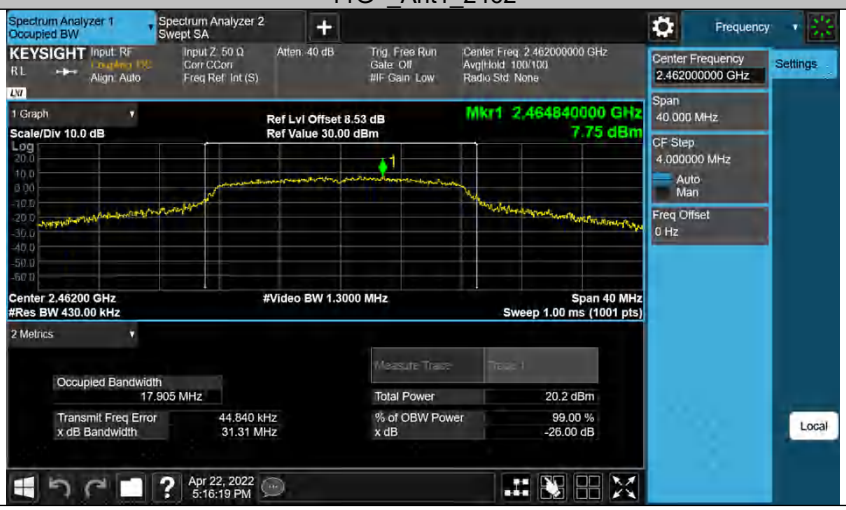
11B _Ant1_2462

11G _Ant1_2412



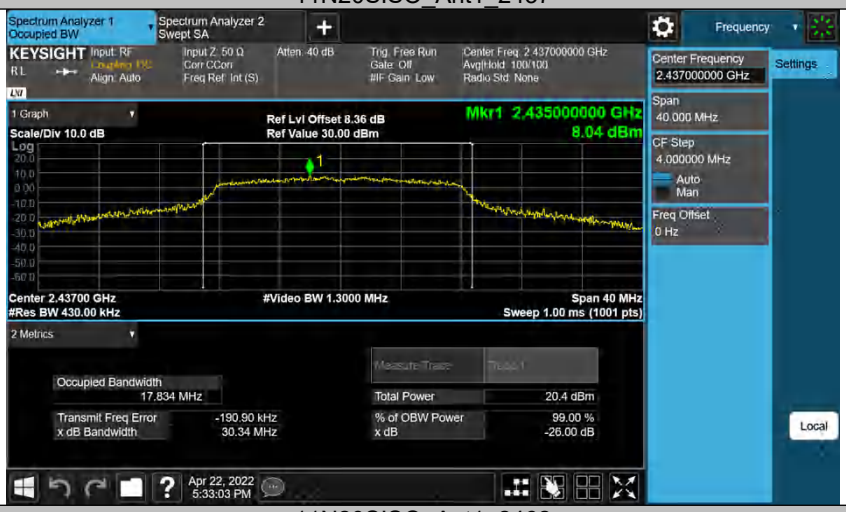
11G _Ant1_2437

11G _Ant1_2462

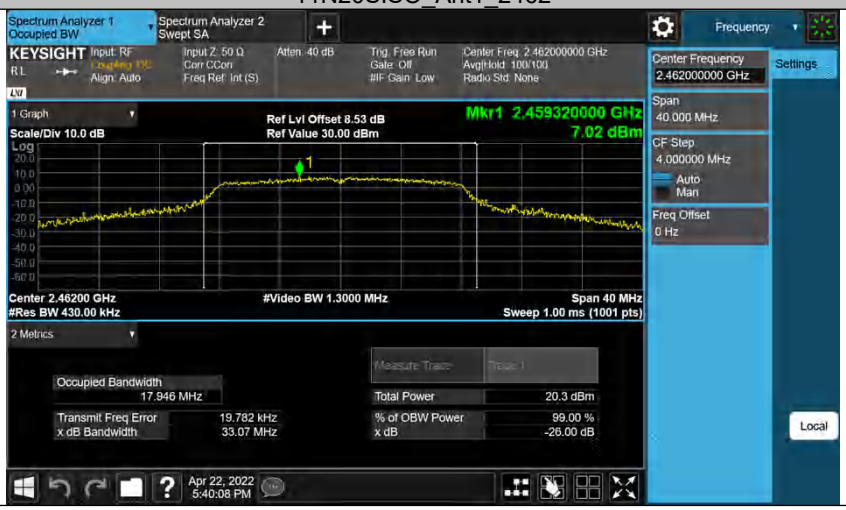


11N20SISO_Ant1_2412

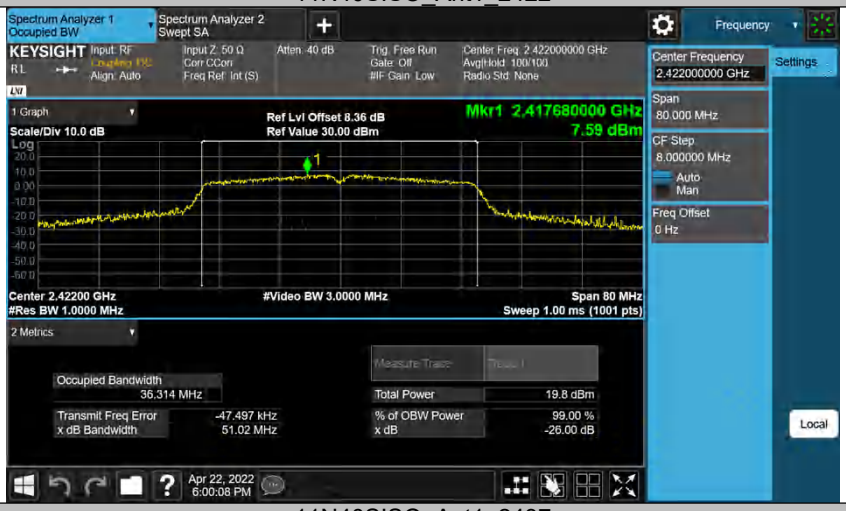
11N20SISO_Ant1_2437



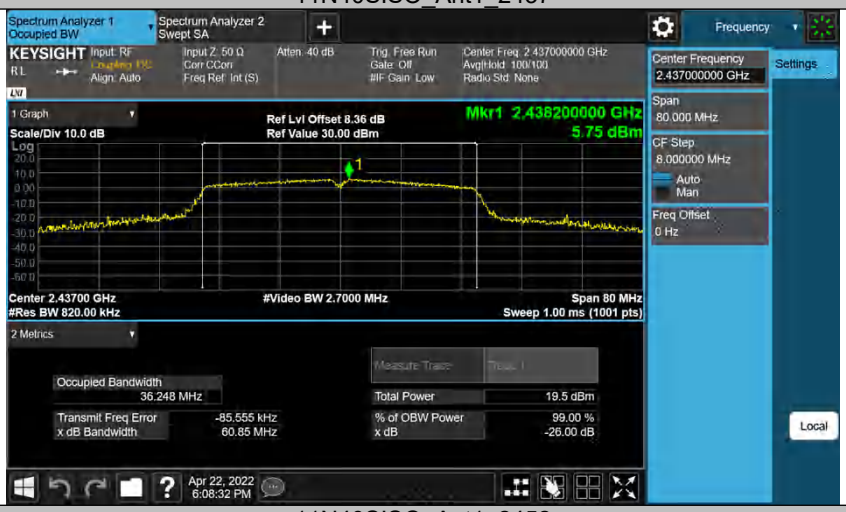
11N20SISO_Ant1_2462



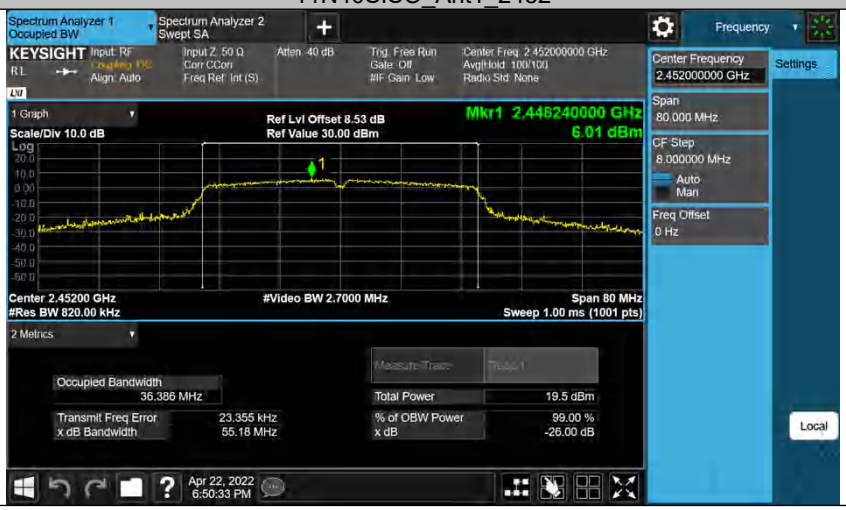
11N40SISO_Ant1_2422



11N40SISO_Ant1_2437



11N40SISO_Ant1_2452



Appendix B.3: 6dB Bandwidth

11B _Ant1_2412

11B _Ant1_2437

11B _Ant1_2462

11G _Ant1_2412

11G _Ant1_2437

11G _Ant1_2462

11N20SISO_Ant1_2412

11N20SISO_Ant1_2437

11N20SISO_Ant1_2462

11N40SISO_Ant1_2422

11N40SISO_Ant1_2437

11N40SISO_Ant1_2452

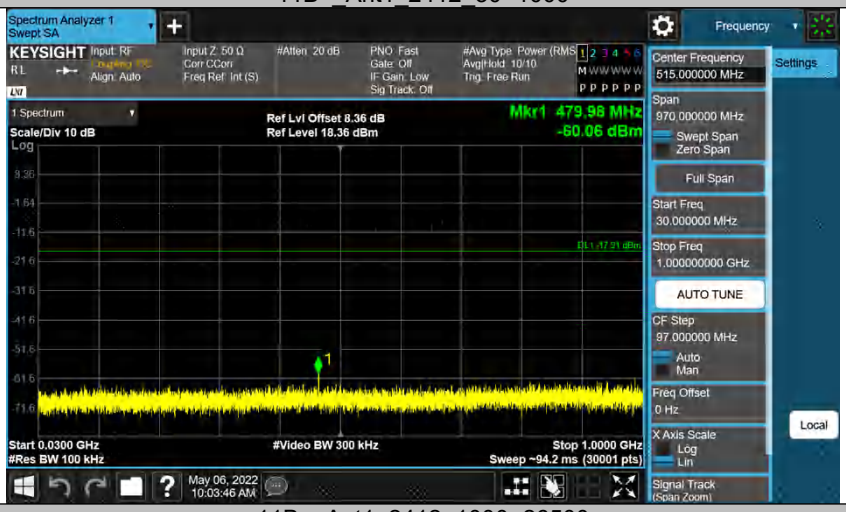
Appendix B.4: Conducted Spurious Emissions Measured in 100 kHz Bandwidth

Conducted Spurious Emission

TestMode	Antenna	Channel	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	Reference	2.09	2.09	---	PASS
			30~1000	2.09	-60.06	≤-17.91	PASS
			1000~26500	2.09	-50.27	≤-17.91	PASS
		2437	Reference	6.86	6.86	---	PASS
			30~1000	6.86	-54.44	≤-13.14	PASS
			1000~26500	6.86	-48.16	≤-13.14	PASS
		2462	Reference	2.51	2.51	---	PASS
			30~1000	2.51	-56.25	≤-17.49	PASS
			1000~26500	2.51	-52.62	≤-17.49	PASS
11G	Ant1	2412	Reference	-2.35	-2.35	---	PASS
			30~1000	-2.35	-55.44	≤-22.35	PASS
			1000~26500	-2.35	-52.75	≤-22.35	PASS
		2437	Reference	0.88	0.88	---	PASS
			30~1000	0.88	-55.46	≤-19.12	PASS
			1000~26500	0.88	-53.46	≤-19.12	PASS
		2462	Reference	-2.68	-2.68	---	PASS
			30~1000	-2.68	-55.92	≤-22.68	PASS
			1000~26500	-2.68	-52.82	≤-22.68	PASS
11N20SISO	Ant1	2412	Reference	-4.50	-4.50	---	PASS
			30~1000	-4.50	-56.39	≤-24.5	PASS
			1000~26500	-4.50	-53.35	≤-24.5	PASS
		2437	Reference	0.78	0.78	---	PASS
			30~1000	0.78	-55.64	≤-19.22	PASS
			1000~26500	0.78	-53.03	≤-19.22	PASS
		2462	Reference	-3.66	-3.66	---	PASS
			30~1000	-3.66	-55.64	≤-23.66	PASS
			1000~26500	-3.66	-53.11	≤-23.66	PASS
11N40SISO	Ant1	2422	Reference	-8.17	-8.17	---	PASS
			30~1000	-8.17	-54.24	≤-28.17	PASS
			1000~26500	-8.17	-53.66	≤-28.17	PASS
		2437	Reference	-2.34	-2.34	---	PASS
			30~1000	-2.34	-47.31	≤-22.34	PASS
			1000~26500	-2.34	-53.21	≤-22.34	PASS
		2452	Reference	-9.64	-9.64	---	PASS
			30~1000	-9.64	-53.05	≤-29.64	PASS
			1000~26500	-9.64	-53.1	≤-29.64	PASS

11B _Ant1_2412_0~Reference

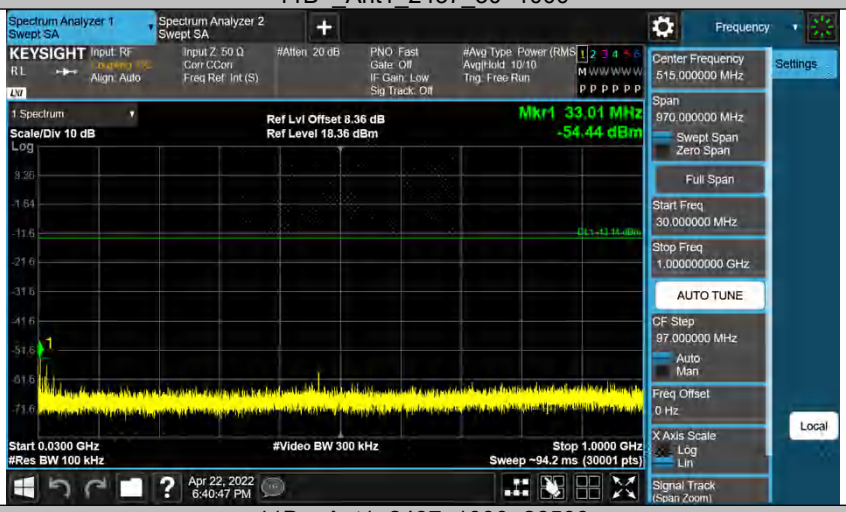
11B _Ant1_2412_30~1000



11B _Ant1_2412_1000~26500

11B _Ant1_2437_0~Reference

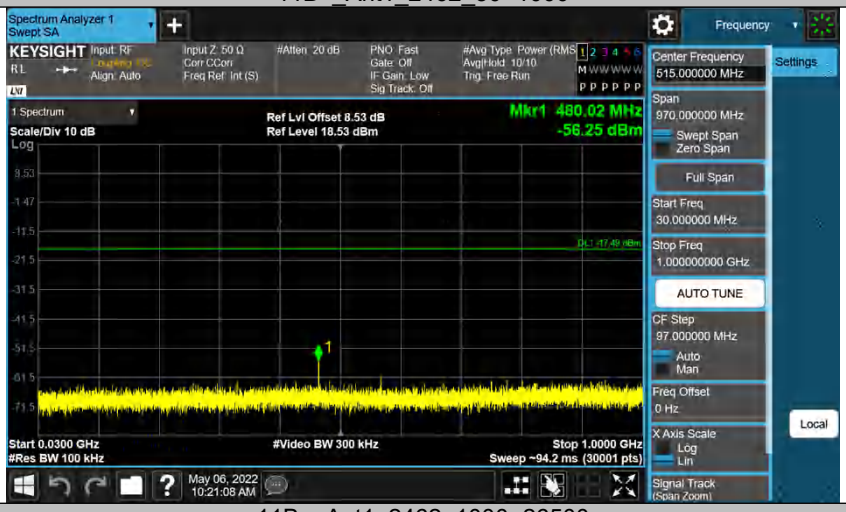
11B _Ant1_2437_30~1000



11B _Ant1_2437_1000~26500

11B _Ant1_2462_0~Reference

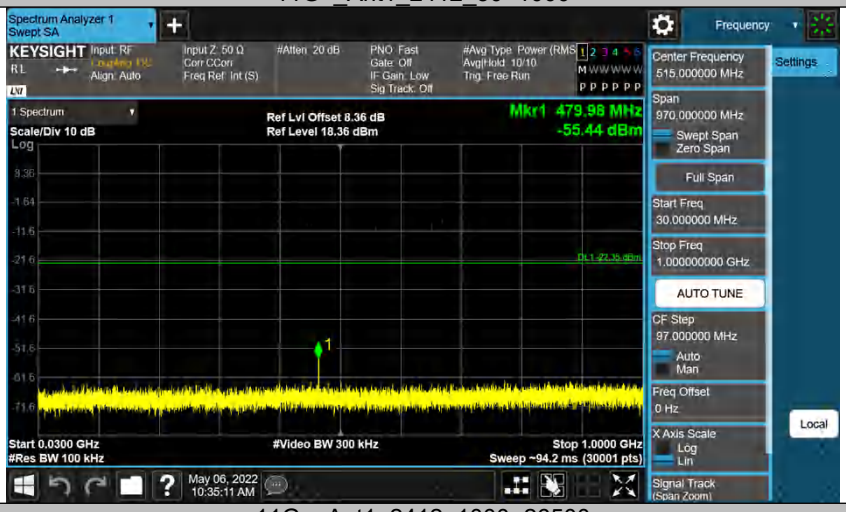
11B _Ant1_2462_30~1000



11B _Ant1_2462_1000~26500

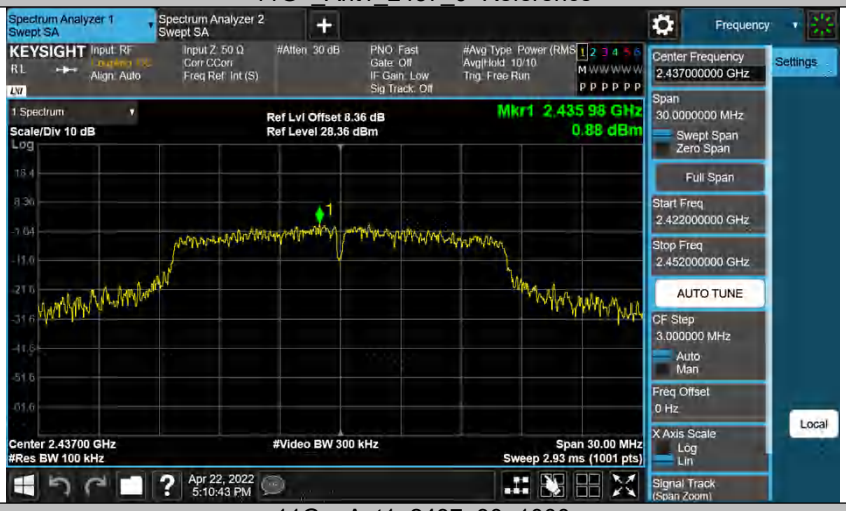
11G _Ant1_2412_0~Reference

11G _Ant1_2412_30~1000

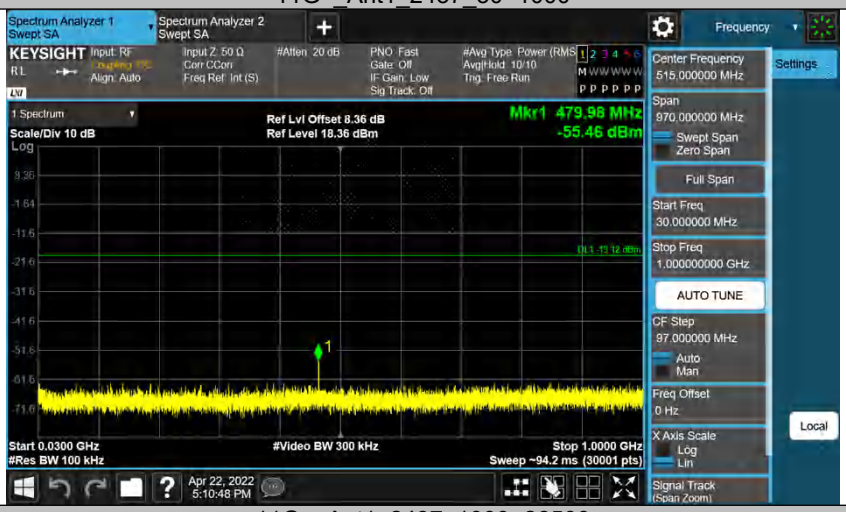


11G _Ant1_2412_1000~26500

11G _Ant1_2437_0~Reference

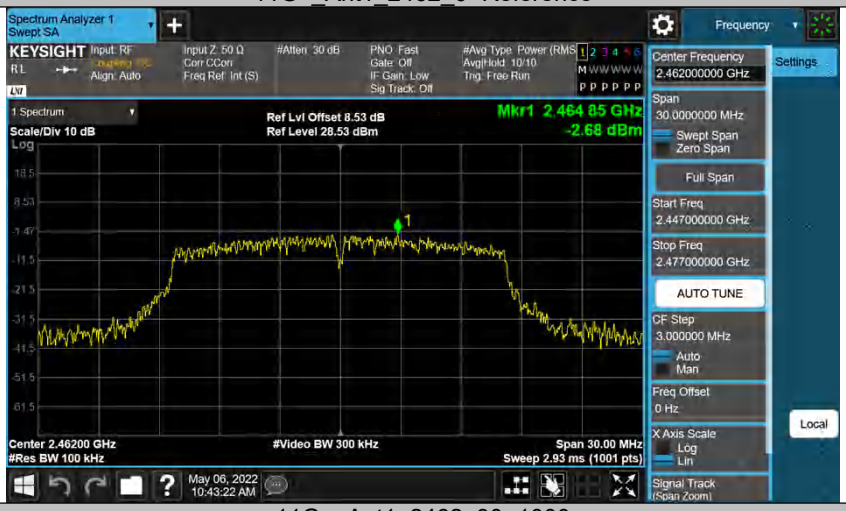


11G _Ant1_2437_30~1000

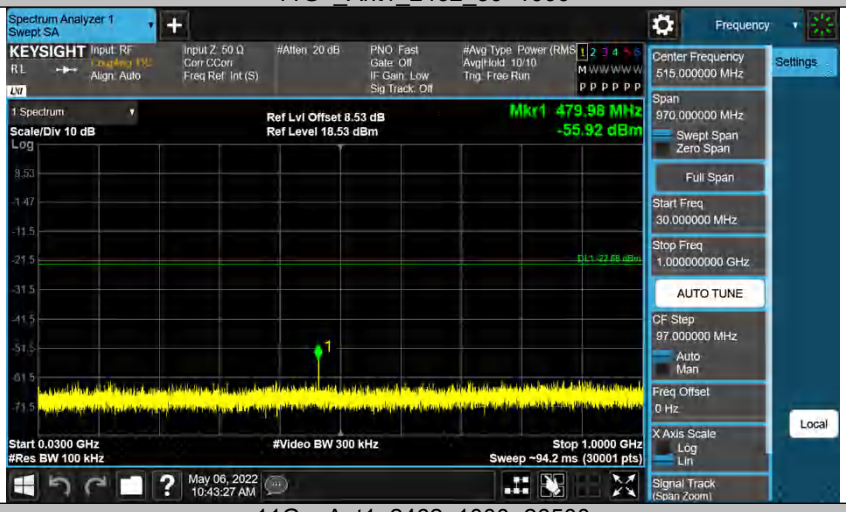


11G _Ant1_2437_1000~26500

11G _Ant1_2462_0~Reference

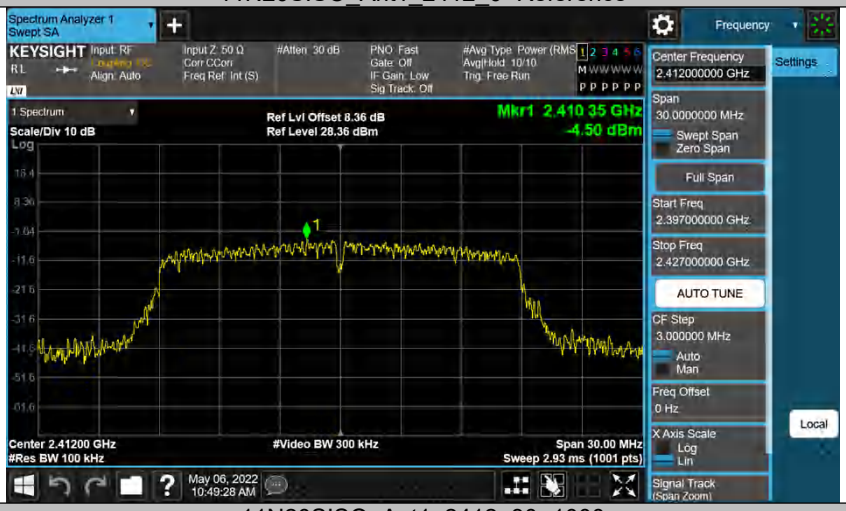


11G _Ant1_2462_30~1000

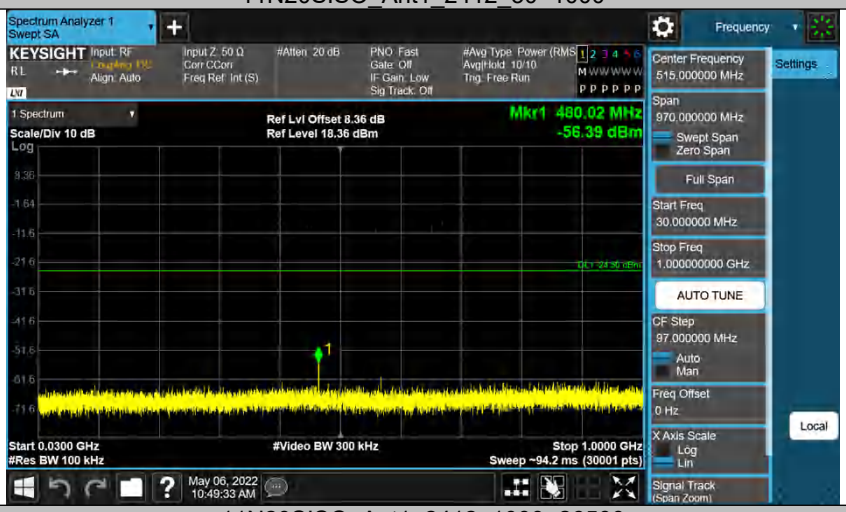


11G _Ant1_2462_1000~26500

11N20SISO_Ant1_2412_0~Reference

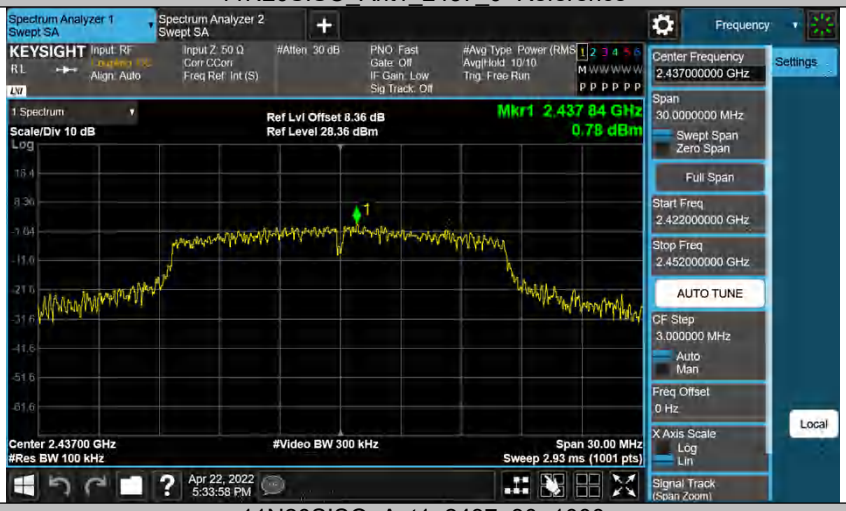


11N20SISO_Ant1_2412_30~1000

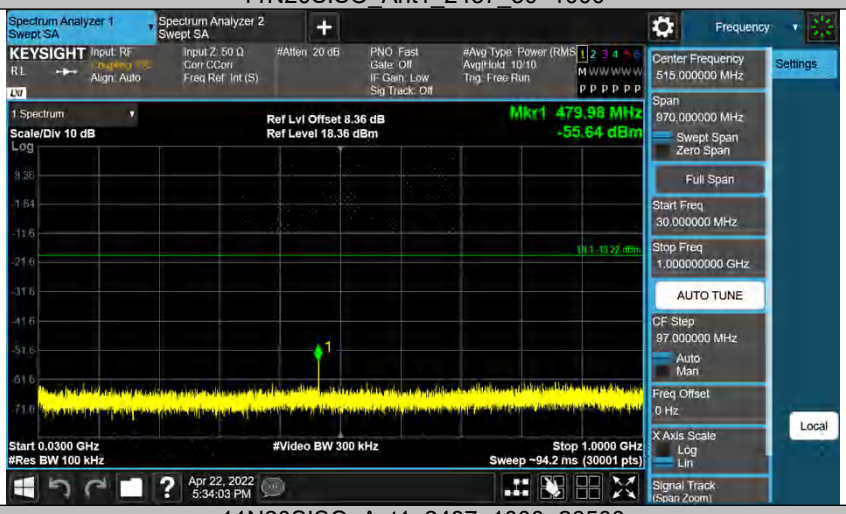


11N20SISO_Ant1_2412_1000~26500

11N20SISO_Ant1_2437_0~Reference

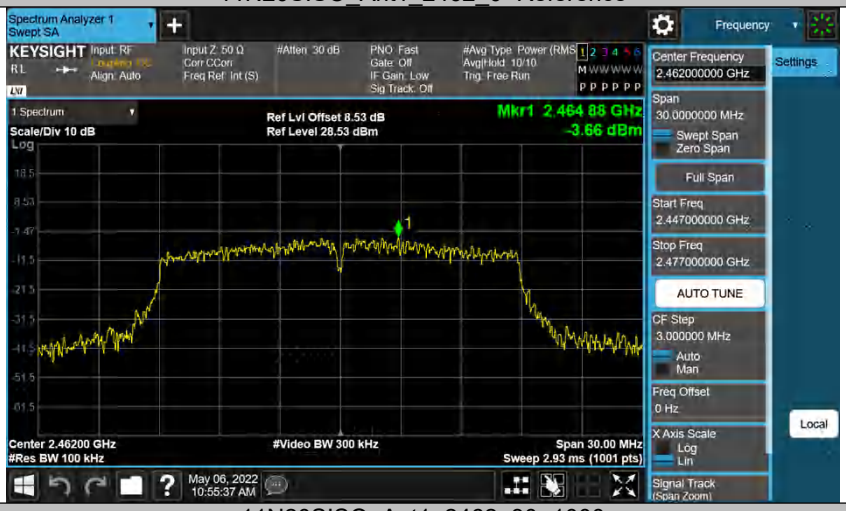


11N20SISO_Ant1_2437_30~1000

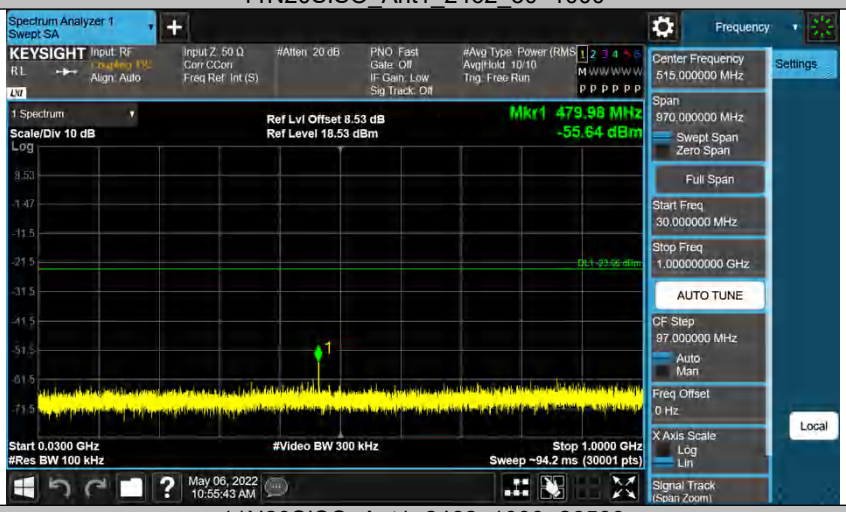


11N20SISO_Ant1_2437_1000~26500

11N20SISO_Ant1_2462_0~Reference

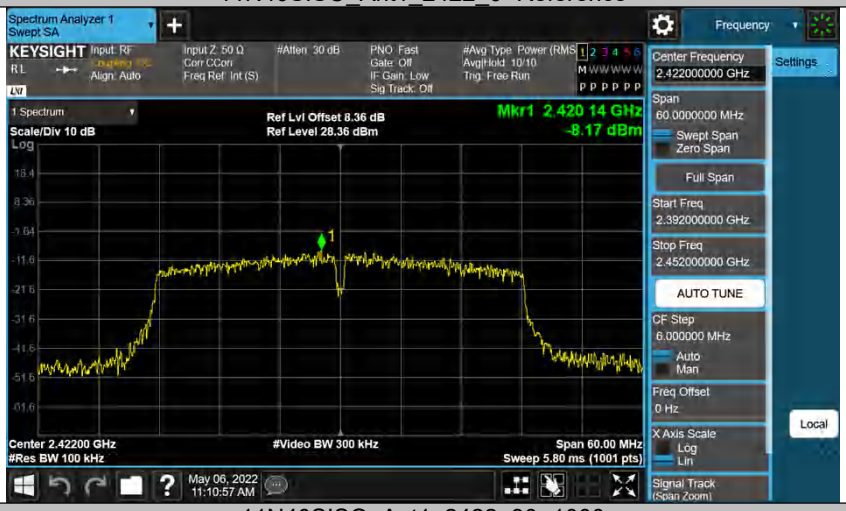


11N20SISO_Ant1_2462_30~1000

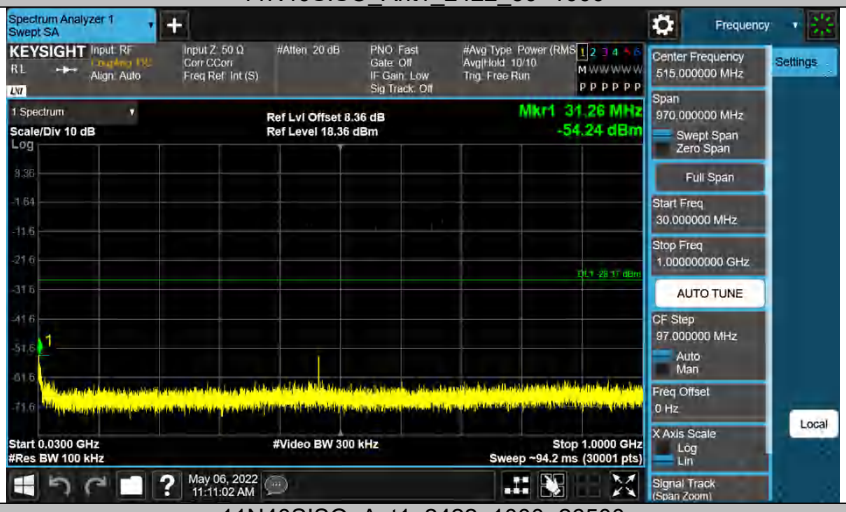


11N20SISO_Ant1_2462_1000~26500

11N40SISO_Ant1_2422_0~Reference

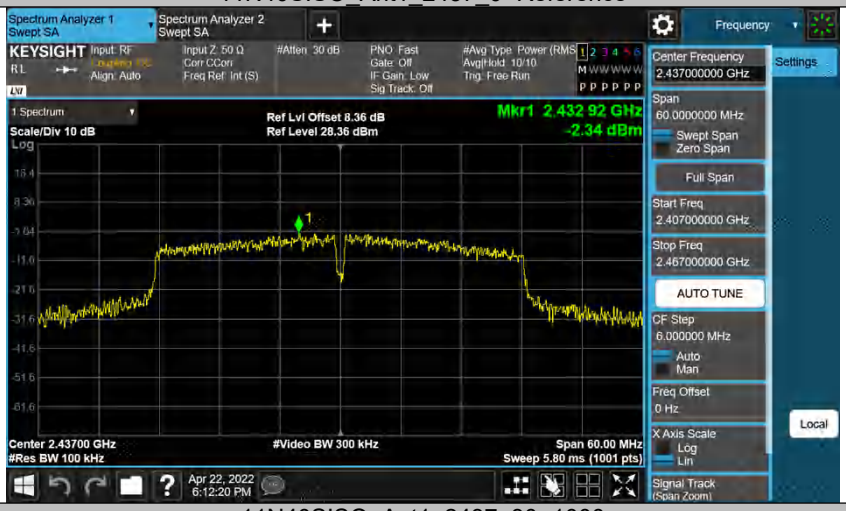


11N40SISO_Ant1_2422_30~1000

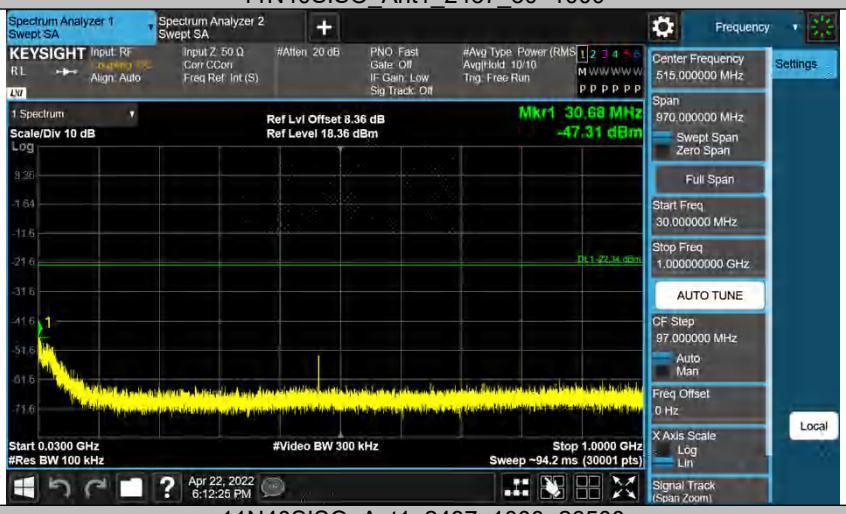


11N40SISO_Ant1_2422_1000~26500

11N40SISO_Ant1_2437_0~Reference



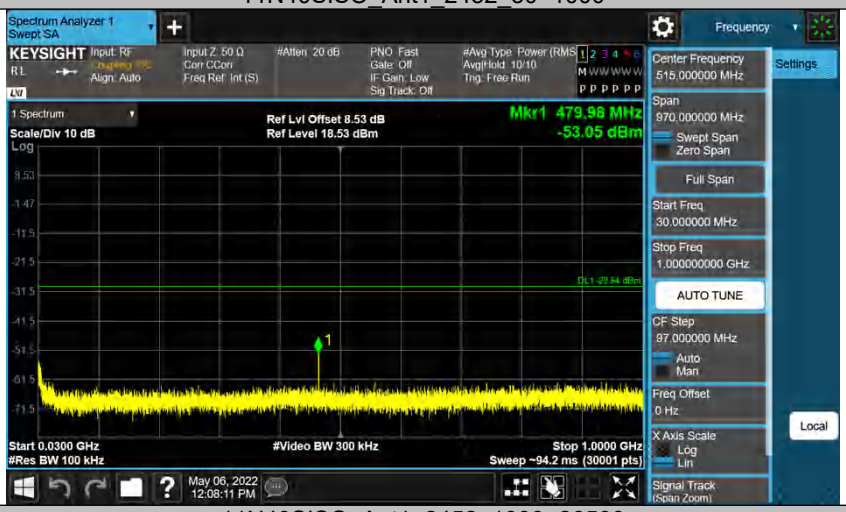
11N40SISO_Ant1_2437_30~1000



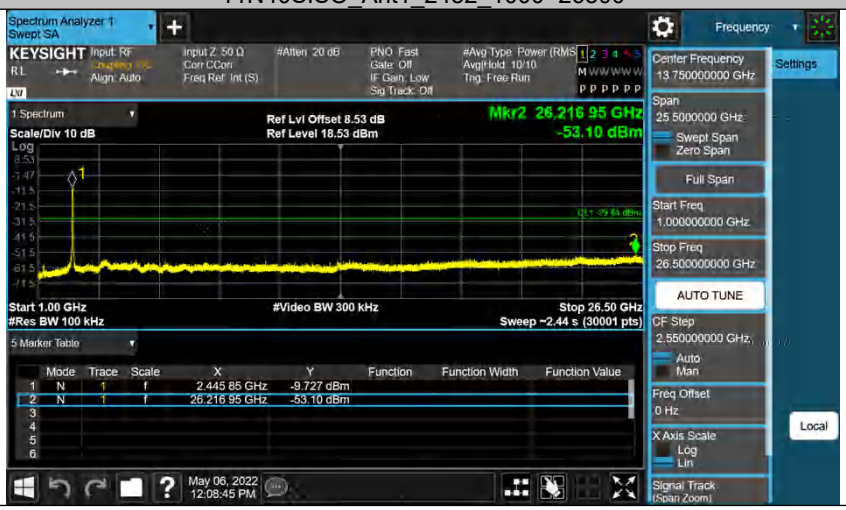
11N40SISO_Ant1_2437_1000~26500

11N40SISO_Ant1_2452_0~Reference

11N40SISO_Ant1_2452_30~1000



11N40SISO_Ant1_2452_1000~26500



Band edge

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	3.58	-41.93	≤-16.42	PASS
		High	2462	2.53	-47.06	≤-17.47	PASS
11G	Ant1	Low	2412	-1.88	-29.29	≤-21.88	PASS
		High	2462	-2.11	-41.34	≤-22.11	PASS
11N20SISO	Ant1	Low	2412	-4.03	-35.21	≤-24.03	PASS
		High	2462	-3.02	-43.6	≤-23.02	PASS
11N40SISO	Ant1	Low	2422	-8.31	-42.32	≤-28.31	PASS
		High	2452	-8.65	-43.02	≤-28.65	PASS

11B _Ant1_Low_2412

11B _Ant1_High_2462

11G _Ant1_Low_2412

11G _Ant1_High_2462

11N20SISO_Ant1_Low_2412

11N20SISO_Ant1_High_2462

11N40SISO_Ant1_Low_2422

11N40SISO_Ant1_High_2452

Appendix C: Test Results of Radiated Testing

APPENDIX C: TEST RESULTS OF RADIATED TESTING 1

APPENDIX C.1: TEST RESULTS OF RADIATED SPURIOUS EMISSIONS 2
Wi-Fi 802.11 b mode, 1 Mbps *2*
Wi-Fi 802.11 g mode, 6 Mbps *18*
Wi-Fi 802.11 n(HT20) mode, MCS0 ..... *22*
Wi-Fi 802.11 n(HT40) mode, MCS0 ..... *26*

APPENDIX C.2: TEST RESULTS OF RADIATED EMISSIONS IN RESTRICTED BANDS 30
Wi-Fi 802.11 b mode, 1 Mbps *30*
Wi-Fi 802.11 g mode, 6 Mbps *34*
Wi-Fi 802.11 n(HT20) mode, MCS0 ..... *38*
Wi-Fi 802.11 n(HT40) mode, MCS0 ..... *42*

APPENDIX C.3: TEST RESULTS OF CONDUCTED EMISSION ON AC MAINS 46

Note 1: Testing was carried out within frequency range 9 kHz to the tenth harmonics. The measurement results below 30MHz and above 18GHz were greater than 20dB below the limit, so only the radiated spurious emissions from 30MHz to 18GHz were reported.
Note 2: All test modes (802.11 b/g/n) have been pre-scanning test and only the worst case of test mode (802.11b) for Radiated Spurious Emissions were reported.
Note 3: All different configurations (128MB and 256MB flash) have been pre-scanning test and only the worst case of configurations (256MB) for Radiated Spurious Emissions were reported.

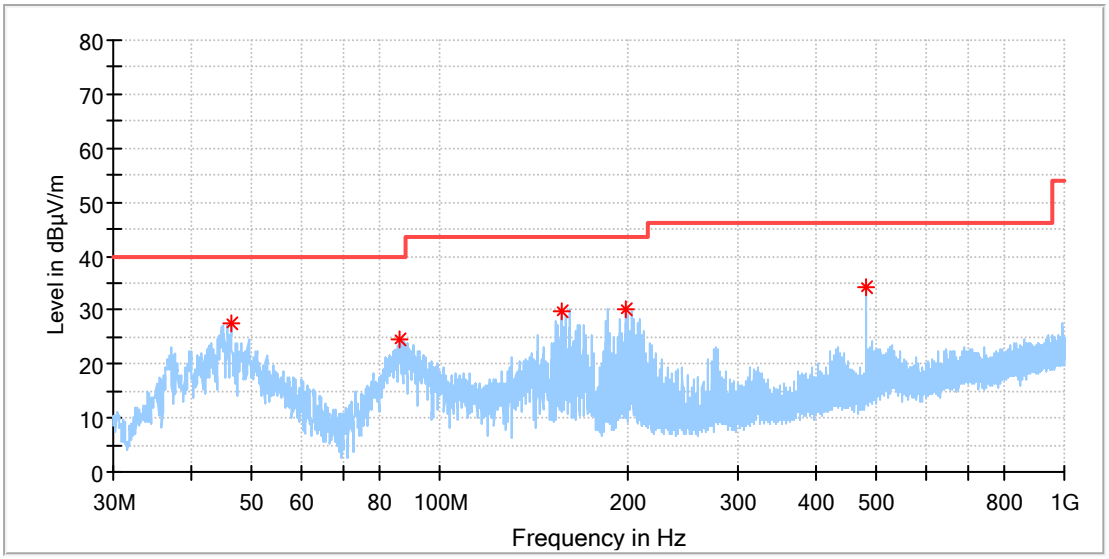
Appendix C.1: Test Results of Radiated Spurious Emissions

Wi-Fi 802.11 b mode, 1 Mbps

30MHz - 1GHz

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 1
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

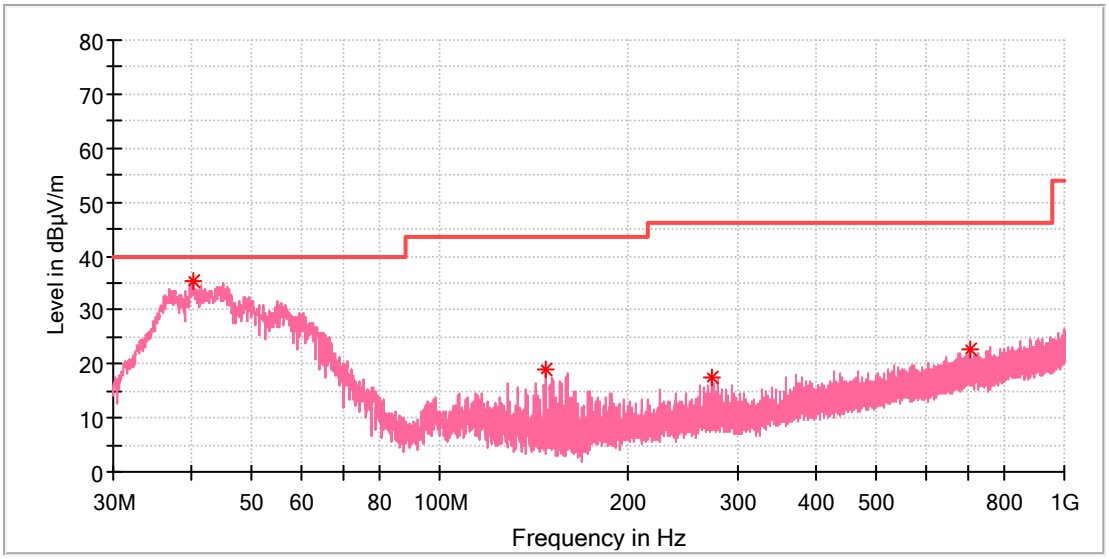


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
46.303462	27.59	40.00	12.41	100.0	H	270.0	-18.9
86.148077	24.38	40.00	15.62	100.0	H	204.0	-22.4
157.256539	29.64	43.50	13.86	100.0	H	33.0	-22.2
198.518846	29.96	43.50	13.54	100.0	H	90.0	-19.4
480.042692	34.20	46.00	11.80	100.0	H	355.0	-12.6

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 1
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

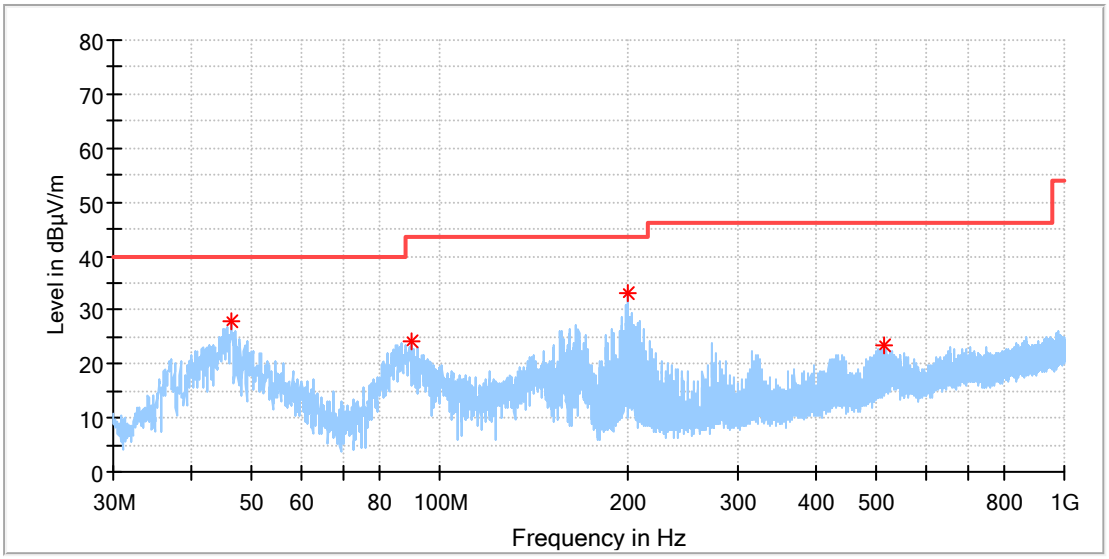


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
40.259615	35.32	40.00	4.68	100.0	V	51.0	-20.3
147.705769	18.98	43.50	24.52	100.0	V	288.0	-22.6
271.865769	17.67	46.00	28.33	100.0	V	342.0	-17.2
705.828846	22.67	46.00	23.33	100.0	V	127.0	-8.3

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 11
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

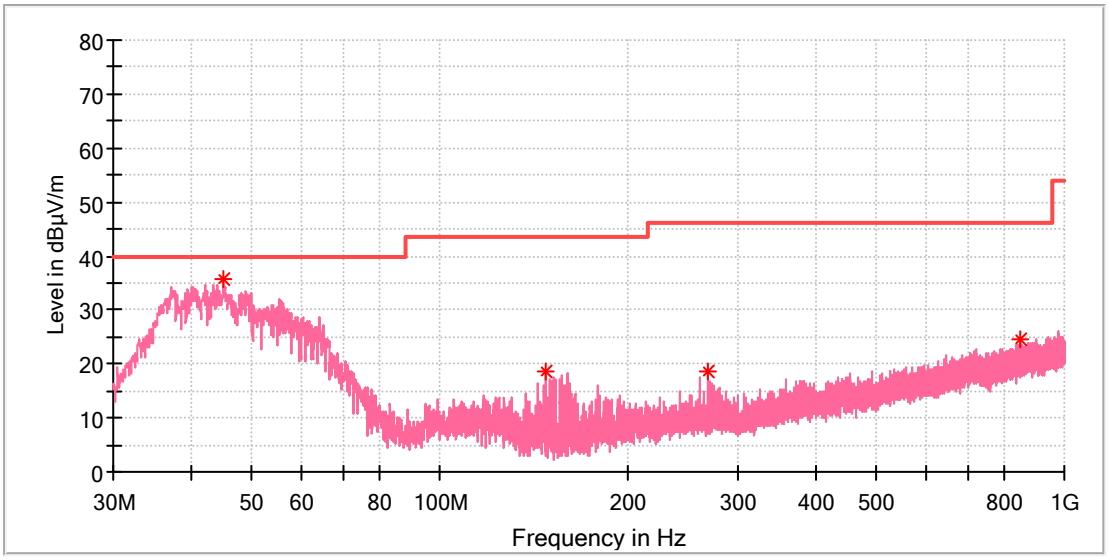


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
46.452692	27.84	40.00	12.16	100.0	H	243.0	-18.9
89.841539	24.21	43.50	19.29	100.0	H	210.0	-21.3
199.861923	33.04	43.50	10.46	100.0	H	279.0	-19.3
512.836154	23.30	46.00	22.70	100.0	H	351.0	-12.0

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 11
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



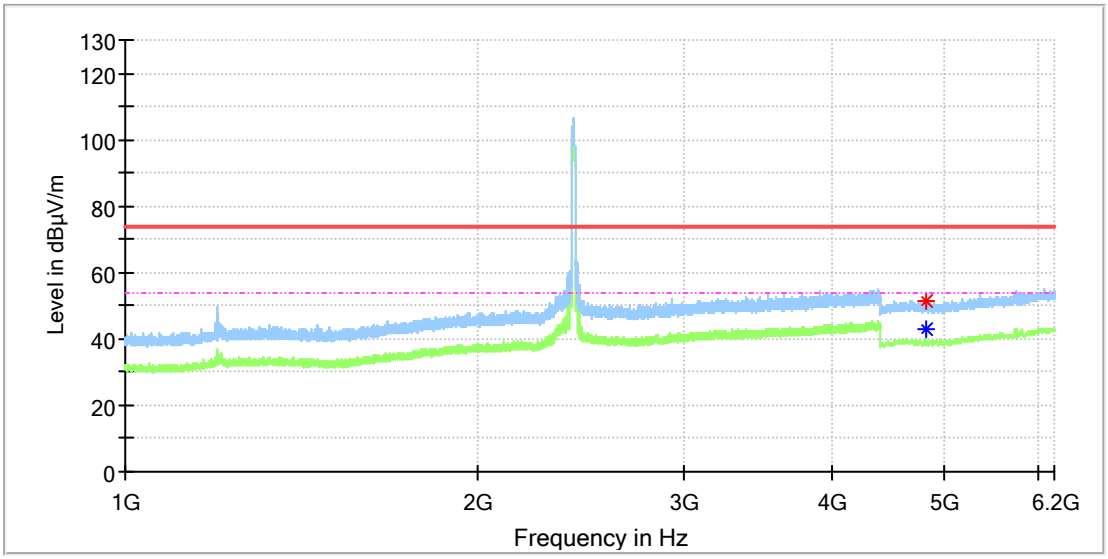
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
45.035000	35.89	40.00	4.11	100.0	V	99.0	-19.2
147.780385	18.64	43.50	24.86	100.0	V	320.0	-22.6
269.403462	18.59	46.00	27.41	100.0	V	320.0	-17.3
848.754615	24.45	46.00	21.55	100.0	V	246.0	-5.9

1GHz - 6.2GHz

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 1
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

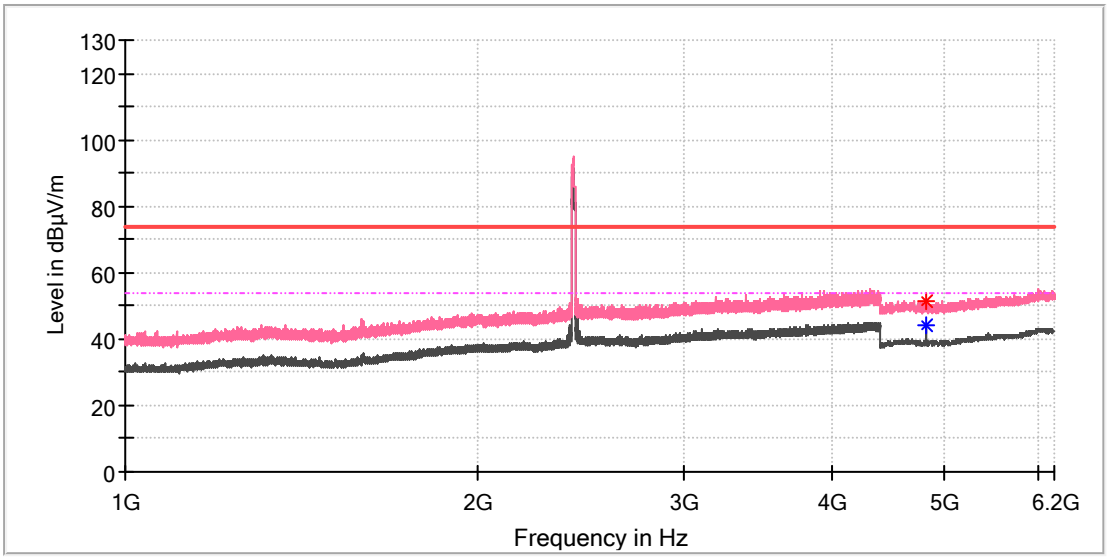


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4824.000000	51.56	---	74.00	22.44	100.0	H	282.0	11.8
4824.000000	---	43.18	54.00	10.82	100.0	H	282.0	11.8

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 1
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

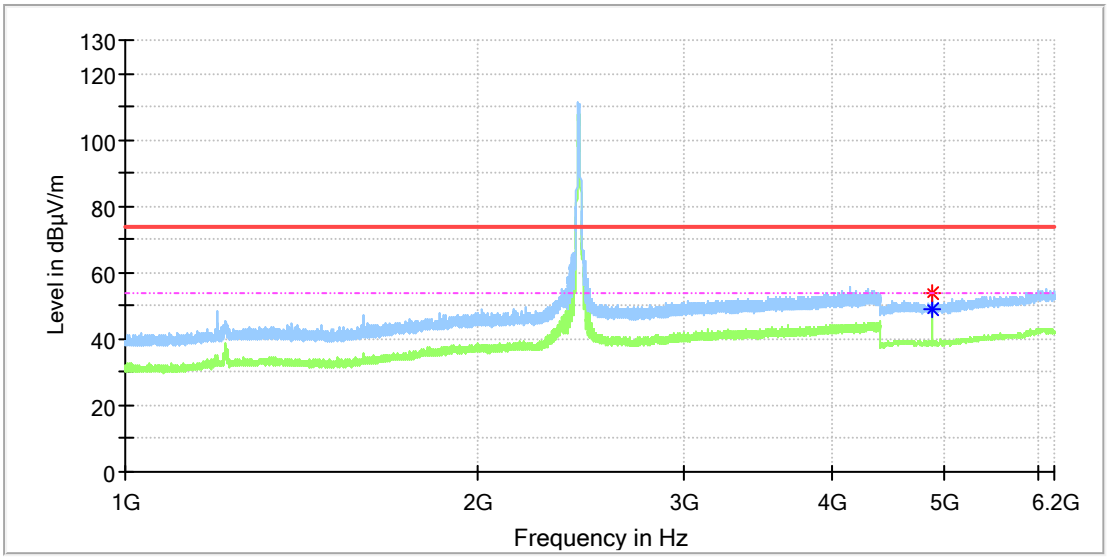


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4824.000000	51.21	---	74.00	22.79	100.0	V	7.0	11.8
4824.000000	---	44.34	54.00	9.66	100.0	V	7.0	11.8

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 6
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

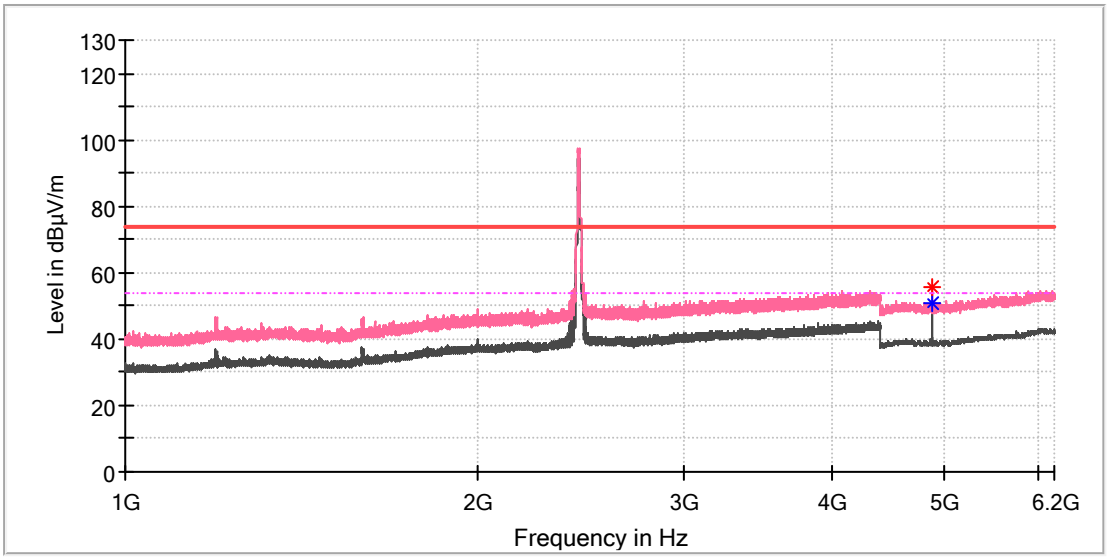


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4873.500000	53.87	---	74.00	20.13	100.0	H	266.0	11.8
4874.000000	---	49.09	54.00	4.91	100.0	H	266.0	11.8

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 6
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

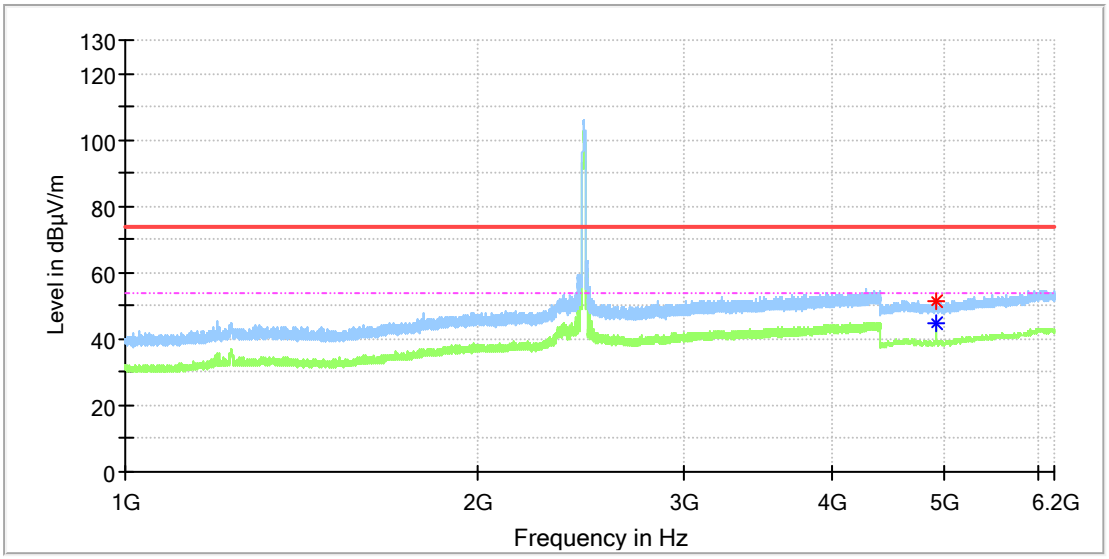


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4874.000000	55.64	---	74.00	18.36	100.0	V	2.0	11.8
4874.000000	---	50.83	54.00	3.17	100.0	V	2.0	11.8

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 11
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

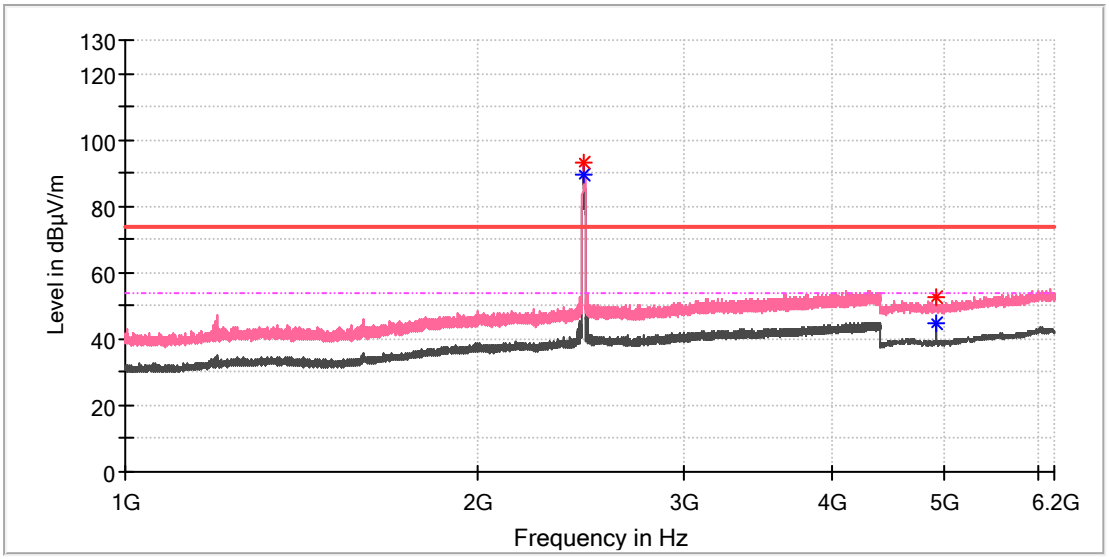


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4923.500000	51.68	---	74.00	22.32	100.0	H	282.0	11.8
4923.500000	---	44.52	54.00	9.48	100.0	H	282.0	11.8

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 11
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



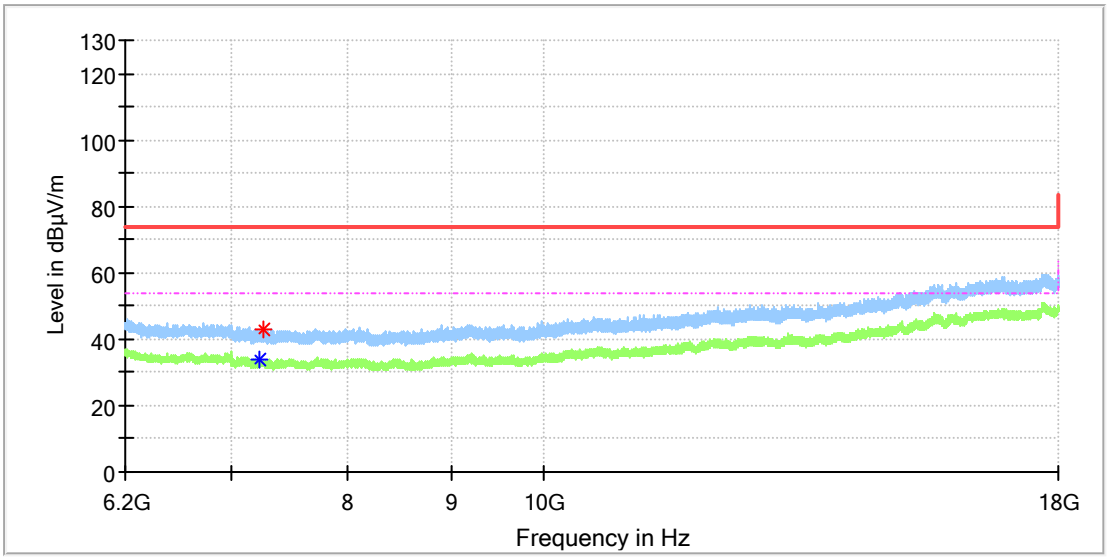
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4924.000000	52.76	---	74.00	21.24	100.0	V	294.0	11.8
4924.000000	---	44.63	54.00	9.37	100.0	V	294.0	11.8

6.2GHz - 18GHz

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 1
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

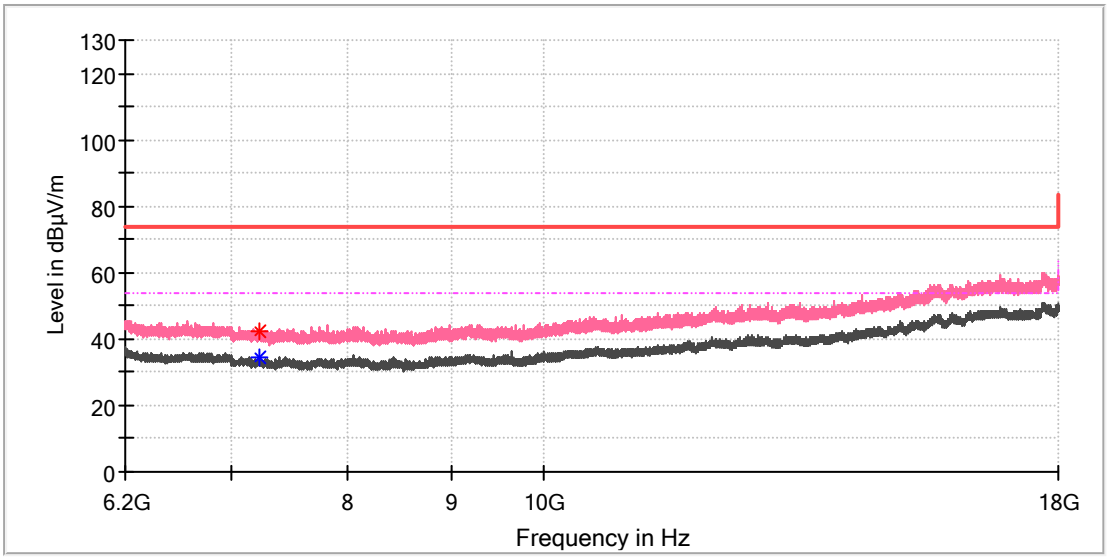


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7231.516667	---	33.82	54.00	20.18	100.0	H	261.0	8.6
7261.508333	42.64	---	74.00	31.36	100.0	H	4.0	8.5

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 1
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

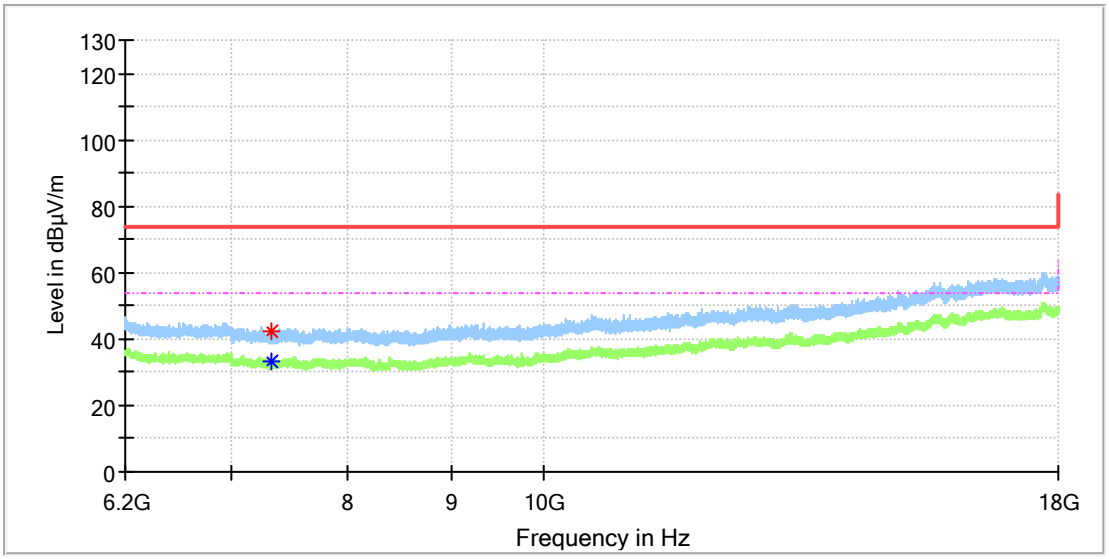


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7228.566667	42.34	---	74.00	31.66	100.0	V	260.0	8.6
7234.466667	---	34.68	54.00	19.32	100.0	V	320.0	8.6

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 6
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

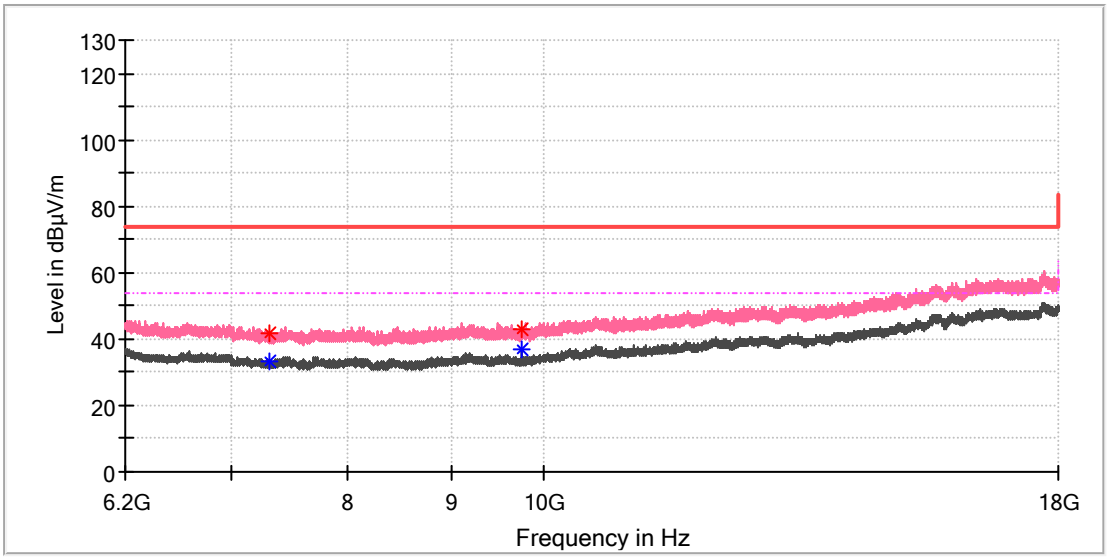


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7320.016667	42.55	---	74.00	31.45	100.0	H	252.0	8.2
7320.016667	---	33.01	54.00	20.99	100.0	H	252.0	8.2

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 6
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

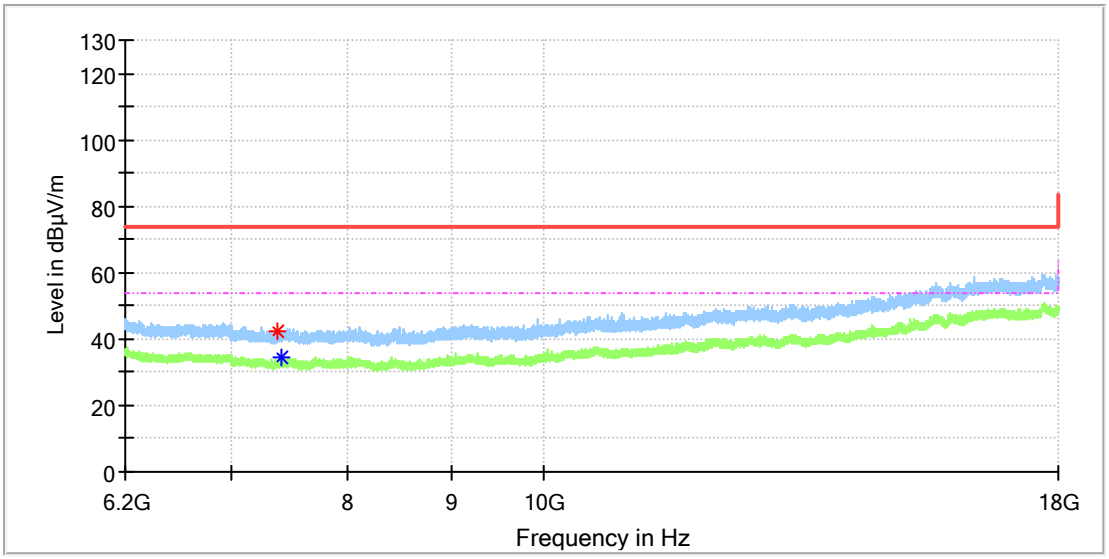


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7306.250000	41.65	---	74.00	32.35	100.0	V	51.0	8.3
7312.150000	---	33.29	54.00	20.71	100.0	V	163.0	8.2
9747.866667	43.09	---	74.00	30.91	100.0	V	125.0	10.4
9747.866667	---	36.92	54.00	17.08	100.0	V	125.0	10.4

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 11
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

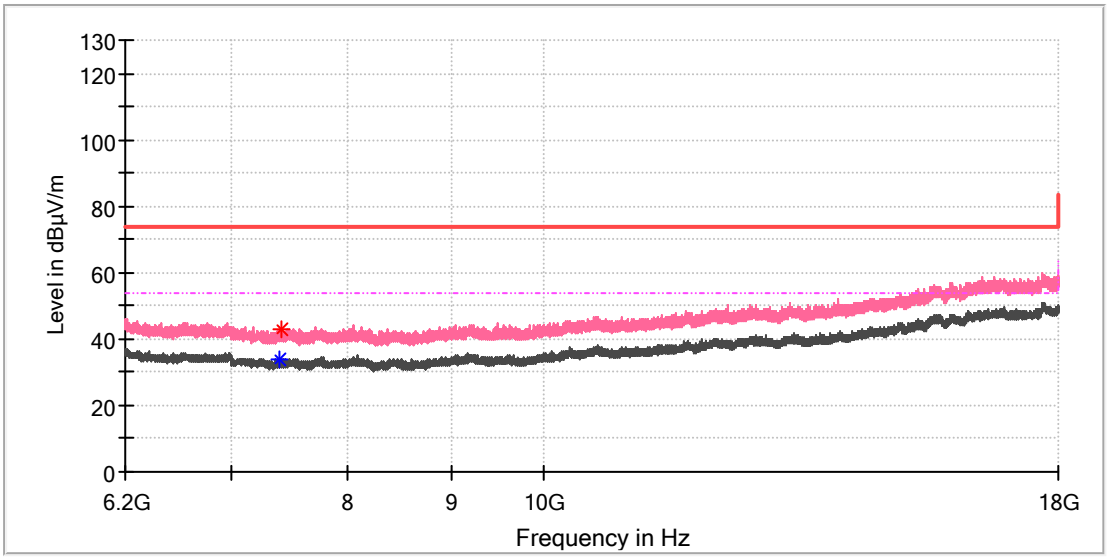


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7384.425000	42.05	---	74.00	31.95	100.0	H	72.0	8.2
7409.500000	---	34.19	54.00	19.81	100.0	H	158.0	8.3

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 11
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



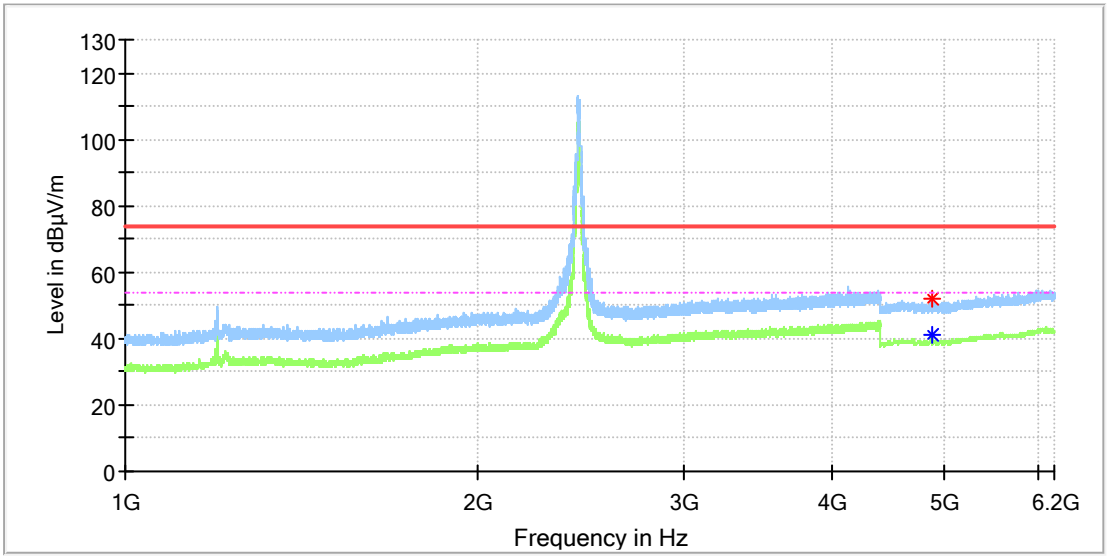
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7393.766667	---	34.09	54.00	19.91	100.0	V	4.0	8.3
7403.600000	42.94	---	74.00	31.06	100.0	V	224.0	8.3

Wi-Fi 802.11 g mode, 6 Mbps
1GHz - 6.2GHz

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11g_Ch 6
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

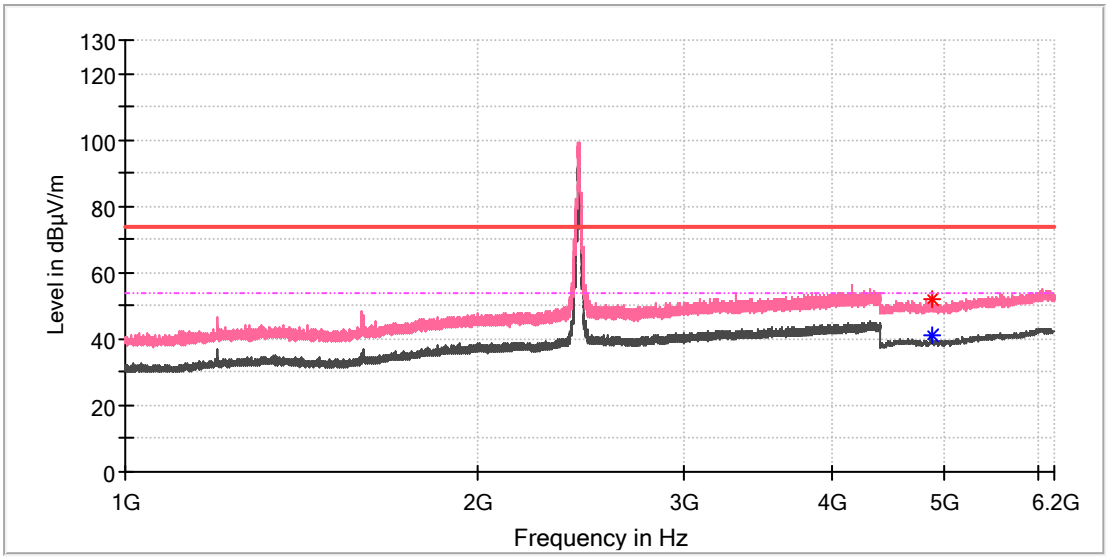


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4870.500000	51.82	---	74.00	22.18	100.0	H	275.0	11.8
4874.500000	---	41.19	54.00	12.81	100.0	H	261.0	11.8

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11g_Ch 6
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



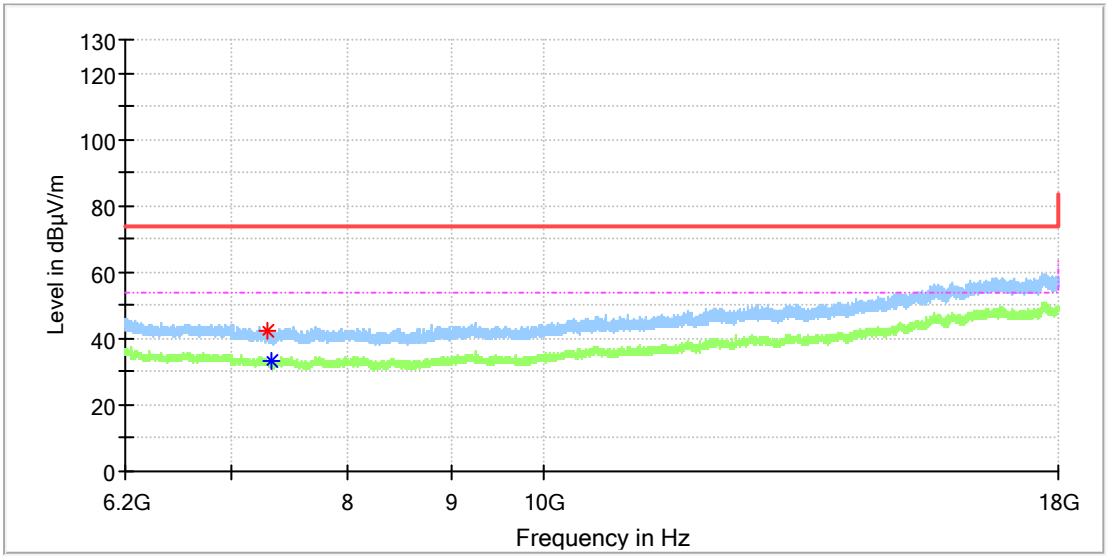
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4869.500000	---	41.39	54.00	12.61	100.0	V	0.0	11.8
4878.000000	51.72	---	74.00	22.28	100.0	V	294.0	11.8

6.2GHz - 18GHz

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11g_Ch 6
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

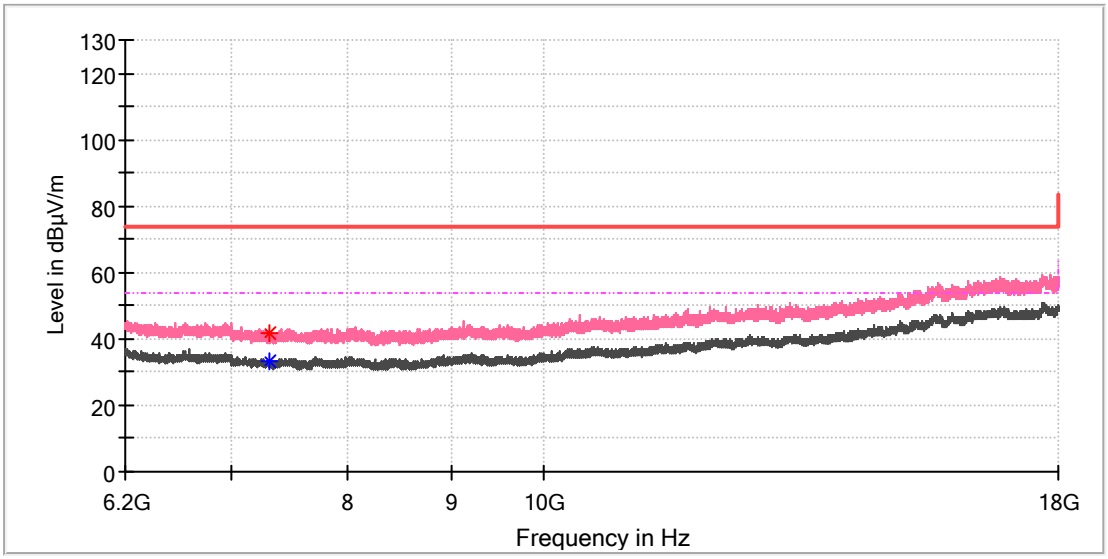


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7291.991667	42.55	---	74.00	31.45	100.0	H	177.0	8.3
7327.883333	---	33.30	54.00	20.70	100.0	H	153.0	8.1

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11g_Ch 6
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



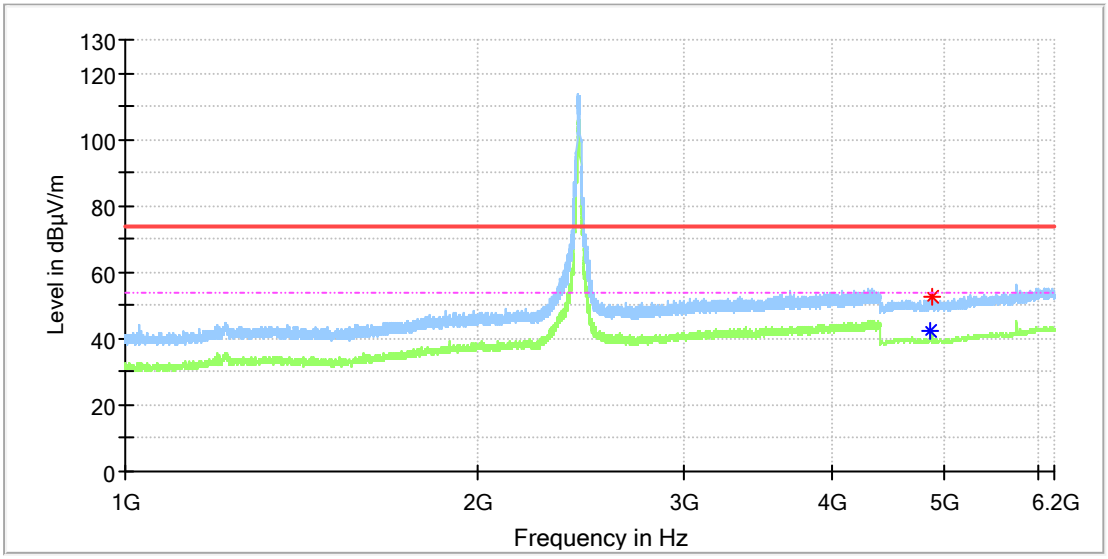
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7312.150000	---	33.05	54.00	20.95	100.0	V	308.0	8.2
7315.591667	41.76	---	74.00	32.24	100.0	V	148.0	8.2

Wi-Fi 802.11 n(HT20) mode, MCS0
1GHz - 6.2GHz

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11n20_Ch 6
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

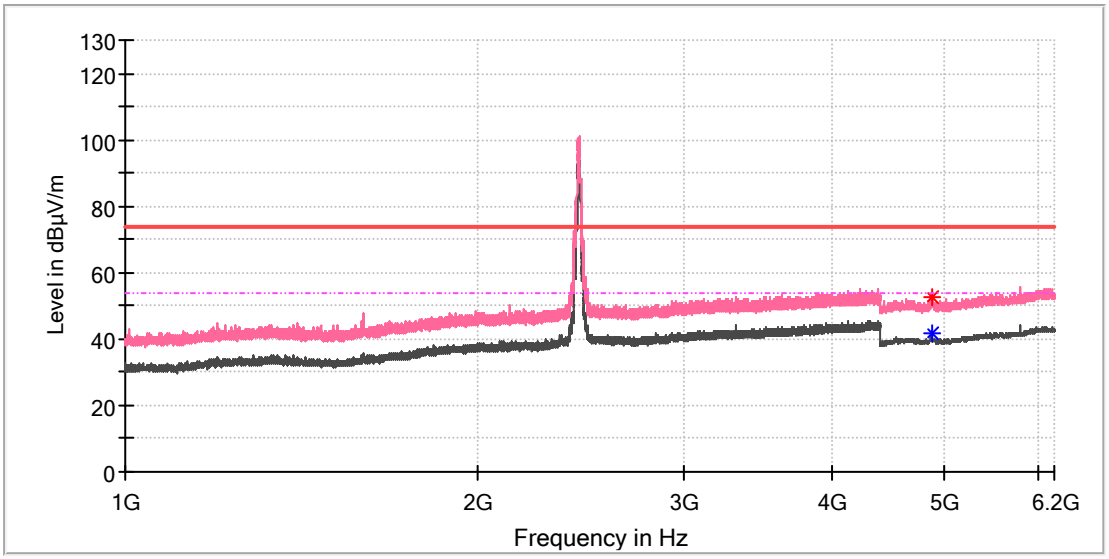


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4867.500000	---	42.02	54.00	11.98	100.0	H	273.0	11.8
4872.500000	52.70	---	74.00	21.30	100.0	H	273.0	11.8

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11n20_Ch 6
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



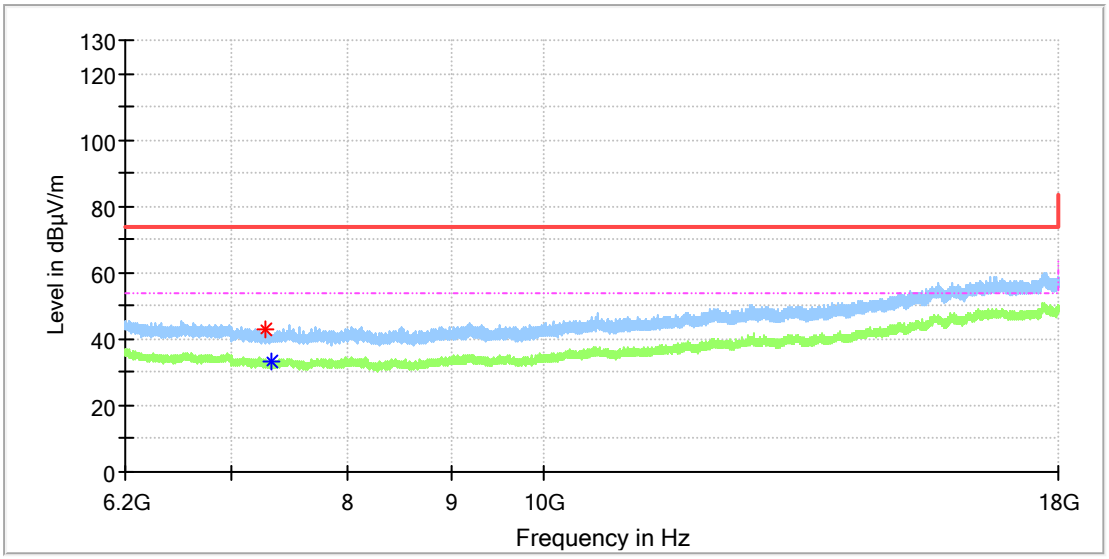
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4870.500000	---	41.95	54.00	12.05	100.0	V	304.0	11.8
4873.500000	52.48	---	74.00	21.52	100.0	V	182.0	11.8

6.2GHz - 18GHz

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11n20_Ch 6
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

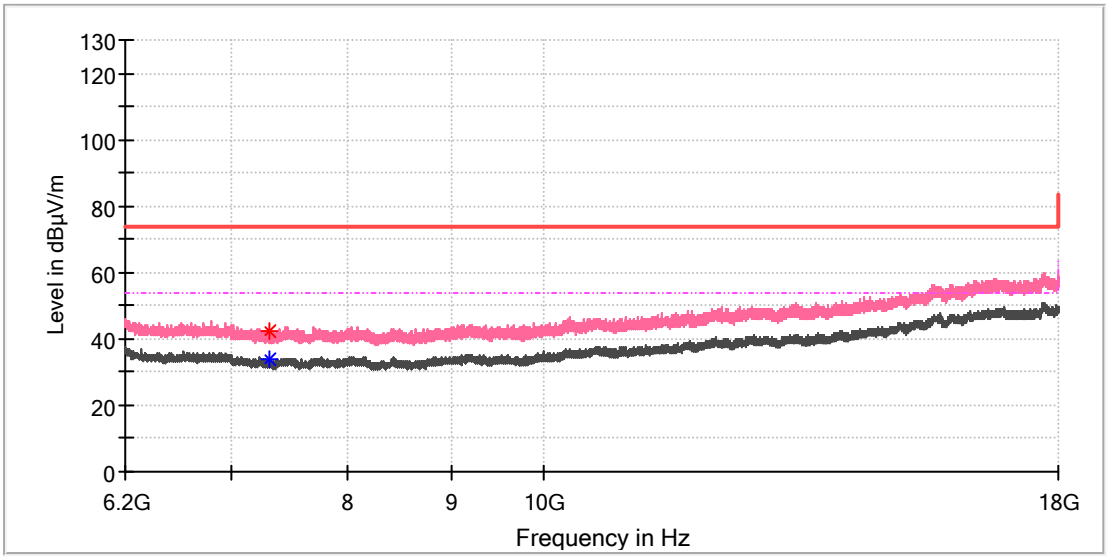


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7274.783333	42.86	---	74.00	31.14	100.0	H	184.0	8.4
7323.950000	---	33.24	54.00	20.76	100.0	H	354.0	8.2

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11n20_Ch 6
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



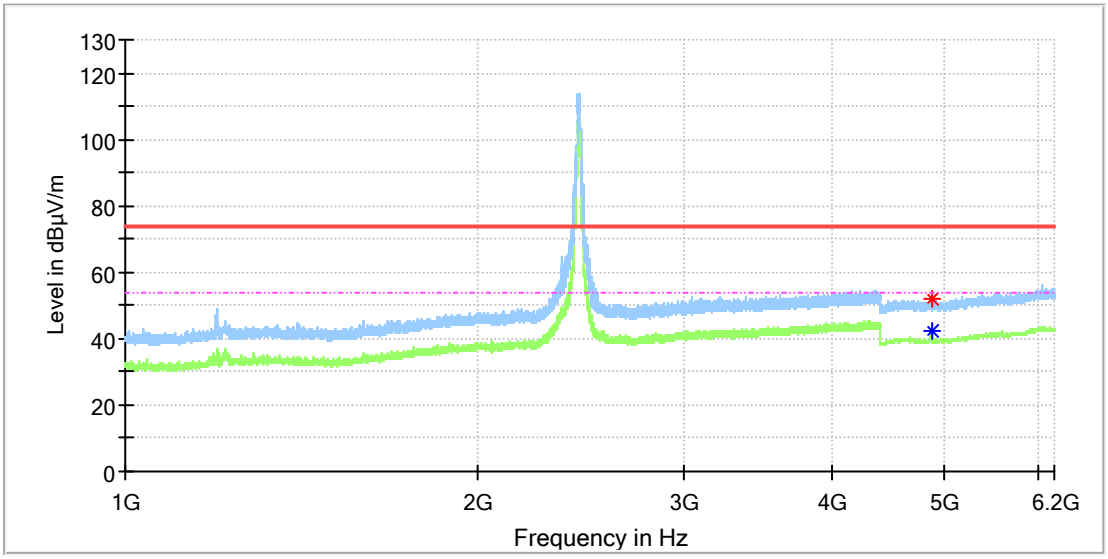
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7307.725000	42.05	---	74.00	31.95	100.0	V	79.0	8.3
7308.708333	---	33.60	54.00	20.40	100.0	V	300.0	8.2

Wi-Fi 802.11 n(HT40) mode, MCS0
1GHz - 6.2GHz

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11n40_Ch 6
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

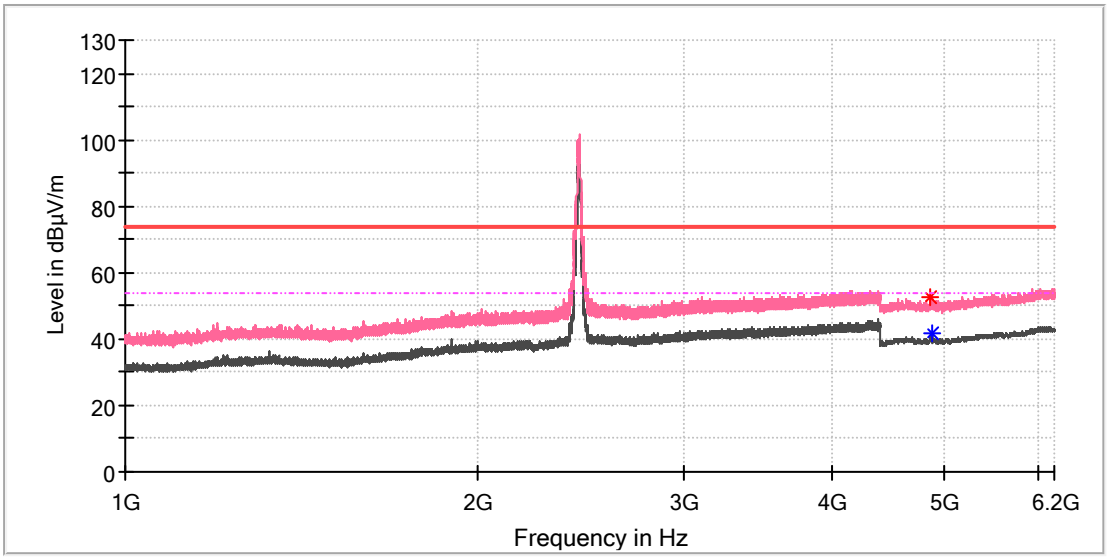


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4871.000000	---	42.29	54.00	11.71	100.0	H	215.0	11.8
4872.000000	52.16	---	74.00	21.84	100.0	H	274.0	11.8

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11n40_Ch 6
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



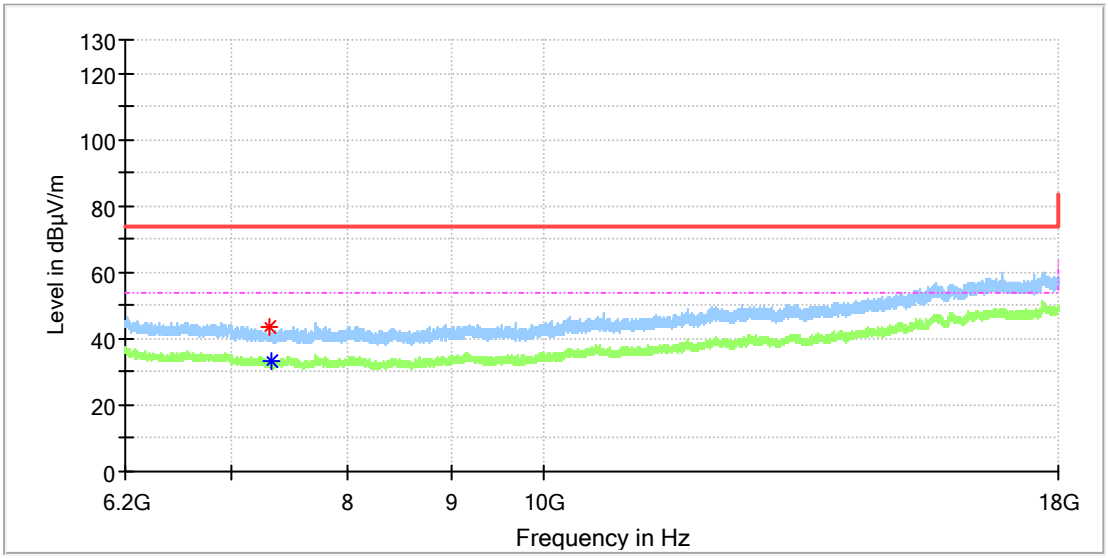
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4867.500000	52.33	---	74.00	21.67	100.0	V	307.0	11.8
4870.000000	---	41.90	54.00	12.10	100.0	V	307.0	11.8

6.2GHz - 18GHz

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11n40_Ch 6
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

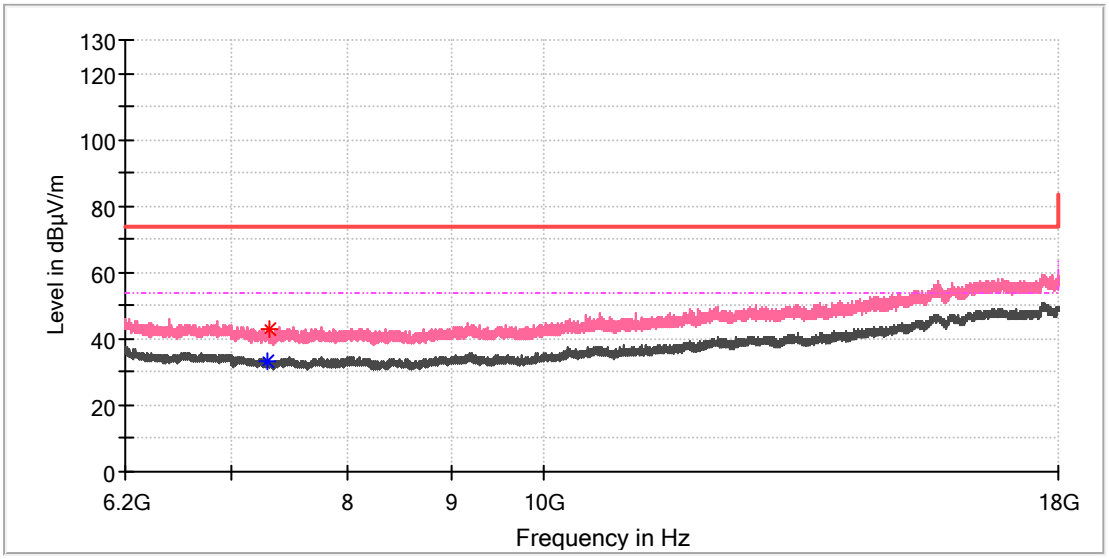


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7302.316667	43.41	---	74.00	30.59	100.0	H	172.0	8.3
7321.000000	---	33.48	54.00	20.52	100.0	H	297.0	8.2

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11n40_Ch 6
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

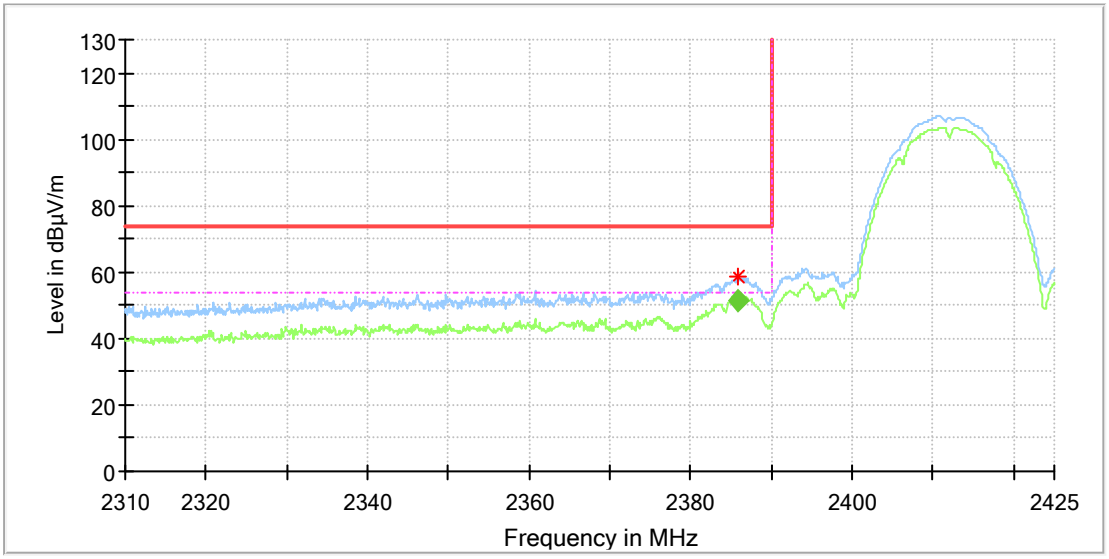
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7299.858333	---	33.50	54.00	20.50	100.0	V	161.0	8.3
7313.625000	43.00	---	74.00	31.00	100.0	V	331.0	8.2

Appendix C.2: Test Results of Radiated Emissions in Restricted Bands

Wi-Fi 802.11 b mode, 1 Mbps
Low channel

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 1
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

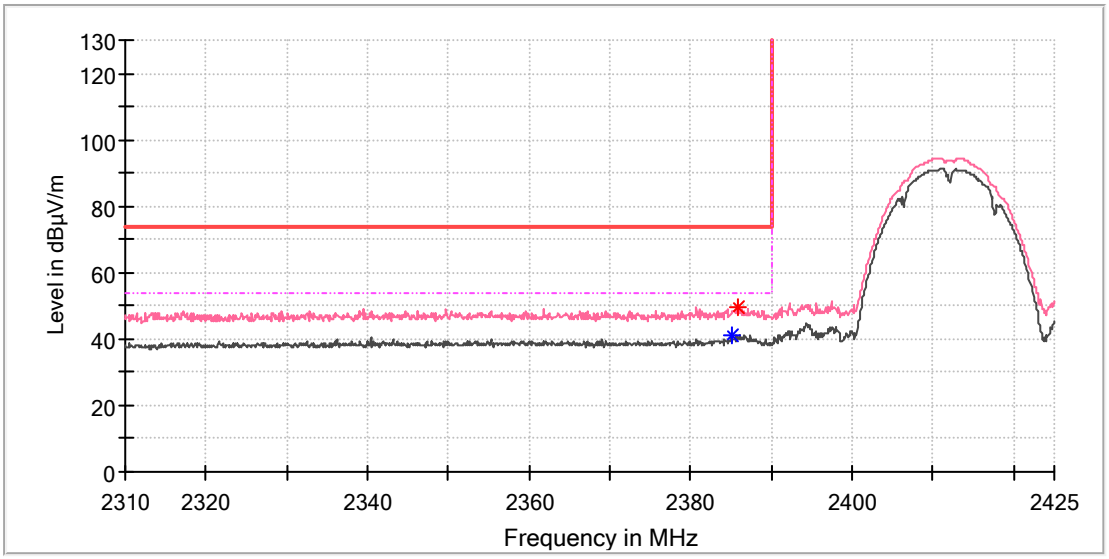
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2385.800000	58.46	---	74.00	15.54	100.0	H	231.0	7.0

Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2385.895900	50.89	54.00	3.11	100.0	H	226.0	7.0

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 1
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



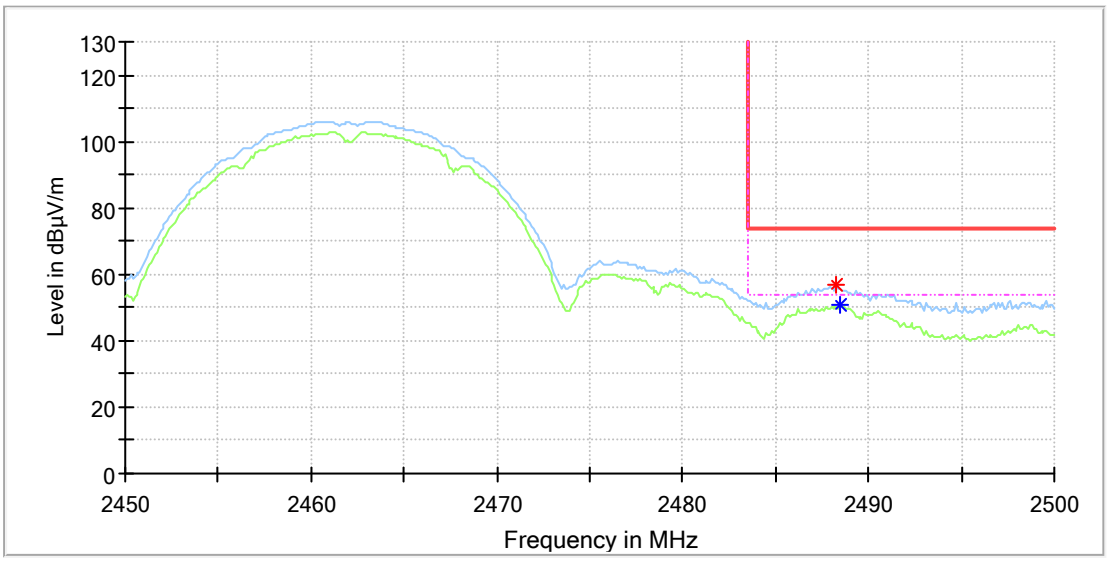
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2385.000000	---	41.02	54.00	12.98	100.0	V	276.0	7.0
2385.900000	49.42	---	74.00	24.58	100.0	V	115.0	7.0

High channel

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 11
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

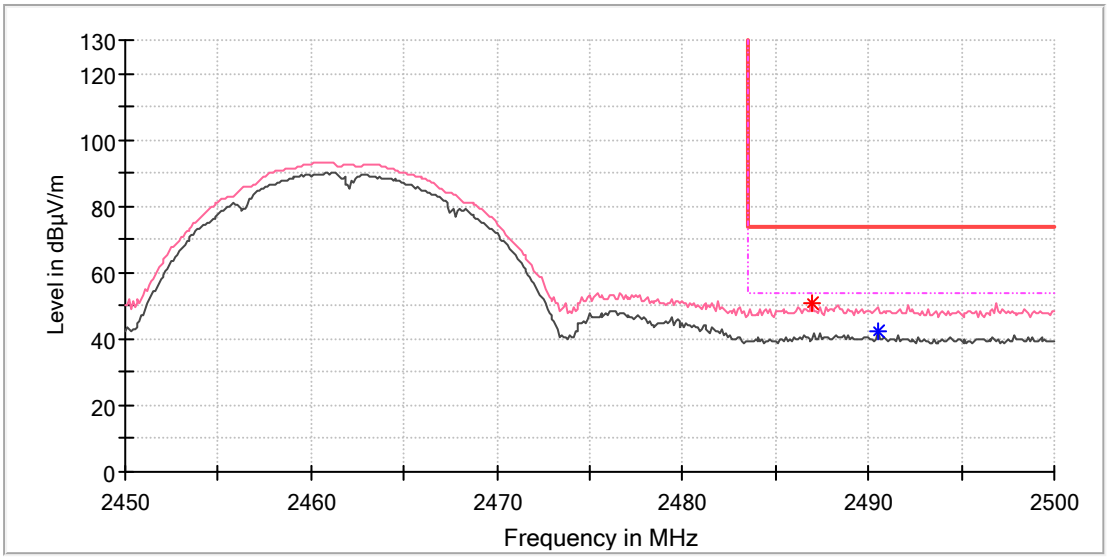


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2488.300000	56.61	---	74.00	17.39	100.0	H	197.0	7.4
2488.500000	---	50.54	54.00	3.46	100.0	H	217.0	7.4

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11b_Ch 11
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



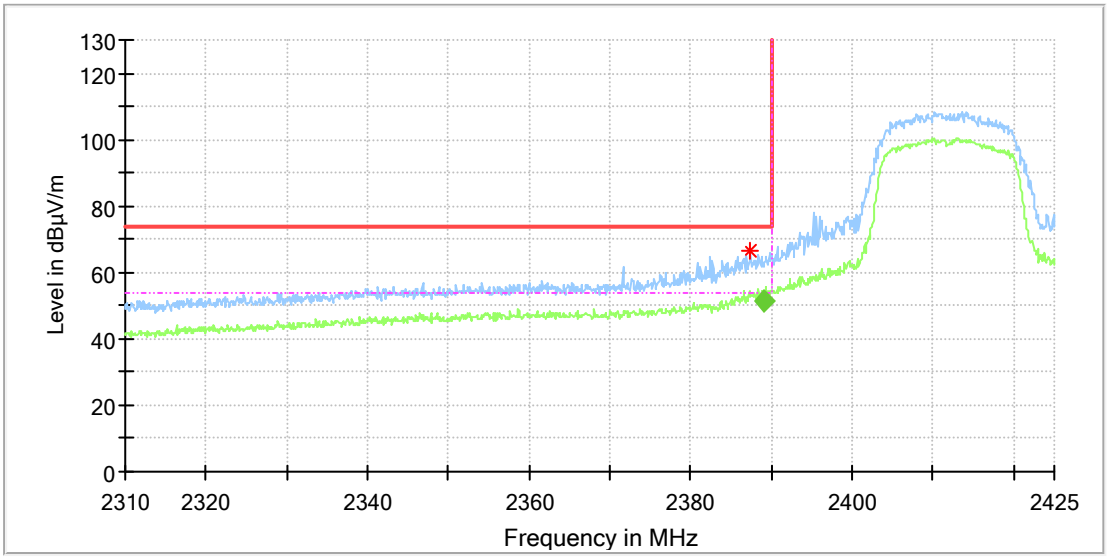
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2487.000000	50.59	---	74.00	23.41	100.0	V	260.0	7.4
2490.500000	---	42.21	54.00	11.79	100.0	V	319.0	7.4

Wi-Fi 802.11 g mode, 6 Mbps
Low channel

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11g_Ch 1
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

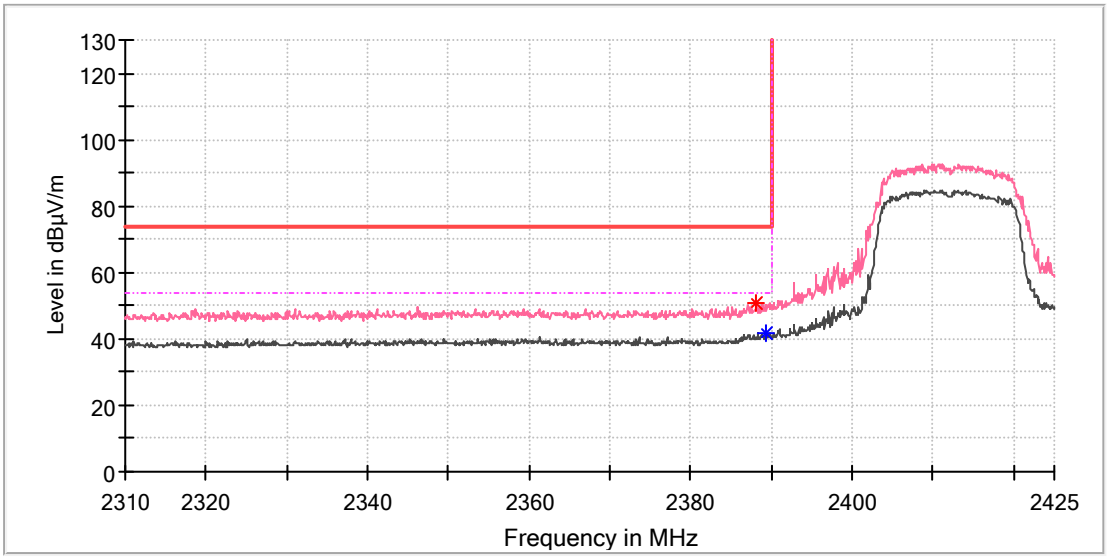
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2387.400000	66.28	---	74.00	7.72	100.0	H	202.0	7.0

Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2389.056300	50.82	54.00	3.18	100.0	H	190.0	7.0

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11g_Ch 1
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



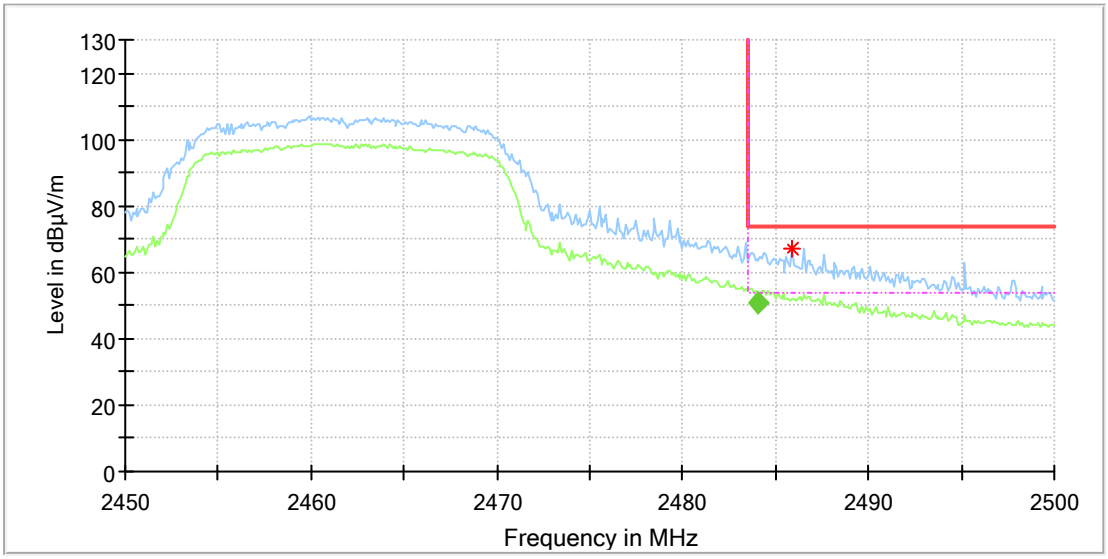
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2388.100000	50.77	---	74.00	23.23	100.0	V	99.0	7.0
2389.300000	---	41.98	54.00	12.02	100.0	V	99.0	7.0

High channel

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11g_Ch 11
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

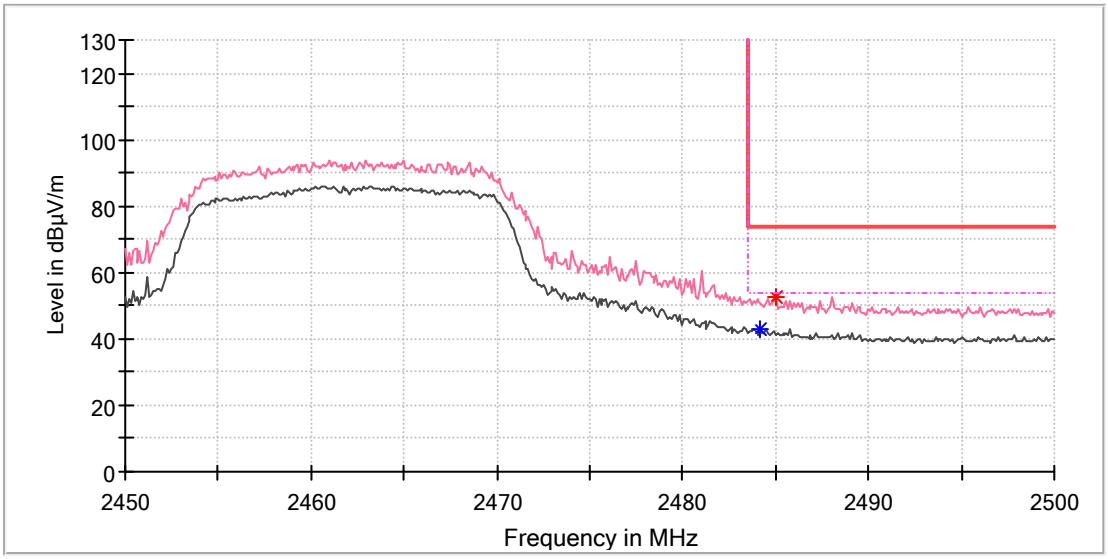
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2485.900000	67.29	---	74.00	6.71	100.0	H	212.0	7.4

Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2484.085900	50.79	54.00	3.21	100.0	H	201.0	7.4

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11g_Ch 11
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



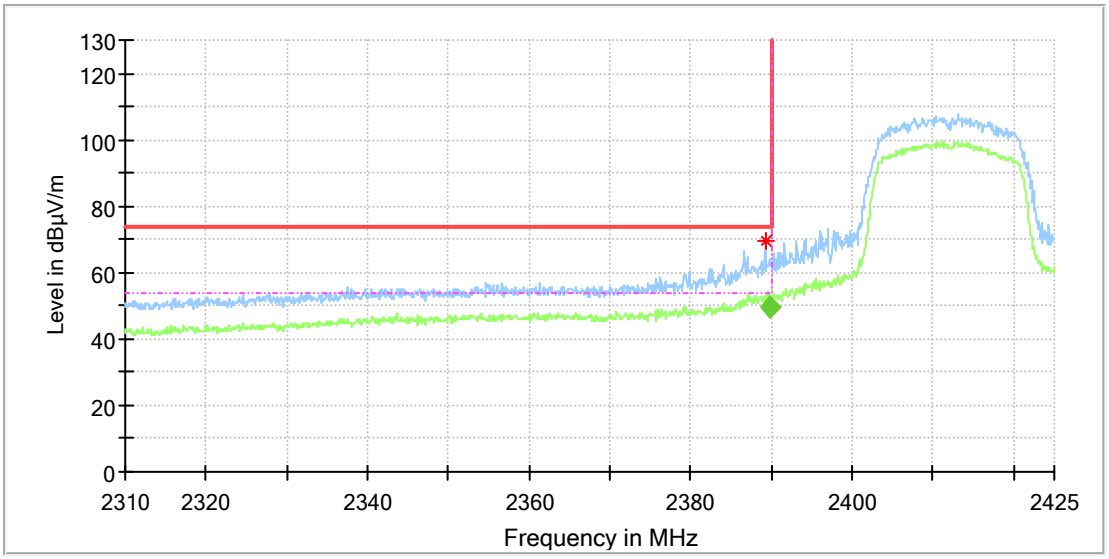
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2484.200000	---	43.16	54.00	10.84	100.0	V	112.0	7.4
2485.000000	52.33	---	74.00	21.67	100.0	V	263.0	7.4

Wi-Fi 802.11 n(HT20) mode, MCS0
Low channel

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11n20_Ch 1
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

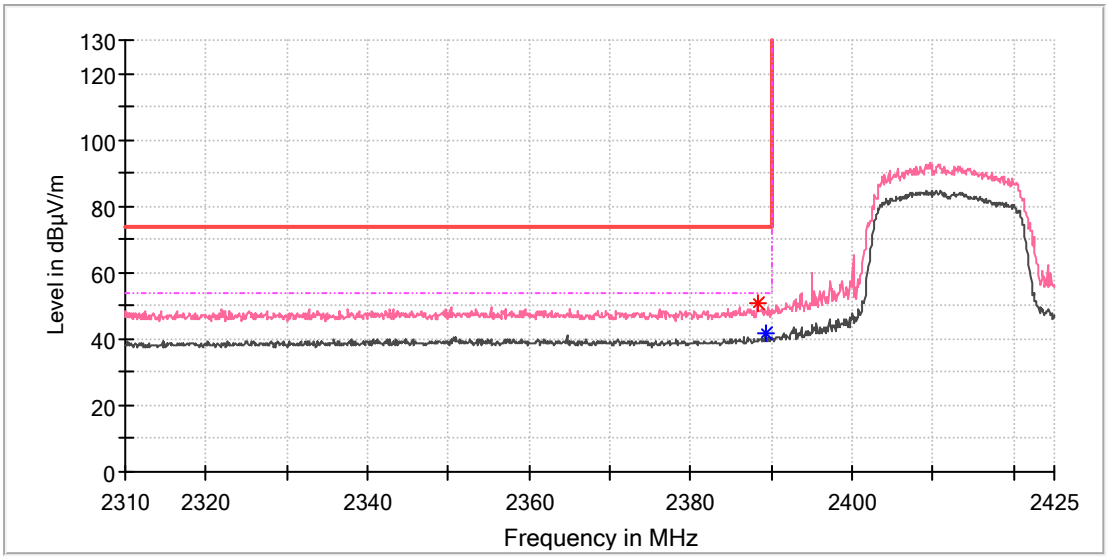
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2389.200000	69.47	---	74.00	4.53	100.0	H	195.0	7.0

Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2389.847400	49.64	54.00	4.36	100.0	H	190.0	7.0

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11n20_Ch 1
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



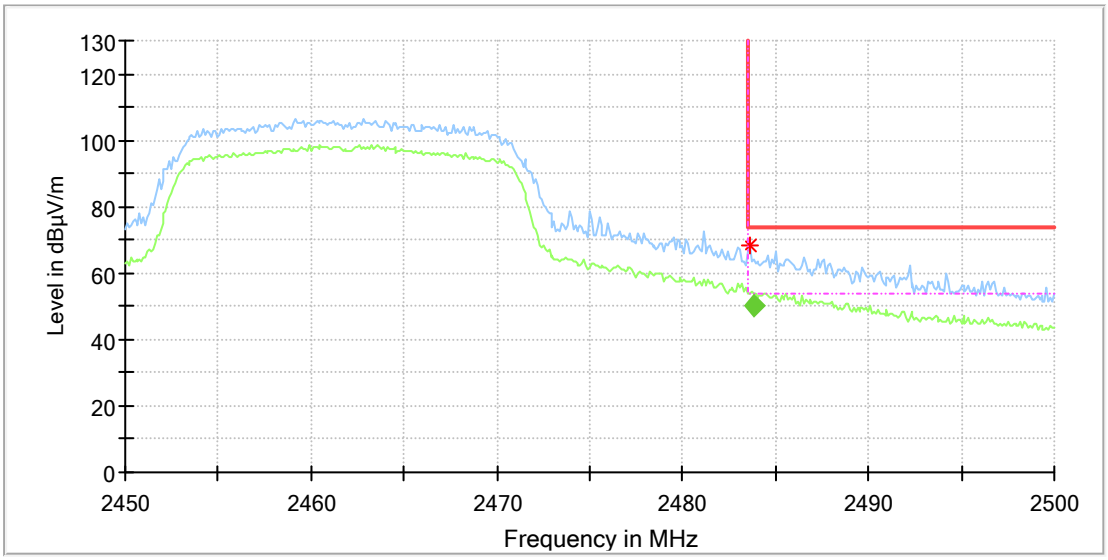
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2388.200000	50.67	---	74.00	23.33	100.0	V	84.0	7.0
2389.200000	---	41.47	54.00	12.53	100.0	V	161.0	7.0

High channel

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11n20_Ch 11
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

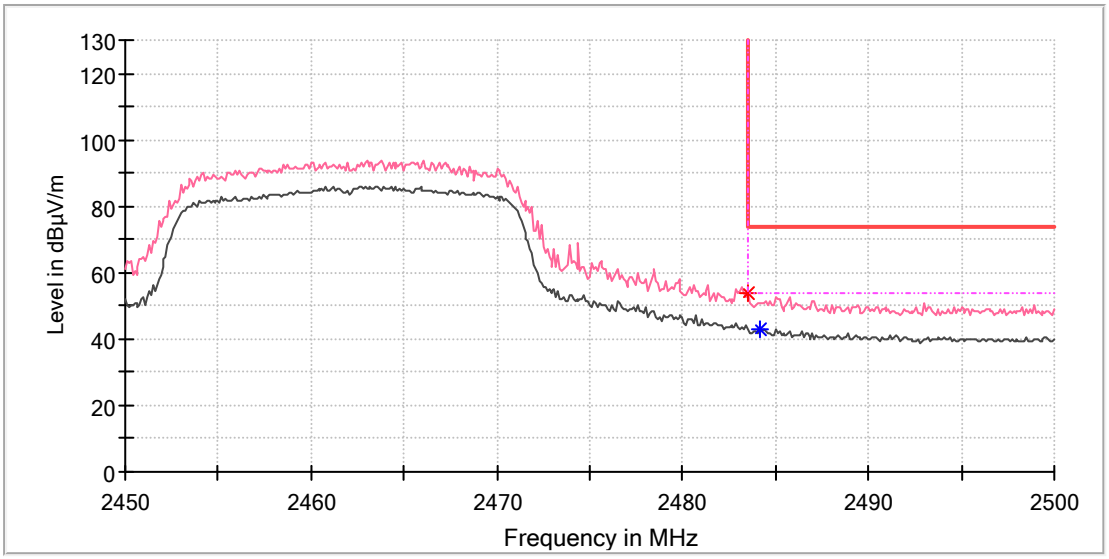
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.600000	68.43	---	74.00	5.57	100.0	H	204.0	7.4

Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.823000	49.95	54.00	4.05	100.0	H	55.0	7.4

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11n20_Ch 11
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



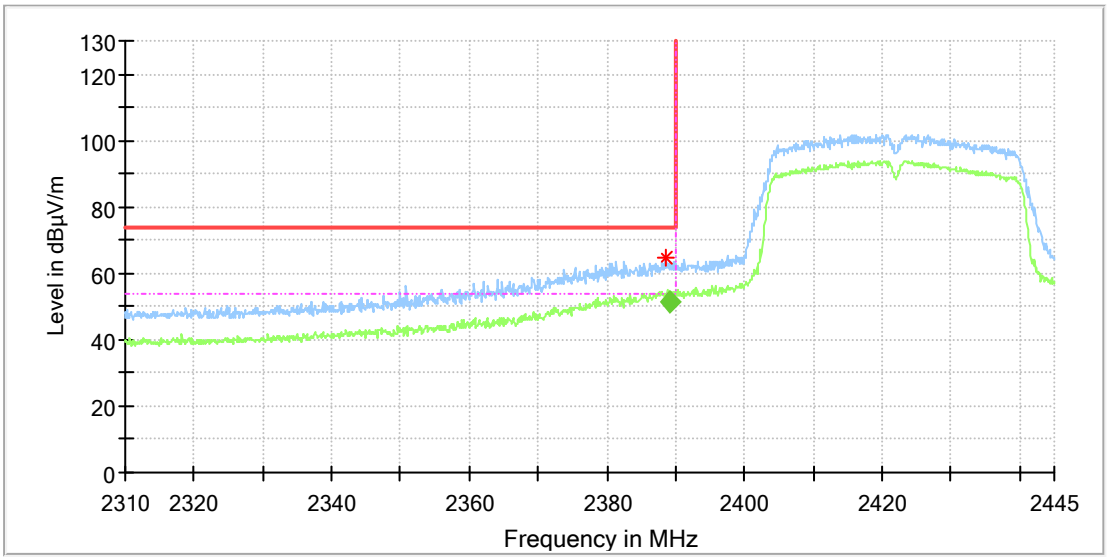
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.500000	53.73	---	74.00	20.27	100.0	V	324.0	7.4
2484.200000	---	43.00	54.00	11.00	100.0	V	122.0	7.4

Wi-Fi 802.11 n(HT40) mode, MCS0
Low channel

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11n40_Ch 3
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

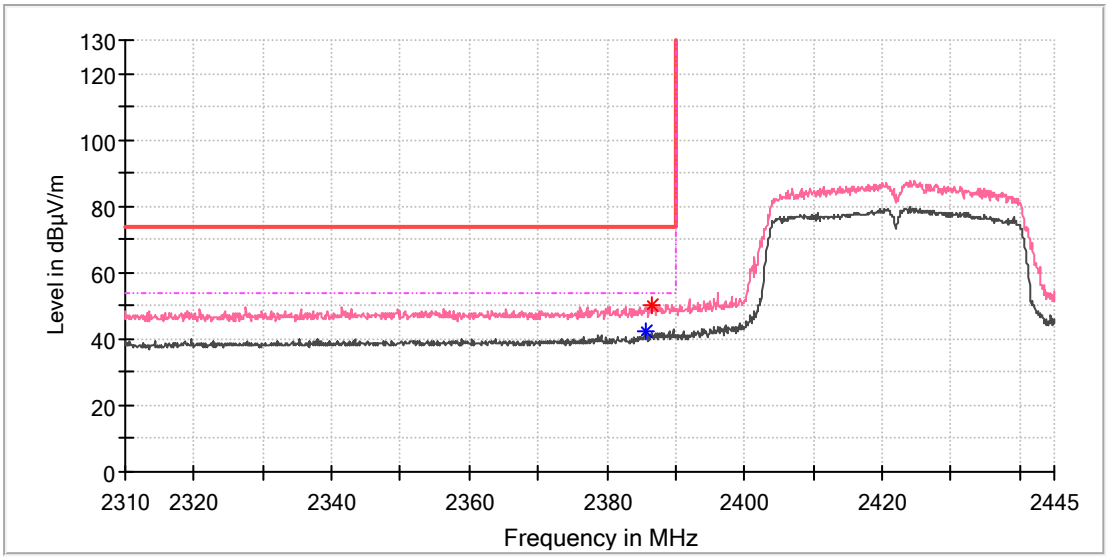
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2388.500000	64.51	---	74.00	9.49	100.0	H	217.0	7.0

Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2389.028700	50.92	54.00	3.08	100.0	H	194.0	7.0

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11n40_Ch 3
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



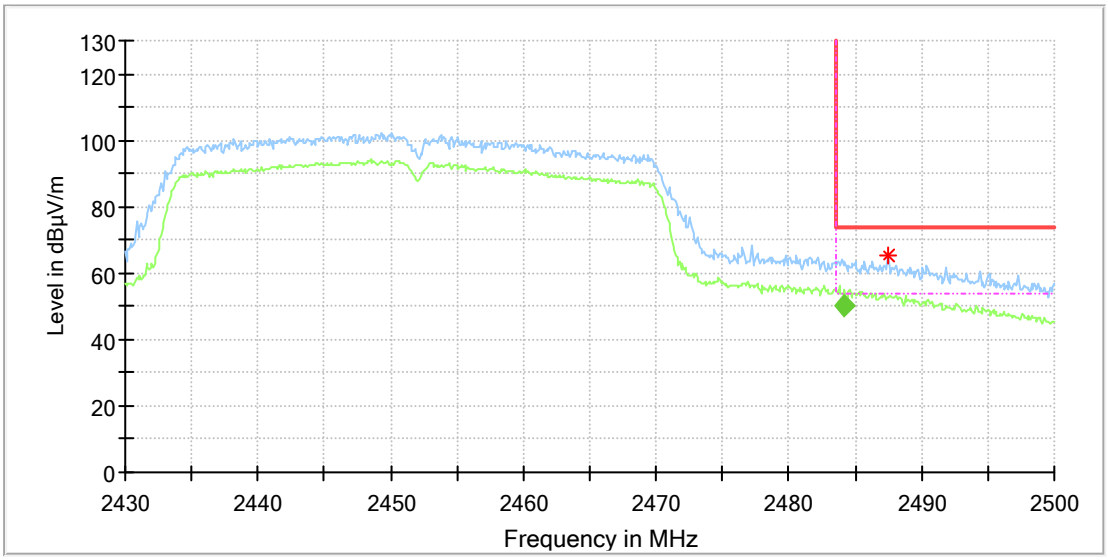
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2385.600000	---	42.51	54.00	11.49	100.0	V	99.0	7.0
2386.600000	50.01	---	74.00	23.99	100.0	V	99.0	7.0

High channel

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11n40_Ch 9
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

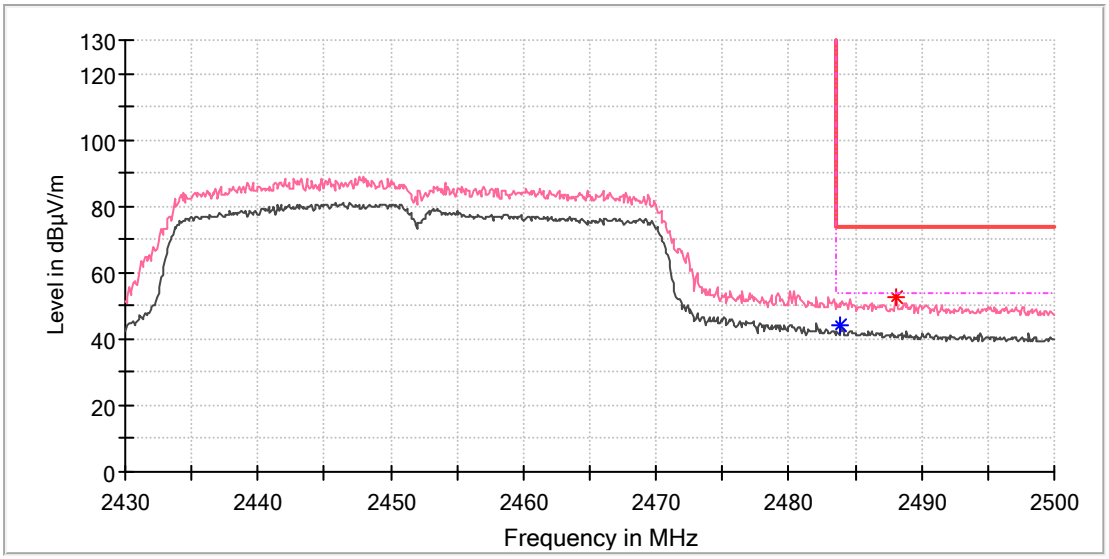
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2487.500000	65.48	---	74.00	8.52	100.0	H	211.0	7.4

Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2484.145500	50.15	54.00	3.85	100.0	H	227.0	7.4

EUT Information

EUT Name:	WIFI Module
Model:	AI7688H2
Test Mode:	WiFi 2.4G_11n40_Ch 9
Order No/Sample No:	168367224/A003243030-002
Test Voltage::	DC 3.3V
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



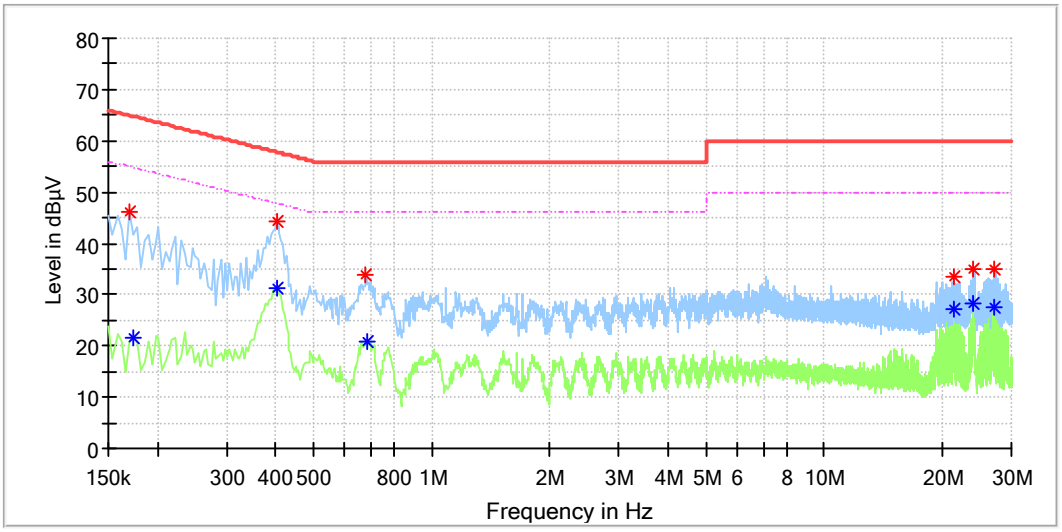
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.900000	---	44.26	54.00	9.74	100.0	V	326.0	7.4
2488.100000	52.54	---	74.00	21.46	100.0	V	104.0	7.4

Appendix C.3: Test Results of Conducted Emission on AC Mains

EUT Information

EUT Name:	wifi module
Order No:	168367224
Model:	AI7688H2
Test mode:	Operating
Test Voltage:	AC 120V/60Hz
Test By:	William Wang
Review By:	Terry Yin
Tem./Hum./Pressure:	23.3 ℃/54%//101kPa
Remark:	SR2

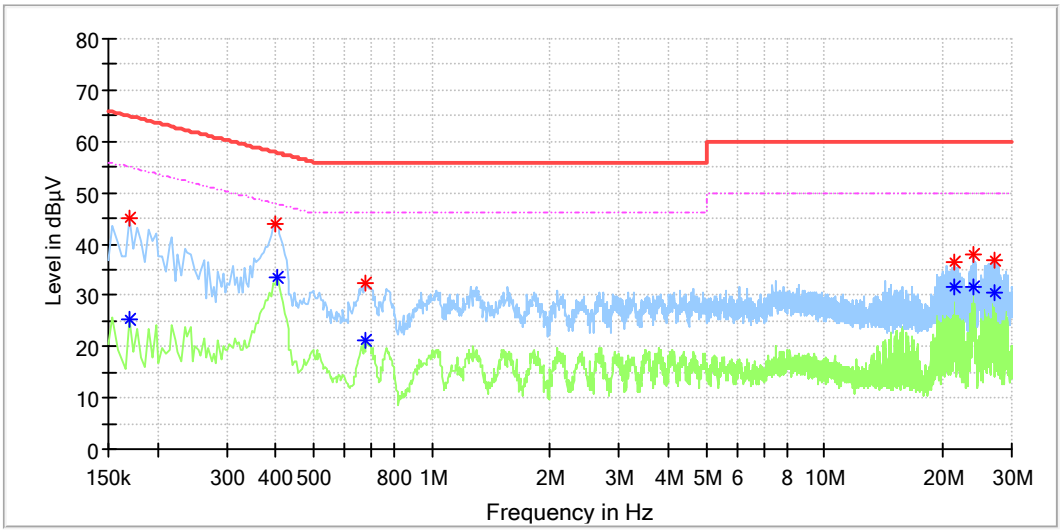


Critical_Freqs

Frequency (MHz)	MaxPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
0.170000	46.24	---	64.96	18.72	L1	9.9
0.174000	---	21.57	54.77	33.20	L1	9.9
0.402000	44.15	---	57.81	13.66	L1	9.9
0.402000	---	31.22	47.81	16.60	L1	9.9
0.678000	34.04	---	56.00	21.96	L1	10.0
0.682000	---	21.01	46.00	24.99	L1	10.0
21.398000	33.44	---	60.00	26.56	L1	10.4
21.478000	---	27.14	50.00	22.86	L1	10.4
24.002000	35.14	---	60.00	24.86	L1	10.4
24.038000	---	28.16	50.00	21.84	L1	10.4
26.998000	34.97	---	60.00	25.03	L1	10.4
27.078000	---	27.50	50.00	22.50	L1	10.4

EUT Information

EUT Name:	wifi module
Order No:	168367224
Model:	AI7688H2
Test mode:	Operating
Test Voltage:	AC 120V/60Hz
Test By:	William Wang
Review By:	Terry Yin
Tem./Hum./Pressure:	23.3 ℃/54%//101kPa
Remark:	SR2



Critical_Freqs

Frequency (MHz)	MaxPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
0.170000	44.88	---	64.96	20.08	N	9.8
0.170000	---	25.44	54.96	29.52	N	9.8
0.398000	44.03	---	57.90	13.86	N	9.8
0.402000	---	33.43	47.81	14.38	N	9.8
0.678000	---	21.15	46.00	24.85	N	9.8
0.678000	32.25	---	56.00	23.75	N	9.8
21.478000	---	31.55	50.00	18.45	N	10.3
21.478000	36.31	---	60.00	23.69	N	10.3
23.998000	---	31.76	50.00	18.24	N	10.3
23.998000	37.92	---	60.00	22.08	N	10.3
27.118000	---	30.48	50.00	19.52	N	10.4
27.118000	36.90	---	60.00	23.10	N	10.4