



RADIO TEST REPORT

Report No.: SHATBL2110018W02

Applicant:
Fuwei Global Co., Ltd

Address:
7F., No. 33, Fushun St., Zhongshan Dist., Taipei City 10427, Taiwan

Product Name : 2.4G Wi-Fi Home Base
Brand Name : arpha
Model Name : BS-04
Series Model : W02RS11-W;EC-21BS-04
Test Standard : FCC Part 15.247
FCC ID : 2A297BS-04

"Shanghai ATBL Technology Co., Ltd." hereby certifies that according to actual testing conditions. The test results or observations are provided in accordance with measured value, without taking risks caused by uncertainty into account. Without explicit stipulation in special agreements, standards or regulations, ATBL shall not assume any responsibility. The test results or observations are applicable only to tested sample. Client shall be responsible for representativeness of the sample and authenticity of the material. This report will be void without authorized signature or special seal for testing report. Do not copied without authorization.
Tel:+86(0)21-51298625 Web:www.atbl-lab.com

TEST RESULT CERTIFICATION

Applicant's Name : Fuwei Global Co., Ltd

Address : 7F., No. 33, Fushun St., Zhongshan Dist., Taipei City 10427 , Taiwan

Manufacturer's Name : DONGGUAN LINGDU ELECTRONIC TECHNOLOGY CO., LTD

Address : No. 1 Longcheng Street, Xiekeng Village, Qingxi Town, Dongguan, China

Product Description

Product Name : 2.4G Wi-Fi Home Base

Brand Name : arpha

Model Name : BS-04

Series Model : W02RS11-W;EC-21BS-04

Test Standards : FCC Part15.247

Test Procedure : ANSI C63.10-2013

This device described above has been tested by ATBL, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of ATBL, this document only be altered or revised by ATBL, personal only, and shall be noted in the revision of the document.

Date of Test :

Date of receipt of test item : 20 Oct. 2021

Date (s) of performance of tests : 20 Oct. 2021~ 27 Oct. 2021

Date of Issue : 10Nov. 2021

Test Result : **Pass**

Report Prepared by :

Roean Wei

(Roeanwei)

Report Approved by :

Ghost Li.

(Ghost.Li)

Authorized Signatory :

Terry yang

(Terry yang)



Table of Contents	Page
1. SUMMARY OF TEST RESULTS	6
2. GENERAL INFORMATION	7
2.1 GENERAL DESCRIPTION OF THE EUT	7
2.2 DESCRIPTION OF THE TEST MODES	9
2.3 TEST SOFTWARE AND POWER LEVEL	9
2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	10
2.5 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS	11
2.6 LABORATORY INFORMATION	11
2.7 MEASUREMENT UNCERTAINTY	12
2.8 EQUIPMENTS LIST FOR ALL TEST ITEMS	12
3. EMC EMISSION TEST	13
3.1 CONDUCTED EMISSION MEASUREMENT	13
3.2 RADIATED EMISSION MEASUREMENT	17
4. CONDUCTED SPURIOUS & BAND EDGE EMISSION	32
4.1 LIMIT	32
4.2 TEST PROCEDURE	32
4.3 DEVIATION FROM STANDARD	32
4.4 TEST SETUP	32
4.5 EUT OPERATION CONDITIONS	32
4.6 TEST RESULTS	33
5. POWER SPECTRAL DENSITY TEST	57
5.1 LIMIT	57
5.2 TEST PROCEDURE	57
5.3 DEVIATION FROM STANDARD	57
5.4 TEST SETUP	57
5.5 EUT OPERATION CONDITIONS	57
5.6 TEST RESULTS	58
6. BANDWIDTH TEST	70
6.1 LIMIT	70
6.2 TEST PROCEDURE	70
6.3 DEVIATION FROM STANDARD	70
6.4 TEST SETUP	70
6.5 EUT OPERATION CONDITIONS	70

Table of Contents	Page
6.6 TEST RESULTS	70
7. PEAK OUTPUT POWER TEST	82
7.1 LIMIT	82
7.2 TEST PROCEDURE	82
7.3 DEVIATION FROM STANDARD	82
7.4 TEST SETUP	83
7.5 EUT OPERATION CONDITIONS	83
7.6 TEST RESULTS	84
APPENDIX-PHOTOS OF TEST SETUP	85



Revision History

Rev.	Issue Date	Report No.	Effect Page	Contents
00	10Nov. 2021	SHATBL2110018W02	ALL	Initial Issue



1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:
KDB 558074 D01 15.247 Meas Guidance v05r02.

FCC Part 15.247,Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	--
15.247 (a)(2)	6dB Bandwidth	PASS	--
15.247 (b)(3)	Output Power	PASS	--
15.209	Radiated Spurious Emission	PASS	--
15.247 (d)	Conducted Spurious & Band Edge Emission	PASS	--
15.247 (e)	Power Spectral Density	PASS	--

NOTE:

- (1) 'N/A' denotes test is not applicable in this Test Report.
- (2) All tests are according to ANSI C63.10-2013.

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	2.4G Wi-Fi Home Base														
Trade Name	arpha														
Model Name	BS-04														
Series Model	W02RS11-W;EC-21BS-04														
Model Difference	Only the model names are different.														
Product Description	<p>The EUT is a 2.4G Wi-Fi Home Base</p> <table border="1"> <tr> <td>Operation Frequency:</td> <td>802.11b/g/n 20: 2412~2462 MHz 802.11n(40MHz):2422~2452MHz</td> </tr> <tr> <td>Modulation Type:</td> <td>802.11b(DSSS):CCK,DQPSK,DBPSK 802.11g(OFDM):BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM):BPSK,QPSK,16-QAM,64-QAM</td> </tr> <tr> <td>Bit Rate of Transmitter:</td> <td>802.11b:11/5.5/2/1 Mbps 802.11g:54/48/36/24/18/12/9/6Mbps 802.11n(20MHz): 65/58.5/52/39/26/19.5/13/6.5Mbps 802.11n(40MHz): 135/121.5/108/81/54/40.5/37/13.5Mbps</td> </tr> <tr> <td>Number of Channel:</td> <td>802.11b/g/n20: 11CH 802.11n 40: 7CH</td> </tr> <tr> <td>Antenna Designation:</td> <td>Please refer to the Note 3.</td> </tr> <tr> <td>Antenna Gain (dBi):</td> <td>2dBi</td> </tr> <tr> <td>Duty Cycle:</td> <td>>98%</td> </tr> </table>	Operation Frequency:	802.11b/g/n 20: 2412~2462 MHz 802.11n(40MHz):2422~2452MHz	Modulation Type:	802.11b(DSSS):CCK,DQPSK,DBPSK 802.11g(OFDM):BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM):BPSK,QPSK,16-QAM,64-QAM	Bit Rate of Transmitter:	802.11b:11/5.5/2/1 Mbps 802.11g:54/48/36/24/18/12/9/6Mbps 802.11n(20MHz): 65/58.5/52/39/26/19.5/13/6.5Mbps 802.11n(40MHz): 135/121.5/108/81/54/40.5/37/13.5Mbps	Number of Channel:	802.11b/g/n20: 11CH 802.11n 40: 7CH	Antenna Designation:	Please refer to the Note 3.	Antenna Gain (dBi):	2dBi	Duty Cycle:	>98%
Operation Frequency:	802.11b/g/n 20: 2412~2462 MHz 802.11n(40MHz):2422~2452MHz														
Modulation Type:	802.11b(DSSS):CCK,DQPSK,DBPSK 802.11g(OFDM):BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM):BPSK,QPSK,16-QAM,64-QAM														
Bit Rate of Transmitter:	802.11b:11/5.5/2/1 Mbps 802.11g:54/48/36/24/18/12/9/6Mbps 802.11n(20MHz): 65/58.5/52/39/26/19.5/13/6.5Mbps 802.11n(40MHz): 135/121.5/108/81/54/40.5/37/13.5Mbps														
Number of Channel:	802.11b/g/n20: 11CH 802.11n 40: 7CH														
Antenna Designation:	Please refer to the Note 3.														
Antenna Gain (dBi):	2dBi														
Duty Cycle:	>98%														
Channel List	Please refer to the Note 2.														
Adapter	Input:100~240V - 50/60Hz 0.4A Output: DC5V 2A														
Hardware version number	SC-16003_V1.0.1														
Software version number	V1.0.21														
Connecting I/O Port(s)	Please refer to the Note 1.														

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User Manual.

2.

Operation Frequency of channel			
802.11b/g/n(20MHz)		Channel List for 802.11n(40MHz)	
Channel	Frequency	Channel	Frequency
01	2412	03	2422
02	2417	04	2427
03	2422	05	2432
04	2427	06	2437
05	2432	07	2442
06	2437	08	2447
07	2442	09	2452
08	2447		
09	2452		
10	2457		
11	2462		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, themiddle frequency, and the highest frequency of channel were selected to perform the test, and the selectedchannel see below:

Carrier Frequency Channel

2.4GHz Test Frequency:

For 802.11b/g/n (HT20)		For 802.11n (HT40)	
Channel	Freq.(MHz)	Channel	Freq.(MHz)
01	2412	03	2422
06	2437	06	2437
11	2462	09	2452

3.

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Note
1	alpha	BS-04	FPC	N/A	2dBi	WLAN Antenna

2.2 DESCRIPTION OF THE TEST MODES

Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Worst Mode	Description	Data Rate
Mode 1	TX IEEE 802.11b CH1	1 Mbps
Mode 2	TX IEEE 802.11b CH6	1 Mbps
Mode 3	TX IEEE 802.11 b CH11	1 Mbps
Mode 4	TX IEEE 802.11g CH1	6 Mbps
Mode 5	TX IEEE 802.11g CH6	6 Mbps
Mode 6	TX IEEE 802.11g CH11	6 Mbps
Mode 7	TX IEEE 802.11n HT20 CH1	MCS 0
Mode 8	TX IEEE 802.11n HT20 CH6	MCS 0
Mode 9	TX IEEE 802.11n HT20 CH11	MCS 0
Mode 10	TX IEEE 802.11n HT40 CH3	MCS 0
Mode 11	TX IEEE 802.11n HT40 CH6	MCS 0
Mode 12	TX IEEE 802.11n HT40 CH9	MCS 0

Note:

- (1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.
- (2) We have been tested for all available U.S. voltage and frequencies (For 120V, 50/60Hz and 240V, 50/60Hz) for which the device is capable of operation, and the worst case of 120V /60Hz is shown in the report.
- (3) The battery is fully-charged during the radiated and RF conducted test.

Conducted Emission

Test Case	
Conducted Emission	Mode13: Keeping WIFI TX

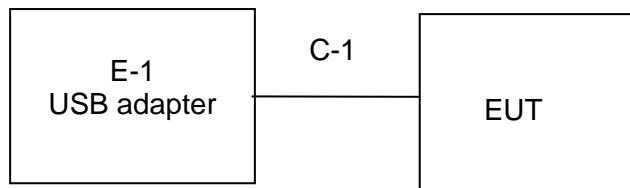
2.3 TEST SOFTWARE AND POWER LEVEL

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

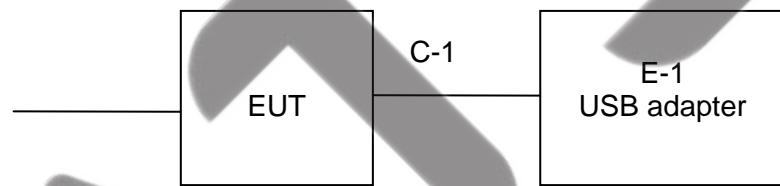
RF Function	Type	Mode Or Modulation type	Ant Gain(dBi)	Power Class	Software For Testing
WIFI(2.4G)	2.4G WIFI	802.11b	2	14	SecureCRT
		802.11g		13	
		802.11n(HT20)		10	
		802.11n(HT40)		10	

2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiation Test Set



Conduction Test Set



2.5 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
N/A	N/A	N/A	N/A	N/A	N/A

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Notebook	Lenovo	DESKTOP-USDE009	00326-10000-00000-AA636	N/A
C-1	USB Cable	N/A	100cm	N/A	N/A

Note:

(1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.6 LABORATORY INFORMATION

Company Name:	Shanghai ATBL Technology Co., Ltd.
Address:	Building 8, No. 160, Basheng Road, Waigaoqiao Free Trade Zone, Pudong New Area, Shanghai
Telephone:	+86(0)21-51298625
The FCC Registration Number (FRN):	0031025281
A2LA Number:	6184.01
CNAS Number:	CNAS L14531

2.7 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	RF output power, conducted	$\pm 0.958\text{dB}$
2	Conducted spurious emissions	$\pm 2.988\text{dB}$
3	All emissions, radiated 30MHz-1GHz	$\pm 2.50\text{dB}$
4	All emissions, radiated 1GHz-18GHz	$\pm 3.51\text{dB}$
5	Occupied bandwidth	$\pm 23.20\text{dB}$
6	Power spectral density	$\pm 0.886\text{dB}$

2.8 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Management number	Calibrated until
Test Receiver	R&S	ESCI	100469	SHATBL-E003	2022.07.13
Spectrum Analyzer	Agilent	N9020A	MY50200811	SHATBL-E017	2022.07.13
Bilog Antenna	SCHWARZBECK	VLUB 9168	01174	SHATBL-E008	2023.09.27
Horn Antenna	SCHWARZBECK	BBHA 9120D	02014	SHATBL-E009	2023.09.27
Pre-Amplifier (0.1M-3GHz)	JPT	JPA-10M1G35	2101010003500 1	SHATBL-E005	2022.10.07
Pre-Amplifier (1G-18GHz)	JPT	JPA0118-55-30 3A	1910001800055 000	SHATBL-E006	2022.07.13
Temperature & Humidity	DeLi	DeLi	N/A	SHATBL-E016	2022.10.07
Antenna/Turntable Controller	Brilliant	N/A	N/A	SHATBL-E007	N/A
Test SW	FALA	EMC-RI(Ver.4A2)		SHATBL-E046	N/A

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Management number	Calibration date
Test Receiver	R&S	ESPI	101679	SHATBL-E012	2022.07.13
LISN	R&S	ENV216	101300	SHATBL-E013	2022.07.13
LISN	R&S	ENV216	100333	SHATBL-E041	2022.03.08
Temperature & Humidity	DeLi	DeLi	N/A	SHATBL-E015	2022.10.07
Test SW	FALA	EZ-EMC(Ver.EMC-CON3A1.1)		SHATBL-E044	N/A

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	equipment number	Calibrated until
MIMO Power measurement test Set	DARE	RPR3006W	16I00054SN016	SHATBL-W006	2022.10.07
			RPR6W-20001005	SHATBL-W013	2022.10.07
Signal Analyzer	Agilent	N9020A	MY57300196	SHATBL-W004	2022.10.07
Signal Generator	Agilent	N5182B	MY46240556	SHATBL-W005	2022.10.07
Wireless Communications Test Set	R&S	CMW500	101331	SHATBL-W007	2022.10.07
Temperature & Humidity	Deli	deli	N/A	SHATBL-W011	2022.10.07
Attenuator	Agilent	8494B	DC-18G	SHATBL-W009	2022.10.07
Attenuator	Agilent	8496B	DC-18G	SHATBL-W010	2022.10.07
power splitter	MNK	MPD-DC/6-2S	62315 G51	SHATBL-W015	2022.10.07
			62315 G52	SHATBL-W016	2022.10.07
Filter	Chengdu kangmaiwei	ZBSF-C2400-2483.5-T3	N/A	SHATBL-W021	N/A
Constant temperature and humidity box	KSON	THS-B6C-150	6159K	SHATBL-W019	2022.01.26
Test SW	FALA	LZ-RF(Ver.LzRF-03A3.1)		SHATBL-W020	N/A

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table.

FREQUENCY (MHz)	Conducted Emission limit (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of “ *” marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

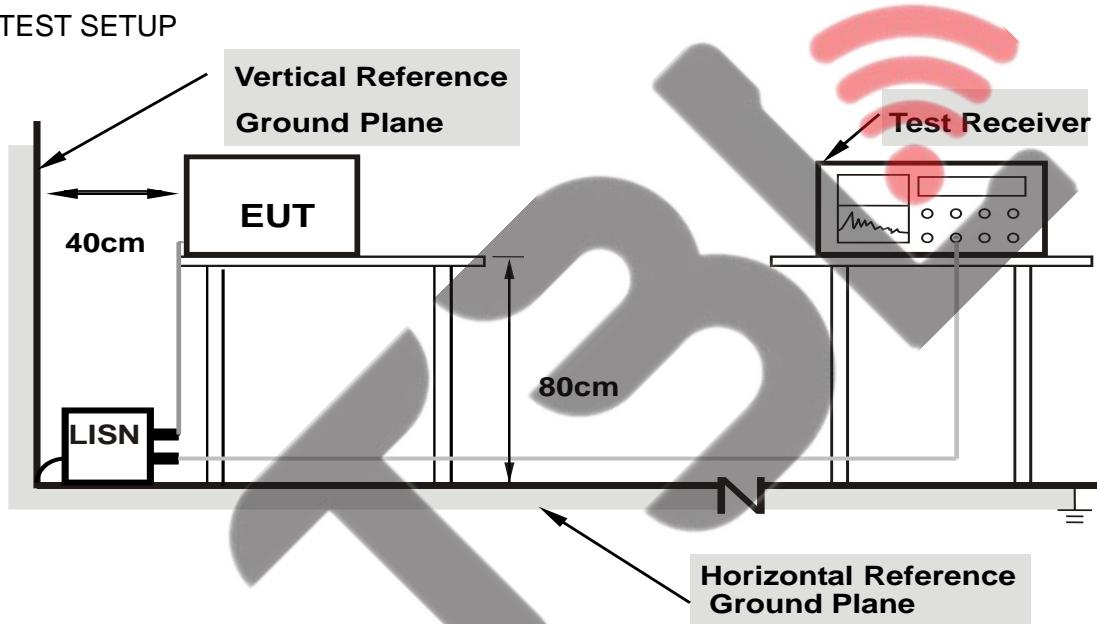
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.1.2 TEST PROCEDURE

- a. The EUT is 0.8 m from the horizontal ground plane and 0.4 m from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments are powered from additional LISN(s). The LISN provides 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN is at least 80 cm from the nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 TEST SETUP



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes support units.

3.1.4 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

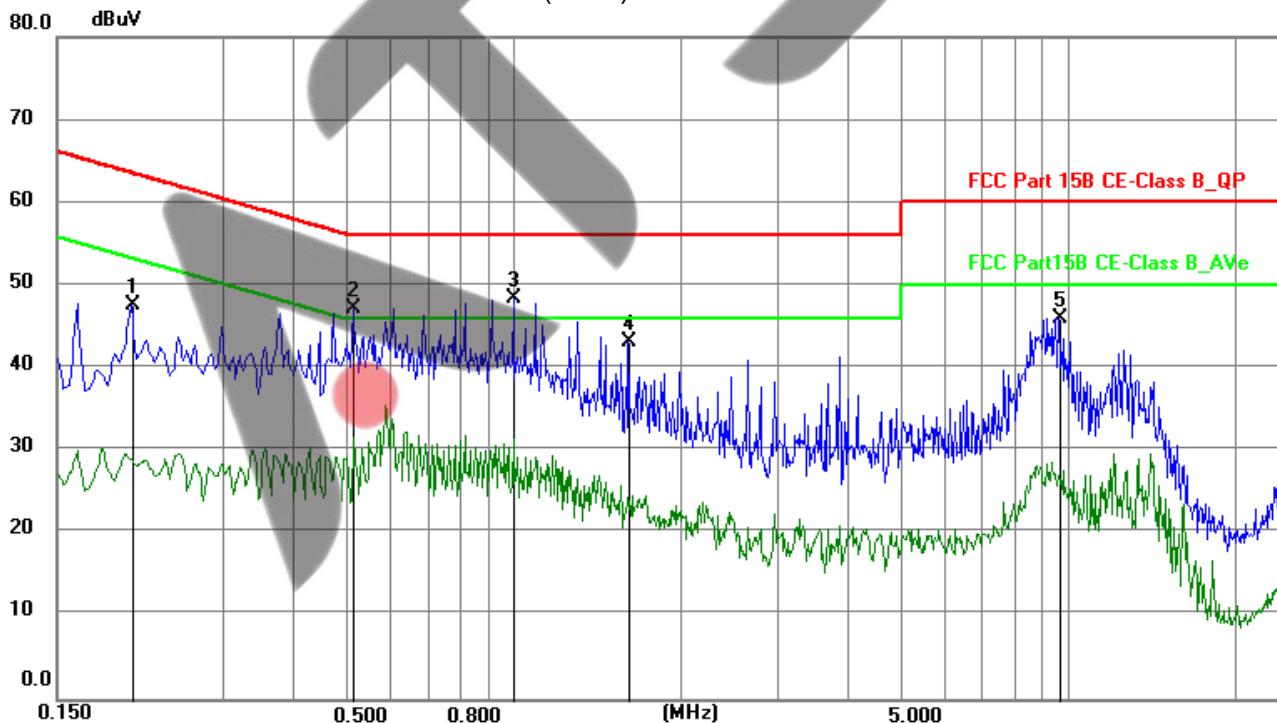
3.1.5 TEST RESULT

Temperature:	26.2°C	Relative Humidity:	53%RH
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 1		

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.2040	33.56	10.08	43.64	63.45	-19.81	QP
2	0.2040	15.62	10.08	25.70	53.45	-27.75	AVG
3	0.5144	33.15	10.04	43.19	56.00	-12.81	QP
4	0.5144	17.78	10.04	27.82	46.00	-18.18	AVG
5	1.0005	34.60	9.94	44.54	56.00	-11.46	QP
6	1.0005	17.63	9.94	27.57	46.00	-18.43	AVG
7	1.6125	28.36	9.96	38.32	56.00	-17.68	QP
8	1.6125	12.35	9.96	22.31	46.00	-23.69	AVG
9	9.6990	30.73	10.32	41.05	60.00	-18.95	QP
10	9.6990	13.48	10.32	23.80	50.00	-26.20	AVG
11	27.7080	19.55	11.16	30.71	60.00	-29.29	QP
12	27.7080	9.32	11.16	20.48	50.00	-29.52	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result =Reading + Factor)–Limit.
3. Factor=LISN factor+Cableloss+Limiter (10dB)

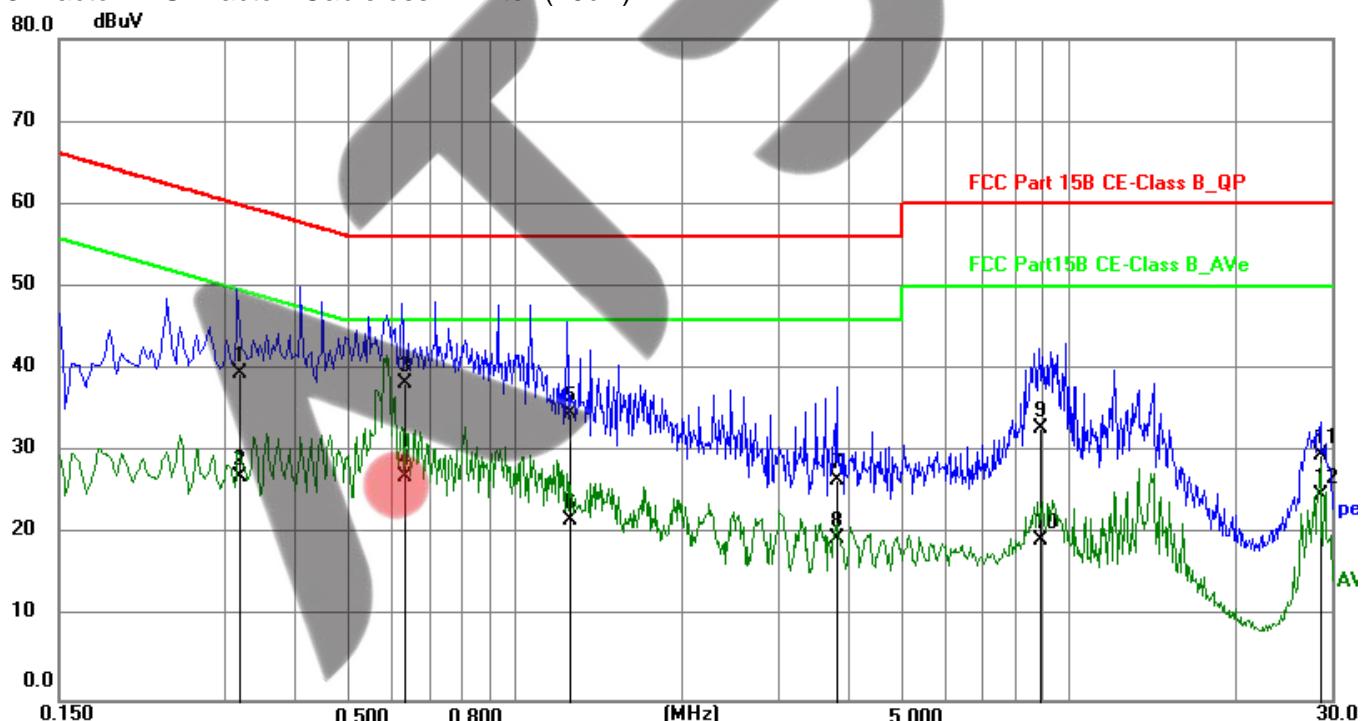


Temperature:	26.2°C	Relative Humidity:	53%RH
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Mode 1		

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.3180	29.35	10.32	39.67	59.76	-20.09	QP
2	0.3180	16.70	10.32	27.02	49.76	-22.74	AVG
3	0.6310	28.18	10.16	38.34	56.00	-17.66	QP
4	0.6310	17.02	10.16	27.18	46.00	-18.82	AVG
5	1.2590	24.56	10.16	34.72	56.00	-21.28	QP
6	1.2590	11.77	10.16	21.93	46.00	-24.07	AVG
7	3.8160	16.43	10.24	26.67	56.00	-29.33	QP
8	3.8160	9.42	10.24	19.66	46.00	-26.34	AVG
9	8.8950	22.78	10.15	32.93	60.00	-27.07	QP
10	8.8950	9.38	10.15	19.53	50.00	-30.47	AVG
11	28.6870	18.51	11.18	29.69	60.00	-30.31	QP
12	28.6870	13.63	11.18	24.81	50.00	-25.19	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result =Reading + Factor)–Limit.
3. Factor=LISN factor+Cableloss+Limiter (10dB)



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205(a)&209(a) limit in the table and according to ANSI C63.10-2013 below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

Frequencies (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (1000MHz-25GHz)

FREQUENCY (MHz)	(dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RESTRICTED FREQUENCY BANDS

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

For Radiated Emission

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/QP/AV
Start Frequency	9 KHz/150KHz(Peak/QP/AV)
Stop Frequency	150KHz/30MHz(Peak/QP/AV)
RB / VB (emission in restricted band)	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz); 200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/QP
Start Frequency	30 MHz(Peak/QP)
Stop Frequency	1000 MHz (Peak/QP)
RB / VB (emission in restricted band)	120 KHz / 300 KHz

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/AV
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier harmonic(Peak/AV)
RB / VB (emission in restricted band)	1MHz / 3MHz(Peak) 1 MHz/1/T MHz(AVG)

For Restricted band

Spectrum Parameter	Setting
Detector	Peak/AV
Start/Stop Frequency	Lower Band Edge: 2310 to 2430 MHz Upper Band Edge: 2445 to 2500 MHz
RB / VB	1 MHz / 3 MHz(Peak) 1 MHz/1/T MHz(AVG)

Receiver Parameter	Setting
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

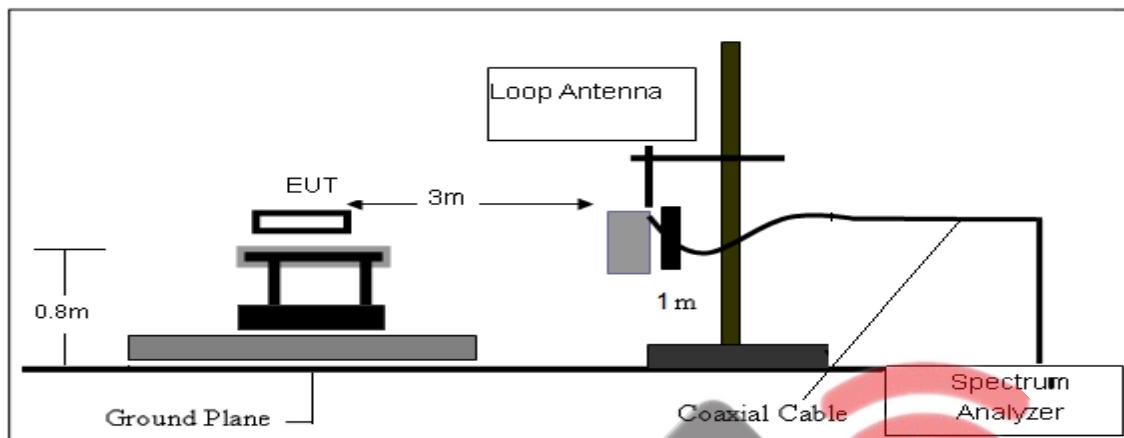
- a. The measuring distance at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
- b. The EUT was placed on the top of a rotating table 0.8 m (above 1GHz is 1.5 m) above the ground at a 3 m anechoic chamber test site. The table was rotated 360 degree to determine the position of the highest radiation.
- c. The height of the equipment shall be 0.8 m (above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. Horizontal and vertical polarization of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and QuasiPeak detector mode will be re-measured.
- e. If the Peak Mode measured value is compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and no additional QP Mode measurement was performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

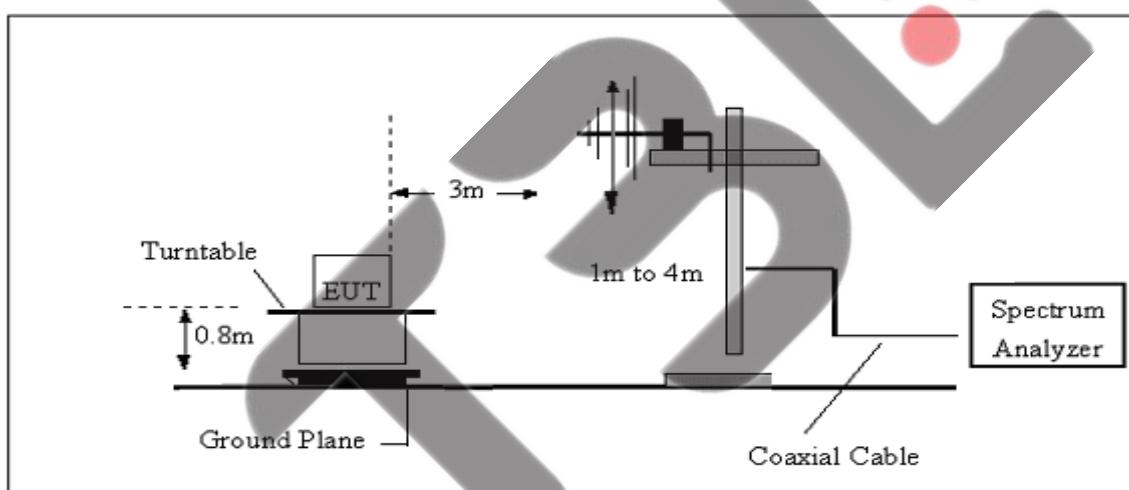
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

3.2.3 TEST SETUP

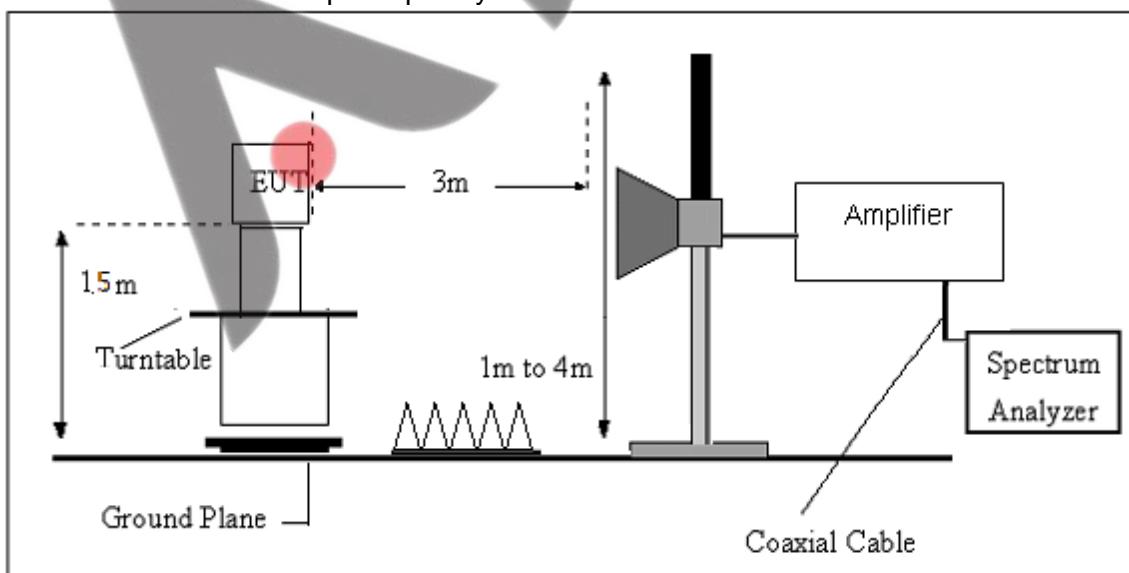
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



3.2.4 EUT OPERATING CONDITIONS

Please refer to section 3.1.4 of this report.

3.2.5 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where

FS = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

For example

Frequency (MHz)	FS (dB μ V/m)	RA (dB μ V/m)	AF (dB)	CL (dB)	AG (dB)	Factor (dB)
300	40	58.1	12.2	1.6	31.9	-18.1

$$\text{Factor} = AF + CL - AG$$

3.2.6 TEST RESULTS(RADIATED SPURIOUS EMISSIONS)

Temperature:	23.0(C)	Relative Humidity:	59%RH
Test Voltage:	DC 5V	Polarization:	--
Test Mode:	TX Mode		

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

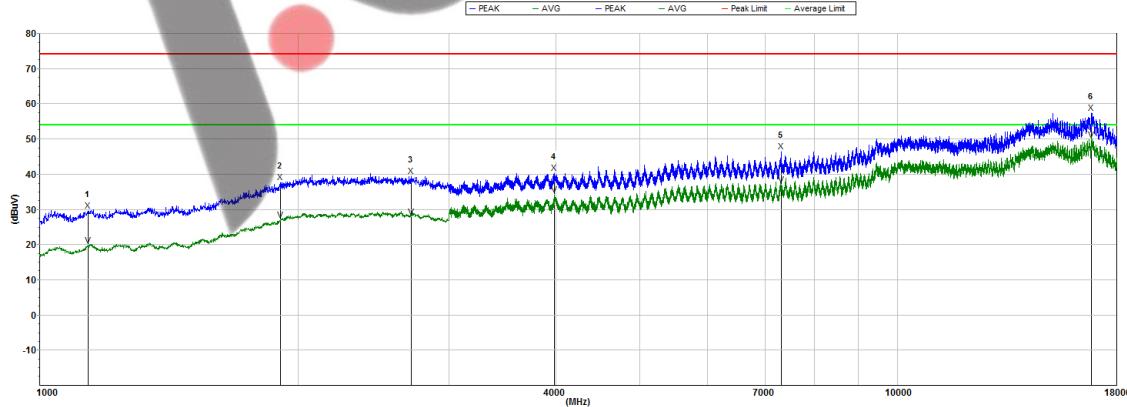
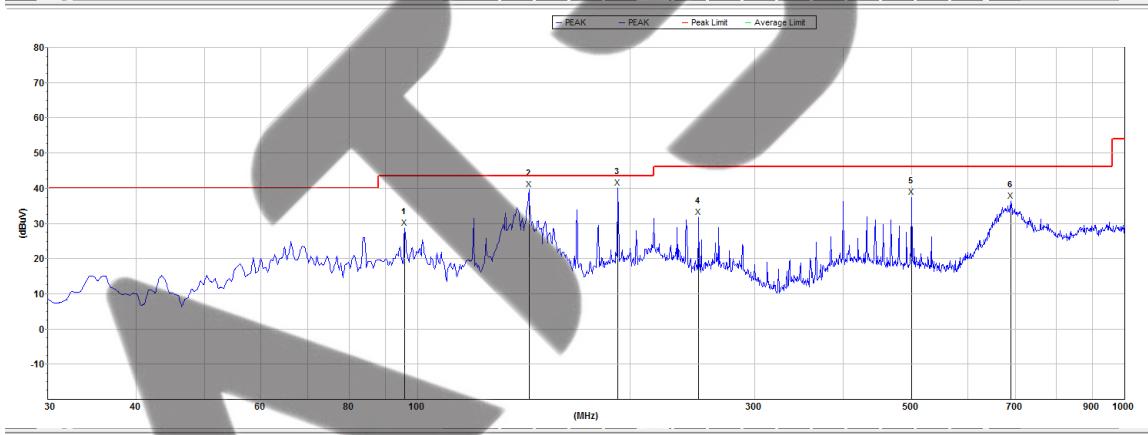
Distance extrapolation factor = $40 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

30MHz - 18000MHz

Temperature:	23.0(C)	Relative Humidity:	59%RH
Test Voltage:	DC 5V	Phase:	Horizontal
Test Mode:	Mode 1/2/3/4/5/6/7/8/9/10/11/12 (Mode 1/2/3 worst mode)		

2412 Horizontal



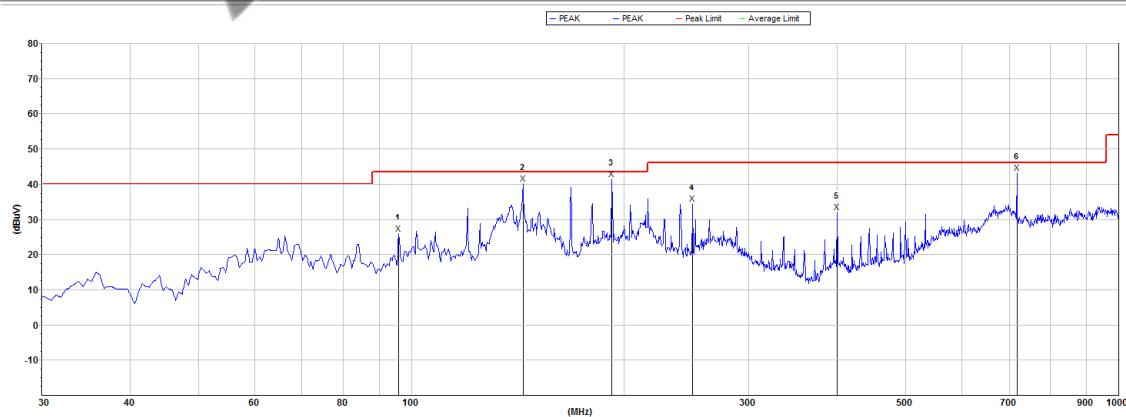
Temperature:	23.0(C)	Relative Humidity:	59%RH
Test Voltage:	DC 5V	Phase:	Vertical
Test Mode:	Mode 1/2/3/4/5/6/7/8/9/10/11/12 (Mode 1/2/3 worst mode)		

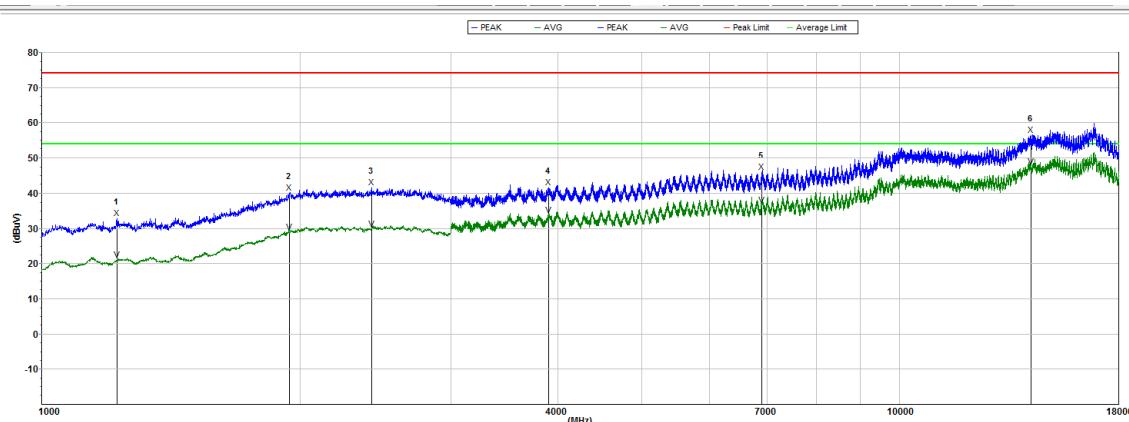
2412 Vertical



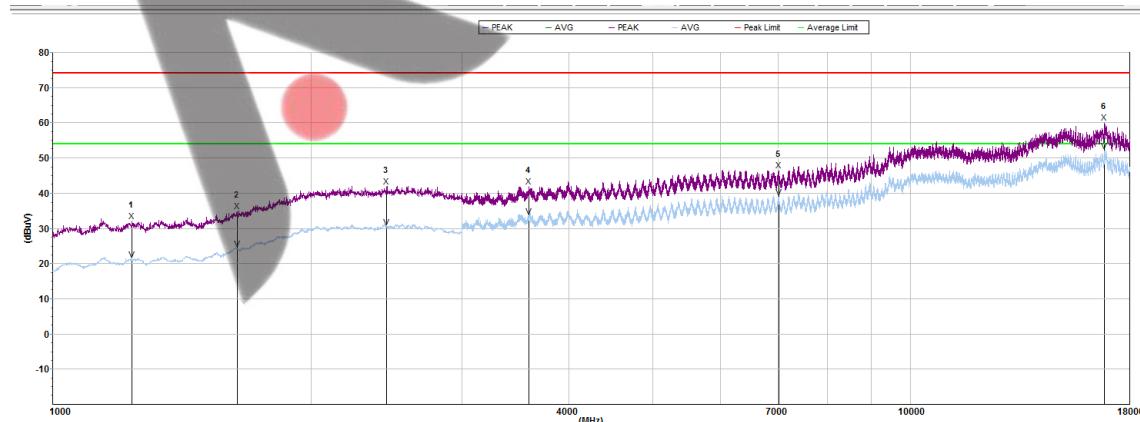
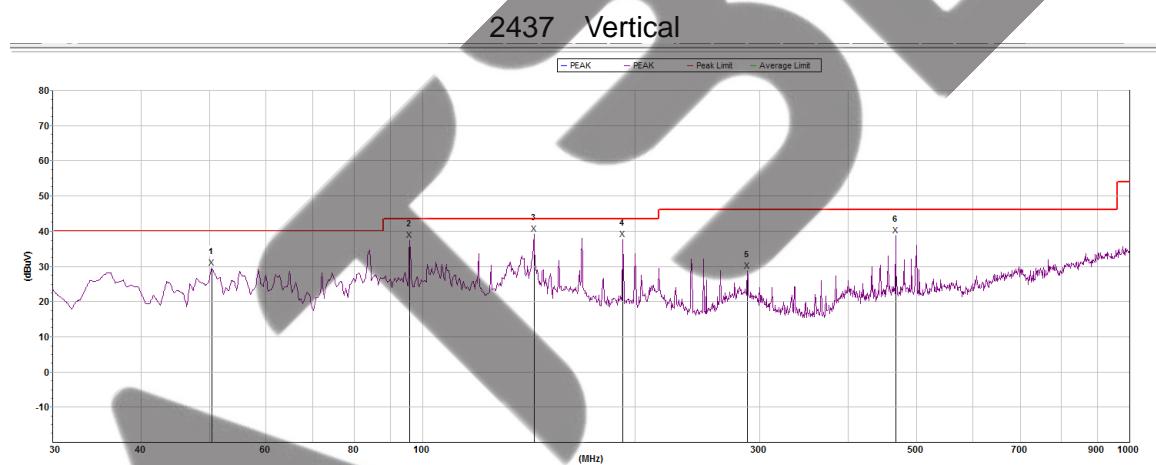
Temperature:	23.0(C)	Relative Humidity:	59%RH
Test Voltage:	DC 5V	Phase:	Horizontal
Test Mode:	Mode 1/2/3/4/5/6/7/8/9/10/11/12 (Mode 1/2/3 worst mode)		

2437 Horizontal

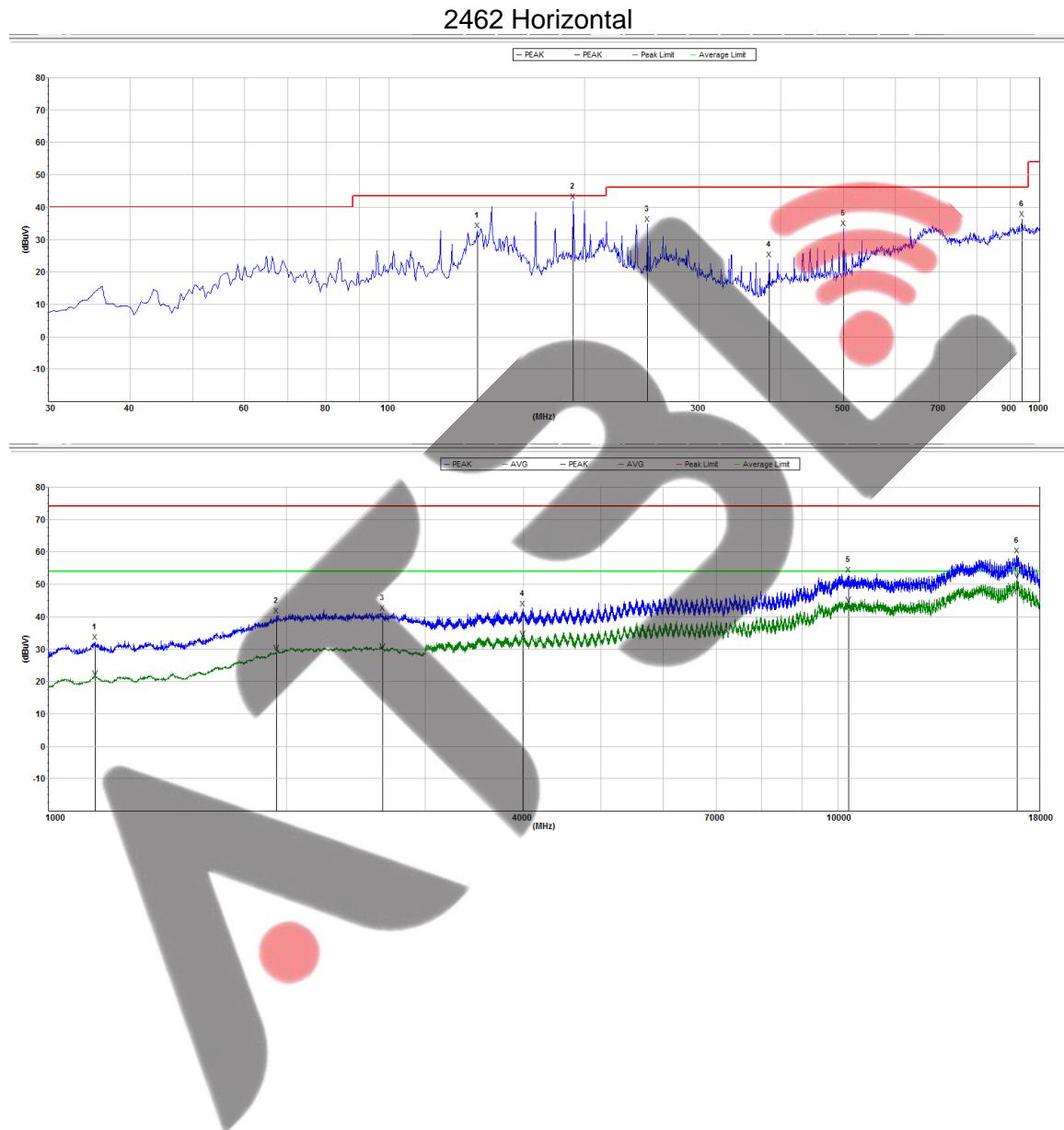




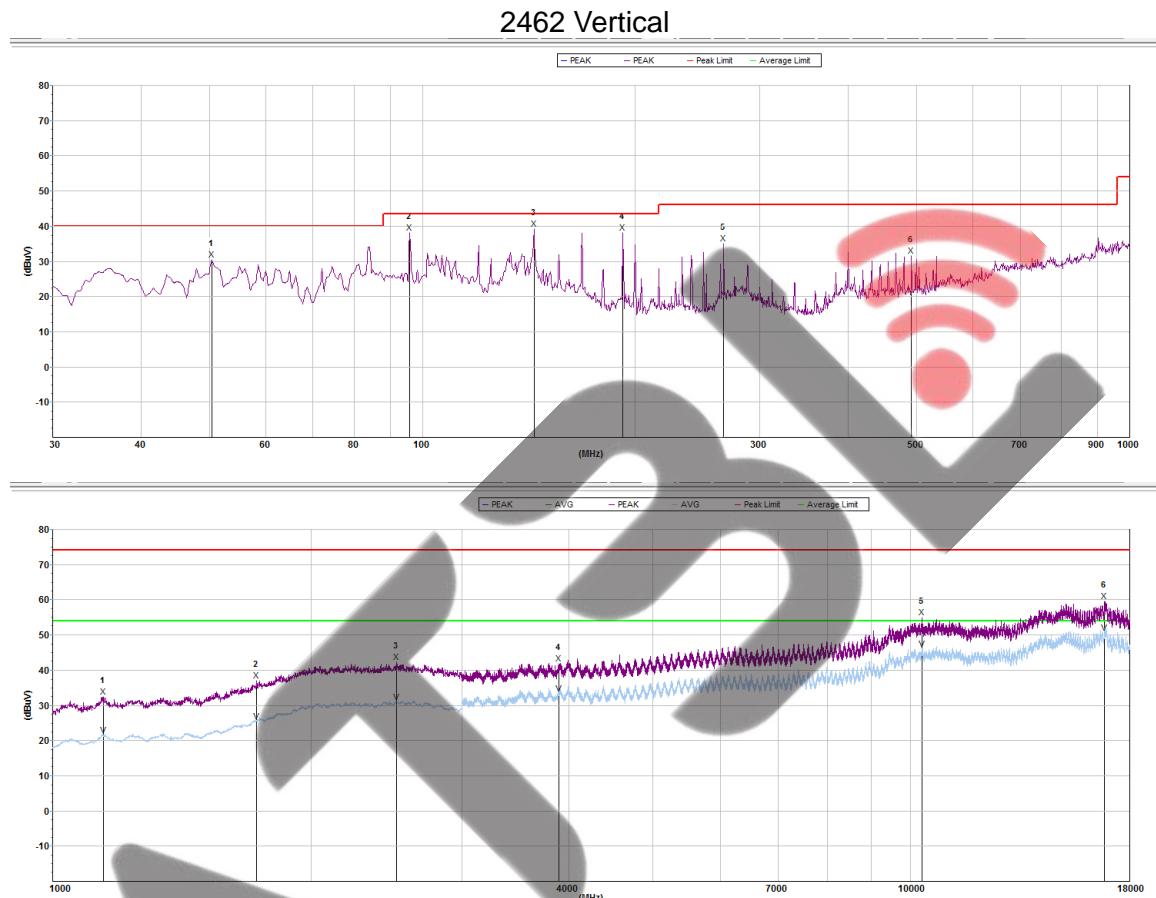
Temperature:	23.0(C)	Relative Humidity:	59%RH
Test Voltage:	DC 5V	Phase:	Vertical
Test Mode:	Mode 1/2/3/4/5/6/7/8/9/10/11/12 (Mode 1/2/3 worst mode)		



Temperature:	23.0(C)	Relative Humidity:	59%RH
Test Voltage:	DC 5V	Phase:	Horizontal
Test Mode:	Mode 1/2/3/4/5/6/7/8/9/10/11/12 (Mode 1/2/3 worst mode)		



Temperature:	23.0(C)	Relative Humidity:	59%RH
Test Voltage:	DC 5V	Phase:	Vertical
Test Mode:	Mode 1/2/3/4/5/6/7/8/9/10/11/12 (Mode 1/2/3 worst mode)		



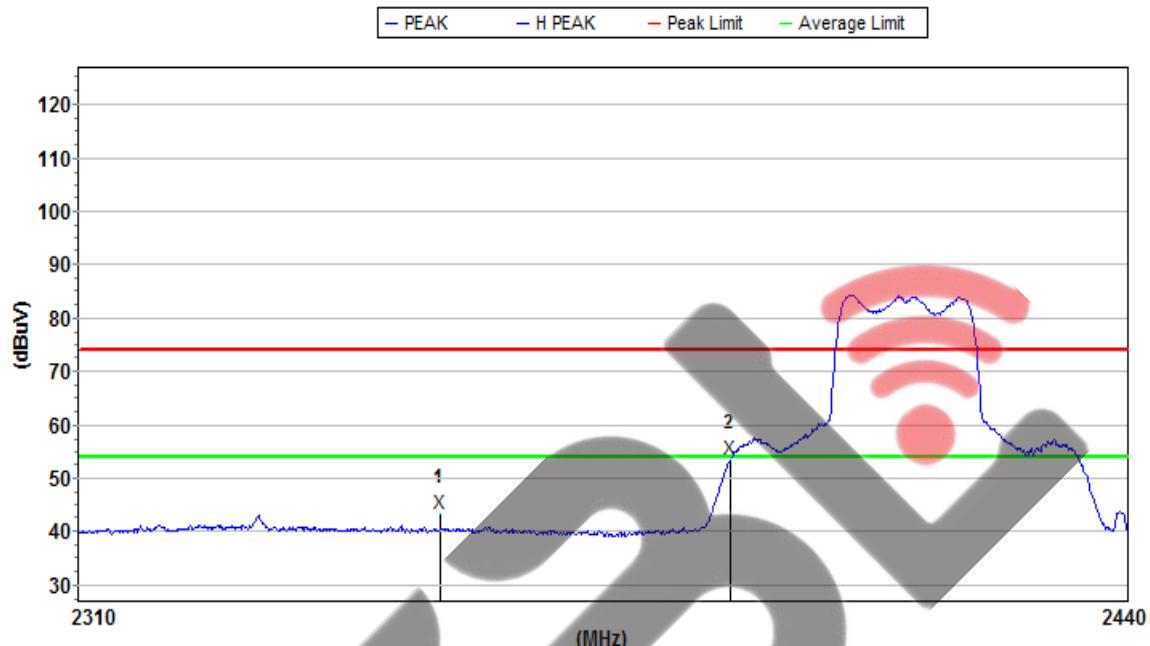
Note:

1. Factor=Ant.Factor+cable loss-Amp.Gain .
2. Level contains the factor;Margin=Limit-Level.
3. 802.11b, 802.11g, 802.11n (HT-20), 802.11n (HT-40) mode all have been tested, the worst case is 802.11b, only show the worstcase.

3.2.6 TEST RESULTS (BAND EDGEREQUIREMENTS)

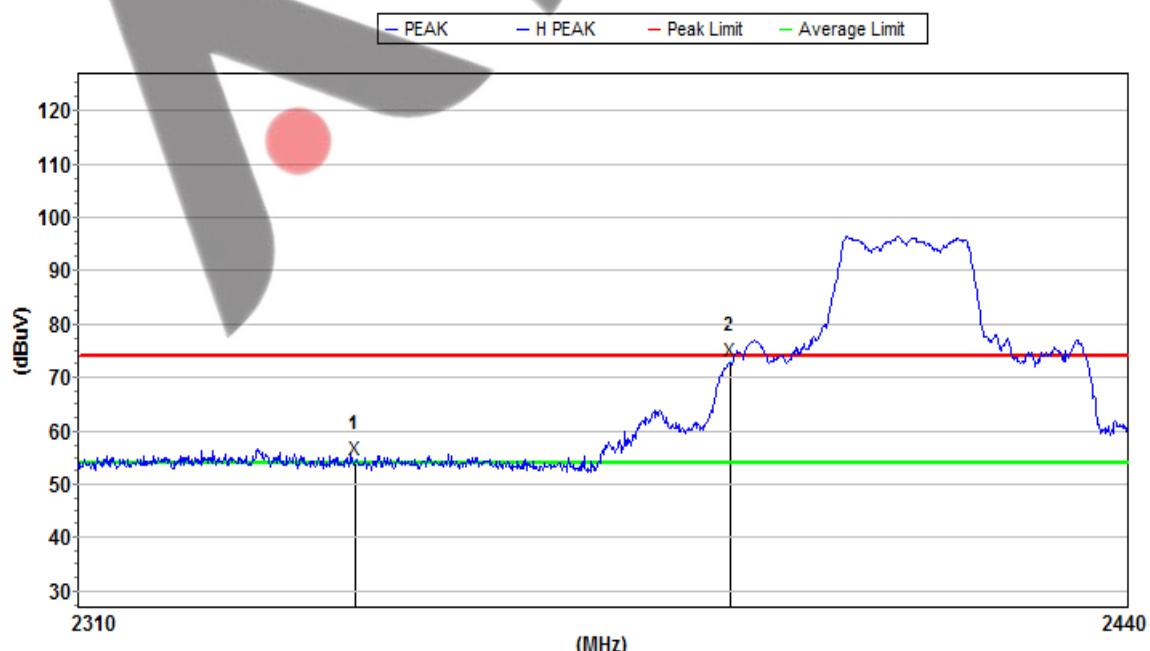
802.11g-Low

Horizontal-Avg



Mk.	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Ant.F/G.(dB/m)	Amp.G.(dB)	Pol.
Avg:							
1	2354.048124	43.5	54.0	10.5	22.7	50.2	H
2	2390.000000	53.8	54.0	0.2	22.8	50.2	H

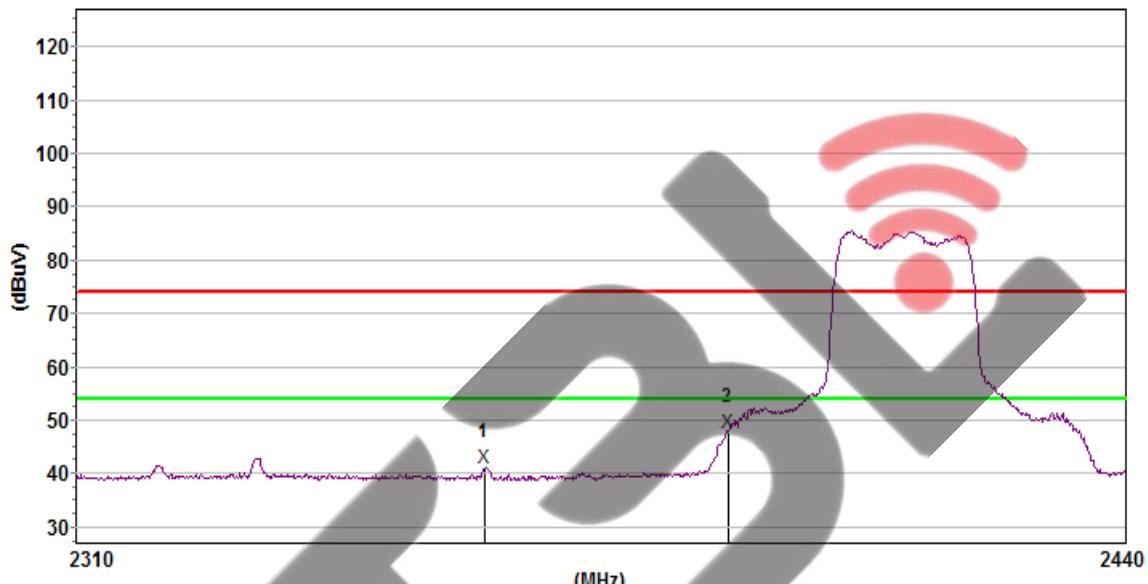
Horizontal-Peak



Mk.	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Ant.F/G.(dB/m)	Amp.G.(dB)	Pol.
Peak:							
1	2343.631526	54.5	74.0	19.5	22.7	50.2	H
2	2390.000000	72.9	74.0	1.1	22.8	50.2	H

Vertical-Avg

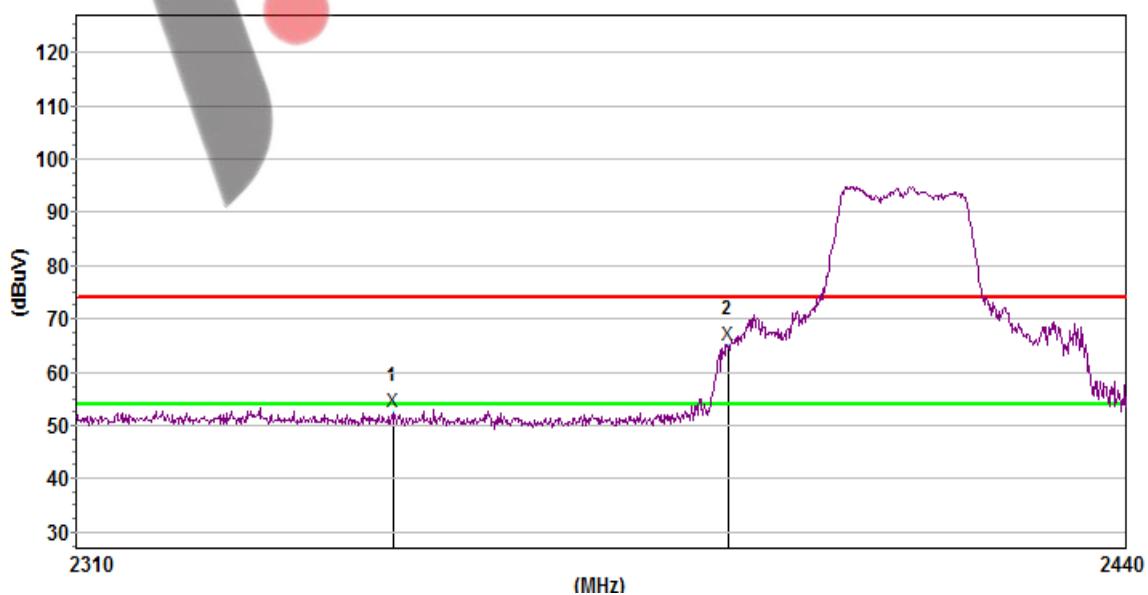
— PEAK — V PEAK — Peak Limit — Average Limit



Mk.	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Ant.F/G.(dB/m)	Amp.G.(dB)	Pol.
Avg:							
1	2359.725915	41.1	54.0	12.9	23.0	50.2	V
2	2390.000000	47.6	54.0	6.4	23.1	50.2	V

Vertical-Peak

— PEAK — V PEAK — Peak Limit — Average Limit

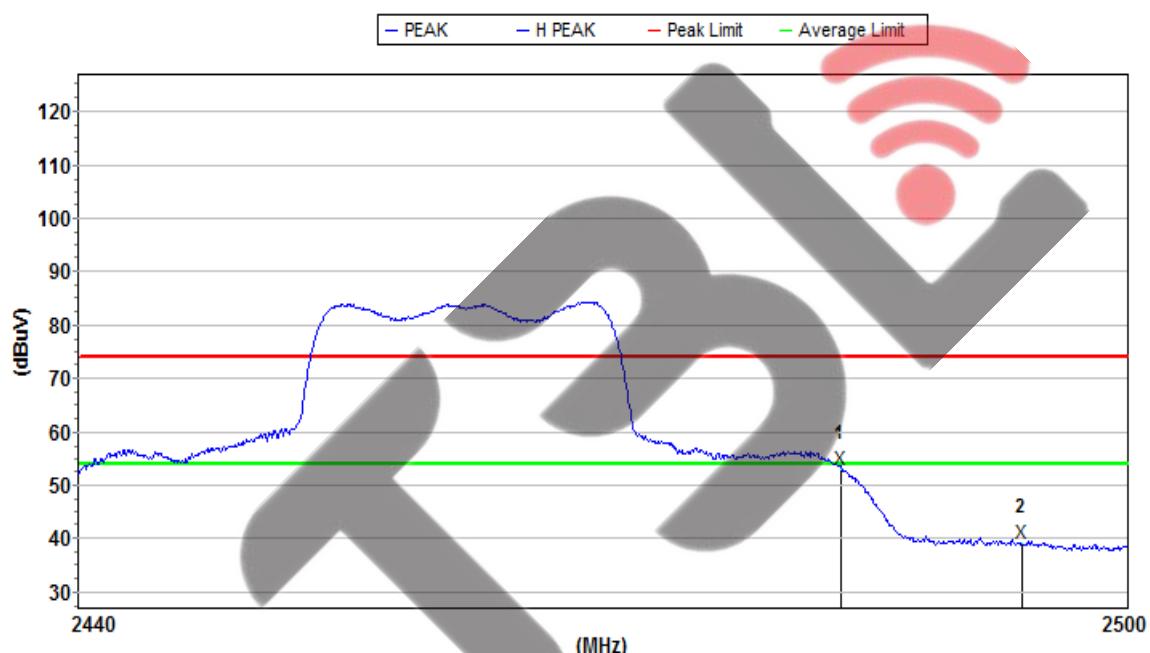


0

Mk.	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Ant.F/G.(dB/m)	Amp.G.(dB)	Pol.
Peak:							
1	2348.512573	52.6	74.0	21.4	23.0	50.2	V
2	2390.000000	65.0	74.0	9.0	23.1	50.2	V

802.11g-High

Horizontal-Avg



Mk.	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Ant.F/G.(dB/m)	Amp.G.(dB)	Pol.
Avg:							
1	2483.500000	53.1	54.0	0.9	22.9	50.2	H
2	2493.873614	39.2	54.0	14.8	22.9	50.2	H

Horizontal-Peak



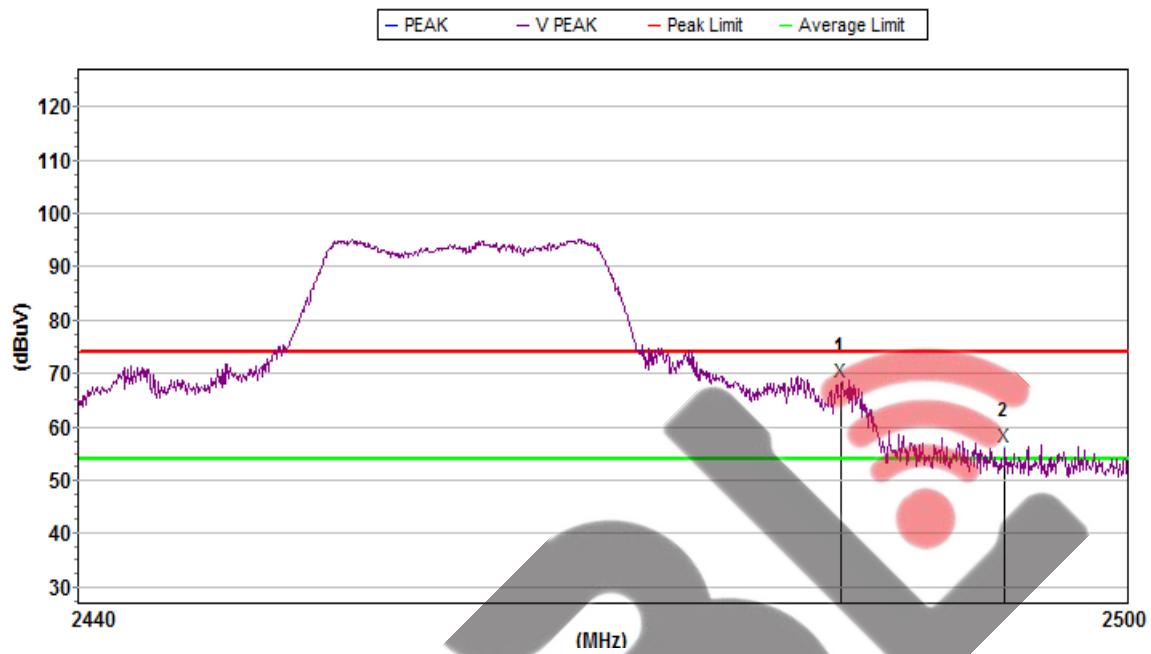
Mk.	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Ant.F/G.(dB/m)	Amp.G.(dB)	Pol.
Peak:							
1	2483.500000	73.4	74.0	0.6	22.9	50.2	H
2	2492.238412	57.9	74.0	16.1	22.9	50.2	H

Vertical-Avg



Mk.	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Ant.F/G.(dB/m)	Amp.G.(dB)	Pol.
Avg:							
1	2483.500000	49.2	54.0	4.8	23.3	50.2	V
2	2491.875179	40.2	54.0	13.8	23.3	50.2	V

Vertical-Peak



Mk.	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Ant.F/G.(dB/m)	Amp.G.(dB)	Pol.
Peak:							
1	2483.500000	68.3	74.0	5.7	23.4	50.2	V
2	2492.904476	56.4	74.0	17.6	23.4	50.2	V

Note: 802.11b, 802.11g, 802.11n (HT-20), 802.11n (HT-40) mode all have been tested, the worst case is 802.11g, only show the worst case.

4.CONDUCTED SPURIOUS & BAND EDGE EMISSION

4.1 LIMIT

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

4.2 TEST PROCEDURE

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

For Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 2300 to 2432 MHz Upper Band Edge: 2442 to 2500 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

4.3 DEVIATION FROM STANDARD

No deviation.

4.4 TEST SETUP



The EUT which is powered by the Battery, is connected to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

4.5 EUT OPERATION CONDITIONS

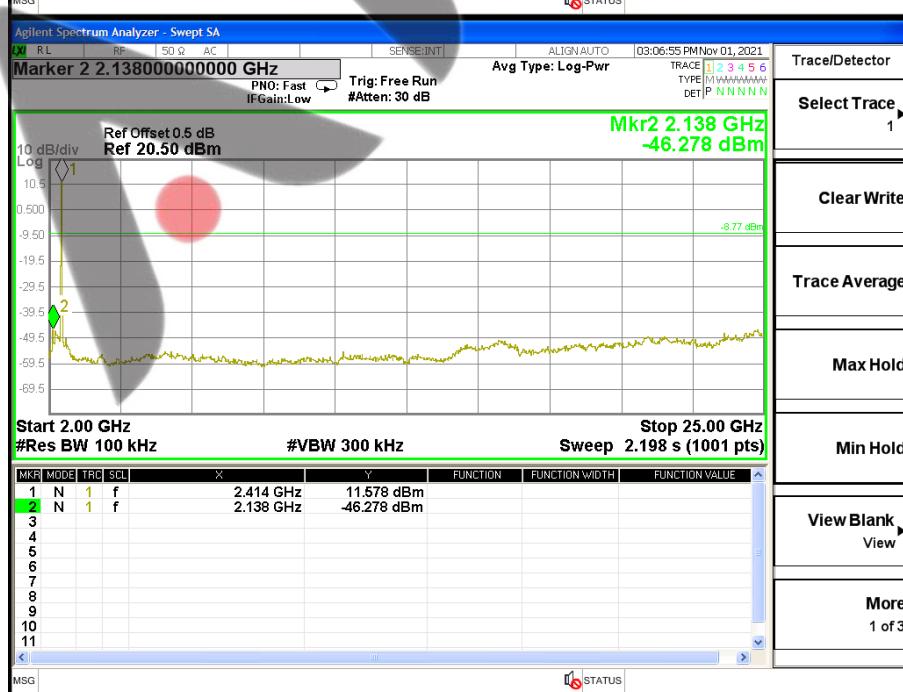
Please refer to section 3.1.4 of this report.

4.6 TEST RESULTS

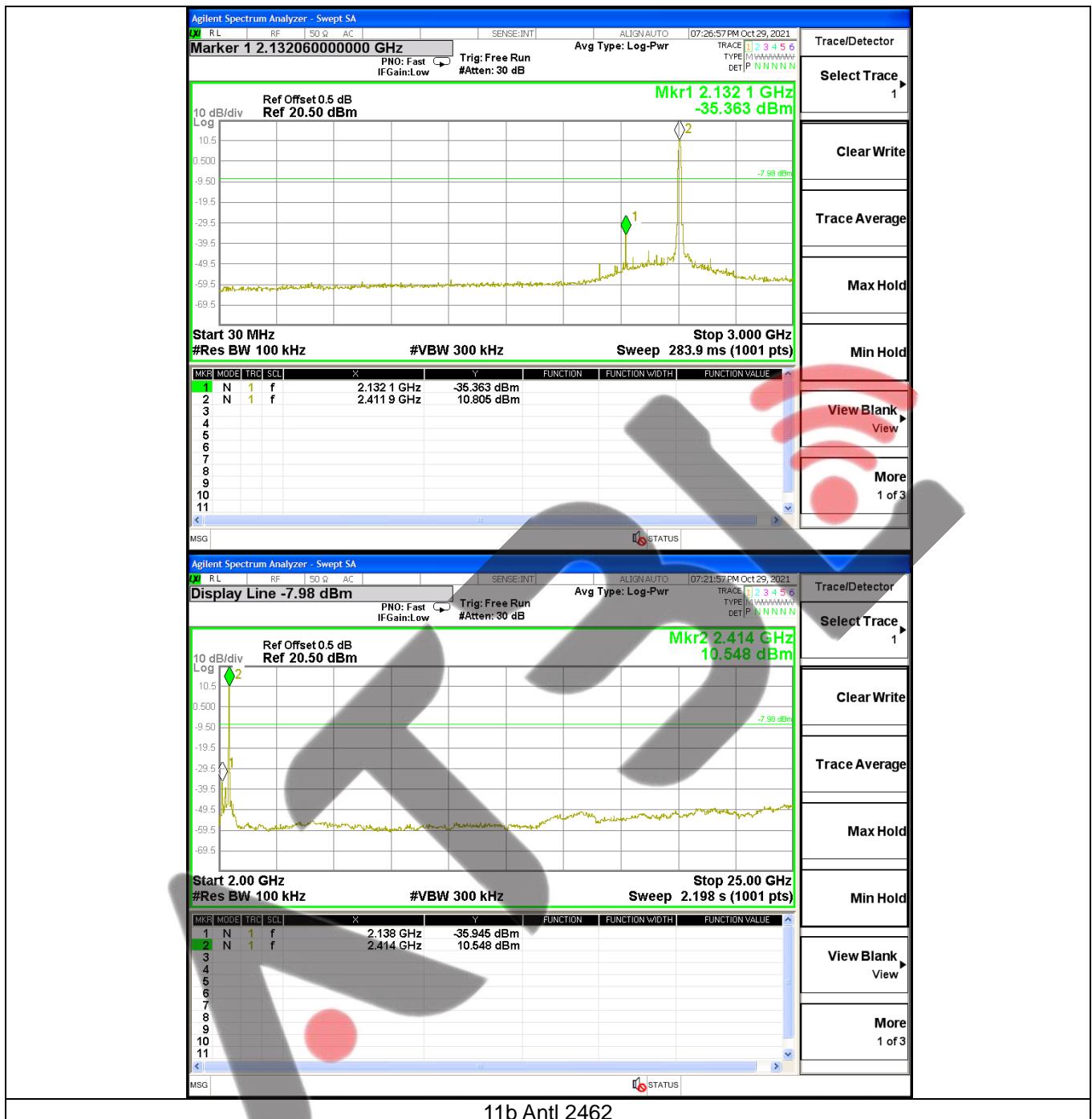
Temperature:	25 °C	Relative Humidity:	60%
Test Voltage:	DC 5V	Test Mode:	TX b Mode /CH01, CH11

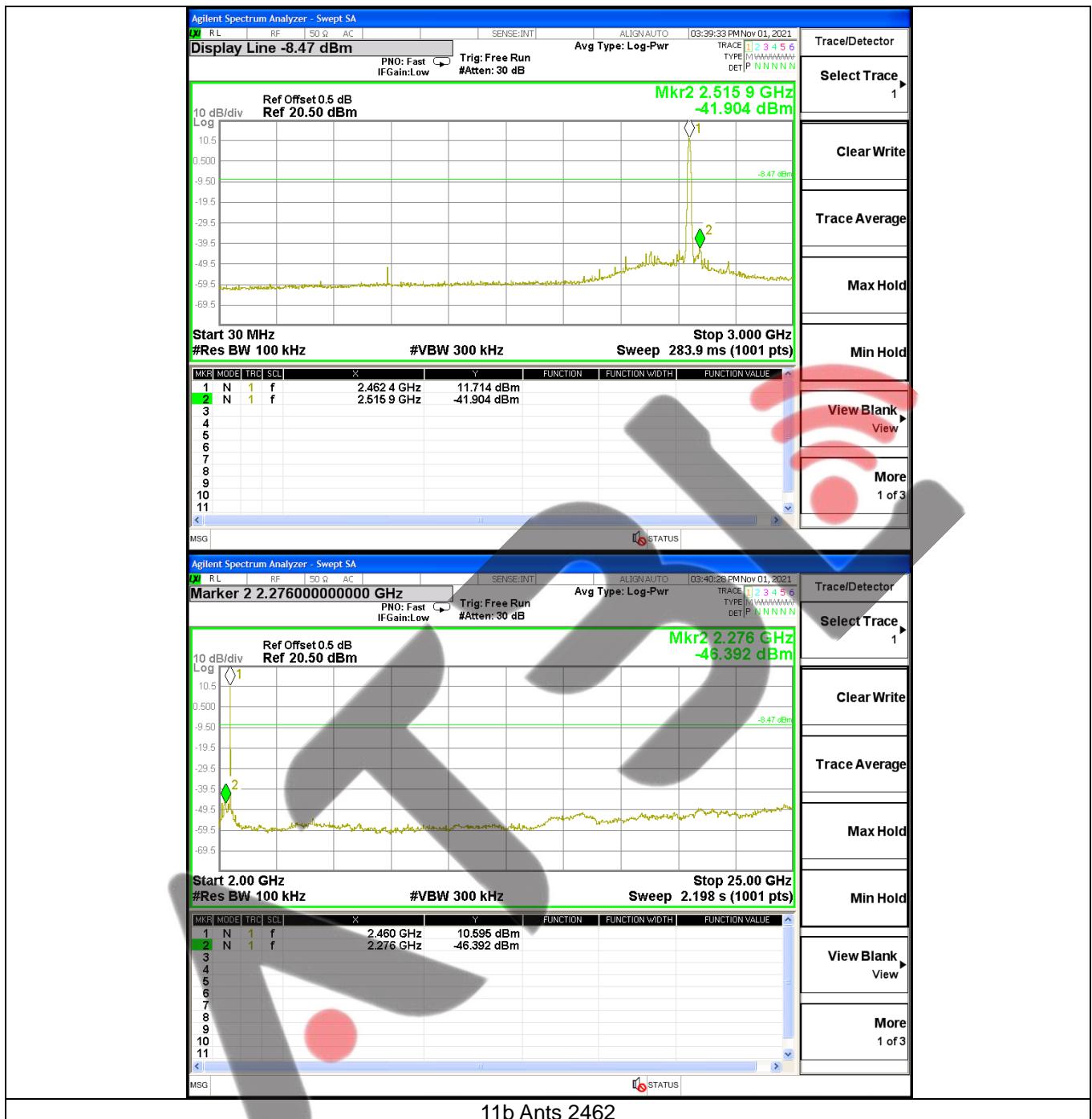
Mode	Frequency(MHz)	Test value(MHz)	Test value(dBm)	Limit(dBm)	Results
11b Antl	2412	2239.7	-44.685	-8.774	Pass
11b Ants	2412	2132.1	-35.363	-7.979	Pass
11b Antl	2462	2515.9	-41.904	-8.466	Pass
11b Ants	2462	2133.0	-35.123	-7.154	Pass

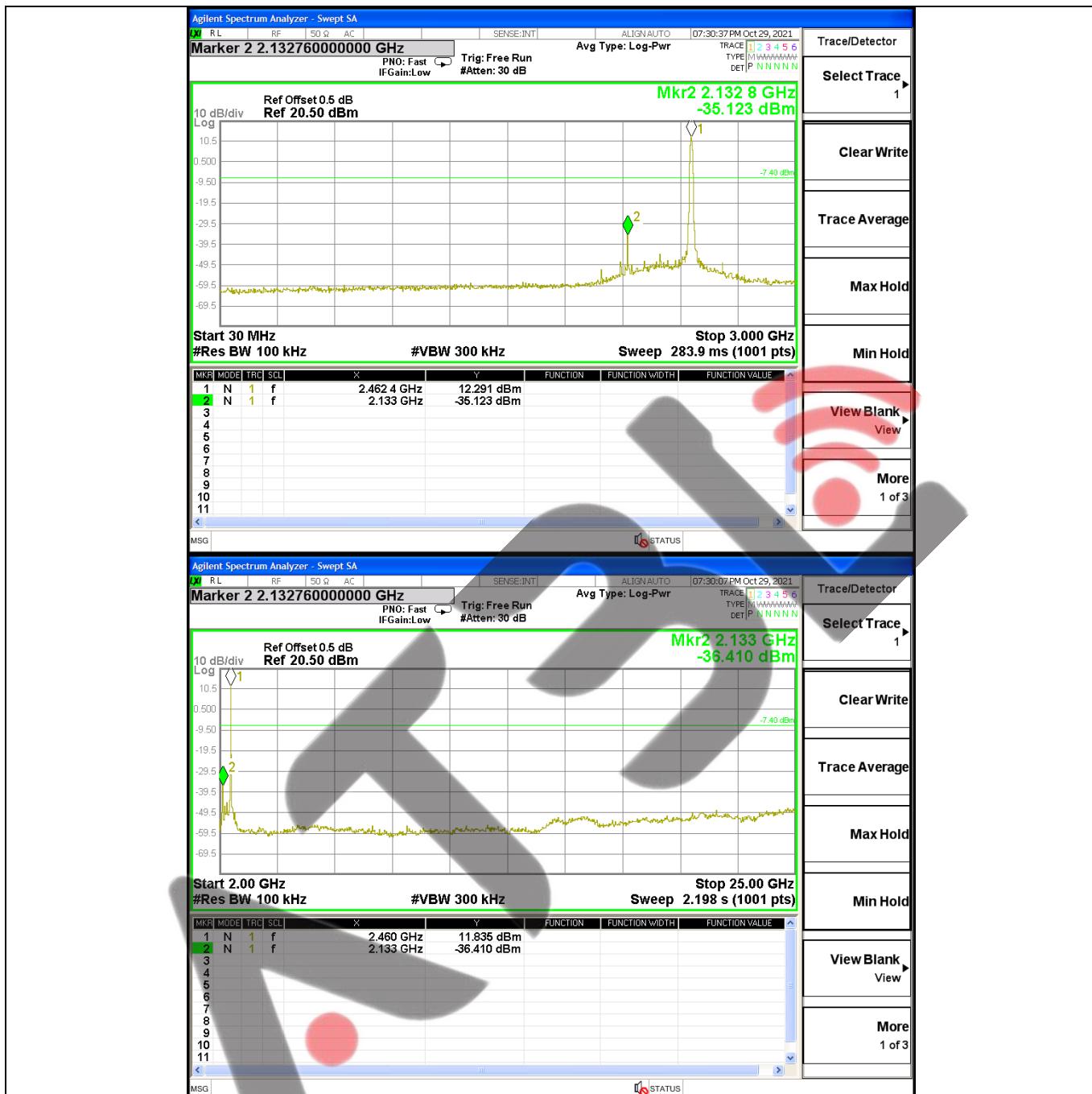
11b Antl 2412



11b Ants 2412



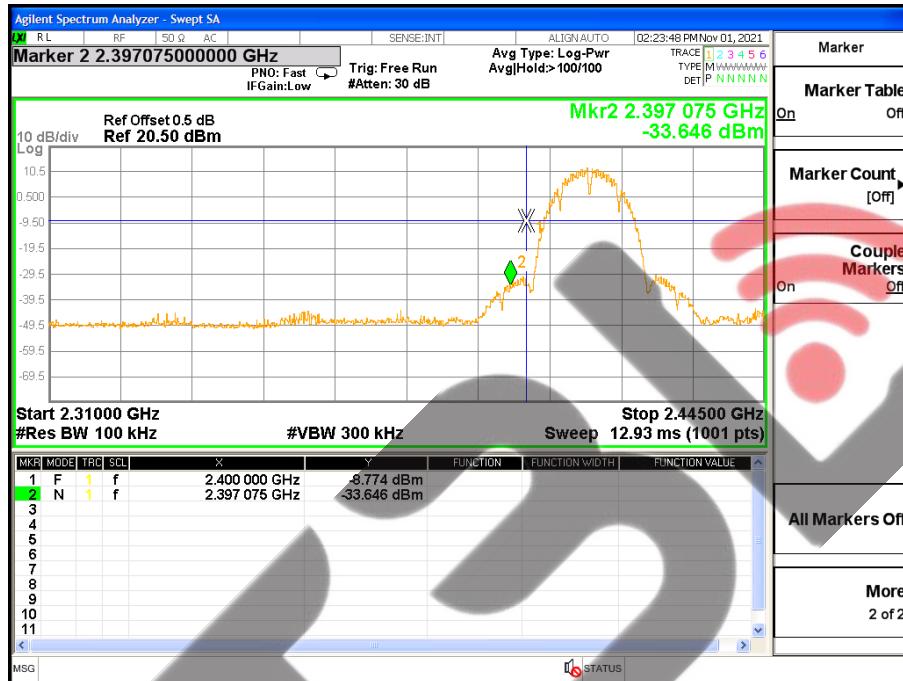




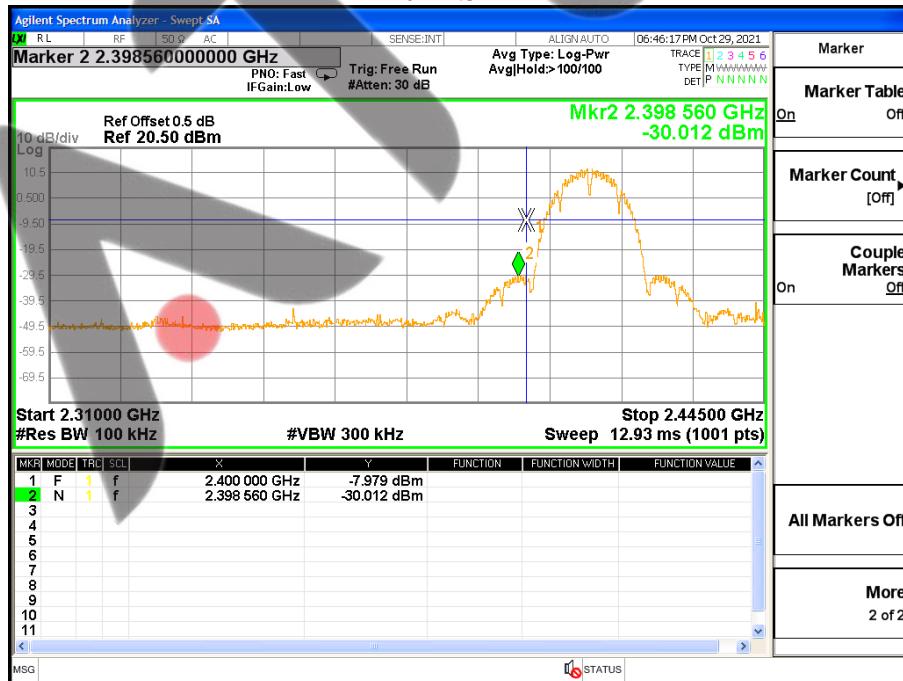
Band edge(it's also the reference level for conducted spurious emission)

Mode	Frequency(MHz)	Test value (dBm)	Limit(dBm)	Result
11b Antl	2412	-33.646	-8.774	Pass
11b Ants	2412	-30.012	-7.979	Pass
11b Antl	2462	-38.967	-8.466	Pass
11b Ants	2462	-42.658	-7.154	Pass

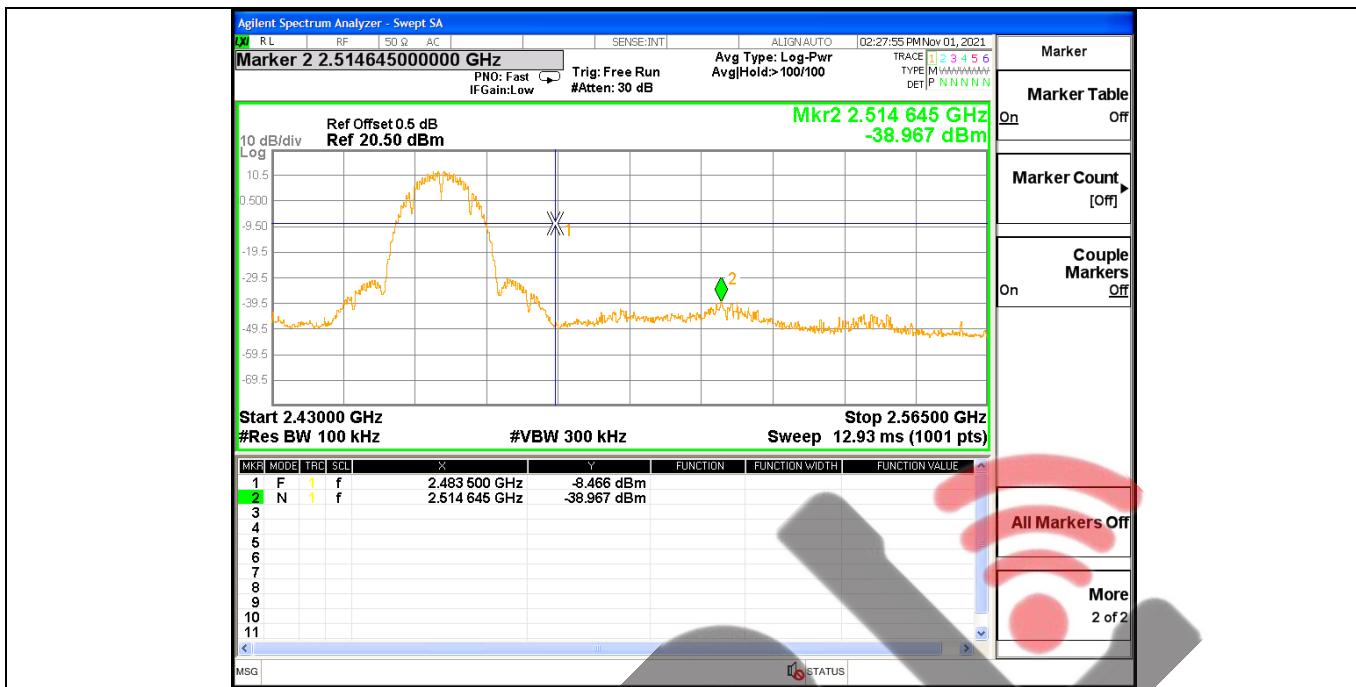
11b Antl 2412



11b Ants 2412



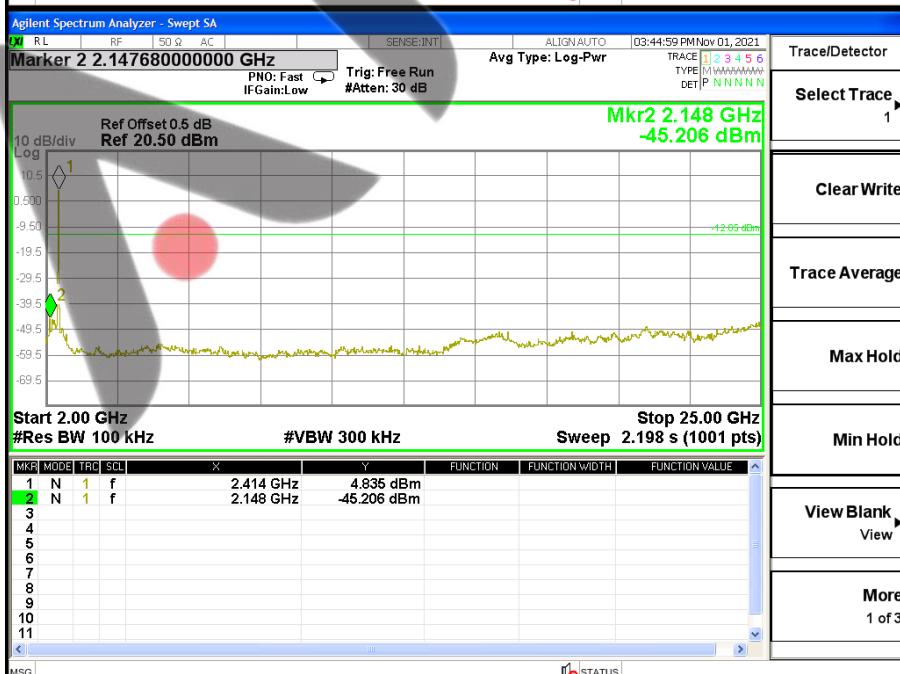
11b Antl 2462



Temperature:	25°C	Relative Humidity:	60%
Test Voltage:	DC 5V	Test Mode:	TX g Mode /CH01, CH11

Mode	Frequency(MHz)	Test value(MHz)	Test value(dBm)	Limit(dBm)	Results
11g Antl	2412	2239.7	-42.895	-12.650	Pass
11g Ants	2412	2133.0	-32.089	-11.973	Pass
11g Antl	2462	2400.1	-42.873	-13.199	Pass
11g Ants	2462	2132.8	-34.133	-11.639	Pass

11g Antl 2412



11g Ants 2412

