

FCC 15.247 2.4GHz Test Report

for

Elitegroup Computer Systems Co., Ltd.

No. 239, Sec. 2., TiDing Blvd., Taipei, Taiwan 11493

Product Name : Ultra tiny PC
Model Name : (1)LIVA Q1AXXXXXX (2)PB01AX
(X=A to Z,a-z,0-9 or blank)
Brand : (1)LIVA (2)ECS
FCC ID : WL6LIVA-Q1APLUS

Prepared by: : AUDIX Technology Corporation,
EMC Department



The test report is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

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**Audix Technology Corp.**

No. 491, Zhongfu Rd., Linkou Dist.,

New Taipei City 244, Taiwan

Tel: +886 2 26099301**Fax: +886 2 26099303**

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APPENDIX A TEST DATA AND PLOTS

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TEST REPORT

Applicant : Elitegroup Computer Systems Co., Ltd.
EUT Description
(1) Product : Ultra tiny PC
(2) Model : (1)LIVA Q1AXXXXX (2)PB01AX (X=A to Z,a-z,0-9 or blank)
(3) Brand : (1)LIVA (2)ECS
(4) Power Supply : DC 12V, 2A

Applicable Standards:

Title 47 CFR FCC Part 15 Subpart C
ANSI C63.10:2013

Audix Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Audix Technology Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Report: 2021. 05. 31

Reviewed by: Sabrina Wang (Sabrina Wang/Administrator)

Approved by: Johnny Hsueh (Johnny Hsueh/Section Manager)



Audix Technology Corp.
No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

1. REVISION RECORD OF TEST REPORT

Edition No	Issued Date	Revision Summary	Report Number
0	2021. 05. 31	Original Report	EM-F210266

2. SUMMARY OF TEST RESULTS

Rule	Description	Results
15.207	Conducted Emission	PASS
15.247(d)/ 15.205	Radiated Band Edge and Radiated Spurious Emission	PASS
15.247(a)(2)	6dB/Occupied Bandwidth	PASS
15.247(b)(3)	Maximum Peak Output Power	PASS
15.247(d)	Conducted Band Edges and Conducted Spurious Emission	PASS
15.247 (e)	Peak Power Spectral Density	PASS
15.203	Antenna Requirement	Compliance
Note: The uncertainties value is not used in determining the result.		

3. GENERAL INFORMATION

3.1. Description of Application

Applicant	Elitegroup Computer Systems Co., Ltd. No. 239, Sec. 2., TiDing Blvd., Taipei, Taiwan 11493
Product	Ultra tiny PC
Brand	(1)LIVA (2)ECS
Model	(1)LIVA Q1AXXXXX (2)PB01AX (X=A to Z,a-z,0-9 or blank) The differences between above models are for marketing purpose. The details of differences description refer to below table 1.

Table 1: Model different list

Marketing Type (Appearance)	Model Series	Brand	IO Board	Mother Board	CPU	Resolution (Display)
Type A	LIVA Q1A	LIVA	AR3288-Q1AIO	AR3288-Q1A	RK3288	HDMI: 4090x2160/60Hz
	PB01A	ECS				
Type B	LIVA Q1A PLUS	LIVA	AR3399-Q1AIO	AR3399-Q1A	RK3399	HDMI: 4090x2160/60Hz DP: 2560x1440/60Hz
	PB01AP	ECS				

Note: Marketing Type A and B used same WLAN Chip on IO Board, difference for some support IO ports and Layout.

3.2. Description of EUT

Test Model	(1)LIVA Q1A (2)LIVA Q1A PLUS		
Serial Number	N/A		
Power Rating	DC 12V, 2A (Refer to AC adapter rating)		
RF Features	WLAN:802.11 b/g/n Bluetooth: BT and BLE (BT 5.2)		
Transmit Type	2.4 GHz		
	802.11b		1T1R
	802.11g		1T1R
	802.11n-HT20		1T1R
	BT/BLE		1T1R
Test Sample	Sample No.	Test Item	Firmware
	03-LIVA Q1A	AC Conduction, RSE, Output Power	N/A
	07-LIVA Q1A PLUS	AC Conduction, RSE	N/A
Sample Status	Mass production		
Date of Receipt	2021. 04. 08		
Date of Test	2021. 04. 28 ~ 05. 12		
Interface Ports of EUT	Marketing Type A Test Model: LIVA Q1A • USB 2.0 Port x3 • Micro USB Port x1 • LAN Port x1 • HDMI Port x1 • Micro SD Slot x1 • DC In Port x1	Marketing Type B Test Model: LIVA Q1A PLUS • USB 2.0 Port x2 • USB 3.0 Port x1 • LAN Port x1 • HDMI Port x1 • DP Port x1 • Micro SD Slot x1 • DC In Port x1	
	Accessories Supplied • AC Adapter • VESA Mount		

3.3. Reference Test Guidance

None

3.4. Antenna Information

Antenna Part Number	Supplier	Antenna Type	Frequency (MHz)	Max Gain(dBi)
T-543-9291173-1	Linking	PIFA Antenna	2400~2500	1.83

3.5. EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number	Modulation	Data Rate (Mbps)
802.11b	2412-2462	11	DSSS(DBPSK/DQPSK/CCK)	Up to 11
802.11g		11	OFDM BPSK/QPSK/16QAM/64QAM)	Up to 54
802.11n-HT20				Up to 72.2
BLE	2402-2480	40	GFSK	Up to 1

Channel List							
802.11 b/g/n-HT20							
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
1	2412	4	2427	7	2442	10	2457
2	2417	5	2432	8	2447	11	2462
3	2422	6	2437	9	2452		

Channel List							
BLE							
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
37	2402	09	2422	18	2442	28	2462
00	2404	10	2424	19	2444	29	2464
01	2406	38	2426	20	2446	30	2466
02	2408	11	2428	21	2448	31	2468
03	2410	12	2430	22	2450	32	2470
04	2412	13	2432	23	2452	33	2472
05	2414	14	2434	24	2454	34	2474
06	2416	15	2436	25	2456	35	2476
07	2418	16	2438	26	2458	36	2478
08	2420	17	2440	27	2460	39	2480

3.6. Descriptions of Key Components

Marketing Type A

Item	Supplier	Model / Type	Character
Mother Board	ECS	AR3288-Q1A	
CPU	Rockchip	RK3288	1.6GHz (Socket: FCBGA 636P)
eMMC (Storage)	BIWIN	BWCTASC11P32G	32GB
DRAM	BIWIN	BW52L256M32D1P	LPDDR3 1600MHz 2GB
WLAN+BT(Combo card)	AMPAK	AP6236	802.11 b/g/n+BT 5.2 +BLE
Antenna	Linking	T-543-9291173-1	Black, PIFA Antenna
Adapter (Wall-mounted 2C)	APD	WB-24J12R	I/P: 100-240Vac, 50-60Hz, 0.7A Max. O/P: 12Vdc, 2.0A BSMI: R43017
	DC Power Cord: Non-Shielded, Undetached, 1.0m		

Remark: For more detailed features description, please refer to the manufacturer's specifications or the user manual.

Marketing Type B

Item	Supplier	Model / Type	Character
Mother Board	ECS	AR3399-Q1A	
CPU	Rockchip	RK3399	1.4GHz (Socket: FCBGA 828P)
eMMC (Storage)	Kingston	EMMC32G-TA28	32GB
DRAM	BIWIN	BW52L256M32D1P	LPDDR3 1600MHz 2GB
WLAN+BT(Combo card)	AMPAK	AP6236	802.11 b/g/n+BT 5.2 +BLE
Antenna	Linking	T-543-9291173-1	Black, PIFA Antenna
Adapter (Wall-mounted 2C)	APD	WB-24J12R	I/P: 100-240Vac, 50-60Hz, 0.7A Max. O/P: 12Vdc, 2.0A BSMI: R43017
	DC Power Cord: Non-Shielded, Undetached, 1.0m		

Remark: For more detailed features description, please refer to the manufacturer's specifications or the user manual.

3.7. Test Configuration

Mode	TX _{on} (ms)	1/ TX _{on} (kHz)	Duty Cycle (x)	Duty Cycle Factor [10log(1/x)] (dB)
802.11b	8.420	0.119	0.995	N/A
802.11g	1.395	0.717	0.972	0.12
802.11n-HT20	1.310	0.763	0.970	0.13
BLE (1Mbps)	0.412	2.427	---	---

Note: When duty cycle is less than 98% (0.98) that duty cycle factor 10log(1/x) is needed to add in conducted test items measured in average detector.



AC Conduction	Test Model
Normal operation	LIVA Q1A
	LIVA Q1A PLUS

Item	Mode	Data Rate	Test Channel	Test Model
Radiated Test Case	Radiated Band Edge	802.11b	1Mbps	1/11
		802.11g	6Mbps	1/11
		802.11n-HT20	MCS8	1/11
		BLE	1Mbps	37/39
	Radiated Spurious Emission	802.11b	1Mbps	1
		802.11g	6Mbps	11
		802.11n-HT20	MCS8	6
		BLE	1Mbps	37/39
Conducted Test Case	6dB/Occupied Bandwidth	802.11b	1Mbps	1/7/11
		802.11g	6Mbps	1/7/11
		802.11n-HT20	MCS8	1/7/11
		BLE	1Mbps	37/17/39
	Peak Output Power	802.11b	1Mbps	1/7/11
		802.11g	6Mbps	1/7/11
		802.11n-HT20	MCS8	1/7/11
		BLE	1Mbps	37/17/39
	Band Edge	802.11b	1Mbps	1/11
		802.11g	6Mbps	1/11
		802.11n-HT20	MCS8	1/11
		BLE	1Mbps	37/39
	Spurious Emission	802.11b	1Mbps	1/7/11
		802.11g	6Mbps	1/7/11
		802.11n-HT20	MCS8	1/7/11
		BLE	1Mbps	37/17/39
	Peak Power Spectral Density	802.11b	1Mbps	1/7/11
		802.11g	6Mbps	1/7/11
		802.11n-HT20	MCS8	1/7/11
		BLE	1Mbps	37/17/39

Note 1: ☒ Mobile Device

☐ Portable Device, and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow: ☐ Lie ☐ Side ☐ Stand

Note 2: Low, mid, and high channels were measured, only the worst channel of each modulation was presented in this report.

Note 3: The marketing Type A (Test Model: LIVA Q1A) and Type B (Test model: LIVA Q1A PLUS) device embedded same WLAN+BT(Combo card). So we select the test model LIVA Q1A to measurement all RF conducted test items.

3.8. Output Power Setting

Mode	Centre Frequency (MHz)	Power Setting
802.11b	2412	default
	2437	default
	2462	default
Mode	Centre Frequency (MHz)	Power Setting
802.11g	2412	default
	2437	default
	2462	default
Mode	Centre Frequency (MHz)	Power Setting
802.11n-HT20	2412	default
	2437	default
	2462	default
Mode	Centre Frequency (MHz)	Power Setting
BLE	2402	default
	2440	default
	2480	default

3.9. Tested Supporting System List

3.9.1. Support Peripheral Unit

Test Model: LIVA Q1A					
No.	Product	Brand	Model No.	Serial No.	Approval
1.	LCD Monitor	DELL	U2718Qb	N/A	FCC By DoC
2.	USB Mouse	acer	SM-9020 B	N/A	FCC By DoC
3.	Notebook PC	HP	HSTNN-Q98C	N/A	FCC By DoC
Test Model: LIVA Q1A PLUS					
No.	Product	Brand	Model No.	Serial No.	Approval
1.	LCD Monitor	DELL	U2718Qb	N/A	FCC By DoC
2.	Notebook PC	HP	HSTNN-Q98C	N/A	FCC By DoC
3.	USB Mouse (Emission Test Used)	acer	SM-9020 B	N/A	FCC By DoC
4.	USB Dongle (Emission Test Used)	SanDisk	SDCZ48-O32G	N/A	N/A

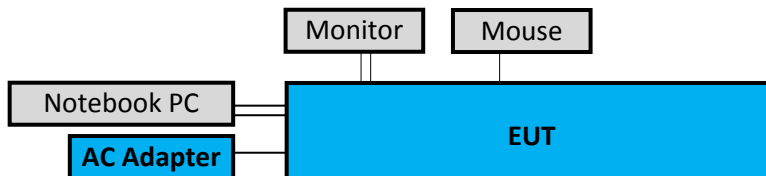
3.9.2. Cable Lists

Test Model: LIVA Q1A	
No.	Cable Description Of The Above Support Units
1.	HDMI Cable: Shielded, Detachable, 1.8m AC Power Cord: Unshielded, Detachable, 1.8m
2.	USB Cable: Unshielded, Undetachable, 1.8m
3.	Micro USB Cable (Emission Test Used): HTC, M/N: M410 Micro USB, 1.2m LAN Cable: Shielded, Detachable, 1.8m AC adapter: hp, M/N PPP-012C-S DC Power Cord: Unshielded, Detachable, 1.8m with a core AC Power Cord: Unshielded, Detachable, 1.8m
Test Model: LIVA Q1A PLUS	
No.	Cable Description Of The Above Support Units
1.	DP Cable (Emission Test Used): Shielded, Detachable, 1.8m HDMI Cable: Shielded, Detachable, 1.8m AC Power Cord: Unshielded, Detachable, 1.8m
2.	LAN Cable (Emission Test Used): Shielded, Detachable, 1.8m AC adapter: hp, M/N PPP-012C-S DC Power Cord: Unshielded, Detachable, 1.8m with a core AC Power Cord: Unshielded, Detachable, 1.8m
3.	USB Cable: Unshielded, Undetachable, 1.8m
4.	---

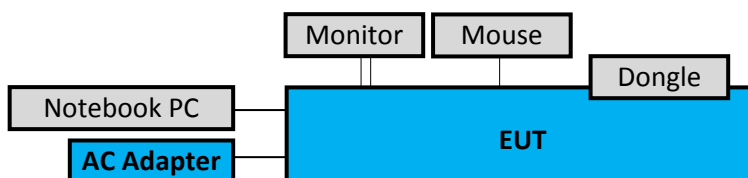
3.10. Setup Configuration

3.10.1. EUT Configuration for Power Line & Radiated Emission

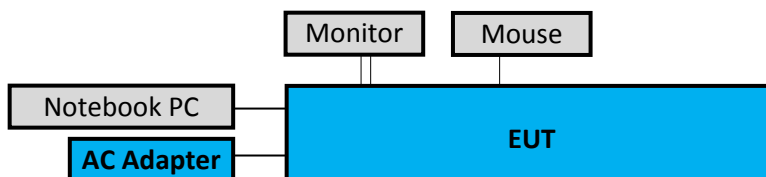
Test Model: LIVA Q1A



Test Model: LIVA Q1A PLUS



3.10.2. EUT Configuration for RF Conducted Test Items



3.11. Operating Condition of EUT

Test program “RF Test Tool” is used for enabling EUT BLE or WLAN function under continues transmitting and choosing data rate/ channel.

3.12. Description of Test Facility

Name of Test Firm	Audix Technology Corporation / EMC Department No. 491, Zhongfu Rd., Linkou Dist., New Taipei City 244, Taiwan Tel: +886-2-26092133 Fax: +886-2-26099303 Website : www.audixtech.com Contact e-mail: attemc_report@audixtech.com
Accreditations	The laboratory is accredited by following organizations under ISO/IEC 17025:2017 (1) NVLAP(USA) NVLAP Lab Code 200077-0 (2) TAF(Taiwan) No. 1724
Test Facilities	FCC OET Designation Number under APEC MRA by NCC is : TW1724 ISED CAB Identifier Number under APEC TEL MRA by NCC is TW1724 (1) No.8 Shielded Room (2) No.1 3m Semi Anechoic Chamber (3) Fully Anechoic Chamber

3.13.Measurement Uncertainty

Test Items/Facilities			Frequency Range	Uncertainty
Conduction Test			9kHz-150kHz	±3.7dB
			150kHz-30MHz	±3.4dB
Radiation Test	☒	No.1 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±3.8dB
			200MHz-1000MHz, 3m, Horizontal	±4.1dB
			30MHz-200MHz, 3m, Vertical	±4.5dB
			200MHz-1000MHz, 3m, Vertical	±4.5dB
			1GHz-6GHz, 3m	±4.7dB
			6GHz-18GHz, 3m	±4.1dB
	☐	No.3 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±3.9dB
			200MHz-1000MHz, 3m, Horizontal	±4.2dB
			30MHz-200MHz, 3m, Vertical	±4.3dB
			200MHz-1000MHz, 3m, Vertical	±4.5dB
	☐	No.4 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±4.1dB
			200MHz-1000MHz, 3m, Horizontal	±4.5dB
			30MHz-200MHz, 3m, Vertical	±4.4dB
			200MHz-1000MHz, 3m, Vertical	±4.8dB
			1GHz-6GHz, 3m	±5.0dB
			6GHz-18GHz, 3m	±4.7dB
	☐	No.5 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±4.2dB
			200MHz-1000MHz, 3m, Horizontal	±4.3dB
			30MHz-200MHz, 3m, Vertical	±4.3dB
			200MHz-1000MHz, 3m, Vertical	±4.7dB
			1GHz-6GHz, 3m	±4.8dB
			6GHz-18GHz, 3m	±4.5dB
	☒	Fully Anechoic Chamber	30MHz~1000MHz	±4.6dB
			1GHz~18GHz	±5.4dB
			18GHz~40GHz	±3.52dB
			40GHz~260GHz	±3.56dB

Remark : Uncertainty = $ku_c(y)$

Test Item	Uncertainty
6dB Bandwidth	± 0.05kHz
Maximum peak output power	± 0.33dB
Power spectral density	± 0.13dB
Conducted Emission Limitations	± 0.13dB

4. MEASUREMENT EQUIPMENT LIST

4.1. Conducted Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESR3	101774	2021.02.02	1 Year
2.	A.M.N.	R&S	ENV432	101567	2021.04.21	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-855-9	2020.12.10	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	100354	2021.01.04	1 Year
5.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.8 S/R	2021.04.15	1 Year
6.	Coaxial Cable	Yeida	RG/58AU	CE-08	2020.09.19	1 Year
7.	Test Software	Audix	e3	V6.120619c	N.C.R.	N.C.R.

4.2. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2020.09.16	1 Year
2.	Spectrum Analyzer	Agilent	N9030A-526	MY53310269	2021.01.14	1 Year
3.	Test Receiver	R&S	ESCS30	100039	2020.06.05	1 Year
4.	Amplifier	HP	8447D	2944A07178	2020.04.29	1 Year
5.	Microwave Amplifier	Keysight	83051A	MY53010042	2020.08.05	1 Year
6.	Microwave Amplifier	Agilent	8449B	3008A02678	2021.02.27	1 Year
7.	Loop Antenna	R&S	HFH2-Z2	891847/27	2019.12.26	2 Years
8.	Bilog Antenna	TESEQ	CBL6112D	33821	2021.01.15	1 Year
9.	Horn Antenna	ETS-Lindgren	3117	00135902	2020.03.10	1 Year
10.	Horn Antenna	COM-POWER	AH-840	101092	2020 05.08	1 Year
11.	2.4GHz Notch Filter	K&L Microwave	7NSL10-2441.5 /E130.5-O/O	1	2020 07.24	1 Year
12.	3GHz Notch Filter	Microwave	H3G018G1	484796	2020.08.20	1 Year
13.	Coaxial Cable	MIYAZAKI	5D2W	CLAMP-01	2020.09.19	1 Year
14.	Coaxial Cable	MIYAZAKI	5D2W	RE-11	2021.01.29	1 Year
15.	Coaxial Cable	HUBER+ SUHNER	SUCOFLEX 104	RE-29	2020.09.19	1 Year
16.	Coaxial Cable	HUBER+ SUHNER	SUCOFLEX 102	RE-30	2020.09.19	1 Year
17.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2020.04.17	1 Year
18.	Digital Thermo-Hygro Meter	EVERY DAY	E-512	RF-02	2020.04. 17	1 Year
19.	Test Software	Audix	e3	V6.120619c	N.C.R.	N.C.R.
20.	Test Software	Audix	e3	V6.110601	N.C.R.	N.C.R.

4.3. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Keysight	N9020B-544	MY57120357	2021.01.06	1 Year
2.	USB Wideband Power Sensor	Agilent	U2021XA	MY53460001	2021.01.07	1 Year
3.	USB Wideband Power Sensor	Agilent	U2021XA	MY53070003	2021.01.07	1 Year
4.	USB Wideband Power Sensor	Agilent	U2021XA	MY53070006	2021.01.07	1 Year
5.	USB Wideband Power Sensor	Agilent	U2021XA	MY53070007	2021.01.07	1 Year
6.	Simultaneous Sampling	Agilent	DAQ U2531A	TW53363505	N.C.R.	N.C.R.
7.	Digital Thermo-Hygro Meter	Shenzhen Datronn Electronics	KT-905	RF	2020.04.17	1 Year
8.	Software	Agilent	Power Panel	Version:R03.0 8.00	N.C.R.	N.C.R.

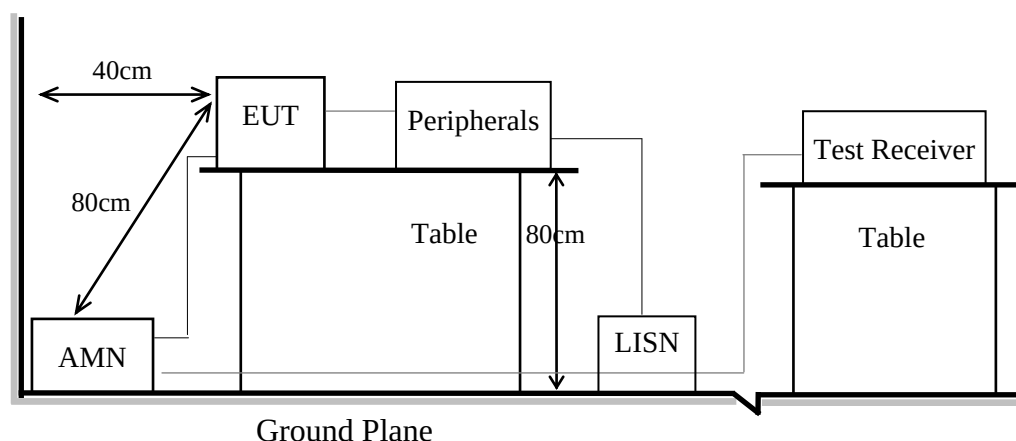
5. CONDUCTED EMISSION

5.1. Block Diagram of Test Setup

5.1.1. Block Diagram of EUT

Indicated as section 3.10

5.1.2. Shielded Room Setup Diagram



5.2. Conducted Emission Limit

Frequency	Conducted Limit	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dB μ V	56 ~ 46 dB μ V
500kHz ~ 5MHz	56 dB μ V	46 dB μ V
5MHz ~ 30MHz	60 dB μ V	50 dB μ V

Remark1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.

2.: The lower limit applies to the band edges.

5.3. Test Procedure

- 5.3.1. To set up the EUT as indicated in ANSI C63.10. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.
- 5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).
- 5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)
- 5.3.4. Checking frequency range from 150kHz to 30 MHz and record the emission which does not have 20 dB below limit.

5.4. Test Results

Please refer to Appendix A.

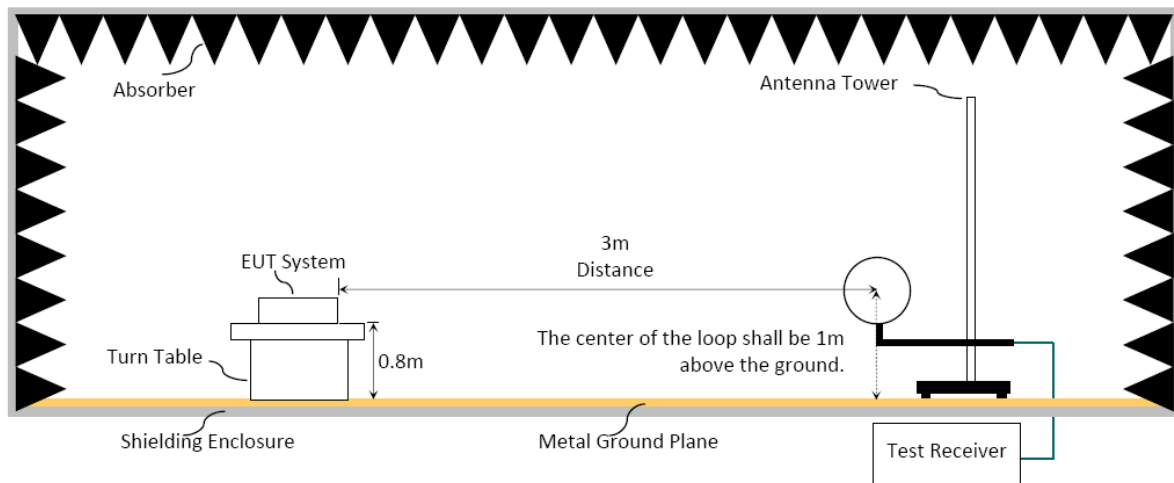
6. RADIATED EMISSION

6.1. Block Diagram of Test Setup

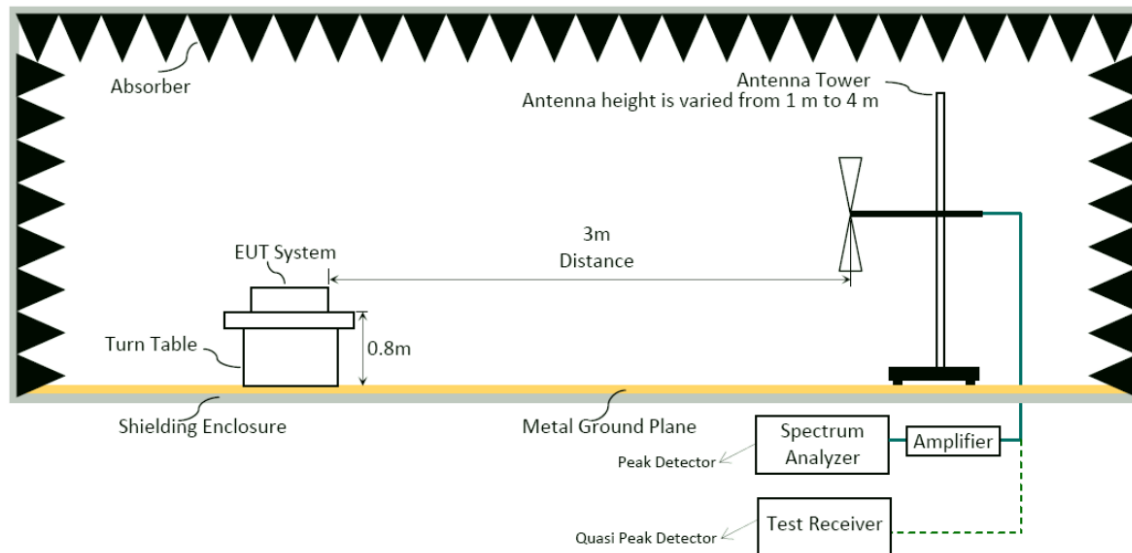
6.1.1. Block Diagram of EUT

Indicated as section 3.10

6.1.2. Setup Diagram for 9kHz-30MHz

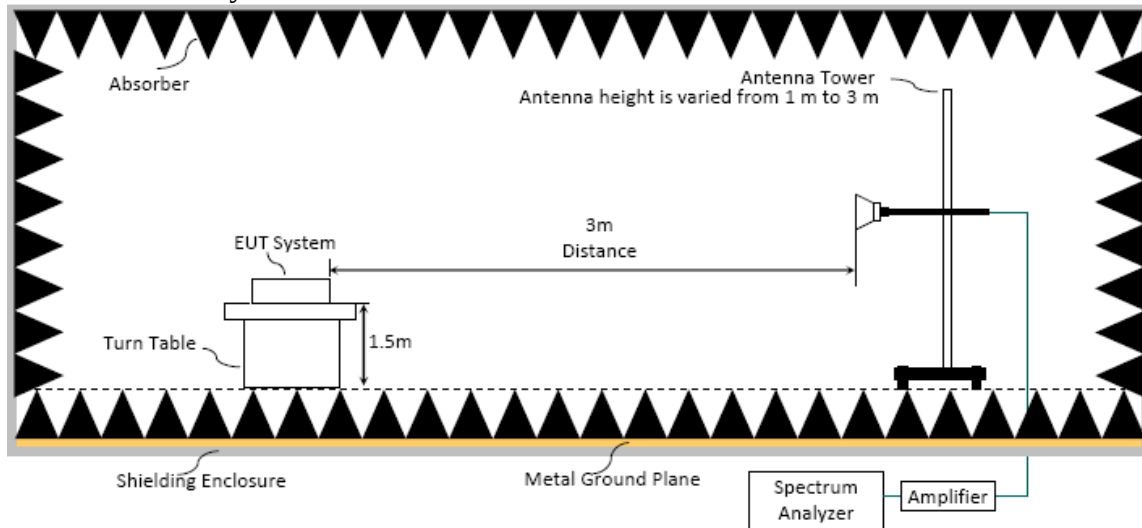


6.1.3. Setup Diagram for 30-1000MHz

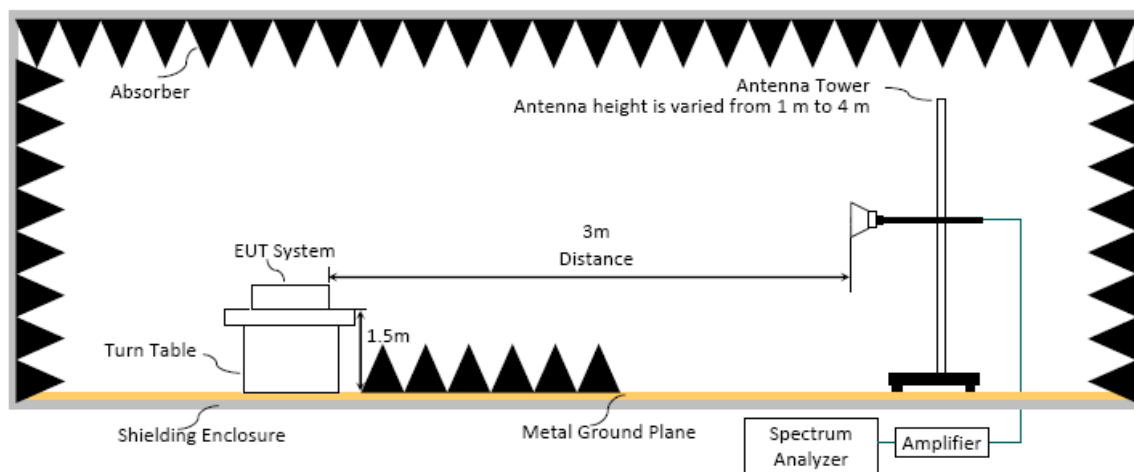


6.1.4. Setup Diagram for above 1GHz

Fully Anechoic Chamber



Semi Anechoic Chamber



6.2. Radiated Emission Limits

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205 Section 8.10 table 6, must also comply with the radiated emission limits specified as below.

Frequency (MHz)	Distance(m)	Limits	
		dB μ V/m	μ V/m
0.009 - 0.490	300	67.6-20 log f(kHz)	2400/f kHz
0.490 - 1.705	30	87.6-20 log f(kHz)	24000/f kHz
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88- 216	3	43.5	150
216- 960	3	46.0	200
Above 960	3	54.0	500
Above 1000	3	74.0 dB μ V/m (Peak) 54.0 dB μ V/m (Average)	

Remark : (1) dB μ V/m = 20 log (μ V/m)

- (2) The tighter limit applies to the edge between two frequency bands.
- (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- (4) Fundamental and emission fall within operation band are exempted from this section.
- (5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

6.3. Test Procedure

Frequency Range 9kHz~30MHz:

The EUT setup on the turntable which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2020 regulation.

- (1) RBW = 9kHz with peak and average detector.
- (2) Detector: average and peak (9kHz-490kHz)
Q.P. (490kHz-30MHz)

Frequency Range 30MHz ~ 25GHz:

The EUT setup on the turn table which has 80cm (for 30-1000MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m (for 30-1000MHz) and from 1m to 3m (for above 1GHz at fully Anechoic Chamber) or from 1 m to 4 m (for above 1GHz at Semi Anechoic Chamber) to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

Frequency below 1GHz:

Spectrum Analyzer is used for pre-testing with following setting:

- (1) RBW = 120KHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.

Note 1: When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required, otherwise using Q.P. for final measurement.

Note 2: When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

Frequency above 1GHz to 10th harmonic (up to 25 GHz):

Peak Detector:

- (1) RBW = 1MHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.

Note: When peak-detected value is lower than limit that the measurement using the average detector is not required, otherwise using average detector for final measurement.

Average Detector:☒ **Option 1:**

(1) RBW = 1MHz

(2) VBW $\geq 1/T$.

Modulation Type	T (ms)	1/T (kHz)	VBW Setting
802.11b	8.420	0.119	10Hz
802.11g	1.395	0.717	750Hz
802.11n-HT20	1.310	0.763	820Hz
BLE	0.412	2.427	2.7kHz

N/A: 1/T is not implemented when duty cycle presented in section 3.6 is $\geq 98\%$.

(1) Detector = Peak.

(2) Sweep time = auto.

(3) Trace mode = max hold.

(4) Allow sweeps to continue until the trace stabilizes.

☐ **Option 2:**

Average Emission Level = Peak Emission Level + D.C.C.F.

6.4. Measurement Result Explanation

☒ Peak Emission Level = Antenna Factor + Cable Loss + Meter Reading (including Preamp factor if test used)

☒ Average Emission Level = Antenna Factor + Cable Loss + Meter Reading (including Preamp factor if test used)

☐ Average Emission Level = Peak Emission Level + DCCF

Duty Cycle Correction Factor (DCCF) = $20\log(TX_{on}/TX_{on+off})$ presented in section 3.7

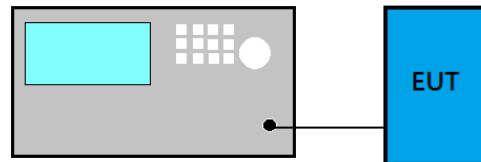
☐ ERP = Peak Emission Level - 95.2dB - 2.14dB

6.5. Test Results

Please refer to Appendix A.

7. 6dB/OCCUPIED BANDWIDTH

7.1. Block Diagram of Test Setup



7.2. Specification Limits

The minimum 6dB bandwidth shall be at least 500kHz.

7.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2020:

For 6dB Bandwidth

- (1) Set RBW = 100 kHz.
- (2) Set the video bandwidth (VBW) $\geq 3 \times \text{RBW}$.
- (3) Detector = Peak.
- (4) Trace mode = max hold.
- (5) Sweep = auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x to -6dB power to record the final bandwidth..

For 99% Occupied Bandwidth

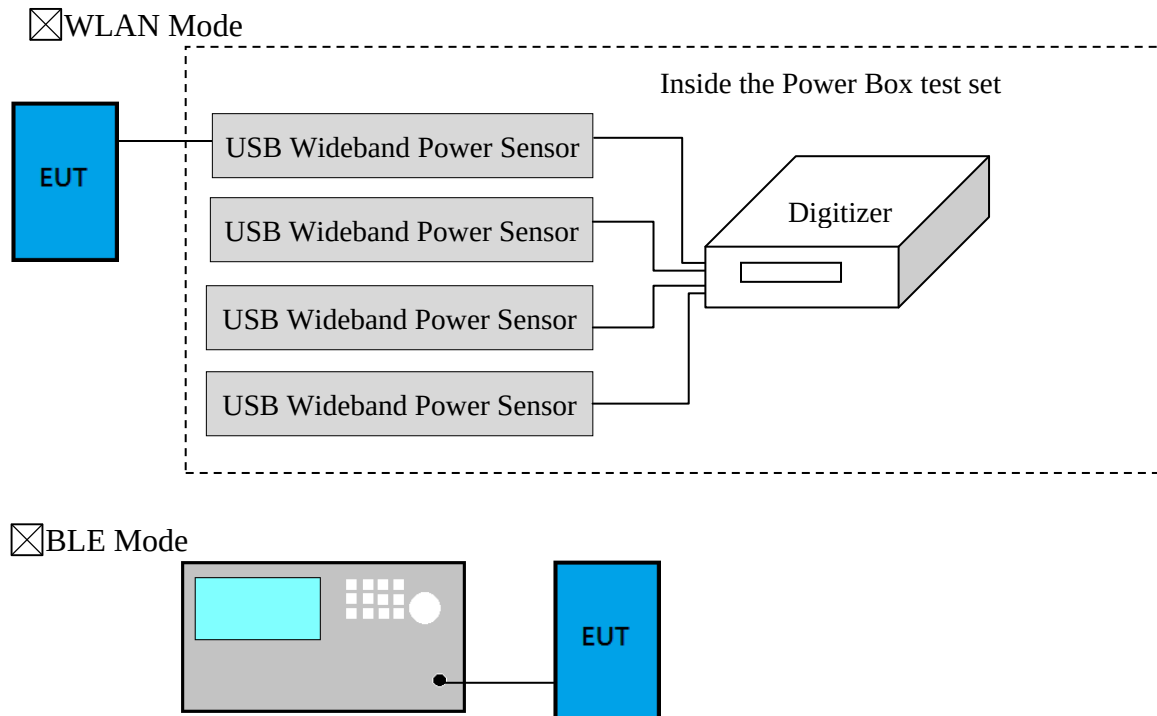
- (1) Set Span range 1.5~5 times the OBW
- (2) Set RBW close to 1% to 5% of OBW.
- (3) Set $\text{VBW} \geq 3 \times \text{RBW}$.
- (4) Detector = Peak.
- (5) Trace mode = Max hold
- (6) Sweep = Auto couple.
- (7) Allow the trace to stabilize.

7.4. Test Results

Please refer to Appendix A

8. MAXIMUM PEAK OUTPUT POWER

8.1. Block Diagram of Test Setup



8.2. Specification Limits

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5MHz is : 1Watt. (30dBm), and E.I.R.P.: 4Watt (36dBm)

8.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2020:

■ **PKPM1 Peak power meter method:**

EUT is connected to power sensor and record the maximum output power.

■ **Maximum peak conducted output power method:**

- (1) Set the RBW $\geq$ DTS bandwidth
- (2) Set VBW $\geq 3 \times$ RBW
- (3) Set span $\geq 3 \times$ RBW.
- (4) Sweep time = auto couple
- (5) Detector = peak.
- (6) Trace mode = max hold.
- (7) Allow trace to fully stabilize.
- (8) Use peak marker function to determine the peak amplitude level.

■ **Method AVGPM (Measurement using an RF average power meter):**

EUT is connected to power sensor and record the maximum average output power and duty cycle factor is added when duty cycle presented in section 3.7 is $< 98\%$.

□ **Method AVGSA-2 (Spectrum channel power)**

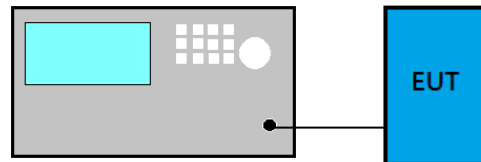
- (1) Set span to at least 1.5 times the OBW
- (2) Set RBW = 1 -5% of OBW
- (3) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.
- (8) Duty cycle factor is added when duty cycle presented in section 3.7 is $< 98\%$.

8.4. Test Results

Please refer to Appendix A

9. EMISSION LIMITATIONS

9.1. Block Diagram of Test Setup



9.2. Specification Limits

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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, that the required attenuation shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in Section 15.209(a) Section 8.9 table 4 is not required. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a) Section 8.10 table 6, must also comply with the radiated emission limits specified in Section 15.209(a) Section 8.9 table 4 (See Section 15.205(c)).

9.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2020:

■ Reference Level

- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth.
- (3) Set the RBW to: 100 kHz.
- (4) Set the VBW $\geq 3 \times$ RBW.
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = max hold.
- (8) Allow trace to fully stabilize to find the max PSD as reference level.

■ Emission Level Measurement

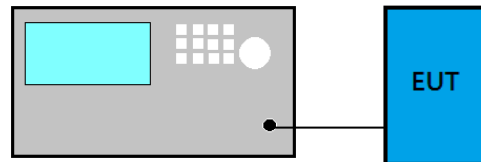
- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth.
- (3) Set the RBW to: 100 kHz.
- (4) Set the VBW $\geq 3 \times$ RBW.
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = max hold.
- (8) Allow trace to fully stabilize to find the max level.

9.4. Test Results

Please refer to Appendix A

10. POWER SPECTRAL DENSITY

10.1. Block Diagram of Test Setup



10.2. Specification Limits

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band.

10.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2020:

■ Method PKPSD (peak PSD)

- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth.
- (3) Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- (4) Set the VBW $\geq 3 \times \text{RBW}$.
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = max hold.
- (8) Allow trace to fully stabilize.
- (9) Use the peak marker function to determine the maximum amplitude level.
- (10) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

□ Method AVGPSD-2

- (1) Using peak PSD procedure step 1 to step 4.
- (2) Detector = RMS detector
- (3) Sweep time = auto couple
- (4) Trace mode = trace averaging over a minimum of 100 traces
- (5) Use the peak marker function to determine the maximum amplitude level.
- (6) Duty cycle factor is added when duty cycle presented in section 3.7 < 98%.
- (7) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

10.4. Test Results

Please refer to Appendix A



Audix Technology Corp.
No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

11.DEVIATION TO TEST SPECIFICATIONS

【NONE】



Audix Technology Corp.
No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

APPDNDIX A

TEST DATA AND PLOTS

(Model: (1)LIVA Q1A (2)LIVA Q1A PLUS)

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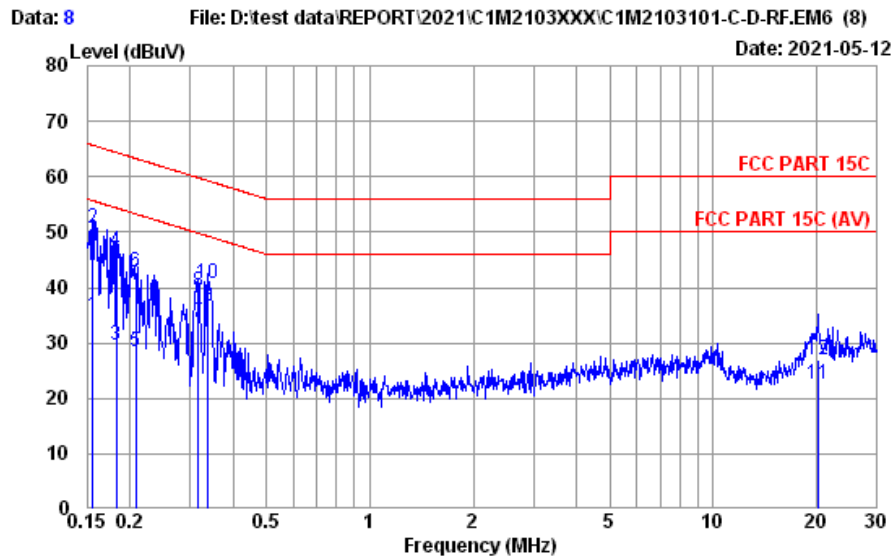
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Audix Technology Corp.
No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

A.1 CONDUCTED EMISSION

Test Date	2021/05/12	Temp./Hum.	26°C/50%
Test Voltage	AC 120V 60Hz (Via AC Adapter)	Tested By	Roy Hung
		Test Model	LIVA Q1A



Site No. : No.8 Shielded Room Data No. : 8
Instrument 1 : Receiver ESR3(774)
Instrument 2 : ENH432 (567)(A)|CE-08|ESH3-Z2 (354)
Limit : FCC PART 15C Phase : NEUTRAL
Environment : 26°C / 50% Engineer : Roy Hung
EUT Model : LIVA Q1A Test Rating : 120Vac/60Hz
Test Mode : Operating

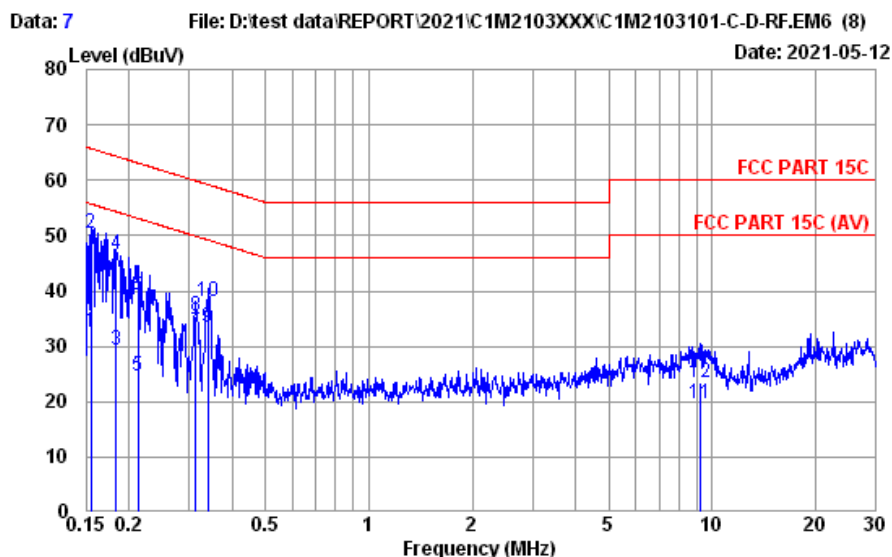
	Freq. (MHz)	AMM Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.156	10.20	0.03	9.85	14.78	34.86	55.69	20.83	Average
2	0.156	10.20	0.03	9.85	30.68	50.76	65.69	14.93	QP
3	0.182	10.20	0.03	9.85	9.61	29.69	54.37	24.68	Average
4	0.182	10.20	0.03	9.85	26.56	46.64	64.37	17.73	QP
5	0.208	10.20	0.03	9.85	8.46	28.54	53.27	24.73	Average
6	0.208	10.20	0.03	9.85	22.84	42.92	63.27	20.35	QP
7	0.317	10.20	0.03	9.85	13.64	33.72	49.80	16.08	Average
8	0.317	10.20	0.03	9.85	19.33	39.41	59.80	20.39	QP
9	0.337	10.20	0.03	9.85	16.65	36.73	49.27	12.54	Average
10	0.337	10.20	0.03	9.85	20.76	40.84	59.27	18.43	QP
11	20.162	10.90	0.20	9.94	1.63	22.67	50.00	27.33	Average
12	20.162	10.90	0.20	9.94	5.87	26.91	60.00	33.09	QP

Remarks: 1. Emission Level= AMM Factor + Cable Loss + Pulse Att. + Reading.

Audix Technology Corp.
No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Test Date	2021/05/12	Temp./Hum.	26°C/50%
Test Voltage	AC 120V 60Hz (Via AC Adapter)	Tested By	Roy Hung
		Test Model	LIVA Q1A



Site No. : No.8 Shielded Room Data No. : 7
Instrument 1 : Receiver ESR3(774)
Instrument 2 : ENH432 (567)(A)|CE-08|ESH3-Z2 (354)
Limit : FCC PART 15C Phase : LINE
Environment : 26°C / 50% Engineer : Roy Hung
EUT Model : LIVA Q1A Test Rating : 120Vac/60Hz
Test Mode : Operating

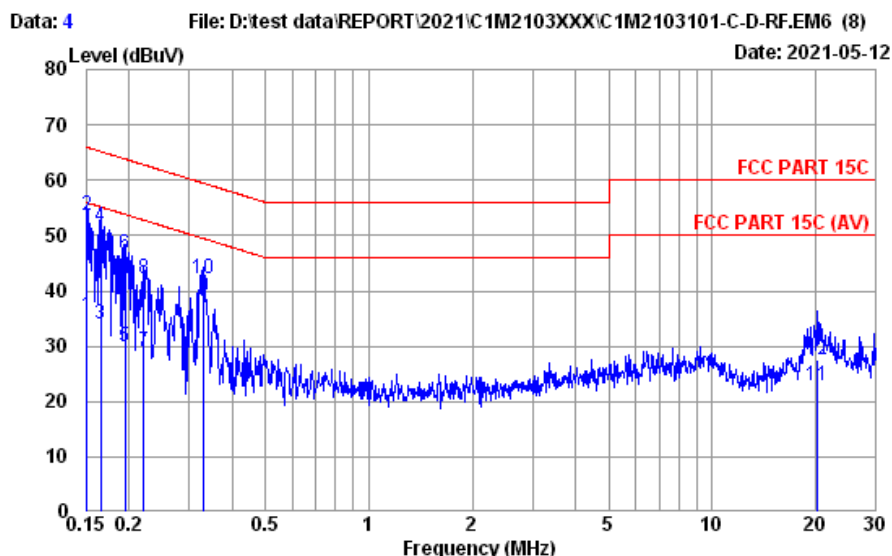
	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.155	10.20	0.03	9.85	12.53	32.61	55.74	23.13	Average
2	0.155	10.20	0.03	9.85	30.33	50.41	65.74	15.33	QP
3	0.183	10.20	0.03	9.85	9.18	29.26	54.33	25.07	Average
4	0.183	10.20	0.03	9.85	26.49	46.57	64.33	17.76	QP
5	0.213	10.20	0.03	9.85	4.44	24.52	53.10	28.58	Average
6	0.213	10.20	0.03	9.85	19.24	39.32	63.10	23.78	QP
7	0.313	10.20	0.03	9.85	12.44	32.52	49.88	17.36	Average
8	0.313	10.20	0.03	9.85	15.30	35.38	59.88	24.50	QP
9	0.339	10.20	0.03	9.85	13.42	33.50	49.22	15.72	Average
10	0.339	10.20	0.03	9.85	18.12	38.20	59.22	21.02	QP
11	9.204	10.38	0.13	9.88	-0.76	19.63	50.00	30.37	Average
12	9.204	10.38	0.13	9.88	3.06	23.45	60.00	36.55	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.

Audix Technology Corp.
No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Test Date	2021/05/12	Temp./Hum.	26°C/50%
Test Voltage	AC 120V 60Hz (Via AC Adapter)	Tested By	Roy Hung
		Test Model	LIVA Q1A PLUS



Site No. : No.8 Shielded Room Data No. : 4
Instrument 1 : Receiver ESR3(774)
Instrument 2 : ENH432 (567)(A)|CE-08|ESH3-Z2 (354)
Limit : FCC PART 15C Phase : NEUTRAL
Environment : 26°C / 50% Engineer : Roy Hung
EUT Model : LIVA Q1A Plus Test Rating : 120Vac/60Hz
Test Mode : Operating

	Freq. (MHz)	AMM Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.151	10.20	0.03	9.85	15.26	35.34	55.96	20.62	Average
2	0.151	10.20	0.03	9.85	33.41	53.49	65.96	12.47	QP
3	0.166	10.20	0.03	9.85	13.85	33.93	55.16	21.23	Average
4	0.166	10.20	0.03	9.85	31.59	51.67	65.16	13.49	QP
5	0.194	10.20	0.03	9.85	9.95	30.03	53.84	23.81	Average
6	0.194	10.20	0.03	9.85	26.58	46.66	63.84	17.18	QP
7	0.221	10.20	0.03	9.85	8.88	28.96	52.79	23.83	Average
8	0.221	10.20	0.03	9.85	22.14	42.22	62.79	20.57	QP
9	0.330	10.20	0.03	9.85	18.78	38.86	49.44	10.58	Average
10	0.330	10.20	0.03	9.85	22.26	42.34	59.44	17.10	QP
11	20.270	10.91	0.20	9.94	1.76	22.81	50.00	27.19	Average
12	20.270	10.91	0.20	9.94	6.45	27.50	60.00	32.50	QP

Remarks: 1. Emission Level= AMM Factor + Cable Loss + Pulse Att. + Reading.

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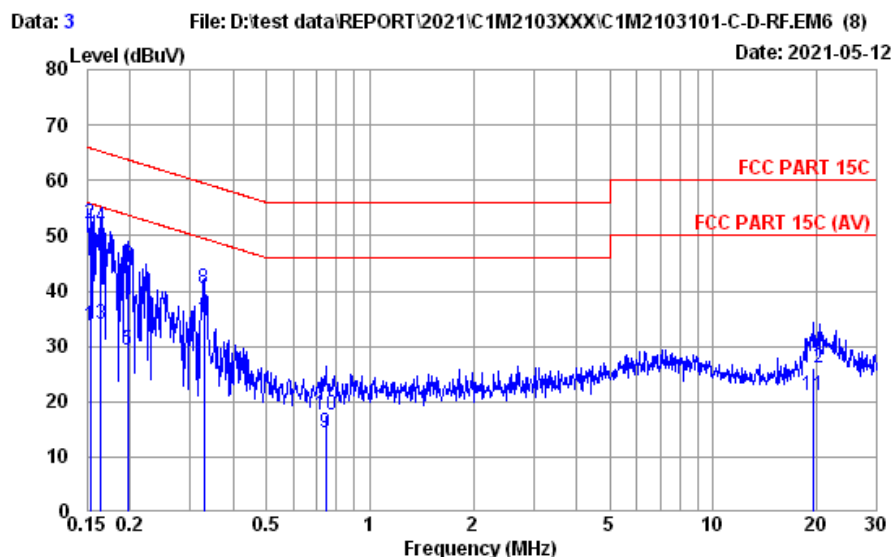
No. 491, Zhongfu Rd., Linkou Dist.,

New Taipei City 244, Taiwan

Tel: +886 2 26099301

Fax: +886 2 26099303

Test Date	2021/05/12	Temp./Hum.	26°C/50%
Test Voltage	AC 120V 60Hz (Via AC Adapter)	Tested By	Roy Hung
		Test Model	LIVA Q1A PLUS



Site No. : No.8 Shielded Room Data No. : 3
Instrument 1 : Receiver ESR3(774)
Instrument 2 : ENH432 (567)(A)|CE-08|ESH3-Z2 (354)
Limit : FCC PART 15C Phase : LINE
Environment : 26°C / 50% Engineer : Roy Hung
EUT Model : LIVA Q1A Plus Test Rating : 120Vac/60Hz
Test Mode : Operating

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.153	10.20	0.03	9.85	13.65	33.73	55.82	22.09	Average
2	0.153	10.20	0.03	9.85	32.16	52.24	65.82	13.58	QP
3	0.165	10.20	0.03	9.85	13.97	34.05	55.21	21.16	Average
4	0.165	10.20	0.03	9.85	31.60	51.68	65.21	13.53	QP
5	0.197	10.20	0.03	9.85	9.18	29.26	53.76	24.50	Average
6	0.197	10.20	0.03	9.85	24.73	44.81	63.76	18.95	QP
7	0.329	10.20	0.03	9.85	14.13	34.21	49.49	15.28	Average
8	0.329	10.20	0.03	9.85	20.28	40.36	59.49	19.13	QP
9	0.743	10.20	0.04	9.85	-5.69	14.40	46.00	31.60	Average
10	0.743	10.20	0.04	9.85	-2.48	17.61	56.00	38.39	QP
11	19.635	10.59	0.20	9.94	0.23	20.96	50.00	29.04	Average
12	19.635	10.59	0.20	9.94	5.34	26.07	60.00	33.93	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.

A.2 RADIATED EMISSION

Test Date	2021/05/07~10	Temp./Hum.	22~24°C /63~63%
Test Voltage	AC 120V 60Hz (Via AC Adapter)	Tested By	Sam Chang
		Test Model	(1)LIVA Q1A (2)LIVA Q1A PLUS

A.2.1 Emissions within Restricted Frequency Bands

A.2.1.1 Frequency 9kHz~30MHz

The emissions (9kHz~30MHz) not reported for there is no emission be found.

Audix Technology Corp.

No. 491, Zhongfu Rd., Linkou Dist.,

New Taipei City244, Taiwan

Tel: +886 2 26099301

Fax: +886 2 26099303

A.2.1.2 Frequency Below 1GHz

● Test model: LIVA Q1A

Mode	802.11n-HT20	Frequency	TX 2437MHz
------	--------------	-----------	------------

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
35.820	22.12	1.30	26.50	35.05	31.97	40.00	8.03	Peak
120.210	18.70	2.53	26.17	32.09	27.15	43.50	16.35	Peak
211.390	16.46	3.49	25.79	34.23	28.39	43.50	15.11	Peak
286.080	19.48	4.19	25.70	33.36	31.33	46.00	14.67	Peak
782.720	26.45	7.72	27.35	28.67	35.49	46.00	10.51	Peak
882.630	26.80	8.33	27.09	30.25	38.29	46.00	7.71	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
32.910	23.30	1.24	26.51	35.14	33.17	40.00	6.83	Peak
116.330	18.47	2.48	26.19	36.15	30.91	43.50	12.59	Peak
216.240	16.75	3.53	25.78	33.53	28.03	46.00	17.97	Peak
324.880	20.40	4.64	25.93	31.23	30.34	46.00	15.66	Peak
931.130	27.20	8.62	26.91	28.23	37.14	46.00	8.86	Peak
995.150	27.89	8.95	26.69	28.10	38.25	54.00	15.75	Peak

Mode	BLE	Frequency	TX 2440MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
117.300	18.56	2.49	26.19	33.22	28.08	43.50	15.42	Peak
216.240	16.75	3.53	25.78	33.27	27.77	46.00	18.23	Peak
288.020	19.51	4.20	25.70	33.39	31.40	46.00	14.60	Peak
557.680	24.47	6.63	27.33	29.09	32.86	46.00	13.14	Peak
690.570	25.51	7.22	27.46	29.72	34.99	46.00	11.01	Peak
958.290	27.49	8.76	26.82	28.46	37.89	46.00	8.11	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
32.910	23.30	1.24	26.51	33.67	31.70	40.00	8.30	Peak
113.420	18.28	2.44	26.21	37.52	32.03	43.50	11.47	Peak
214.300	16.65	3.52	25.79	33.24	27.62	43.50	15.88	Peak
289.960	19.55	4.22	25.70	30.77	28.84	46.00	17.16	Peak
319.060	20.25	4.57	25.88	31.06	30.00	46.00	16.00	Peak
965.080	27.57	8.79	26.79	29.12	38.69	54.00	15.31	Peak

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Fax: +886 2 26099303

● Test model: LIVA Q1A PLUS

Mode	802.11n-HT20	Frequency	TX 2437MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
35.820	22.12	1.30	26.50	33.44	30.36	40.00	9.64	Peak
116.330	18.47	2.48	26.19	32.86	27.62	43.50	15.88	Peak
219.150	16.94	3.56	25.78	33.07	27.79	46.00	18.21	Peak
285.110	19.46	4.18	25.70	33.38	31.32	46.00	14.68	Peak
540.220	24.25	6.57	27.28	30.23	33.77	46.00	12.23	Peak
970.900	27.64	8.83	26.79	28.64	38.32	54.00	15.68	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
31.940	23.58	1.22	26.51	33.92	32.21	40.00	7.79	Peak
116.330	18.47	2.48	26.19	35.67	30.43	43.50	13.07	Peak
213.330	16.55	3.50	25.79	34.03	28.29	43.50	15.21	Peak
321.000	20.31	4.59	25.88	31.12	30.14	46.00	15.86	Peak
909.790	26.95	8.49	27.01	28.41	36.84	46.00	9.16	Peak
995.150	27.89	8.95	26.69	27.42	37.57	54.00	16.43	Peak

Mode	BLE	Frequency	TX 2440MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
34.850	22.70	1.28	26.50	30.63	28.11	40.00	11.89	Peak
116.330	18.47	2.48	26.19	33.31	28.07	43.50	15.43	Peak
219.150	16.94	3.56	25.78	34.77	29.49	46.00	16.51	Peak
287.050	19.49	4.19	25.70	34.08	32.06	46.00	13.94	Peak
931.130	27.20	8.62	26.91	28.34	37.25	46.00	8.75	Peak
988.360	27.82	8.92	26.72	27.86	37.88	54.00	16.12	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
34.850	22.70	1.28	26.50	35.08	32.56	40.00	7.44	Peak
117.300	18.56	2.49	26.19	35.79	30.65	43.50	12.85	Peak
211.390	16.46	3.49	25.79	33.84	28.00	43.50	15.50	Peak
336.520	20.71	4.79	26.01	30.28	29.77	46.00	16.23	Peak
861.290	26.76	8.20	27.13	29.25	37.08	46.00	8.92	Peak
972.840	27.64	8.83	26.79	28.14	37.82	54.00	16.18	Peak

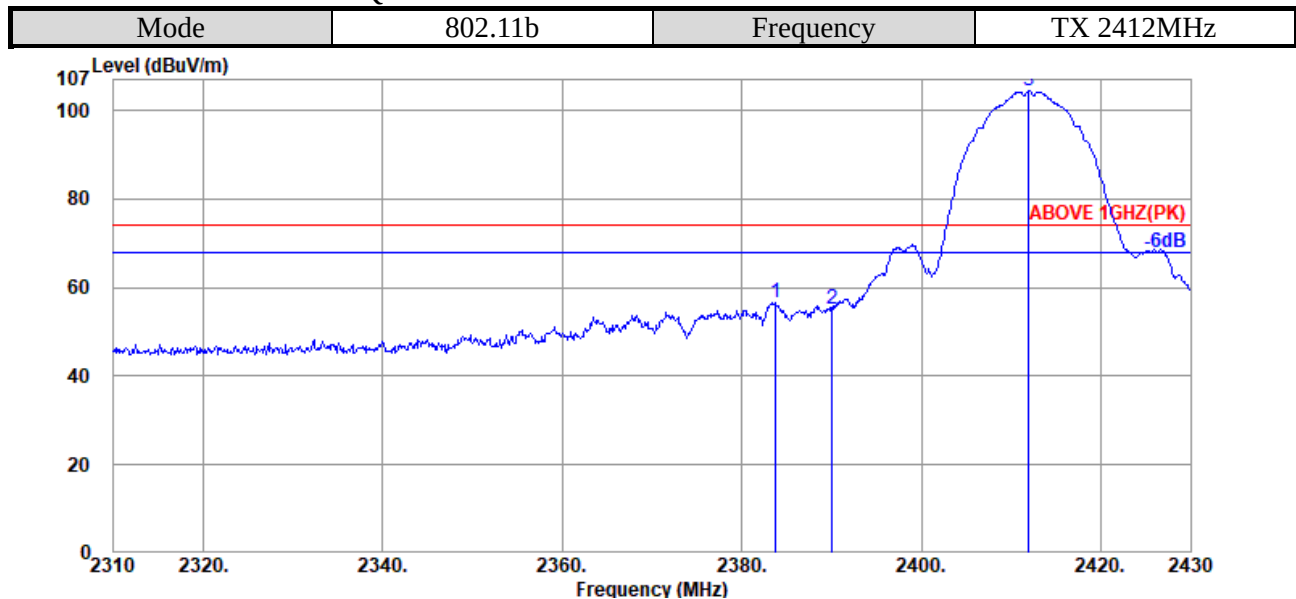
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New Taipei City244, Taiwan

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Fax: +886 2 26099303

A.2.1.3 Frequency Above 1 GHz to 10th harmonics

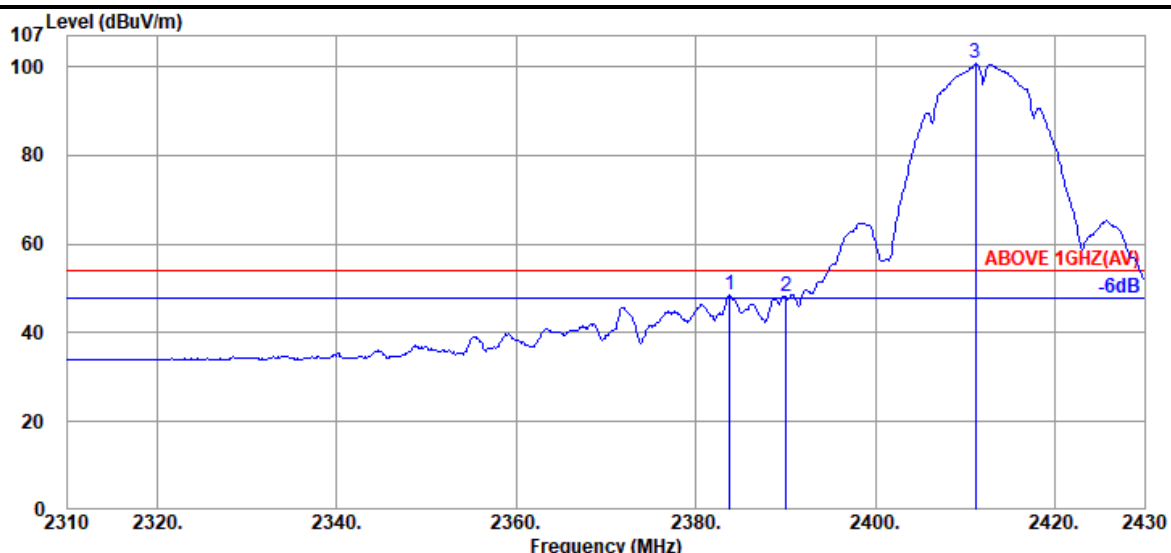
Band Edge:

- Test model: LIVA Q1A



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2383.800	31.89	7.95	34.53	51.20	56.51	74.00	17.49	Peak
2390.040	31.89	7.95	34.54	49.85	55.15	74.00	18.85	Peak
@ 2412.000	31.94	7.96	34.54	99.00	104.36	---	---	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2383.800	31.89	7.95	34.53	43.11	48.42	54.00	5.58	Average
2390.040	31.89	7.95	34.54	42.77	48.07	54.00	5.93	Average
@ 2411.160	31.87	7.96	34.54	95.33	100.62	---	---	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

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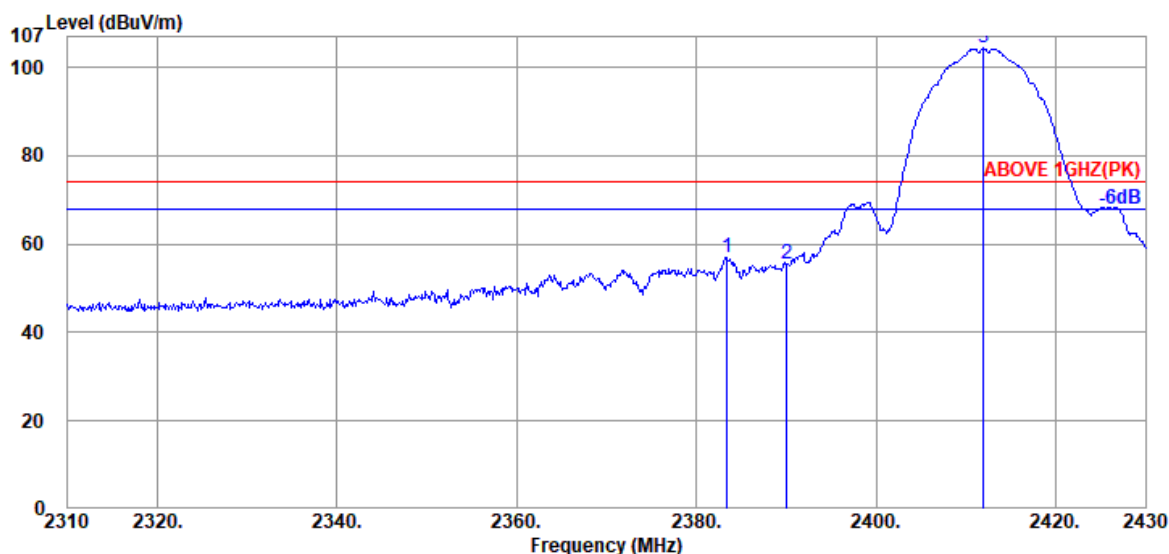
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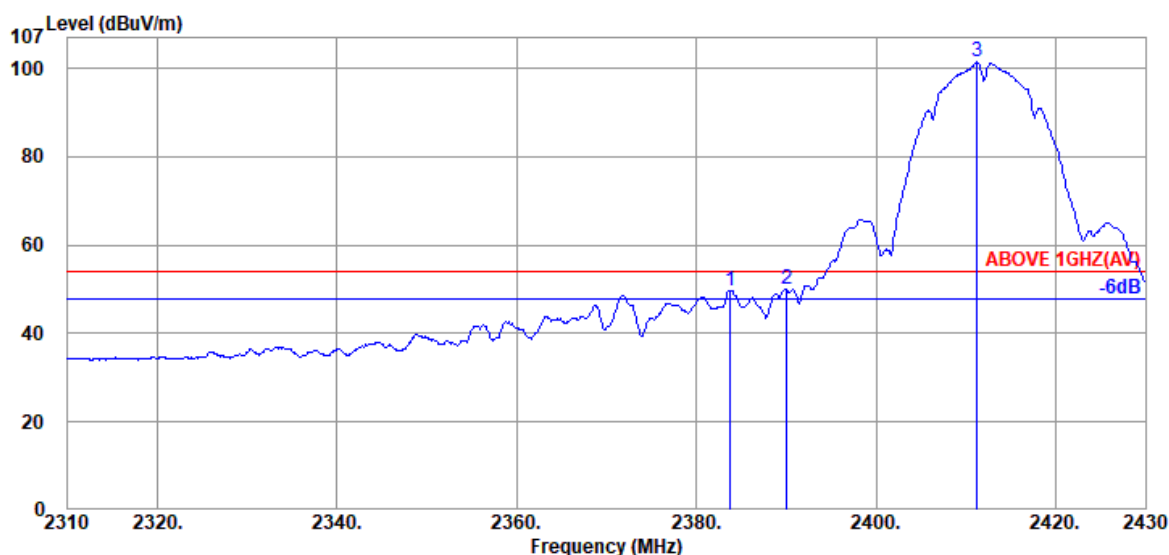
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Mode	802.11b	Frequency	TX 2412MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2383.440	31.93	7.95	34.53	51.54	56.89	74.00	17.11	Peak
2390.040	31.89	7.95	34.54	50.27	55.57	74.00	18.43	Peak
@ 2412.000	31.94	7.96	34.54	98.91	104.27	---	---	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2383.800	31.89	7.95	34.53	44.50	49.81	54.00	4.19	Average
2390.040	31.89	7.95	34.54	44.55	49.85	54.00	4.15	Average
@ 2411.280	31.94	7.96	34.54	95.98	101.34	---	---	Average

Remark: The "@" means fundamental frequency, it is ignored in this section.

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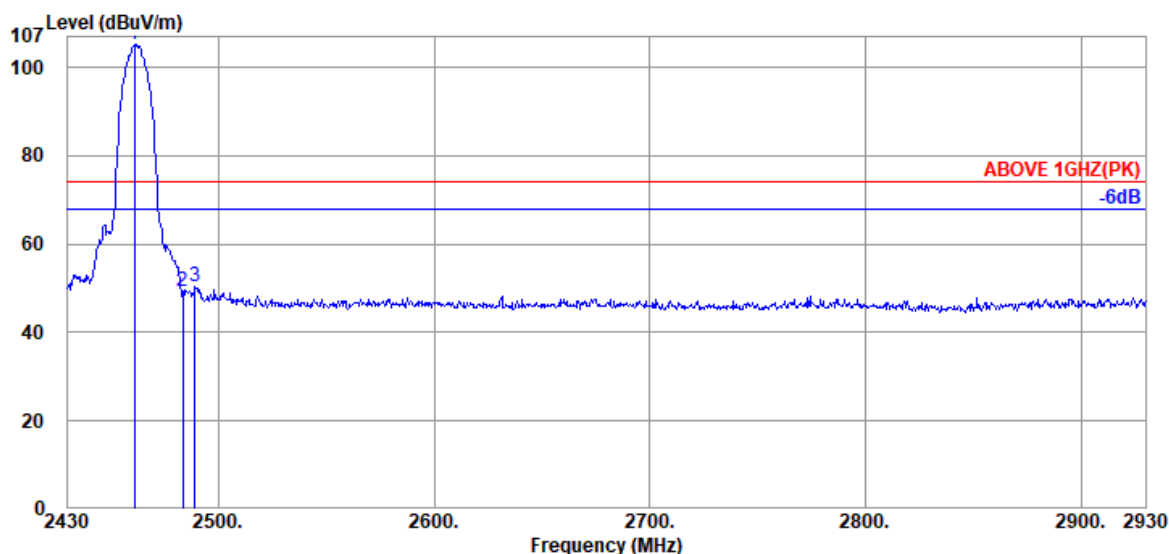
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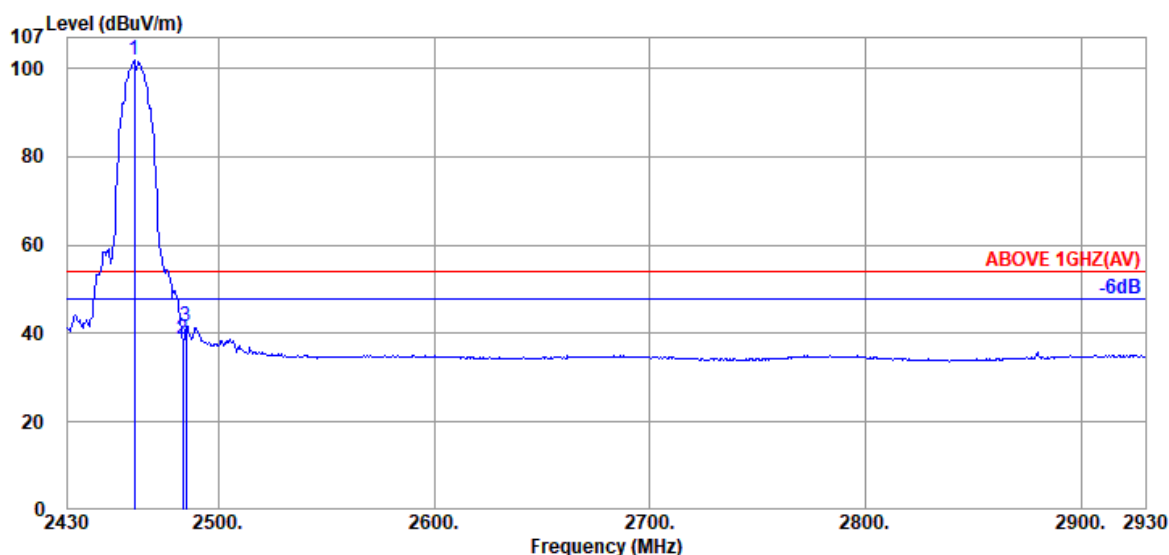
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Mode	802.11b	Frequency	TX 2462MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2461.000	32.30	7.98	34.55	99.34	105.07	---	---	Peak
2483.500	32.30	7.99	34.55	43.54	49.28	74.00	24.72	Peak
2489.000	32.30	8.00	34.55	44.60	50.35	74.00	23.65	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2461.000	32.30	7.98	34.55	96.28	102.01	---	---	Average
2483.500	32.30	7.99	34.55	32.96	38.70	54.00	15.30	Average
2485.000	32.30	7.99	34.55	36.07	41.81	54.00	12.19	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

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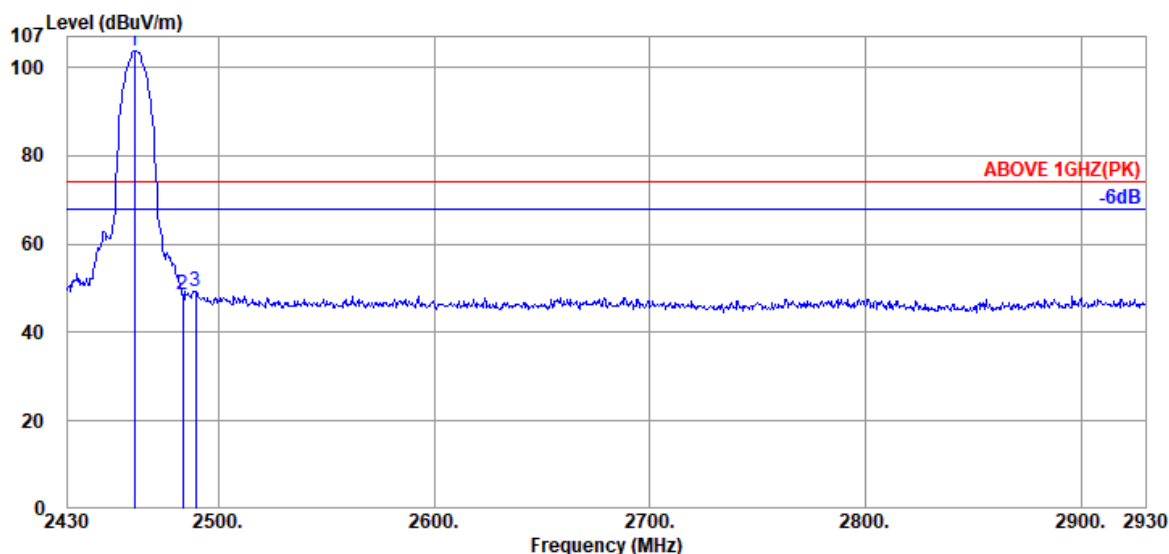
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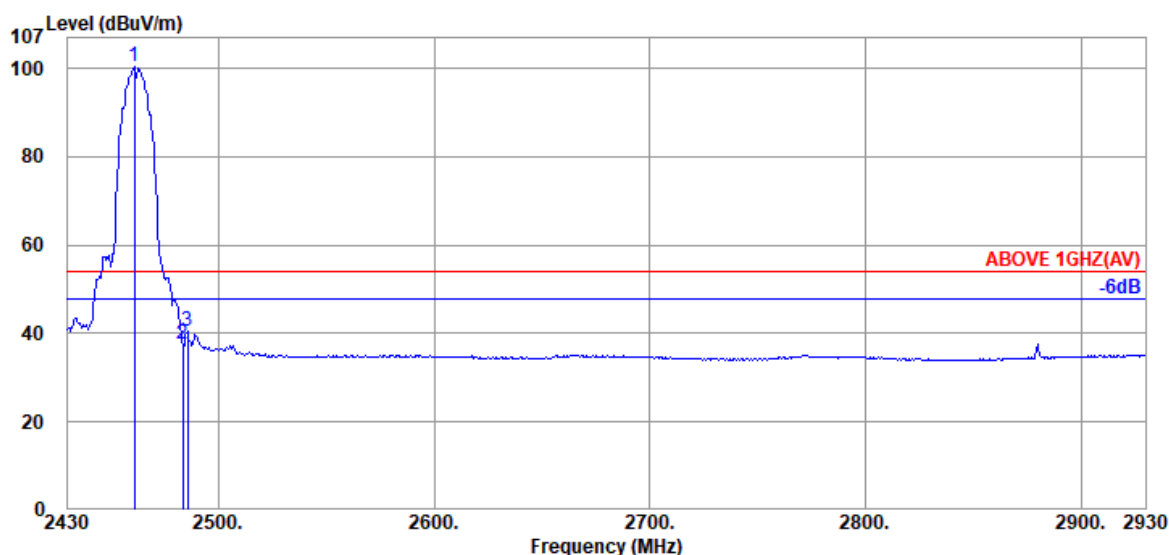
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Mode	802.11b	Frequency	TX 2462MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2461.000	32.30	7.98	34.55	97.98	103.71	---	---	Peak
2483.500	32.30	7.99	34.55	42.83	48.57	74.00	25.43	Peak
2489.500	32.30	8.00	34.55	43.50	49.25	74.00	24.75	Peak

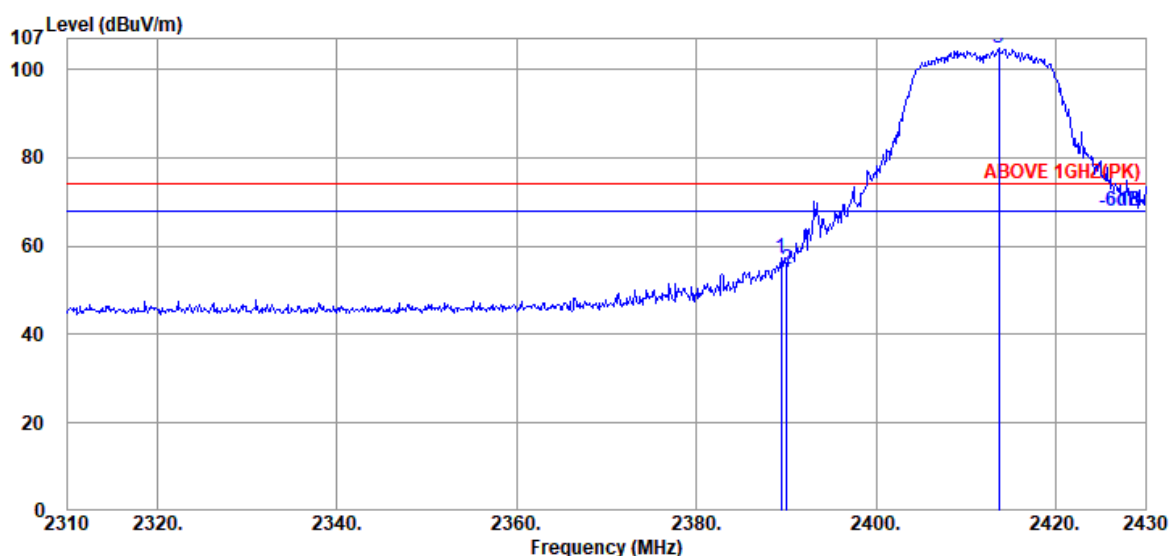


Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2461.000	32.30	7.98	34.55	94.82	100.55	---	---	Average
2483.500	32.30	7.99	34.55	31.85	37.59	54.00	16.41	Average
2485.500	32.30	7.99	34.55	34.70	40.44	54.00	13.56	Average

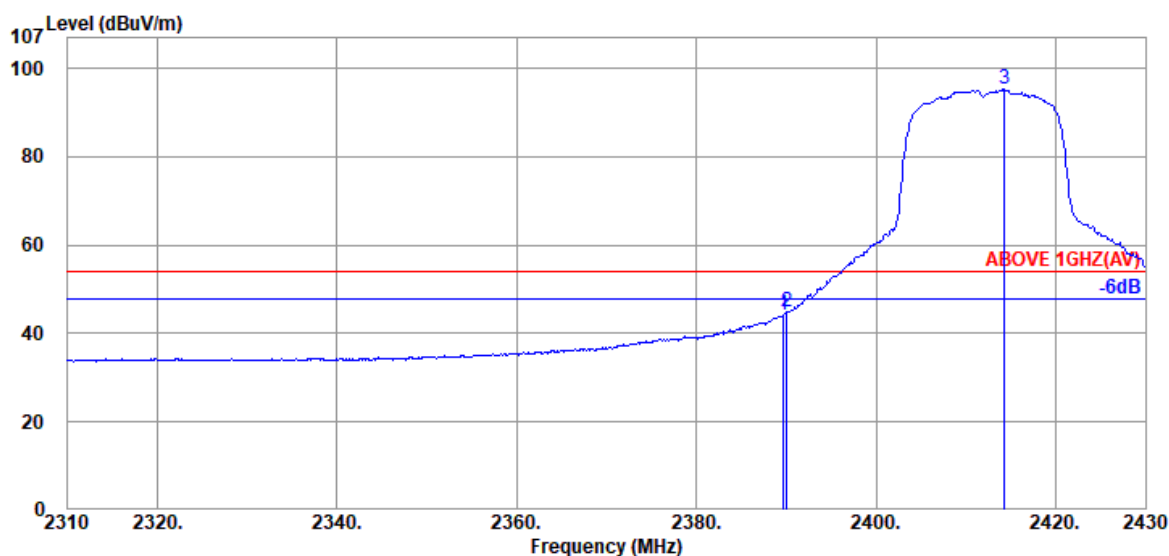
Remark: The “@” means fundamental frequency, it is ignored in this section.

Mode	802.11g	Frequency	TX 2412MHz
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Antenna at Horizontal Polarization

Antenna at Horizontal Polarization								
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.440	31.89	7.95	34.53	52.02	57.33	74.00	16.67	Peak
2390.040	31.89	7.95	34.54	49.60	54.90	74.00	19.10	Peak
@ 2413.680	31.94	7.96	34.54	99.32	104.68	---	---	Peak



Antenna at Horizontal Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
	2389.680	31.89	7.95	34.53	38.81	44.12	54.00	9.88	Average
	2390.040	31.89	7.95	34.54	39.57	44.87	54.00	9.13	Average
@	2414.280	31.94	7.96	34.54	89.93	95.29	---	---	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

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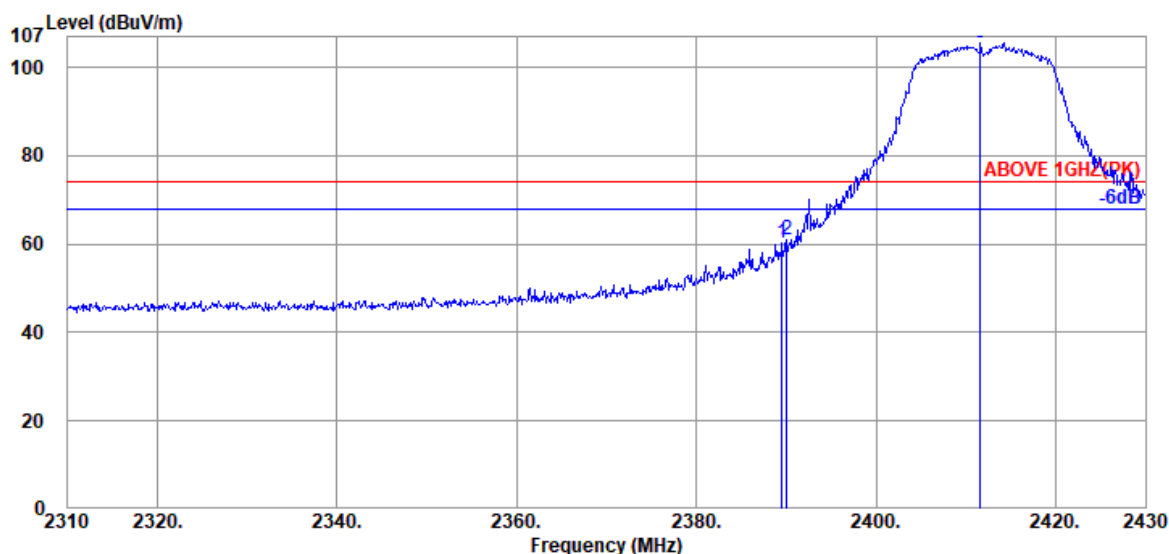
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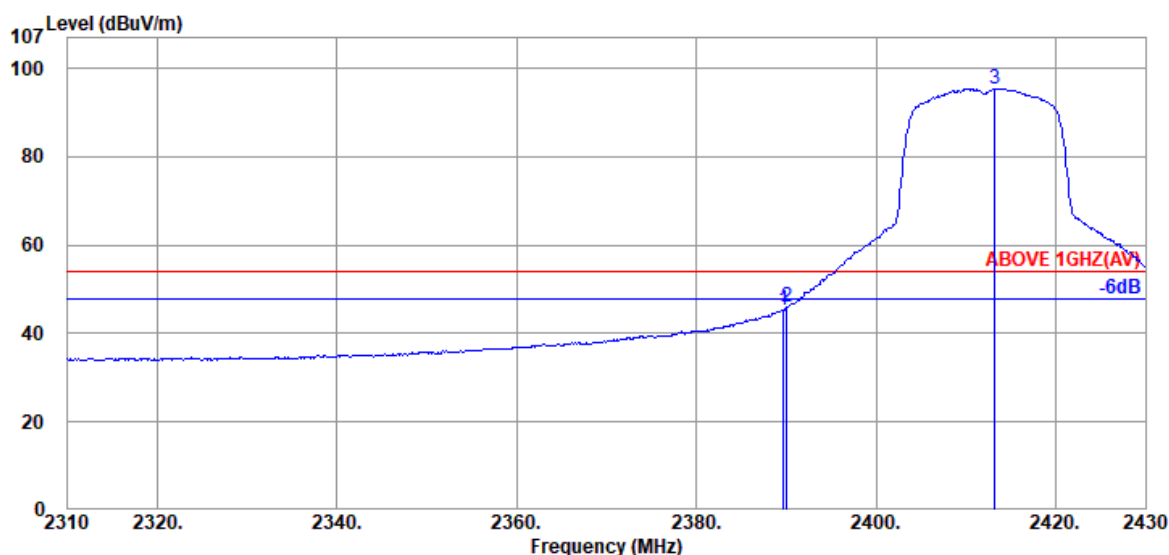
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Mode	802.11g	Frequency	TX 2412MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.560	31.89	7.95	34.53	55.07	60.38	74.00	13.62	Peak
2390.040	31.89	7.95	34.54	55.54	60.84	74.00	13.16	Peak
@ 2411.640	31.94	7.96	34.54	100.25	105.61	---	---	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.680	31.89	7.95	34.53	39.96	45.27	54.00	8.73	Average
2390.040	31.89	7.95	34.54	40.71	46.01	54.00	7.99	Average
@ 2413.200	31.94	7.96	34.54	90.08	95.44	---	---	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

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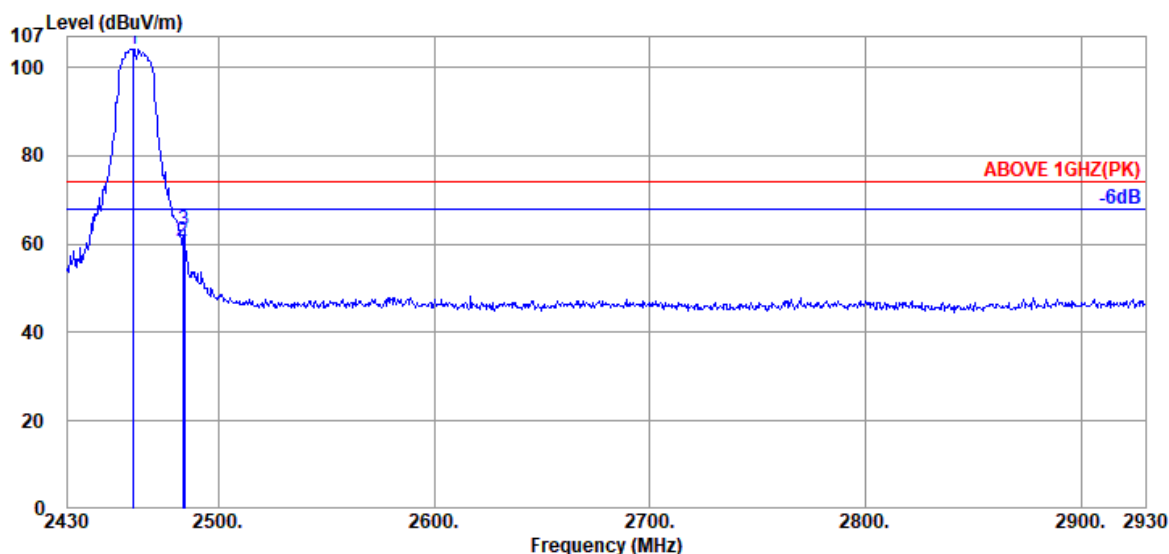
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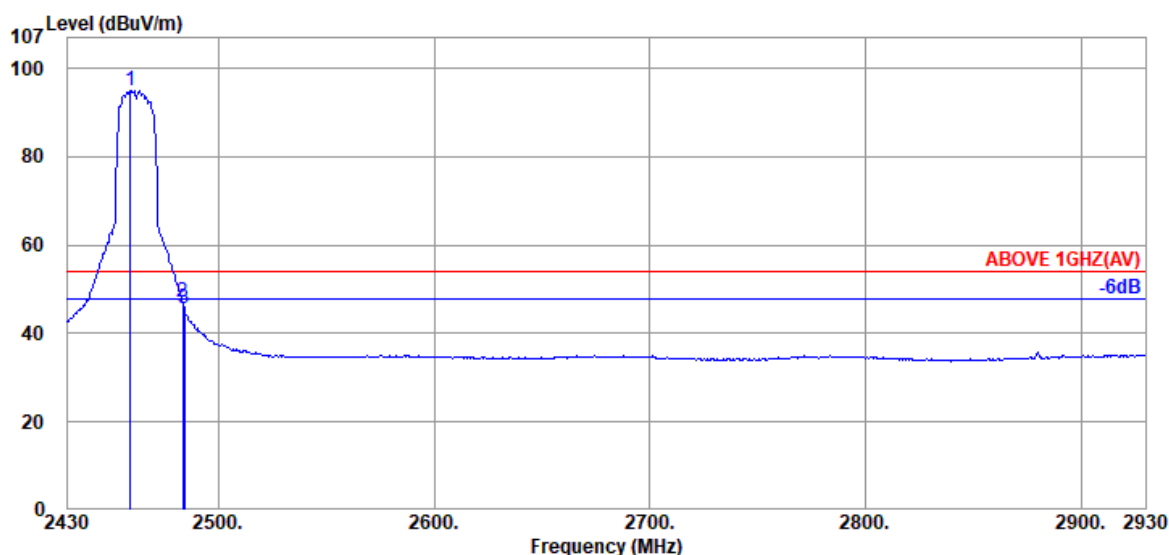
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Mode	802.11g	Frequency	TX 2462MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2460.500	32.30	7.98	34.55	98.47	104.20	---	---	Peak
2483.500	32.30	7.99	34.55	54.83	60.57	74.00	13.43	Peak
2484.000	32.30	7.99	34.55	57.31	63.05	74.00	10.95	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2459.000	32.30	7.98	34.55	89.21	94.94	---	---	Average
2483.500	32.30	7.99	34.55	41.24	46.98	54.00	7.02	Average
2484.000	32.30	7.99	34.55	40.05	45.79	54.00	8.21	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

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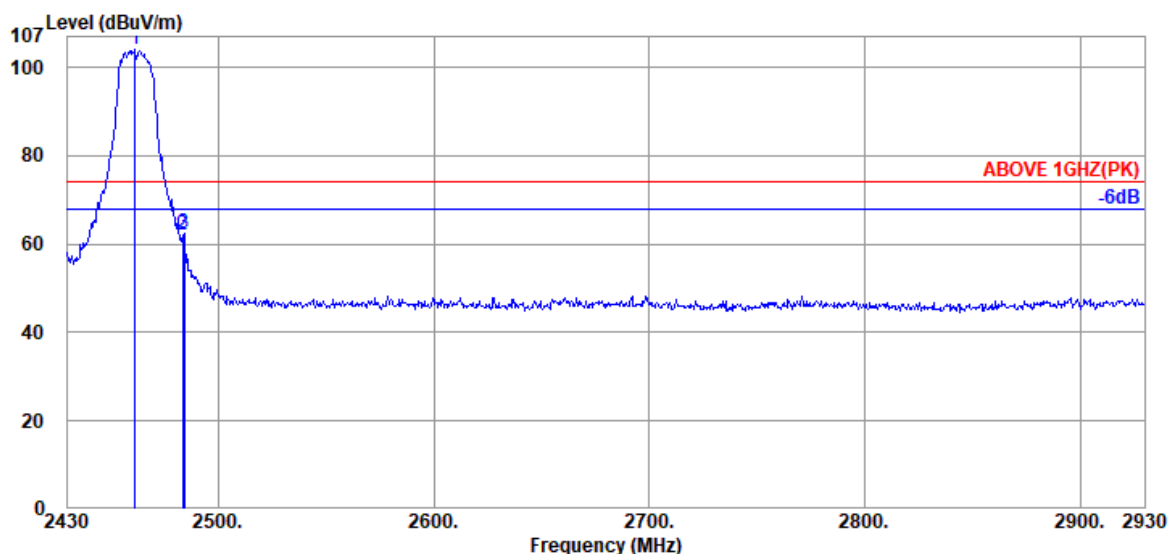
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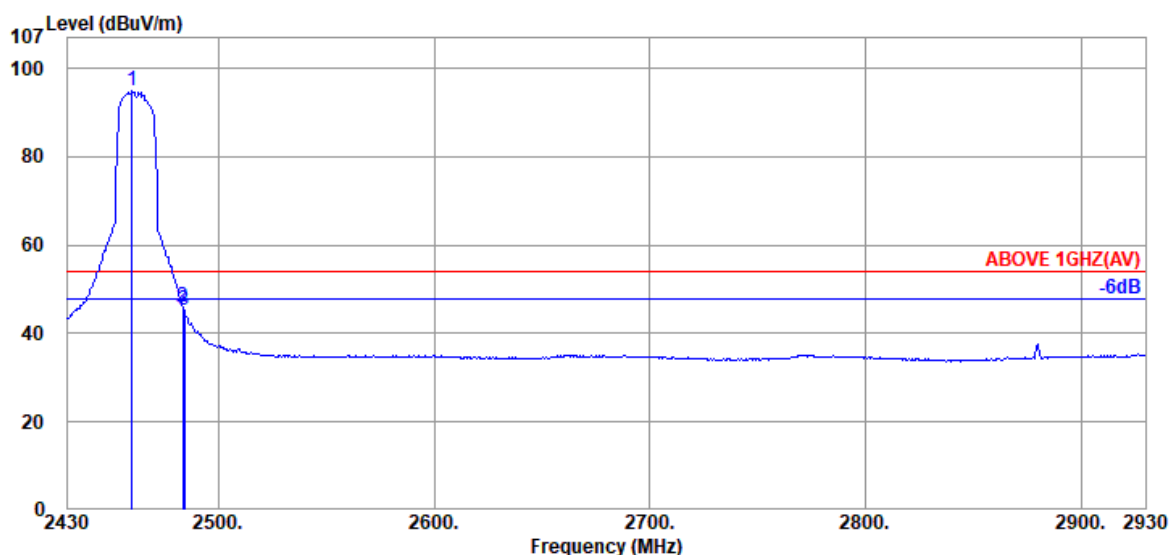
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Mode	802.11g	Frequency	TX 2462MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2461.500	32.30	7.98	34.55	98.23	103.96	---	---	Peak
2483.500	32.30	7.99	34.55	56.52	62.26	74.00	11.74	Peak
2484.000	32.30	7.99	34.55	56.82	62.56	74.00	11.44	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2460.000	32.30	7.98	34.55	89.06	94.79	---	---	Average
2483.500	32.30	7.99	34.55	40.15	45.89	54.00	8.11	Average
2484.000	32.30	7.99	34.55	39.37	45.11	54.00	8.89	Average

Remark: The "@" means fundamental frequency, it is ignored in this section.

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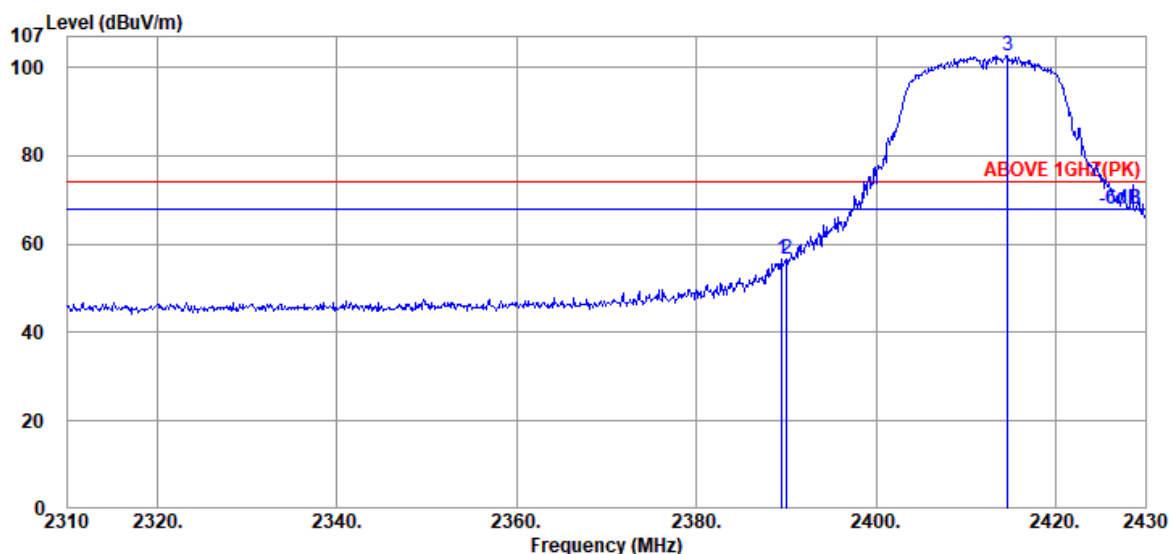
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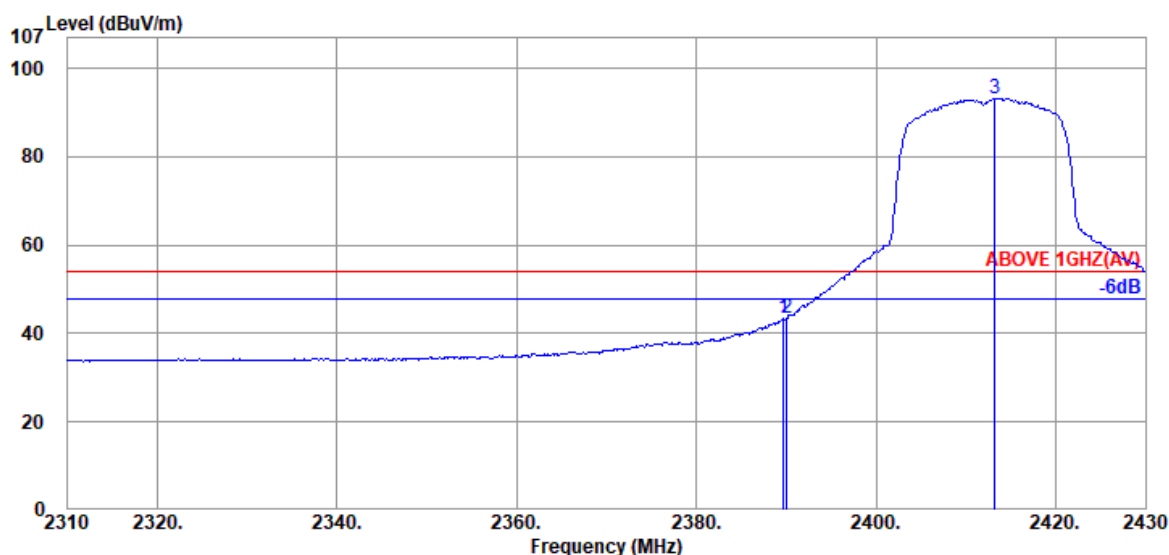
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Mode	802.11n-HT20	Frequency	TX 2412MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.560	31.89	7.95	34.53	51.15	56.46	74.00	17.54	Peak
2390.040	31.89	7.95	34.54	51.30	56.60	74.00	17.40	Peak
@ 2414.640	31.94	7.96	34.54	97.41	102.77	---	---	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.680	31.89	7.95	34.53	37.98	43.29	54.00	10.71	Average
2390.040	31.89	7.95	34.54	38.19	43.49	54.00	10.51	Average
@ 2413.200	31.94	7.96	34.54	87.91	93.27	---	---	Average

Remark: The "@" means fundamental frequency, it is ignored in this section.

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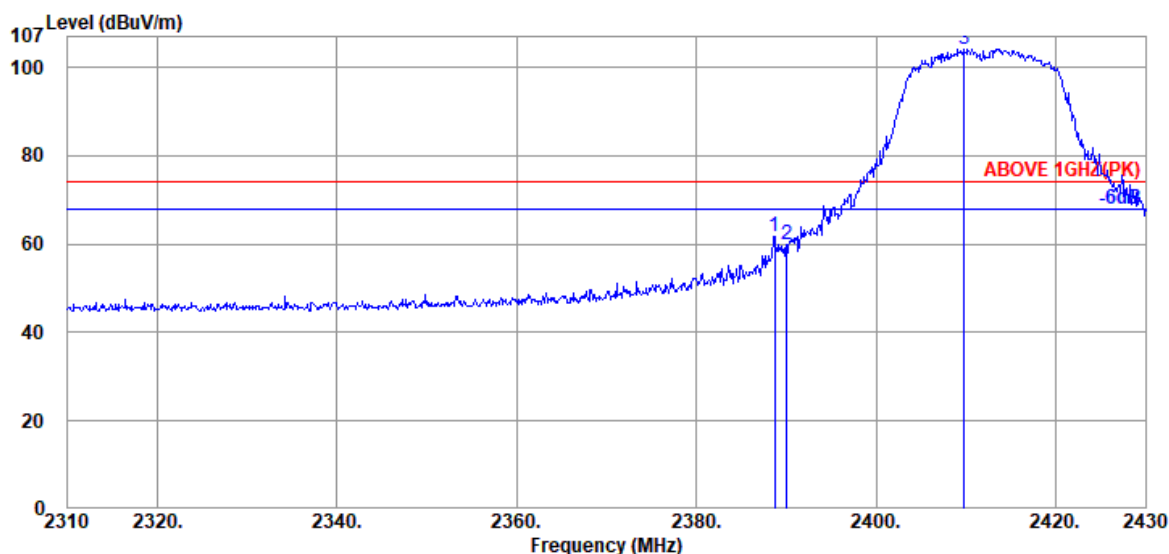
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Tel: +886 2 26099301

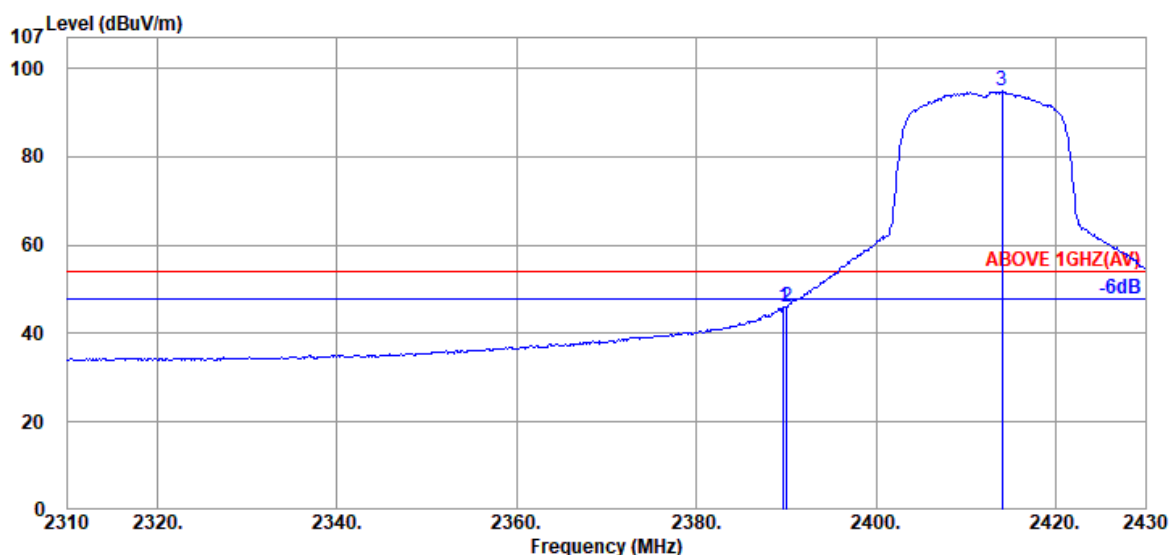
Fax: +886 2 26099303

Mode	802.11n-HT20	Frequency	TX 2412MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.720	31.89	7.95	34.53	56.42	61.73	74.00	12.27	Peak
2390.040	31.89	7.95	34.54	54.69	59.99	74.00	14.01	Peak
@ 2409.840	31.87	7.96	34.54	98.88	104.17	---	---	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.680	31.89	7.95	34.53	40.65	45.96	54.00	8.04	Average
2390.040	31.89	7.95	34.54	40.64	45.94	54.00	8.06	Average
@ 2414.040	31.94	7.96	34.54	89.55	94.91	---	---	Average

Remark: The "@" means fundamental frequency, it is ignored in this section.

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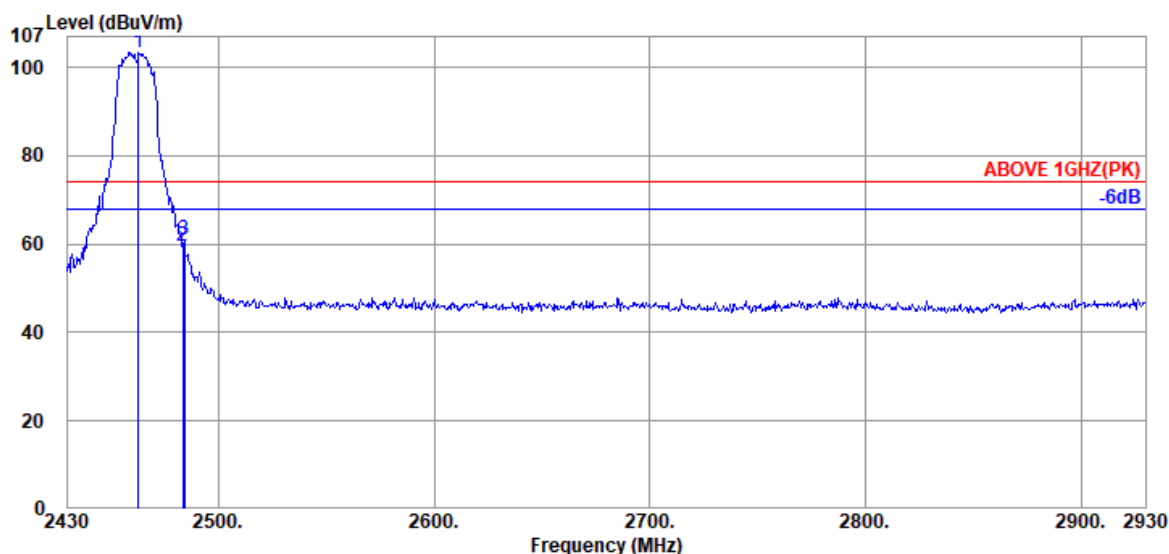
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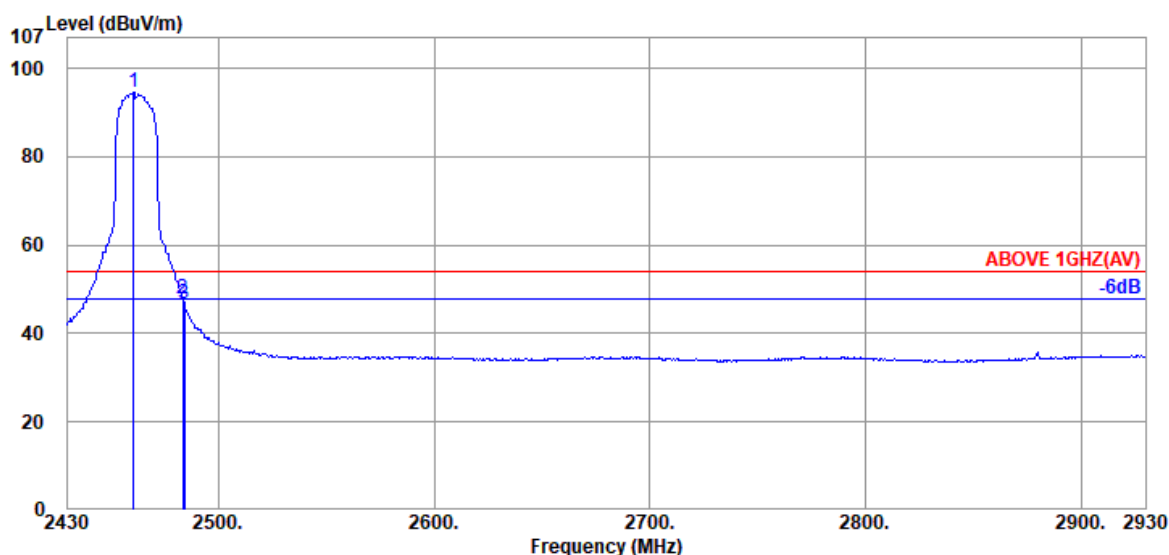
Fax: +886 2 26099303

Mode	802.11n-HT20	Frequency	TX 2462MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2463.000	32.30	7.98	34.55	97.67	103.40	---	---	Peak
2483.500	32.30	7.99	34.55	53.65	59.39	74.00	14.61	Peak
2484.000	32.30	7.99	34.55	55.07	60.81	74.00	13.19	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2460.500	32.30	7.98	34.55	88.92	94.65	---	---	Average
2483.500	32.30	7.99	34.55	41.95	47.69	54.00	6.31	Average
2484.000	32.30	7.99	34.55	41.15	46.89	54.00	7.11	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

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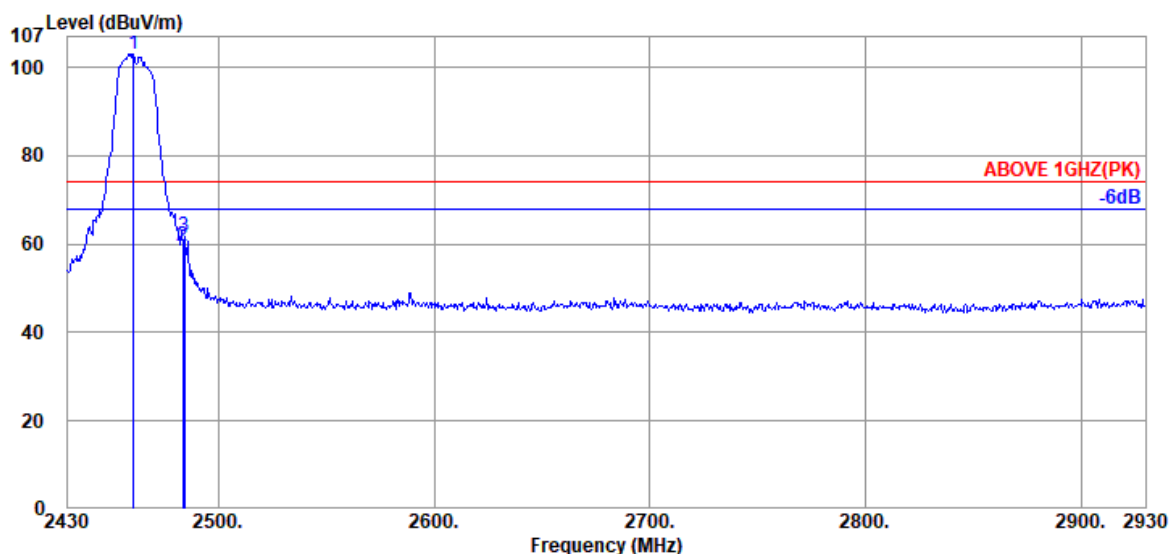
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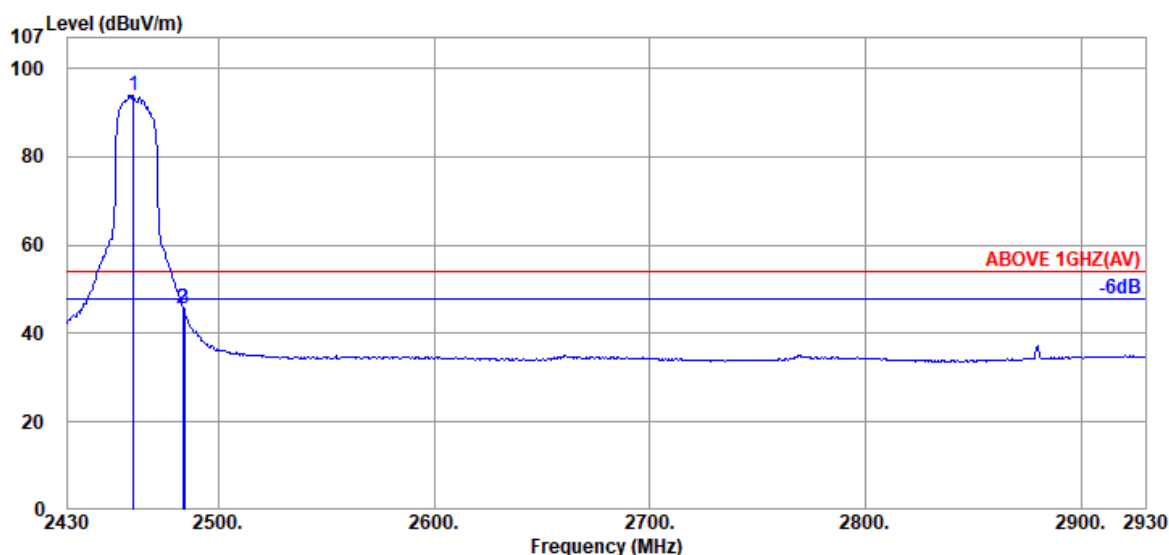
Fax: +886 2 26099303

Mode	802.11n-HT20	Frequency	TX 2462MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2460.500	32.30	7.98	34.55	97.41	103.14	---	---	Peak
2483.500	32.30	7.99	34.55	53.60	59.34	74.00	14.66	Peak
2484.000	32.30	7.99	34.55	56.01	61.75	74.00	12.25	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2460.500	32.30	7.98	34.55	88.28	94.01	---	---	Average
2483.500	32.30	7.99	34.55	40.07	45.81	54.00	8.19	Average
2484.000	32.30	7.99	34.55	39.81	45.55	54.00	8.45	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

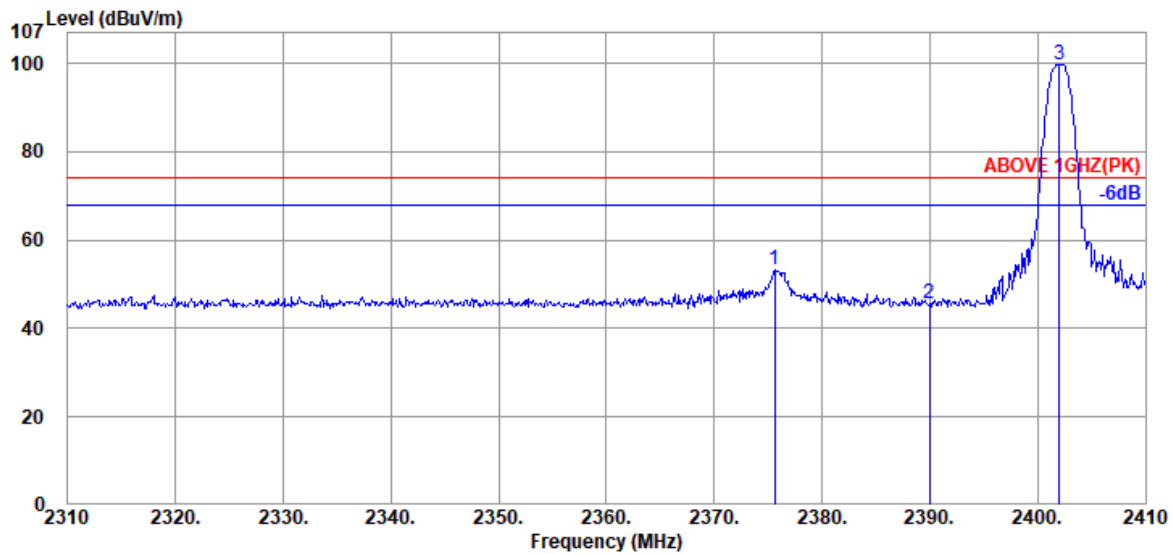
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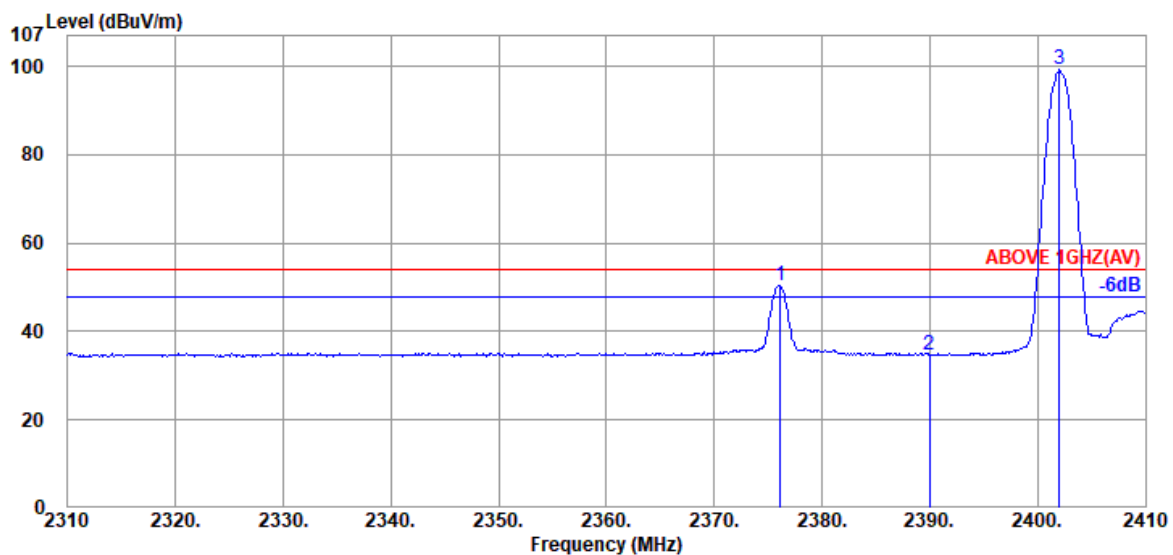
Fax: +886 2 26099303

Mode	BLE	Frequency	TX 2402MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2375.600	31.97	7.94	34.53	47.96	53.34	74.00	20.66	Peak
2390.000	31.89	7.95	34.54	40.29	45.59	74.00	28.41	Peak
@ 2402.000	31.80	7.95	34.54	94.51	99.72	---	---	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2376.100	31.97	7.94	34.53	45.19	50.57	54.00	3.43	Average
2390.000	31.89	7.95	34.54	29.53	34.83	54.00	19.17	Average
@ 2402.000	31.80	7.95	34.54	93.97	99.18	---	---	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

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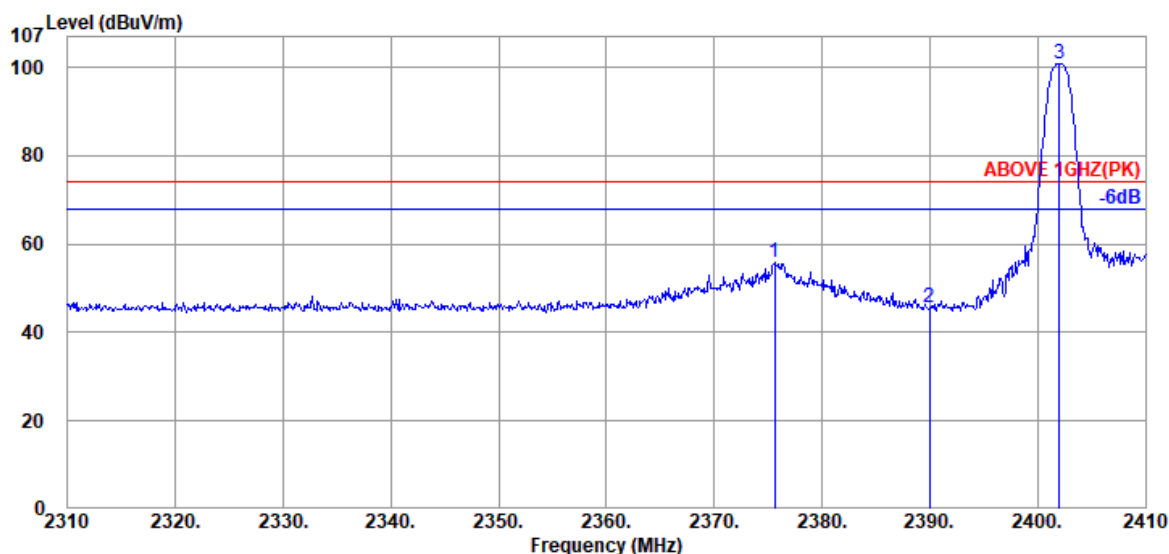
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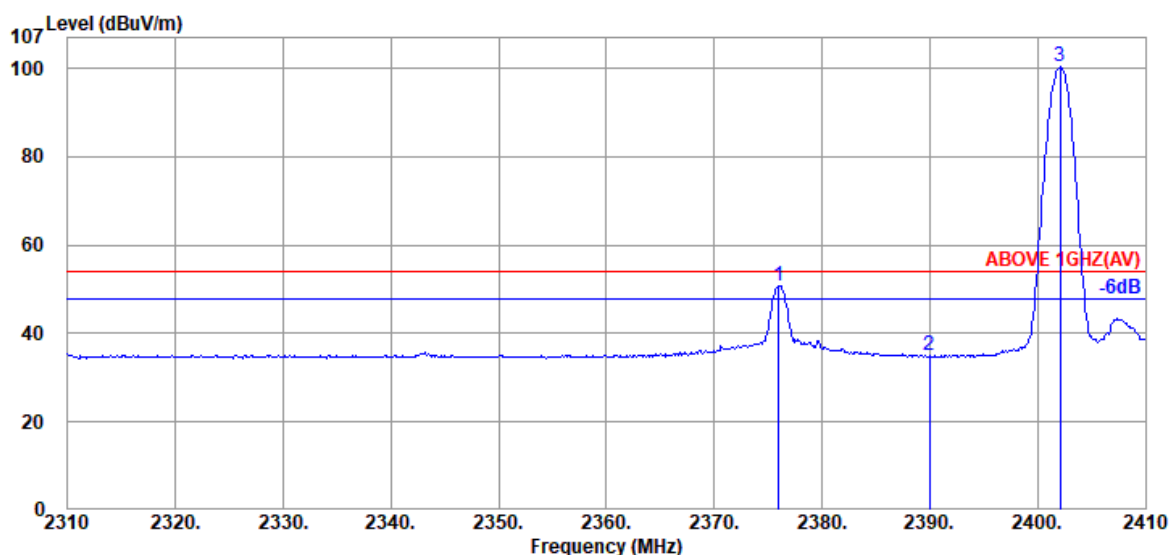
Fax: +886 2 26099303

Mode	BLE	Frequency	TX 2402MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2375.600	31.97	7.94	34.53	50.40	55.78	74.00	18.22	Peak
2390.000	31.89	7.95	34.54	40.29	45.59	74.00	28.41	Peak
@ 2402.000	31.80	7.95	34.54	95.57	100.78	---	---	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2376.000	31.97	7.94	34.53	45.54	50.92	54.00	3.08	Average
2390.000	31.89	7.95	34.54	29.63	34.93	54.00	19.07	Average
@ 2402.100	31.80	7.95	34.54	95.06	100.27	---	---	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

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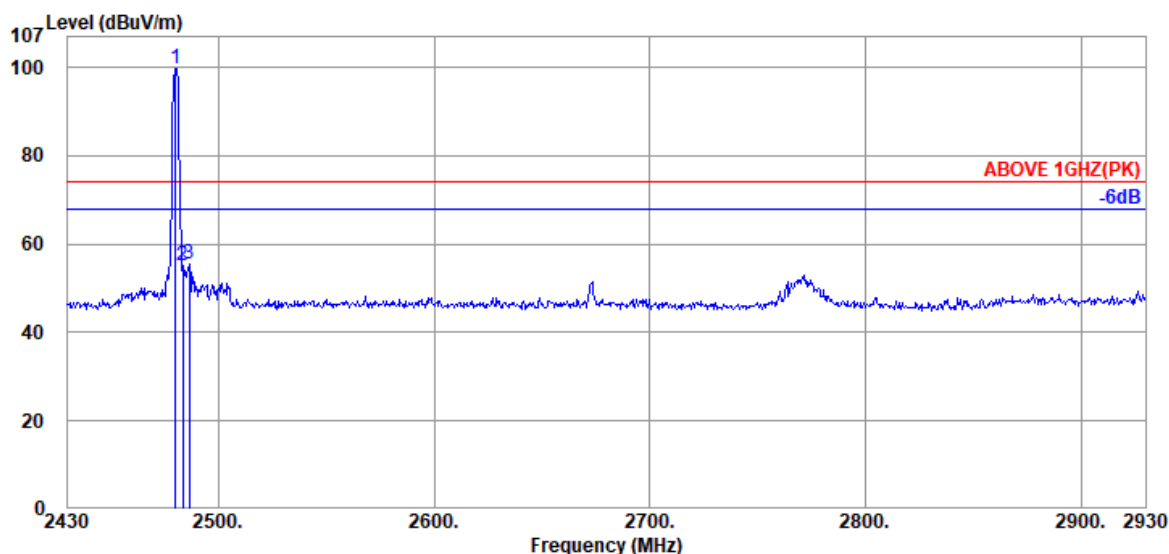
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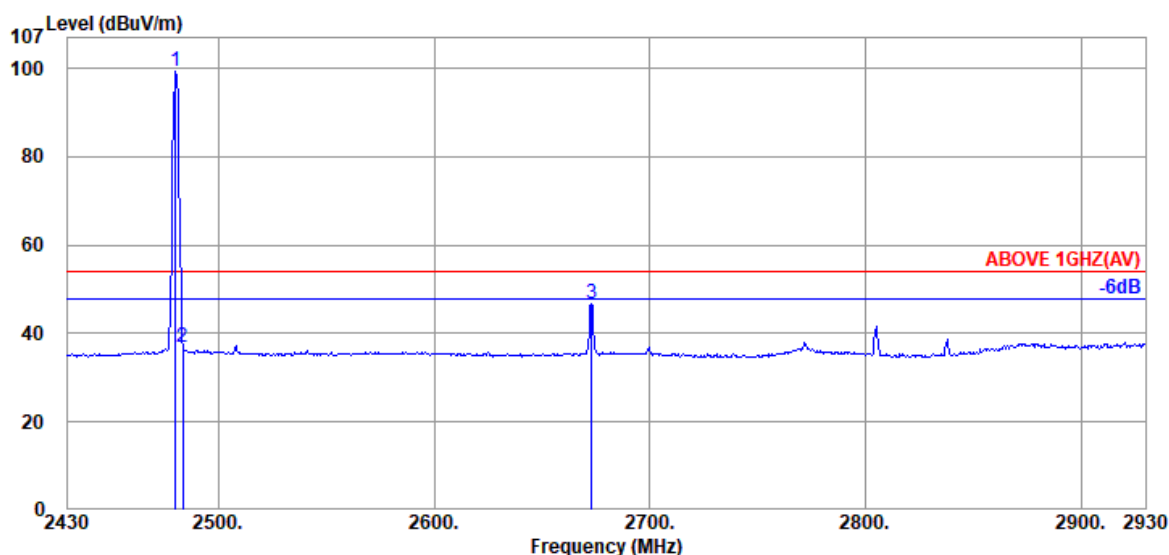
Fax: +886 2 26099303

Mode	BLE	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2480.000	32.30	7.99	34.55	94.11	99.85	---	---	Peak
2483.500	32.30	7.99	34.55	49.55	55.29	74.00	18.71	Peak
2486.500	32.30	8.00	34.55	49.60	55.35	74.00	18.65	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2480.000	32.30	7.99	34.55	93.43	99.17	---	---	Average
2483.500	32.30	7.99	34.55	30.97	36.71	54.00	17.29	Average
2673.000	32.20	8.08	34.60	41.08	46.76	54.00	7.24	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

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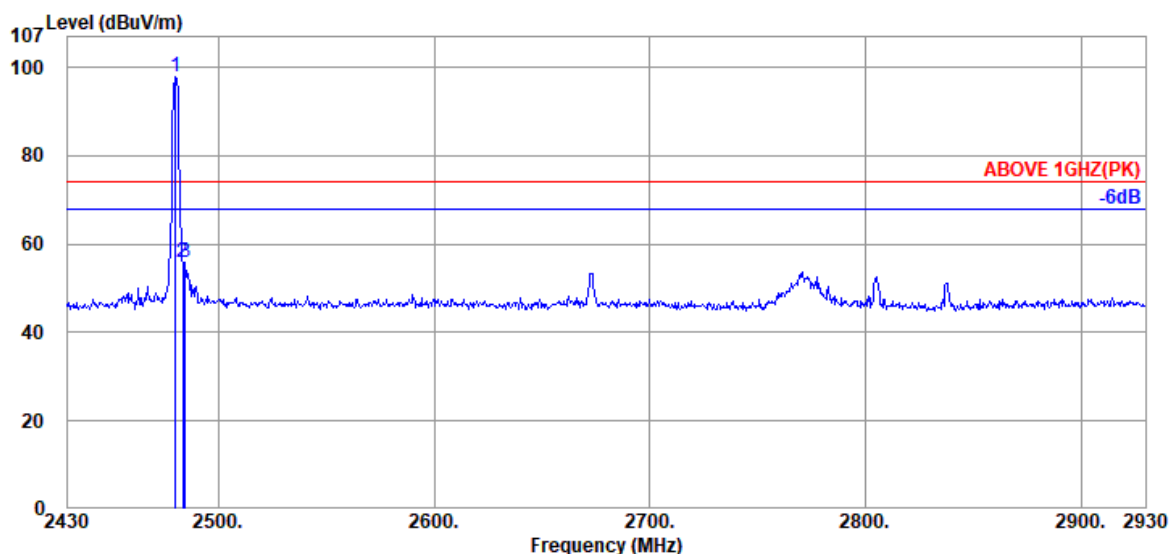
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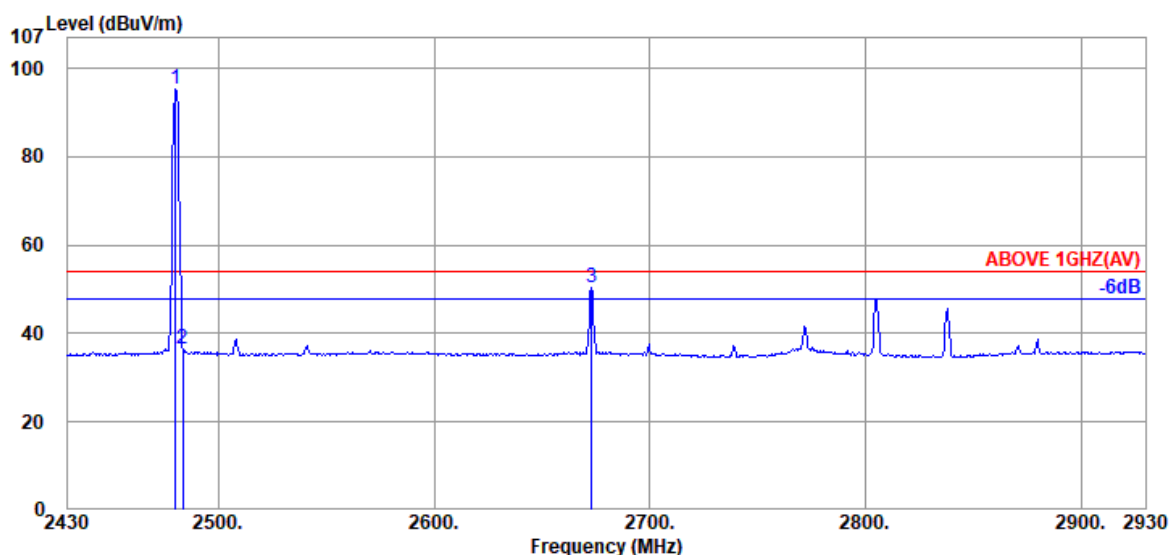
Fax: +886 2 26099303

Mode	BLE	Frequency	TX 2480MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2480.000	32.30	7.99	34.55	92.07	97.81	---	---	Peak
2483.500	32.30	7.99	34.55	49.96	55.70	74.00	18.30	Peak
2484.500	32.30	7.99	34.55	50.07	55.81	74.00	18.19	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2480.000	32.30	7.99	34.55	89.71	95.45	---	---	Average
2483.500	32.30	7.99	34.55	30.64	36.38	54.00	17.62	Average
2673.000	32.20	8.08	34.60	44.69	50.37	54.00	3.63	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

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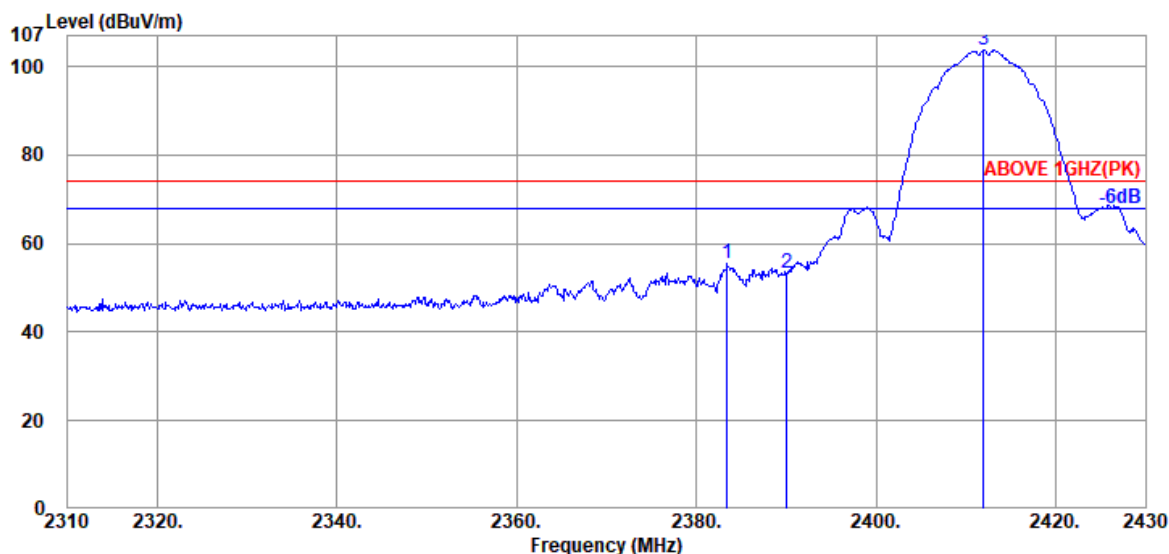
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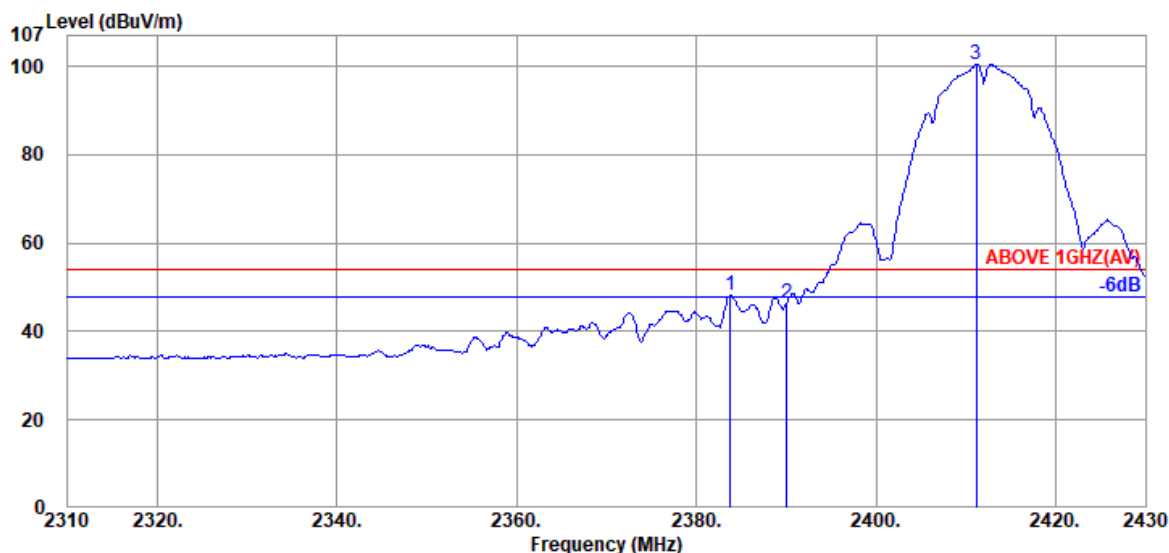
● Test model: LIVA Q1A PLUS

Mode	802.11b	Frequency	TX 2412MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2383.440	31.93	7.95	34.53	50.18	55.53	74.00	18.47	Peak
2390.040	31.89	7.95	34.54	47.95	53.25	74.00	20.75	Peak
@ 2412.000	31.94	7.96	34.54	98.29	103.65	---	---	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2383.800	31.89	7.95	34.53	42.84	48.15	54.00	5.85	Average
2390.040	31.89	7.95	34.54	41.09	46.39	54.00	7.61	Average
@ 2411.160	31.87	7.96	34.54	95.26	100.55	---	---	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

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Report Number: EM-F210266

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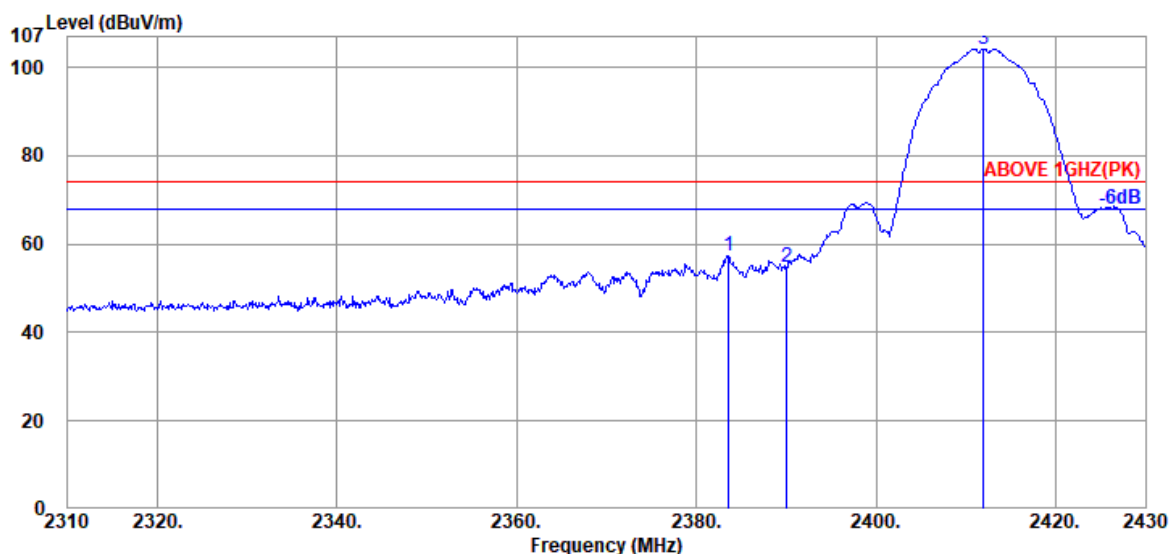
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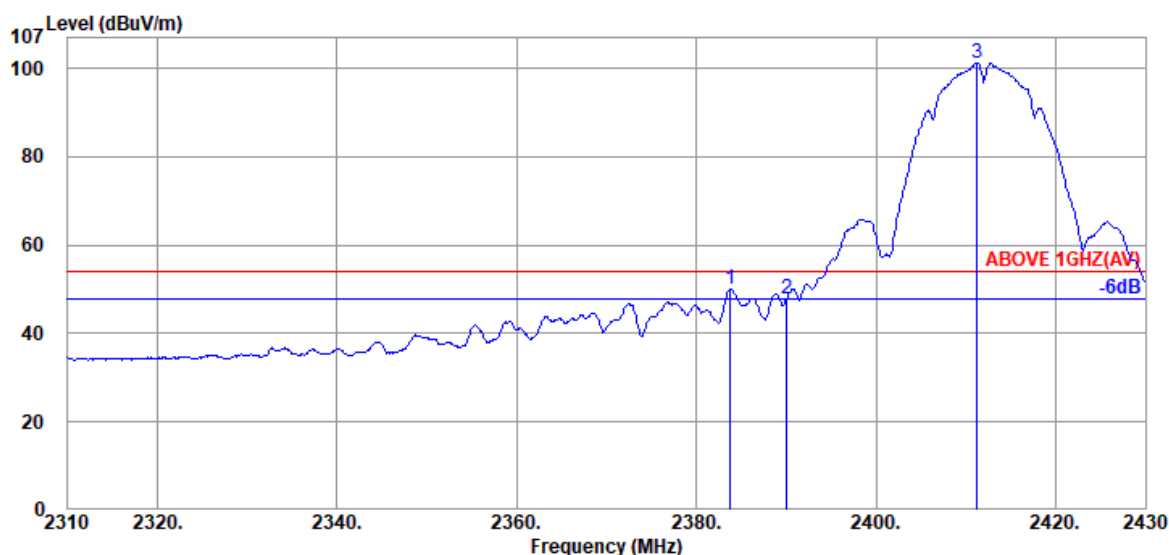
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Mode	802.11b	Frequency	TX 2412MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2383.560	31.89	7.95	34.53	52.18	57.49	74.00	16.51	Peak
2390.040	31.89	7.95	34.54	49.49	54.79	74.00	19.21	Peak
@ 2412.000	31.94	7.96	34.54	98.87	104.23	---	---	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2383.800	31.89	7.95	34.53	44.74	50.05	54.00	3.95	Average
2390.040	31.89	7.95	34.54	42.39	47.69	54.00	6.31	Average
@ 2411.280	31.94	7.96	34.54	95.88	101.24	---	---	Average

Remark: The "@" means fundamental frequency, it is ignored in this section.

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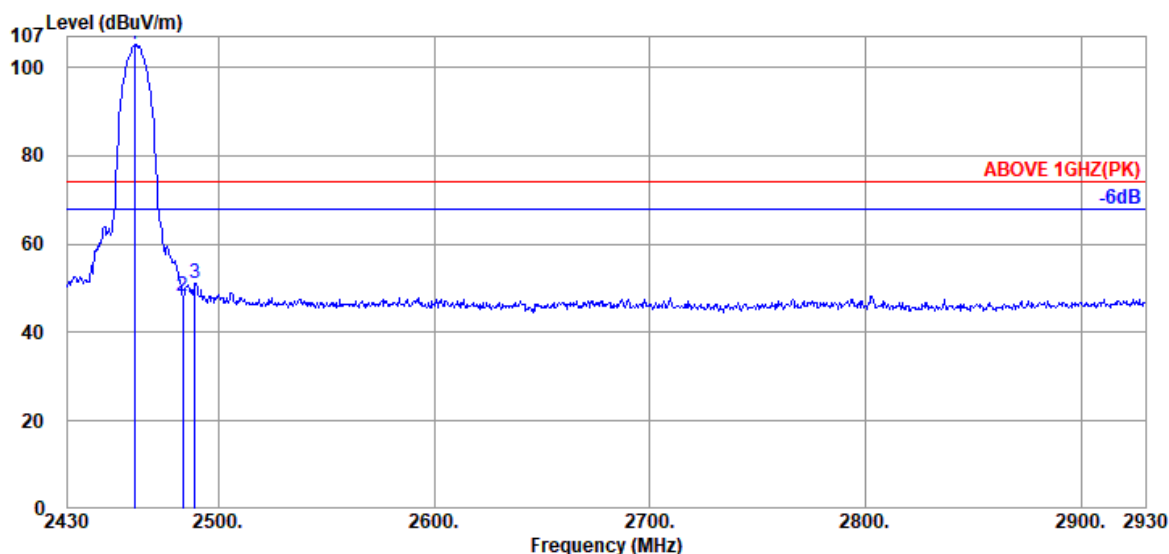
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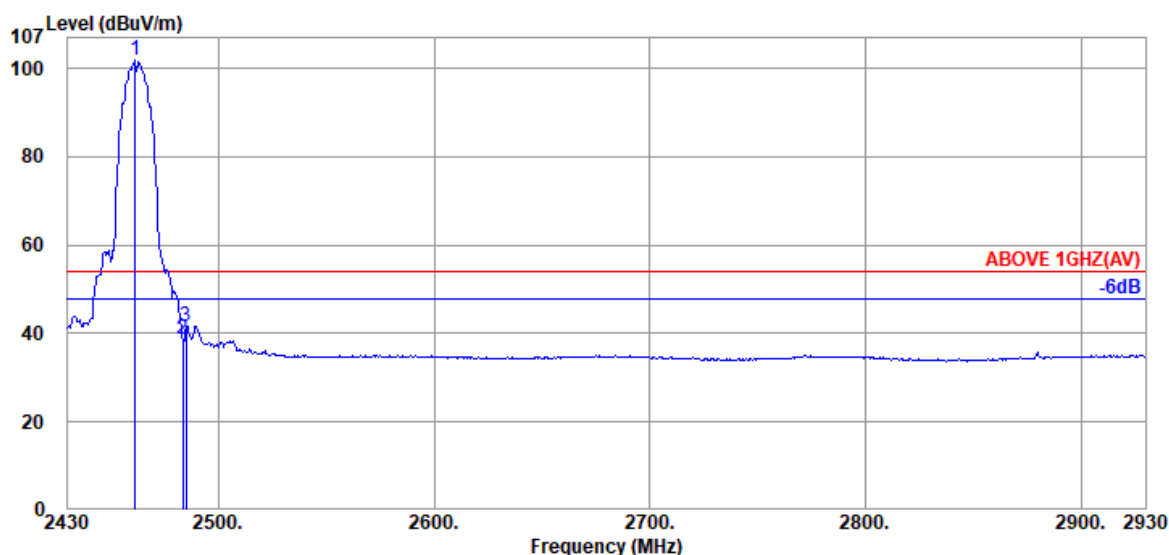
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Mode	802.11b	Frequency	TX 2462MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2461.000	32.30	7.98	34.55	99.31	105.04	---	---	Peak
2483.500	32.30	7.99	34.55	42.53	48.27	74.00	25.73	Peak
2489.000	32.30	8.00	34.55	45.51	51.26	74.00	22.74	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2461.500	32.30	7.98	34.55	96.05	101.78	---	---	Average
2483.500	32.30	7.99	34.55	32.88	38.62	54.00	15.38	Average
2485.000	32.30	7.99	34.55	36.06	41.80	54.00	12.20	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

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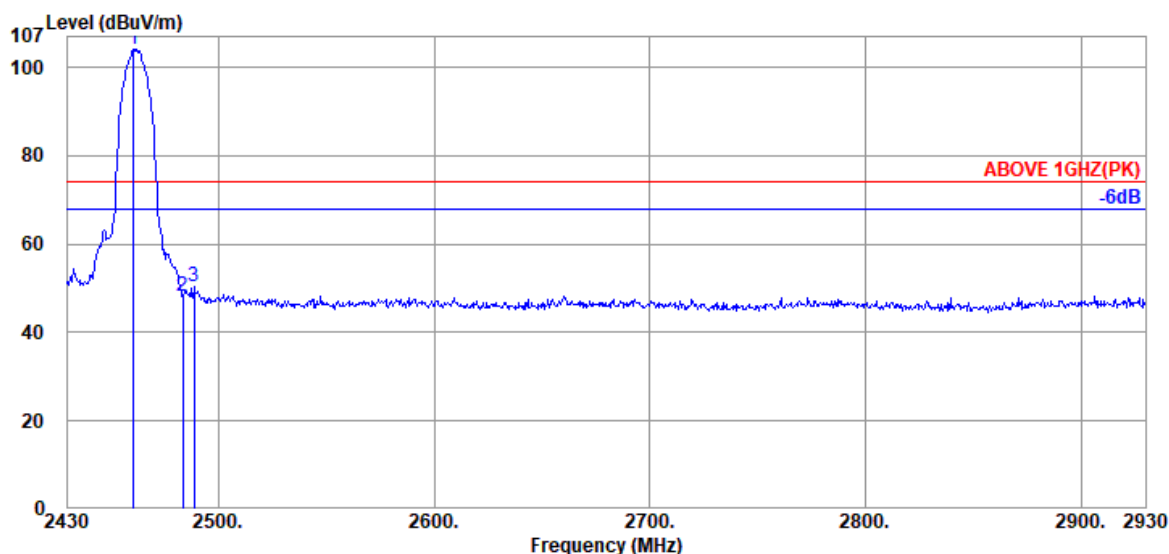
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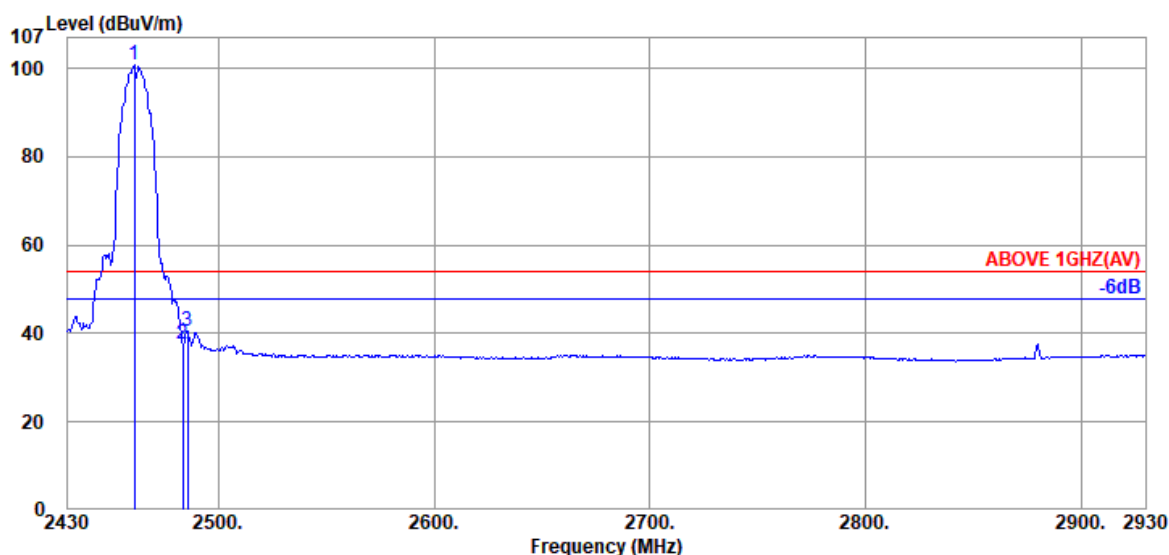
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Mode	802.11b	Frequency	TX 2462MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2460.500	32.30	7.98	34.55	98.34	104.07	---	---	Peak
2483.500	32.30	7.99	34.55	42.43	48.17	74.00	25.83	Peak
2488.500	32.30	8.00	34.55	44.59	50.34	74.00	23.66	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2461.000	32.30	7.98	34.55	95.06	100.79	---	---	Average
2483.500	32.30	7.99	34.55	31.98	37.72	54.00	16.28	Average
2485.500	32.30	7.99	34.55	34.94	40.68	54.00	13.32	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

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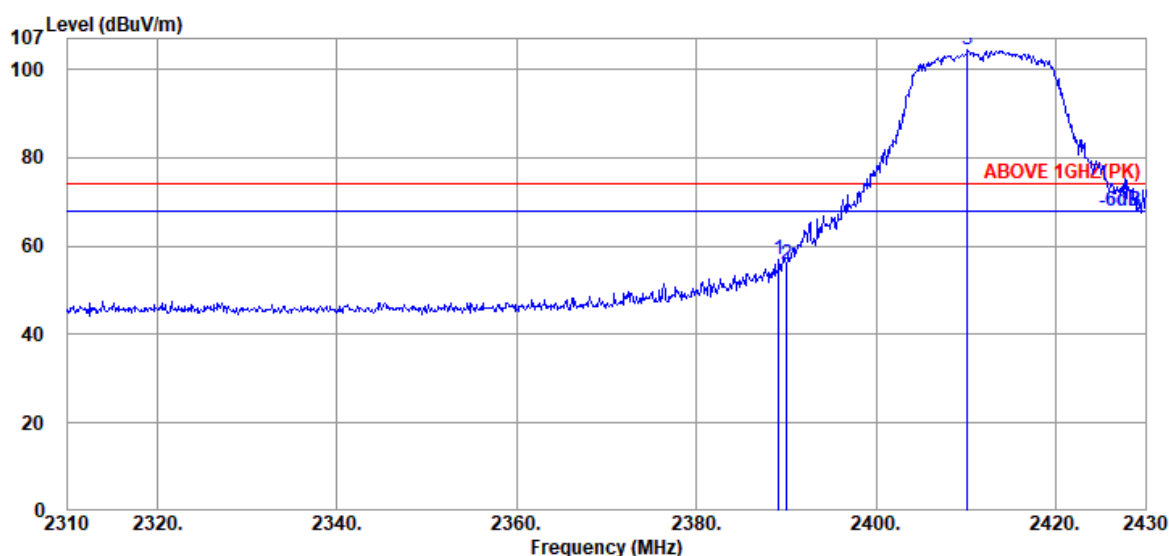
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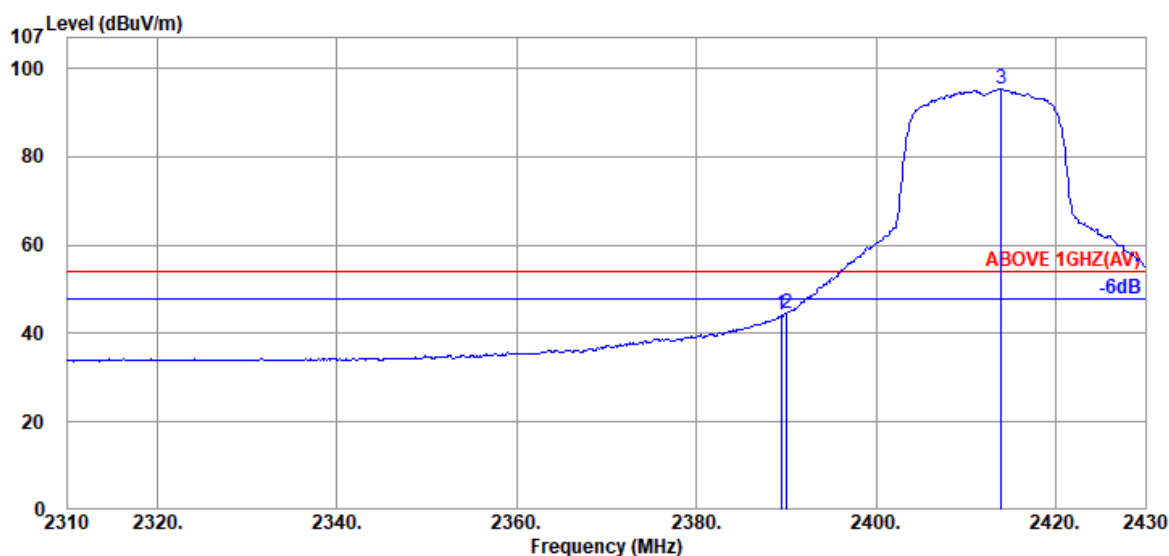
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Mode	802.11g	Frequency	TX 2412MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.200	31.89	7.95	34.53	51.48	56.79	74.00	17.21	Peak
2390.040	31.89	7.95	34.54	50.66	55.96	74.00	18.04	Peak
@ 2410.200	31.87	7.96	34.54	99.00	104.29	---	---	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.440	31.89	7.95	34.53	38.74	44.05	54.00	9.95	Average
2390.040	31.89	7.95	34.54	39.43	44.73	54.00	9.27	Average
@ 2413.920	31.94	7.96	34.54	89.95	95.31	---	---	Average

Remark: The "@" means fundamental frequency, it is ignored in this section.

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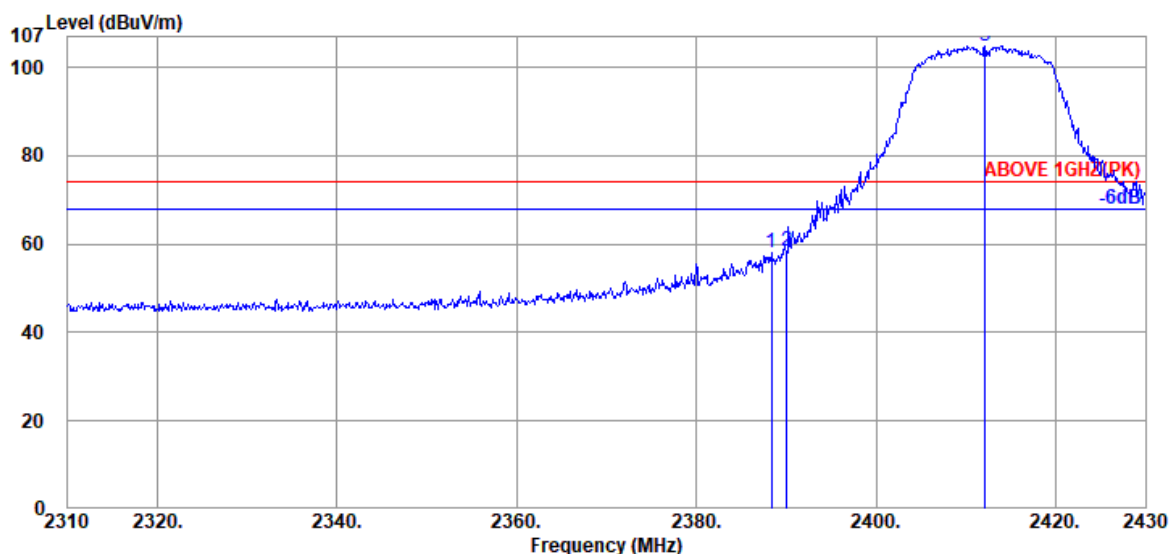
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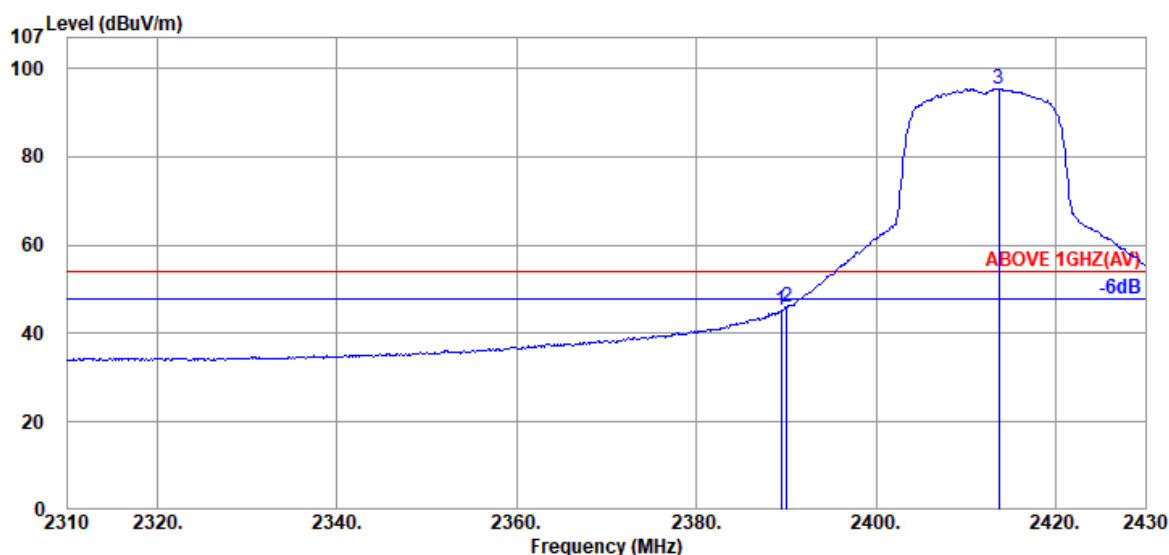
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Mode	802.11g	Frequency	TX 2412MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.360	31.89	7.95	34.53	52.64	57.95	74.00	16.05	Peak
2390.040	31.89	7.95	34.54	52.96	58.26	74.00	15.74	Peak
@ 2412.120	31.94	7.96	34.54	99.44	104.80	---	---	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.440	31.89	7.95	34.53	39.89	45.20	54.00	8.80	Average
2390.040	31.89	7.95	34.54	40.58	45.88	54.00	8.12	Average
@ 2413.680	31.94	7.96	34.54	90.03	95.39	---	---	Average

Remark: The "@" means fundamental frequency, it is ignored in this section.

Audix Technology Corp.

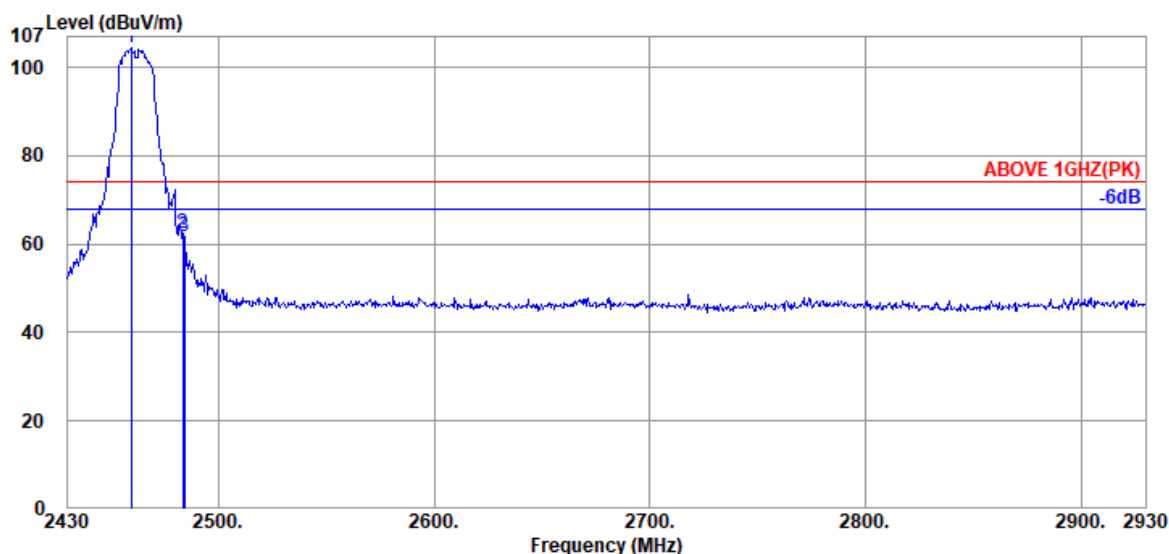
No. 491, Zhongfu Rd., Linkou Dist.,

New Taipei City244, Taiwan

Tel: +886 2 26099301

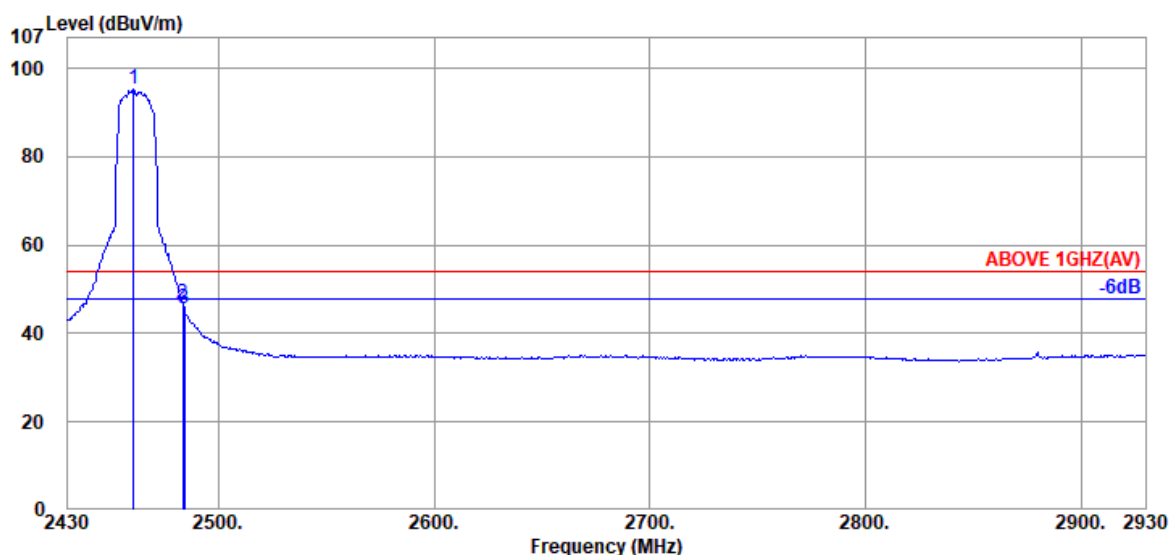
Fax: +886 2 26099303

Mode	802.11g	Frequency	TX 2462MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2459.500	32.30	7.98	34.55	98.58	104.31	---	---	Peak
2483.500	32.30	7.99	34.55	56.71	62.45	74.00	11.55	Peak
2484.000	32.30	7.99	34.55	55.96	61.70	74.00	12.30	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2460.500	32.30	7.98	34.55	89.47	95.20	---	---	Average
2483.500	32.30	7.99	34.55	40.91	46.65	54.00	7.35	Average
2484.000	32.30	7.99	34.55	39.82	45.56	54.00	8.44	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

Audix Technology Corp.

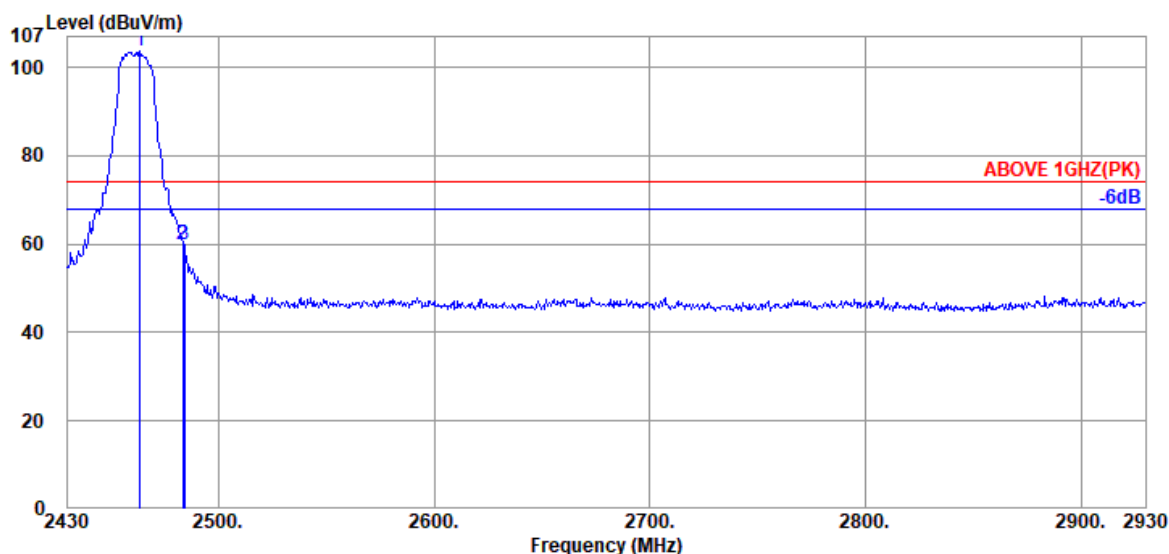
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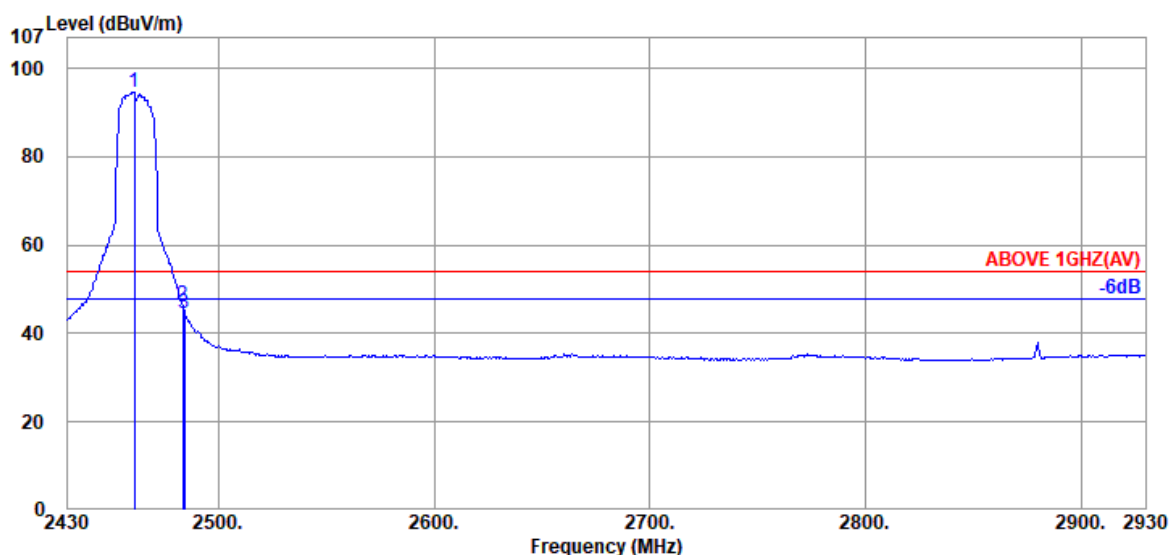
Fax: +886 2 26099303

Mode	802.11g	Frequency	TX 2462MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2463.500	32.30	7.98	34.55	97.87	103.60	---	---	Peak
2483.500	32.30	7.99	34.55	54.24	59.98	74.00	14.02	Peak
2484.000	32.30	7.99	34.55	54.28	60.02	74.00	13.98	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2461.000	32.30	7.98	34.55	88.95	94.68	---	---	Average
2483.500	32.30	7.99	34.55	40.58	46.32	54.00	7.68	Average
2484.000	32.30	7.99	34.55	38.93	44.67	54.00	9.33	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

Audix Technology Corp.

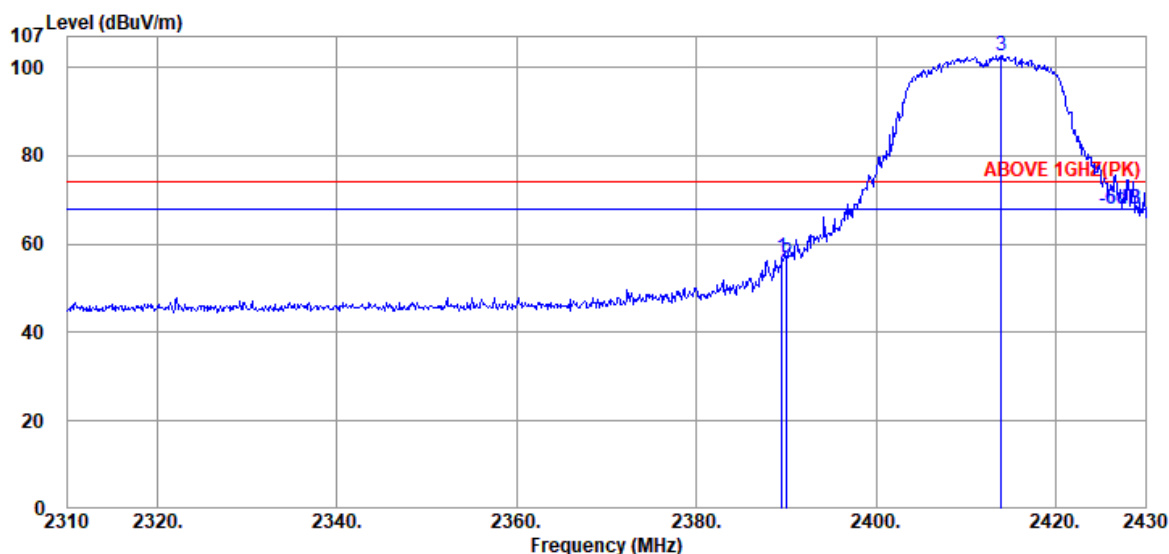
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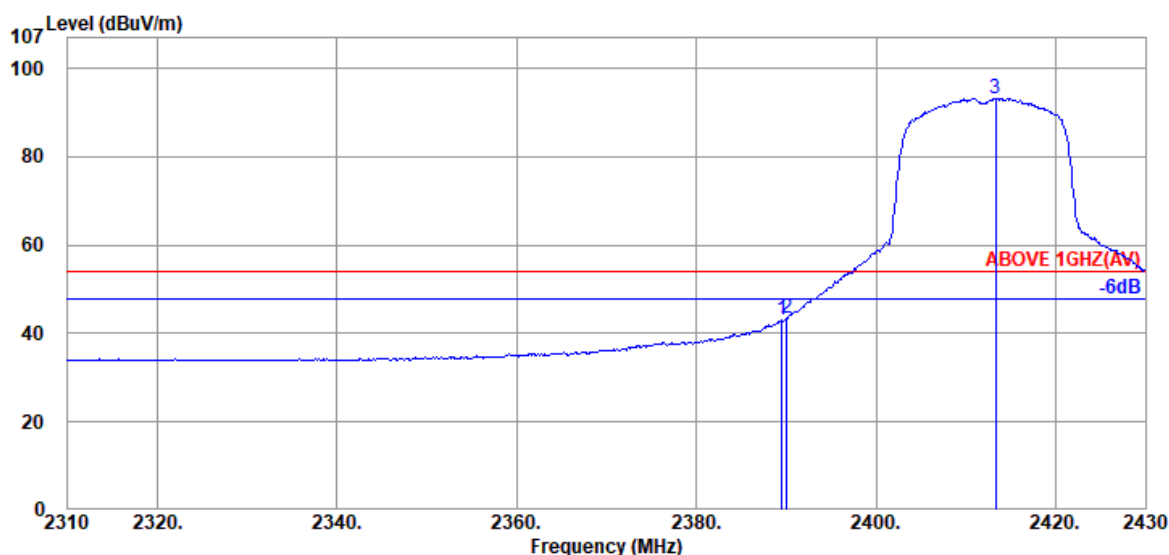
Fax: +886 2 26099303

Mode	802.11n-HT20	Frequency	TX 2412MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.560	31.89	7.95	34.53	51.67	56.98	74.00	17.02	Peak
2390.040	31.89	7.95	34.54	50.74	56.04	74.00	17.96	Peak
@ 2413.920	31.94	7.96	34.54	97.28	102.64	---	---	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.560	31.89	7.95	34.53	37.69	43.00	54.00	11.00	Average
2390.040	31.89	7.95	34.54	38.30	43.60	54.00	10.40	Average
@ 2413.320	31.94	7.96	34.54	87.89	93.25	---	---	Average

Remark: The "@" means fundamental frequency, it is ignored in this section.

Audix Technology Corp.

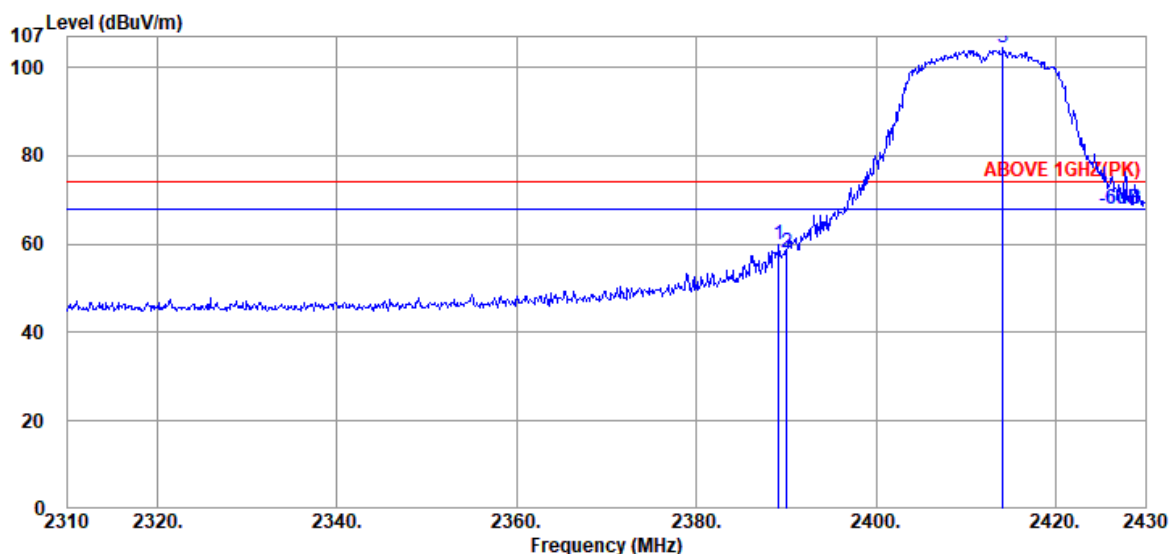
No. 491, Zhongfu Rd., Linkou Dist.,

New Taipei City 244, Taiwan

Tel: +886 2 26099301

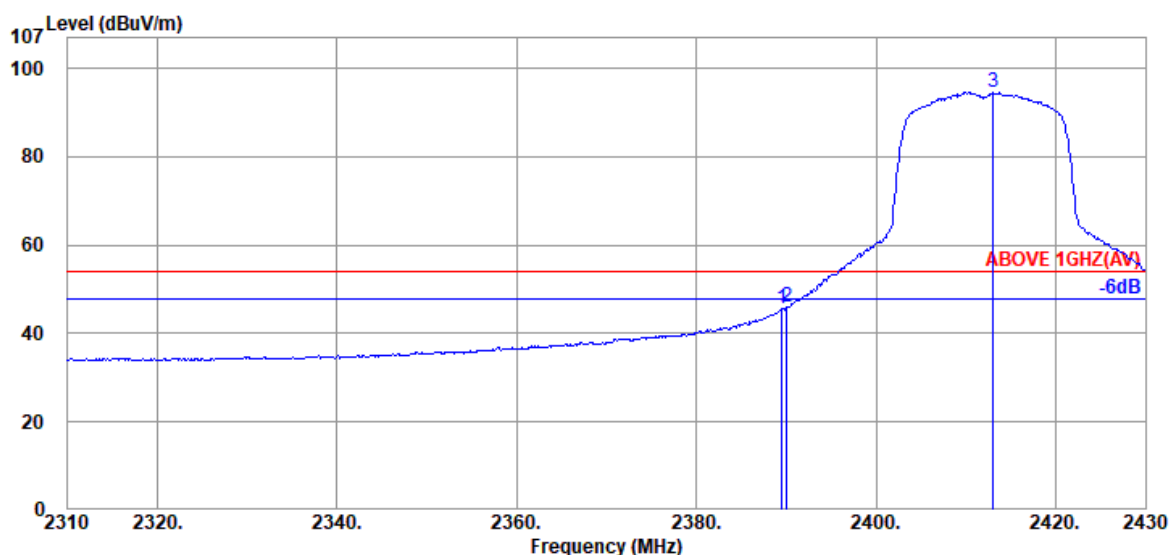
Fax: +886 2 26099303

Mode	802.11n-HT20	Frequency	TX 2412MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.200	31.89	7.95	34.53	54.53	59.84	74.00	14.16	Peak
2390.040	31.89	7.95	34.54	52.60	57.90	74.00	16.10	Peak
@ 2414.160	31.94	7.96	34.54	98.93	104.29	---	---	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.560	31.89	7.95	34.53	40.17	45.48	54.00	8.52	Average
2390.040	31.89	7.95	34.54	40.73	46.03	54.00	7.97	Average
@ 2413.080	31.94	7.96	34.54	89.19	94.55	---	---	Average

Remark: The "@" means fundamental frequency, it is ignored in this section.

Audix Technology Corp.

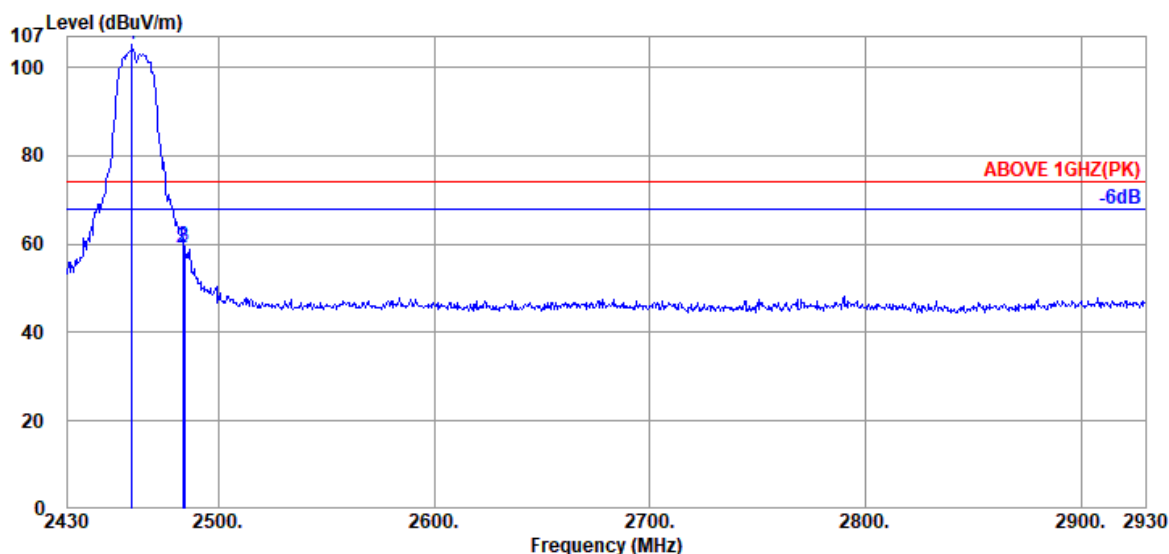
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Tel: +886 2 26099301

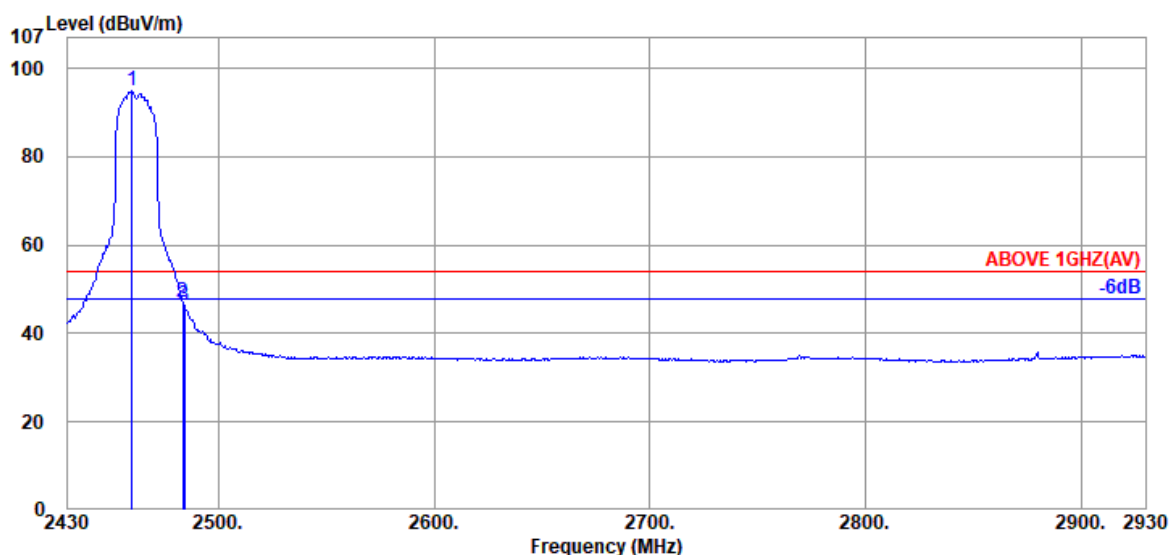
Fax: +886 2 26099303

Mode	802.11n-HT20	Frequency	TX 2462MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2460.000	32.30	7.98	34.55	99.36	105.09	---	---	Peak
2483.500	32.30	7.99	34.55	53.39	59.13	74.00	14.87	Peak
2484.000	32.30	7.99	34.55	53.69	59.43	74.00	14.57	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2460.000	32.30	7.98	34.55	89.04	94.77	---	---	Average
2483.500	32.30	7.99	34.55	41.40	47.14	54.00	6.86	Average
2484.000	32.30	7.99	34.55	40.73	46.47	54.00	7.53	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

Audix Technology Corp.

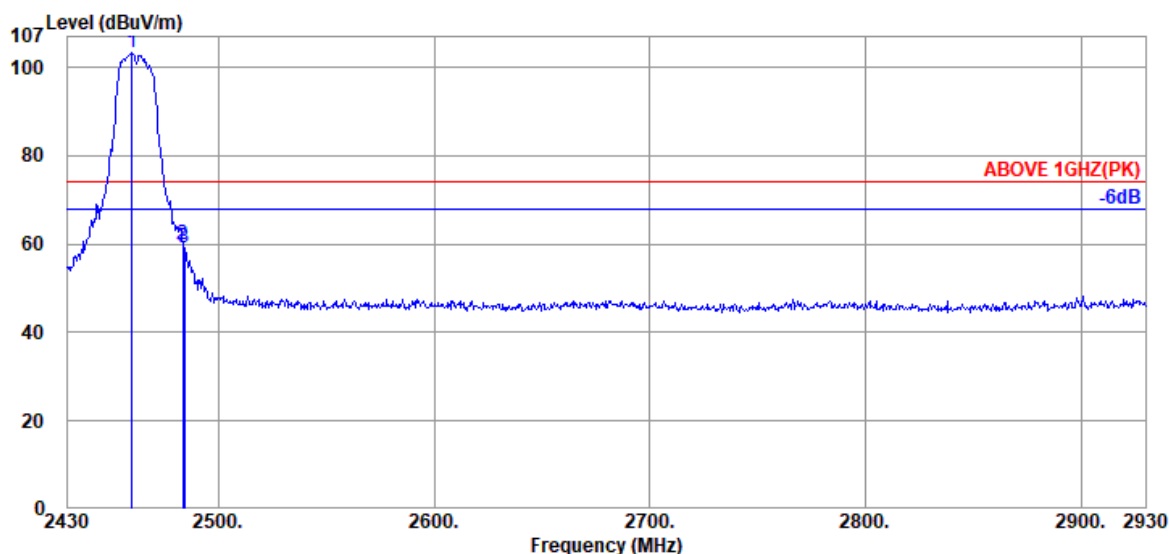
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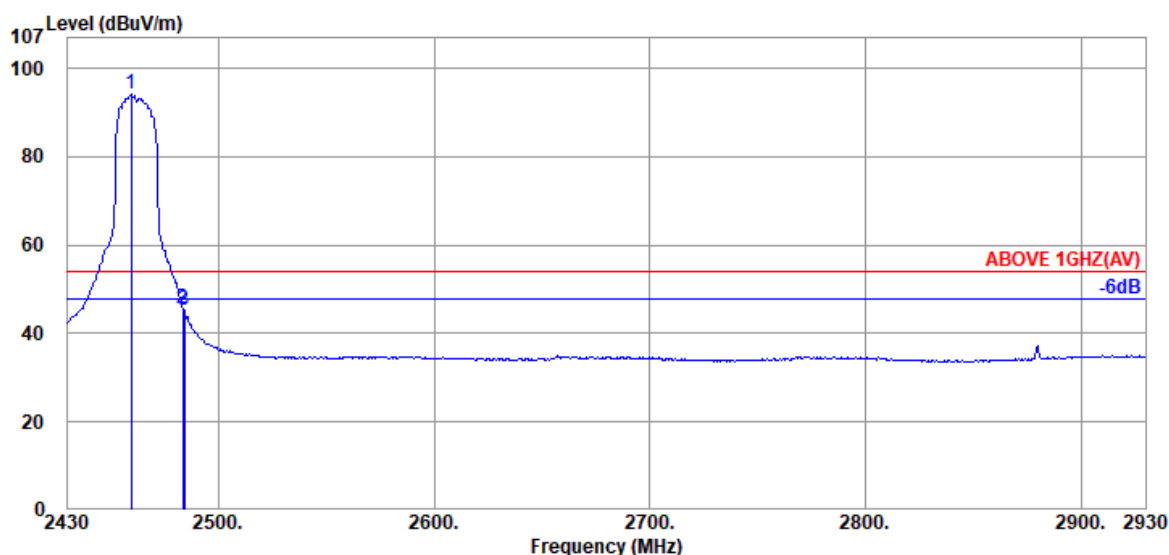
Fax: +886 2 26099303

Mode	802.11n-HT20	Frequency	TX 2462MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2460.000	32.30	7.98	34.55	97.47	103.20	---	---	Peak
2483.500	32.30	7.99	34.55	54.02	59.76	74.00	14.24	Peak
2484.000	32.30	7.99	34.55	53.42	59.16	74.00	14.84	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2459.500	32.30	7.98	34.55	88.31	94.04	---	---	Average
2483.500	32.30	7.99	34.55	40.00	45.74	54.00	8.26	Average
2484.000	32.30	7.99	34.55	39.44	45.18	54.00	8.82	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

Audix Technology Corp.

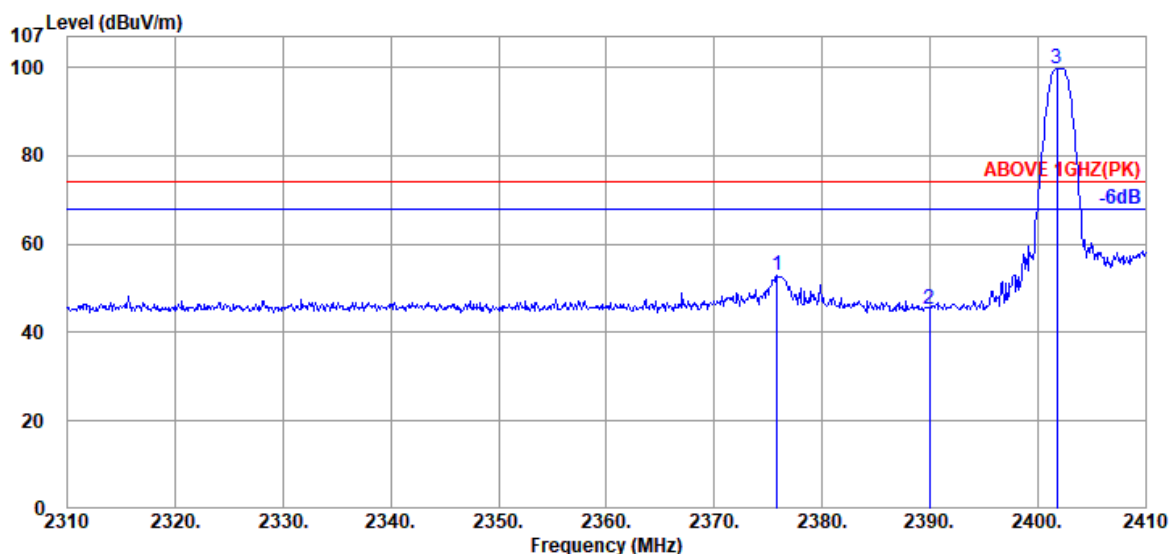
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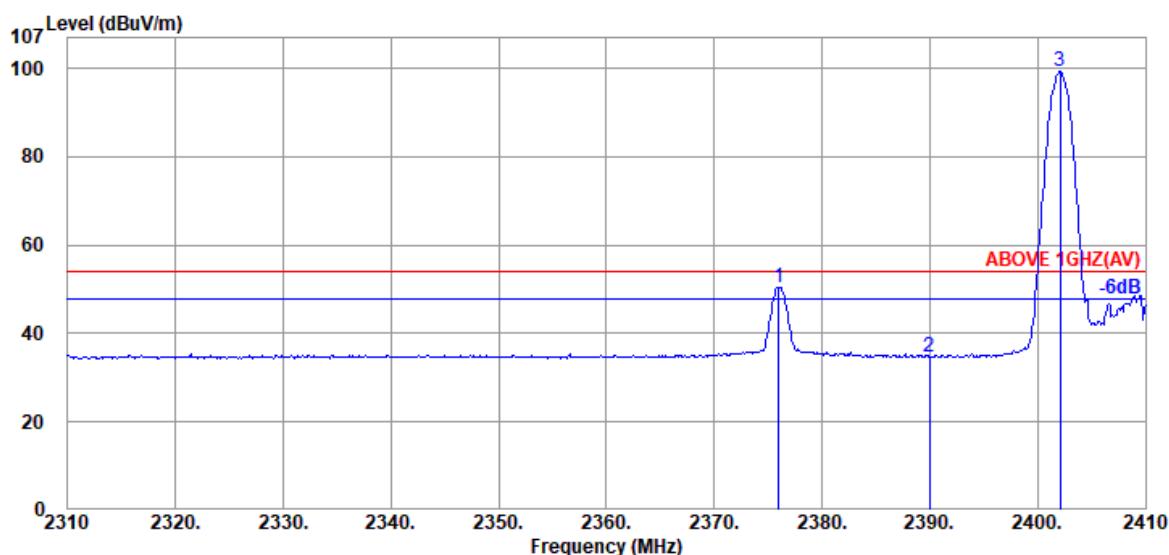
Fax: +886 2 26099303

Mode	BLE	Frequency	TX 2402MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2375.800	31.97	7.94	34.53	47.44	52.82	74.00	21.18	Peak
2390.000	31.89	7.95	34.54	39.95	45.25	74.00	28.75	Peak
@ 2401.800	31.80	7.95	34.54	94.49	99.70	---	---	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2376.000	31.97	7.94	34.53	45.15	50.53	54.00	3.47	Average
2390.000	31.89	7.95	34.54	29.36	34.66	54.00	19.34	Average
@ 2402.100	31.80	7.95	34.54	94.02	99.23	---	---	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

Audix Technology Corp.

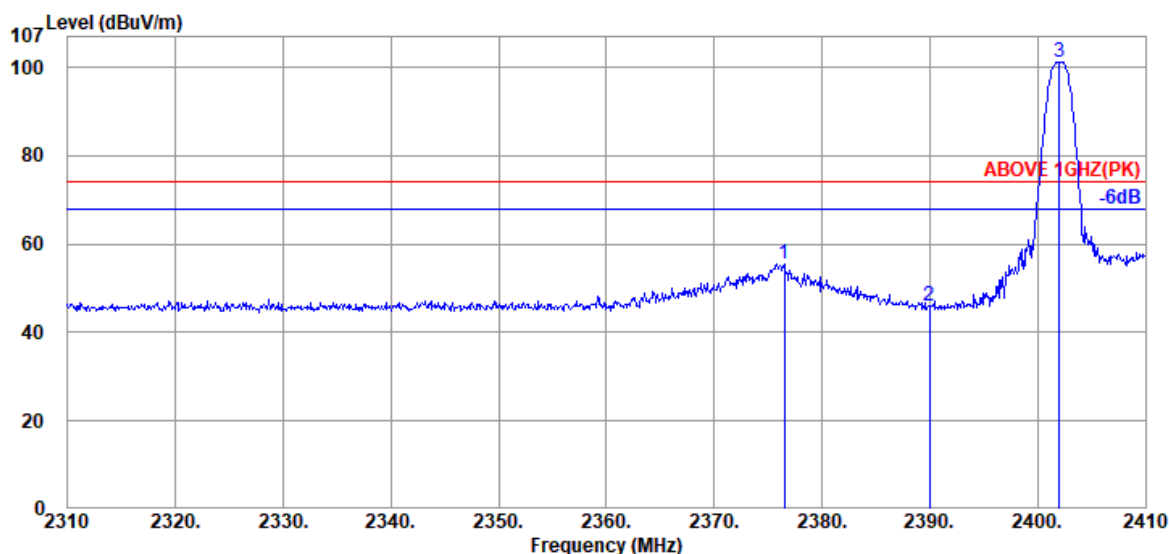
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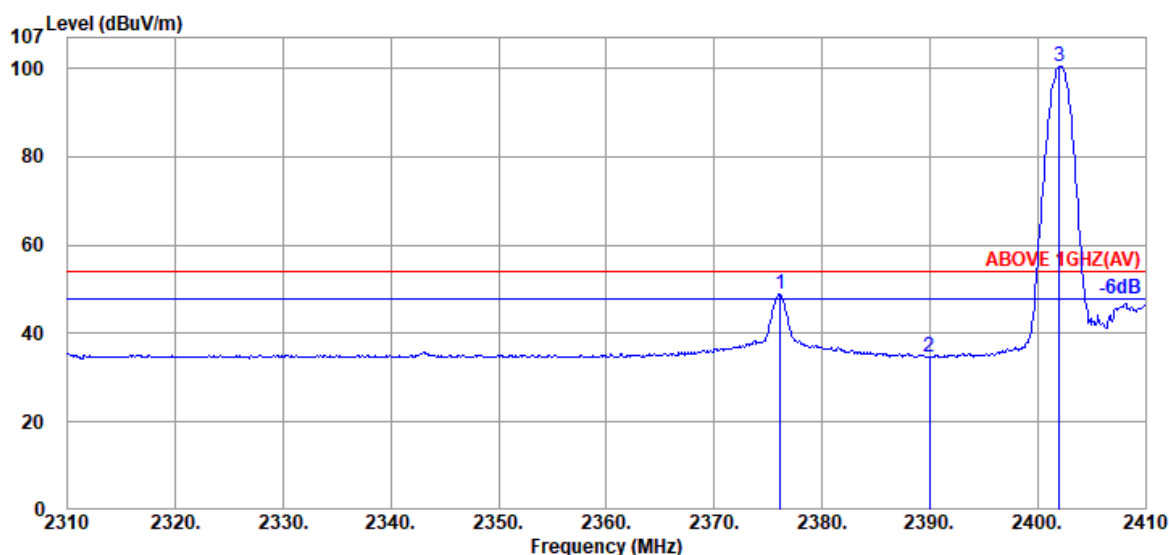
Fax: +886 2 26099303

Mode	BLE	Frequency	TX 2402MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2376.500	31.97	7.94	34.53	50.27	55.65	74.00	18.35	Peak
2390.000	31.89	7.95	34.54	40.66	45.96	74.00	28.04	Peak
@ 2402.000	31.80	7.95	34.54	95.95	101.16	---	---	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2376.100	31.97	7.94	34.53	43.39	48.77	54.00	5.23	Average
2390.000	31.89	7.95	34.54	29.54	34.84	54.00	19.16	Average
@ 2402.000	31.80	7.95	34.54	95.25	100.46	---	---	Average

Remark: The "@" means fundamental frequency, it is ignored in this section.

Audix Technology Corp.

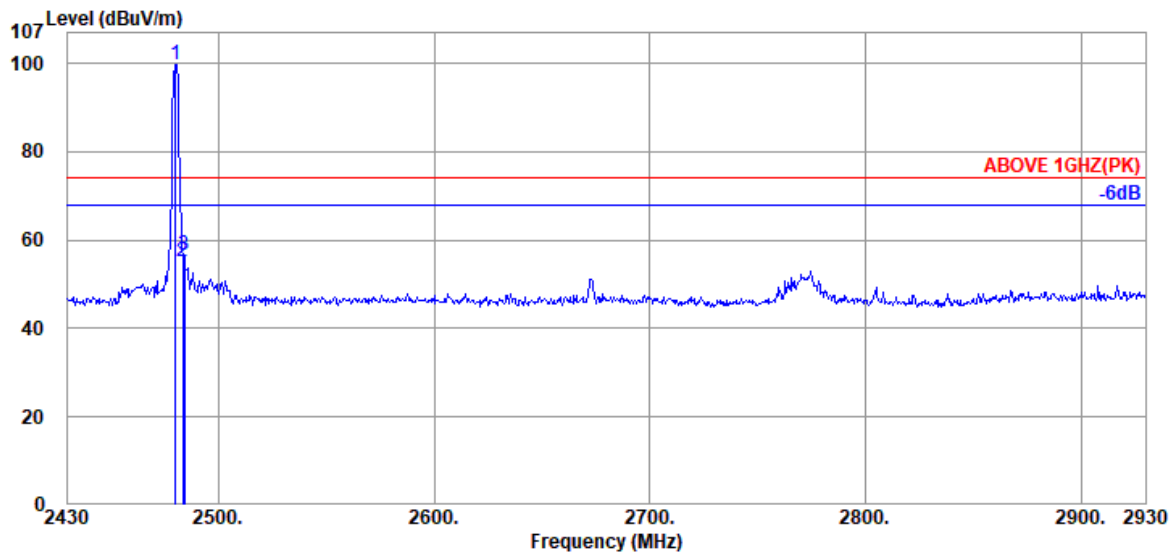
No. 491, Zhongfu Rd., Linkou Dist.,

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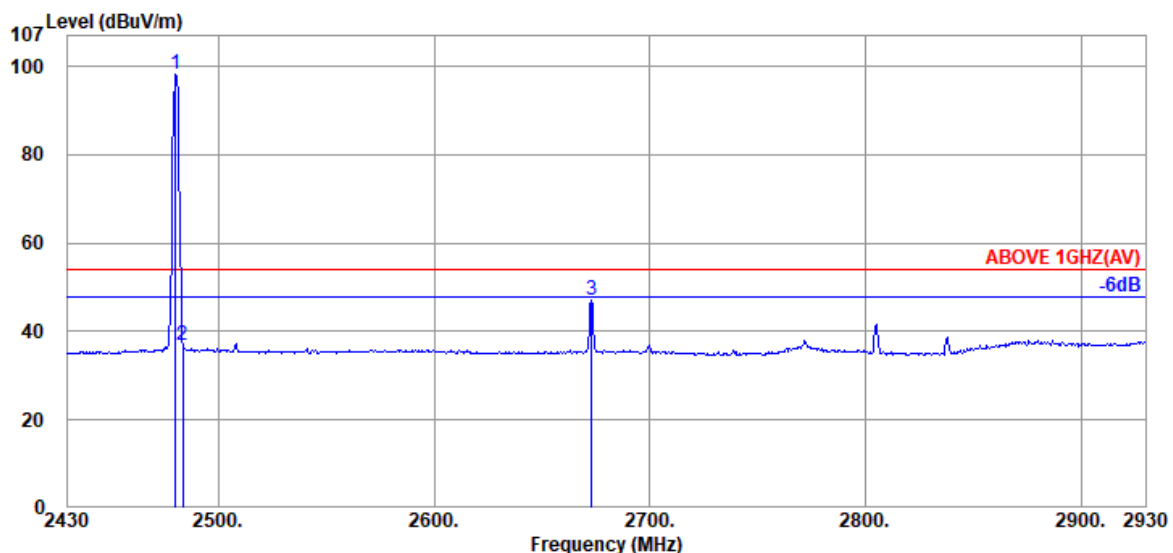
Fax: +886 2 26099303

Mode	BLE	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Detector
@ 2480.000	32.30	7.99	34.55	94.07	99.81	---	---	Peak
2483.500	32.30	7.99	34.55	49.33	55.07	74.00	18.93	Peak
2484.000	32.30	7.99	34.55	50.83	56.57	74.00	17.43	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Detector
@ 2480.000	32.30	7.99	34.55	92.41	98.15	---	---	Average
2483.500	32.30	7.99	34.55	31.26	37.00	54.00	17.00	Average
2673.000	32.20	8.08	34.60	41.46	47.14	54.00	6.86	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

Audix Technology Corp.

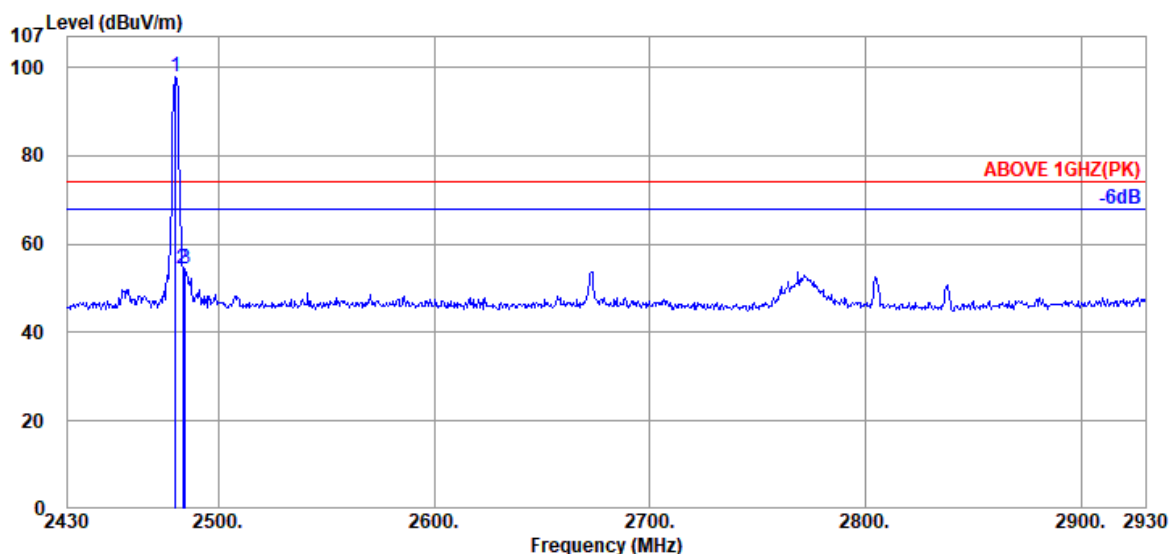
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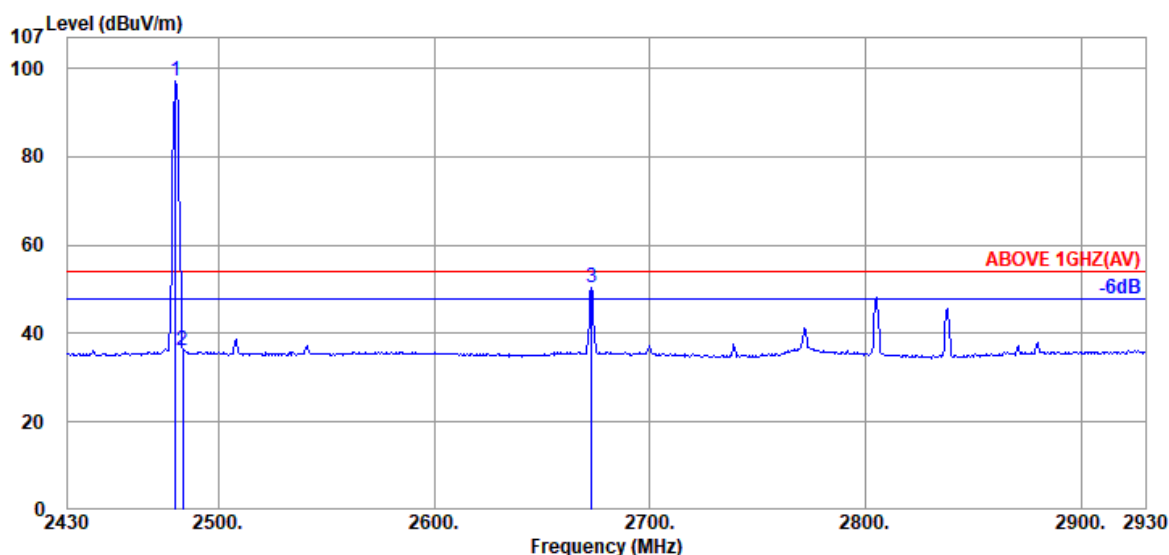
Fax: +886 2 26099303

Mode	BLE	Frequency	TX 2480MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2480.000	32.30	7.99	34.55	91.97	97.71	---	---	Peak
2483.500	32.30	7.99	34.55	48.72	54.46	74.00	19.54	Peak
2484.500	32.30	7.99	34.55	48.77	54.51	74.00	19.49	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2480.000	32.30	7.99	34.55	91.41	97.15	---	---	Average
2483.500	32.30	7.99	34.55	30.48	36.22	54.00	17.78	Average
2673.000	32.20	8.08	34.60	44.65	50.33	54.00	3.67	Average

Remark: The “@” means fundamental frequency, it is ignored in this section.

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A.2.2 Emissions outside the frequency band:

The emissions (up to 25GHz) not reported for there is no emission be found.

● Test model: LIVA Q1A

Mode	802.11b	Frequency	TX 2412MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4824.000	33.67	10.49	34.44	32.96	42.68	54.00	11.32	Peak
7235.000	35.40	12.27	34.66	31.77	44.78	54.00	9.22	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4824.000	33.67	10.49	34.44	32.79	42.51	54.00	11.49	Peak
7235.000	35.40	12.27	34.66	32.05	45.06	54.00	8.94	Peak

Mode	802.11g	Frequency	TX 2462MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4924.000	33.83	10.56	34.42	33.64	43.61	54.00	10.39	Peak
7385.000	35.80	12.34	34.74	31.76	45.16	54.00	8.84	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4924.000	33.83	10.56	34.42	32.19	42.16	54.00	11.84	Peak
7385.000	35.80	12.34	34.74	32.29	45.69	54.00	8.31	Peak

Mode	802.11n-HT20	Frequency	TX 2437MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4874.000	33.85	10.54	34.43	32.75	42.71	54.00	11.29	Peak
7310.000	35.50	12.29	34.69	32.64	45.74	54.00	8.26	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4874.000	33.85	10.54	34.43	31.70	41.66	54.00	12.34	Peak
7310.000	35.50	12.29	34.69	33.12	46.22	54.00	7.78	Peak

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Mode	BLE	Frequency	TX 2402MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4804.000	33.60	10.49	34.44	32.64	42.29	54.00	11.71	Peak
7205.000	35.60	12.25	34.63	30.72	43.94	54.00	10.06	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4804.000	33.60	10.49	34.44	33.16	42.81	54.00	11.19	Peak
7205.000	35.60	12.25	34.63	32.69	45.91	54.00	8.09	Peak

Mode	BLE	Frequency	TX 2440MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4880.000	33.85	10.54	34.43	31.65	41.61	54.00	12.39	Peak
7319.000	35.60	12.29	34.71	31.19	44.37	54.00	9.63	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4880.000	33.85	10.54	34.43	31.97	41.93	54.00	12.07	Peak
7319.000	35.60	12.29	34.71	31.90	45.08	54.00	8.92	Peak

Mode	BLE	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4960.000	33.83	10.60	34.41	31.29	41.31	54.00	12.69	Peak
7439.000	35.80	12.36	34.78	32.36	45.74	54.00	8.26	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4960.000	33.83	10.60	34.41	32.36	42.38	54.00	11.62	Peak
7439.000	35.80	12.36	34.78	31.71	45.09	54.00	8.91	Peak

Audix Technology Corp.

No. 491, Zhongfu Rd., Linkou Dist.,

New Taipei City244, Taiwan

Tel: +886 2 26099301

Fax: +886 2 26099303

● Test model: LIVA Q1A PLUS

Mode	802.11b	Frequency	TX 2412MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4824.000	33.67	10.49	34.44	33.74	43.46	54.00	10.54	Peak
7235.000	35.40	12.27	34.66	31.56	44.57	54.00	9.43	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4824.000	33.67	10.49	34.44	34.88	44.60	54.00	9.40	Peak
7235.000	35.40	12.27	34.66	32.33	45.34	54.00	8.66	Peak

Mode	802.11g	Frequency	TX 2462MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4924.000	33.83	10.56	34.42	32.12	42.09	54.00	11.91	Peak
7385.000	35.80	12.34	34.74	32.28	45.68	54.00	8.32	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4924.000	33.83	10.56	34.42	32.18	42.15	54.00	11.85	Peak
7385.000	35.80	12.34	34.74	32.44	45.84	54.00	8.16	Peak

Mode	802.11n-HT20	Frequency	TX 2437MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4874.000	33.85	10.54	34.43	32.29	42.25	54.00	11.75	Peak
7310.000	35.50	12.29	34.69	31.86	44.96	54.00	9.04	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4874.000	33.85	10.54	34.43	33.30	43.26	54.00	10.74	Peak
7310.000	35.50	12.29	34.69	32.27	45.37	54.00	8.63	Peak

Audix Technology Corp.

No. 491, Zhongfu Rd., Linkou Dist.,

New Taipei City 244, Taiwan

Tel: +886 2 26099301

Fax: +886 2 26099303

Mode	BLE	Frequency	TX 2402MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4804.000	33.60	10.49	34.44	32.12	41.77	54.00	12.23	Peak
7205.000	35.60	12.25	34.63	30.85	44.07	54.00	9.93	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4804.000	33.60	10.49	34.44	33.15	42.80	54.00	11.20	Peak
7205.000	35.60	12.25	34.63	30.95	44.17	54.00	9.83	Peak

Mode	BLE	Frequency	TX 2440MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4880.000	33.85	10.54	34.43	31.65	41.61	54.00	12.39	Peak
7319.000	35.60	12.29	34.71	31.65	44.83	54.00	9.17	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4880.000	33.85	10.54	34.43	31.32	41.28	54.00	12.72	Peak
7319.000	35.60	12.29	34.71	31.60	44.78	54.00	9.22	Peak

Mode	BLE	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4960.000	33.83	10.60	34.41	31.20	41.22	54.00	12.78	Peak
7439.000	35.80	12.36	34.78	31.05	44.43	54.00	9.57	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4960.000	33.83	10.60	34.41	31.41	41.43	54.00	12.57	Peak
7439.000	35.80	12.36	34.78	31.19	44.57	54.00	9.43	Peak

Audix Technology Corp.

No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301

Fax: +886 2 26099303

A.2.3 Emissions in Non-restricted Frequency Bands:

Pursuant to ANSI C63.10:2013 that emission levels below the FCC 15.209(a) Section 8.9 table 4 general radiated emissions limits is not required.

A.3 6dB/OCCUPIED BANDWIDTH

Test Date	2021/04/28	Temp./Hum.	25°C /65%
Cable Loss	1.45dB	Tested By	Sam Chang
Test Voltage	AC 120V 60Hz (Via AC Adapter)		

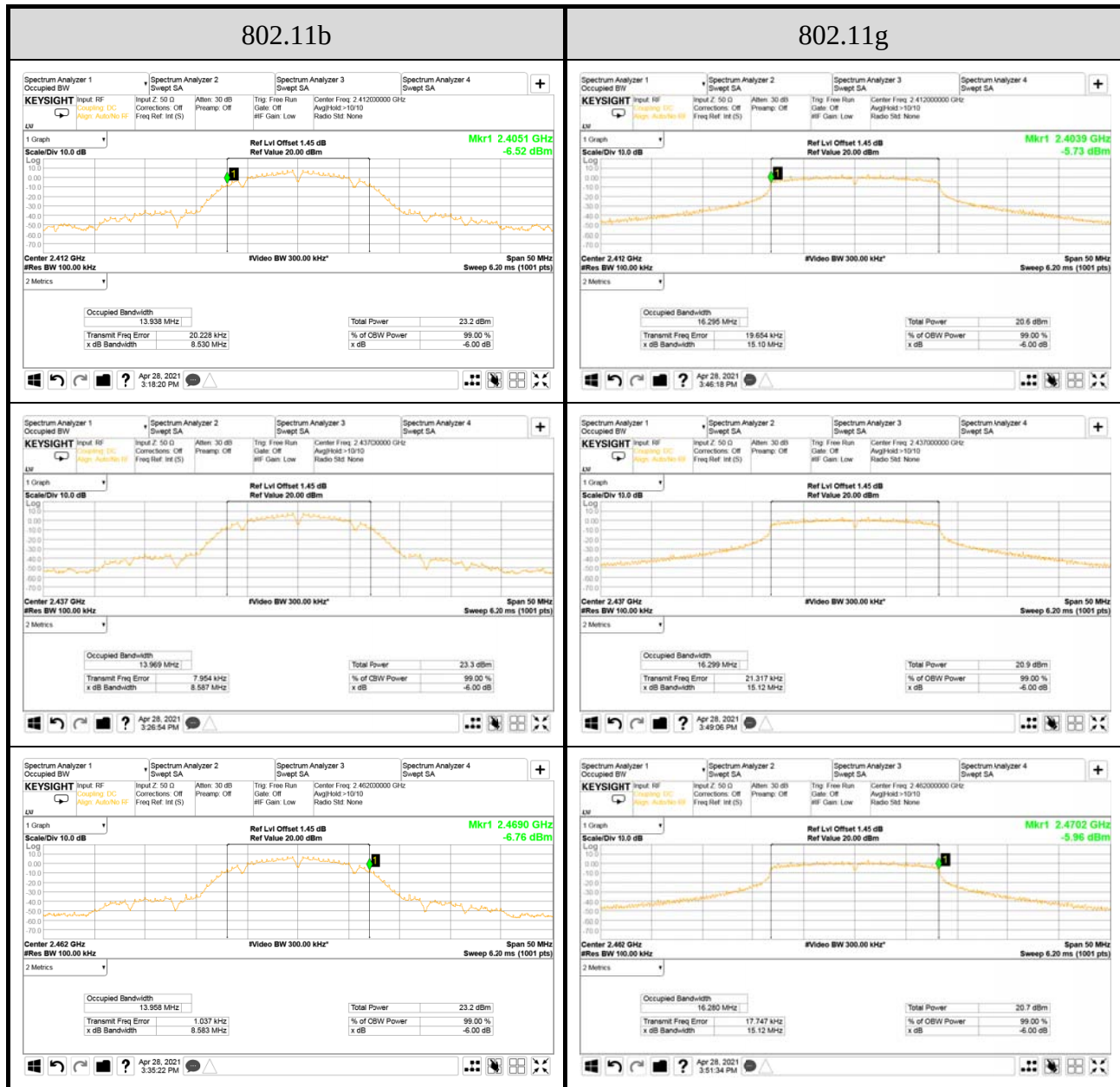
A.3.1 Emission Bandwidth Result

Mode	Centre Frequency (MHz)	6 dB Bandwidth (MHz)	Occupied (99%) Bandwidth (MHz)	Limit
802.11b	2412	8.530	13.938	>500kHz
	2437	8.587	13.969	
	2462	8.583	13.958	
802.11g	2412	15.10	16.295	
	2437	15.12	16.299	
	2462	15.12	16.280	
802.11n-HT20	2412	15.11	17.461	
	2437	15.11	17.454	
	2462	15.11	17.450	
BLE	2402	0.7121	1.0857	
	2440	0.7175	1.0854	
	2480	0.7115	1.0857	

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New Taipei City244, Taiwan

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Fax: +886 2 26099303

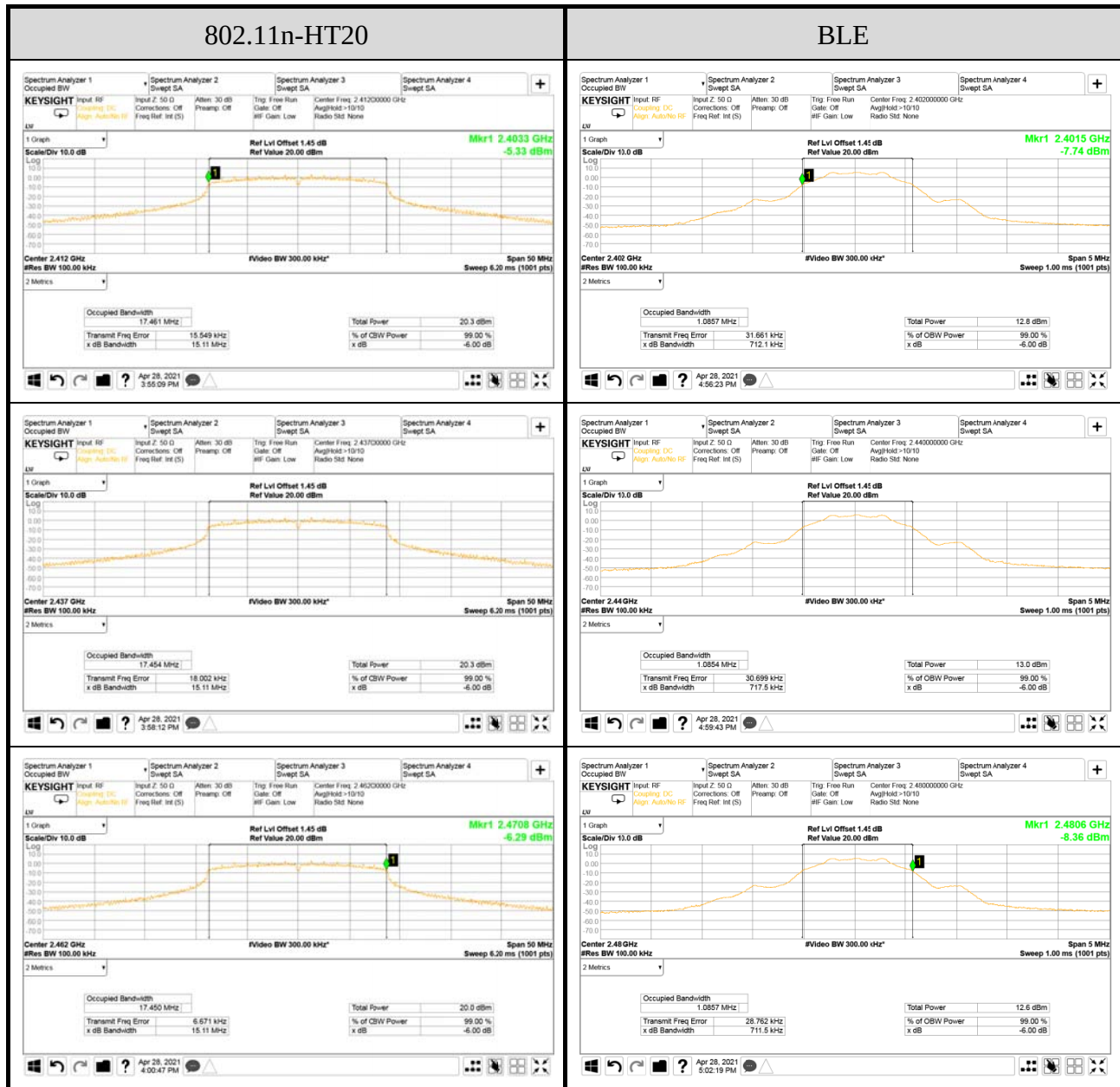
A.3.2 Measurement Plots



Note: All results have been included cable loss and Simultaneous Factor.

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Tel: +886 2 26099301
Fax: +886 2 26099303



Note: All results have been included cable loss and Simultaneous Factor.

A.4 MAXIMUM PEAK OUTPUT POWER

Test Date	2021/04/28	Temp./Hum.	25°C /65%
Cable Loss	1.45dB	Tested By	Sam Chang
Test Voltage	AC 120V 60Hz (Via AC Adapter)		
Duty Cycle	802.11b: 0.995 802.11g: 0.972 802.11n-HT20: 0.970		

A.4.1 Peak Output Power

Mode	Centre Frequency (MHz)	Peak Output Power		Antenna Gain (dBi)	Output Power (E.I.R.P.)		Limit
		(dBm)	(W)		(dBm)	(W)	
802.11b	2412	19.77	0.095	1.83	21.60	0.145	<30dBm (1W) (Maximum Peak Output Power)
	2437	19.66	0.092		21.49	0.141	
	2462	19.70	0.093		21.53	0.142	<36dBm (4W) (E.I.R.P)

Mode	Centre Frequency (MHz)	Peak Output Power		Antenna Gain (dBi)	Output Power (E.I.R.P.)		Limit
		(dBm)	(W)		(dBm)	(W)	
802.11g	2412	24.52	2412	1.83	26.35	0.432	<30dBm (1W) (Maximum Peak Output Power)
	2437	24.65	2437		26.48	0.445	
	2462	24.73	2462		26.56	0.453	<36dBm (4W) (E.I.R.P)

Mode	Centre Frequency (MHz)	Peak Output Power		Antenna Gain (dBi)	Output Power (E.I.R.P.)		Limit
		(dBm)	(W)		(dBm)	(W)	
802.11n-HT20	2412	24.25	0.266	1.83	26.08	0.406	<30dBm (1W) (Maximum Peak Output Power)
	2437	24.74	0.298		26.57	0.454	
	2462	24.59	0.288		26.42	0.439	<36dBm (4W) (E.I.R.P)

Mode	Centre Frequency (MHz)	Peak Output Power		Antenna Gain (dBi)	Output Power (E.I.R.P.)		Limit
		(dBm)	(W)		(dBm)	(W)	
BLE	2402	6.31	0.004	1.83	8.14	0.007	<30dBm (1W) (Maximum Peak Output Power)
	2440	6.63	0.005		8.46	0.007	
	2480	6.29	0.004		8.12	0.006	<36dBm (4W) (E.I.R.P)

Note: The results have been included cable loss.

A.4.2 Average Output Power (Reporting only)

Mode	Centre Frequency (MHz)	Average Output Power (dBm)	10log (1/X)	Max. Average Output Power		Antenna Gain (dBi)	Average Output Power (E.I.R.P.)		Limit
				(dBm)	(W)		(dBm)	(W)	
802.11b	2412	17.29	0	17.29	0.054	1.83	19.12	0.082	<30dBm (1W) (Maximum Peak Output Power) <36dBm (4W) (E.I.R.P)
	2437	17.24		17.24	0.053		19.07	0.081	
	2462	17.31		17.31	0.054		19.14	0.082	

Mode	Centre Frequency (MHz)	Average Output Power (dBm)	10log (1/X)	Max. Average Output Power		Antenna Gain (dBi)	Average Output Power (E.I.R.P.)		Limit
				(dBm)	(W)		(dBm)	(W)	
802.11g	2412	15.28	0.12	15.40	0.035	1.83	17.23	0.053	<30dBm (1W) (Maximum Peak Output Power) <36dBm (4W) (E.I.R.P)
	2437	15.32		15.44	0.035		17.27	0.053	
	2462	15.37		15.49	0.035		17.32	0.054	

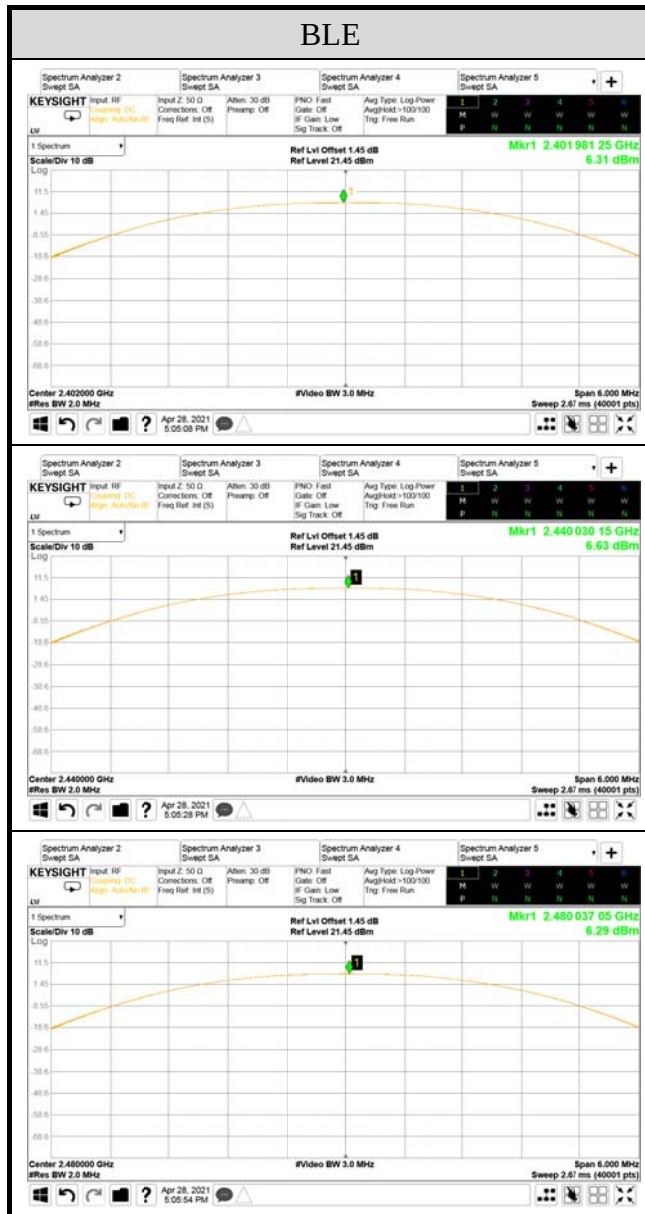
Mode	Centre Frequency (MHz)	Average Output Power (dBm)	10log (1/X)	Max. Average Output Power		Antenna Gain (dBi)	Average Output Power (E.I.R.P.)		Limit
				(dBm)	(W)		(dBm)	(W)	
802.11n-HT20	2412	14.68	0.13	14.81	0.030	1.83	16.64	0.046	<30dBm (1W) (Maximum Peak Output Power) <36dBm (4W) (E.I.R.P)
	2437	14.72		14.85	0.031		16.68	0.047	
	2462	14.64		14.77	0.030		16.60	0.046	

Note: The results have been included cable loss.

Audix Technology Corp.
No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City244, Taiwan

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Fax: +886 2 26099303

A.4.3 Measurement Plots



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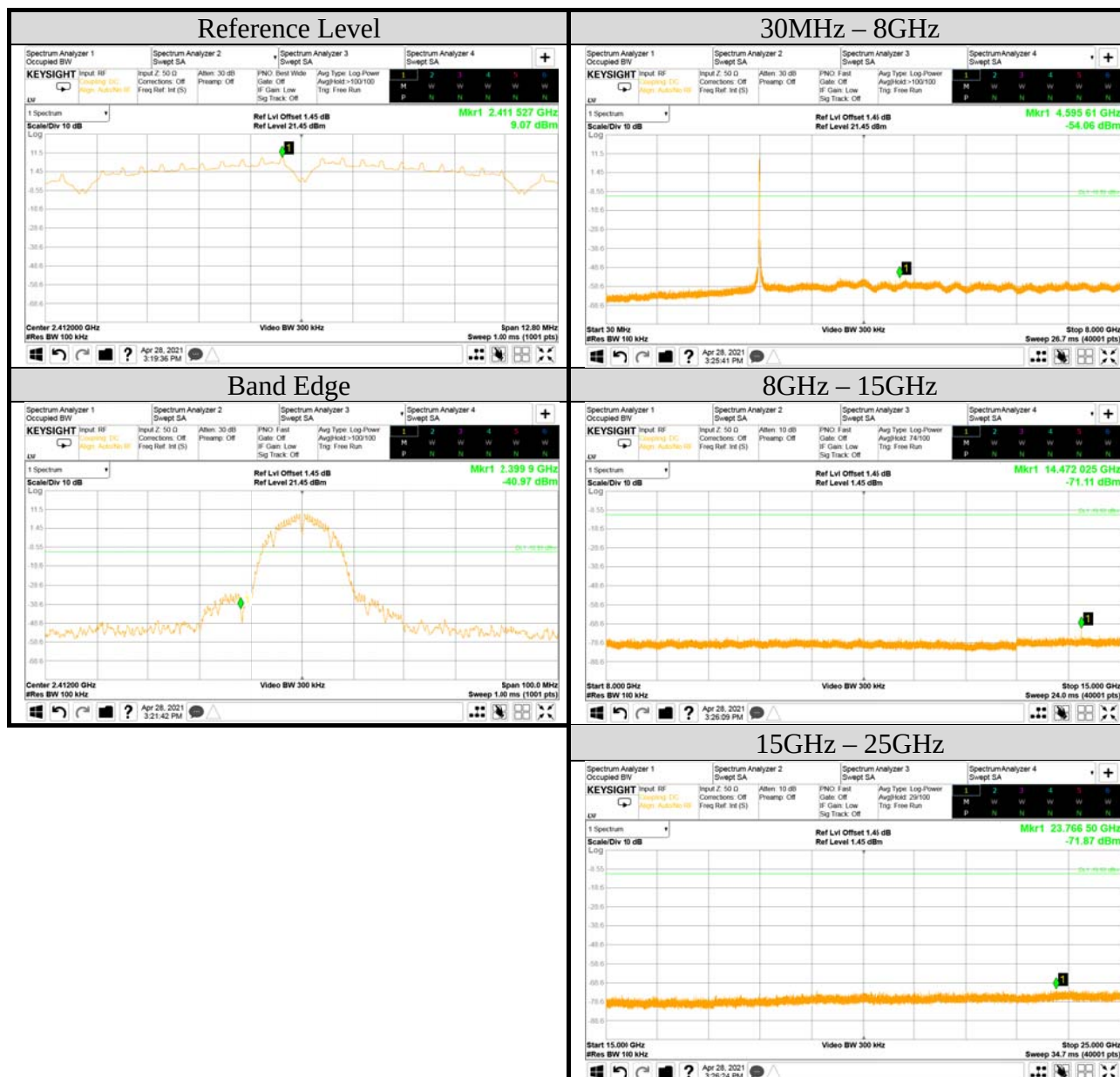
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Tel: +886 2 26099301

Fax: +886 2 26099303

A.5 EMISSION LIMITATIONS

Test Date	2021/04/28	Temp./Hum.	25℃/65%
Cable Loss	1.45dB	Test Voltage	AC 120V 60Hz (Via AC Adapter)
Mode	802.11b	Tested By	Sam Chang
Frequency	TX 2412MHz		
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0dB



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No. 491, Zhongfu Rd., Linkou Dist.,

New Taipei City 244, Taiwan

Tel: +886 2 26099301

Fax: +886 2 26099303

Test Date	2021/04/28	Temp./Hum.	25°C/65%
Cable Loss	1.45dB	Test Voltage	AC 120V 60Hz (Via AC Adapter)
Mode	802.11b	Tested By	Sam Chang
Frequency	TX 2437MHz		
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0dB



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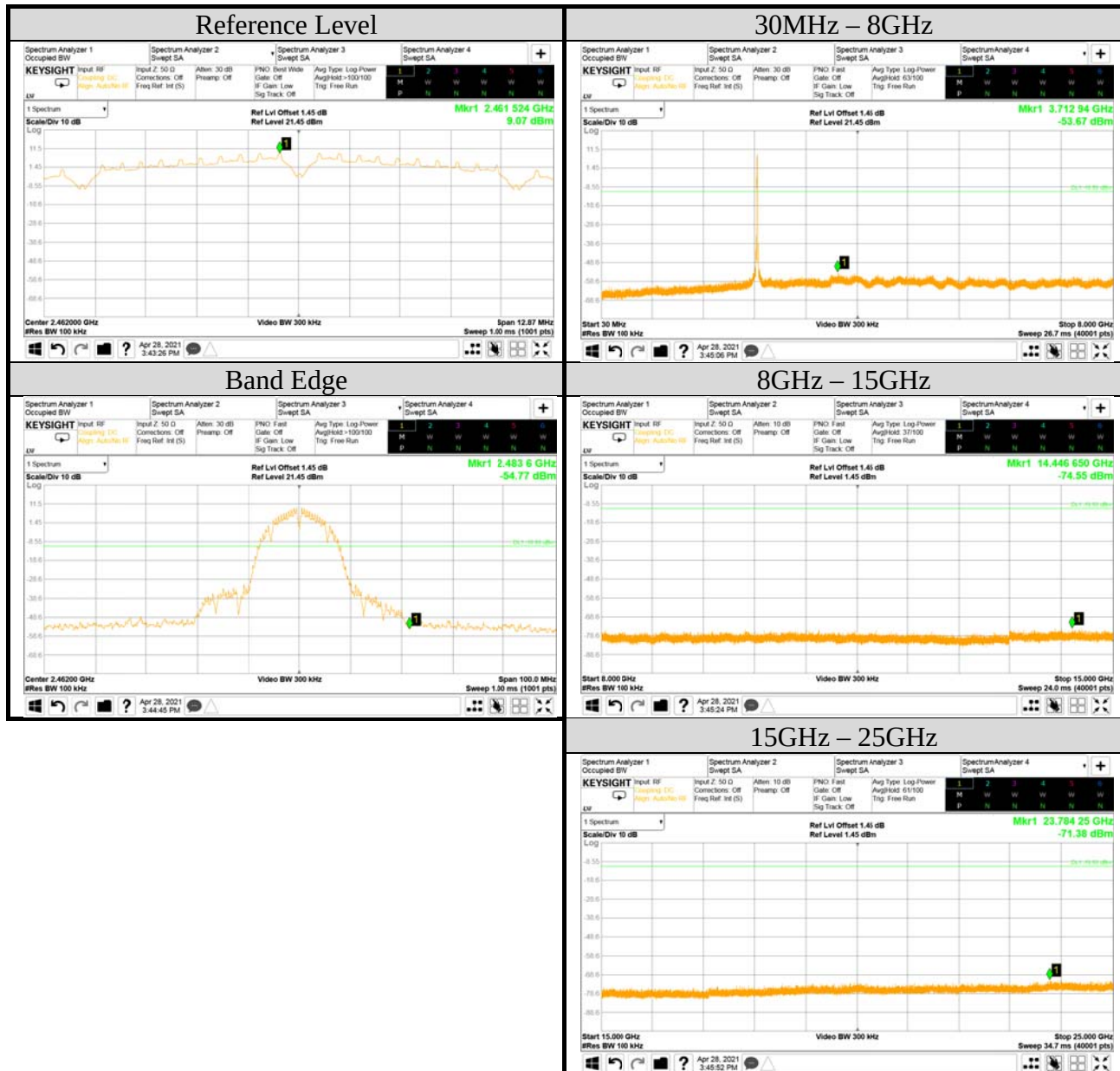
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Fax: +886 2 26099303

Test Date	2021/04/28	Temp./Hum.	25℃/65%
Cable Loss	1.45dB	Test Voltage	AC 120V 60Hz (Via AC Adapter)
Mode	802.11b	Tested By	Sam Chang
Frequency	TX 2462MHz		
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0dB



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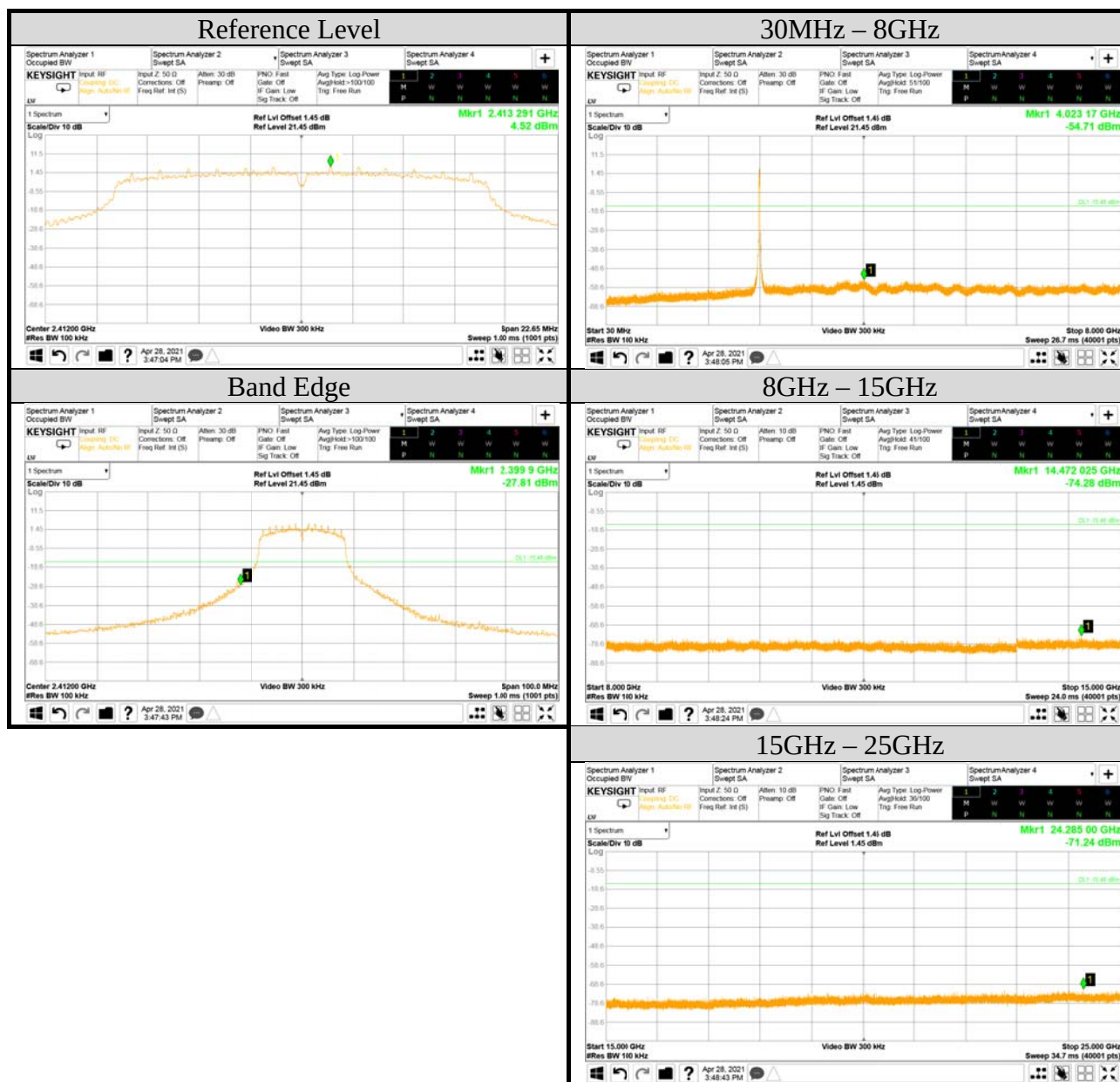
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New Taipei City 244, Taiwan

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Fax: +886 2 26099303

Test Date	2021/04/28	Temp./Hum.	25℃ /65%
Cable Loss	1.45dB	Test Voltage	AC 120V 60Hz (Via AC Adapter)
Mode	802.11g	Tested By	Sam Chang
Frequency	TX 2412MHz		
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0dB



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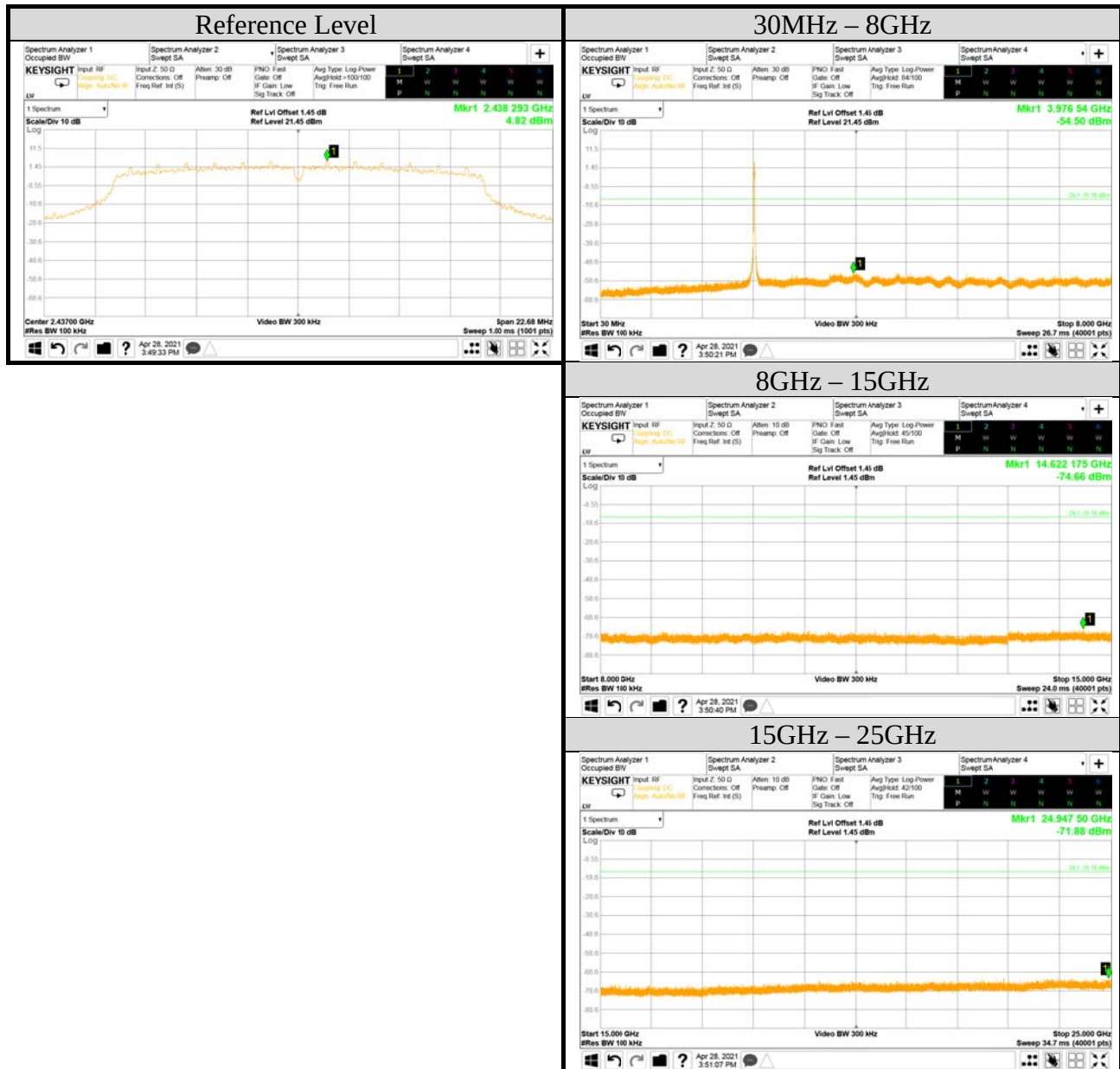
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Fax: +886 2 26099303

Test Date	2021/04/28	Temp./Hum.	25°C/65%
Cable Loss	1.45dB	Test Voltage	AC 120V 60Hz (Via AC Adapter)
Mode	802.11g	Tested By	Sam Chang
Frequency	TX 2437MHz		
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0dB



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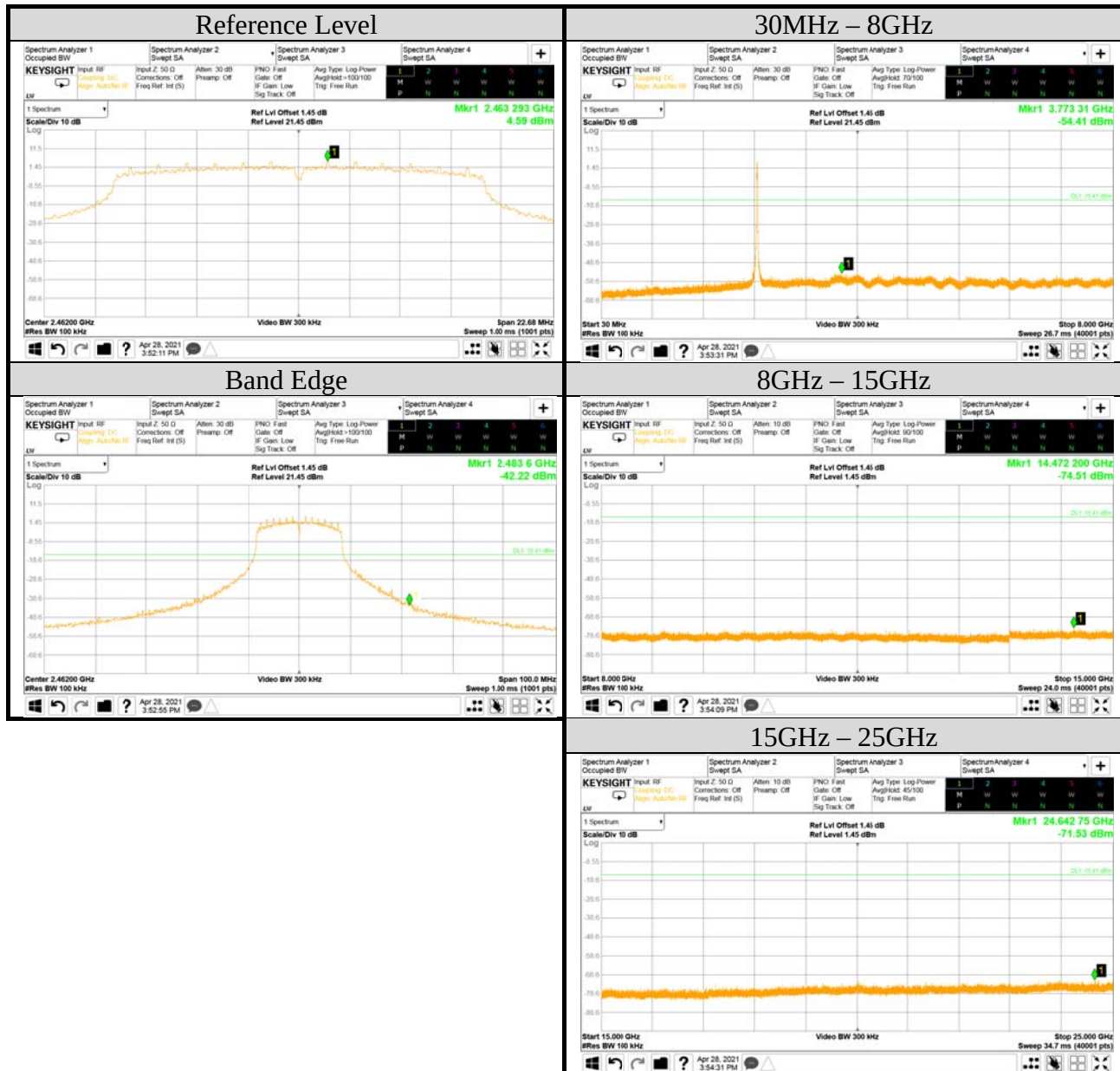
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New Taipei City 244, Taiwan

Tel: +886 2 26099301

Fax: +886 2 26099303

Test Date	2021/04/28	Temp./Hum.	25°C/65%
Cable Loss	1.45dB	Test Voltage	AC 120V 60Hz (Via AC Adapter)
Mode	802.11g	Tested By	Sam Chang
Frequency	TX 2462MHz		
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0dB



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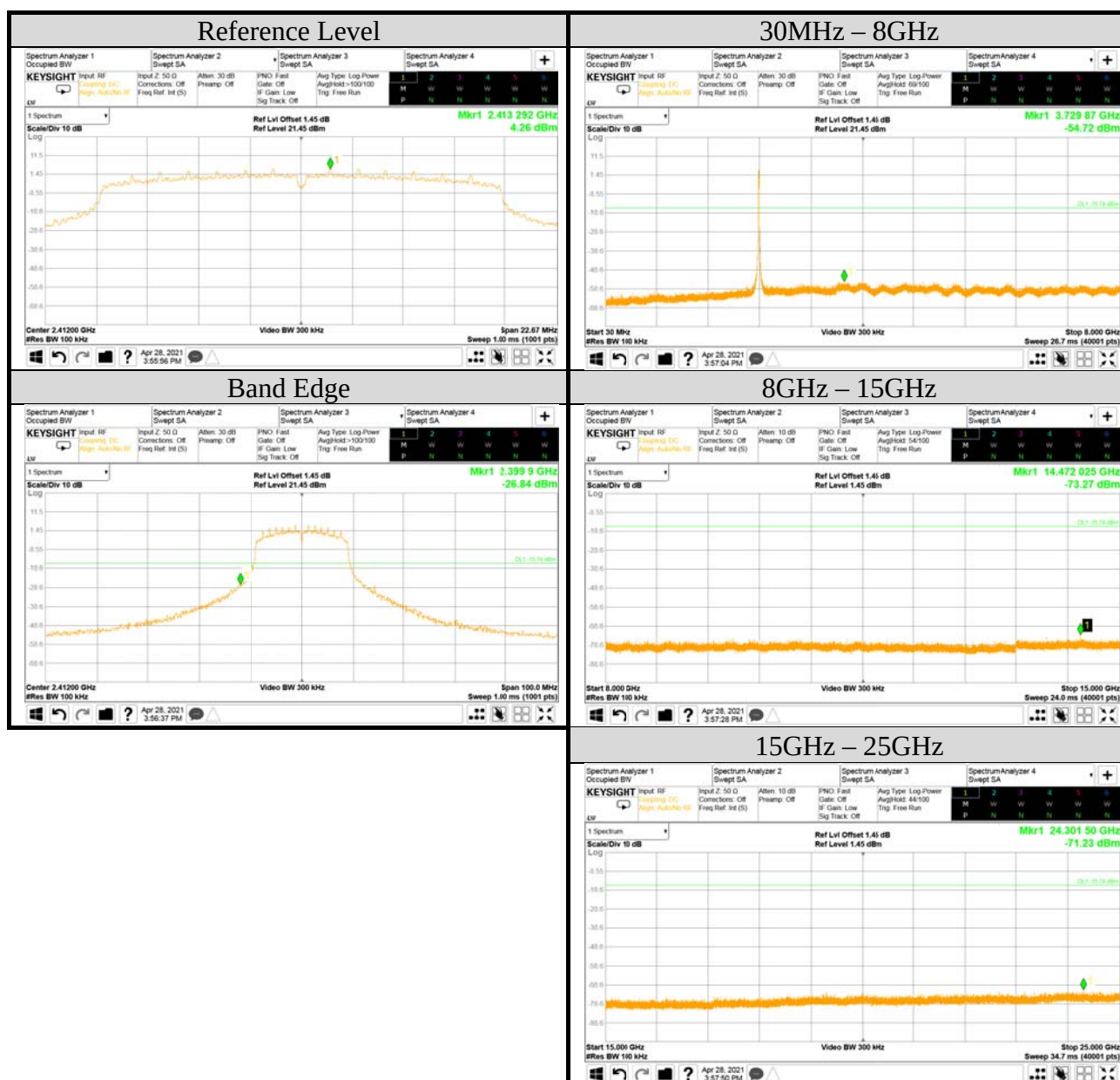
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New Taipei City 244, Taiwan

Tel: +886 2 26099301

Fax: +886 2 26099303

Test Date	2021/04/28	Temp./Hum.	25℃ /65%
Cable Loss	1.45dB	Test Voltage	AC 120V 60Hz (Via AC Adapter)
Mode	802.11n-HT20	Tested By	Sam Chang
Frequency	TX 2412MHz		
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0dB



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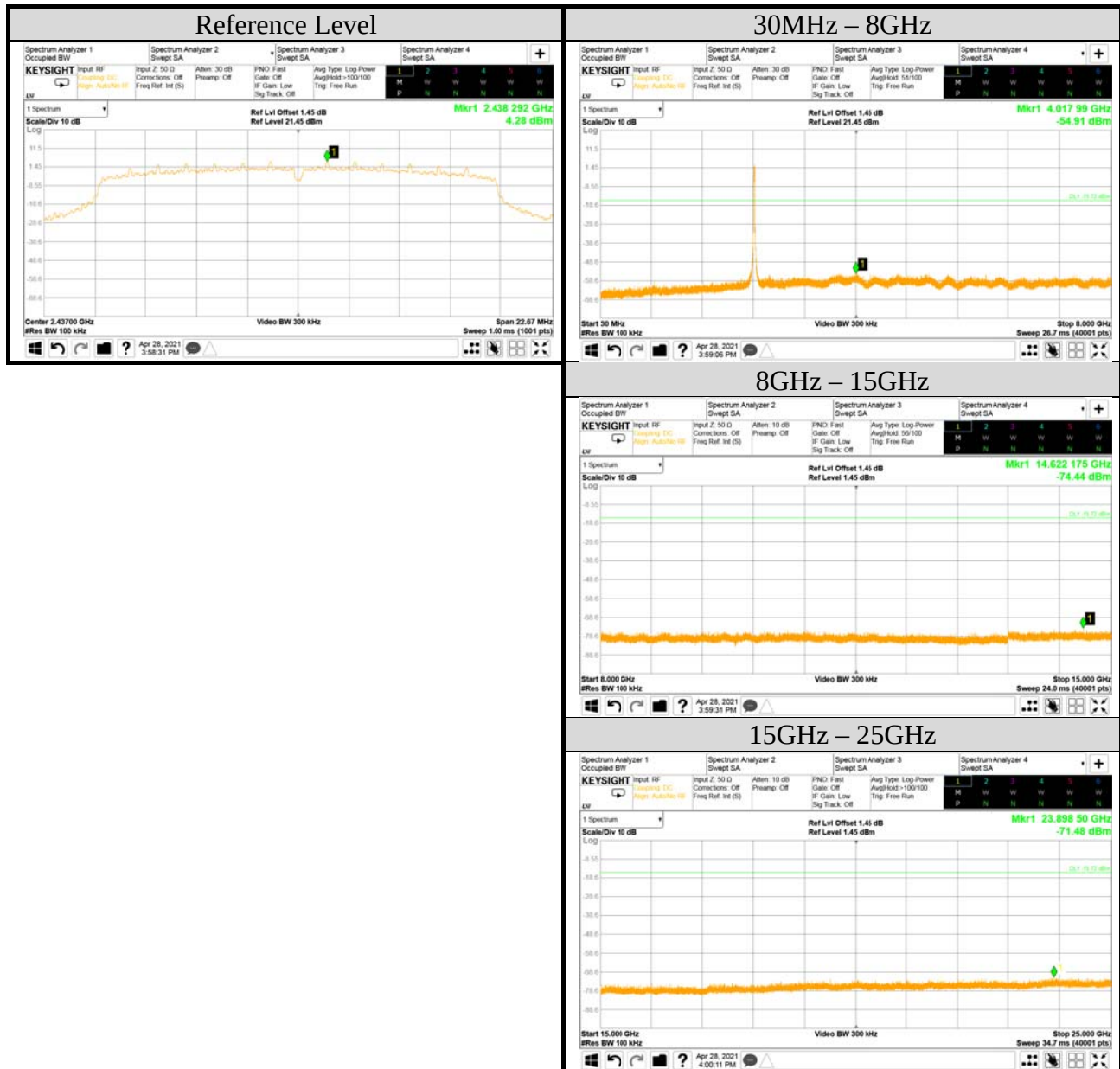
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Fax: +886 2 26099303

Test Date	2021/04/28	Temp./Hum.	25°C/65%
Cable Loss	1.45dB	Test Voltage	AC 120V 60Hz (Via AC Adapter)
Mode	802.11n-HT20	Tested By	Sam Chang
Frequency	TX 2437MHz		
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0dB



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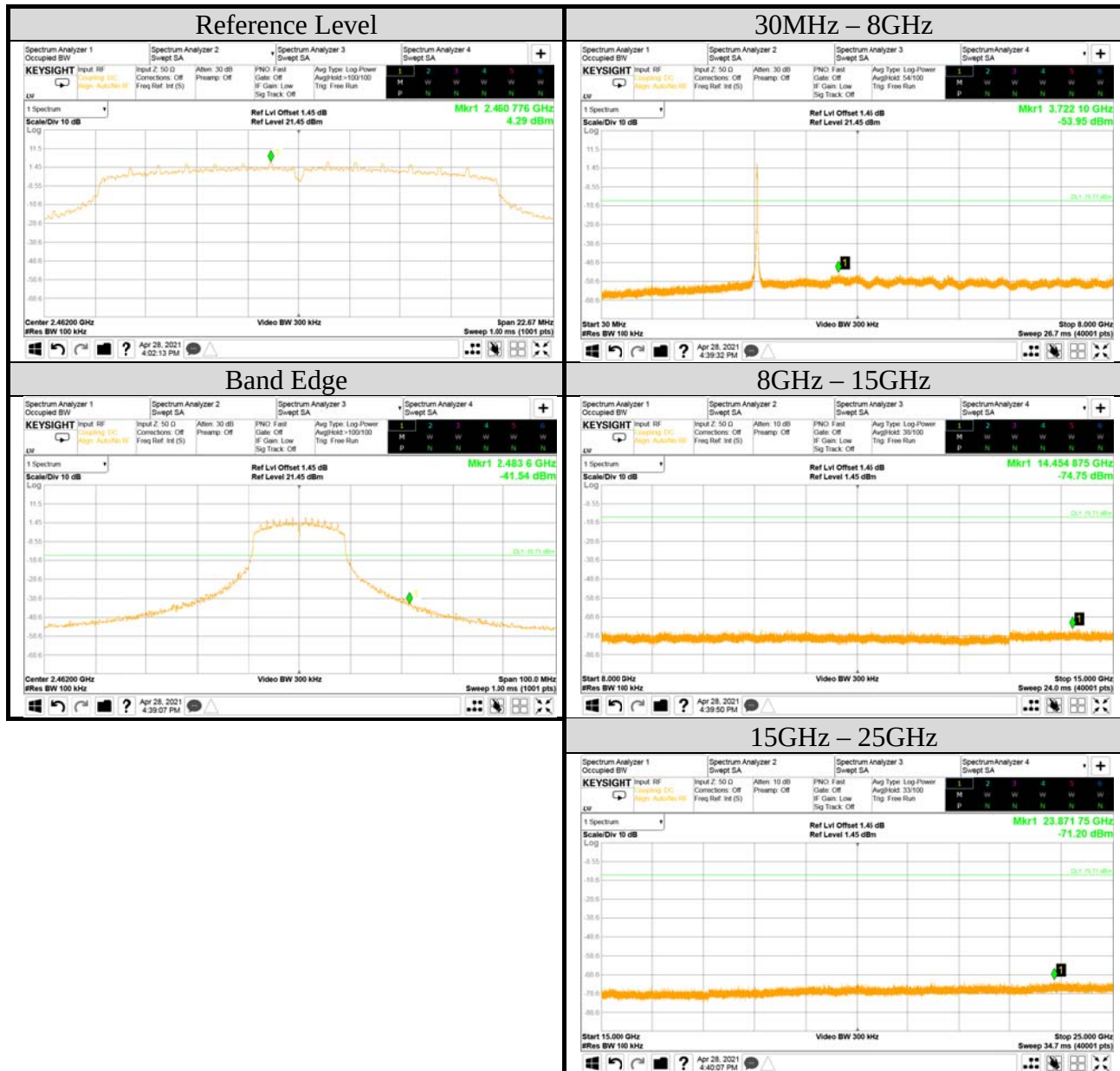
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Tel: +886 2 26099301

Fax: +886 2 26099303

Test Date	2021/04/28	Temp./Hum.	25°C /65%
Cable Loss	1.45dB	Test Voltage	AC 120V 60Hz (Via AC Adapter)
Mode	802.11n-HT20	Tested By	Sam Chang
Frequency	TX 2462MHz		
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0dB



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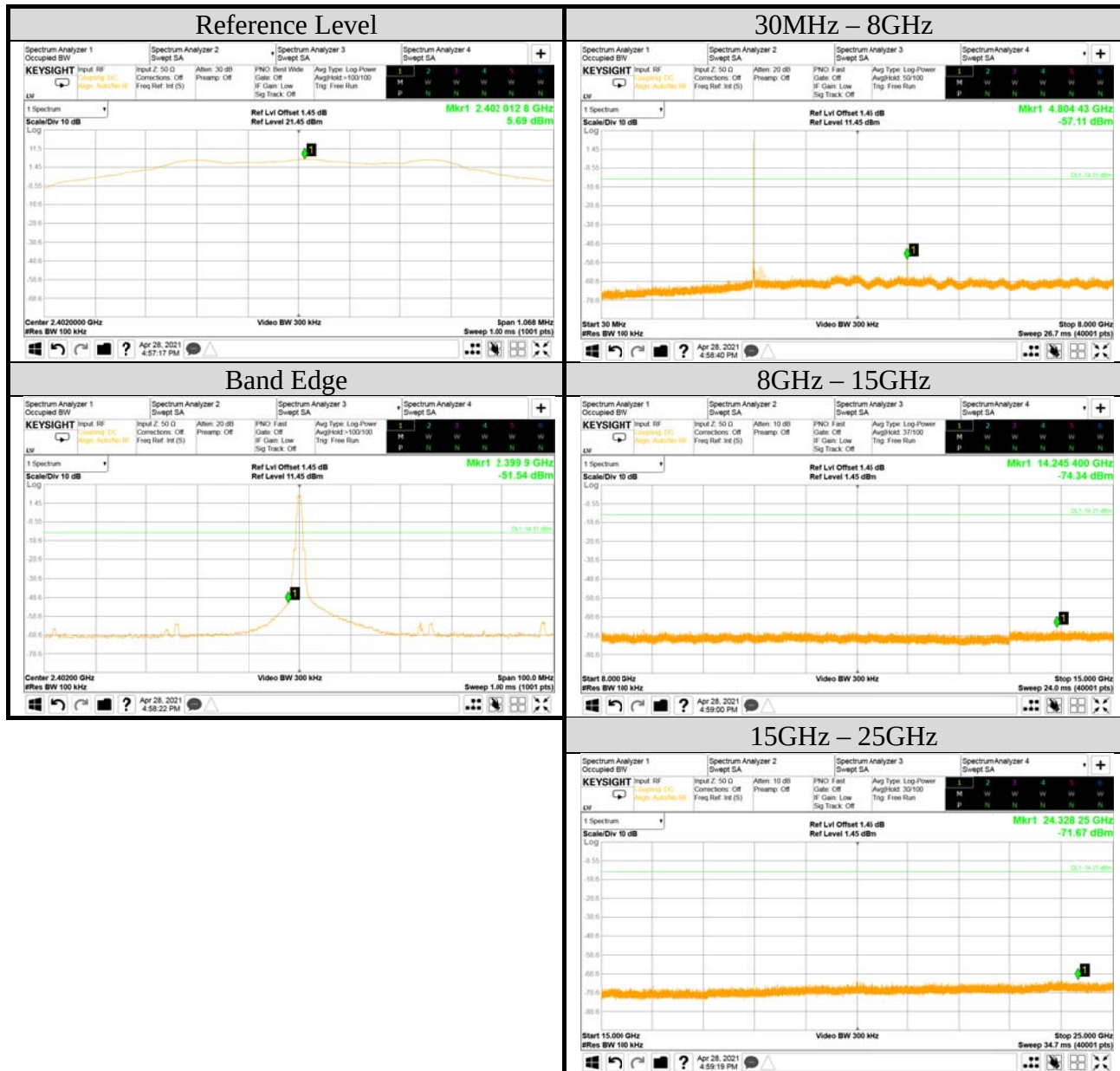
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Fax: +886 2 26099303

Test Date	2021/04/28	Temp./Hum.	25℃/65%
Cable Loss	1.45dB	Test Voltage	AC 120V 60Hz (Via AC Adapter)
Mode	BLE	Tested By	Sam Chang
Frequency	TX 2402MHz		
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0dB



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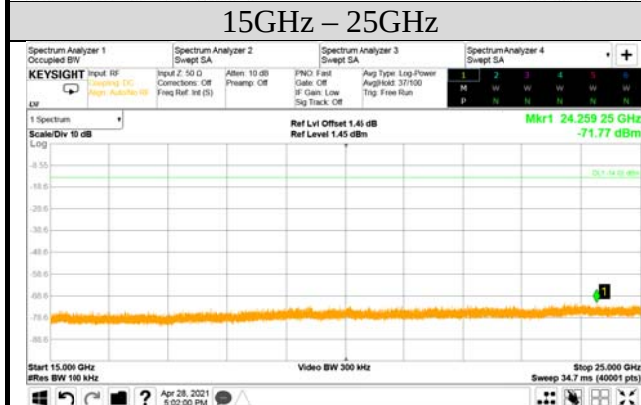
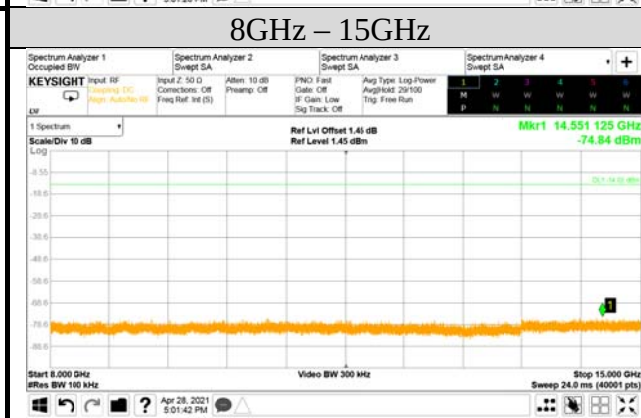
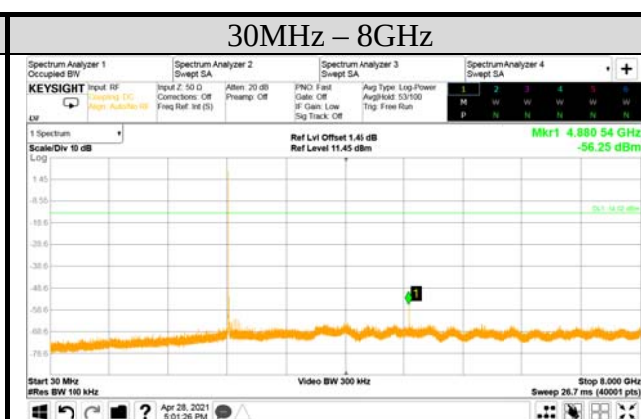
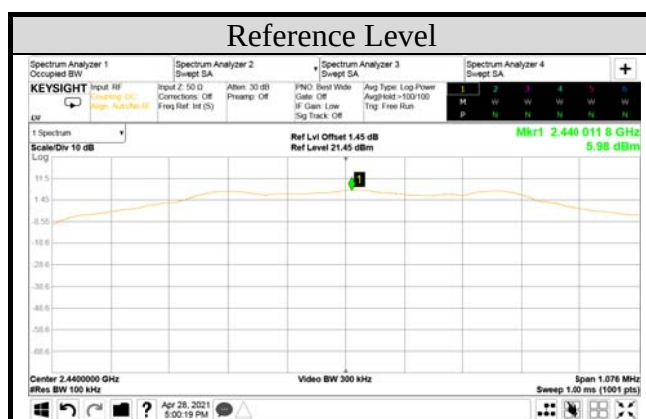
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New Taipei City 244, Taiwan

Tel: +886 2 26099301

Fax: +886 2 26099303

Test Date	2021/04/28	Temp./Hum.	25℃ /65%
Cable Loss	1.45dB	Test Voltage	AC 120V 60Hz (Via AC Adapter)
Mode	BLE	Tested By	Sam Chang
Frequency	TX 2440MHz		
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0dB



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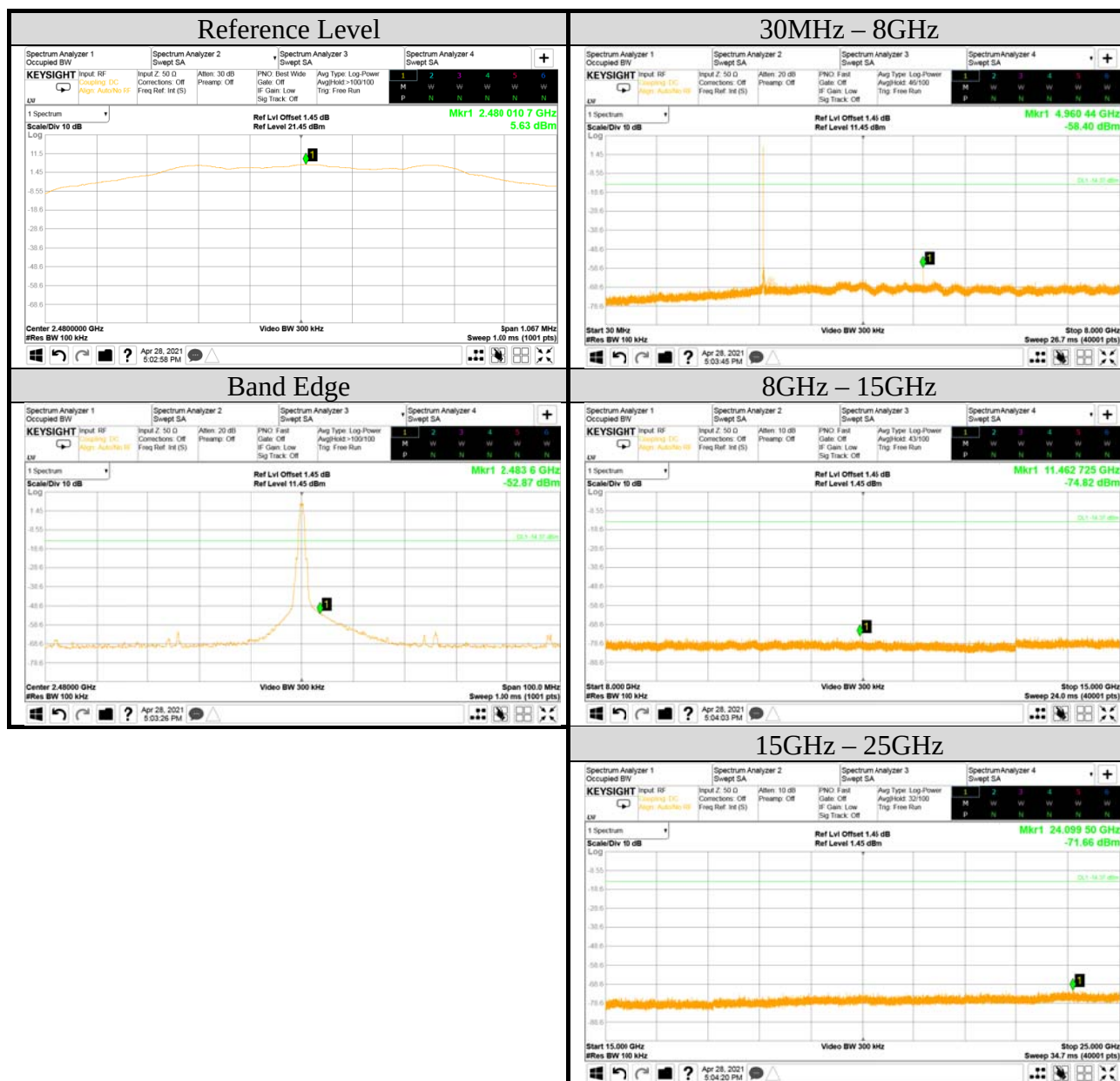
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New Taipei City 244, Taiwan

Tel: +886 2 26099301

Fax: +886 2 26099303

Test Date	2021/04/28	Temp./Hum.	25℃ /65%
Cable Loss	1.45dB	Test Voltage	AC 120V 60Hz (Via AC Adapter)
Mode	BLE	Tested By	Sam Chang
Frequency	TX 2480MHz		
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0dB



A.6 POWER SPECTRAL DENSITY

Test Date	2021/04/28	Temp./Hum.	25℃ /65%
Cable Loss	1.45dB	Tested By	Sam Chang
Test Voltage	AC 120V 60Hz (Via AC Adapter)		
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0dB

A.6.1 Power Spectral Density Result

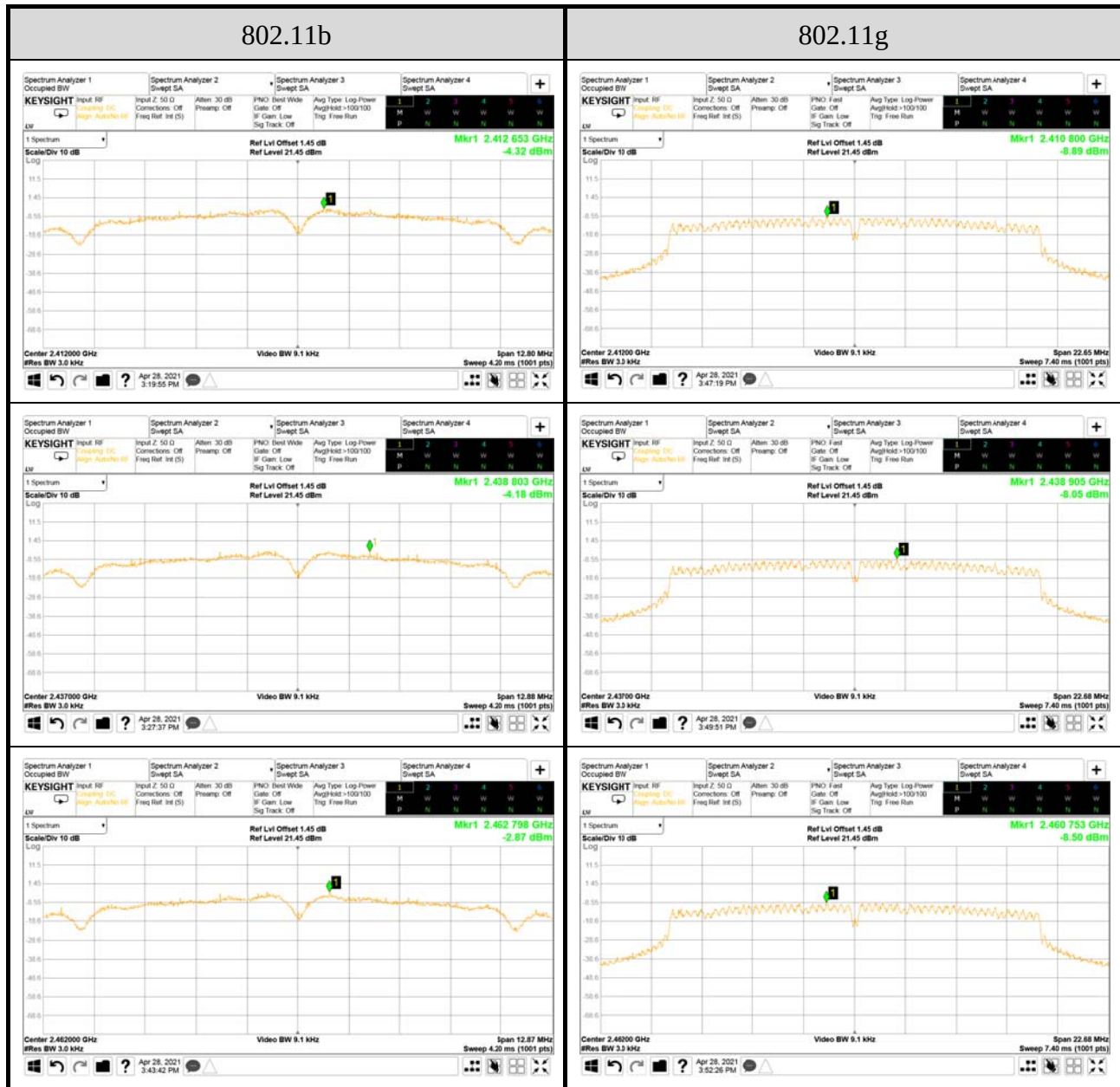
Mode	Centre Frequency (MHz)	Power Spectral Density (dBm)	Limit
802.11b	2412	-4.32	<8 dBm/3kHz
	2437	-4.18	
	2462	-2.87	
802.11g	2412	-8.89	
	2437	-8.05	
	2462	-8.50	
802.11n-HT20	2412	-9.07	
	2437	-8.80	
	2462	-8.99	
BLE	2402	-7.68	
	2440	-7.43	
	2480	-7.82	

Note: All results have been included cable loss and Simultaneous Factor.

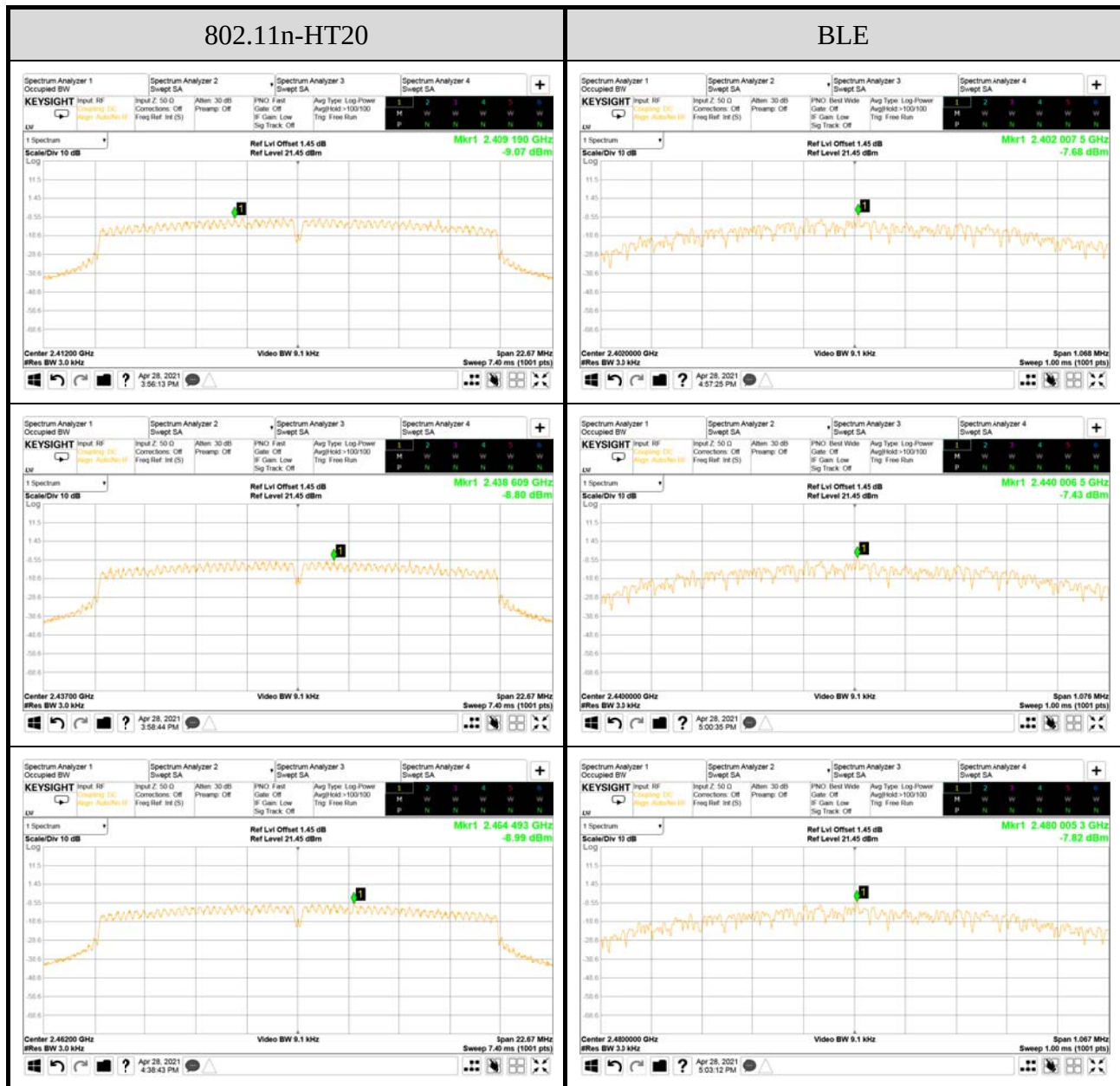
Audix Technology Corp.
No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

A.6.2 Measurement Plots



Note: All results have been included cable loss and Simultaneous Factor.



Note: All results have been included cable loss and Simultaneous Factor.