

FCC 15.247 & RSS-247 2.4 GHz Test Report

for

FUTABA Corporation

**1080 Yabutsuka Chosei-mura Chosei-gun Chiba-ken
299-4395 JAPAN**

Product Name : Radio Control
Model Name : (1)R404SBS (2)R404SBS-E
Brand : Futaba
FCC ID : AZPR404SBS-24G
IC : 2914D-R404SBS

**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.

TABLE OF CONTENTS

Description	Page
TEST REPORT	4
1. REVISION RECORD OF TEST REPORT	5
2. SUMMARY OF TEST RESULTS	6
3. GENERAL INFORMATION	7
3.1. Description of Application	7
3.2. Description of EUT	8
3.3. Antenna Information	8
3.4. EUT Specifications Assessed in Current Report	9
3.5. Description of Key Components	9
3.6. Test Configuration	10
3.7. Tested Supporting System List	11
3.8. Setup Configuration	11
3.9. Operating Condition of EUT	11
3.10. Description of Test Facility	12
3.11. Measurement Uncertainty	13
4. MEASUREMENT EQUIPMENT LIST	14
4.1. Radiated Emission Measurement	14
4.2. RF Conducted Measurement	14
5. CONDUCTED EMISSION	15
6. RADIATED EMISSION	16
6.1. Block Diagram of Test Setup	16
6.3. Radiated Emission Limits	18
6.4. Test Procedure	19
6.5. Measurement Result Explanation	20
6.6. Test Results	20
7. 20dB/OCCUPIED BANDWIDTH	21
7.1. Block Diagram of Test Setup	21
7.2. Specification Limits	21
7.3. Test Procedure	21
7.4. Test Results	21
8. CARRIER FREQUENCY SEPARATION	22
8.1. Block Diagram of Test Setup	22
8.2. Specification Limits	22
8.3. Test Procedure	22
8.4. Test Results	22
9. TIME OF OCCUPANCY	23
9.1. Block Diagram of Test Setup	23
9.2. Specification Limits	23
9.3. Test Procedure	23
9.4. Test Results	23
10. NUMBER OF HOPPING CHANNELS	24
10.1. Block Diagram of Test Setup	24
10.2. Specification Limits	24
10.3. Test Procedure	24



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10.4. Test Results	24
11. MAXIMUM PEAK OUTPUT POWER	25
11.1. Block Diagram of Test Setup	25
11.2. Specification Limits.....	25
11.3. Test Procedure	25
11.4. Test Results	25
12. EMISSION LIMITATIONS	26
12.1. Block Diagram of Test Setup	26
12.2. Specification Limits.....	26
12.3. Test Procedure	26
12.4. Test Results	26
13. DEVIATION TO TEST SPECIFICATIONS	27

APPENDIX A TEST DATA AND PLOTS
APPENDIX B TEST PHOTOGRAPHS

TEST REPORT

Applicant : FUTABA Corporation
Manufacturer : FUTABA Corporation
EUT Description
(1) Product : Radio Control
(2) Model : (1)R404SBS (2)R404SBS-E
(3) Brand : Futaba
(4) Power Supply: DC 3.7 ~ 7.4V (Battery)

Applicable Standards:

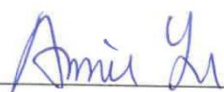
Title 47 CFR FCC Part 15 Subpart C
RSS-Gen (Issue 5), Amendment 2, February 2021
RSS-247 (Issue 2), February 2017
ANSI C63.10:2013

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.

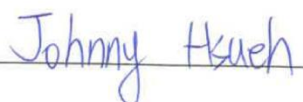
Date of Report: 2021. 09. 17

Reviewed by:



(Annie Yu/Administrator)

Approved by:



(Johnny Hsueh/Section Manager)



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1. REVISION RECORD OF TEST REPORT

Edition No	Issued Date	Revision Summary	Report Number
0	2021. 09. 17	Original Report	EM-F210711

2. SUMMARY OF TEST RESULTS

Rule		Description	Results
FCC	IC		
15.207	RSS-Gen §8.8	Conducted Emission	N/A ^{Note 1}
15.247(d)/15.205	RSS-Gen §8.9 RSS-247 §5.5	Radiated Band Edge and Radiated Spurious Emission	PASS
15.247(a)(1)	RSS-247 §5.1(2)	20dB/Occupied Bandwidth	PASS
15.247(a)(1)	RSS-247 §5.1(2)	Carrier Frequency Separation	PASS
15.247(a)(1)(iii)	RSS-247 §5.1(4)	Time of Occupancy	PASS
15.247(a)(1)(iii)	RSS-247 §5.1(4)	Number of Hopping Channels	PASS
15.247(b)(1)	RSS-247 §5.1(2)	Maximum Peak Output Power	PASS
15.247(d)	RSS-247 §5.5	Conducted Band Edges and Conducted Spurious Emission	PASS
15.203	---	Antenna Requirement	Compliance

Note: 1. The EUT only employs battery power for operation, so it is unnecessary to test.
2. The uncertainties value is not used in determining the result.

3. GENERAL INFORMATION

3.1. Description of Application

Applicant	FUTABA Corporation 1080 Yabutsuka Chosei-mura Chosei-gun Chiba-ken, 299-4395 Japan.		
Manufacturer	FUTABA Corporation 1080 Yabutsuka Chosei-mura Chosei-gun Chiba-ken, 299-4395 Japan.		
Product	Radio Control		
Brand	Futaba		
Model Number	(1)R404SBS (2)R404SBS-E The difference between models is as following, and the difference has only influence on radiated emission. The models R404SBS and R404SBS-E were tested in this report.		
	Item	R404SBS	R404SBS-E
	Case	Different	Different
	Antenna Type	Mono-pole type/PCB Type	PCB type
	Antenna Gain	-5.16dBi/-1.381dBi	1.112dBi/1.878dBi

3.2. Description of EUT

Test Model	(1)R404SBS (2)R404SBS-E
Serial Number	N/A
Power Rating	DC 3.7 ~ 7.4V
RF Features	FHSS
Transmit Type	1T1R
Sample Status	Mass production
Date of Receipt	2021. 08. 29
Date of Test	2021. 08. 13 ~ 09. 07
Interface Ports of EUT	None
Accessories Supplied	None

3.3. Antenna Information

No.	Model	Manufacture	Antenna Type	Frequency (MHz)	Max Gain(dBi)
Model: R404SBS					
1	Mono-pole type	Hirose	U.FL-LP-068N1T -21-(120)D	2400-2500	-5.16
2	PCB	SANSEI ELECTRIC CO., LTD	ANTB24-105A0	2400-2500	-1.381
Model: R404SBS-E					
3	PCB	SANSEI ELECTRIC CO., LTD	ANTB24-106A0	2400-2500	1.112
4	PCB	SANSEI ELECTRIC CO., LTD	ANTB24-106A0	2400-2500	1.878

3.4. EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number
FHSS	2406-2478	37

Mode	Modulation	Data Rate (Mbps)
FHSS	Frequency-Hopping Spread-Spectrum	1

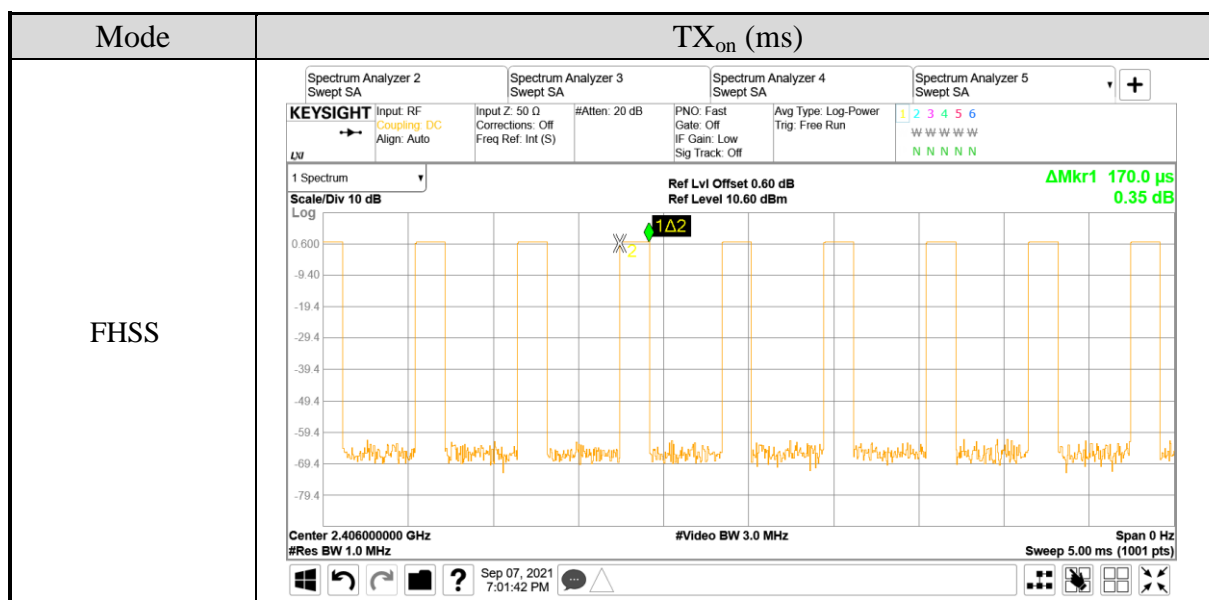
Mode: FHSS					
Channel List					
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
01	2406	14	2432	27	2458
02	2408	15	2434	28	2460
03	2410	16	2436	29	2462
04	2412	17	2438	30	2464
05	2414	18	2440	31	2466
06	2416	19	2442	32	2468
07	2418	20	2444	33	2470
08	2420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

3.5. Description of Key Components

None

3.6. Test Configuration

Mode	Duty Cycle (x)	TX _{on} (ms)	Duty Cycle Correction Factor (dB)
FHSS	N/A	0.17	N/A



Item	Mode	Test Channel
Radiated Band Edge ^{Note1&2}	FHSS	01/37
Radiated Spurious Emission ^{Note1&2}	FHSS	01/19/37
20dB Bandwidth ^{Note3}	FHSS	01/19/37
Carrier Frequency Separation ^{Note3}	FHSS	01/19/37
Time of Occupancy ^{Note3}	FHSS	01/19/37
Number of Hopping Channels ^{Note3}	FHSS	19
Maximum Peak Output Power ^{Note4}	FHSS	01/19/37
Band Edges ^{Note3}	FHSS	01/37
Spurious Emission ^{Note3}	FHSS	01/19/37

Note 1: Mobile Device, and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow: Lie Side Stand Portable Device

Note 2: Due the antenna are different, all models would be test.

Note 3: The worst case (antenna A with R304SBS) was tested on this test item.

Note 4: The worst case (antenna A & B with R304SBS) was tested on this test item.

3.7. Tested Supporting System List

3.7.1. Support Peripheral Unit

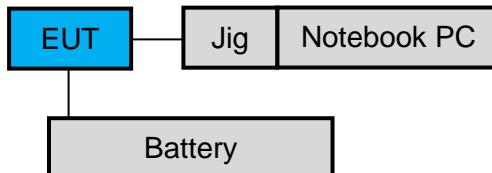
No.	Product	Brand	Model No.	Serial No.	Approval
1.	Notebook PC	ASUS	E403SA	N/A	N/A
2.	Battery	Futaba	HT5F1800B	N/A	N/A
3.	Jig	Futaba	CIU-2	N/A	N/A

3.7.2. Cable Lists

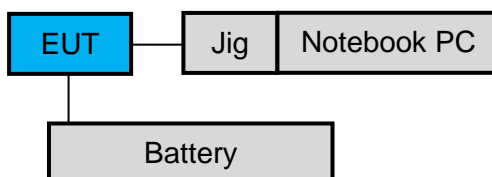
No.	Cable Description Of The Above Support Units
1.	Signal Cable: Unshielded, Detachable, 0.1m Adapter: ASUS, M/N AD890526 DC Power Cord : Unshielded, Detachable, 2.0m
2.	Signal Cable: Unshielded, Detachable, 0.1m
3.	Signal Cable: Unshielded, Detachable, 0.12m

3.8. Setup Configuration

3.8.1. EUT Configuration for Radiated Emission



3.8.2. EUT Configuration for RF Conducted Test Items



3.9. Operating Condition of EUT

Test program “Futaba Term” is used for enabling EUT RF function under continues transmitting and choosing data rate/ channel.

3.10. 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.1 3m Semi Anechoic Chamber

3.11. Measurement Uncertainty

Test Items/Facilities		Frequency Range	Uncertainty	
Conduction Test		9kHz-150kHz	±3.7dB	
		150kHz-30MHz	±3.4dB	
Radiation Test	<input checked="" type="checkbox"/>	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
	<input type="checkbox"/>	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
	<input type="checkbox"/>	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
	<input type="checkbox"/>	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
	<input type="checkbox"/>	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
20dB Bandwidth	±0.2kHz
99% Occupied Bandwidth	±0.38%
Carrier Frequency Separation	±0.2kHz
Time of Occupancy	±0.03sec
Maximum peak Output power	± 0.52dB
Conducted Emission Limitations	± 0.13dB

4. MEASUREMENT EQUIPMENTLIST

4.1. 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.	Test Receiver	Agilent	N9010A-526	MY53400071	2020.09.16	1 Year
3.	A.M.N.	R&S	ESCS30	100338	2021.06.17	1 Year
4.	L.I.S.N.	HP	8447D	2944A06305	2021.01.14	1 Year
5.	Pulse Limiter	TESEQ	CBL6112D	33821	2021.07.16	1 Year
6.	Amplifier	HP	8449B	3008A01284	2021.05.19	1 Year
7.	Microwave Preamplifier	Keysight	83051A	MY53010042	2021.07.30	1 Year
8.	2.4GHz Notch Filter	K&L Microwave	7NSL10-244 1.5/E130.5-O /O	2	2021.07.24	1 Year
9.	Notch Filter	Microwave	H3G018G1	484796	2021.07.24	1 Year
10.	Horn Antenna	EMCO	3115	9112-3775	2021.05.12	1 Year
11.	Horn Antenna	COM-POWER	AH-840	101092	2021.01.05	1 Year
12.	Coaxial Cable	MIYAZAKI	5D2W	RE-11	2021.01.29	1 Year
13.	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 106	RE-14	2021.01.29	1 Year
14.	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	RE-30	2021.08.25	1 Year
15.	Coaxial Cable	EMCI	EMC 104	RE-20	2021.01.29	1 Year
16.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2021.04.15	1 Year
17.	Test Software	Audix	e3	V6.120619c	N.C.R.	1 Year

4.2. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Keysight	N9020B	MY59071380	2021.03.10	1 Year
2.	Digital Thermo-Hygro Meter	iMax	HTC-1	RF-03	2021.04.15	1 Year



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5. CONDUCTED EMISSION

【The EUT only employs battery power for operation, no conductive emission limits are required according to FCC Part 15 Section §15.207 and RSS-Gen §8.8】

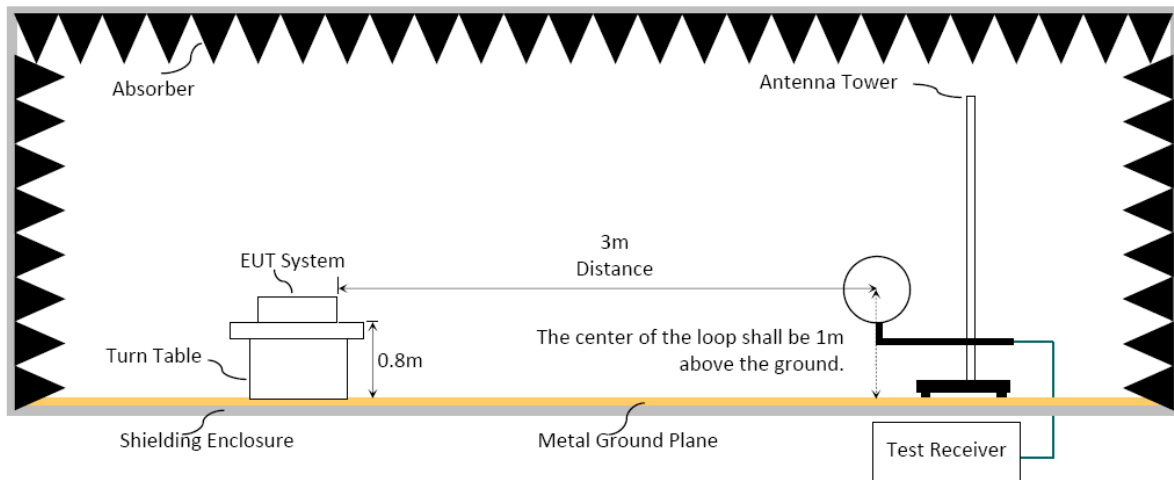
6. RADIATED EMISSION

6.1. Block Diagram of Test Setup

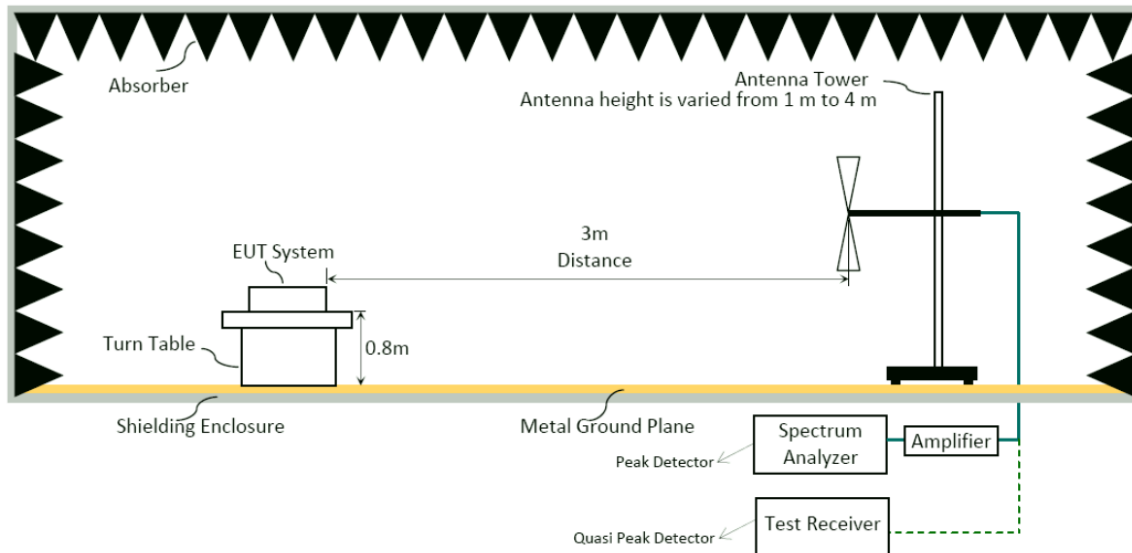
6.1.1. Block Diagram of EUT

Indicated as section 3.8

6.1.2. Setup Diagram for 9kHz-30MHz

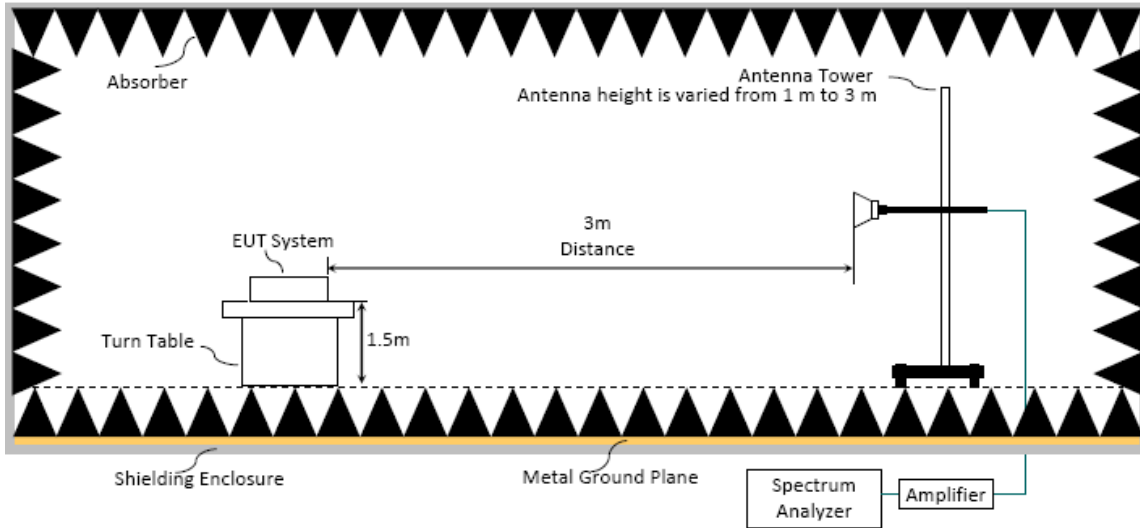


6.1.3. Setup Diagram for 30-1000MHz

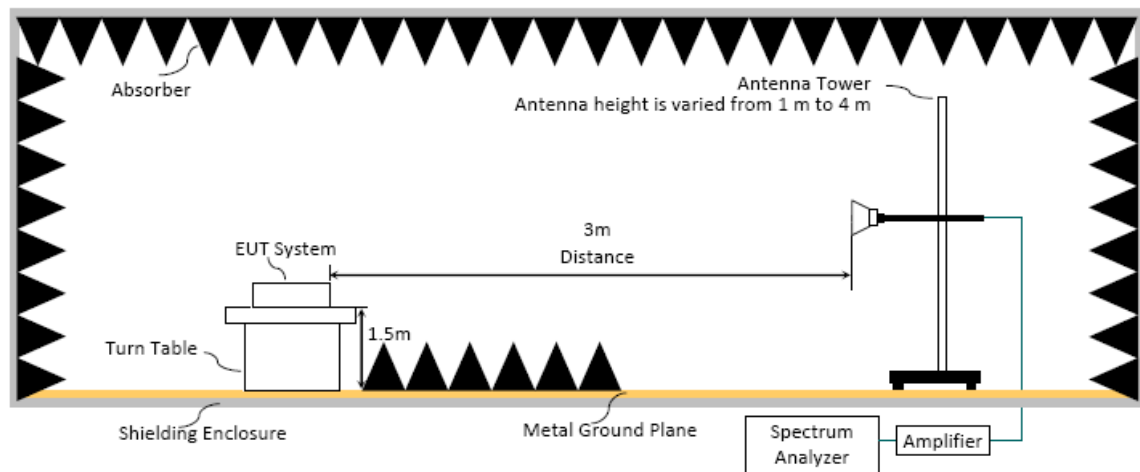


6.1.4. Setup Diagram for above 1GHz

Fully Anechoic Chamber



Semi Anechoic Chamber



6.3. 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/RSS-Gen 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.

6.4. 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 C63.10-2013 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	TX _{on} (ms)	1/ TX _{on} (kHz)	VBW Setting (kHz)
FHSS	0.17	5.882	6.2

N/A: 1/ T is not implemented when duty cycle presented in section 3.7 is \geq 98%.

(3) Detector = Peak.

(4) Sweep time = auto.

(5) Trace mode = max hold.

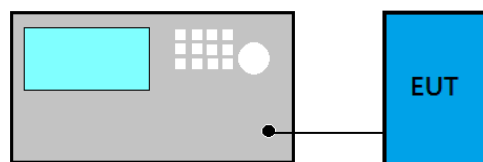
(6) Allow sweeps to continue until the trace stabilizes.

 Option 2:Average Emission Level(dB μ V/m) = Peak Emission Level(dB μ V/m) + D.C.C.F.**6.5. Measurement Result Explanation** Peak Emission Level(dB μ V/m) = Antenna Factor(dB/m) + Cable Loss(dB) +
Meter Reading(dB) (including Preamp factor if test used) Average Emission Level(dB μ V/m) = Antenna Factor (dB/m) + Cable Loss(dB) +
Meter Reading(dB) (including Preamp factor if test used) Average Emission Level(dB μ V/m) = Peak Emission Level(dB μ V/m) + DCCF
Duty Cycle Correction Factor (DCCF) = $20\log(\text{TX}_{\text{on}}/\text{TX}_{\text{on+off}})$ presented in section 3.6 ERP = Peak Emission Level(dB μ V/m) - 95.2dB - 2.14dB**6.6. Test Results**

Please refer to Appendix A.

7. 20dB/OCCUPIED BANDWIDTH

7.1. Block Diagram of Test Setup



7.2. Specification Limits

Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

7.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

For 20dB Bandwidth

- (1) Set Span range 2~5 times the OBW
- (2) Set VBW $\geq 3 \times$ 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 dB to -20 dB to record the final bandwidth.

For 99% Occupied Bandwidth

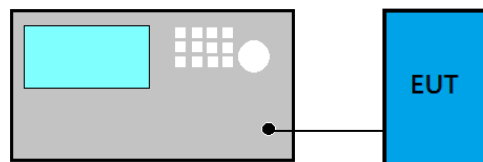
- (8) Set Span range 1.5~5 times the OBW
- (9) Set RBW close to 1% to 5% of OBW.
- (10) Set VBW $\geq 3 \times$ RBW.
- (11) Detector = Peak.
- (12) Trace mode = Max hold
- (13) Sweep = Auto couple.
- (14) Allow the trace to stabilize.

7.4. Test Results

Please refer to Appendix A

8. CARRIER FREQUENCY SEPARATION

8.1. Block Diagram of Test Setup



8.2. Specification Limits

Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output no greater than 125mW.

8.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

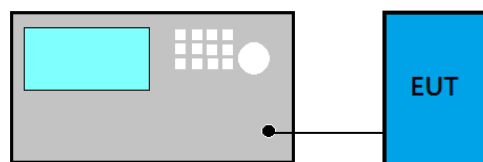
- (1) Span = Wide enough to capture the peaks of two adjacent channels
- (2) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
- (3) $VBW \geq RBW$
- (4) Sweep = Auto
- (5) Detector function = Peak
- (6) Trace = Max hold
- (7) Allow the trace to stabilize.

8.4. Test Results

Please refer to Appendix A

9. TIME OF OCCUPANCY

9.1. Block Diagram of Test Setup



9.2. Specification Limits

Frequency hopping systems in the 2400-2483.5MHz shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by number of hopping channels employed.

9.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

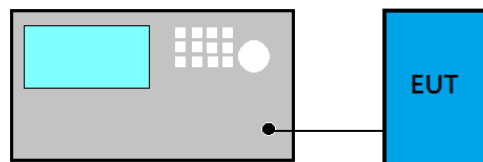
- (1) Span: Zero span, centered on a hopping channel.
- (2) RBW shall be \leq channel spacing and where possible RBW should be set $\gg 1/T$, where T is the expected dwell time per channel.
- (3) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
- (4) Detector function = Peak
- (5) Trace = Max hold

9.4. Test Results

Please refer to Appendix A

10. NUMBER OF HOPPING CHANNELS

10.1. Block Diagram of Test Setup



10.2. Specification Limits

Frequency hopping systems which use fewer than 20 hopping frequencies may employ intelligent hopping techniques to avoid interference to other transmissions. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 non-overlapping channels.

10.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

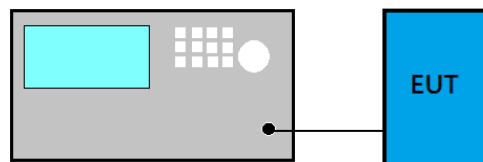
- (1) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
- (2) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
- (3) VBW \geq RBW
- (4) Sweep = Auto
- (5) Detector function = Peak
- (6) Trace = m=Max hold
- (7) Allow the trace to stabilize.

10.4. Test Results

Please refer to Appendix A

11. MAXIMUM PEAK OUTPUT POWER

11.1. Block Diagram of Test Setup



11.2. Specification Limits

The Limits of maximum Peak Output Power for frequency hopping systems in 2400-2483.5MHz is: 0.125Watt. (21dBm)

11.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

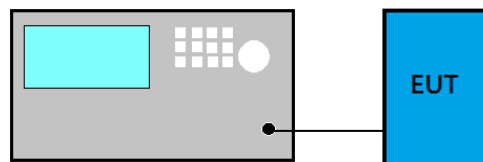
- (a) Use the following spectrum analyzer settings
 - (1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
 - (2) RBW > 20 dB bandwidth of the emission being measured.
 - (3) VBW \geq RBW
 - (4) Sweep: Auto
 - (5) Detector function: Peak
 - (6) Trace: Max hold
- (b) Allow trace to stabilize.
- (c) Use the marker-to-peak function to set the marker to the peak of the emission.

11.4. Test Results

Please refer to Appendix A

12. EMISSION LIMITATIONS

12.1. Block Diagram of Test Setup



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

12.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

- (1) Set span wide enough to capture the peak level of the in-band emission and all spurious emissions; up to 10th harmonic.
- (2) RBW = 100 kHz
- (3) VBW \geq RBW
- (4) Sweep = Auto
- (5) Detector function = Peak
- (6) Trace = Max hold

12.4. Test Results

Please refer to Appendix A



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13.DEVIATION TO TEST SPECIFICATIONS

【NONE】



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APPENDIX A

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APPDNDIX A

TEST DATA AND PLOTS

(Model: (1)R404SBS (2)R404SBS-E)

TABLE OF CONTENTS

A.1 RADIATED EMISSION	2
A.1.1 Emissions within Restricted Frequency Bands.....	2
A.1.2 Emissions outside the frequency band:.....	21
A.1.3 Emissions in Non-restricted Frequency Bands:.....	25
A.2 20dB BANDWIDTH	26
A.2.1 20dB Bandwidth Result.....	26
A.2.2 Measurement Plots	26
A.3 CARRIER FREQUENCY SEPARATION	27
A.4 TIME OF OCCUPANCY.....	28
A.4.1 Time of Occupancy	28
A.5 NUMBER OF HOPPING CHANNELS	30
A.6 MAXIMUM PEAK OUTPUT POWER	31
A.6.1 Maximum Peak Output Power.....	31
A.6.2 Measurement Plots	32
A.7 EMISSION LIMITATIONS MEASUREMENT	33
A.7.1 Band Edge.....	33
A.7.2 Spurious Emission	34

A.1 RADIATED EMISSION

Test Date	2021/08/13	Temp./Hum.	25°C/53%
Test Voltage	DC 6V (Via Battery)	Tested By	Hua Wu

A.1.1 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.

A.2.1.2 Frequency Below 1GHz

M/N: R404SBS, Antenna A

Mode	FHSS	Frequency	TX 2406MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
30.97	23.26	1.20	26.51	27.83	25.78	40.00	14.22	Peak
101.78	16.65	2.29	26.29	33.53	26.18	43.50	17.32	Peak
141.55	16.88	2.76	26.05	28.17	21.76	43.50	21.74	Peak
216.24	16.17	3.53	25.78	29.87	23.79	46.00	22.21	Peak
378.23	20.95	5.30	26.36	33.33	33.22	46.00	12.78	Peak
540.22	23.61	6.57	27.28	34.98	37.88	46.00	8.12	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
53.28	13.34	1.62	26.46	46.29	34.79	40.00	5.21	Peak
79.47	12.86	2.02	26.36	41.67	30.19	40.00	9.81	Peak
119.24	17.95	2.52	26.17	29.08	23.38	43.50	20.12	Peak
191.99	15.05	3.29	25.84	28.40	20.90	43.50	22.60	Peak
323.91	19.70	4.64	25.90	30.36	28.80	46.00	17.20	Peak
378.23	20.95	5.30	26.36	34.56	34.45	46.00	11.55	Peak

M/N: R404SBS, Antenna B

Mode	FHSS	Frequency	TX 2406MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
35.82	21.22	1.30	26.50	28.57	24.59	40.00	15.41	Peak
101.78	16.65	2.29	26.29	32.78	25.43	43.50	18.07	Peak
378.23	20.95	5.30	26.36	33.45	33.34	46.00	12.66	Peak
454.86	22.38	6.05	26.89	29.14	30.68	46.00	15.32	Peak
490.75	22.97	6.36	27.11	28.66	30.88	46.00	15.12	Peak
629.46	24.45	6.93	27.44	28.90	32.84	46.00	13.16	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
50.37	13.87	1.57	26.48	40.91	29.87	40.00	10.13	Peak
53.28	13.34	1.62	26.46	46.26	34.76	40.00	5.24	Peak
76.56	12.65	1.98	26.37	40.35	28.61	40.00	11.39	Peak
79.47	12.86	2.02	26.36	42.87	31.39	40.00	8.61	Peak
378.23	20.95	5.30	26.36	34.17	34.06	46.00	11.94	Peak
513.06	23.29	6.48	27.21	29.59	32.15	46.00	13.85	Peak

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M/N: R404SBS-E, Antenna A

Mode	FHSS	Frequency	TX 2406MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
101.78	16.65	2.29	26.29	31.72	24.37	43.50	19.13	Peak
132.82	17.32	2.66	26.10	28.70	22.58	43.50	20.92	Peak
243.40	17.82	3.79	25.75	27.94	23.80	46.00	22.20	Peak
355.92	20.43	5.03	26.17	27.68	26.97	46.00	19.03	Peak
444.19	22.21	5.96	26.83	28.76	30.10	46.00	15.90	Peak
594.54	24.25	6.76	27.42	30.22	33.81	46.00	12.19	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
50.37	13.87	1.57	26.48	41.84	30.80	40.00	9.20	Peak
53.28	13.34	1.62	26.46	42.62	31.12	40.00	8.88	Peak
79.47	12.86	2.02	26.36	39.89	28.41	40.00	11.59	Peak
125.06	17.71	2.58	26.14	29.66	23.81	43.50	19.69	Peak
323.91	19.70	4.64	25.90	29.56	28.00	46.00	18.00	Peak
482.99	22.84	6.29	27.06	29.46	31.53	46.00	14.47	Peak

M/N: R404SBS-E, Antenna B

Mode	FHSS	Frequency	TX 2406MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
30.97	23.26	1.20	26.51	27.81	25.76	40.00	14.24	Peak
101.78	16.65	2.29	26.29	31.50	24.15	43.50	19.35	Peak
323.91	19.70	4.64	25.90	28.49	26.93	46.00	19.07	Peak
378.23	20.95	5.30	26.36	33.42	33.31	46.00	12.69	Peak
540.22	23.61	6.57	27.28	35.17	38.07	46.00	7.93	Peak
647.89	24.54	7.02	27.44	29.35	33.47	46.00	12.53	Peak

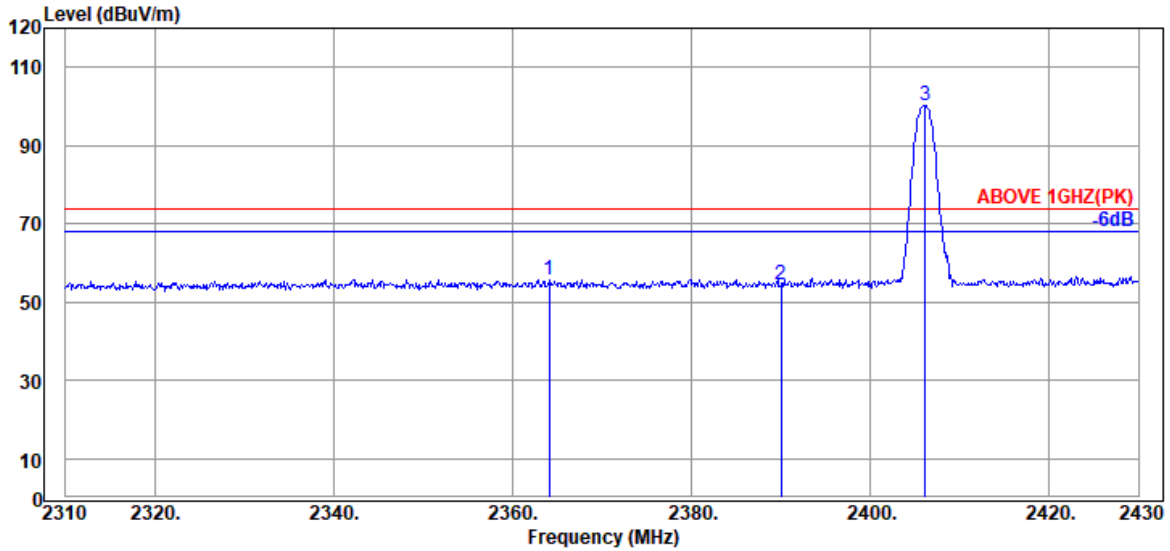
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
50.37	13.87	1.57	26.48	41.01	29.97	40.00	10.03	Peak
53.28	13.34	1.62	26.46	43.65	32.15	40.00	7.85	Peak
76.56	12.65	1.98	26.37	38.05	26.31	40.00	13.69	Peak
86.26	14.05	2.11	26.34	37.97	27.79	40.00	12.21	Peak
378.23	20.95	5.30	26.36	34.47	34.36	46.00	11.64	Peak
540.22	23.61	6.57	27.28	34.30	37.20	46.00	8.80	Peak

A.2.1.3 Frequency Above 1 GHz to 10th harmonics

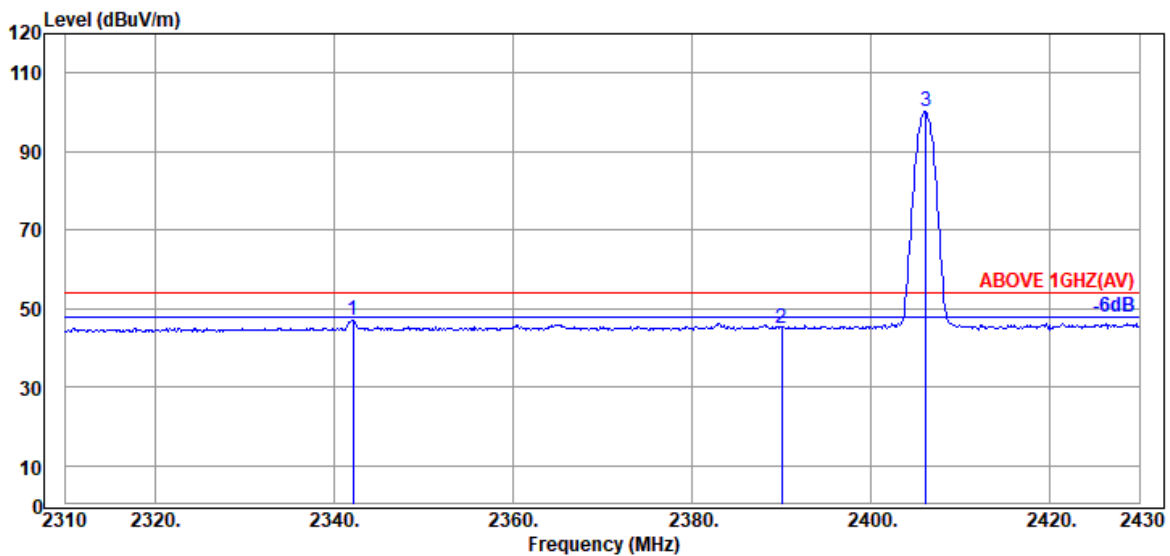
Band Edge: M/N: R404SBS, Antenna A

Mode	FHSS	Frequency	TX 2406MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2364.12	28.20	5.98	39.96	61.64	55.86	74.00	18.14	Peak
2390.04	28.20	6.04	39.95	60.07	54.36	74.00	19.64	Peak
@ 2406.12	28.23	6.07	39.95	105.74	100.09	---	---	Peak

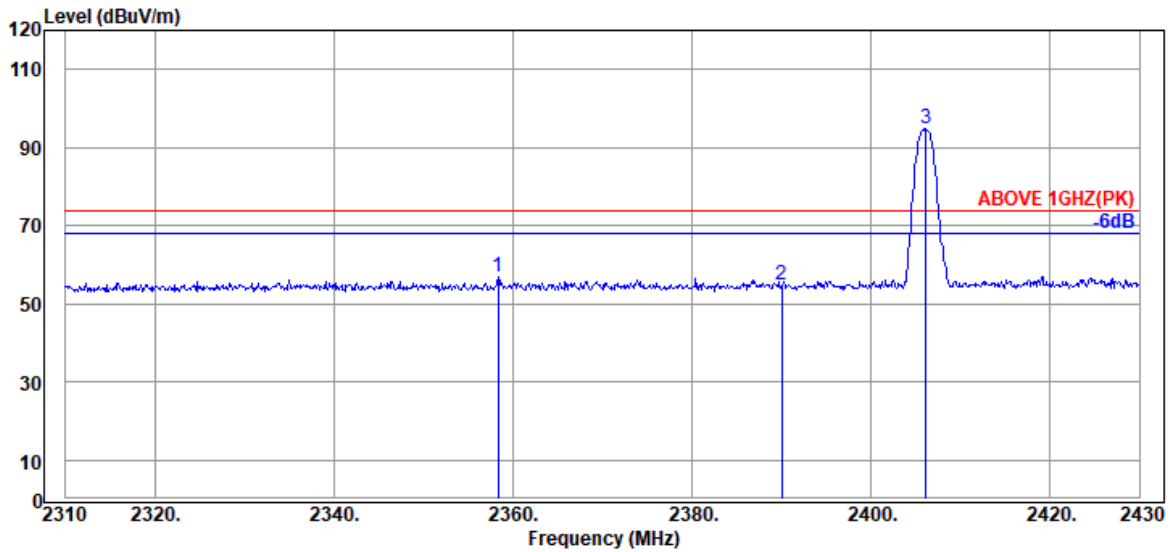


Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2342.16	28.12	5.96	39.96	52.83	46.95	54.00	7.05	Average
2390.04	28.20	6.04	39.95	50.51	44.80	54.00	9.20	Average
@ 2406.12	28.23	6.07	39.95	105.67	100.02	---	---	Average

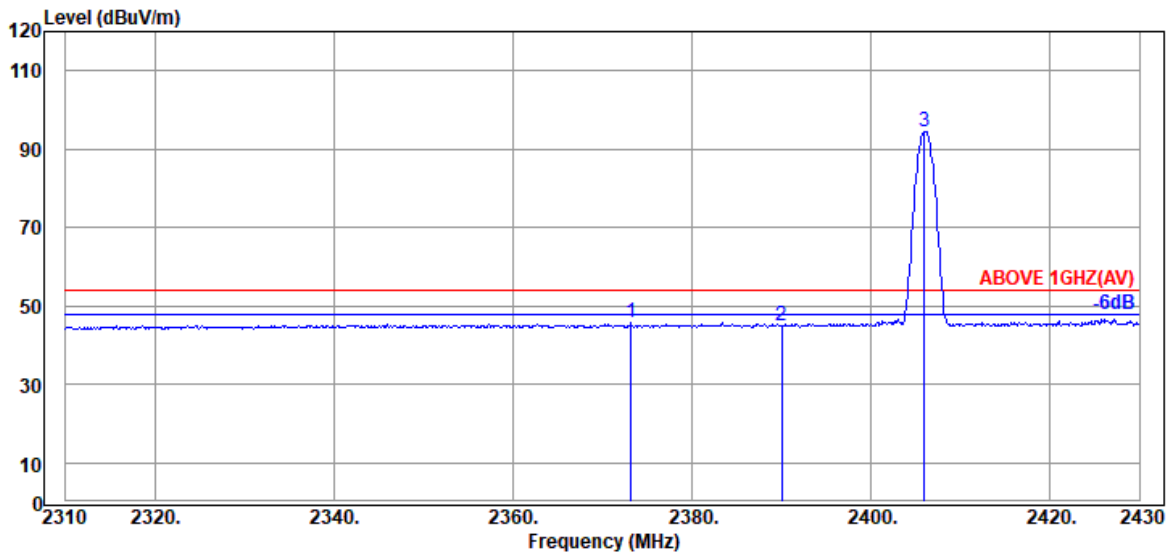
Remark: The “@” means fundamental frequency, it is ignored in this section.

Mode	FHSS	Frequency	TX 2406MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2358.36	28.20	5.98	39.96	62.70	56.92	74.00	17.08	Peak
2390.04	28.20	6.04	39.95	60.48	54.77	74.00	19.23	Peak
@ 2406.12	28.23	6.07	39.95	100.31	94.66	---	---	Peak

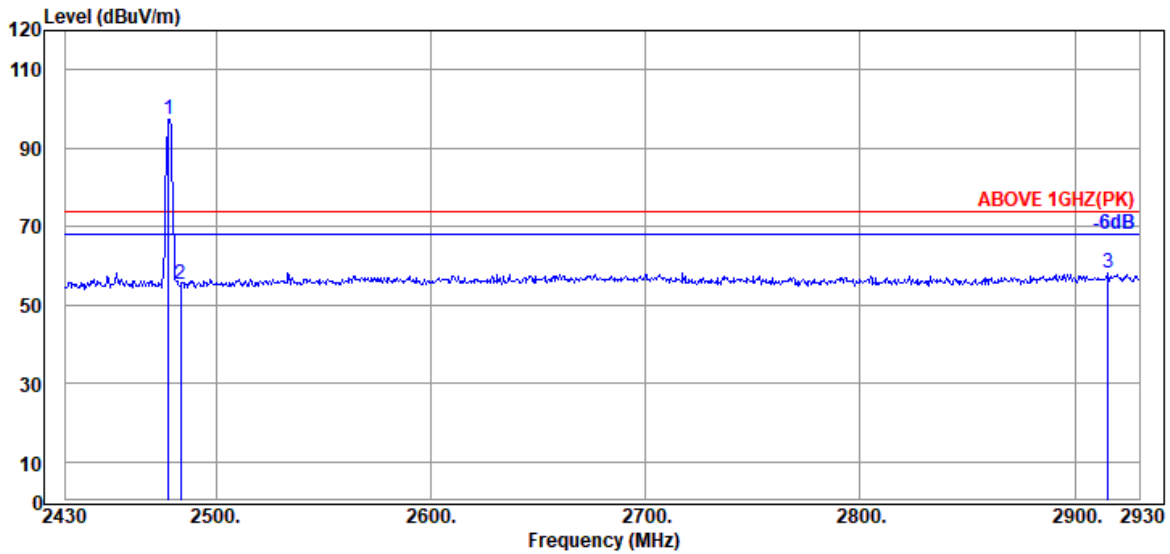


Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2373.24	28.20	6.01	39.96	51.39	45.64	54.00	8.36	Average
2390.04	28.20	6.04	39.95	50.84	45.13	54.00	8.87	Average
@ 2406.00	28.23	6.07	39.95	100.23	94.58	---	---	Average

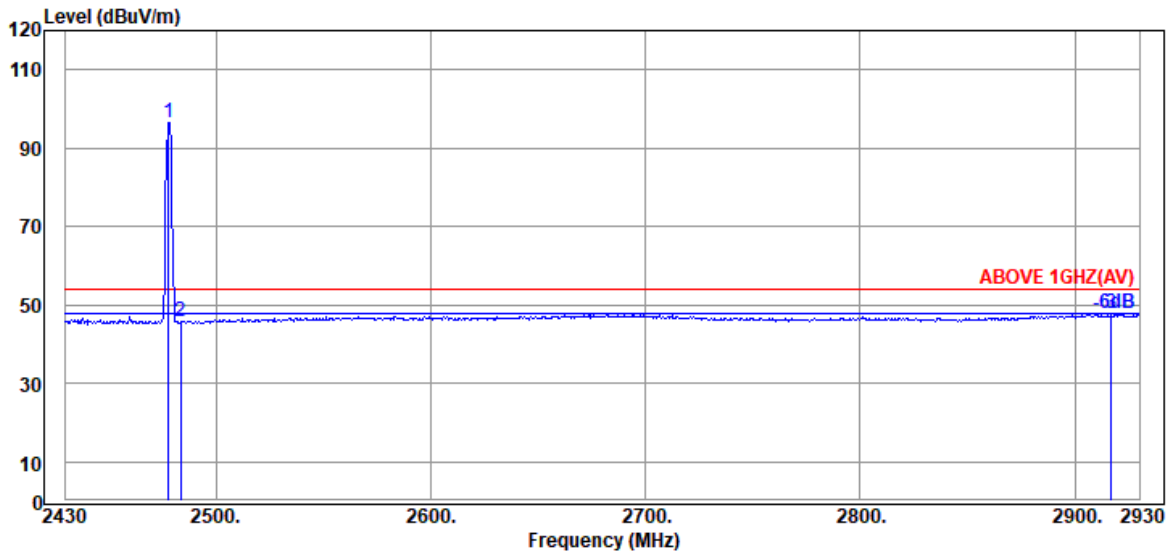
Remark: The “@” means fundamental frequency, it is ignored in this section.

Mode	FHSS	Frequency	TX 2478MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2478.00	28.46	6.18	39.94	102.49	97.19	---	---	Peak
2483.50	28.47	6.18	39.94	60.51	55.22	74.00	18.78	Peak
2915.50	29.83	6.75	40.06	61.56	58.08	74.00	15.92	Peak

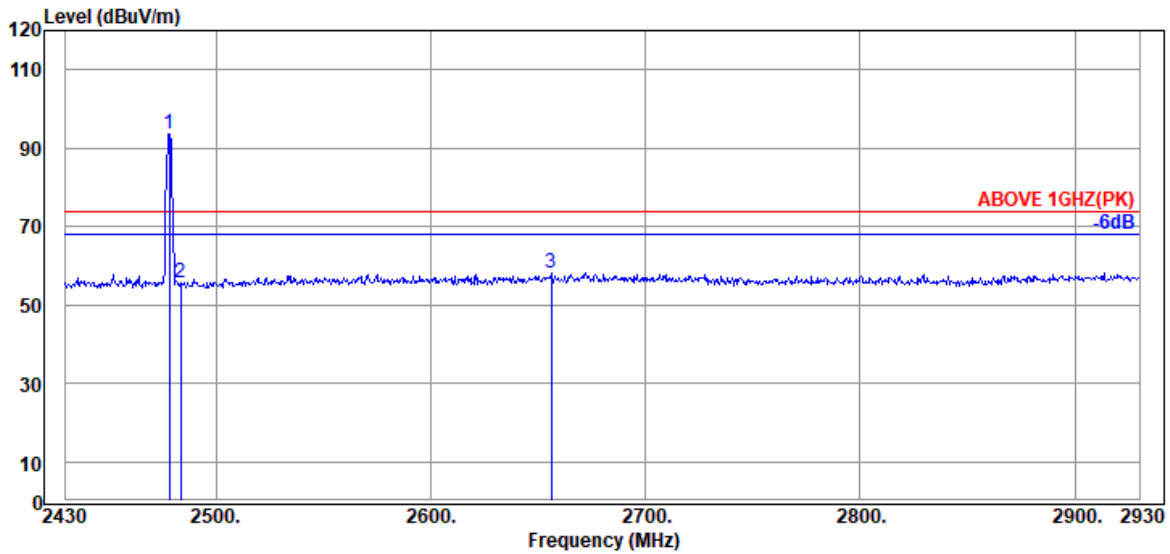


Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2478.00	28.46	6.18	39.94	101.99	96.69	---	---	Average
2483.50	28.47	6.18	39.94	50.91	45.62	54.00	8.38	Average
2917.00	29.83	6.75	40.06	51.20	47.72	54.00	6.28	Average

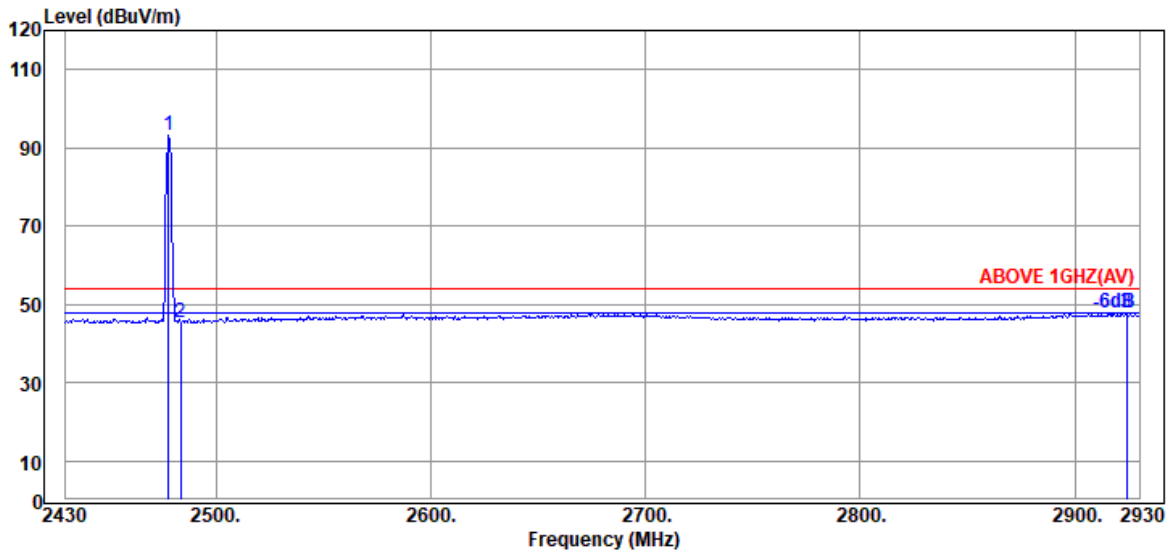
Remark: The “@” means fundamental frequency, it is ignored in this section.

Mode	FHSS	Frequency	TX 2478MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2478.50	28.46	6.18	39.94	98.71	93.41	---	---	Peak
2483.50	28.47	6.18	39.94	60.98	55.69	74.00	18.31	Peak
2656.00	28.91	6.41	39.99	62.93	58.26	74.00	15.74	Peak



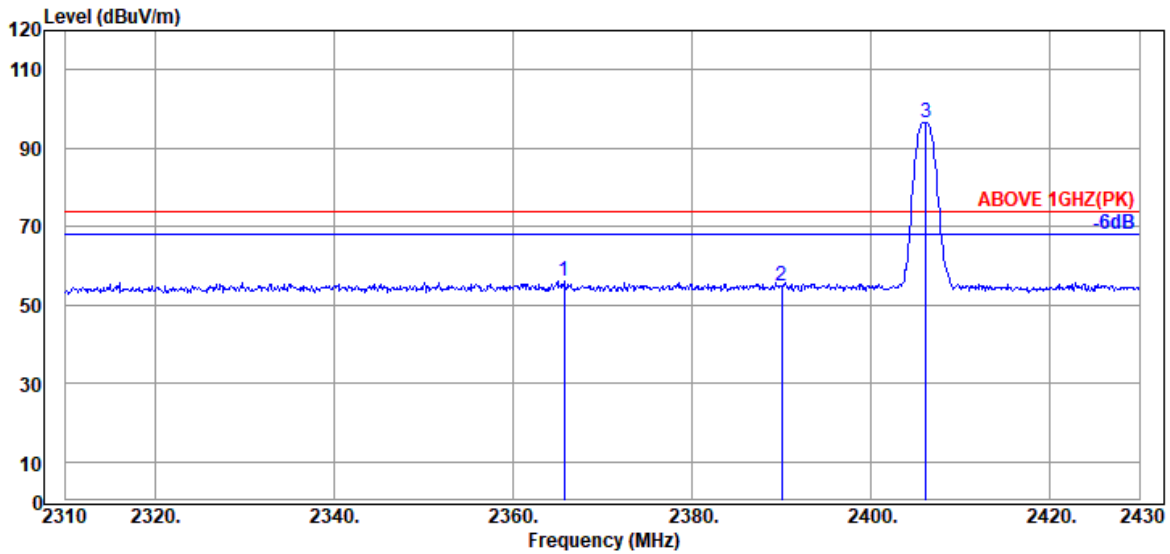
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2478.00	28.46	6.18	39.94	98.32	93.02	---	---	Average
2483.50	28.47	6.18	39.94	50.79	45.50	54.00	8.50	Average
2924.00	29.85	6.75	40.06	51.15	47.69	54.00	6.31	Average

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

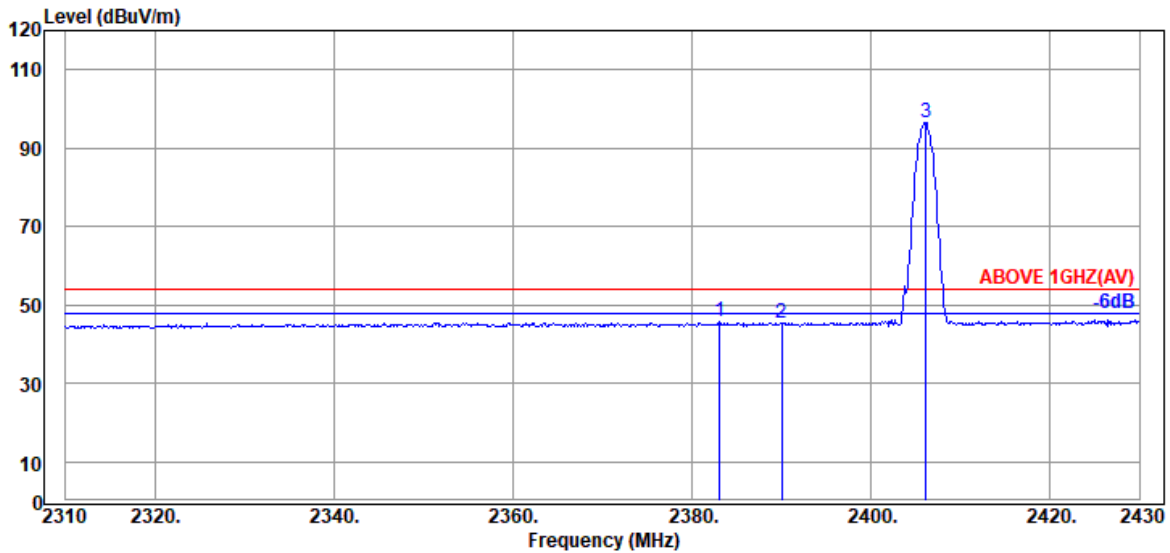
M/N: R404SBS, Antenna B

Mode	FHSS	Frequency	TX 2406MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2365.68	28.20	5.98	39.96	62.06	56.28	74.00	17.72	Peak
2390.04	28.20	6.04	39.95	60.47	54.76	74.00	19.24	Peak
@ 2406.12	28.23	6.07	39.95	102.23	96.58	---	---	Peak

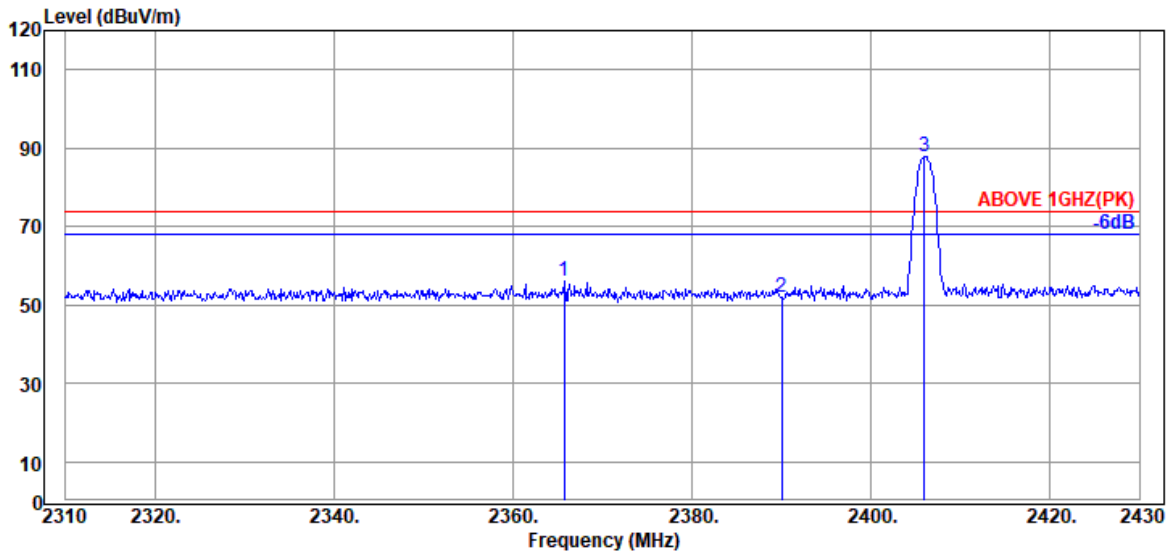


Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2383.08	28.20	6.01	39.96	51.40	45.65	54.00	8.35	Average
2390.04	28.20	6.04	39.95	51.24	45.53	54.00	8.47	Average
@ 2406.12	28.23	6.07	39.95	102.14	96.49	---	---	Average

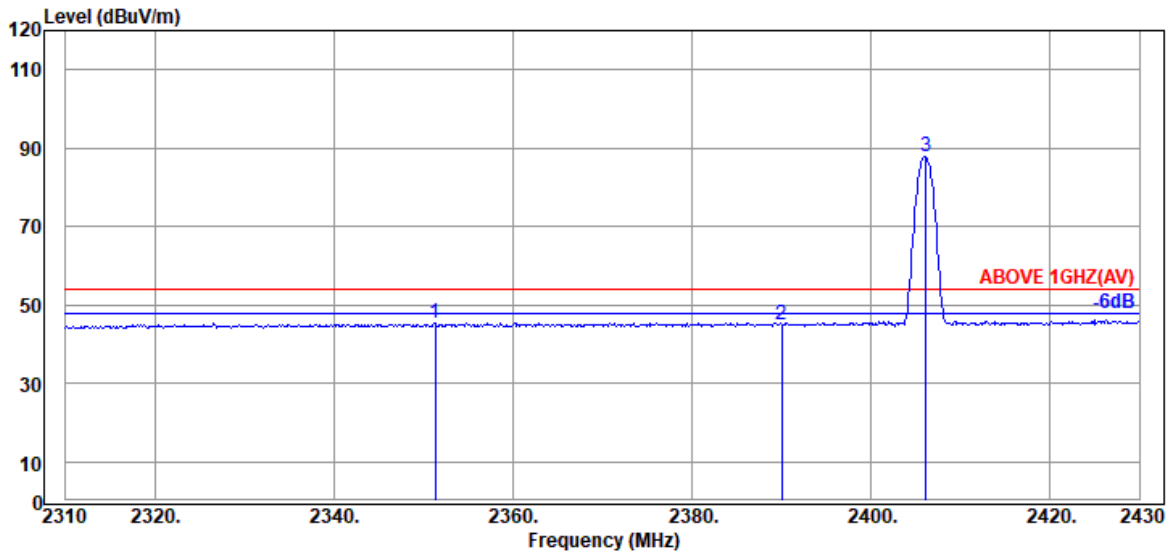
Remark: The "@" means fundamental frequency, it is ignored in this section.

Mode	FHSS	Frequency	TX 2406MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2365.68	28.20	5.98	39.96	61.76	55.98	74.00	18.02	Peak
2390.04	28.20	6.04	39.95	57.72	52.01	74.00	21.99	Peak
@ 2406.00	28.23	6.07	39.95	93.49	87.84	---	---	Peak

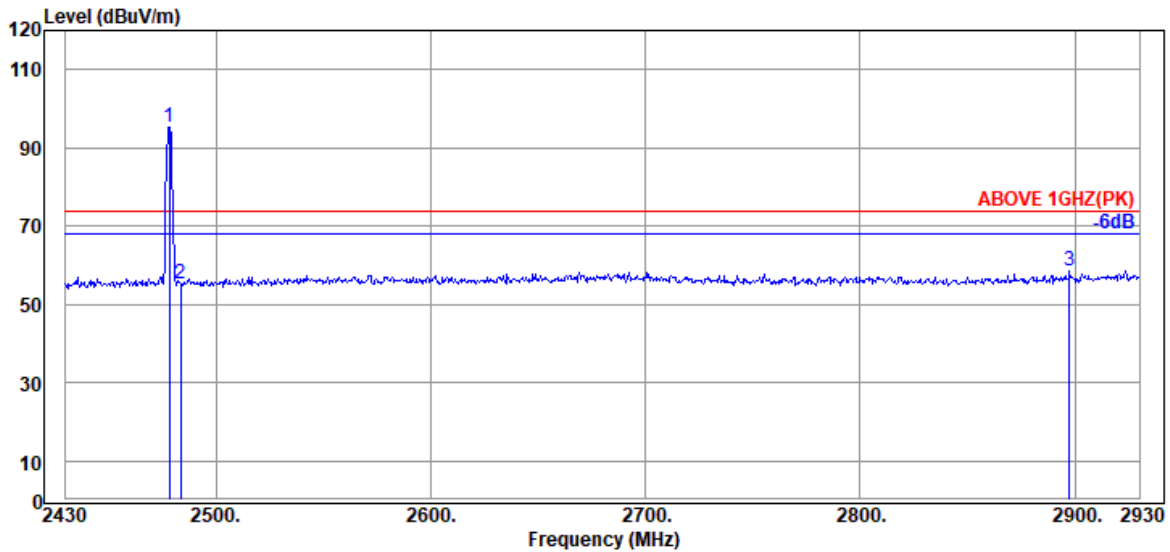


Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2351.28	28.20	5.96	39.96	51.18	45.38	54.00	8.62	Average
2390.04	28.20	6.04	39.95	50.80	45.09	54.00	8.91	Average
@ 2406.12	28.23	6.07	39.95	93.69	88.04	---	---	Average

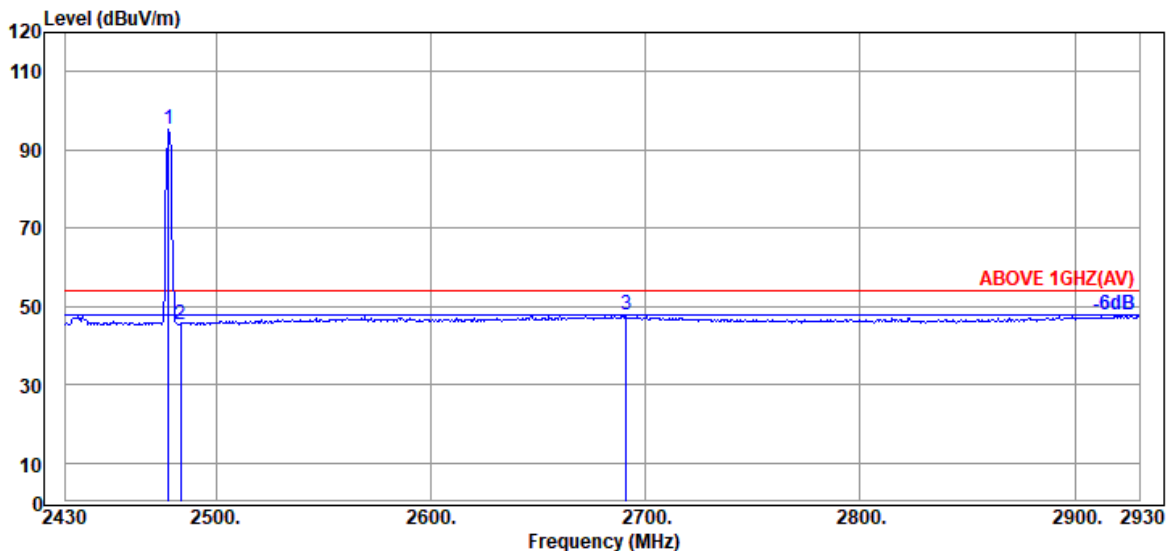
Remark: The “@” means fundamental frequency, it is ignored in this section.

Mode	FHSS	Frequency	TX 2478MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2478.50	28.46	6.18	39.94	100.58	95.28	---	---	Peak
2483.50	28.47	6.18	39.94	60.49	55.20	74.00	18.80	Peak
2897.50	29.80	6.73	40.05	62.28	58.76	74.00	15.24	Peak

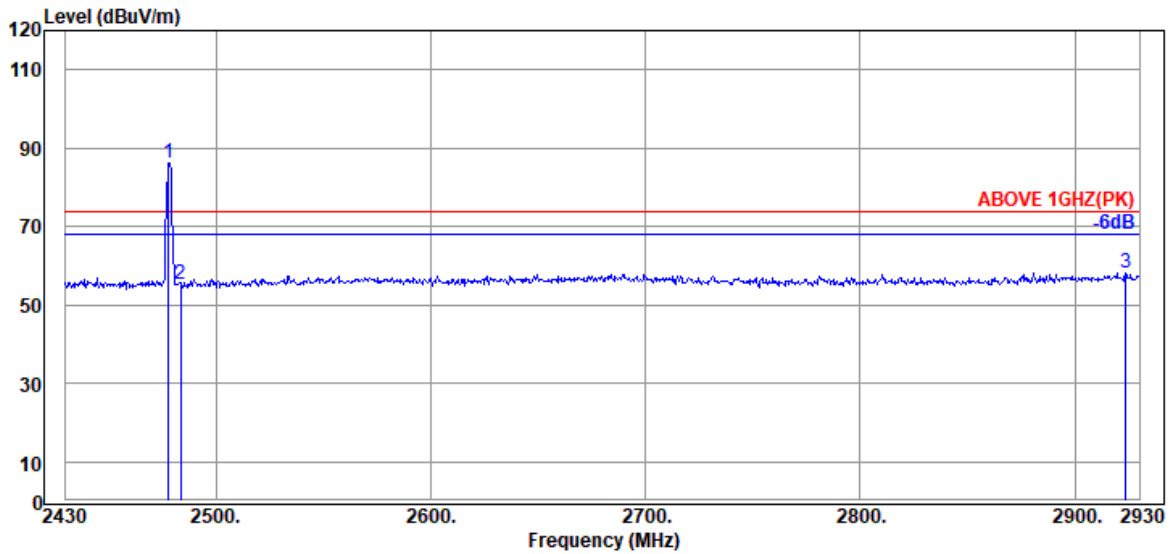


Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2478.00	28.46	6.18	39.94	100.35	95.05	---	---	Average
2483.50	28.47	6.18	39.94	50.84	45.55	54.00	8.45	Average
2691.00	28.97	6.45	40.00	52.35	47.77	54.00	6.23	Average

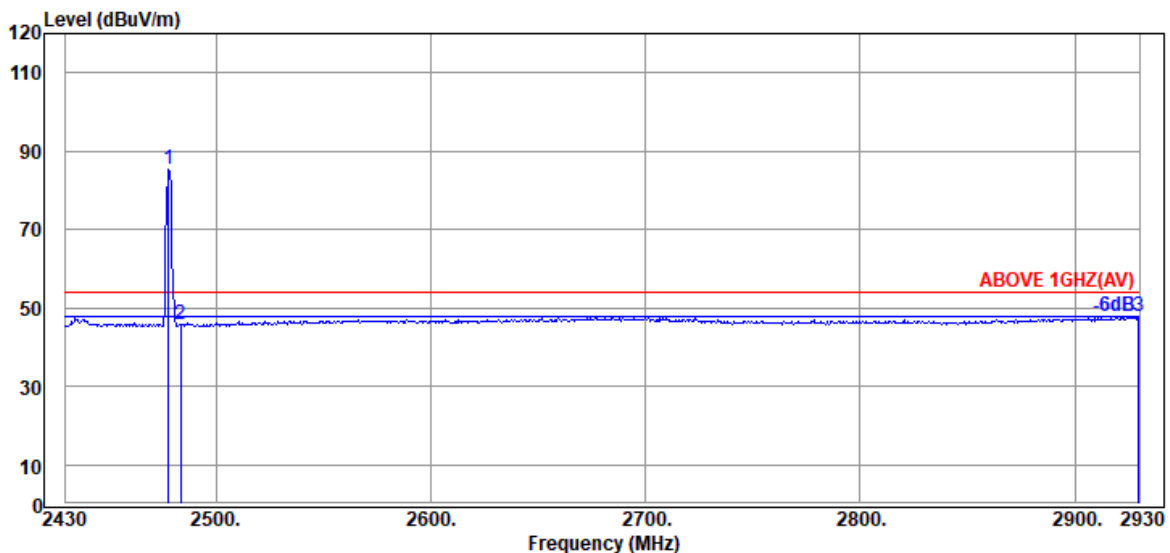
Remark: The “@” means fundamental frequency, it is ignored in this section.

Mode	FHSS	Frequency	TX 2478MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2478.00	28.46	6.18	39.94	91.37	86.07	---	---	Peak
2483.50	28.47	6.18	39.94	60.51	55.22	74.00	18.78	Peak
2923.50	29.85	6.75	40.06	61.49	58.03	74.00	15.97	Peak



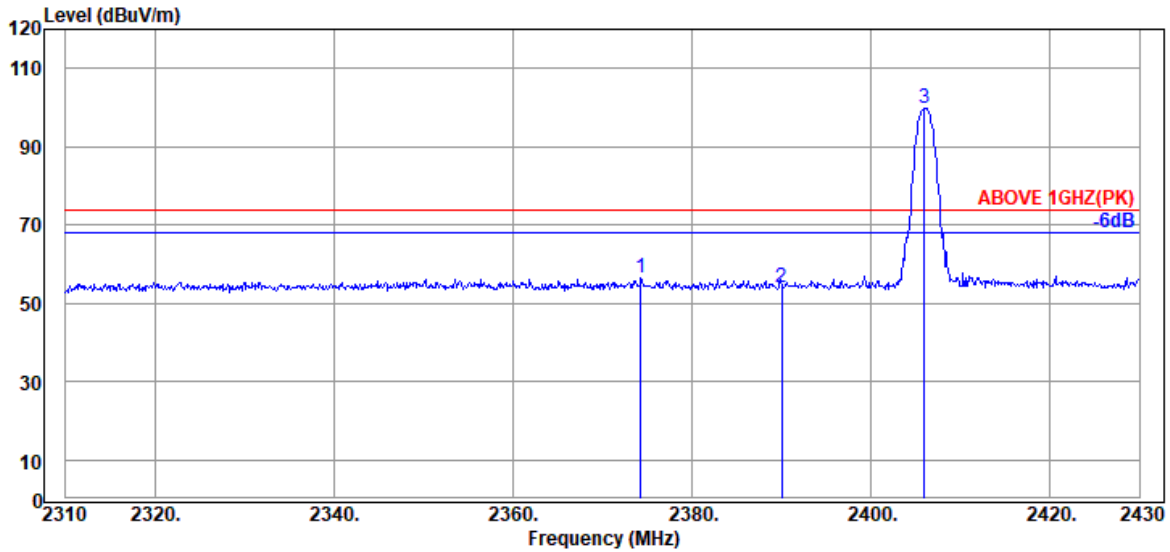
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2478.00	28.46	6.18	39.94	90.55	85.25	---	---	Average
2483.50	28.47	6.18	39.94	50.87	45.58	54.00	8.42	Average
2929.50	29.87	6.77	40.06	51.09	47.67	54.00	6.33	Average

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

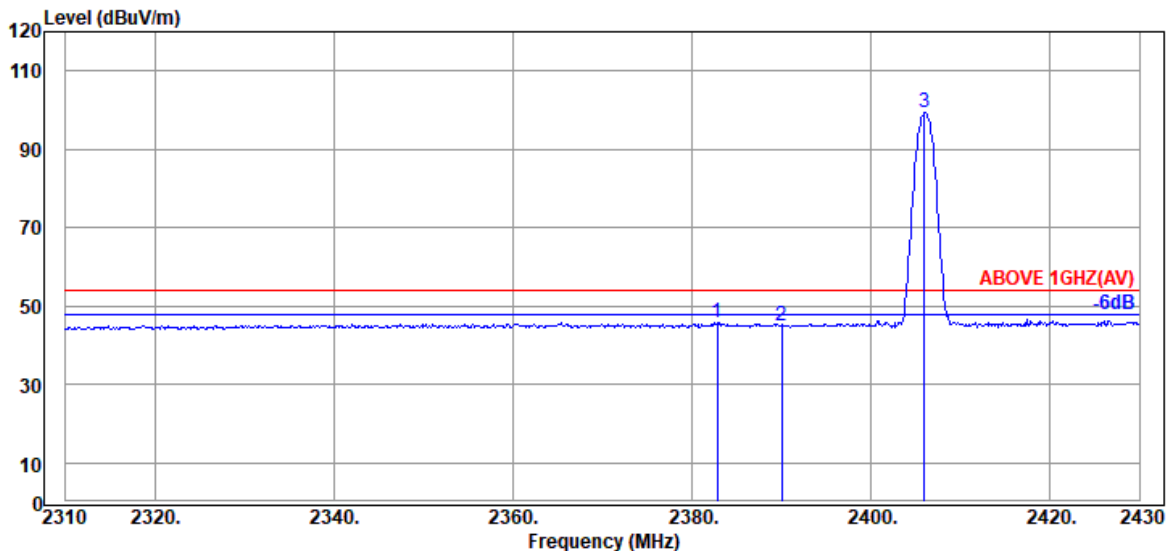
M/N: R404SBS-E, Antenna A

Mode	FHSS	Frequency	TX 2406MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2374.32	28.20	6.01	39.96	62.28	56.53	74.00	17.47	Peak
2390.04	28.20	6.04	39.95	59.76	54.05	74.00	19.95	Peak
@ 2406.00	28.23	6.07	39.95	105.30	99.65	---	---	Peak

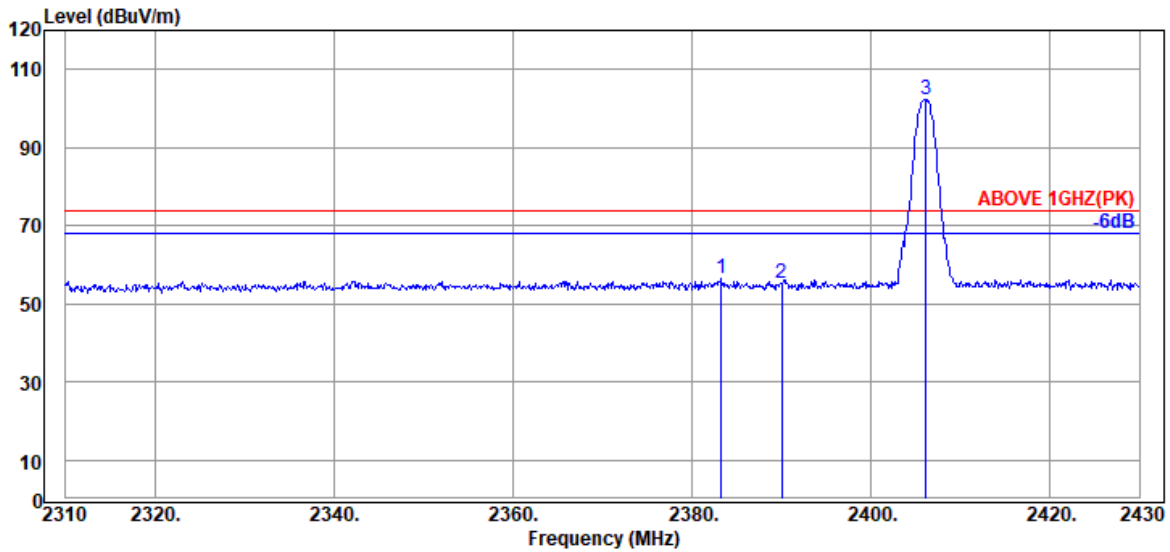


Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2382.84	28.20	6.01	39.96	51.52	45.77	54.00	8.23	Average
2390.04	28.20	6.04	39.95	50.52	44.81	54.00	9.19	Average
@ 2406.00	28.23	6.07	39.95	105.01	99.36	---	---	Average

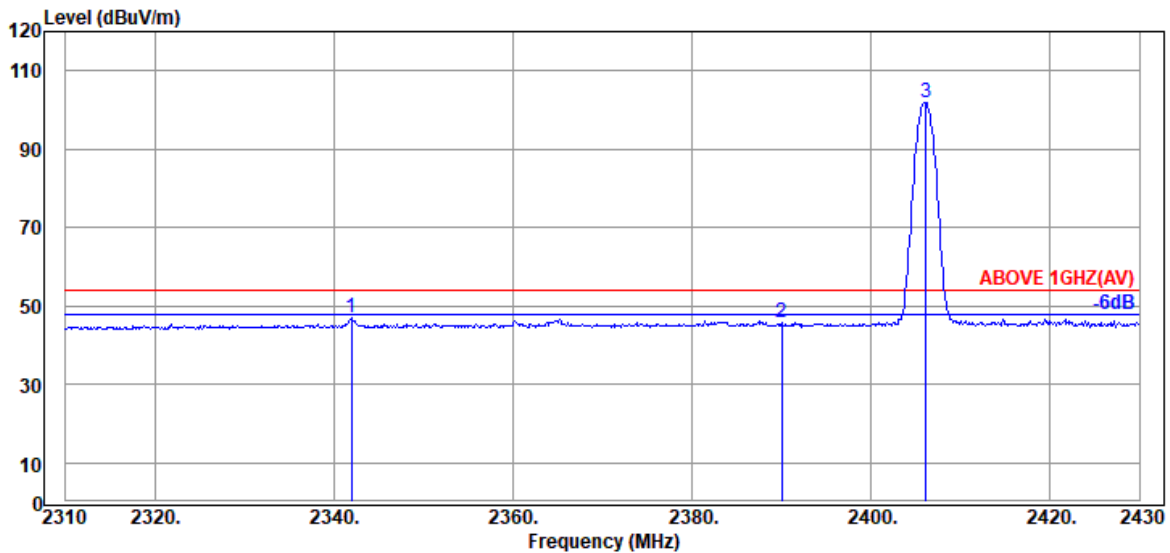
Remark: The “@” means fundamental frequency, it is ignored in this section.

Mode	FHSS	Frequency	TX 2406MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2383.32	28.20	6.01	39.96	62.12	56.37	74.00	17.63	Peak
2390.04	28.20	6.04	39.95	60.94	55.23	74.00	18.77	Peak
@ 2406.12	28.23	6.07	39.95	107.78	102.13	---	---	Peak

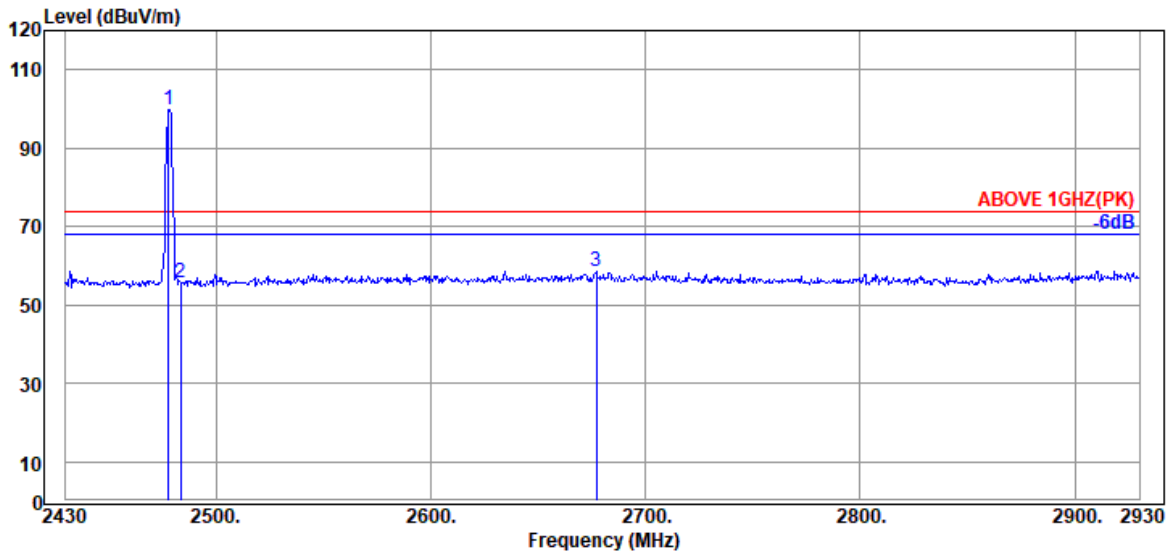


Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2341.92	28.12	5.96	39.96	52.88	47.00	54.00	7.00	Average
2390.04	28.20	6.04	39.95	51.28	45.57	54.00	8.43	Average
@ 2406.12	28.23	6.07	39.95	107.67	102.02	---	---	Average

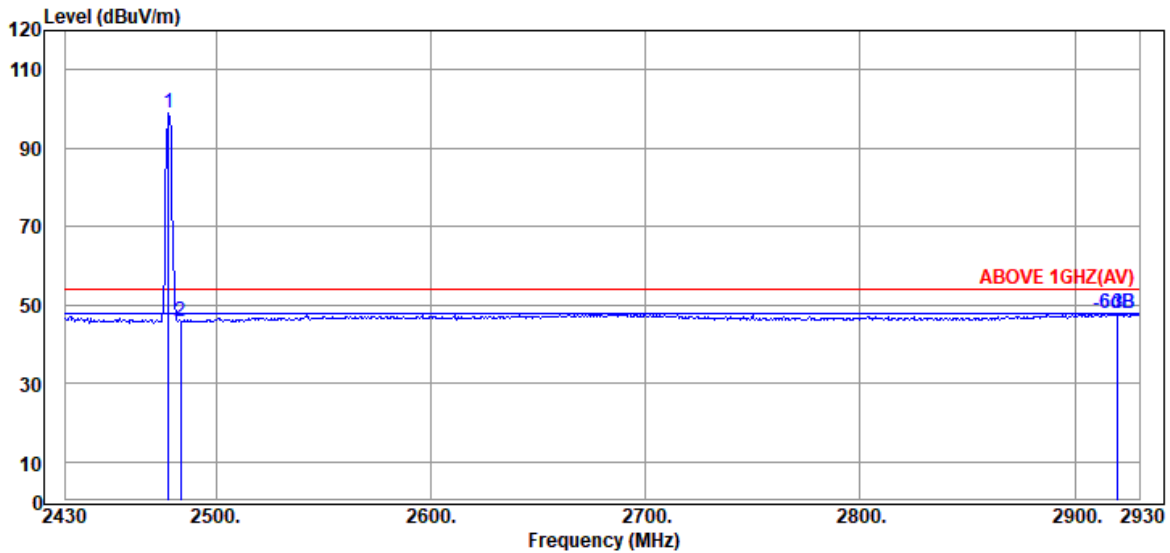
Remark: The “@” means fundamental frequency, it is ignored in this section.

Mode	FHSS	Frequency	TX 2478MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Detector
@ 2478.00	28.46	6.43	39.94	105.03	99.98	---	---	Peak
2483.50	28.47	6.43	39.94	60.70	55.66	74.00	18.34	Peak
2677.00	28.96	6.65	39.99	62.88	58.50	74.00	15.50	Peak

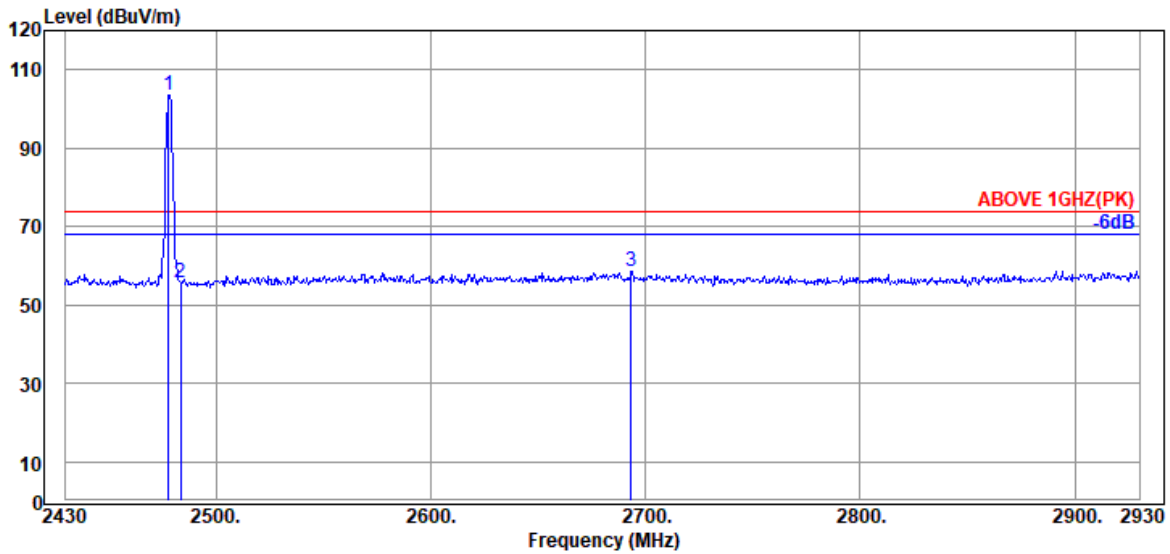


Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Detector
@ 2478.00	28.46	6.43	39.94	103.87	98.82	---	---	Average
2483.50	28.47	6.43	39.94	50.95	45.91	54.00	8.09	Average
2920.00	29.85	6.90	40.06	51.27	47.96	54.00	6.04	Average

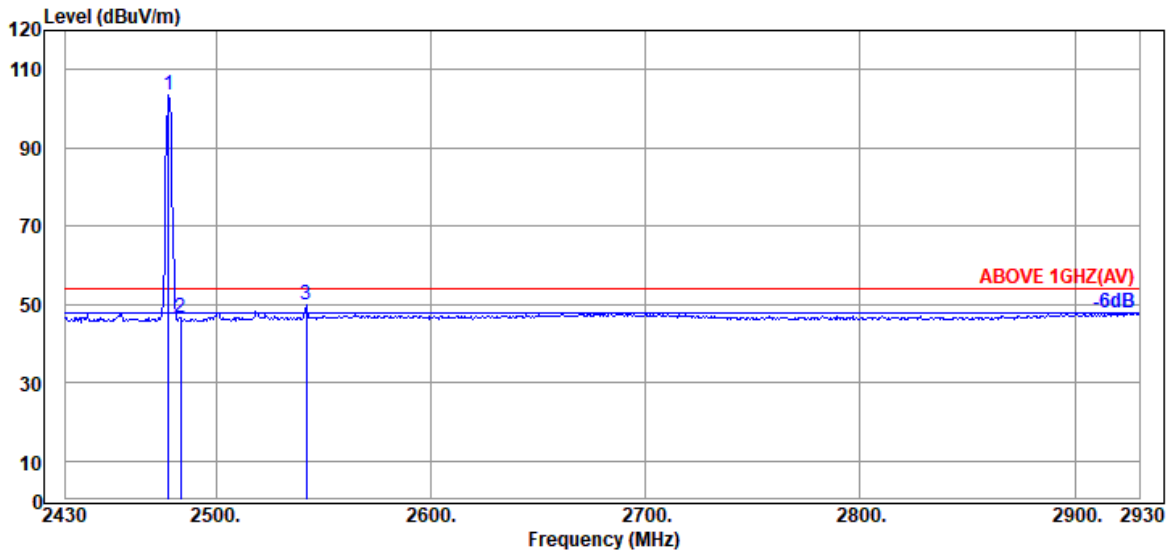
Remark: The “@” means fundamental frequency, it is ignored in this section.

Mode	FHSS	Frequency	TX 2478MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2478.00	28.46	6.43	39.94	108.69	103.64	---	---	Peak
2483.50	28.47	6.43	39.94	60.60	55.56	74.00	18.44	Peak
2693.50	28.99	6.67	40.00	63.02	58.68	74.00	15.32	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2478.00	28.46	6.43	39.94	108.54	103.49	---	---	Average
2483.50	28.47	6.43	39.94	51.48	46.44	54.00	7.56	Average
2542.00	28.67	6.50	39.95	54.49	49.71	54.00	4.29	Average

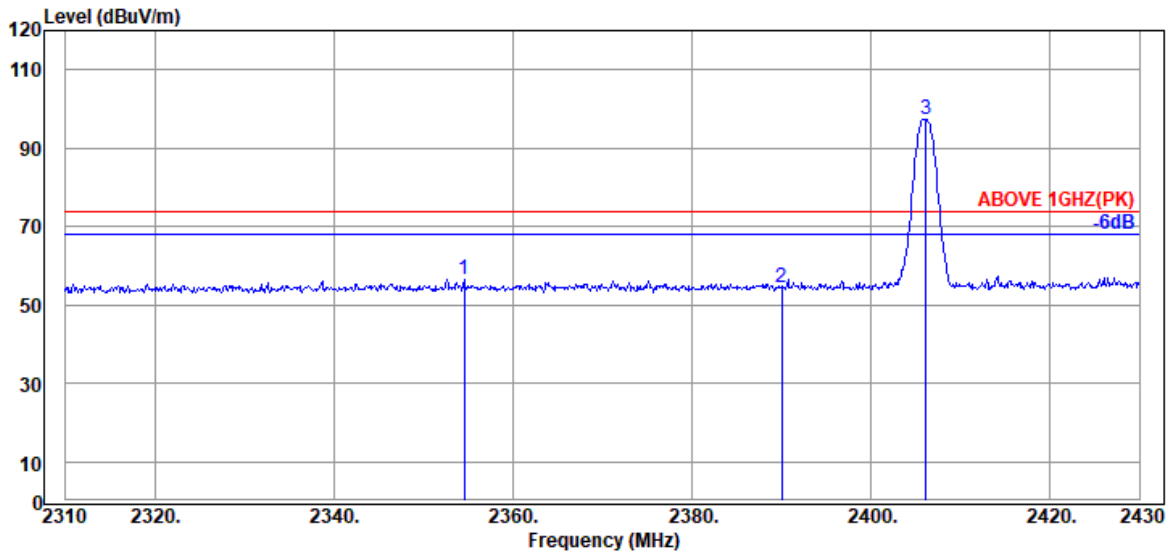
Remark: The “@” means fundamental frequency, it is ignored in this section.

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 Fax: +886 2 26099303

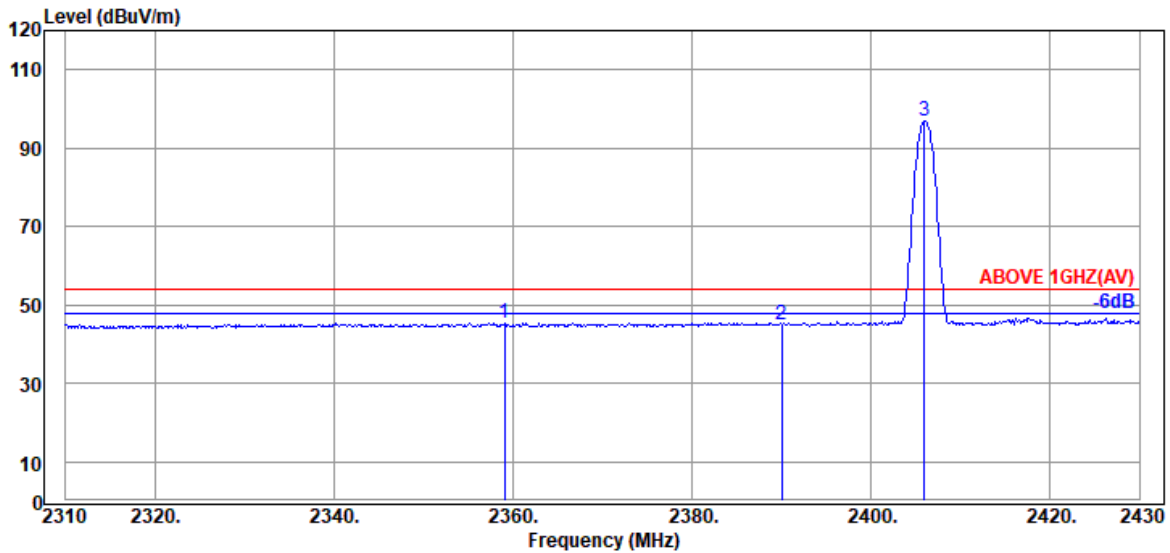
M/N: R404SBS-E, Antenna B

Mode	FHSS	Frequency	TX 2406MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2354.52	28.20	5.98	39.96	62.26	56.48	74.00	17.52	Peak
2390.04	28.20	6.04	39.95	60.16	54.45	74.00	19.55	Peak
@ 2406.12	28.23	6.07	39.95	102.88	97.23	---	---	Peak

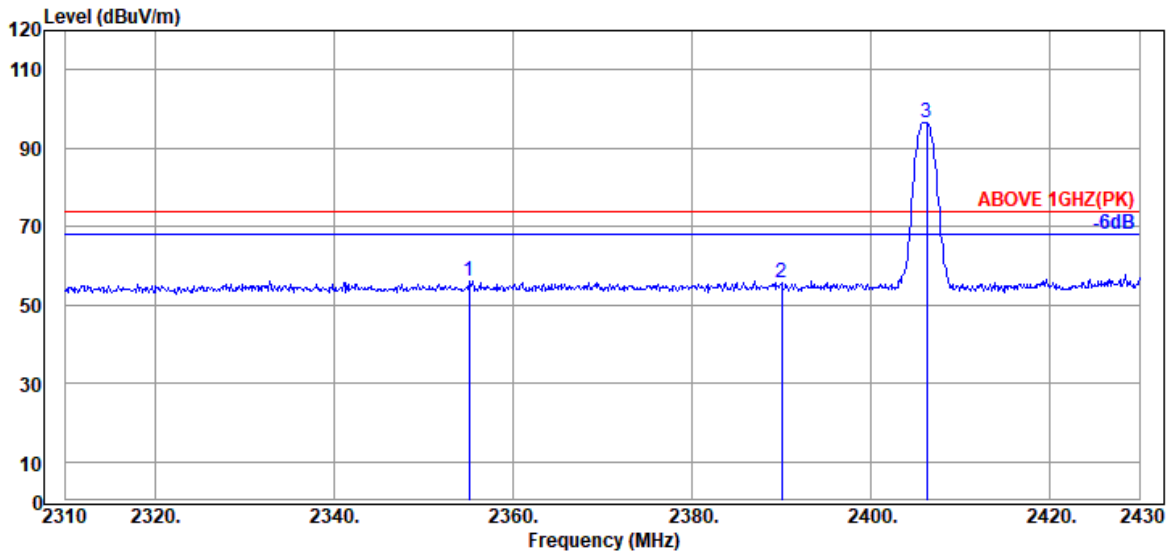


Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2359.08	28.20	5.98	39.96	51.16	45.38	54.00	8.62	Average
2390.04	28.20	6.04	39.95	50.80	45.09	54.00	8.91	Average
@ 2406.00	28.23	6.07	39.95	102.62	96.97	---	---	Average

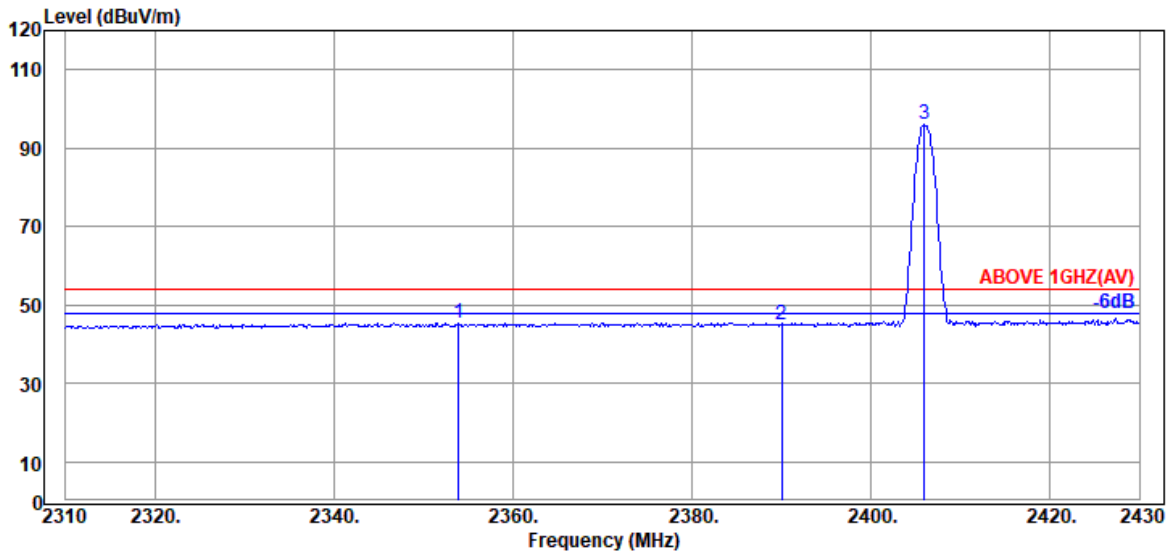
Remark: The “@” means fundamental frequency, it is ignored in this section.

Mode	FHSS	Frequency	TX 2406MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2355.12	28.20	5.98	39.96	62.03	56.25	74.00	17.75	Peak
2390.04	28.20	6.04	39.95	61.33	55.62	74.00	18.38	Peak
@ 2406.24	28.23	6.07	39.95	102.18	96.53	---	---	Peak

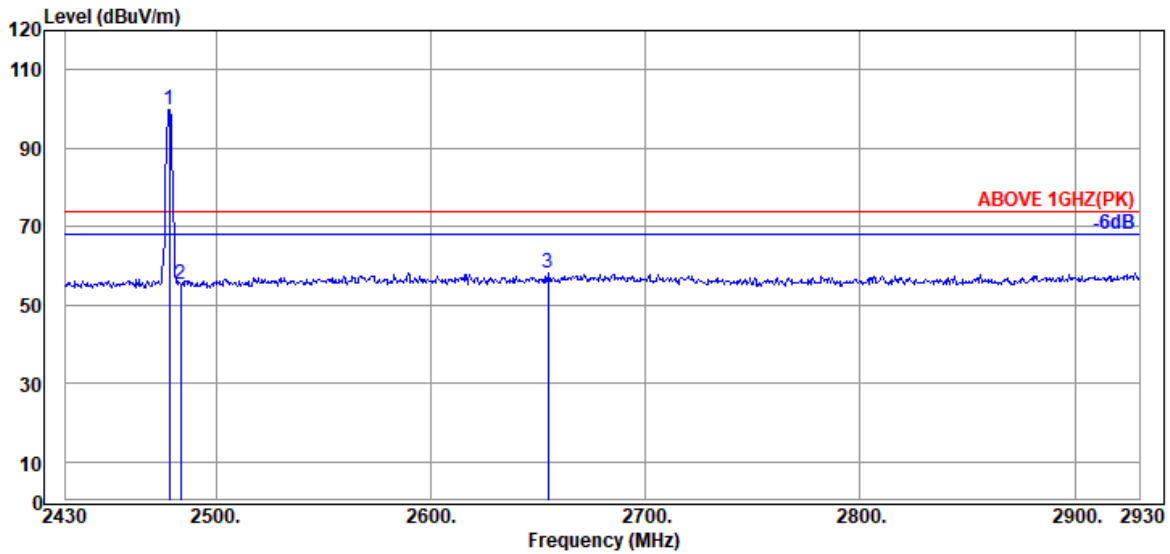


Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2353.92	28.20	5.98	39.96	51.29	45.51	54.00	8.49	Average
2390.04	28.20	6.04	39.95	50.50	44.79	54.00	9.21	Average
@ 2406.00	28.23	6.07	39.95	101.75	96.10	---	---	Average

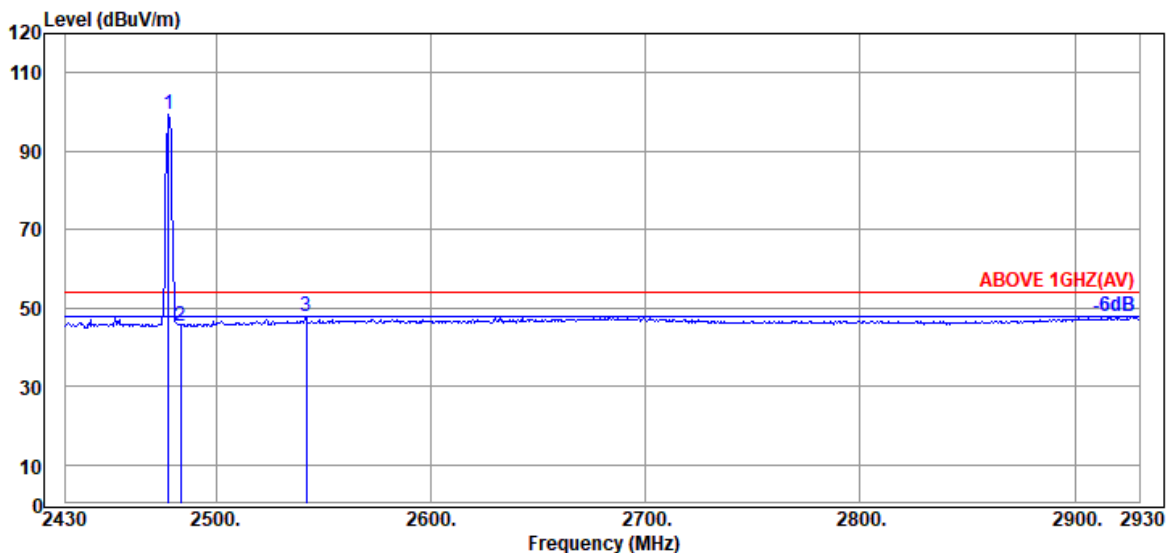
Remark: The “@” means fundamental frequency, it is ignored in this section.

Mode	FHSS	Frequency	TX 2478MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2478.50	28.46	6.18	39.94	105.21	99.91	---	---	Peak
2483.50	28.47	6.18	39.94	60.52	55.23	74.00	18.77	Peak
2654.50	28.91	6.41	39.99	62.97	58.30	74.00	15.70	Peak

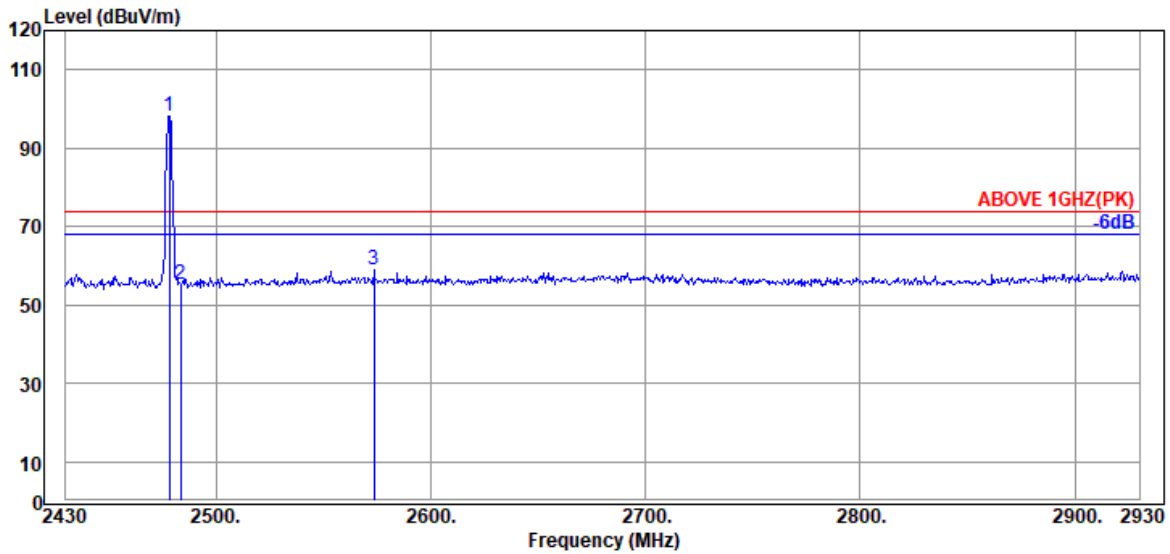


Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2478.00	28.46	6.18	39.94	104.54	99.24	---	---	Average
2483.50	28.47	6.18	39.94	50.78	45.49	54.00	8.51	Average
2542.00	28.67	6.28	39.95	52.75	47.75	54.00	6.25	Average

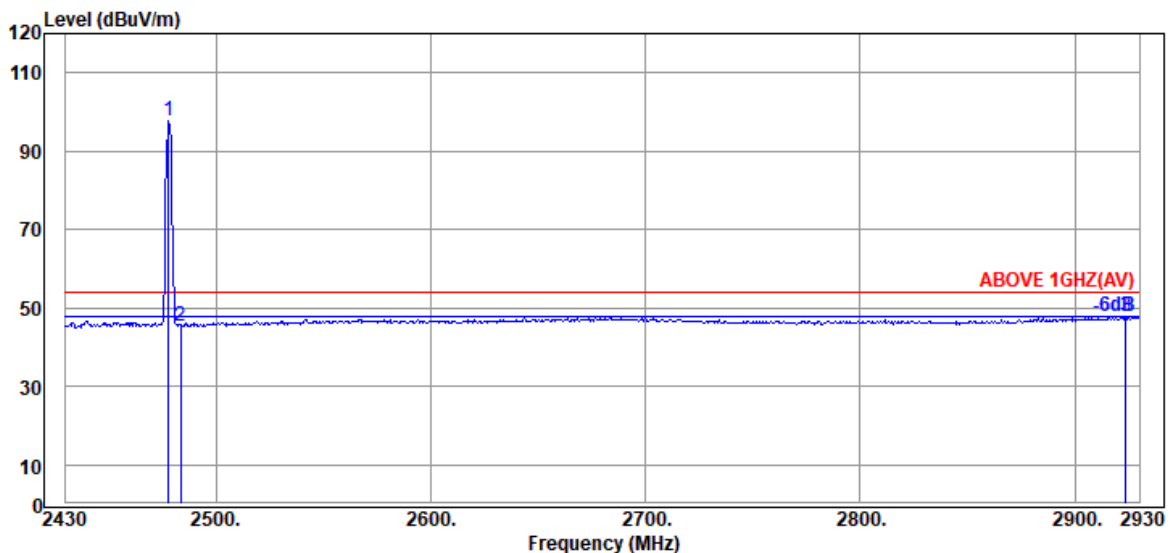
Remark: The “@” means fundamental frequency, it is ignored in this section.

Mode	FHSS	Frequency	TX 2478MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2478.50	28.46	6.18	39.94	103.38	98.08	---	---	Peak
2483.50	28.47	6.18	39.94	60.42	55.13	74.00	18.87	Peak
2573.50	28.79	6.32	39.96	64.01	59.16	74.00	14.84	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 2478.00	28.46	6.18	39.94	103.06	97.76	---	---	Average
2483.50	28.47	6.18	39.94	50.86	45.57	54.00	8.43	Average
2923.50	29.85	6.75	40.06	51.18	47.72	54.00	6.28	Average

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

A.1.2 Emissions outside the frequency band:

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

M/N: R404SBS, Antenna A

Mode	FHSS			Frequency	TX 2406MHz			
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4812.00	33.13	8.68	39.39	44.26	46.68	54.00	7.32	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4812.00	33.13	8.68	39.39	44.73	47.15	54.00	6.85	Peak

Mode	FHSS			Frequency	TX 2442MHz			
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4884.00	33.20	8.72	39.35	43.89	46.46	54.00	7.54	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4884.00	33.20	8.72	39.35	44.83	47.40	54.00	6.60	Peak

Mode	FHSS			Frequency	TX 2478MHz			
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4956.00	33.38	8.77	39.32	43.48	46.31	54.00	7.69	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4956.00	33.38	8.77	39.32	44.57	47.40	54.00	6.60	Peak

M/N: R404SBS, Antenna B

Mode		FHSS		Frequency		TX 2406MHz		
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4812.00	33.13	8.68	39.39	44.10	46.52	54.00	7.48	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4812.00	33.13	8.68	39.39	44.07	46.49	54.00	7.51	Peak

Mode		FHSS		Frequency		TX 2442MHz		
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4884.00	33.20	8.72	39.35	43.73	46.30	54.00	7.70	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4884.00	33.20	8.72	39.35	44.31	46.88	54.00	7.12	Peak

Mode		FHSS		Frequency		TX 2478MHz		
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4956.00	33.38	8.77	39.32	43.92	46.75	54.00	7.25	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4956.00	33.38	8.77	39.32	44.08	46.91	54.00	7.09	Peak

M/N: R404SBS-E, Antenna A

Mode		FHSS			Frequency		TX 2406MHz	
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4812.00	33.13	8.68	39.39	43.68	46.10	54.00	7.90	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4812.00	33.13	8.68	39.39	44.17	46.59	54.00	7.41	Peak

Mode		FHSS			Frequency		TX 2442MHz	
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4884.00	33.20	8.72	39.35	43.45	46.02	54.00	7.98	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4884.00	33.20	8.72	39.35	44.35	46.92	54.00	7.08	Peak

Mode		FHSS			Frequency		TX 2478MHz	
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4956.00	33.38	8.77	39.32	43.29	46.12	54.00	7.88	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4956.00	33.38	8.77	39.32	43.07	45.90	54.00	8.10	Peak

M/N: R404SBS-E, Antenna B

Mode	FHSS			Frequency	TX 2406MHz			
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4812.00	33.13	8.68	39.39	43.71	46.13	54.00	7.87	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4812.00	33.13	8.68	39.39	42.90	45.32	54.00	8.68	Peak

Mode	FHSS			Frequency	TX 2442MHz			
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4884.00	33.20	8.72	39.35	44.68	47.25	54.00	6.75	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4884.00	33.20	8.72	39.35	43.10	45.67	54.00	8.33	Peak

Mode	FHSS			Frequency	TX 2478MHz			
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4956.00	33.38	8.77	39.32	44.73	47.56	54.00	6.44	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4956.00	33.38	8.77	39.32	46.22	49.05	54.00	4.95	Peak

A.1.3 Emissions in Non-restricted Frequency Bands:

All emission levels below the FCC 15.209(a)/RSS-Gen Section 8.9 table 4 general radiated emissions limits is not required.

A.2 20dB BANDWIDTH

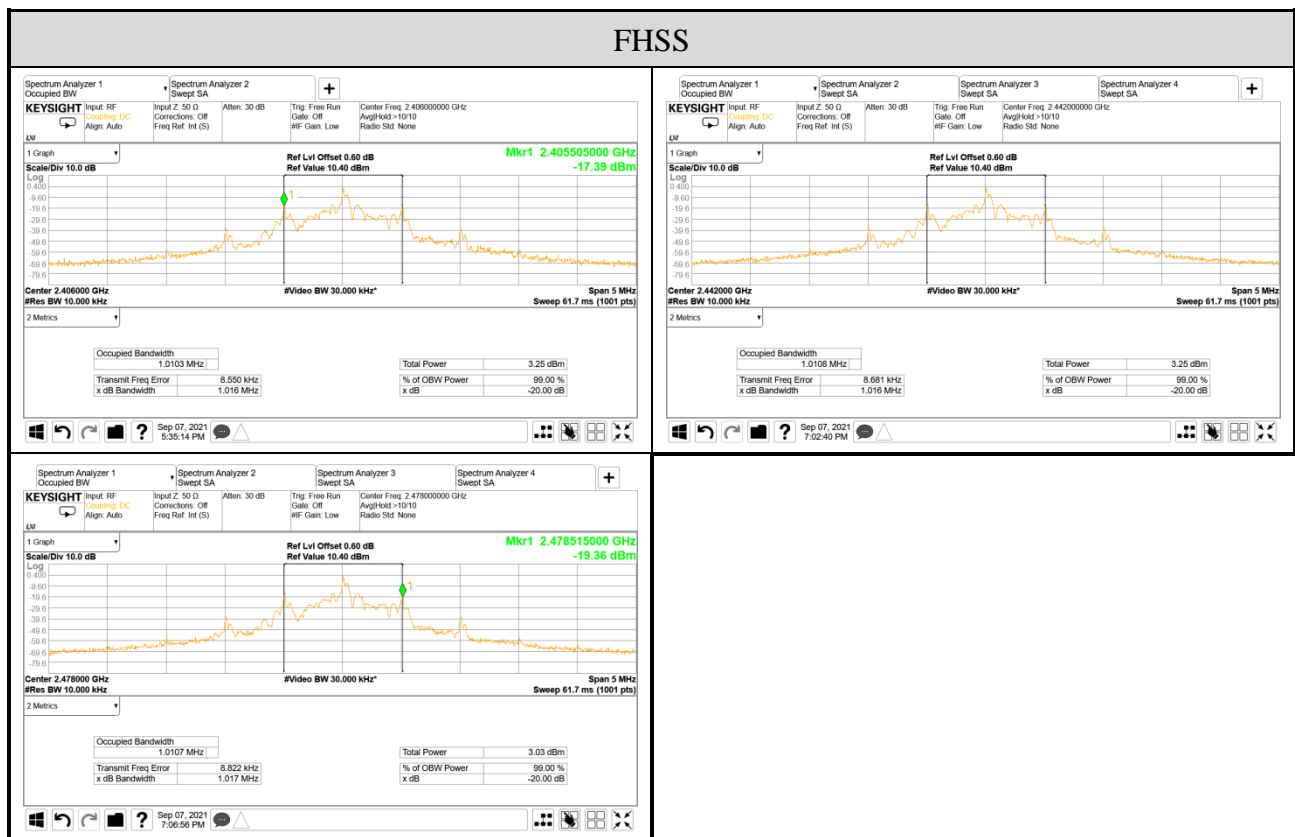
Test Date	2021/09/07	Temp./Hum.	23°C/53%
Cable Loss	0.6dB	Tested By	Chuntse Wu
Test Voltage	DC 6V (Via Battery)		

A.2.1 20dB Bandwidth Result

Mode	Centre Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz) (Reference only)	2/3 (20dB Bandwidth)
FHSS	2406	1.016	1.0103	0.677
	2442	1.016	1.0108	0.677
	2478	1.017	1.0107	0.678

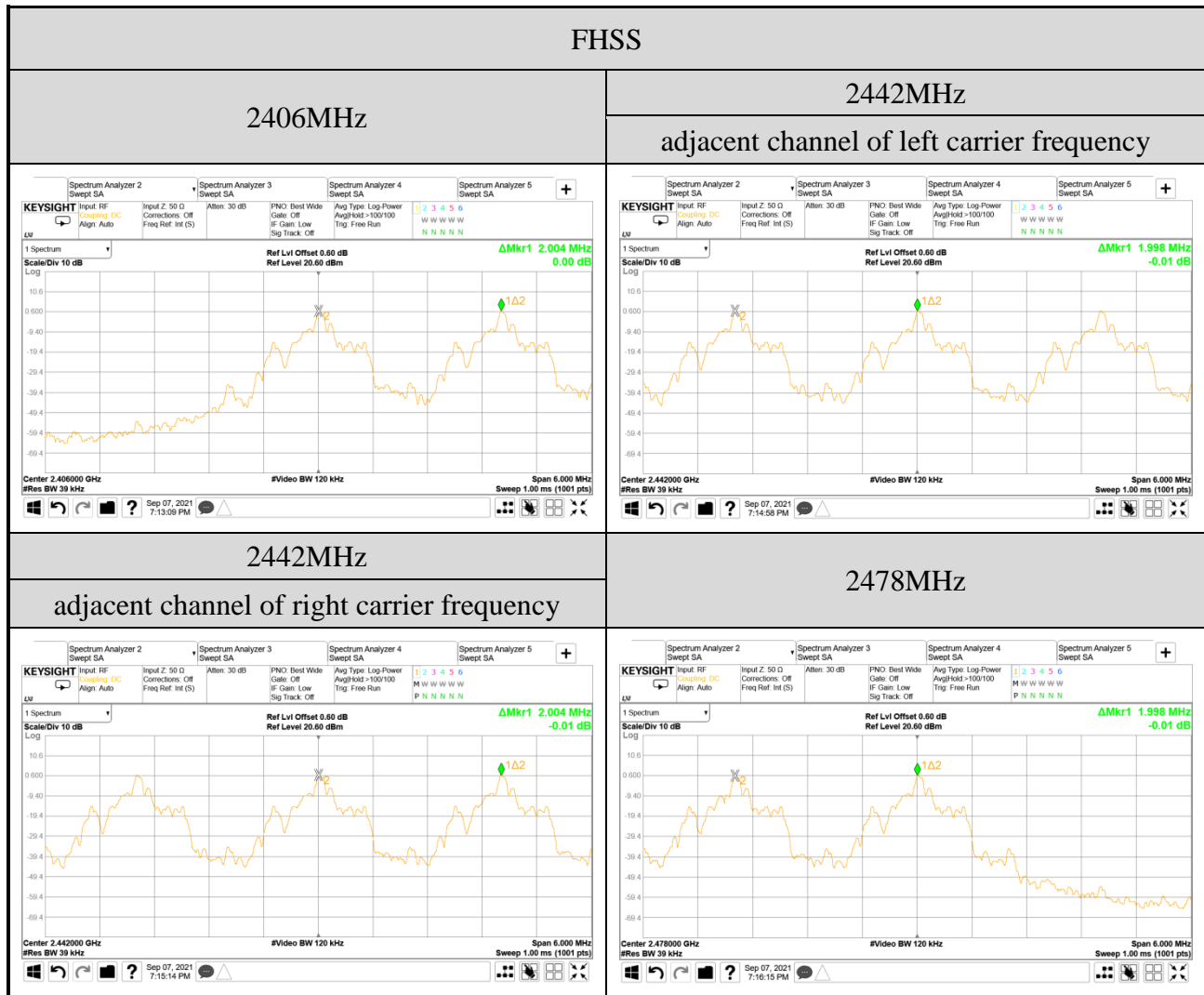
Remark: The maximum two-thirds of the 20dB bandwidth is the limit for carrier frequency separation presented.

A.2.2 Measurement Plots



A.3 CARRIER FREQUENCY SEPARATION

Test Date	2021/09/07	Temp./Hum.	23°C/53%
Cable Loss	0.6dB	Tested By	Chuntse Wu
Test Voltage	DC 6V (Via Battery)		



A.4 TIME OF OCCUPANCY

Test Date	2021/09/07	Temp./Hum.	23°C/53%
Cable Loss	0.6dB	Tested By	Chuntse Wu
Test Voltage	DC 6V (Via Battery)		

A.4.1 Time of Occupancy

Mode	Centre Frequency (MHz)	Each second appearance transmission	Time of Occupancy (ms)	Maximum accumulated Time of Occupancy (ms)	Limit (ms)
FHSS	2406	45	0.17	113.22	<400
	2442	45	0.17	113.22	<400
	2478	45	0.17	113.22	<400

Observation Period:

37 channels * 0.4 seconds = 14.8 seconds

Centre Frequency: 2406

For each second of 45 transmission appearance, the longest time of occupancy is 45 channels 14.8 * 0.17 ms = 113.22 ms (<400ms)

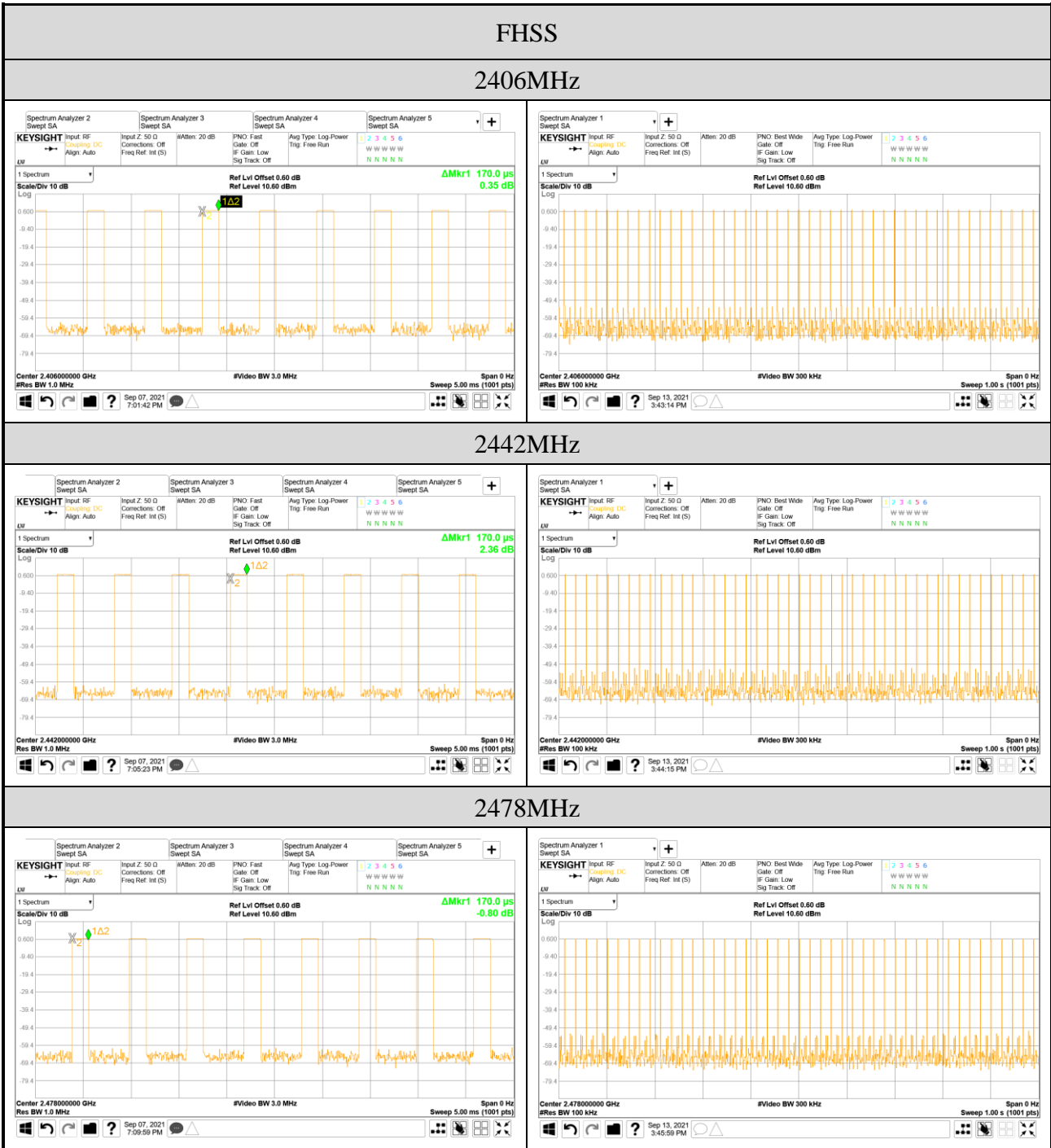
Centre Frequency: 2442

For each second of 45 transmission appearance, the longest time of occupancy is 45 channels 14.8 * 0.17 ms = 113.22 ms (<400ms)

Centre Frequency: 2478

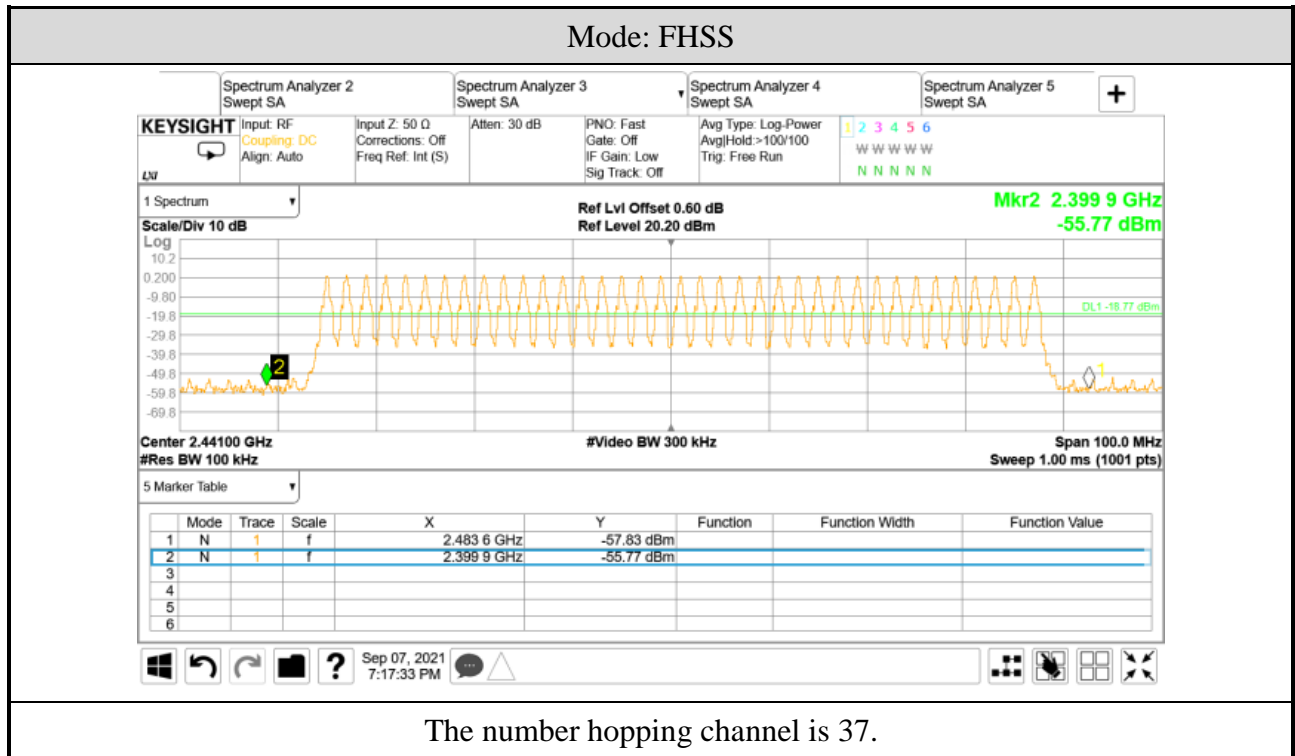
For each second of 45 transmission appearance, the longest time of occupancy is 45 channels 14.8 * 0.17 ms = 113.22 ms (<400ms)

● Measurement Plots



A.5 NUMBER OF HOPPING CHANNELS

Test Date	2021/09/07	Temp./Hum.	23°C/53%
Cable Loss	0.6dB	Tested By	Chuntse Wu
Test Voltage	DC 6V (Via Battery)		



A.6 MAXIMUM PEAK OUTPUT POWER

Test Date	2021/09/07	Temp./Hum.	23°C/53%
Cable Loss	0.6dB	Tested By	Chuntse Wu
Test Voltage	DC 6V (Via Battery)		

A.6.1 Maximum Peak Output Power

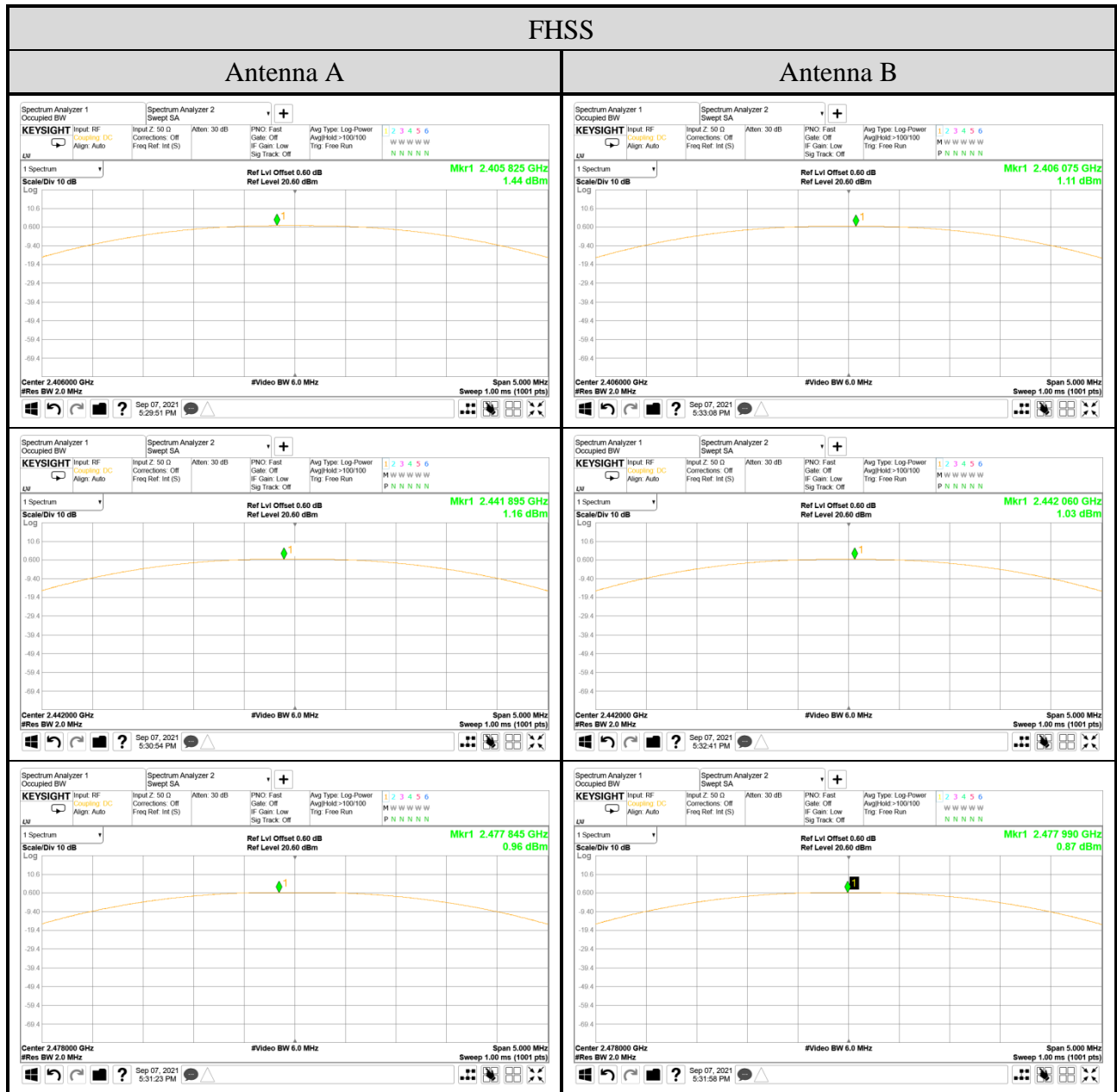
Antenna A

Mode	Centre Frequency (MHz)	Maximum Peak Output Power		Limit
		dBm	W	
FHSS	2406	1.44	0.0014	21dBm (0.125W)
	2442	1.16	0.0013	
	2478	0.96	0.0012	

Antenna B

Mode	Centre Frequency (MHz)	Maximum Peak Output Power		Limit
		dBm	W	
FHSS	2406	1.11	0.0013	21dBm (0.125W)
	2442	1.03	0.0013	
	2478	0.87	0.0012	

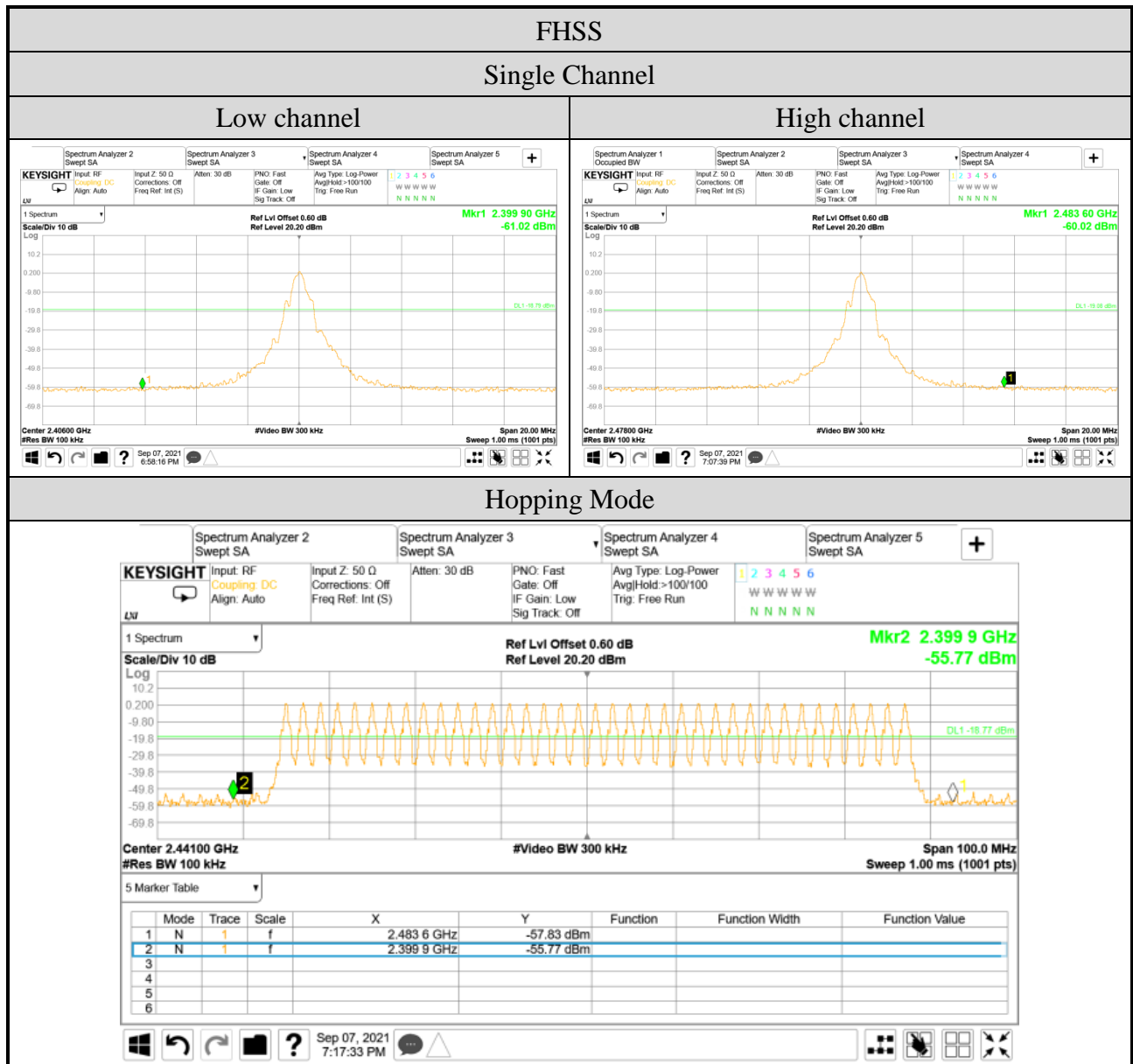
A.6.2 Measurement Plots



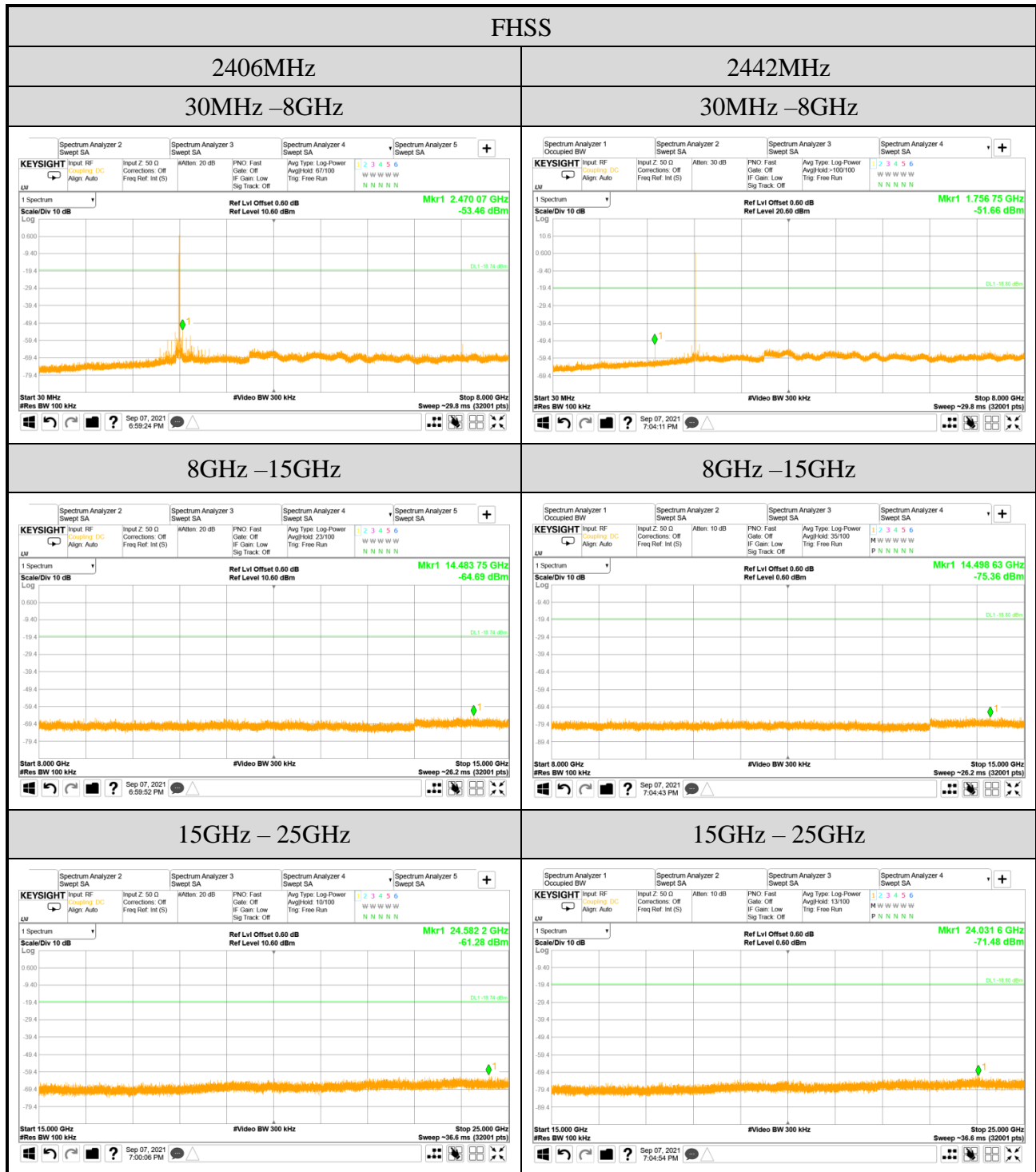
A.7 EMISSION LIMITATIONS MEASUREMENT

Test Date	2021/09/07	Temp./Hum.	23°C/53%
Cable Loss	0.6dB	Tested By	Chuntse Wu
Test Voltage	DC 6V (Via Battery)		

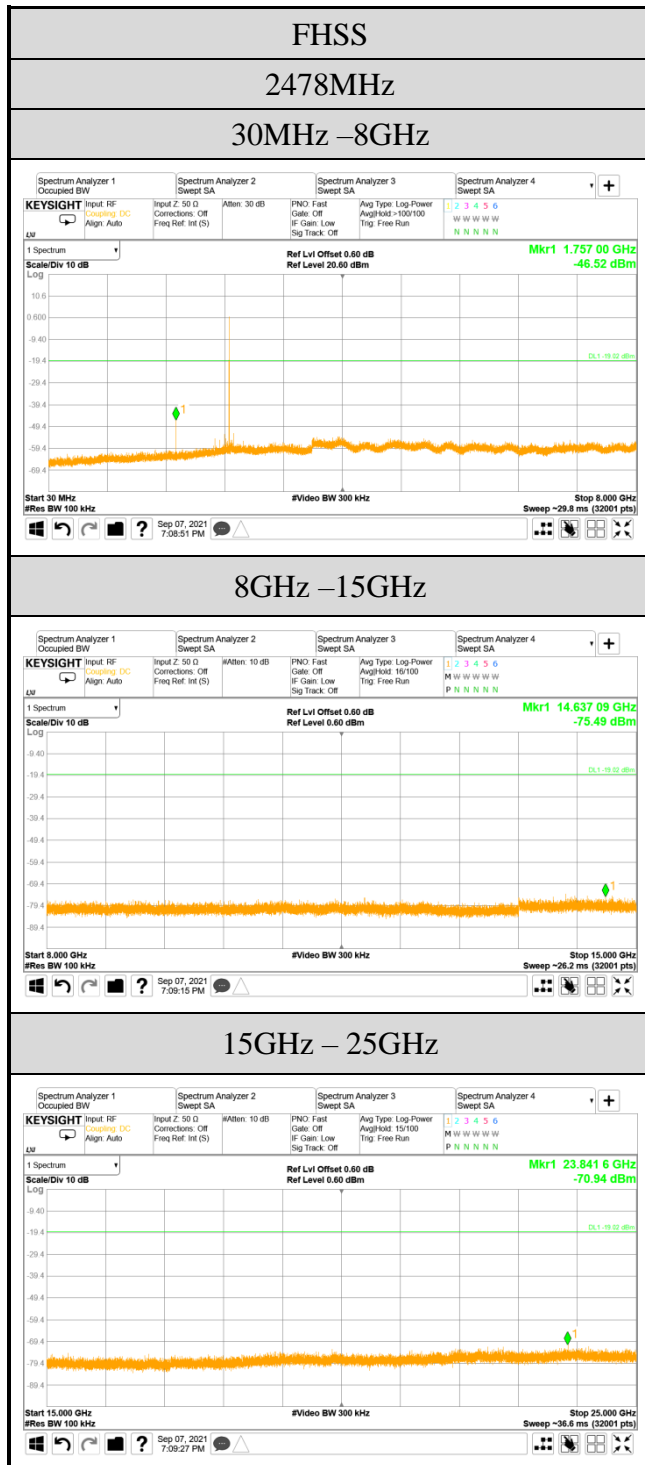
A.7.1 Band Edge



A.7.2 Spurious Emission



Note: All results have been included cable loss.



Note: All results have been included cable loss.



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APPENDIX B

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APPDNDIX B

TEST PHOTOGRAPHS

(Model: (1)R404SBS (2)R404SBS-E)