

FCC 15.247 & RSS-247 2.4 GHz Test Report

for

FUTABA Corporation

**1080 Yabutsuka Chosei-son Chosei-gun,
Chiba-ken, 299-4395 Japan.**

Product Name : Radio Control
Model Name : CGY770R
Brand Futaba
FCC ID : AZPCGY770R-24G
IC : 2914D-CGY770R

**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.

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APPENDIX A TEST DATA AND PLOTS

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TEST REPORT

Applicant : FUTABA Corporation
Manufacturer : FUTABA Corporation
EUT Description
(1) Product : Radio Control
(2) Model : CGY770R
(3) Brand : Futaba
(4) Power Supply: DC 3.7V ~ 7.4V

Applicable Standards:

Title 47 CFR FCC Part 15 Subpart C
RSS-Gen (Issue 5), Amendment 2, February 2021
RSS-247 (Issue 3), August 2023
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.

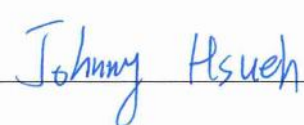
Date of Report: 2024. 07. 31

Reviewed by:



(Sunnie Huang/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	2024. 07. 31	Original Report	EM-F240299

2. SUMMARY OF TEST RESULTS

Rule		Description	Results
FCC	IC		
15.207	RSS-Gen §8.8	Conducted Emission	N/A, NOTE 3
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 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. Decision rule according to the limit of the test standard chapter, the test value is lower than the limit specified in the test chapter, and it is judged as Pass. 2. The uncertainties value is not used in determining the result. 3. The EUT only employs battery power for operation, so it is unnecessary to test.			



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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
Model	CGY770R
Brand	Futaba



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3.2. Description of EUT

Test Model	CGY770R		
Serial Number	N/A		
Power Rating	DC 3.7V ~ 7.4V		
Software Version	N/A		
RF Features	T-FHSS		
Transmit Type	1T1R		
Test Sample	Sample No.	Test Item	Firmware
	01	AC Conduction, RSE, RF Conducted	N/A
Sample Status	Trial sample		
Date of Receipt	2024. 01. 23		
Date of Test	2024. 07. 09 ~ 10		
Interface Ports of EUT	None		
Accessories Supplied	None		

3.3. Antenna Information

No.	Antenna Type		Manufacture	Antenna Part Number	Frequency (MHz)	Max Gain (dBi)
1.	ANT A	1/4λ antenna	SANSEI ELECTRIC CO., LTD	ANTC32-072A0	2400-2500	-5.16
	ANT B	1/4λ antenna	SANSEI ELECTRIC CO., LTD	ANTC32-072A0	2400-2500	-5.16

3.4. EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number	Modulation	Data Rate (kbps)
T-FHSS	2407.50 - 2467.50	31	FHSS	128

T-FHSS							
Channel List							
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
1	2407.50	9	2423.50	17	2439.50	25	2455.50
2	2409.50	10	2425.50	18	2441.50	26	2457.50
3	2411.50	11	2427.50	19	2443.50	27	2459.50
4	2413.50	12	2429.50	20	2445.50	28	2461.50
5	2415.50	13	2431.50	21	2447.50	29	2463.50
6	2417.50	14	2433.50	22	2449.50	30	2465.50
7	2419.50	15	2435.50	23	2451.50	31	2467.50
8	2421.50	16	2437.50	24	2453.50		

3.5. Description of Key Components

None

3.6. Test Configuration

Item		Mode	Test Channel
Radiated Test Case	Radiated Spurious Emission (30MHz~1GHz)	T-FHSS	31

Item		Mode	Test Channel
Radiated Test Case	Radiated Band Edge ^{Note}	T-FHSS	1/31
	Radiated Spurious Emission ^{Note}	T-FHSS	1/16/31

Item		Mode	ANT Port	Test Channel
Conducted Test Case	20dB Bandwidth	T-FHSS	ANT A	1/16/31
			ANT B	1/16/31
	Carrier Frequency Separation	T-FHSS	ANT A	1/16/31
			ANT B	1/16/31
	Time of Occupancy	T-FHSS	ANT A	1/16/31
			ANT B	1/16/31
	Number of Hopping Channels	T-FHSS	ANT A	17
			ANT B	17
	Maximum Peak Output Power	T-FHSS	ANT A	1/2/16/31
			ANT B	1/2/16/31
	Band Edges	T-FHSS	ANT A	1/31
			ANT B	1/31
	Spurious Emission	T-FHSS	ANT A	1/16/31
			ANT B	1/16/31

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.

3.7. Output Power Setting

Mode	Centre Frequency (MHz)	Power Setting
T-FHSS	2407.50	Default
	2437.50	Default
	2467.50	Default

3.8. Tested Supporting System List

3.8.1. Support Peripheral Unit

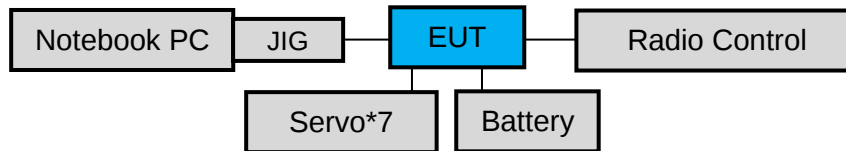
No.	Product	Brand	Model No.	Serial No.	Approval
1.	Notebook PC	ASUS	X1403Z	R1NOLP02A95005F	Contains FCC ID: RAS-MT-7921
2.	Test Jig	Futaba	CIU-3	N/A	N/A
3.	Radio Control	Futaba	GPB-1	N/A	N/A
4.	Battery (DC 6.0V)	Futaba	HT5F1700B	N/A	N/A
5.	Servo*7	Parallax	900-00005	N/A	N/A

3.8.2. Cable Lists

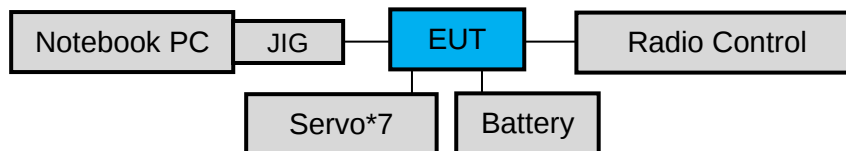
No.	Cable Description Of The Above Support Units
1.	Adapter: ASUS, M/N A19-090P2A DC Cord : Shielded, Undetachable, 1.5m, Bonded a ferrite core AC Power Cord : Unshielded, Detachable, 0.8m
2.	Power Wire: Unshielded, Undetectable, 0.45m
3.	Power Wire: Unshielded, Undetectable, 0.30m
4.	Power Wire: Unshielded, Undetectable, 0.30m
5.	Power Wire: Unshielded, Undetectable, 0.45m*7

3.9. Setup Configuration

3.9.1. EUT Configuration for Power Line & Radiated Emission



3.9.2. EUT Configuration for RF Conducted Test Items



3.10. Operating Condition of EUT

Test program “Futaba Term” is used for enabling EUT RF function under continue transmitting and choosing channel.

3.11. 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

3.12.Measurement Uncertainty

Test Items/Facilities			Frequency Range	Uncertainty
Conduction Test	☐	No. 7 Shielded Room	9kHz-150kHz	±3.6dB
			150kHz-30MHz	±3.3dB
	☐	No. 8 Shielded Room	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	±4.2dB
			30MHz-200MHz, 3m, Vertical	±4.7dB
			200MHz-1000MHz, 3m, Vertical	±4.8dB
			1GHz-6GHz, 3m	±4.8dB
			6GHz-18GHz, 3m	±4.3dB
	☐	No.3 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±3.9dB
			200MHz-1000MHz, 3m, Horizontal	±4.2dB
			30MHz-200MHz, 3m, Vertical	±4.7dB
			200MHz-1000MHz, 3m, Vertical	±4.8dB
			1GHz-6GHz, 3m	±4.5dB
			6GHz-18GHz, 3m	±4.0dB
	☐	No.4 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±3.9dB
			200MHz-1000MHz, 3m, Horizontal	±4.3dB
			30MHz-200MHz, 3m, Vertical	±4.8dB
			200MHz-1000MHz, 3m, Vertical	±4.9dB
			1GHz-6GHz, 3m	±4.2dB
			6GHz-18GHz, 3m	±3.8dB
	☐	No.5 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±3.9dB
			200MHz-1000MHz, 3m, Horizontal	±4.1dB
			30MHz-200MHz, 3m, Vertical	±4.8dB
			200MHz-1000MHz, 3m, Vertical	±4.7dB
			1GHz-6GHz, 3m	±4.8dB
			6GHz-18GHz, 3m	±4.6dB
	Radiated emissions (18GHz-40GHz)		18GHz-40GHz, 3m	±3.4dB

Remark : Uncertainty = $ku_c(y)$

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Test Item	Uncertainty
20dB Bandwidth	$\pm 0.2\text{kHz}$
99% Occupied Bandwidth	$\pm 0.38\%$
Carrier Frequency Separation	$\pm 0.2\text{kHz}$
Time of Occupancy	$\pm 0.03\text{sec}$
Maximum peak Output power	$\pm 0.52\text{dB}$
Conducted Emission Limitations	$\pm 0.13\text{dB}$

4. MEASUREMENT EQUIPMENT LIST

4.1. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2023.08.16	1 Year
2.	Spectrum Analyzer	Keysight	N9010B-544	MY55460198	2024.03.21	1 Year
3.	Test Receiver	R&S	ESCS30	100338	2024.06.18	1 Year
4.	Amplifier	HP	8447D	2944A06305	2023.12.20	1 Year
5.	Microwave Preamplifier	HP	8449B	3008A01284	2024.06.11	1 Year
6.	Microwave Amplifier	Keysight	83051A	MY56480113	2023.09.11	1 Year
7.	Bilog Antenna	TESEQ	CBL6112D	33821	2024.02.17	1 Year
8.	Double-Ridged Waveguide Horn	EMCO	3115	9112-3775	2024.04.30	1 Year
9.	Horn Antenna	COM-POWER	AH-840	101092	2024.01.12	1 Year
10.	2.4GHz Notch Filter	K&L Microwave	7NSL10-2441.5/E130.5-O/O	2	2024.04.11	1 Year
11.	High-Pass Filter	Microwave	H3G018G1	484796	2024.04.11	1 Year
12.	Coaxial Cable	MIYAZAKI	5D2W	RE-11	2024.01.05	1 Year
13.	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 106	RE-14	2024.01.05	1 Year
14.	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	RE-30	2023.08.21	1 Year
15.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2024.04.11	1 Year
16.	Test Software	Audix	e3	V9 18621a	N.C.R.	N.C.R.

4.2. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Keysight	N9010B	MY59071380	2024.03.29	1 Year
2.	Digital Thermo-Hygro Meter	iMax	HTC-1	RF-03	2024.04.11	1 Year



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5. CONDUCTED EMISSION

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

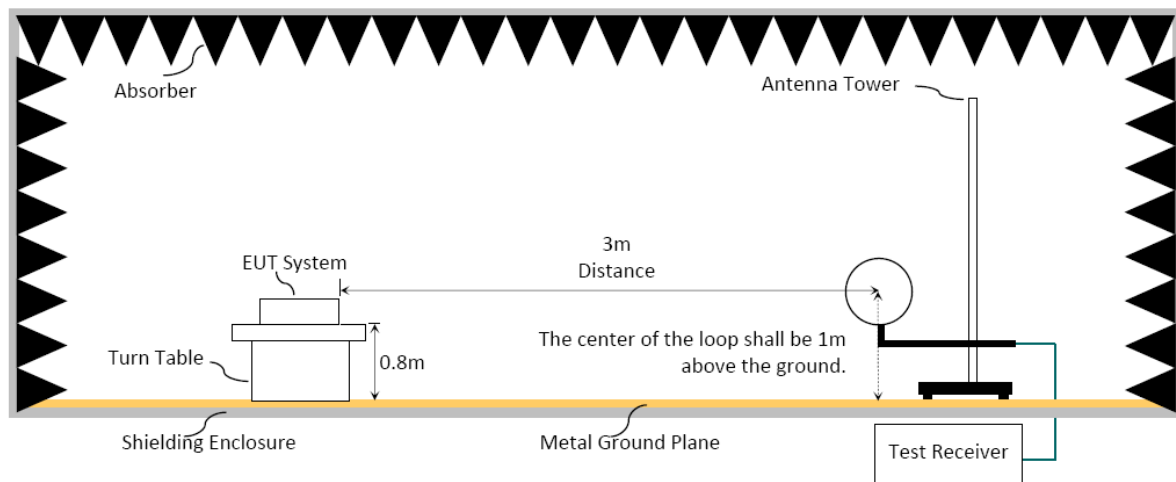
6. RADIATED EMISSION

6.1. Block Diagram of Test Setup

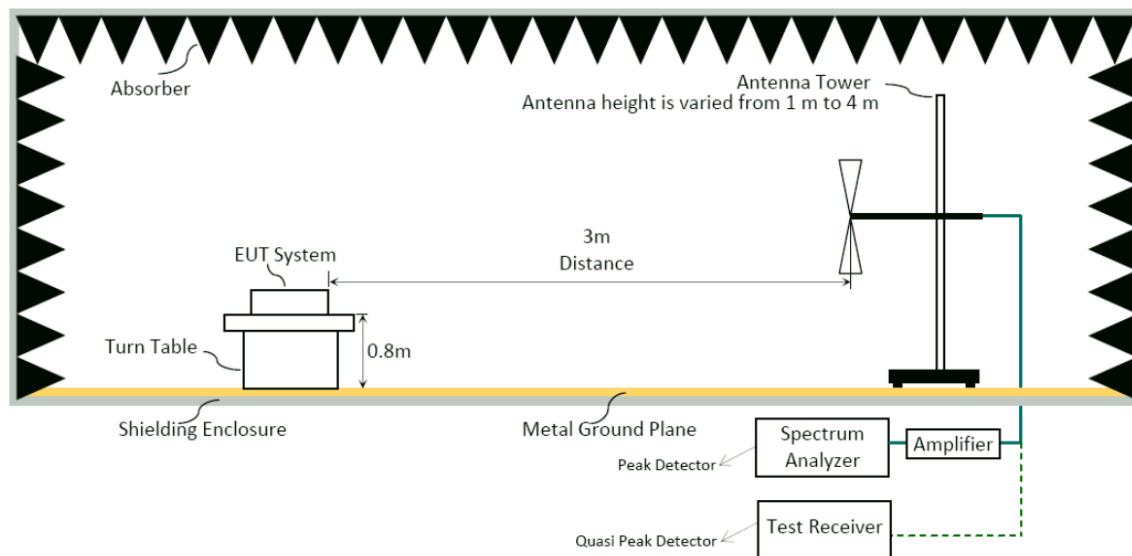
6.1.1. Block Diagram of EUT

Indicated as section 3.9

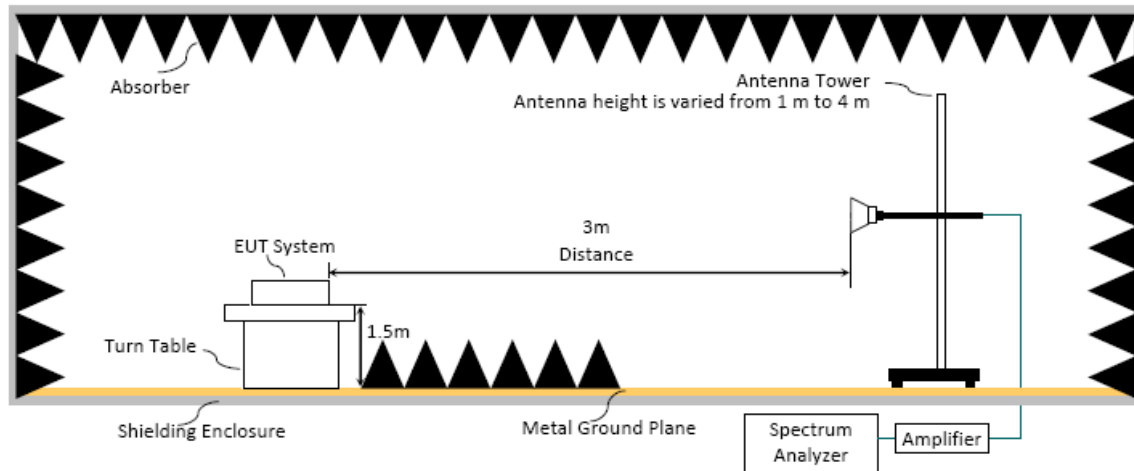
6.1.2. Setup Diagram for 9kHz-30MHz



6.1.3. Setup Diagram for 30-1000MHz



6.1.4. Setup Diagram for above 1GHz



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/ 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.

6.3. 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 C63.10-2013 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 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 $\geq 1/T$. (Duty Cycle < 98%)

(3) VBW = 10Hz (Duty Cycle $\geq 98\%$, when duty cycle presented in section 3.7)

Modulation Type	VBW Setting (VBW $\geq 1/T$) (kHz)
T-FHSS	N/A

(4) Detector = Peak.

(5) Sweep time = auto.

(6) Trace mode = max hold.

(7) 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 (dB μ V/m) = Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) + Reading (dB μ V).

□ Average Emission Level (dB μ V/m) = Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) + Reading (dB μ V).

■ Average Emission Level (dB μ V/m) = Peak Emission Level (dB μ V/m) + DCCF (dB)
Duty Cycle Correction Factor (DCCF) (dB) = $20\log(TX_{on}/TX_{on+off})$ presented in section 3.7.

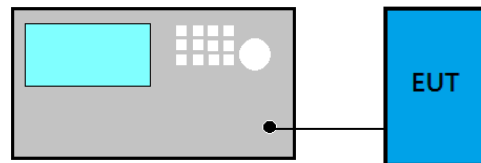
□ ERP (dBm) = Peak Emission Level (dB μ V/m) - 95.2 dB - 2.14 dB

6.5. 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 RBW close to 1% to 5% of OBW.
- (3) Set $VBW \geq 3 \times RBW$.
- (4) Detector = Peak.
- (5) Trace mode = Max hold.
- (6) Sweep = Auto couple.
- (7) Allow the trace to stabilize.
- (8) Setting channel bandwidth function x dB to -20 dB to record the final bandwidth.

For 99% Occupied Bandwidth

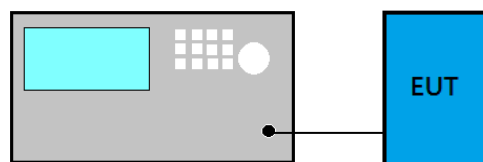
- (9) Set Span range 1.5~5 times the OBW
- (10) Set RBW close to 1% to 5% of OBW.
- (11) Set $VBW \geq 3 \times RBW$.
- (12) Detector = Peak.
- (13) Trace mode = Max hold
- (14) Sweep = Auto couple.
- (15) Allow the trace to stabilize.

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:

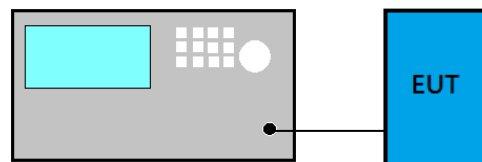
- (1) Span = Wide enough to capture the peaks of two adjacent channels
- (2) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
- (3) $VBW \geq RBW$
- (4) Sweep = Auto
- (5) Detector function = Peak
- (6)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

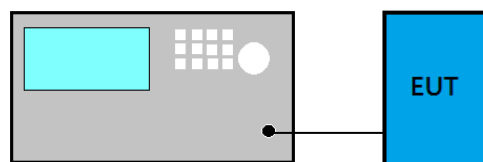
- (1) Span: Zero span, centered on a hopping channel.
- (2) RBW shall be $\leq$ channel spacing and where possible RBW should be set $\gg 1/T$, where T is the expected dwell time per channel.
- (3) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger 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:

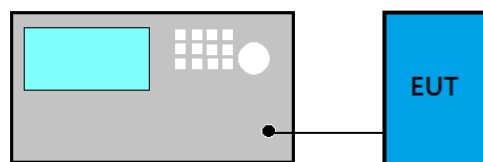
- (1) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
- (2) RBW: To identify clearly the individual channels, set 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:

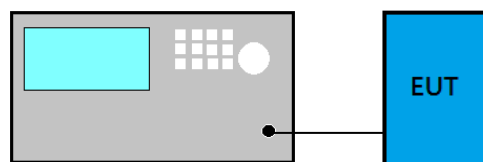
- (a) Use the following spectrum analyzer settings
 - (1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
 - (2) RBW > 20 dB bandwidth of the emission being measured.
 - (3) VBW $\geq$ RBW
 - (4) Sweep: Auto
 - (5) Detector function: Peak
 - (6) Trace: Max hold
- (b)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

TEST DATA AND PLOTS

(Model: CGY770R)

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A.1 RADIATED EMISSION

Test Date	2024/07/05	Temp./Hum.	25°C/51%
Test Voltage	DC 6.6V (Via Battery)	Tested By	Sean Wang

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 1 GHz

Mode	T-FHSS	Frequency	TX 2467.50MHz
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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
32.328	22.99	1.25	26.50	32.13	29.87	40.00	10.13	Peak
121.568	17.85	2.55	26.18	33.01	27.22	43.50	16.28	Peak
457.576	22.14	6.05	26.95	33.15	34.38	46.00	11.62	Peak
540.026	23.34	6.55	27.33	35.22	37.78	46.00	8.22	Peak
903.194	26.17	8.74	27.14	33.70	41.47	46.00	4.53	Peak
988.748	26.90	9.21	26.86	33.91	43.17	54.00	10.83	Peak

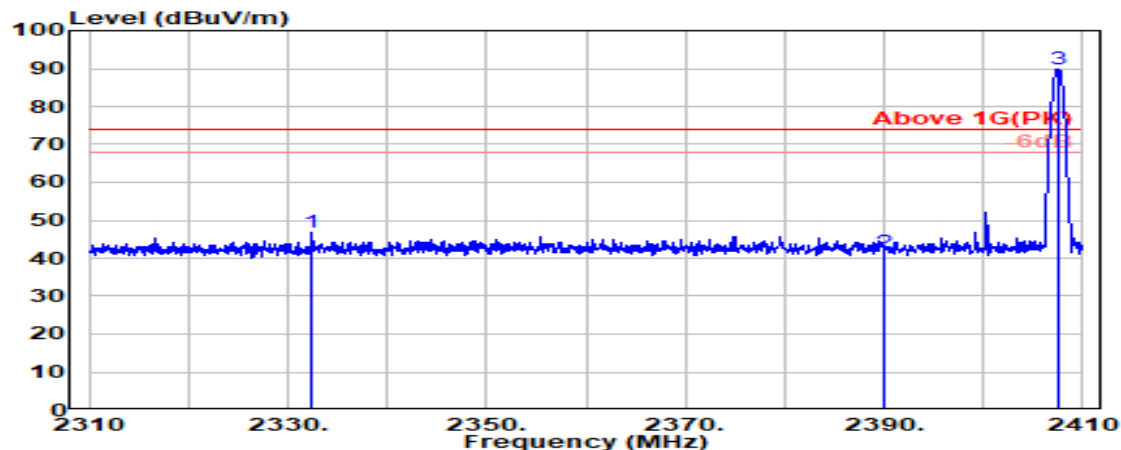
Antenna at Vertical Polarization

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
33.880	22.30	1.28	26.50	30.87	27.95	40.00	12.05	Peak
140.192	17.05	2.76	26.08	33.35	27.08	43.50	16.42	Peak
455.442	22.09	6.03	26.93	32.09	33.28	46.00	12.72	Peak
540.026	23.34	6.55	27.33	34.23	36.79	46.00	9.21	Peak
925.116	26.36	8.86	27.06	32.16	40.32	46.00	5.68	Peak
966.632	26.72	9.09	26.93	32.13	41.02	54.00	12.98	Peak

A.2.1.3 Frequency Above 1 GHz to 10th harmonics

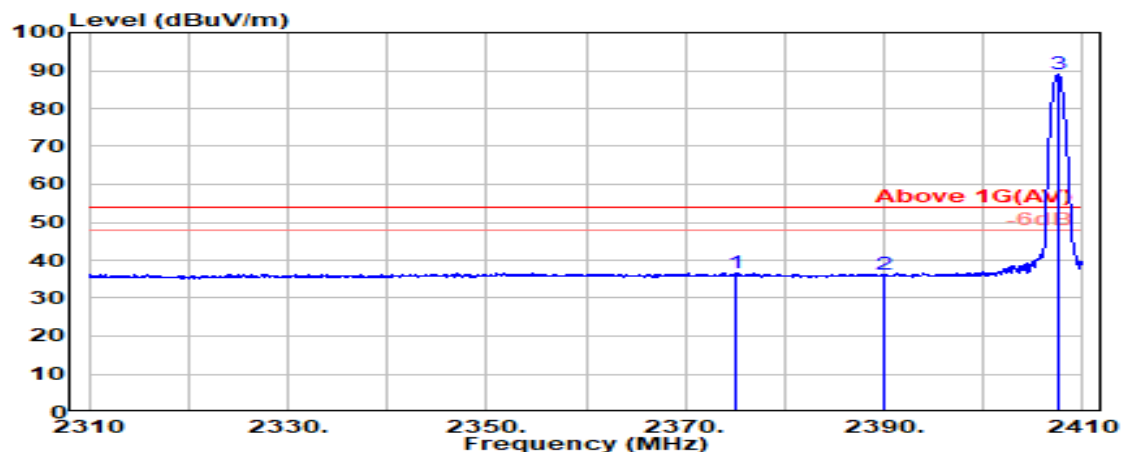
Band Edge:

Mode	T-FHSS	Frequency	TX 2407.50MHz
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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
2332.371	28.19	5.95	39.93	52.68	46.89	74.00	27.11	Peak
2390.000	28.14	6.03	39.93	47.45	41.70	74.00	32.30	Peak
@ 2407.474	28.13	6.06	39.93	95.56	89.82	---	---	Peak

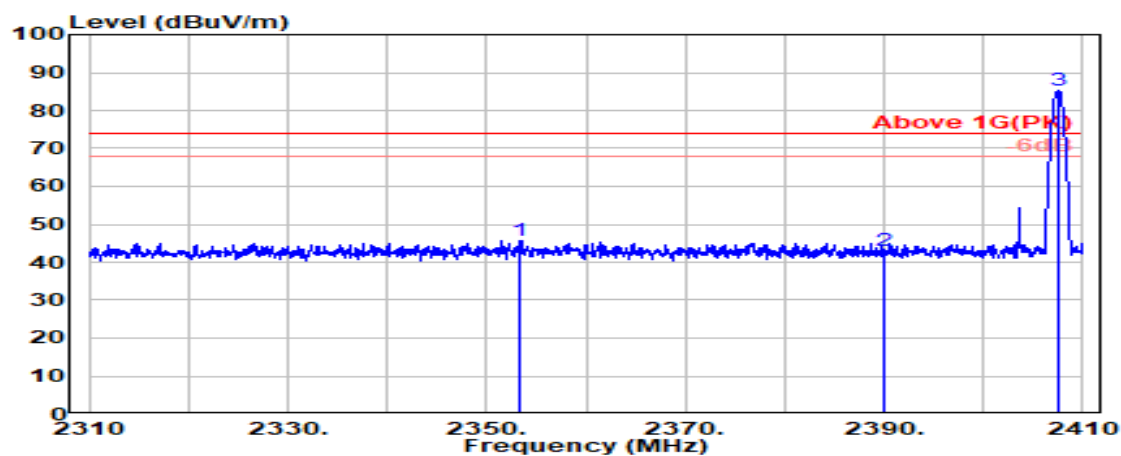


Antenna at Horizontal Polarization

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
2375.155	28.20	6.01	39.93	42.23	36.52	54.00	17.48	Average
2390.000	28.14	6.03	39.93	41.82	36.07	54.00	17.93	Average
@ 2407.474	28.13	6.06	39.93	94.64	88.91	---	---	Average

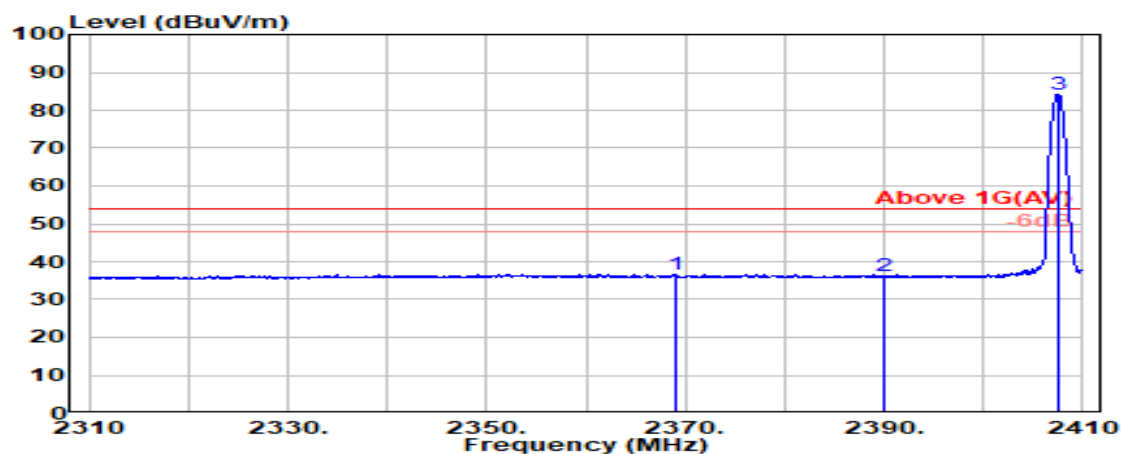
Remark: The “@” means fundamental frequency, it is ignored in this section.

Mode	T-FHSS	Frequency	TX 2407.50MHz
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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
2353.402	28.29	5.98	39.93	51.24	45.58	74.00	28.42	Peak
2390.000	28.14	6.03	39.93	48.77	43.02	74.00	30.98	Peak
@ 2407.474	28.13	6.06	39.93	90.86	85.13	---	---	Peak

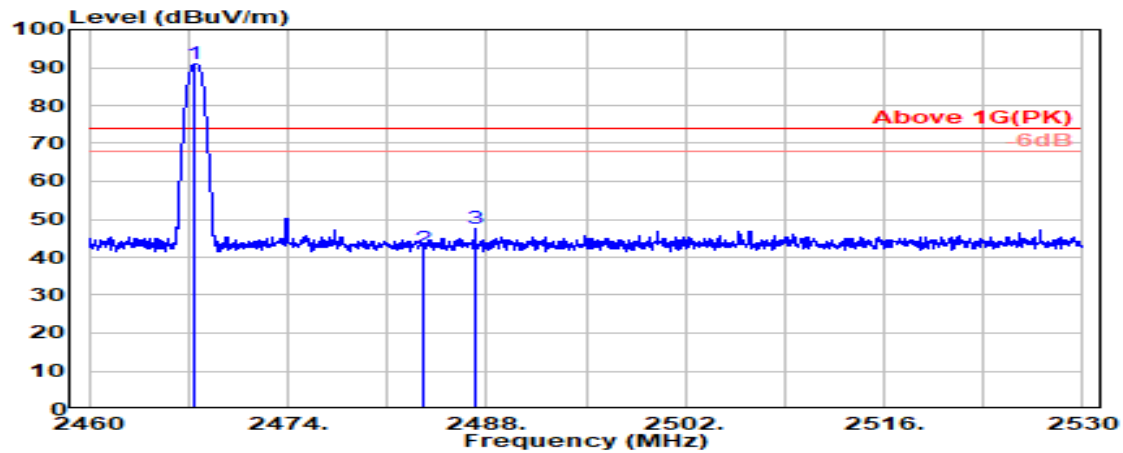


Antenna at Vertical Polarization

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
2368.969	28.22	6.00	39.93	42.42	36.72	54.00	17.28	Average
2390.000	28.14	6.03	39.93	41.83	36.07	54.00	17.93	Average
@ 2407.474	28.13	6.06	39.93	89.93	84.20	---	---	Average

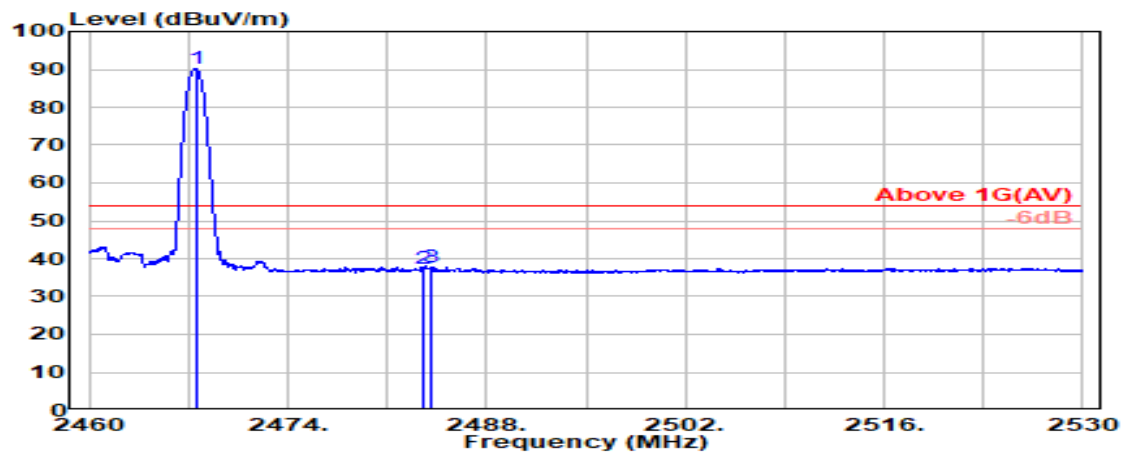
Remark: The “@” means fundamental frequency, it is ignored in this section.

Mode	T-FHSS	Frequency	TX 2467.50MHz
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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
@	2467.469	28.34	6.14	39.92	96.56	91.12	---	---	Peak
	2483.500	28.37	6.17	39.92	47.50	42.12	74.00	31.88	Peak
	2487.242	28.37	6.17	39.92	53.09	47.72	74.00	26.28	Peak

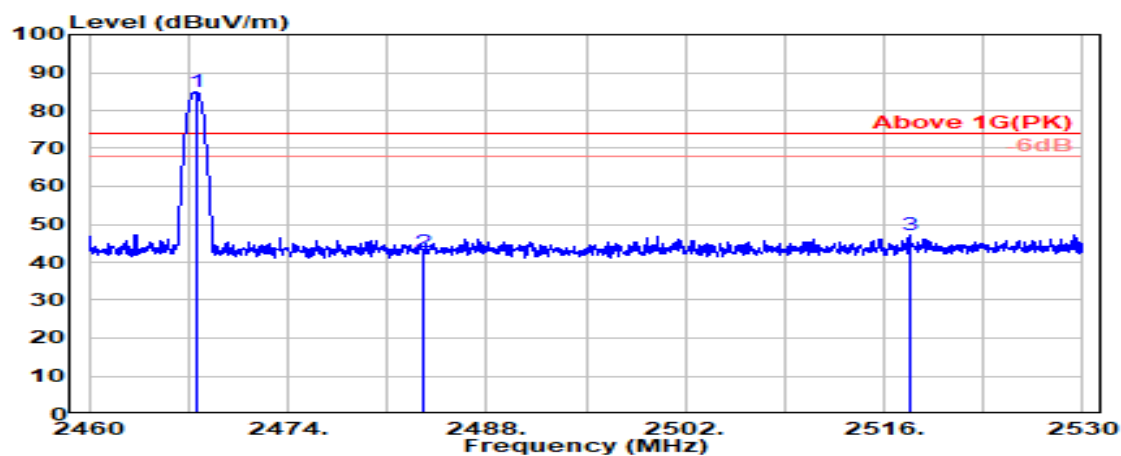


Antenna at Horizontal Polarization

	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
@	2467.505	28.34	6.14	39.92	95.64	90.20	---	---	Average
	2483.500	28.37	6.17	39.92	42.81	37.42	54.00	16.58	Average
	2484.139	28.37	6.17	39.92	43.23	37.84	54.00	16.16	Average

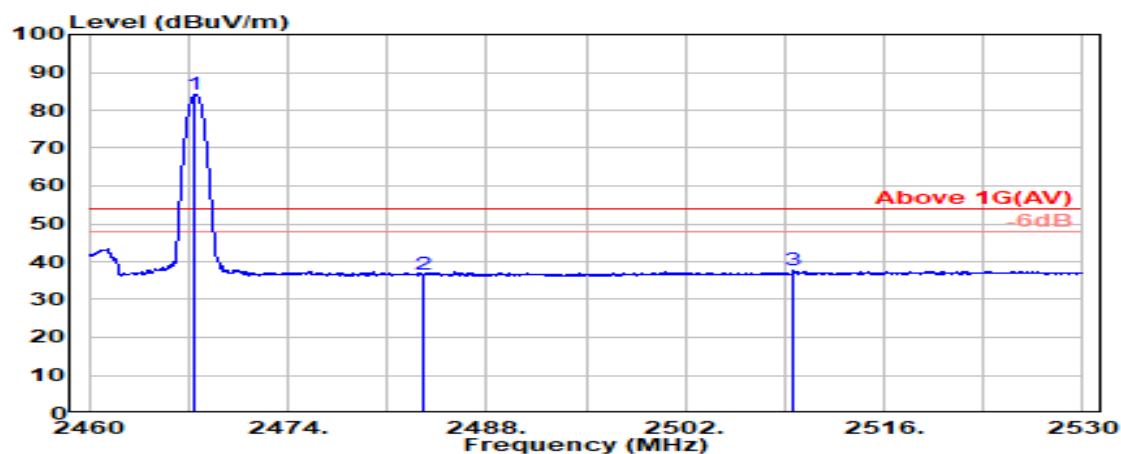
Remark: The “@” means fundamental frequency, it is ignored in this section.

Mode	T-FHSS	Frequency	TX 2467.50MHz
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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
@	2467.505	28.34	6.14	39.92	90.43	84.98	---	---	Peak
	2483.500	28.37	6.17	39.92	47.97	42.59	74.00	31.41	Peak
	2517.768	28.51	6.21	39.92	52.32	47.12	74.00	26.88	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
@	2467.469	28.34	6.14	39.92	89.53	84.09	---	---	Average
	2483.500	28.37	6.17	39.92	41.99	36.60	54.00	17.40	Average
	2509.613	28.46	6.20	39.92	42.87	37.61	54.00	16.39	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.

Mode	T-FHSS	Frequency	TX 2407.50MHz
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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
4935.714	33.20	8.41	39.31	46.39	48.69	54.00	5.31	Peak
7402.857	36.31	9.98	39.57	46.04	52.76	54.00	1.24	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
4934.286	33.20	8.41	39.31	45.95	48.25	54.00	5.75	Peak
7402.857	36.31	9.98	39.57	45.90	52.61	54.00	1.39	Peak

Mode	T-FHSS	Frequency	TX 2437.50MHz
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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
4875.714	33.15	8.37	39.34	45.82	48.01	54.00	5.99	Peak
7312.857	36.40	9.92	39.55	45.20	51.97	54.00	2.03	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
4875.714	33.15	8.37	39.34	45.73	47.91	54.00	6.09	Peak
7312.857	36.40	9.92	39.55	44.58	51.35	54.00	2.65	Peak

Mode	T-FHSS	Frequency	TX 2467.50MHz
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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
4814.286	32.96	8.33	39.37	45.76	47.68	54.00	6.32	Peak
7222.857	36.15	9.86	39.52	42.49	48.98	54.00	5.02	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
4814.286	32.96	8.33	39.37	45.04	46.96	54.00	7.04	Peak
7222.500	36.15	9.86	39.52	41.87	48.36	54.00	5.64	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/OCCUPIED BANDWIDTH

Test Date	2024/07/09 ~ 10	Temp./Hum.	22-23°C/55-57%
Cable Loss	1.5dB	Tested By	Sean Wang
Test Voltage	DC 6.6V (Via Battery)		

A.2.1 Emission Bandwidth Result

Mode	ANT	Centre Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit 2/3 (20dB Bandwidth)
T-FHSS	ANT A	2407.50	0.2689	0.21943	0.179
		2437.50	0.2680	0.22341	0.179
		2467.50	0.2578	0.21967	0.172
	ANT B	2407.50	0.2593	0.22248	0.173
		2437.50	0.2693	0.22553	0.180
		2467.50	0.2588	0.22131	0.173

Remark: The maximum two-thirds of the 20dB bandwidth shall be at maximum 0.182MHz.

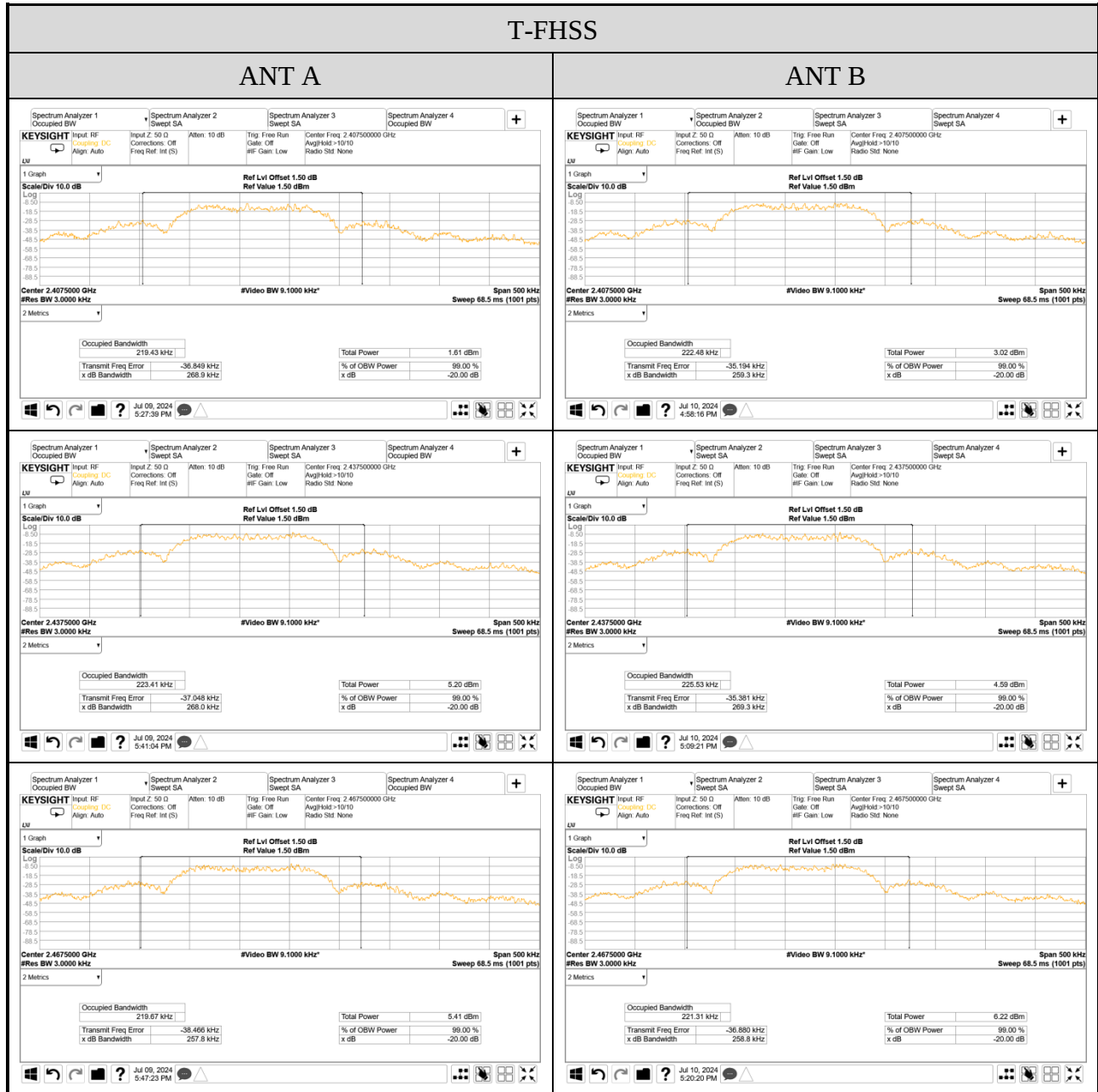
Audix Technology Corp.

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

Tel: +886 2 26099301

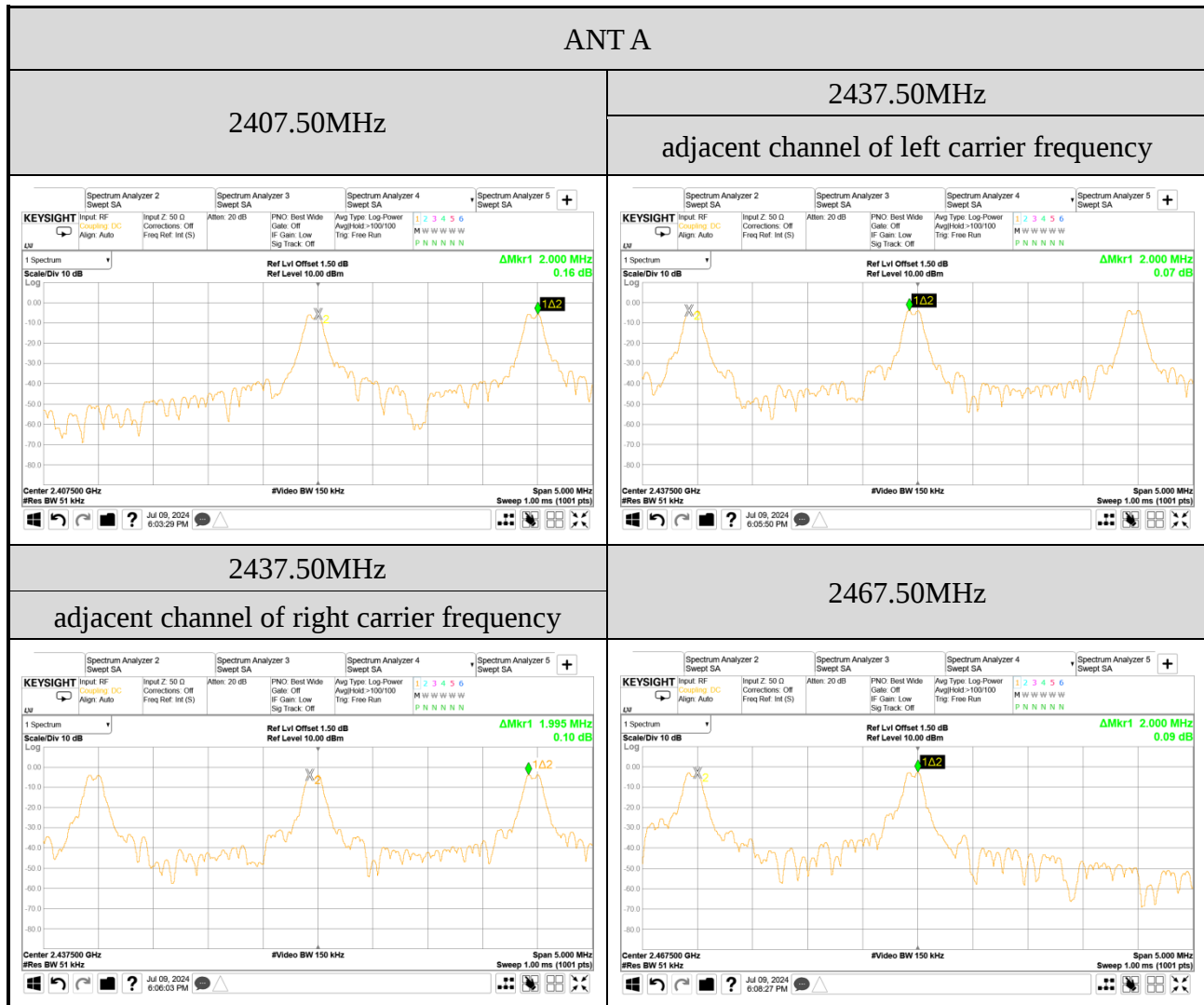
Fax: +886 2 26099303

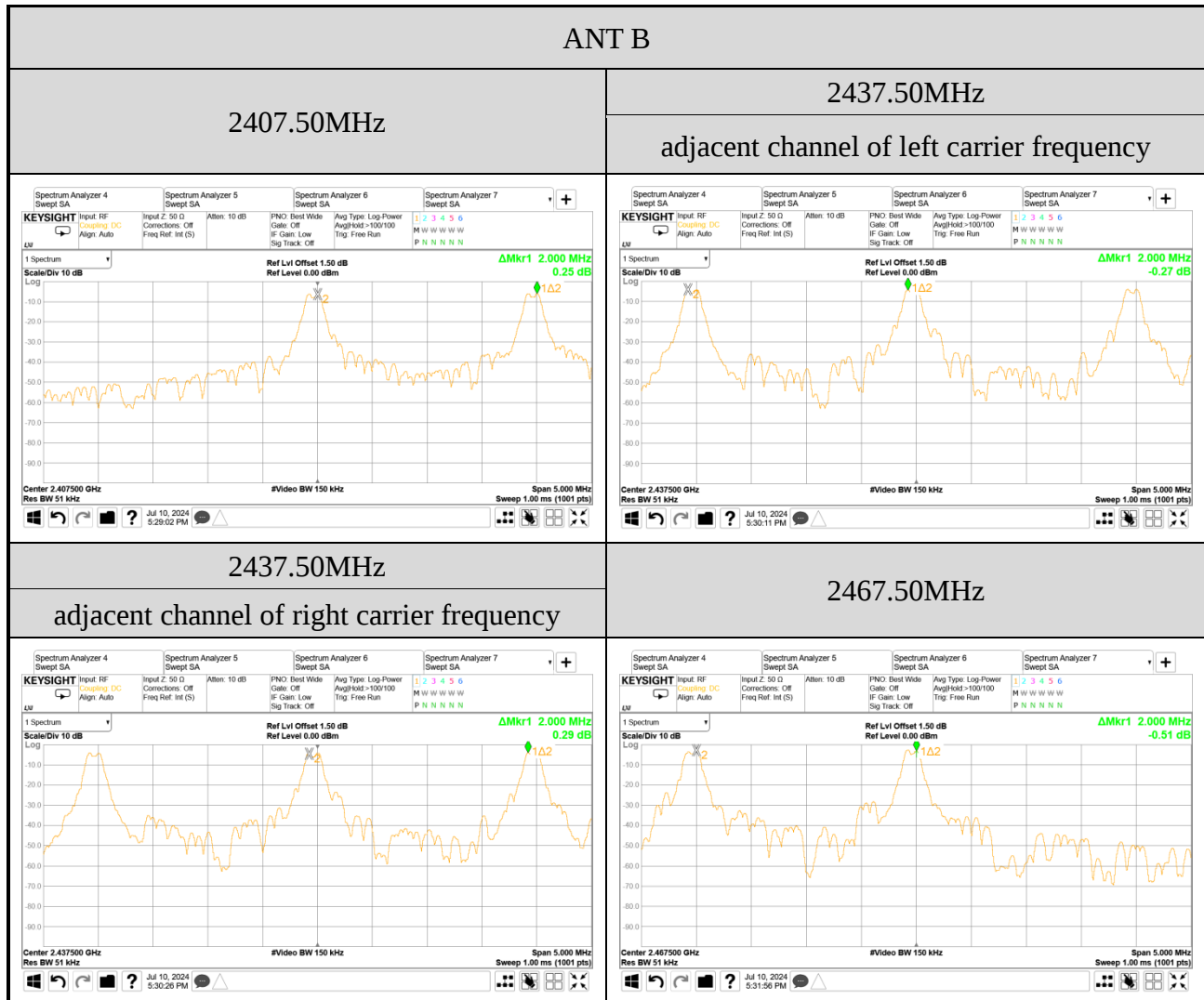
A.2.2 Measurement Plots



A.3 CARRIER FREQUENCY SEPARATION

Test Date	2024/07/09 ~ 10	Temp./Hum.	22-23°C/55-57%
Cable Loss	1.5dB	Tested By	Sean Wang
Test Voltage	DC 6.6V (Via Battery)		





A.4 TIME OF OCCUPANCY

Test Date	2024/07/09 ~ 10	Temp./Hum.	22-23°C/55-57%
Cable Loss	1.5dB	Tested By	Sean Wang
Test Voltage	DC 6.6V (Via Battery)		

A.4.1 Time of Occupancy

ANT A

Mode	Centre Frequency (MHz)	Each second appearance transmission	Time of Occupancy (ms)	Maximum accumulated Time of Occupancy (ms)	Limit (ms)
T-FHSS	2407.50	2	0.600	14.8800	<400
	2437.50	2	0.650	16.1200	<400
	2467.50	2	0.650	16.1200	<400

Observation Period:

31 channels* 0.4 seconds= 12.4 seconds

Centre Frequency: 2407.50MHzFor each second of 2 transmission appearance, the longest time of occupancy is
2 channels* 12.4 /1* 0.6000 ms= 14.8800 ms (<400ms)**Centre Frequency: 2437.50MHz**For each second of 2 transmission appearance, the longest time of occupancy is
2 channels* 12.4 /1* 0.6500 ms= 16.1200 ms (<400ms)**Centre Frequency: 2467.50MHz**For each second of 2 transmission appearance, the longest time of occupancy is
2 channels* 12.4 /1* 0.6500 ms= 16.1200 ms (<400ms)

ANT B

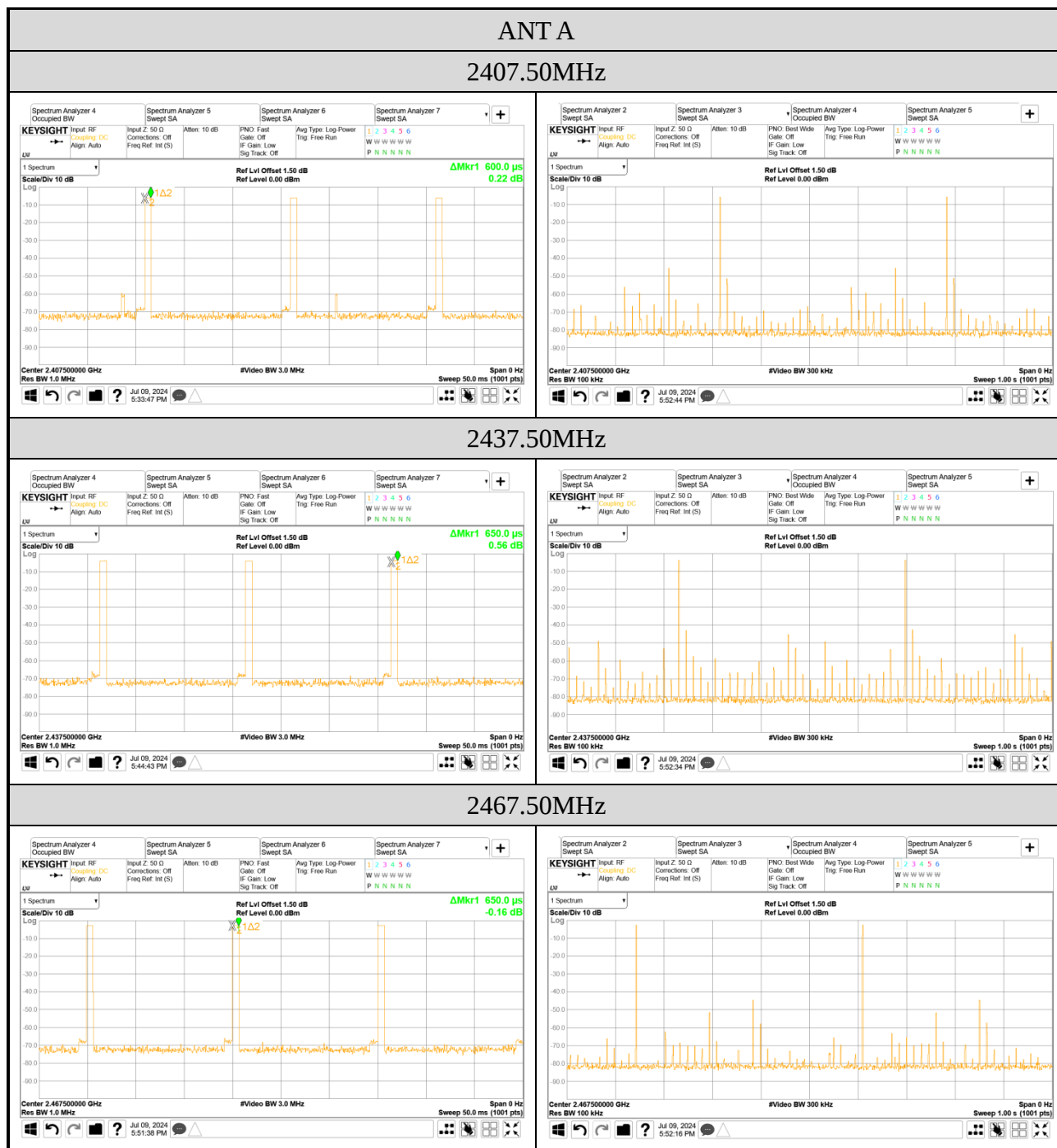
Mode	Centre Frequency (MHz)	Each second appearance transmission	Time of Occupancy (ms)	Maximum accumulated Time of Occupancy (ms)	Limit (ms)
T-FHSS	2407.50	2	0.650	16.1200	<400
	2437.50	2	0.600	14.8800	<400
	2467.50	2	0.600	14.8800	<400

Observation Period:

31 channels* 0.4 seconds= 12.4 seconds

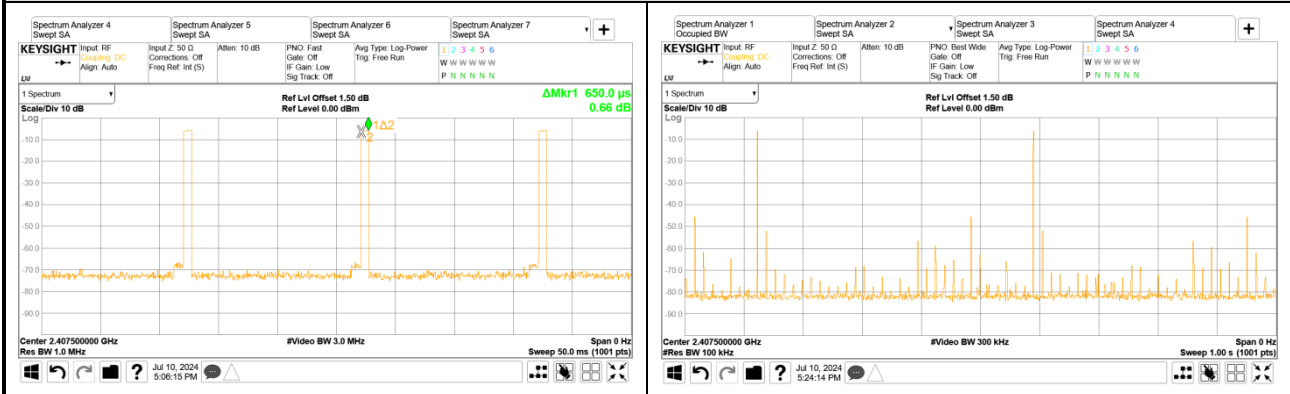
Centre Frequency: 2407.50MHzFor each second of 2 transmission appearance, the longest time of occupancy is
2 channels* 12.4 /1* 0.6500 ms= 16.1200 ms (<400ms)**Centre Frequency: 2437.50MHz**For each second of 2 transmission appearance, the longest time of occupancy is
2 channels* 12.4 /1* 0.6000 ms= 14.8800 ms (<400ms)**Centre Frequency: 2467.50MHz**For each second of 2 transmission appearance, the longest time of occupancy is
2 channels* 12.4 /1* 0.6000 ms= 14.8800 ms (<400ms)

A.4.2 Measurement Plots

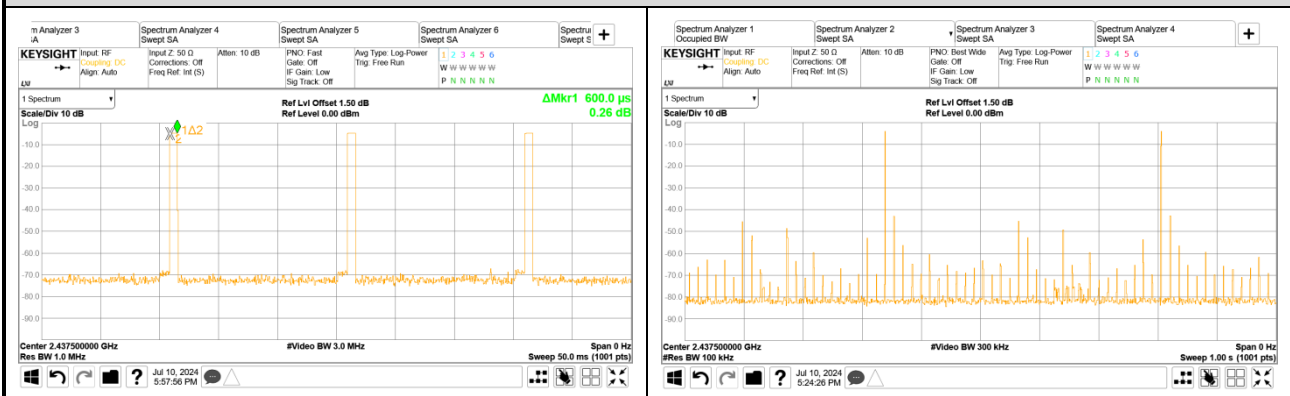


ANT B

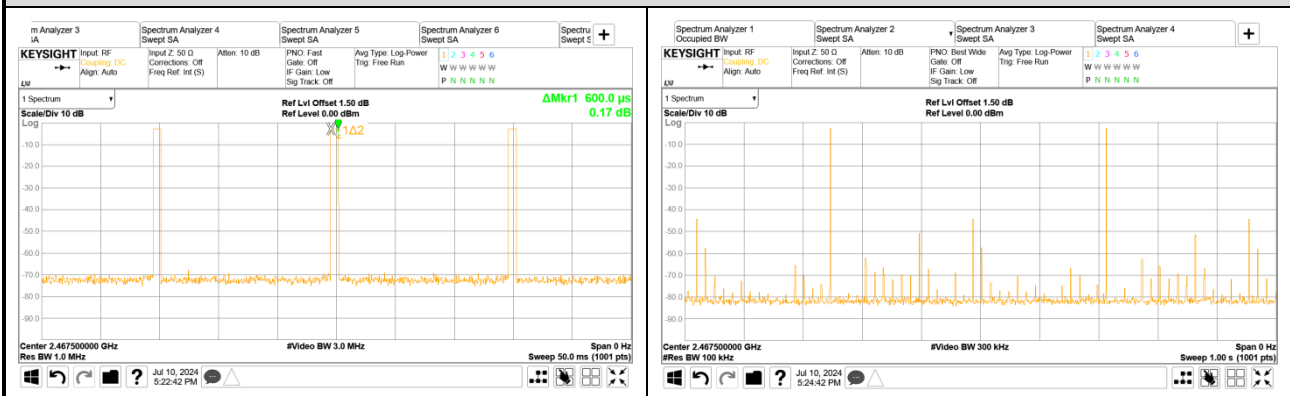
2407.50MHz



2437.50MHz

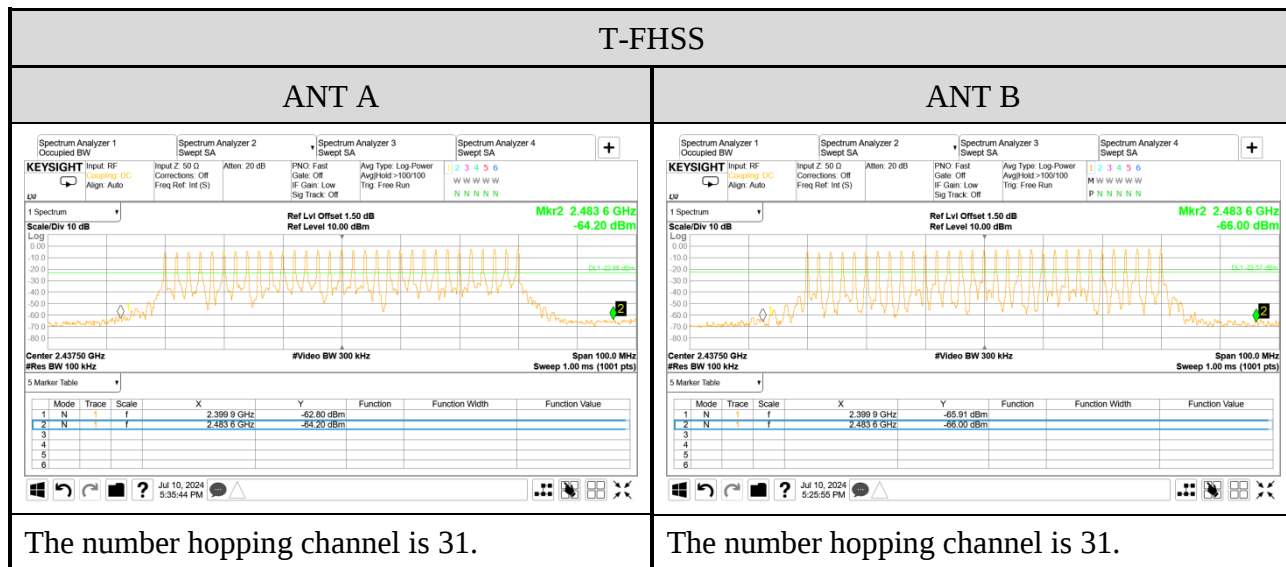


2467.50MHz



A.5 NUMBER OF HOPPING CHANNELS

Test Date	2024/07/10	Temp./Hum.	23°C/57%
Cable Loss	1.5dB	Tested By	Sean Wang
Test Voltage	DC 6.6V (Via Battery)		



A.6 MAXIMUM PEAK OUTPUT POWER

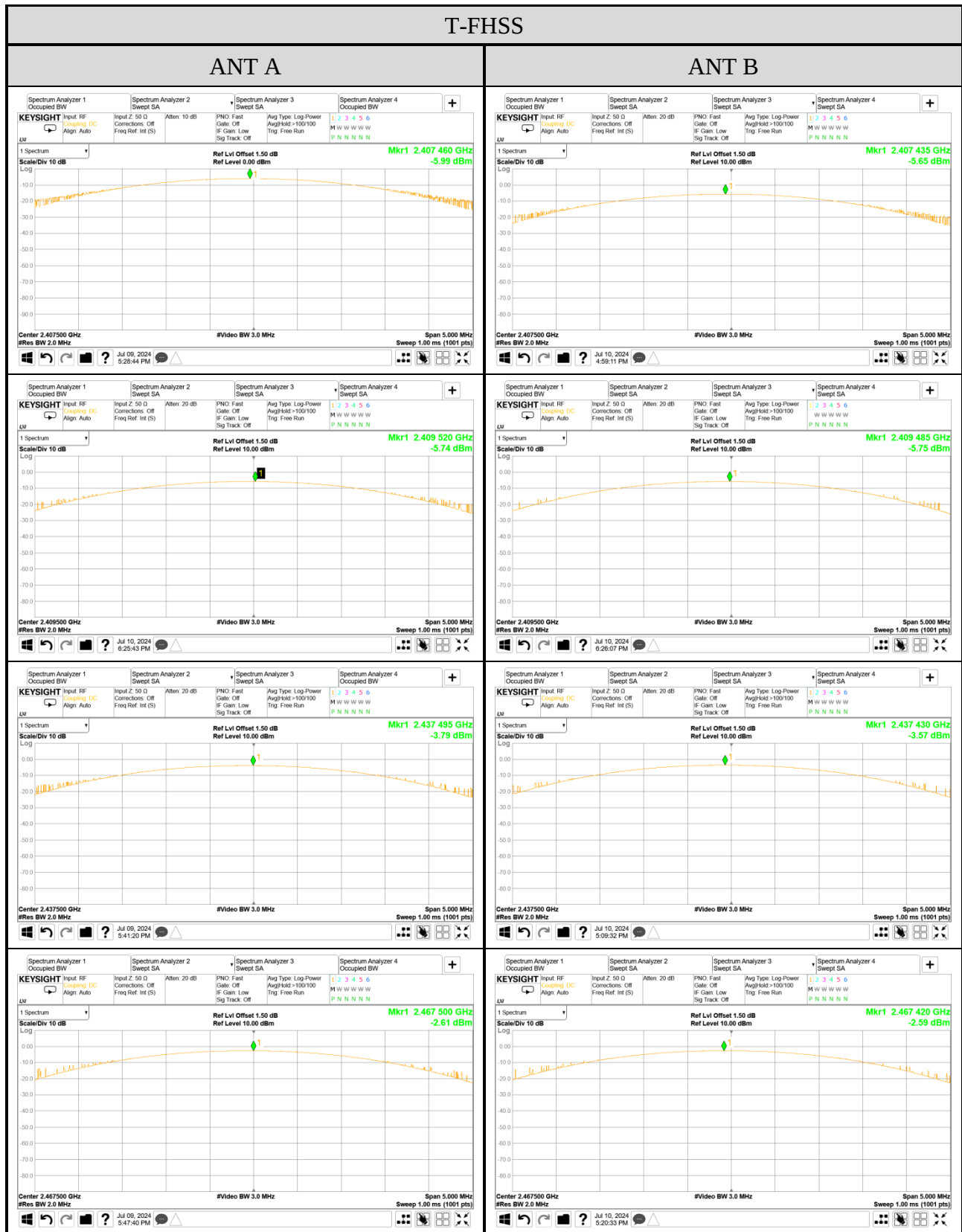
Test Date	2024/07/09 ~ 10	Temp./Hum.	22-23°C/55-57%
Cable Loss	1.5dB	Tested By	Sean Wang
Test Voltage	DC 6.6V (Via Battery)		

A.6.1 Maximum Peak Output Power

Mode	ANT	Centre Frequency (MHz)	Peak Output Power		Limit
			dBm	W	
T-FHSS	ANT A	2407.50	-5.99	0.000252	21dBm (0.125W)
		2409.50	-5.74	0.000267	
		2437.50	-3.79	0.000418	
		2467.50	-2.61	0.000548	

Mode	ANT	Centre Frequency (MHz)	Peak Output Power		Limit
			dBm	W	
T-FHSS	ANT B	2407.50	-5.65	0.000272	21dBm (0.125W)
		2409.50	-5.75	0.000266	
		2437.50	-3.57	0.000440	
		2467.50	-2.59	0.000551	

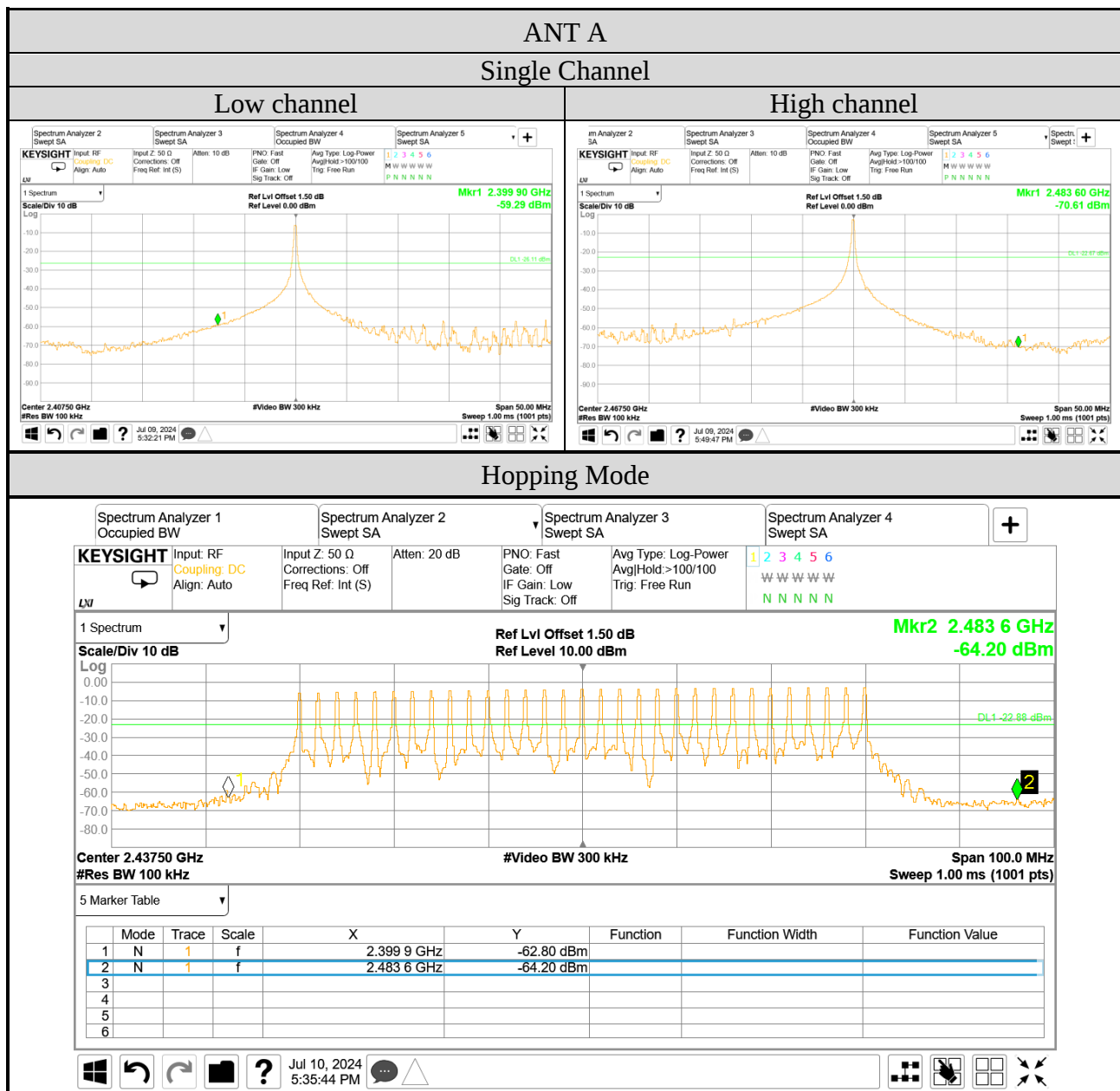
A.6.2 Measurement Plots



A.7 EMISSION LIMITATIONS MEASUREMENT

A.7.1 Band Edge

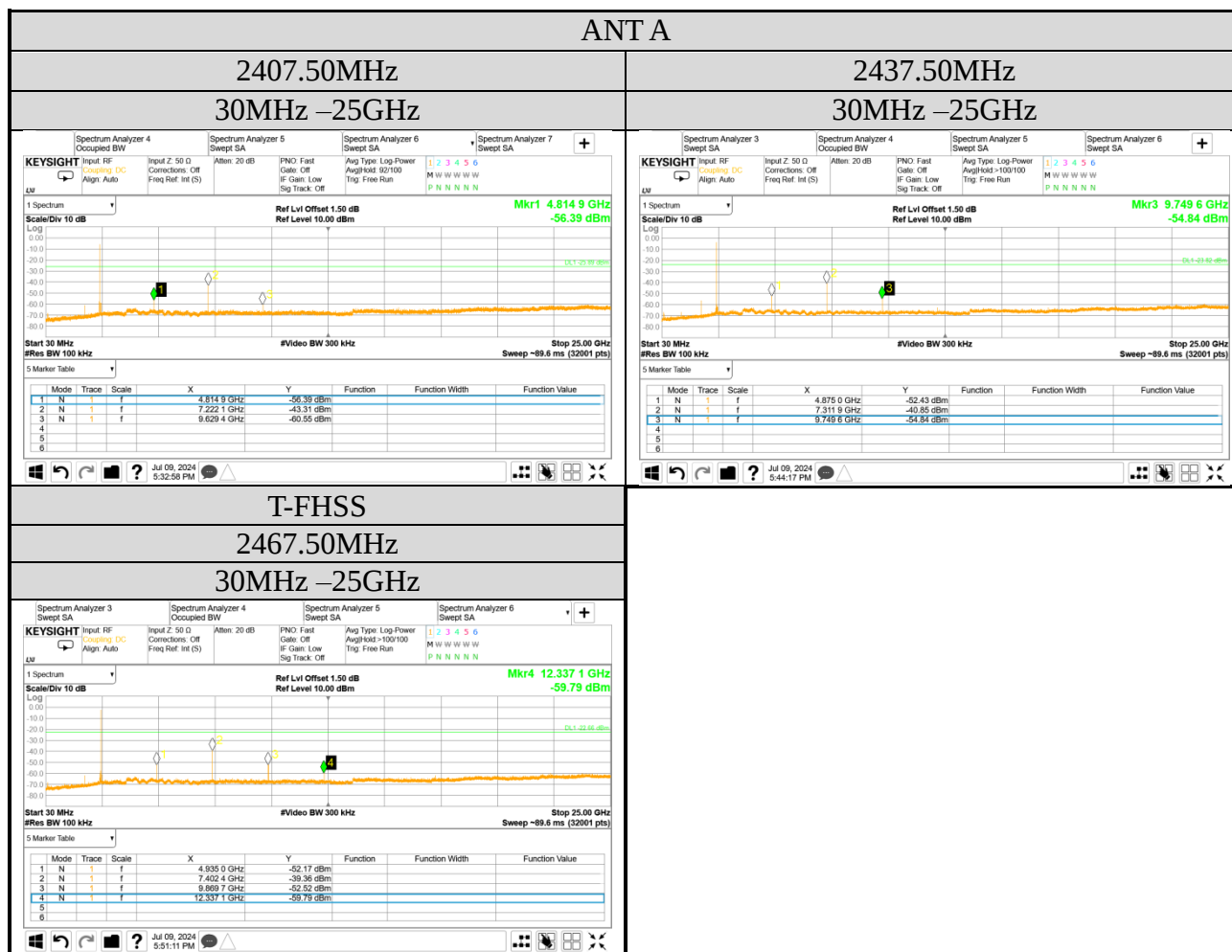
Test Date	2024/07/09 ~ 10	Temp./Hum.	22-23°C/55-57%
Cable Loss	1.5dB	Tested By	Sean Wang
Test Voltage	DC 6.6V (Via Battery)		





A.7.2 Spurious Emission

Test Date	2024/07/09 ~ 10	Temp./Hum.	22-23°C/55-57%
Cable Loss	1.5dB	Tested By	Sean Wang
Test Voltage	DC 6.6V (Via Battery)		



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APPENDIX B

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APPENDIX B

TEST PHOTOGRAPHS

(Model: CGY770R)