

**FCC 15.247 DSS
2.4GHz Report**

for

FUTABA Corporation

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

Brand : Futaba
Product Name : Radio Control
Model Name : R3006SB
FCC ID : AZPR3006SB-24G

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APPENDIX A TEST PLOTS

APPENDIX B TEST PHOTOGRAPHS

TEST REPORT CERTIFICATION

Applicant : FUTABA Corporation
Manufacture : FUTABA Corporation
Product Name : Radio Control
Model No. : R3006SB
Serial No. : N/A
Brand : Futaba

Applicable Standards:

FCC Rules and Regulations Part 15 Subpart C, Oct. 2014
ANSI C63.4:2009
FCC Public Notice DA 00-705

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 Test: 2015. 04. 07 ~ 11

Date of Report: 2015. 04. 13

Producer: Annie Yu
(Annie Yu/Administrator)

Signatory: Ben Cheng
(Ben Cheng/Manager)

1. REPORT HISTORY

Revision	Date	Revision Summary	Report Number
0	2015. 04. 13	Original Report.	EM-F150185

2. SUMMARY OF TEST RESULTS

Rule	Description	Results
15.207	Conducted Emission	N/A
15.247(d)/15.209	Radiated Band Edge and Radiated Spurious Emission	PASS
15.247(a)(1)	20dB Bandwidth	PASS
15.247(a)(1)	Carrier Frequency Separation	PASS
15.247(a)(1)(iii)	Time of Occupancy	PASS
15.247(a)(1)(iii)	Number of Hopping Channels	PASS
15.247(b)(1)	Maximum Peak Output Power	PASS
15.247(d)/15.205	Conducted Band Edges and Conducted Spurious Emission	PASS
15.203	Antenna Requirement	PASS
Note: The EUT only employs battery power for operation, so it is unnecessary to test.		

3. GENERAL INFORMATION

3.1. Description of EUT

Product	Radio Control
Model Number	R3006SB
Serial Number	N/A
Brand Name	Futaba
Applicant	FUTABA Corporation 1080 YabutsukaChosei-son Chosei-gun Chiba, 299-4395 Japan.
Manufacture	FUTABA Corporation 1080 YabutsukaChosei-son Chosei-gun Chiba, 299-4395 Japan.
Transmit Type	1T1R
Date of Receipt of Sample	2015. 03. 26

3.2. EUT Specifications Assessed in Current Report

Fundamental Range (MHz)	Channel Number	Modulation	Data Rate (kbps)
2407.5-2467.5	31	T-FHSS	128

Channel List			
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
1	2407.5	17	2439.5
2	2409.5	18	2441.5
3	2411.5	19	2443.5
4	2413.5	20	2445.5
5	2415.5	21	2447.5
6	2417.5	22	2449.5
7	2419.5	23	2451.5
8	2421.5	24	2453.5
9	2423.5	25	2455.5
10	2425.5	26	2457.5
11	2427.5	27	2459.5
12	2429.5	28	2461.5
13	2431.5	29	2463.5
14	2433.5	30	2465.5
15	2435.5	31	2467.5
16	2437.5		

3.3. Antenna Information

Manufacture	Antenna Type	Frequency	Max Gain (dBi)
Wanshih Electronic Co., Ltd.	Coaxial Antenna	2.4GHz	-5.16

	Item	Test Channel
Radiated Test Case	Radiated Band Edge	1/31
	Radiated Spurious Emission	1/16/31
Conducted Test Case	20dB Bandwidth	1/16/31
	Carrier Frequency Separation	1/16/31
	Time of Occupancy	1/16/31
	Number of Hopping Channels	16
	Maximum Peak Output Power	1/16/31
	Band Edges	1/31
	Spurious Emission	1/16/31

3.4. Tested Supporting System List

3.4.1. Support Peripheral Unit

No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Notebook PC	acer	Acer Aspire 4755G	N/A	HLZ-AR5B97
2.	Digital Servo #1 ~ #5	Futaba	S3003	N/A	N/A
3.	Notebook	ASUS	ASUS N20A	N/A	TLZ-BT253

3.4.2. Cable Lists

No.	Cable Description Of The Above Support Units
1.	Adapter: DELTA, M/N ADP-90CDDDB, DC Power Cord: Non-Shielded, Detachable, 1.8m AC Power Cord: Non-Shielded, Undetachable, 1.8m Bonded a ferrite core Data Cable: Non-Shielded, Detachable, 0.65m
2.	Data Cable*5: Non-Shielded, Detachable, 0.4m
3.	AC adapter: ACBEL, M/N AA90PM111, I/P: Non-Shielded, Detachable, 1.8m O/P: Shielded, Undetachable, 1.8m (Bonded a ferrite core) Data Cable: Non-Shielded, Detachable, 0.65m

3.5. Setup Configuration

3.5.1. EUT Configuration for Power Line Emission



3.5.2. EUT Configuration for Conducted Test Items



3.6. Operating Condition of EUT

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

3.7. Description of Test Facility

Test Firm Name	:	AUDIX Technology Corporation EMC Department No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan
Test Location & Facility	:	No. 7 Shielded Room No. 67-4, Dingfu, Linkou Dist., New Taipei City 244, Taiwan Semi-Anechoic Chamber No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan May 11, 2012 File on Federal Communication Commission Registration Number: 90993
NVLAP Lab. Code	:	200077-0
TAF Accreditation No	:	1724

3.8. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Radiation Test (Distance: 3m)	30MHz~1000MHz	±5.3dB
	Above 1GHz	±4.8dB

Remark : Uncertainty = $k u_c(y)$

Test Item	Uncertainty
20dB Bandwidth	±0.2kHz
Carrier Frequency Separation	±0.2kHz
Time Of Occupancy	±0.03sec
Maximum peak Output power	± 0.52dB
Conducted Emission Limitations	± 0.13dB

4. MEASUREMENT EQUIPMENT LIST

4.1. Radiated Emission Measurement

4.1.1. Frequency Range 30MHz~1000MHz

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2014. 09. 15	1 Year
2.	Test Receiver	R & S	ESCS30	100338	2014. 06. 24	1 Year
3.	Amplifier	HP	8447D	2944A06305	2015. 02. 12	1 Year
4.	Bilog Antenna	TESEQ	CBL6112D	33821	2014. 08. 02	1 Year

4.1.2. Frequency Range 30MHz~1000MHz

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2014. 09. 15	1 Year
2.	Test Receiver	R&S	ESCS30	100338	2014. 06. 24	1 Year
3.	Amplifier	Agilent	8449B	3008A00529	2015. 01. 22	1 Year
4.	2.4GHz Notch Filter	K&L	7NSL10-244 1.5E130.5-0 0	1	2014. 06. 12	1 Year
5.	3G High Pass Filter	Microwave Circuits	H3G018G1	484796	2014. 06. 12	1 Year
6.	Horn Antenna	EMCO	3115	9609-4927	2014. 06. 17	1 Year
7.	Horn Antenna	EMCO	3116	2653	2014. 10. 14	1 Year

4.2. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	2014. 07. 24	1 Year

5. CONDUCTED EMISSION MEASUREMENT

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

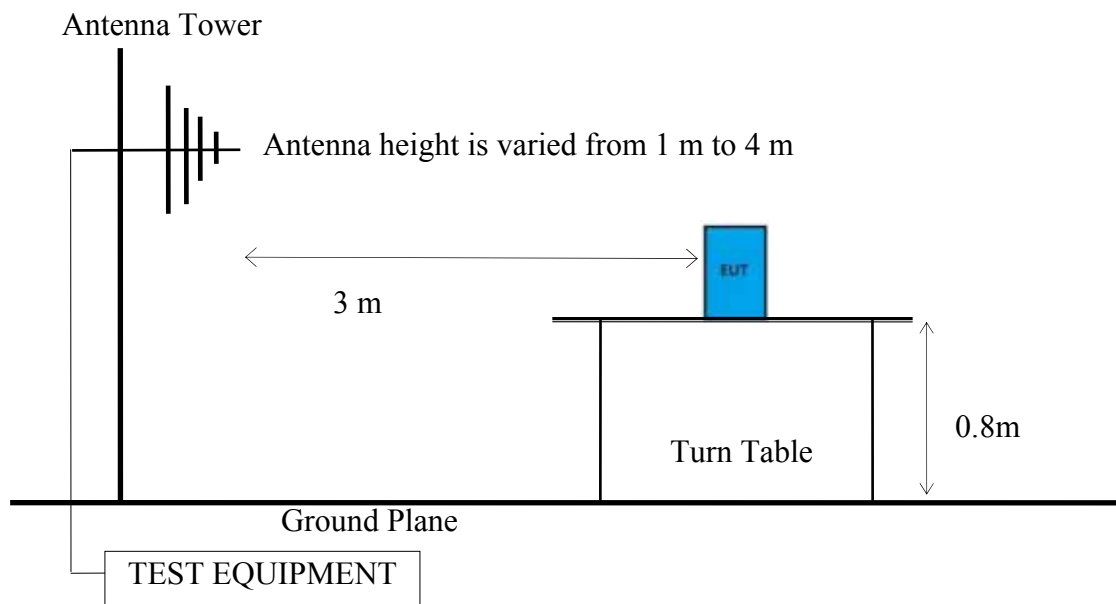
6. RADIATED EMISSION MEASUREMENT

6.1. Block Diagram of Test Setup

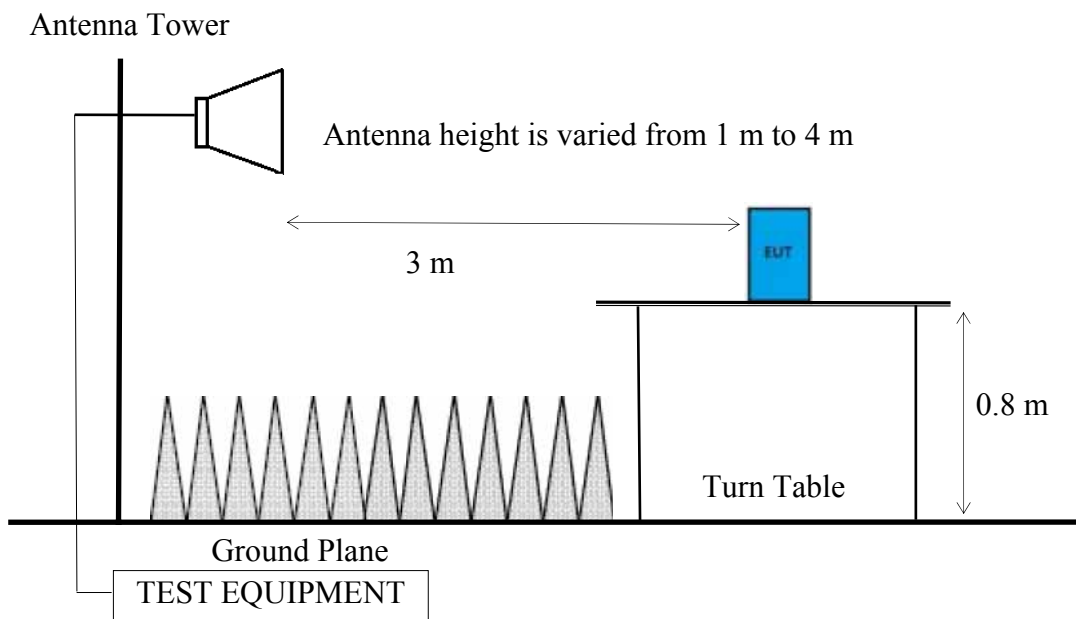
6.1.1. Block Diagram of connection between EUT and simulators

Indicated as section 3.7

6.1.2. Setup Diagram for 30-1000MHz



6.1.3. Semi-Anechoic Chamber (3m) 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, must also comply with the radiated emission limits specified as below.

Frequency (MHz)	Distance(m)	Field Strengths Limits	
		$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
Above 1000	3	74.0 $\text{dB}\mu\text{V/m}$ (Peak) 54.0 $\text{dB}\mu\text{V/m}$ (Average)	

Remark : (1) $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$

- (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 C63.4: 8.3.2.2, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

6.3. Test Procedure

The EUT setup on the turn find table which has 80 cm 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 C63.4-2009 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.
- (7) When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required. Otherwise using Q.P. for finally measurement.

Frequency above 1GHz to 10th harmonic:

Peak Measurement:

- (1) RBW = 1 MHz
- (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.
- (7) When peak-detected value is lower than limit that the measurement using the average detector is not required. Otherwise using average detector for finally measurement.

Average Measurement:

☐ **Option 1:**

- (1) RBW = 1 MHz
- (2) VBW = 1/T
- (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 = Peak Emission Level + D.C.C.F.

6.4. Measurement Result Explanation

Peak Emission Level = Antenna Factor + Cable Loss + Meter Reading

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

Duty Cycle Correction Factor (DCCF) = $20\log(TX_{on}/TX_{on+off})$ presented in section 3.4

6.5. Test Results

PASSED.

Test Date	2015/04/10	Temp./Hum.	22°C/48%
Test Voltage	DC 6V		

6.5.1. Emissions within Restricted Frequency Bands

6.5.1.1. Frequency Below 1GHz

Frequency	TX 2407.5MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
95.96	10.23	3.19	27.64	41.06	43.50	2.44	Peak
240.49	11.86	4.27	28.79	44.92	46.00	1.08	Peak
408.30	15.69	5.73	21.88	43.30	46.00	2.70	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
31.94	17.52	2.37	18.52	38.41	40.00	1.59	Peak
95.96	10.23	3.19	27.15	40.57	43.50	2.93	Peak
408.30	15.69	5.73	19.47	40.89	46.00	5.11	Peak

Frequency	TX 2435.5MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
95.96	10.23	3.19	27.74	41.16	43.50	2.34	Peak
239.52	11.76	4.26	28.61	44.63	46.00	1.37	Peak
408.30	15.69	5.73	21.75	43.17	46.00	2.83	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
30.97	18.07	2.34	17.96	38.37	40.00	1.63	Peak
95.96	10.23	3.19	27.22	40.64	43.50	2.86	Peak
408.30	15.69	5.73	18.88	40.30	46.00	5.70	Peak

Frequency	TX 2467.5MHz
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Antenna at Horizontal Polarization

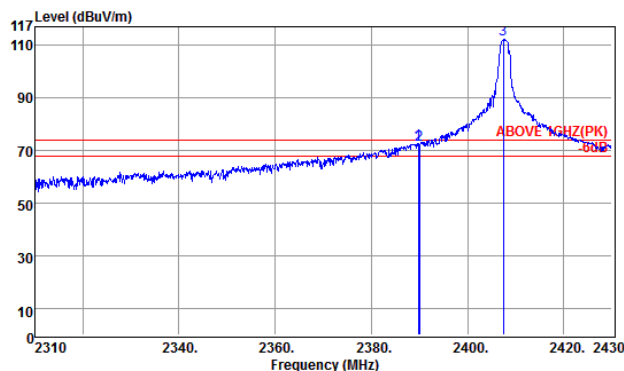
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
95.96	10.23	3.19	27.72	41.14	43.50	2.36	Peak
240.49	11.86	4.27	27.69	43.82	46.00	2.18	Peak
384.05	15.20	5.51	21.49	42.20	46.00	3.80	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
32.91	17.04	2.38	18.72	38.14	40.00	1.86	Peak
95.96	10.23	3.19	27.44	40.86	43.50	2.64	Peak
408.30	15.69	5.73	19.13	40.55	46.00	5.45	Peak

6.5.1.2. Frequency Above 1 GHz to 10th harmonics

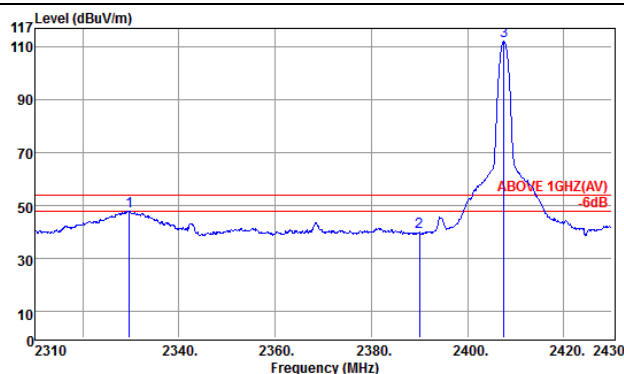
Band Edge:



Site no. : Audix NO.1 3m Chamber Data no. : 3
Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
Limit : ABOVE 1GHZ(PK)
Env. / Ins. : 22°C/48% N9010A Engineer : Chuntse_Wu
EUT : R3008SB
Power Rating : DC 6V
Test Mode : Tx 2407.5MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2389.80	28.40	5.24	39.10	72.74	74.00	1.26	Peak
2	2390.04	28.40	5.24	38.36	72.00	74.00	2.00	Peak
3	2407.44	28.42	5.26	78.38	112.06	74.00	-38.06	Peak

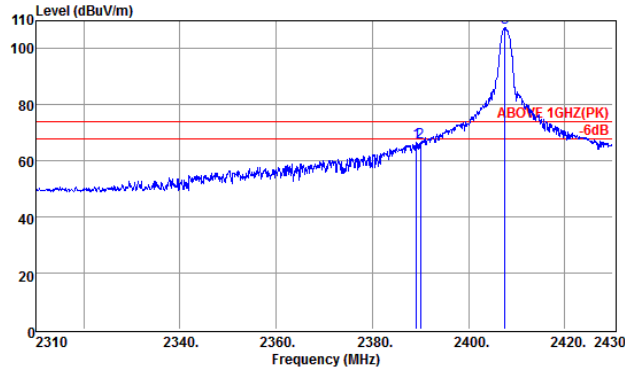
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : Audix NO.1 3m Chamber Data no. : 4
Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
Limit : ABOVE 1GHZ(AV)
Env. / Ins. : 22°C/48% N9010A Engineer : Chuntse_Wu
EUT : R3008SB
Power Rating : DC 6V
Test Mode : Tx 2407.5MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2329.68	28.34	5.15	14.44	47.93	54.00	6.07	Average
2	2390.04	28.40	5.24	6.34	39.98	54.00	14.02	Average
3	2407.56	28.42	5.26	78.37	112.05	54.00	-58.05	Average

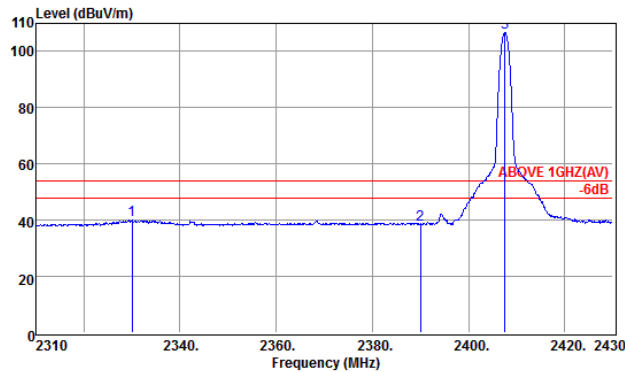
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : Audix NO.1 3m Chamber Data no. : 1
Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
Limit : ABOVE 1GHZ(PK)
Env. / Ins. : 22°C/48% N9010A Engineer : Chuntse_Wu
EUT : R3008SB
Power Rating : DC 8V
Test Mode : Tx 2407.5MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2389.20	28.40	5.24	32.84	66.48	74.00	7.52	Peak
2	2390.04	28.40	5.24	32.83	66.47	74.00	7.53	Peak
3	2407.56	28.42	5.26	73.89	107.57	74.00	-33.57	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.



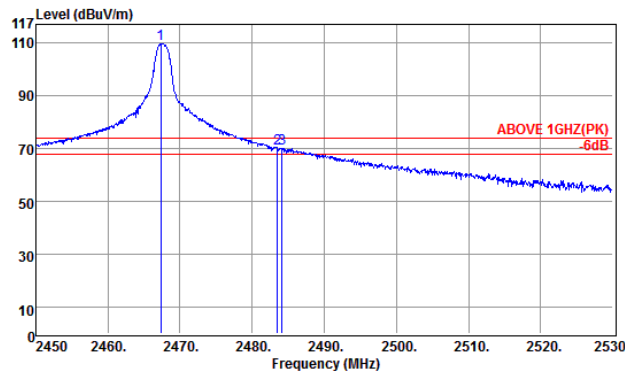
Site no. : Audix NO.1 3m Chamber Data no. : 2
Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
Limit : ABOVE 1GHZ(AV)
Env. / Ins. : 22°C/48% N9010A Engineer : Chuntse_Wu
EUT : R3008SB
Power Rating : DC 8V
Test Mode : Tx 2407.5MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2330.04	28.34	5.15	6.61	40.10	54.00	13.90	Average
2	2390.04	28.40	5.24	4.85	38.49	54.00	15.51	Average
3	2407.56	28.42	5.26	73.07	106.75	54.00	-52.75	Average

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

AUDIX Technology Corp.
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New Taipei City 244, Taiwan

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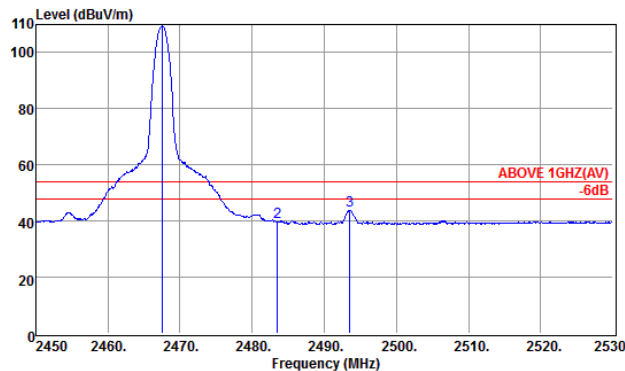


Site no. : Audix NO.1 3m Chamber
Dis. / Ant. : 3m 3115(4927)
Limit : ABOVE 1GHZ(PK)
Env. / Ins. : 22°C/48% N9010A
EUT : R3006SB
Power Rating : DC 6V
Test Mode : Tx 2487.5MHz

Data no. : 5
Ant. pol. : HORIZONTAL
Engineer : Chuntse_Wu

Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1 2487.38	28.47	5.34	75.74	109.55	74.00	-35.55	Peak
2 2483.52	28.49	5.37	36.23	70.09	74.00	3.81	Peak
3 2484.16	28.49	5.37	36.27	70.13	74.00	3.87	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : Audix NO.1 3m Chamber
Dis. / Ant. : 3m 3115(4927)
Limit : ABOVE 1GHZ(AV)
Env. / Ins. : 22°C/48% N9010A
EUT : R3006SB
Power Rating : DC 6V
Test Mode : Tx 2487.5MHz

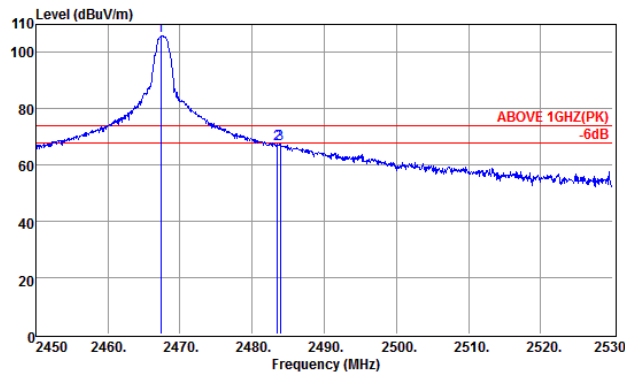
Data no. : 6
Ant. pol. : HORIZONTAL
Engineer : Chuntse_Wu

Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1 2487.60	28.47	5.35	75.80	109.42	54.00	-55.42	Average
2 2483.52	28.49	5.37	5.87	38.73	54.00	14.27	Average
3 2483.52	28.49	5.38	10.04	43.91	54.00	10.09	Average

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

AUDIX Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

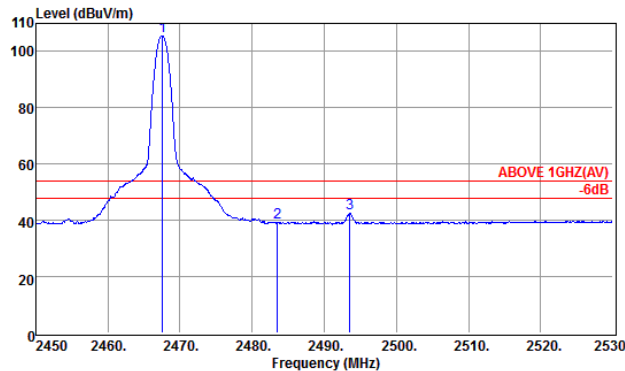
Tel: +886 2 26099301
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Site no. : Audix NO.1 3m Chamber Data no. : 7
Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
Limit : ABOVE 1GHZ(PK)
Env. / Ins. : 22°C/48% N9010A Engineer : Chuntse_Wu
EUT : R3006SB
Power Rating : DC 8V
Test Mode : Tx 2467.5MHz

Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1 2467.36	28.47	5.34	71.83	105.79	74.00	-31.79	Peak
2 2483.52	28.49	5.37	33.86	67.52	74.00	6.48	Peak
3 2483.92	28.49	5.37	33.72	67.58	74.00	6.42	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : Audix NO.1 3m Chamber Data no. : 8
Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
Limit : ABOVE 1GHZ(AV)
Env. / Ins. : 22°C/48% N9010A Engineer : Chuntse_Wu
EUT : R3006SB
Power Rating : DC 8V
Test Mode : Tx 2467.5MHz

Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1 2467.60	28.47	5.35	71.83	105.85	54.00	-51.85	Average
2 2483.52	28.49	5.37	5.42	39.28	54.00	14.72	Average
3 2493.52	28.49	5.38	8.66	42.53	54.00	11.47	Average

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

6.5.2. Emissions outside the frequency band:

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

Frequency	TX 2407.5MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2251.60	28.27	5.04	22.70	56.01	74.00	17.99	Peak
2330.56	28.34	5.15	22.68	56.17	74.00	17.83	Peak
4816.00	33.01	8.10	16.15	57.26	74.00	16.74	Peak

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
2251.60	56.01	-35.73	20.28	54.00	33.72
2330.56	56.17	-35.73	20.44	54.00	33.56
4816.00	57.26	-35.73	21.53	54.00	32.47

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2251.60	28.27	5.04	16.27	49.58	74.00	24.42	Peak
2330.56	28.34	5.15	18.89	52.38	74.00	21.62	Peak
4814.50	33.01	8.10	17.30	58.41	74.00	15.59	Peak
7224.00	35.80	9.98	8.87	54.65	74.00	19.35	Peak

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
2251.60	49.58	-35.73	13.85	54.00	40.15
2330.56	52.38	-35.73	16.65	54.00	37.35
4814.50	58.41	-35.73	22.68	54.00	31.32
7224.00	54.65	-35.73	18.92	54.00	35.08

Frequency	TX 2435.5MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2280.16	28.29	5.08	19.20	52.57	74.00	21.43	Peak
2357.44	28.37	5.19	18.16	51.72	74.00	22.28	Peak
4871.50	33.13	8.17	11.75	53.05	74.00	20.95	Peak

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
2280.16	52.57	-35.73	16.84	54.00	37.16
2357.44	51.72	-35.73	15.99	54.00	38.01
4871.50	53.05	-35.73	17.32	54.00	36.68

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2357.44	28.37	5.19	15.53	49.09	74.00	24.91	Peak
4871.50	33.13	8.17	12.08	53.38	74.00	20.62	Peak

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
2357.44	49.09	-35.73	13.36	54.00	40.64
4871.50	53.38	-35.73	17.65	54.00	36.35

Frequency	TX 2467.5MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2312.08	28.32	5.13	15.91	49.36	74.00	24.64	Peak
4934.50	33.25	8.23	12.83	54.31	74.00	19.69	Peak

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
2312.08	49.36	-35.73	13.63	54.00	40.37
4934.50	54.31	-35.73	18.58	54.00	35.42

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4936.00	33.25	8.23	14.37	55.85	74.00	18.15	Peak

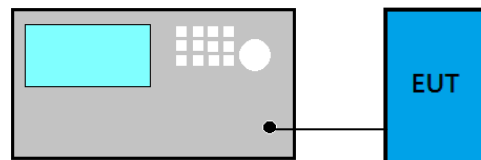
Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
4936.00	55.85	-35.73	20.12	54.00	33.88

6.5.3. Emissions in Non-restricted Frequency Bands

All emission levels below the 15.209 general radiated emissions limits is not required.

7. 20dB BANDWIDTH MEASUREMENT

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 DA00-705:

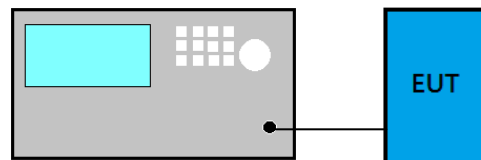
- (1) Set RBW close to 1% of OBW.
- (2) Set $VBW \geq RBW$.
- (3) Detector = Peak.
- (4) Trace mode = max hold.
- (5) Sweep = auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x dB to -20 dB to record the final bandwidth.

7.4. Test Results

Please refer to Appendix A

8. CARRIER FREQUENCY SEPARATION MEASUREMENT

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 DA00-705:

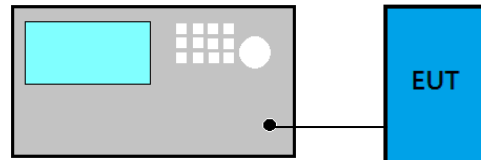
- (1) Span = wide enough to capture the peaks of two adjacent channels
- (2) RBW $\geq$ 1% of the span
- (3) VBW $\geq$ RBW
- (4) Sweep = auto
- (5) Detector function = peak
- (6) Trace = max hold

8.4. Test Results

Please refer to Appendix A

9. TIME OF OCCUPANCY MEASUREMENT

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 DA00-705:

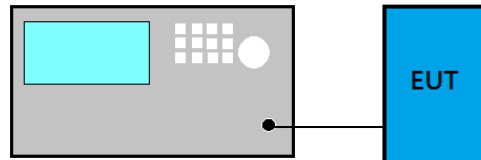
- (1) Span = zero span, centered on a hopping channel
- (2) RBW = 1 MHz
- (3) VBW $\geq$ RBW
- (4) Sweep = as necessary to capture the entire dwell time per hopping channel
- (5) Detector function = peak
- (6) Trace = max hold

9.4. Test Results

Please refer to Appendix A

10. NUMBER OF HOPPING CHANNELS MEASUREMENT

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 DA00-705:

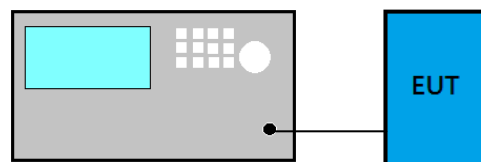
- (1) Span = the frequency band of operation
- (2) RBW $\geq$ 1% of the span
- (3) VBW $\geq$ RBW
- (4) Sweep = auto
- (5) Detector function = peak
- (6) Trace = max hold

10.4. Test Results

Please refer to Appendix A

11. MAXIMUM PEAK OUTPUT POWER MEASUREMENT

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 DA00-705:

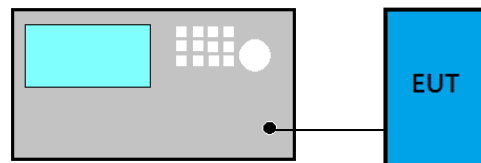
- (1) Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
- (2) RBW $\geq$ 1% of the span
- (3) VBW $\geq$ RBW
- (4) Sweep = auto
- (5) Detector function = peak
- (6) Trace = max hold

11.4. Test Results

Please refer to Appendix A

12. EMISSION LIMITATIONS MEASUREMENT

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. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (See Section 15.205(c)). (※ This test result attaching to §3.6.3)

12.3. Test Procedure

Following measurement procedure is reference to DA00-705:

- (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 ≥ RBW
- (4) Sweep = auto
- (5) Detector function = peak
- (6) Trace = max hold

12.4. Test Results

Please refer to Appendix A

13.DEVIATION TO TEST SPECIFICATIONS

【NONE】



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APPENDIX A

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APPDNDIX A

TEST PLOTS

(Model: R3006SB)

File Number: C1M1503324

Report Number: EM-F150185

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A.1 20DB BANDWIDTH MEASUREMENT

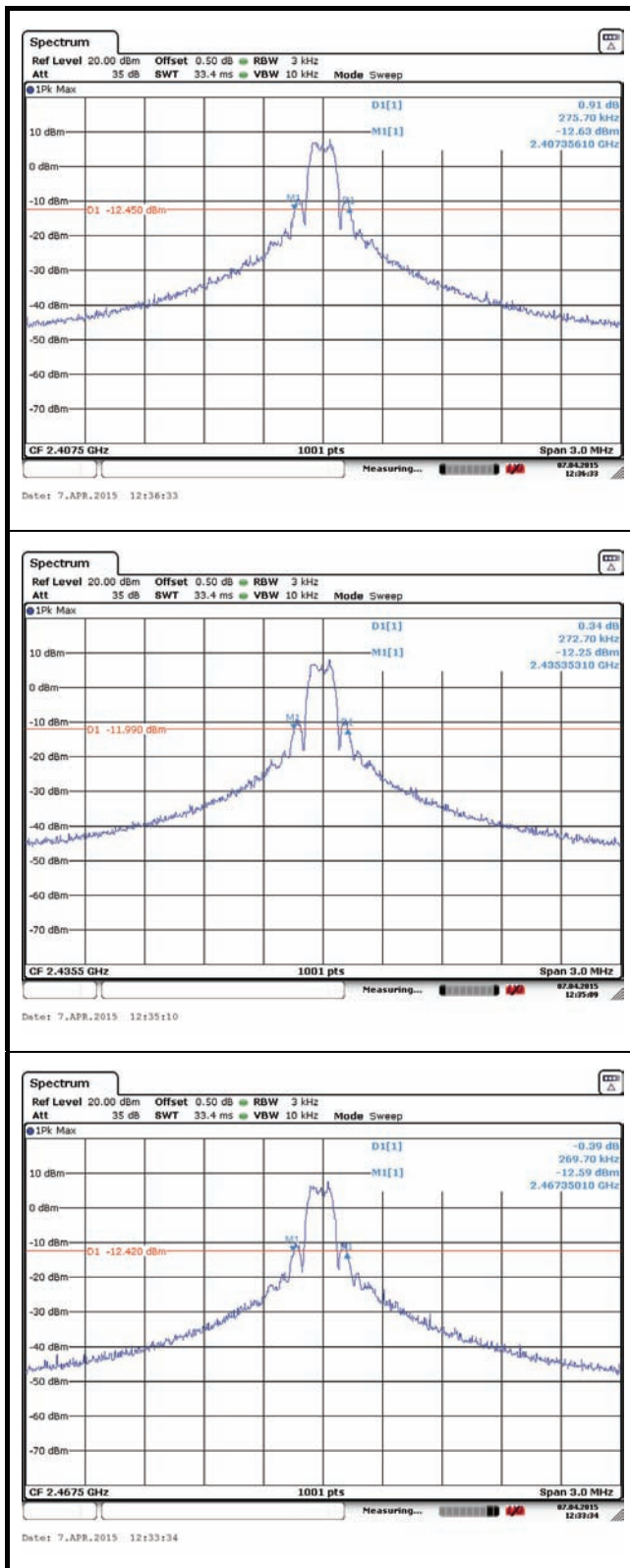
Test Date	2015/04/07	Temp./Hum.	25°C/58%
Cable Loss	0.5dB	Test Voltage	DC 6V

A.1.1 20dB Bandwidth Result

Centre Frequency (MHz)	20 dB Bandwidth (MHz)	Limit 2/3 (20dB Bandwidth)
2407.500	0.27570	0.18380
2435.500	0.27270	0.18180
2467.500	0.26970	0.17980

Remark: The maximum two-thirds of the 20dB bandwidth shall be at maximum 0.18380kHz.

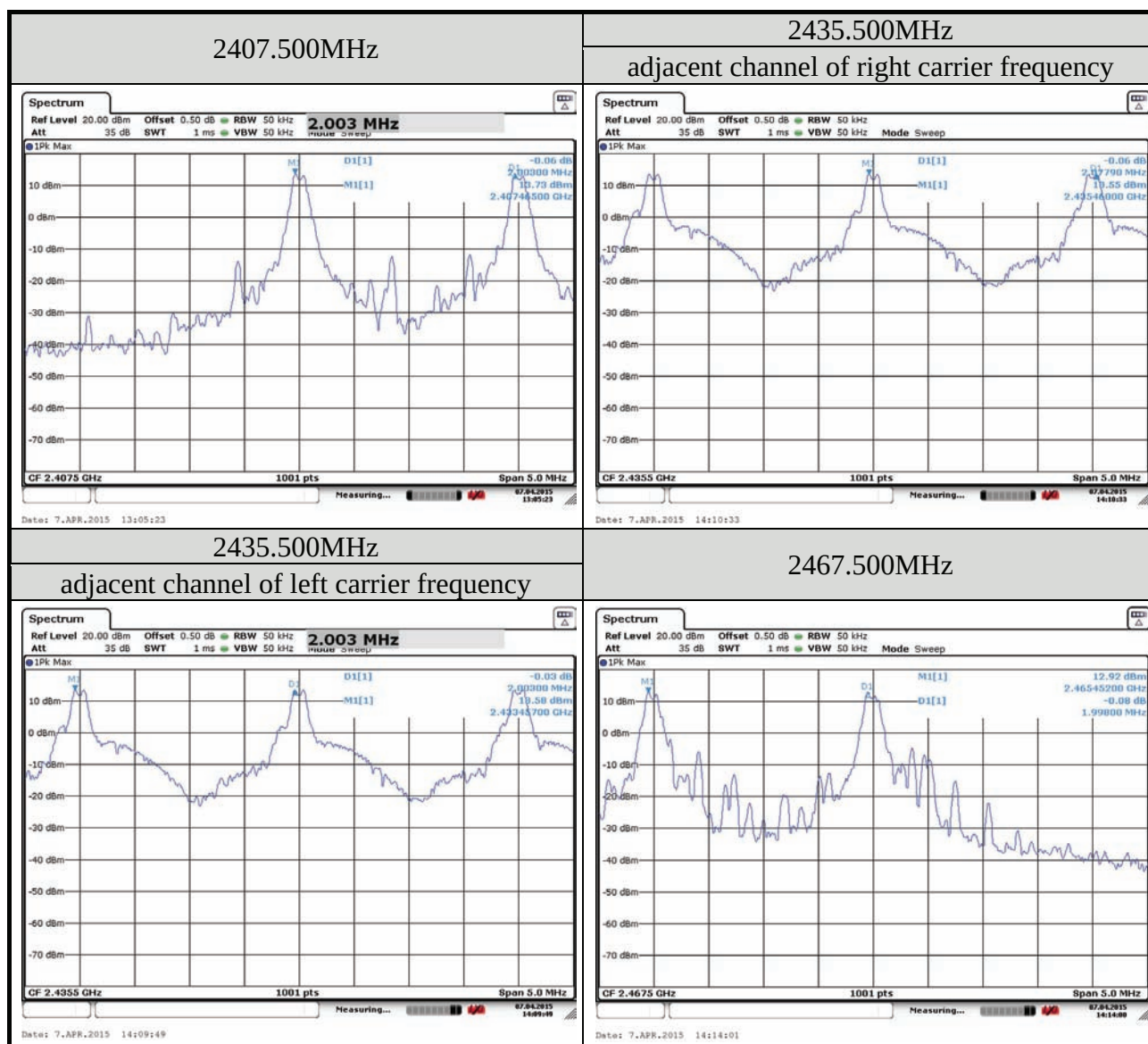
A.1.2 Measurement Plots



A.2 CARRIER FREQUENCY SEPARATION MEASUREMENT

Test Date	2015/04/07	Temp./Hum.	25°C/58%
Cable Loss	0.5dB	Test Voltage	DC 6V

A.2.1 Measurement Plots



A.3 TIME OF OCCUPANCY MEASUREMENT

Test Date	2015/04/07	Temp./Hum.	25°C/58%
Cable Loss	0.5dB	Test Voltage	DC 6V

A.3.1 Time of Occupancy

Centre Frequency (MHz)	Time of Occupancy (ms)	Maximum accumulated Time of Occupancy (ms)	Limit (ms)
2407.500	1.635	20.274	<400
2435.500	1.635	20.274	<400
2467.500	1.635	20.274	<400

Duty cycle: 31 channels*0.4 seconds = 12.4 seconds

Test Frequency: 2407.500MHz

For each second of 1 channel appearance, the longest time of occupancy for each of 12.4 seconds is:

$$1\text{channels} \times 12.4\text{ seconds} \times 1.635\text{ms} = 20.274\text{ms}$$

Test Frequency: 2435.500MHz

For each second of 1 channel appearance, the longest time of occupancy for each of 12.4 seconds is:

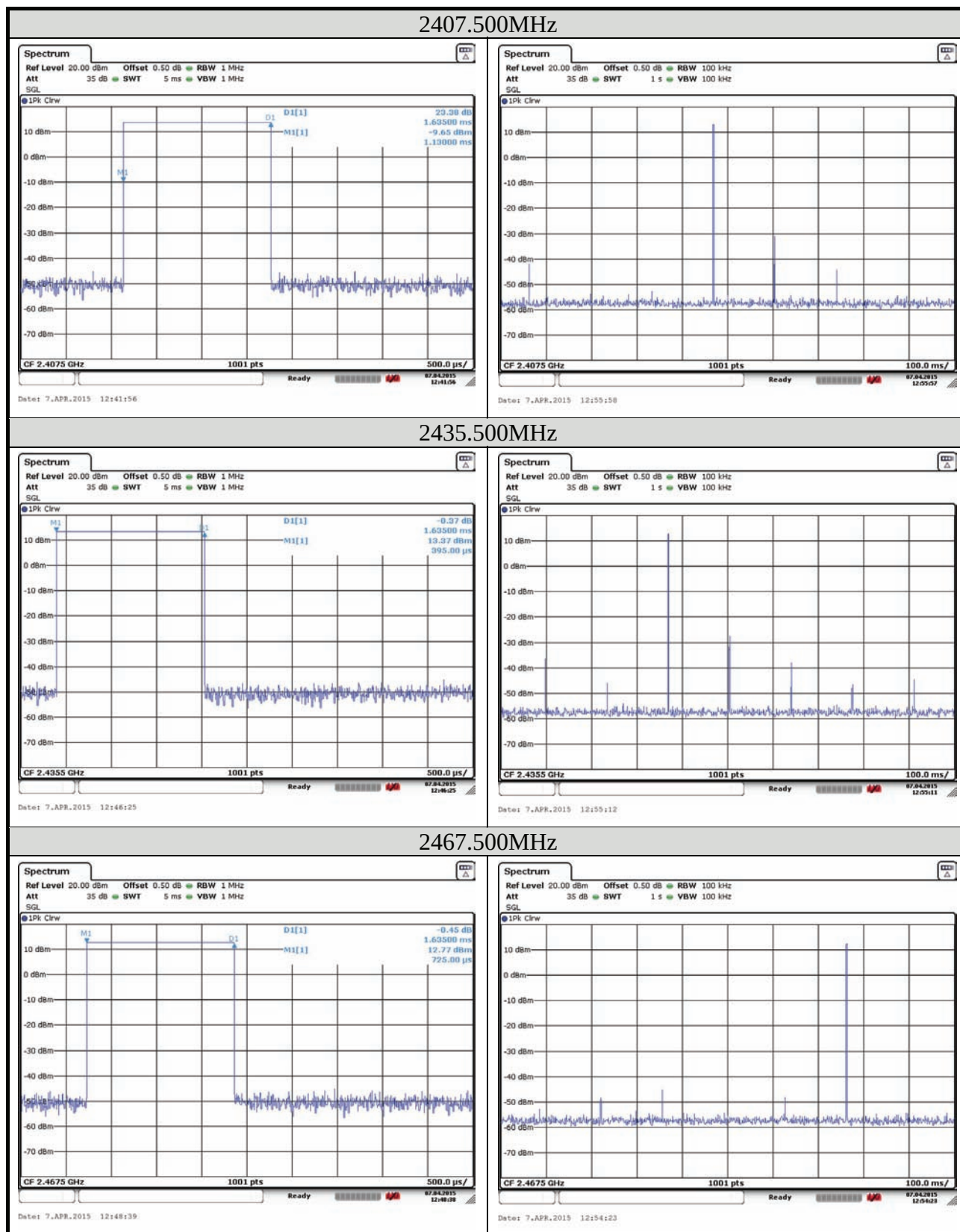
$$1\text{channel} \times 12.4\text{ seconds} \times 1.635\text{ms} = 20.274\text{ms}$$

Test Frequency: 2467.500MHz

For each second of 1 channel appearance, the longest time of occupancy for each of 12.4 seconds is:

$$1\text{channel} \times 12.4\text{ seconds} \times 1.635\text{ms} = 20.274\text{ms}$$

A.3.2 Measurement Plots



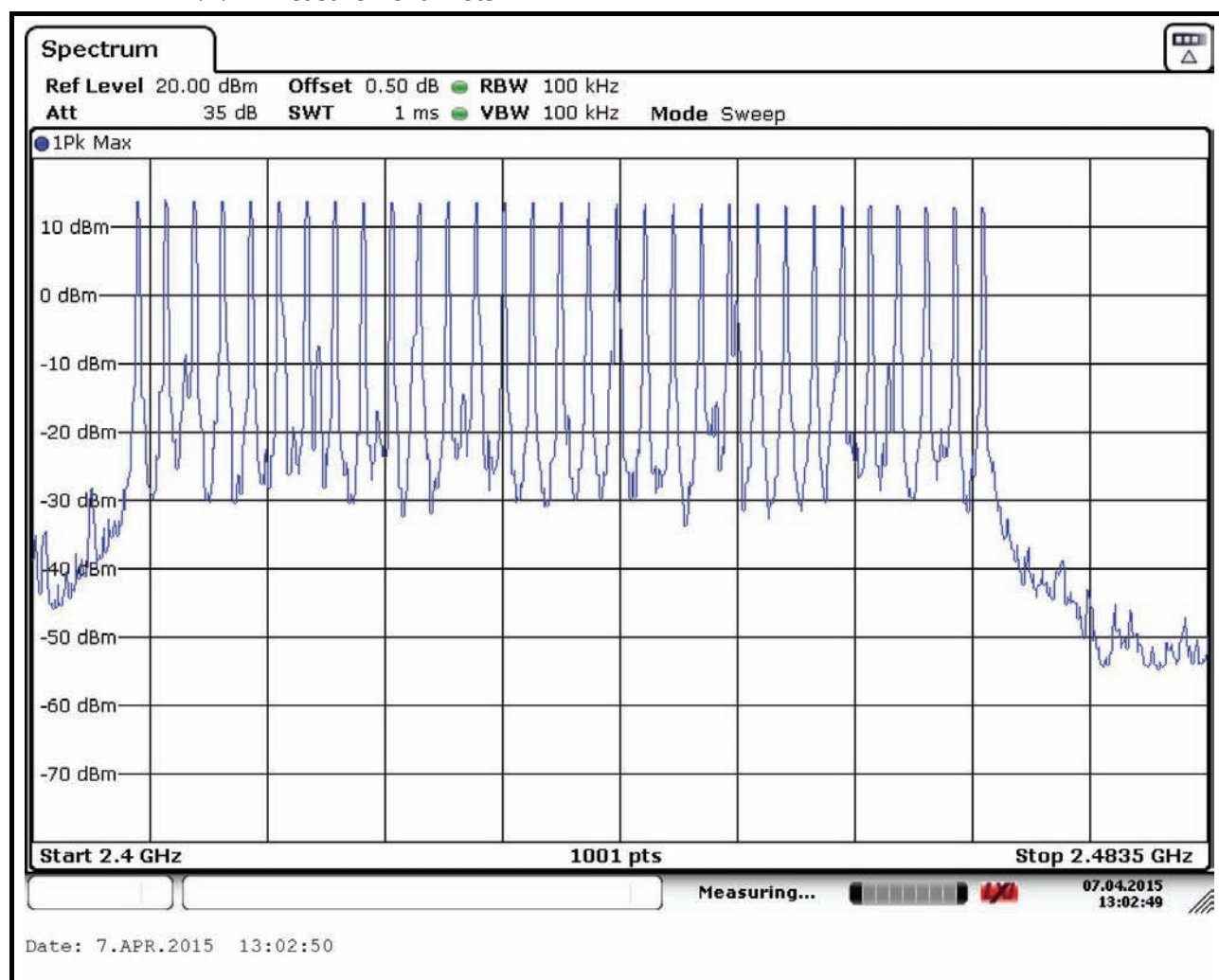
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A.4 NUMBER OF HOPPING CHANNELS MEASUREMENT

Test Date	2015/04/11	Temp./Hum.	25°C/58%
Cable Loss	0.5dB	Test Voltage	DC 6V

A.4.1 Measurement Plots



The number hopping channel is 31.

A.5 MAXIMUM PEAK OUTPUT POWER MEASUREMENT

Test Date	2015/04/07	Temp./Hum.	25°C/58%
Cable Loss	0.5dB	Test Voltage	DC 6V

A.5.1 Output Power

Test ANT: ANT A

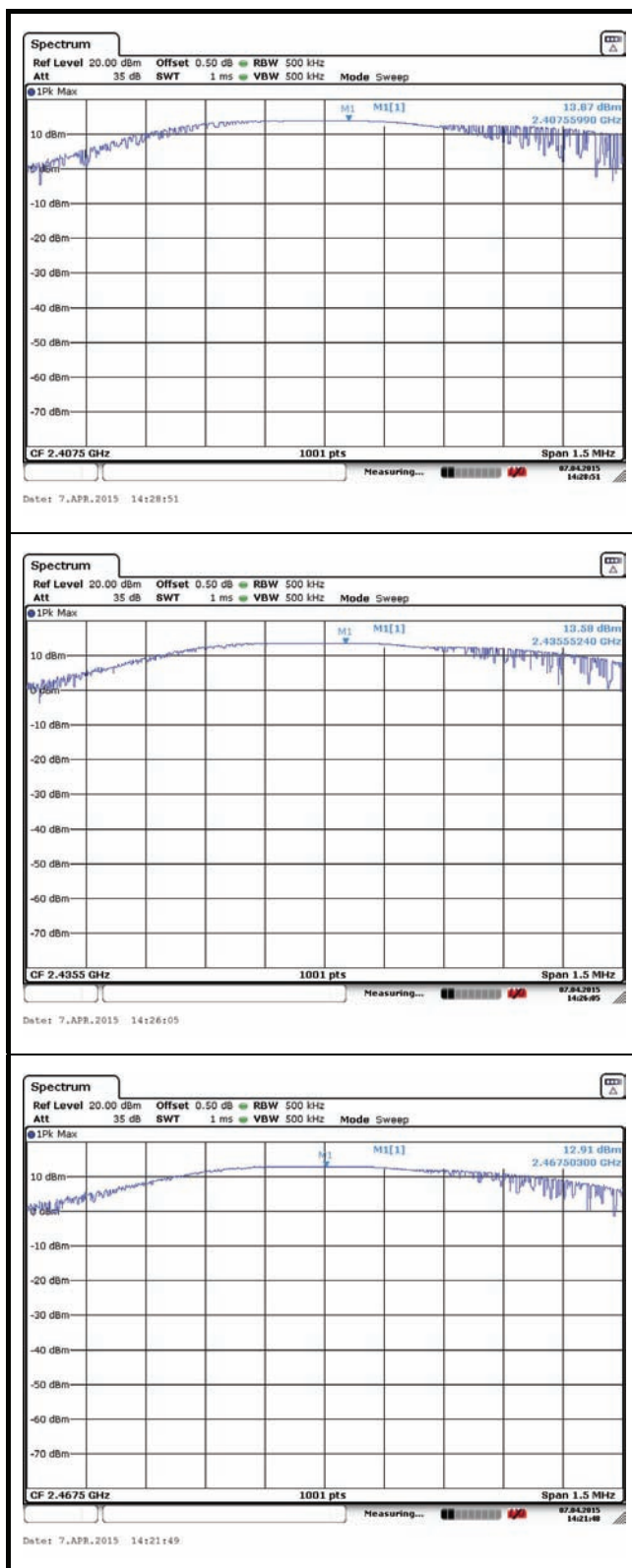
Centre Frequency (MHz)	Peak Output Power		Limit
	dBm	W	
2407.500	13.87	0.024	21dBm (0.125W)
2435.500	13.58	0.023	
2467.500	12.91	0.020	

Test ANT: ANT B

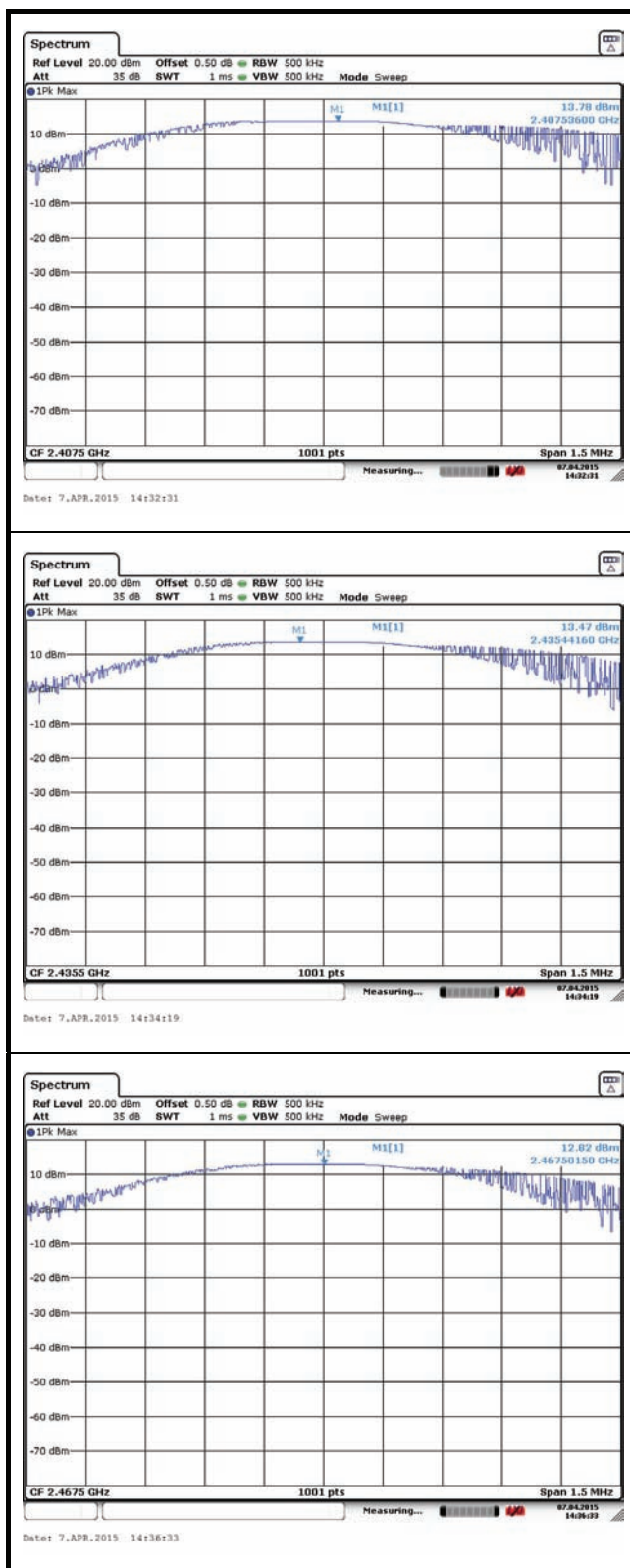
Centre Frequency (MHz)	Peak Output Power		Limit
	dBm	W	
2407.500	13.78	0.024	21dBm (0.125W)
2435.500	13.47	0.022	
2467.500	12.82	0.019	

A.5.2 Measurement Plots

Test ANT: ANT A



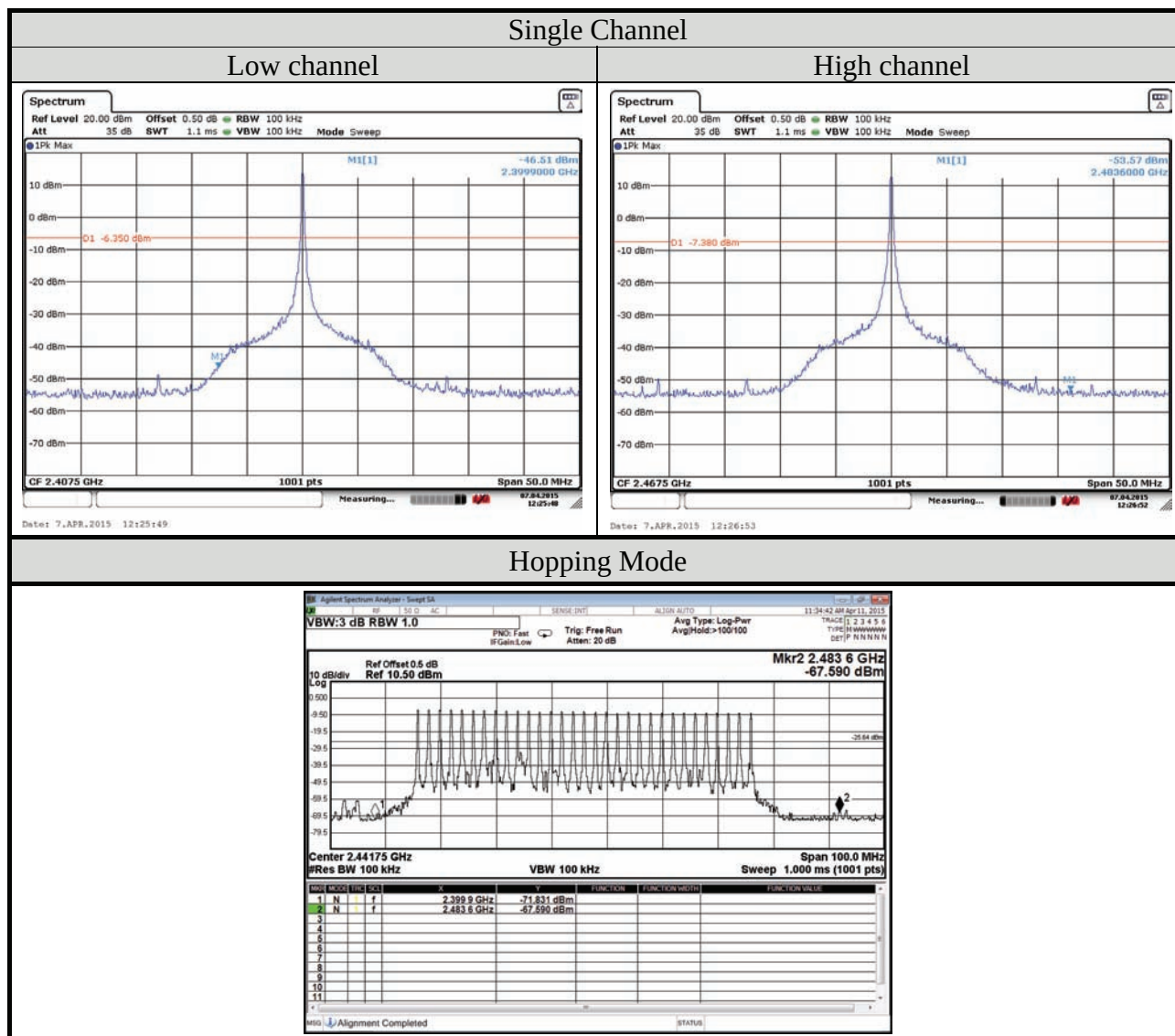
Test ANT: ANT B



A.6 EMISSION LIMITATIONS MEASUREMENT

A.6.1 Band Edge

Test Date	2015/04/07 ~ 2015/04/11	Temp./Hum.	25°C/58%
Cable Loss	0.5dB	Test Voltage	DC 6V

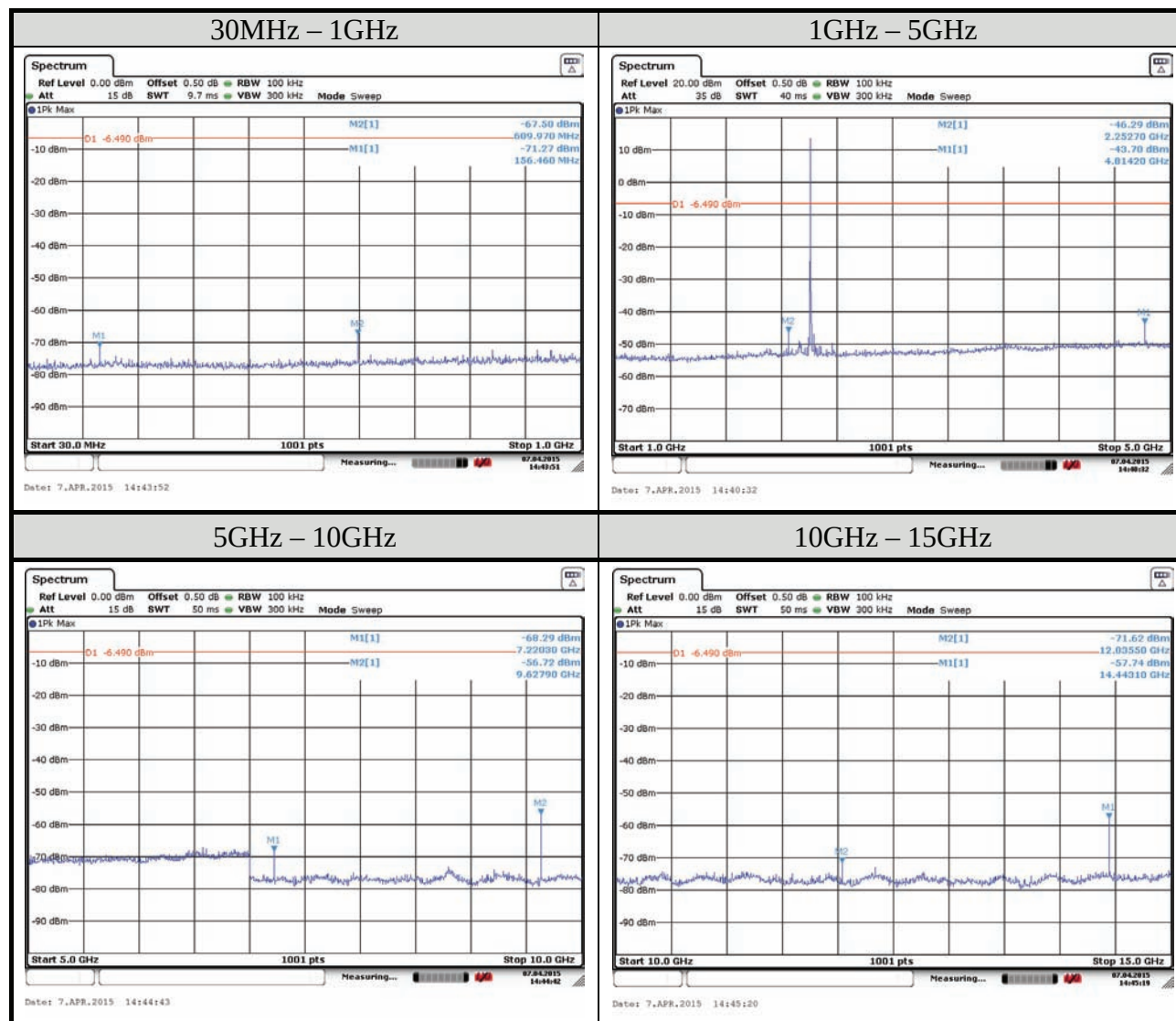


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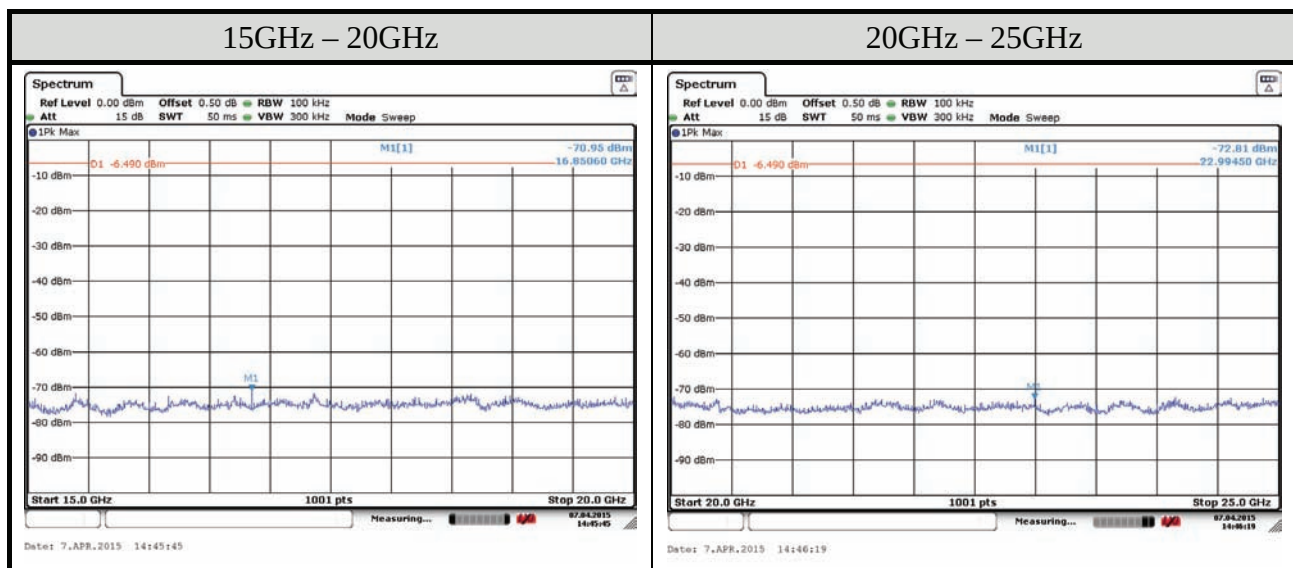
A.6.2 Spurious Emission

Test Date	2015/04/07	Temp./Hum.	25°C/58%
Mode	TX	Frequency	2407.500MHz
Cable Loss	0.5dB	Test Voltage	DC 6V



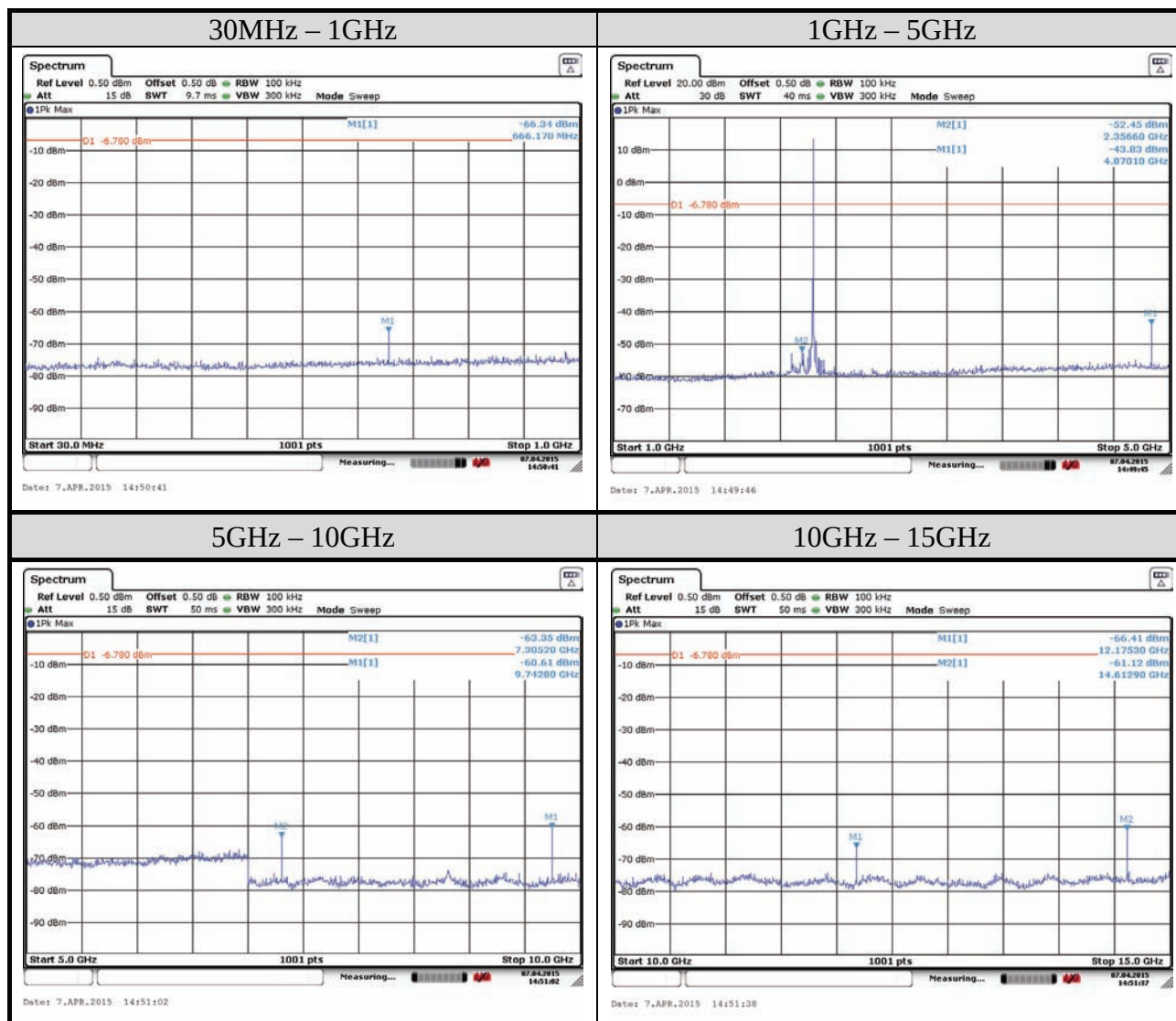
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Note: All results have been included cable loss and simultaneous factor.

Test Date	2015/04/07	Temp./Hum.	25°C/58%
Mode	TX	Frequency	2437.500MHz
Cable Loss	0.5dB	Test Voltage	DC 6V



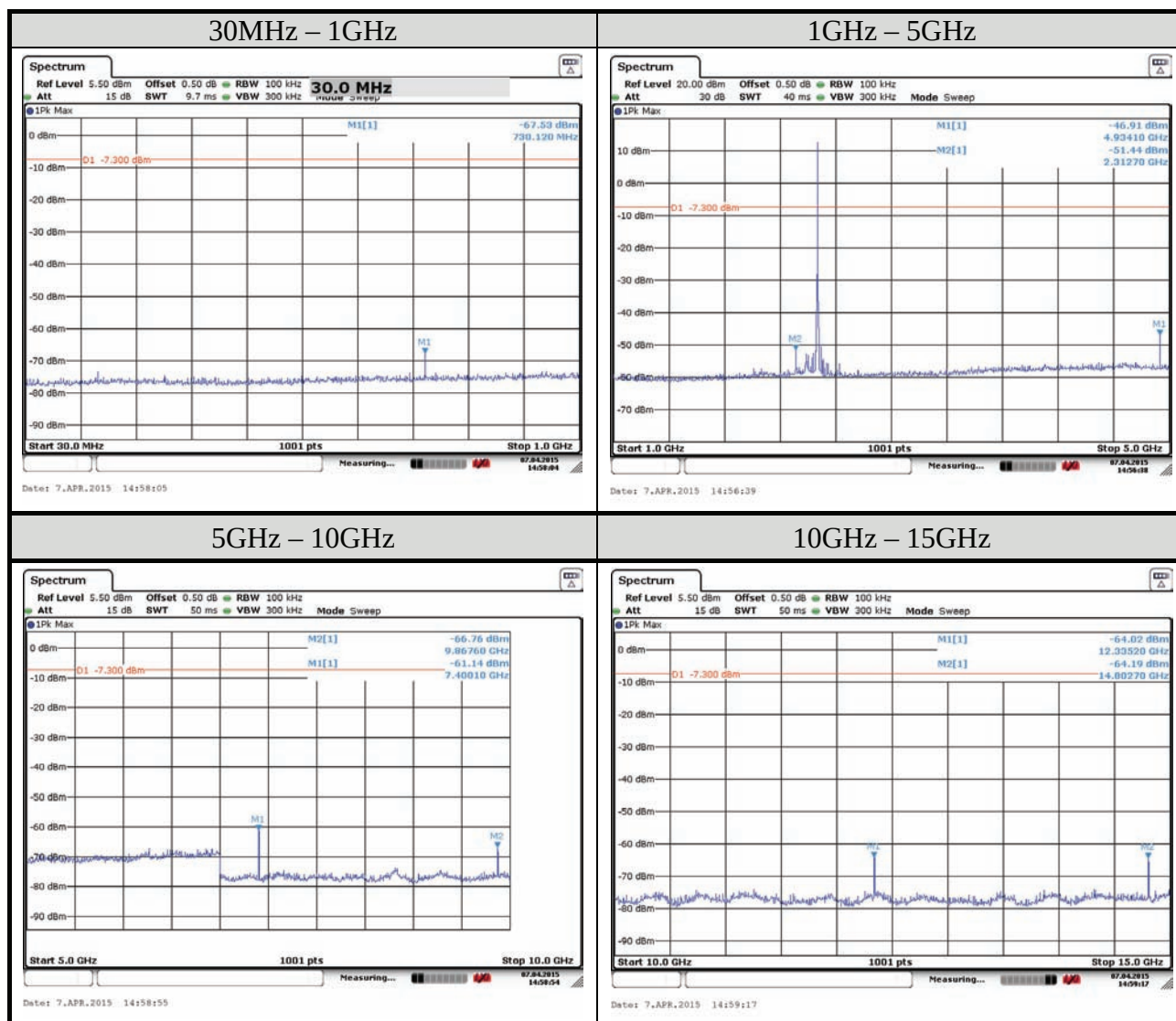
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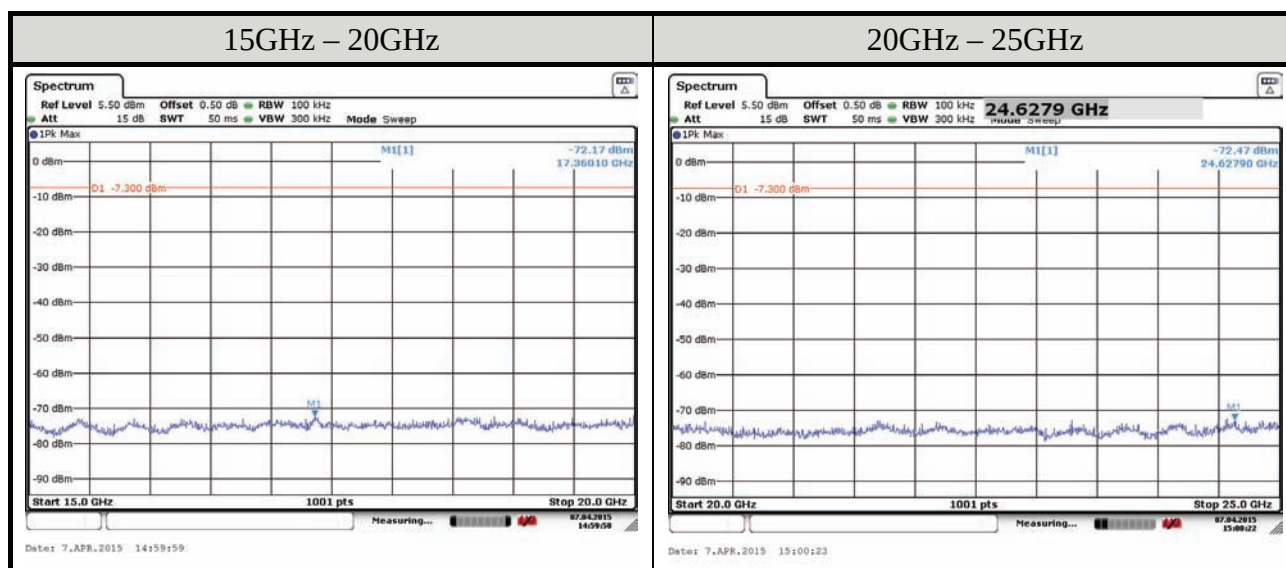
Note: All results have been included cable loss and simultaneous factor.

Test Date	2015/04/07	Temp./Hum.	25°C/58%
Mode	TX	Frequency	2467.500MHz
Cable Loss	0.5dB	Test Voltage	DC 6V



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Note: All results have been included cable loss and simultaneous factor.