

FCC 15.247 2.4 GHz Report

for

Tatung Company

22, Chungshan N. Rd., 3rd Sec. Taipei Taiwan

Product Name : IOT Gateway
Model Name : IOT-3352
Brand : TATUNG
FCC ID : BJM-IOT3352

**Prepared by: : AUDIX Technology Corporation,
EMC Department**



TABLE OF CONTENTS

Description	Page
TEST REPORT CERTIFICATION.....	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.....	9
3.4. EUT Specifications Assessed in Current Report.....	9
3.5. Data Rate Relative to Output Power.....	11
3.6. Test Configuration.....	12
3.7. Tested Supporting System List.....	14
3.8. Setup Configuration.....	14
3.9. Operating Condition of EUT.....	14
3.10. Description of Test Facility.....	15
3.11. Measurement Uncertainty.....	15
4. MEASUREMENT EQUIPMENT LIST.....	16
4.1. Conducted Emission Measurement.....	16
4.2. Radiated Emission Measurement.....	16
4.3. RF Conducted Measurement.....	16
5. CONDUCTED EMISSION.....	17
5.1. Block Diagram of Test Setup.....	17
5.2. Conducted Emission Limit.....	17
5.3. Test Procedure.....	18
5.4. Test Results.....	18
6. RADIATED EMISSION.....	19
6.1. Block Diagram of Test Setup.....	19
6.2. Radiated Emission Limits.....	20
6.3. Test Procedure.....	21
6.4. Measurement Result Explanation.....	22
6.5. Test Results.....	22
7. 6dB BANDWIDTH.....	23
7.1. Block Diagram of Test Setup.....	23
7.2. Specification Limits.....	23
7.3. Test Procedure.....	23
7.4. Test Results.....	23
8. MAXIMUM PEAK OUTPUT POWER.....	24
8.1. Block Diagram of Test Setup.....	24
8.2. Specification Limits.....	24
8.3. Test Procedure.....	25
8.4. Test Results.....	25
9. EMISSION LIMITATIONS.....	26
9.1. Block Diagram of Test Setup.....	26
9.2. Specification Limits.....	26

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9.3. Test Procedure	26
9.4. Test Results	27
10. POWER SPECTRAL DENSITY	28
10.1. Block Diagram of Test Setup	28
10.2. Specification Limits	28
10.3. Test Procedure	28
10.4. Test Results	28
11. DEVIATION TO TEST SPECIFICATIONS	29

APPENDIX A TEST DATA AND PLOTS

APPENDIX B TEST PHOTOGRAPHS

TEST REPORT CERTIFICATION

Applicant : Tatung Company
EUT Description
(1) Product : IOT Gateway
(2) Model : IOT-3352
(3) Brand : TATUNG

Applicable Standards:

47 CFR FCC Part 15 Subpart C
ANSI C63.10:2013
KDB 558074 D01 DTS Meas Guidance v04

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: 2017. 05. 19

Reviewed by: Annie Yu (Annie Yu/Administrator)

Approved by: Ben Cheng (Ben Cheng/Manager)

1. REVISION RECORD OF TEST REPORT

Edition No	Issued Data	Revision Summary	Report Number
0	2017. 05. 19	Original Report	EM-F170245

2. SUMMARY OF TEST RESULTS

Rule	Description	Results
15.207	Conducted Emission	PASS
15.247(d)/15.205	Radiated Band Edge and Radiated Spurious Emission	PASS
15.247(a)(2)	6dB Bandwidth	PASS
15.247(b)(3)	Maximum Peak Output	PASS
15.247(d)	Conducted Band Edges and Conducted Spurious Emission	PASS
15.247 (e)	Peak Power Spectral Density	PASS
15.203	Antenna Requirement	PASS

3. GENERAL INFORMATION

3.1. Description of Application

Applicant	Tatung Company 22, Chungshan N. Rd., 3rd Sec. Taipei Taiwan
Product	IOT Gateway
Model	IOT-3352
Brand	TATUNG

3.2. Description of EUT

Test Model	IOT-3352	
Serial Number	N/A	
Power Rating	DC 12V	
RF Features	WLAN: 802.11/b/g/n Bluetooth: BT and BLE	
Transmit Type	2.4 GHz	
	802.11b	1T1R
	802.11g	1T1R
	802.11n-HT20	1T1R
	802.11n-HT40	1T1R
	BT/BLE	1T1R
Interface Ports of EUT	One DC IN port One LAN port Two USB ports	
Accessories	• LTE USB Stick (HUAWEI, Model: E3327h-510, FCC ID: QISE3372H-510) • I.T.E. Power Supply (Wall-mount, 2C) (UNIFIVE, M/N: UV324-1220, Input: AC 100-240V, 50/60Hz, 0.6A, Output: DC 12V, 2A, Power Cord: Unshielded, Undetachable, 1.1m)	
Date of Receipt	2017. 03. 23	
Date of Test	2017. 04. 14 ~ 05. 15	

3.3. Antenna Information

Antenna Part Number	Manufacture	Antenna Type	Frequency (MHz)	Max Gain (dBi)
AN2400-5533RS	INVAX System Technology Corp.	Omni-Directional	2400 to 2500	2.2

3.4. EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number
802.11b	2412-2462	11
802.11g		11
802.11n-HT20		11
802.11n-HT40	2422-2452	7
BLE	2402-2480	40

Mode	Modulation	Data Rate (Mbps)
802.11b	DSSS (DBPSK/DQPSK/CCK)	Up to 11
802.11g	OFDM (BPSK/QPSK/16QAM/64QAM)	Up to 54
802.11n-HT20		Up to 144.4
802.11n-HT40		Up to 150
BLE	GFSK	1

Channel List			
802.11 b/g/n-HT20		802.11n-HT40	
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
1	2412		
2	2417		
3	2422		
4	2427	3	2422
5	2432	4	2427
6	2437	5	2432
7	2442	6	2437
8	2447	7	2442
9	2452	8	2447
10	2457	9	2452
11	2462		

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

3.5. Data Rate Relative to Output Power

802.11b							
Channel	Modulation			Date Rate (Mbps)		Power (dBm)	
1	DBPSK			1		17.23	
1	DQPSK			2		17.22	
1	CCK			5.5		17.20	
1	CCK			11		17.18	
802.11g							
Channel	Modulation			Date Rate (Mbps)		Power (dBm)	
1	BPSK			6		14.23	
1	BPSK			9		14.23	
1	QPSK			12		14.22	
1	QPSK			18		14.22	
1	16-QAM			24		14.22	
1	16-QAM			36		14.21	
1	64-QAM			48		14.21	
1	64-QAM			54		14.20	
802.11n-HT20				802.11n-HT40			
Channel	Modulation	Date Rate	Power (dBm)	Channel	Modulation	Date Rate	Power (dBm)
1	BPSK	MCS0	13.76	3	BPSK	MCS0	13.21
1	QPSK	MCS1	13.75	3	QPSK	MCS1	13.21
1	QPSK	MCS2	13.75	3	QPSK	MCS2	13.20
1	16-QAM	MCS3	13.74	3	16-QAM	MCS3	13.20
1	16-QAM	MCS4	13.74	3	16-QAM	MCS4	13.19
1	64-QAM	MCS5	13.74	3	64-QAM	MCS5	13.19
1	64-QAM	MCS6	13.74	3	64-QAM	MCS6	13.19
1	64-QAM	MCS7	13.73	3	64-QAM	MCS7	13.18

Note: Above results are assessed in peak power.

3.6. Test Configuration

Mode	Duty Cycle (x)	T (ms)	Duty Cycle Factor (dB)
802.11b	0.89	1.304	0.51
802.11g	0.64	0.2448	1.94
802.11n-HT20	0.57	0.2272	2.44
802.11n-HT40	0.52	0.128	2.84
BLE	0.64	0.400	1.94

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

AC Conduction	
Test Case	Normal operation

Item		Mode	Data Rate	Test Channel
Radiated Test Case	Radiated Band Edge Note1	802.11b	1Mbps	1/11
		802.11g	6Mbps	1/11
		802.11n-HT20	MCS7	1/11
		802.11n-HT40	MCS7	3/9
		BLE	1Mbps	37/39
	Radiated Spurious Emission Note1 & 2	802.11b	1 Mbps	6
		802.11g	6Mbps	6
		802.11n-HT20	MCS7	11
		802.11n-HT40	MCS7	9
		BLE	1Mbps	37/17/39

Item		Mode	Data Rate	Test Channel
Conducted Test Case	6dB Bandwidth	802.11b	1Mbps	1/6/11
		802.11g	6Mbps	1/6/11
		802.11n-HT20	MCS8	1/6/11
		802.11n-HT40	MCS8	3/6/9
		BLE	1Mbps	37/17/39
	Peak Power Spectral Density	802.11b	1Mbps	1/6/11
		802.11g	6Mbps	1/6/11
		802.11n-HT20	MCS8	1/6/11
		802.11n-HT40	MCS8	3/6/9
		BLE	1Mbps	37/17/39
	Peak Output Power	802.11b	1Mbps	1/6/11
		802.11g	6Mbps	1/6/11
		802.11n-HT20	MCS8	1/6/11
		802.11n-HT40	MCS8	3/6/9
		BLE	1Mbps	37/17/39
	Band Edge	802.11b	1Mbps	1/11
		802.11g	6Mbps	1/11
		802.11n-HT20	MCS8	1/11
		802.11n-HT40	MCS8	3/9
		BLE	1Mbps	37/17/39
	Spurious Emission	802.11b	1Mbps	1/6/11
		802.11g	6Mbps	1/6/11
		802.11n-HT20	MCS8	1/6/11
		802.11n-HT40	MCS8	3/6/9
		BLE	1Mbps	37/17/39

Note 1:

☒ Mobile Device

☐ Portable Device, and 3 axis were assessed.

☐ 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. Tested Supporting System List

3.7.1. Support Peripheral Unit

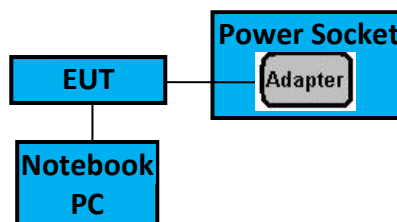
No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Notebook PC	ASUS	PU301L	N/A	N/A
2.	Power Socket	N/A	N/A	N/A	N/A

3.7.2. Cable Lists

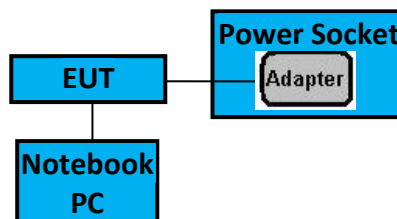
No.	Cable Description Of The Above Support Units
1.	LAN Cable: Shielded, Detachable, 1.5m Adapter: ACBEL, M/N AA90PM111 Cord: Unshielded, Detachable, 1.8m AC Power Cord: Shielded, Undetachable, 1.8m, with one ferrite core
2.	Power Cable: Unshielded, Detachable, 1.5m

3.8. Setup Configuration

3.8.1. EUT Configuration for Power Line & Radiated Emission



3.8.2. EUT Configuration for RF Conducted Test Items



3.9. Operating Condition of EUT

Test programs "tftpd32" and "PuTTY" are used for enabling EUT WLAN 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. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan Tel: +886-2-26092133 Fax: +886-2-26099303 Website : www.audixtech.com Contact e-mail: sales@audixtech.com
Accreditations	The laboratory is accredited by following organizations under ISO/IEC 17025:2005 (1) NVLAP(USA) NVLAP Lab Code 200077-0 (2) TAF(Taiwan) No. 1724 (3) FCC OET Designation No. TW1004 & TW1090
Test Facilities	(1) No. 8 Shielding Room (2) Semi-Anechoic Chamber (IC Test Site Registration No.: 5183B-1) (3) Fully Anechoic Chamber (IC Test Site Registration No.: 5183B-4)

3.11. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conduction Test	150kHz~30MHz	±3.50dB
Radiation Test (Distance: 3m)	30MHz~1000MHz	± 3.68dB
	Above 1GHz	± 5.82dB

Remark : Uncertainty = $ku_c(y)$

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

4. MEASUREMENT EQUIPMENT LIST

4.1. Conducted Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESR3	101774	2017. 02. 07	1 Year
2.	A.M.N.	R&S	ENV4200	100169	2016. 11. 11	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-855-9	2016. 12. 23	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	100354	2017. 01. 16	1 Year
5.	Test Software	Audix	e3	V.6.120424	N.C.R.	N.C.R.

4.2. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2016. 09. 19	1 Year
2.	Test Receiver	R&S	ESCS30	100338	2016. 06. 22	1 Year
3.	Amplifier	HP	8447D	2944A06305	2017. 02. 16	1 Year
4.	Amplifier	HP	8449B	3008A00529	2017. 02. 08	1 Year
5.	Bilog Antenna	CHASE	CBL6112D	33821	2017. 01. 21	1 Year
6.	Loop Antenna	R&S	HFH2-Z2	891847/27	2016. 12. 23	1 Year
7.	Double-Ridged Waveguide Horn	ETS-Lindgren	3117	00135902	2017. 03. 07	1 Year
8.	2.4GHz Notch Filter	K&L	7NSL10-244 1.5E130.5-00	1	2016. 07. 28	1 Year
9.	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

4.3. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY52220368	2016. 12. 01	1 Year
2.	Power Meter	Anritsu	ML2495A	1145008	2016. 10. 27	1 Year
3.	Power Sensor	Anritsu	MA2411B	1126096	2016. 10. 27	1 Year

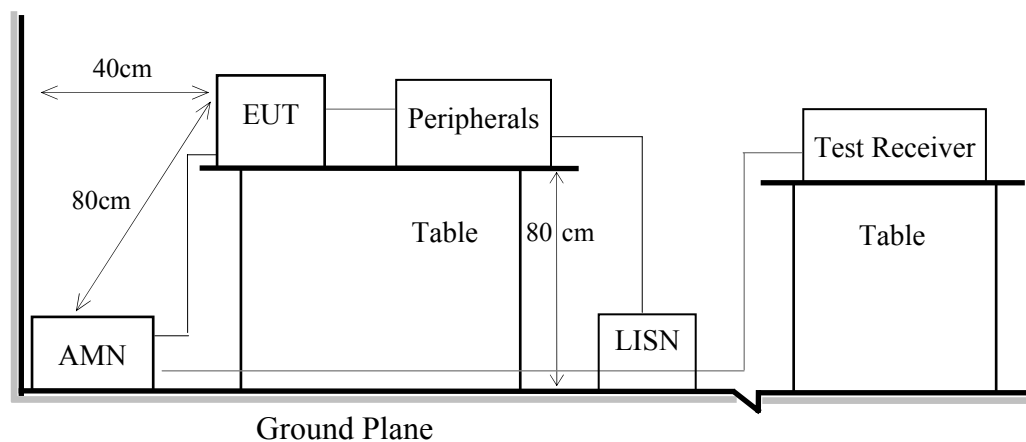
5. CONDUCTED EMISSION

5.1. Block Diagram of Test Setup

5.1.1. Block Diagram of EUT

Indicated as section 3.9

5.1.2. Shielded Room Setup Diagram



5.2. Conducted Emission Limit

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

Remark 1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.

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

5.3. Test Procedure

- 5.3.1. To set up the EUT as indicated in ANSI C 63.10. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.
- 5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).
- 5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)
- 5.3.4. Checking frequency range from 150 kHz to 30 MHz and record the emission which does not have 20 dB below limit.

5.4. Test Results

Please refer to Appendix A.

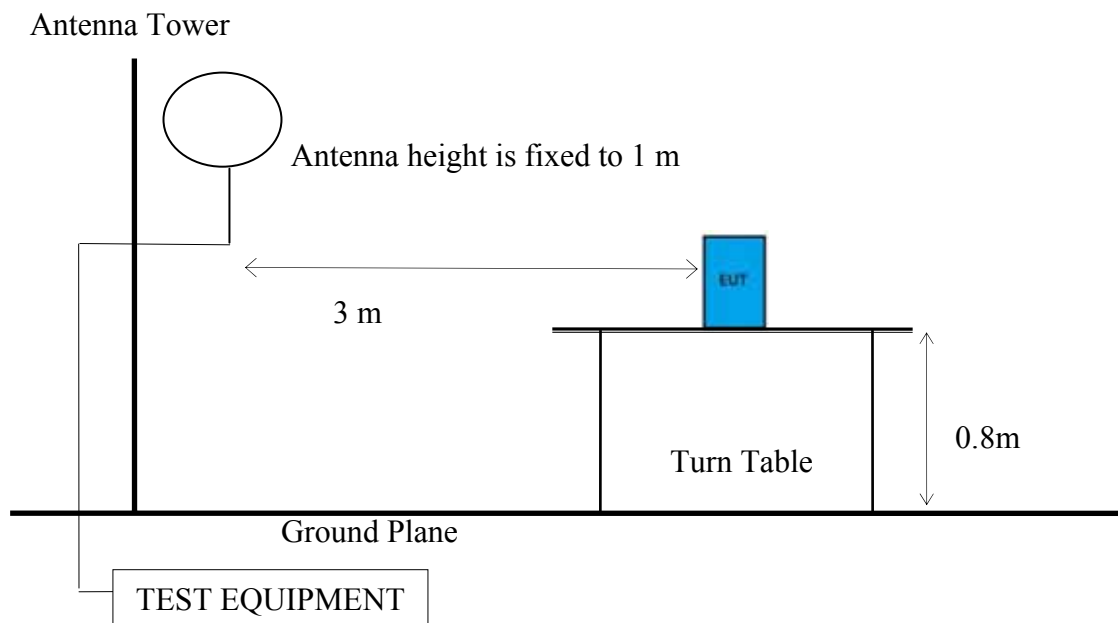
6. RADIATED EMISSION

6.1. Block Diagram of Test Setup

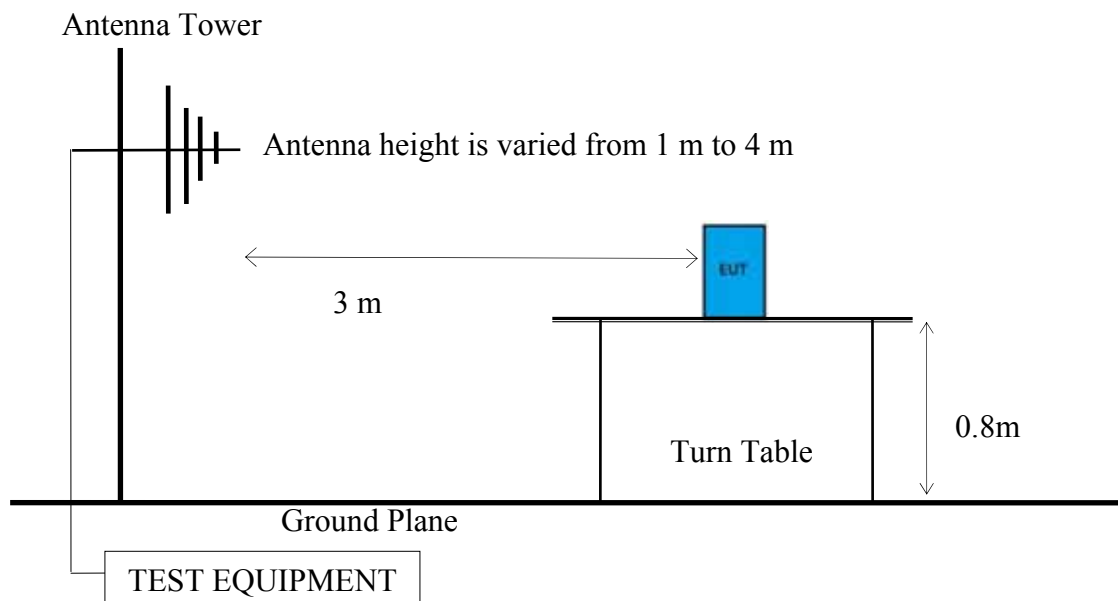
6.1.1. Block Diagram of EUT

Indicated as section 3.9

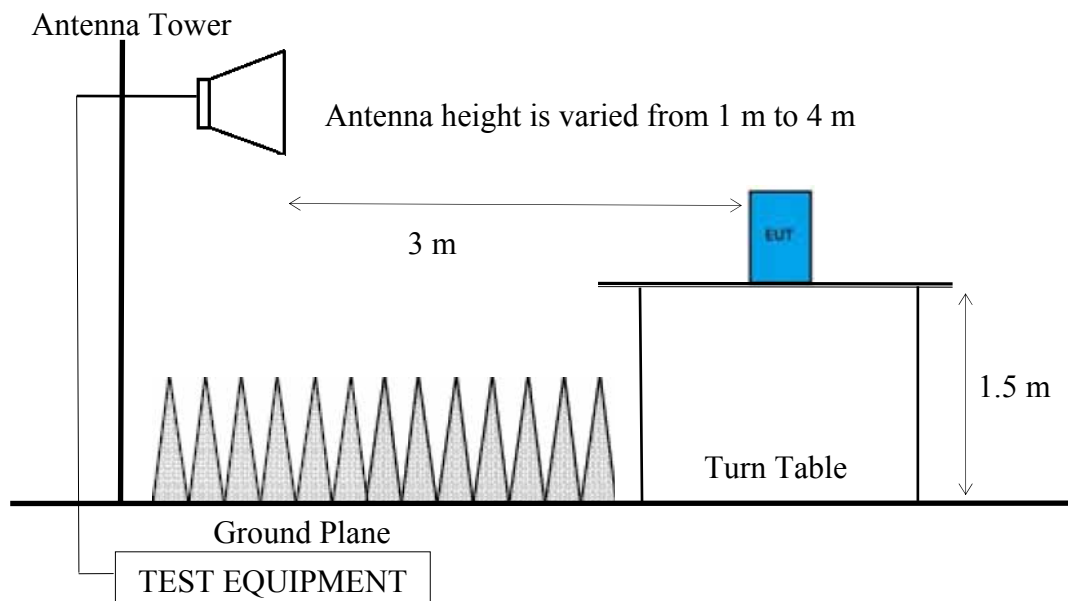
6.1.2. Setup Diagram for 9kHz-30MHz



6.1.3. Setup Diagram for 30-1000 MHz



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 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	2400/kHz
0.490 - 1.705	30	87.6	24000/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 turn table 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 find table which has 80 cm (for 30-1000 MHz) 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 1 GHz:

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 (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.
- (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 Detector:**■ Option 1:**

(1) RBW = 1MHz

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

Modulation Type	T (ms)	1/T (kHz)	VBW Setting (kHz)
802.11b	1.304	0.7686	0.767
802.11g	0.2448	4.0850	4.085
802.11n-HT20	0.2272	4.4014	4.400
802.11n-HT40	0.128	7.8125	7.810
BLE	0.400	2.500	2.500

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

(1) Detector = Peak.

(2) Sweep time = auto.

(3) Trace mode = max hold.

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

□ Option 2:

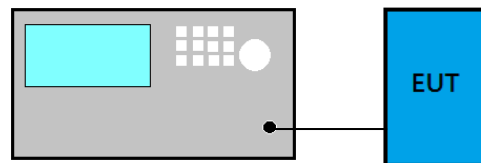
Average Emission Level = Peak Emission Level + D.C.C.F.

6.4. Measurement Result Explanation**■** Peak Emission Level = Antenna Factor + Cable Loss + Meter Reading**■** Average Emission Level = Antenna Factor + Cable Loss + Meter Reading**□** Average Emission Level = Peak Emission Level + DCCFDuty Cycle Correction Factor (DCCF) = $20\log(TX_{on}/TX_{on+off})$ presented in section 3.7**□** ERP = Peak Emission Level - 95.2dB - 2.14dB**6.5. Test Results**

Please refer to Appendix A.

7. 6dB BANDWIDTH

7.1. Block Diagram of Test Setup



7.2. Specification Limits

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

7.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

- (1) Set RBW = 100 kHz.
- (2) Set the video bandwidth (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 -6 dB to record the final bandwidth.

7.4. Test Results

Please refer to Appendix A

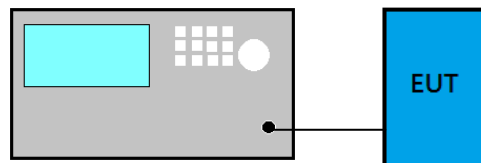
8. MAXIMUM PEAK OUTPUT POWER

8.1. Block Diagram of Test Setup

8.1.1. For WLAN Function



8.1.2. For BLE Function



8.2. Specification Limits

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

8.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

■ **PKPM1 Peak power meter method:**

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

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

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

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

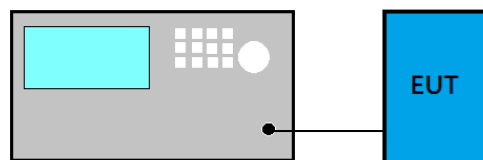
- (1) Set span to at least 1.5 times the OBW
- (2) Set RBW = 1 -5% of OBW
- (3) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Compute power by integrating the spectrum across the OBW of the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

8.4. Test Results

Please refer to Appendix A

9. EMISSION LIMITATIONS

9.1. Block Diagram of Test Setup



9.2. Specification Limits

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, that the required attenuation shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in Section 15.209(a) 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)).

9.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

■ Reference Level

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

■ Emission Level Measurement

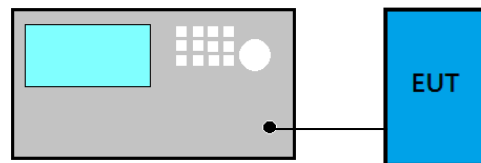
- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth.
- (3) Set the RBW to: 100 kHz.
- (4) Set the VBW $\geq 3 \times$ RBW.
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = max hold.
- (8) Allow trace to fully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

9.4. Test Results

Please refer to Appendix A

10. POWER SPECTRAL DENSITY

10.1. Block Diagram of Test Setup



10.2. Specification Limits

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

10.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

■ Method PKPSD (peak PSD)

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

□ Method AVGPSD-2

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

10.4. Test Results

Please refer to Appendix A

11.DEVIATION TO TEST SPECIFICATIONS

【NONE】



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APPENDIX A

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APPDNDIX A

TEST DATA AND PLOTS

(Model: IOT-3352)

TABLE OF CONTENTS

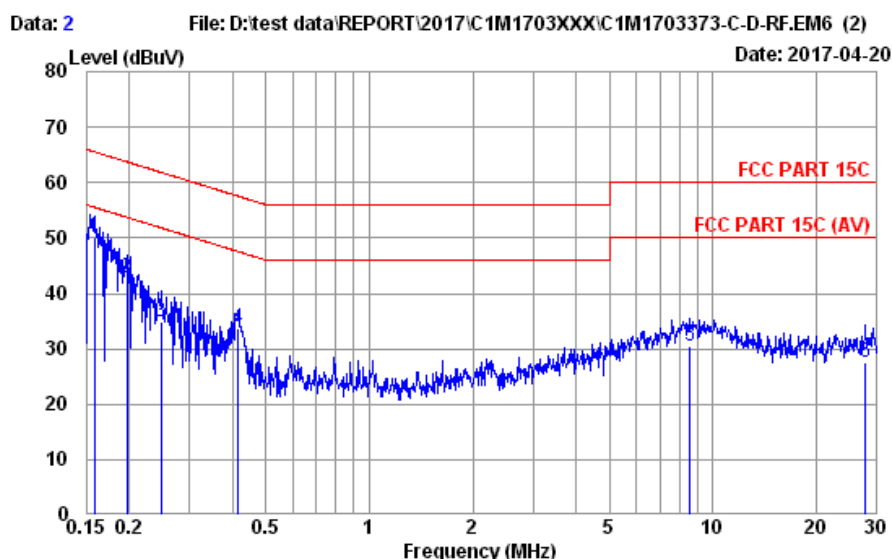
A.1 CONDUCTED EMISSION	2
A.2 RADIATED EMISSION	4
A.2.1 Emissions within Restricted Frequency Bands.....	4
A.2.2 Emissions outside the frequency band:.....	26
A.2.3 Emissions in Non-restricted Frequency Bands:.....	29
A.3 6dB BANDWIDTH	30
A.3.1 6dB Bandwidth Result.....	30
A.3.2 Measurement Plots	31
A.4 MAXIMUM PEAK OUTPUT POWER	34
A.4.1 Peak Output Power	34
A.4.2 Average Output Power (Reporting only).....	35
A.4.3 Measurement Plots	36
A.5 EMISSION LIMITATIONS	37
A.6 POWER SPECTRAL DENSITY	52
A.6.1 Power Spectral Density Result	52
A.6.2 Measurement Plots	53

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A.1 CONDUCTED EMISSION

Test Date	2017/04/20	Temp./Hum.	22°C/57%
Test Voltage	AC 120V, 60Hz (Via Power Supply)		



Site no. : No.8 Shielded Room Data no. : 2
Condition : ENV4200 100169 LISN Phase : NEUTRAL
Limit : FCC PART 15C
Env. / Ins. : 22°C / 57% ESR3 (1774) Engineer : Jemy
EUT : IOT-3352
Power Rating : 120Vac/60Hz
Test Mode : Operating

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.158	11.47	0.03	9.86	28.76	50.12	65.56	15.44	QP
2	0.197	11.30	0.03	9.86	21.74	42.93	63.76	20.83	QP
3	0.248	11.21	0.03	9.86	13.72	34.82	61.82	27.00	QP
4	0.415	11.05	0.04	9.86	12.67	33.62	57.55	23.93	QP
5	8.592	11.98	0.18	9.88	8.40	30.44	60.00	29.56	QP
6	27.855	16.35	0.32	9.98	0.99	27.64	60.00	32.36	QP

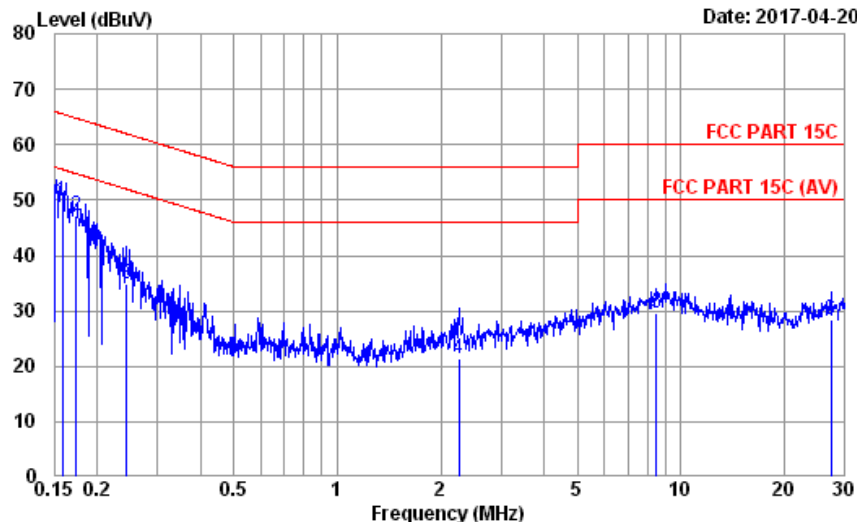
Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

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Test Date	2017/04/20	Temp./Hum.	23°C/52%
Test Voltage	AC 120V, 60Hz (Via Power Supply)		

Data: 1 File: D:\test data\REPORT\2017\C1M1703XXX\C1M1703373-C-D-RF-EM6 (2) Date: 2017-04-20



Site no. : No.8 Shielded Room Data no. : 1
Condition : ENV4200 100169 LISN Phase : LINE
Limit : FCC PART 15C
Env. / Ins. : 22°C / 57% ESR3 (1774) Engineer : Jemy
EUT : IOT-3352
Power Rating : 120Vac/60Hz
Test Mode : Operating

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.158	10.78	0.03	9.86	29.19	49.86	65.56	15.70	QP
2	0.174	10.77	0.03	9.86	26.55	47.21	64.77	17.56	QP
3	0.243	10.71	0.03	9.86	14.25	34.85	62.00	27.15	QP
4	2.261	10.61	0.09	9.86	0.88	21.44	56.00	34.56	QP
5	8.501	11.18	0.18	9.88	8.33	29.57	60.00	30.43	QP
6	27.271	15.31	0.32	9.98	2.71	28.32	60.00	31.68	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when using a quasi-peak detector,
the EUT shall be deemed to meet both limits and measurement
with average detector is unnecessary.

A.2 RADIATED EMISSION

Test Date	2017/04/20 ~ 05/15	Temp./Hum.	24~26°C/41~43%
Test Voltage	AC 120V, 60Hz (Via Power Supply)		

A.2.1 Emissions within Restricted Frequency Bands

A.2.1.1 Frequency 9kHz~30MHz

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

A.2.1.2 Frequency Below 1 GHz

Mode	802.11g	Frequency	TX 2437MHz
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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
335.55	20.95	4.80	17.22	42.97	46.00	3.03	Peak
384.05	22.32	5.38	10.88	38.58	46.00	7.42	Peak
749.74	26.12	7.35	11.11	44.58	46.00	1.42	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
335.55	20.95	4.80	10.04	35.79	46.00	10.21	Peak
418.00	22.94	5.72	7.63	36.29	46.00	9.71	Peak
626.55	25.01	6.85	2.79	34.65	46.00	11.35	Peak

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Mode	BLE	Frequency	TX 2402MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
335.55	20.95	4.80	17.22	42.97	46.00	3.03	Peak
384.05	22.32	5.38	10.88	38.58	46.00	7.42	Peak
500.45	23.77	6.43	5.73	35.93	46.00	10.07	Peak
749.74	26.12	7.35	11.11	44.58	46.00	1.42	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
335.55	20.95	4.80	10.04	35.79	46.00	10.21	Peak
418.00	22.94	5.72	7.63	36.29	46.00	9.71	Peak
626.55	25.01	6.85	2.79	34.65	46.00	11.35	Peak
749.74	26.12	7.35	3.60	37.07	46.00	8.93	Peak

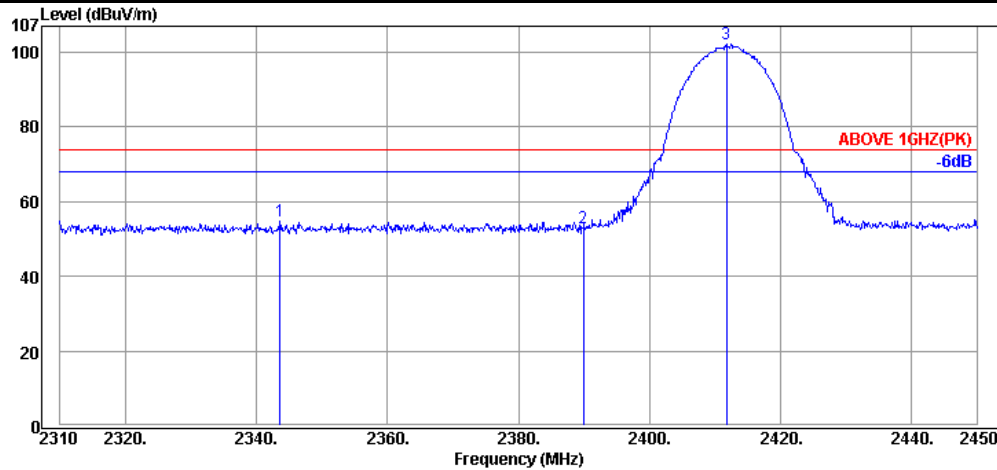
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A.2.1.3 Frequency Above 1 GHz to 10th harmonics

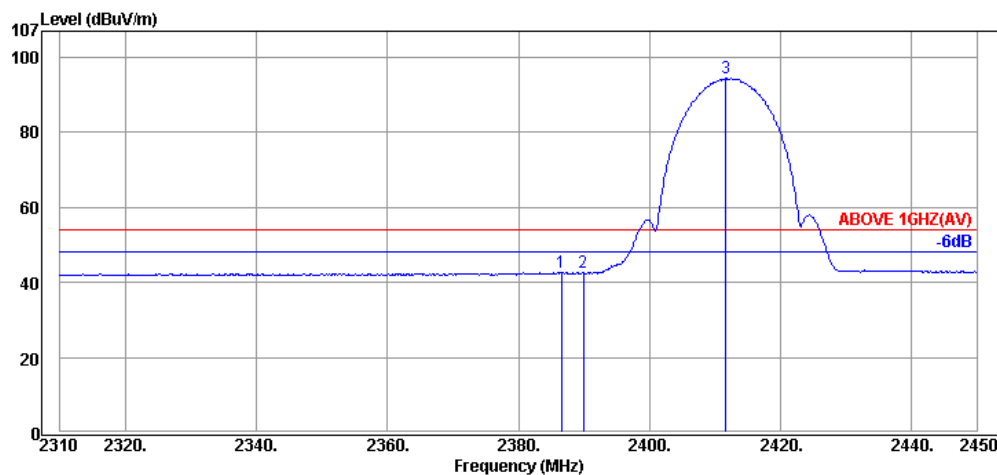
Band Edge:

Mode	802.11b	Frequency	TX 2412MHz
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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
2343.60	31.63	6.02	17.07	54.72	74.00	19.28	Peak
2389.94	31.68	6.08	15.06	52.82	74.00	21.18	Peak
2411.78	31.71	6.11	64.28	102.10	---	---	Peak

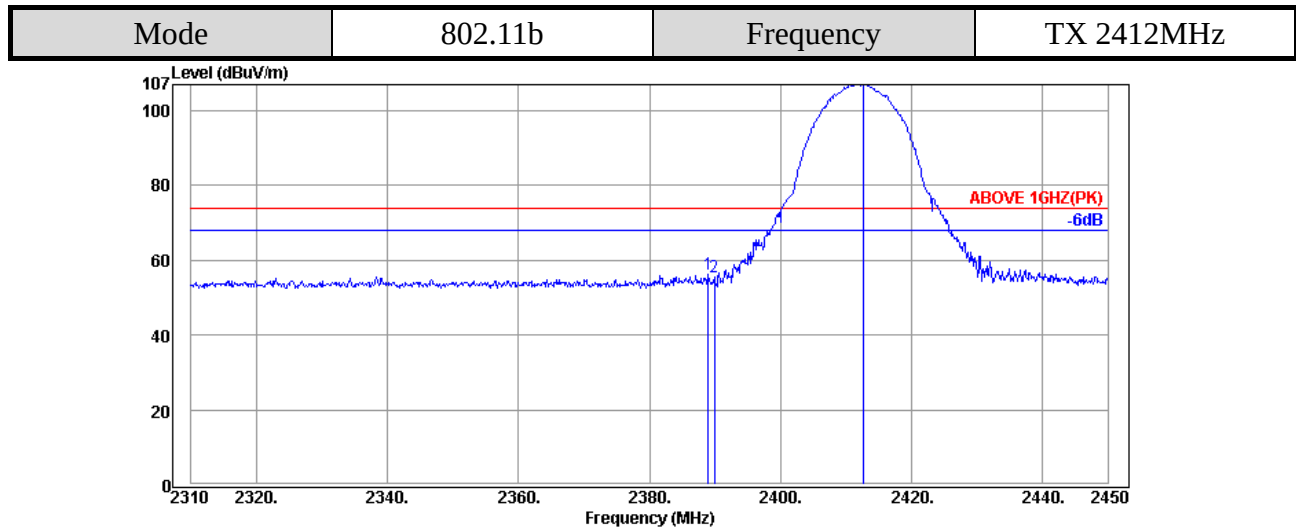


Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2386.58	31.68	6.07	4.95	42.70	54.00	11.30	Average
2389.94	31.68	6.08	4.91	42.67	54.00	11.33	Average
2411.64	31.71	6.11	56.64	94.46	---	---	Average

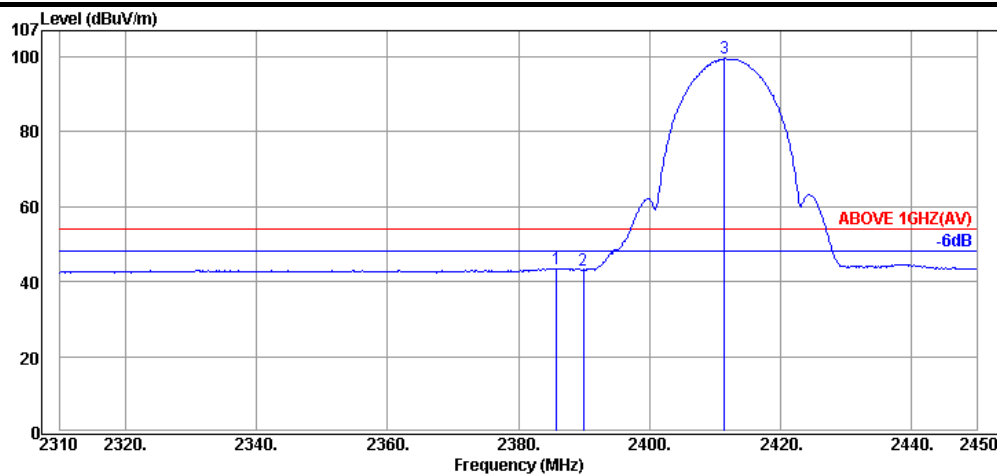
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.96	31.68	6.08	18.63	56.39	74.00	17.61	Peak
2389.94	31.68	6.08	17.81	55.57	74.00	18.43	Peak
2412.76	31.71	6.11	69.71	107.53	---	---	Peak



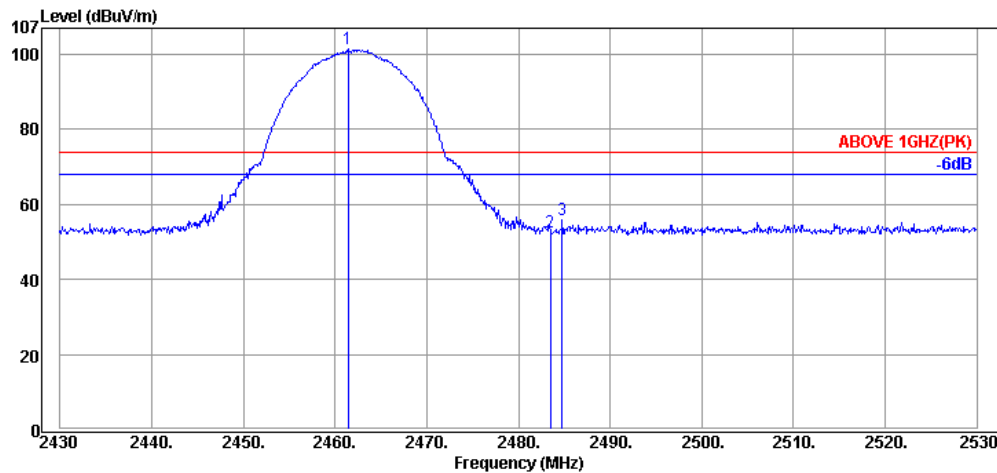
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2385.88	31.68	6.07	5.73	43.48	54.00	10.52	Average
2389.94	31.68	6.08	5.44	43.20	54.00	10.80	Average
2411.50	31.71	6.11	61.79	99.61	---	---	Average

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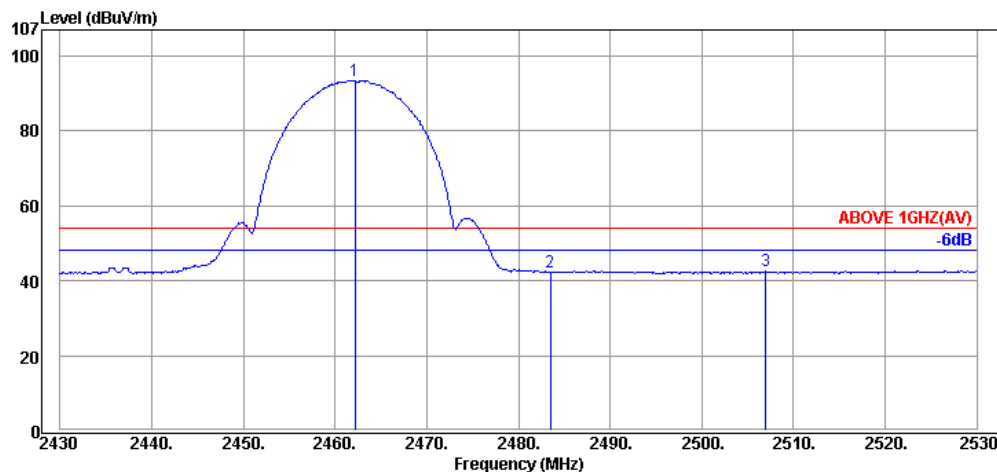
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Mode	802.11b	Frequency	TX 2462MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2461.40	31.76	6.16	63.50	101.42	---	---	Peak
2483.50	31.78	6.19	14.49	52.46	74.00	21.54	Peak
2484.80	31.78	6.19	17.98	55.95	74.00	18.05	Peak



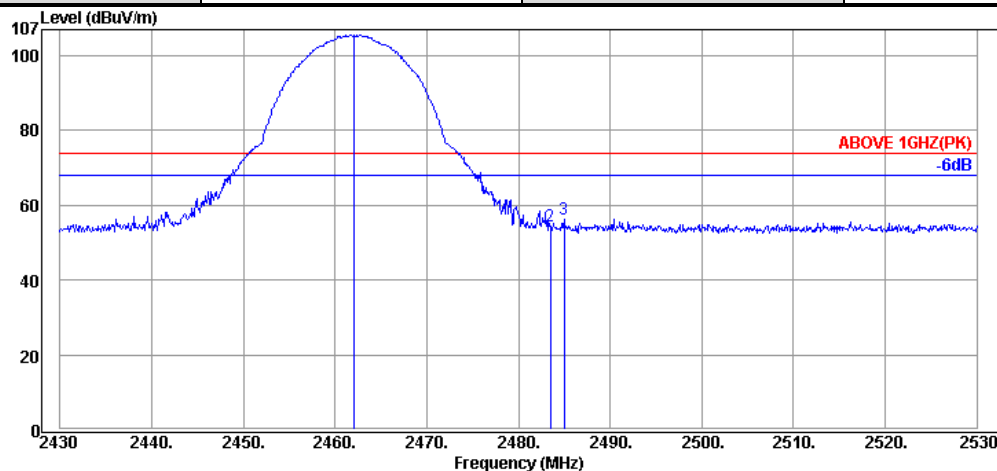
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2462.20	31.76	6.16	55.47	93.39	---	---	Average
2483.50	31.78	6.19	4.43	42.40	54.00	11.60	Average
2507.00	31.81	6.21	4.57	42.59	54.00	11.41	Average

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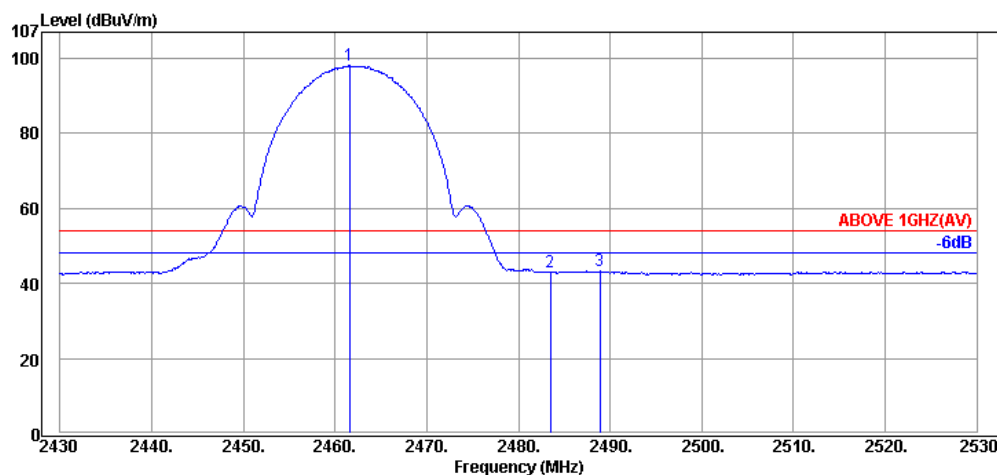
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Mode	802.11b	Frequency	TX 2462MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2462.10	31.76	6.16	67.73	105.65	---	---	Peak
2483.50	31.78	6.19	16.51	54.48	74.00	19.52	Peak
2485.00	31.78	6.19	18.45	56.42	74.00	17.58	Peak



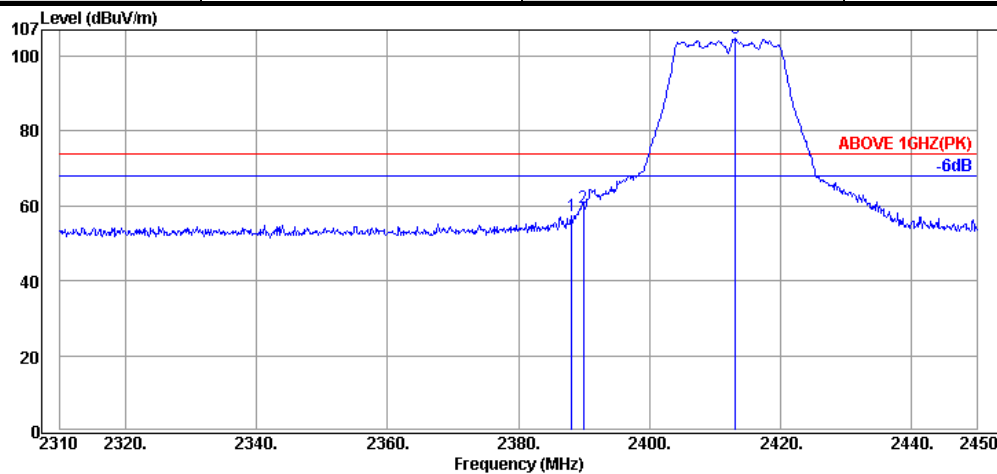
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2461.60	31.76	6.16	60.10	98.02	---	---	Average
2483.50	31.78	6.19	5.02	42.99	54.00	11.01	Average
2488.90	31.78	6.19	5.27	43.24	54.00	10.76	Average

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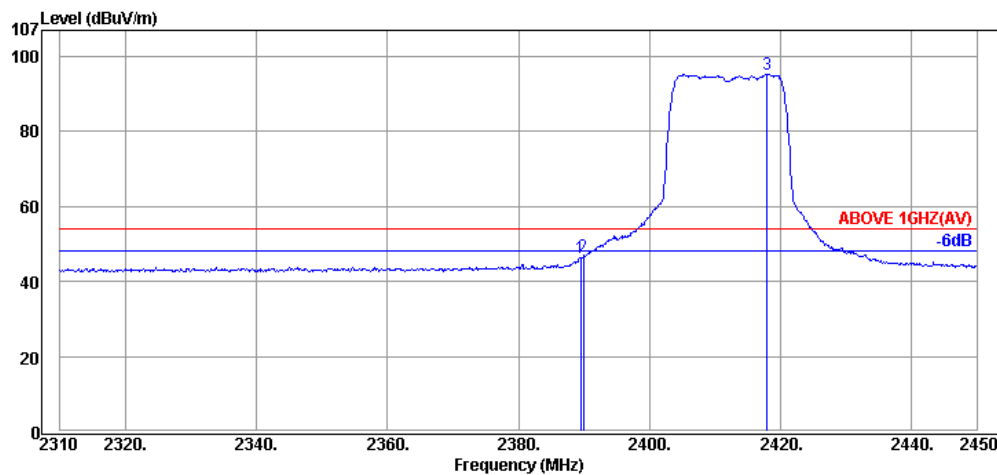
Tel: +886 2 26099301
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Mode	802.11g	Frequency	TX 2412MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.12	31.68	6.08	19.52	57.28	74.00	16.72	Peak
2389.94	31.68	6.08	21.93	59.69	74.00	14.31	Peak
2413.18	31.71	6.11	67.05	104.87	---	---	Peak



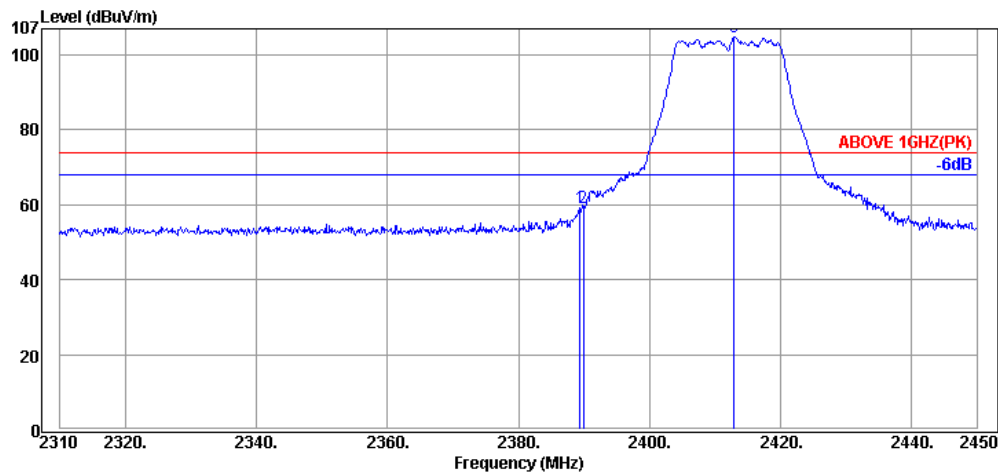
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.52	31.68	6.08	8.62	46.38	54.00	7.62	Average
2389.94	31.68	6.08	8.89	46.65	54.00	7.35	Average
2417.94	31.71	6.11	57.53	95.35	---	---	Average

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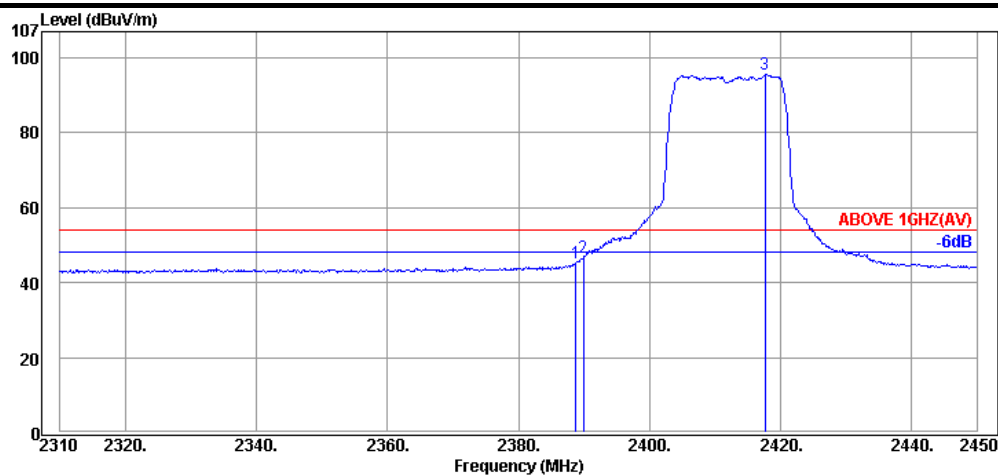
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Fax: +886 2 26099303

Mode	802.11g	Frequency	TX 2412MHz
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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
2389.38	31.68	6.08	21.31	59.07	74.00	14.93	Peak
2389.94	31.68	6.08	21.45	59.21	74.00	14.79	Peak
2412.90	31.71	6.11	67.06	104.88	---	---	Peak



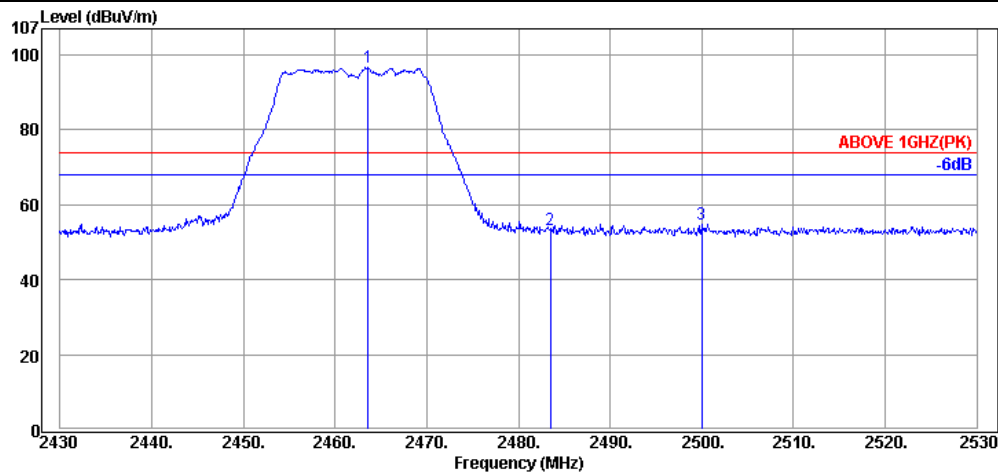
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.82	31.68	6.08	7.56	45.32	54.00	8.68	Average
2389.94	31.68	6.08	9.06	46.82	54.00	7.18	Average
2417.66	31.71	6.11	57.79	95.61	---	---	Average

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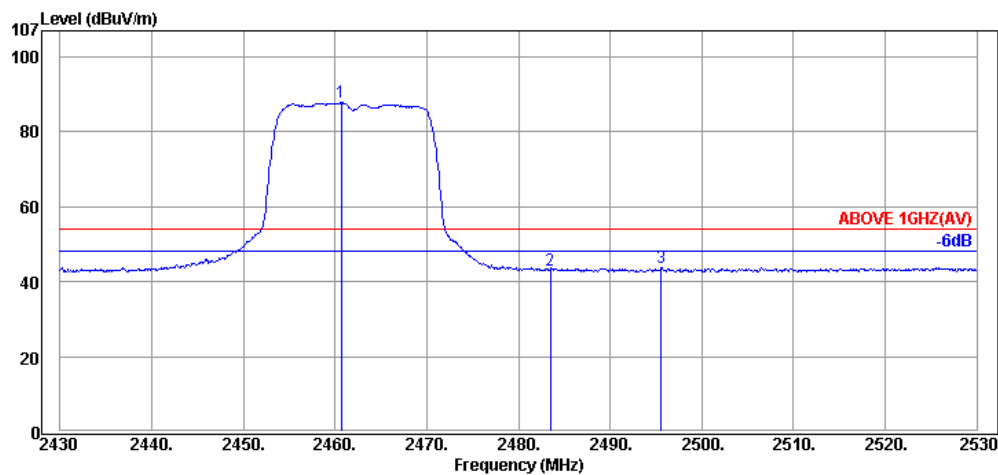
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Fax: +886 2 26099303

Mode	802.11g	Frequency	TX 2462MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2463.60	31.76	6.16	58.78	96.70	---	---	Peak
2483.50	31.78	6.19	15.29	53.26	74.00	20.74	Peak
2500.00	31.80	6.21	16.72	54.73	74.00	19.27	Peak



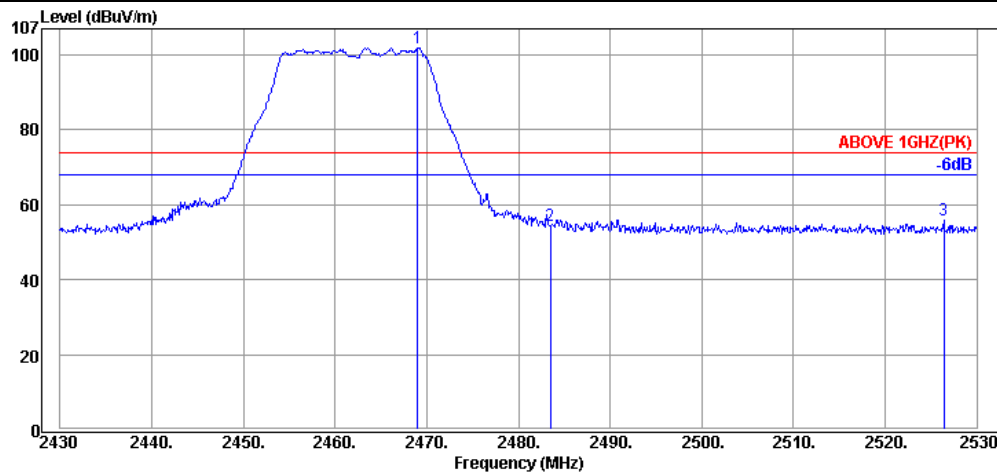
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2460.70	31.76	6.16	49.90	87.82	---	---	Average
2483.50	31.78	6.19	5.05	43.02	54.00	10.98	Average
2495.60	31.79	6.20	5.66	43.65	54.00	10.35	Average

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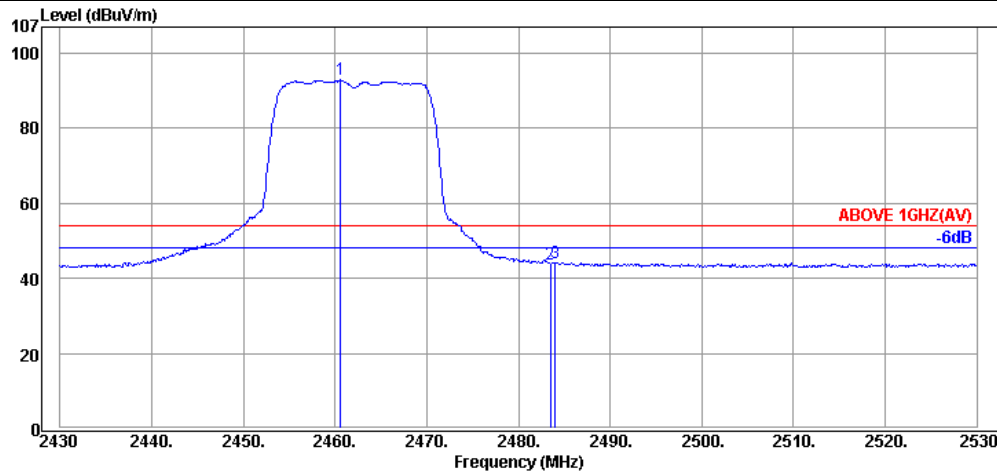
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Fax: +886 2 26099303

Mode	802.11g	Frequency	TX 2462MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2469.00	31.77	6.17	63.94	101.88	---	---	Peak
2483.50	31.78	6.19	16.56	54.53	74.00	19.47	Peak
2526.40	31.83	6.25	17.91	55.99	74.00	18.01	Peak



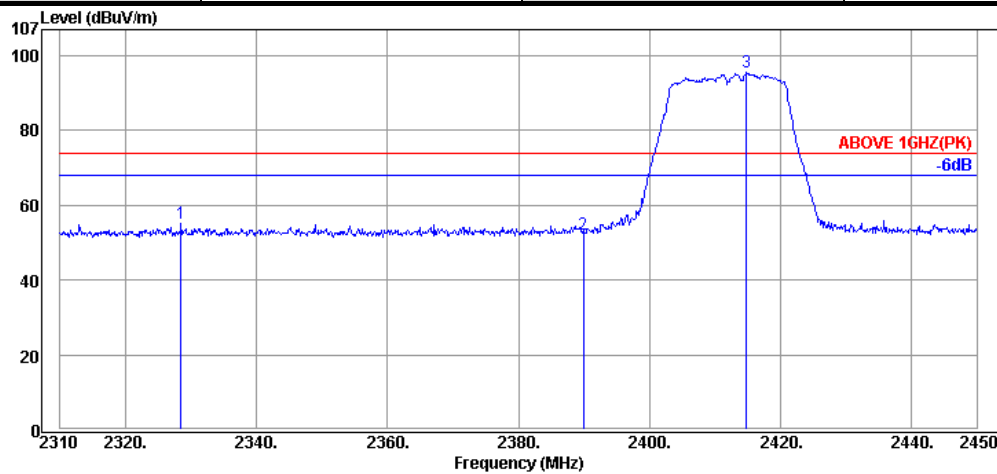
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2460.60	31.76	6.16	54.94	92.86	---	---	Average
2483.50	31.78	6.19	5.96	43.93	54.00	10.07	Average
2484.00	31.78	6.19	6.23	44.20	54.00	9.80	Average

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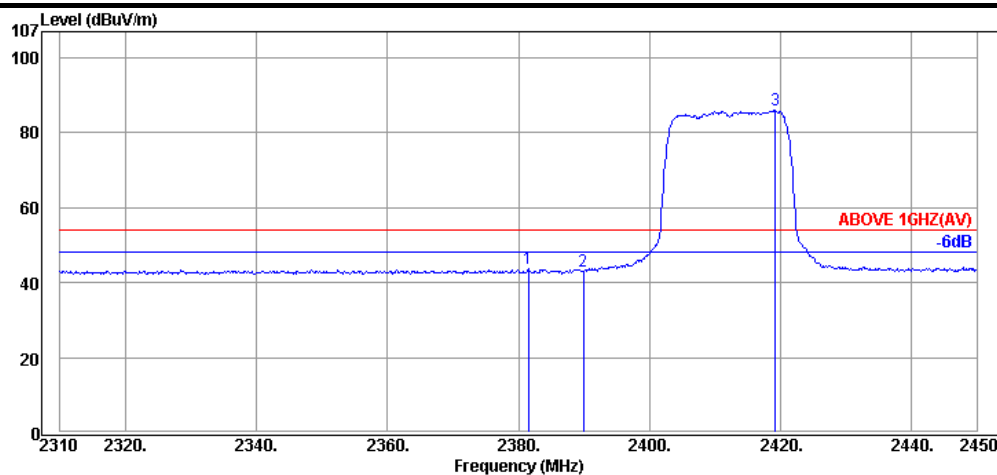
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Mode	802.11n-HT20	Frequency	TX 2412MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2328.48	31.61	6.00	17.62	55.23	74.00	18.77	Peak
2389.94	31.68	6.08	14.63	52.39	74.00	21.61	Peak
2414.86	31.71	6.11	57.62	95.44	---	---	Peak

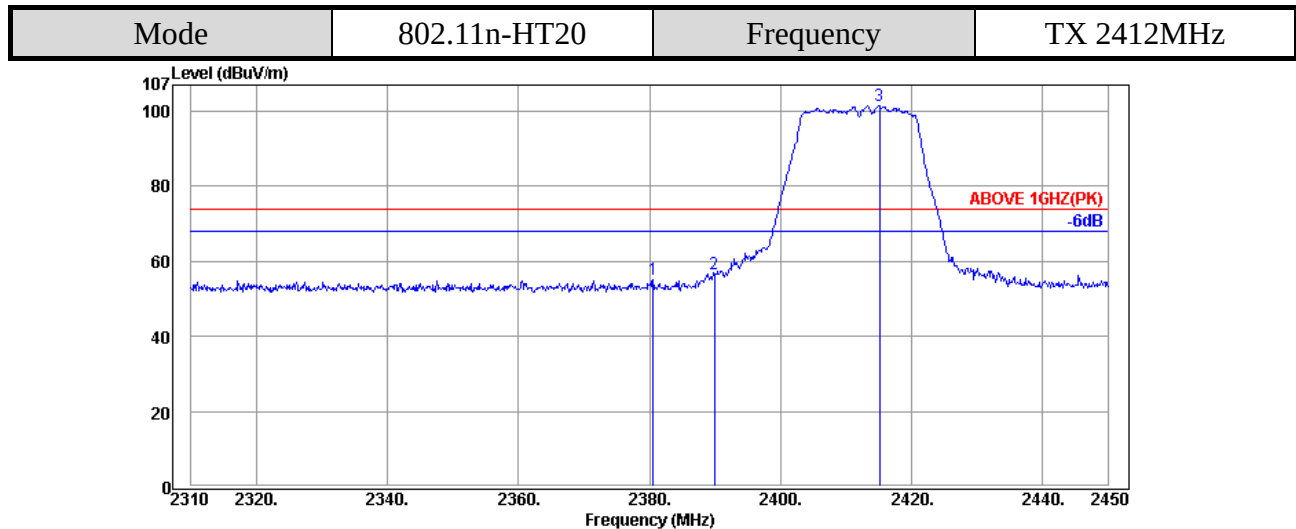


Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2381.54	31.67	6.07	5.84	43.58	54.00	10.42	Average
2389.94	31.68	6.08	5.42	43.18	54.00	10.82	Average
2419.20	31.71	6.12	48.31	86.14	---	---	Average

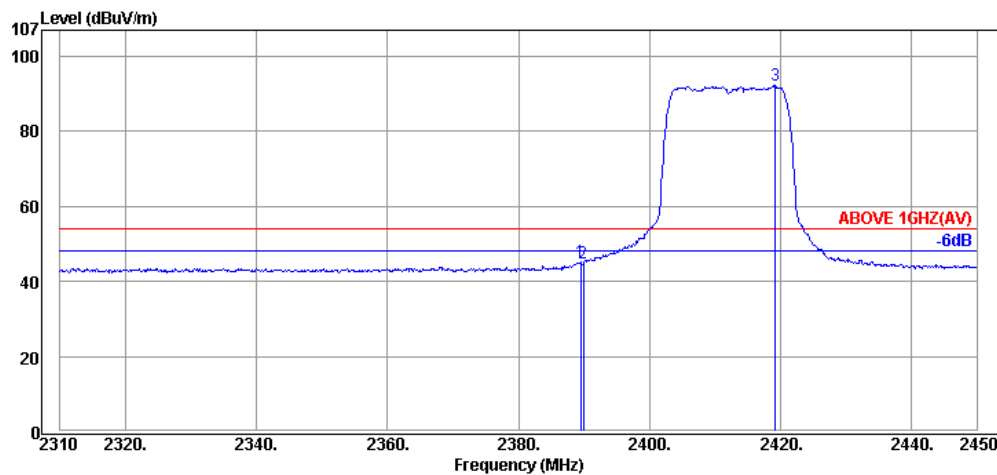
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2380.56	31.67	6.07	17.31	55.05	74.00	18.95	Peak
2389.94	31.68	6.08	18.87	56.63	74.00	17.37	Peak
2415.14	31.71	6.11	63.53	101.35	---	---	Peak



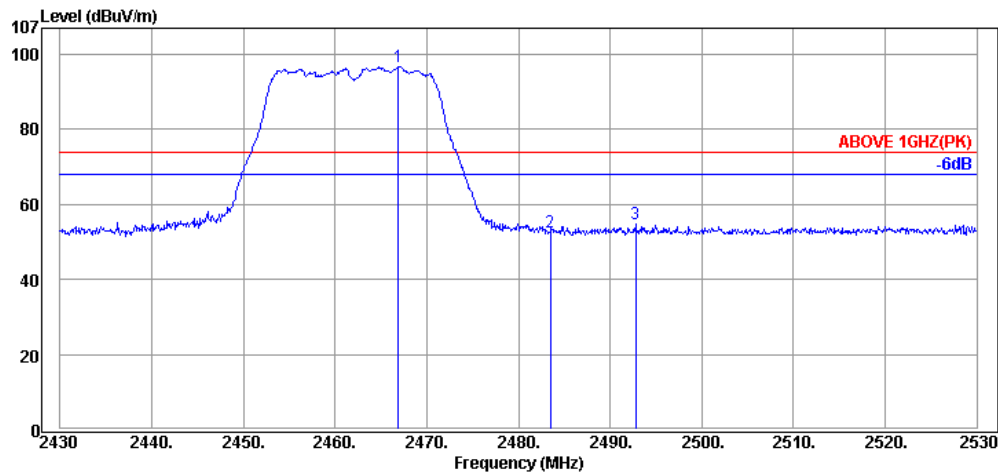
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.52	31.68	6.08	7.57	45.33	54.00	8.67	Average
2389.94	31.68	6.08	7.12	44.88	54.00	9.12	Average
2419.20	31.71	6.12	54.43	92.26	---	---	Average

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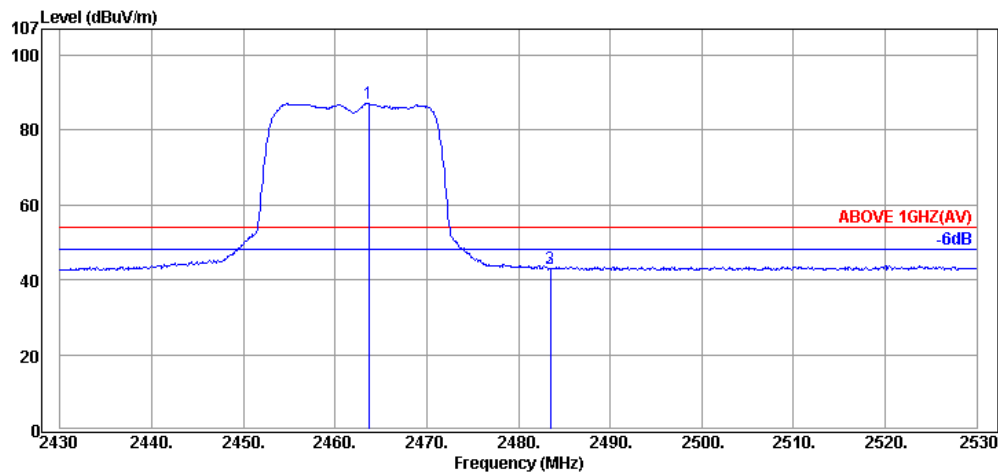
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Fax: +886 2 26099303

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

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2466.90	31.76	6.17	58.95	96.88	---	---	Peak
2483.50	31.78	6.19	14.73	52.70	74.00	21.30	Peak
2492.80	31.79	6.20	16.63	54.62	74.00	19.38	Peak



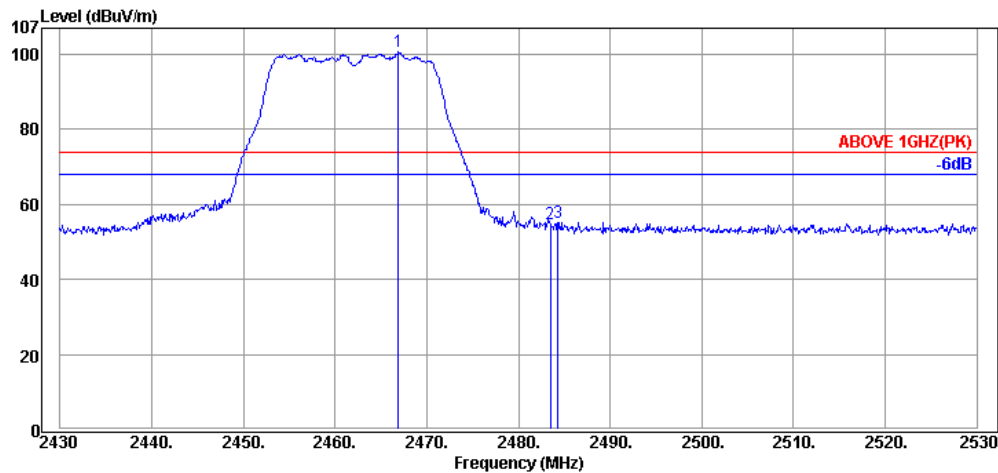
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2463.70	31.76	6.16	49.19	87.11	---	---	Average
2483.50	31.78	6.19	5.19	43.16	54.00	10.84	Average
2483.50	31.78	6.19	5.19	43.16	54.00	10.84	Average

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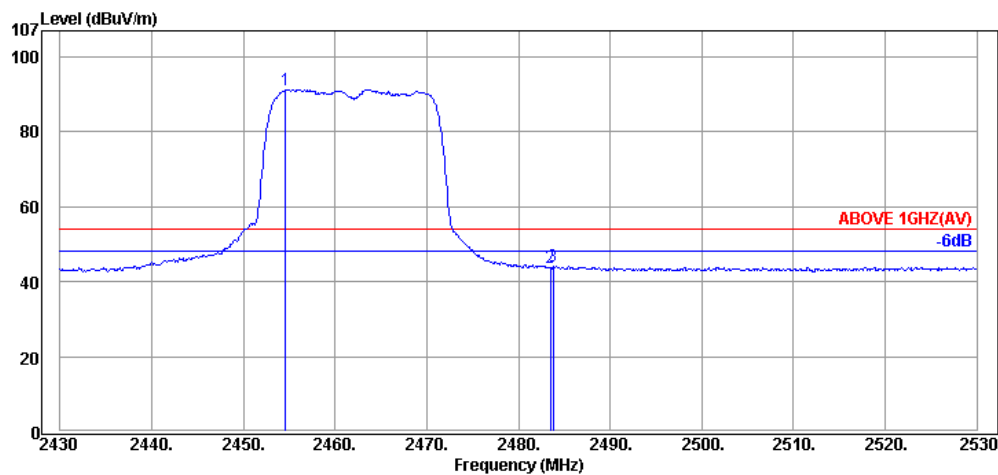
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Fax: +886 2 26099303

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

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2466.90	31.76	6.17	62.65	100.58	---	---	Peak
2483.50	31.78	6.19	16.97	54.94	74.00	19.06	Peak
2484.30	31.78	6.19	17.36	55.33	74.00	18.67	Peak



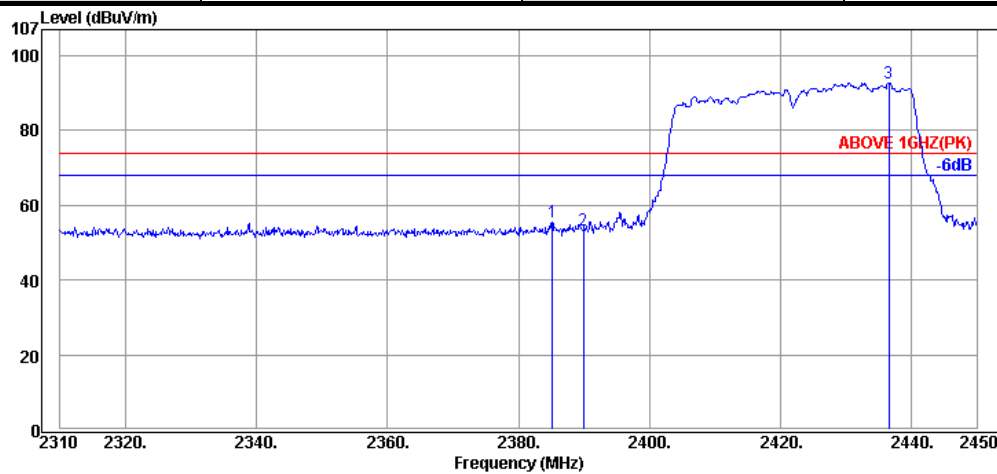
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2454.60	31.75	6.15	53.41	91.31	---	---	Average
2483.50	31.78	6.19	5.83	43.80	54.00	10.20	Average
2483.80	31.78	6.19	6.23	44.20	54.00	9.80	Average

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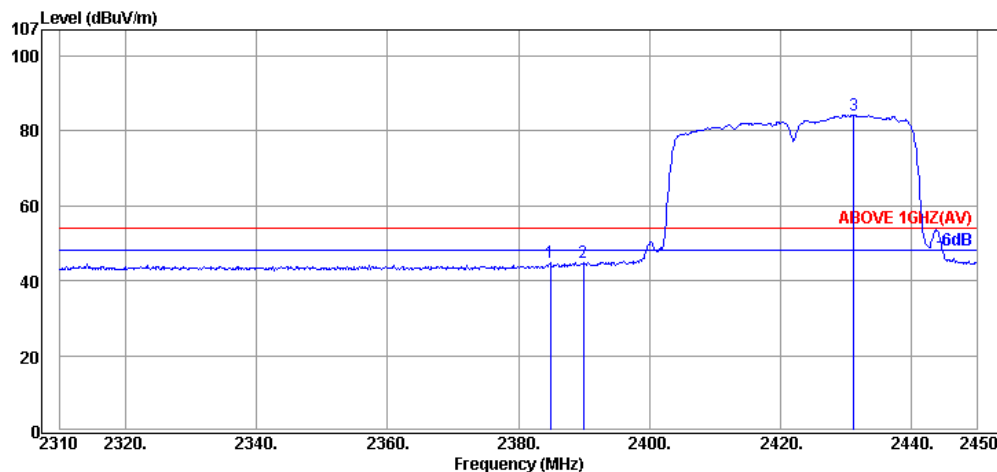
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Mode	802.11n-HT40	Frequency	TX 2422MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2385.18	31.68	6.07	17.62	55.37	74.00	18.63	Peak
2389.94	31.68	6.08	15.66	53.42	74.00	20.58	Peak
2436.56	31.73	6.13	54.87	92.73	---	---	Peak



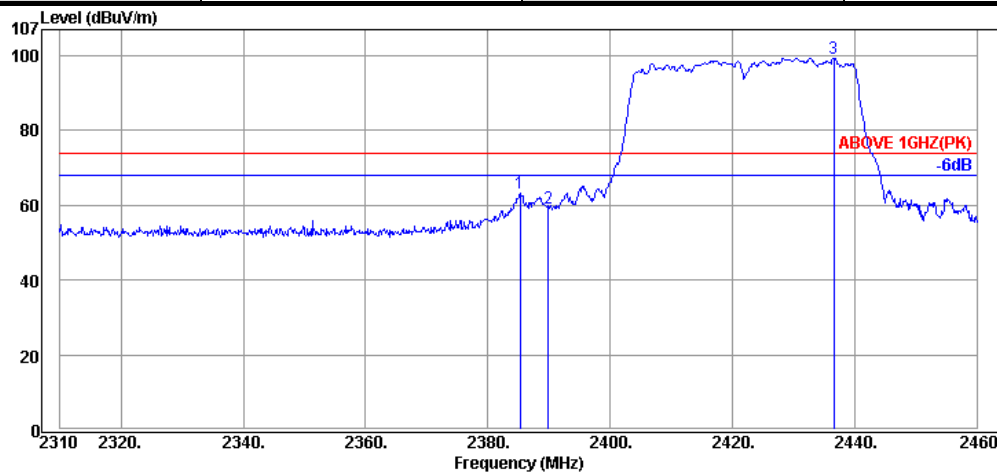
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2384.90	31.68	6.07	7.02	44.77	54.00	9.23	Average
2389.94	31.68	6.08	7.10	44.86	54.00	9.14	Average
2431.24	31.72	6.13	46.46	84.31	---	---	Average

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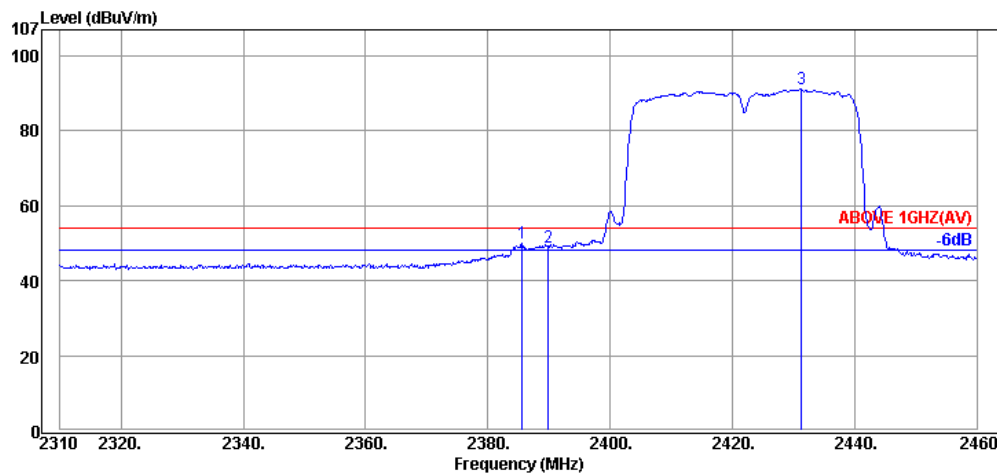
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Fax: +886 2 26099303

Mode	802.11n-HT40	Frequency	TX 2422MHz
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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
2385.30	31.68	6.07	25.57	63.32	74.00	10.68	Peak
2389.95	31.68	6.08	21.57	59.33	74.00	14.67	Peak
2436.60	31.73	6.13	61.58	99.44	---	---	Peak



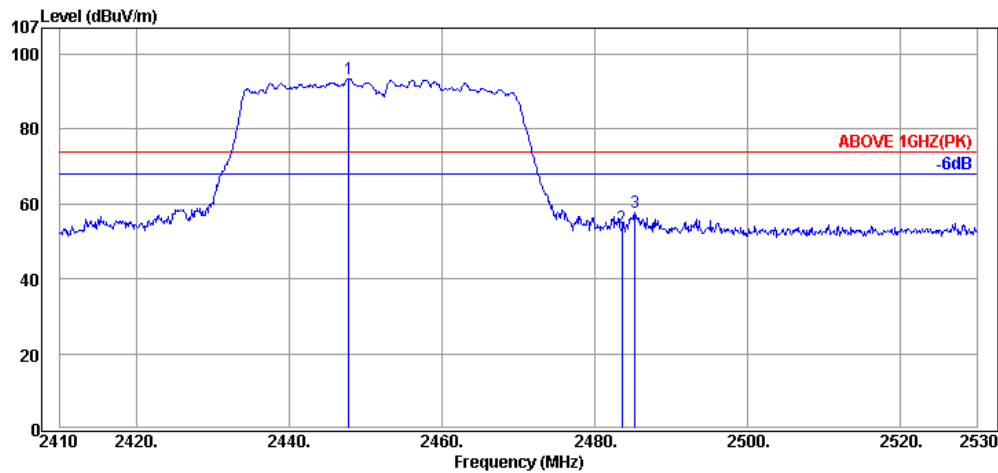
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2385.60	31.68	6.07	12.13	49.88	54.00	4.12	Average
2389.95	31.68	6.08	11.22	48.98	54.00	5.02	Average
2431.35	31.72	6.13	53.25	91.10	---	---	Average

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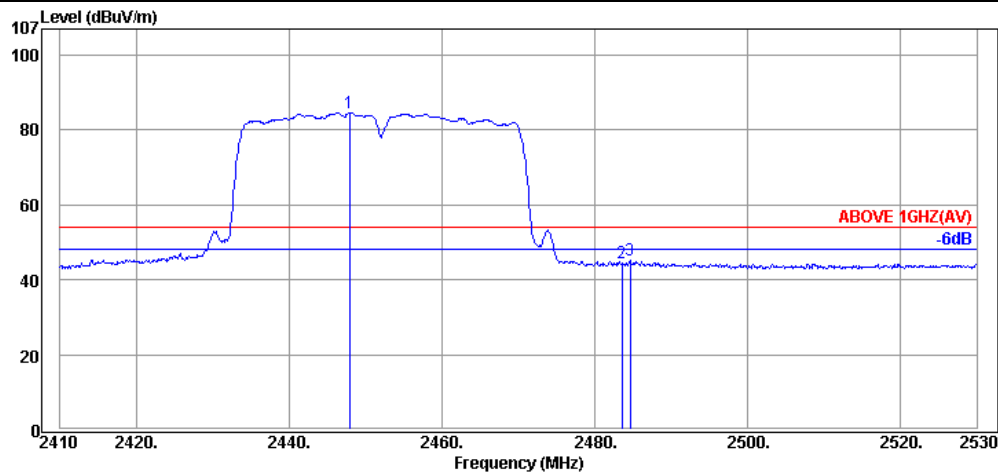
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Fax: +886 2 26099303

Mode	802.11n-HT40	Frequency	TX 2452MHz
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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
2447.80	31.75	6.14	55.66	93.55	---	---	Peak
2483.56	31.78	6.19	15.82	53.79	74.00	20.21	Peak
2485.24	31.78	6.19	19.86	57.83	74.00	16.17	Peak



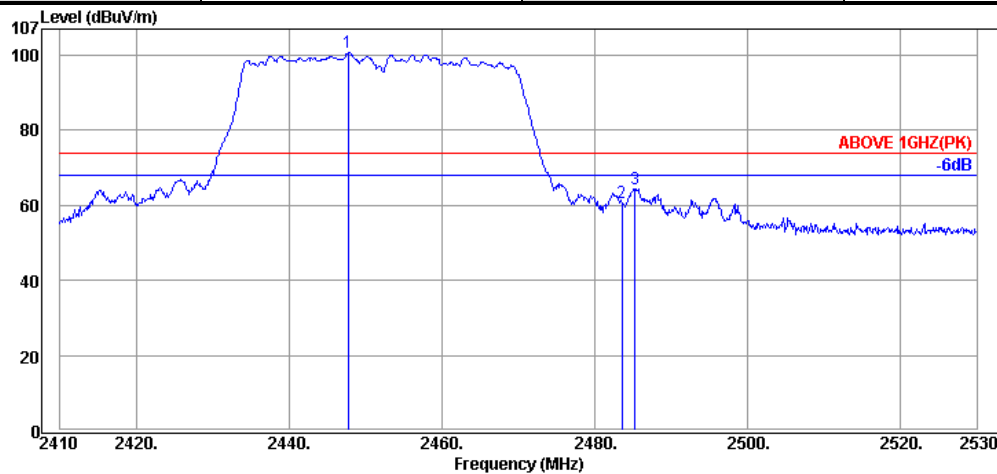
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2447.92	31.75	6.14	46.82	84.71	---	---	Average
2483.56	31.78	6.19	6.54	44.51	54.00	9.49	Average
2484.64	31.78	6.19	7.17	45.14	54.00	8.86	Average

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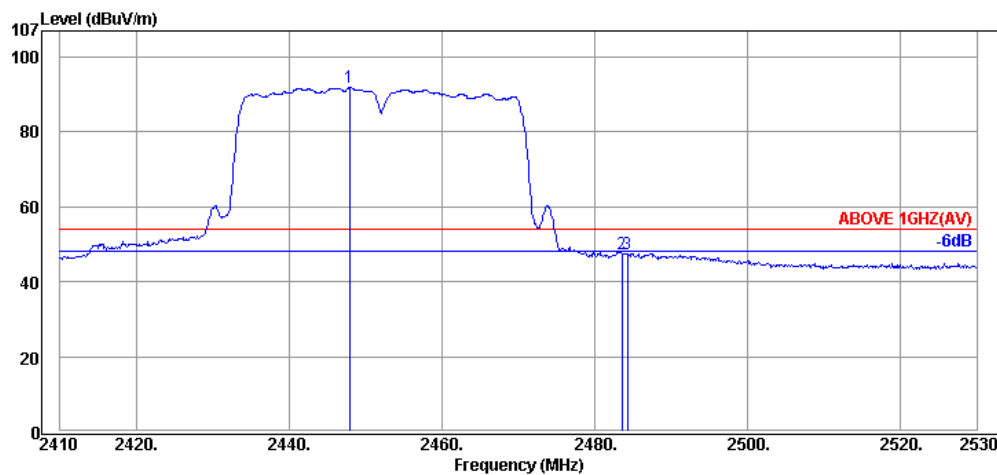
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Mode	802.11n-HT40	Frequency	TX 2452MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2447.68	31.75	6.14	62.83	100.72	---	---	Peak
2483.56	31.78	6.19	22.56	60.53	74.00	13.47	Peak
2485.24	31.78	6.19	26.53	64.50	74.00	9.50	Peak



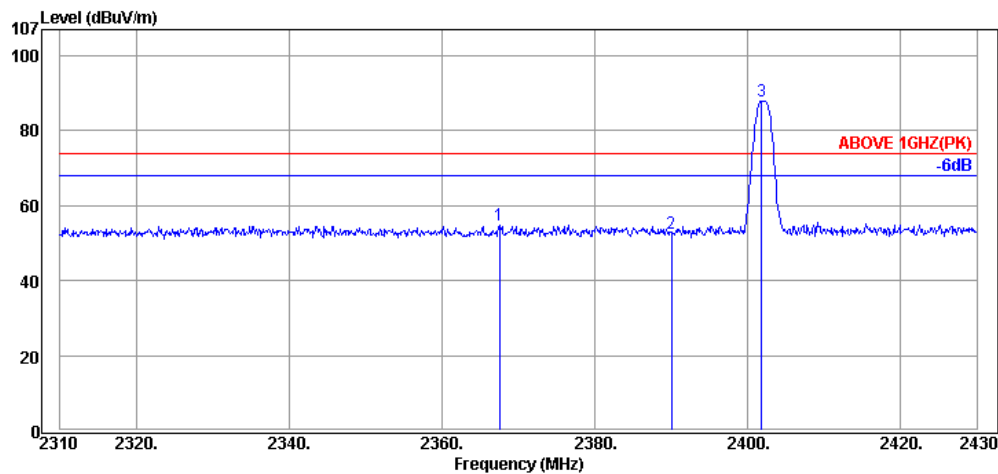
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2447.92	31.75	6.14	53.97	91.86	---	---	Average
2483.56	31.78	6.19	9.59	47.56	54.00	6.44	Average
2484.28	31.78	6.19	9.57	47.54	54.00	6.46	Average

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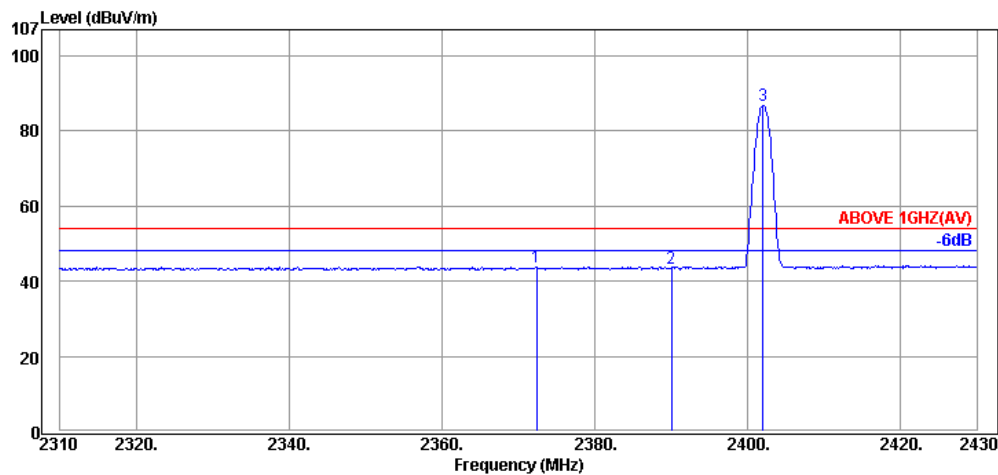
Tel: +886 2 26099301
Fax: +886 2 26099303

Mode	BLE	Frequency	TX 2402MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2367.48	31.65	6.05	17.06	54.76	74.00	19.24	Peak
2390.04	31.68	6.08	14.98	52.74	74.00	21.26	Peak
2401.80	31.69	6.09	50.07	87.85	---	---	Peak



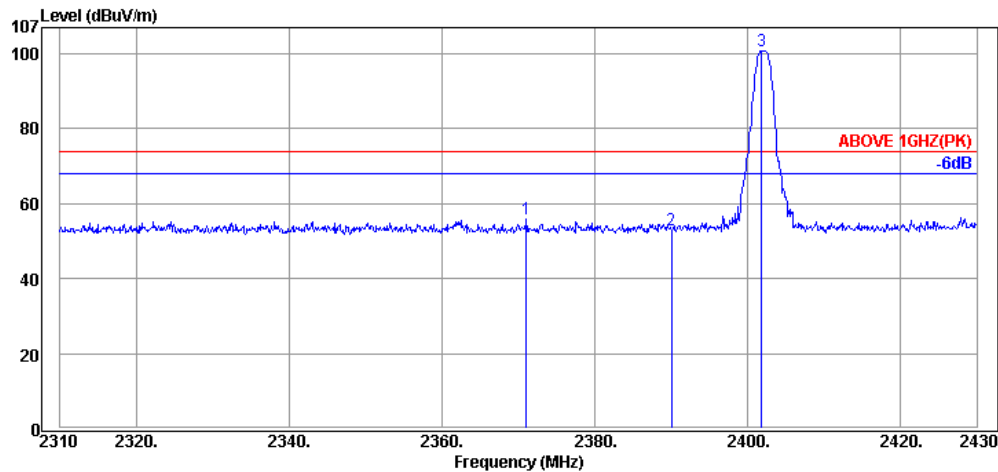
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2372.40	31.66	6.06	6.20	43.92	54.00	10.08	Average
2390.04	31.68	6.08	5.70	43.46	54.00	10.54	Average
2402.04	31.69	6.09	49.05	86.83	---	---	Average

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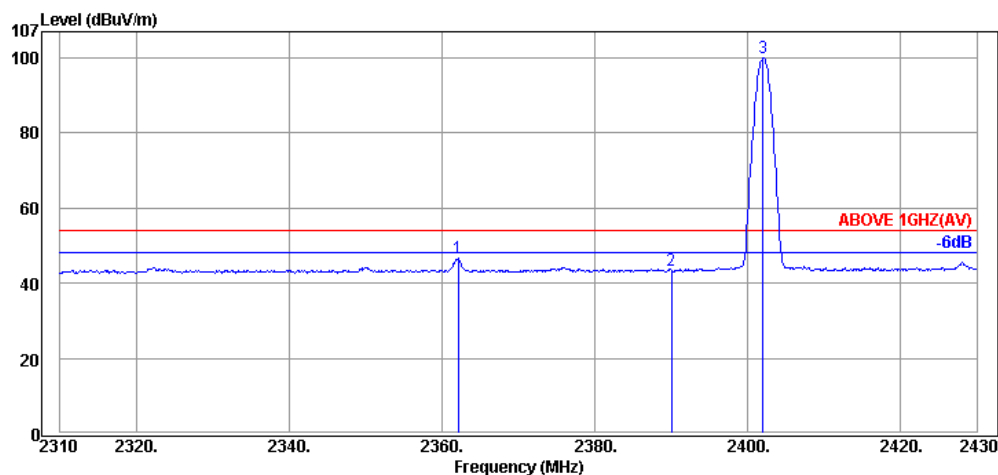
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Mode	BLE	Frequency	TX 2402MHz
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Antenna at Vertical Polarization

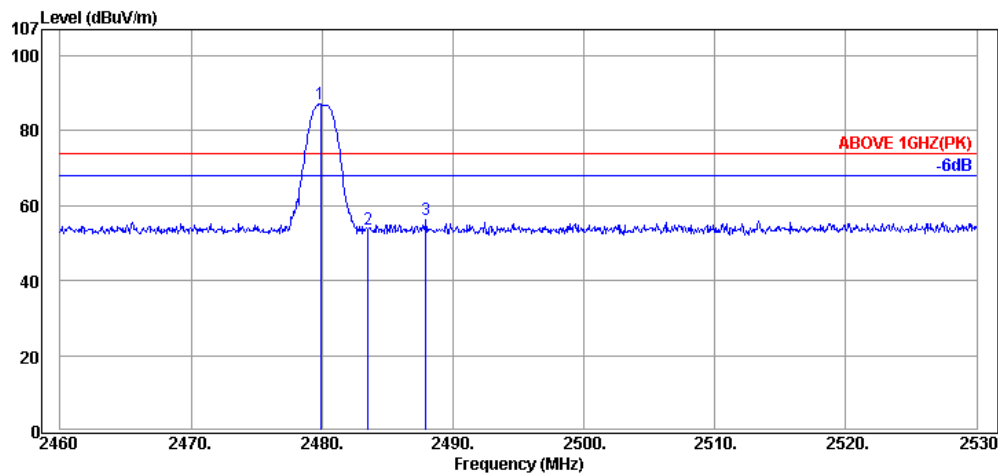
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2371.08	31.66	6.05	18.32	56.03	74.00	17.97	Peak
2390.04	31.68	6.08	15.33	53.09	74.00	20.91	Peak
2401.80	31.69	6.09	63.09	100.87	---	---	Peak



Antenna at Vertical Polarization

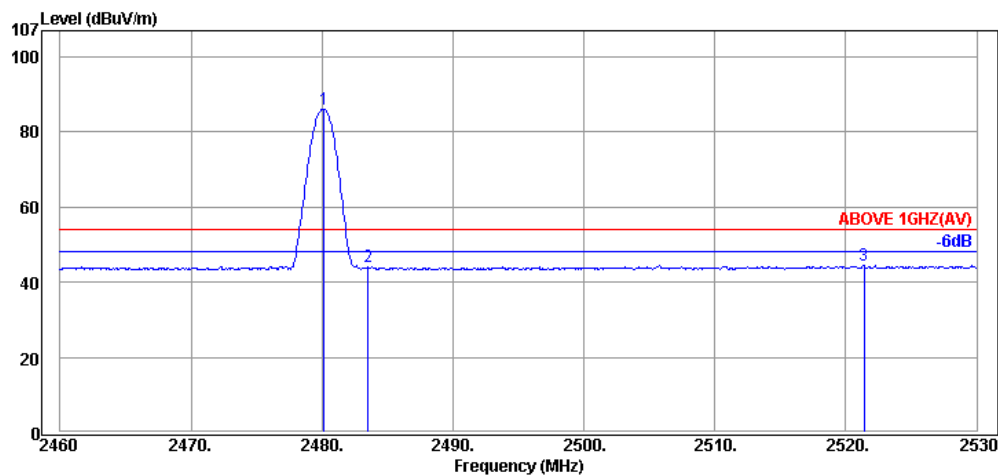
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2362.08	31.64	6.04	8.85	46.53	54.00	7.47	Average
2390.04	31.68	6.08	5.79	43.55	54.00	10.45	Average
2402.04	31.69	6.09	62.12	99.90	---	---	Average

Mode	BLE	Frequency	TX 2480MHz
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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
2479.88	31.78	6.18	49.05	87.01	---	---	Peak
2483.52	31.78	6.19	15.85	53.82	74.00	20.18	Peak
2487.93	31.78	6.19	18.16	56.13	74.00	17.87	Peak



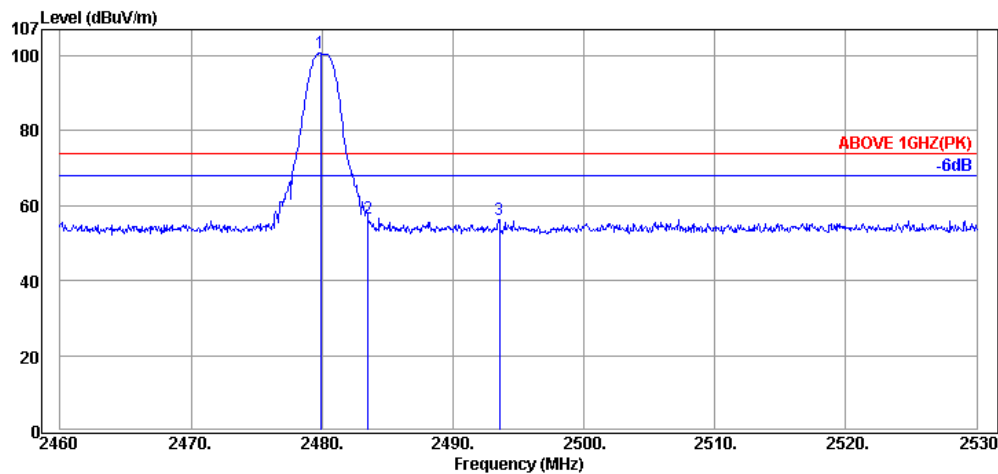
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.16	31.78	6.18	48.17	86.13	---	---	Average
2483.52	31.78	6.19	5.98	43.95	54.00	10.05	Average
2521.39	31.82	6.23	6.44	44.49	54.00	9.51	Average

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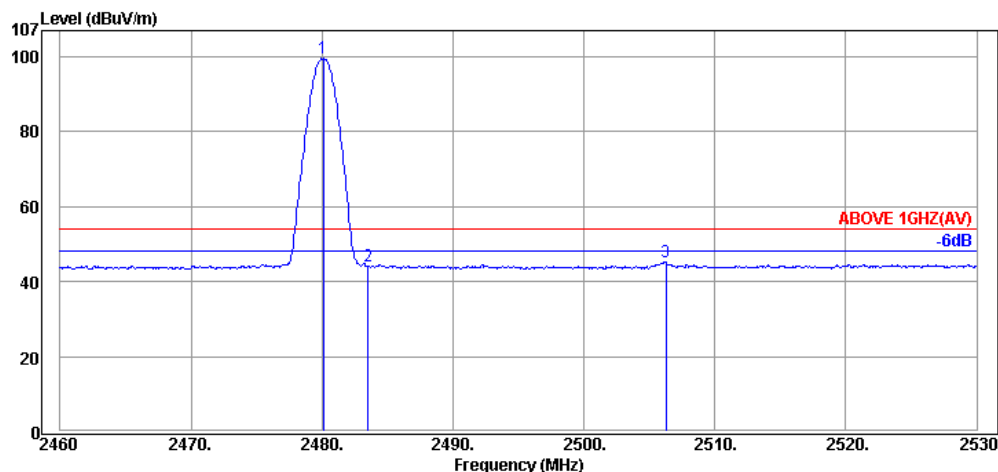
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Fax: +886 2 26099303

Mode	BLE	Frequency	TX 2480MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2479.88	31.78	6.18	62.64	100.60	---	---	Peak
2483.52	31.78	6.19	18.60	56.57	74.00	17.43	Peak
2493.53	31.79	6.20	18.43	56.42	74.00	17.58	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
2480.09	31.78	6.18	61.60	99.56	---	---	Average
2483.52	31.78	6.19	6.05	44.02	54.00	9.98	Average
2506.27	31.81	6.21	7.24	45.26	54.00	8.74	Average

A.2.2 Emissions outside the frequency band:

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

Mode	802.11b	Frequency	TX 2437MHz
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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
1996.00	31.17	5.28	4.38	40.83	54.00	13.17	Peak
4875.00	33.85	9.09	1.15	44.09	54.00	9.91	Peak
7310.00	35.64	11.80	-0.88	46.56	54.00	7.44	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
1996.00	31.17	5.28	10.84	47.29	54.00	6.71	Peak
4875.00	33.85	9.09	-0.05	42.89	54.00	11.11	Peak
6000.00	35.40	9.91	4.78	50.09	54.00	3.91	Peak

Mode	802.11g	Frequency	TX 2437MHz
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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
1948.00	30.89	5.20	9.67	45.76	54.00	8.24	Peak
4875.00	33.85	9.09	-1.22	41.72	54.00	12.28	Peak
7310.00	35.64	11.80	-0.73	46.71	54.00	7.29	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
1994.00	31.17	5.28	9.49	45.94	54.00	8.06	Peak
4875.00	33.85	9.09	-0.41	42.53	54.00	11.47	Peak
7310.00	35.64	11.80	-0.35	47.09	54.00	6.91	Peak

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

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
2084.00	31.31	5.50	5.99	42.80	54.00	11.20	Peak
4925.00	33.87	9.24	-0.32	42.79	54.00	11.21	Peak
7385.00	35.62	12.26	-0.01	47.87	54.00	6.13	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
2000.00	31.20	5.29	13.10	49.59	54.00	4.41	Peak
4925.00	33.87	9.24	0.23	43.34	54.00	10.66	Peak
7385.00	35.62	12.26	-0.35	47.53	54.00	6.47	Peak

Mode	802.11n-HT40	Frequency	TX 2452MHz
------	--------------	-----------	------------

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
2046.00	31.26	5.39	6.17	42.82	54.00	11.18	Peak
4905.00	33.86	9.19	-0.47	42.58	54.00	11.42	Peak
7355.00	35.63	12.10	-0.15	47.58	54.00	6.42	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
1992.00	31.13	5.27	14.07	50.47	54.00	3.53	Peak
4905.00	33.86	9.19	-0.49	42.56	54.00	11.44	Peak
7355.00	35.63	12.10	-0.67	47.06	54.00	6.94	Peak

Mode	BLE	Frequency	TX 2402MHz
------	-----	-----------	------------

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
4805.00	33.82	8.87	1.10	43.79	54.00	10.21	Peak
7205.00	35.66	11.27	-0.29	46.64	54.00	7.36	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
4805.00	33.82	8.87	1.34	44.03	54.00	9.97	Peak
7205.00	35.66	11.27	0.48	47.41	54.00	6.59	Peak

Mode	BLE	Frequency	TX 2440MHz
------	-----	-----------	------------

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
4880.00	33.85	9.14	1.66	44.65	54.00	9.35	Peak
7320.00	35.63	11.80	0.61	48.04	54.00	5.96	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
4880.00	33.85	9.14	0.82	43.81	54.00	10.19	Peak
7320.00	35.63	11.80	0.48	47.91	54.00	6.09	Peak

Mode	BLE	Frequency	TX 2480MHz
------	-----	-----------	------------

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
4960.00	33.88	9.40	1.05	44.33	54.00	9.67	Peak
7440.00	35.61	12.56	0.50	48.67	54.00	5.33	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
4960.00	33.88	9.40	1.47	44.75	54.00	9.25	Peak
7440.00	35.61	12.56	1.58	49.75	54.00	4.25	Peak

A.2.3 Emissions in Non-restricted Frequency Bands:

Pursuant to KDB 558074 D01 DTS Meas Guidance v04 that emission levels below the 15.209 general radiated emissions limits is not required.

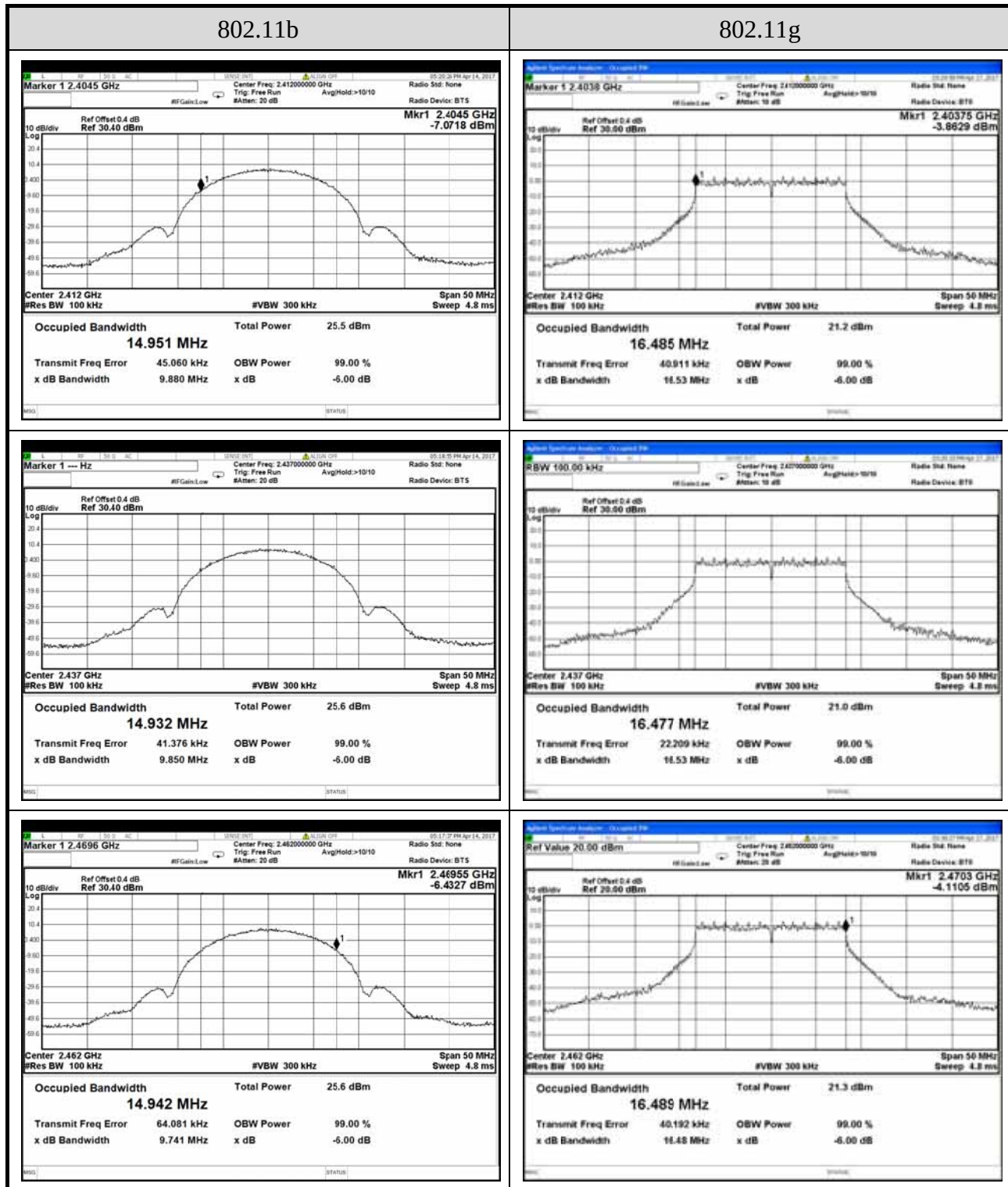
A.3 6dB BANDWIDTH

Test Date	2017/04/14 ~ 05/11	Temp./Hum.	26°C/42 ~ 43%
Cable Loss	WLAN: 0.4dB BLE: 1.5dB	Test Voltage	AC 120V, 60Hz (Via Power Supply)

A.3.1 6dB Bandwidth Result

Mode	Centre Frequency (MHz)	6 dB Bandwidth (MHz)	Limit
802.11b	2412	9.880	>500kHz
	2437	9.850	
	2462	9.741	
802.11g	2412	16.53	
	2437	16.53	
	2462	16.48	
802.11n-HT20	2412	17.69	
	2437	17.74	
	2462	17.71	
802.11n-HT40	2422	36.03	
	2437	35.86	
	2452	36.41	
BLE	2402	0.7314	
	2440	0.7067	
	2480	0.7271	

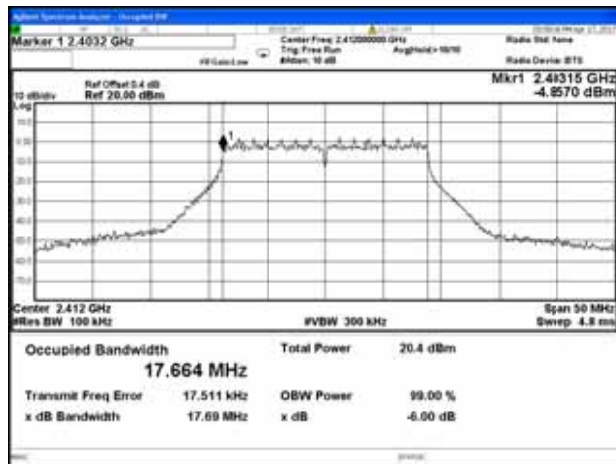
A.3.2 Measurement Plots



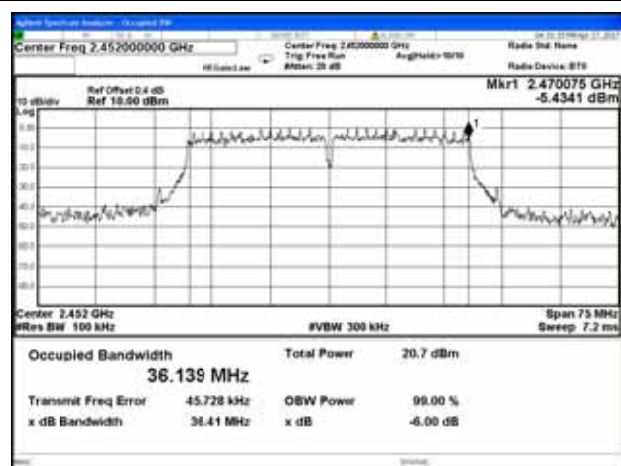
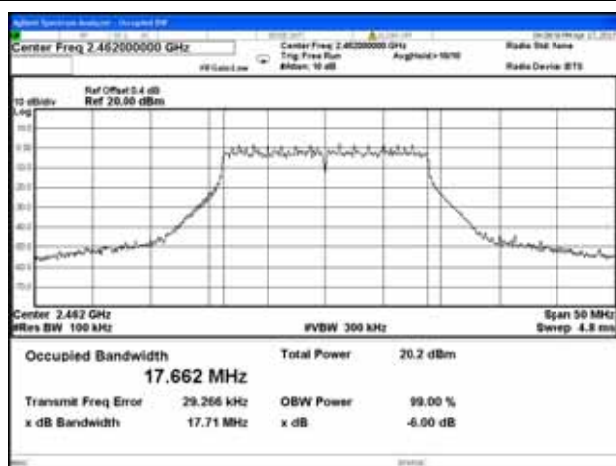
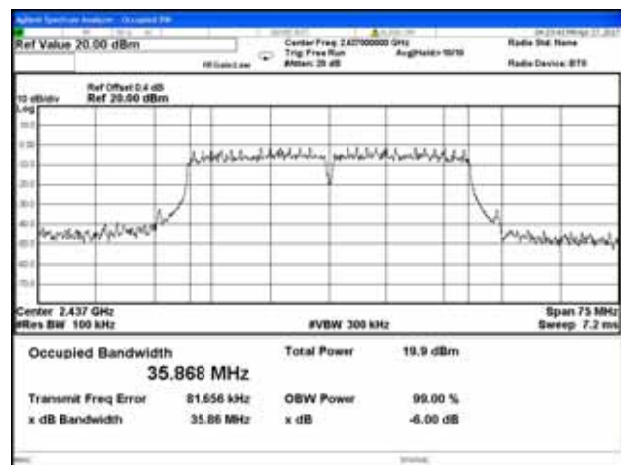
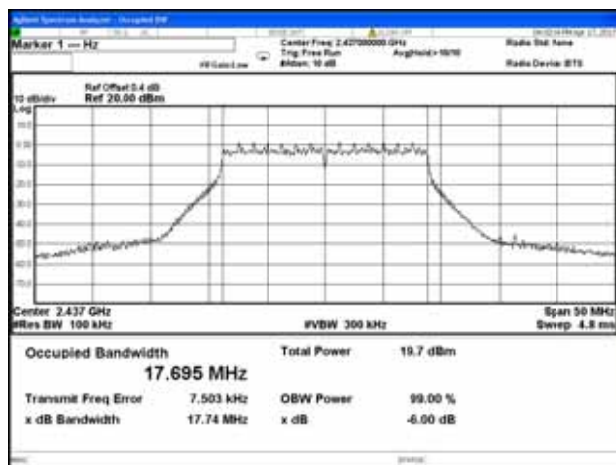
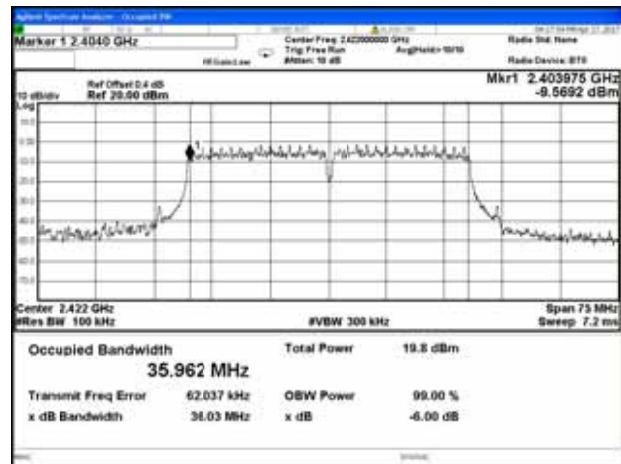
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802.11n-HT20



802.11n-HT40



BLE



A.4 MAXIMUM PEAK OUTPUT POWER

Test Date	2017/04/14 ~ 05/11	Temp./Hum.	26°C/42 ~ 43%
Cable Loss	WLAN: 0.4dB BLE: 1.5dB	Test Voltage	AC 120V, 60Hz (Via Power Supply)

A.4.1 Peak Output Power

Modulation Type	Centre Frequency (MHz)	MAX Output Power		Limit
		(dBm)	(W)	
802.11b	2412	19.33	0.085704	< 30dBm (1W)
	2437	19.48	0.088716	
	2462	19.23	0.083753	
802.11g	2412	22.34	0.171396	
	2437	23.04	0.201372	
	2462	22.99	0.199067	
802.11n-HT20	2412	21.76	0.149968	
	2437	21.42	0.138676	
	2462	22.05	0.160325	
802.11n-HT40	2422	21.89	0.154525	
	2437	22.31	0.170216	
	2452	22.53	0.179061	

Note: The results have been included cable loss.

Mode	Centre Frequency (MHz)	MAX Output Power		Limit
		(dBm)	(W)	
BLE	2402	0.697	0.001174	< 30dBm (1W)
	2440	0.625	0.001155	
	2480	0.311	0.001074	

Note: The results have been included cable loss.

A.4.2 Average Output Power (Reporting only)

Mode	Centre Frequency (MHz)	Average Output Power (dBm)	10log (1/X)	Total Average Output Power		Limit
				(dBm)	(W)	
802.11b	2412	16.72	0.51	17.23	0.052845	< 30dBm (1W)
	2437	16.29		16.80	0.047863	
	2462	16.42		16.93	0.049317	
802.11g	2412	12.29	1.91	14.23	0.026485	
	2437	12.16		14.10	0.025704	
	2462	12.77		14.71	0.029580	
802.11n-HT20	2412	11.32	2.44	13.76	0.023768	
	2437	10.98		13.42	0.021979	
	2462	11.17		13.61	0.022961	
802.11n-HT40	2422	10.37	2.84	13.21	0.020941	
	2437	10.60		13.44	0.022080	
	2452	11.01		13.85	0.024266	

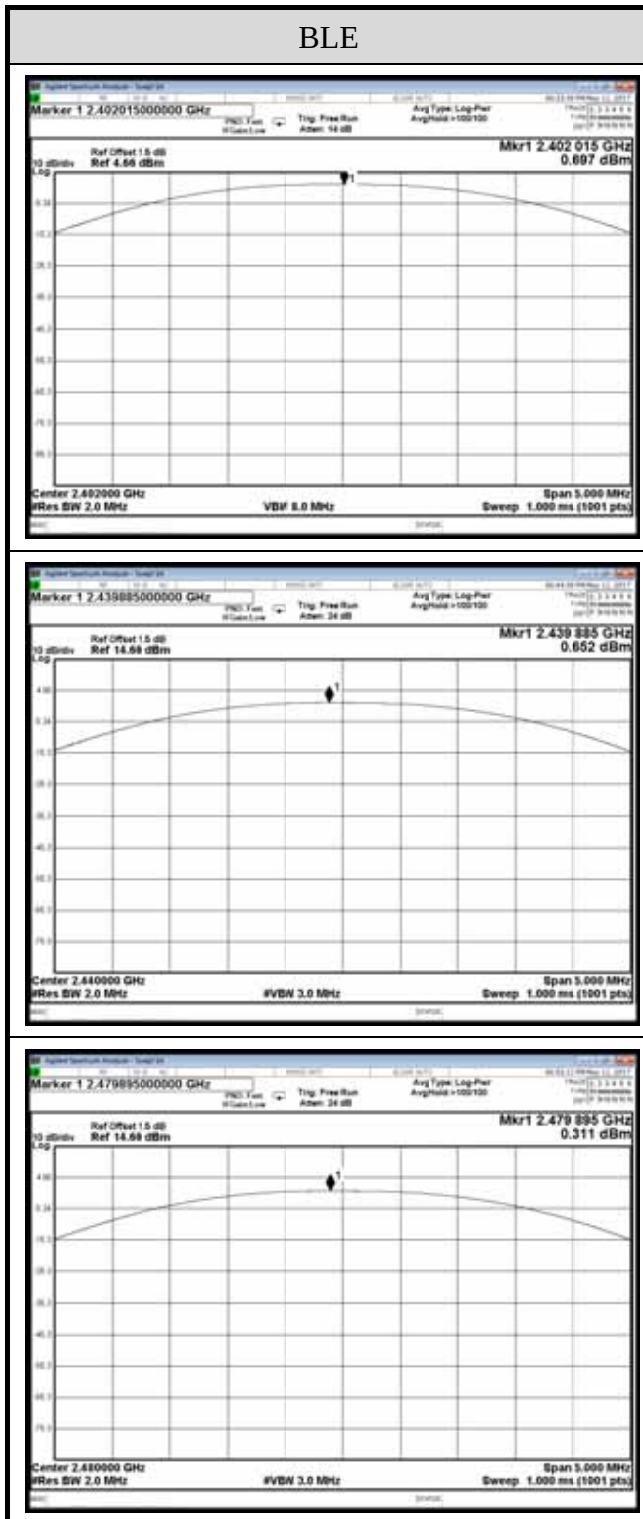
Note: The results have been included cable loss.

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A.4.3 Measurement Plots

BLE

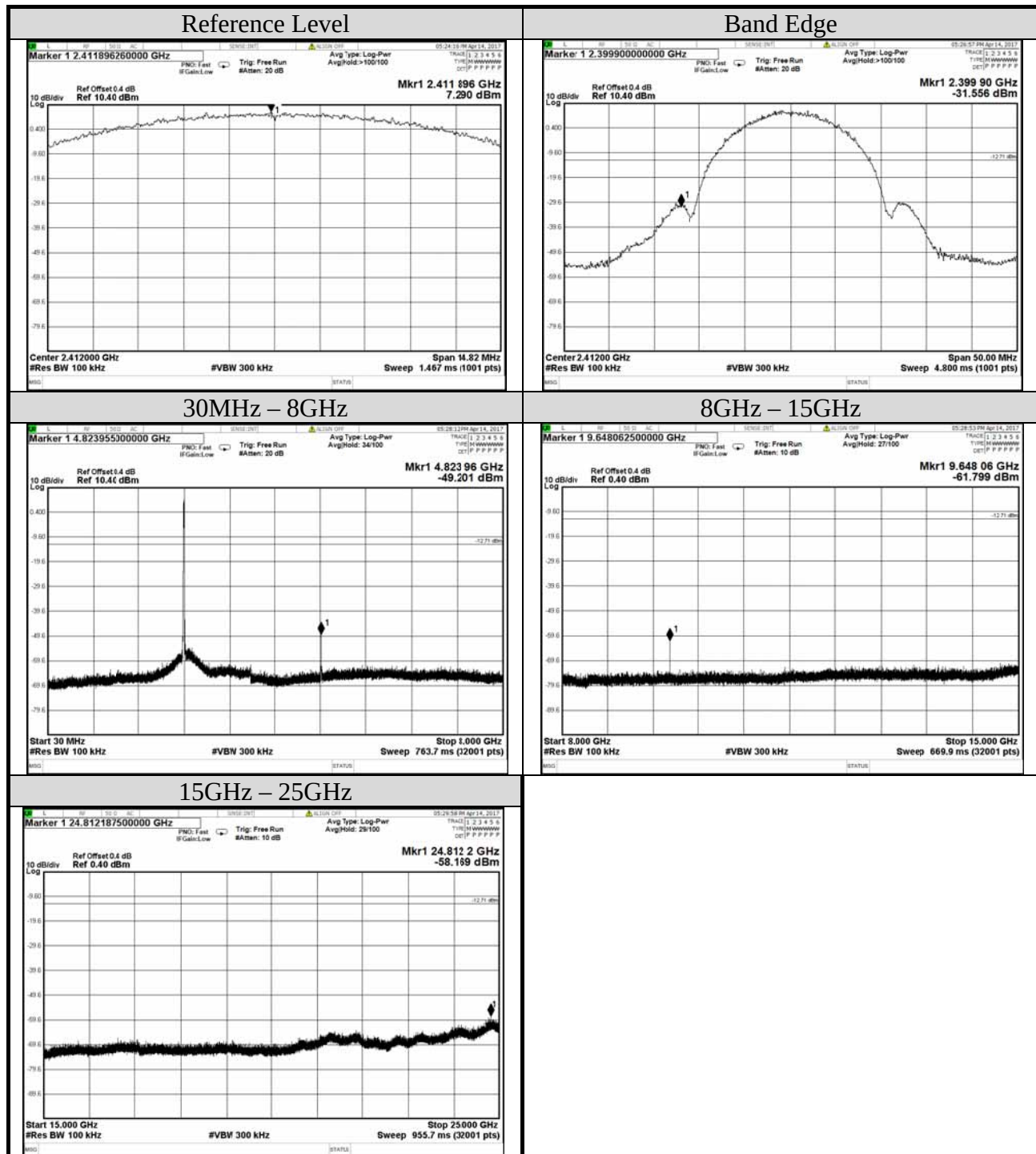


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A.5 EMISSION LIMITATIONS

Test Date	2017/04/14	Temp./Hum.	26°C/42%
Cable Loss	0.4dB	Test Voltage	AC 120V, 60Hz (Via Power Supply)
Mode	802.11b	Frequency	TX 2412MHz
Simultaneous Factor	10 log(n) (Note: "n" is antenna number)		0



File Number: C1M1703373

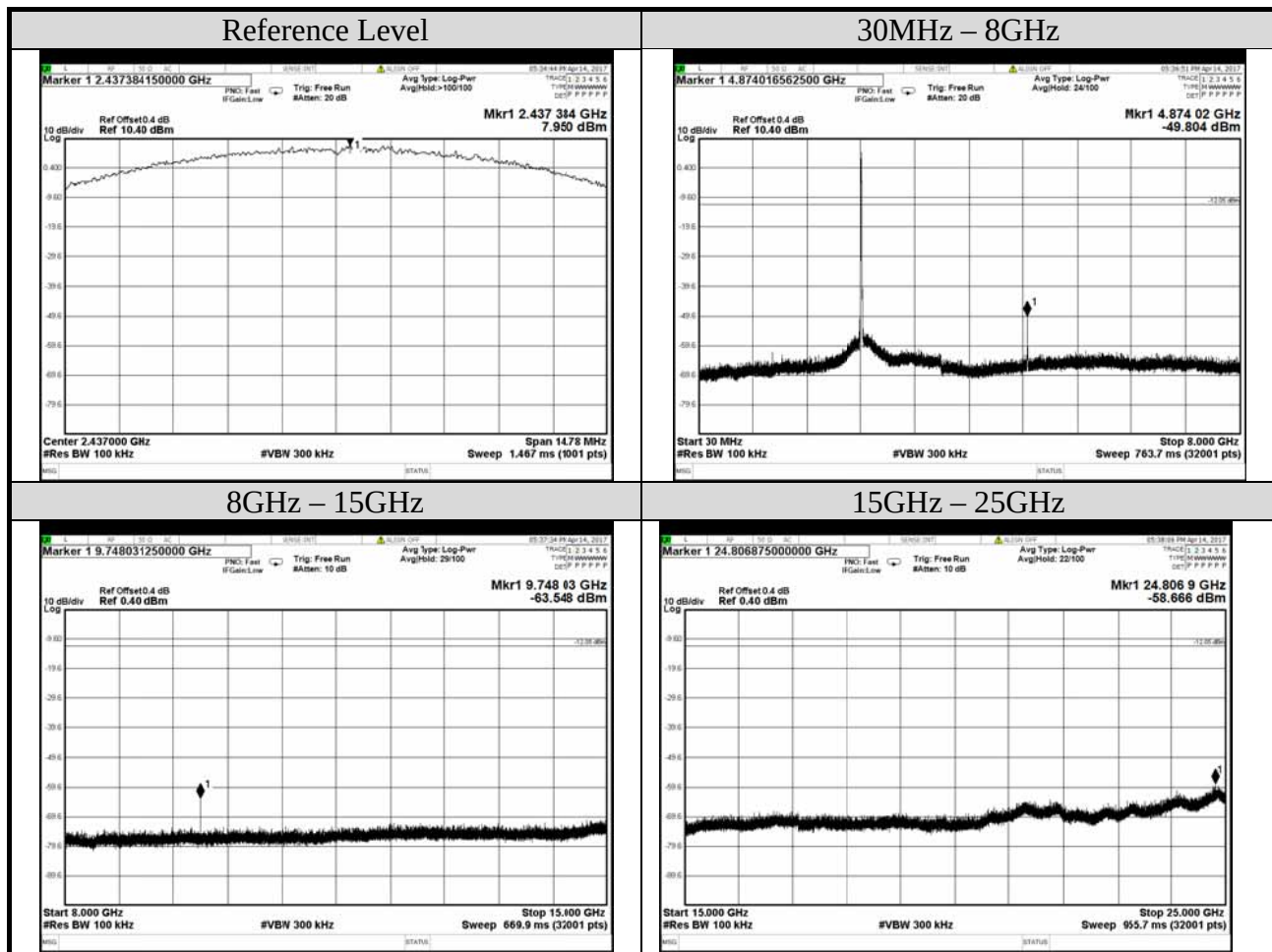
Report Number: EM-F170245

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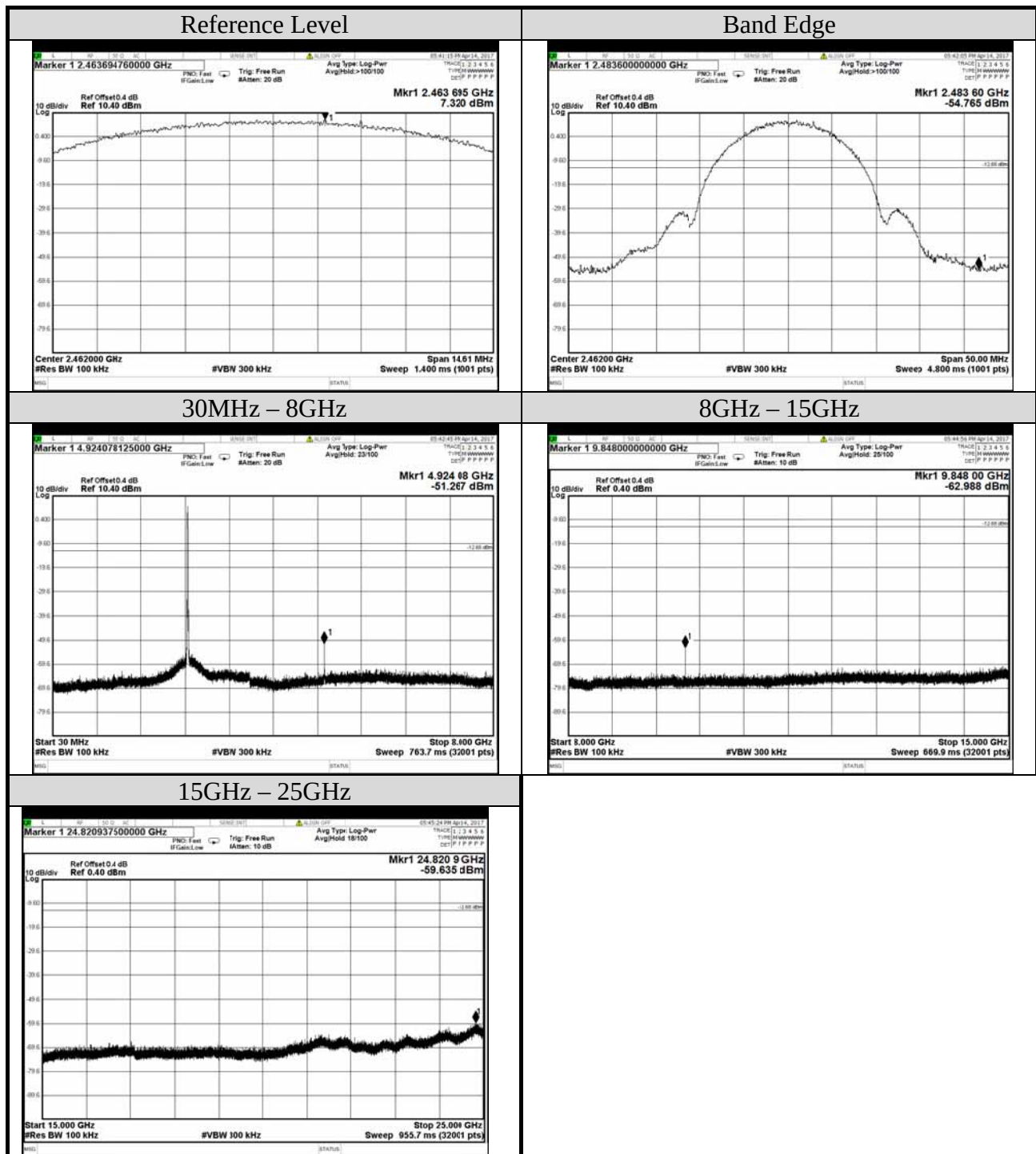
Test Date	2017/04/14	Temp./Hum.	26°C/42%
Cable Loss	0.4dB	Test Voltage	AC 120V, 60Hz (Via Power Supply)
Mode	802.11b	Frequency	TX 2437MHz
Simultaneous Factor 10 log(n) (Note: "n" is antenna number)			0



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Test Date	2017/04/14	Temp./Hum.	26°C/42%
Cable Loss	0.4dB	Test Voltage	AC 120V, 60Hz (Via Power Supply)
Mode	802.11b	Frequency	TX 2462MHz
Simultaneous Factor	10 log(n) (Note: "n" is antenna number)		0



File Number: C1M1703373

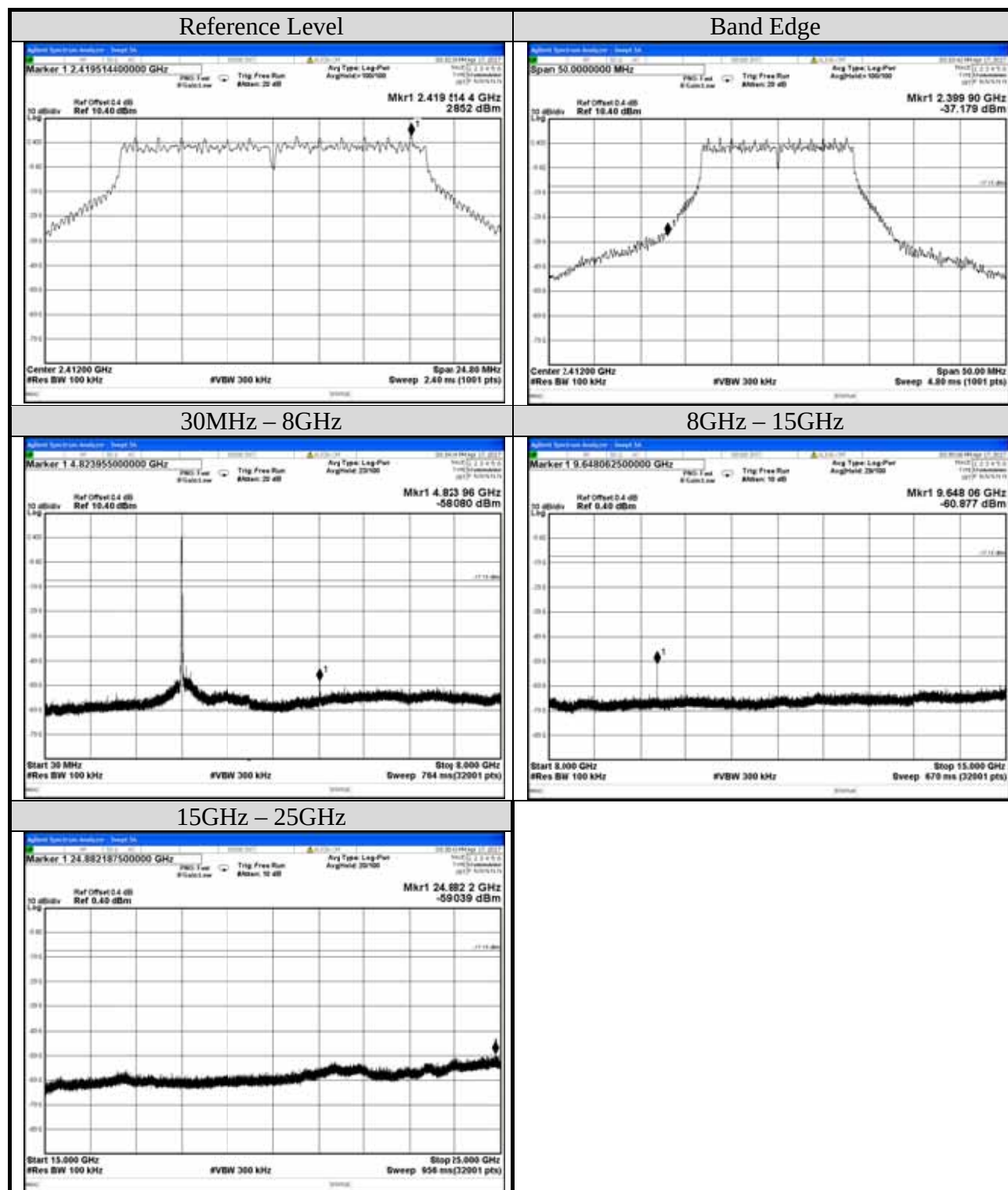
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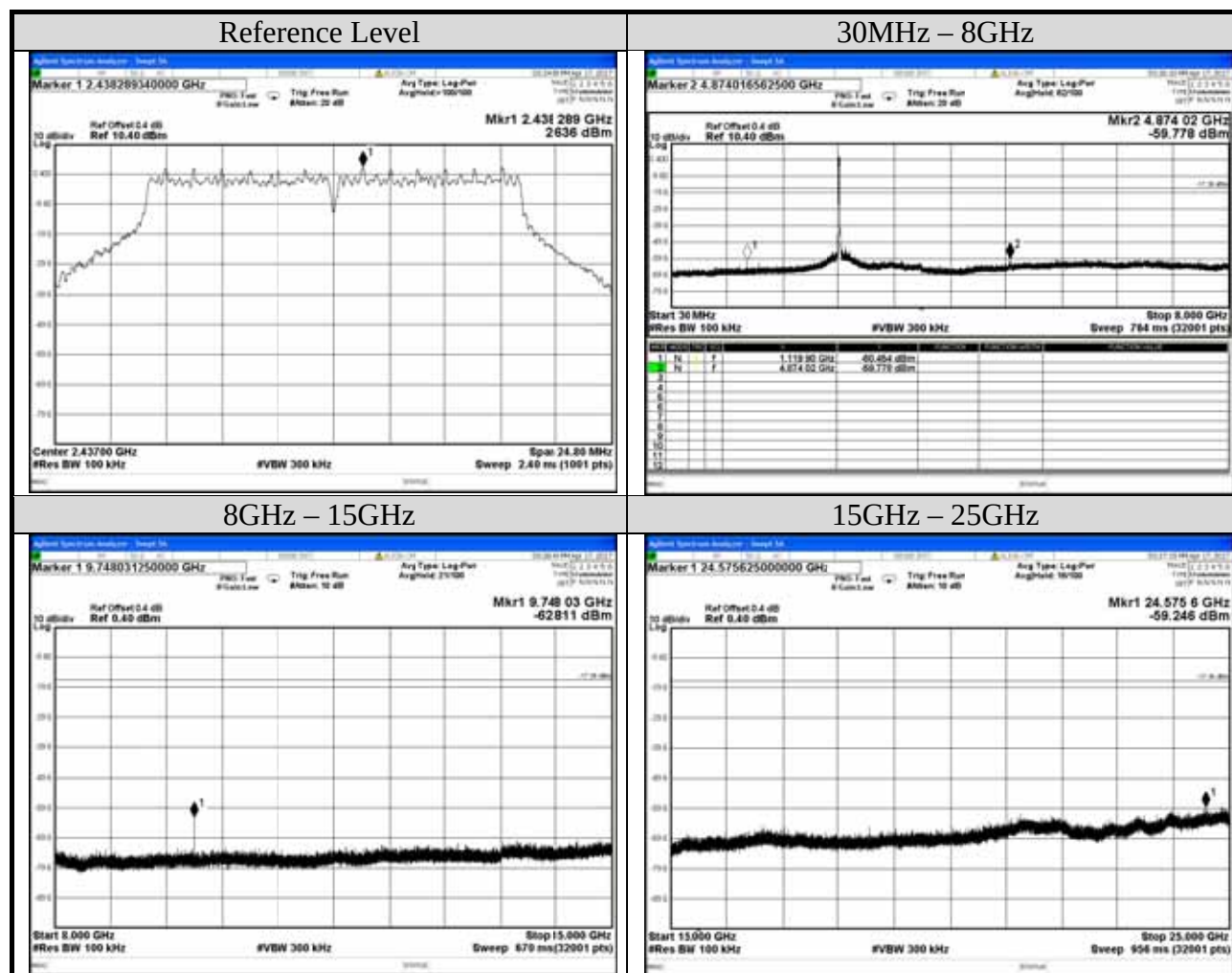
Test Date	2017/04/14	Temp./Hum.	26°C/42%
Cable Loss	0.4dB	Test Voltage	AC 120V, 60Hz (Via Power Supply)
Mode	802.11g	Frequency	TX 2412MHz
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0



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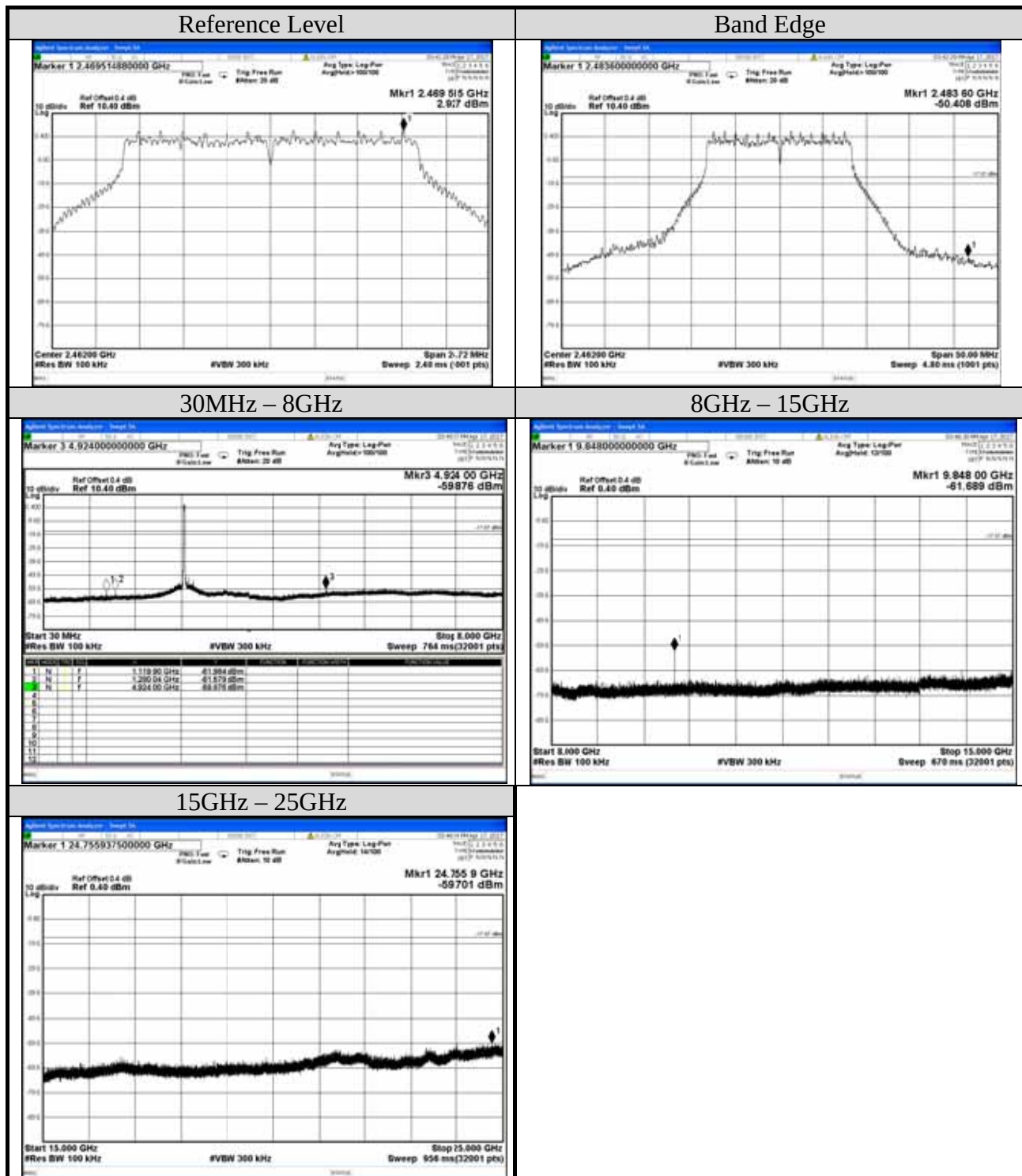
Test Date	2017/04/14	Temp./Hum.	26°C/42%
Cable Loss	0.4dB	Test Voltage	AC 120V, 60Hz (Via Power Supply)
Mode	802.11g	Frequency	TX 2437MHz
Simultaneous Factor	10 log(n) (Note: "n" is antenna number)		0



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Test Date	2017/04/14	Temp./Hum.	26°C/42%
Cable Loss	0.4dB	Test Voltage	AC 120V, 60Hz (Via Power Supply)
Mode	802.11g	Frequency	TX 2462MHz
Simultaneous Factor 10 log(n) (Note: "n" is antenna number)			0

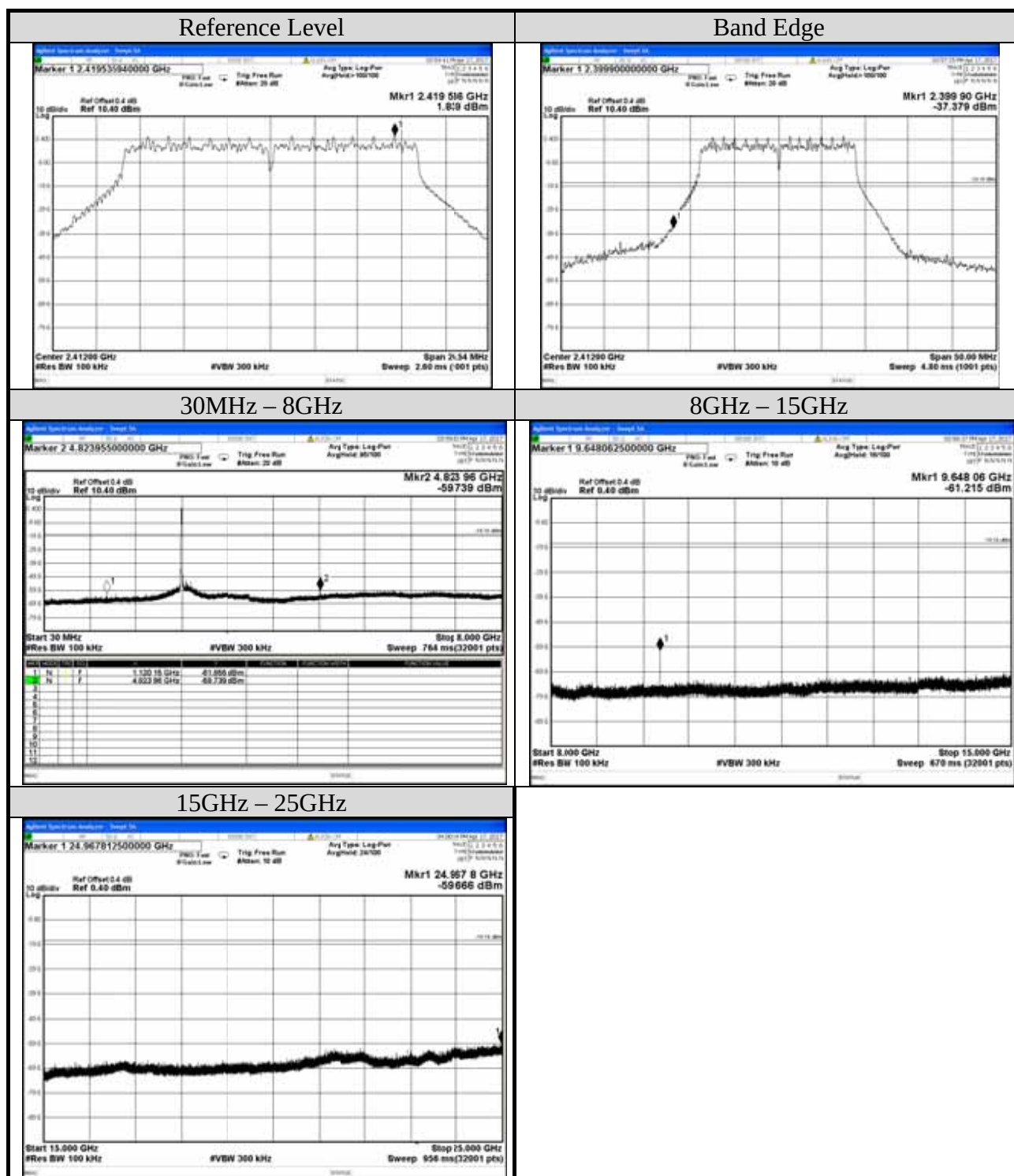


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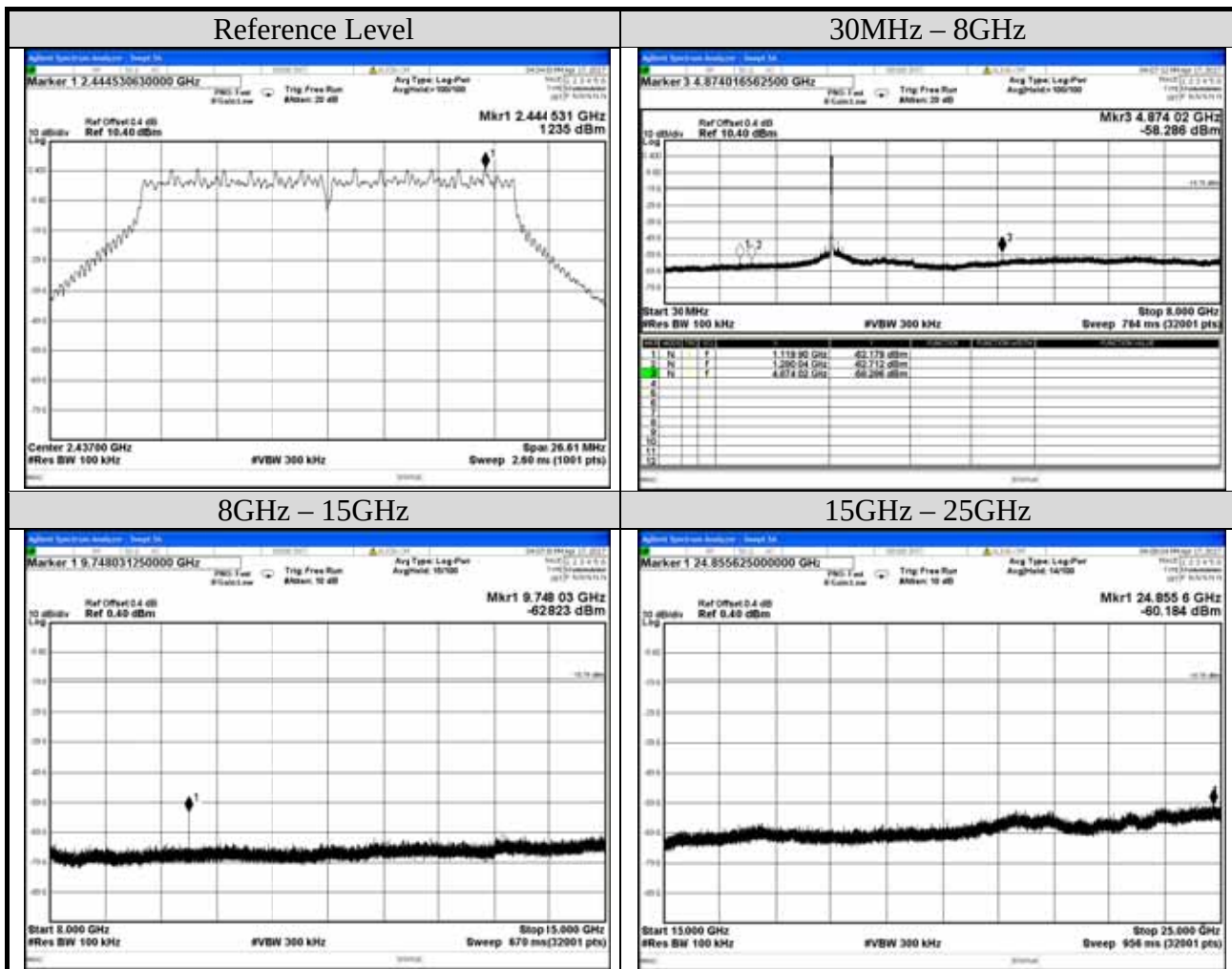
Test Date	2017/04/14	Temp./Hum.	26°C/42%
Cable Loss	0.4dB	Test Voltage	AC 120V, 60Hz (Via Power Supply)
Mode	802.11n-HT20	Frequency	TX 2412MHz
Simultaneous Factor 10 log(n) (Note: "n" is antenna number)			0



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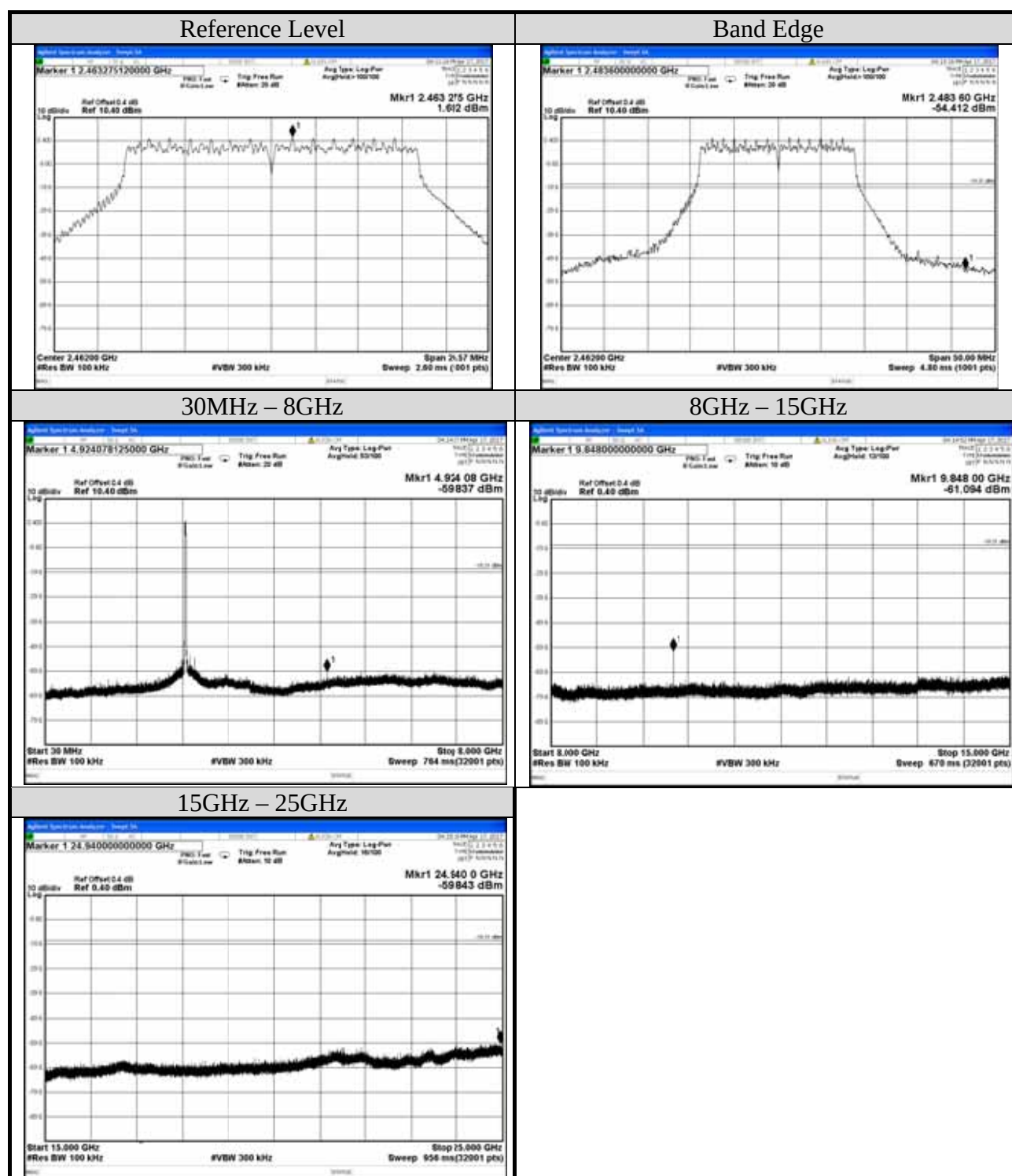
Test Date	2017/04/14	Temp./Hum.	26°C/42%
Cable Loss	0.4dB	Test Voltage	AC 120V, 60Hz (Via Power Supply)
Mode	802.11n-HT20	Frequency	TX 2437MHz
Simultaneous Factor 10 log(n) (Note: "n" is antenna number)			0



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Test Date	2017/04/14	Temp./Hum.	26°C/43%
Cable Loss	0.4dB	Test Voltage	AC 120V, 60Hz (Via Power Supply)
Mode	802.11n-HT20	Frequency	TX 2462MHz
Simultaneous Factor 10 log(n) (Note: "n" is antenna number)			0



File Number: C1M1703373

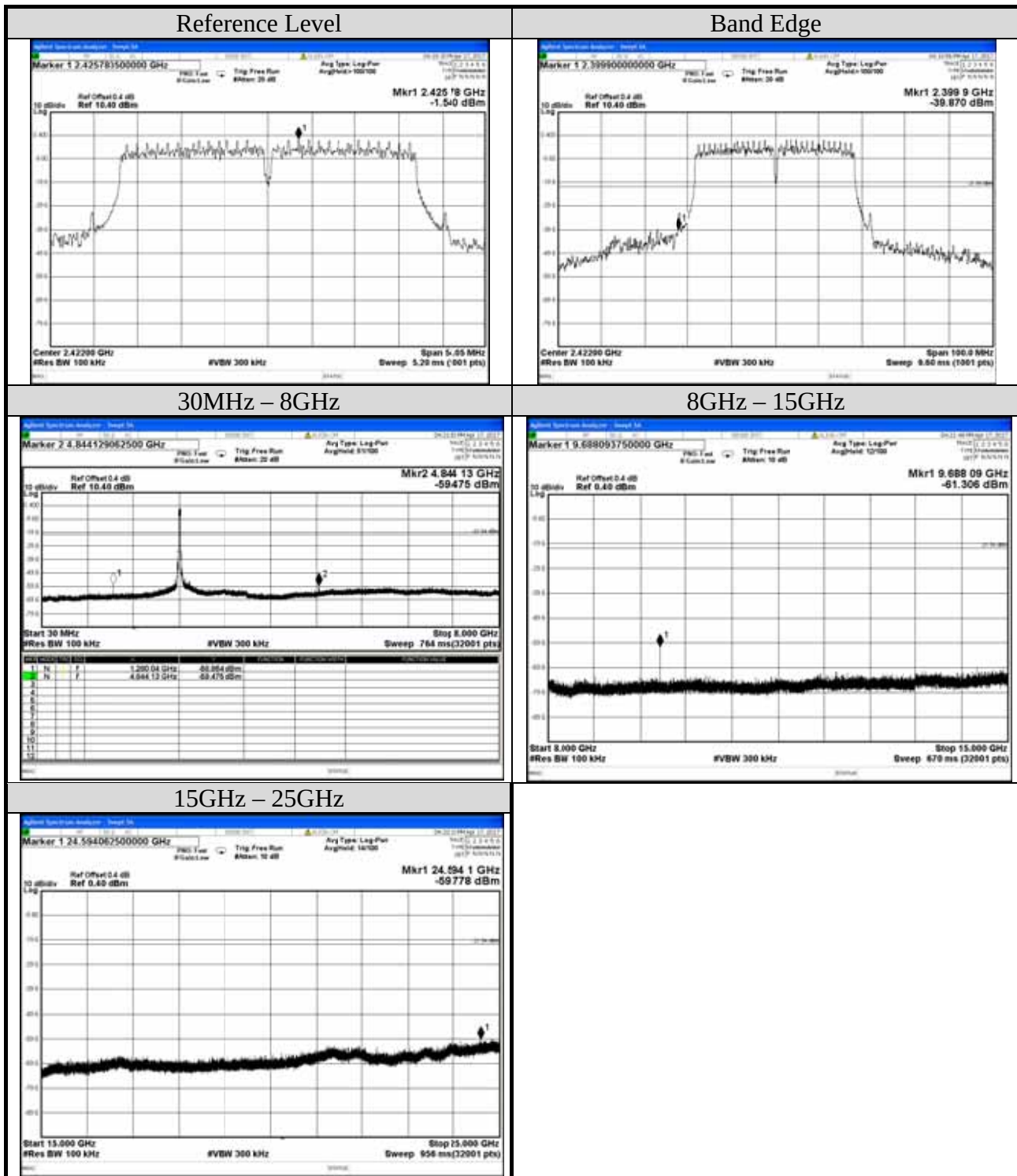
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Test Date	2017/04/14	Temp./Hum.	26°C/43%
Cable Loss	0.4dB	Test Voltage	AC 120V, 60Hz (Via Power Supply)
Mode	802.11n-HT40	Frequency	TX 2422MHz
Simultaneous Factor	10 log(n) (Note: "n" is antenna number)		0



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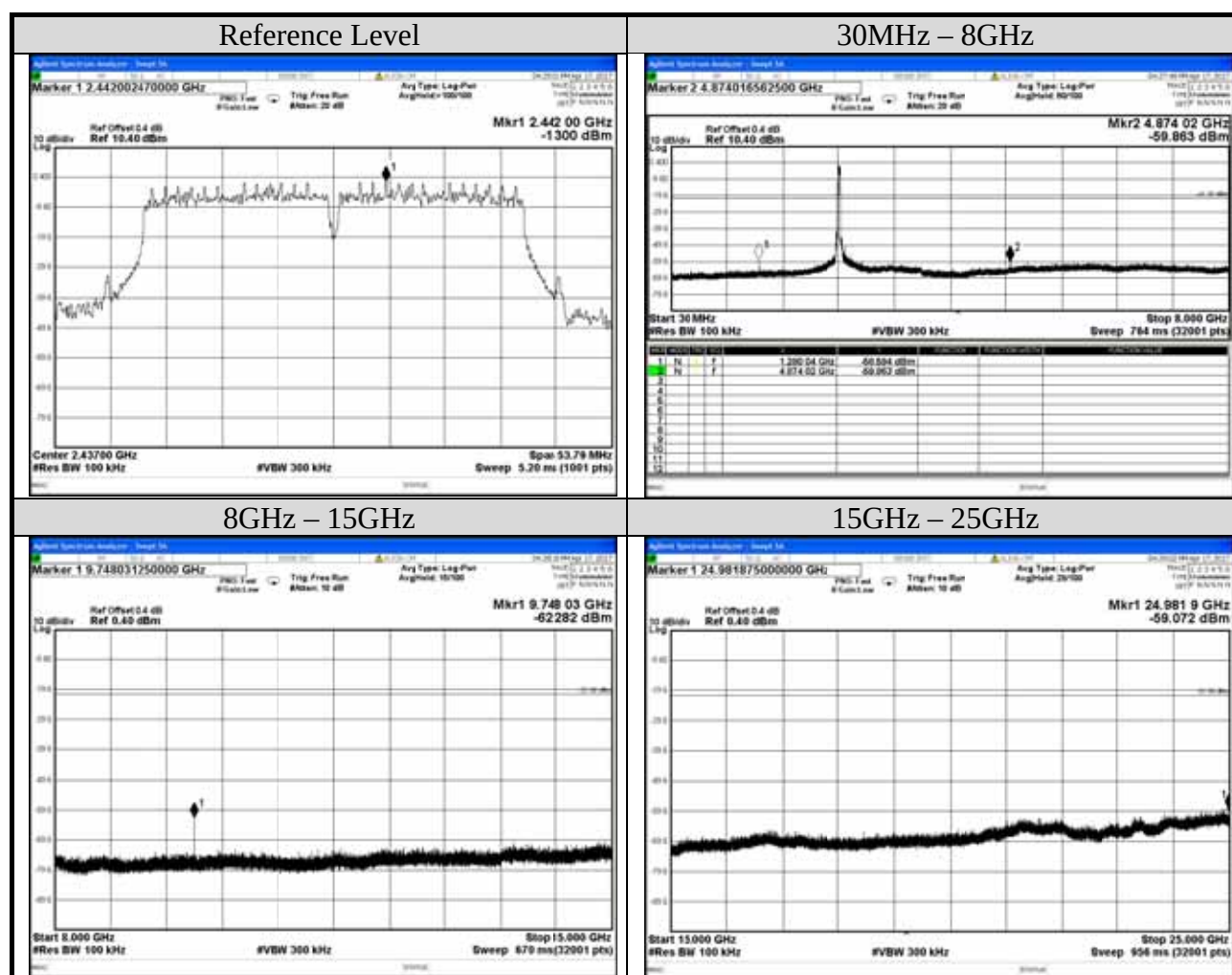
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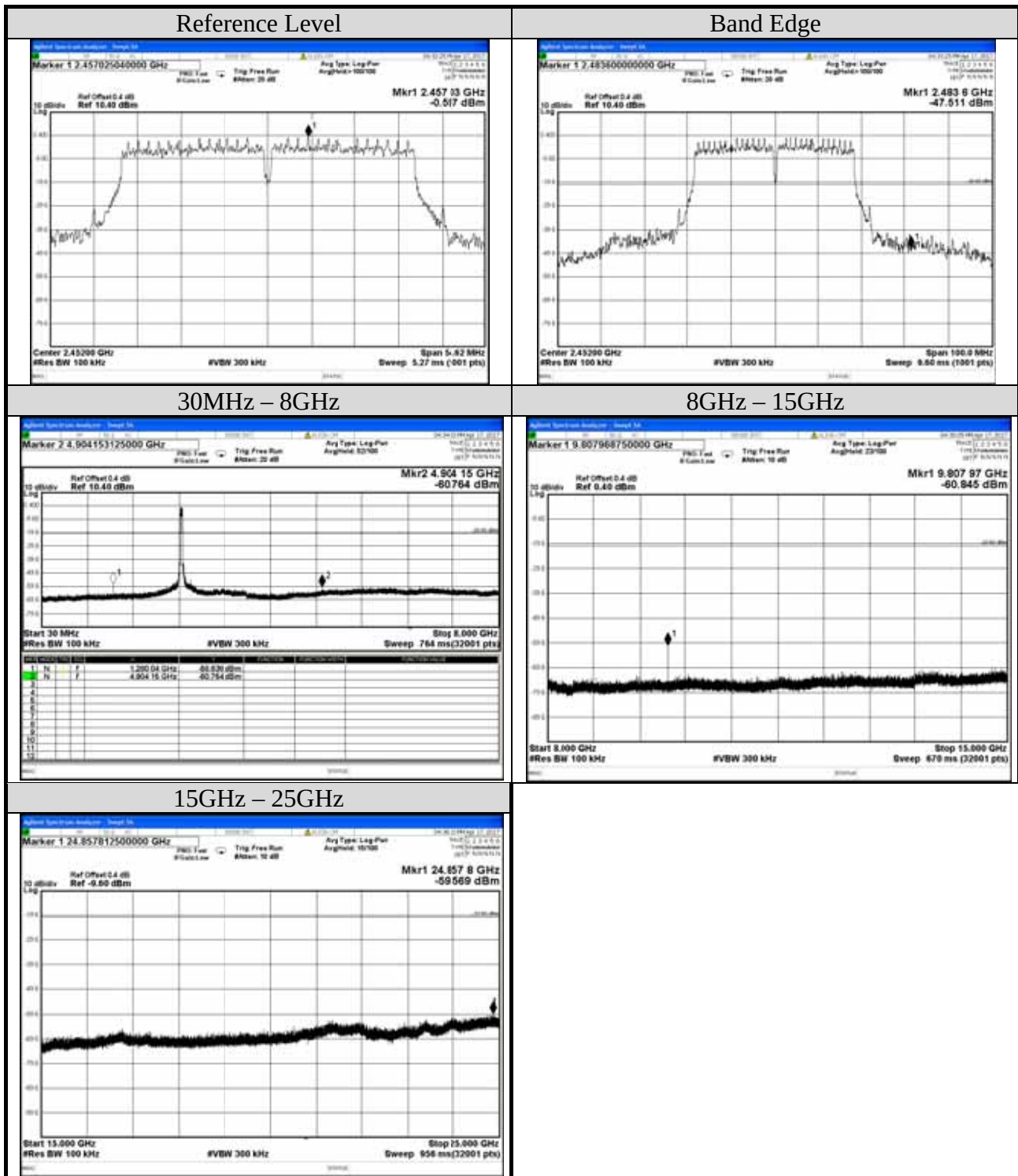
Test Date	2017/04/14	Temp./Hum.	26°C/43%
Cable Loss	0.4dB	Test Voltage	AC 120V, 60Hz (Via Power Supply)
Mode	802.11n-HT40	Frequency	TX 2437MHz
Simultaneous Factor	10 log(n) (Note: "n" is antenna number)		0



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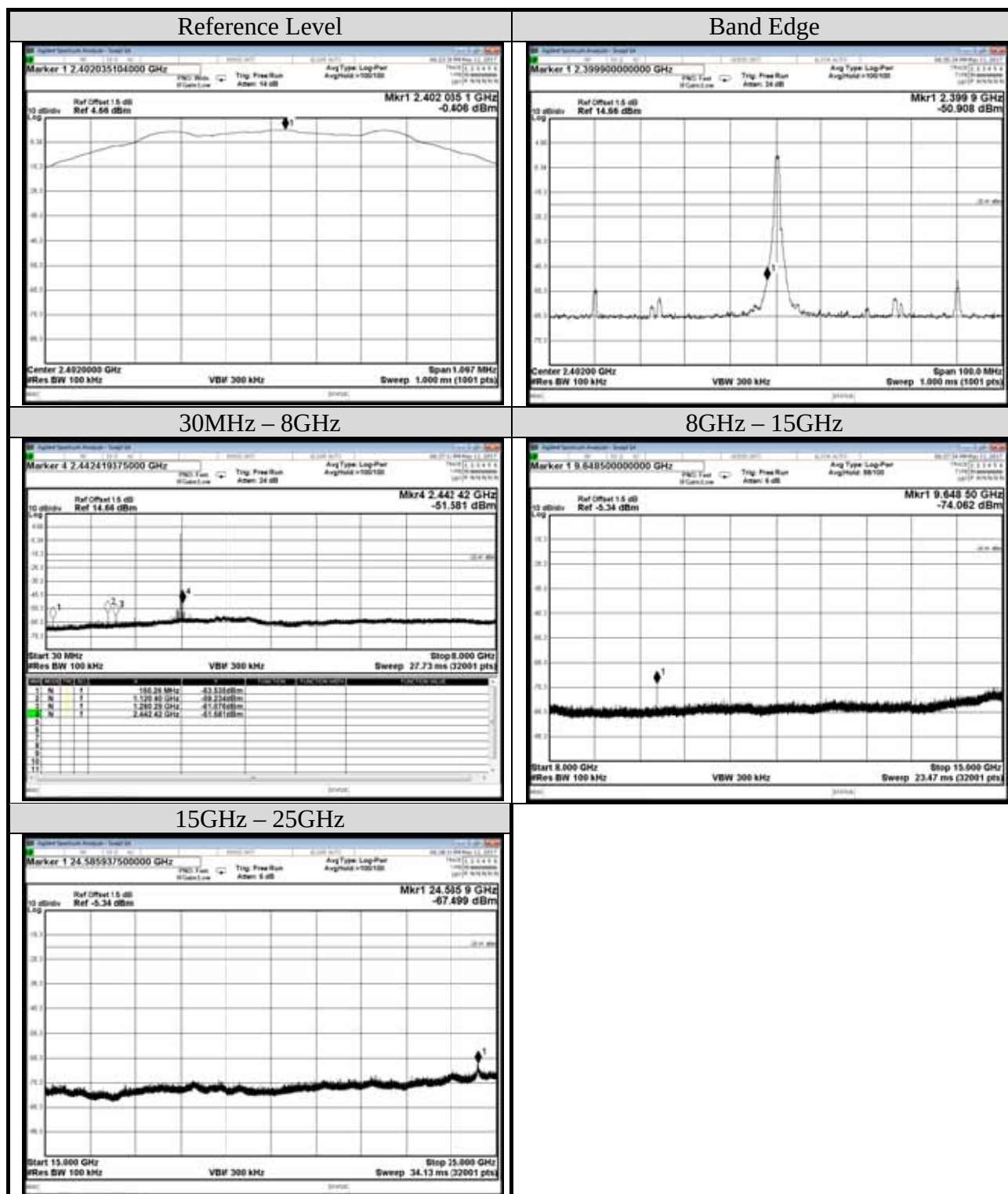
Test Date	2017/04/14	Temp./Hum.	26°C/43%
Cable Loss	0.4dB	Test Voltage	AC 120V, 60Hz (Via Power Supply)
Mode	802.11n-HT40	Frequency	TX 2452MHz
Simultaneous Factor	10 log(n) (Note: "n" is antenna number)		0



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Test Date	2017/05/11	Temp./Hum.	26°C/42%
Cable Loss	1.5dB	Test Voltage	AC 120V, 60Hz (Via Power Supply)
Mode	BLE	Frequency	TX 2402MHz
Simultaneous Factor	10 log(n) (Note: "n" is antenna number)		0



File Number: C1M1703373

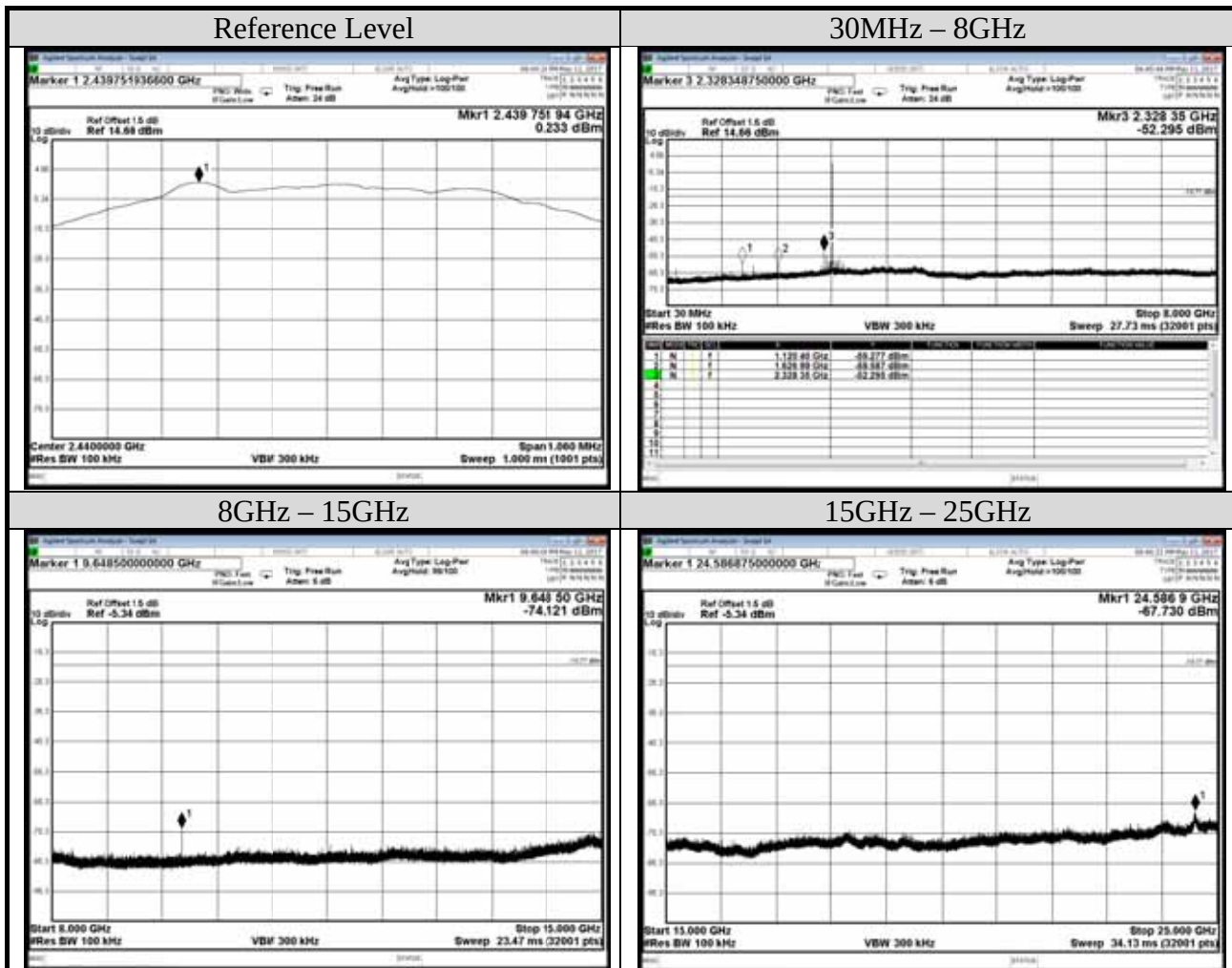
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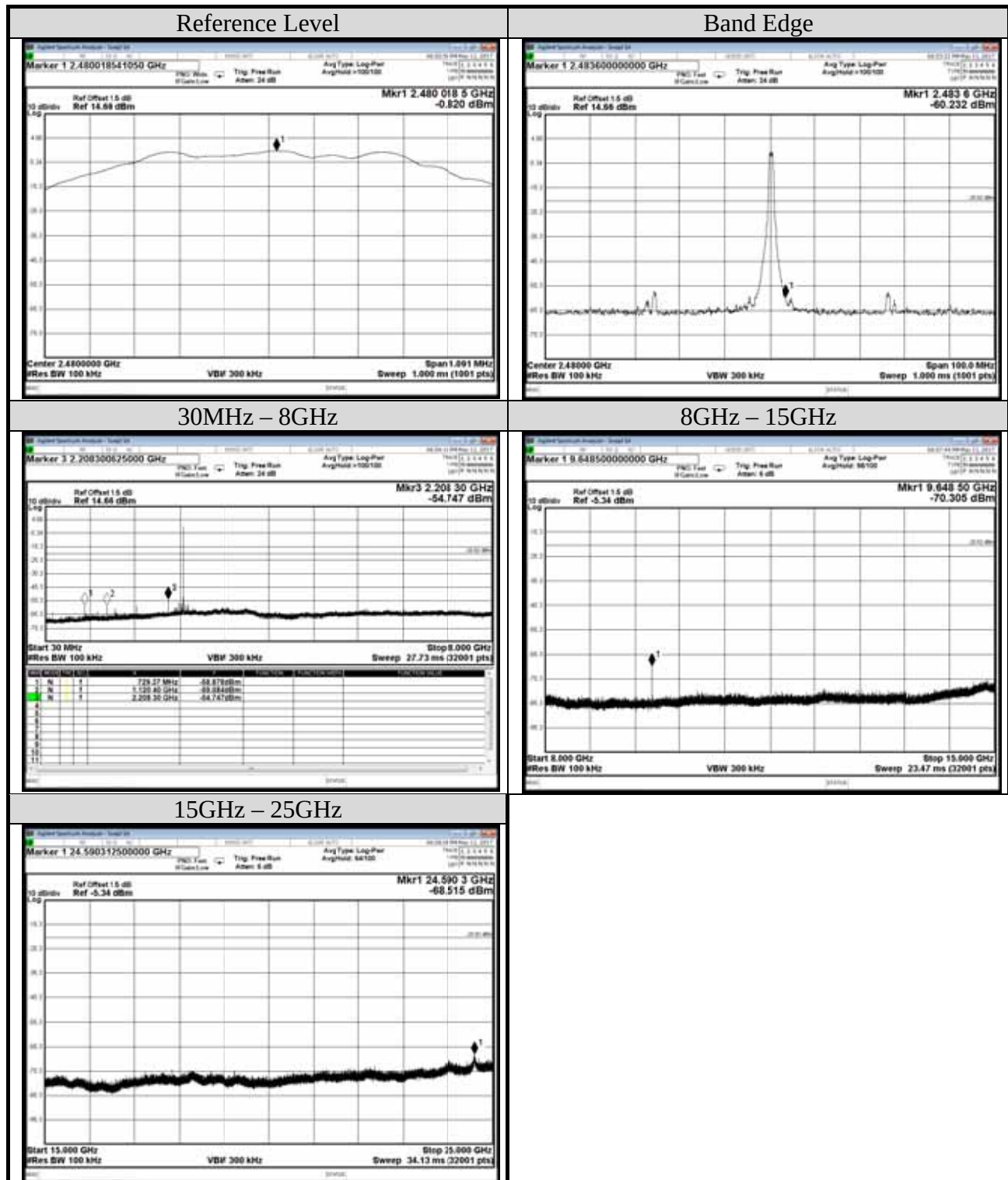
Test Date	2017/05/11	Temp./Hum.	26°C/42%
Cable Loss	1.5dB	Test Voltage	AC 120V, 60Hz (Via Power Supply)
Mode	BLE	Frequency	TX 2440MHz
Simultaneous Factor	10 log(n) (Note: "n" is antenna number)		0



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Test Date	2017/05/11	Temp./Hum.	26°C/42%
Cable Loss	1.5dB	Test Voltage	AC 120V, 60Hz (Via Power Supply)
Mode	BLE	Frequency	TX 2480MHz
Simultaneous Factor	10 log(n) (Note: "n" is antenna number)		0



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A.6 POWER SPECTRAL DENSITY

Test Date	2017/04/14 ~ 05/11	Temp./Hum.	26°C/42 ~ 43%
Cable Loss	WLAN: 0.4dB BLE: 1.5dB	Test Voltage	AC 120V, 60Hz (Via Power Supply)
Simultaneous Factor 10 log(n) (Note: "n" is antenna number)			0

A.6.1 Power Spectral Density Result

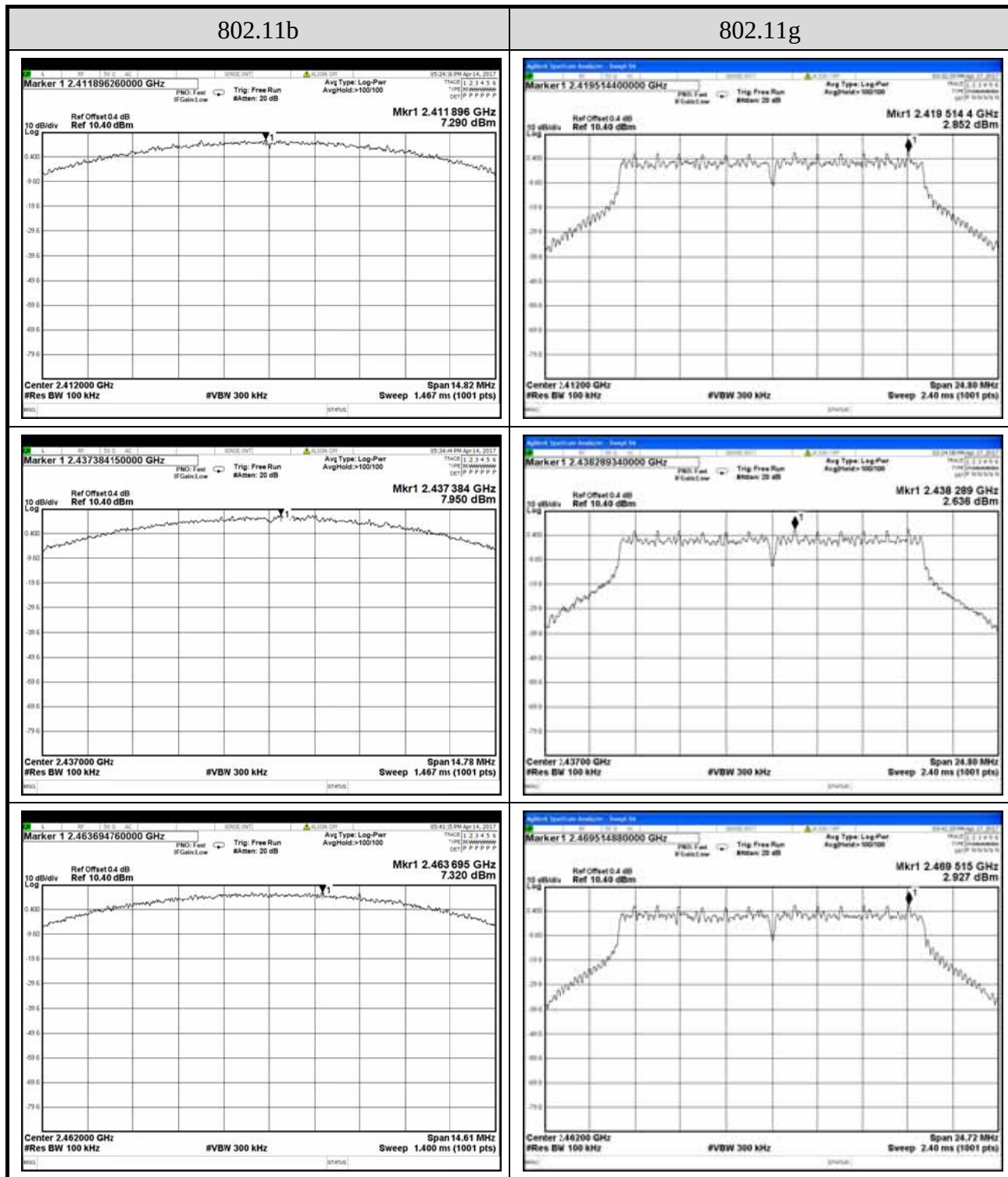
Mode	Centre Frequency (MHz)	Power Spectral Density (dBm)	Limit
802.11b	2412	7.290	< 8 dBm/3kHz
	2437	7.950	
	2462	7.320	
802.11g	2412	2.852	
	2437	2.636	
	2462	2.927	
802.11n-HT20	2412	1.839	
	2437	1.235	
	2462	1.692	
802.11n-HT40	2422	-1.540	
	2437	-1.300	
	2452	-0.597	
BLE	2402	-0.406	
	2440	0.233	
	2480	-0.820	

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

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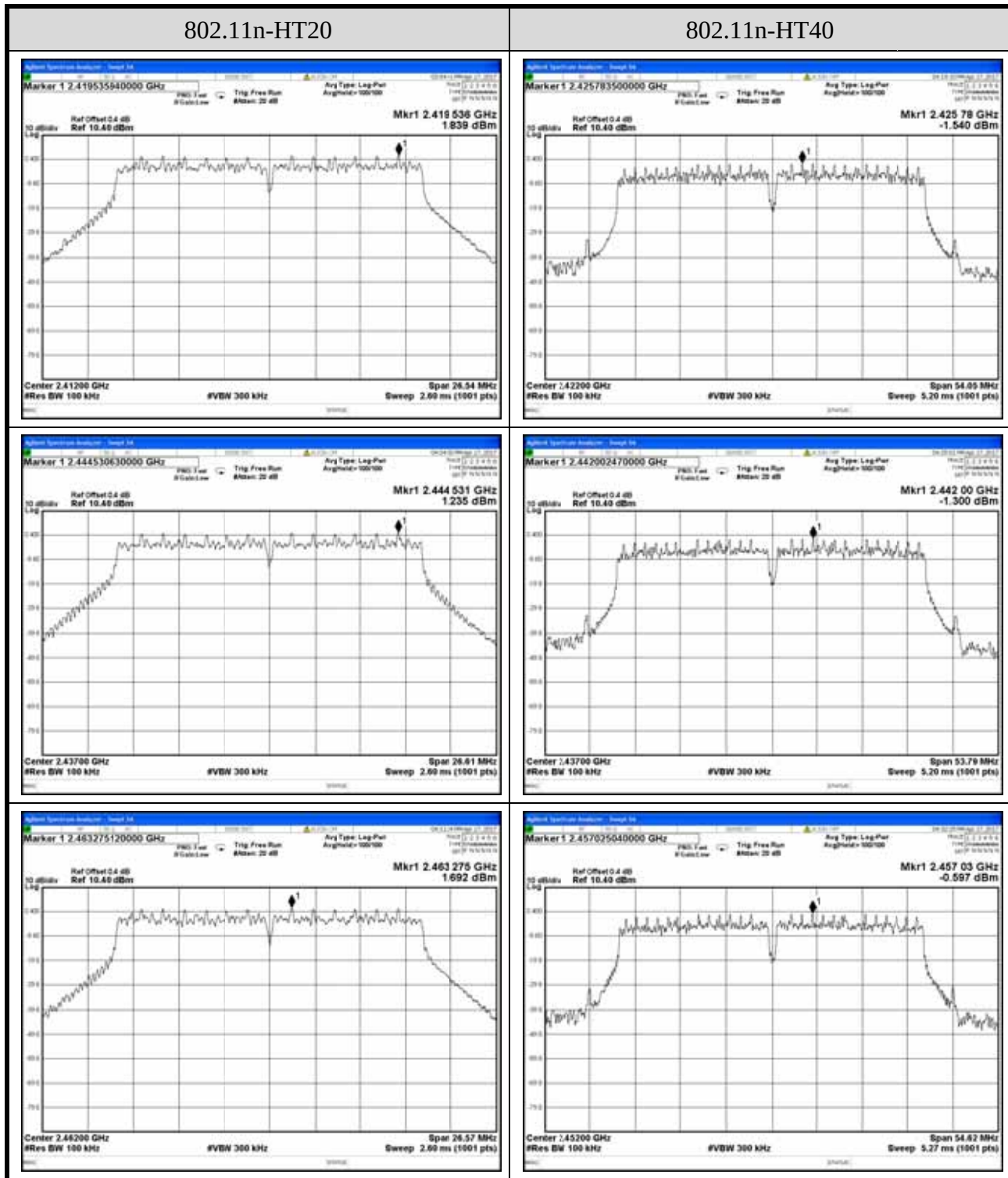
A.6.2 Measurement Plots



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

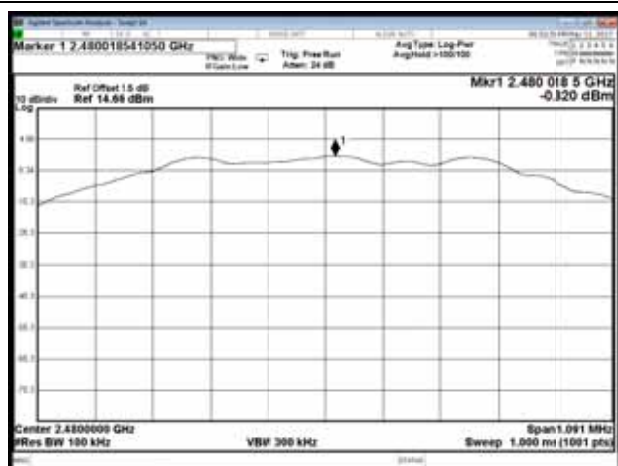
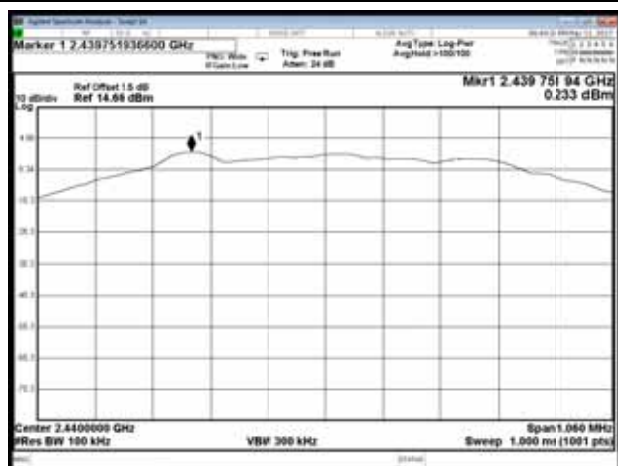
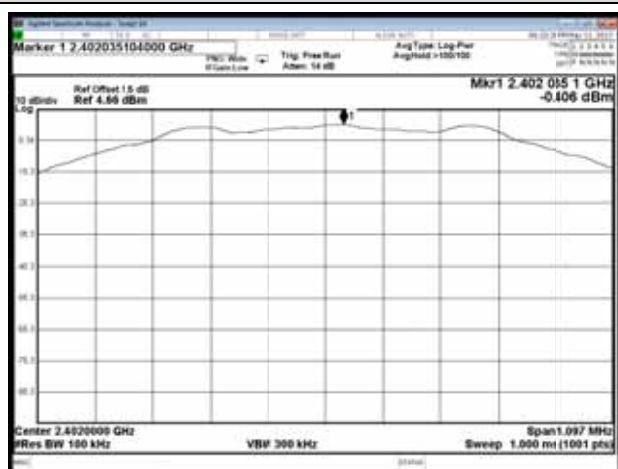
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Note: All results have been included cable loss and Simultaneous Factor.

BLE



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



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APPENDIX B

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APPENDIX B

TEST PHOTOGRAPHS

(Model: IOT-3352)

B.1 Conducted Emission Measurement



FRONT VIEW



BACK VIEW

B.2 Radiated Measurement at Chamber

Frequency Below to 1GHz



Frequency Above to 1GHz



B.3 RF Conducted Measurement

