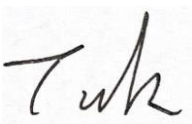
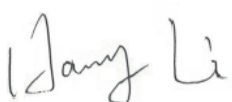


RF Test Report

Report No.: HQ200606DC09-FI**FCC ID:** 2AWOT-SMARTDETECTOR**Applicant Name:** Visual World Co., Ltd**Applicant Address:** 50 meters north of Tangxing First Road, Guangming District, Shenzhen**Product Name** VW-Smart detector**Brand name:** N/A**Test Model:** VW-SD08**Series Model:** VW-SD05; VW-SD07; VW-SD10.1; VW-SD12.5; VW-SD14; VW-SD15.6;
VW-SD18.5; VW-SD21.5; VW-SD22; VW-SD24; VW-SD27; VW-SD28;
VW-SD32;**Received Date:** Jun. 06, 2020**Test Date:** Jun. 06, 2020 ~ Jun. 20, 2020**Issued Date:** Jun. 30, 2020**Issued By:** Hwa-Hsing (Dongguan) Testing Co., Ltd.**Lab Address:** No.101, Bld N1, Yuyuan 2Rd, Yuyuan Industrial Park, HuangJiang Town, Dongguan, China**Test Location:** No.101, Bld N1, Yuyuan 2Rd, Yuyuan Industrial Park, HuangJiang Town, Dongguan, China**FCC Designation Number:** CN1255**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2013

The above equipment has been tested by **Hwa-Hsing (Dongguan) Testing Co., Ltd.**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by :  , **Date:** Jun. 25, 2020
Tank Tan//Engineer

Approved by :  , **Date:** Jun. 30, 2020
Harry Li/ Supervisor

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by A2LA or any agency of the federal government. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

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Release Control Record

Issue No.	Description	Date Issued
HQ200606DC09-FI	Original Release	Jun. 30, 2020

1. Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10:2013; KDB 558074 D01 15.247 Meas Guidance v05r02			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit.
15.205 & 209	Radiated Emissions	Pass	Meet the requirement of limit.
15.247(d)	Band Edge Measurement	Pass	Meet the requirement of limit.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6dB Bandwidth	Pass	Meet the requirement of limit.
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used. The device is professionally installed

1.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUTs specified in CISPR 16-4-2:

The listed uncertainties are the worst cases uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.66 dB
Radiated Emissions up to 1 GHz	9KHz ~ 30MHz	2.90dB
	30MHz ~ 1000MHz	3.47 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	4.84 dB
	18GHz ~ 40GHz	4.62 dB

1.3 Modification Record

There were no modifications required for compliance.

2. General Information

2.1 General Description of EUT

Product Name	VW-Smart detector
Brand Name	N/A
Test Model	VW-SD08
Identification No. of EUT	N/A
Series Model	VW-SD05; VW-SD07; VW-SD10.1; VW-SD12.5; VW-SD14; VW-SD15.6; VW-SD18.5; VW-SD21.5; VW-SD22; VW-SD24; VW-SD27; VW-SD28; VW-SD32;
Model Difference	All of models are exactly the same except the model name and size
Status of EUT	Engineering prototype
Power Supply Rating	DC12V from Adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation technology	DSSS, OFDM
Transfer Rate	802.11b: 11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 300.0Mbps
Operating Frequency	802.11b, 802.11g, 802.11n (20MHz): 2412 ~ 2462MHz 802.11n (40MHz): 2422 ~ 2452MHz
Number of Channel	11 channels for 802.11b, 802.11g, 802.11n (20MHz) 7 channels for 802.11n (40MHz)
Maximum Output Power	14.24dBm (Average power)
Antenna Type	FPCB antenna with 2dBi gain
Antenna Connector	I-PEX

Note:

1. Please refer to the EUT photo document (Reference No.: HQ200606DC09) for detailed product photo.
2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.
3. The EUT incorporates a SISO function. The WLAN function with one antenna transmission and one antenna reception.

Support mode	Frequency band	Transmit and receive mode	Transmit and Receive Chain
802.11b	2412~2462MHz	SISO	1TX, 1RX
802.11g	2412~2462MHz	SISO	1TX, 1RX
802.11n HT20	2412~2462MHz	SISO	1TX, 1RX
802.11n HT40	2422~2452MHz	SISO	1TX, 1RX

4. The UUT power supply the adapter as below:

Brand name:	DAJING
Model name:	ADP-36C2
Input:	AC100-240V~50/60Hz, 1.0A
Output:	DC12V 3.0A

2.2 Description of Test Channels

11 channels are provided for 802.11b, 802.11g and 802.11n (20MHz):

Channel	Frequency	Channel	Frequency
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

7 channels are provided for 802.11n (40MHz):

Channel	Frequency	Channel	Frequency
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

2.3 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable test items				Description
	RE $\geq$ 1G	RE<1G	PLC	APCM	
802.11b	√	√	√	√	-
802.11g	√	√	√	√	-
802.11n (20MHz)	√	√	√	√	-
802.11n (40MHz)	√	√	√	√	-

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.

Note: "-" means no effect.

Radiated Emission Test (Above 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Tested Channel	Modulation Type	Data Rate (Mbps)
802.11b	1, 6, 11	DSSS	1.0
802.11g	1, 6, 11	OFDM	6.0
802.11n (20MHz)	1, 6, 11	OFDM	7.2
802.11n (40MHz)	3, 6, 9	OFDM	15.0

Radiated Emission Test (Below 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Tested Channel	Modulation Type	Data Rate (Mbps)
802.11b	1, 6, 11	DSSS	1

Power Line Conducted Emission Test:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Tested Channel	Modulation Type	Data Rate (Mbps)
802.11b	1, 6, 11	DSSS	1

Antenna Port Conducted Measurement:

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	DSSS	1.0
-	802.11g	1 to 11	OFDM	6.0
-	802.11n (20MHz)	1 to 11	OFDM	7.2
-	802.11n (40MHz)	3 to 9	OFDM	15.0

Test Condition:

Applicable test items	Environmental Conditions	Power supply	Tested by
RE $\geq$ 1G	25.6deg. C, 62%RH	DC12 V from dc port input	Tank Tan
RE<1G	25.6deg. C, 62%RH	DC12 V from dc port input	Tank Tan
PLC	25deg. C, 65 %RH	DC12V from dc port input	Tank Tan
APCM	25deg. C, 65 %RH	DC12V from dc port input	Harry Li

Power setting value from test software:

Mode	Channel Number	FREQ. (MHz)	Power Setting
			Ant 0
802.11b	1	2412	25
	6	2437	25
	11	2462	25
802.11g	1	2412	30
	6	2437	30
	11	2462	30
802.11n20	1	2412	35
	6	2437	35
	11	2462	35
802.11n40	3	2422	40
	6	2437	40
	9	2452	40

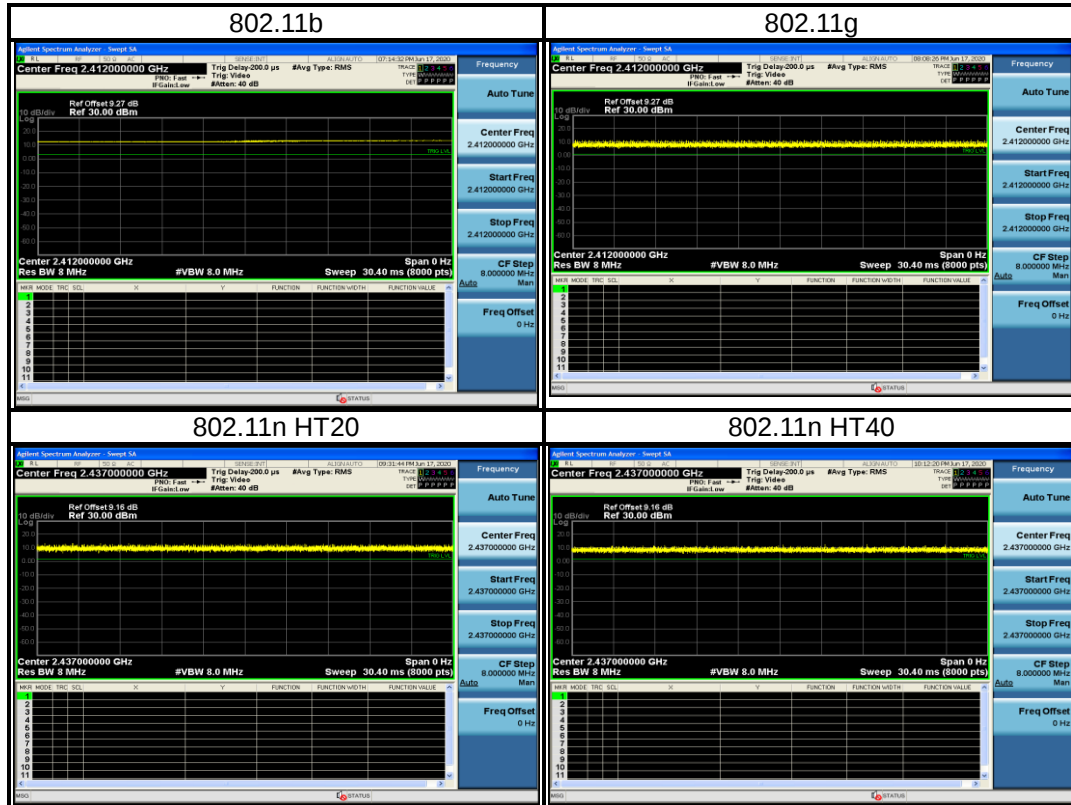
2.4 DutyCycleof Test Signal

802.11b: Duty cycle of test signal is 100%, Duty cycle of test signal is >98%

802.11g: Duty cycle of test signal is 100%, Duty cycle of test signal is >98%

802.11n HT20: Duty cycle of test signal is 100%, Duty cycle of test signal is >98%

802.11n HT40: Duty cycle of test signal is 100%, Duty cycle of test signal is >98%



2.5 Description of Support Units

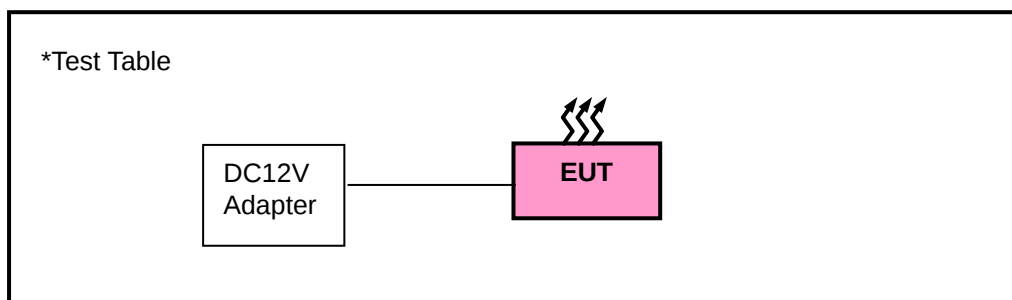
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Mouse	DELL	MS111-L	CN-09RRC7-44751-0C6-04TR	N/A
2.	Keyboard	DELL	KDY1202000	N/A	N/A

Insert Cable Connections to/from EUT provided by test team.

No.	Signal Cable Description Of The Above Support Units
1.	USB Line: Un-shieldin 1.5m
2.	USB Line: Un-shieldin 1.5m

2.6 Configuration of System under Test



2.7 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247)

KDB 558074 D01 15.247 Meas Guidance v05r02

KDB 662911 D01 v02r01

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

Note: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3. Test types and results

3.1 Radiated Emission and Bandedge Measurement

3.1.1 Limits of radiated emission and bandedge measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

3.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
EMI Test Receiver Rohde&Schwarz	ESCI 7	100962	2020-05-14	2021-05-13
Broadband antenna Schwarzbeck	VULB 9168	00937	2019-10-18	2020-10-17
3m Semi-anechoic Chamber MAORUI	9m*6m*6m	NSEMC003	2018-10-20	2020-10-19
Signal Amplifier Com-power	PAM-103	18020051	2019-10-18	2020-10-17
Attenuator Rohde&Schwarz	TS2GA-6dB	18101101	N/A	N/A
Test software FARAD	FARAD	EZ_EMCV1.1.4.2	N/A	N/A
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	2019-10-18	2020-10-17
Loop Antenna	HLA 6121	45745	2019-10-18	2020-10-17
Preamplifier EMCI	EMC001340	980201	2019-10-18	2020-10-17
Digital Multimeter FLUKE	15B+	43512617WS	2019-10-18	2020-10-17
Horn Antenna Schwarzbeck	BBHA 9170	01959	2019-10-18	2020-10-17
Spectrum Analyzer Rohde&Schwarz	FSV-40N	101783	2019-10-18	2020-10-17
Broadband Coaxial Preamplifier Schwarzbeck	BBV 9718	00025	2019-10-18	2020-10-17
Horn Antenna Schwarzbeck	BBHA 9170	BBHA9170242	2019-10-18	2020-10-17
Pre-Amplifier EMCI	EMC 184045	980102	2019-10-18	2020-10-17
Spectrum Keysight	N9020A	MY51240612	2019-10-18	2020-10-17
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower&Turn Table Controller MF	MF-7802	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA.
2. The test was performed in Chamber 1.

3.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

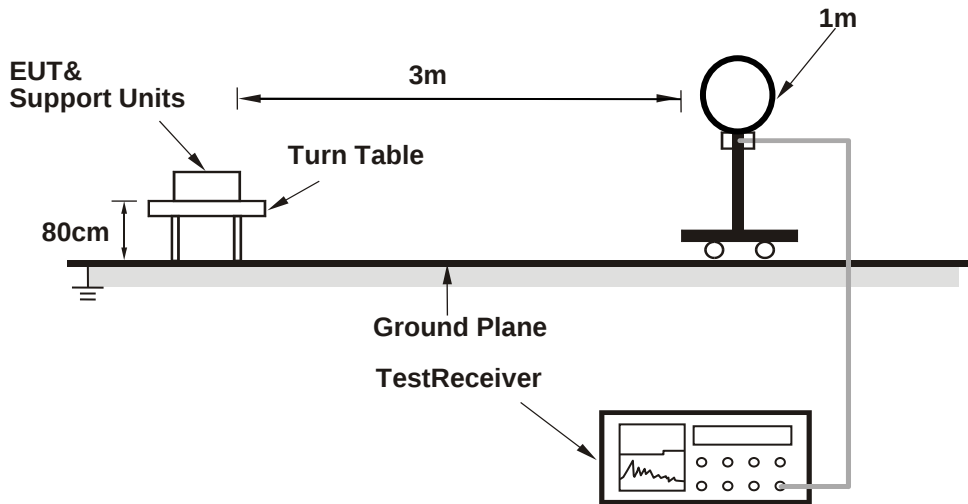
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz & 360kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1/T for Average (Duty cycle < 98 %) detection at frequency above 1 GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

3.1.4 Deviation from Test Standard

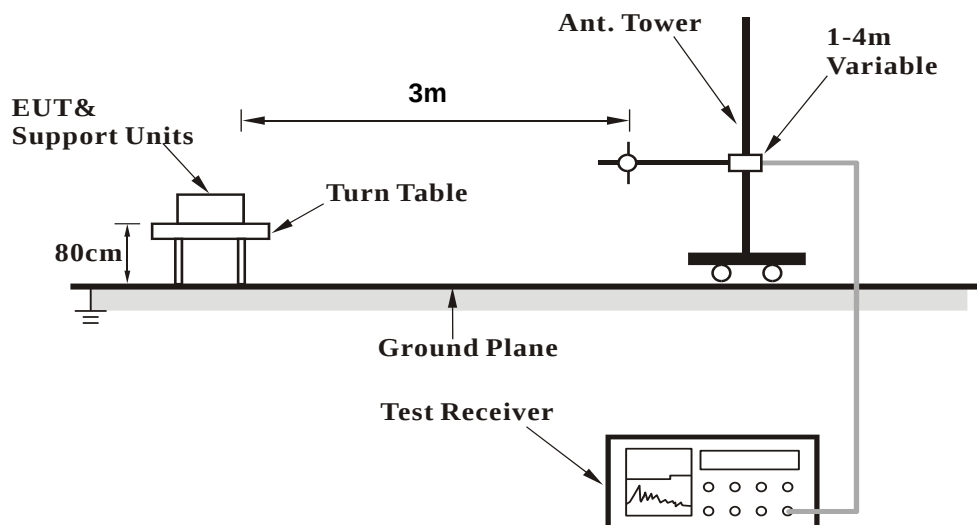
No deviation.

3.1.5 Test Set up

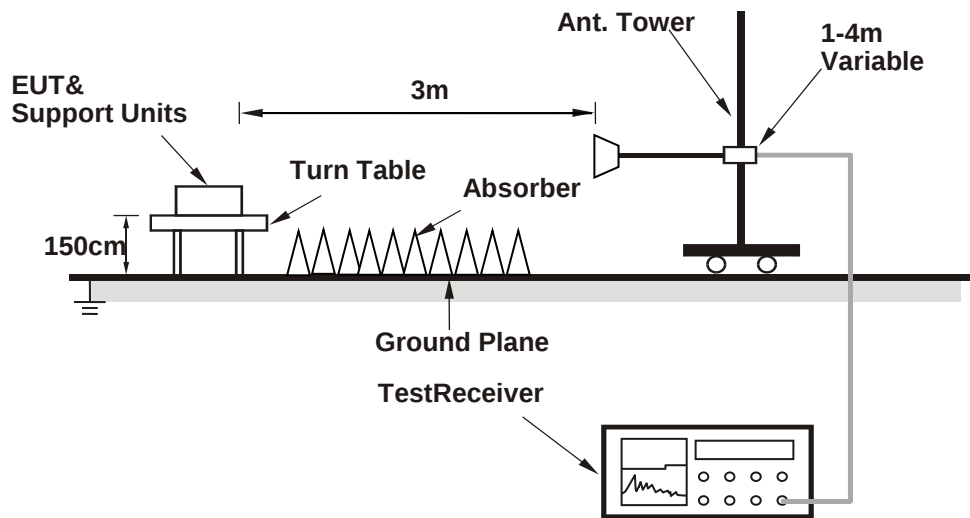
Radiated emission below 30MHz:



Frequency Range below 1GHz:



Frequency Range above 1GHz:



Directional Antenna.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

3.1.6 EUT Operating Conditions

- Placed the EUT on the testing table.
- Set the EUT under transmission condition continuously at specific channel frequency.

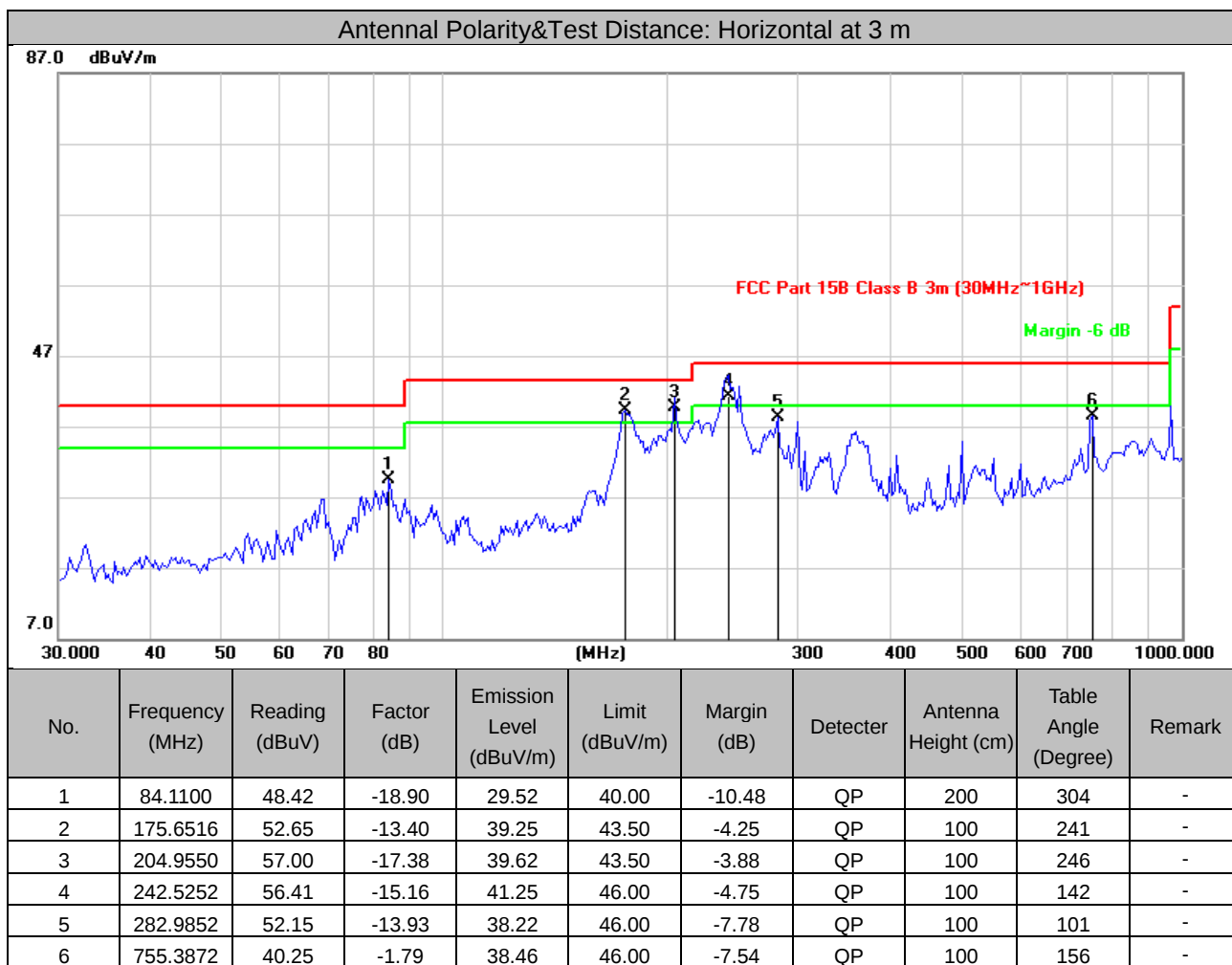
3.1.7 Test Results

9kHz ~ 30MHz Data:

The amplitude of spurious emissions attenuated more than 20dB below the permissible value is not required to be report.

30MHz ~ 1GHz Worst-Case Data:

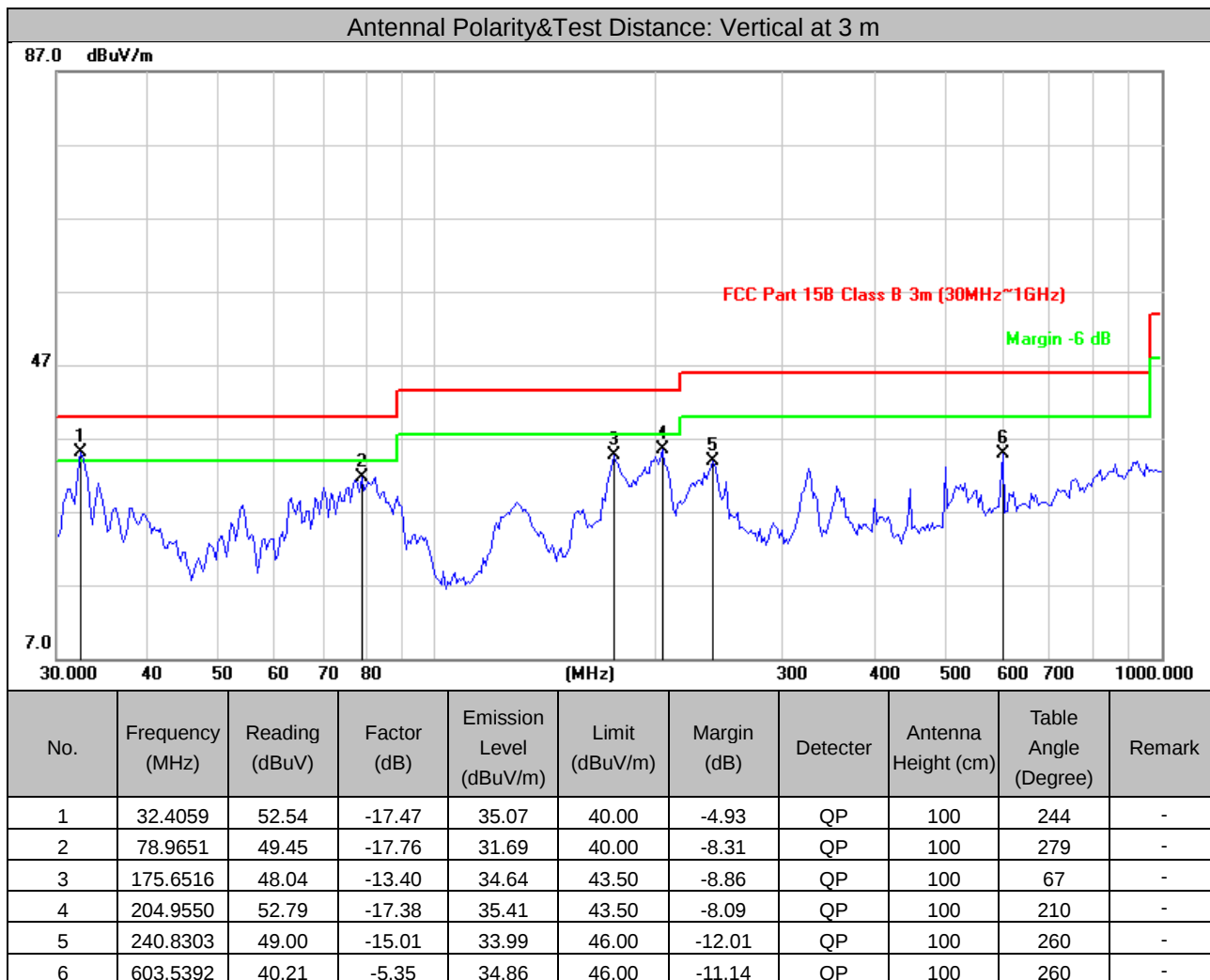
EUT Test Condition	802.11b 2462MHz TX		
Test Channel	Channel 11	Frequency Range	30MHz ~ 1GHz
Power supply	DC 12V from adapter	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25.6deg. C, 62%RH	Tested By	Tank tan



Remarks:

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value

EUT Test Condition	802.11b 2462MHz TX		
Channel	Channel 11	Frequency Range	30MHz ~ 1GHz
Power supply	DC 12V from adapter	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25.6deg. C, 62%RH	Tested By	Tank Tan

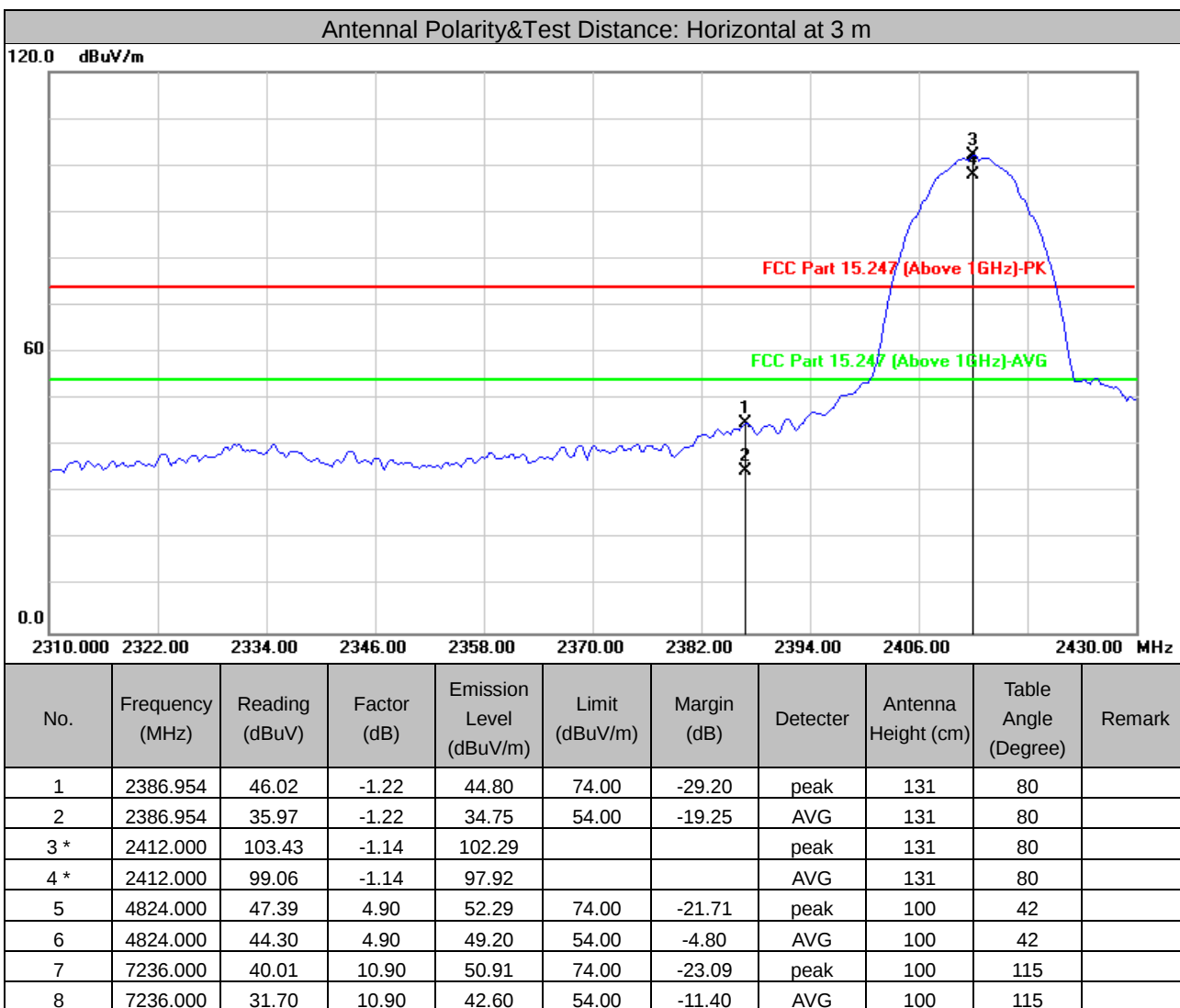


Remarks:

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value

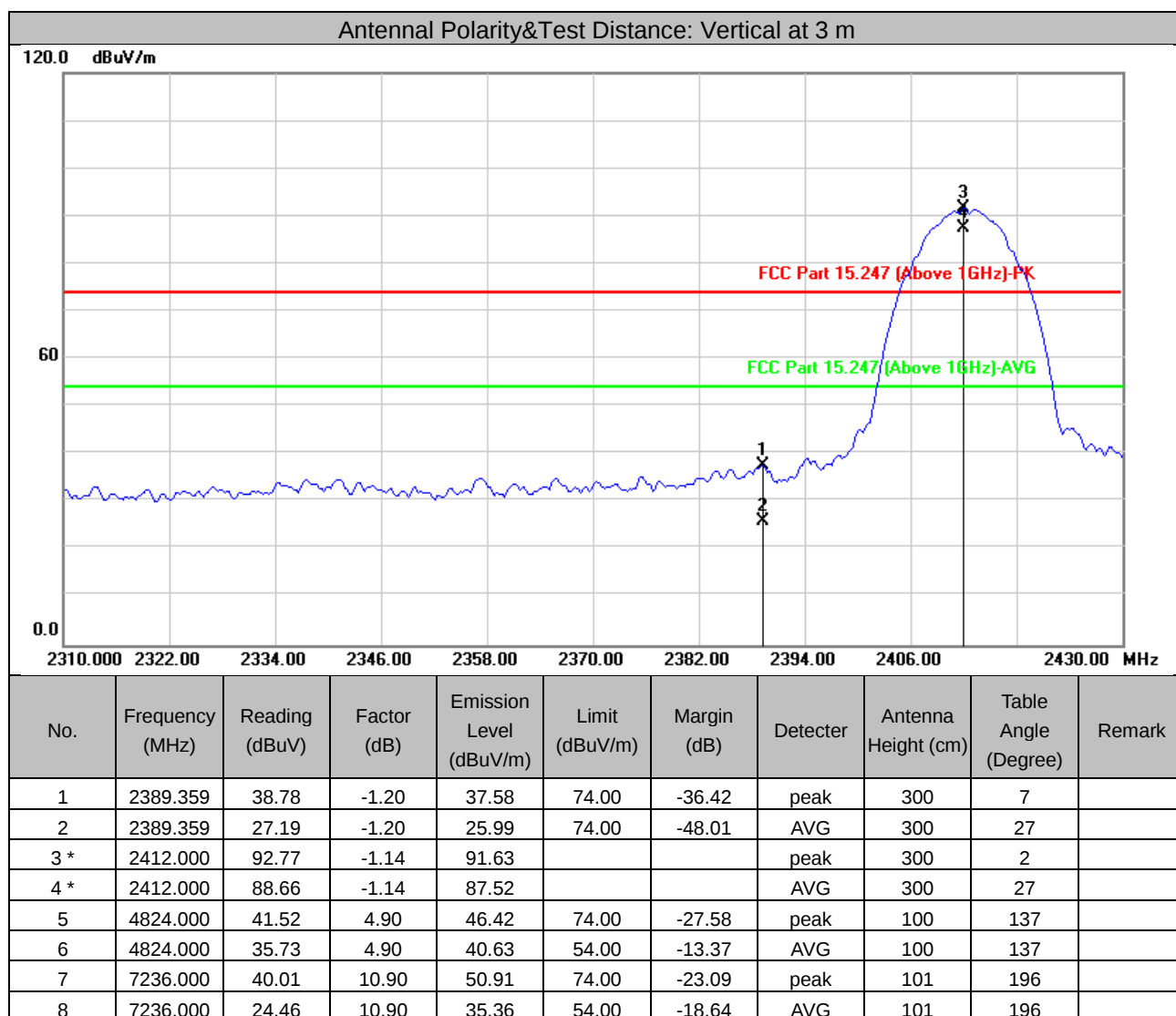
Above 1GHz Data:

EUT Test Condition:	802.11b: 2412MHz TX		
Test Channel	Channel 1	Frequency Range	1GHz ~ 25GHz
Power supply	DC 12V from adapter	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25.6deg. C, 62%RH	Tested By	Tank tan



Remarks:

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2412MHz: Fundamental frequency.



Remarks:

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2412MHz: Fundamental frequency.

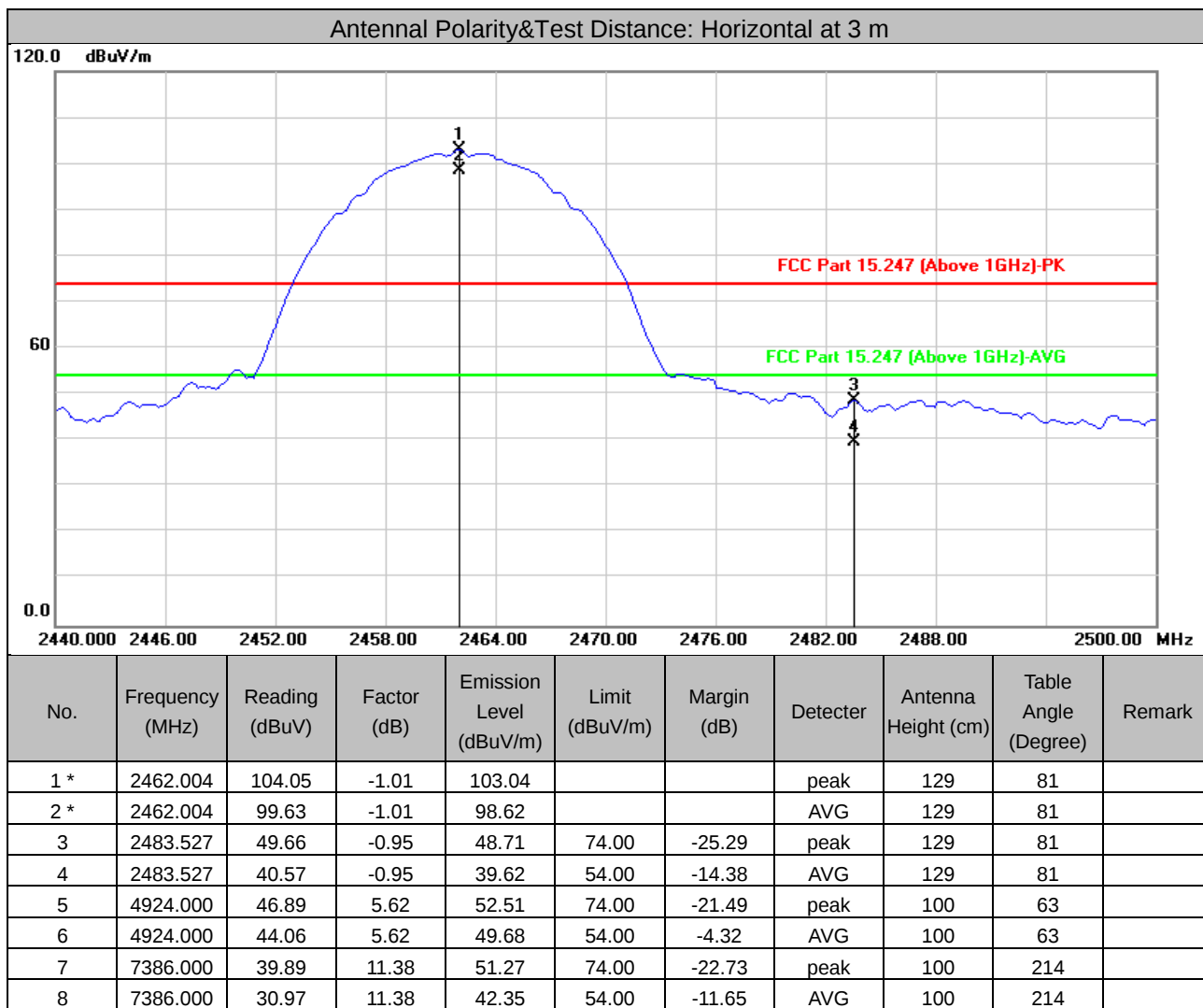
EUT Test Condition	802.11b: 2437MHz TX		
Test Channel	Channel 6	Frequency Range	1GHz ~ 25GHz
Power supply	DC 12V from adapter	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25.6deg. C, 62%RH	Tested By	Tank tan

Antennal Polarity&Test Distance: Horizontal at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 *	2437.000	102.86	-1.08	101.78			peak	264	152	
2 *	2437.000	97.93	-1.08	96.85			AVG	264	152	
3	4874.000	47.82	5.47	53.29	74.00	-20.71	peak	100	249	
4	4874.000	43.15	5.47	48.62	54.00	-5.38	AVG	100	249	
5	7311.000	40.18	11.14	51.32	74.00	-22.68	peak	100	101	
6	7311.000	31.21	11.14	42.35	54.00	-11.65	AVG	100	101	
Antennal Polarity&Test Distance: Vertical at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 *	2437.000	93.45	-1.08	92.37			peak	120	138	
2 *	2437.000	88.34	-1.08	87.26			AVG	120	138	
3	4874.000	42.15	5.47	47.62	74.00	-26.38	peak	198	174	
4	4874.000	36.00	5.47	41.47	54.00	-12.53	AVG	198	174	
5	7311.000	39.20	11.14	50.34	74.00	-23.66	peak	100	132	
6	7311.000	23.97	11.14	35.11	54.00	-18.89	AVG	100	132	

Remarks:

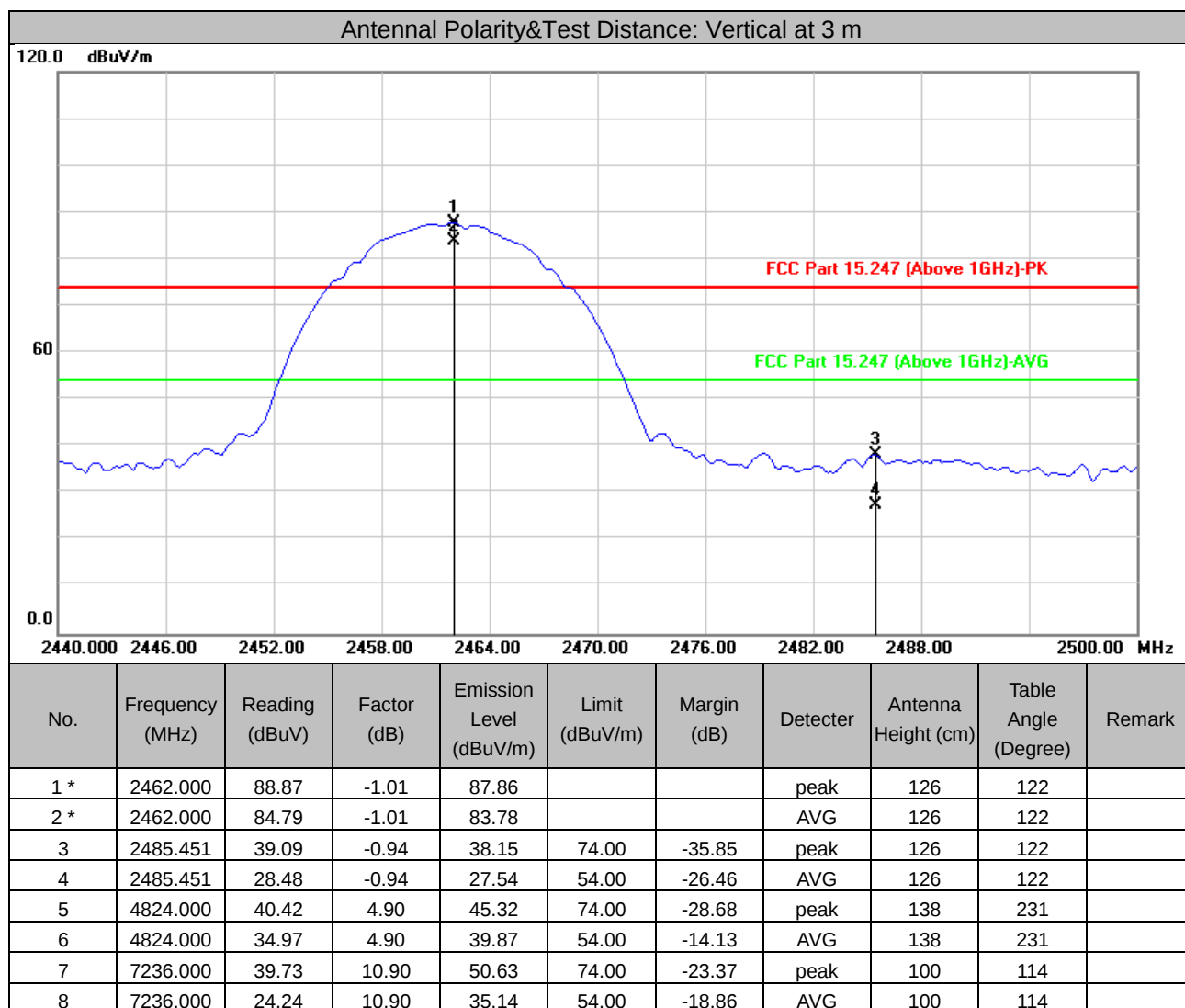
1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2437MHz: Fundamental frequency.

EUT Test Condition	802.11b: 2462MHz TX		
Test channel	Channel 11	Frequency Range	1GHz ~ 25GHz
Power supply	DC 12V from adapter	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25.6deg. C, 62%RH	Tested By	Tank tan



Remarks:

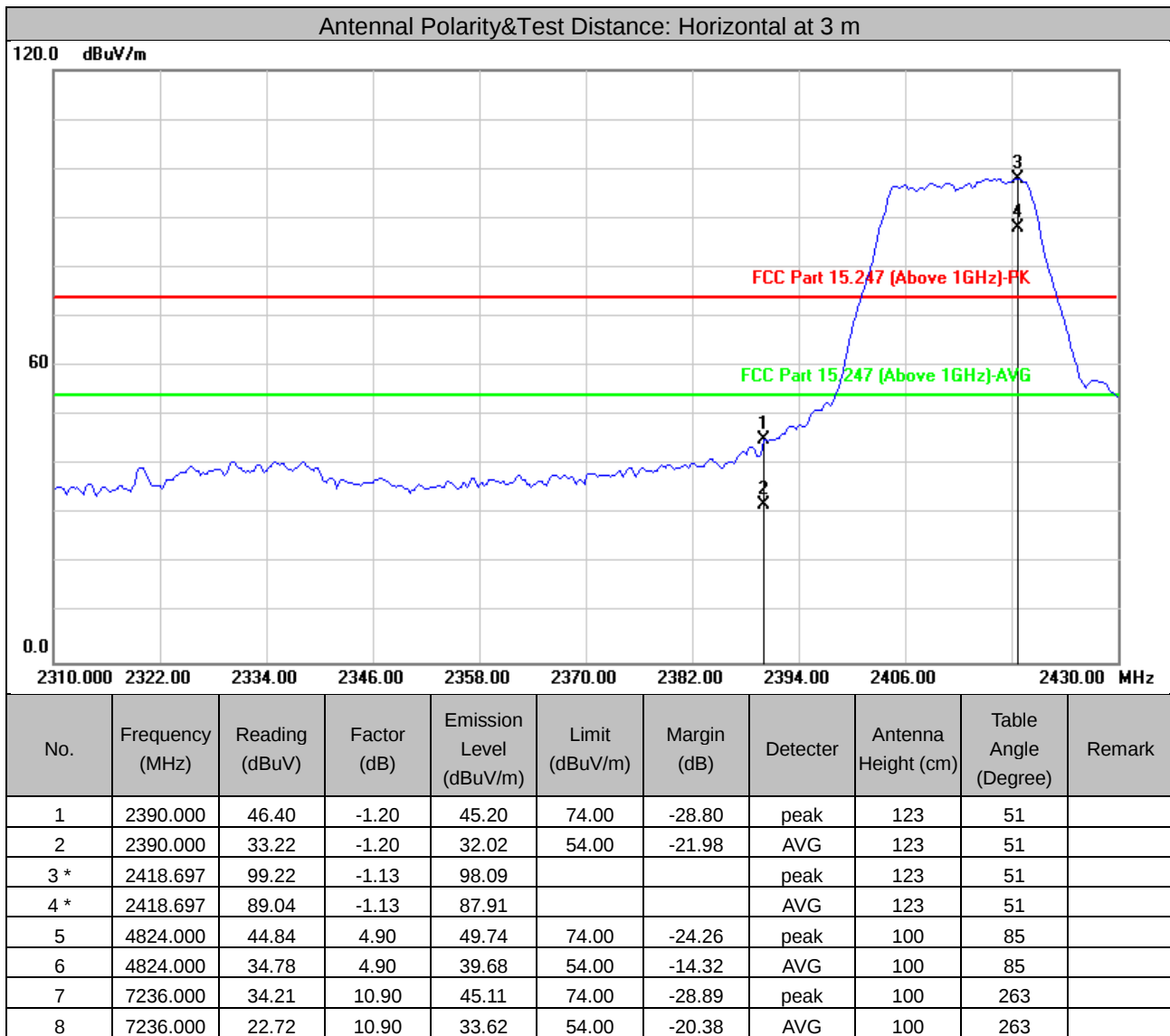
1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2462MHz: Fundamental frequency.



Remarks:

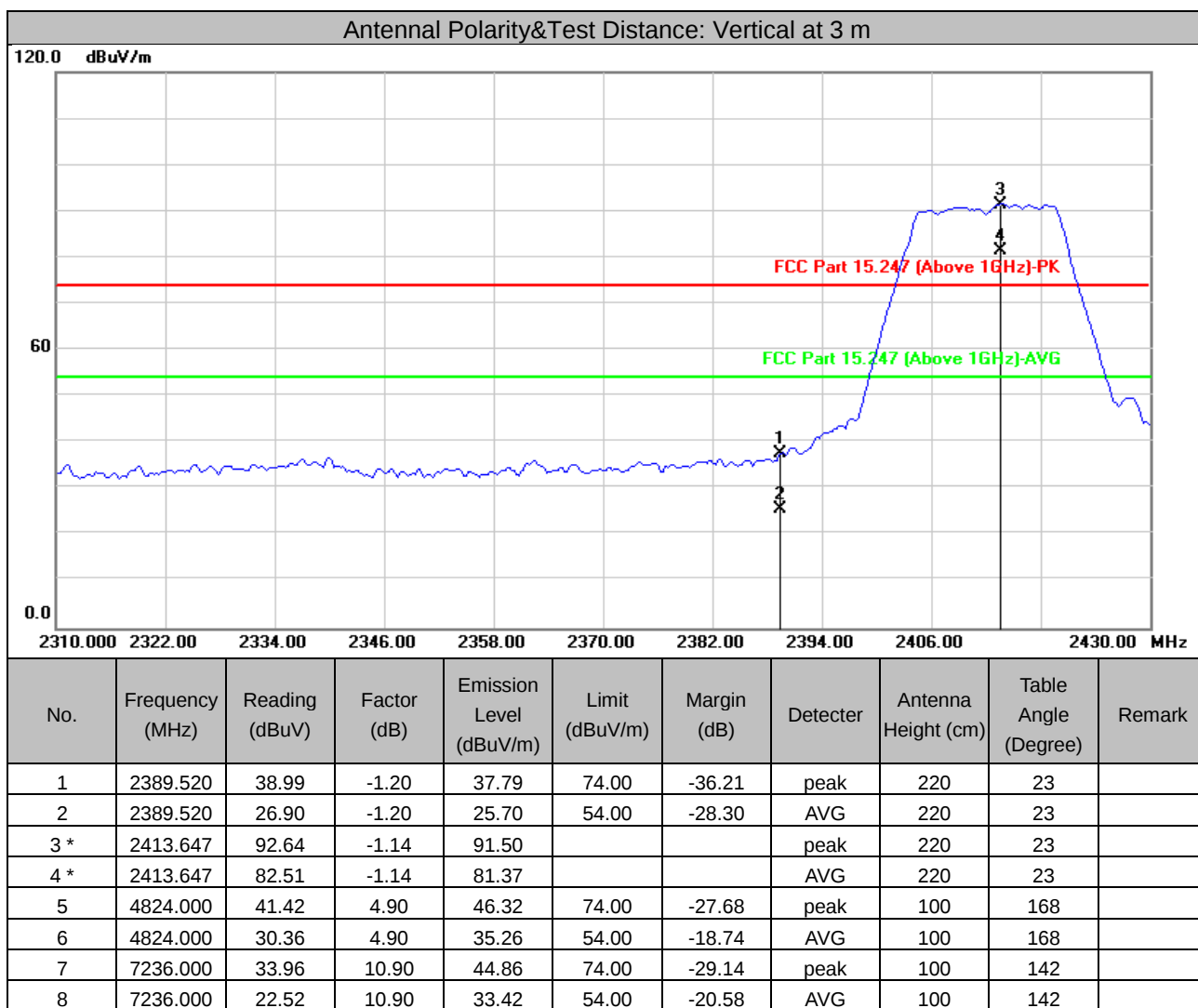
1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2462MHz: Fundamental frequency.

EUT Test Condition:	802.11g: 2412MHz TX		
Test Channel	Channel 1	Frequency Range	1GHz ~ 25GHz
Power supply	DC 12V from adapter	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25.6deg. C, 62%RH	Tested By	Tank tan



Remarks:

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2412MHz: Fundamental frequency.



Remarks:

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2412MHz: Fundamental frequency.

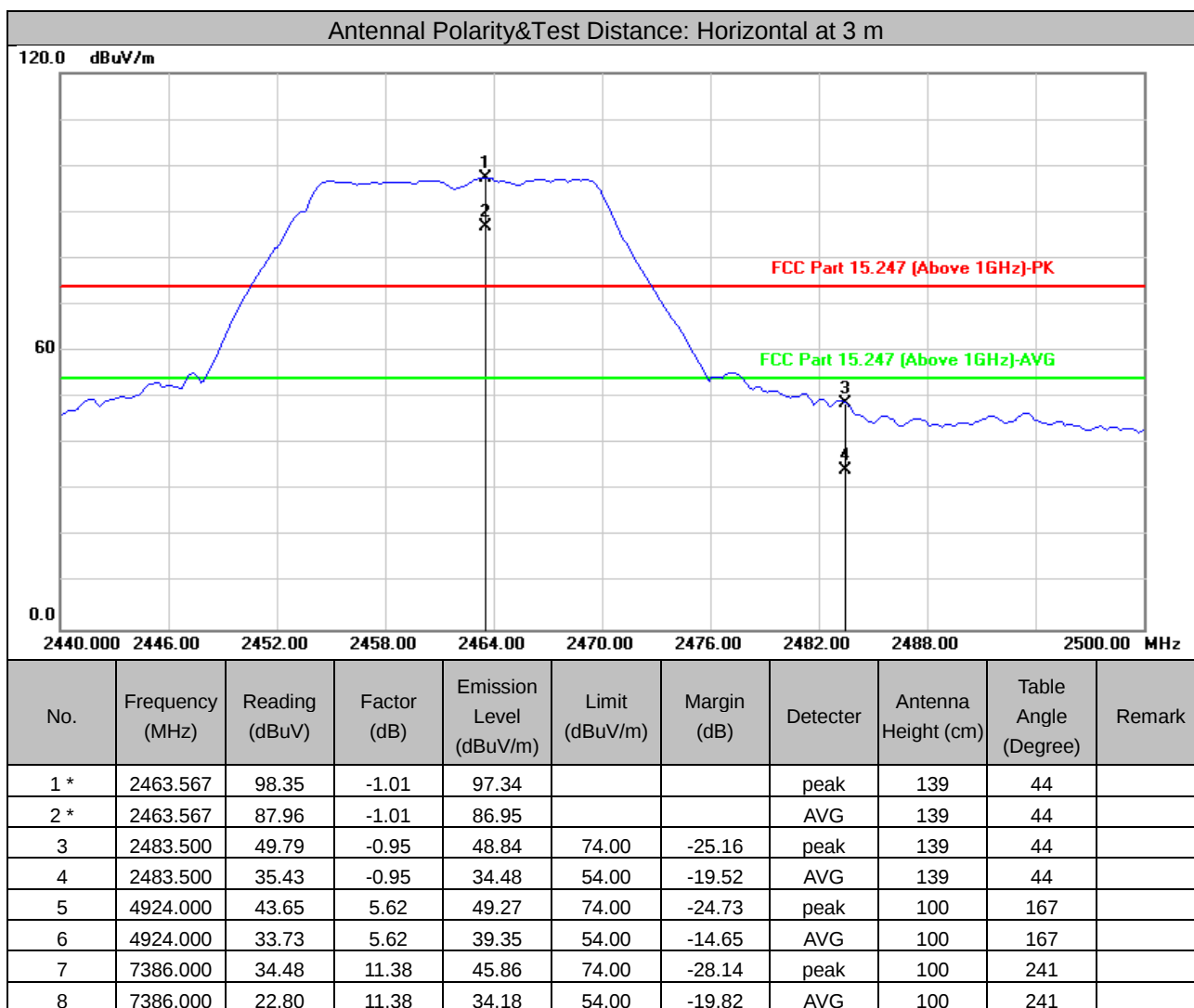
EUT Test Condition	802.11g: 2437MHz TX		
Test Channel	Channel 6	Frequency Range	1GHz ~ 25GHz
Power supply	DC 12V from adapter	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25.6deg. C, 62%RH	Tested By	Tank tan

Antennal Polarity&Test Distance: Horizontal at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 *	2437.000	99.40	-1.08	98.32			peak	235	179	
2 *	2437.000	89.22	-1.08	88.14			AVG	235	179	
3	4874.000	44.16	5.47	49.63	74.00	-24.37	peak	100	215	
4	4874.000	34.67	5.47	40.14	54.00	-13.86	AVG	100	215	
5	7311.000	34.23	11.14	45.37	74.00	-28.63	peak	100	121	
6	7311.000	22.58	11.14	33.72	54.00	-20.28	AVG	100	121	
Antennal Polarity&Test Distance: Vertical at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 *	2437.000	93.59	-1.08	92.51			peak	114	245	
2 *	2437.000	82.95	-1.08	81.87			AVG	114	245	
3	4874.000	40.51	5.47	45.98	74.00	-28.02	peak	100	174	
4	4874.000	30.27	5.47	35.74	54.00	-18.26	AVG	100	174	
5	7311.000	34.12	11.14	45.26	74.00	-28.74	peak	100	216	
6	7311.000	22.63	11.14	33.77	54.00	-20.23	AVG	100	216	

Remarks:

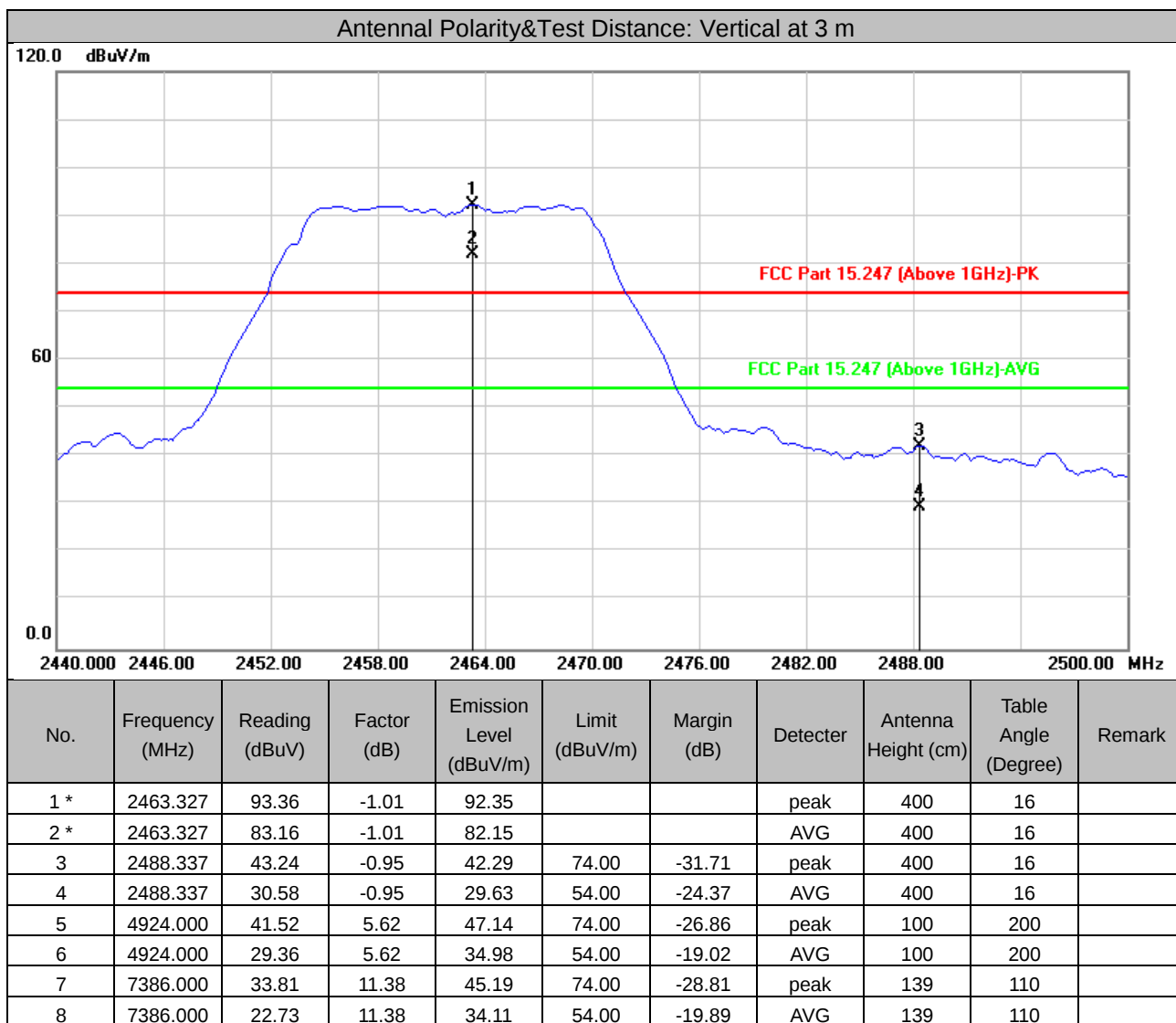
1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2437MHz: Fundamental frequency.

EUT Test Condition	802.11g: 2462MHz TX		
Test channel	Channel 11	Frequency Range	1GHz ~ 25GHz
Power supply	DC 12V from adapter	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25.6deg. C, 62%RH	Tested By	Tank tan



Remarks:

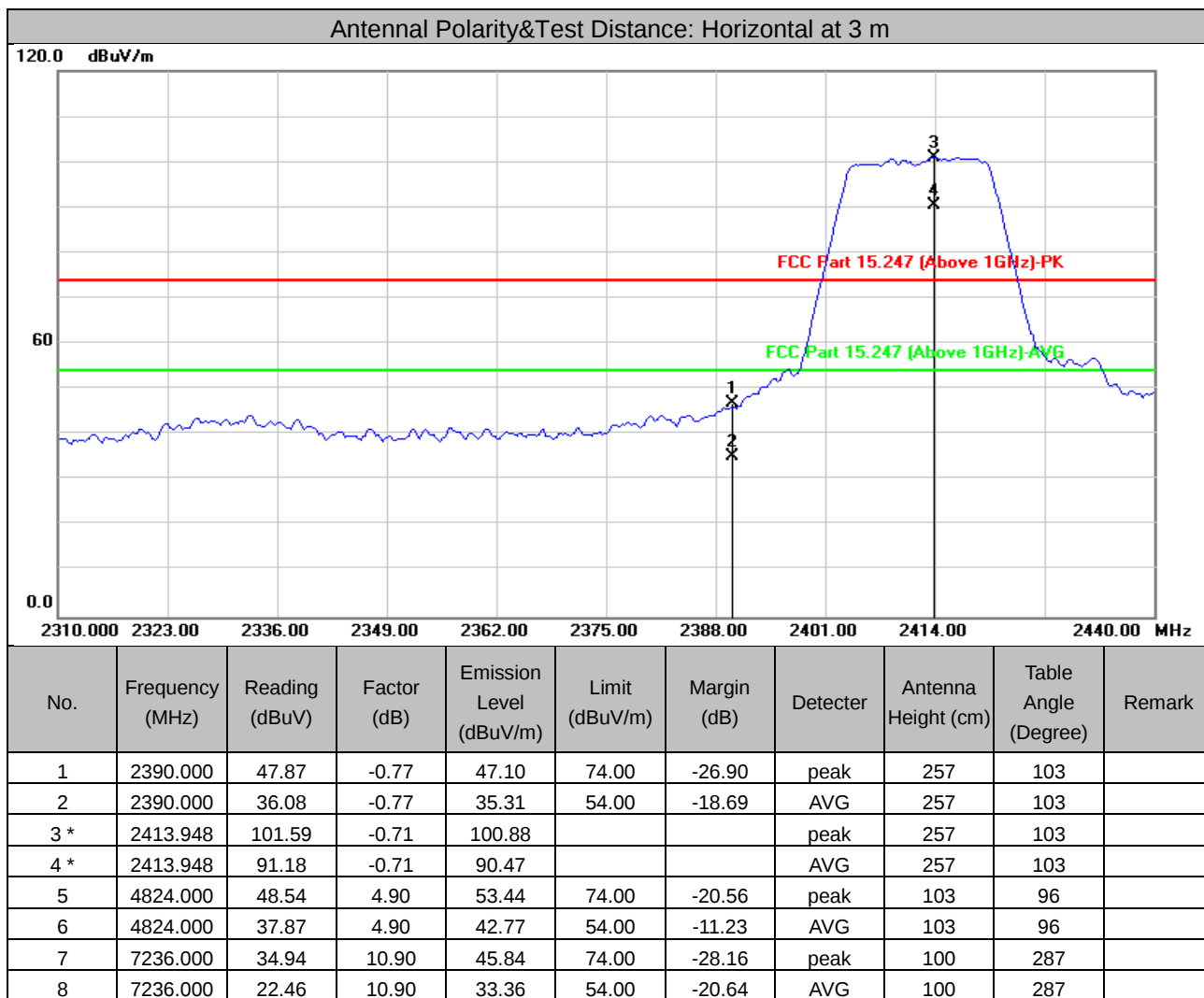
1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2462MHz: Fundamental frequency.



Remarks:

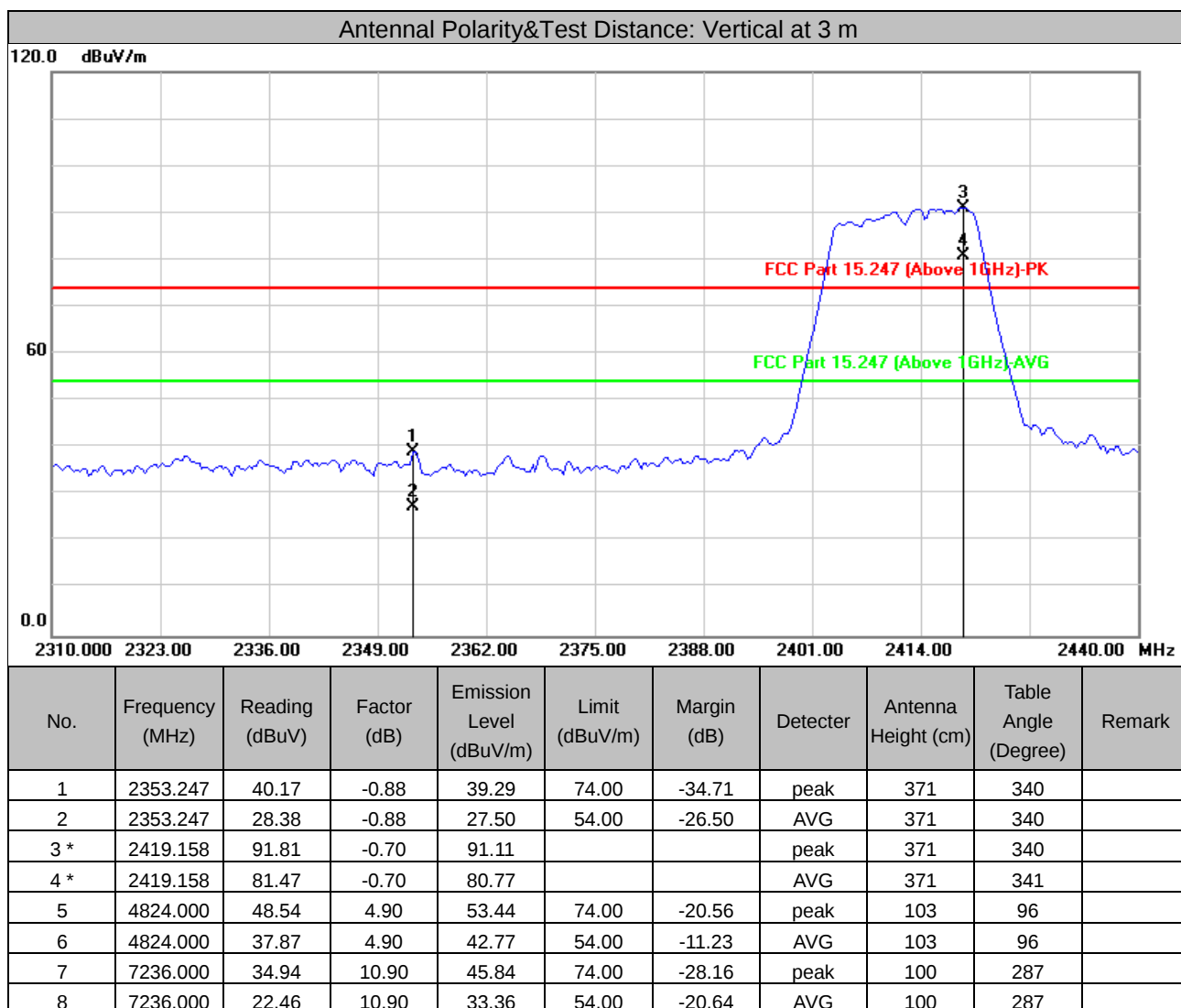
1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2462MHz: Fundamental frequency.

EUT Test Condition:	802.11n HT20: 2412MHz TX		
Test Channel	Channel 1	Frequency Range	1GHz ~ 25GHz
Power supply	DC 12V from adapter	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25.6deg. C, 62%RH	Tested By	Tank tan



Remarks:

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2412MHz: Fundamental frequency.



Remarks:

Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)

Margin value = Emission level – Limit value

2412MHz: Fundamental frequency.

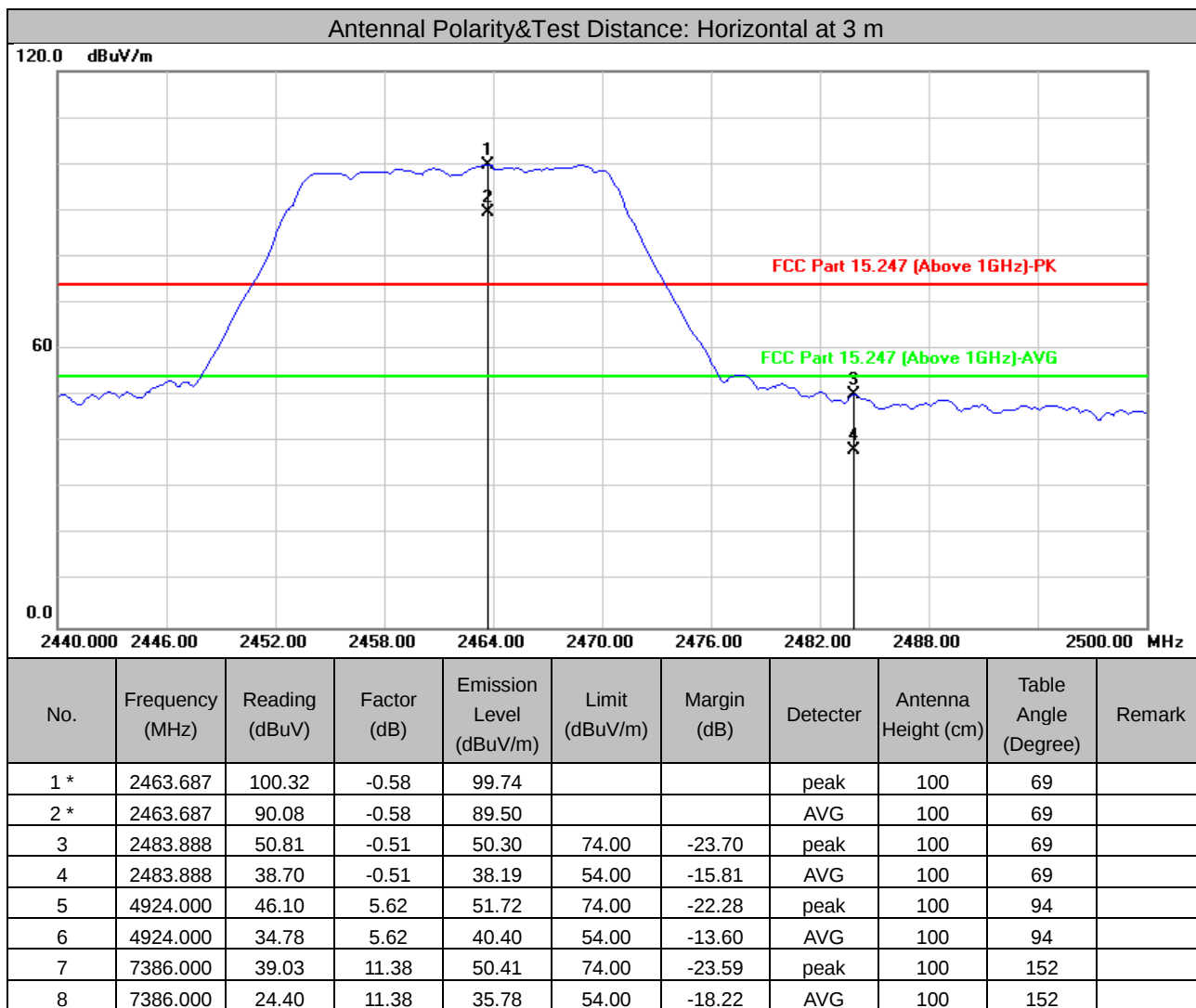
EUT Test Condition	802.11n HT20: 2437MHz TX		
Test Channel	Channel 6	Frequency Range	1GHz ~ 25GHz
Power supply	DC 12V from adapter	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25.6deg. C, 62%RH	Tested By	Tank tan

Antennal Polarity&Test Distance: Horizontal at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 *	2437.000	102.34	-1.08	101.26			peak	283	99	
2 *	2437.000	91.95	-1.08	90.87			AVG	283	99	
3	4874.000	48.79	5.47	54.26	74.00	-19.74	peak	100	118	
4	4874.000	37.16	5.47	42.63	54.00	-11.37	AVG	100	118	
5	7311.000	33.58	11.14	44.72	74.00	-29.28	peak	100	167	
6	7311.000	22.15	11.14	33.29	54.00	-20.71	AVG	100	167	
Antennal Polarity&Test Distance: Vertical at 3 m										
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 *	2437.000	93.42	-1.08	92.34			peak	355	346	
2 *	2437.000	82.29	-1.08	81.21			AVG	355	346	
3	4874.000	39.04	5.47	44.51	74.00	-29.49	peak	100	261	
4	4874.000	29.40	5.47	34.87	54.00	-19.13	AVG	100	261	
5	7311.000	34.48	11.14	45.62	74.00	-28.38	peak	100	170	
6	7311.000	22.30	11.14	33.44	54.00	-20.56	AVG	100	170	

Remarks:

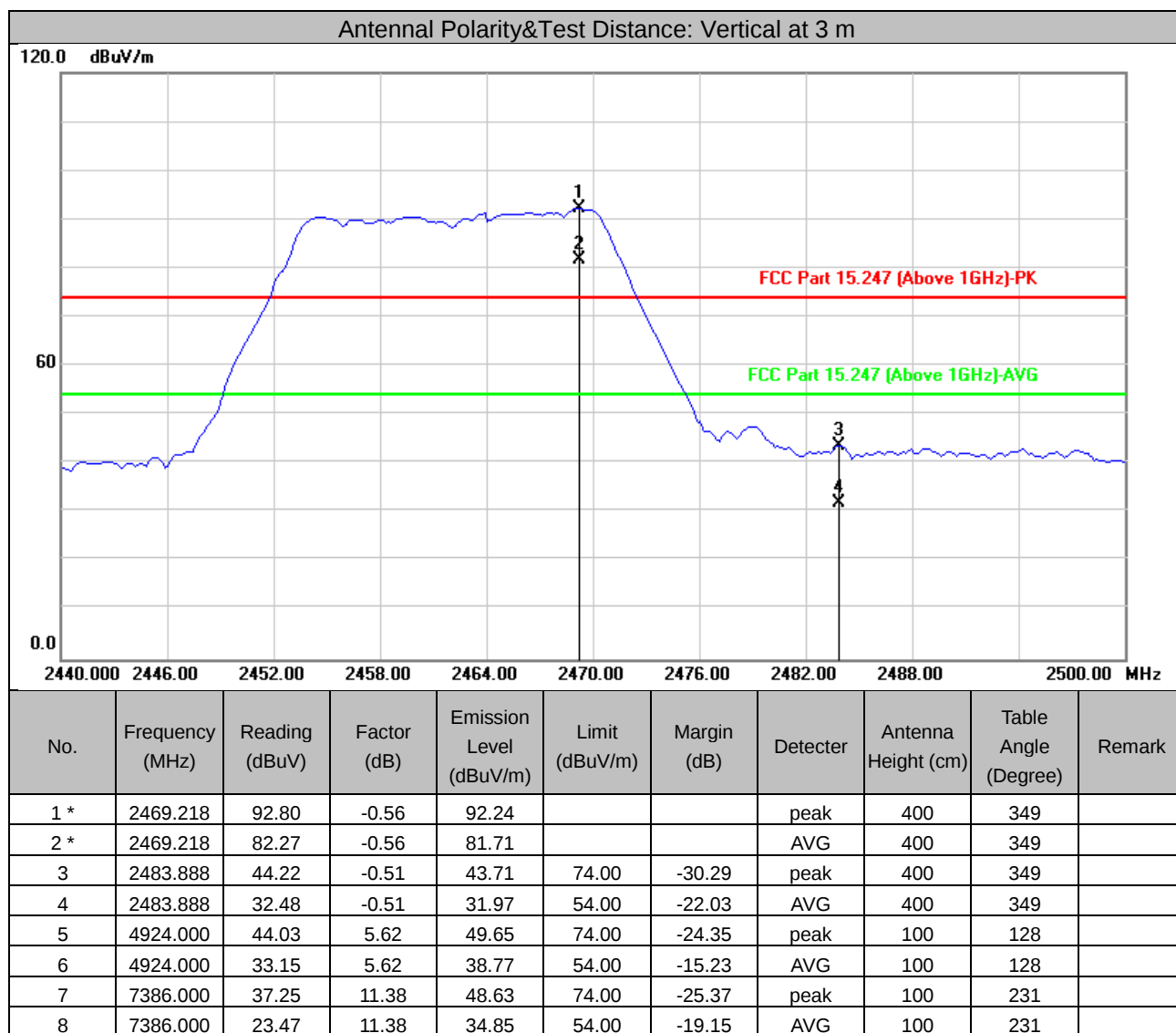
1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2437MHz: Fundamental frequency.

EUT Test Condition	802.11n HT20: 2462MHz TX		
Test channel	Channel 11	Frequency Range	1GHz ~ 25GHz
Power supply	DC 12V from adapter	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25.6deg. C, 62%RH	Tested By	Tank tan



Remarks:

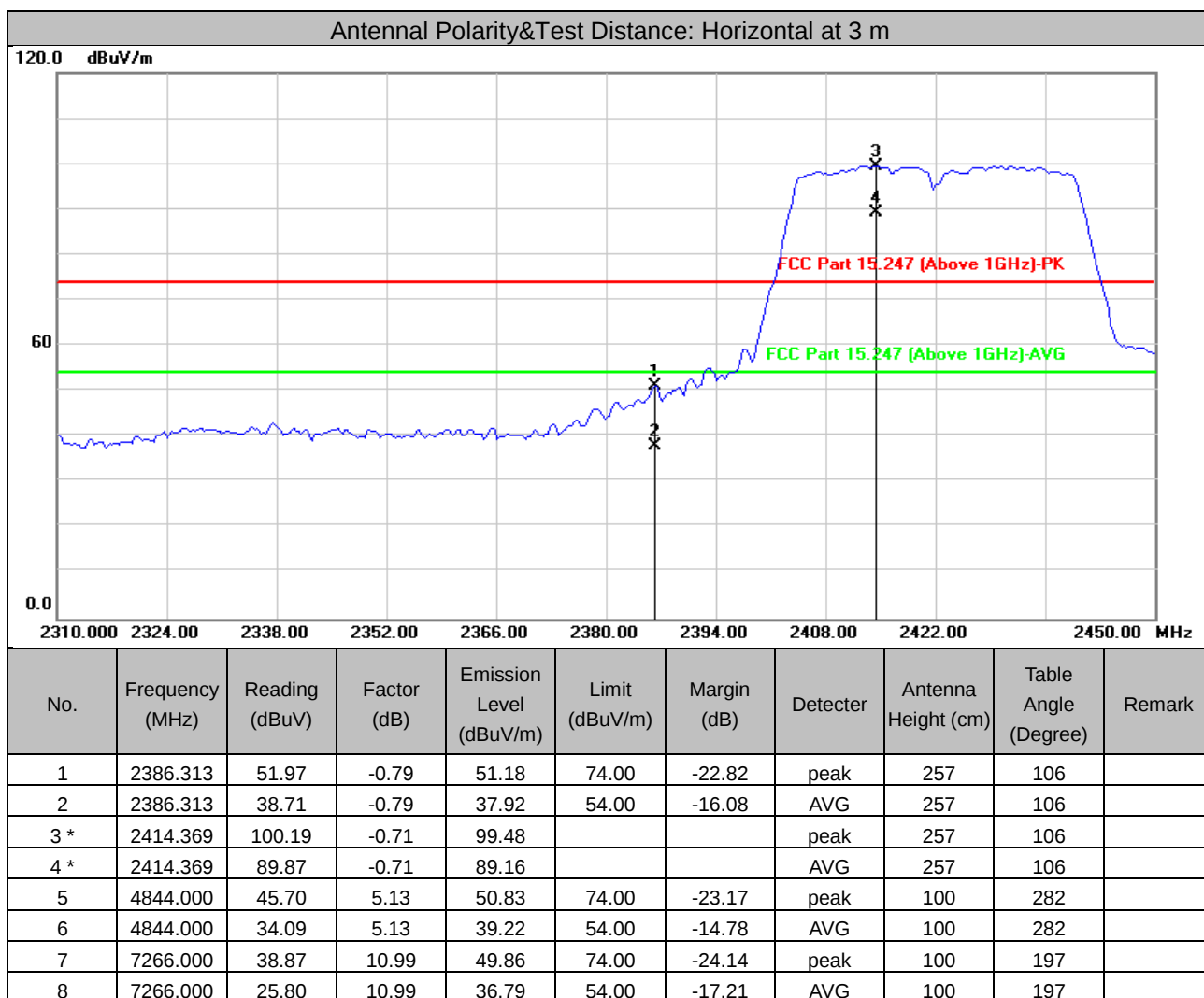
- Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
- Margin value = Emission level – Limit value
- 2462MHz: Fundamental frequency.



Remarks:

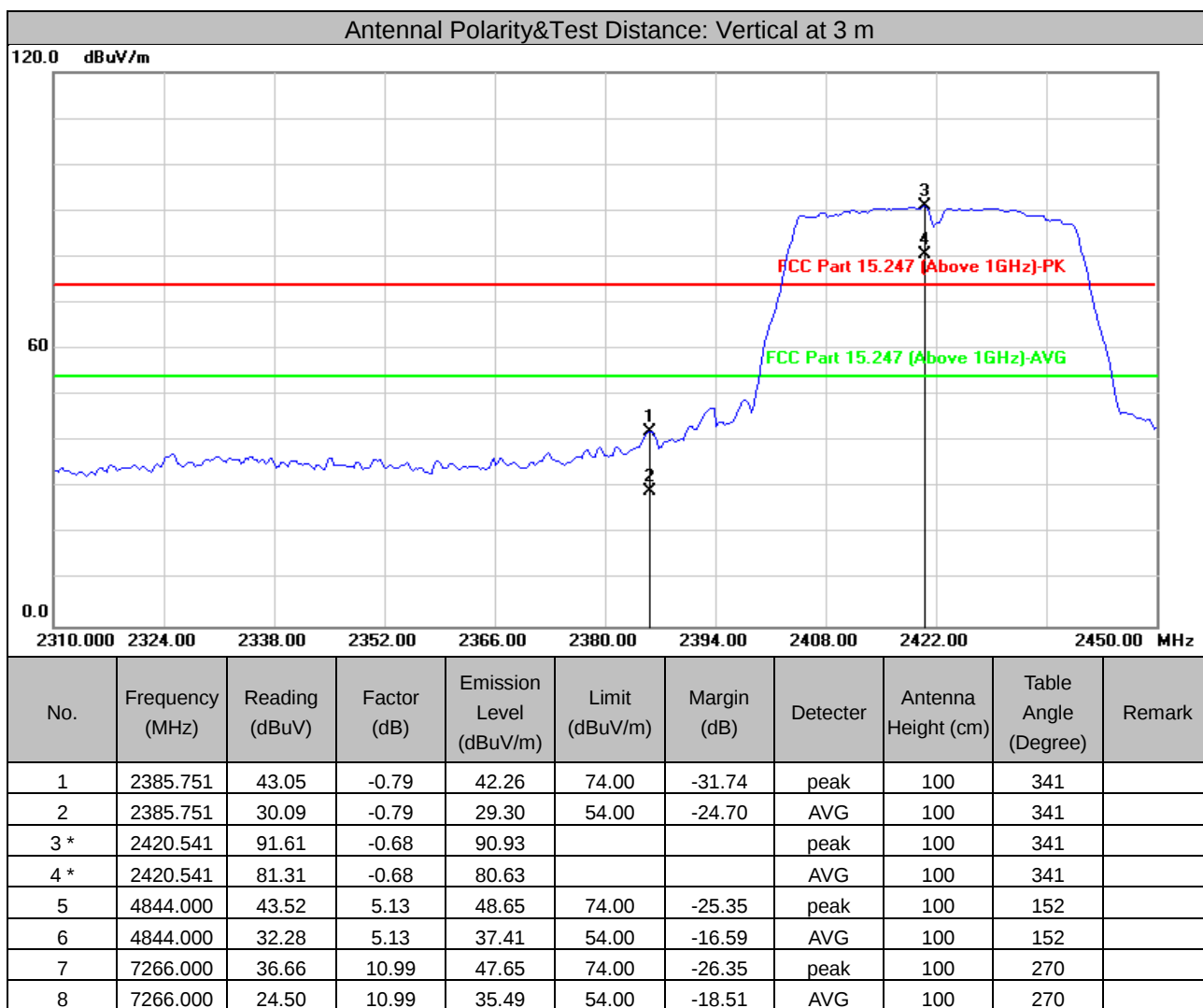
1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2462MHz: Fundamental frequency.

EUT Test Condition:	802.11n HT40: 2422MHz TX		
Test Channel	Channel 3	Frequency Range	1GHz ~ 25GHz
Power supply	DC 12V from adapter	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25.6deg. C, 62%RH	Tested By	Tank tan



Remarks:

- Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
- Margin value = Emission level – Limit value
- 2422MHz: Fundamental frequency.



Remarks:

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2422MHz: Fundamental frequency.

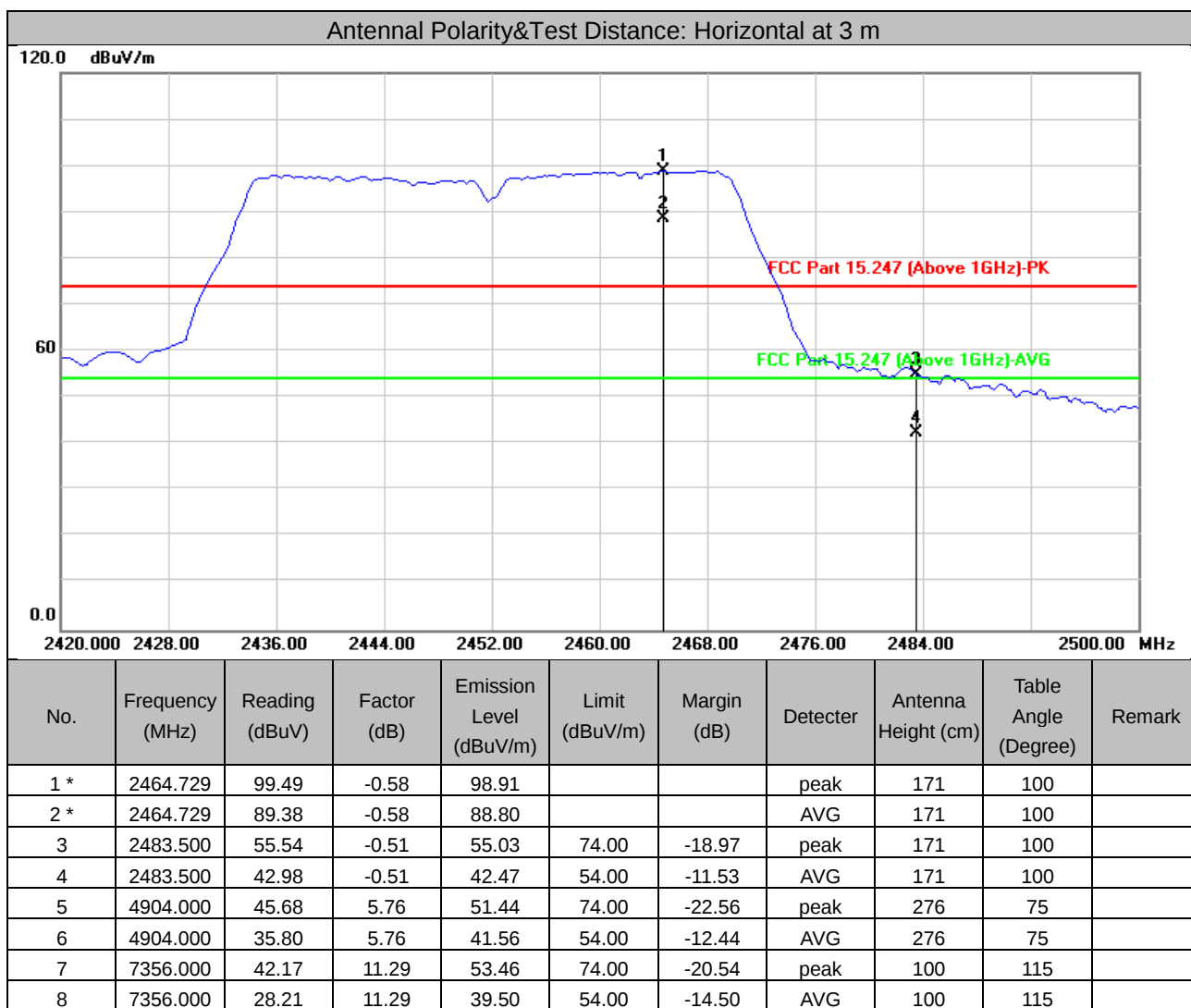
EUT Test Condition	802.11n HT40: 2437MHz TX		
Test Channel	Channel 6	Frequency Range	1GHz ~ 25GHz
Power supply	DC 12V from adapter	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25.6deg. C, 62%RH	Tested By	Tank tan

Antennal Polarity&Test Distance: Horizontal at 3 m										
No.	Frequency (MHz)	Reading (dBUV)	Factor (dB)	Emission Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 *	2437.000	100.75	-1.08	99.67			peak	261	101	
2 *	2437.000	90.40	-1.08	89.32			AVG	261	101	
3	4874.000	46.17	5.47	51.64	74.00	-22.36	peak	100	293	
4	4874.000	34.21	5.47	39.68	54.00	-14.32	AVG	100	293	
5	7311.000	39.00	11.14	50.14	74.00	-23.86	peak	100	185	
6	7311.000	25.81	11.14	36.95	54.00	-17.05	AVG	100	185	
Antennal Polarity&Test Distance: Vertical at 3 m										
No.	Frequency (MHz)	Reading (dBUV)	Factor (dB)	Emission Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)	Remark
1 *	2437.000	92.40	-1.08	91.32			peak	100	351	
2 *	2437.000	81.93	-1.08	80.85			AVG	100	351	
3	4874.000	43.09	5.47	48.56	74.00	-25.44	peak	100	126	
4	4874.000	31.85	5.47	37.32	54.00	-16.68	AVG	100	126	
5	7311.000	36.71	11.14	47.85	74.00	-26.15	peak	100	267	
6	7311.000	23.14	11.14	34.28	54.00	-19.72	AVG	100	267	

Remarks:

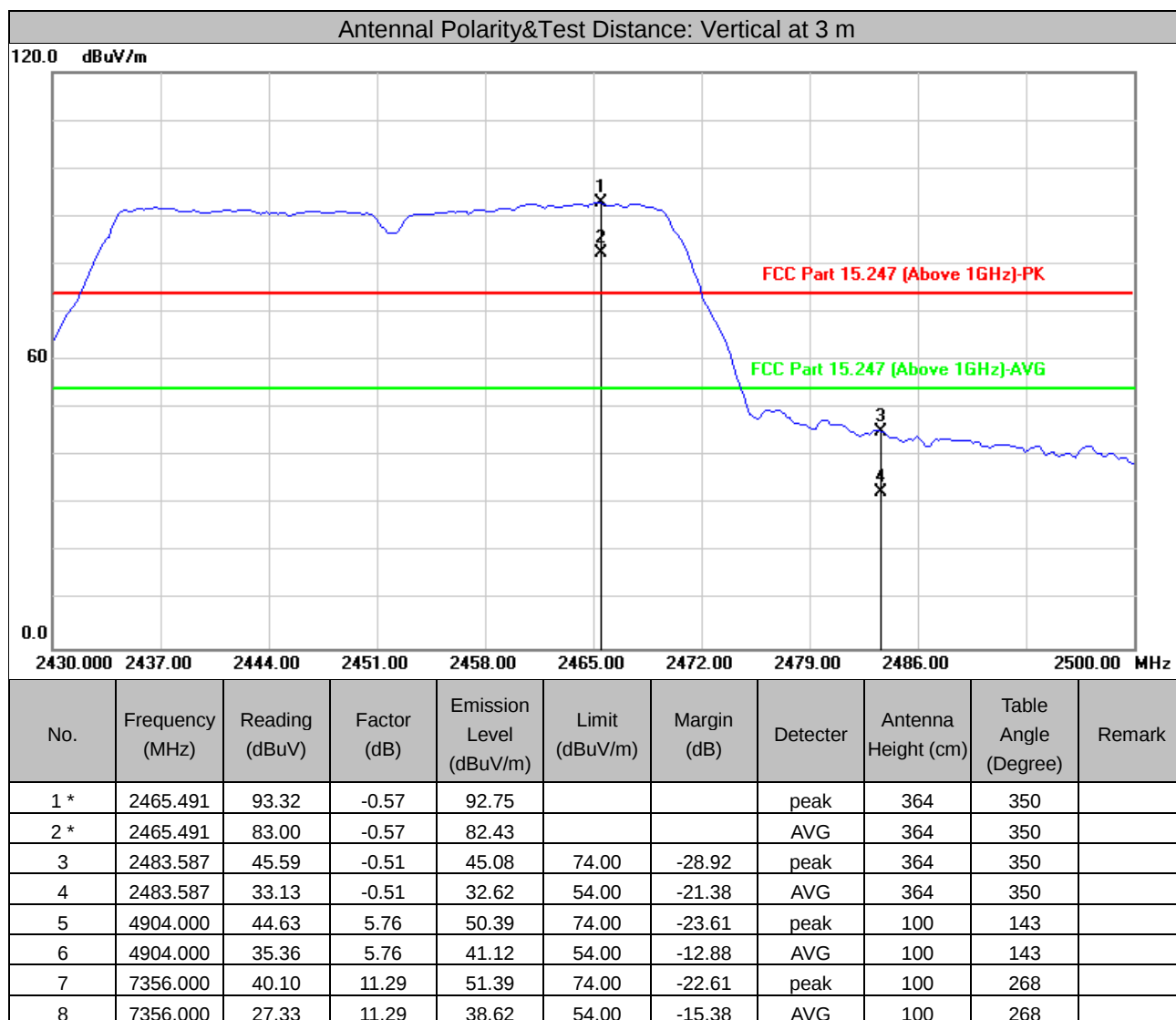
1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2437MHz: Fundamental frequency.

EUT Test Condition	802.11n HT40: 2452MHz TX		
Test Channel	Channel 9	Frequency Range	1GHz ~ 25GHz
Power supply	DC 12V from adapter	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25.6deg. C, 62%RH	Tested By	Tank tan



Remarks:

- Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
- Margin value = Emission level – Limit value
- 2452MHz: Fundamental frequency.



Remarks:

1. Emission Level = Read Level + Factor (Antenna Factor + Cable Loss - Preamp Factor)
2. Margin value = Emission level – Limit value
3. 2452MHz: Fundamental frequency.

3.2 Conducted Emission Measurement

3.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

3.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
EMI Test Receiver Rohde&Schwarz	ESCI3	101418	2019-09-18	2020-09-17
Artificial Mains Network Rohde&Schwarz	ENV216	3560.6550.15	2019-10-18	2020-10-17
Test software FARAD	EZ_EMCC V1.1.4.2	N/A	N/A	N/A
Hygrothermograph Yuhuaze	HTC-1	NA	2019-10-18	2020-10-17
Digital Multimeter FLUKE	15B+	43512617WS	2019-10-18	2020-10-17

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA.
2. The test was performed in Shielded Room 1.

3.2.3 Test Procedures

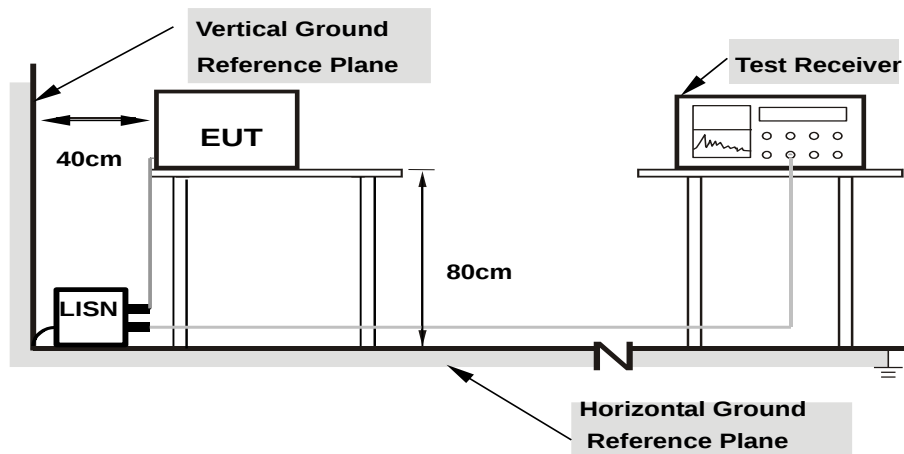
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit – 20dB) was not recorded.

Note: All modes of operation were investigated and the worst-case emissions are reported.

3.2.4 Deviation from Test Standard

No deviation.

3.2.5 Test setup



- Note:**
- Support units were connected to second LISN.
 - Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

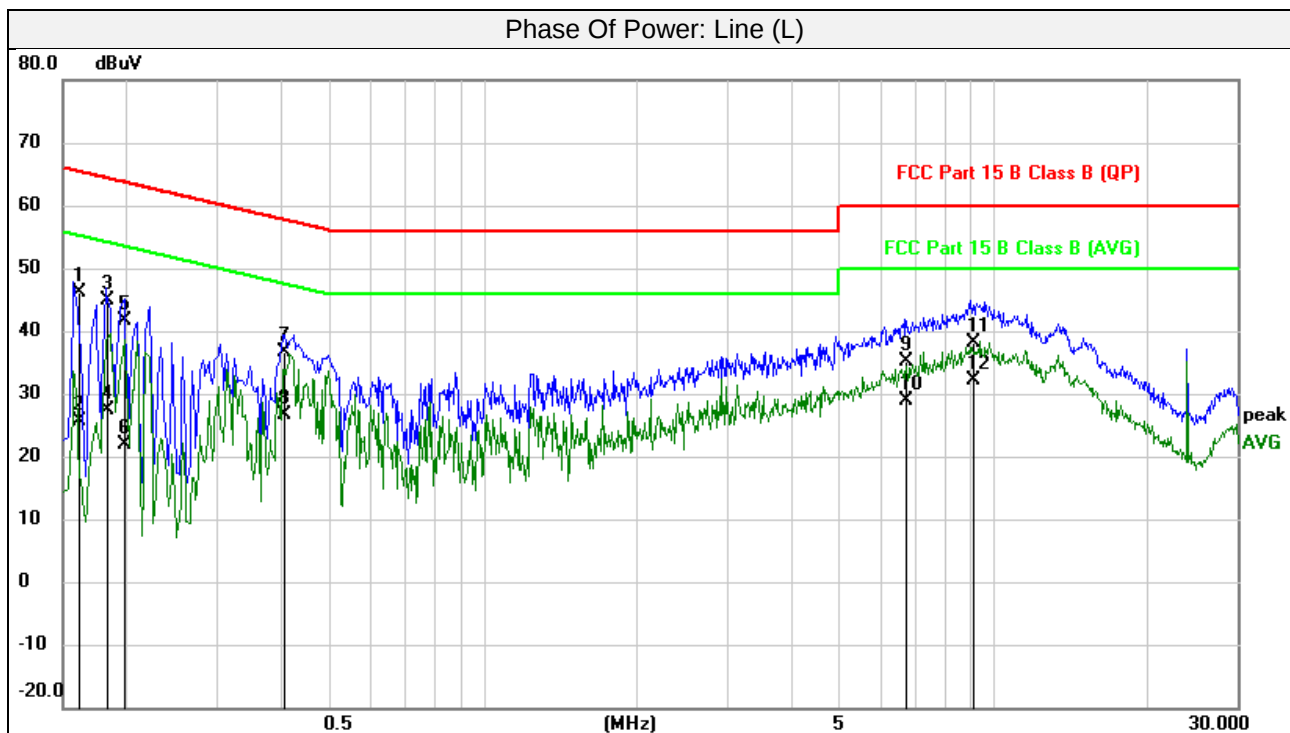
3.2.6 EUT Operating Conditions

- Placed the EUT on the testing table.
- Set the EUT under transmission condition continuously at specific channel frequency.

3.2.7 Test Results

Conducted worst-case data (802.11b CH1)

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution andwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Power supply	DC 12V from adapter	Environmental Conditions	25°C, 60%RH
Tested by	Tank Tan	Test Date	2020/06/14

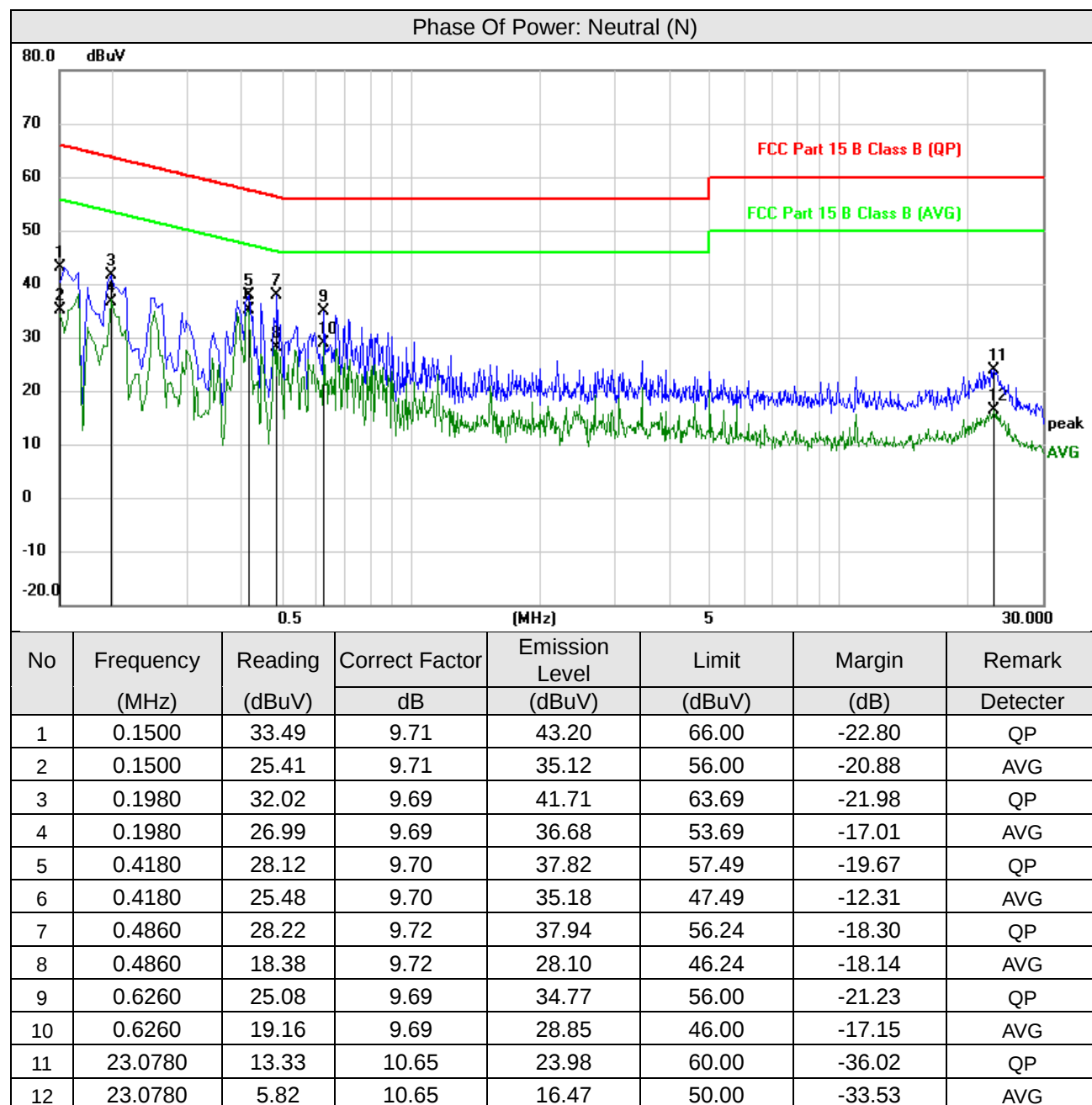


No	Frequency (MHz)	Reading (dBuV)	Correct Factor	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Remark
			dB				
1	0.1617	36.32	9.70	46.02	65.38	-19.36	QP
2	0.1617	16.00	9.70	25.70	55.38	-29.68	AVG
3	0.1839	35.25	9.69	44.94	64.31	-19.37	QP
4	0.1839	17.75	9.69	27.44	54.31	-26.87	AVG
5	0.1990	31.89	9.69	41.58	63.65	-22.07	QP
6	0.1990	12.14	9.69	21.83	53.65	-31.82	AVG
7	0.4086	26.87	9.70	36.57	57.68	-21.11	QP
8	0.4086	16.87	9.70	26.57	47.68	-21.11	AVG
9	6.7249	25.47	9.71	35.18	60.00	-24.82	QP
10	6.7249	19.09	9.71	28.80	50.00	-21.20	AVG
11	9.0821	28.44	9.81	38.25	60.00	-21.75	QP
12	9.0821	22.38	9.81	32.19	50.00	-17.81	AVG

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution andwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Power supply	DC 12V from adapter	Environmental Conditions	25°C, 60%RH
Tested by	Tank Tan	Test Date	2020/06/14


REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

3.3 6dB Bandwidth Measurement

3.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

3.3.2 Test Setup



3.3.3 Test Instruments

Refer to section 10.1 to get information of above instrument.

3.3.4 Test Procedure

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

3.3.5 Deviation from Test Standard

No deviation.

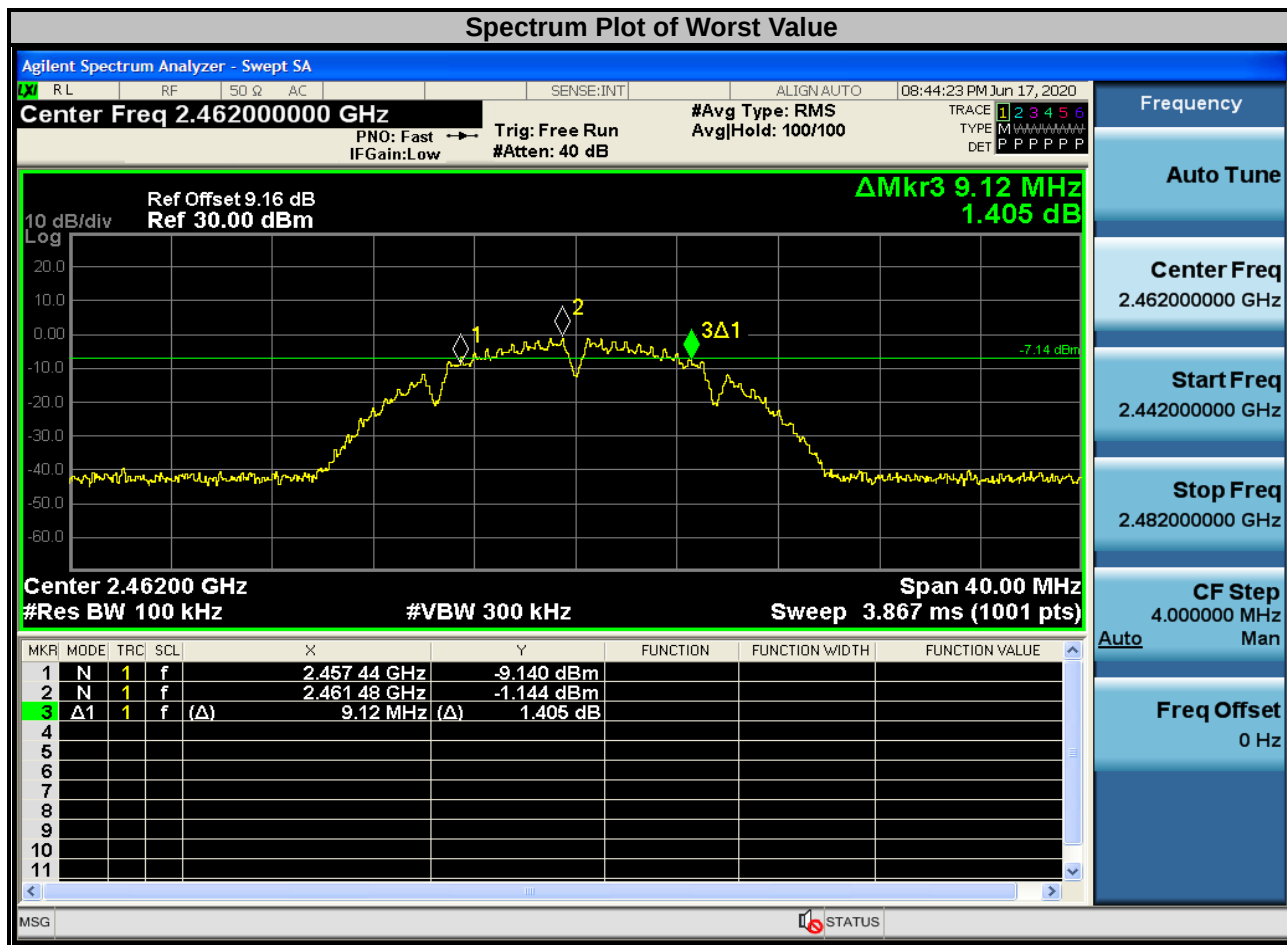
3.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

3.3.7 Test Result

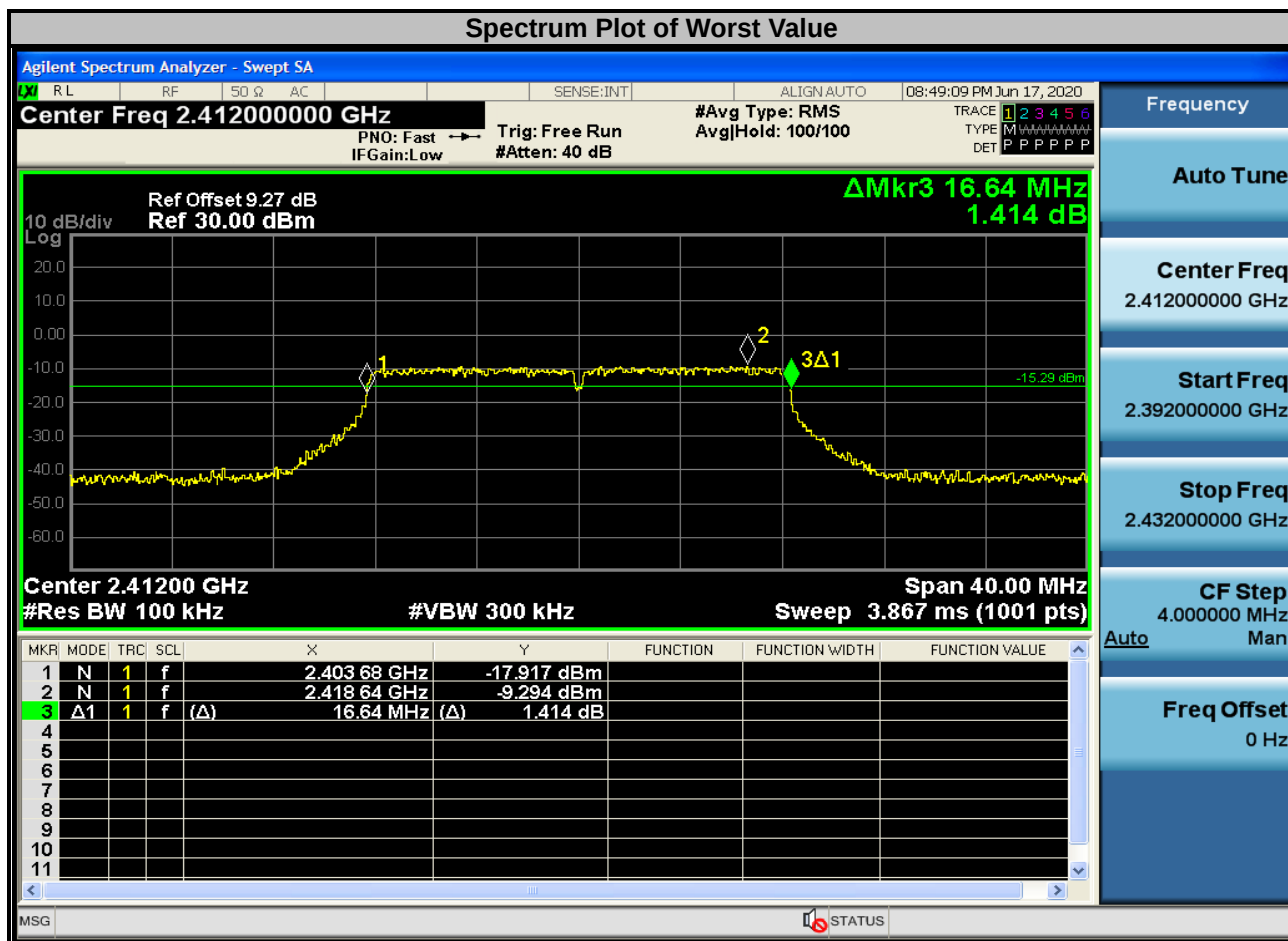
802.11b

Channel	Frequency (MHz)	6dB Bandwidth(MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	9.080	0.5	Pass
6	2437	8.600	0.5	Pass
11	2462	9.120	0.5	Pass



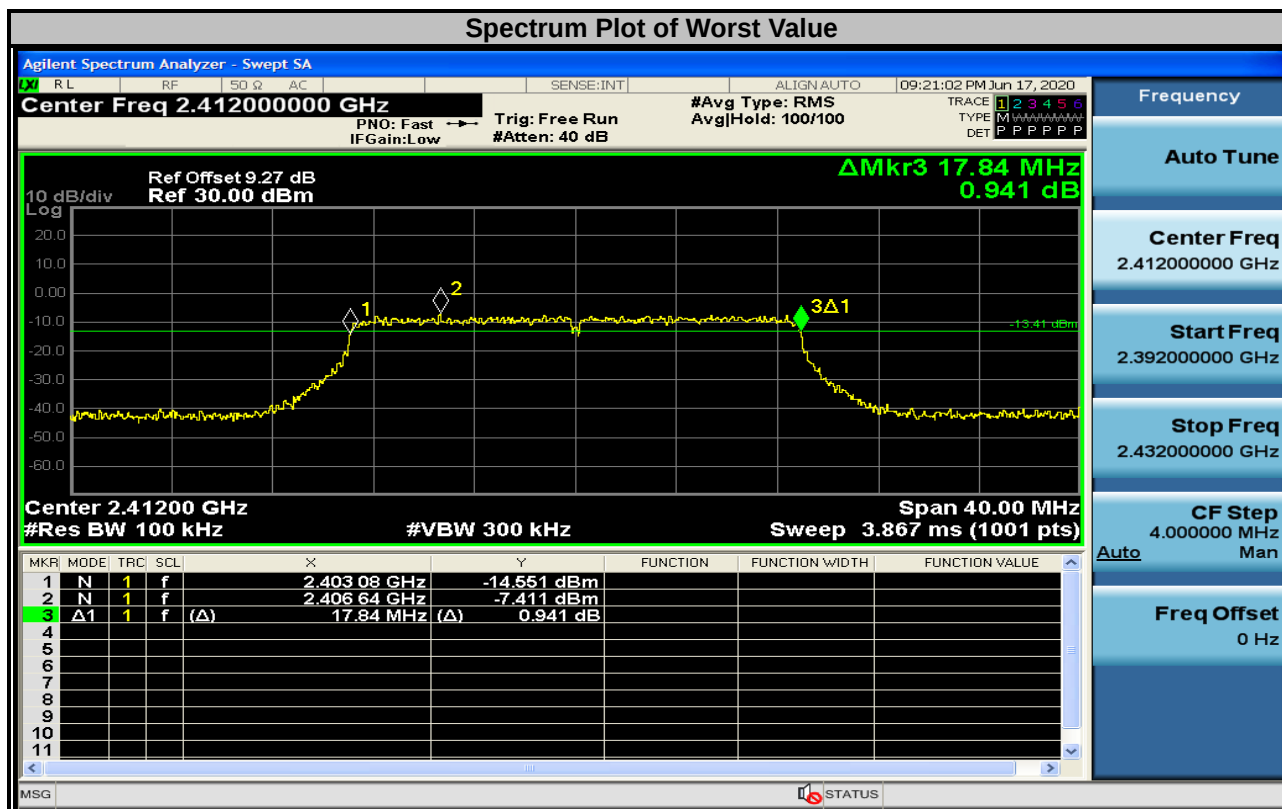
802.11g

Channel	Frequency (MHz)	6dB Bandwidth(MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.640	0.5	Pass
6	2437	16.640	0.5	Pass
11	2462	16.640	0.5	Pass



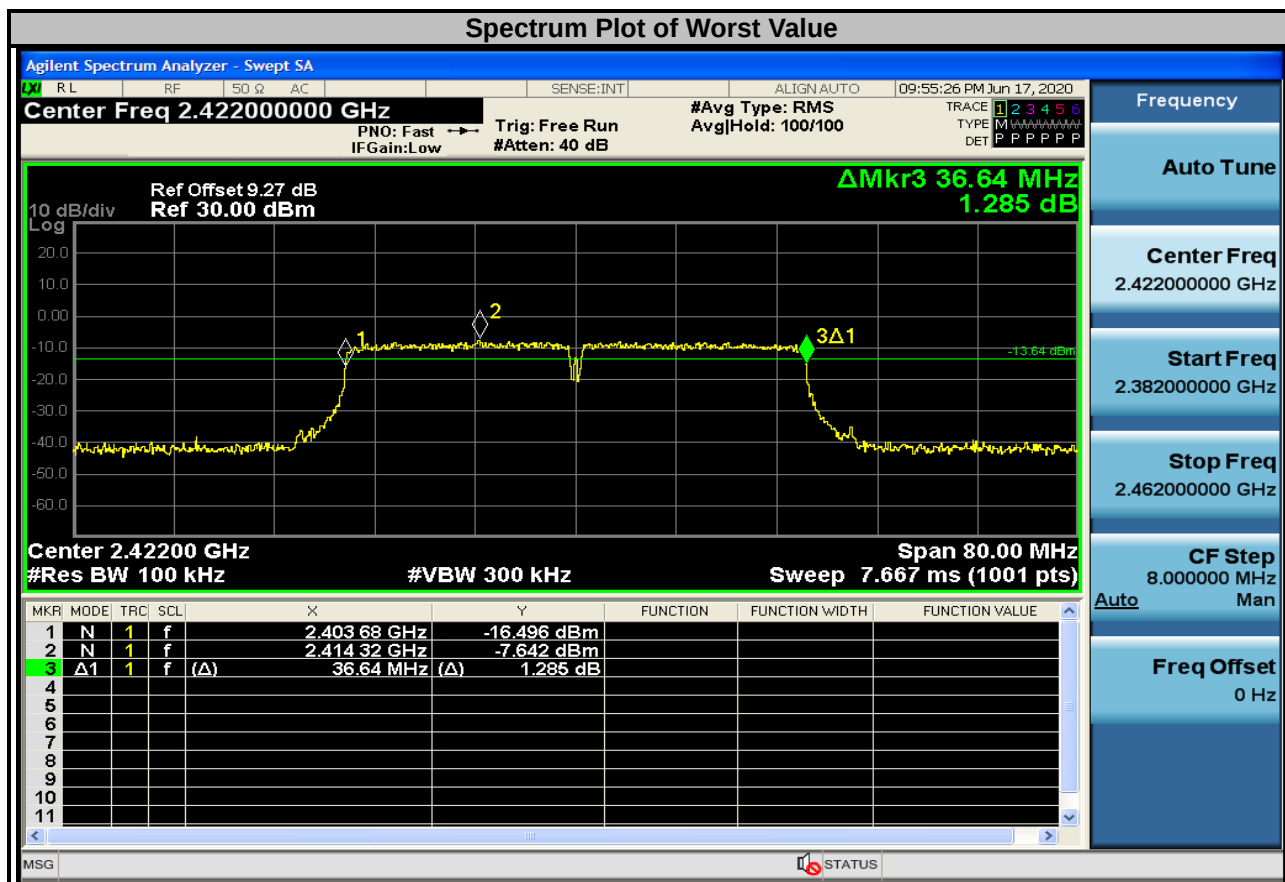
802.11n HT20

Channel	Frequency (MHz)	6dB Bandwidth(MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.840	0.5	Pass
6	2437	17.800	0.5	Pass
11	2462	17.840	0.5	Pass



802.11n HT40

Channel	Frequency (MHz)	6dB Bandwidth(MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	36.640	0.5	Pass
6	2437	36.640	0.5	Pass
9	2452	36.640	0.5	Pass

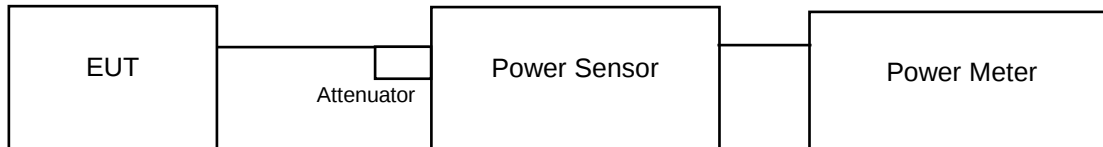


3.4 Conducted Output Power Measurement

3.4.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHzbands: 1 Watt (30dBm)

3.4.2 Test Setup



3.4.3 Test Instruments

Refer to section 10.1 to get information of above instrument.

3.4.4 Test Procedures

A peak / average power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak / average power sensor. Record the power level.

3.4.5 Deviation from Test Standard

No deviation.

3.4.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

3.4.7 Test Results

Average power:

802.11b

CH.	Fre. (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)
1	2412	11.561	10.63	30
6	2437	10.740	10.31	30
11	2462	10.839	10.35	30

802.11g

CH.	Fre. (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)
1	2412	10.116	10.05	30
6	2437	8.750	9.42	30
11	2462	8.872	9.48	30

802.11n HT20

CH.	Fre. (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)
1	2412	16.032	12.05	30
6	2437	15.453	11.89	30
11	2462	14.555	11.63	30

802.11n HT40

CH.	Fre. (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)
1	2422	26.546	14.24	30
6	2437	15.453	11.89	30
11	2452	14.555	11.63	30

Peak power:
802.11b

CH.	Fre. (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)
1	2412	16.218	12.10	30
6	2437	13.521	11.31	30
11	2462	13.583	11.33	30

802.11g

CH.	Fre. (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)
1	2412	16.293	12.12	30
6	2437	14.521	11.62	30
11	2462	14.622	11.65	30

802.11n HT20

CH.	Fre. (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)
1	2412	27.164	14.34	30
6	2437	25.823	14.12	30
11	2462	24.889	13.96	30

802.11n HT40

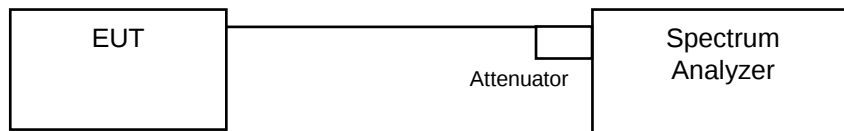
CH.	Fre. (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)
3	2422	46.345	16.66	30
6	2437	43.954	16.43	30
9	2452	41.976	16.23	30

3.5 Power Spectral Density Measurement

3.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

3.5.2 Test Setup



3.5.3 Test Instruments

Refer to section 10.1 to get information of above instrument.

3.5.4 Test Procedure

- Set the RBW = 10 kHz, VBW = 30 kHz, Detector = peak.
- Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz bandsegment within the fundamental EBW.

3.5.5 Deviation from Test Standard

No deviation.

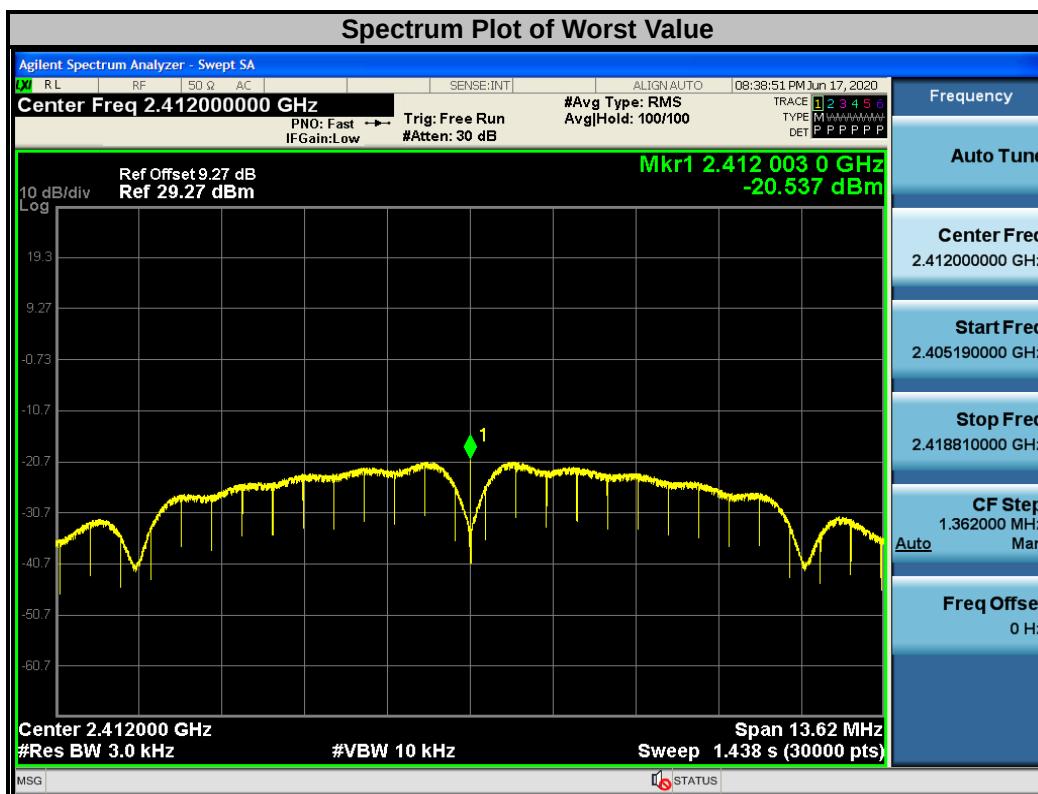
3.5.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

3.5.7 Test Results

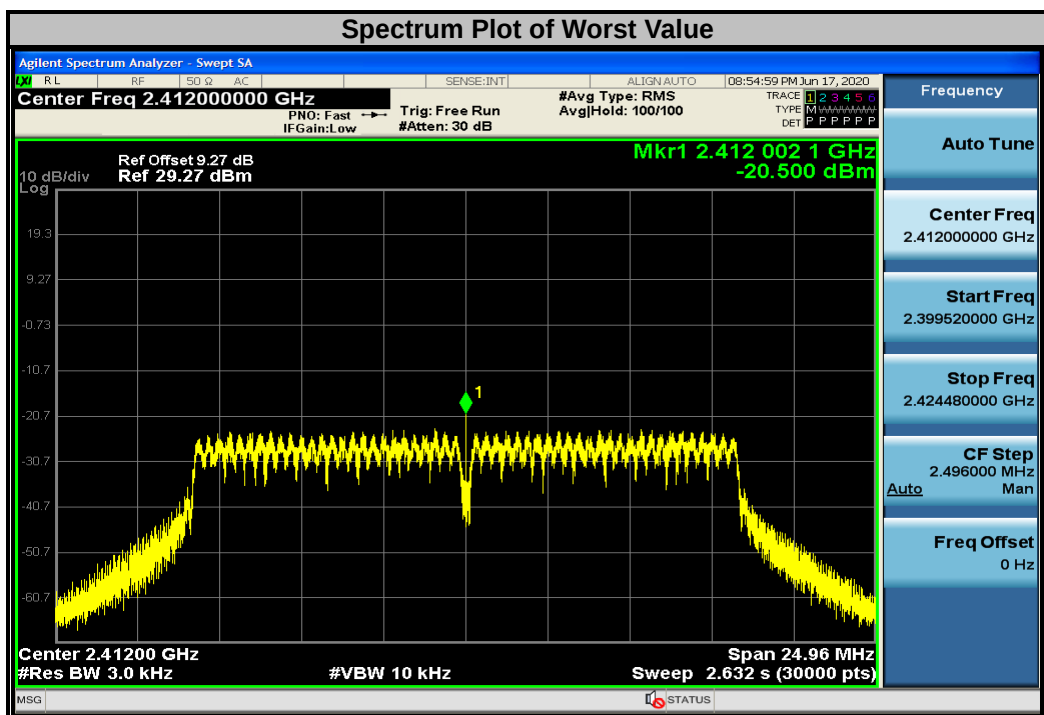
802.11b:

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
1	2412	-20.54	8	Pass
6	2437	-20.85	8	Pass
11	2462	-20.78	8	Pass



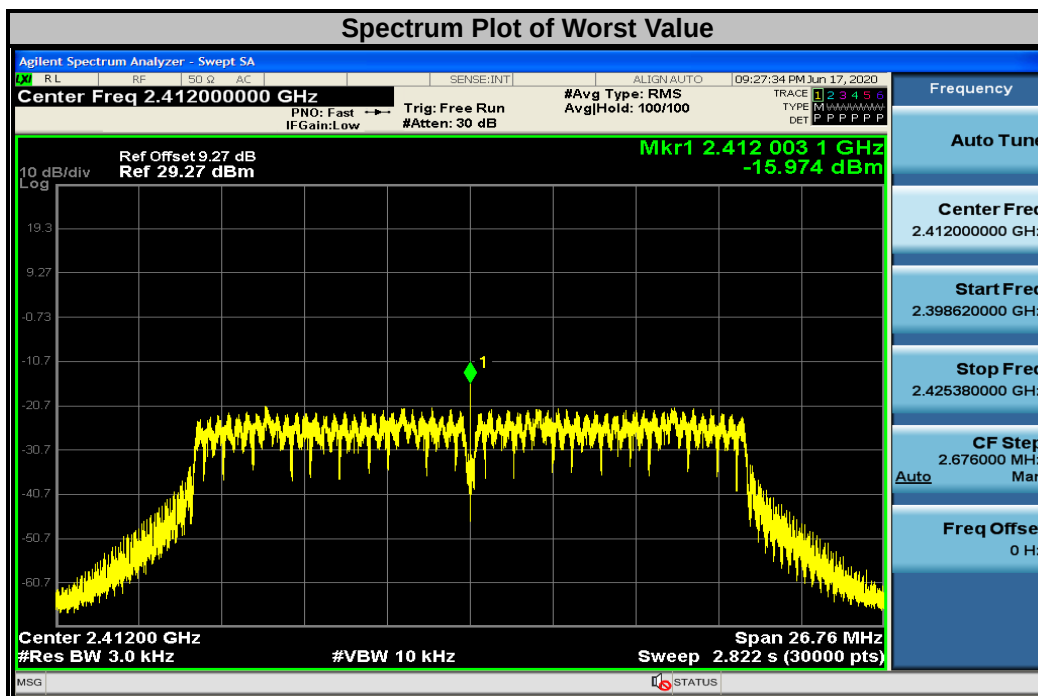
802.11g:

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
1	2412	-20.50	8	Pass
6	2437	-20.94	8	Pass
11	2462	-20.94	8	Pass



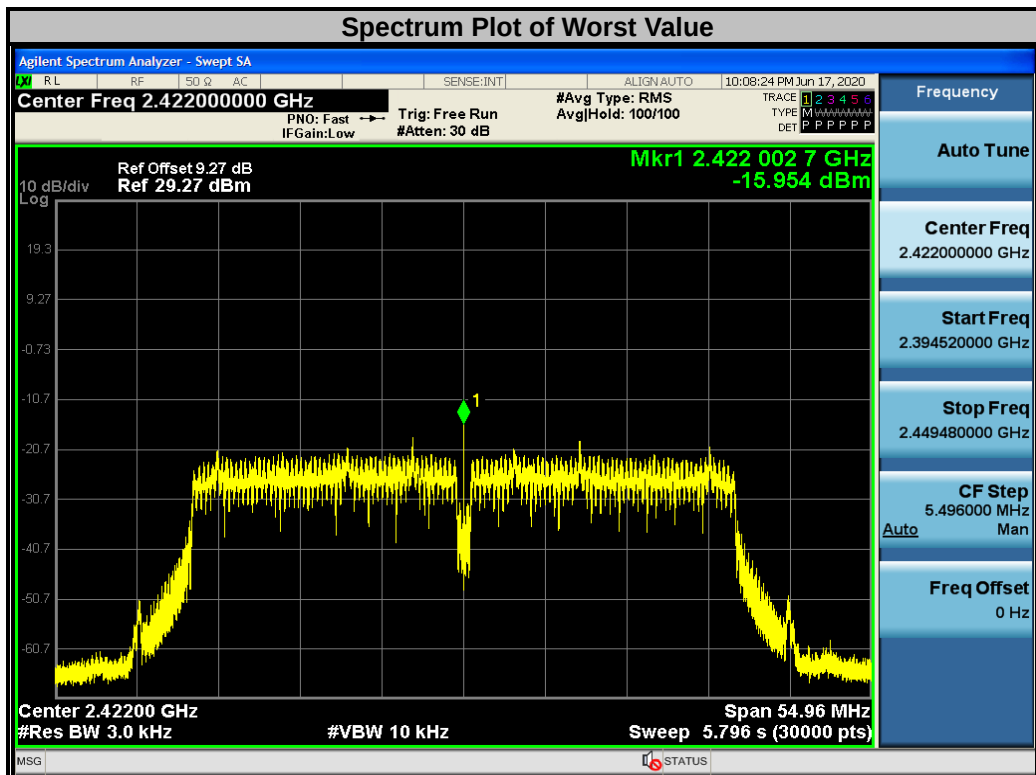
802.11n HT20:

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
1	2412	-15.97	8	Pass
6	2437	-16.39	8	Pass
11	2462	-16.49	8	Pass



802.11n HT40:

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
3	2422	-15.95	8	Pass
6	2437	-16.49	8	Pass
9	2452	-16.48	8	Pass



3.6 Conducted Out of Band Emission Measurement

3.6.1 Limits of Conducted Out of Band Emission Measurement

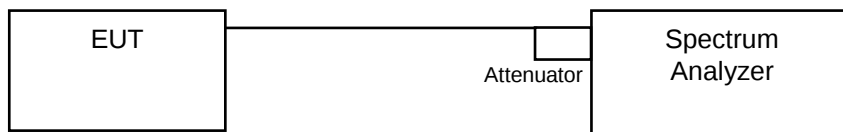
For average power:

Below -30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

For peak power:

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth)

3.6.2 Test Setup



3.6.3 Test Instruments

Refer to section 10.1 to get information of above instrument.

3.6.4 Test Procedure

Measurement procedure REF

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHzband segment within the fundamental EBW.

3.6.5 Measurement procedure OOB

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

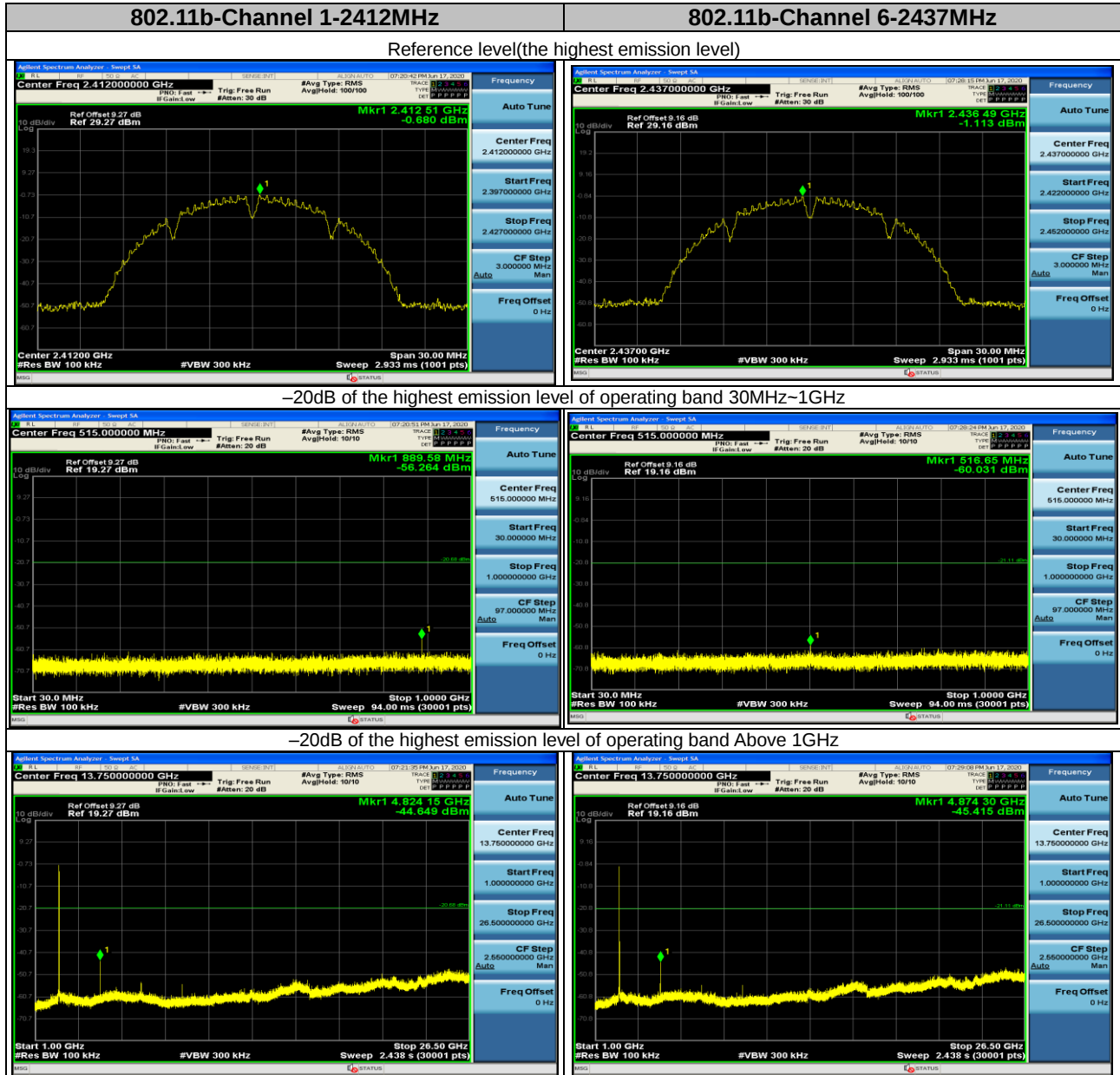
3.6.6 Deviation from Test Standard

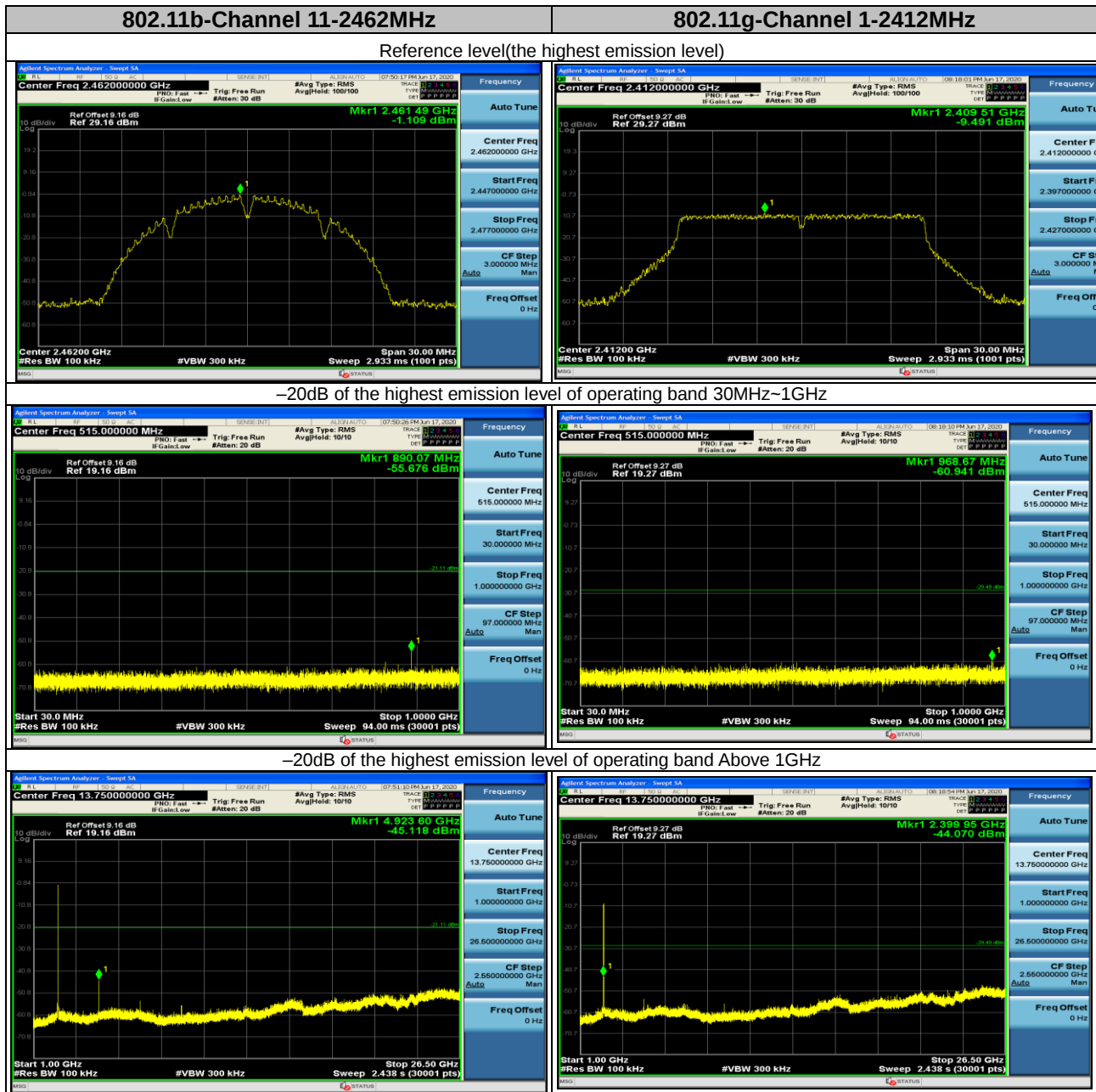
No deviation.

3.6.7 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

3.6.8 Test results

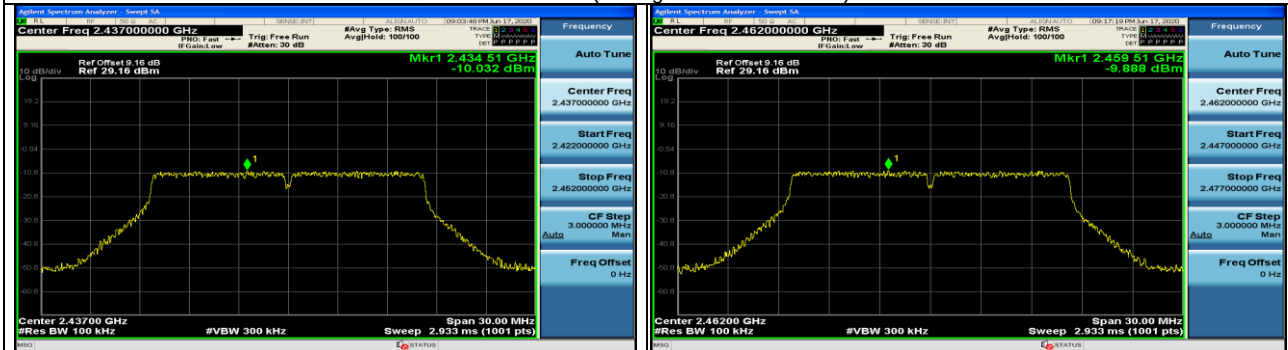




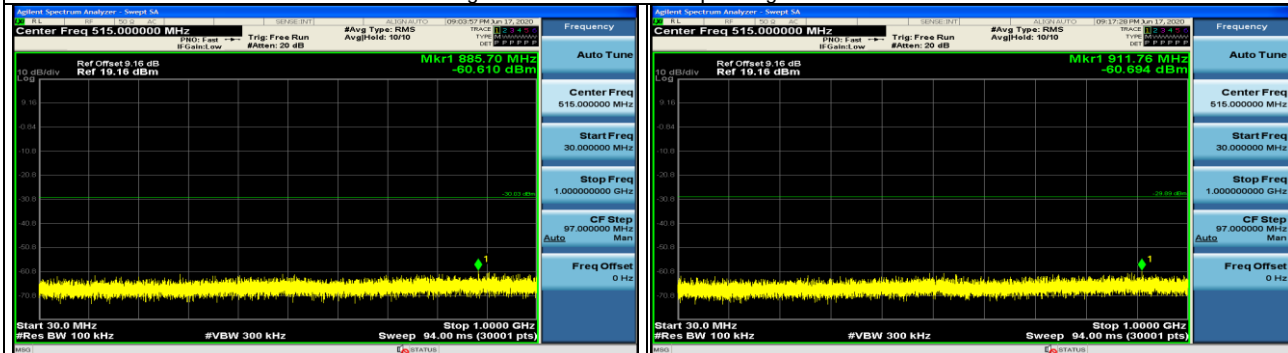
802.11g-Channel 6-2437MHz

802.11g-Channel 11-2462MHz

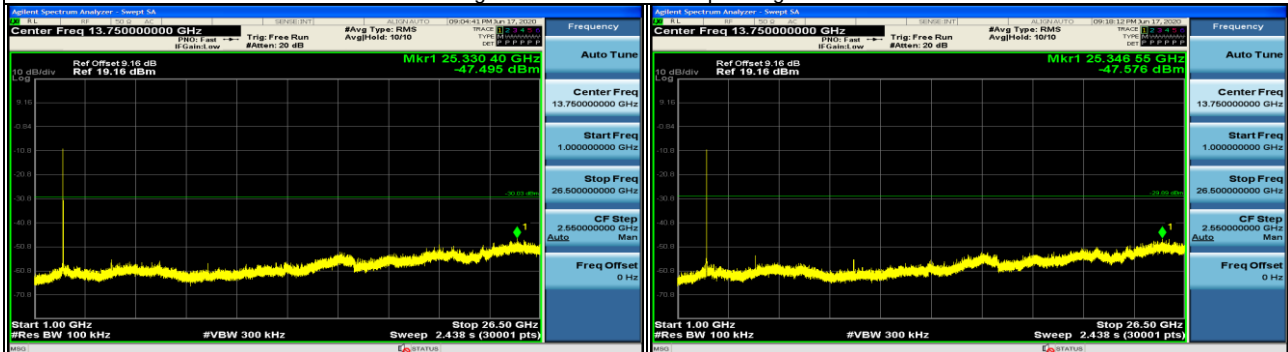
Reference level(the highest emission level)

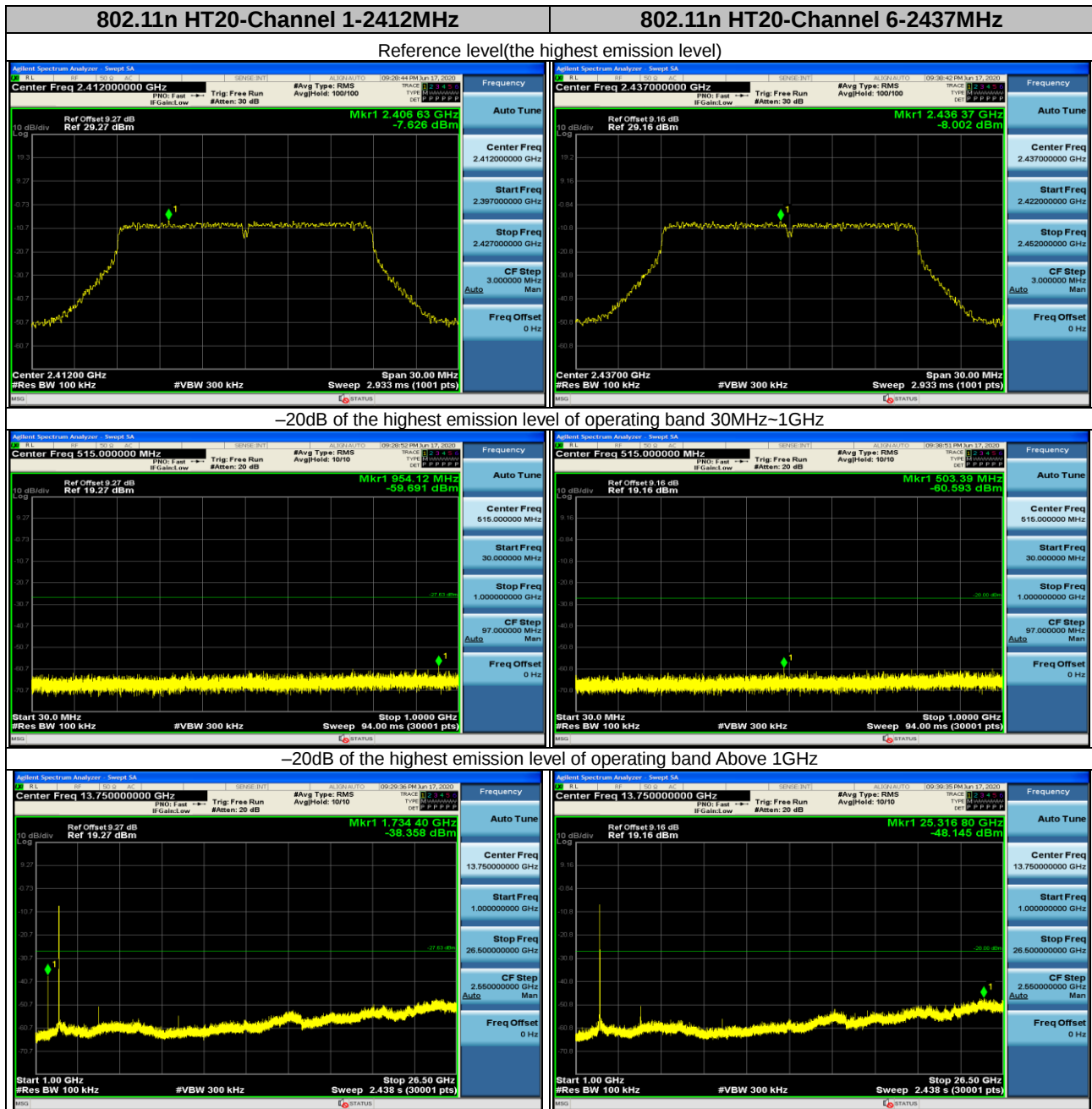


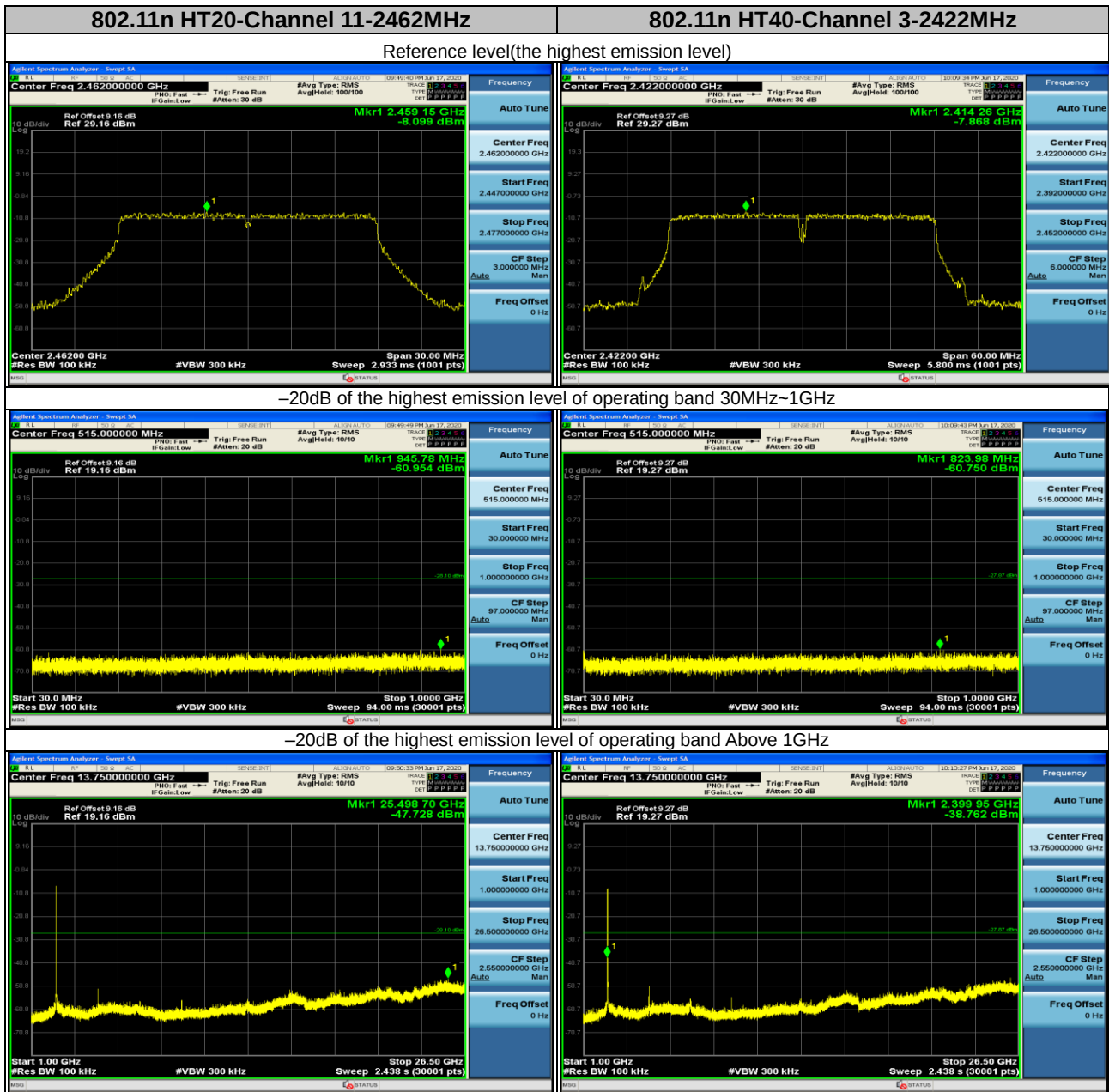
-20dB of the highest emission level of operating band 30MHz-1GHz

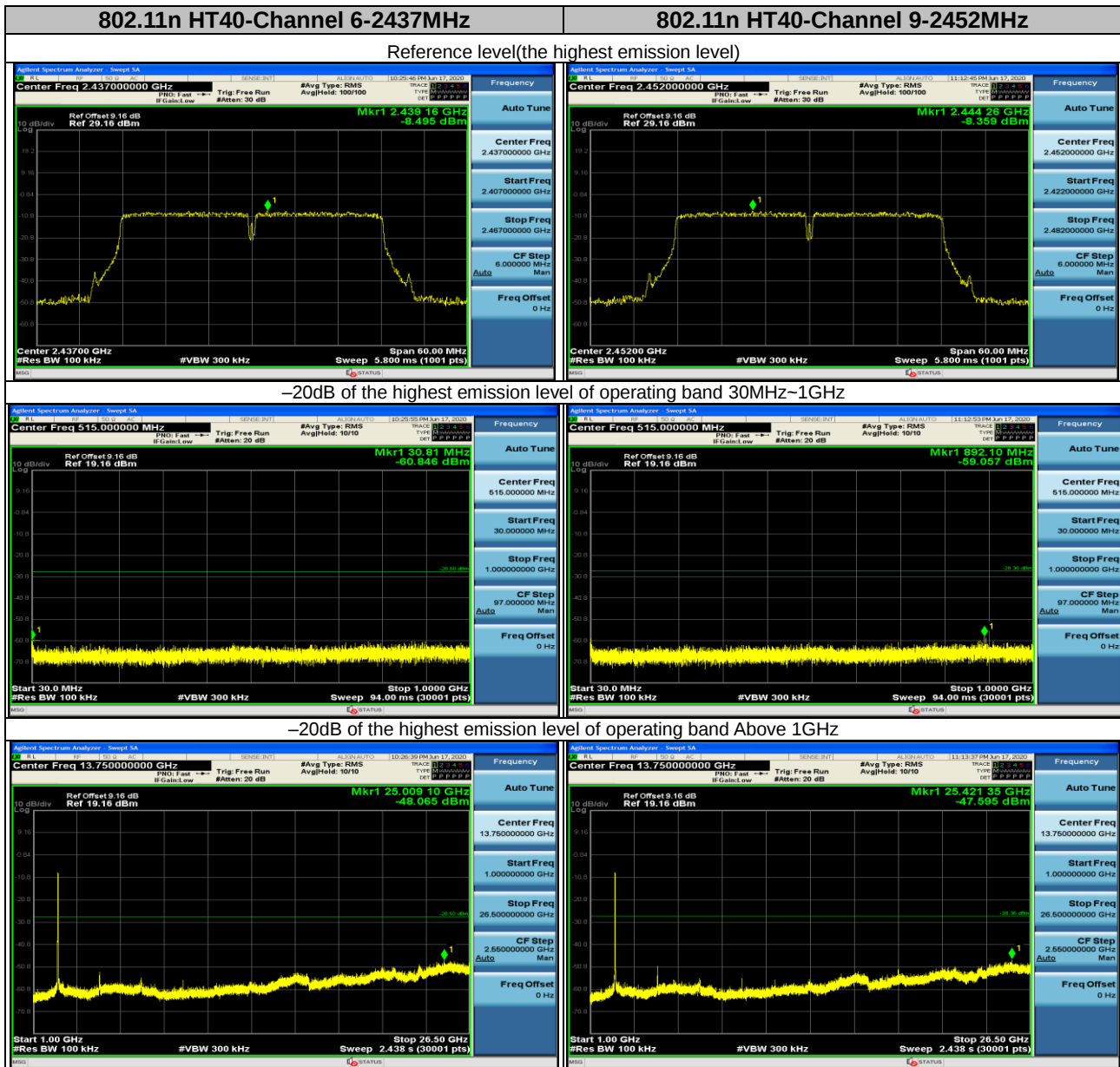


-20dB of the highest emission level of operating band Above 1GHz









Bandedge:



4. Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

5. Test instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Spectrum Keysight	N9020A	MY51240612	2019/10/18	2020/10/17
Spectrum Analyzer Rohde&Schwarz	FSV-40N	101783	2019/10/18	2020/10/17
Power Meter10Hz~18GHz Tonscend	JS0806-2	188060126	2019/10/18	2020/10/17
Signal generator Keysight	N5182A	GB40051020	2019/10/18	2020/10/17
Signal generator Keysight	N5182A	MY47420944	2019/10/18	2020/10/17
Test Software Tonscend	JS0806-2	NA	NA	NA
Hygrothermograph Yuhuaze	HTC-1	NA	2019/10/18	2020/10/17

Note: 3. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA.

4. The test was performed in Chamber 1.

Appendix – Information on the Testing Laboratories

We, [Hwa-Hsing \(Dongguan\) Co., Ltd.](#), A global provider of TESTING and CERTIFICATION services for consumer products, electronic products and wireless information technology products. Adhering to the core values "HONEST and TRUSTWORTHY, OBJECTIVE and IMPARTIALITY, RIGOROUS and AFFICIENT", commitment to provide professional, perfect and efficient comprehensive ONE-STOP solution of TESTING and CERTIFICATION services for Manufacturers, Buyers, Traders, Brands, Retailers. Assist client to better manage risk, protect their brands, reduce costs and cut time to over 150 markets in global. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Contact Tel: [0769-83078199](tel:0769-83078199)

Email: customerservice.dg@hwa-hsing.com

Web Site: www.hwa-hsing.com

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