

FCC Test Report

Report No.: RFBASM-WTW-P21071003

FCC ID: QYLWCN3990Z11

Test Model: ZX10

Series Model: ZX10Y (Y= 10 characters, Y can be 0-9, a-z, A-Z, " - ", " _ ", " / ", " \ " or blank for marketing purpose and no impact safety related critical components and constructions.)

Received Date: Jul. 28, 2021

Test Date: Aug. 26 ~ Nov. 08, 2021

Issued Date: Nov. 19, 2021

Applicant: Getac Technology Corporation.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

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FCC Registration / Designation Number (1): 788550 / TW0003

FCC Registration / Designation Number (2): 281270 / TW0032



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Release Control Record

Issue No.	Description	Date Issued
RFBASM-WTW-P21071003	Original release.	Nov. 19, 2021

1 Certificate of Conformity

Product: Tablet

Brand: Getac

Test Model: ZX10

Series Model: ZX10Y (Y= 10 characters, Y can be 0-9, a-z, A-Z, “ - “, “ _ “, “ / “, “ \ “ or blank for marketing purpose and no impact safety related critical components and constructions.)

Sample Status: Identical Prototype

Applicant: Getac Technology Corporation.

Test Date: Aug. 26 ~ Nov. 08, 2021

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, 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 RF characteristics under the conditions specified in this report.

Prepared by :


Polly Chien / Specialist

Date:

Nov. 19, 2021

Approved by :



Jeremy Lin / Project Engineer

Date:

Nov. 19, 2021

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -13.15dB at 0.41799MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.3dB at 2483.50MHz.
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	Antenna connector is I-PEX not a standard connector.

Note:

- For 2.4G band compliance with rule 15.247(d) of the band-edge items, the test plots were recorded in Annex A. Test Procedures refer to report 4.1.3.
- Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.79 dB
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.00 dB
	30MHz ~ 200MHz	2.91 dB
	200MHz ~1000MHz	2.93 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	1.76 dB
	18GHz ~ 40GHz	1.77 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Tablet
Brand	Getac
Test Model	ZX10
Series Model	ZX10Y (Y= 10 characters, Y can be 0-9, a-z, A-Z, “ - “, “ _ “, “ / “, “ \ “ or blank for marketing purpose and no impact safety related critical components and constructions.)
Model Difference	For marketing purpose
Sample Status	Identical Prototype
Power Supply Rating	19Vdc (from adapter) 3.84Vdc (from battery)
Modulation Type	802.11b: BPSK, QPSK, CCK 802.11g/n: BPSK, QPSK, 16QAM, 64QAM
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 400Mbps
Operating Frequency	2412~2462MHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20/VHT20): 11 802.11n (HT40/VHT40): 7
Output Power	148.795mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	Refer to note
Cable Supplied	NA

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides 2 completed transmitters and 2 receivers.

Modulation Mode	TX Function
802.11b	2TX
802.11g	2TX
802.11n (HT20/VHT20)	2TX
802.11n (HT40/VHT40)	2TX

2. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	FSP	FSP065-RBBN3	I/P: 100-240 Vac, 50-60Hz, 1.5 A O/P: 19.0 Vdc, 3.42 A 1.47m non-shielded cable with 1 core
Battery 1	Getac	BP1S2P4990B	Rating: 3.84Vdc, 9740mAh, 37.4Wh Typical Capacity: 9980mAh, 38.32Wh
Battery 2	Getac	BP1S1P4990B	Rating: 3.84Vdc, 4870mAh, 18.7Wh Typical Capacity: 4990mAh, 19.16Wh
Power cord	I-SHENG ELECTRIC WIRE & CABLE CO., LTD.	SP-305B+IS-034	1.7M
Touch pen	Getac	N52 Magnet	N/A

* After the pretesting battery, battery 2 mode is found to be the worst case and therefore had been chosen for final test.

3. EUT contains following configurations.

Part	Brand	Model	Note	Configuration			
				1	2	3	4
CPU	Qualcomm	SDA 660	-	V	V	V	V
Memory	Samsung	KM3V6001CM-B705	4GB	V	V	V	V
VIDEO CONTROLLER	Qualcomm	Adreno GU 512	-	V	V	V	V
eMMC Storage	Samsung	-	64GB	V	V	V	V
DISPLAY	AUO	G101UAN2.0	-	V	V	V	V
Touch Screen	EETI	EXC80H60	-	V	V	V	V
Real Camera	Unison	MV21A6A1-TF5D	16M PLCC MIPI	V	V	V	V
Front Camera	Unison	MV2980A1-TF4R-P	8M PLCC MIPI	V	V	V	V
WLAN/BT	Qualcomm	WCN3990	-	V	V	V	V
HF-RFID	Getac	PN7150	-	V	V	V	V
GPS	Locosys	MC-1010-V2B	-	V	V	V	V
Barcode Reader	Honeywell	N6703SR-W5-103	-	V	V	V	V
Smart Card Option Bay	Alcor	AU9560-GBS-GR	-			V	V
Normal capacity battery	Getac	BP1S1P4990B	BYD Cell, CSL595490HPlus	V		V	
High capacity battery	Getac	BP1S2P4990B	BYD Cell, CSL595490HPlus		V		V

*After the pretesting, the configuration 3 is found to be the worst case and had been chosen for final test.

4. The EUT uses the following antennas.

Ant. Type	PIFA				
Ant. Connector	IPEX				
Peak Gain (dBi)					
Frequency (MHz)	2400~2500	5180 ~ 5240	5260 ~ 5320	5500 ~ 5720	5745 ~ 5825
Main	1.84	0.74	0.62	-0.82	-1.96
Aux	-3.3	3.08	2.84	2.59	2.90

* The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

5. Spurious emission of the simultaneous operation (WLAN 2.4GHz, BT and NFC or WLAN 5GHz and NFC) has been evaluated and no non-compliance was found.

3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g, 802.11n (HT20/VHT20):

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 (HT40/VHT40):

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to				Description
	RE $\geq$ 1G	RE<1G	PLC	APCM	

Where RE $\geq$ 1G: Radiated Emission above 1GHz & Bandedge Measurement
 RE<1G: Radiated Emission below 1GHz
 PLC: Power Line Conducted Emission
 APCM: Antenna Port Conducted Measurement

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X plane**.
2. For radiated emission (below 1GHz) and power line conducted emission test items chosen the worst maximum fundamental emission level channel.

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	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (VHT20)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (VHT40)	3 to 9	3, 6, 9	OFDM	BPSK	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	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (VHT20)	1 to 11	1	OFDM	BPSK	7.2

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	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (VHT20)	1 to 11	1	OFDM	BPSK	7.2

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	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (VHT20)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (VHT40)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	23 deg. C, 66% RH	120Vac, 60Hz	Titan Hsu, Adair Peng
RE<1G	23 deg. C, 66% RH	120Vac, 60Hz	Titan Hsu
PLC	23 deg. C, 67% RH	120Vac, 60Hz	Adair Peng
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Jisyong Wang

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is > 98 %, duty factor is not required.

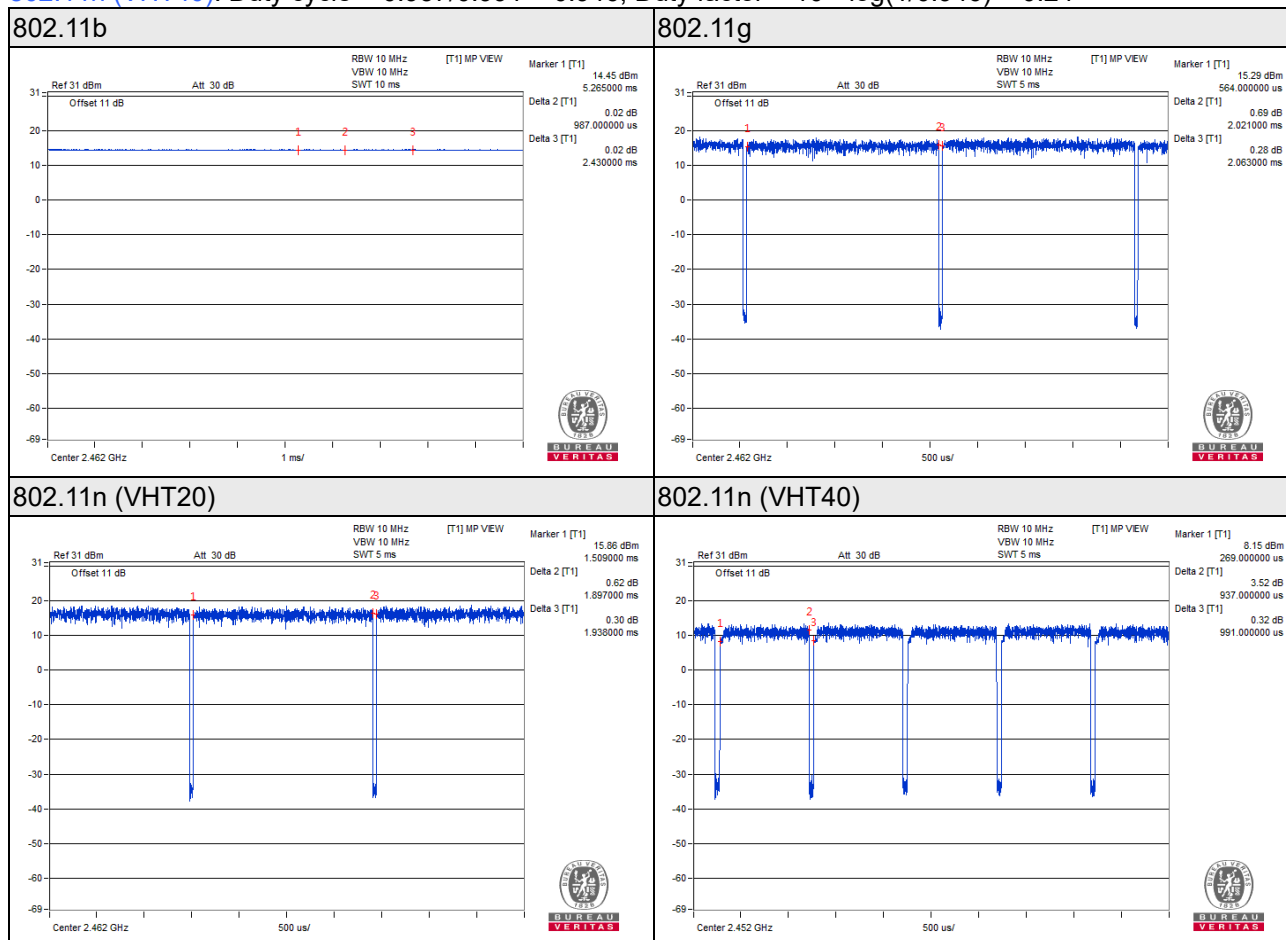
Duty cycle of test signal is < 98 %, duty factor is required.

802.11b: Duty cycle is 100 %, duty factor is not required.

802.11g: Duty cycle = $2.021/2.063 = 0.980$

802.11n (VHT20): Duty cycle = $1.897/1.938 = 0.979$, Duty factor = $10 * \log(1/0.979) = 0.09$

802.11n (VHT40): Duty cycle = $0.937/0.991 = 0.946$, Duty factor = $10 * \log(1/0.946) = 0.24$



3.4 Description of Support Units

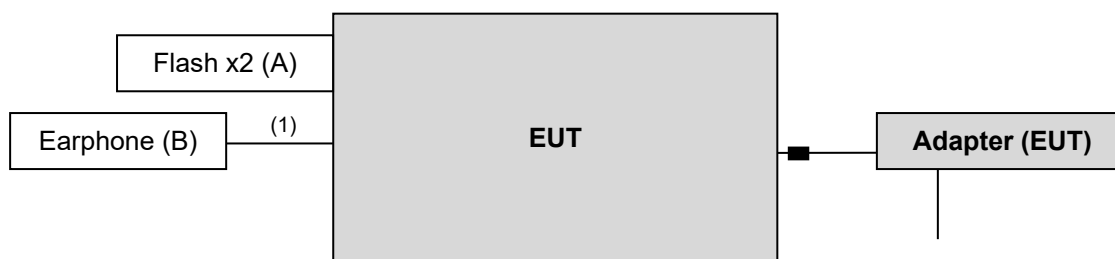
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Flash	SanDisk	SDDDC3-032G	NA	NA	Type-C
	Flash	HP	v250W	05	NA	Type-A
B.	Earphone	APPLE	MB770FE	NA	NA	-

Note: All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Audio cable	1	1.2	N	0	-

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards and References

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

Test standard:

FCC Part 15, Subpart C (15.247)

ANSI C63.10-2013

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

References Test Guidance:

KDB 558074 D01 15.247 Meas Guidance v05r02

KDB 662911 D01 Multiple Transmitter Output v02r01

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 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.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver Rohde & Schwarz	N9038A	MY55420137	Apr. 09, 2021	Apr. 08, 2022
Spectrum Analyzer KEYSIGHT	N9020B	MY60110440	Dec. 18, 2020	Dec. 17, 2021
BILOG Antenna SCHWARZBECK	VULB9168	9168-1213	Nov. 04, 2020 Oct. 27, 2021	Nov. 03, 2021 Oct. 26, 2022
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-563	Nov. 22, 2020	Nov. 21, 2021
HORN Antenna SCHWARZBECK	BBHA 9170	995	Nov. 22, 2020	Nov. 21, 2021
Loop Antenna TESEQ	HLA 6121	45745	Jul. 21, 2021	Jul. 20, 2022
Preamplifier EMCI	EMC330N	980782	Jan. 12, 2021	Jan. 11, 2022
Preamplifier EMCI	EMC118A45SE	980808	Jan. 12, 2021	Jan. 11, 2022
Preamplifier EMCI	EMC184045SE	980788	Jan. 12, 2021	Jan. 11, 2022
RF signal cable EMCI	EMC104-SM-SM-(9 000+2000+1000)	201243+ 201231+ 210102	Jan. 12, 2021	Jan. 11, 2022
RF signal cable EMCI	EMCCFD400-NM-N M-(9000+300+500)	201236+ 201235+ 201233	Jan. 12, 2021	Jan. 11, 2022
RF signal cable EMCI	EMC101G-KM-KM- (5000+3000+2000)	201260+201257+20125 4	Jan. 12, 2021	Jan. 11, 2022
Software BV ADT	ADT_Radiated_V7. 6.15.9.5	NA	NA	NA
Antenna Tower Max-Full	MFT-151SS-0.5T	NA	NA	NA
Turn Table Max-Full	MF-7802BS	NA	NA	NA
Turn Table Controller Max-Full	MF-7802BS	MF780208674	NA	NA
Peak Power Analyzer KEYSIGHT	8990B	MY51000485	Jan. 19, 2021	Jan. 18, 2022
Wideband Power Sensor KEYSIGHT	N1923A	MY58020002	Jan. 11, 2021	Jan. 10, 2022

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in WM Chamber 8.
 3. Tested date: Aug. 26 ~ Nov. 08, 2021

4.1.3 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case 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.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter 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 detect 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:

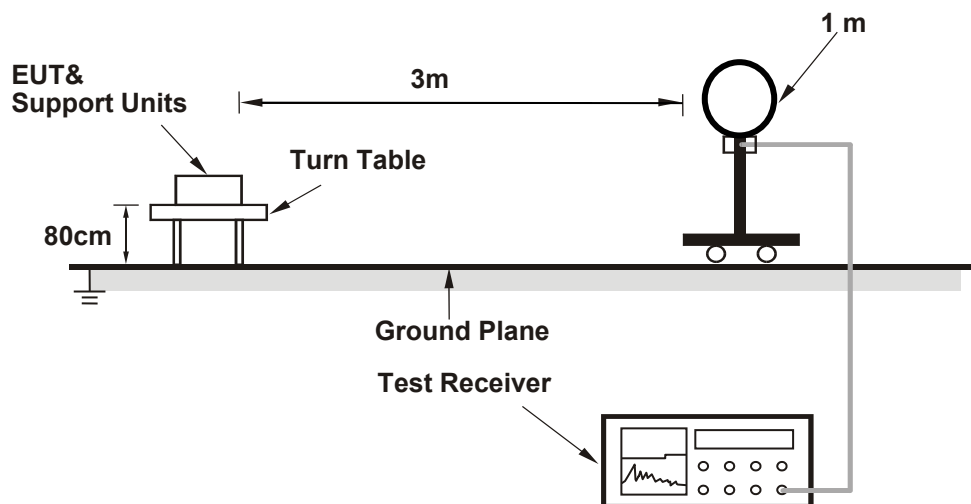
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
(802.11b: RBW = 1MHz, VBW = 10Hz; 802.11g: RBW = 1MHz, VBW = 10Hz;
802.11n (VHT20): RBW = 1MHz, VBW = 1kHz; 802.11n (VHT40): RBW = 1MHz, VBW = 3kHz)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

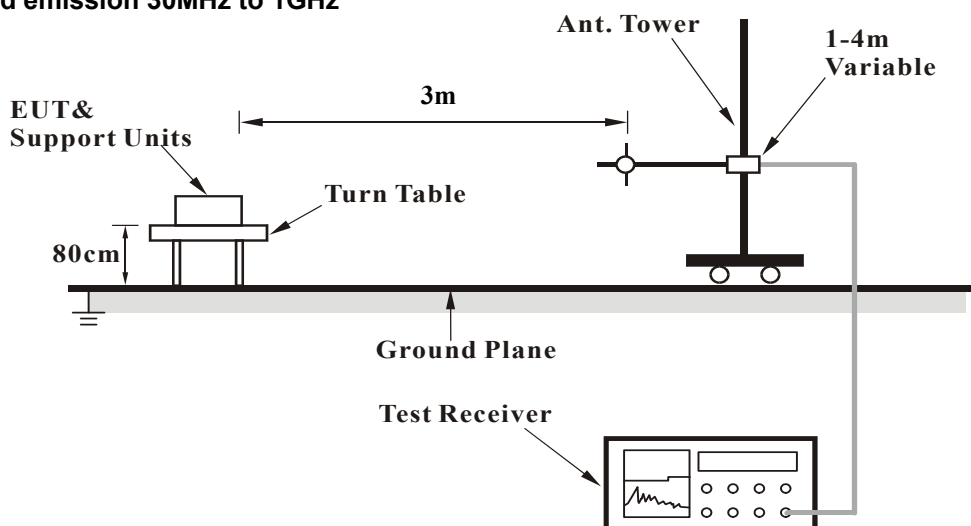
No deviation.

4.1.5 Test Setup

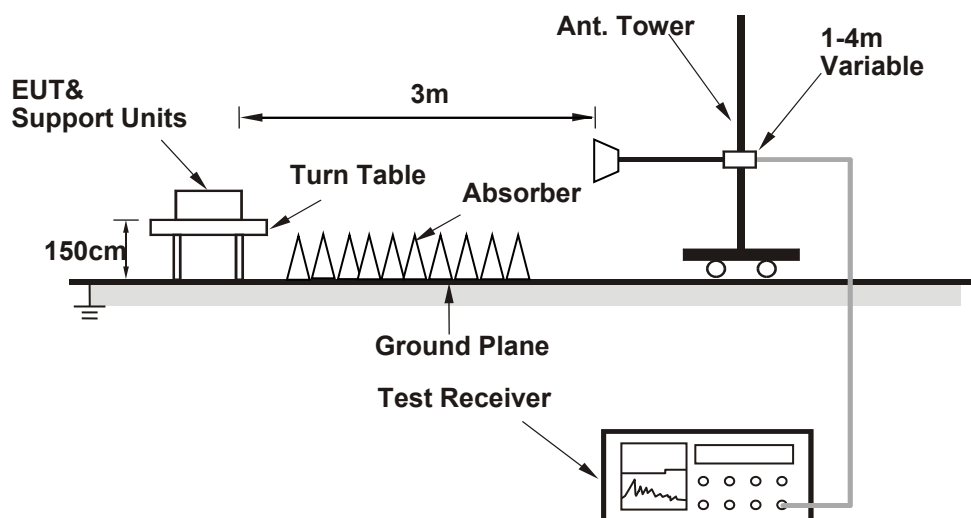
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

- The EUT powered by adapter.
- The EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz worst-Case data:

RF Mode	TX 802.11b	Channel	CH 1 : 2412 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	56.9 PK	74.0	-17.1	1.18 H	322	25.2	31.7
2	2390.00	44.9 AV	54.0	-9.1	1.18 H	322	13.2	31.7
3	*2412.00	111.3 PK			1.18 H	322	79.6	31.7
4	*2412.00	108.7 AV			1.18 H	322	77.0	31.7
5	4824.00	50.1 PK	74.0	-23.9	3.25 H	42	47.7	2.4
6	4824.00	40.7 AV	54.0	-13.3	3.25 H	42	38.3	2.4
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	56.5 PK	74.0	-17.5	2.10 V	258	24.8	31.7
2	2390.00	44.3 AV	54.0	-9.7	2.10 V	258	12.6	31.7
3	*2412.00	106.7 PK			2.10 V	258	75.0	31.7
4	*2412.00	104.0 AV			2.10 V	258	72.3	31.7
5	4824.00	49.7 PK	74.0	-24.3	1.16 V	235	47.3	2.4
6	4824.00	42.6 AV	54.0	-11.4	1.16 V	235	40.2	2.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11b	Channel	CH 6 : 2437 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	109.3 PK			2.64 H	190	77.5	31.8
2	*2437.00	106.6 AV			2.64 H	190	74.8	31.8
3	4874.00	49.8 PK	74.0	-24.2	1.12 H	65	47.3	2.5
4	4874.00	41.7 AV	54.0	-12.3	1.12 H	65	39.2	2.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	107.5 PK			2.72 V	74	75.7	31.8
2	*2437.00	104.9 AV			2.72 V	74	73.1	31.8
3	4874.00	51.3 PK	74.0	-22.7	1.04 V	58	48.8	2.5
4	4874.00	45.5 AV	54.0	-8.5	1.04 V	58	43.0	2.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11b	Channel	CH 11 : 2462 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	107.8 PK			2.17 H	177	76.0	31.8
2	*2462.00	105.2 AV			2.17 H	177	73.4	31.8
3	2483.50	55.7 PK	74.0	-18.3	2.61 H	190	23.8	31.9
4	2483.50	45.2 AV	54.0	-8.8	2.61 H	190	13.3	31.9
5	4924.00	49.1 PK	74.0	-24.9	1.01 H	65	46.5	2.6
6	4924.00	38.8 AV	54.0	-15.2	1.01 H	65	36.2	2.6
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	106.0 PK			2.28 V	74	74.2	31.8
2	*2462.00	103.2 AV			2.28 V	74	71.4	31.8
3	2483.50	56.4 PK	74.0	-17.6	2.28 V	74	24.5	31.9
4	2483.50	45.1 AV	54.0	-8.9	2.28 V	74	13.2	31.9
5	4924.00	49.6 PK	74.0	-24.4	1.11 V	56	47.0	2.6
6	4924.00	42.6 AV	54.0	-11.4	1.11 V	56	40.0	2.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11g	Channel	CH 1 : 2412 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	59.7 PK	74.0	-14.3	1.46 H	192	28.0	31.7
2	2390.00	46.0 AV	54.0	-8.0	1.46 H	192	14.3	31.7
3	*2412.00	110.6 PK			1.46 H	192	78.9	31.7
4	*2412.00	101.1 AV			1.46 H	192	69.4	31.7
5	4824.00	48.7 PK	74.0	-25.3	1.05 H	66	46.3	2.4
6	4824.00	35.7 AV	54.0	-18.3	1.05 H	66	33.3	2.4
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	60.5 PK	74.0	-13.5	3.17 V	75	28.8	31.7
2	2390.00	47.5 AV	54.0	-6.5	3.17 V	75	15.8	31.7
3	*2412.00	109.8 PK			3.17 V	75	78.1	31.7
4	*2412.00	100.0 AV			3.17 V	75	68.3	31.7
5	4824.00	49.6 PK	74.0	-24.4	1.01 V	55	47.2	2.4
6	4824.00	35.9 AV	54.0	-18.1	1.01 V	55	33.5	2.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11g	Channel	CH 6 : 2437 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	110.9 PK			1.51 H	193	79.1	31.8
2	*2437.00	101.4 AV			1.51 H	193	69.6	31.8
3	4874.00	49.0 PK	74.0	-25.0	1.10 H	68	46.5	2.5
4	4874.00	35.9 AV	54.0	-18.1	1.10 H	68	33.4	2.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	109.9 PK			3.12 V	78	78.1	31.8
2	*2437.00	100.4 AV			3.12 V	78	68.6	31.8
3	4874.00	50.0 PK	74.0	-24.0	1.06 V	58	47.5	2.5
4	4874.00	36.2 AV	54.0	-17.8	1.06 V	58	33.7	2.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11g	Channel	CH 11 : 2462 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	110.0 PK			1.37 H	192	78.2	31.8
2	*2462.00	100.2 AV			1.37 H	192	68.4	31.8
3	2483.50	61.6 PK	74.0	-12.4	1.37 H	192	29.7	31.9
4	2483.50	49.3 AV	54.0	-4.7	1.37 H	192	17.4	31.9
5	4924.00	49.0 PK	74.0	-25.0	1.07 H	63	46.4	2.6
6	4924.00	35.9 AV	54.0	-18.1	1.07 H	63	33.3	2.6
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	108.6 PK			2.33 V	66	76.8	31.8
2	*2462.00	98.6 AV			2.33 V	66	66.8	31.8
3	2483.50	61.5 PK	74.0	-12.5	2.33 V	66	29.6	31.9
4	2483.50	49.0 AV	54.0	-5.0	2.33 V	66	17.1	31.9
5	4924.00	49.9 PK	74.0	-24.1	1.06 V	58	47.3	2.6
6	4924.00	36.2 AV	54.0	-17.8	1.06 V	58	33.6	2.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11n (VHT20)	Channel	CH 1 : 2412 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	65.4 PK	74.0	-8.6	1.21 H	188	33.7	31.7
2	2390.00	51.9 AV	54.0	-2.1	1.21 H	188	20.2	31.7
3	*2412.00	112.0 PK			1.21 H	188	80.3	31.7
4	*2412.00	101.8 AV			1.21 H	188	70.1	31.7
5	4824.00	48.9 PK	74.0	-25.1	1.12 H	62	46.5	2.4
6	4824.00	35.9 AV	54.0	-18.1	1.12 H	62	33.5	2.4
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	67.6 PK	74.0	-6.4	2.83 V	74	35.9	31.7
2	2390.00	53.7 AV	54.0	-0.3	2.83 V	74	22.0	31.7
3	*2412.00	111.4 PK			2.83 V	74	79.7	31.7
4	*2412.00	100.1 AV			2.83 V	74	68.4	31.7
5	4824.00	49.9 PK	74.0	-24.1	1.04 V	57	47.5	2.4
6	4824.00	36.1 AV	54.0	-17.9	1.04 V	57	33.7	2.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11n (VHT20)	Channel	CH 6 : 2437 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	111.8 PK			1.31 H	190	80.0	31.8
2	*2437.00	101.6 AV			1.31 H	190	69.8	31.8
3	4874.00	49.0 PK	74.0	-25.0	1.11 H	63	46.5	2.5
4	4874.00	35.9 AV	54.0	-18.1	1.11 H	63	33.4	2.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	111.0 PK			2.90 V	75	79.2	31.8
2	*2437.00	100.0 AV			2.90 V	75	68.2	31.8
3	4874.00	50.0 PK	74.0	-24.0	1.09 V	59	47.5	2.5
4	4874.00	36.1 AV	54.0	-17.9	1.09 V	59	33.6	2.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11n (VHT20)	Channel	CH 11 : 2462 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	109.9 PK			2.61 H	219	78.1	31.8
2	*2462.00	99.8 AV			2.61 H	219	68.0	31.8
3	2483.50	64.6 PK	74.0	-9.4	2.61 H	219	32.7	31.9
4	2483.50	51.3 AV	54.0	-2.7	2.61 H	219	19.4	31.9
5	4924.00	48.9 PK	74.0	-25.1	1.13 H	65	46.3	2.6
6	4924.00	35.8 AV	54.0	-18.2	1.13 H	65	33.2	2.6
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	108.4 PK			2.33 V	67	76.6	31.8
2	*2462.00	98.2 AV			2.33 V	67	66.4	31.8
3	2483.50	62.2 PK	74.0	-11.8	2.33 V	67	30.3	31.9
4	2483.50	49.7 AV	54.0	-4.3	2.33 V	67	17.8	31.9
5	4924.00	49.8 PK	74.0	-24.2	1.05 V	52	47.2	2.6
6	4924.00	36.1 AV	54.0	-17.9	1.05 V	52	33.5	2.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11n (VHT40)	Channel	CH 3 : 2422 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	64.4 PK	74.0	-9.6	2.40 H	217	32.7	31.7
2	2390.00	52.7 AV	54.0	-1.3	2.40 H	217	21.0	31.7
3	*2422.00	108.1 PK			2.40 H	217	76.4	31.7
4	*2422.00	98.3 AV			2.40 H	217	66.6	31.7
5	4844.00	48.9 PK	74.0	-25.1	1.14 H	69	46.4	2.5
6	4844.00	36.1 AV	54.0	-17.9	1.14 H	69	33.6	2.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	64.7 PK	74.0	-9.3	2.14 V	74	33.0	31.7
2	2390.00	53.5 AV	54.0	-0.5	2.14 V	74	21.8	31.7
3	*2422.00	106.7 PK			2.14 V	74	75.0	31.7
4	*2422.00	96.9 AV			2.14 V	74	65.2	31.7
5	4844.00	50.0 PK	74.0	-24.0	1.03 V	56	47.5	2.5
6	4844.00	36.4 AV	54.0	-17.6	1.03 V	56	33.9	2.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11n (VHT40)	Channel	CH 6 : 2437 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	107.9 PK			2.53 H	211	76.1	31.8
2	*2437.00	98.1 AV			2.53 H	211	66.3	31.8
3	4874.00	49.0 PK	74.0	-25.0	1.11 H	64	46.5	2.5
4	4874.00	36.0 AV	54.0	-18.0	1.11 H	64	33.5	2.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	106.6 PK			2.09 V	75	74.8	31.8
2	*2437.00	96.8 AV			2.09 V	75	65.0	31.8
3	4874.00	49.9 PK	74.0	-24.1	1.00 V	55	47.4	2.5
4	4874.00	36.2 AV	54.0	-17.8	1.00 V	55	33.7	2.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11n (VHT40)	Channel	CH 9 : 2452 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2452.00	107.0 PK			2.63 H	217	75.2	31.8
2	*2452.00	97.0 AV			2.63 H	217	65.2	31.8
3	2483.50	66.2 PK	74.0	-7.8	2.63 H	217	34.3	31.9
4	2483.50	53.7 AV	54.0	-0.3	2.63 H	217	21.8	31.9
5	4904.00	48.8 PK	74.0	-25.2	1.11 H	63	46.2	2.6
6	4904.00	35.9 AV	54.0	-18.1	1.11 H	63	33.3	2.6
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2452.00	104.8 PK			2.33 V	74	73.0	31.8
2	*2452.00	95.1 AV			2.33 V	74	63.3	31.8
3	2483.50	62.4 PK	74.0	-11.6	2.33 V	74	30.5	31.9
4	2483.50	50.5 AV	54.0	-3.5	2.33 V	74	18.6	31.9
5	4904.00	49.7 PK	74.0	-24.3	1.04 V	52	47.1	2.6
6	4904.00	36.2 AV	54.0	-17.8	1.04 V	52	33.6	2.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

Below 1GHz worst-case data:

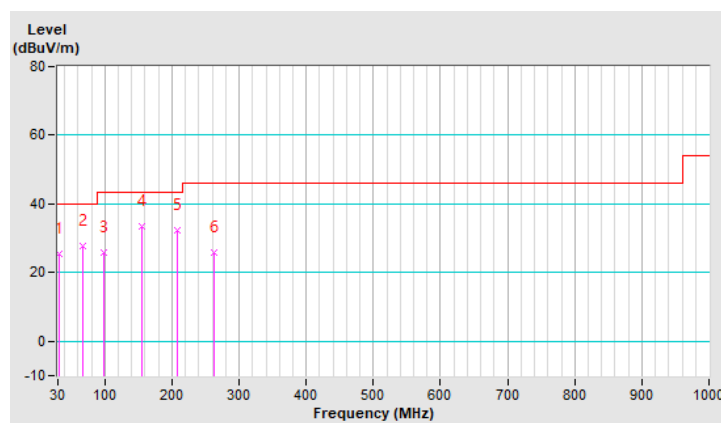
802.11n (VHT20)

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	32.81	25.6 QP	40.0	-14.4	1.50 H	102	45.1	-19.5
2	66.55	27.8 QP	40.0	-12.2	1.50 H	280	47.6	-19.8
3	98.88	25.9 QP	43.5	-17.6	1.50 H	155	48.8	-22.9
4	155.12	33.6 QP	43.5	-9.9	1.01 H	2	51.6	-18.0
5	208.54	32.3 QP	43.5	-11.2	1.50 H	151	54.1	-21.8
6	263.36	25.8 QP	46.0	-20.2	1.01 H	112	44.9	-19.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

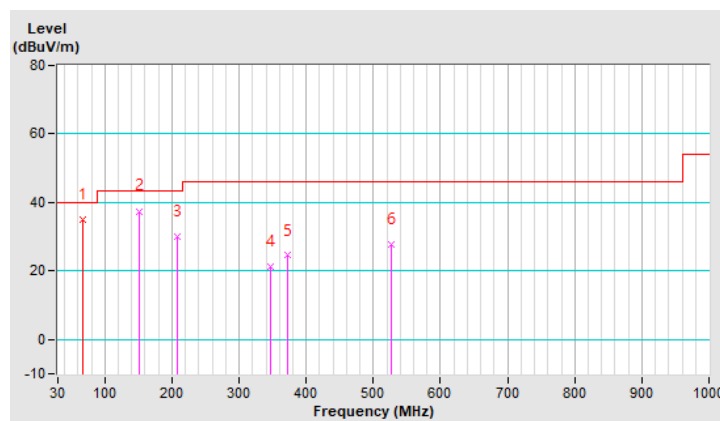


CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	66.41	35.0 QP	40.0	-5.0	1.00 V	237	54.8	-19.8
2	150.90	37.5 QP	43.5	-6.0	1.00 V	183	55.5	-18.0
3	208.54	30.0 QP	43.5	-13.5	1.00 V	177	51.8	-21.8
4	346.30	21.4 QP	46.0	-24.6	1.49 V	154	38.0	-16.6
5	371.61	24.5 QP	46.0	-21.5	1.00 V	112	40.3	-15.8
6	526.25	27.8 QP	46.0	-18.2	1.00 V	176	40.1	-12.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



4.2 Conducted Emission Measurement

4.2.1 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.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESR3	102783	Dec. 21, 2020	Dec. 20, 2021
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 04, 2020	Sep. 03, 2021
LISN/AMN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 28, 2021	Jan. 27, 2022
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ENV216	101196	Apr. 26, 2021	Apr. 25, 2022
Software ADT	BV ADT_Conf_ V7.3.7.4	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Shielded Room 2 (Conduction 2).

3. The VCCI Site Registration No. is C-12047.

4. Tested date: Aug. 31, 2021

4.2.3 Test Procedures

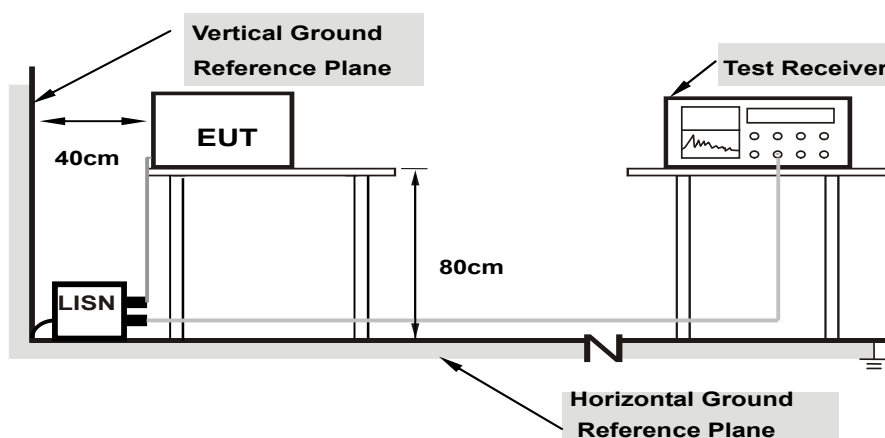
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance 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: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

4.2.7 Test Results

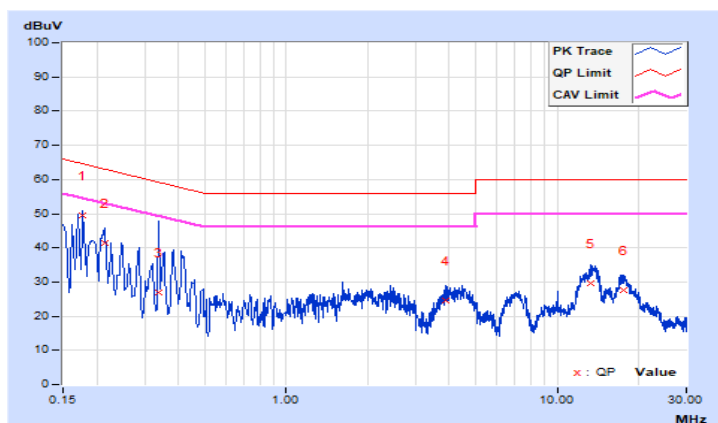
Worst-case data: 802.11n (VHT20)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17800	10.07	39.37	24.77	49.44	34.84	64.58	54.58	-15.14	-19.74
2	0.21400	10.08	31.41	19.92	41.49	30.00	63.05	53.05	-21.56	-23.05
3	0.33800	10.09	16.75	5.79	26.84	15.88	59.25	49.25	-32.41	-33.37
4	3.85800	10.22	14.25	6.12	24.47	16.34	56.00	46.00	-31.53	-29.66
5	13.37400	10.36	19.19	12.37	29.55	22.73	60.00	50.00	-30.45	-27.27
6	17.67800	10.42	17.14	11.29	27.56	21.71	60.00	50.00	-32.44	-28.29

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.

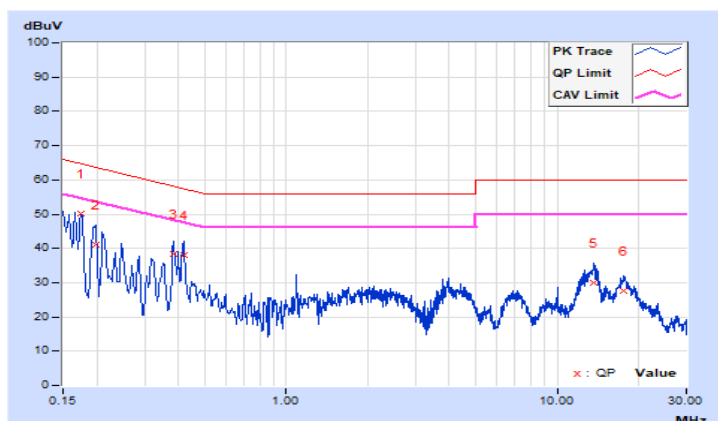


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17400	10.08	39.96	24.87	50.04	34.95	64.77	54.77	-14.73	-19.82
2	0.19780	10.08	30.83	16.01	40.91	26.09	63.70	53.70	-22.79	-27.61
3	0.38200	10.10	28.16	24.41	38.26	34.51	58.24	48.24	-19.98	-13.73
4	0.41799	10.10	28.04	24.24	38.14	34.34	57.49	47.49	-19.35	-13.15
5	13.70600	10.50	19.51	12.84	30.01	23.34	60.00	50.00	-29.99	-26.66
6	17.53800	10.59	16.90	10.92	27.49	21.51	60.00	50.00	-32.51	-28.49

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.

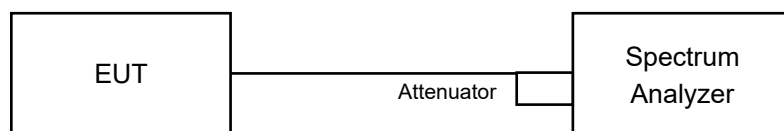


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 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.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	8.60	9.08	0.5	Pass
6	2437	8.59	9.06	0.5	Pass
11	2462	8.56	8.56	0.5	Pass

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	15.79	15.79	0.5	Pass
6	2437	15.79	15.79	0.5	Pass
11	2462	15.16	15.16	0.5	Pass

802.11n (VHT20)

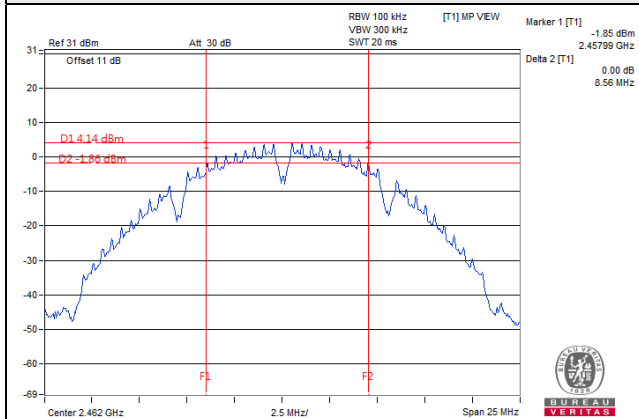
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.41	16.43	0.5	Pass
6	2437	16.41	16.42	0.5	Pass
11	2462	15.13	15.74	0.5	Pass

802.11n (VHT40)

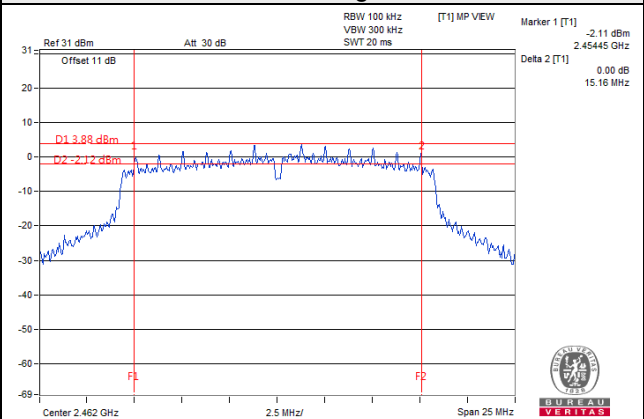
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	32.62	33.94	0.5	Pass
6	2437	35.39	35.83	0.5	Pass
9	2452	36.12	36.46	0.5	Pass

Spectrum Plot of Worst Value

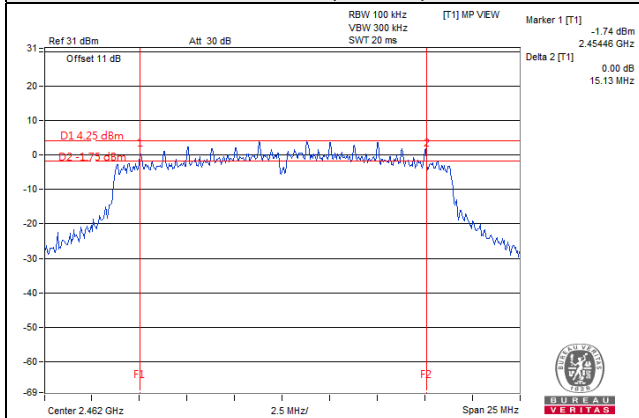
802.11b



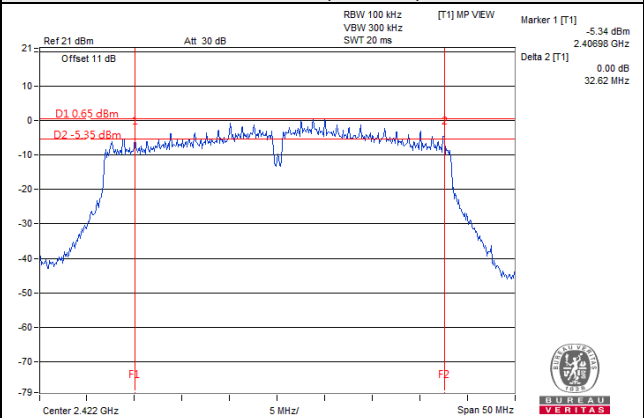
802.11g



802.11n (VHT20)



802.11n (VHT40)



4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

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

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

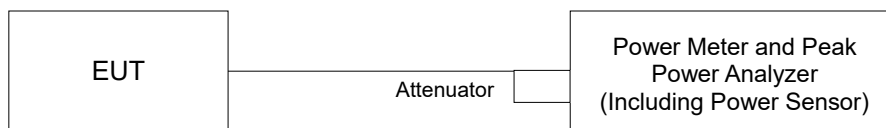
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;

Array Gain = $5 \log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices: Array Gain = $10 \log(N_{ANT}/N_{SS})$ dB.

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as item 4.3.6.

4.4.7 Test Results

Peak Power

802.11b

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	15.89	15.15	71.549	18.55	30.00	Pass
6	2437	15.85	15.21	71.649	18.55	30.00	Pass
11	2462	15.87	15.18	71.598	18.55	30.00	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	18.35	18.28	135.689	21.33	30.00	Pass
6	2437	18.39	18.31	136.788	21.36	30.00	Pass
11	2462	18.30	18.23	134.136	21.28	30.00	Pass

802.11n (VHT20)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	18.86	18.51	147.871	21.70	30.00	Pass
6	2437	18.90	18.47	147.932	21.70	30.00	Pass
11	2462	18.93	18.49	148.795	21.73	30.00	Pass

802.11n (VHT40)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	18.45	18.37	138.691	21.42	30.00	Pass
6	2437	18.43	18.38	138.528	21.42	30.00	Pass
9	2452	18.40	18.34	137.417	21.38	30.00	Pass

Average Power

802.11b

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	12.99	12.62	38.188	15.82
6	2437	12.90	12.69	38.076	15.81
11	2462	12.95	12.68	38.260	15.83

802.11g

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	13.88	13.79	48.367	16.85
6	2437	13.83	13.78	48.033	16.82
11	2462	13.79	13.75	47.647	16.78

802.11n (VHT20)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	14.19	14.02	51.477	17.12
6	2437	14.21	13.98	51.367	17.11
11	2462	14.23	14.01	51.662	17.13

802.11n (VHT40)

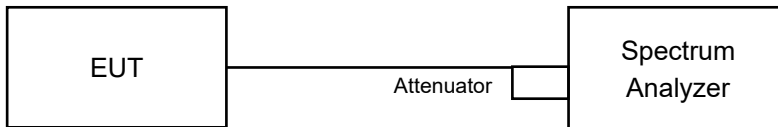
Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
3	2422	13.73	13.59	46.461	16.67
6	2437	13.68	13.62	46.349	16.66
9	2452	13.69	13.51	45.827	16.61

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz band during any time interval of continuous transmission.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set the VBW $\geq 3 \times \text{RBW}$.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as item 4.3.6.

4.5.7 Test Results

802.11b

TX chain	Channel	Frequency (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
0	1	2412	-10.40	3.01	-7.39	8.00	Pass
	6	2437	-9.61	3.01	-6.60	8.00	Pass
	11	2462	-9.54	3.01	-6.53	8.00	Pass
1	1	2412	-10.62	3.01	-7.61	8.00	Pass
	6	2437	-9.54	3.01	-6.53	8.00	Pass
	11	2462	-9.44	3.01	-6.43	8.00	Pass

Note:

- Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
- Directional gain = Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 2.66\text{dBi} < 6\text{dBi}$, so the limit is not reduced.

802.11g

TX chain	Channel	Frequency (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
0	1	2412	-10.83	3.01	-7.82	8.00	Pass
	6	2437	-11.27	3.01	-8.26	8.00	Pass
	11	2462	-10.06	3.01	-7.05	8.00	Pass
1	1	2412	-10.79	3.01	-7.78	8.00	Pass
	6	2437	-11.17	3.01	-8.16	8.00	Pass
	11	2462	-9.70	3.01	-6.69	8.00	Pass

Note:

- Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
- Directional gain = Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 2.66\text{dBi} < 6\text{dBi}$, so the limit is not reduced.

802.11n (VHT20)

TX chain	Channel	Frequency (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
0	1	2412	-10.95	3.01	-7.94	8.00	Pass
	6	2437	-11.25	3.01	-8.24	8.00	Pass
	11	2462	-10.79	3.01	-7.78	8.00	Pass
1	1	2412	-11.89	3.01	-8.88	8.00	Pass
	6	2437	-11.09	3.01	-8.08	8.00	Pass
	11	2462	-10.63	3.01	-7.62	8.00	Pass

Note:

- Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
- Directional gain = Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 2.66\text{dBi} < 6\text{dBi}$, so the limit is not reduced.

802.11n (VHT40)

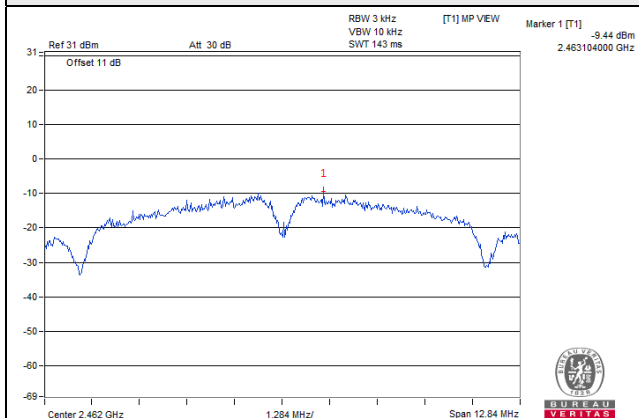
TX chain	Channel	Frequency (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
0	3	2422	-14.62	3.01	-11.61	8.00	Pass
	6	2437	-14.14	3.01	-11.13	8.00	Pass
	9	2452	-16.06	3.01	-13.05	8.00	Pass
1	3	2422	-14.90	3.01	-11.89	8.00	Pass
	6	2437	-14.03	3.01	-11.02	8.00	Pass
	9	2452	-16.18	3.01	-13.17	8.00	Pass

Note:

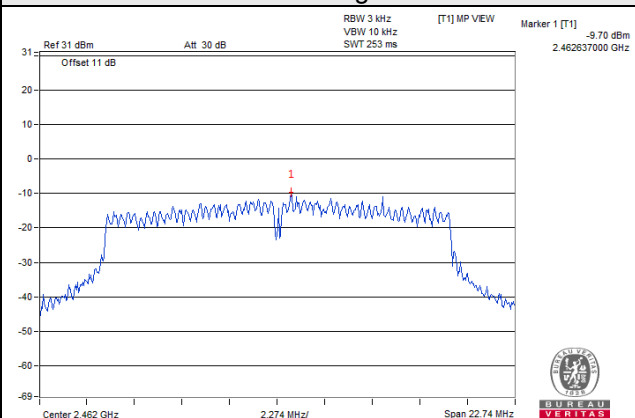
- Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
- Directional gain = Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 2.66\text{dBi} < 6\text{dBi}$, so the limit is not reduced.

Spectrum Plot of Worst Value

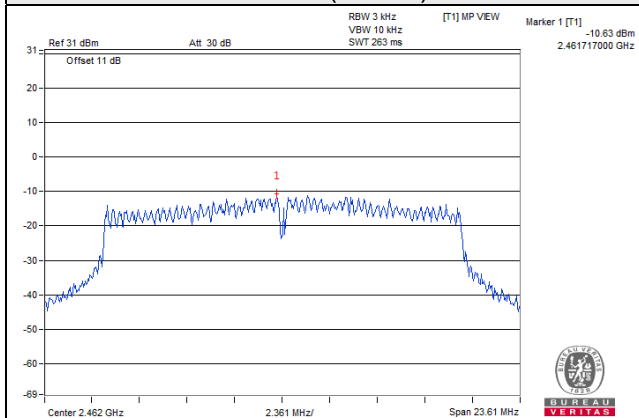
802.11b



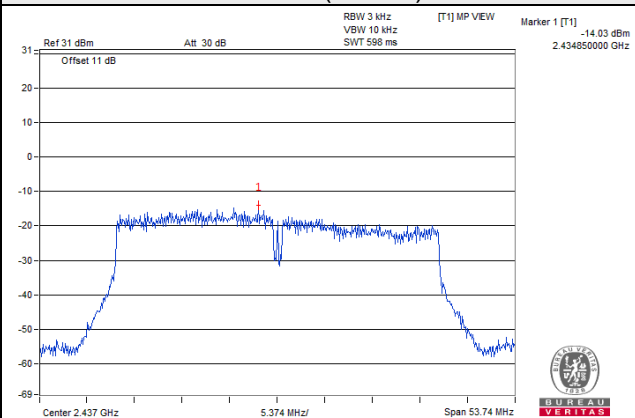
802.11g



802.11n (VHT20)



802.11n (VHT40)

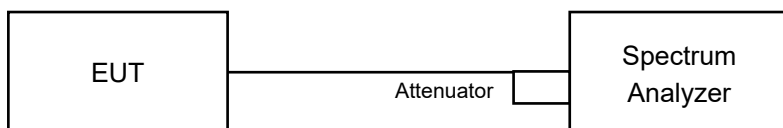


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 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 kHz band segment within the fundamental EBW.

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.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

Same as item 4.3.6.

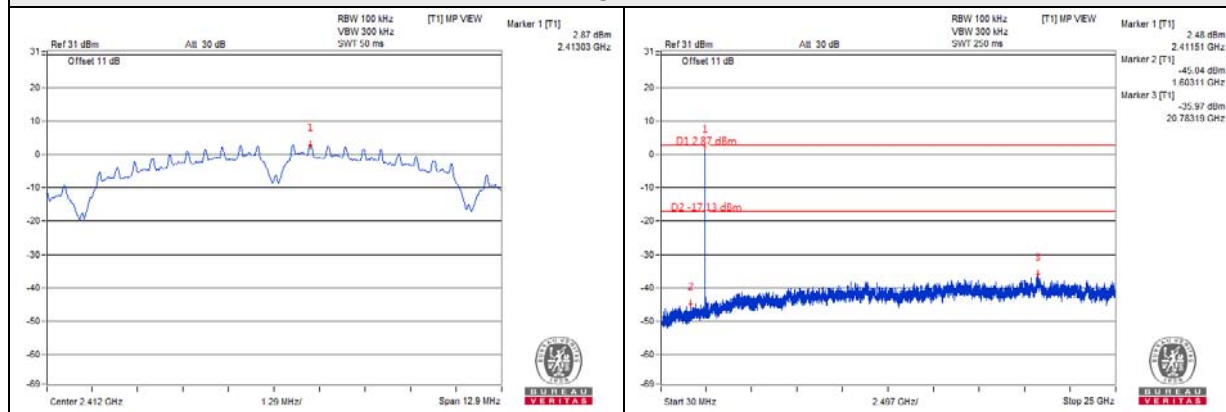
4.6.7 Test Results

The conducted emission test is performed on each TX port of operating mode without summing or adding $10\log(N)$ since the limit is relative emission limit.

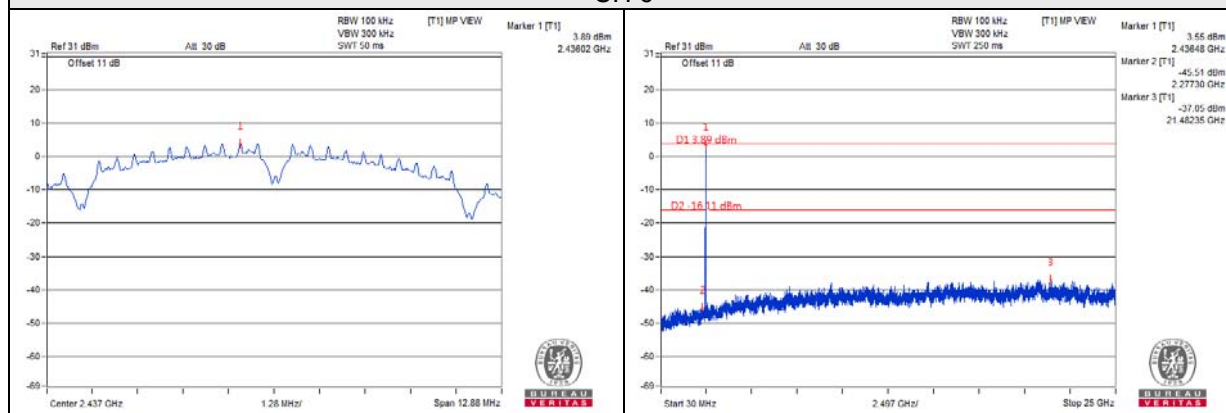
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b_Chain 0

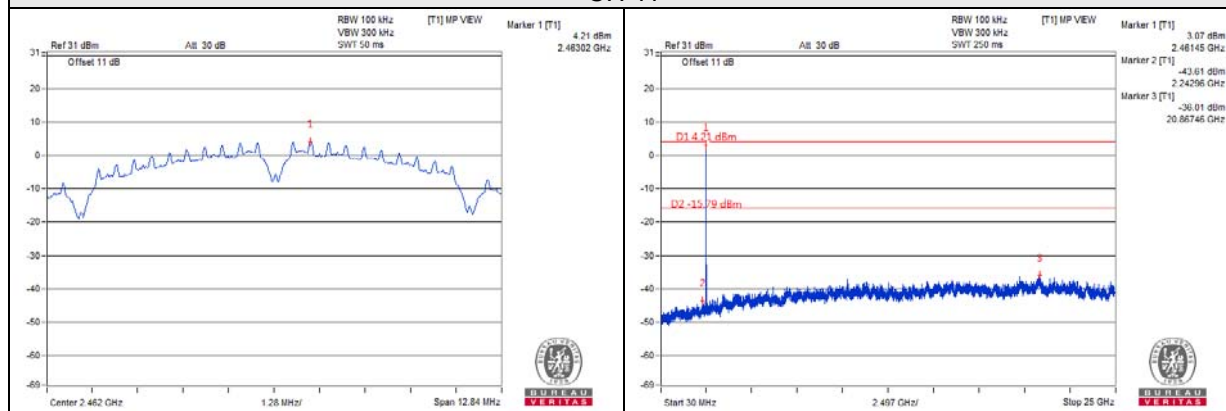
CH 1



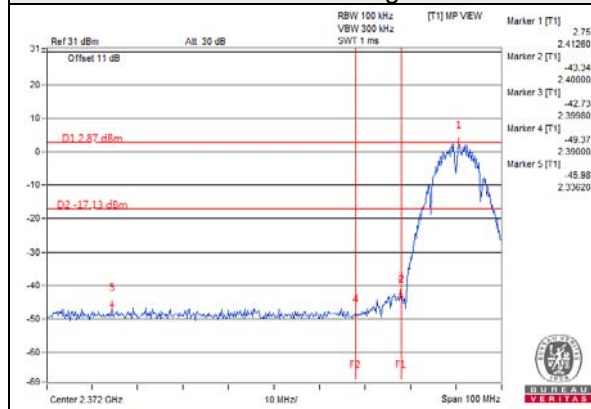
CH 6



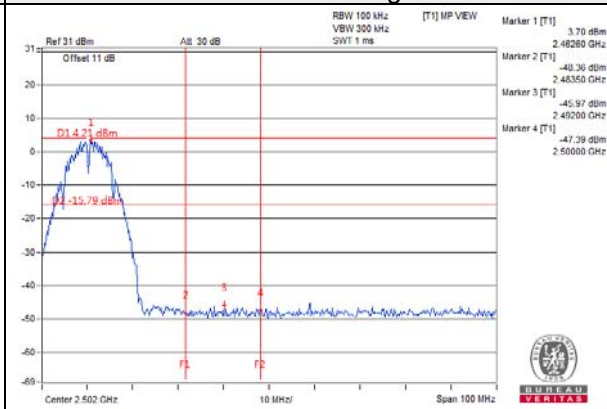
CH 11



CH 1 Band edge

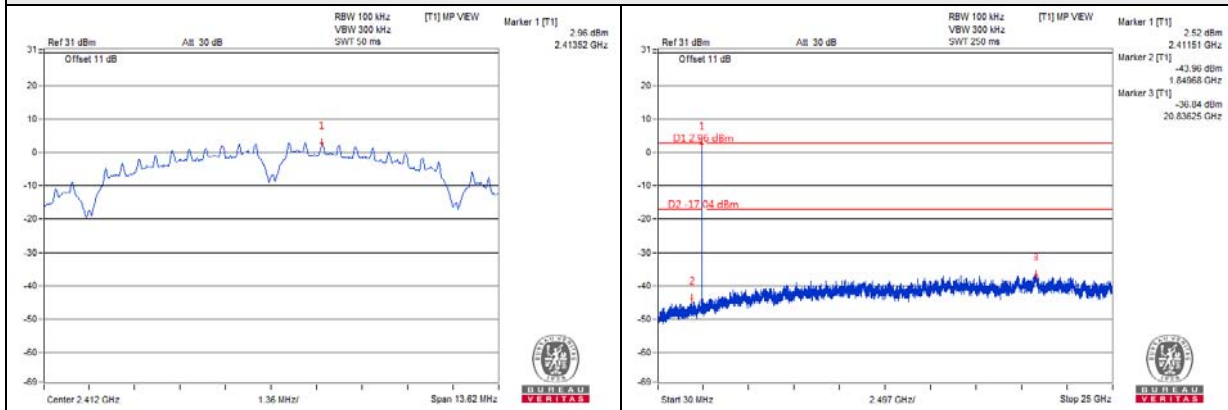


CH 11 Band edge

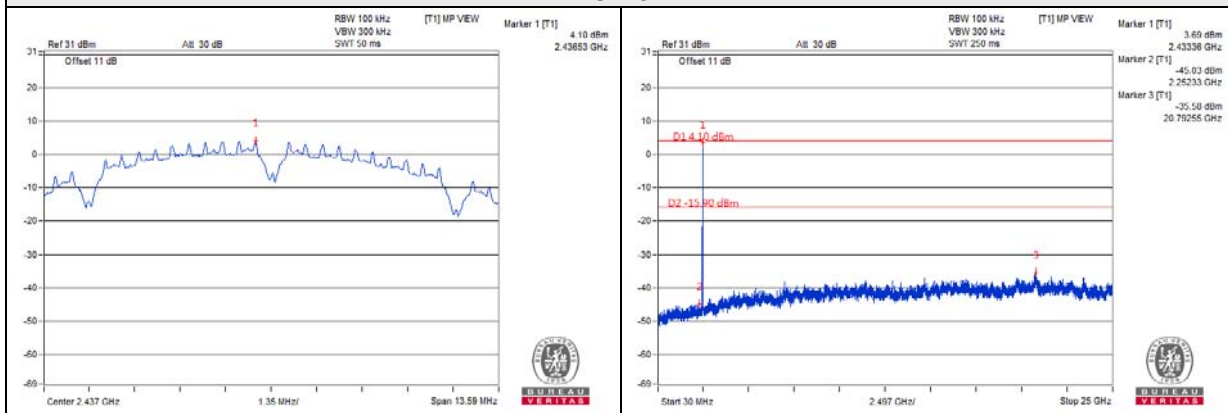


802.11b_Chain 1

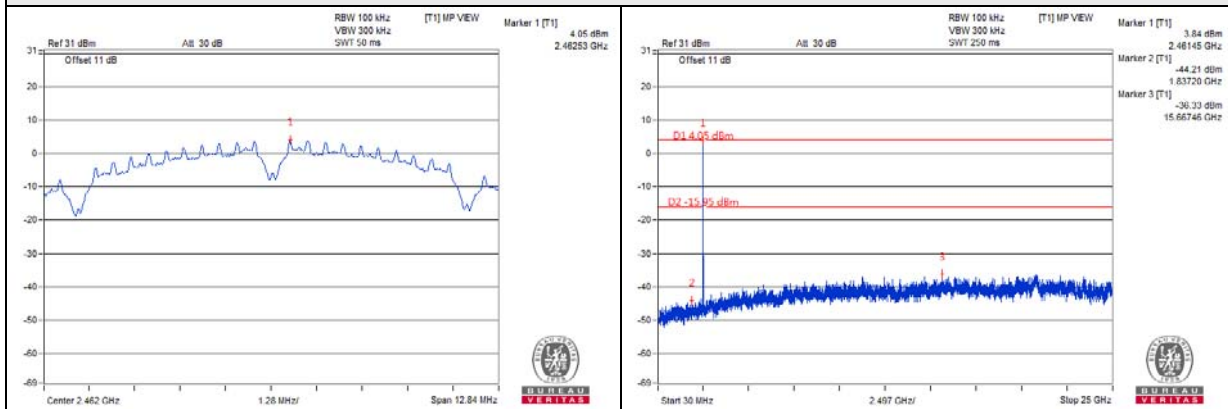
CH 1



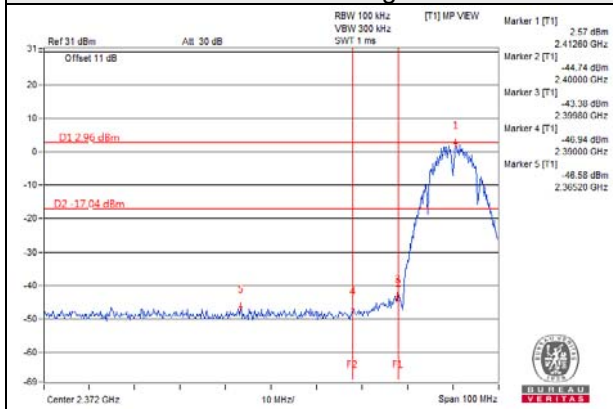
CH 6



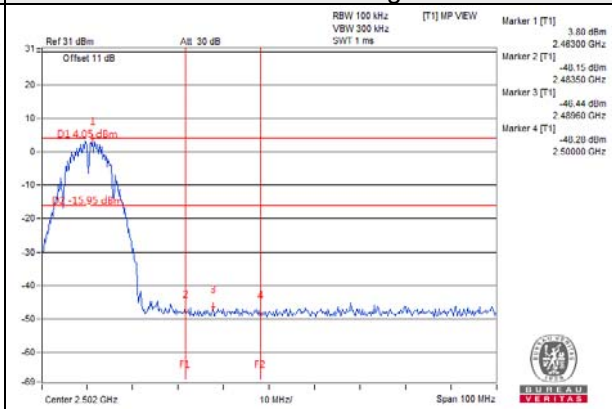
CH 11



CH 1 Band edge

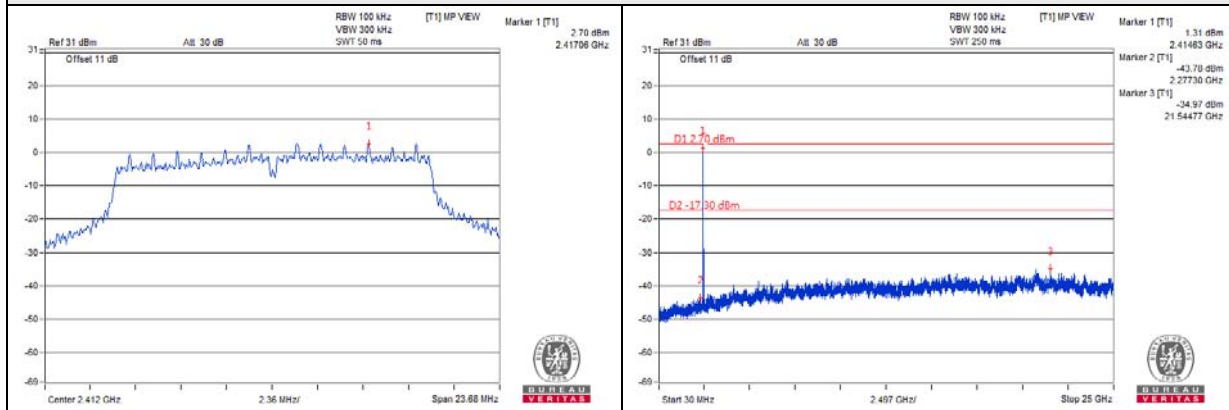


CH 11 Band edge

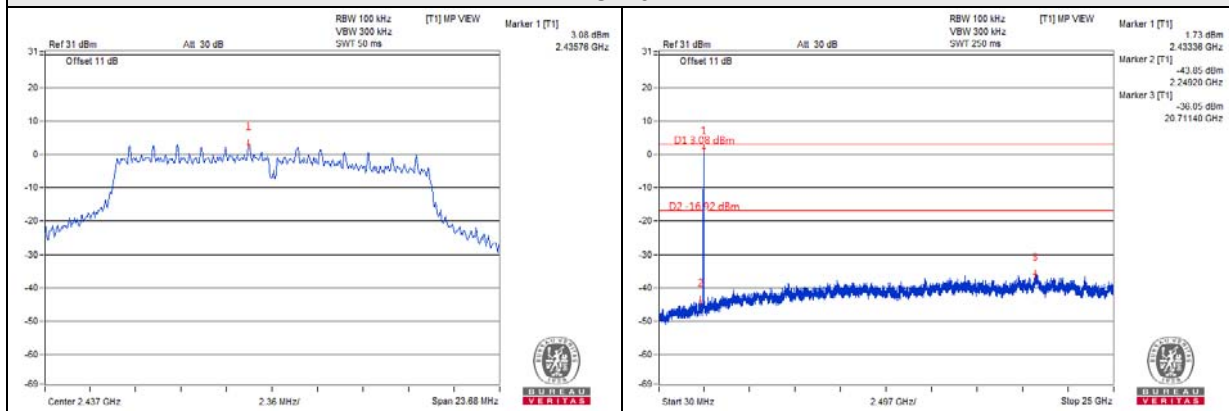


802.11g_Chain 0

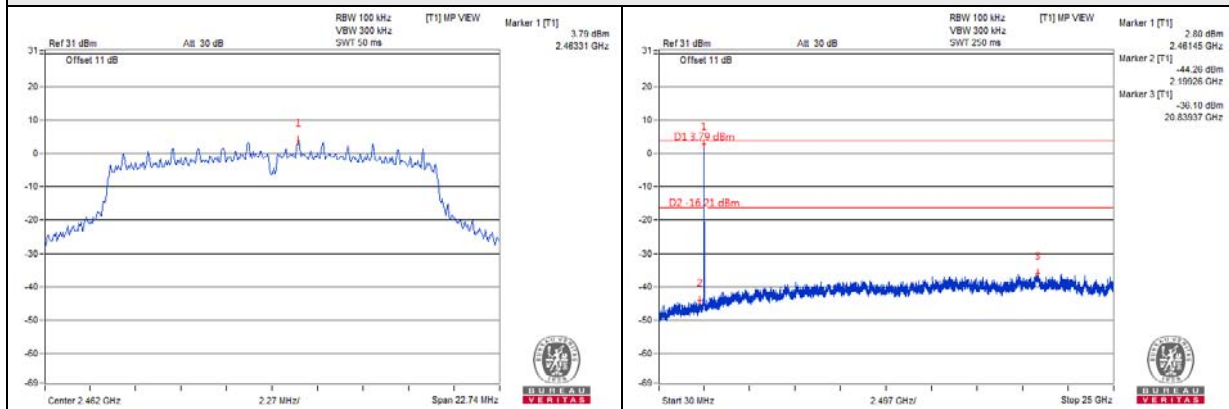
CH 1



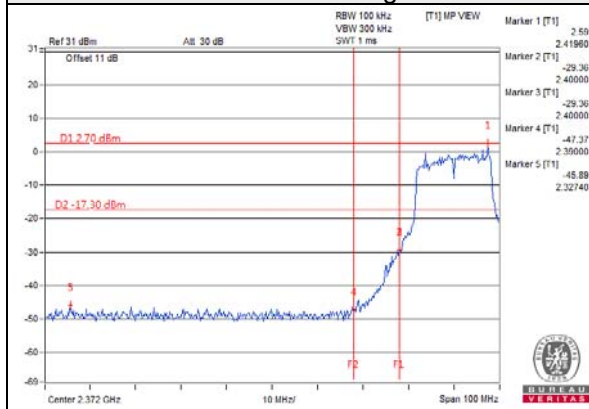
CH 6



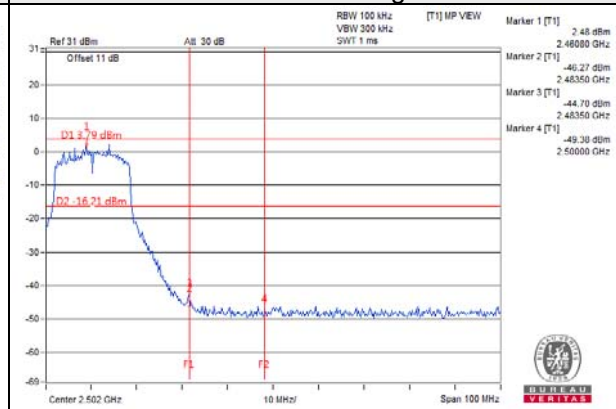
CH 11



CH 1 Band edge

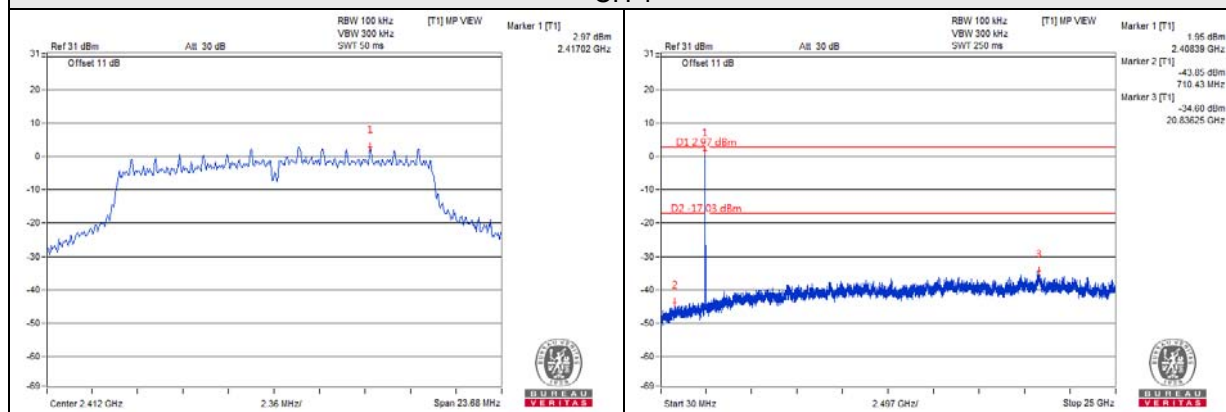


CH 11 Band edge

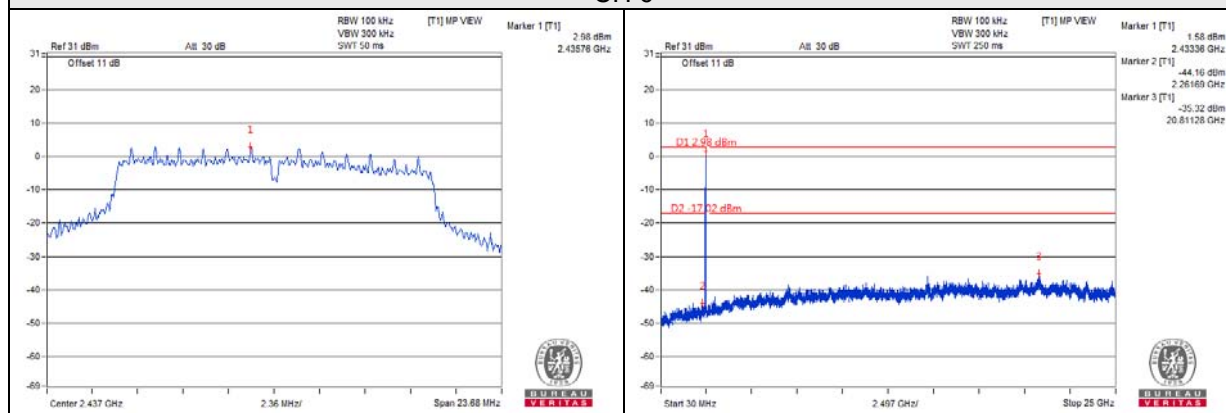


802.11g_Chain 1

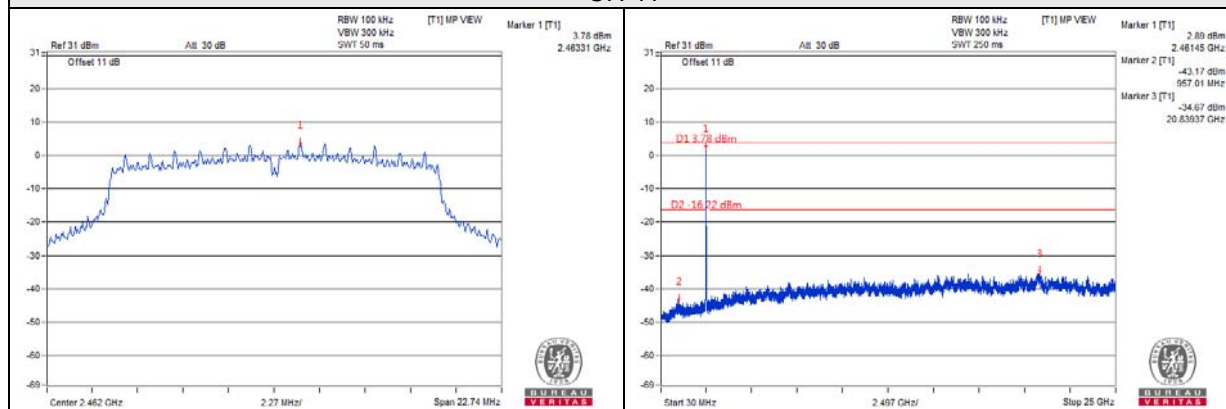
CH 1



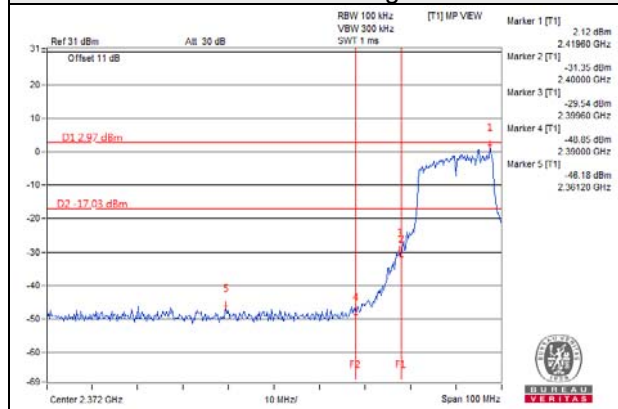
CH 6



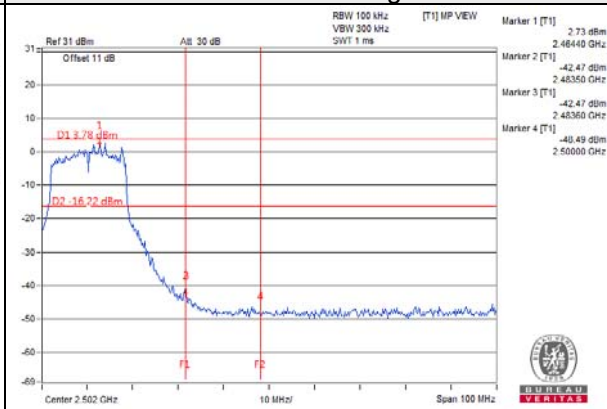
CH 11



CH 1 Band edge

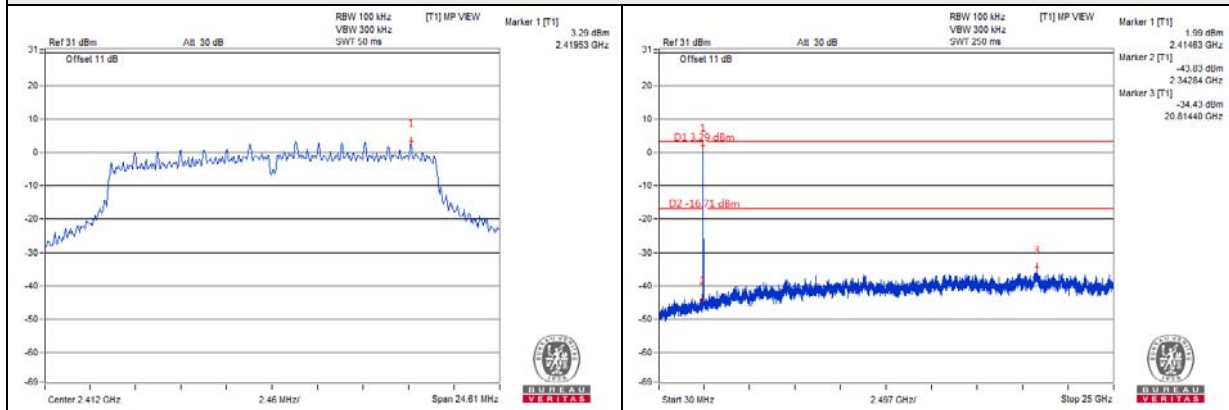


CH 11 Band edge

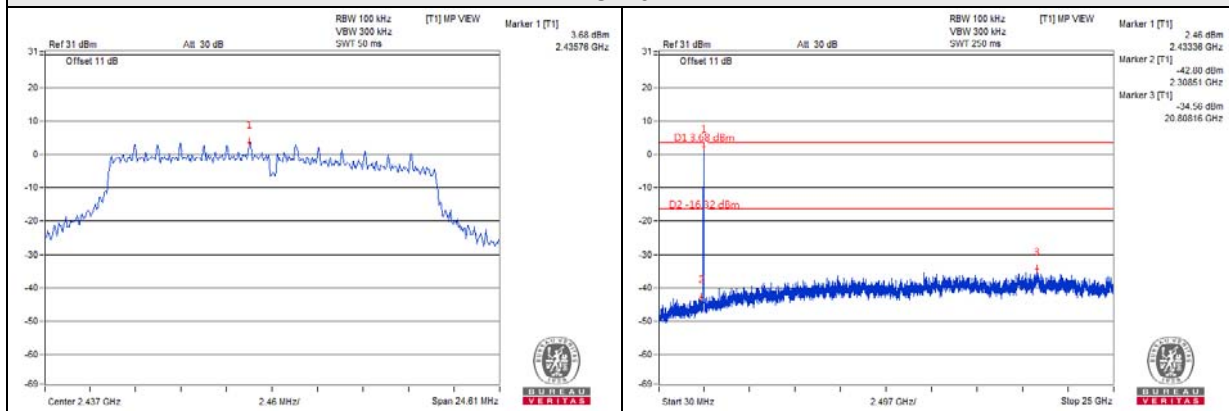


802.11n (VHT20)_Chain 0

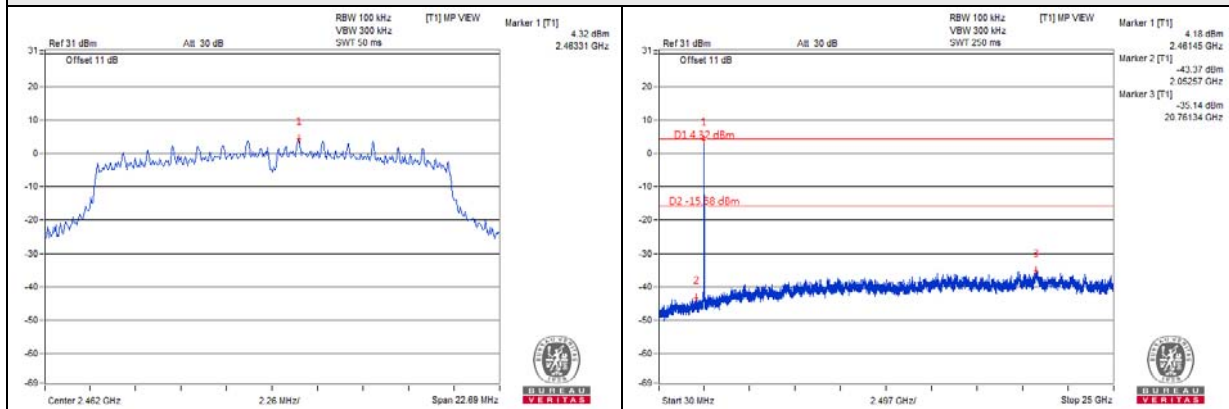
CH 1



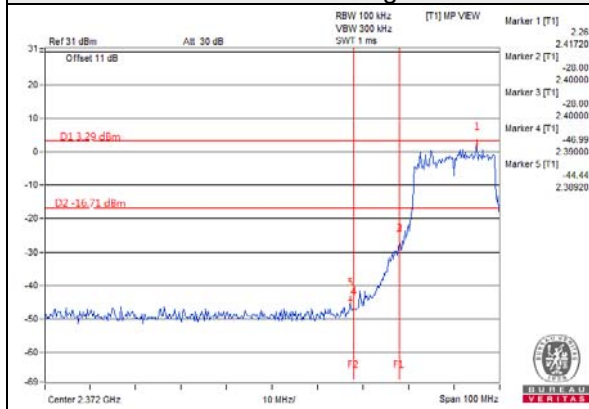
CH 6



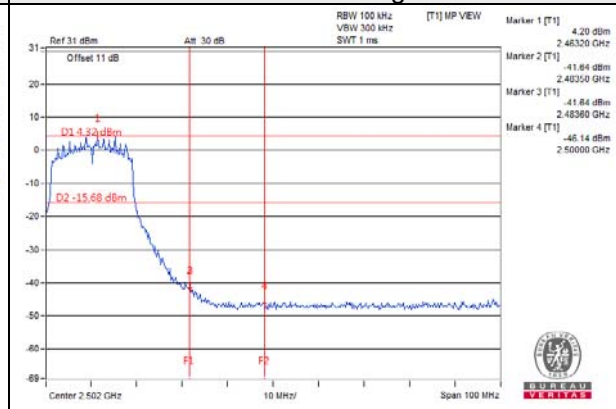
CH 11



CH 1 Band edge

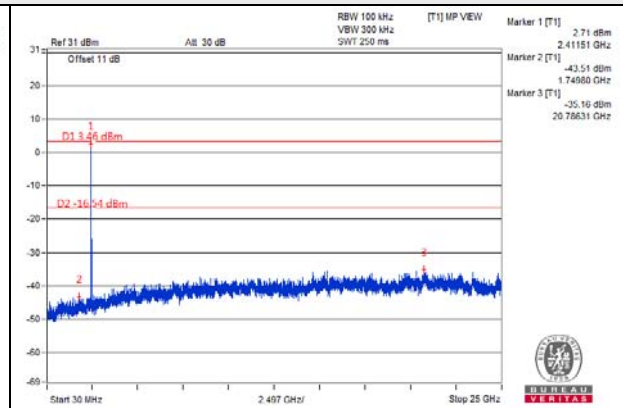
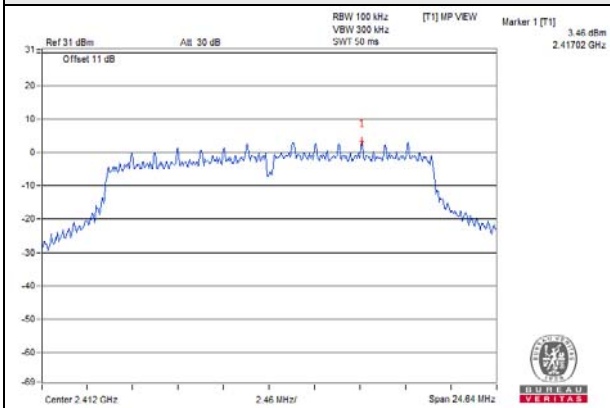


CH 11 Band edge

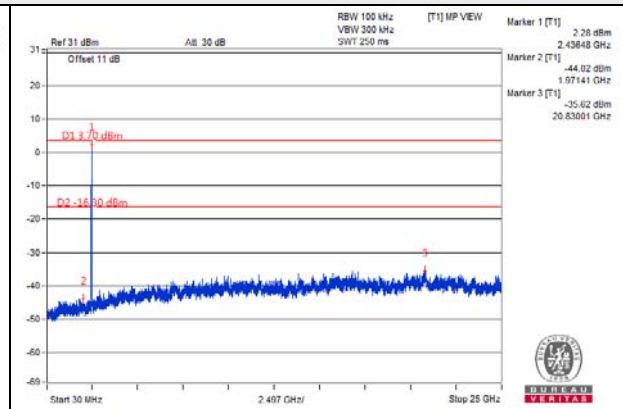
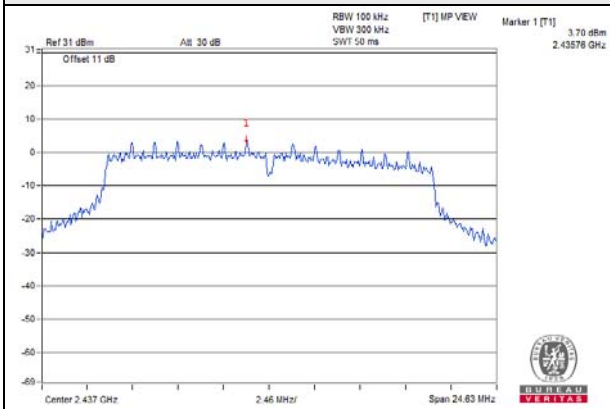


802.11n (VHT20)_Chain 1

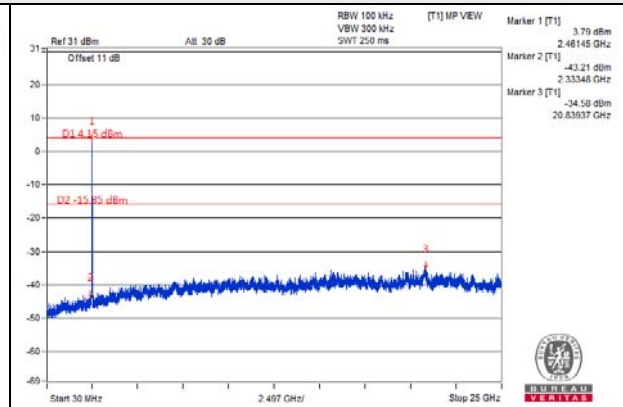
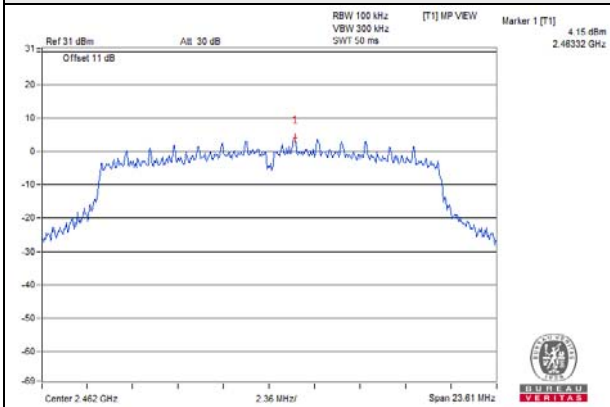
CH 1



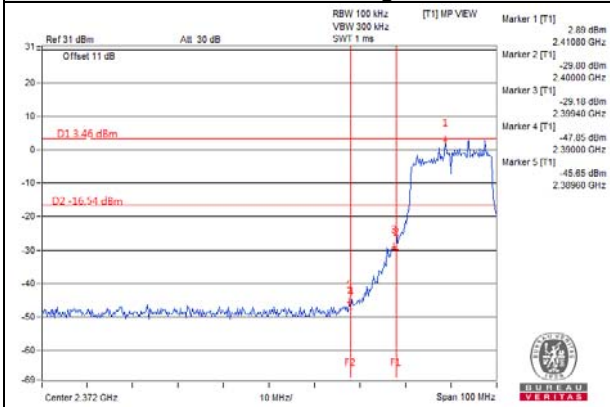
CH 6



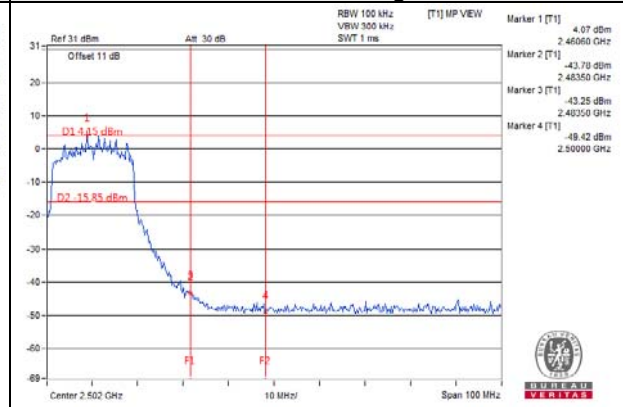
CH 11



CH 1 Band edge

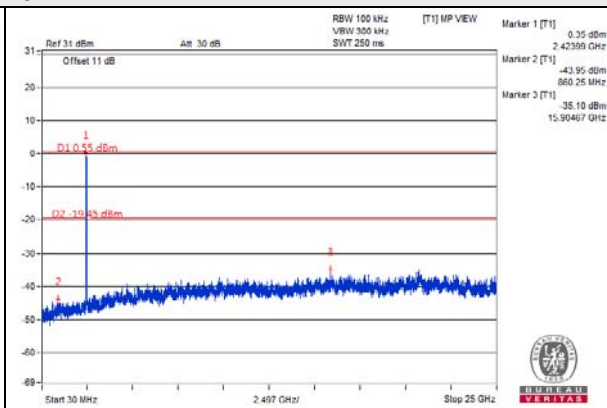
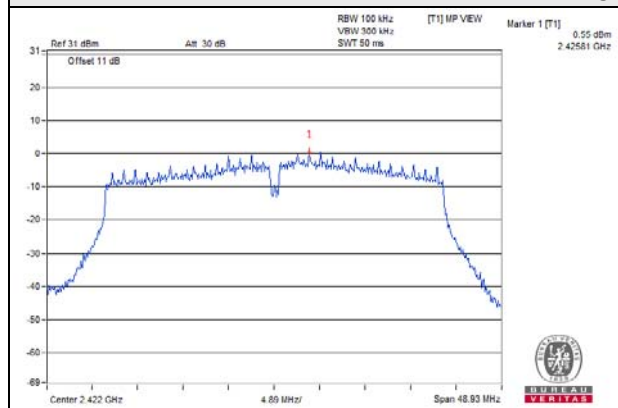


CH 11 Band edge

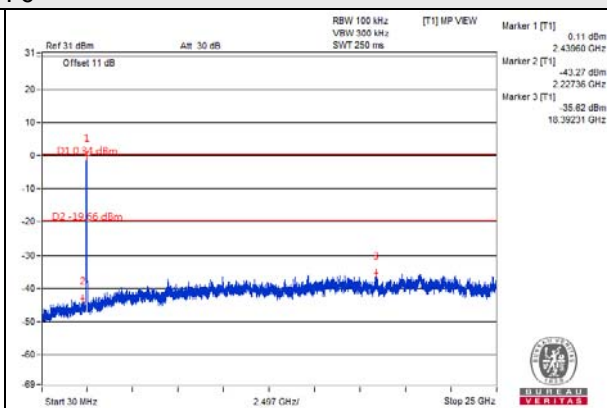
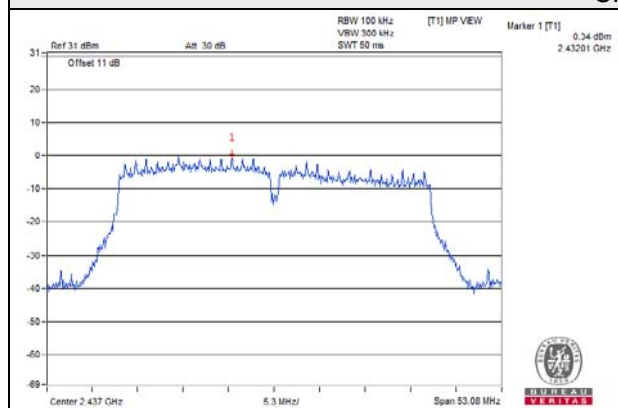


802.11n (VHT40)_Chain 0

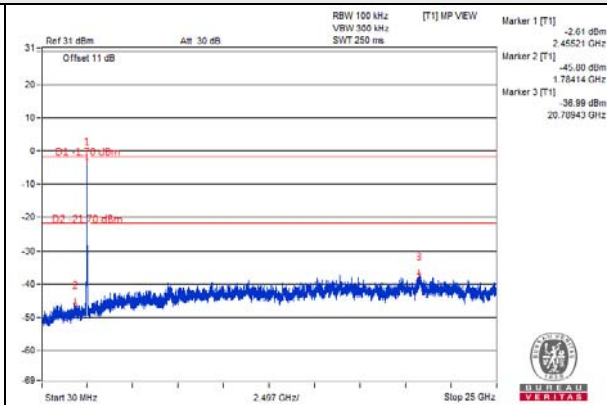
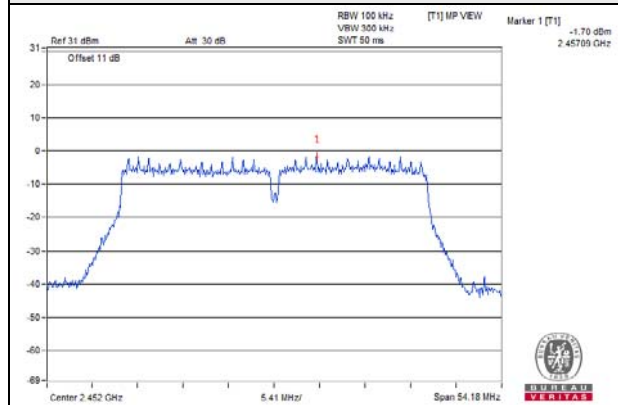
CH 3



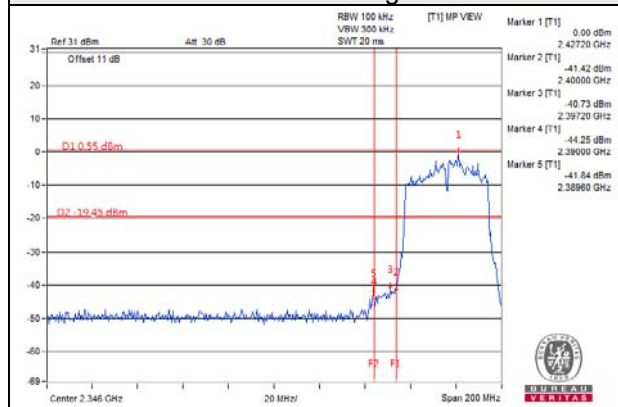
CH 6



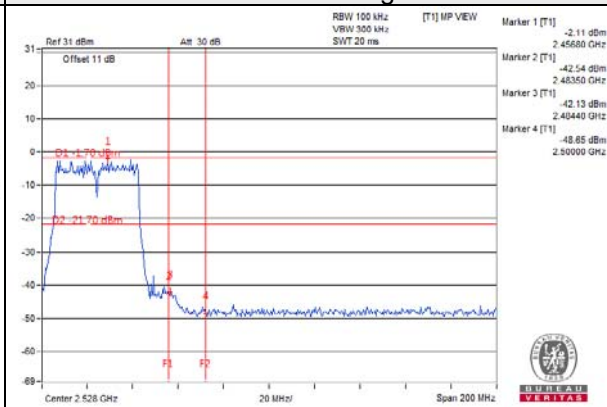
CH 9



CH 3 Band edge

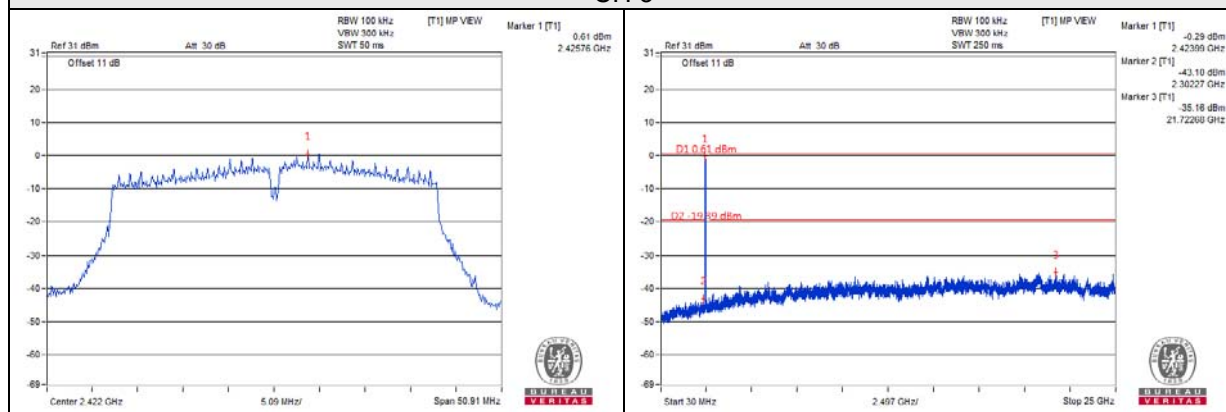


CH 9 Band edge

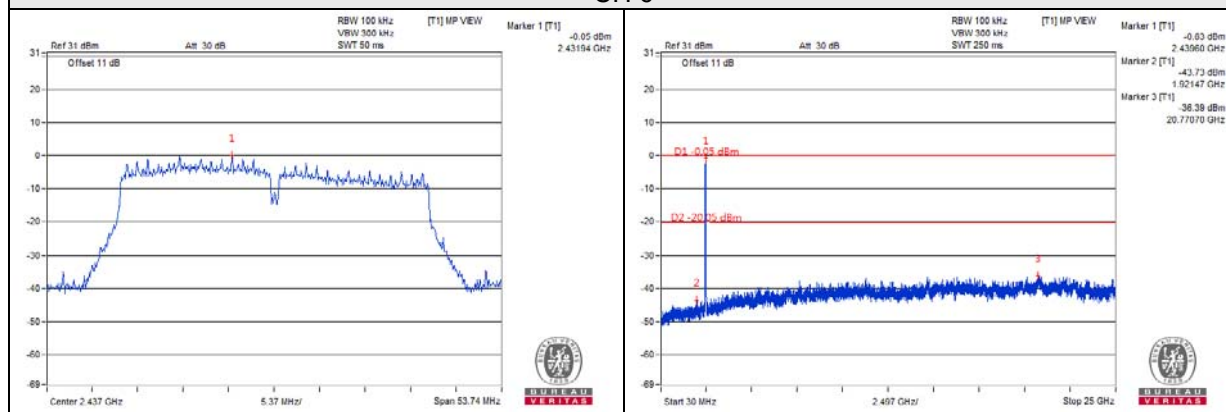


802.11n (VHT40)_Chain 1

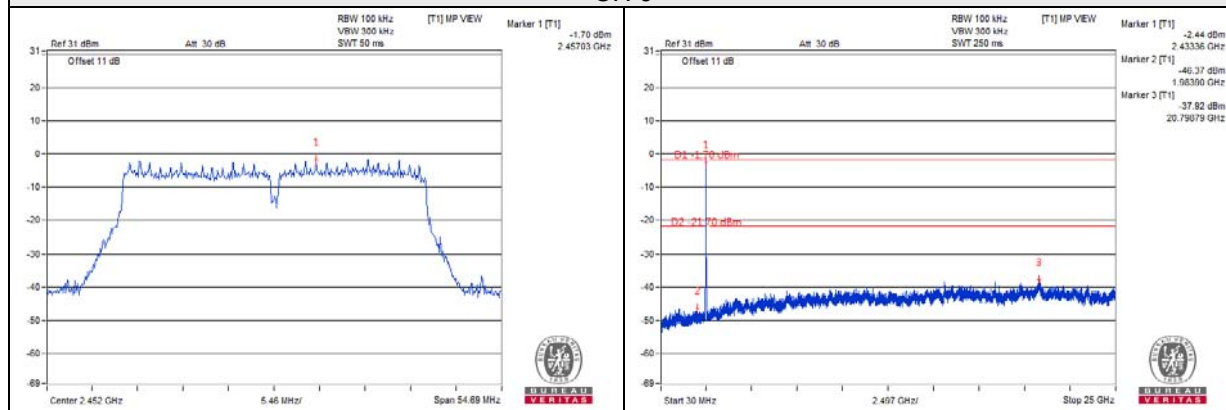
CH 3



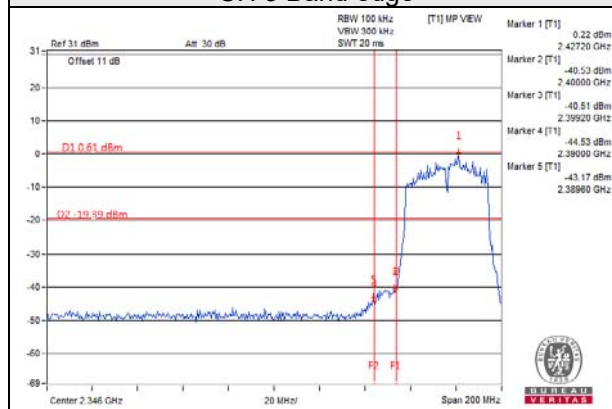
CH 6



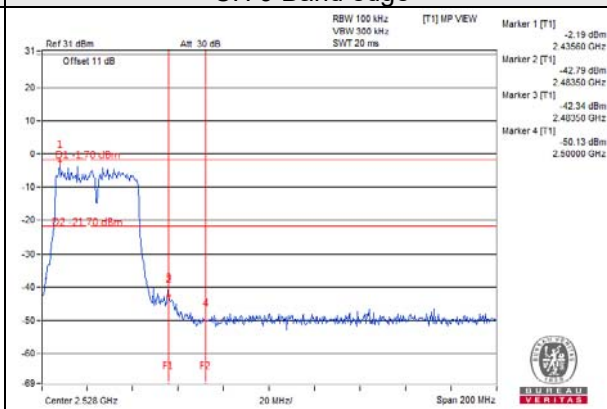
CH 9



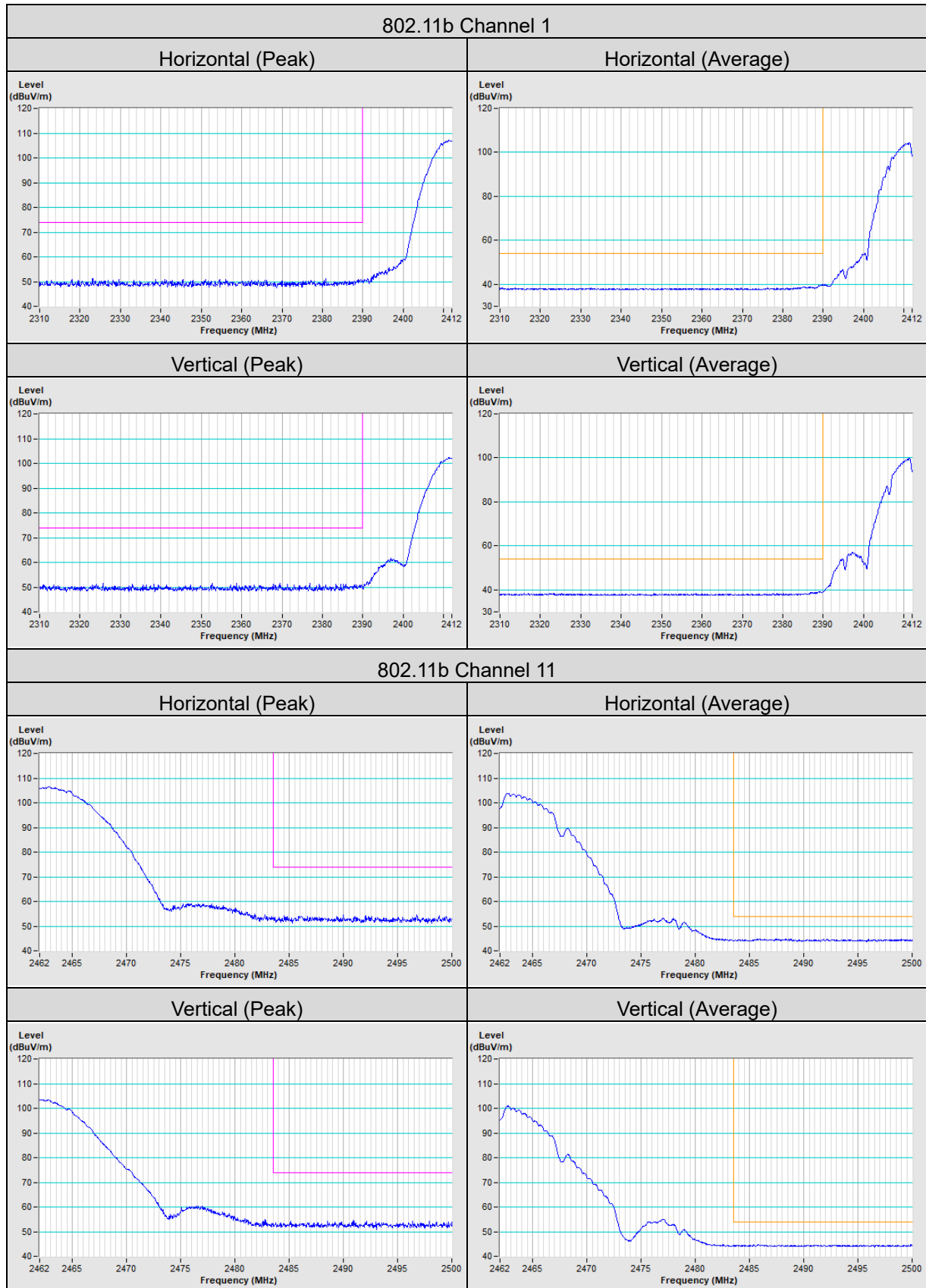
CH 3 Band edge

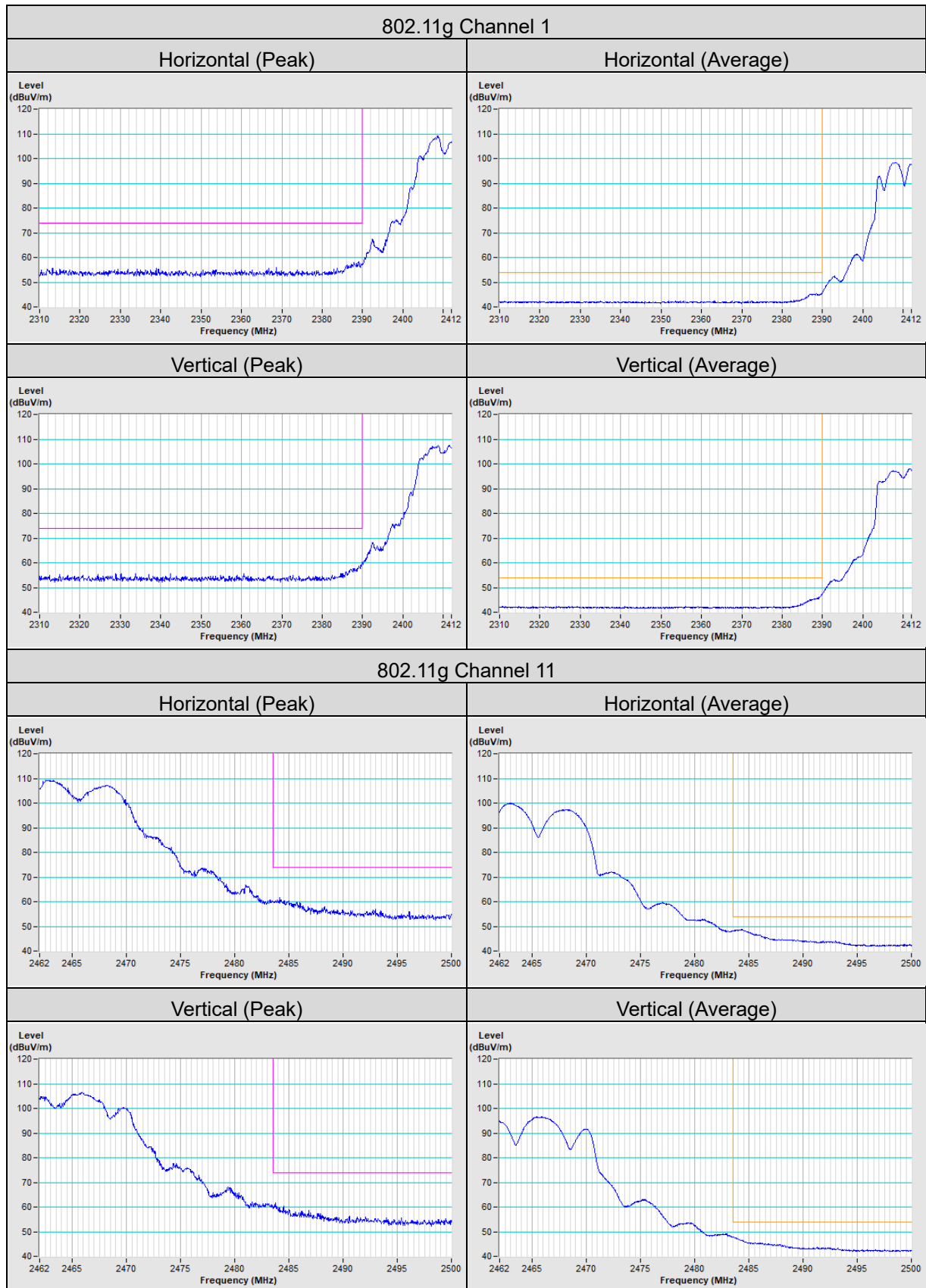


CH 9 Band edge



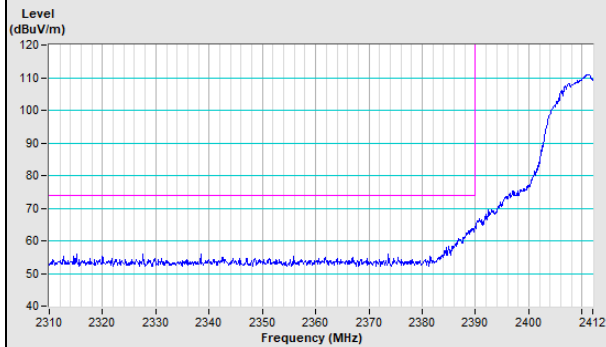
Annex A- Band Edge Measurement



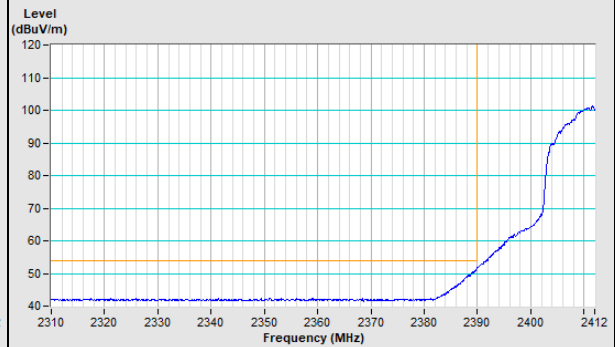


802.11n (VHT20) Channel 1

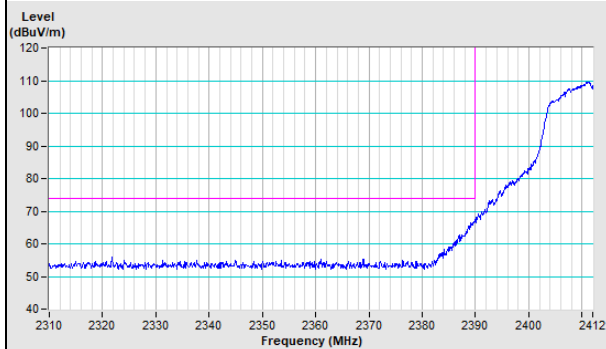
Horizontal (Peak)



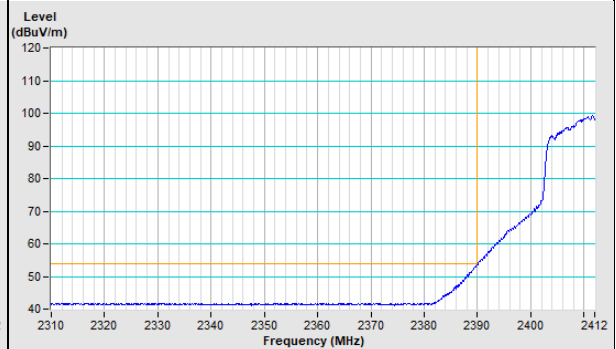
Horizontal (Average)



Vertical (Peak)

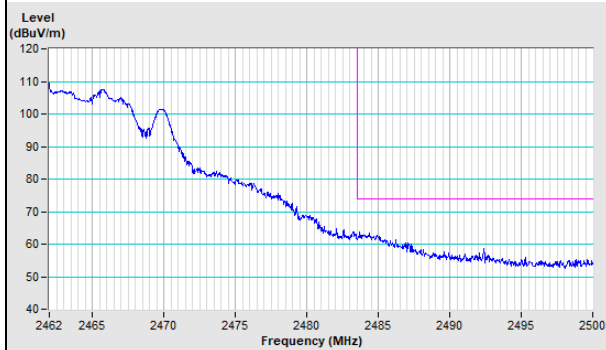


Vertical (Average)

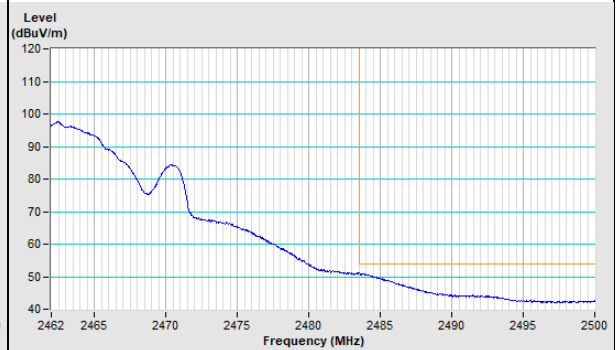


802.11n (VHT20) Channel 11

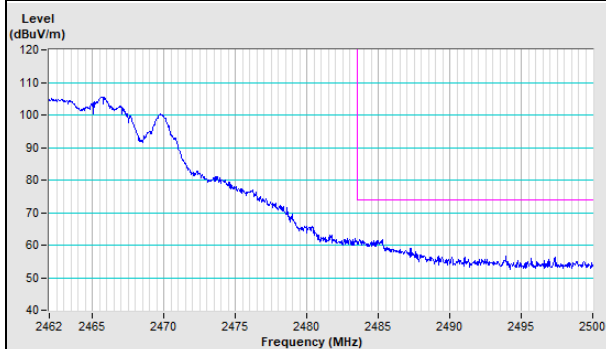
Horizontal (Peak)



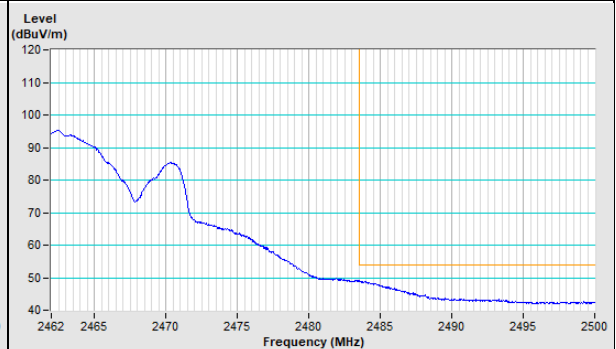
Horizontal (Average)



Vertical (Peak)

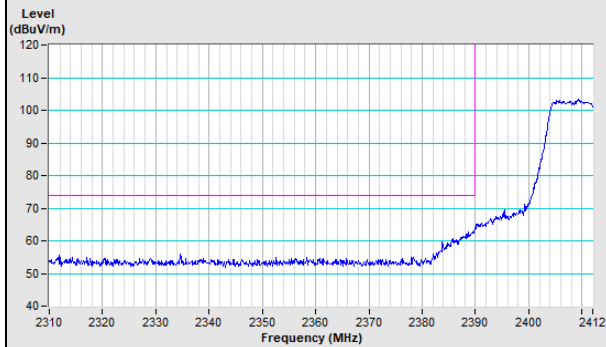


Vertical (Average)

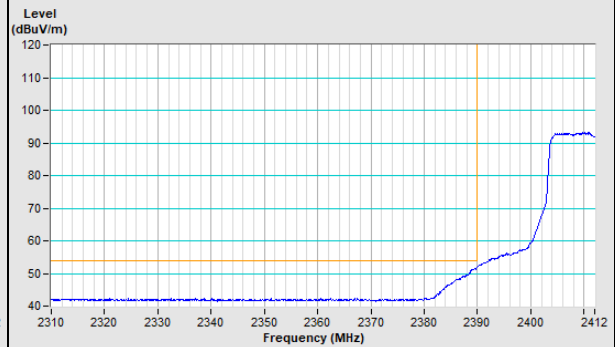


802.11n (VHT40) Channel 3

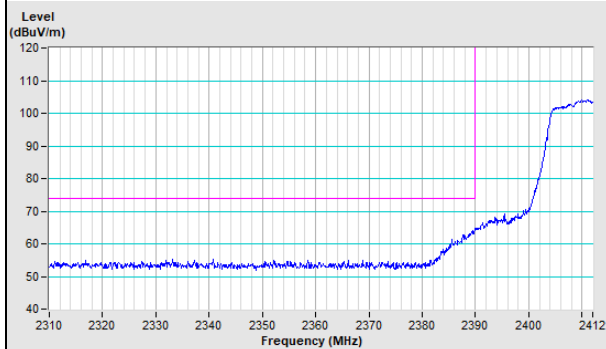
Horizontal (Peak)



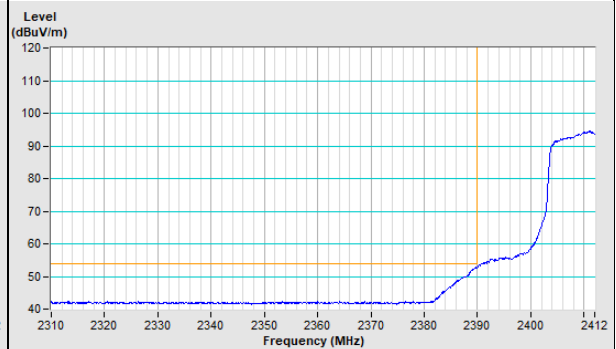
Horizontal (Average)



Vertical (Peak)

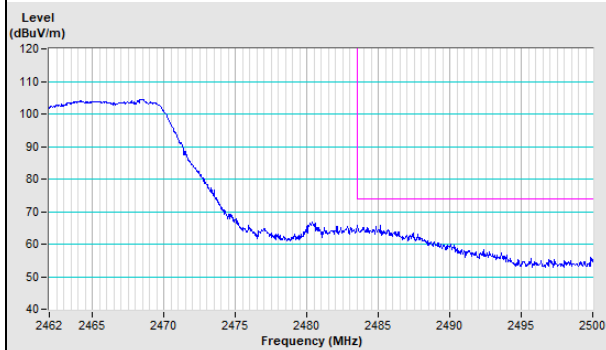


Vertical (Average)

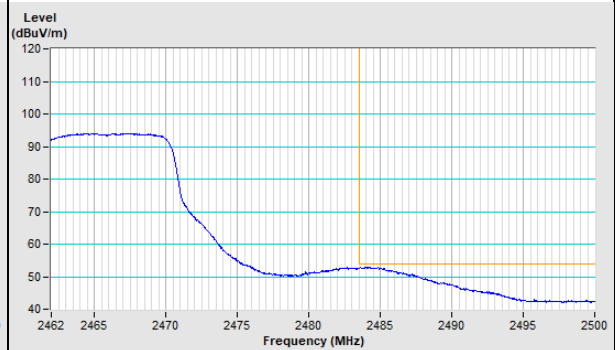


802.11n (VHT40) Channel 9

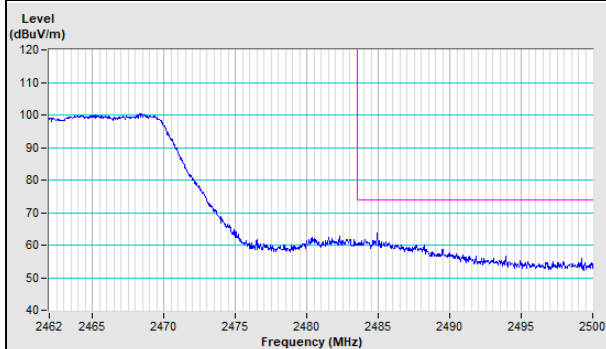
Horizontal (Peak)



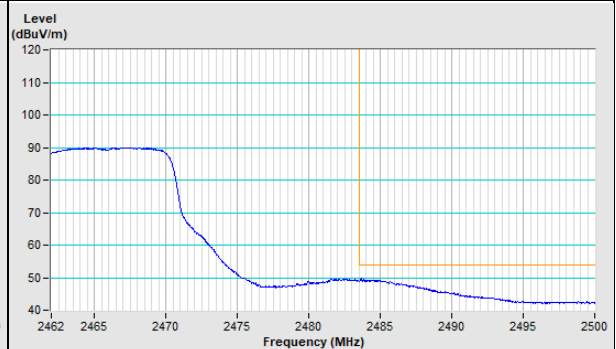
Horizontal (Average)



Vertical (Peak)



Vertical (Average)



5 Pictures of Test Arrangements

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

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. 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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Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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