

## FCC Test Report

**Report No.:** RFBCMA-WTW-P21050301

**FCC ID:** RAXHT3000W

**Test Model:** HT3000W

**Series Model:** WN3000

**Received Date:** Mar. 16, 2021

**Test Date:** Mar. 16 to June 02, 2021

**Issued Date:** July 20, 2021

**Applicant:** Arcadyan Technology Corporation

**Address:** No.8, Sec.2, Guangfu Rd., Hsinchu City 30071, Taiwan, R.O.C.

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Hsin Chu Laboratory

**Lab Address:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan

**Test Location:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan

**FCC Registration /  
Designation Number:** 723255 / TW2022



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### Release Control Record

Issue No.	Description	Date Issued
RFBCMA-WTW-P21050301	Original release.	July 20, 2021

## 1 Certificate of Conformity

**Product:** Wi-Fi Daughtercard  
**Brand:** Hughes  
**Test Model:** HT3000W  
**Series Model:** WN3000  
**Sample Status:** Engineering sample  
**Applicant:** Arcadyan Technology Corporation  
**Test Date:** Mar. 16 to June 02, 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 EMC characteristics under the conditions specified in this report.

**Prepared by :** Phoenix Huang , **Date:** July 20, 2021  
Phoenix Huang / Specialist

**Approved by :** Clark Lin , **Date:** July 20, 2021  
Clark Lin / Technical Manager

## 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 -14.72 dB at 0.15000 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.0 dB at 2387.31 MHz and 2483.50 MHz.
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(MHF) not a standard connector.

### Note:

- For 2.4 GHz band compliance with rule 15.247(d) of the band-edge items, the test plots were recorded in Annex A.
- 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) ( $\pm$ )
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.9 dB
Conducted emissions	-	2.5 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.1 dB
	30MHz ~ 1GHz	5.1 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.1 dB
	18GHz ~ 40GHz	5.3 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product	Wi-Fi Daughtercard
Brand	Hughes
Test Model	HT3000W
Series Model	WN3000
Status of EUT	Engineering sample
Power Supply Rating	12 Vdc
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT20/40 in 2.4GHz 1024QAM for OFDMA in 11ax HE mode
Modulation Technology	DSSS, OFDM, OFDMA
Transfer Rate	802.11b: up to 11 Mbps 802.11a/g: up to 54 Mbps 802.11n: up to 300 Mbps 802.11ac: up to 866.7 Mbps 802.11ax: up to 1201.0 Mbps
Operating Frequency	<b>2.4GHz:</b> 2.412 ~ 2.462GHz <b>5GHz:</b> 5.18~ 5.24 GHz, 5.26 ~ 5.32 GHz, 5.50 ~ 5.72 GHz, 5.745 ~ 5.825 GHz
Number of Channel	<b>2.4GHz:</b> 802.11b, 802.11g, 802.11n (HT20), VHT20, 802.11ax (HE20): 11 802.11n (HT40), VHT40, 802.11ax (HE40): 7 <b>5GHz:</b> 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20): 25 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 12 802.11ac (VHT80), 802.11ax (HE80): 6
Output Power	<b>CDD Mode:</b> <b>2.412 ~ 2.462 GHz:</b> 546.729 mW <b>5.18 ~ 5.24 GHz:</b> 568.329 mW <b>5.26 ~ 5.32 GHz:</b> 246.883 mW <b>5.5 ~ 5.72 GHz:</b> 248.442 mW <b>5.745 ~ 5.825 GHz:</b> 474.031 mW <b>Beamforming Mode:</b> <b>2.412 ~ 2.462 GHz:</b> 485.414 mW <b>5.18 ~ 5.24 GHz:</b> 450.516 mW <b>5.26 ~ 5.32 GHz:</b> 227.7 mW <b>5.5 ~ 5.72 GHz:</b> 238.82 mW <b>5.745 ~ 5.825 GHz:</b> 443.757 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The EUT has two model names which are identical to each other in all aspects except for the followings:

Model Name	LAN port	Remark
HT3000W	2	With heat sink
WN3000	1	Without heat sink

Note: From the above models, the radiated emission worst case was found in **model: HT3000W**. Therefore only the test data of the mode was recorded in this report.

2. Simultaneously transmission condition.

Condition	Technology	
1	WLAN 2.4GHz	WLAN 5GHz

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

3. The EUT has below radios as following table:

Radio 1	Radio 2
WLAN 2.4GHz	WLAN 5GHz

4. The antennas provided to the EUT, please refer to the following table:

Antenna Set	RF Chain No.	Model	Antenna Net Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector Type	Cable Length (mm)
1	0	WG622221-HS	1.9	2.4~2.4835	Dipole	i-pex(MHF)	60
	1	WG622221-HS	2.1	2.4~2.4835	Dipole	i-pex(MHF)	70
	0	WG622221-HS	2.5	5.15~5.85	Dipole	i-pex(MHF)	40
	1	WG622221-HS	3	5.15~5.85	Dipole	i-pex(MHF)	41
2	0	WE620221-HS	1.5	2.4~2.4835	Dipole	i-pex(MHF)	90
	1	WE620221-HS	2	2.4~2.4835	Dipole	i-pex(MHF)	70
	0	WE620221-HS	2.4	5.15~5.85	Dipole	i-pex(MHF)	43
	1	WE620221-HS	2.9	5.15~5.85	Dipole	i-pex(MHF)	40

Note: Max. gain was selected for the final test.



5. The EUT incorporates a MIMO function:

2.4GHz Band		
MODULATION MODE	TX & RX CONFIGURATION	
802.11b	2TX	2RX
802.11g	2TX	2RX
802.11n (HT20)	2TX	2RX
802.11n (HT40)	2TX	2RX
VHT20	2TX	2RX
VHT40	2TX	2RX
802.11ax (HE20)	2TX	2RX
802.11ax (HE40)	2TX	2RX
5GHz Band		
MODULATION MODE	TX & RX CONFIGURATION	
802.11a	2TX	2RX
802.11n (HT20)	2TX	2RX
802.11n (HT40)	2TX	2RX
802.11ac (VHT20)	2TX	2RX
802.11ac (VHT40)	2TX	2RX
802.11ac (VHT80)	2TX	2RX
802.11ax (HE20)	2TX	2RX
802.11ax (HE40)	2TX	2RX
802.11ax (HE80)	2TX	2RX

Note:

1. All of modulation mode support beamforming function except 802.11a/b/g modulation mode.
2. The EUT support Beamforming and CDD mode, therefore both mode were investigated and the worst case scenario was identified. The worst case data were presented in test report.
3. The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz), VHT mode for 20MHz (40MHz) and 802.11ax mode for 20MHz (40MHz), therefore the manufacturer will control the power for 802.11n/ VHT mode is the same as the 802.11ax mode or more lower than it and investigated worst case to representative mode in test report.

6. 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.
7. 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.

### 3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g, 802.11n (HT20), VHT20, 802.11ax (HE20):

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

7 channels are provided for 802.11n (HT40), VHT40, 802.11ax (HE40):

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

### 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: The EUT's Dipole antenna had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y Z-plane**.

#### **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.

CDD Mode					
Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1Mb/s
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6Mb/s
802.11ax (HE20)	1 to 11	1, 6, 11	OFDMA	BPSK	MCS0
802.11ax (HE40)	3 to 9	3, 6, 9	OFDMA	BPSK	MCS0

#### **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.

CDD Mode					
Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter
802.11b	1 to 11	11	DSSS	DBPSK	1Mb/s

#### **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.

CDD Mode					
Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter
802.11b	1 to 11	11	DSSS	DBPSK	1Mb/s

### 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.

<b>CDD Mode</b>					
Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1Mb/s
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6Mb/s
VHT20 (output power only)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
VHT40 (output power only)	3 to 9	3, 6, 9	OFDM	BPSK	MCS0
802.11ax (HE20)	1 to 11	1, 6, 11	OFDMA	BPSK	MCS0
802.11ax (HE40)	3 to 9	3, 6, 9	OFDMA	BPSK	MCS0
<b>Beamforming Mode (output power only)</b>					
Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter
VHT20	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
VHT40	3 to 9	3, 6, 9	OFDM	BPSK	MCS0
802.11ax (HE20)	1 to 11	1, 6, 11	OFDMA	BPSK	MCS0
802.11ax (HE40)	3 to 9	3, 6, 9	OFDMA	BPSK	MCS0

### Test Condition:

Applicable To	Environmental Conditions	Input Power (System)	Tested By
RE $\geq$ 1G	20deg. C, 71%RH, 24deg. C, 72%RH	120Vac, 60Hz	Gary Cheng, Gary Cheng
RE<1G	24deg. C, 63%RH	120Vac, 60Hz	Sampson Chen
PLC	25deg. C, 62%RH	120Vac, 60Hz	Sampson Chen
APCM	25deg. C, 60%RH	120Vac, 60Hz	Eric Peng

### 3.3 Duty Cycle of Test Signal

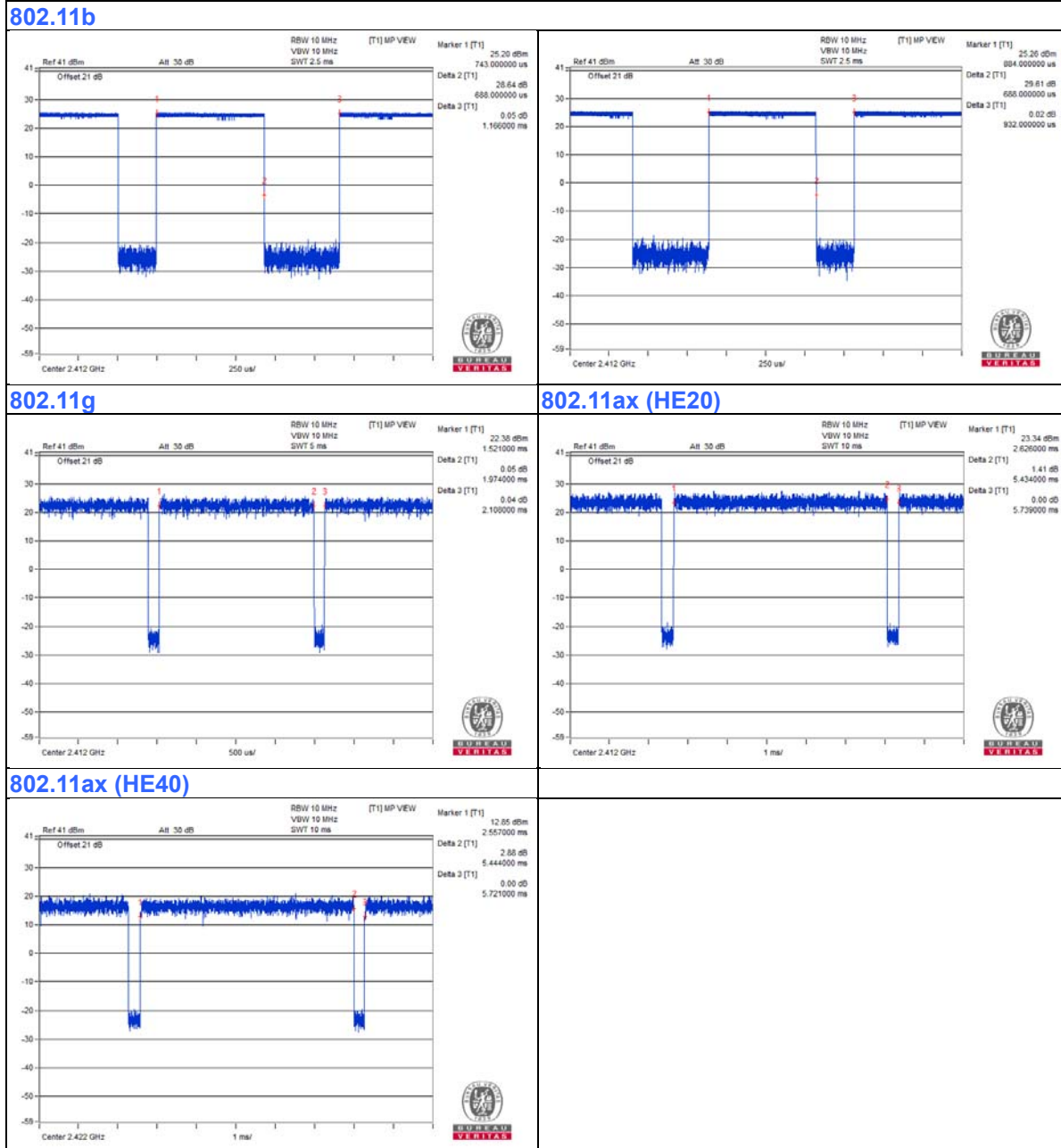
Duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b: Duty cycle = 1.376 ms/2.098 ms = 0.656, Duty factor = 10 \* log (1/Duty cycle) = 1.83 dB

802.11g: Duty cycle = 1.974 ms/2.108 ms = 0.936, Duty factor = 10 \* log (1/Duty cycle) = 0.29 dB

802.11n (HT20): Duty cycle = 5.434 ms/5.739 ms = 0.947, Duty factor = 10 \* log (1/Duty cycle) = 0.24 dB

802.11n (HT40): Duty cycle = 5.444 ms/5.721 ms = 0.952, Duty factor = 10 \* log (1/Duty cycle) = 0.22 dB



### 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.	Adapter	APD	WB-18D12FU	NA	NA	Supplied by client
B.	Laptop	DELL	Latitude E7440	NA	NA	Supplied by client
C.	Laptop	Lenovo	20U5S01X00 L14	PF-1ANPYA	NA	Provided by Lab
D.	Test Tool	Arcadyan	NA	NA	NA	Supplied by client

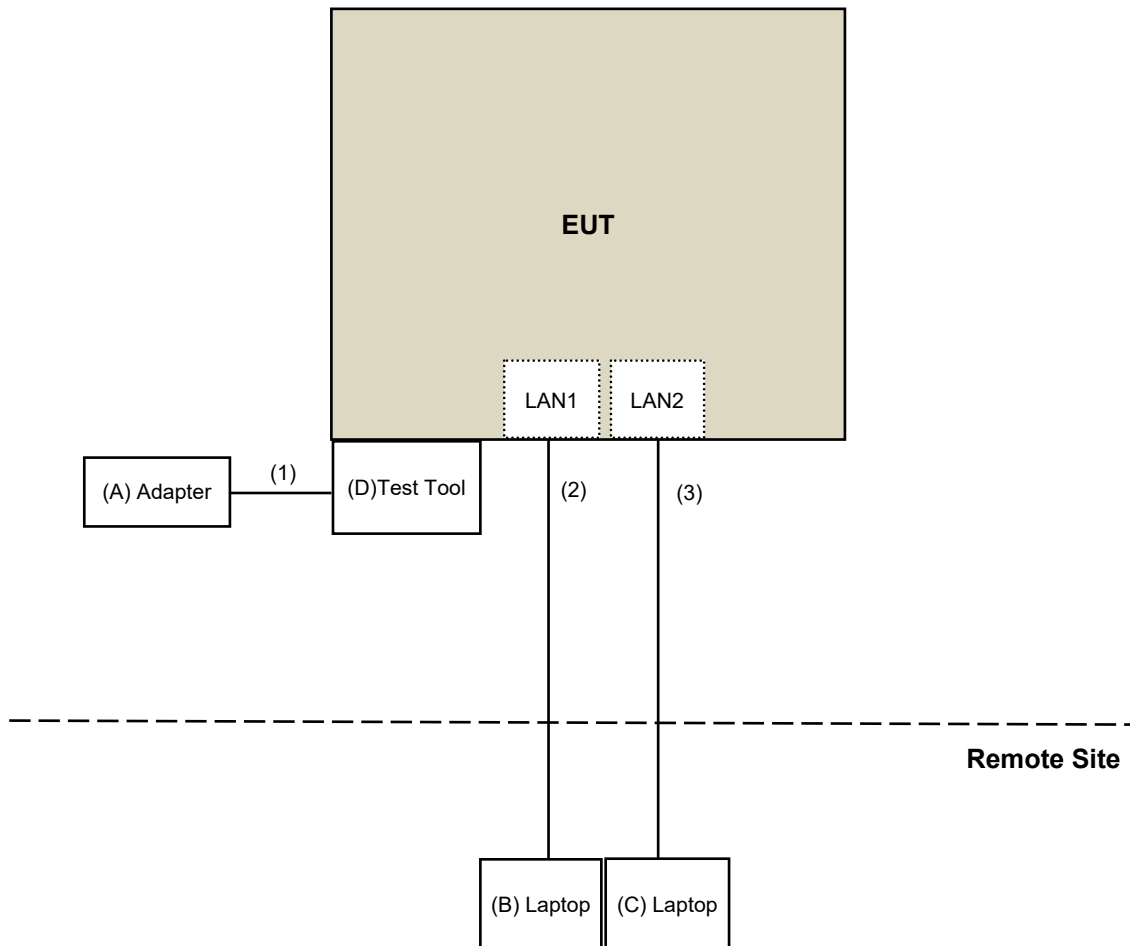
Note:

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

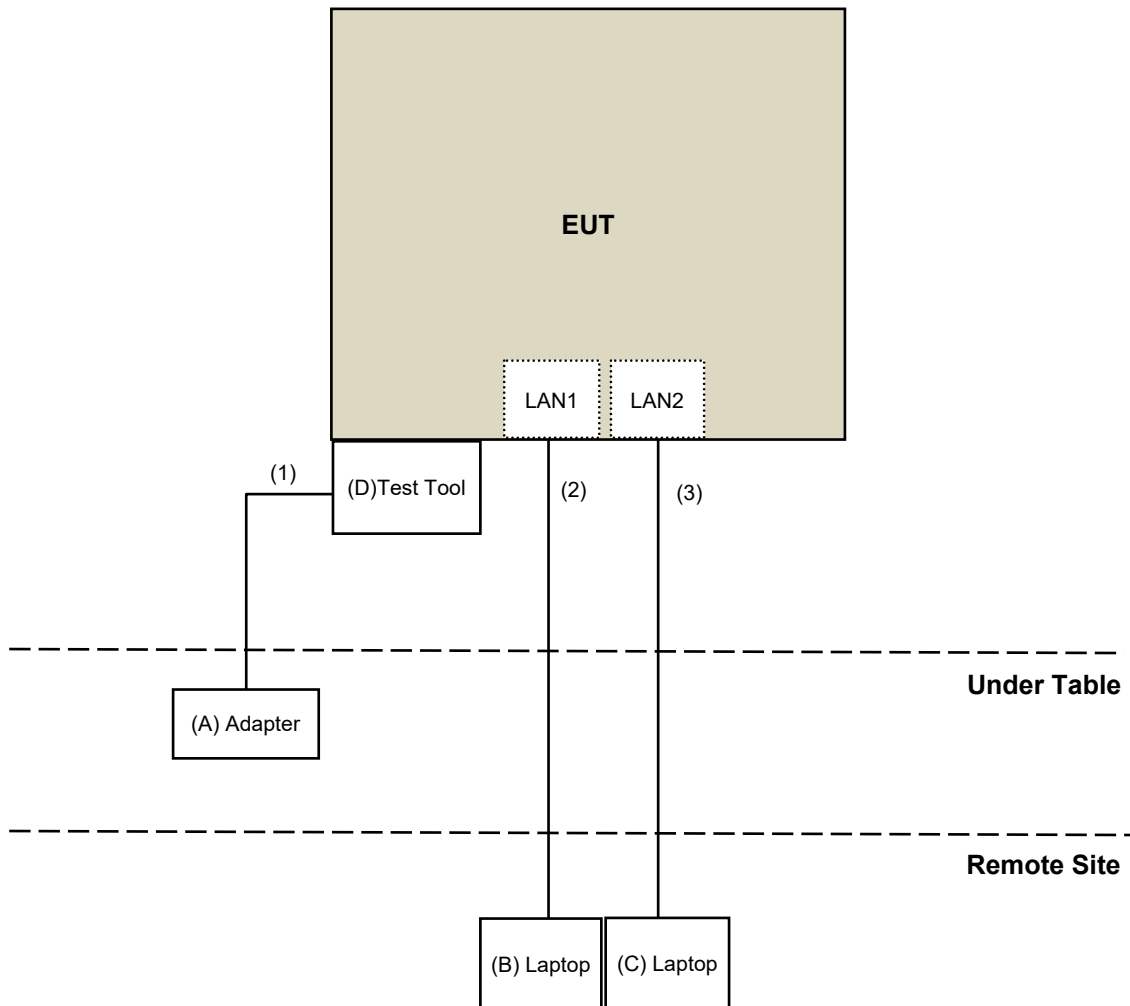
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	1	1.4	No	0	Supplied by client
2.	RJ-45 Cable	1	10	No	0	Provided by Lab
3.	RJ-45 Cable	1	10	No	0	Provided by Lab

### 3.4.1 Configuration of System under Test

#### For AC Power Conducted Emission test:



**For Radiated Emission 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 30dB 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

**For Radiated emission test:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESR3	102528	Mar. 02, 2021	Mar. 01, 2022
Spectrum Analyzer Keysight	N9030B	MY57141948	May 22, 2020	May 21, 2021
Pre-Amplifier EMCi	EMC001340	980142	May 25, 2020	May 24, 2021
Loop Antenna Electro-Metrics	EM-6879	264	Mar. 05, 2021	Mar. 04, 2022
RF Cable	5D-FB	LOOPCAB-001	Jan. 07, 2021	Jan. 06, 2022
RF Cable	5D-FB	LOOPCAB-002	Jan. 07, 2021	Jan. 06, 2022
Pre-Amplifier EMCi	EMC330N	980538	Apr. 26, 2021	Apr. 25, 2022
Trilog Broadband Antenna SCHWARZBECK	VULB9168	9168-0842	Nov. 03, 2020	Nov. 02, 2021
RF Cable	8D	966-5-1	Apr. 26, 2021	Apr. 25, 2022
RF Cable	8D	966-5-2	Apr. 26, 2021	Apr. 25, 2022
RF Cable	8D	966-5-3	Apr. 26, 2021	Apr. 25, 2022
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-ATT5-02	Jan. 11, 2021	Jan. 10, 2022
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-1819	Nov. 22, 2020	Nov. 21, 2021
Pre-Amplifier EMCi	EMC12630SE	980509	Apr. 26, 2021	Apr. 25, 2022
RF Cable EMCi	EMC104-SM-SM-1500	180503	Apr. 26, 2021	Apr. 25, 2022
RF Cable EMCi	EMC104-SM-SM-2000	180501	Apr. 26, 2021	Apr. 25, 2022
RF Cable EMCi	EMC104-SM-SM-6000	180506	Apr. 26, 2021	Apr. 25, 2022
Pre-Amplifier EMCi	EMC184045SE	980387	Jan. 11, 2021	Jan. 10, 2022
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 22, 2020	Nov. 21, 2021
RF Cable	EMC102-KM-KM-1200	160924	Jan. 11, 2021	Jan. 10, 2022
RF Cable	EMC-KM-KM-4000	200214	Mar. 10, 2021	Mar. 09, 2022
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	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 966 Chamber No. 5.
3. Tested Date: May 15 to 17, 2021

**For Bandedge test:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESR3	102528	Mar. 02, 2021	Mar. 01, 2022
Spectrum Analyzer Keysight	N9030B	MY57141948	May 22, 2020	May 21, 2021
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-1819	Nov. 22, 2020	Nov. 21, 2021
Pre-Amplifier EMCI	EMC12630SE	980509	Apr. 29, 2020	Apr. 28, 2021
RF Cable EMCI	EMC104-SM-SM-1500	180503	Apr. 29, 2020	Apr. 28, 2021
RF Cable EMCI	EMC104-SM-SM-2000	180501	Apr. 29, 2020	Apr. 28, 2021
RF Cable EMCI	EMC104-SM-SM-6000	180506	Apr. 29, 2020	Apr. 28, 2021
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 11, 2021	Jan. 10, 2022
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 22, 2020	Nov. 21, 2021
RF Cable	EMC102-KM-KM-1200	160924	Jan. 11, 2021	Jan. 10, 2022
RF Cable	EMC-KM-KM-4000	200214	Mar. 10, 2021	Mar. 09, 2022
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	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 966 Chamber No. 5.
3. Tested Date: Mar. 16 to 17, 2021

**For other test items test:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	101516	Mar. 08, 2021	Mar. 07, 2022
Power meter Anritsu	ML2495A	1529002	July 22, 2020	July 21, 2021
Power sensor Anritsu	MA2411B	1339443	July 22, 2020	July 21, 2021
10dB Attenuator Woken	MDCS18N-10	MDCS18N-10-01	Apr. 13, 2021	Apr. 12, 2022
Software	ADT_RF Test Software V6.6.5.4	NA	NA	NA

- NOTE:**
1. The test was performed in Oven room 2.
  2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  3. Tested Date: June 02, 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 detects 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:**

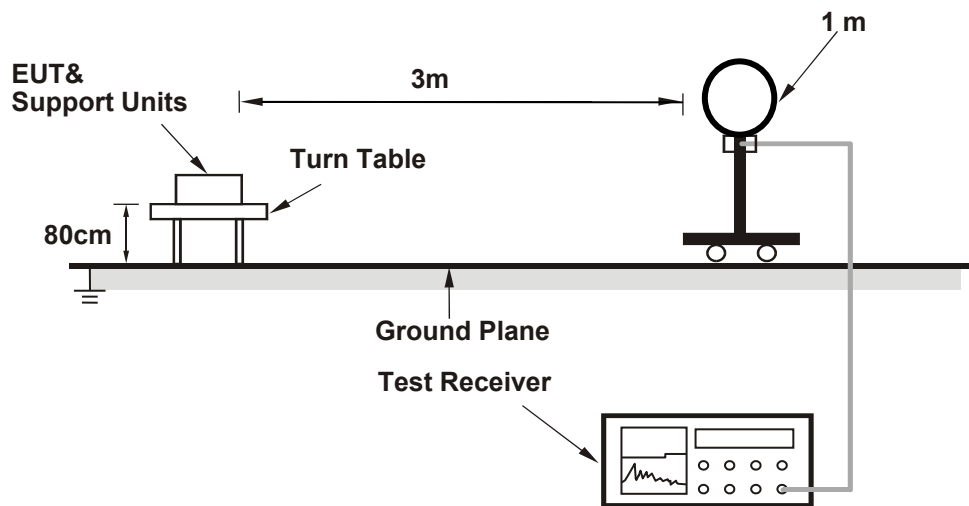
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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.
4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

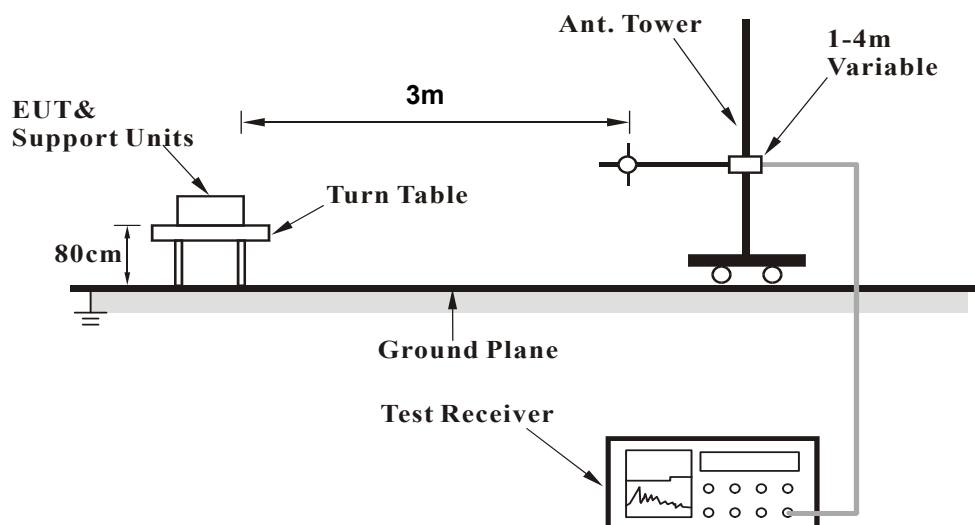
No deviation.

#### 4.1.5 Test Setup

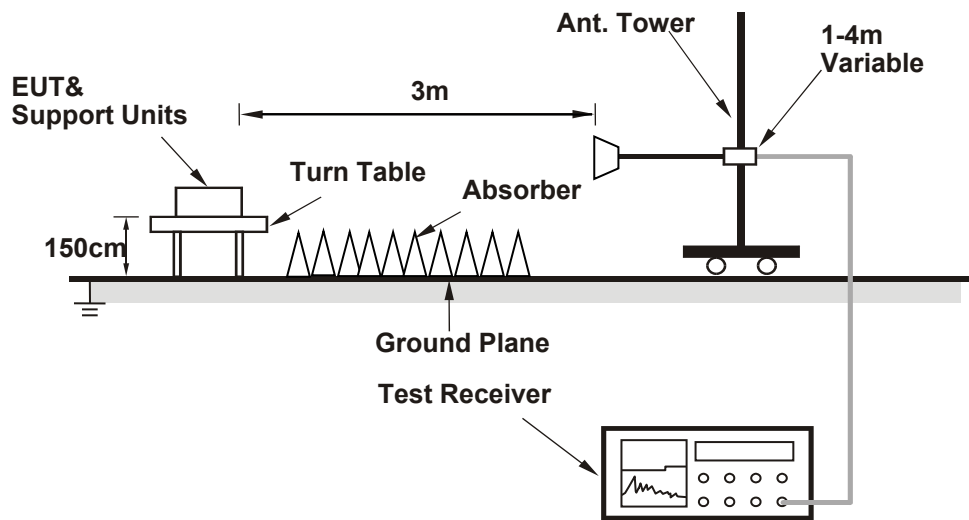
##### For Radiated emission below 30MHz



##### 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

- a. Placed the EUT on the testing table.
- b. Controlling software (QRCT 4.0.00177.0) has been activated to set the EUT under transmission condition continuously at specific channel frequency.



## 4.1.7 Test Results

## Above 1GHz Data:

<b>RF Mode</b>	TX 802.11b	<b>Channel</b>	CH 1 : 2412 MHz
<b>Frequency Range</b>	1GHz ~ 25GHz	<b>Detector Function</b>	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	2387.31	61.7 PK	74.0	-12.3	3.69 H	61	64.4	-2.7
2	<b>2387.31</b>	<b>53.0 AV</b>	<b>54.0</b>	<b>-1.0</b>	<b>3.69 H</b>	<b>61</b>	<b>55.7</b>	<b>-2.7</b>
3	2390.00	60.8 PK	74.0	-13.2	3.69 H	61	63.5	-2.7
4	2390.00	51.1 AV	54.0	-2.9	3.69 H	61	53.8	-2.7
5	*2412.00	121.2 PK			3.69 H	61	123.9	-2.7
6	*2412.00	119.1 AV			3.69 H	61	121.8	-2.7
7	4824.00	39.0 PK	74.0	-35.0	1.17 H	159	37.2	1.8
8	4824.00	28.8 AV	54.0	-25.2	1.17 H	159	27.0	1.8

**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	2387.14	59.1 PK	74.0	-14.9	1.37 V	331	61.8	-2.7
2	2387.14	49.0 AV	54.0	-5.0	1.37 V	331	51.7	-2.7
3	2390.00	60.4 PK	74.0	-13.6	1.37 V	331	63.1	-2.7
4	2390.00	49.7 AV	54.0	-4.3	1.37 V	331	52.4	-2.7
5	*2412.00	115.8 PK			1.37 V	331	118.5	-2.7
6	*2412.00	113.5 AV			1.37 V	331	116.2	-2.7
7	4824.00	39.4 PK	74.0	-34.6	1.00 V	36	37.6	1.8
8	4824.00	29.4 AV	54.0	-24.6	1.00 V	36	27.6	1.8

**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.

<b>RF Mode</b>	TX 802.11b	<b>Channel</b>	CH 6 : 2437 MHz
<b>Frequency Range</b>	1GHz ~ 25GHz	<b>Detector Function</b>	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	58.6 PK	74.0	-15.4	3.68 H	56	61.3	-2.7
2	2390.00	52.4 AV	54.0	-1.6	3.68 H	56	55.1	-2.7
3	*2437.00	121.1 PK			3.68 H	56	123.8	-2.7
4	*2437.00	118.8 AV			3.68 H	56	121.5	-2.7
5	2483.50	57.2 PK	74.0	-16.8	3.68 H	56	60.0	-2.8
6	2483.50	47.6 AV	54.0	-6.4	3.68 H	56	50.4	-2.8
7	4874.00	30.2 PK	74.0	-43.8	1.00 H	0	28.5	1.7
8	4874.00	29.9 AV	54.0	-24.1	1.00 H	0	28.2	1.7
9	7311.00	45.2 PK	74.0	-28.8	1.77 H	135	38.0	7.2
10	7311.00	33.0 AV	54.0	-21.0	1.77 H	135	25.8	7.2

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	58.7 PK	74.0	-15.3	3.20 V	343	61.4	-2.7
2	2390.00	52.6 AV	54.0	-1.4	3.20 V	343	55.3	-2.7
3	*2437.00	119.7 PK			3.20 V	343	122.4	-2.7
4	*2437.00	118.1 AV			3.20 V	343	120.8	-2.7
5	2483.50	56.8 PK	74.0	-17.2	3.20 V	343	59.6	-2.8
6	2483.50	47.2 AV	54.0	-6.8	3.20 V	343	50.0	-2.8
7	4874.00	39.4 PK	74.0	-34.6	1.13 V	174	37.7	1.7
8	4874.00	29.1 AV	54.0	-24.9	1.13 V	174	27.4	1.7
9	7311.00	44.6 PK	74.0	-29.4	1.00 V	272	37.4	7.2
10	7311.00	35.3 AV	54.0	-18.7	1.00 V	272	28.1	7.2

**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.

<b>RF Mode</b>	TX 802.11b	<b>Channel</b>	CH 11 : 2462 MHz
<b>Frequency Range</b>	1GHz ~ 25GHz	<b>Detector Function</b>	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	120.2 PK			3.86 H	355	123.0	-2.8
2	*2462.00	117.8 AV			3.86 H	355	120.6	-2.8
3	2483.50	59.1 PK	74.0	-14.9	3.86 H	355	61.9	-2.8
4	2483.50	50.3 AV	54.0	-3.7	3.86 H	355	53.1	-2.8
5	2486.87	59.8 PK	74.0	-14.2	3.86 H	355	62.6	-2.8
6	2486.87	51.5 AV	54.0	-2.5	3.86 H	355	54.3	-2.8
7	4924.00	30.3 PK	74.0	-43.7	1.00 H	11	28.5	1.8
8	4924.00	30.0 AV	54.0	-24.0	1.00 H	11	28.2	1.8
9	7386.00	45.0 PK	74.0	-29.0	1.80 H	131	37.6	7.4
10	7386.00	32.5 AV	54.0	-21.5	1.80 H	131	25.1	7.4

**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	*2462.00	117.9 PK			3.29 V	228	120.7	-2.8
2	*2462.00	115.9 AV			3.29 V	228	118.7	-2.8
3	2483.50	59.2 PK	74.0	-14.8	3.29 V	228	62.0	-2.8
4	2483.50	51.0 AV	54.0	-3.0	3.29 V	228	53.8	-2.8
5	2486.87	61.0 PK	74.0	-13.0	3.29 V	228	63.8	-2.8
6	2486.87	51.4 AV	54.0	-2.6	3.29 V	228	54.2	-2.8
7	4924.00	39.3 PK	74.0	-34.7	1.13 V	184	37.5	1.8
8	4924.00	28.8 AV	54.0	-25.2	1.13 V	184	27.0	1.8
9	7386.00	44.5 PK	74.0	-29.5	1.04 V	274	37.1	7.4
10	7386.00	35.1 AV	54.0	-18.9	1.04 V	274	27.7	7.4

**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.

<b>RF Mode</b>	TX 802.11g	<b>Channel</b>	CH 1 : 2412 MHz
<b>Frequency Range</b>	1GHz ~ 25GHz	<b>Detector Function</b>	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	66.6 PK	74.0	-7.4	1.69 H	245	69.3	-2.7
2	2390.00	52.6 AV	54.0	-1.4	1.69 H	245	55.3	-2.7
3	*2412.00	117.6 PK			1.69 H	245	120.3	-2.7
4	*2412.00	107.5 AV			1.69 H	245	110.2	-2.7
5	4824.00	30.6 PK	74.0	-43.4	1.01 H	17	28.8	1.8
6	4824.00	30.4 AV	54.0	-23.6	1.01 H	17	28.6	1.8

**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	65.8 PK	74.0	-8.2	3.24 V	39	68.5	-2.7
2	2390.00	52.9 AV	54.0	-1.1	3.24 V	39	55.6	-2.7
3	*2412.00	117.1 PK			3.24 V	39	119.8	-2.7
4	*2412.00	107.1 AV			3.24 V	39	109.8	-2.7
5	4824.00	39.4 PK	74.0	-34.6	1.20 V	203	37.6	1.8
6	4824.00	28.8 AV	54.0	-25.2	1.20 V	203	27.0	1.8

**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.

<b>RF Mode</b>	TX 802.11g	<b>Channel</b>	CH 6 : 2437 MHz
<b>Frequency Range</b>	1GHz ~ 25GHz	<b>Detector Function</b>	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	68.2 PK	74.0	-5.8	1.74 H	257	70.9	-2.7
2	2390.00	52.4 AV	54.0	-1.6	1.74 H	257	55.1	-2.7
3	*2437.00	121.6 PK			1.74 H	257	124.3	-2.7
4	*2437.00	112.9 AV			1.74 H	257	115.6	-2.7
5	2483.50	63.8 PK	74.0	-10.2	1.74 H	257	66.6	-2.8
6	2483.50	49.6 AV	54.0	-4.4	1.74 H	257	52.4	-2.8
7	4874.00	30.1 PK	74.0	-43.9	1.03 H	4	28.4	1.7
8	4874.00	30.1 AV	54.0	-23.9	1.03 H	4	28.4	1.7
9	7311.00	44.9 PK	74.0	-29.1	1.72 H	137	37.7	7.2
10	7311.00	32.5 AV	54.0	-21.5	1.72 H	137	25.3	7.2

**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	68.4 PK	74.0	-5.6	2.77 V	343	71.1	-2.7
2	2390.00	52.8 AV	54.0	-1.2	2.77 V	343	55.5	-2.7
3	*2437.00	121.8 PK			2.77 V	343	124.5	-2.7
4	*2437.00	113.1 AV			2.77 V	343	115.8	-2.7
5	2483.50	64.5 PK	74.0	-9.5	2.77 V	343	67.3	-2.8
6	2483.50	50.0 AV	54.0	-4.0	2.77 V	343	52.8	-2.8
7	4874.00	39.1 PK	74.0	-34.9	1.15 V	188	37.4	1.7
8	4874.00	28.6 AV	54.0	-25.4	1.15 V	188	26.9	1.7
9	7311.00	45.0 PK	74.0	-29.0	1.06 V	269	37.8	7.2
10	7311.00	35.6 AV	54.0	-18.4	1.06 V	269	28.4	7.2

**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.

<b>RF Mode</b>	TX 802.11g	<b>Channel</b>	CH 11 : 2462 MHz
<b>Frequency Range</b>	1GHz ~ 25GHz	<b>Detector Function</b>	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	114.1 PK			2.67 H	301	116.9	-2.8
2	*2462.00	104.7 AV			2.67 H	301	107.5	-2.8
3	2483.50	62.9 PK	74.0	-11.1	2.67 H	301	65.7	-2.8
4	2483.50	50.8 AV	54.0	-3.2	2.67 H	301	53.6	-2.8
5	4924.00	30.5 PK	74.0	-43.5	1.08 H	9	28.7	1.8
6	4924.00	30.0 AV	54.0	-24.0	1.08 H	9	28.2	1.8
7	7386.00	45.9 PK	74.0	-28.1	1.76 H	122	38.5	7.4
8	7386.00	33.4 AV	54.0	-20.6	1.76 H	122	26.0	7.4

**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	*2462.00	117.3 PK			3.88 V	360	120.1	-2.8
2	*2462.00	107.1 AV			3.88 V	360	109.9	-2.8
3	2483.50	64.5 PK	74.0	-9.5	3.88 V	360	67.3	-2.8
4	2483.50	52.4 AV	54.0	-1.6	3.88 V	360	55.2	-2.8
5	4924.00	40.0 PK	74.0	-34.0	1.11 V	184	38.2	1.8
6	4924.00	29.6 AV	54.0	-24.4	1.11 V	184	27.8	1.8
7	7386.00	44.4 PK	74.0	-29.6	1.04 V	262	37.0	7.4
8	7386.00	35.0 AV	54.0	-19.0	1.04 V	262	27.6	7.4

**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.

<b>RF Mode</b>	TX 802.11ax (HE20)	<b>Channel</b>	CH 1 : 2412 MHz
<b>Frequency Range</b>	1GHz ~ 25GHz	<b>Detector Function</b>	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	2389.16	64.0 PK	74.0	-10.0	3.99 H	358	66.7	-2.7
2	2389.16	51.0 AV	54.0	-3.0	3.99 H	358	53.7	-2.7
3	2390.00	63.2 PK	74.0	-10.8	3.99 H	358	65.9	-2.7
4	2390.00	50.3 AV	54.0	-3.7	3.99 H	358	53.0	-2.7
5	*2412.00	121.2 PK			3.99 H	358	123.9	-2.7
6	*2412.00	106.5 AV			3.99 H	358	109.2	-2.7
7	4824.00	39.4 PK	74.0	-34.6	1.05 H	17	37.6	1.8
8	4824.00	26.3 AV	54.0	-27.7	1.05 H	17	24.5	1.8

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	2389.16	64.2 PK	74.0	-9.8	3.69 V	93	66.9	-2.7
2	2389.16	50.4 AV	54.0	-3.6	3.69 V	93	53.1	-2.7
3	2390.00	67.2 PK	74.0	-6.8	3.69 V	93	69.9	-2.7
4	2390.00	52.8 AV	54.0	-1.2	3.69 V	93	55.5	-2.7
5	*2412.00	119.5 PK			3.69 V	93	122.2	-2.7
6	*2412.00	105.8 AV			3.69 V	93	108.5	-2.7
7	4824.00	38.7 PK	74.0	-35.3	1.24 V	157	36.9	1.8
8	4824.00	26.4 AV	54.0	-27.6	1.24 V	157	24.6	1.8

**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.

<b>RF Mode</b>	TX 802.11ax (HE20)	<b>Channel</b>	CH 6 : 2437 MHz
<b>Frequency Range</b>	1GHz ~ 25GHz	<b>Detector Function</b>	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	68.2 PK	74.0	-5.8	3.94 H	344	70.9	-2.7
2	2390.00	52.1 AV	54.0	-1.9	3.94 H	344	54.8	-2.7
3	*2437.00	121.6 PK			3.94 H	344	124.3	-2.7
4	*2437.00	112.7 AV			3.94 H	344	115.4	-2.7
5	2483.50	64.4 PK	74.0	-9.6	3.94 H	344	67.2	-2.8
6	2483.50	50.1 AV	54.0	-3.9	3.94 H	344	52.9	-2.8
7	4874.00	39.2 PK	74.0	-34.8	1.10 H	15	37.5	1.7
8	4874.00	26.0 AV	54.0	-28.0	1.10 H	15	24.3	1.7
9	7311.00	43.5 PK	74.0	-30.5	1.80 H	120	36.3	7.2
10	7311.00	31.0 AV	54.0	-23.0	1.80 H	120	23.8	7.2

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	69.0 PK	74.0	-5.0	3.72 V	107	71.7	-2.7
2	2390.00	52.6 AV	54.0	-1.4	3.72 V	107	55.3	-2.7
3	*2437.00	122.2 PK			3.72 V	107	124.9	-2.7
4	*2437.00	113.4 AV			3.72 V	107	116.1	-2.7
5	2483.50	64.1 PK	74.0	-9.9	3.72 V	107	66.9	-2.8
6	2483.50	49.9 AV	54.0	-4.1	3.72 V	107	52.7	-2.8
7	4874.00	38.6 PK	74.0	-35.4	1.24 V	165	36.9	1.7
8	4874.00	26.2 AV	54.0	-27.8	1.24 V	165	24.5	1.7
9	7311.00	43.4 PK	74.0	-30.6	1.01 V	265	36.2	7.2
10	7311.00	31.2 AV	54.0	-22.8	1.01 V	265	24.0	7.2

**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.



<b>RF Mode</b>	TX 802.11ax (HE20)	<b>Channel</b>	CH 11 : 2462 MHz
<b>Frequency Range</b>	1GHz ~ 25GHz	<b>Detector Function</b>	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	119.4 PK			3.02 H	360	122.2	-2.8
2	*2462.00	104.7 AV			3.02 H	360	107.5	-2.8
3	2483.50	64.5 PK	74.0	-9.5	3.02 H	360	67.3	-2.8
4	2483.50	51.7 AV	54.0	-2.3	3.02 H	360	54.5	-2.8
5	4924.00	39.2 PK	74.0	-34.8	1.13 H	28	37.4	1.8
6	4924.00	26.2 AV	54.0	-27.8	1.13 H	28	24.4	1.8
7	7386.00	43.6 PK	74.0	-30.4	1.82 H	119	36.2	7.4
8	7386.00	31.2 AV	54.0	-22.8	1.82 H	119	23.8	7.4

**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	*2462.00	115.5 PK			3.83 V	134	118.3	-2.8
2	*2462.00	102.2 AV			3.83 V	134	105.0	-2.8
3	2483.50	66.4 PK	74.0	-7.6	3.83 V	134	69.2	-2.8
<b>4</b>	<b>2483.50</b>	<b>53.0 AV</b>	<b>54.0</b>	<b>-1.0</b>	<b>3.83 V</b>	<b>134</b>	<b>55.8</b>	<b>-2.8</b>
5	4924.00	38.9 PK	74.0	-35.1	1.23 V	177	37.1	1.8
6	4924.00	26.5 AV	54.0	-27.5	1.23 V	177	24.7	1.8
7	7386.00	43.0 PK	74.0	-31.0	1.05 V	271	35.6	7.4
8	7386.00	31.0 AV	54.0	-23.0	1.05 V	271	23.6	7.4

**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.

<b>RF Mode</b>	TX 802.11ax (HE40)	<b>Channel</b>	CH 3 : 2422 MHz
<b>Frequency Range</b>	1GHz ~ 25GHz	<b>Detector Function</b>	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	2386.10	65.0 PK	74.0	-9.0	1.00 H	337	67.7	-2.7
2	2386.10	51.9 AV	54.0	-2.1	1.00 H	337	54.6	-2.7
3	2390.00	62.6 PK	74.0	-11.4	1.00 H	337	65.3	-2.7
4	2390.00	46.7 AV	54.0	-7.3	1.00 H	337	49.4	-2.7
5	*2422.00	111.8 PK			1.00 H	337	114.5	-2.7
6	*2422.00	99.0 AV			1.00 H	337	101.7	-2.7
7	4844.00	39.9 PK	74.0	-34.1	1.14 H	32	38.1	1.8
8	4844.00	26.3 AV	54.0	-27.7	1.14 H	32	24.5	1.8
9	7266.00	44.0 PK	74.0	-30.0	1.76 H	120	36.7	7.3
10	7266.00	31.5 AV	54.0	-22.5	1.76 H	120	24.2	7.3

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	2386.10	62.8 PK	74.0	-11.2	3.79 V	92	65.5	-2.7
2	2386.10	46.7 AV	54.0	-7.3	3.79 V	92	49.4	-2.7
3	2390.00	64.4 PK	74.0	-9.6	3.79 V	92	67.1	-2.7
4	2390.00	52.7 AV	54.0	-1.3	3.79 V	92	55.4	-2.7
5	*2422.00	110.3 PK			3.79 V	92	113.0	-2.7
6	*2422.00	98.3 AV			3.79 V	92	101.0	-2.7
7	4844.00	38.1 PK	74.0	-35.9	1.26 V	150	36.3	1.8
8	4844.00	25.9 AV	54.0	-28.1	1.26 V	150	24.1	1.8
9	7266.00	43.3 PK	74.0	-30.7	1.04 V	266	36.0	7.3
10	7266.00	31.1 AV	54.0	-22.9	1.04 V	266	23.8	7.3

**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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency.

<b>RF Mode</b>	TX 802.11ax (HE40)	<b>Channel</b>	CH 6 : 2437 MHz
<b>Frequency Range</b>	1GHz ~ 25GHz	<b>Detector Function</b>	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	66.0 PK	74.0	-8.0	3.65 H	339	68.7	-2.7
2	2390.00	52.1 AV	54.0	-1.9	3.65 H	339	54.8	-2.7
3	*2437.00	116.0 PK			3.65 H	339	118.7	-2.7
4	*2437.00	103.3 AV			3.65 H	339	106.0	-2.7
5	2483.50	61.5 PK	74.0	-12.5	3.65 H	339	64.3	-2.8
6	2483.50	48.8 AV	54.0	-5.2	3.65 H	339	51.6	-2.8
7	4874.00	39.3 PK	74.0	-34.7	1.09 H	2	37.6	1.7
8	4874.00	26.2 AV	54.0	-27.8	1.09 H	2	24.5	1.7
9	7311.00	43.9 PK	74.0	-30.1	1.77 H	121	36.7	7.2
10	7311.00	31.5 AV	54.0	-22.5	1.77 H	121	24.3	7.2

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	65.7 PK	74.0	-8.3	2.66 V	86	68.4	-2.7
2	2390.00	52.7 AV	54.0	-1.3	2.66 V	86	55.4	-2.7
3	*2437.00	115.3 PK			2.66 V	86	118.0	-2.7
4	*2437.00	102.8 AV			2.66 V	86	105.5	-2.7
5	2483.50	61.7 PK	74.0	-12.3	2.66 V	86	64.5	-2.8
6	2483.50	49.1 AV	54.0	-4.9	2.66 V	86	51.9	-2.8
7	4874.00	38.2 PK	74.0	-35.8	1.24 V	161	36.5	1.7
8	4874.00	26.0 AV	54.0	-28.0	1.24 V	161	24.3	1.7
9	7311.00	43.2 PK	74.0	-30.8	1.05 V	279	36.0	7.2
10	7311.00	30.8 AV	54.0	-23.2	1.05 V	279	23.6	7.2

**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.

<b>RF Mode</b>	TX 802.11ax (HE40)	<b>Channel</b>	CH 9 : 2452 MHz
<b>Frequency Range</b>	1GHz ~ 25GHz	<b>Detector Function</b>	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	108.7 PK			3.66 H	334	111.4	-2.7
2	*2452.00	96.2 AV			3.66 H	334	98.9	-2.7
3	2483.50	59.7 PK	74.0	-14.3	3.66 H	334	62.5	-2.8
4	2483.50	47.6 AV	54.0	-6.4	3.66 H	334	50.4	-2.8
5	2486.17	64.8 PK	74.0	-9.2	3.66 H	334	67.6	-2.8
6	2486.17	47.6 AV	54.0	-6.4	3.66 H	334	50.4	-2.8
7	2489.72	64.5 PK	74.0	-9.5	3.66 H	334	67.3	-2.8
8	2489.72	51.2 AV	54.0	-2.8	3.66 H	334	54.0	-2.8
9	4904.00	39.6 PK	74.0	-34.4	1.09 H	23	37.9	1.7
10	4904.00	26.2 AV	54.0	-27.8	1.09 H	23	24.5	1.7
11	7356.00	43.6 PK	74.0	-30.4	1.72 H	108	36.3	7.3
12	7356.00	31.3 AV	54.0	-22.7	1.72 H	108	24.0	7.3

**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	111.1 PK			3.87 V	92	113.8	-2.7
2	*2452.00	97.4 AV			3.87 V	92	100.1	-2.7
3	2483.50	62.7 PK	74.0	-11.3	3.87 V	92	65.5	-2.8
4	2483.50	49.8 AV	54.0	-4.2	3.87 V	92	52.6	-2.8
5	2486.17	65.9 PK	74.0	-8.1	3.87 V	92	68.7	-2.8
6	2486.17	52.8 AV	54.0	-1.2	3.87 V	92	55.6	-2.8
7	2489.72	62.0 PK	74.0	-12.0	3.87 V	92	64.8	-2.8
8	2489.72	48.8 AV	54.0	-5.2	3.87 V	92	51.6	-2.8
9	4904.00	38.1 PK	74.0	-35.9	1.23 V	172	36.4	1.7
10	4904.00	26.2 AV	54.0	-27.8	1.23 V	172	24.5	1.7
11	7356.00	42.9 PK	74.0	-31.1	1.03 V	274	35.6	7.3
12	7356.00	30.5 AV	54.0	-23.5	1.03 V	274	23.2	7.3

**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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* " : Fundamental frequency.

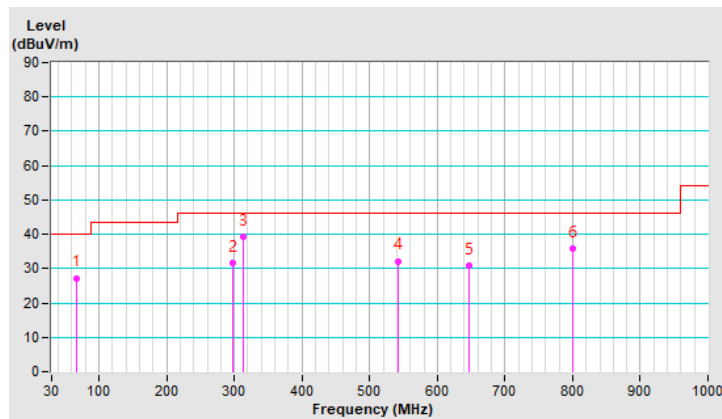
### Below 1GHz Data:

<b>RF Mode</b>	TX 802.11b	<b>Channel</b>	CH 11 : 2462 MHz
<b>Frequency Range</b>	9kHz ~ 1GHz	<b>Detector Function</b>	Quasi-Peak (QP)

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	66.86	27.3 QP	40.0	-12.7	3.00 H	70	41.6	-14.3
2	297.30	31.5 QP	46.0	-14.5	1.00 H	53	43.9	-12.4
3	313.31	39.4 QP	46.0	-6.6	1.50 H	305	51.3	-11.9
4	542.69	32.2 QP	46.0	-13.8	1.50 H	161	39.0	-6.8
5	646.32	31.0 QP	46.0	-15.0	1.50 H	134	35.6	-4.6
6	799.98	35.7 QP	46.0	-10.3	1.00 H	256	38.1	-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 of frequency range 30MHz~1000MHz.
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.



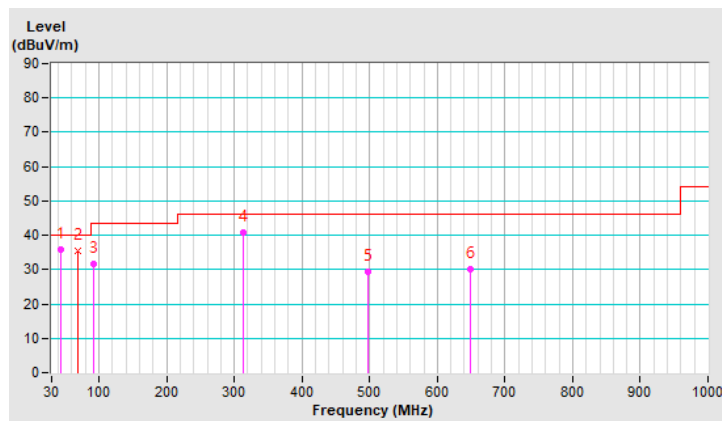
<b>RF Mode</b>	TX 802.11b	<b>Channel</b>	CH 11 : 2462 MHz
<b>Frequency Range</b>	9kHz ~ 1GHz	<b>Detector Function</b>	Quasi-Peak (QP)

**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	43.39	35.7 QP	40.0	-4.3	1.50 V	175	48.6	-12.9
2	67.98	35.6 QP	40.0	-4.4	1.00 V	68	50.1	-14.5
3	92.81	31.8 QP	43.5	-11.7	1.00 V	175	50.2	-18.4
4	312.48	40.7 QP	46.0	-5.3	1.00 V	265	52.7	-12.0
5	496.69	29.5 QP	46.0	-16.5	2.00 V	176	37.2	-7.7
6	649.47	30.2 QP	46.0	-15.8	1.00 V	294	34.8	-4.6

**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 of frequency range 30MHz~1000MHz.
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.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 20, 2020	Oct. 19, 2021
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 27, 2020	Oct. 26, 2021
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 26, 2021	Mar. 25, 2022
50 ohms Terminator	50	3	Oct. 26, 2020	Oct. 25, 2021
RF Cable	5D-FB	COCCAB-001	Sep. 26, 2020	Sep. 25, 2021
Fixed attenuator EMCI	STI02-2200-10	005	Aug. 29, 2020	Aug. 28, 2021
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

**Note:**

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conduction 1.
- 3 Tested Date: May 15, 2021

#### 4.2.3 Test Procedures

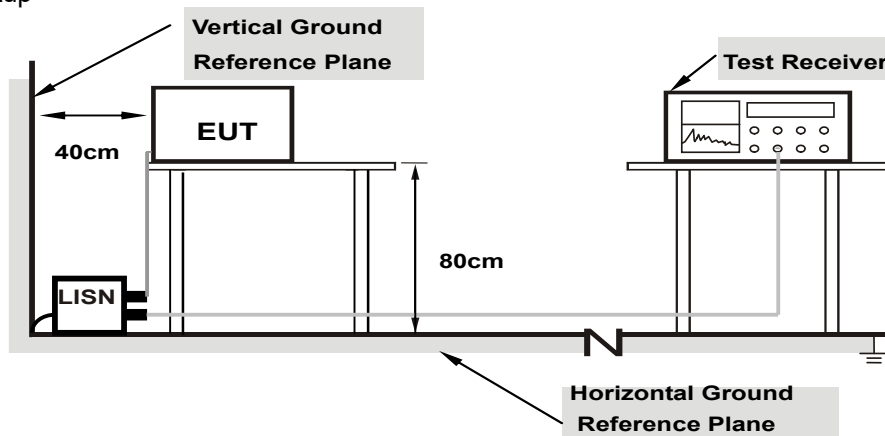
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance 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.



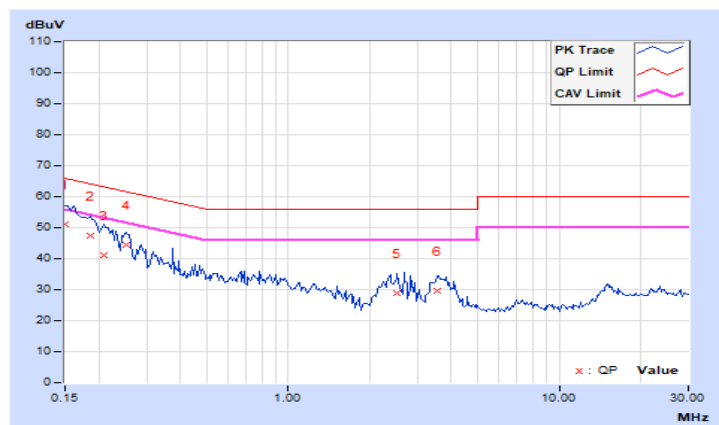
## 4.2.7 Test Results

<b>RF Mode</b>	TX 802.11b	<b>Channel</b>	CH 11 : 2462 MHz
<b>Frequency Range</b>	150kHz ~ 30MHz	<b>Detector Function &amp; Resolution Bandwidth</b>	Quasi-Peak (QP) / Average (AV), 9kHz

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.96	41.32	31.10	51.28	41.06	66.00	56.00	-14.72	-14.94
2	0.18516	9.98	37.53	28.94	47.51	38.92	64.25	54.25	-16.74	-15.33
3	0.20859	9.99	31.02	21.82	41.01	31.81	63.26	53.26	-22.25	-21.45
4	0.25156	10.00	34.42	26.82	44.42	36.82	61.71	51.71	-17.29	-14.89
5	2.53125	10.18	18.56	9.82	28.74	20.00	56.00	46.00	-27.26	-26.00
6	3.55078	10.25	19.24	9.91	29.49	20.16	56.00	46.00	-26.51	-25.84

## 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

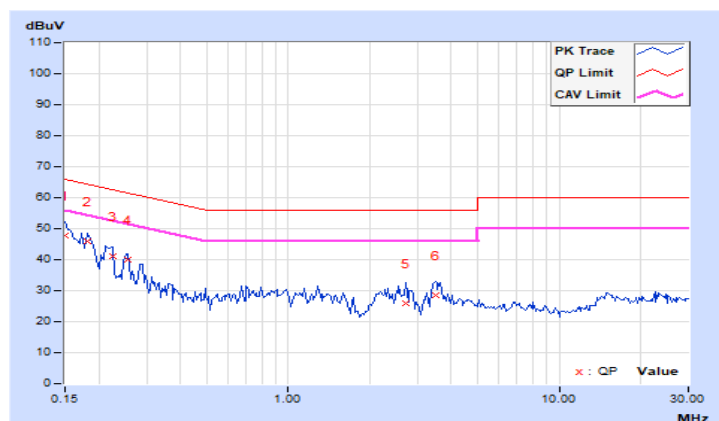


<b>RF Mode</b>	TX 802.11b	<b>Channel</b>	CH 11 : 2462 MHz
<b>Frequency Range</b>	150kHz ~ 30MHz	<b>Detector Function &amp; Resolution Bandwidth</b>	Quasi-Peak (QP) / Average (AV), 9kHz

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.94	37.90	27.29	47.84	37.23	66.00	56.00	-18.16	-18.77
2	0.18125	9.97	36.08	25.24	46.05	35.21	64.43	54.43	-18.38	-19.22
3	0.22422	9.98	31.06	19.67	41.04	29.65	62.66	52.66	-21.62	-23.01
4	0.25547	9.99	29.92	23.05	39.91	33.04	61.58	51.58	-21.67	-18.54
5	2.70703	10.18	15.81	7.48	25.99	17.66	56.00	46.00	-30.01	-28.34
6	3.49609	10.22	18.37	9.77	28.59	19.99	56.00	46.00	-27.41	-26.01

**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

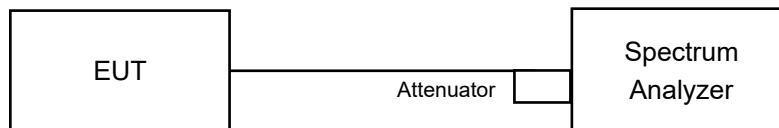


### 4.3 6dB Bandwidth Measurement

#### 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

- a. Set resolution bandwidth (RBW) = 100kHz
- b. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
- c. Trace mode = max hold.
- d. Sweep = auto couple.
- e. 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	8.09	8.09	0.5	Pass
6	2437	8.08	8.09	0.5	Pass
11	2462	8.08	8.07	0.5	Pass

##### 802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	15.87	15.77	0.5	Pass
6	2437	15.86	15.66	0.5	Pass
11	2462	15.87	16.30	0.5	Pass

##### 802.11ax (HE20)

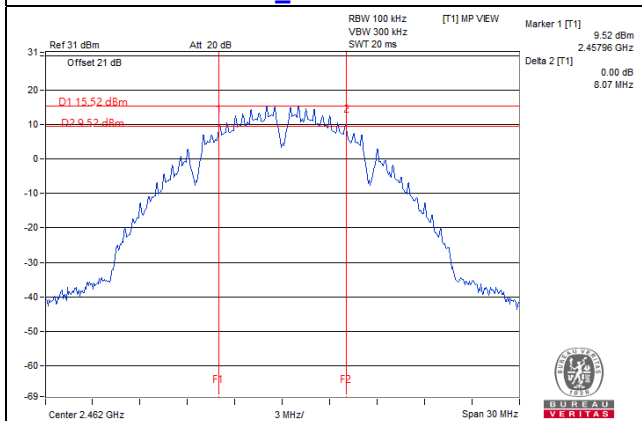
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	18.14	18.11	0.5	Pass
6	2437	18.11	18.00	0.5	Pass
11	2462	18.45	18.13	0.5	Pass

##### 802.11ax (HE40)

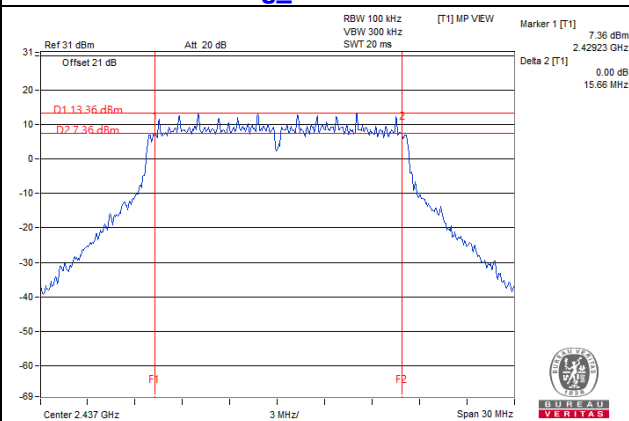
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	37.96	37.62	0.5	Pass
6	2437	37.89	37.69	0.5	Pass
9	2452	37.92	37.93	0.5	Pass

### Spectrum Plot of Worst Value

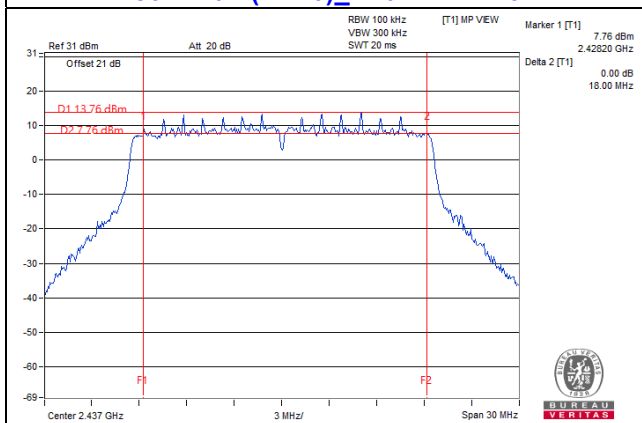
#### 802.11b\_Chain 1 / CH11



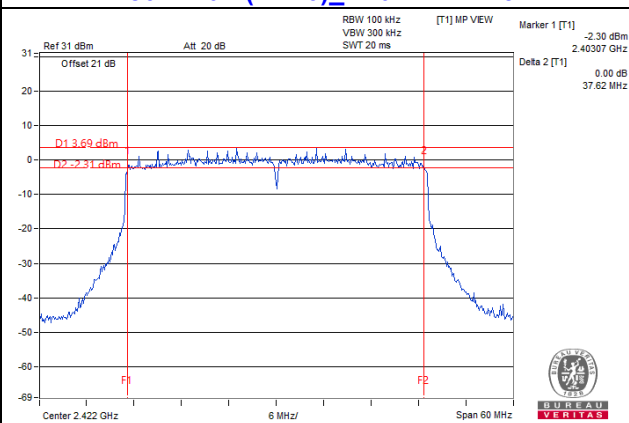
#### 802.11g\_Chain 1 / CH6



#### 802.11ax (HE20)\_Chain 1 / CH6



#### 802.11ax (HE40)\_Chain 1 / CH3



## 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,

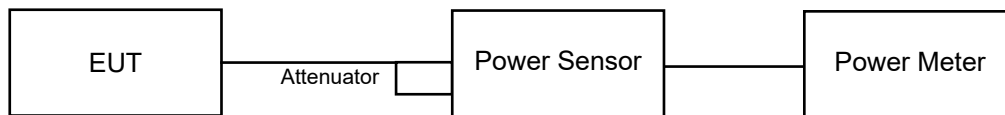
Array Gain = 0 dB (i.e., no array gain) for  $N_{ANT} \leq 4$ ;

Array Gain = 0 dB (i.e., no array gain) for channel widths  $\geq 40$  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

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

##### CDD Mode:

##### 802.11b

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	24.02	24.38	526.505	27.21	30	Pass
6	2437	24.18	24.49	543.008	27.35	30	Pass
11	2462	24.22	24.51	546.729	27.38	30	Pass

##### 802.11g

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	21.50	22.19	306.831	24.87	30	Pass
6	2437	24.12	24.49	539.416	27.32	30	Pass
11	2462	23.11	23.69	438.528	26.42	30	Pass

##### VHT20

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	21.47	22.07	301.346	24.79	30	Pass
6	2437	23.47	24.16	482.946	26.84	30	Pass
11	2462	21.49	22.06	301.623	24.79	30	Pass

##### VHT40

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	17.29	17.32	107.531	20.32	30	Pass
6	2437	22.35	23.01	371.777	25.70	30	Pass
9	2452	17.19	17.49	108.465	20.35	30	Pass

##### 802.11ax (HE20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	21.56	22.13	306.524	24.86	30	Pass
6	2437	23.62	24.20	493.171	26.93	30	Pass
11	2462	21.54	22.16	306.998	24.87	30	Pass

##### 802.11ax (HE40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	17.43	17.45	110.925	20.45	30	Pass
6	2437	22.48	23.05	378.848	25.78	30	Pass
9	2452	17.31	17.64	111.903	20.49	30	Pass

### Beamforming Mode:

#### VHT20

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	22.99	22.13	362.373	25.59	30	Pass
6	2437	24.07	23.62	485.414	26.86	30	Pass
11	2462	22.02	21.60	303.765	24.83	30	Pass

Note: The directional gain =  $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 5.01 \text{ dBi} < 6\text{dBi}$ , so the power limit shall not be reduced.

#### VHT40

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	17.40	17.04	105.537	20.23	30	Pass
6	2437	21.05	20.45	238.268	23.77	30	Pass
9	2452	17.42	17.09	106.376	20.27	30	Pass

Note: The directional gain =  $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 5.01 \text{ dBi} < 6\text{dBi}$ , so the power limit shall not be reduced.

#### 802.11ax (HE20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	23.14	22.20	372.022	25.71	30	Pass
6	2437	24.09	23.58	484.483	26.85	30	Pass
11	2462	22.15	21.67	310.952	24.93	30	Pass

Note: The directional gain =  $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 5.01 \text{ dBi} < 6\text{dBi}$ , so the power limit shall not be reduced.

#### 802.11ax (HE40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	17.54	17.18	108.994	20.37	30	Pass
6	2437	21.11	20.48	240.808	23.82	30	Pass
9	2452	17.48	17.21	108.577	20.36	30	Pass

Note: The directional gain =  $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 5.01 \text{ dBi} < 6\text{dBi}$ , so the power limit shall not be reduced.

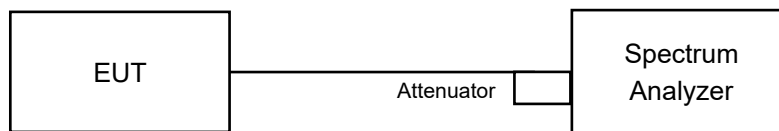


## 4.5 Power Spectral Density Measurement

### 4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz.

### 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

- a. Measure the duty cycle (x).
- b. Set instrument center frequency to DTS channel center frequency.
- c. Set span to at least 1.5 times the OBW.
- d. Set RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- e. Set VBW  $\geq 3 \times \text{RBW}$ .
- f. Detector = power averaging (RMS) or sample detector (when RMS not available).
- g. Ensure that the number of measurement points in the sweep  $\geq 2 \times \text{span}/\text{RBW}$ .
- h. Sweep time = auto couple.
- i. Do not use sweep triggering. Allow sweep to "free run".
- j. Employ trace averaging (RMS) mode over a minimum of 100 traces.
- k. Use the peak marker function to determine the maximum amplitude level.
- l. Add  $10 \log (1/x)$ , where x is the duty cycle measured in step (a), to the measured PSD to compute the average PSD during the actual transmission time.

### 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

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/3kHz)		Duty Factor (dB)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1				
1	2412	-12.30	-12.40	1.83	-7.51	8.00	Pass
6	2437	-12.74	-11.54	1.83	-7.26	8.00	Pass
11	2462	-13.07	-10.80	1.83	-6.95	8.00	Pass

- Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.  
 2. The directional gain =  $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2]$  = 5.01 dBi < 6dBi, so the power density limit shall not be reduced.  
 3. Refer to section 3.3 for duty cycle spectrum plot.

##### 802.11g

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/3kHz)		Duty Factor (dB)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1				
1	2412	-12.78	-11.50	0.29	-8.80	8.00	Pass
6	2437	-10.45	-9.64	0.29	-6.73	8.00	Pass
11	2462	-11.16	-10.02	0.29	-7.26	8.00	Pass

- Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.  
 2. The directional gain =  $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2]$  = 5.01 dBi < 6dBi, so the power density limit shall not be reduced.  
 3. Refer to section 3.3 for duty cycle spectrum plot.

##### 802.11ax (HE20)

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/3kHz)		Duty Factor (dB)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1				
1	2412	-15.56	-15.22	0.24	-12.14	8.00	Pass
6	2437	-13.72	-13.03	0.24	-10.11	8.00	Pass
11	2462	-15.74	-14.99	0.24	-12.10	8.00	Pass

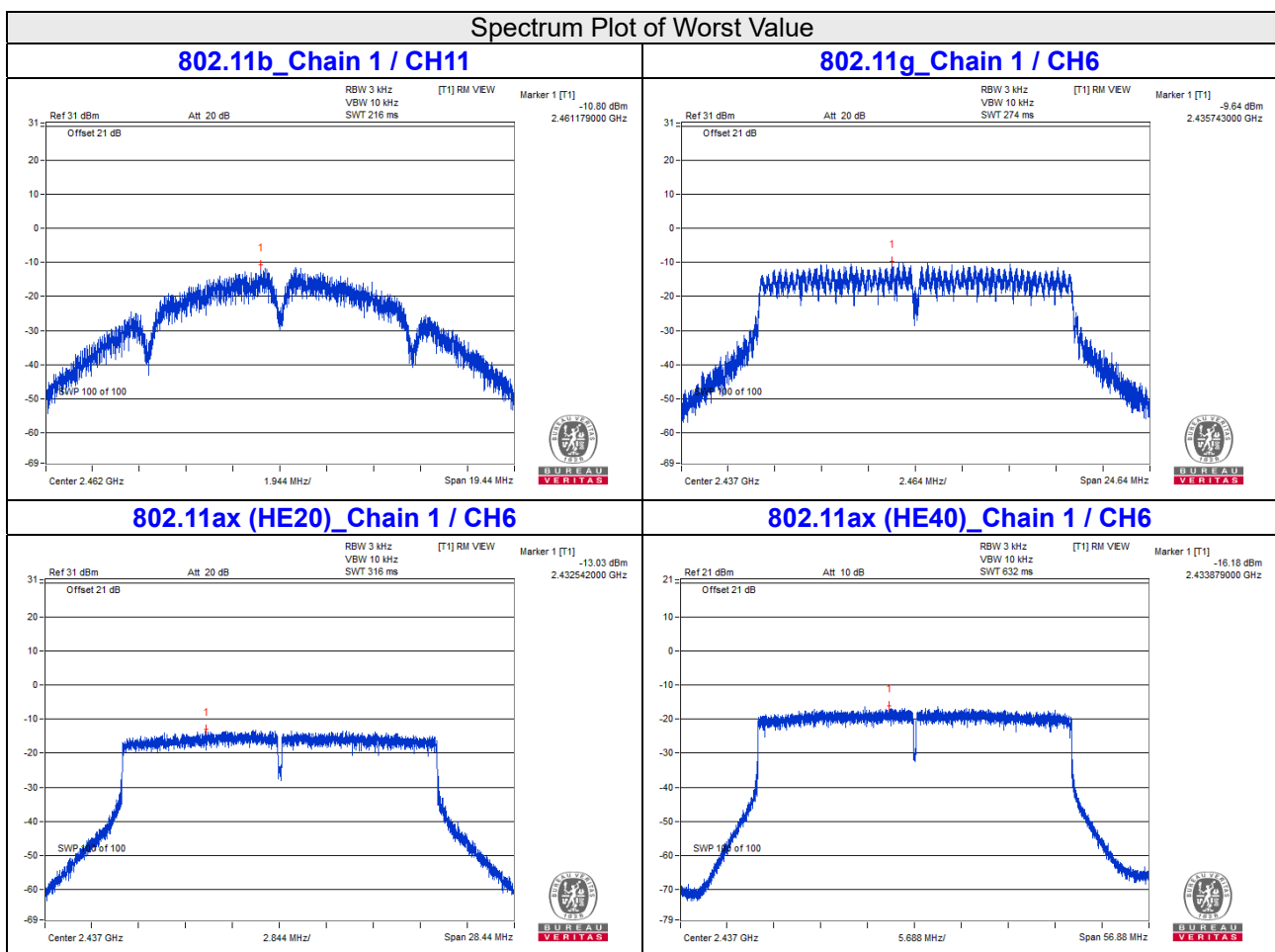
- Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.  
 2. The directional gain =  $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2]$  = 5.01 dBi < 6dBi, so the power density limit shall not be reduced.  
 3. Refer to section 3.3 for duty cycle spectrum plot.

### 802.11ax (HE40)

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/3kHz)		Duty Factor (dB)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1				
3	2422	-22.17	-21.90	0.22	-18.81	8.00	Pass
6	2437	-16.73	-16.18	0.22	-13.22	8.00	Pass
9	2452	-22.06	-22.95	0.22	-19.26	8.00	Pass

- Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.  
 2. The directional gain =  $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 5.01 \text{ dBi} < 6\text{dBi}$ , so the power density limit shall not be reduced.  
 3. Refer to section 3.3 for duty cycle spectrum plot.

### Spectrum Plot of Worst Value

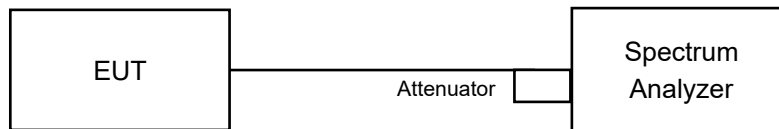


## 4.6 Conducted Out of Band Emission Measurement

### 4.6.1 Limits of Conducted Out of Band Emission Measurement

Below 30dB 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.

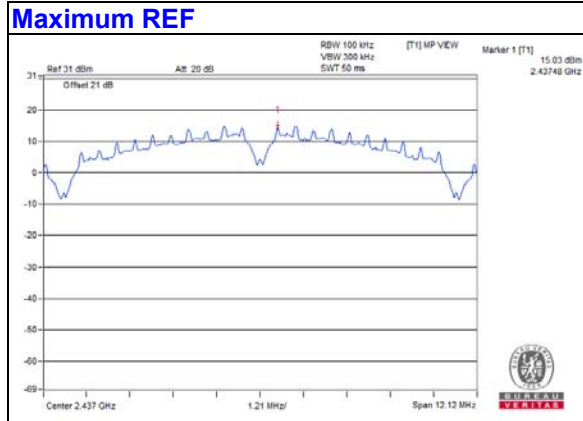
### 4.6.6 EUT Operating Condition

Same as Item 4.3.6

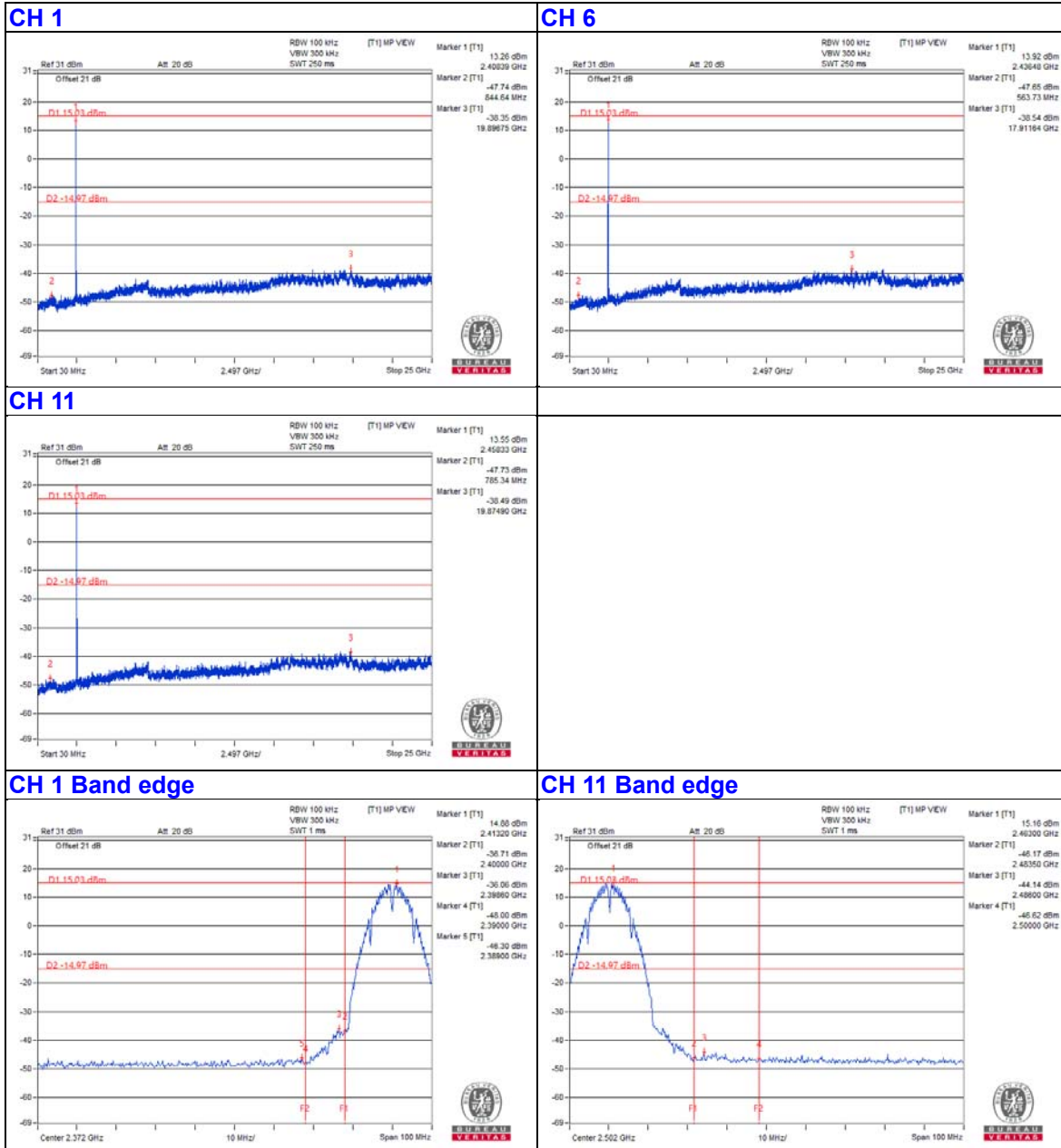
### 4.6.7 Test Results

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

802.11b

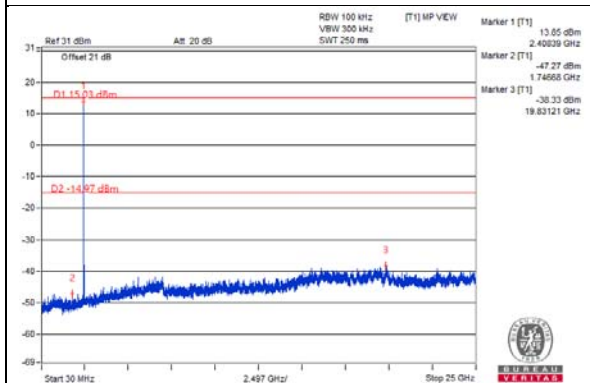


Chain 0

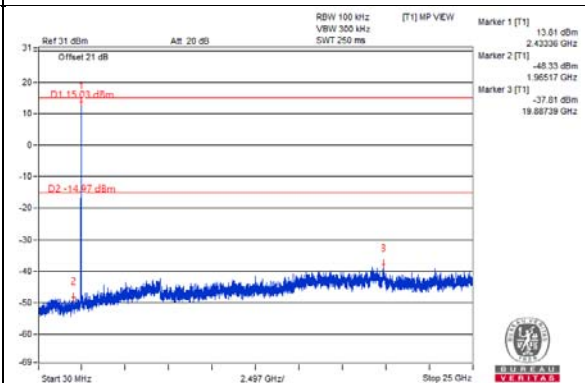


Chain 1

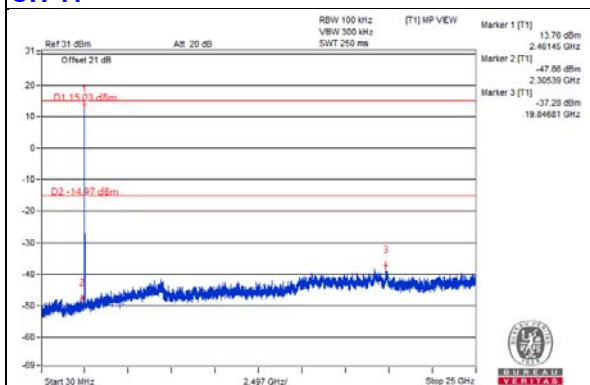
CH 1



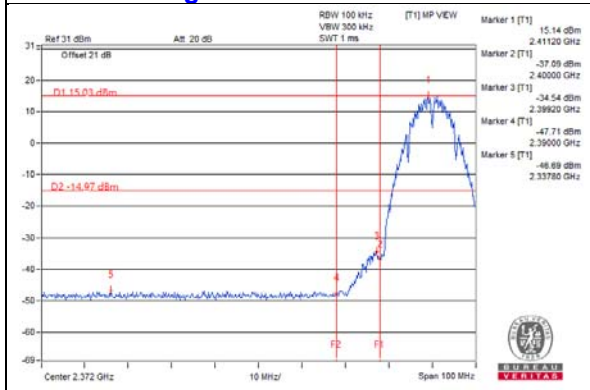
CH 6



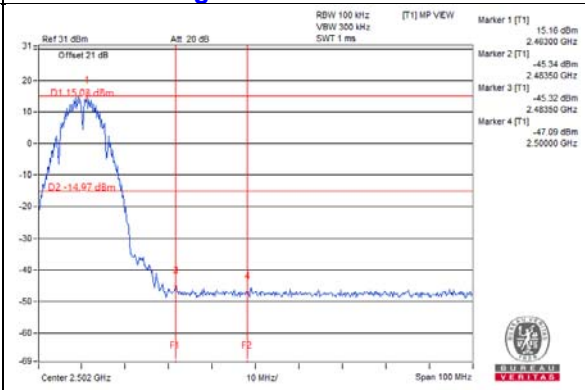
CH 11



CH 1 Band edge

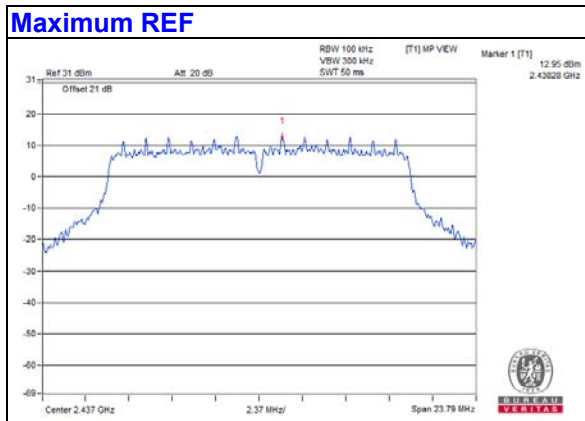


CH 11 Band edge



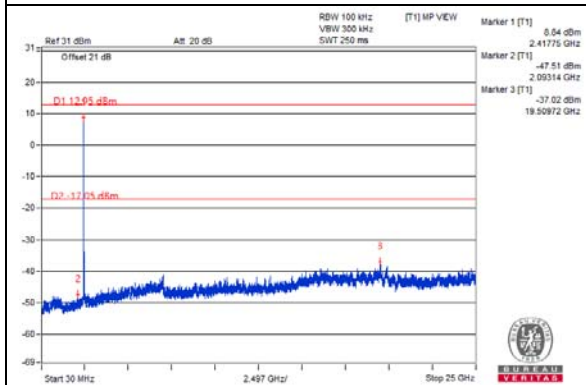
802.11g

Maximum REF

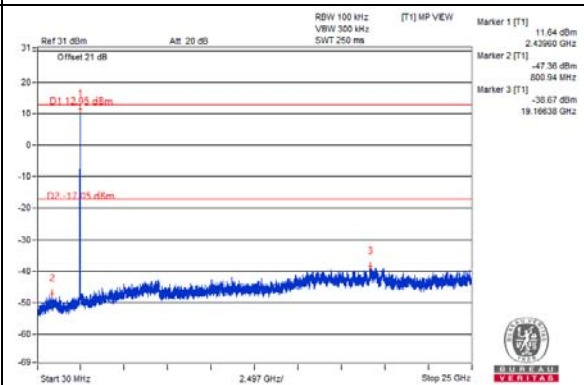


Chain 0

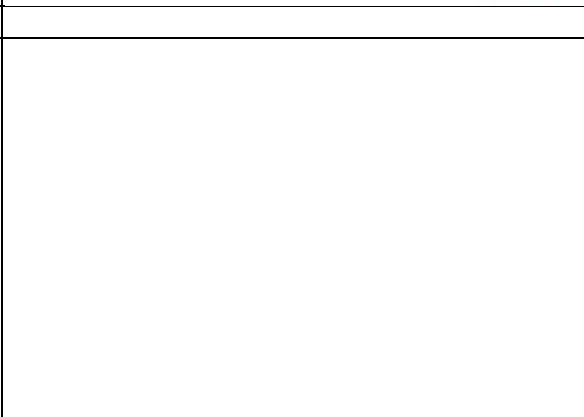
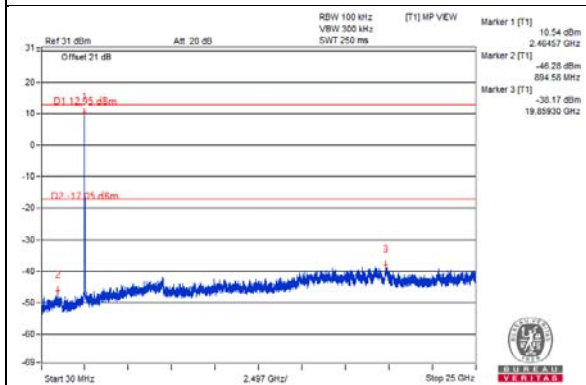
CH 1



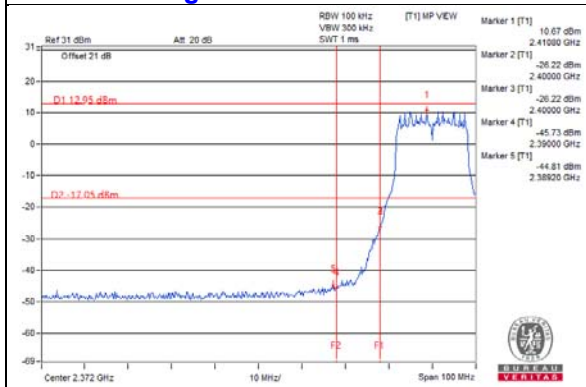
CH 6



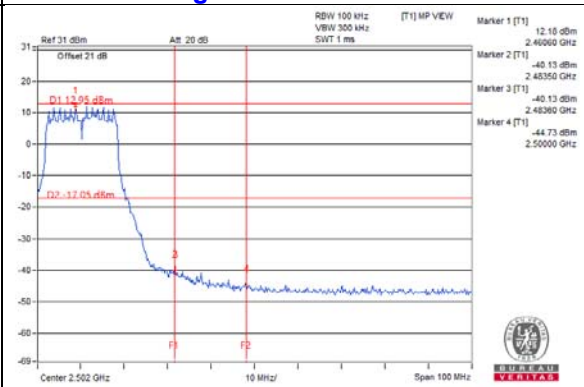
CH 11



CH 1 Band edge

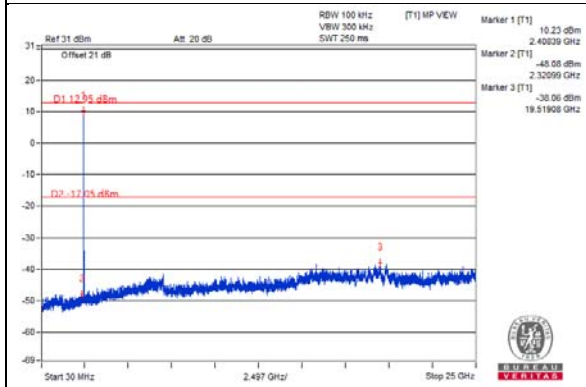


CH 11 Band edge

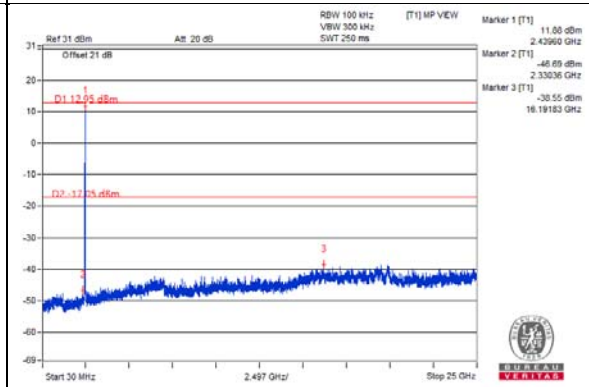


### Chain 1

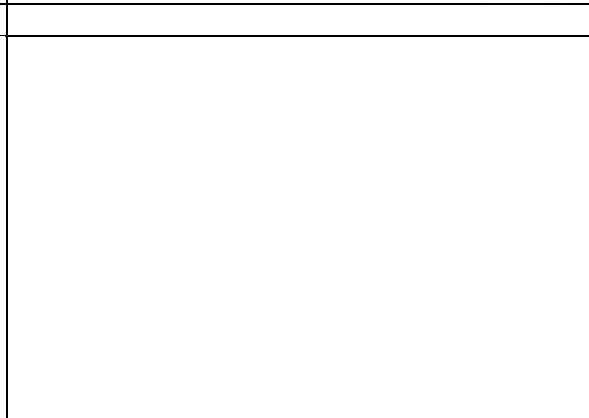
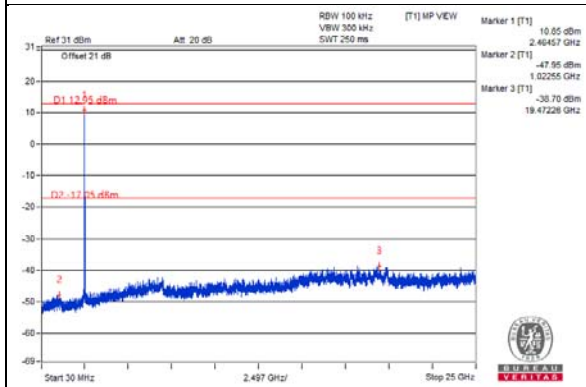
#### CH 1



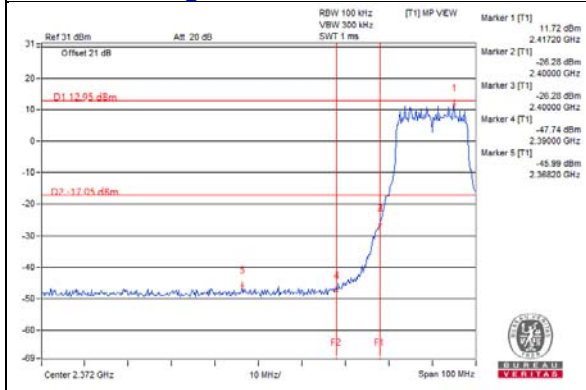
#### CH 6



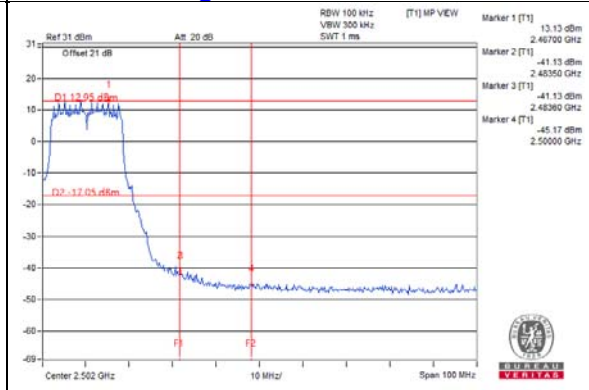
#### CH 11



#### CH 1 Band edge



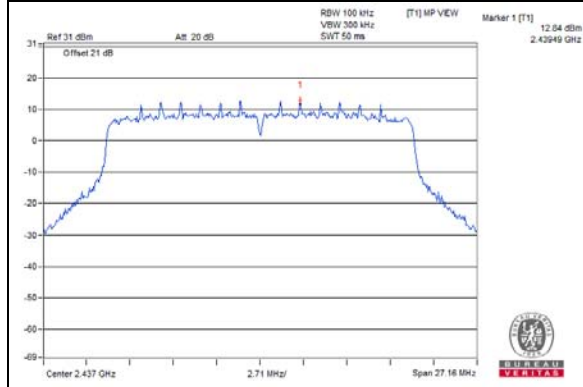
#### CH 11 Band edge





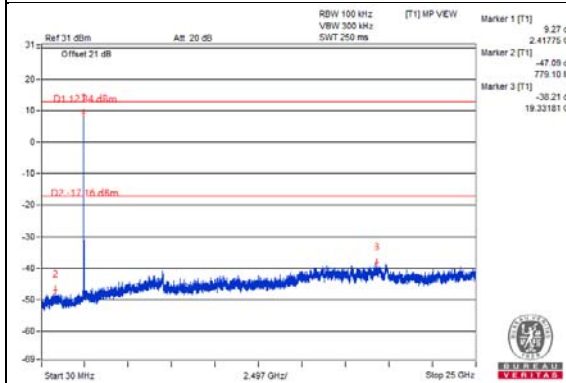
# 802.11ax (HE20)

## Maximum REF

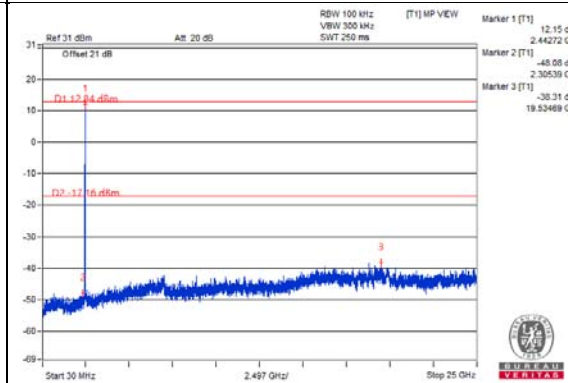


## Chain 0

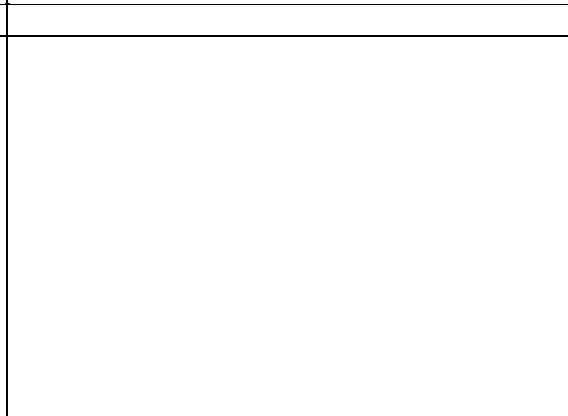
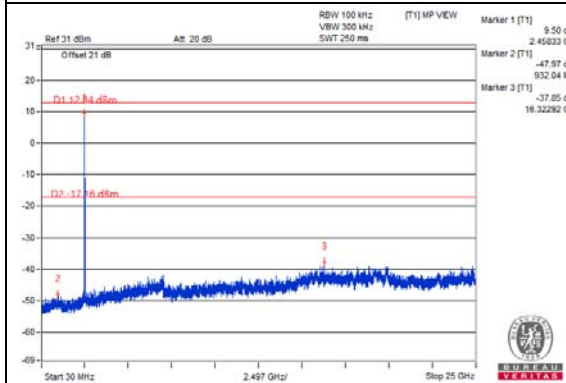
### CH 1



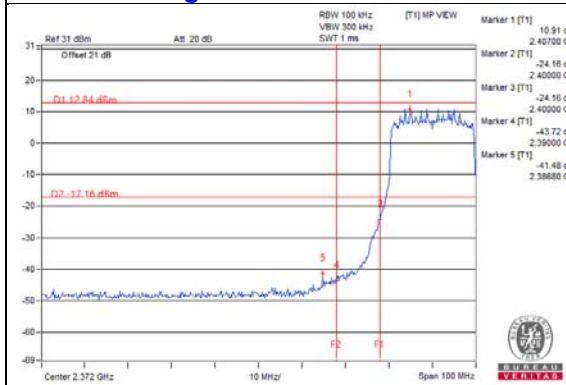
### CH 6



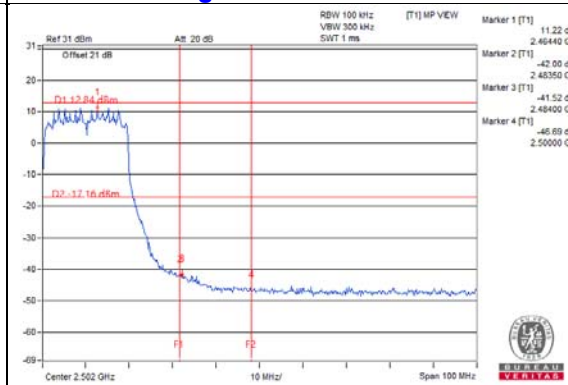
### CH 11



### CH 1 Band edge

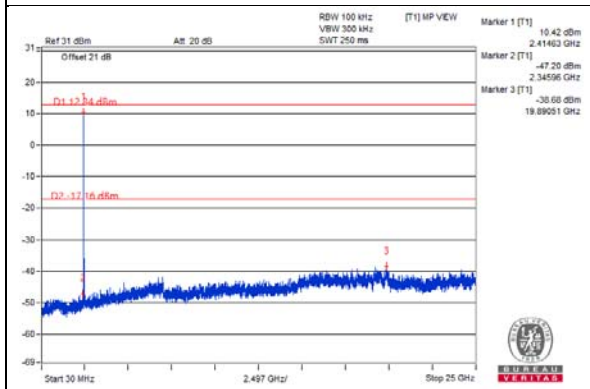


### CH 11 Band edge

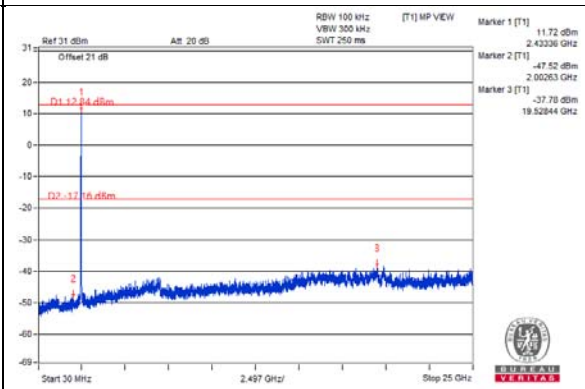


Chain 1

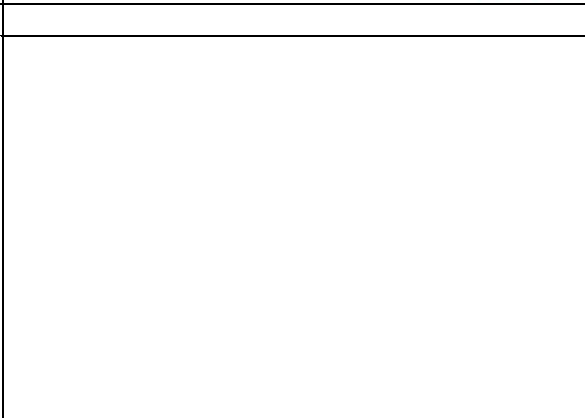
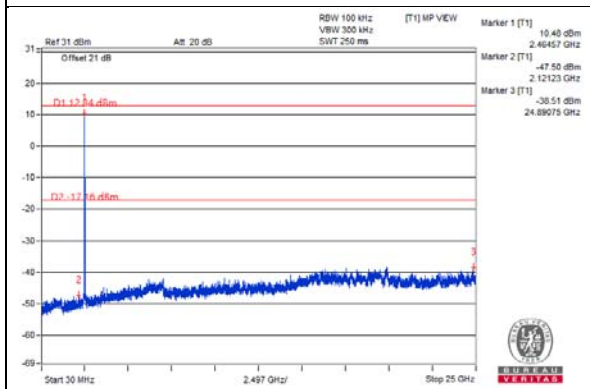
CH 1



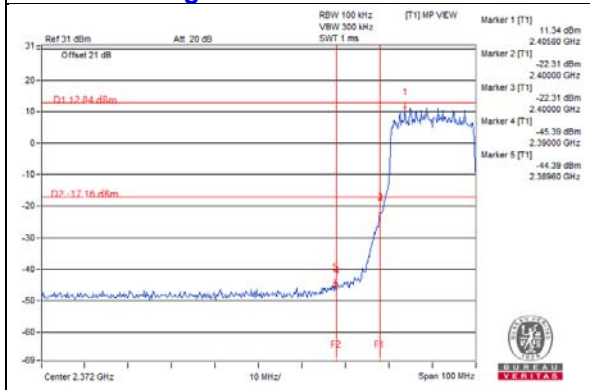
CH 6



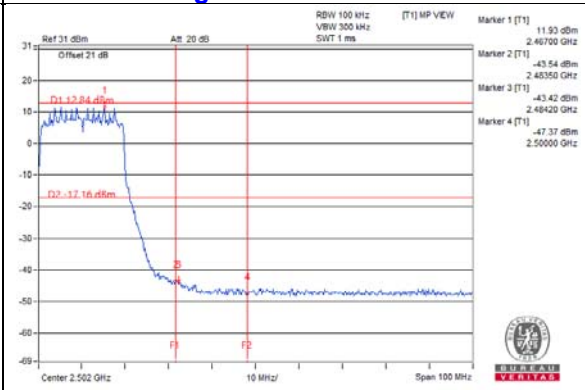
CH 11



CH 1 Band edge

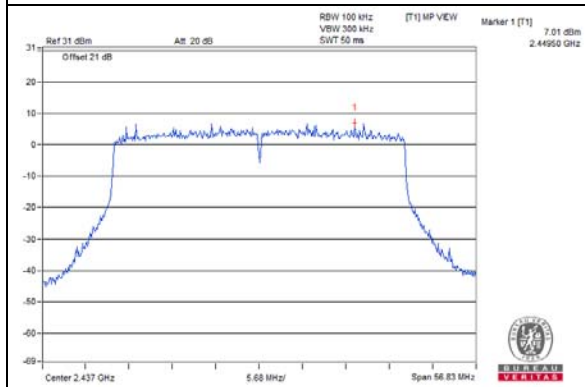


CH 11 Band edge



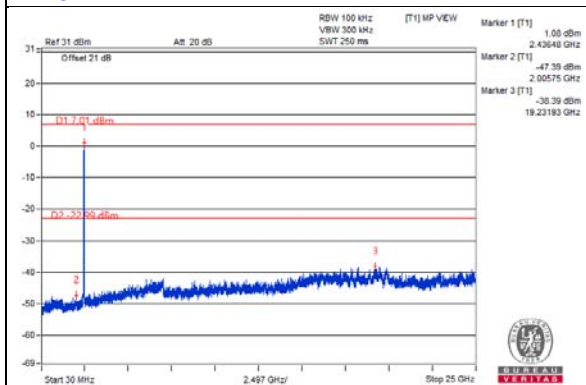
# 802.11ax (HE40)

## Maximum REF

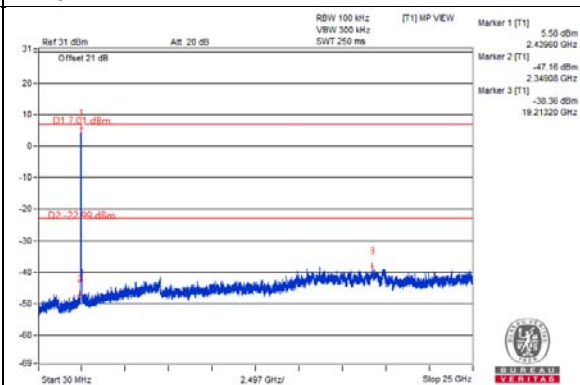


## Chain 0

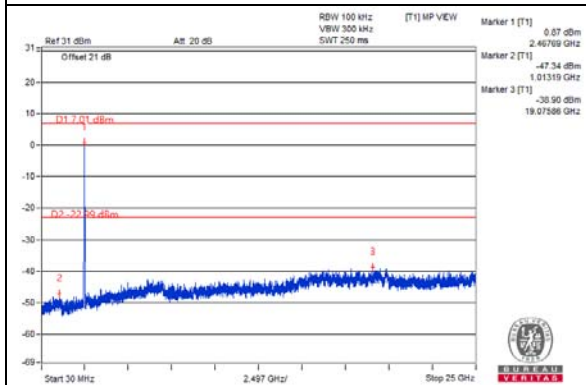
### CH 3



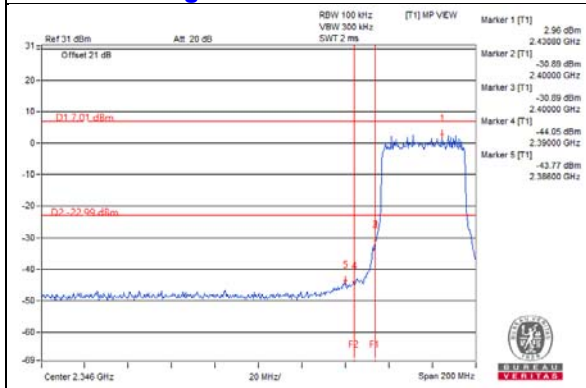
### CH 6



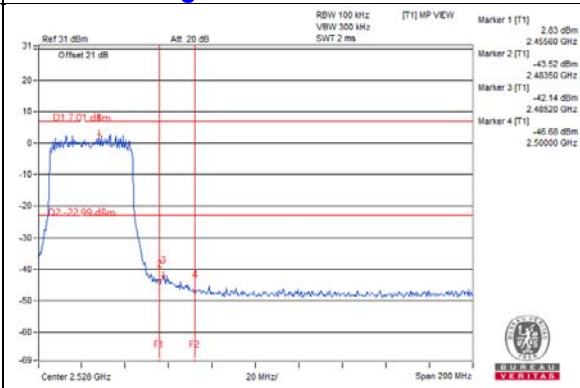
### CH 9



### CH 3 Band edge

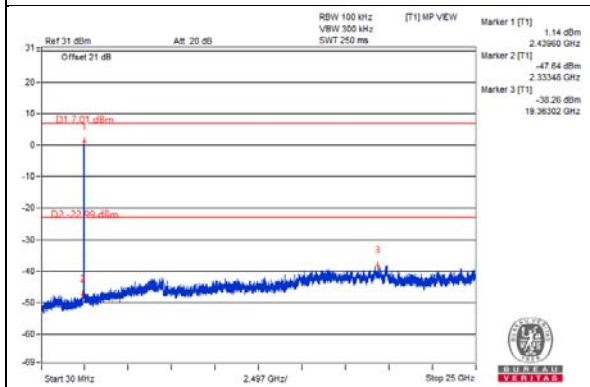


### CH 9 Band edge

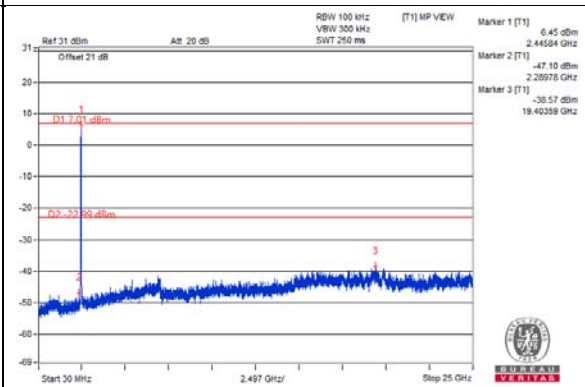


### Chain 1

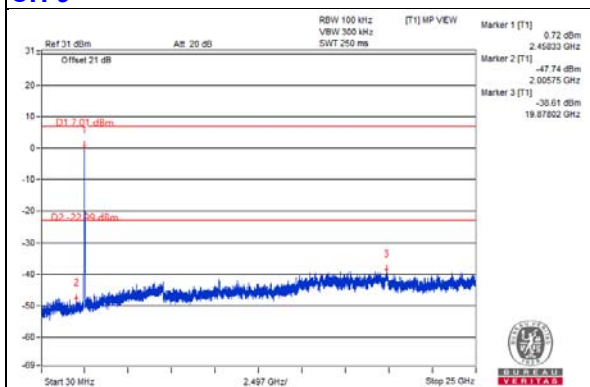
#### CH 3



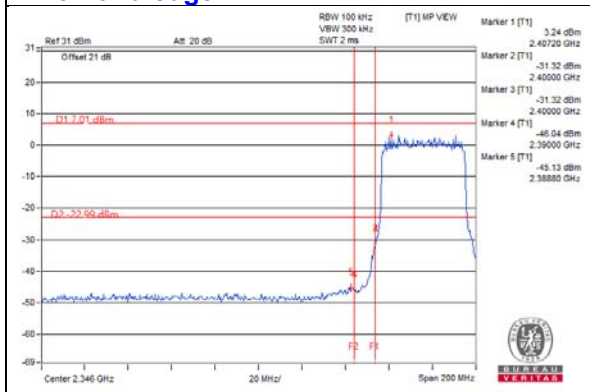
#### CH 6



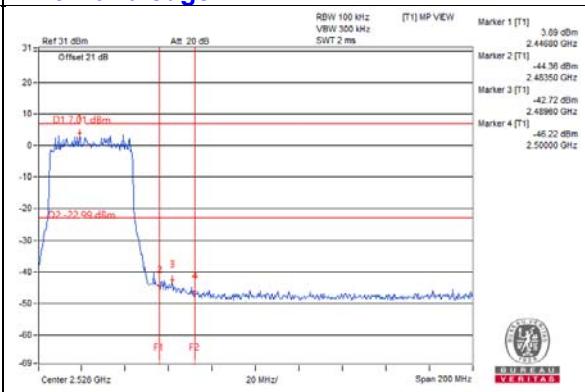
#### CH 9



#### CH 3 Band edge



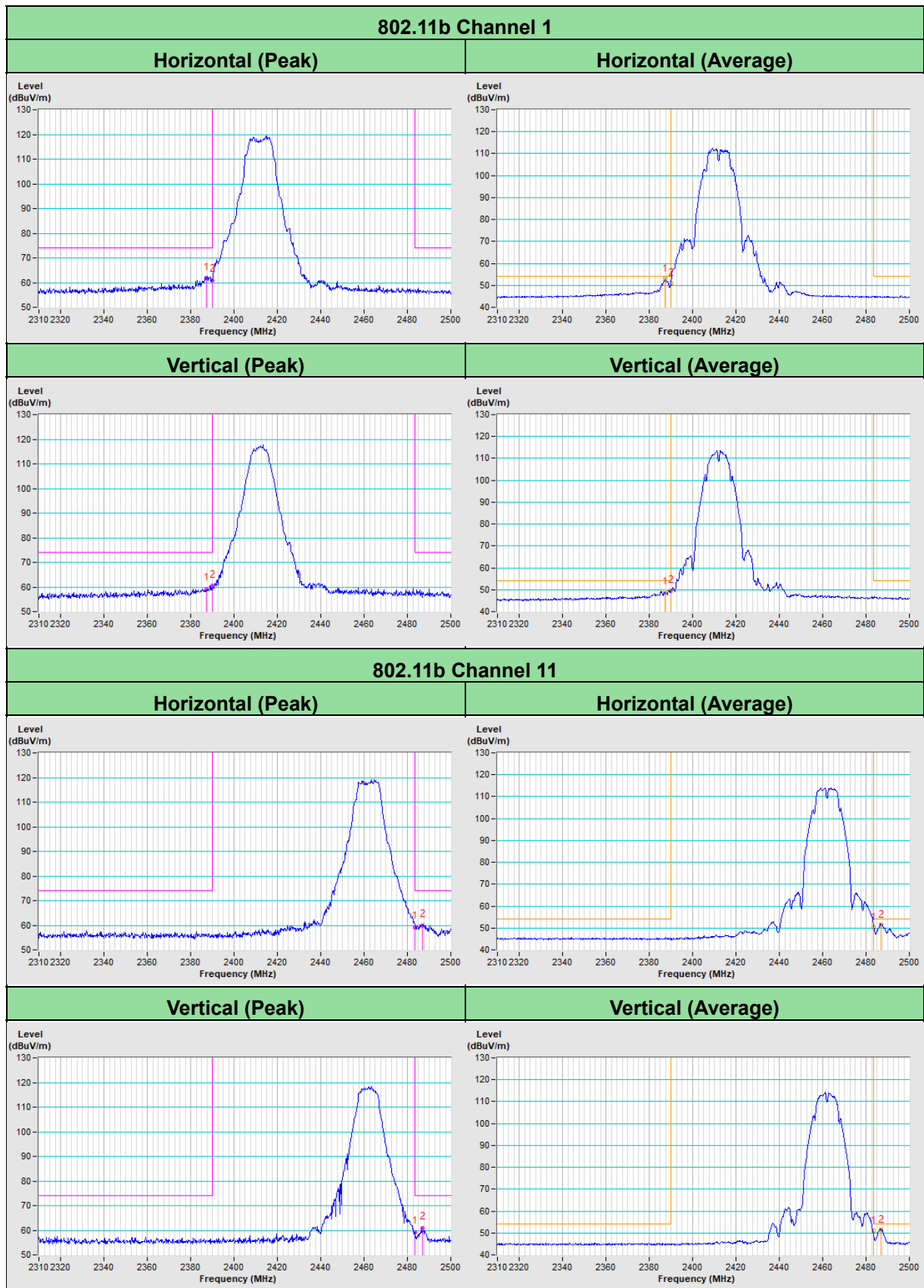
#### CH 9 Band edge



## 5 Pictures of Test Arrangements

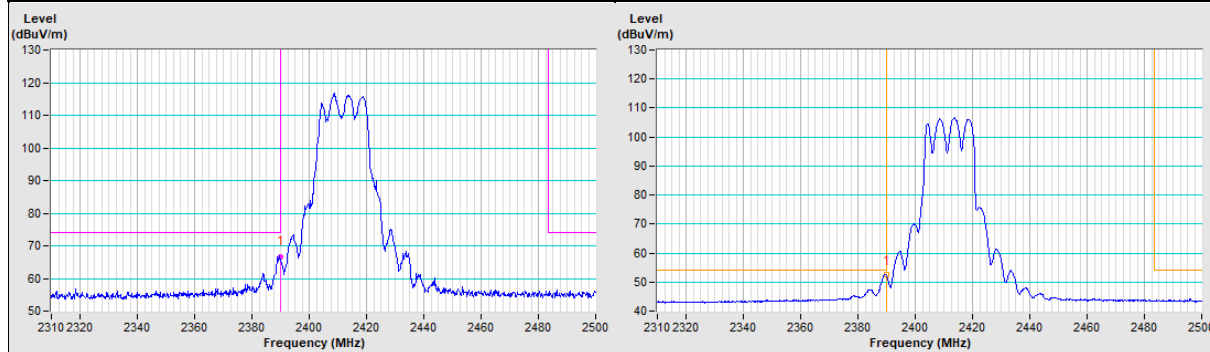
Please refer to the attached file (Test Setup Photo).

### Annex A - Band-Edge Measurement

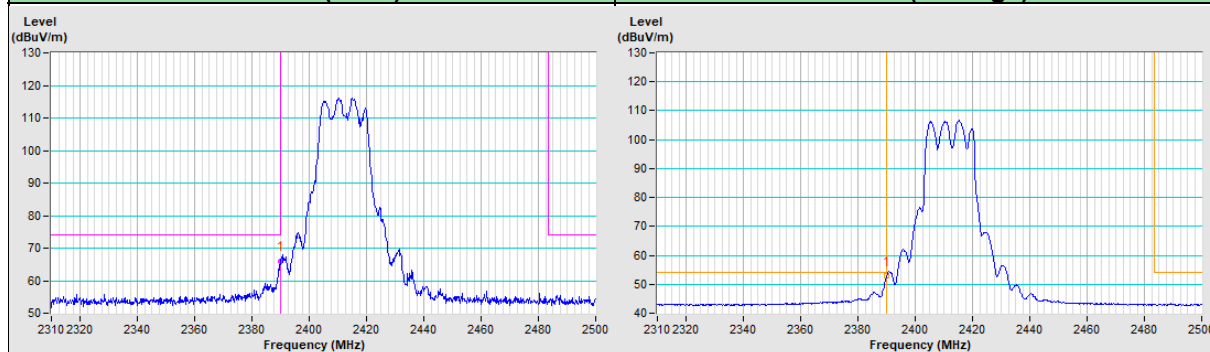


### 802.11g Channel 1

Horizontal (Peak)	Horizontal (Average)
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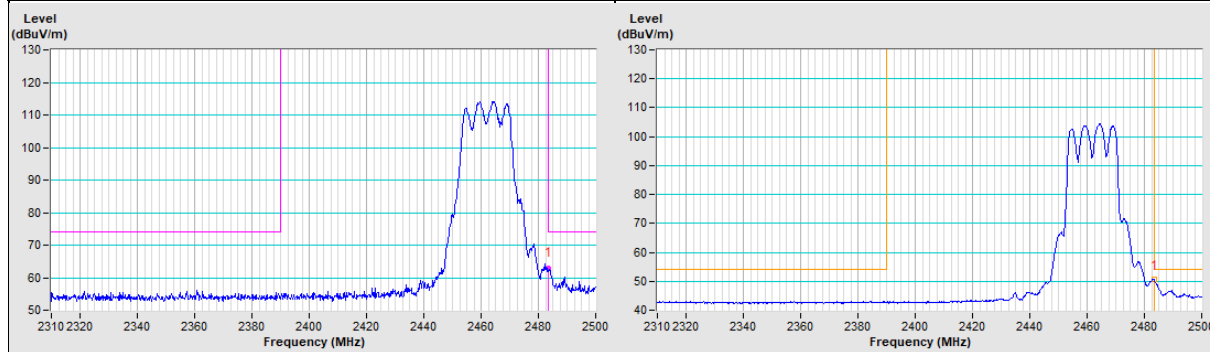


Vertical (Peak)	Vertical (Average)
-----------------	--------------------

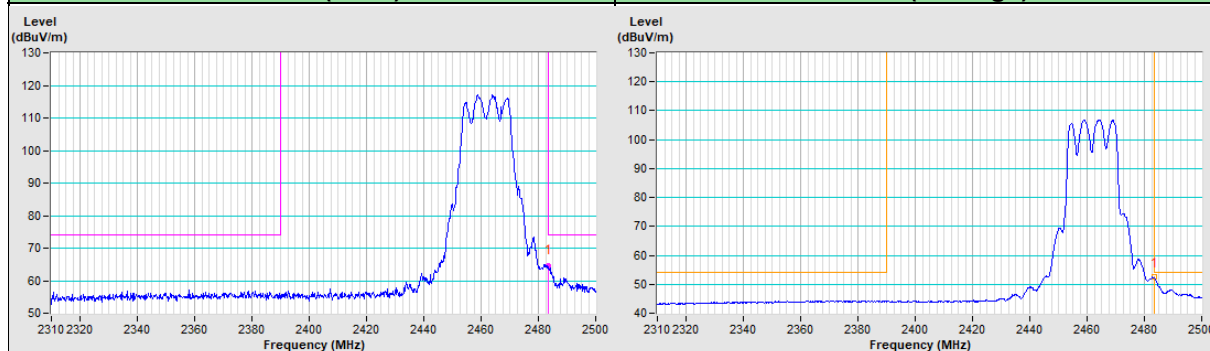


### 802.11g Channel 11

Horizontal (Peak)	Horizontal (Average)
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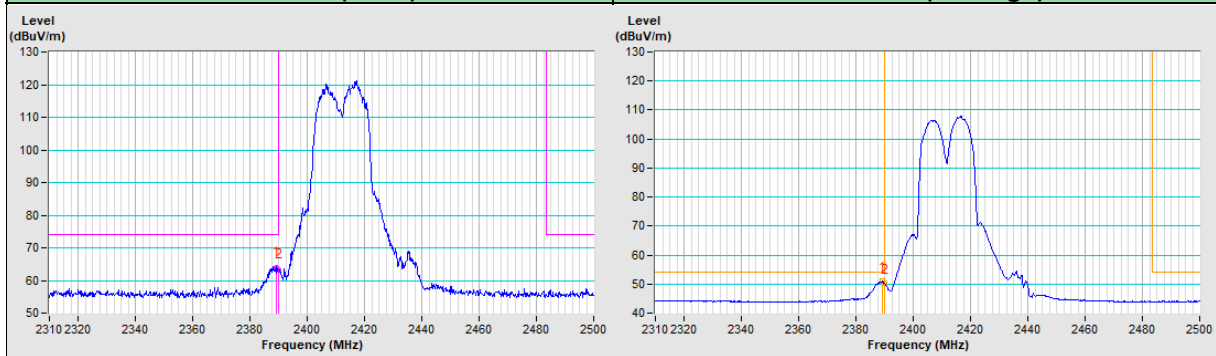


Vertical (Peak)	Vertical (Average)
-----------------	--------------------

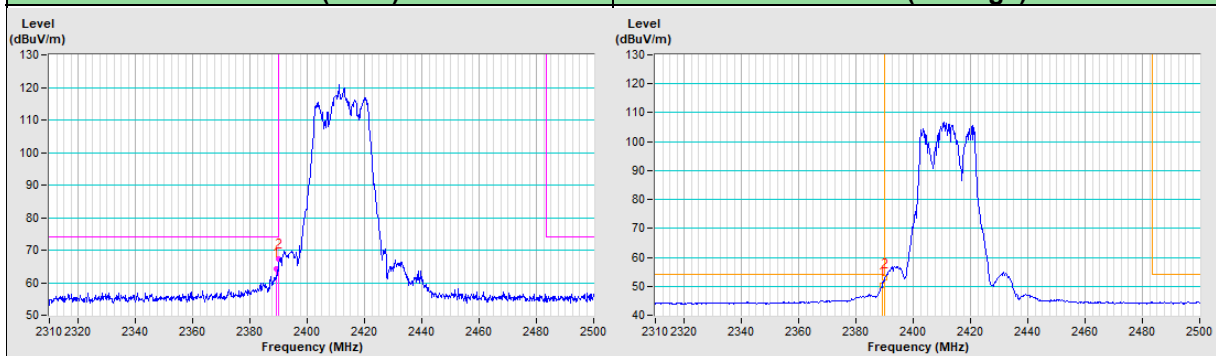


### 802.11ax (HE20) Channel 1

Horizontal (Peak)	Horizontal (Average)
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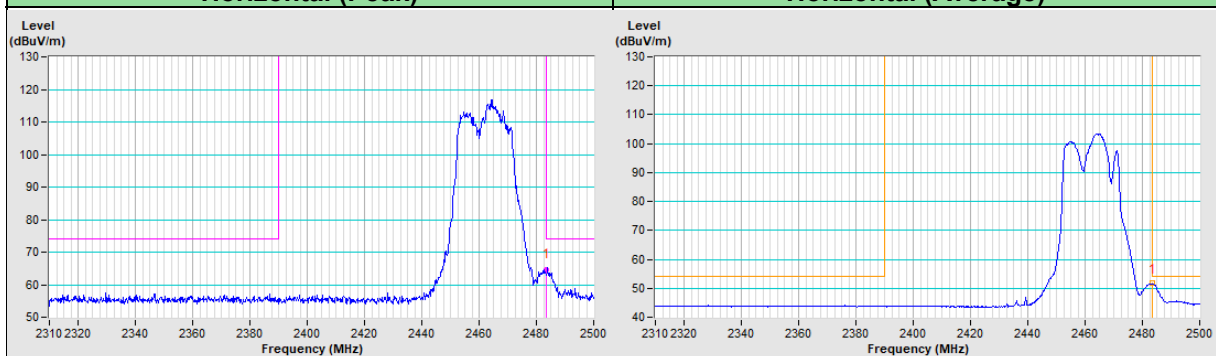


Vertical (Peak)	Vertical (Average)
-----------------	--------------------

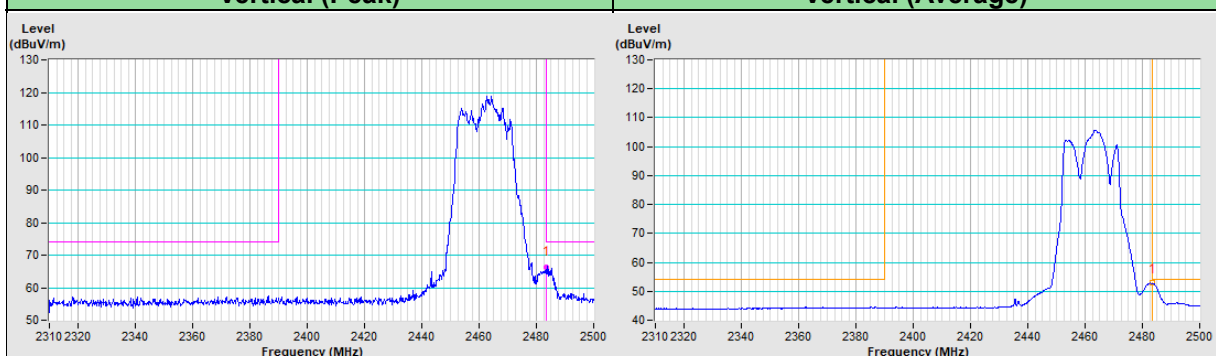


### 802.11ax (HE20) Channel 11

Horizontal (Peak)	Horizontal (Average)
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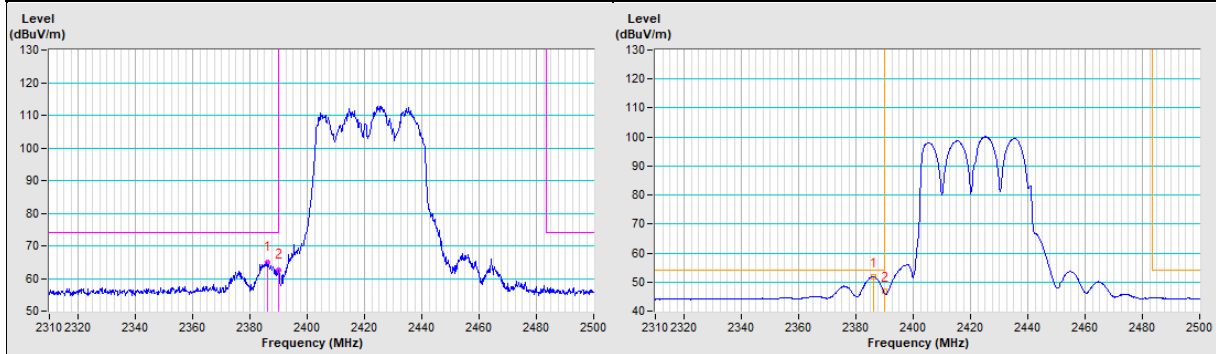
Vertical (Peak)	Vertical (Average)
-----------------	--------------------



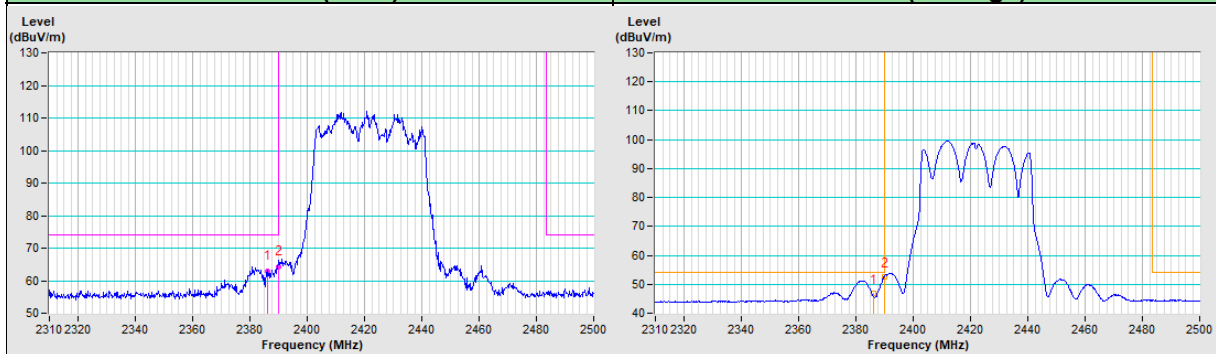


### 802.11ax (HE40) Channel 3

<b>Horizontal (Peak)</b>	<b>Horizontal (Average)</b>
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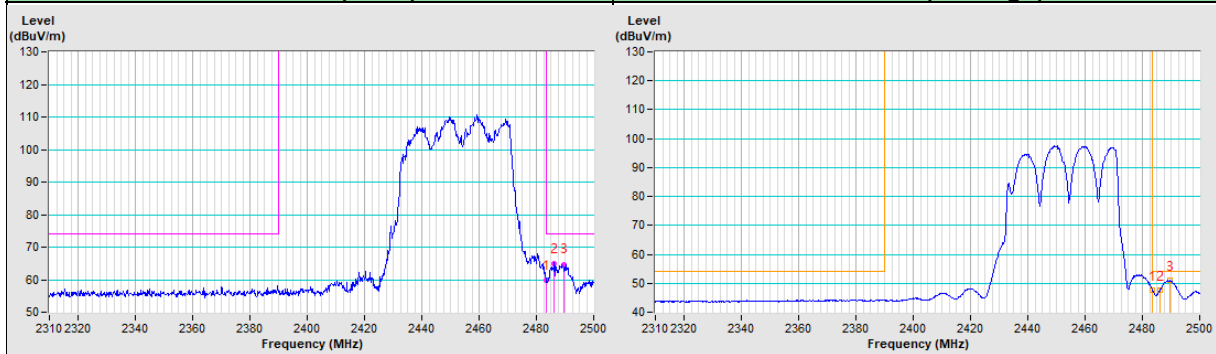


<b>Vertical (Peak)</b>	<b>Vertical (Average)</b>
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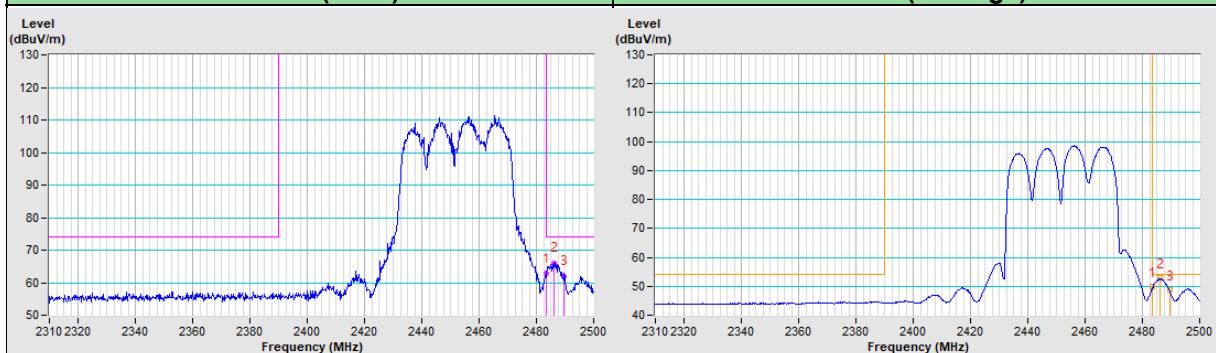


### 802.11ax (HE40) Channel 9

<b>Horizontal (Peak)</b>	<b>Horizontal (Average)</b>
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<b>Vertical (Peak)</b>	<b>Vertical (Average)</b>
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## 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 according to ISO/IEC 17025.

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

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