

## FCC Test Report (WLAN)

**Report No.:** RF200630E06

**FCC ID:** MQT-AT100R6

**Test Model:** xCL\_AT-100-R6-18U

**Received Date:** June 30, 2020

**Test Date:** July 13 to Aug. 19, 2020

**Issued Date:** Oct. 23, 2020

**Applicant:** XAC AUTOMATION CORP.

**Address:** 4F, No. 30, INDUSTRY E. RD. IX, SCIENCE-BASED INDUSTRIAL  
PARK,HSINCHU,TAIWAN

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

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**Test Location:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
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**FCC Registration /  
Designation Number:** 723255 / TW2022



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### Release Control Record

Issue No.	Description	Date Issued
RF200630E06	Original release.	Oct. 23, 2020

## 1 Certificate of Conformity

**Product:** Terminal

**Brand:** XAC

**Test Model:** xCL\_AT-100-R6-18U

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** XAC AUTOMATION CORP.

**Test Date:** July 13 to Aug. 19, 2020

**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 :**



Joyce Kuo / Specialist

**Date:**

Oct. 23, 2020

**Approved by :**



Clark Lin / Technical Manager

**Date:**

Oct. 23, 2020

## 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 -21.61dB at 1.18359MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.8dB 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(MHF) not a standard connector.

### Note:

- For 2.4GHz 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) ( $\pm$ )
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	5.4 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.0 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 (WLAN)

Product	Terminal
Brand	XAC
Test Model	xCL_AT-100-R6-18U
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	Refer to note
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54 Mbps 802.11n: up to 150 Mbps
Operating Frequency	<b>2.4GHz:</b> 2.412 ~ 2.462 GHz <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): 11 <b>5GHz:</b> 802.11a, 802.11n (HT20): 25 802.11n (HT40):12
Output Power	<b>2.4 GHz:</b> 280.543 mW <b>5.18 ~ 5.24 GHz:</b> 53.456 mW <b>5.26 ~ 5.32 GHz:</b> 55.976 mW <b>5.5 ~ 5.72 GHz:</b> 25.527 mW <b>5.745 ~ 5.825 GHz:</b> 72.111 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Battery x1 (Option)
Data Cable Supplied	NA

Note:

1. The EUT has three radios as following table:

Radio 1	Radio 2	Radio 3
WLAN(2.4GHz + 5GHz) + Bluetooth	WWAN(LTE + WCDMA)	NFC

2. Simultaneously transmission condition.

Condition	Technology	
1	WWAN	NFC
2	WWAN	Bluetooth
3	WLAN 2.4GHz	NFC
4	WLAN 5GHz	NFC
5	Bluetooth	NFC

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

3. The EUT must be supplied power adapter and battery as following table:

Adapter (Only test not for sale)		
Brand	Model	Specification
DEE VAN ENTERPRISE CO., LTD	DSA-18PFCA-05 050300	AC Input: 100-240Vac, 0.6A, 50-60Hz DC Output: 5Vdc, 3A
Battery (Option)		
Brand	Model	Specification
Shenzhen Rishengzhi Electronics Technology Co., Ltd.	W001	3.6V, 6700mAh, 24.12Wh

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

Antenna Set.	RF Chain NO.	Brand	Model (NCC 必填)	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type
NFC	Main	XAC	RTOS	13	13.56MHz	wire	None
Wi-Fi BT	Main	AWAN	AYF6P-100002	2.29	2400MHz~2500MHz	PIFA	i-pex(MHF)
				2.77	5150MHz~5850MHz		
LTE	Main(B2) TX	AWAN	AXF6P-100015	2.11	1850 MHz to 1910 MHz	PIFA	i-pex(MHF)
	Main(B4) TX			1.33	1710 MHz to 1755 MHz		
	Main(B12) TX			1.46	699 MHz to 715 MHz		
	Main(B2) RX			2.69	1930 MHz to 1990 MHz		
	Main(B4) RX			0.66	2110 MHz to 2155 MHz		
	Main(B12) RX			2.64	729 MHz to 745 MHz		
Aux(B2) RX	AWAN	AXF6P-100005	1.95	1930 MHz to 1990 MHz	PIFA	i-pex(MHF)	
			Aux(B4) RX	2.96			2110 MHz to 2155 MHz
			Aux(B12) RX	2.61			729 MHz to 746 MHz
WCDMA	Main(B2) TX	AWAN	AXF6P-100015	2.11	1850 MHz to 1910 MHz	PIFA	i-pex(MHF)
	Main(B5) TX			0.32	824 MHz to 849 MHz		
	Main(B2) RX			2.69	1930 MHz to 1990 MHz		
	Main(B5) RX			2.53	869 MHz to 894 MHz		
	Aux(B2) RX	AWAN	AXF6P-100005	2.45	1930 MHz to 1990 MHz	PIFA	i-pex(MHF)
	Aux(B5) RX	1.23	869 MHz to 894 MHz				
GPS	Main	YAGEO	ANT8010JLD2B151	3.29	1575.42MHz	Chip	i-pex(MHF)

5. The EUT was pre-tested for radiated emission test under following test modes:

Pre-test Mode	Power
<b>Mode A</b>	<b>Power from Adapter</b>
Mode B	Power from Battery
From the above modes, the worst radiated test was found in <b>Mode A</b> .	

6. The EUT was pre-tested for conducted emission test under following test modes:

Pre-test Mode	Power
<b>Mode A</b>	<b>Power from Adapter</b>
Mode B	Power from Laptop
From the above modes, the worst conducted emission test was found in <b>Mode A</b> .	



7. The EUT incorporates a SISO function.

<b>2.4GHz Band</b>		
<b>MODULATION MODE</b>	<b>TX &amp; RX CONFIGURATION</b>	
<b>802.11b</b>	1TX	1RX
<b>802.11g</b>	1TX	1RX
<b>802.11n (HT20)</b>	1TX	1RX
<b>5GHz Band</b>		
<b>MODULATION MODE</b>	<b>TX &amp; RX CONFIGURATION</b>	
<b>802.11a</b>	1TX	1RX
<b>802.11n (HT20)</b>	1TX	1RX
<b>802.11n (HT40)</b>	1TX	1RX

8. 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.

9. 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 and 802.11n (HT20):

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		

### 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

#### **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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

#### **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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1	DSSS	DBPSK	1

#### **Power Line Conducted Emission Test:**

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1	DSSS	DBPSK	1

**Antenna Port Conducted Measurement:**

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

**Test Condition:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (System)	TESTED BY
RE $\geq$ 1G	22deg. C, 70%RH	120Vac, 60Hz	Nelson Teng
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Nelson Teng
PLC	25deg. C, 75%RH	120Vac, 60Hz	Kevin Ko
APCM	25deg. C, 60%RH	120Vac, 60Hz	Kevin Ko

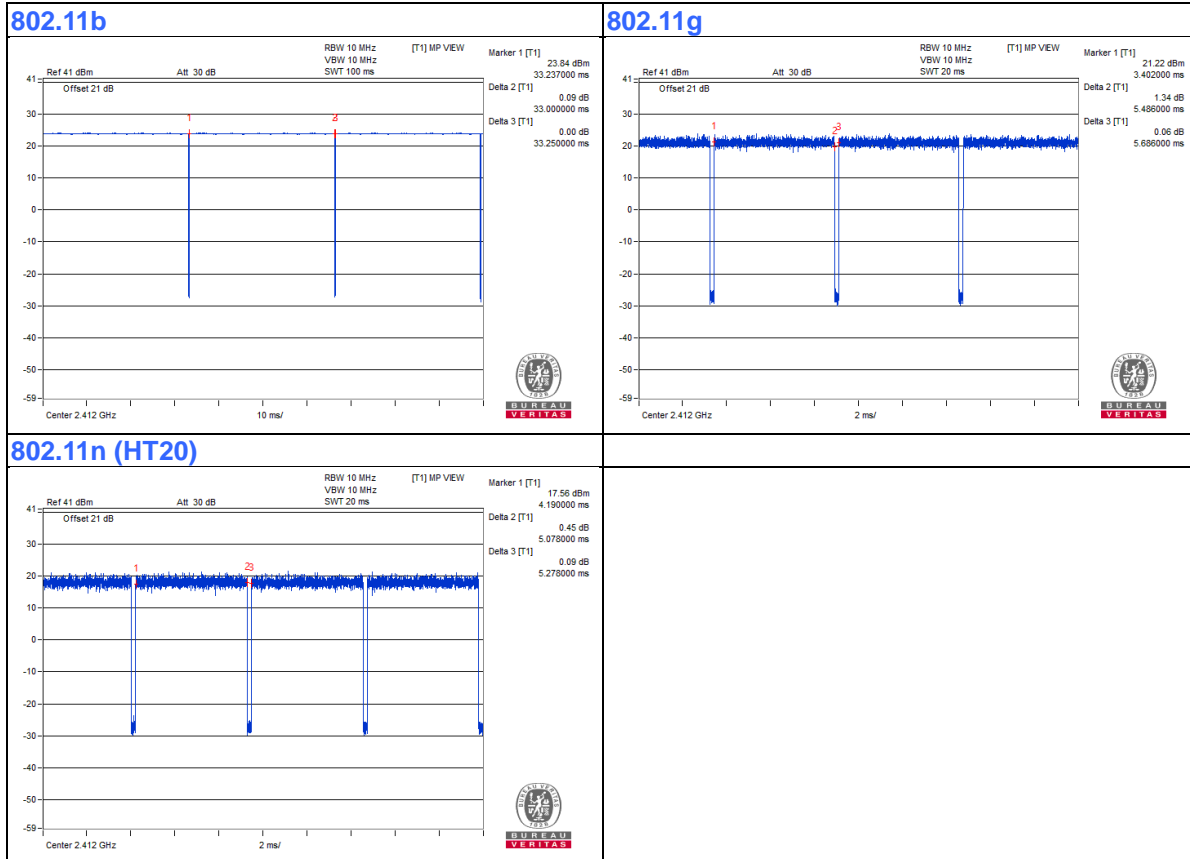
### 3.3 Duty Cycle of Test Signal

If duty cycle of test signal is  $\geq 98\%$ , duty factor is not required.  
 If duty cycle of test signal is  $< 98\%$ , duty factor is not required.

802.11b: Duty cycle =  $33 \text{ ms} / 33.25 \text{ ms} = 0.992$

802.11g: Duty cycle =  $5.486 \text{ ms} / 5.686 \text{ ms} = 0.965$ , Duty factor =  $10 * \log(1/\text{Duty cycle}) = 0.16 \text{ dB}$

802.11n (HT20): Duty cycle =  $5.078 \text{ ms} / 5.278 \text{ ms} = 0.962$ , Duty factor =  $10 * \log(1/\text{Duty cycle}) = 0.17 \text{ dB}$



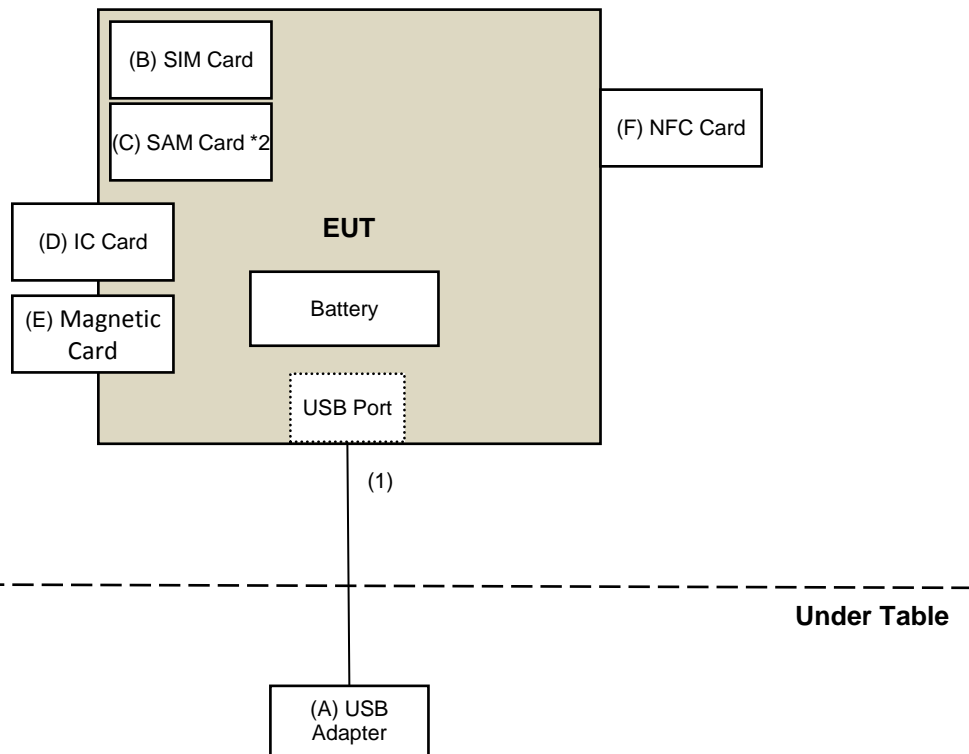
### 3.4 Description of Support Units

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.	USB Adapter	DEE VAN	DSA-18PFCA-05 050300	NA	NA	Supplied by client
B.	SIM Card	Keysight	NA	NA	NA	Provided by Lab
C.	SAM Card *2	XAC	NA	NA	NA	Supplied by client
D.	IC Card	XAC	NA	NA	NA	Supplied by client
E.	Magnetic Card	XAC	NA	NA	NA	Supplied by client
F.	NFC Card	XAC	NA	NA	NA	Supplied by client

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB Type C to USB Cable	1	1.2	Yes	0	Supplied by client

### 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**

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

**For Radiated Emission test:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 06, 2020	July 05, 2021
Pre-Amplifier EMCI	EMC001340	980142	May 25, 2020	May 24, 2021
Loop Antenna Electro-Metrics	EM-6879	264	Feb. 18, 2020	Feb. 17, 2021
RF Cable	NA	LOOPCAB-001	Jan. 08, 2020	Jan. 07, 2021
RF Cable	NA	LOOPCAB-002	Jan. 08, 2020	Jan. 07, 2021
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	Apr. 28, 2020	Apr. 27, 2021
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 11, 2019	Nov. 10, 2020
RF Cable	8D	966-3-1	Mar. 17, 2020	Mar. 16, 2021
RF Cable	8D	966-3-2	Mar. 17, 2020	Mar. 16, 2021
RF Cable	8D	966-3-3	Mar. 17, 2020	Mar. 16, 2021
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Sep. 26, 2019	Sep. 25, 2020
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Nov. 24, 2019	Nov. 23, 2020
Pre-Amplifier EMCI	EMC12630SE	980384	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC104-SM-SM-1200	160922	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC104-SM-SM-2000	180601	June 09, 2020	June 08, 2021
RF Cable	EMC104-SM-SM-6000	180602	June 09, 2020	June 08, 2021
Spectrum Analyzer Keysight	N9030A	MY54490679	July 13, 2020	July 12, 2021
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 15, 2020	Jan. 14, 2021
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 24, 2019	Nov. 23, 2020
RF Cable	EMC102-KM-KM-1200	160924	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC-KM-KM-4000	200214	Mar. 11, 2020	Mar. 10, 2021
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	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. 3.
3. Tested Date: July 27 to Aug. 03, 2020

**For Bandedge test:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210202	Dec. 13, 2019	Dec. 12, 2020
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Nov. 24, 2019	Nov. 23, 2020
Pre-Amplifier EMCI	EMC 12630 SE	980638	Apr. 08, 2020	Apr. 07, 2021
RF Cable	EMC104-SM-SM-1200	160923	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC104-SM-SM-2000	180502	Apr. 29, 2020	Apr. 28, 2021
RF Cable	EMC104-SM-SM-6000	180418	Apr. 29, 2020	Apr. 28, 2021
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 15, 2020	Jan. 14, 2021
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 24, 2019	Nov. 23, 2020
RF Cable	EMC102-KM-KM-1200	160924	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC-KM-KM-4000	200214	Mar. 11, 2020	Mar. 10, 2021
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. 3.
3. Tested Date: July 14, 2020

**For other test:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	100964	May 29, 2020	May 28, 2021
Spectrum Analyzer Keysight	N9030A	MY54490679	July 13, 2020	July 12, 2021
Power meter Anritsu	ML2495A	1529002	July 22, 2020	July 21, 2021
Power sensor Anritsu	MA2411B	1339443	July 22, 2020	July 21, 2021
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 14, 2020	Apr. 13, 2021
Mech Switch Absorptive Mini-Circuits	MSP4TA-18+	0140	Feb. 10, 2020	Feb. 09, 2021
FXD ATTEN Mini-Circuits	BW-S3W2+	MN71981	Feb. 10, 2020	Feb. 09, 2021
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: Aug. 19, 2020

#### 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:**

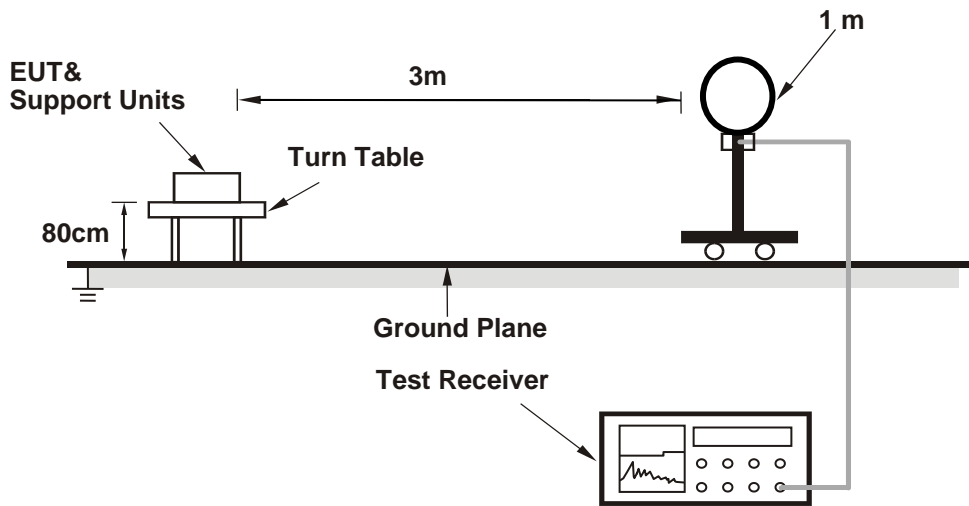
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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

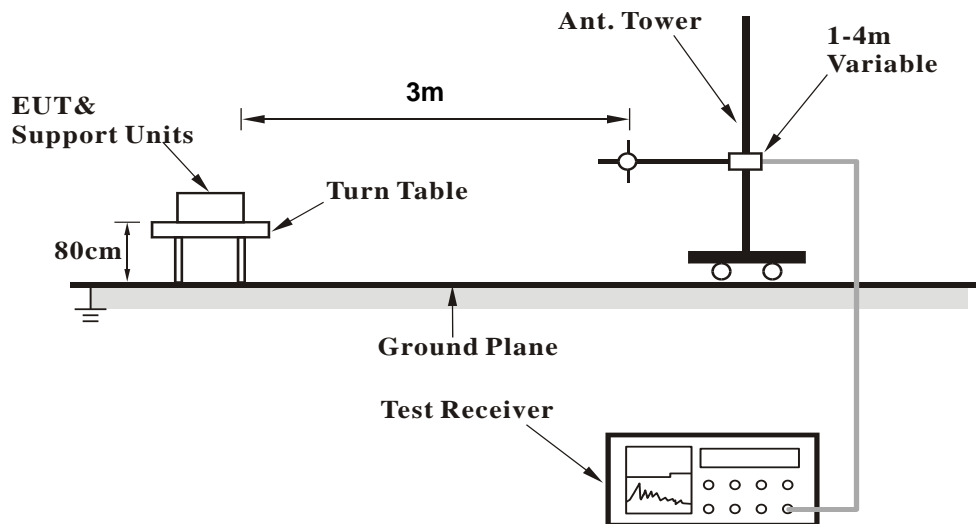
No deviation.

4.1.5 Test Setup

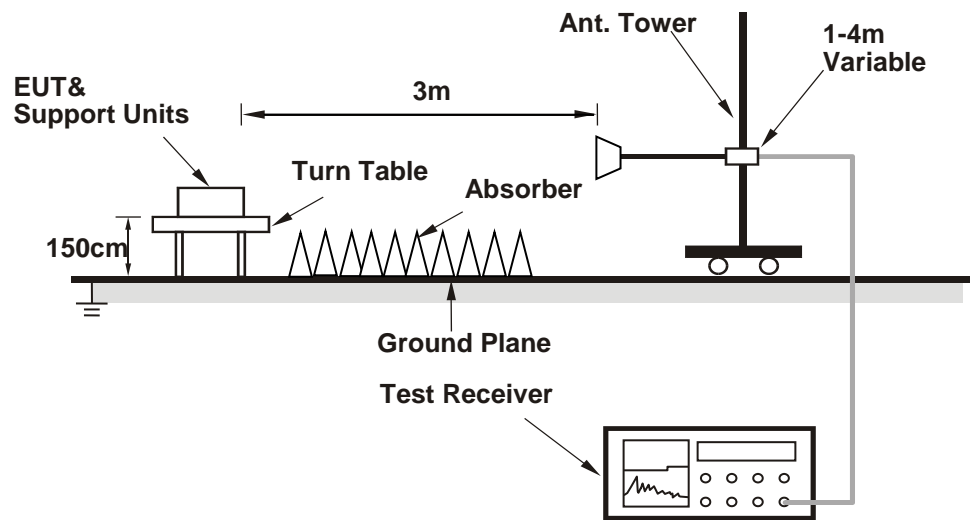
**For Radiated emission below 30MHz**



**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 (QDART 4.8.29) has been activated to set the EUT under transmission condition continuously.

## 4.1.7 Test Results

## ABOVE 1GHz DATA

## 802.11b

<b>Channel</b>	TX Channel 1	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		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	55.8 PK	74.0	-18.2	1.18 H	203	57.6	-1.8
2	2390.00	46.0 AV	54.0	-8.0	1.18 H	203	47.8	-1.8
3	*2412.00	105.9 PK			1.18 H	203	107.7	-1.8
4	*2412.00	103.7 AV			1.18 H	203	105.5	-1.8
5	4824.00	46.1 PK	74.0	-27.9	1.15 H	47	43.9	2.2
6	4824.00	41.8 AV	54.0	-12.2	1.15 H	47	39.6	2.2

Antenna Polarity & Test Distance : Vertical at 3m								
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	1.27 V	25	61.5	-1.8
2	2390.00	52.3 AV	54.0	-1.7	1.27 V	25	54.1	-1.8
3	*2412.00	108.6 PK			1.27 V	25	110.4	-1.8
4	*2412.00	106.7 AV			1.27 V	25	108.5	-1.8
5	4824.00	48.2 PK	74.0	-25.8	1.41 V	329	46.0	2.2
6	4824.00	46.3 AV	54.0	-7.7	1.41 V	329	44.1	2.2

## 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>Channel</b>	TX Channel 6	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		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	53.4 PK	74.0	-20.6	1.17 H	191	55.2	-1.8
2	2390.00	41.5 AV	54.0	-12.5	1.17 H	191	43.3	-1.8
3	*2437.00	105.6 PK			1.17 H	191	107.4	-1.8
4	*2437.00	103.5 AV			1.17 H	191	105.3	-1.8
5	2483.50	55.8 PK	74.0	-18.2	1.17 H	191	57.7	-1.9
6	2483.50	41.6 AV	54.0	-12.4	1.17 H	191	43.5	-1.9
7	4874.00	45.7 PK	74.0	-28.3	1.16 H	51	43.6	2.1
8	4874.00	41.3 AV	54.0	-12.7	1.16 H	51	39.2	2.1
9	7311.00	43.4 PK	74.0	-30.6	1.84 H	197	34.3	9.1
10	7311.00	31.2 AV	54.0	-22.8	1.84 H	197	22.1	9.1

**Antenna Polarity & Test Distance : Vertical at 3m**

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	56.1 PK	74.0	-17.9	1.00 V	27	57.9	-1.8
2	2390.00	43.2 AV	54.0	-10.8	1.00 V	27	45.0	-1.8
3	*2437.00	106.1 PK			1.00 V	27	107.9	-1.8
4	*2437.00	104.5 AV			1.00 V	27	106.3	-1.8
5	2483.50	58.3 PK	74.0	-15.7	1.00 V	27	60.2	-1.9
6	2483.50	44.4 AV	54.0	-9.6	1.00 V	27	46.3	-1.9
7	4874.00	48.6 PK	74.0	-25.4	1.44 V	334	46.5	2.1
8	4874.00	46.6 AV	54.0	-7.4	1.44 V	334	44.5	2.1
9	7311.00	43.4 PK	74.0	-30.6	2.04 V	301	34.3	9.1
10	7311.00	31.3 AV	54.0	-22.7	2.04 V	301	22.2	9.1

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

<b>Channel</b>	TX Channel 11	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		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	102.1 PK			1.80 H	328	103.9	-1.8
2	*2462.00	99.0 AV			1.80 H	328	100.8	-1.8
3	2487.31	63.8 PK	74.0	-10.2	1.80 H	328	65.7	-1.9
4	2487.31	48.1 AV	54.0	-5.9	1.80 H	328	50.0	-1.9
5	4924.00	45.2 PK	74.0	-28.8	1.11 H	65	42.9	2.3
6	4924.00	41.1 AV	54.0	-12.9	1.11 H	65	38.8	2.3
7	7386.00	43.9 PK	74.0	-30.1	1.90 H	203	34.5	9.4
8	7386.00	31.6 AV	54.0	-22.4	1.90 H	203	22.2	9.4

**Antenna Polarity & Test Distance : Vertical at 3m**

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	106.4 PK			1.18 V	22	108.2	-1.8
2	*2462.00	104.3 AV			1.18 V	22	106.1	-1.8
3	2487.31	61.3 PK	74.0	-12.7	1.18 V	22	63.2	-1.9
4	2487.31	51.5 AV	54.0	-2.5	1.18 V	22	53.4	-1.9
5	4924.00	48.5 PK	74.0	-25.5	1.45 V	350	46.2	2.3
6	4924.00	46.2 AV	54.0	-7.8	1.45 V	350	43.9	2.3
7	7386.00	42.8 PK	74.0	-31.2	1.99 V	297	33.4	9.4
8	7386.00	30.8 AV	54.0	-23.2	1.99 V	297	21.4	9.4

**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.

**802.11g**

<b>Channel</b>	TX Channel 1	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		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	59.5 PK	74.0	-14.5	1.22 H	207	61.3	-1.8
2	2390.00	47.2 AV	54.0	-6.8	1.22 H	207	49.0	-1.8
3	*2412.00	103.1 PK			1.22 H	207	104.9	-1.8
4	*2412.00	93.8 AV			1.22 H	207	95.6	-1.8
5	4824.00	44.4 PK	74.0	-29.6	1.14 H	51	42.2	2.2
6	4824.00	35.6 AV	54.0	-18.4	1.14 H	51	33.4	2.2

Antenna Polarity & Test Distance : Vertical at 3m								
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	68.5 PK	74.0	-5.5	1.16 V	25	70.3	-1.8
2	2390.00	52.3 AV	54.0	-1.7	1.16 V	25	54.1	-1.8
3	*2412.00	107.2 PK			1.16 V	25	109.0	-1.8
4	*2412.00	97.5 AV			1.16 V	25	99.3	-1.8
5	4824.00	49.0 PK	74.0	-25.0	1.45 V	340	46.8	2.2
6	4824.00	36.9 AV	54.0	-17.1	1.45 V	340	34.7	2.2

**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>Channel</b>	TX Channel 6	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		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	54.4 PK	74.0	-19.6	1.25 H	218	56.2	-1.8
2	2390.00	42.2 AV	54.0	-11.8	1.25 H	218	44.0	-1.8
3	*2437.00	106.5 PK			1.25 H	218	108.3	-1.8
4	*2437.00	96.7 AV			1.25 H	218	98.5	-1.8
5	2488.55	56.7 PK	74.0	-17.3	1.25 H	218	58.6	-1.9
6	2488.55	42.6 AV	54.0	-11.4	1.25 H	218	44.5	-1.9
7	4874.00	45.0 PK	74.0	-29.0	1.08 H	64	42.9	2.1
8	4874.00	35.9 AV	54.0	-18.1	1.08 H	64	33.8	2.1
9	7311.00	44.3 PK	74.0	-29.7	1.86 H	211	35.2	9.1
10	7311.00	32.0 AV	54.0	-22.0	1.86 H	211	22.9	9.1

**Antenna Polarity & Test Distance : Vertical at 3m**

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	57.2 PK	74.0	-16.8	1.10 V	33	59.0	-1.8
2	2390.00	44.1 AV	54.0	-9.9	1.10 V	33	45.9	-1.8
3	*2437.00	109.0 PK			1.10 V	33	110.8	-1.8
4	*2437.00	99.5 AV			1.10 V	33	101.3	-1.8
5	2488.55	62.6 PK	74.0	-11.4	1.10 V	33	64.5	-1.9
6	2488.55	48.8 AV	54.0	-5.2	1.10 V	33	50.7	-1.9
7	4874.00	48.4 PK	74.0	-25.6	1.44 V	343	46.3	2.1
8	4874.00	36.5 AV	54.0	-17.5	1.44 V	343	34.4	2.1
9	7311.00	43.4 PK	74.0	-30.6	2.07 V	293	34.3	9.1
10	7311.00	31.0 AV	54.0	-23.0	2.07 V	293	21.9	9.1

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

<b>Channel</b>	TX Channel 11	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		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	102.3 PK			1.24 H	86	104.1	-1.8
2	*2462.00	92.4 AV			1.24 H	86	94.2	-1.8
3	2483.50	66.2 PK	74.0	-7.8	1.24 H	86	68.1	-1.9
4	2483.50	51.6 AV	54.0	-2.4	1.24 H	86	53.5	-1.9
5	4924.00	44.8 PK	74.0	-29.2	1.17 H	58	42.5	2.3
6	4924.00	35.8 AV	54.0	-18.2	1.17 H	58	33.5	2.3
7	7386.00	43.9 PK	74.0	-30.1	1.96 H	202	34.5	9.4
8	7386.00	31.8 AV	54.0	-22.2	1.96 H	202	22.4	9.4

**Antenna Polarity & Test Distance : Vertical at 3m**

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	103.3 PK			1.05 V	26	105.1	-1.8
2	*2462.00	94.1 AV			1.05 V	26	95.9	-1.8
3	2483.50	69.3 PK	74.0	-4.7	1.05 V	26	71.2	-1.9
<b>4</b>	<b>2483.50</b>	<b>53.2 AV</b>	<b>54.0</b>	<b>-0.8</b>	<b>1.05 V</b>	<b>26</b>	<b>55.1</b>	<b>-1.9</b>
5	4924.00	48.7 PK	74.0	-25.3	1.47 V	347	46.4	2.3
6	4924.00	36.5 AV	54.0	-17.5	1.47 V	347	34.2	2.3
7	7386.00	43.9 PK	74.0	-30.1	2.09 V	290	34.5	9.4
8	7386.00	31.8 AV	54.0	-22.2	2.09 V	290	22.4	9.4

**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.

**802.11n (HT20)**

<b>Channel</b>	TX Channel 1	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		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	65.5 PK	74.0	-8.5	1.20 H	207	67.3	-1.8
2	2390.00	49.1 AV	54.0	-4.9	1.20 H	207	50.9	-1.8
3	*2412.00	103.5 PK			1.20 H	207	105.3	-1.8
4	*2412.00	93.8 AV			1.20 H	207	95.6	-1.8
5	4824.00	44.1 PK	74.0	-29.9	1.19 H	60	41.9	2.2
6	4824.00	35.3 AV	54.0	-18.7	1.19 H	60	33.1	2.2

Antenna Polarity & Test Distance : Vertical at 3m								
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	73.0 PK	74.0	-1.0	1.08 V	26	74.8	-1.8
2	2390.00	53.1 AV	54.0	-0.9	1.08 V	26	54.9	-1.8
3	*2412.00	107.4 PK			1.08 V	26	109.2	-1.8
4	*2412.00	97.2 AV			1.08 V	26	99.0	-1.8
5	4824.00	48.5 PK	74.0	-25.5	1.47 V	338	46.3	2.2
6	4824.00	36.7 AV	54.0	-17.3	1.47 V	338	34.5	2.2

**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>Channel</b>	TX Channel 6	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		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	53.9 PK	74.0	-20.1	1.24 H	219	55.7	-1.8
2	2390.00	42.0 AV	54.0	-12.0	1.24 H	219	43.8	-1.8
3	*2437.00	106.7 PK			1.24 H	219	108.5	-1.8
4	*2437.00	96.8 AV			1.24 H	219	98.6	-1.8
5	2488.55	56.5 PK	74.0	-17.5	1.24 H	219	58.4	-1.9
6	2488.55	42.2 AV	54.0	-11.8	1.24 H	219	44.1	-1.9
7	4874.00	44.6 PK	74.0	-29.4	1.10 H	71	42.5	2.1
8	4874.00	35.7 AV	54.0	-18.3	1.10 H	71	33.6	2.1
9	7311.00	43.8 PK	74.0	-30.2	1.92 H	189	34.7	9.1
10	7311.00	31.3 AV	54.0	-22.7	1.92 H	189	22.2	9.1

**Antenna Polarity & Test Distance : Vertical at 3m**

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	57.3 PK	74.0	-16.7	1.13 V	24	59.1	-1.8
2	2390.00	44.3 AV	54.0	-9.7	1.13 V	24	46.1	-1.8
3	*2437.00	109.1 PK			1.13 V	24	110.9	-1.8
4	*2437.00	99.6 AV			1.13 V	24	101.4	-1.8
5	2488.55	62.0 PK	74.0	-12.0	1.13 V	24	63.9	-1.9
6	2488.55	48.4 AV	54.0	-5.6	1.13 V	24	50.3	-1.9
7	4874.00	48.1 PK	74.0	-25.9	1.49 V	348	46.0	2.1
8	4874.00	36.7 AV	54.0	-17.3	1.49 V	348	34.6	2.1
9	7311.00	43.3 PK	74.0	-30.7	2.05 V	290	34.2	9.1
10	7311.00	31.3 AV	54.0	-22.7	2.05 V	290	22.2	9.1

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

<b>Channel</b>	TX Channel 11	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		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	97.9 PK			1.00 H	84	99.7	-1.8
2	*2462.00	89.2 AV			1.00 H	84	91.0	-1.8
3	2483.50	65.3 PK	74.0	-8.7	1.00 H	84	67.2	-1.9
4	2483.50	48.3 AV	54.0	-5.7	1.00 H	84	50.2	-1.9
5	4924.00	44.6 PK	74.0	-29.4	1.13 H	59	42.3	2.3
6	4924.00	35.7 AV	54.0	-18.3	1.13 H	59	33.4	2.3
7	7386.00	43.9 PK	74.0	-30.1	1.93 H	198	34.5	9.4
8	7386.00	31.4 AV	54.0	-22.6	1.93 H	198	22.0	9.4

**Antenna Polarity & Test Distance : Vertical at 3m**

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	102.2 PK			1.04 V	26	104.0	-1.8
2	*2462.00	93.1 AV			1.04 V	26	94.9	-1.8
3	2483.50	68.6 PK	74.0	-5.4	1.04 V	26	70.5	-1.9
<b>4</b>	<b>2483.50</b>	<b>53.2 AV</b>	<b>54.0</b>	<b>-0.8</b>	<b>1.04 V</b>	<b>26</b>	<b>55.1</b>	<b>-1.9</b>
5	4924.00	48.3 PK	74.0	-25.7	1.47 V	332	46.0	2.3
6	4924.00	37.3 AV	54.0	-16.7	1.47 V	332	35.0	2.3
7	7386.00	43.8 PK	74.0	-30.2	2.08 V	313	34.4	9.4
8	7386.00	31.4 AV	54.0	-22.6	2.08 V	313	22.0	9.4

**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.



### Below 1GHz Data:

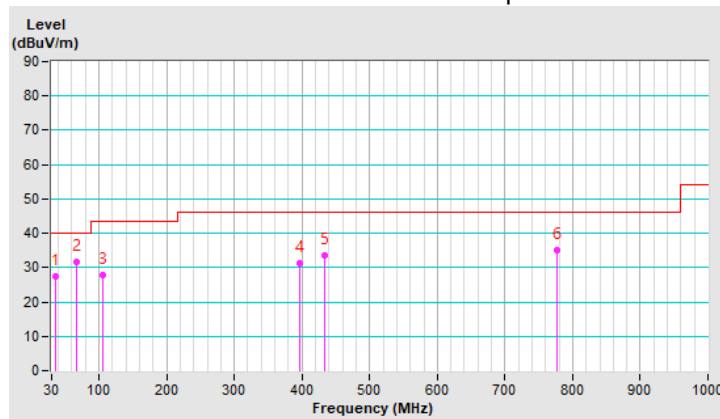
#### 802.11b

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

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	35.67	27.5 QP	40.0	-12.5	3.00 H	219	36.3	-8.8
2	66.67	31.5 QP	40.0	-8.5	4.00 H	10	40.7	-9.2
3	105.83	27.7 QP	43.5	-15.8	3.00 H	95	38.8	-11.1
4	396.01	31.4 QP	46.0	-14.6	1.00 H	227	35.3	-3.9
5	433.96	33.5 QP	46.0	-12.5	1.00 H	276	36.1	-2.6
6	777.53	35.2 QP	46.0	-10.8	1.00 H	278	30.2	5.0

#### 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.



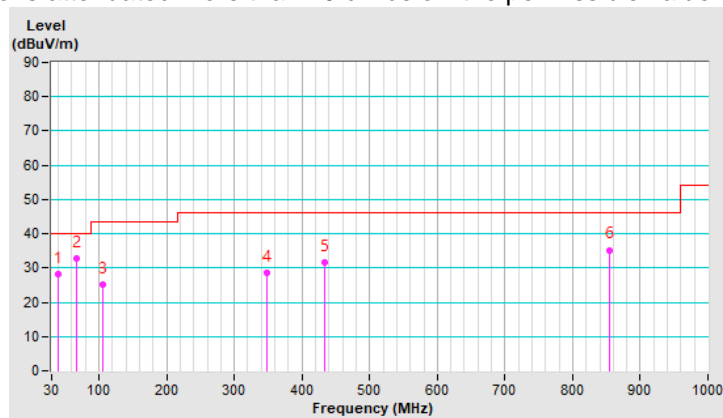
<b>CHANNEL</b>	TX Channel 1	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	9kHz ~ 1GHz		

**Antenna Polarity & Test Distance : Vertical at 3m**

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	40.65	28.3 QP	40.0	-11.7	1.00 V	343	36.6	-8.3
2	66.62	32.6 QP	40.0	-7.4	1.00 V	360	41.8	-9.2
3	106.31	25.1 QP	43.5	-18.4	2.00 V	0	36.1	-11.0
4	348.01	28.6 QP	46.0	-17.4	2.00 V	305	34.0	-5.4
5	433.96	31.5 QP	46.0	-14.5	1.00 V	14	34.1	-2.6
6	854.99	35.3 QP	46.0	-10.7	4.00 V	0	29.4	5.9

**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. 23, 2019	Oct. 22, 2020
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 23, 2019	Oct. 22, 2020
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 19, 2020	Mar. 18, 2021
50 ohms Terminator	50	3	Oct. 23, 2019	Oct. 22, 2020
RF Cable	5D-FB	COCCAB-001	Sep. 27, 2019	Sep. 26, 2020
Fixed attenuator EMCI	STI02-2200-10	005	Aug. 30, 2019	Aug. 29, 2020
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: July 13, 2020

#### 4.2.3 Test Procedures

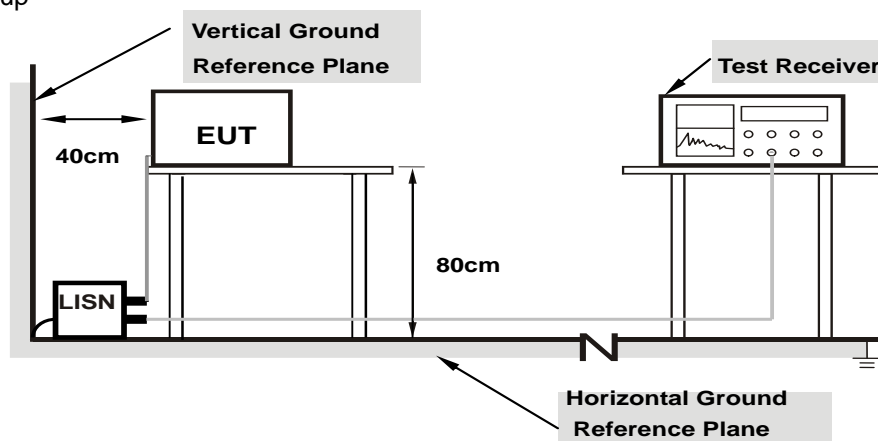
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

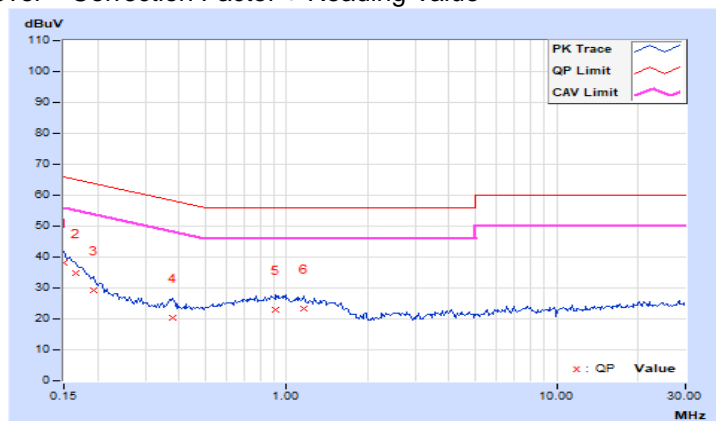
#### 4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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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	10.02	27.97	13.79	37.99	23.81	66.00	56.00	-28.01	-32.19
2	0.16562	10.03	24.83	11.90	34.86	21.93	65.18	55.18	-30.32	-33.25
3	0.19297	10.04	19.09	4.64	29.13	14.68	63.91	53.91	-34.78	-39.23
4	0.38047	10.06	10.31	4.77	20.37	14.83	58.27	48.27	-37.90	-33.44
5	0.91172	10.09	13.00	9.39	23.09	19.48	56.00	46.00	-32.91	-26.52
6	1.16016	10.12	13.23	10.10	23.35	20.22	56.00	46.00	-32.65	-25.78

**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

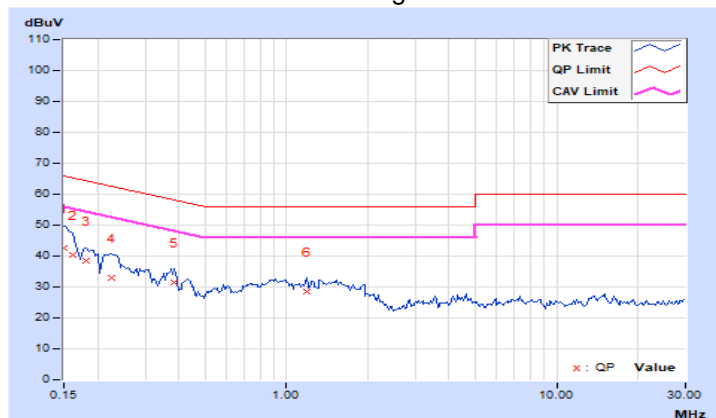


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.02	32.60	16.37	42.62	26.39	66.00	56.00	-23.38	-29.61
2	0.16172	10.02	30.18	15.28	40.20	25.30	65.38	55.38	-25.18	-30.08
3	0.18125	10.03	28.34	13.85	38.37	23.88	64.43	54.43	-26.06	-30.55
4	0.22422	10.04	22.93	12.55	32.97	22.59	62.66	52.66	-29.69	-30.07
5	0.38438	10.06	21.28	15.63	31.34	25.69	58.18	48.18	-26.84	-22.49
<b>6</b>	<b>1.18359</b>	<b>10.14</b>	<b>18.55</b>	<b>14.25</b>	<b>28.69</b>	<b>24.39</b>	<b>56.00</b>	<b>46.00</b>	<b>-27.31</b>	<b>-21.61</b>

**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

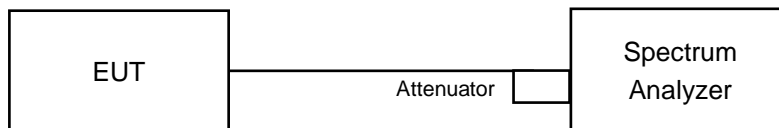


### 4.3 6dB Bandwidth Measurement

#### 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
1	2412	9.05	0.5	Pass
6	2437	8.62	0.5	Pass
11	2462	8.12	0.5	Pass

##### 802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.5	0.5	Pass
6	2437	16.42	0.5	Pass
11	2462	16.42	0.5	Pass

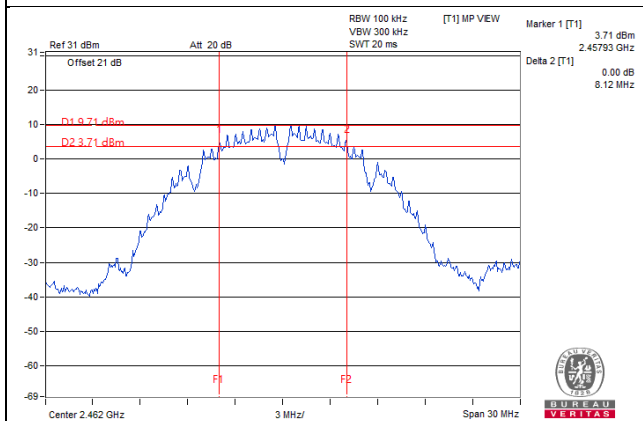
##### 802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.67	0.5	Pass
6	2437	17.36	0.5	Pass
11	2462	17.69	0.5	Pass

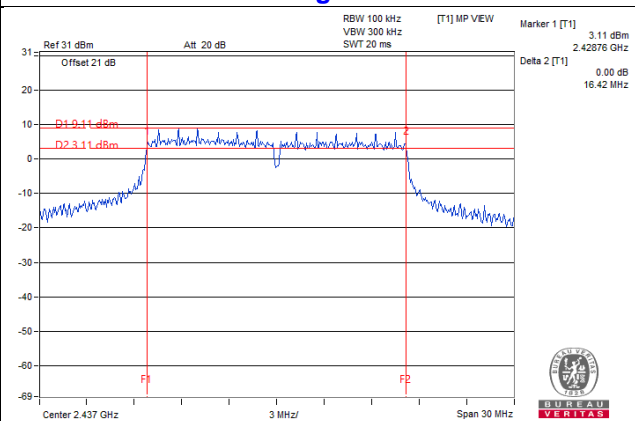


### Spectrum Plot of Worst Value

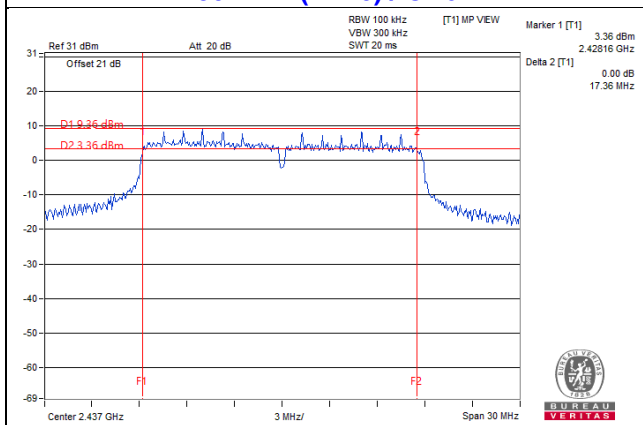
#### 802.11b / CH11



#### 802.11g / CH6



#### 802.11n (HT20) / CH6

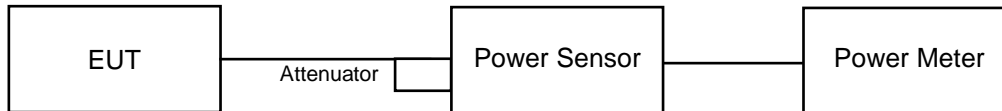


## 4.4 Conducted Output Power Measurement

### 4.4.1 Limits of Conducted Output Power Measurement

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

### 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

#### FOR PEAK POWER

##### 802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	181.134	22.58	30	Pass
6	2437	165.577	22.19	30	Pass
11	2462	116.95	20.68	30	Pass

##### 802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	188.365	22.75	30	Pass
6	2437	280.543	24.48	30	Pass
11	2462	137.088	21.37	30	Pass

##### 802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	182.39	22.61	30	Pass
6	2437	276.694	24.42	30	Pass
11	2462	118.577	20.74	30	Pass

## FOR AVERAGE POWER

### 802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	115.345	20.62
6	2437	95.719	19.81
11	2462	66.681	18.24

### 802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	38.994	15.91
6	2437	91.833	19.63
11	2462	21.627	13.35

### 802.11n (HT20)

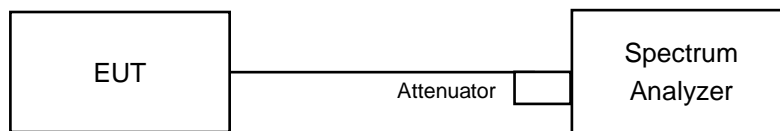
Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	35.318	15.48
6	2437	84.528	19.27
11	2462	14.256	11.54

## 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. Set analyzer center frequency to DTS channel center frequency.
- b. Set the span to 1.5 times the DTS bandwidth.
- c. Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- d. Set the VBW  $\geq 3 \times \text{RBW}$ .
- e. Detector = peak.
- f. Sweep time = auto couple.
- g. Trace mode = max hold.
- h. Allow trace to fully stabilize.
- i. 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

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-3.29	8	Pass
6	2437	-2.84	8	Pass
11	2462	-4.79	8	Pass

##### 802.11g

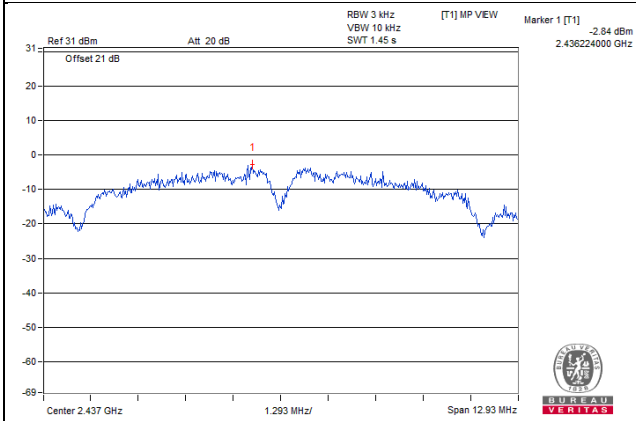
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-8.31	8	Pass
6	2437	-5.74	8	Pass
11	2462	-12.40	8	Pass

##### 802.11n (HT20)

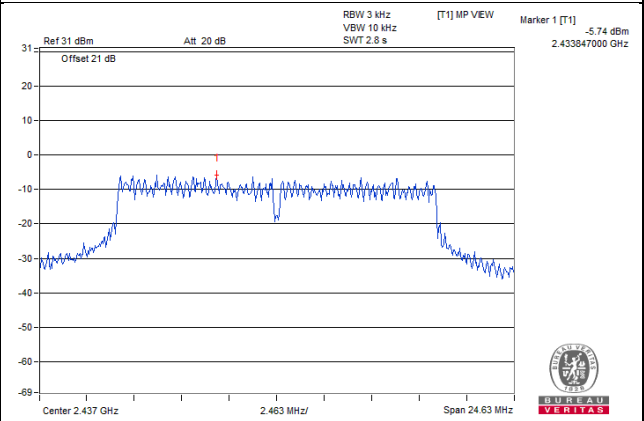
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-10.05	8	Pass
6	2437	-5.27	8	Pass
11	2462	-13.19	8	Pass

Spectrum Plot of Worst Value

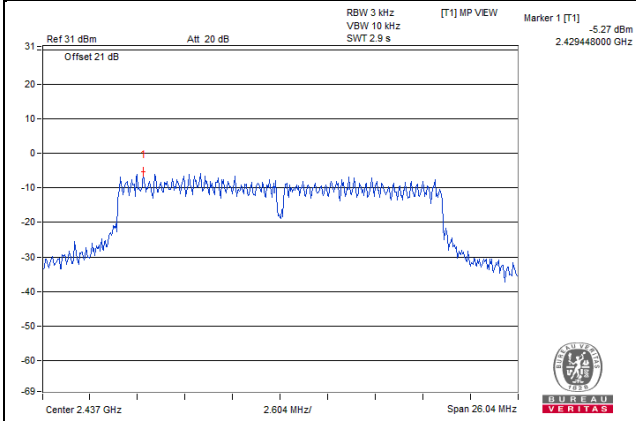
802.11b / CH6



802.11g / CH6



802.11n (HT20) / CH6

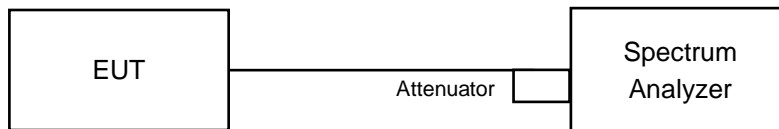


## 4.6 Conducted Out of Band Emission Measurement

### 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

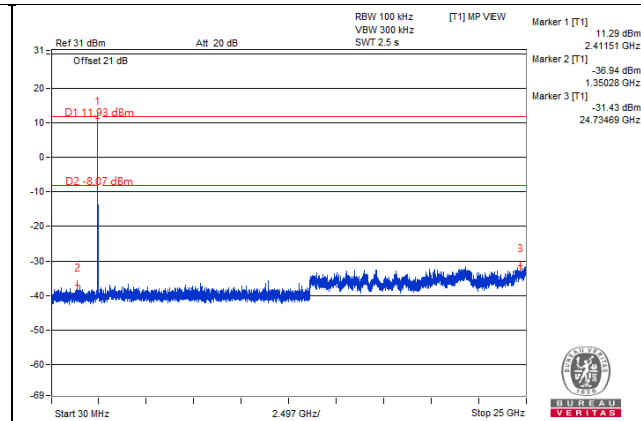
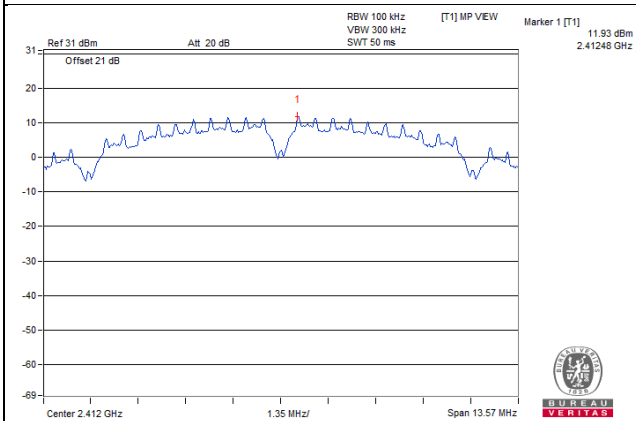
### 4.6.7 Test Results

The 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.

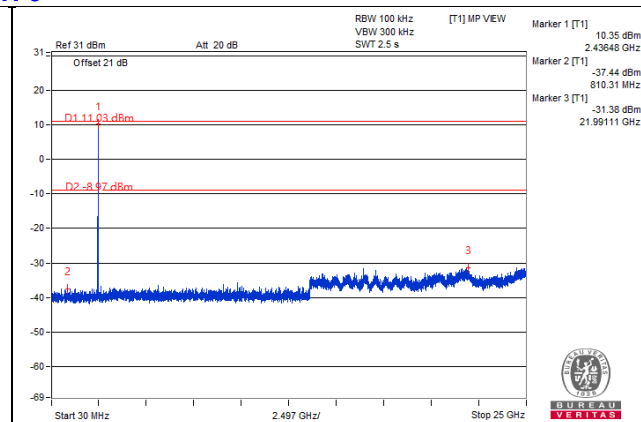
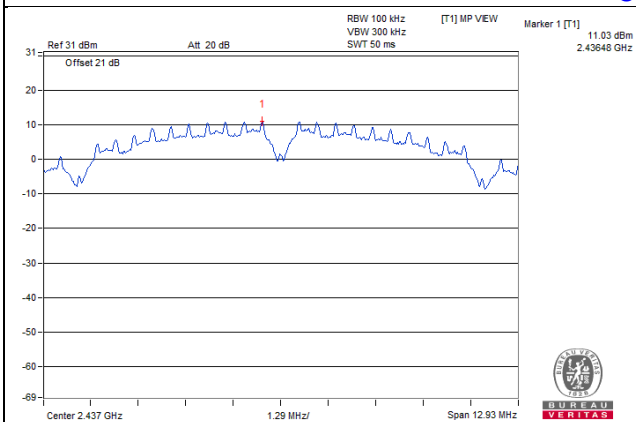


802.11b

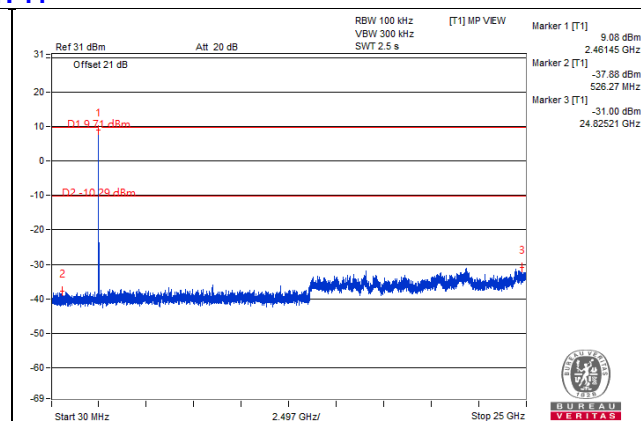
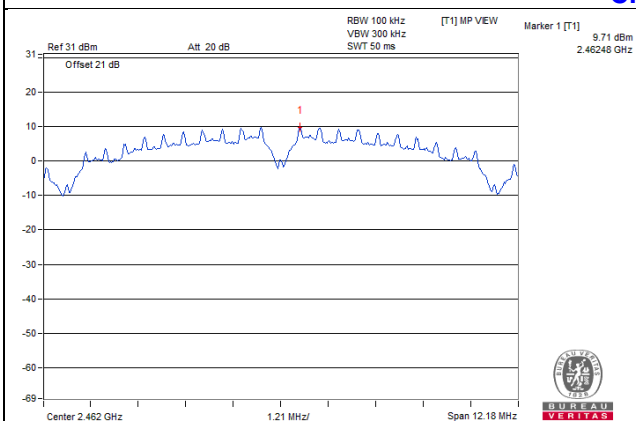
CH 1



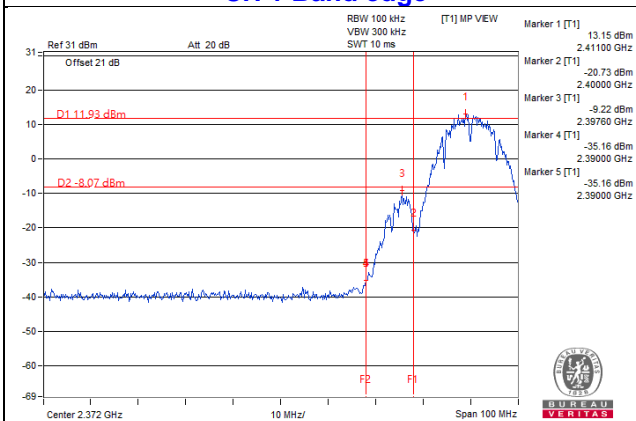
CH 6



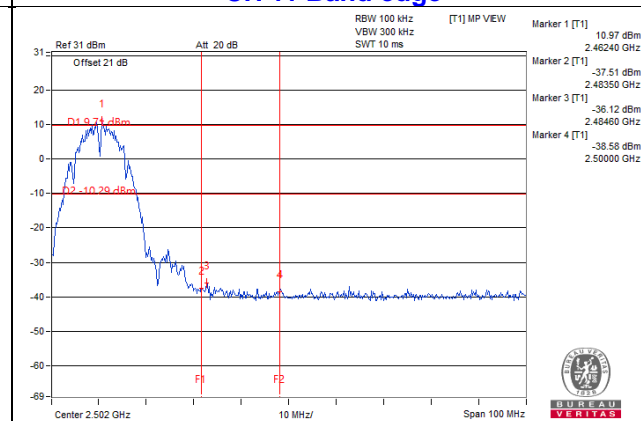
CH 11



CH 1 Band edge

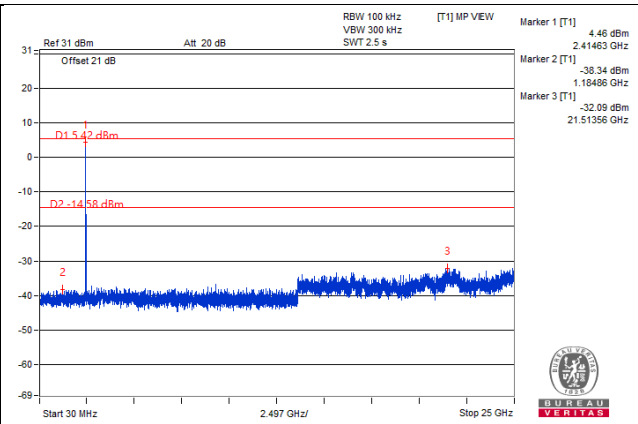
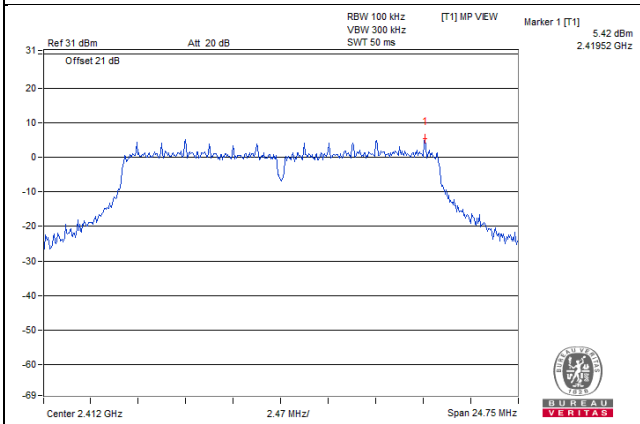


CH 11 Band edge

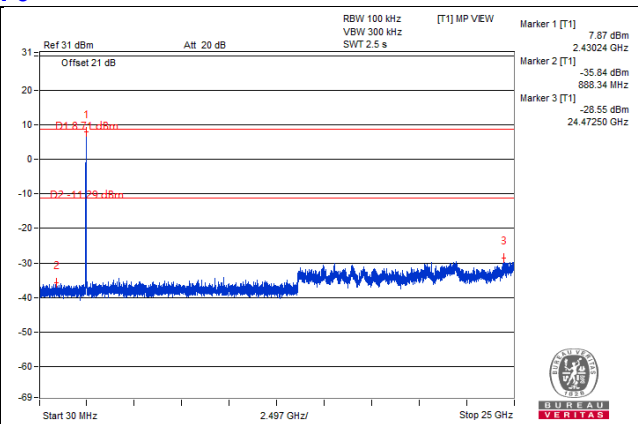
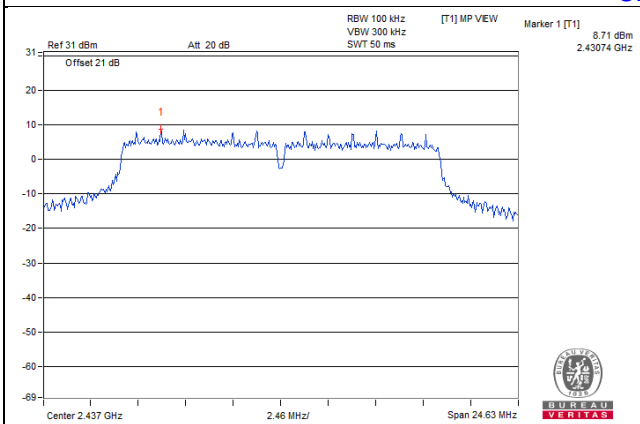


# 802.11g

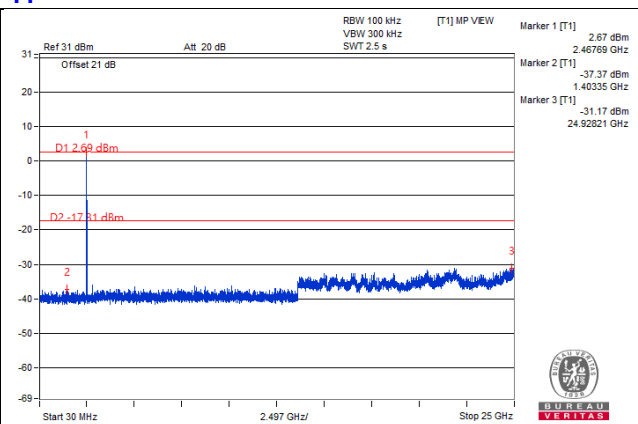
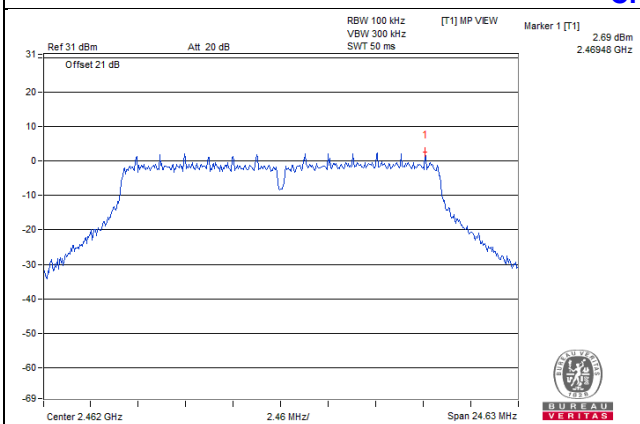
## CH 1



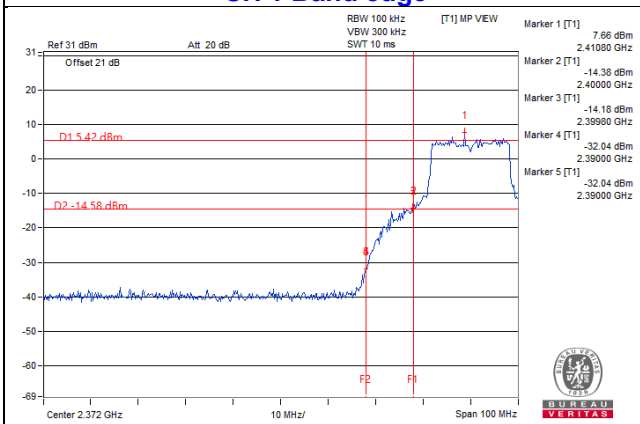
## CH 6



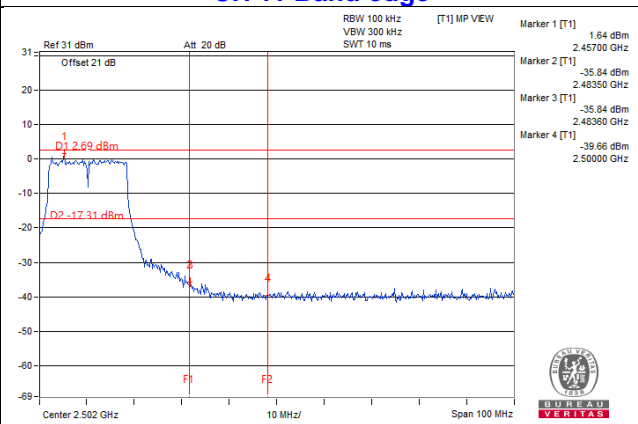
## CH 11



## CH 1 Band edge

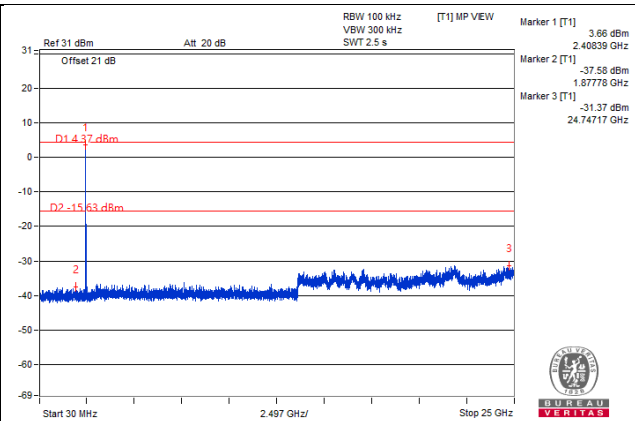
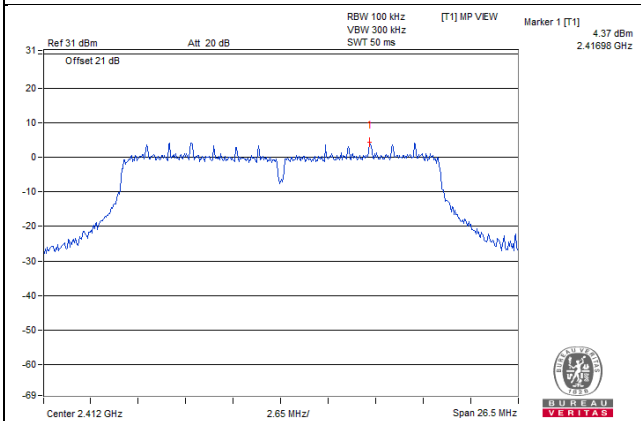


## CH 11 Band edge

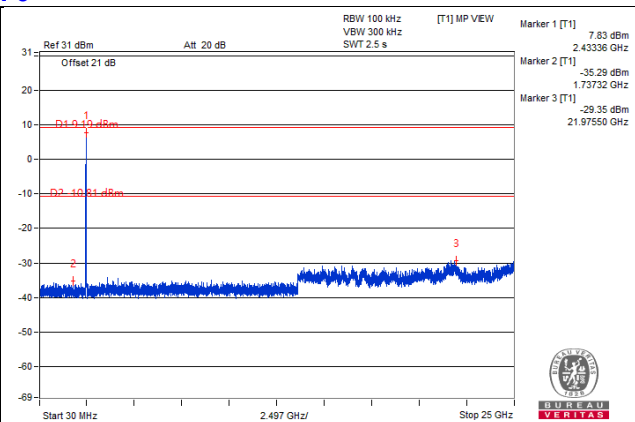
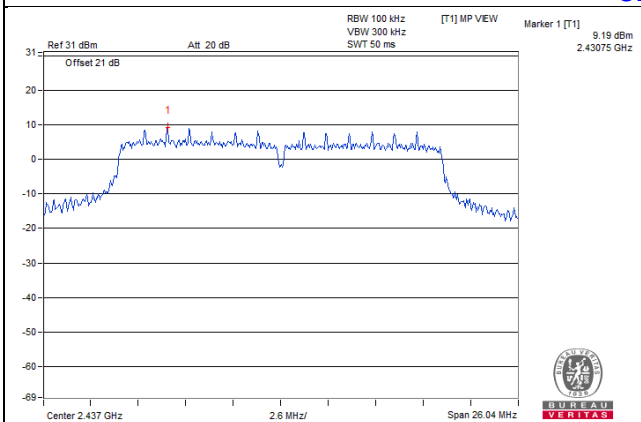


802.11n (HT20)

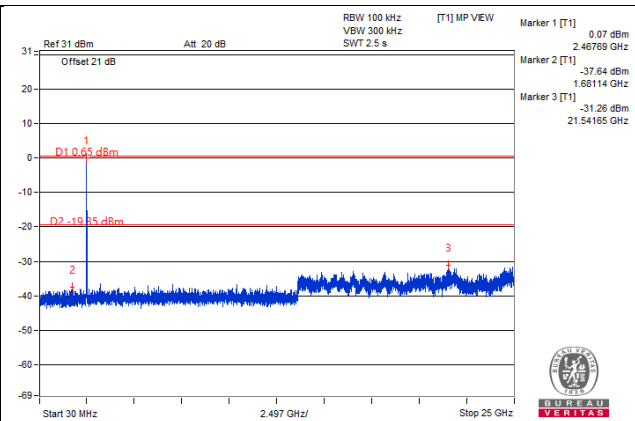
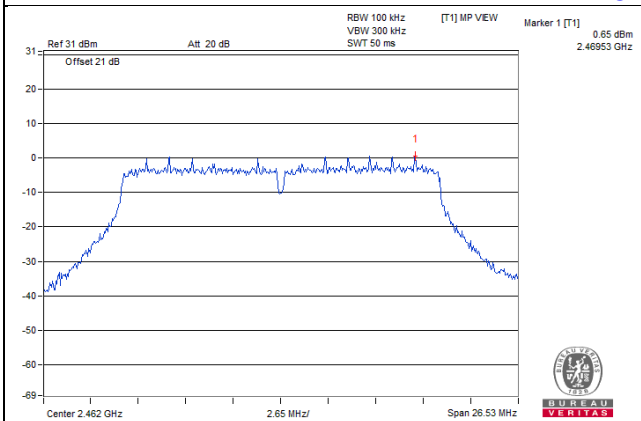
CH 1



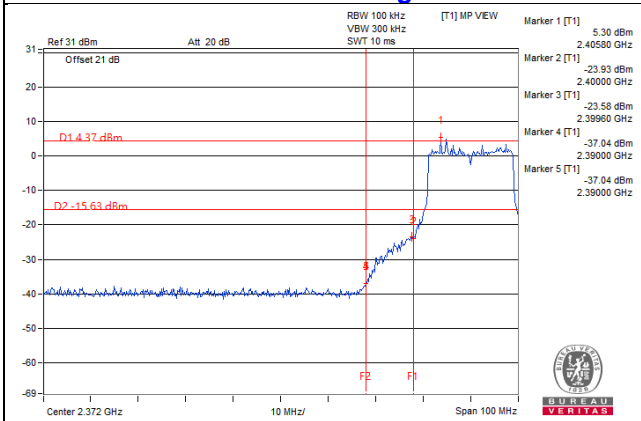
CH 6



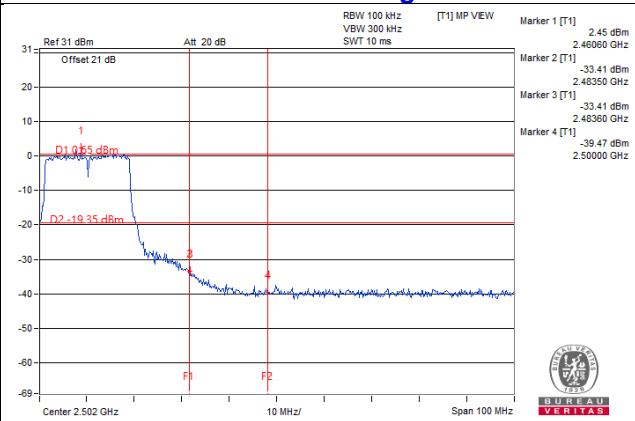
CH 11



CH 1 Band edge



CH 11 Band edge

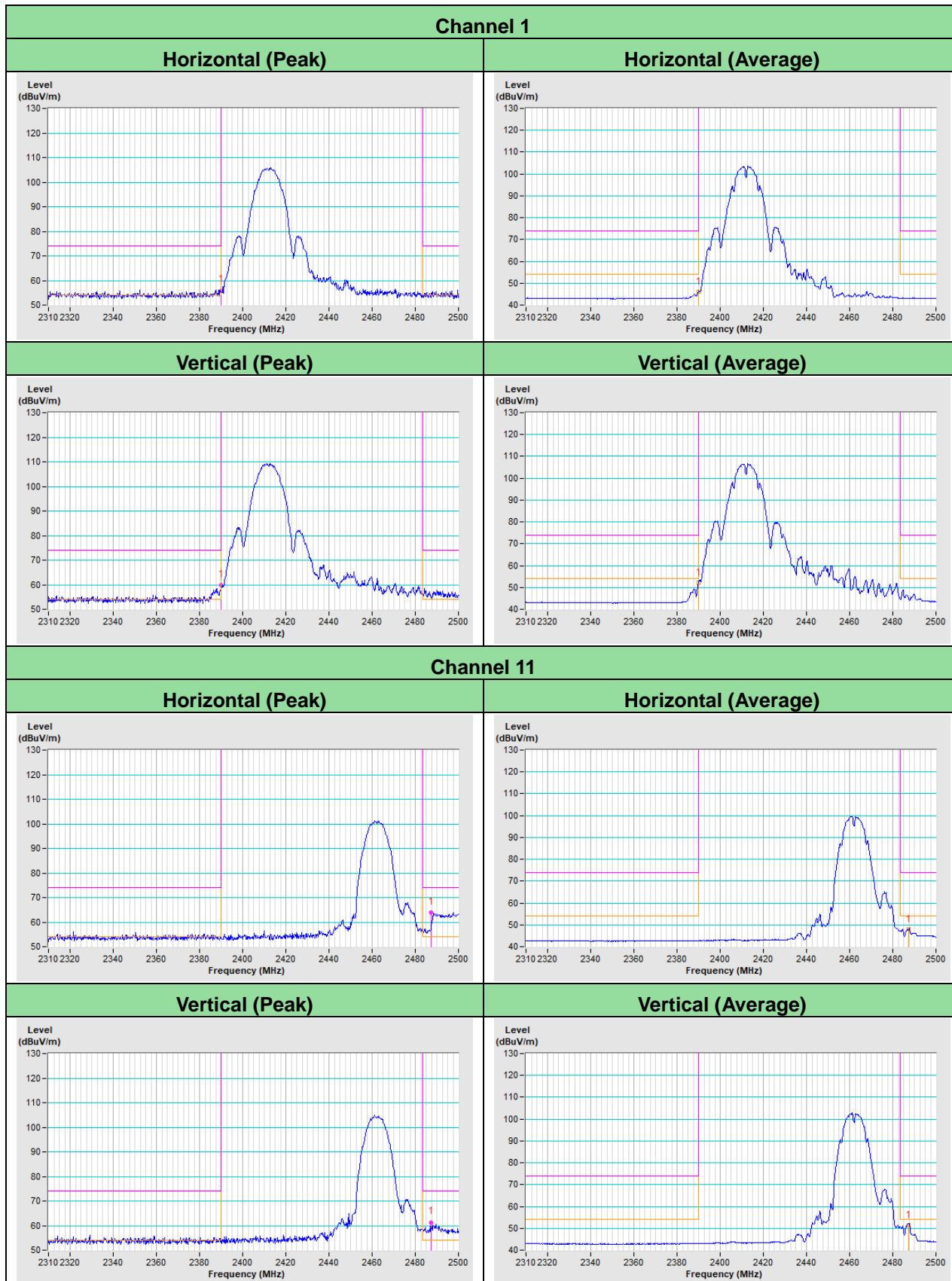


## 5 Pictures of Test Arrangements

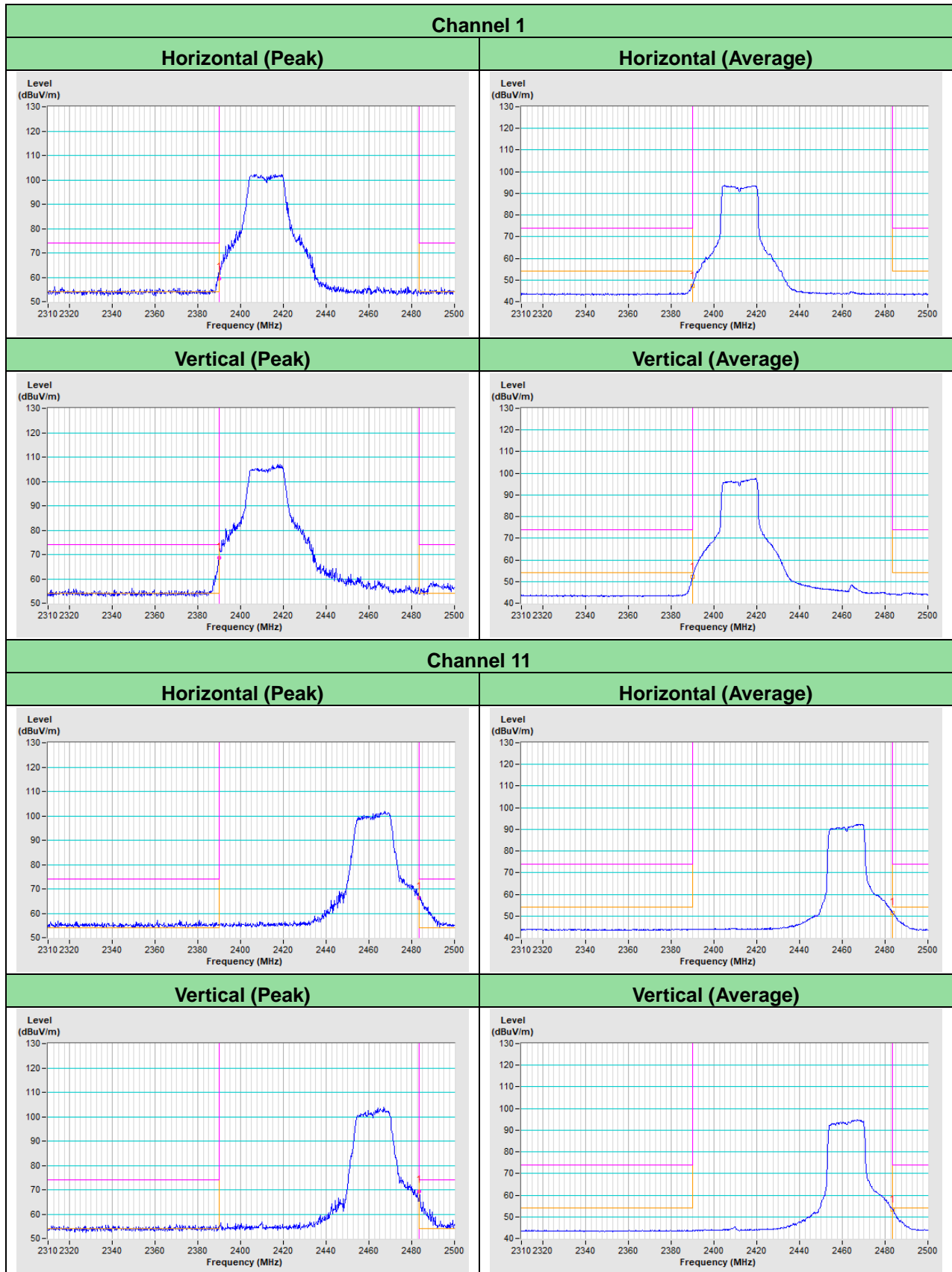
Please refer to the attached file (Test Setup Photo).

# Annex A - Band-Edge Measurement

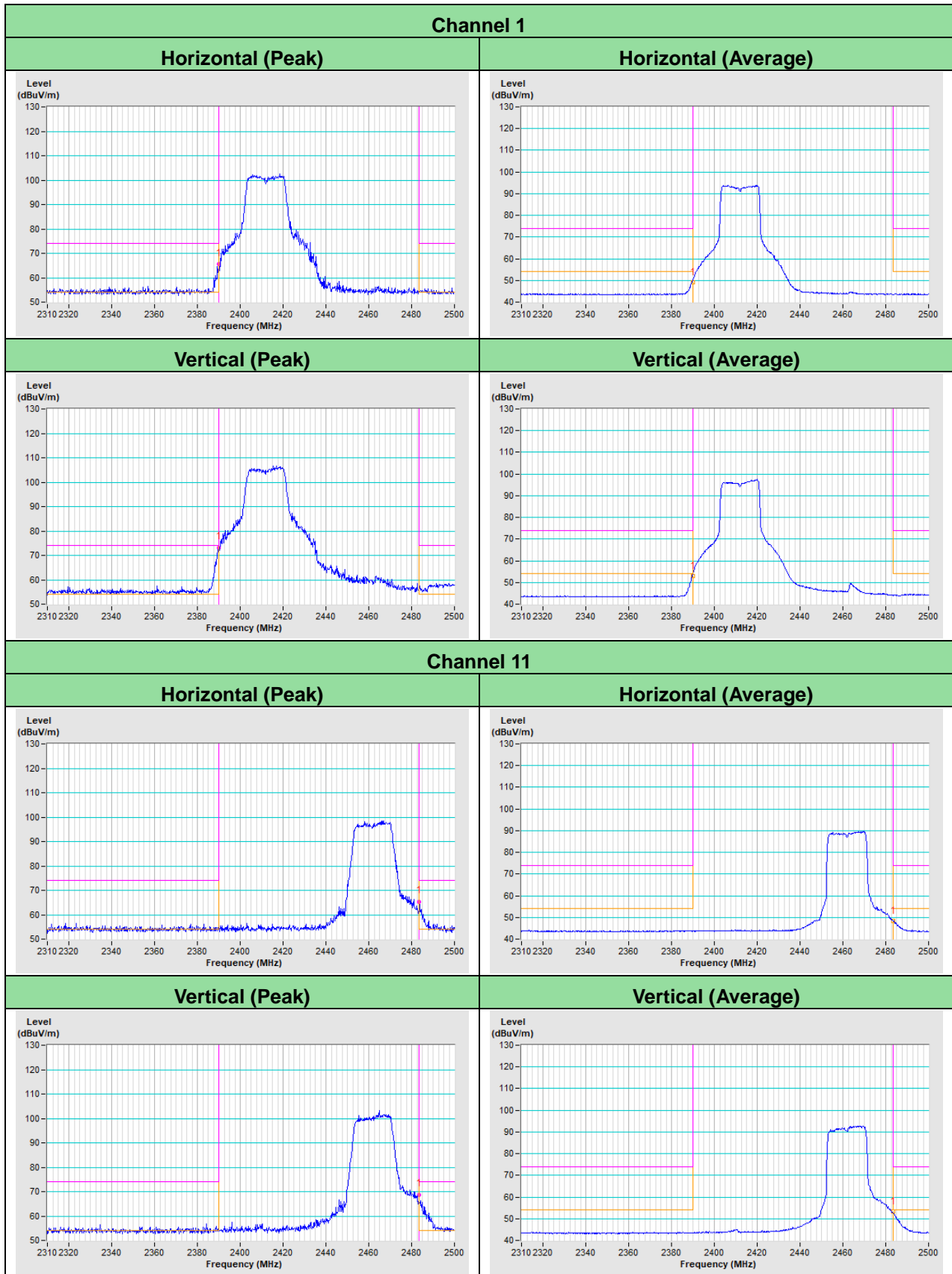
## 802.11b



802.11g



802.11n (HT20)



## 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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