

FCC Test Report

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FCC ID: AK8J20H103

Test Model: J20H103

Received Date: 2021/9/3

Test Date: 2021/9/24 ~ 2021/10/22

Issued Date: 2021/12/1

Applicant: Sony Corporation

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



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Table of Contents

Release Control Record	4
1 Certificate of Conformity.....	5
2 Summary of Test Results	6
2.1 Measurement Uncertainty	6
2.2 Modification Record	6
3 General Information.....	7
3.1 General Description of EUT	7
3.2 Description of Test Modes	9
3.2.1 Test Mode Applicability and Tested Channel Detail	10
3.3 Duty Cycle of Test Signal	12
3.4 Description of Support Units	13
3.4.1 Configuration of System under Test	14
3.5 General Description of Applied Standards and References	14
4 Test Types and Results	16
4.1 Radiated Emission and Bandedge Measurement.....	16
4.1.1 Limits of Radiated Emission and Bandedge Measurement	16
4.1.2 Test Instruments	17
4.1.3 Test Procedures.....	19
4.1.4 Deviation from Test Standard	19
4.1.5 Test Setup.....	20
4.1.6 EUT Operating Conditions.....	21
4.1.7 Test Results	22
4.2 Conducted Emission Measurement	33
4.2.1 Limits of Conducted Emission Measurement	33
4.2.2 Test Instruments	33
4.2.3 Test Procedures.....	34
4.2.4 Deviation from Test Standard	34
4.2.5 Test Setup.....	34
4.2.6 EUT Operating Conditions.....	34
4.2.7 Test Results	35
4.3 6dB Bandwidth Measurement	37
4.3.1 Limits of 6dB Bandwidth Measurement.....	37
4.3.2 Test Setup.....	37
4.3.3 Test Instruments	37
4.3.4 Test Procedure	37
4.3.5 Deviation from Test Standard	37
4.3.6 EUT Operating Conditions.....	37
4.3.7 Test Result.....	38
4.4 Conducted Output Power Measurement.....	39
4.4.1 Limits of Conducted Output Power Measurement	39
4.4.2 Test Setup.....	39
4.4.3 Test Instruments	39
4.4.4 Test Procedures.....	39
4.4.5 Deviation from Test Standard	39
4.4.6 EUT Operating Conditions.....	39
4.4.7 Test Results	40
4.5 Power Spectral Density Measurement.....	42
4.5.1 Limits of Power Spectral Density Measurement	42
4.5.2 Test Setup.....	42
4.5.3 Test Instruments	42
4.5.4 Test Procedure	42
4.5.5 Deviation from Test Standard	42
4.5.6 EUT Operating Condition	42

4.5.7 Test Results	43
4.6 Conducted Out of Band Emission Measurement	45
4.6.1 Limits of Conducted Out of Band Emission Measurement.....	45
4.6.2 Test Setup.....	45
4.6.3 Test Instruments	45
4.6.4 Test Procedure	45
4.6.5 Deviation from Test Standard	45
4.6.6 EUT Operating Condition	45
4.6.7 Test Results	45
5 Pictures of Test Arrangements.....	52
Annex A - Band-Edge Measurement.....	53
Appendix – Information of the Testing Laboratories	56

Release Control Record

Issue No.	Description	Date Issued
RFBHQC-WTW-P21090134	Original release.	2021/12/1

1 Certificate of Conformity

Product: 2TX 11ax (WiFi6E) + BT/BLE Combo Card

Brand: FOXCONN

Test Model: J20H103

Sample Status: Engineering sample

Applicant: Sony Corporation

Test Date: 2021/9/24 ~ 2021/10/22

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 : Cherry Chuo, **Date:** 2021/12/1
Cherry Chuo / Specialist

Approved by : Clark Lin, **Date:** 2021/12/1
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 -17.61 dB at 0.57578 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.1 dB at 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	No antenna connector is used.

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	5.4 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

Product	2TX 11ax (WiFi6E) + BT/BLE Combo Card
Brand	FOXCONN
Test Model	J20H103
Status of EUT	Engineering sample
Power Supply Rating	3.3 Vdc from host equipment
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 1024QAM for OFDMA in 11ax HE mode
Modulation Technology	DSSS, OFDM, OFDMA
Transfer Rate	802.11b: up to 11 Mbps 802.11g: up to 54 Mbps 802.11n: up to 144.4 Mbps 802.11ax: up to 286.8 Mbps
Operating Frequency	2.412 ~ 2.462 GHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20), 802.11ax (HE20): 11
Output Power	773.998 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. Simultaneously transmission condition.

Condition	Technology	
1	WLAN (2.4GHz)	WLAN (6GHz)
2	WLAN (2.4GHz)	WLAN (5GHz)
3	WLAN (6GHz)	Bluetooth
4	WLAN (5GHz)	Bluetooth
5	WLAN(2.4G)	Bluetooth

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

2. The EUT has below radios as following table:

Radio 1	Radio 2
WLAN (2.4GHz+5GHz+6GHz)	Bluetooth

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

For WLAN					
Antenna No.	RF Chain No.	Antenna Net Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector Type
0	0	-0.33	2.4~2.4835	Monopole	none
		1.45	5.15~5.25		
		1.52	5.25~5.35		
		1.58	5.47~5.725		
		1.22	5.725~5.85		
		1.72	5.955~6.415		
		0.29	6.435~6.515		
		0.2	6.535~6.855		
		2.08	6.875~7.115		
1	1	-0.2	2.4~2.4835	Monopole	none
		1.97	5.15~5.25		
		2.16	5.25~5.35		
		1.12	5.47~5.725		
		0.89	5.725~5.85		
		1.81	5.955~6.415		
		-0.06	6.435~6.515		
		-0.05	6.535~6.855		
		1.29	6.875~7.115		

4. 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
802.11ax (HE20)	2TX	2RX

Note: The modulation and bandwidth are similar for 802.11n mode for 20MHz and 802.11ax mode for 20MHz, therefore the manufacturer will control the power for 802.11n mode is the same as the 802.11ax mode or more lower than it and investigated worst case to representative mode in test report.

5. 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.

6. 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), 802.11ax (HE20):

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥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 had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-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.

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

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 Parameter
802.11b	1 to 11	6	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.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter
802.11b	1 to 11	6	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.

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
802.11n (HT20) (output power only)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
802.11ax (HE20)	1 to 11	1, 6, 11	OFDMA	BPSK	MCS0

Test Condition:

Applicable To	Environmental Conditions	Input Power (System)	Tested By
RE≥1G	25deg. C, 66%RH	120Vac, 60Hz	Tom Yang
RE<1G	25deg. C, 66%RH	120Vac, 60Hz	Tom Yang
PLC	25deg. C, 66%RH	120Vac, 60Hz	Tom Yang
APCM	25deg. C, 60%RH	120Vac, 60Hz	Jim Huang

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 shall be considered.

802.11b: Duty cycle = $16.188 \text{ ms} / 16.5 \text{ ms} = 0.981$

802.11g: Duty cycle = $2.576 \text{ ms} / 2.591 \text{ ms} = 0.994$

802.11ax (HE20): Duty cycle = $3.799 \text{ ms} / 4.462 \text{ ms} = 0.851$, Duty factor = $10 * \log(1/\text{Duty cycle}) = 0.7 \text{ dB}$



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.

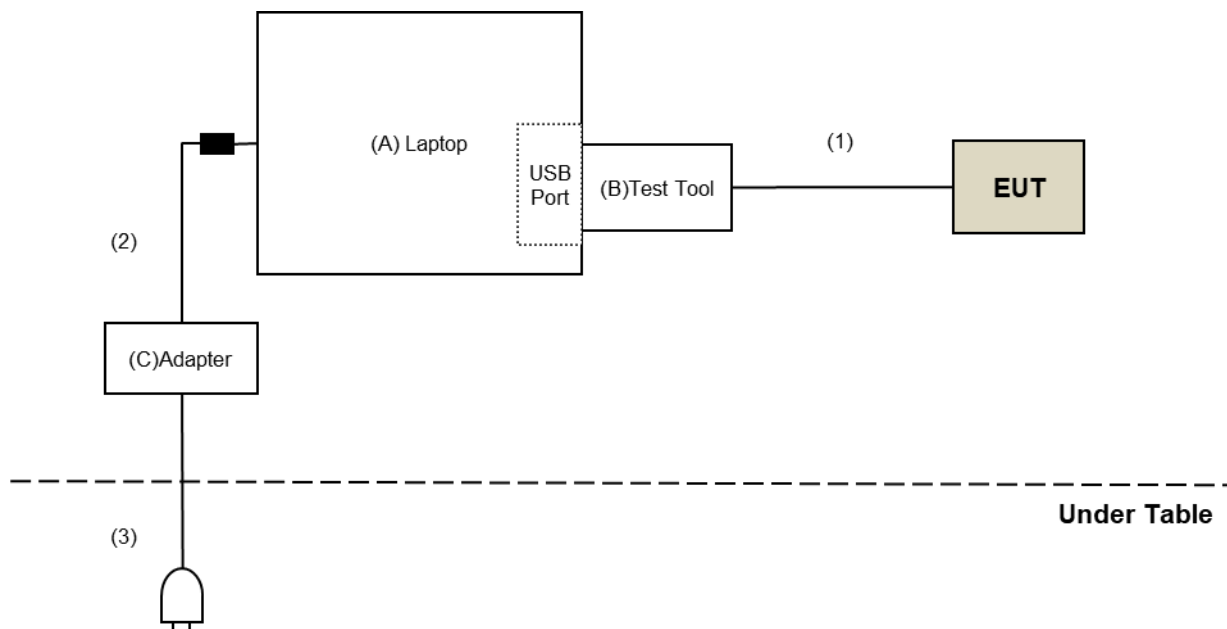
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E5430	HYV4VY1	FCC DoC	Provided by Lab
B.	Test Tool	Foxconn	NA	NA	NA	Supplied by client
C.	Adapter	Dell	FA65NE0-00	NA	NA	Provided by Lab

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Console Cable	1	1.6	No	0	Supplied by client
2.	DC Cable	1	1.8	No	1	Provided by Lab
3.	AC Cable	1	1	No	0	Provided by Lab

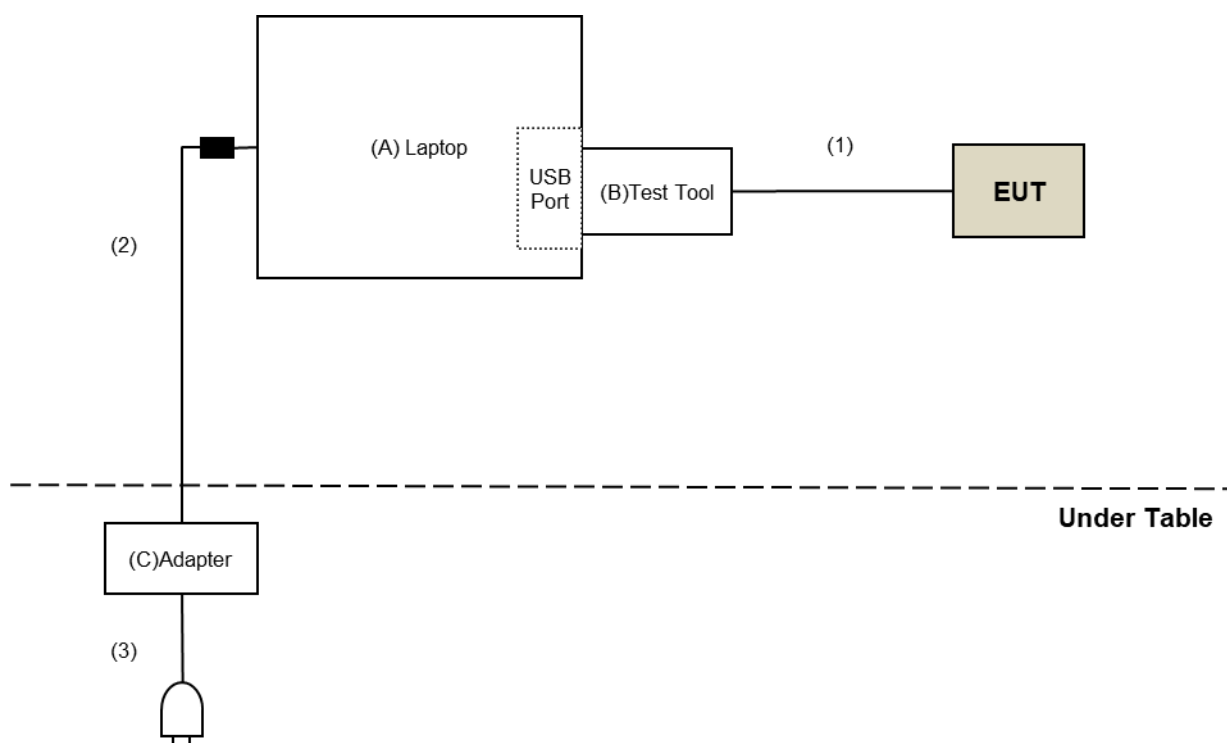
Note: The core is originally attached to the cable.

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 & Bandedge test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	2021/7/22	2022/7/21
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Pre_Amplifier EMCI	EMC001340	980142	2021/5/24	2022/5/23
LOOP ANTENNA Electro-Metrics	EM-6879	264	2021/3/5	2022/3/4
RF Coaxial Cable JYEBO	5D-FB	LOOPCAB-001	2021/1/7	2022/1/6
RF Coaxial Cable JYEBO	5D-FB	LOOPCAB-002	2021/1/7	2022/1/6
Pre_Amplifier Mini-Circuits	ZFL-1000VH2	QA0838008	2020/10/20	2021/10/19
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	2020/11/5	2021/11/4
RF Coaxial Cable COMMATE/PEWC	8D	966-3-1	2021/3/16	2022/3/15
RF Coaxial Cable COMMATE/PEWC	8D	966-3-2	2021/3/16	2022/3/15
RF Coaxial Cable COMMATE/PEWC	8D	966-3-3	2021/3/16	2022/3/15
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	2021/9/23	2022/9/22
Horn Antenna Schwarzbeck	BBHA9120-D	9120D-406	2020/11/22	2021/11/21
Pre_Amplifier EMCI	EMC12630SE	980384	2021/1/11	2022/1/10
RF Coaxial Cable EMCI	EMC104-SM-SM-1500	180504	2021/4/26	2022/4/25
RF Coaxial Cable EMCI	EMC104-SM-SM-2000	180601	2021/6/8	2022/6/7
RF Coaxial Cable EMCI	EMC104-SM-SM-6000	210201	2021/5/13	2022/5/12
Fix tool for Boresight antenna tower LIOW GUU	FBA-01	FBA_SIP01	NA	NA
Spectrum Analyzer Keysight	N9030A	MY54490679	2021/7/9	2022/7/8
Pre_Amplifier EMCI	EMC184045SE	980387	2021/1/11	2022/1/10
Horn Antenna Schwarzbeck	BBHA 9170	BBHA9170519	2020/11/22	2021/11/21
RF Cable-Frequency range: 1-40GHz EMCI	EMC102-KM-KM-1200	160924	2021/1/11	2022/1/10
RF cable (40GHz) EMCI	EMC-KM-KM-4000	200214	2021/3/10	2022/3/9

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: 2021/9/24 ~ 2021/10/2

For other test items test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	101516	2021/3/8	2022/3/7
Power Meter Anritsu	ML2495A	1529002	2021/6/21	2022/6/20
Pulse Power Sensor Anritsu	MA2411B	1339443	2021/5/31	2022/5/30
Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	2021/4/13	2022/4/12
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: 2021/10/22

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:

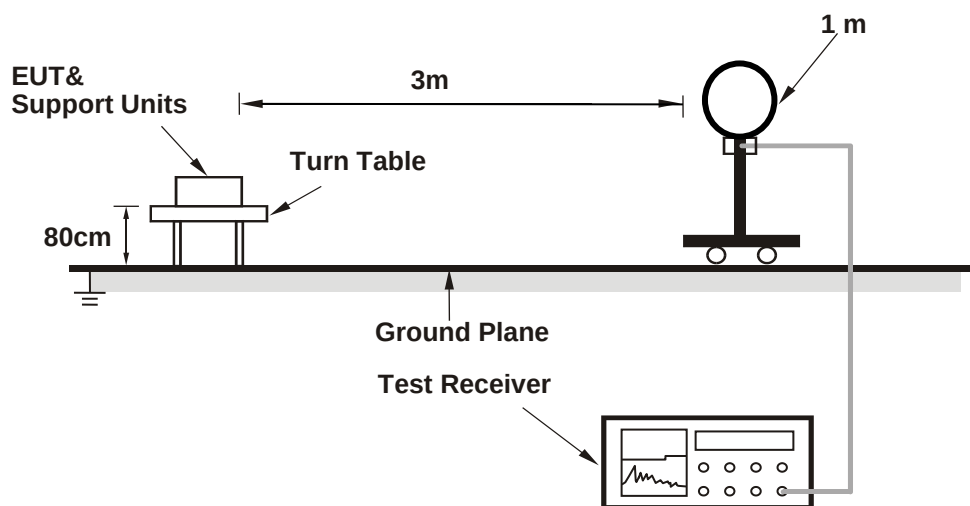
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

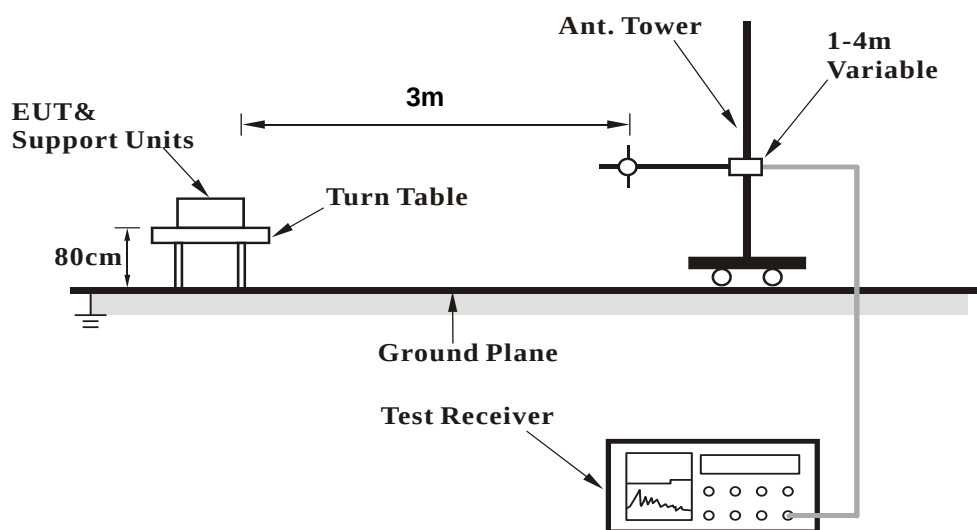
No deviation.

4.1.5 Test Setup

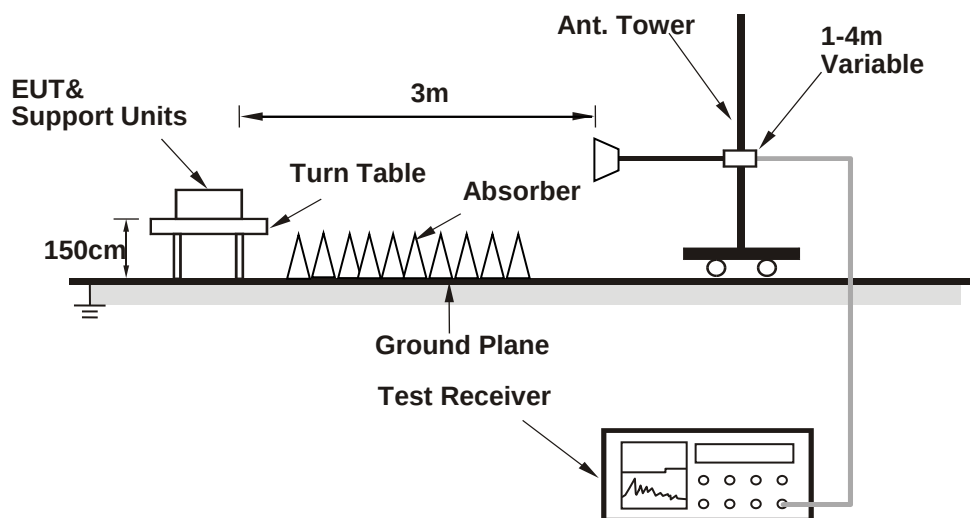
For Radiated emission below 30MHz



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

- Connected the EUT with the Laptop Computer which is placed on remote site.
- Controlling software (QATool_Dbg) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data:

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	57.8 PK	74.0	-16.2	1.74 H	360	59.0	-1.2
2	2390.00	45.3 AV	54.0	-8.7	1.74 H	360	46.5	-1.2
3	*2412.00	109.1 PK			1.74 H	360	110.3	-1.2
4	*2412.00	106.8 AV			1.74 H	360	108.0	-1.2
5	4824.00	40.8 PK	74.0	-33.2	1.09 H	176	37.1	3.7
6	4824.00	38.0 AV	54.0	-16.0	1.09 H	176	34.3	3.7
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	62.8 PK	74.0	-11.2	2.42 V	266	64.0	-1.2
2	2390.00	53.6 AV	54.0	-0.4	2.42 V	266	54.8	-1.2
3	*2412.00	110.8 PK			2.42 V	266	112.0	-1.2
4	*2412.00	108.5 AV			2.42 V	266	109.7	-1.2
5	4824.00	37.8 PK	74.0	-36.2	2.44 V	222	34.1	3.7
6	4824.00	34.9 AV	54.0	-19.1	2.44 V	222	31.2	3.7

Remarks:

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

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	57.8 PK	74.0	-16.2	1.77 H	357	59.0	-1.2
2	2390.00	45.0 AV	54.0	-9.0	1.77 H	357	46.2	-1.2
3	*2437.00	106.9 PK			1.77 H	357	108.1	-1.2
4	*2437.00	104.7 AV			1.77 H	357	105.9	-1.2
5	2483.50	54.1 PK	74.0	-19.9	1.77 H	357	55.3	-1.2
6	2483.50	42.8 AV	54.0	-11.2	1.77 H	357	44.0	-1.2
7	4874.00	43.4 PK	74.0	-30.6	1.20 H	173	39.6	3.8
8	4874.00	41.0 AV	54.0	-13.0	1.20 H	173	37.2	3.8
9	7311.00	54.5 PK	74.0	-19.5	1.13 H	295	44.8	9.7
10	7311.00	50.8 AV	54.0	-3.2	1.13 H	295	41.1	9.7
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	59.7 PK	74.0	-14.3	2.47 V	274	60.9	-1.2
2	2390.00	53.6 AV	54.0	-0.4	2.47 V	274	54.8	-1.2
3	*2437.00	109.1 PK			2.47 V	274	110.3	-1.2
4	*2437.00	107.0 AV			2.47 V	274	108.2	-1.2
5	2483.50	58.7 PK	74.0	-15.3	2.47 V	274	59.9	-1.2
6	2483.50	50.1 AV	54.0	-3.9	2.47 V	274	51.3	-1.2
7	4874.00	41.6 PK	74.0	-32.4	2.41 V	236	37.8	3.8
8	4874.00	38.8 AV	54.0	-15.2	2.41 V	236	35.0	3.8
9	7311.00	51.4 PK	74.0	-22.6	3.73 V	229	41.7	9.7
10	7311.00	48.0 AV	54.0	-6.0	3.73 V	229	38.3	9.7

Remarks:

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

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	110.6 PK			1.66 H	357	111.8	-1.2
2	*2462.00	108.4 AV			1.66 H	357	109.6	-1.2
3	2488.50	58.8 PK	74.0	-15.2	1.66 H	357	60.0	-1.2
4	2488.50	48.8 AV	54.0	-5.2	1.66 H	357	50.0	-1.2
5	4924.00	41.0 PK	74.0	-33.0	1.15 H	175	37.1	3.9
6	4924.00	38.3 AV	54.0	-15.7	1.15 H	175	34.4	3.9
7	7386.00	51.7 PK	74.0	-22.3	1.09 H	300	42.0	9.7
8	7386.00	48.0 AV	54.0	-6.0	1.09 H	300	38.3	9.7
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	108.2 PK			2.17 V	264	109.4	-1.2
2	*2462.00	106.1 AV			2.17 V	264	107.3	-1.2
3	2488.95	61.1 PK	74.0	-12.9	2.17 V	264	62.3	-1.2
4	2488.95	53.5 AV	54.0	-0.5	2.17 V	264	54.7	-1.2
5	4924.00	38.3 PK	74.0	-35.7	2.46 V	222	34.4	3.9
6	4924.00	35.3 AV	54.0	-18.7	2.46 V	222	31.4	3.9
7	7386.00	48.6 PK	74.0	-25.4	3.78 V	242	38.9	9.7
8	7386.00	45.1 AV	54.0	-8.9	3.78 V	242	35.4	9.7

Remarks:

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

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	58.8 PK	74.0	-15.2	1.29 H	338	60.0	-1.2
2	2390.00	46.7 AV	54.0	-7.3	1.29 H	338	47.9	-1.2
3	*2412.00	106.9 PK			1.29 H	338	108.1	-1.2
4	*2412.00	96.9 AV			1.29 H	338	98.1	-1.2
5	4824.00	40.7 PK	74.0	-33.3	1.13 H	184	37.0	3.7
6	4824.00	31.0 AV	54.0	-23.0	1.13 H	184	27.3	3.7
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	71.9 PK	74.0	-2.1	2.39 V	261	73.1	-1.2
2	2390.00	53.5 AV	54.0	-0.5	2.39 V	261	54.7	-1.2
3	*2412.00	105.9 PK			2.39 V	261	107.1	-1.2
4	*2412.00	96.2 AV			2.39 V	261	97.4	-1.2
5	4824.00	38.5 PK	74.0	-35.5	2.42 V	189	34.8	3.7
6	4824.00	28.8 AV	54.0	-25.2	2.42 V	189	25.1	3.7

Remarks:

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

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	58.5 PK	74.0	-15.5	1.23 H	349	59.7	-1.2
2	2390.00	46.6 AV	54.0	-7.4	1.23 H	349	47.8	-1.2
3	*2437.00	110.9 PK			1.23 H	349	112.1	-1.2
4	*2437.00	100.8 AV			1.23 H	349	102.0	-1.2
5	2483.50	55.3 PK	74.0	-18.7	1.23 H	349	56.5	-1.2
6	2483.50	43.1 AV	54.0	-10.9	1.23 H	349	44.3	-1.2
7	4874.00	40.2 PK	74.0	-33.8	1.13 H	191	36.4	3.8
8	4874.00	30.6 AV	54.0	-23.4	1.13 H	191	26.8	3.8
9	7311.00	51.1 PK	74.0	-22.9	1.06 H	316	41.4	9.7
10	7311.00	40.4 AV	54.0	-13.6	1.06 H	316	30.7	9.7
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	66.1 PK	74.0	-7.9	2.39 V	257	67.3	-1.2
2	2390.00	53.6 AV	54.0	-0.4	2.39 V	257	54.8	-1.2
3	*2437.00	112.6 PK			2.39 V	257	113.8	-1.2
4	*2437.00	102.3 AV			2.39 V	257	103.5	-1.2
5	2483.50	63.7 PK	74.0	-10.3	2.39 V	257	64.9	-1.2
6	2483.50	48.2 AV	54.0	-5.8	2.39 V	257	49.4	-1.2
7	4874.00	38.8 PK	74.0	-35.2	2.45 V	217	35.0	3.8
8	4874.00	29.3 AV	54.0	-24.7	2.45 V	217	25.5	3.8
9	7311.00	48.2 PK	74.0	-25.8	3.74 V	249	38.5	9.7
10	7311.00	37.5 AV	54.0	-16.5	3.74 V	249	27.8	9.7

Remarks:

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

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	110.1 PK			1.44 H	354	111.3	-1.2
2	*2462.00	100.2 AV			1.44 H	354	101.4	-1.2
3	2483.50	62.3 PK	74.0	-11.7	1.44 H	354	63.5	-1.2
4	2483.50	49.2 AV	54.0	-4.8	1.44 H	354	50.4	-1.2
5	4924.00	40.1 PK	74.0	-33.9	1.15 H	185	36.2	3.9
6	4924.00	30.6 AV	54.0	-23.4	1.15 H	185	26.7	3.9
7	7386.00	43.6 PK	74.0	-30.4	1.03 H	305	33.9	9.7
8	7386.00	32.4 AV	54.0	-21.6	1.03 H	305	22.7	9.7
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	107.8 PK			2.32 V	266	109.0	-1.2
2	*2462.00	98.1 AV			2.32 V	266	99.3	-1.2
3	2483.50	70.4 PK	74.0	-3.6	2.32 V	266	71.6	-1.2
4	2483.50	53.9 AV	54.0	-0.1	2.32 V	266	55.1	-1.2
5	4924.00	40.6 PK	74.0	-33.4	2.46 V	204	36.7	3.9
6	4924.00	29.9 AV	54.0	-24.1	2.46 V	204	26.0	3.9
7	7386.00	43.8 PK	74.0	-30.2	3.69 V	237	34.1	9.7
8	7386.00	32.7 AV	54.0	-21.3	3.69 V	237	23.0	9.7

Remarks:

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

RF Mode	TX 802.11ax (HE20)	Channel	CH 1 : 2412 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	62.6 PK	74.0	-11.4	1.66 H	326	63.8	-1.2
2	2390.00	49.0 AV	54.0	-5.0	1.66 H	326	50.2	-1.2
3	*2412.00	109.8 PK			1.66 H	326	111.0	-1.2
4	*2412.00	96.9 AV			1.66 H	326	98.1	-1.2
5	4824.00	39.8 PK	74.0	-34.2	1.18 H	193	36.1	3.7
6	4824.00	30.4 AV	54.0	-23.6	1.18 H	193	26.7	3.7
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	69.8 PK	74.0	-4.2	2.41 V	265	71.0	-1.2
2	2390.00	53.6 AV	54.0	-0.4	2.41 V	265	54.8	-1.2
3	*2412.00	108.0 PK			2.41 V	265	109.2	-1.2
4	*2412.00	94.2 AV			2.41 V	265	95.4	-1.2
5	4824.00	40.8 PK	74.0	-33.2	2.52 V	211	37.1	3.7
6	4824.00	30.3 AV	54.0	-23.7	2.52 V	211	26.6	3.7

Remarks:

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

RF Mode	TX 802.11ax (HE20)	Channel	CH 6 : 2437 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	58.2 PK	74.0	-15.8	1.61 H	334	59.4	-1.2
2	2390.00	46.2 AV	54.0	-7.8	1.61 H	334	47.4	-1.2
3	*2437.00	110.3 PK			1.61 H	334	111.5	-1.2
4	*2437.00	100.1 AV			1.61 H	334	101.3	-1.2
5	2483.50	55.2 PK	74.0	-18.8	1.61 H	334	56.4	-1.2
6	2483.50	43.1 AV	54.0	-10.9	1.61 H	334	44.3	-1.2
7	4874.00	39.7 PK	74.0	-34.3	1.17 H	185	35.9	3.8
8	4874.00	30.3 AV	54.0	-23.7	1.17 H	185	26.5	3.8
9	7311.00	51.3 PK	74.0	-22.7	1.01 H	322	41.6	9.7
10	7311.00	40.8 AV	54.0	-13.2	1.01 H	322	31.1	9.7

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	66.3 PK	74.0	-7.7	2.41 V	263	67.5	-1.2
2	2390.00	53.7 AV	54.0	-0.3	2.41 V	263	54.9	-1.2
3	*2437.00	111.3 PK			2.41 V	263	112.5	-1.2
4	*2437.00	101.1 AV			2.41 V	263	102.3	-1.2
5	2483.50	64.1 PK	74.0	-9.9	2.41 V	263	65.3	-1.2
6	2483.50	48.5 AV	54.0	-5.5	2.41 V	263	49.7	-1.2
7	4874.00	38.9 PK	74.0	-35.1	2.50 V	211	35.1	3.8
8	4874.00	29.4 AV	54.0	-24.6	2.50 V	211	25.6	3.8
9	7311.00	48.6 PK	74.0	-25.4	3.75 V	264	38.9	9.7
10	7311.00	37.6 AV	54.0	-16.4	3.75 V	264	27.9	9.7

Remarks:

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

RF Mode	TX 802.11ax (HE20)	Channel	CH 11 : 2462 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	110.9 PK			1.64 H	333	112.1	-1.2
2	*2462.00	97.7 AV			1.64 H	333	98.9	-1.2
3	2483.50	59.2 PK	74.0	-14.8	1.64 H	333	60.4	-1.2
4	2483.50	47.4 AV	54.0	-6.6	1.64 H	333	48.6	-1.2
5	4924.00	40.2 PK	74.0	-33.8	1.15 H	179	36.3	3.9
6	4924.00	30.6 AV	54.0	-23.4	1.15 H	179	26.7	3.9
7	7386.00	43.0 PK	74.0	-31.0	1.08 H	305	33.3	9.7
8	7386.00	32.0 AV	54.0	-22.0	1.08 H	305	22.3	9.7
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	108.4 PK			2.36 V	266	109.6	-1.2
2	*2462.00	95.8 AV			2.36 V	266	97.0	-1.2
3	2483.50	72.8 PK	74.0	-1.2	2.36 V	266	74.0	-1.2
4	2483.50	53.7 AV	54.0	-0.3	2.36 V	266	54.9	-1.2
5	4924.00	41.1 PK	74.0	-32.9	2.50 V	196	37.2	3.9
6	4924.00	30.2 AV	54.0	-23.8	2.50 V	196	26.3	3.9
7	7386.00	42.6 PK	74.0	-31.4	3.69 V	223	32.9	9.7
8	7386.00	32.4 AV	54.0	-21.6	3.69 V	223	22.7	9.7

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.

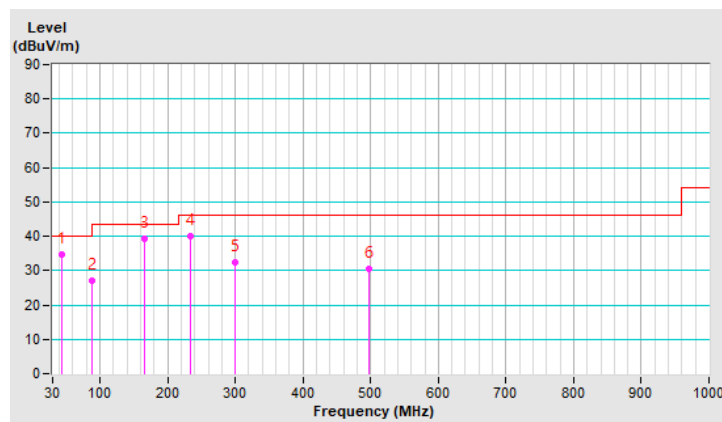
Below 1GHz Data:

RF Mode	TX 802.11b	Channel	CH 6 : 2437 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	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	43.63	34.7 QP	40.0	-5.3	1.50 H	328	43.0	-8.3
2	88.71	27.2 QP	43.5	-16.3	2.00 H	292	41.0	-13.8
3	166.28	39.4 QP	43.5	-4.1	2.00 H	7	47.4	-8.0
4	232.78	40.1 QP	46.0	-5.9	1.00 H	250	49.8	-9.7
5	298.76	32.4 QP	46.0	-13.6	1.00 H	282	39.2	-6.8
6	497.81	30.6 QP	46.0	-15.4	1.50 H	360	31.6	-1.0

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.

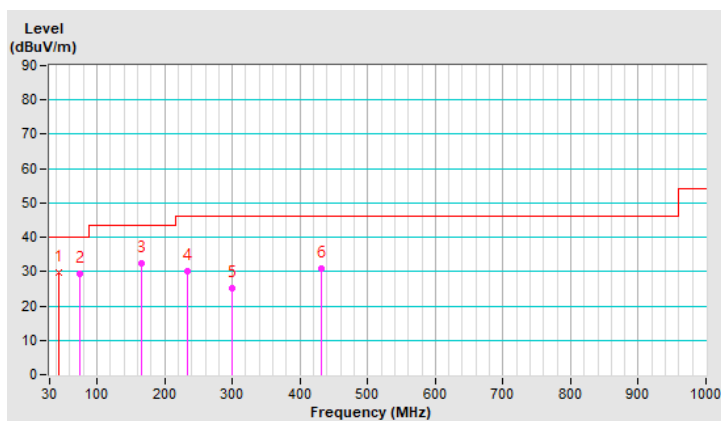


RF Mode	TX 802.11b	Channel	CH 6 : 2437 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	42.77	29.6 QP	40.0	-10.4	3.00 V	294	38.0	-8.4
2	74.33	29.3 QP	40.0	-10.7	3.00 V	164	40.8	-11.5
3	166.04	32.4 QP	43.5	-11.1	1.50 V	64	40.4	-8.0
4	232.80	29.9 QP	46.0	-16.1	2.00 V	297	39.6	-9.7
5	299.32	25.2 QP	46.0	-20.8	1.50 V	232	31.9	-6.7
6	431.99	31.0 QP	46.0	-15.0	1.50 V	360	33.6	-2.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit 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	2020/10/20	2021/10/19
LISN R&S	ESH3-Z5	848773/004	2020/10/27	2021/10/26
LISN R & S	ESH3-Z5	835239/001	2021/3/26	2022/3/25
50 ohms Terminator	50	3	2020/10/26	2021/10/25
RF Coaxial Cable JYEBO	5D-FB	COCCAB-001	2021/9/25	2022/9/24
Fixed attenuator STI	STI02-2200-10	005	2021/8/27	2022/8/26
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: 2021/10/1

4.2.3 Test Procedures

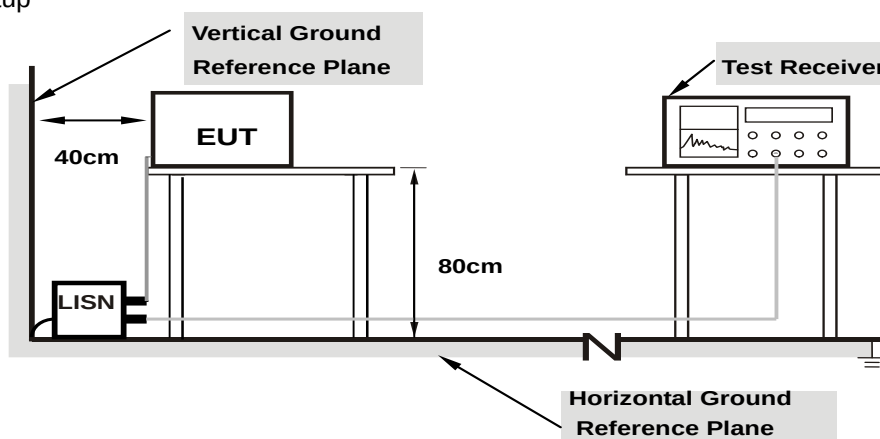
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

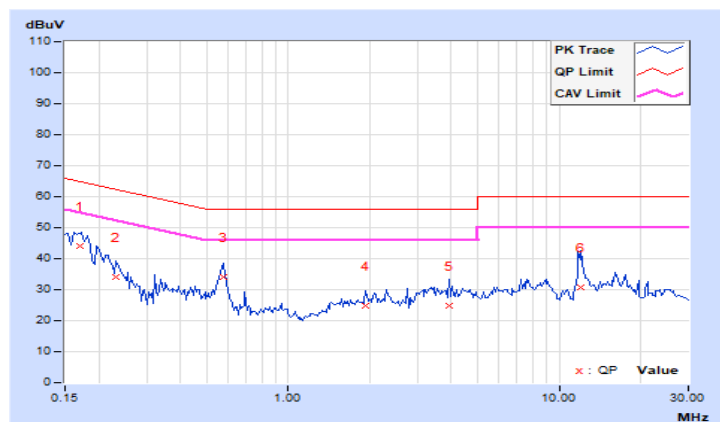
4.2.7 Test Results

RF Mode	TX 802.11b	Channel	CH 6 : 2.437 GHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	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	0.16953	10.05	33.89	16.76	43.94	26.81	64.98	54.98	-21.04	-28.17
2	0.23203	10.05	23.99	8.17	34.04	18.22	62.38	52.38	-28.34	-34.16
3	0.57578	10.08	24.15	18.12	34.23	28.20	56.00	46.00	-21.77	-17.80
4	1.93359	10.16	14.58	9.00	24.74	19.16	56.00	46.00	-31.26	-26.84
5	3.92969	10.26	14.66	6.34	24.92	16.60	56.00	46.00	-31.08	-29.40
6	11.95703	10.73	20.12	14.11	30.85	24.84	60.00	50.00	-29.15	-25.16

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

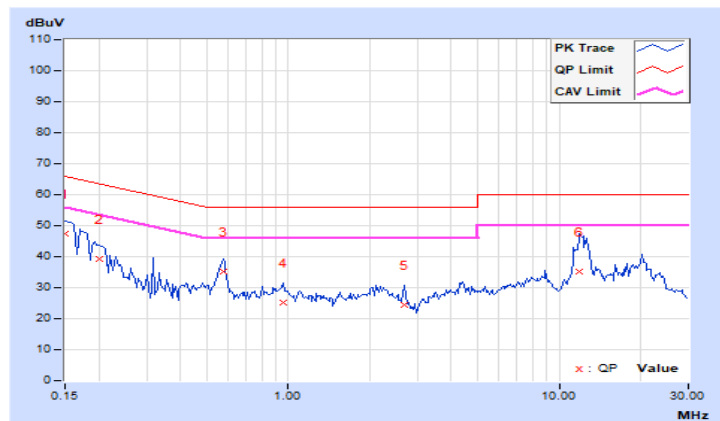


RF Mode	TX 802.11b	Channel	CH 6 : 2.437 GHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

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	10.02	37.43	20.21	47.45	30.23	66.00	56.00	-18.55	-25.77
2	0.20078	10.03	29.28	10.83	39.31	20.86	63.58	53.58	-24.27	-32.72
3	0.57578	10.05	25.28	18.34	35.33	28.39	56.00	46.00	-20.67	-17.61
4	0.96250	10.08	14.99	8.97	25.07	19.05	56.00	46.00	-30.93	-26.95
5	2.66797	10.16	14.23	6.49	24.39	16.65	56.00	46.00	-31.61	-29.35
6	11.80469	10.57	24.74	19.84	35.31	30.41	60.00	50.00	-24.69	-19.59

Remarks:

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

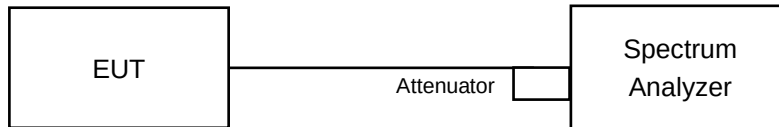


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. In order to obtain results more easily, change max hold to view. It has no effect on the result

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	8.08	8.11	0.5	Pass
6	2437	9.08	9.08	0.5	Pass
11	2462	8.12	8.09	0.5	Pass

802.11g

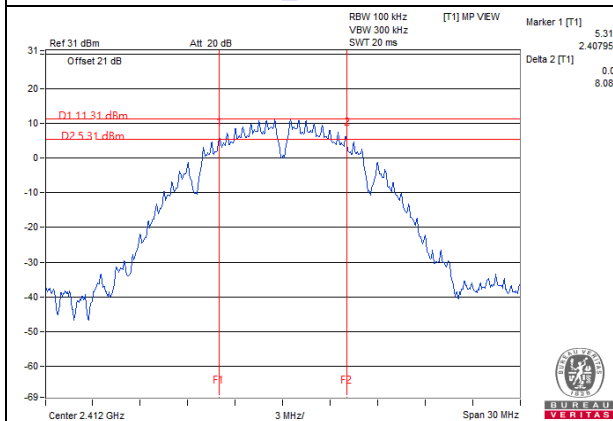
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	15.17	15.11	0.5	Pass
6	2437	15.77	16.33	0.5	Pass
11	2462	15.83	16.37	0.5	Pass

802.11ax (HE20)

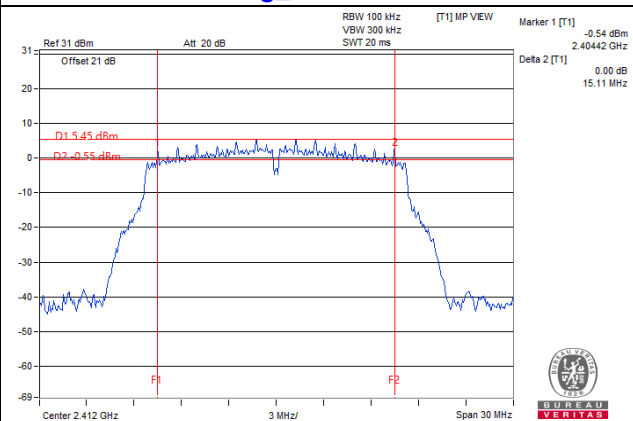
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	18.36	18.05	0.5	Pass
6	2437	18.35	17.92	0.5	Pass
11	2462	18.46	18.81	0.5	Pass

Spectrum Plot of Worst Value

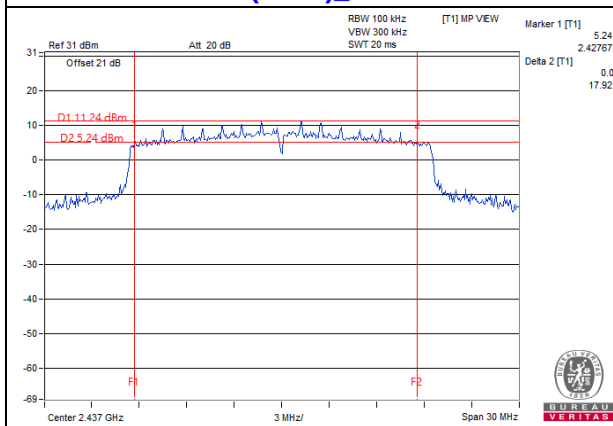
802.11b_Chain 0 / CH1



802.11g_Chain 1 / CH1



802.11ax (HE20)_Chain 1 / 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)

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

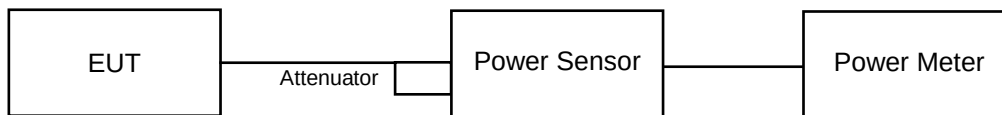
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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

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

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

Peak Power

802.11b

Chan.	Chan. Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	22.12	22.08	324.365	25.11	30	Pass
6	2437	24.28	24.43	545.249	27.37	30	Pass
11	2462	22.46	22.86	369.394	25.67	30	Pass

802.11g

Chan.	Chan. Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	23.71	24.08	490.822	26.91	30	Pass
6	2437	25.74	26.01	773.998	28.89	30	Pass
11	2462	24.93	24.93	622.343	27.94	30	Pass

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	24.41	24.20	539.085	27.32	30	Pass
6	2437	25.18	25.71	702.001	28.46	30	Pass
11	2462	24.11	24.18	519.45	27.16	30	Pass

802.11ax (HE20)

Chan.	Chan. Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Test Result
		Chain 0	Chain 1				
1	2412	24.69	24.37	567.969	27.54	30	Pass
6	2437	25.47	25.94	745.016	28.72	30	Pass
11	2462	24.37	24.43	550.859	27.41	30	Pass

Average Power

802.11b

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Average Power (mW)	Total Average Power (dBm)
		Chain 0	Chain 1		
1	2412	19.53	19.66	182.213	22.61
6	2437	22.19	22.30	335.401	25.26
11	2462	20.17	20.36	212.635	23.28

802.11g

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Average Power (mW)	Total Average Power (dBm)
		Chain 0	Chain 1		
1	2412	16.08	16.02	80.545	19.06
6	2437	21.93	22.11	318.51	25.03
11	2462	17.01	17.38	104.936	20.21

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Average Power (mW)	Total Average Power (dBm)
		Chain 0	Chain 1		
1	2412	15.20	15.27	66.764	18.25
6	2437	21.22	21.37	269.522	24.31
11	2462	16.31	16.53	87.734	19.43

802.11ax (HE20)

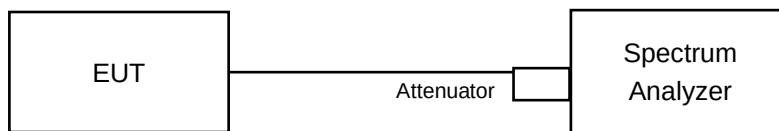
Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Average Power (mW)	Total Average Power (dBm)
		Chain 0	Chain 1		
1	2412	15.25	15.37	67.932	18.32
6	2437	21.49	21.60	285.473	24.56
11	2462	16.51	16.77	92.305	19.65

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

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)		Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
		Chain 0	Chain 1			
1	2412	-0.76	-1.95	1.70	8.00	Pass
6	2437	0.86	0.20	3.55	8.00	Pass
11	2462	-0.82	-1.96	1.66	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 = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 2.75 \text{ dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.

802.11g

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)		Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
		Chain 0	Chain 1			
1	2412	-7.41	-6.66	-4.01	8.00	Pass
6	2437	-2.19	-0.66	1.65	8.00	Pass
11	2462	-6.43	-7.33	-3.85	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 = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 2.75 \text{ dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.

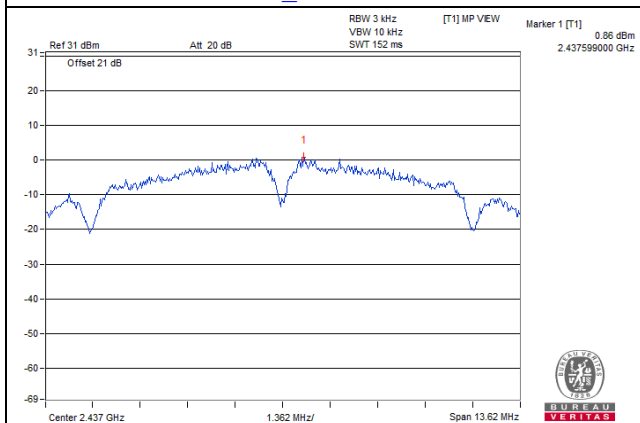
802.11ax (HE20)

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)		Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Test Result
		Chain 0	Chain 1			
1	2412	-10.77	-10.33	-7.53	8.00	Pass
6	2437	-3.18	-4.11	-0.61	8.00	Pass
11	2462	-8.56	-8.41	-5.47	8.00	Pass

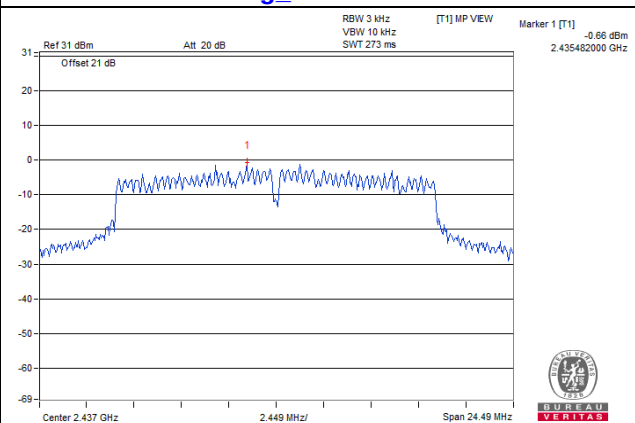
- Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
 2. The directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 2.75 \text{ dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.

Spectrum Plot of Worst Value

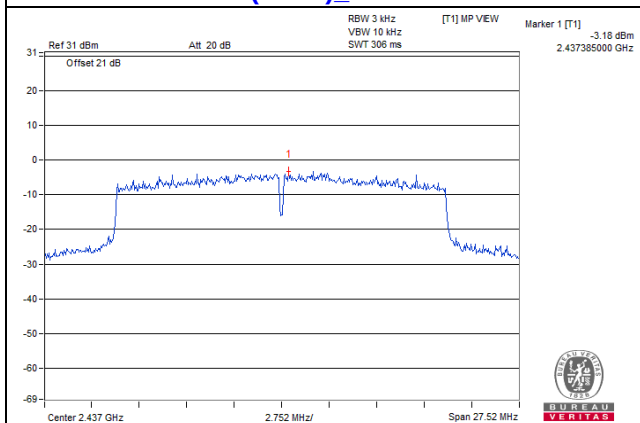
802.11b Chain 0 / CH6



802.11g Chain 1 / CH6



802.11ax (HE20) Chain 0 / CH6

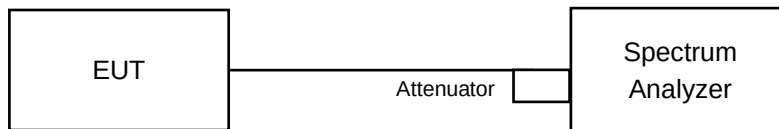


4.6 Conducted Out of Band Emission Measurement

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

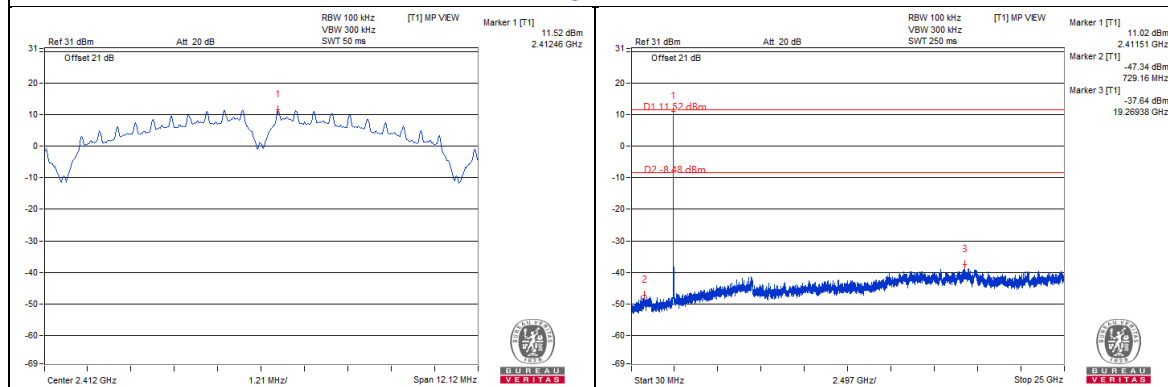
4.6.7 Test Results

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.

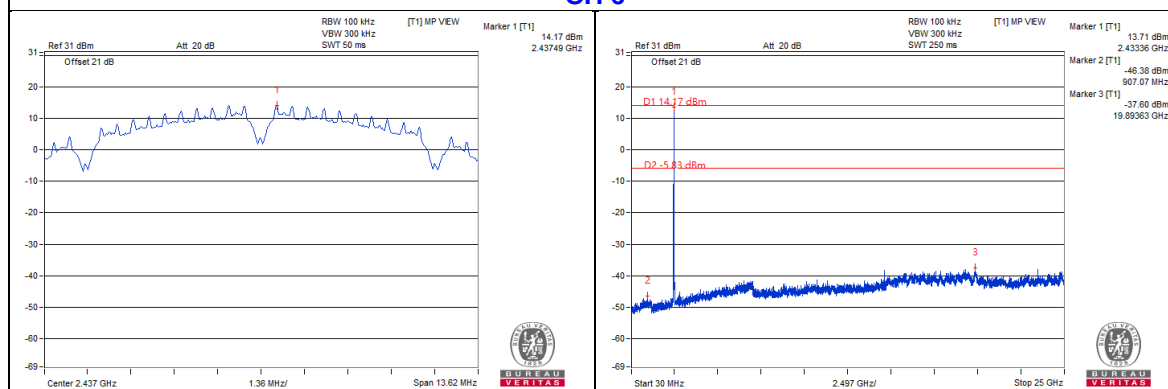
802.11b

Chain 0

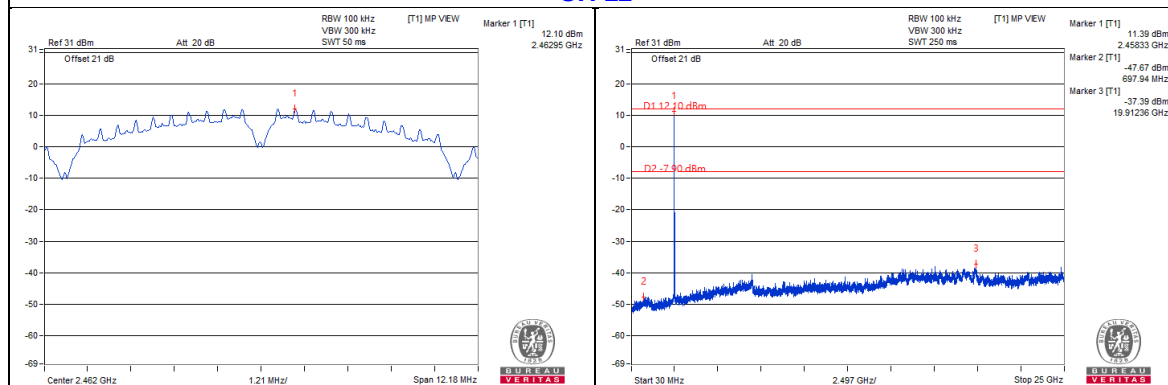
CH 1



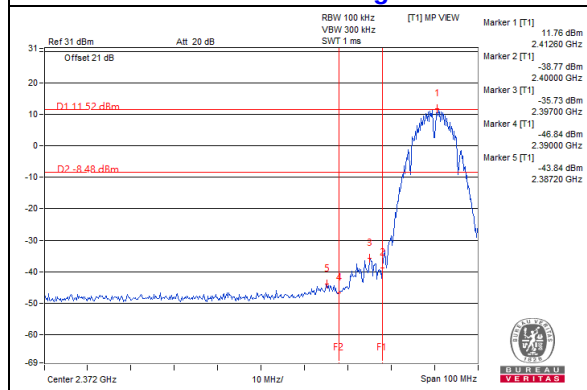
CH 6



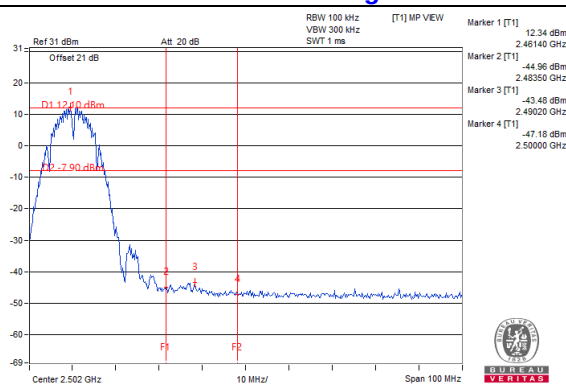
CH 11



CH 1 Band edge

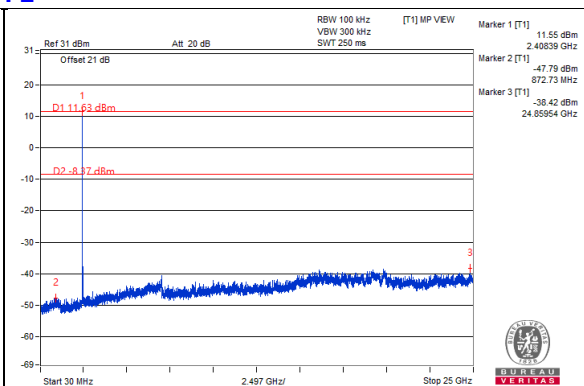
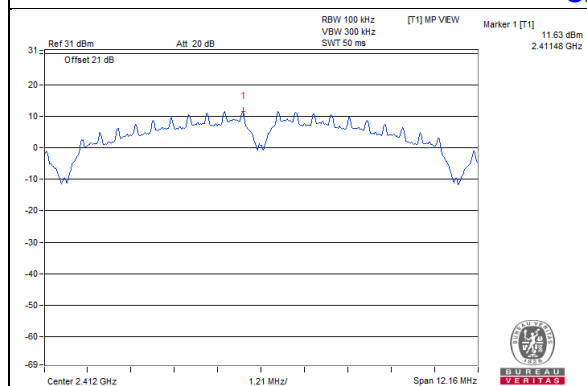


CH 11 Band edge

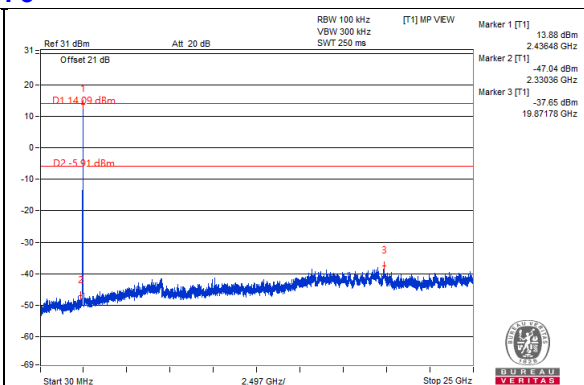
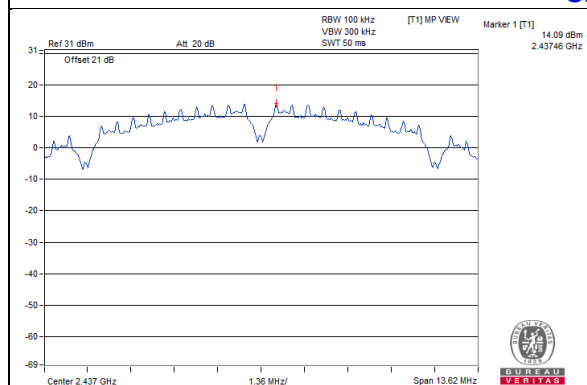


Chain 1

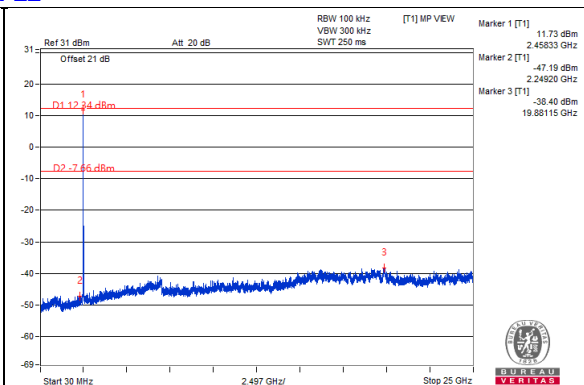
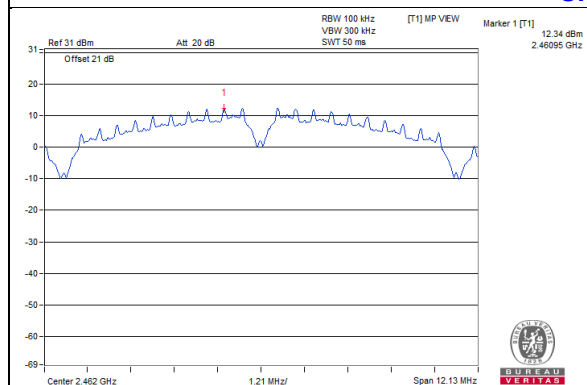
CH 1



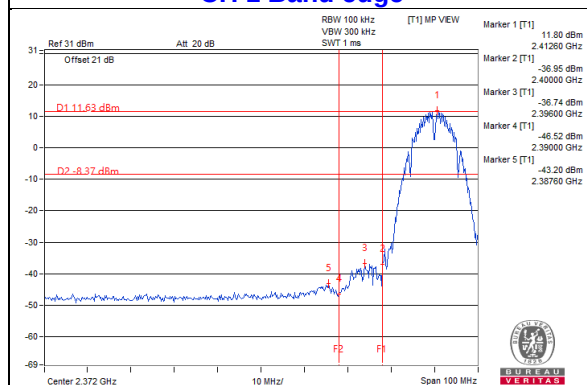
CH 6



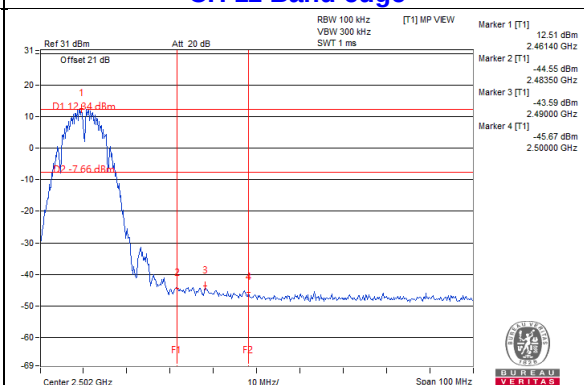
CH 11



CH 1 Band edge

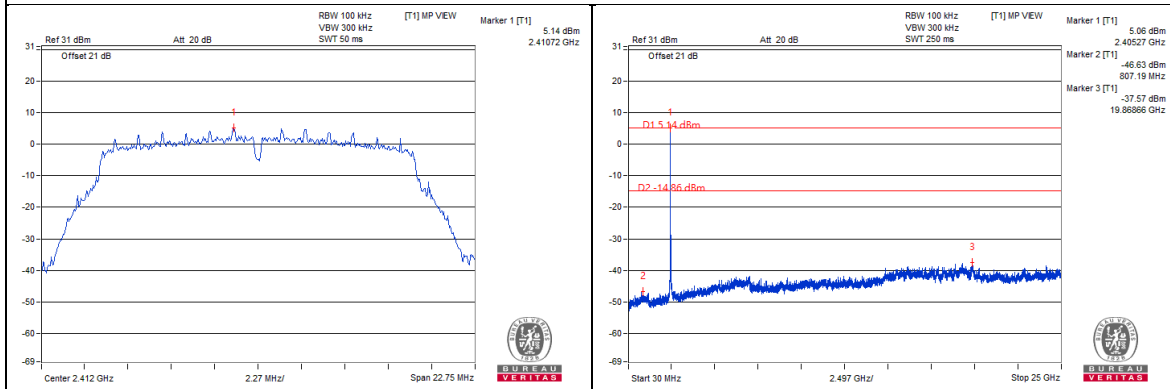


CH 11 Band edge

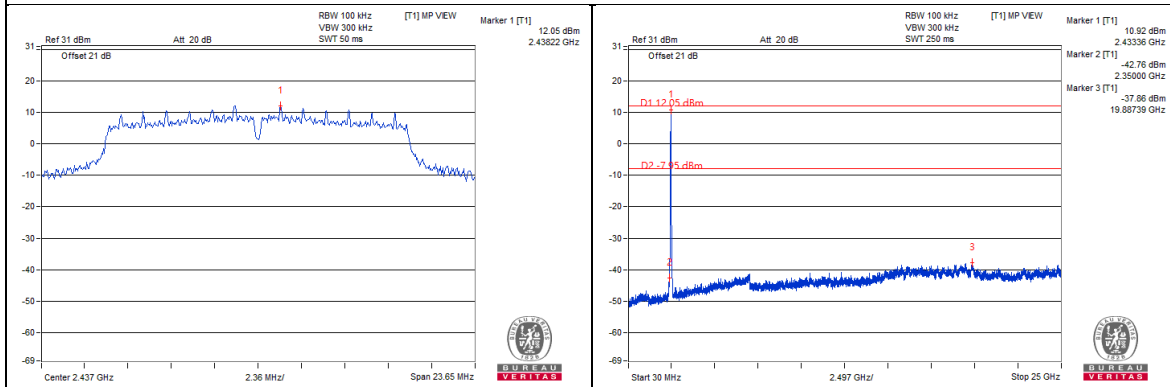


802.11g Chain 0

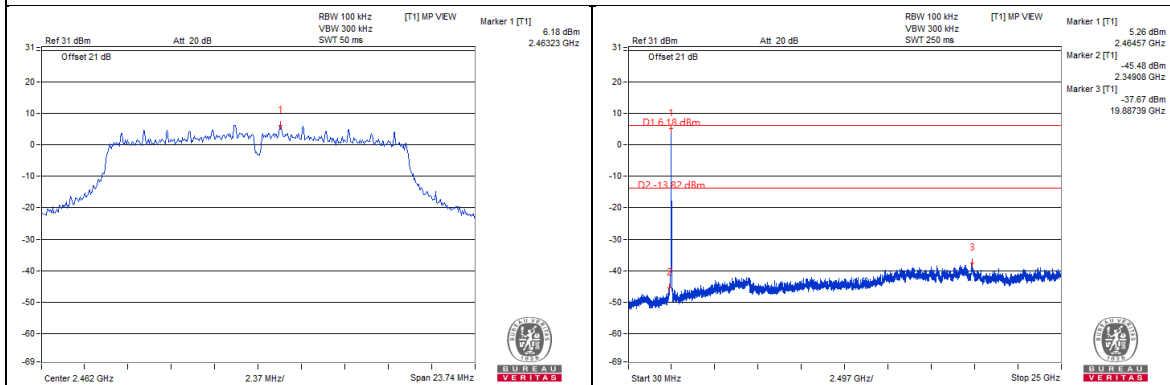
CH 1



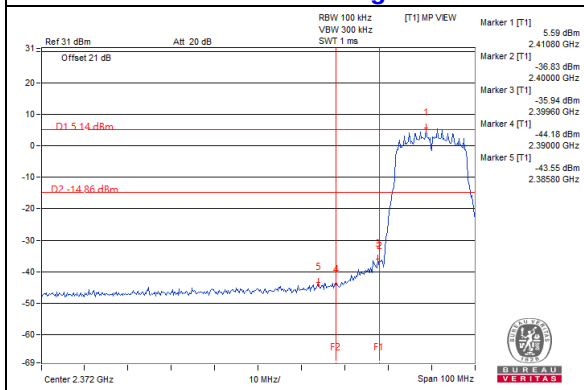
CH 6



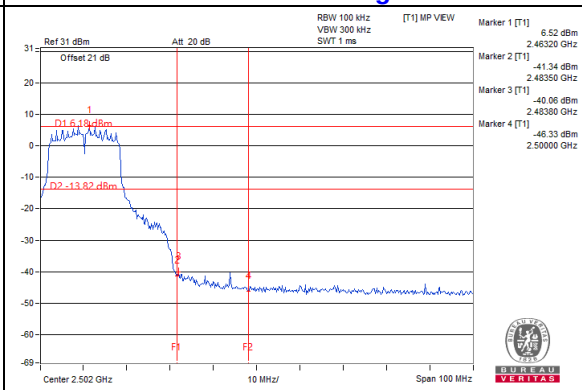
CH 11



CH 1 Band edge

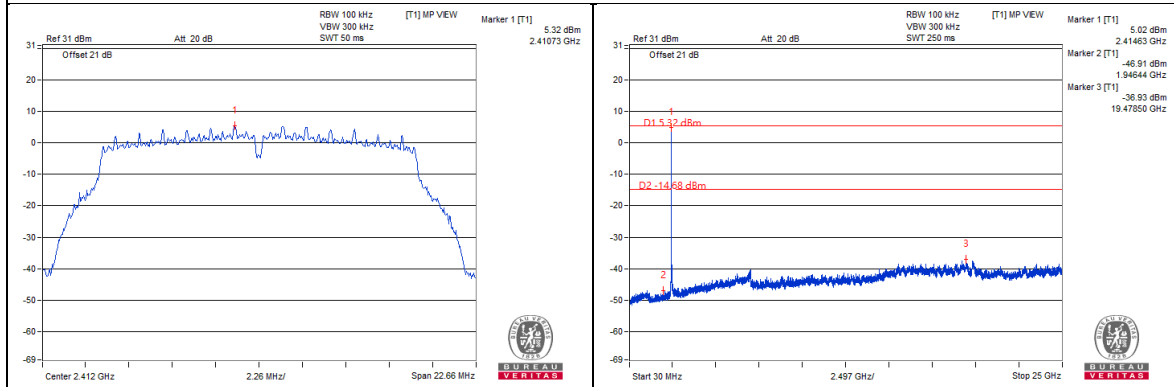


CH 11 Band edge

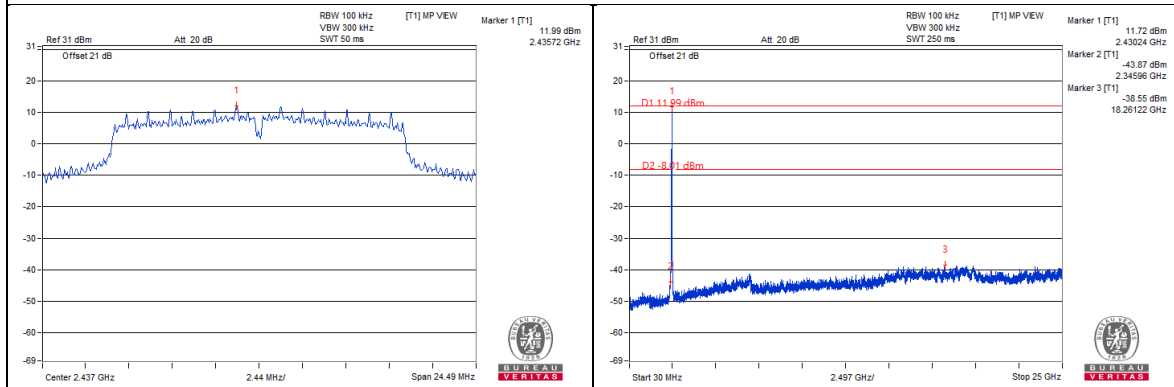


Chain 1

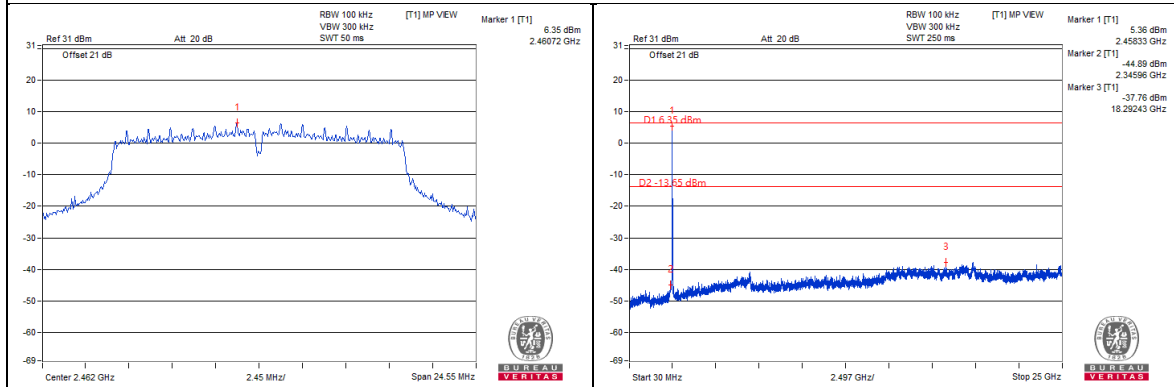
CH 1



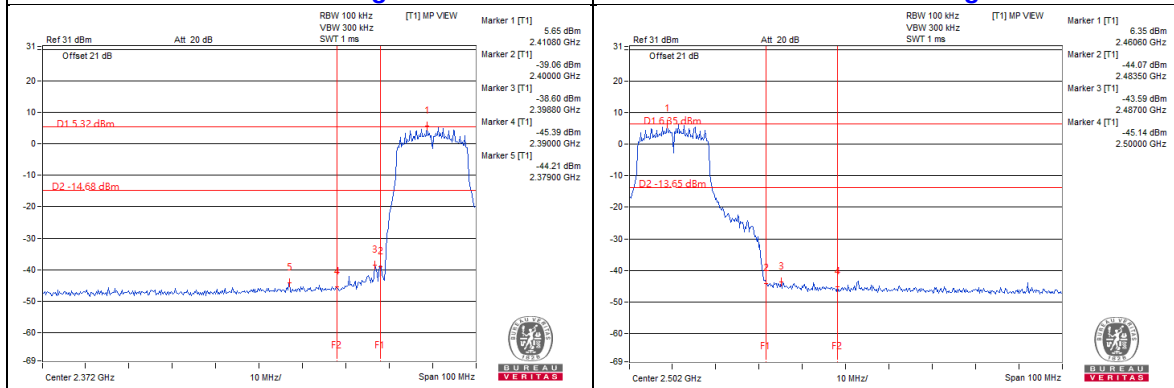
CH 6



CH 11



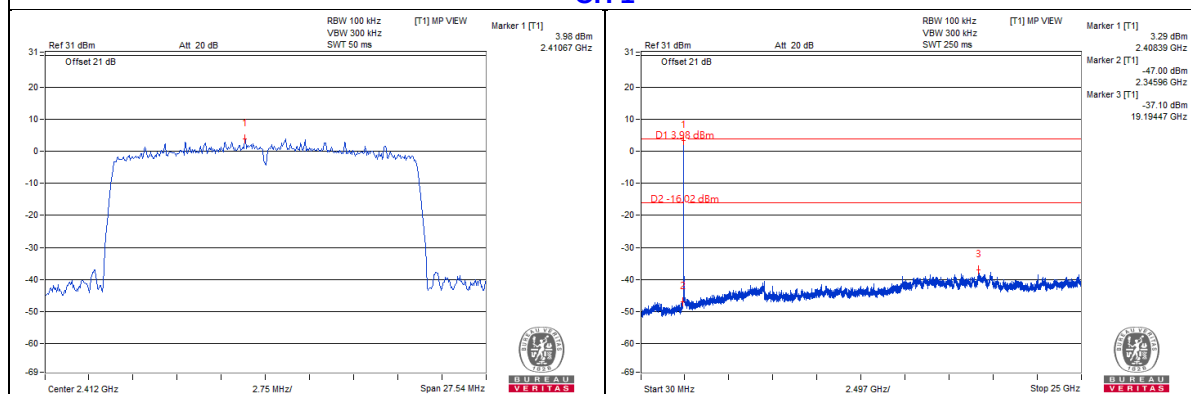
CH 1 Band edge



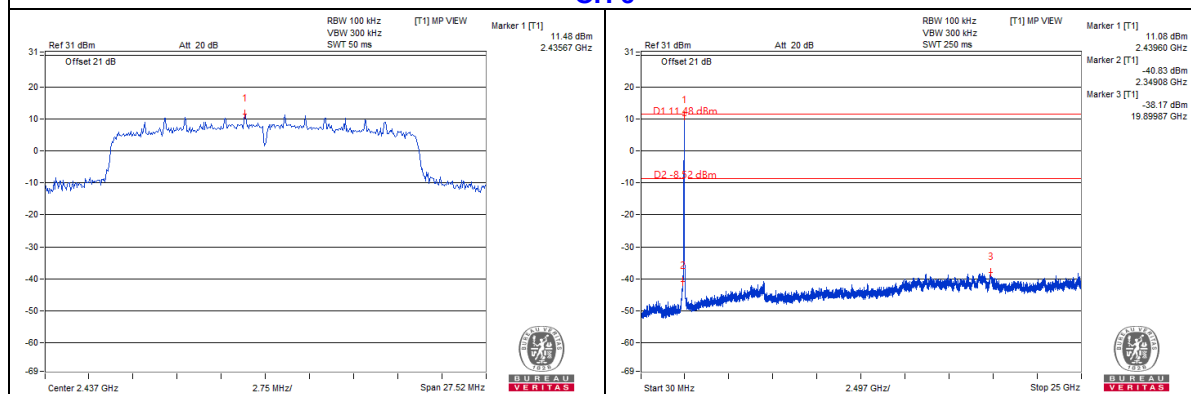
802.11ax (HE20)

Chain 0

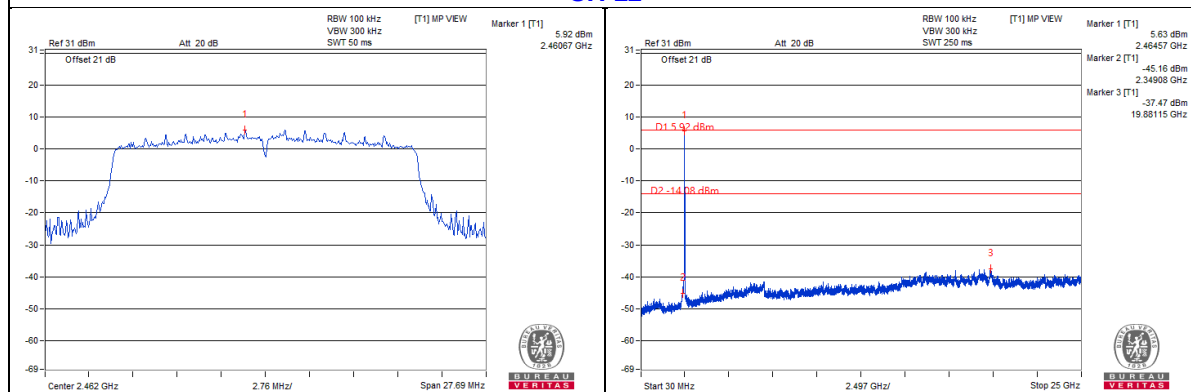
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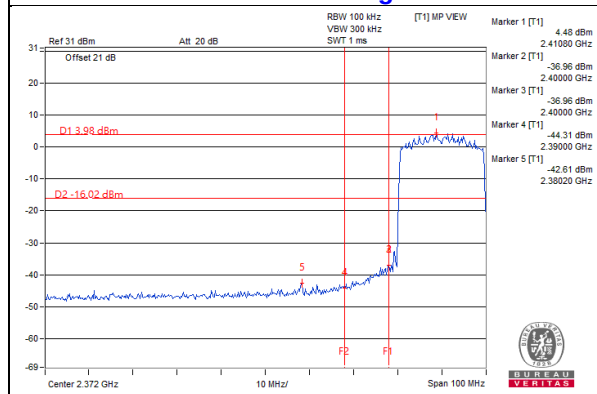
CH 6



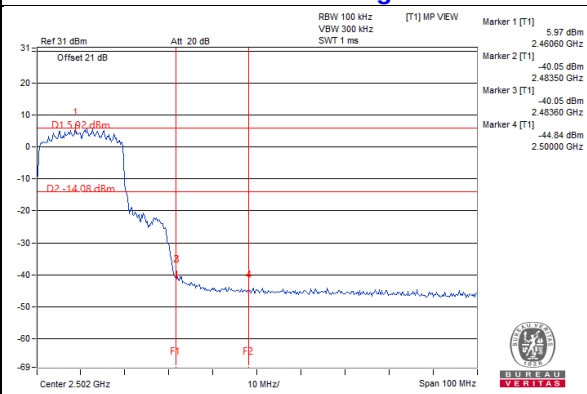
CH 11



CH 1 Band edge

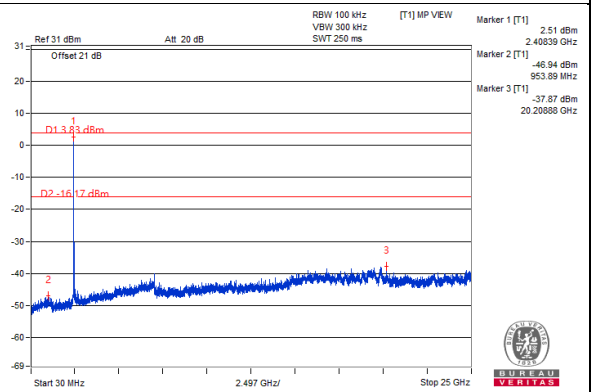
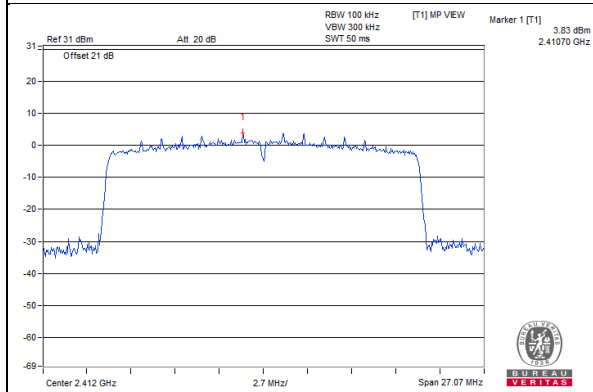


CH 11 Band edge

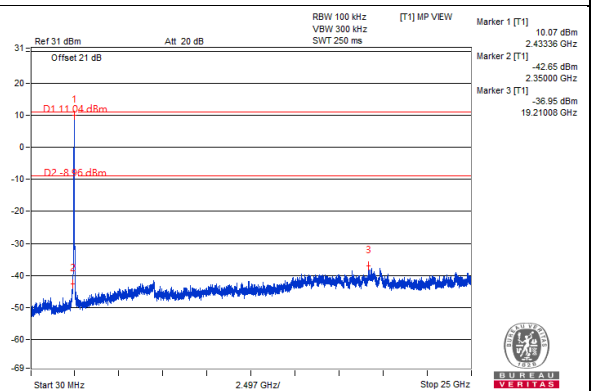
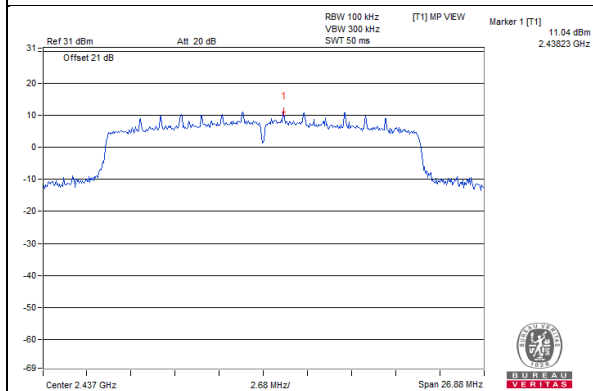


Chain 1

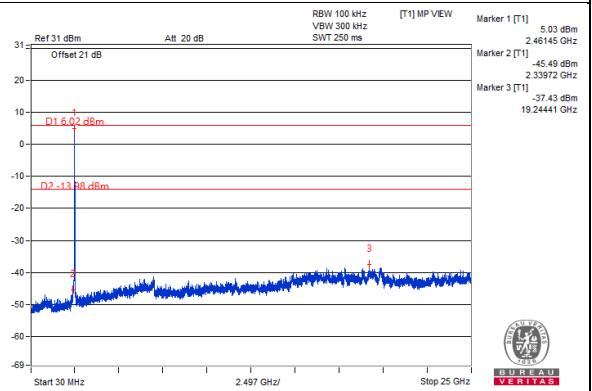
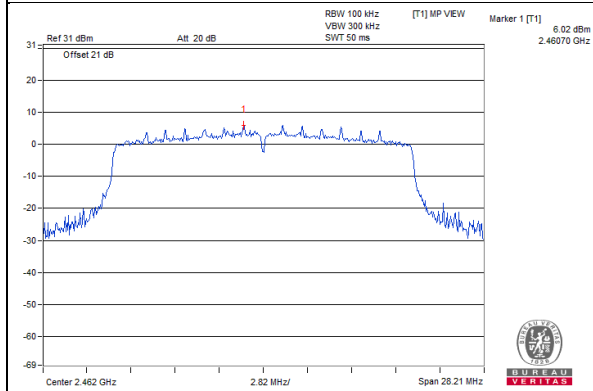
CH 1



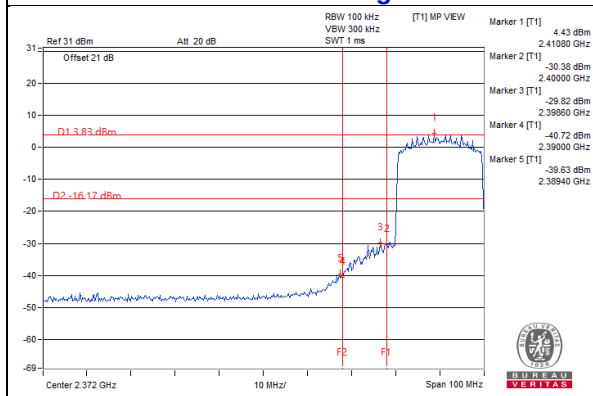
CH 6



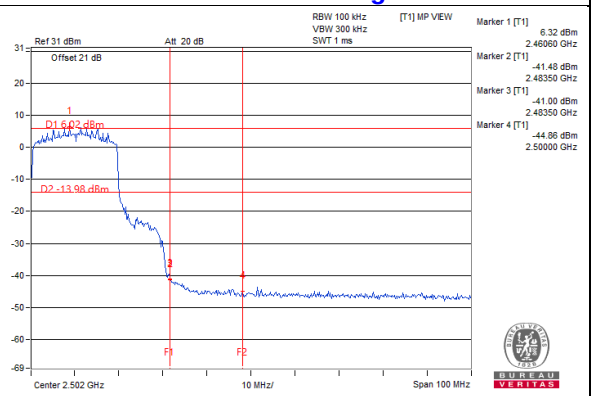
CH 11



CH 1 Band edge



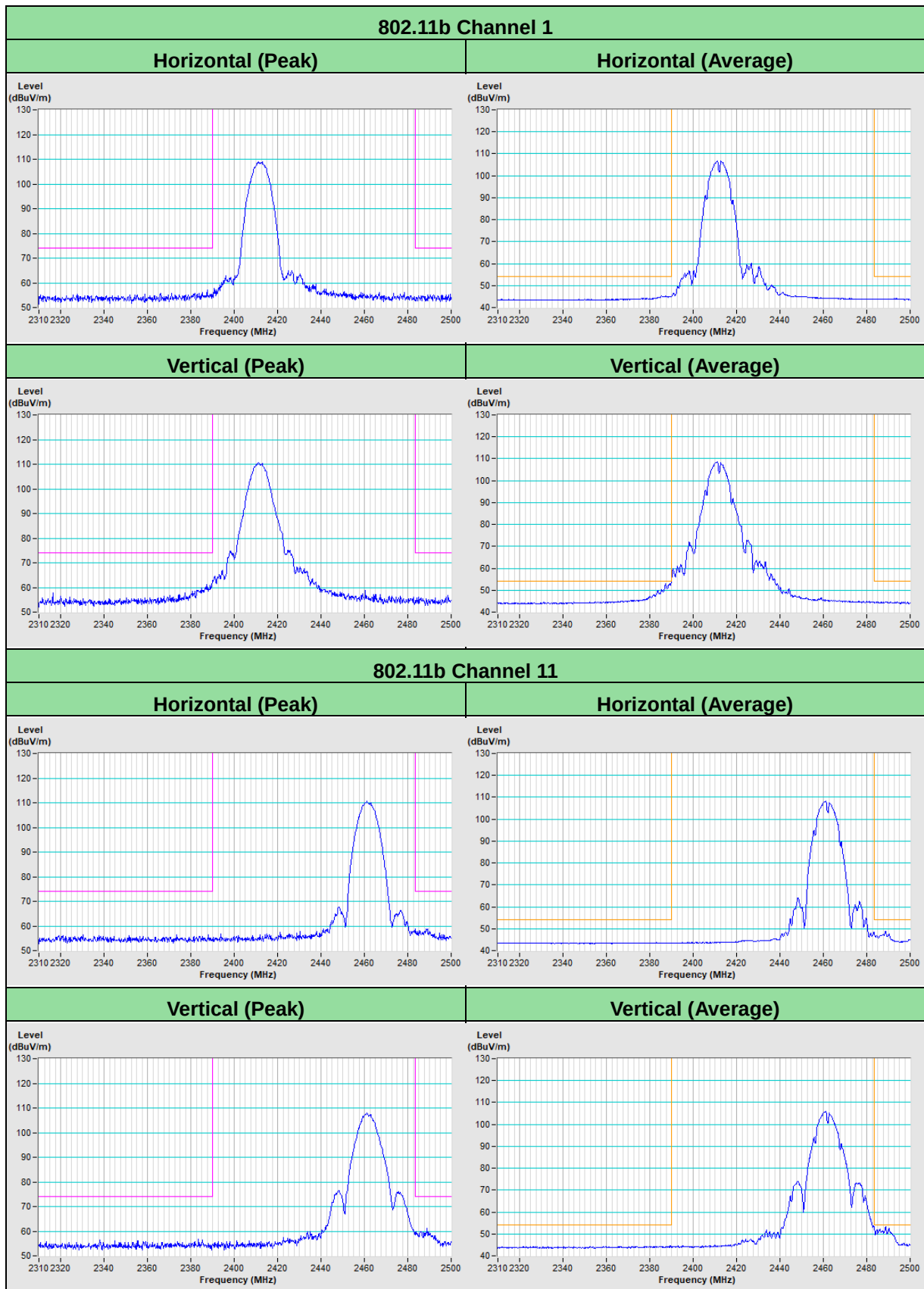
CH 11 Band edge

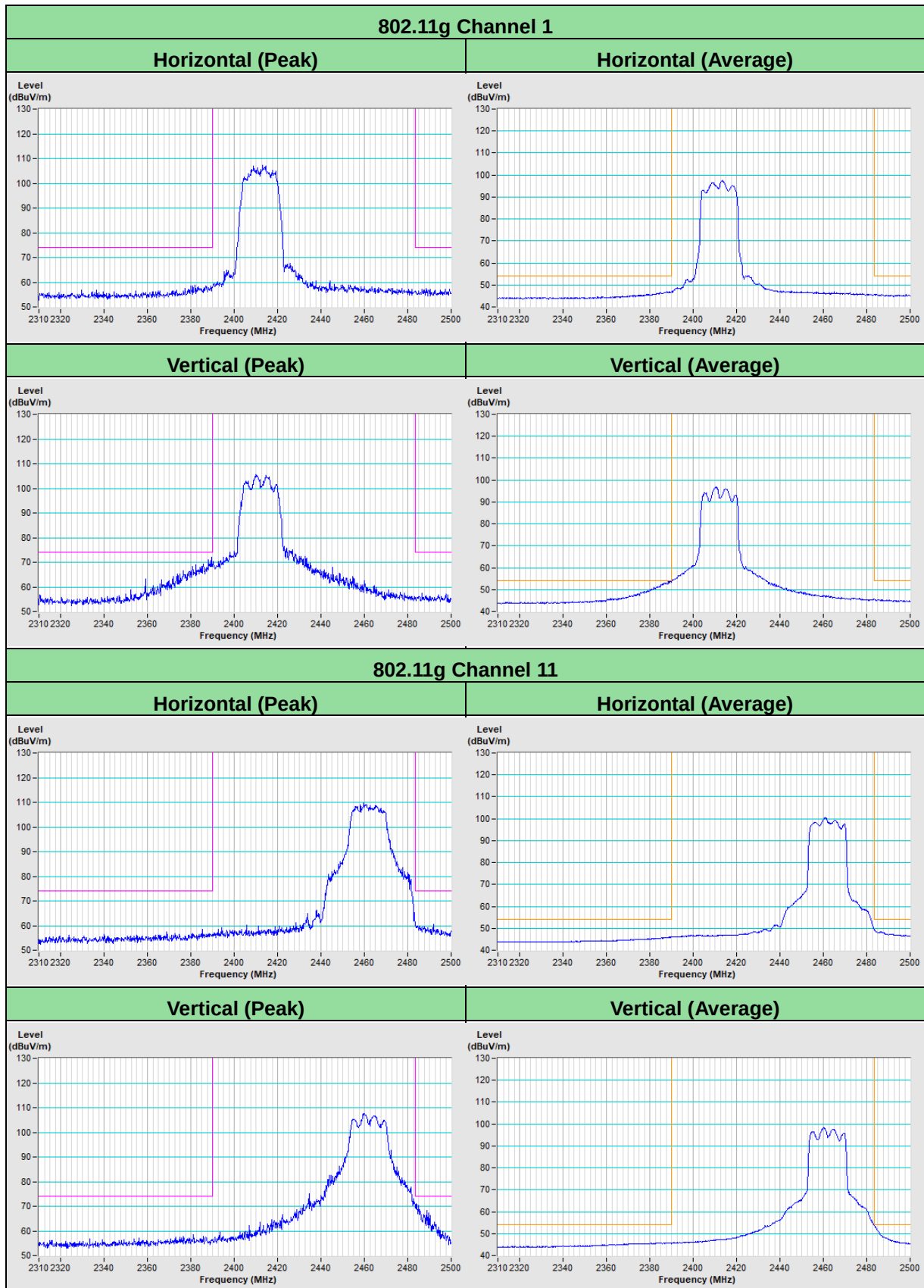


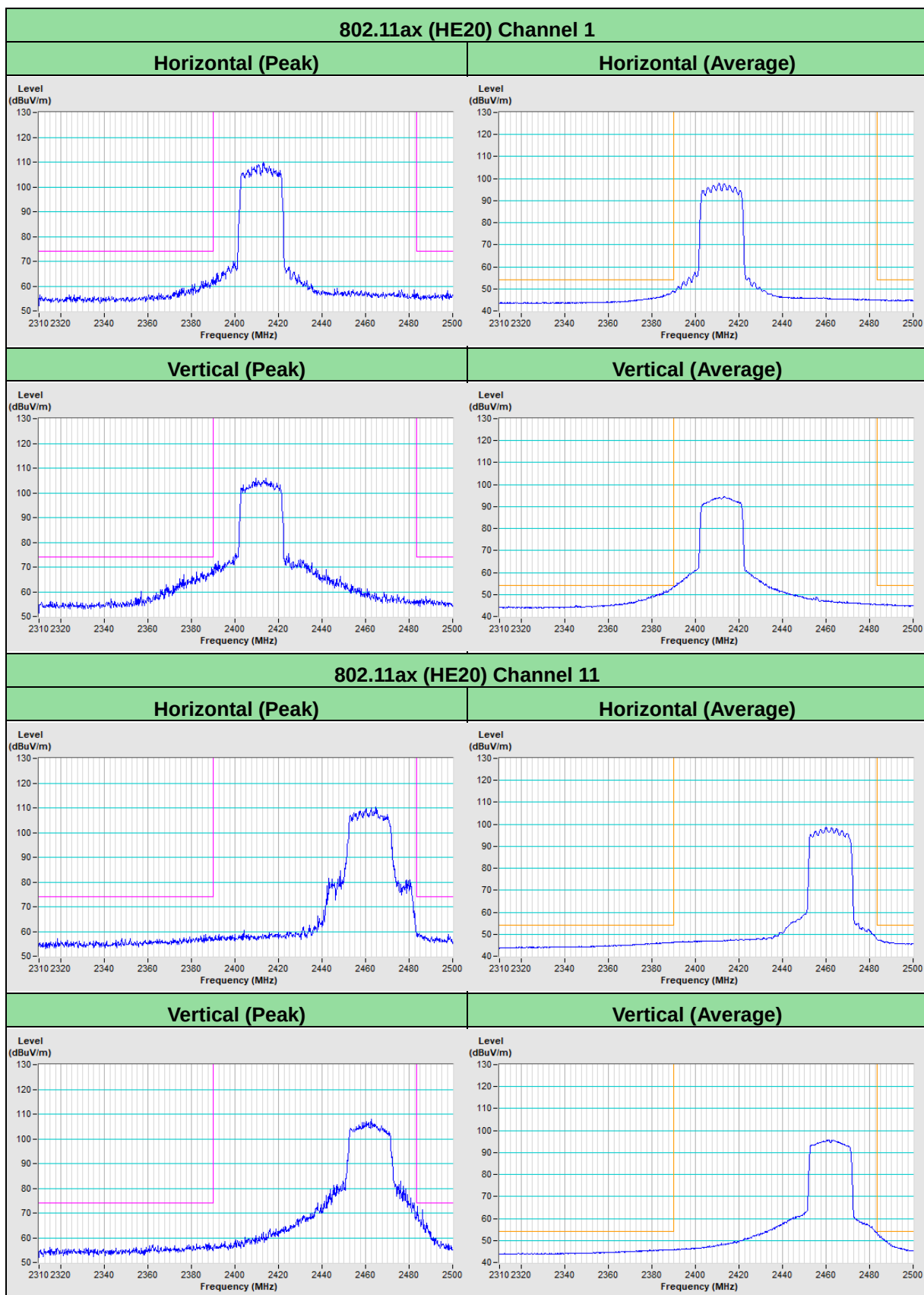
5 Pictures of Test Arrangements

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

Annex A - Band-Edge Measurement







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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Web Site: www.bureauveritas-adt.com

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

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