FCC Test Report

Report No.:	RFBEMV-WTW-P20070304
FCC ID:	XCNUBC1329
Test Model:	UBC1329
Received Date:	July 15, 2020
Test Date:	July 18 to 27, 2020
Issued Date:	Aug. 06, 2020
Applicant:	Ubee Interactive Corp.
Address:	10F-1, No. 5, Taiyuan 1st St. Jhubei Ci, Hsinchu County 302, Taiwan , R.O.C.
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
FCC Registration / Designation Number:	723255 / TW2022

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 10
3.2.1 Test Mode Applicability and Tested Channel Detail 11
3.3 Duty Cycle of Test Signal 13
3.4 Description of Support Units 14
3.4.1 Configuration of System under Test 15
3.5 General Description of Applied Standards and References 16

4 Test Types and Results 17

4.1 Radiated Emission and Bandedge Measurement 17
4.1.1 Limits of Radiated Emission and Bandedge Measurement 17
4.1.2 Test Instruments 18
4.1.3 Test Procedures 20
4.1.4 Deviation from Test Standard 21
4.1.5 Test Setup 21
4.1.6 EUT Operating Conditions 22
4.1.7 Test Results 23
4.2 Conducted Emission Measurement 37
4.2.1 Limits of Conducted Emission Measurement 37
4.2.2 Test Instruments 37
4.2.3 Test Procedures 38
4.2.4 Deviation from Test Standard 38
4.2.5 Test Setup 38
4.2.6 EUT Operating Conditions 38
4.2.7 Test Results 39
4.3 6dB Bandwidth Measurement 41
4.3.1 Limits of 6dB Bandwidth Measurement 41
4.3.2 Test Setup 41
4.3.3 Test Instruments 41
4.3.4 Test Procedure 41
4.3.5 Deviation from Test Standard 41
4.3.6 EUT Operating Conditions 41
4.3.7 Test Result 42
4.4 Conducted Output Power Measurement 44
4.4.1 Limits of Conducted Output Power Measurement 44
4.4.2 Test Setup 44
4.4.3 Test Instruments 44
4.4.4 Test Procedures 44
4.4.5 Deviation from Test Standard 44
4.4.6 EUT Operating Conditions 44
4.4.7 Test Results 45
4.5 Power Spectral Density Measurement 49
4.5.1 Limits of Power Spectral Density Measurement 49
4.5.2 Test Setup 49
4.5.3 Test Instruments 49
4.5.4 Test Procedure 49
4.5.5 Deviation from Test Standard 49
4.5.6 EUT Operating Condition 49

4.5.7 Test Results 50
4.6 Conducted Out of Band Emission Measurement 52
4.6.1 Limits of Conducted Out of Band Emission Measurement 52
4.6.2 Test Setup 52
4.6.3 Test Instruments 52
4.6.4 Test Procedure 52
4.6.5 Deviation from Test Standard 52
4.6.6 EUT Operating Condition 52
4.6.7 Test Results 52
5 Pictures of Test Arrangements 65
Annex A - Band-Edge Measurement 66
Appendix – Information of the Testing Laboratories 70

Release Control Record

Issue No.	Description	Date Issued
RFBEMV-WTW-P20070304	Original release.	Aug. 06, 2020

1 Certificate of Conformity

Product:	DOCSIS 3.1 Advanced WiFi 6 Voice Gateway
Brand:	Ubee
Test Model:	UBC1329
Sample Status:	Mass product
Applicant:	Ubee Interactive Corp.
Test Date:	July 18 to 27, 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 : Cherry Chuo , **Date:** Aug. 06, 2020

Cherry Chuo / Specialist

Approved by : , **Date:** Aug. 06, 2020

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 -16.90dB at 0.31406MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 2390.00MHz, 2388.70MHz, 2389.00MHz, 2484.70MHz.
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:
1. 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.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.9 dB
Conducted emissions	-	2.5 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.1 dB
	30MHz ~ 1GHz	5.1 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.1 dB
	18GHz ~ 40GHz	5.3 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	DOCSIS 3.1 Advanced WiFi 6 Voice Gateway
Brand	Ubee
Test Model	UBC1329
Status of EUT	Mass product
Power Supply Rating	12Vdc from adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT20/40 in 2.4GHz 1024QAM for OFDMA in 11ax HE mode
Modulation Technology	DSSS,OFDM, OFDMA
Transfer Rate	802.11b: up to 11 Mbps 802.11a/g: up to 54 Mbps 802.11n: up to 600 Mbps 802.11ac: up to 3466.7 Mbps 802.11ax: up to 4803.9 Mbps
Operating Frequency	**2.4GHz:** 2.412GHz ~ 2.462GHz **5GHz:** 5.18 ~ 5.24GHz, 5.745 ~ 5.825GHz
Number of Channel	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20), VHT20, 802.11ax (HE20): 11 802.11n (HT40), VHT40, 802.11ax (HE40): 7 **5GHz:** 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20): 9 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 4 802.11ac (VHT80), 802.11ax (HE80): 2
Output Power	**CDD Mode:** **2.412 ~ 2.462 GHz:** 960.327 mW **5.18 ~ 5.24 GHz:** 963.474 mW **5.745 ~ 5.825 GHz:** 971.53 mW **Beamforming Mode:** **2.412 ~ 2.462 GHz:** 596.914 mW **5.18 ~ 5.24 GHz:** 564.943 mW **5.745 ~ 5.825 GHz:** 640.463 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x1
Data Cable Supplied	RJ-45 Cable (Unshielded, 1.5m)

Note:

1. The EUT has two radios as following table:

Radio 1	Radio 2
WLAN 2.4GHz	WLAN 5GHz

2. Simultaneously transmission condition.

Condition	Technology	
1	WLAN 2.4GHz	WLAN 5GHz
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.		

3. The EUT power needs to be supplied from a power adapter, the information is as below table:

Brand	Model No.	Spec.
DVE	DSA-36PFN-12 FUS 120300	Input: 100-240Vac, 1.0A, 50/60Hz Output: 12Vdc, 3.0A DC output cable (Unshielded, 1.5 m)

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

Antenna NO.	RF Chain NO. ex. Chain0/1	Frequency Range (GHz)	Antenna Gain (dBi)	Antenna Type	Connector Type
1	2G Chain 0 / 5G Chain 2	2.4~2.4835	3.79	PCB	i-pex(MHF)
		5.15~5.25	1.61		
		5.725~5.85	1.01		
2	5G Chain3	2.4~2.4835	NA	PCB	i-pex(MHF)
		5.15~5.25	2.06		
		5.725~5.85	1.82		
3	2G Chain 1 / 5G Chain 1	2.4~2.4835	3.07	PCB	i-pex(MHF)
		5.15~5.25	2.76		
		5.725~5.85	1.24		
4	2G Chain 2 / 5G Chain 0	2.4~2.4835	3.5	PCB	i-pex(MHF)
		5.15~5.25	3.26		
		5.725~5.85	3.36		

5. The EUT incorporates a MIMO function:

2.4GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11b	3TX	3RX
802.11g	3TX	3RX
802.11n (HT20)	3TX	3RX
802.11n (HT40)	3TX	3RX
VHT20	3TX	3RX
VHT40	3TX	3RX
802.11ax (HE20)	3TX	3RX
802.11ax (HE40)	3TX	3RX
5GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11a	4TX	4RX
802.11n (HT20)	4TX	4RX
802.11n (HT40)	4TX	4RX
802.11ac (VHT20)	4TX	4RX
802.11ac (VHT40)	4TX	4RX
802.11ac (VHT80)	4TX	4RX
802.11ax (HE20)	4TX	4RX
802.11ax (HE40)	4TX	4RX
802.11ax (HE80)	4TX	4RX

Note:
1. All of modulation mode support beamforming function except 802.11a/b/g modulation mode.
2. The EUT support Beamforming and CDD mode, therefore both mode were investigated and the worst case scenario was identified. The worst case data were presented in test report.
3. The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz), VHT mode for 20MHz (40MHz) and 802.11ax mode for 20MHz (40MHz), therefore the manufacturer will control the power for 802.11n/ VHT mode is the same as the 802.11ax mode or more lower than it and investigated worst case to representative mode in test report. (Final test mode refer to section 3.2.1)

6. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

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

3.2 Description of Test Modes

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

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

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

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥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

Radiated Emission Test (Above 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

CDD Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	Data Rate Parameter
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1Mb/s
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6Mb/s
802.11ax (HE20)	1 to 11	1, 6, 11	OFDMA	BPSK	MCS0
802.11ax (HE40)	3 to 9	3, 6, 9	OFDMA	BPSK	MCS0

Radiated Emission Test (Below 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

CDD Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	Data Rate Parameter
802.11ax (HE20)	1 to 11	6	OFDMA	BPSK	MCS0

Power Line Conducted Emission Test:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

CDD Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	Data Rate Parameter
802.11ax (HE20)	1 to 11	6	OFDMA	BPSK	MCS0

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.

CDD Mode					
MODE	**AVAILABLE CHANNEL**	**TESTED CHANNEL**	**MODULATION TECHNOLOGY**	**MODULATION TYPE**	**Data Rate Parameter**
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1Mb/s
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6Mb/s
VHT20 (Output power only)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
VHT40 (Output power only)	3 to 9	3, 6, 9	OFDM	BPSK	MCS0
802.11ax (HE20)	1 to 11	1, 6, 11	OFDMA	BPSK	MCS0
802.11ax (HE40)	3 to 9	3, 6, 9	OFDMA	BPSK	MCS0
Beamforming Mode (output power only)					
MODE	**AVAILABLE CHANNEL**	**TESTED CHANNEL**	**MODULATION TECHNOLOGY**	**MODULATION TYPE**	**Data Rate Parameter**
VHT20	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
VHT40	3 to 9	3, 6, 9	OFDM	BPSK	MCS0
802.11ax (HE20)	1 to 11	1, 6, 11	OFDMA	BPSK	MCS0
802.11ax (HE40)	3 to 9	3, 6, 9	OFDMA	BPSK	MCS0

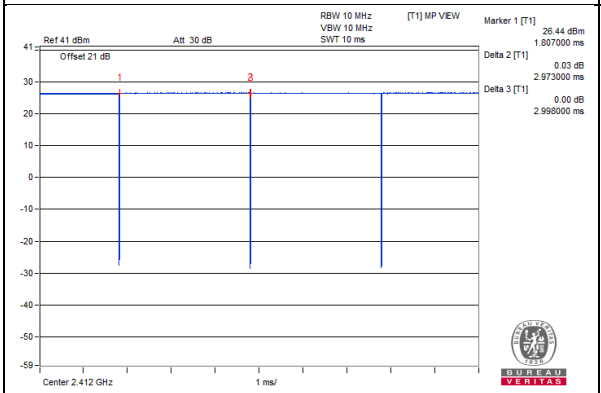
Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 75%RH	120Vac, 60Hz	Kevin Ko
RE<1G	28deg. C, 68%RH	120Vac, 60Hz	Kevin Ko
PLC	25deg. C, 75%RH	120Vac, 60Hz	Kevin Ko
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

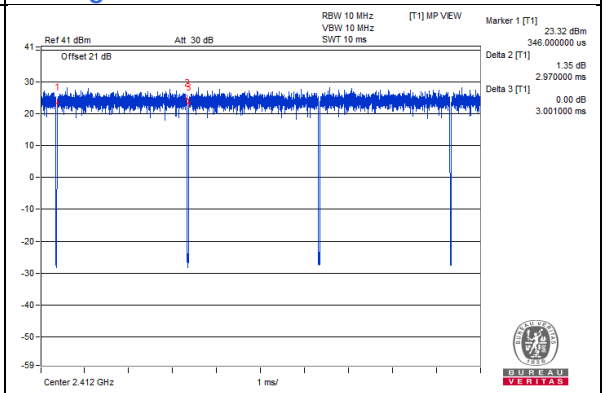
3.3 Duty Cycle of Test Signal

If duty cycle of test signal is ≥ 98 %, duty factor is not required.
802.11b: Duty cycle = 2.973 ms /2.998 ms=0.992
802.11g: Duty cycle = 2.97 ms /3.001 ms=0.99
802.11ax (HE20): Duty cycle = 2.318 ms /2.352 ms=0.986
802.11ax (HE40): Duty cycle = 2.397 ms /2.43 ms=0.986

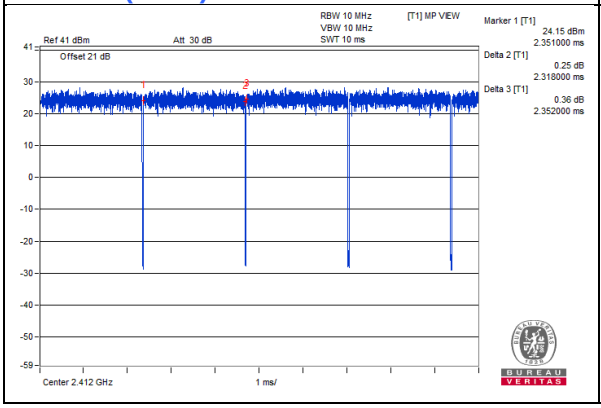
802.11b



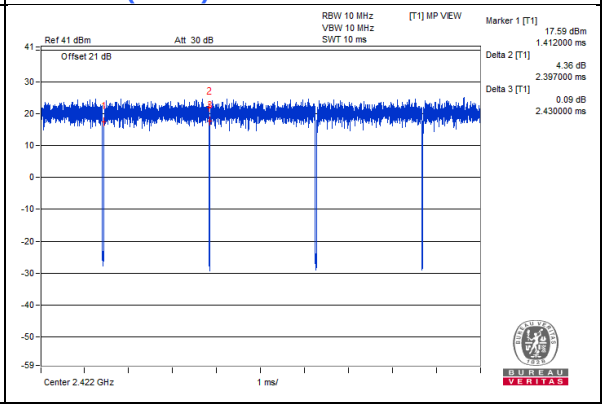
802.11g



802.11ax (HE20)



802.11ax (HE40)



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.

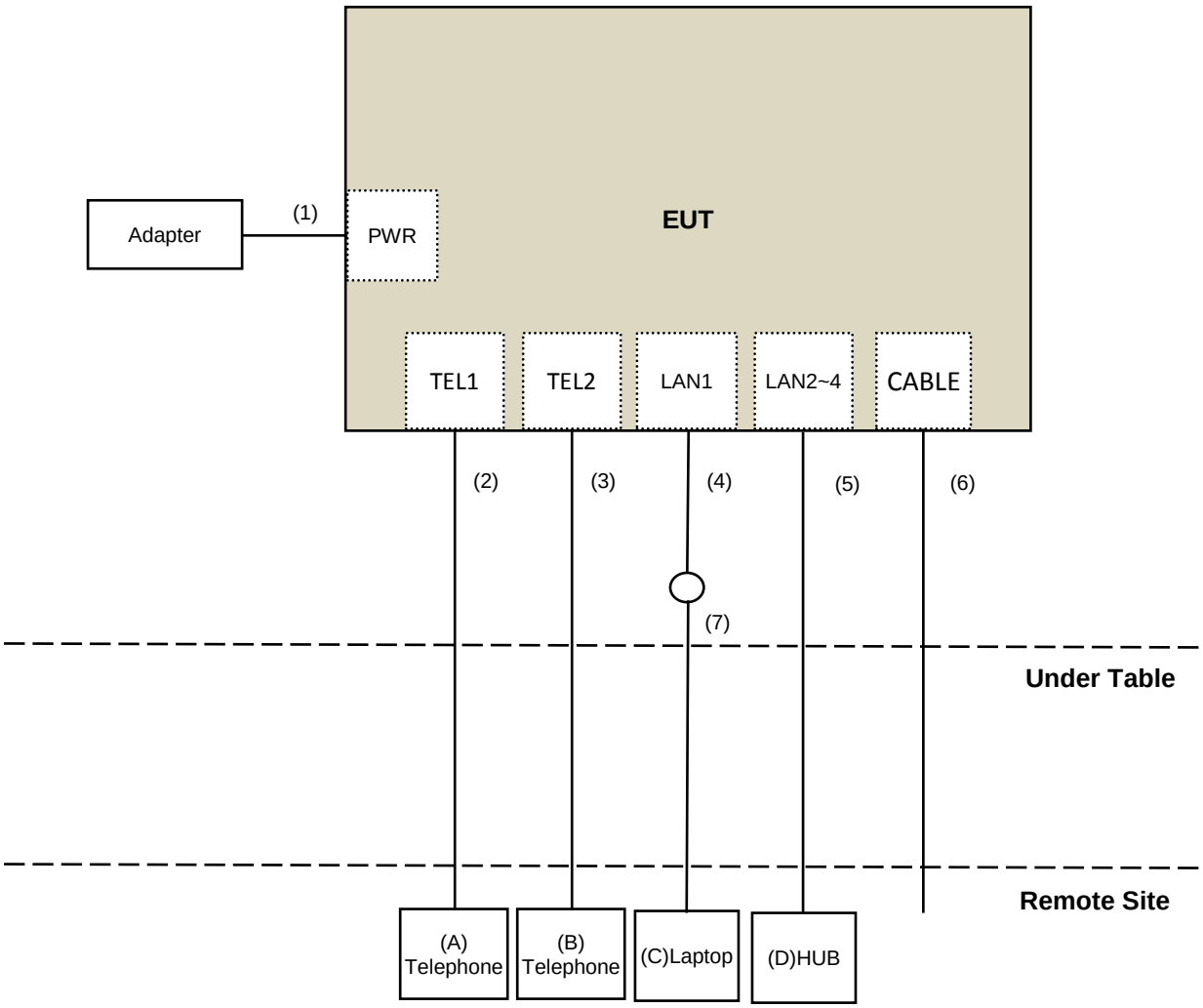
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Telephone	WONDER	WD-303	7C17KA 04011	NA	Provided by Lab
B.	Telephone	WONDER	WD-303	7C17KA 05211	NA	Provided by Lab
C.	Laptop	DELL	E5430	HYV4VY1	FCC DoC	Provided by Lab
D.	HUB	ZyXEL	GS1100-16	S150H44000046	FCC DoC	Provided by Lab

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	1	1.4	No	0	Supplied by client
2.	RJ11 Cable	1	10	No	0	Provided by Lab
3.	RJ11 Cable	1	10	No	0	Provided by Lab
4.	RJ45 Cable	1	1	No	0	Supplied by client
5.	RJ45 Cable	3	10	No	0	Provided by Lab
6.	Coaxial Cable	1	10	Yes	0	Provided by Lab
7.	RJ45 Cable	1	10	No	0	Provided by Lab

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards and References

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

Test Standard:

FCC Part 15, Subpart C (15.247)
ANSI C63.10-2013

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

References Test Guidance:

KDB 558074 D01 15.247 Meas Guidance v05r02
KDB 662911 D01 Multiple Transmitter Output v02r01

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 30dB below the highest level of the desired power:

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

NOTE:

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

4.1.2 Test Instruments

For Radiated emission test

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver 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 18 to 24, 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
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
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: July 27, 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:

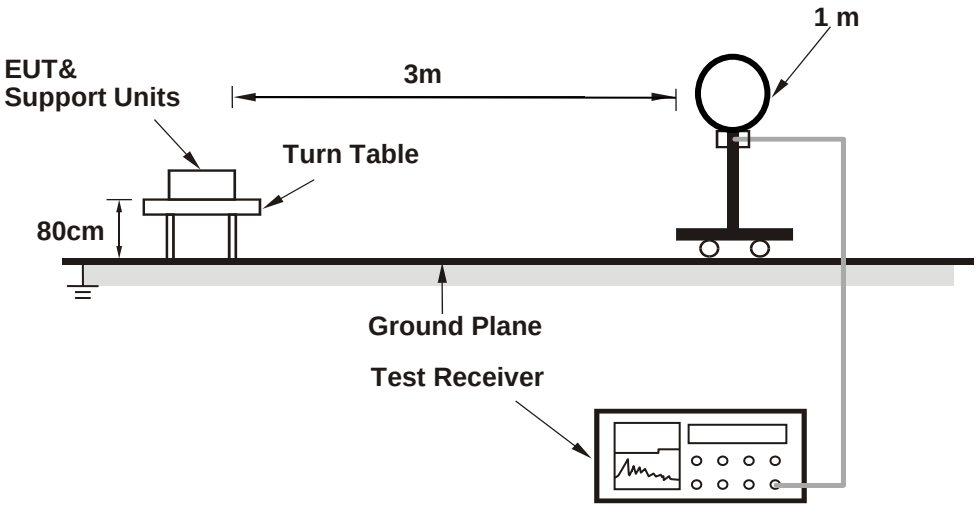
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 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

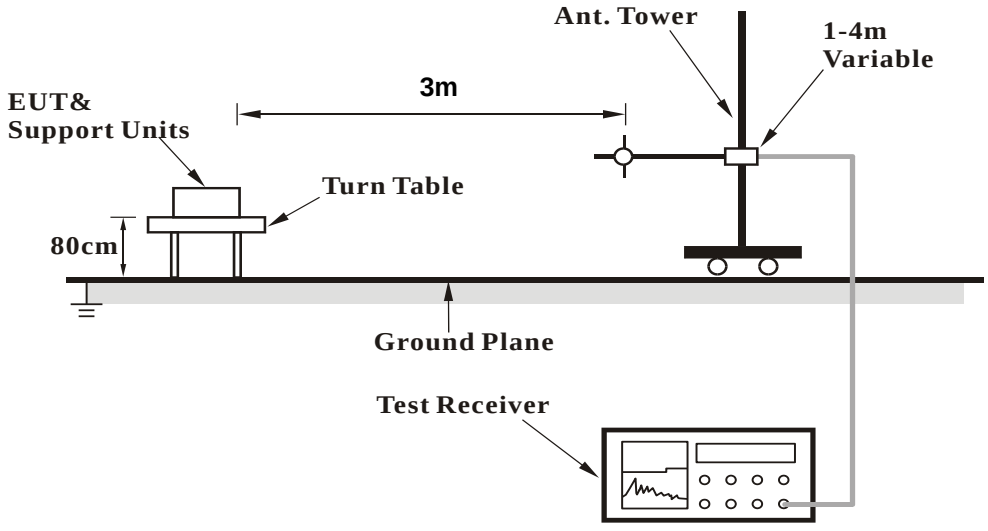
No deviation.

4.1.5 Test Setup

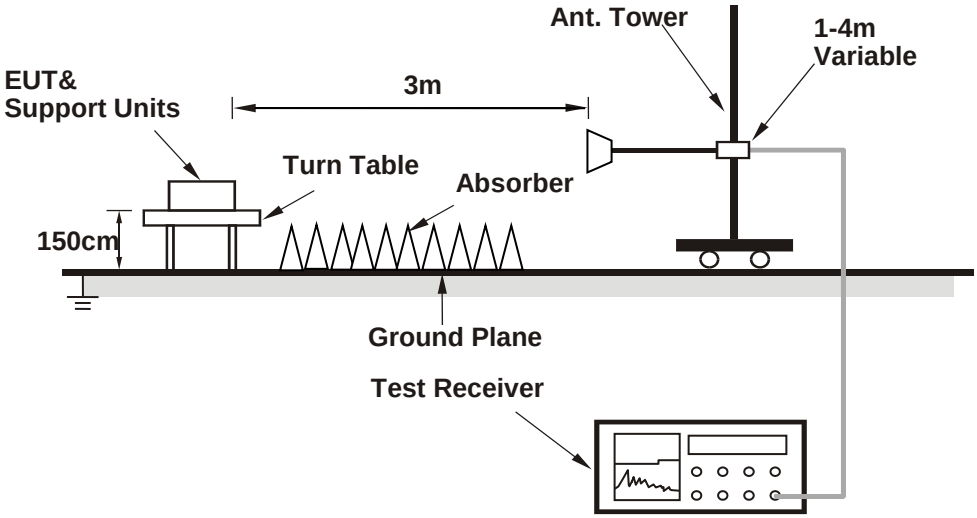
For Radiated emission below 30MHz



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. Connected the EUT with the Laptop which is placed on remote site.
b. Controlling software (accessMTool_REL_3.1.0.3) has been activated to set the EUT under transmission condition continuously at specific channel frenquency.

4.1.7 Test Results

Above 1GHz Data：

802.11b

Channel	TX Channel 1	**Detector Function**	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 25GHz		

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	2385.40	61.2 PK	74.0	-12.8	1.06 H	192	63.1	-1.9
2	2385.40	52.4 AV	54.0	-1.6	1.06 H	192	54.3	-1.9
3	*2412.00	118.1 PK			1.06 H	192	120.0	-1.9
4	*2412.00	115.1 AV			1.06 H	192	117.0	-1.9
5	4824.00	43.2 PK	74.0	-30.8	2.85 H	278	40.3	2.9
6	4824.00	40.5 AV	54.0	-13.5	2.85 H	278	37.6	2.9
Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	2389.20	60.4 PK	74.0	-13.6	3.55 V	194	62.3	-1.9
2	2389.20	50.8 AV	54.0	-3.2	3.55 V	194	52.7	-1.9
3	*2412.00	118.9 PK			3.55 V	194	120.8	-1.9
4	*2412.00	115.7 AV			3.55 V	194	117.6	-1.9
5	4824.00	41.8 PK	74.0	-32.2	1.84 V	52	38.9	2.9
6	4824.00	40.1 AV	54.0	-13.9	1.84 V	52	37.2	2.9

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.
5. " * ": Fundamental frequency.

Channel	TX Channel 6	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 25GHz		

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	57.4 PK	74.0	-16.6	1.00 H	255	59.3	-1.9
2	2390.00	44.9 AV	54.0	-9.1	1.00 H	255	46.8	-1.9
3	*2437.00	115.2 PK			1.00 H	255	117.2	-2.0
4	*2437.00	111.9 AV			1.00 H	255	113.9	-2.0
5	2483.50	57.1 PK	74.0	-16.9	1.00 H	255	59.0	-1.9
6	2483.50	45.0 AV	54.0	-9.0	1.00 H	255	46.9	-1.9
7	4874.00	43.8 PK	74.0	-30.2	2.88 H	282	41.0	2.8
8	4874.00	40.8 AV	54.0	-13.2	2.88 H	282	38.0	2.8
9	7311.00	56.9 PK	74.0	-17.1	1.48 H	68	48.0	8.9
10	7311.00	53.3 AV	54.0	-0.7	1.48 H	68	44.4	8.9
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	59.4 PK	74.0	-14.6	2.86 V	220	61.3	-1.9
2	2390.00	45.0 AV	54.0	-9.0	2.86 V	220	46.9	-1.9
3	*2437.00	117.6 PK			2.86 V	220	119.6	-2.0
4	*2437.00	114.7 AV			2.86 V	220	116.7	-2.0
5	2483.50	57.3 PK	74.0	-16.7	2.86 V	220	59.2	-1.9
6	2483.50	45.1 AV	54.0	-8.9	2.86 V	220	47.0	-1.9
7	4874.00	42.3 PK	74.0	-31.7	1.84 V	53	39.5	2.8
8	4874.00	40.3 AV	54.0	-13.7	1.84 V	53	37.5	2.8
9	7311.00	50.6 PK	74.0	-23.4	2.27 V	86	41.7	8.9
10	7311.00	47.2 AV	54.0	-6.8	2.27 V	86	38.3	8.9

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.
5. " * ": Fundamental frequency.

Channel	TX Channel 11	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 25GHz		

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	2311.22	57.2 PK	74.0	-16.8	1.74 H	277	58.8	-1.6
2	2311.22	49.7 AV	54.0	-4.3	1.74 H	277	51.3	-1.6
3	*2462.00	114.8 PK			1.74 H	277	116.7	-1.9
4	*2462.00	111.6 AV			1.74 H	277	113.5	-1.9
5	2488.60	58.3 PK	74.0	-15.7	1.74 H	277	60.2	-1.9
6	2488.60	47.7 AV	54.0	-6.3	1.74 H	277	49.6	-1.9
7	4924.00	43.0 PK	74.0	-31.0	2.85 H	282	40.3	2.7
8	4924.00	40.3 AV	54.0	-13.7	2.85 H	282	37.6	2.7
9	7386.00	57.1 PK	74.0	-16.9	1.46 H	55	48.1	9.0
10	7386.00	53.1 AV	54.0	-0.9	1.46 H	55	44.1	9.0
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	112.2 PK			2.10 V	257	114.1	-1.9
2	*2462.00	109.4 AV			2.10 V	257	111.3	-1.9
3	2483.50	55.5 PK	74.0	-18.5	2.10 V	257	57.4	-1.9
4	2483.50	44.8 AV	54.0	-9.2	2.10 V	257	46.7	-1.9
5	4924.00	42.0 PK	74.0	-32.0	1.87 V	52	39.3	2.7
6	4924.00	40.3 AV	54.0	-13.7	1.87 V	52	37.6	2.7
7	7386.00	50.0 PK	74.0	-24.0	2.36 V	80	41.0	9.0
8	7386.00	46.3 AV	54.0	-7.7	2.36 V	80	37.3	9.0

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.
5. " * ": Fundamental frequency.

802.11g

Channel	TX Channel 1	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 25GHz		

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	73.8 PK	74.0	-0.2	1.02 H	38	75.7	-1.9
2	2390.00	51.3 AV	54.0	-2.7	1.02 H	38	53.2	-1.9
3	*2412.00	113.4 PK			1.02 H	38	115.3	-1.9
4	*2412.00	104.9 AV			1.02 H	38	106.8	-1.9
5	4824.00	43.5 PK	74.0	-30.5	2.87 H	294	40.6	2.9
6	4824.00	41.0 AV	54.0	-13.0	2.87 H	294	38.1	2.9
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	71.8 PK	74.0	-2.2	1.98 V	240	73.7	-1.9
2	2390.00	49.9 AV	54.0	-4.1	1.98 V	240	51.8	-1.9
3	*2412.00	114.2 PK			1.98 V	240	116.1	-1.9
4	*2412.00	102.8 AV			1.98 V	240	104.7	-1.9
5	4824.00	42.1 PK	74.0	-31.9	1.87 V	61	39.2	2.9
6	4824.00	40.4 AV	54.0	-13.6	1.87 V	61	37.5	2.9

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.
5. " * ": Fundamental frequency.

Channel	TX Channel 6	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 25GHz		

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	65.6 PK	74.0	-8.4	1.76 H	256	67.5	-1.9
2	2390.00	46.9 AV	54.0	-7.1	1.76 H	256	48.8	-1.9
3	*2437.00	115.9 PK			1.76 H	256	117.9	-2.0
4	*2437.00	105.5 AV			1.76 H	256	107.5	-2.0
5	2483.50	60.1 PK	74.0	-13.9	1.76 H	256	62.0	-1.9
6	2483.50	45.9 AV	54.0	-8.1	1.76 H	256	47.8	-1.9
7	4874.00	43.0 PK	74.0	-31.0	2.89 H	292	40.2	2.8
8	4874.00	40.3 AV	54.0	-13.7	2.89 H	292	37.5	2.8
9	7311.00	56.3 PK	74.0	-17.7	1.44 H	67	47.4	8.9
10	7311.00	52.7 AV	54.0	-1.3	1.44 H	67	43.8	8.9
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	62.2 PK	74.0	-11.8	2.89 V	222	64.1	-1.9
2	2390.00	46.7 AV	54.0	-7.3	2.89 V	222	48.6	-1.9
3	*2437.00	117.0 PK			2.89 V	222	119.0	-2.0
4	*2437.00	106.8 AV			2.89 V	222	108.8	-2.0
5	2483.50	60.6 PK	74.0	-13.4	2.89 V	222	62.5	-1.9
6	2483.50	46.9 AV	54.0	-7.1	2.89 V	222	48.8	-1.9
7	4874.00	42.1 PK	74.0	-31.9	1.86 V	43	39.3	2.8
8	4874.00	40.2 AV	54.0	-13.8	1.86 V	43	37.4	2.8
9	7311.00	50.3 PK	74.0	-23.7	2.31 V	78	41.4	8.9
10	7311.00	46.4 AV	54.0	-7.6	2.31 V	78	37.5	8.9

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.
5. " * ": Fundamental frequency.

Channel	TX Channel 11	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 25GHz		

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	115.8 PK			1.69 H	260	117.7	-1.9
2	*2462.00	105.7 AV			1.69 H	260	107.6	-1.9
3	2484.30	73.7 PK	74.0	-0.3	1.69 H	260	75.6	-1.9
4	2484.30	52.3 AV	54.0	-1.7	1.69 H	260	54.2	-1.9
5	4924.00	43.1 PK	74.0	-30.9	2.86 H	283	40.4	2.7
6	4924.00	40.6 AV	54.0	-13.4	2.86 H	283	37.9	2.7
7	7386.00	56.6 PK	74.0	-17.4	1.52 H	76	47.6	9.0
8	7386.00	53.2 AV	54.0	-0.8	1.52 H	76	44.2	9.0
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	112.4 PK			2.97 V	253	114.3	-1.9
2	*2462.00	102.9 AV			2.97 V	253	104.8	-1.9
3	2484.30	72.0 PK	74.0	-2.0	2.97 V	253	73.9	-1.9
4	2484.30	50.8 AV	54.0	-3.2	2.97 V	253	52.7	-1.9
5	4924.00	41.8 PK	74.0	-32.2	1.85 V	57	39.1	2.7
6	4924.00	39.9 AV	54.0	-14.1	1.85 V	57	37.2	2.7
7	7386.00	49.8 PK	74.0	-24.2	2.27 V	75	40.8	9.0
8	7386.00	46.3 AV	54.0	-7.7	2.27 V	75	37.3	9.0

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.
5. " * ": Fundamental frequency.

802.11ax (HE20)

Channel	TX Channel 1	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 25GHz		

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**	**73.9 PK**	**74.0**	**-0.1**	**1.77 H**	**199**	**75.8**	**-1.9**
2	2390.00	53.1 AV	54.0	-0.9	1.77 H	199	55.0	-1.9
3	*2412.00	114.6 PK			1.77 H	199	116.5	-1.9
4	*2412.00	101.5 AV			1.77 H	199	103.4	-1.9
5	4824.00	43.0 PK	74.0	-31.0	2.83 H	291	40.1	2.9
6	4824.00	40.3 AV	54.0	-13.7	2.83 H	291	37.4	2.9
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	1.86 V	9	73.8	-1.9
2	2390.00	52.3 AV	54.0	-1.7	1.86 V	9	54.2	-1.9
3	*2412.00	116.1 PK			1.86 V	9	118.0	-1.9
4	*2412.00	102.4 AV			1.86 V	9	104.3	-1.9
5	4824.00	42.2 PK	74.0	-31.8	1.87 V	46	39.3	2.9
6	4824.00	40.4 AV	54.0	-13.6	1.87 V	46	37.5	2.9

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.
5. " * ": Fundamental frequency.

Channel	TX Channel 6	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	64.8 PK	74.0	-9.2	1.72 H	257	66.7	-1.9
2	2390.00	49.0 AV	54.0	-5.0	1.72 H	257	50.9	-1.9
3	*2437.00	117.7 PK			1.72 H	257	119.7	-2.0
4	*2437.00	105.6 AV			1.72 H	257	107.6	-2.0
5	2483.50	60.4 PK	74.0	-13.6	1.72 H	257	62.3	-1.9
6	2483.50	45.6 AV	54.0	-8.4	1.72 H	257	47.5	-1.9
7	4874.00	42.8 PK	74.0	-31.2	2.86 H	270	40.0	2.8
8	4874.00	40.2 AV	54.0	-13.8	2.86 H	270	37.4	2.8
9	7311.00	56.0 PK	74.0	-18.0	1.52 H	75	47.1	8.9
10	7311.00	52.5 AV	54.0	-1.5	1.52 H	75	43.6	8.9
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	62.3 PK	74.0	-11.7	2.77 V	255	64.2	-1.9
2	2390.00	47.4 AV	54.0	-6.6	2.77 V	255	49.3	-1.9
3	*2437.00	118.6 PK			2.77 V	255	120.6	-2.0
4	*2437.00	106.2 AV			2.77 V	255	108.2	-2.0
5	2483.50	63.6 PK	74.0	-10.4	2.77 V	255	65.5	-1.9
6	2483.50	48.1 AV	54.0	-5.9	2.77 V	255	50.0	-1.9
7	4874.00	42.3 PK	74.0	-31.7	1.79 V	45	39.5	2.8
8	4874.00	40.6 AV	54.0	-13.4	1.79 V	45	37.8	2.8
9	7311.00	50.6 PK	74.0	-23.4	2.31 V	86	41.7	8.9
10	7311.00	47.2 AV	54.0	-6.8	2.31 V	86	38.3	8.9

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.
5. " * ": Fundamental frequency.

Channel	TX Channel 11	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 25GHz		

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	112.9 PK			1.72 H	256	114.8	-1.9
2	*2462.00	100.2 AV			1.72 H	256	102.1	-1.9
3	2486.10	70.9 PK	74.0	-3.1	1.72 H	256	72.8	-1.9
4	2486.10	53.6 AV	54.0	-0.4	1.72 H	256	55.5	-1.9
5	4924.00	43.2 PK	74.0	-30.8	2.90 H	265	40.5	2.7
6	4924.00	40.3 AV	54.0	-13.7	2.90 H	265	37.6	2.7
7	7386.00	56.5 PK	74.0	-17.5	1.52 H	48	47.5	9.0
8	7386.00	52.9 AV	54.0	-1.1	1.52 H	48	43.9	9.0
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	115.4 PK			2.48 V	246	117.3	-1.9
2	*2462.00	102.9 AV			2.48 V	246	104.8	-1.9
3	2486.10	73.5 PK	74.0	-0.5	2.48 V	246	75.4	-1.9
4	2486.10	53.7 AV	54.0	-0.3	2.48 V	246	55.6	-1.9
5	4924.00	41.8 PK	74.0	-32.2	1.86 V	65	39.1	2.7
6	4924.00	40.3 AV	54.0	-13.7	1.86 V	65	37.6	2.7
7	7386.00	50.0 PK	74.0	-24.0	2.35 V	85	41.0	9.0
8	7386.00	46.3 AV	54.0	-7.7	2.35 V	85	37.3	9.0

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.
5. " * ": Fundamental frequency.

802.11ax (HE40)

Channel	TX Channel 3	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 25GHz		

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	2388.70	71.8 PK	74.0	-2.2	1.82 H	256	73.7	-1.9
2	**2388.70**	**53.9 AV**	**54.0**	**-0.1**	**1.82 H**	**256**	**55.8**	**-1.9**
3	*2422.00	108.7 PK			1.82 H	256	110.6	-1.9
4	*2422.00	97.2 AV			1.82 H	256	99.1	-1.9
5	4844.00	43.3 PK	74.0	-30.7	2.83 H	274	40.4	2.9
6	4844.00	40.3 AV	54.0	-13.7	2.83 H	274	37.4	2.9
7	7266.00	55.9 PK	74.0	-18.1	1.53 H	48	47.1	8.8
8	7266.00	52.4 AV	54.0	-1.6	1.53 H	48	43.6	8.8
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2389.00	70.9 PK	74.0	-3.1	2.36 V	258	72.8	-1.9
2	2389.00	50.9 AV	54.0	-3.1	2.36 V	258	52.8	-1.9
3	*2422.00	109.5 PK			2.36 V	258	111.4	-1.9
4	*2422.00	98.0 AV			2.36 V	258	99.9	-1.9
5	4844.00	41.5 PK	74.0	-32.5	1.84 V	59	38.6	2.9
6	4844.00	39.6 AV	54.0	-14.4	1.84 V	59	36.7	2.9
7	7266.00	51.2 PK	74.0	-22.8	2.35 V	80	42.4	8.8
8	7266.00	47.2 AV	54.0	-6.8	2.35 V	80	38.4	8.8

Remarks:

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

Channel	TX Channel 6	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2389.00	70.1 PK	74.0	-3.9	1.72 H	256	72.0	-1.9
2	**2389.00**	**53.9 AV**	**54.0**	**-0.1**	**1.72 H**	**256**	**55.8**	**-1.9**
3	*2437.00	111.2 PK			1.72 H	256	113.2	-2.0
4	*2437.00	98.9 AV			1.72 H	256	100.9	-2.0
5	2483.50	68.7 PK	74.0	-5.3	1.72 H	256	70.6	-1.9
6	2483.50	51.8 AV	54.0	-2.2	1.72 H	256	53.7	-1.9
7	4874.00	43.2 PK	74.0	-30.8	2.90 H	270	40.4	2.8
8	4874.00	40.6 AV	54.0	-13.4	2.90 H	270	37.8	2.8
9	7311.00	56.9 PK	74.0	-17.1	1.45 H	50	48.0	8.9
10	7311.00	53.0 AV	54.0	-1.0	1.45 H	50	44.1	8.9
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	70.4 PK	74.0	-3.6	2.32 V	228	72.3	-1.9
2	2390.00	53.7 AV	54.0	-0.3	2.32 V	228	55.6	-1.9
3	*2437.00	114.2 PK			2.32 V	228	116.2	-2.0
4	*2437.00	101.5 AV			2.32 V	228	103.5	-2.0
5	2483.50	72.0 PK	74.0	-2.0	2.32 V	228	73.9	-1.9
6	2483.50	53.2 AV	54.0	-0.8	2.32 V	228	55.1	-1.9
7	4874.00	42.0 PK	74.0	-32.0	1.79 V	57	39.2	2.8
8	4874.00	40.1 AV	54.0	-13.9	1.79 V	57	37.3	2.8
9	7311.00	50.6 PK	74.0	-23.4	2.31 V	86	41.7	8.9
10	7311.00	47.2 AV	54.0	-6.8	2.31 V	86	38.3	8.9

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.
5. " * ": Fundamental frequency.

Channel	TX Channel 9	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2452.00	110.2 PK			1.69 H	26	112.1	-1.9
2	*2452.00	97.3 AV			1.69 H	26	99.2	-1.9
3	2484.70	70.1 PK	74.0	-3.9	1.69 H	26	72.0	-1.9
4	**2484.70**	**53.9 AV**	**54.0**	**-0.1**	**1.69 H**	**26**	**55.8**	**-1.9**
5	4904.00	43.6 PK	74.0	-30.4	2.84 H	263	40.9	2.7
6	4904.00	40.8 AV	54.0	-13.2	2.84 H	263	38.1	2.7
7	7356.00	57.2 PK	74.0	-16.8	1.50 H	73	48.3	8.9
8	7356.00	53.3 AV	54.0	-0.7	1.50 H	73	44.4	8.9
Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	*2452.00	110.6 PK			2.20 V	244	112.5	-1.9
2	*2452.00	98.3 AV			2.20 V	244	100.2	-1.9
3	2483.50	66.2 PK	74.0	-7.8	2.20 V	244	68.1	-1.9
4	2483.50	51.8 AV	54.0	-2.2	2.20 V	244	53.7	-1.9
5	2489.80	68.7 PK	74.0	-5.3	2.20 V	244	70.6	-1.9
6	2489.80	50.4 AV	54.0	-3.6	2.20 V	244	52.3	-1.9
7	4904.00	41.8 PK	74.0	-32.2	1.83 V	54	39.1	2.7
8	4904.00	40.1 AV	54.0	-13.9	1.83 V	54	37.4	2.7
9	7356.00	49.8 PK	74.0	-24.2	2.36 V	56	40.9	8.9
10	7356.00	46.4 AV	54.0	-7.6	2.36 V	56	37.5	8.9

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.
5. " * ": Fundamental frequency.

Below 1GHz Data:

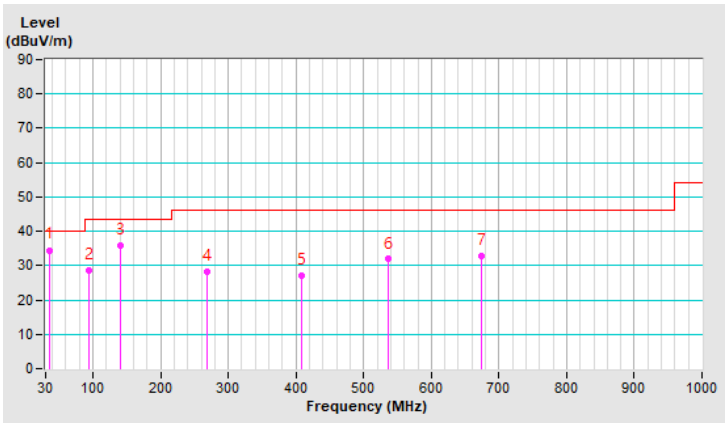
802.11ax (HE20)

Channel	TX Channel 6	Detector Function	Quasi-Peak (QP)
Frequency Range	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	34.5 QP	40.0	-5.5	3.00 H	298	43.1	-8.6
2	93.17	28.7 QP	43.5	-14.8	2.00 H	289	41.6	-12.9
3	141.26	35.9 QP	43.5	-7.6	2.00 H	250	43.1	-7.2
4	268.01	28.2 QP	46.0	-17.8	1.00 H	294	35.3	-7.1
5	408.28	27.2 QP	46.0	-18.8	2.00 H	139	30.0	-2.8
6	535.56	31.8 QP	46.0	-14.2	1.50 H	222	31.6	0.2
7	673.69	32.8 QP	46.0	-13.2	1.00 H	357	29.3	3.5

Remarks:

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

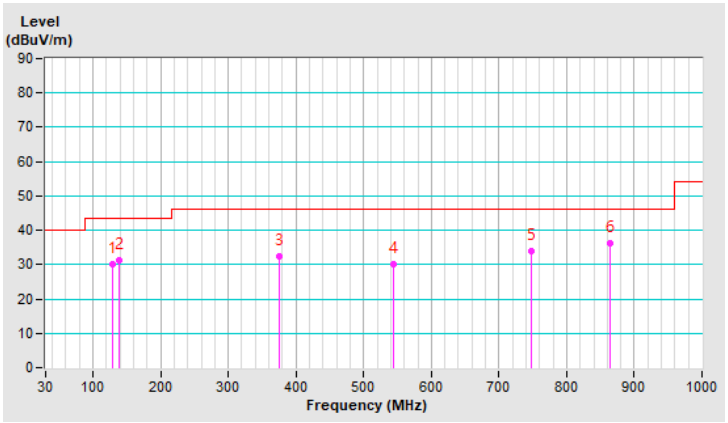


Channel	TX Channel 6	Detector Function	Quasi-Peak (QP)
Frequency Range	9kHz ~ 1GHz		

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	128.16	30.1 QP	43.5	-13.4	1.00 V	146	38.4	-8.3
2	139.20	31.2 QP	43.5	-12.3	1.00 V	360	38.6	-7.4
3	375.00	32.3 QP	46.0	-13.7	1.00 V	116	35.9	-3.6
4	544.25	30.2 QP	46.0	-15.8	3.00 V	300	29.7	0.5
5	747.07	33.9 QP	46.0	-12.1	2.00 V	153	28.5	5.4
6	865.12	36.2 QP	46.0	-9.8	1.00 V	341	29.4	6.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit 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 23, 2020

4.2.3 Test Procedures

a. 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.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

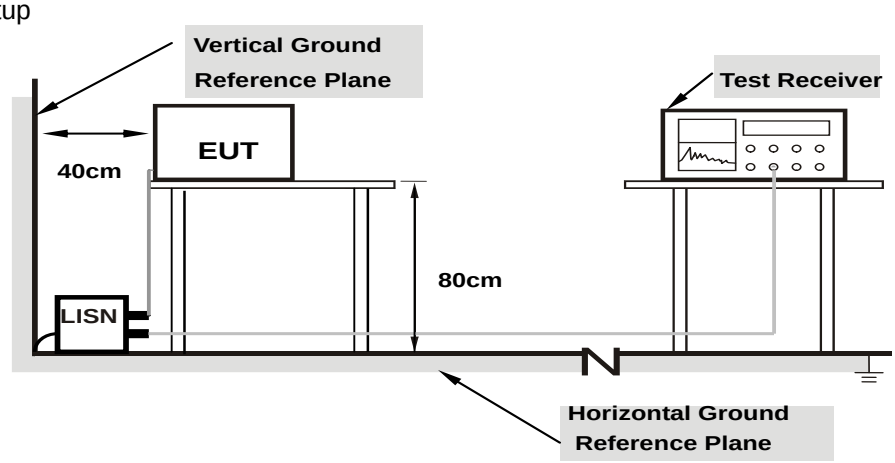
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

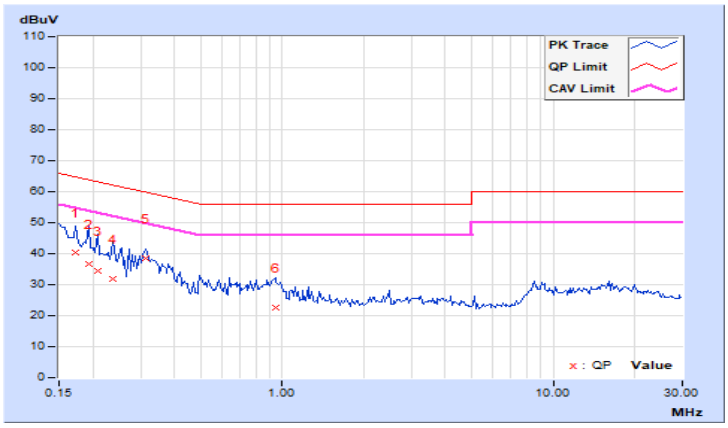
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17344	9.98	30.33	14.89	40.31	24.87	64.79	54.79	-24.48	-29.92
2	0.19297	9.99	26.85	13.49	36.84	23.48	63.91	53.91	-27.07	-30.43
3	0.20859	9.99	24.40	7.29	34.39	17.28	63.26	53.26	-28.87	-35.98
4	0.23594	9.99	21.70	5.86	31.69	15.85	62.24	52.24	-30.55	-36.39
5	**0.31406**	**10.00**	**28.53**	**22.96**	**38.53**	**32.96**	**59.86**	**49.86**	**-21.33**	**-16.90**
6	0.94297	10.05	12.60	3.68	22.65	13.73	56.00	46.00	-33.35	-32.27

Remarks:

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

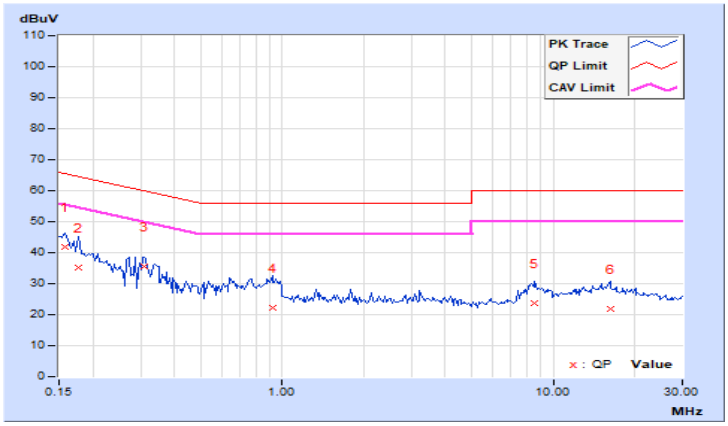


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	9.99	31.79	15.30	41.78	25.29	65.58	55.58	-23.80	-30.29
2	0.17734	10.00	25.09	8.59	35.09	18.59	64.61	54.61	-29.52	-36.02
3	0.31016	10.02	25.72	21.33	35.74	31.35	59.97	49.97	-24.23	-18.62
4	0.91953	10.08	12.23	4.03	22.31	14.11	56.00	46.00	-33.69	-31.89
5	8.55078	10.52	13.00	7.71	23.52	18.23	60.00	50.00	-36.48	-31.77
6	16.20703	10.93	10.82	4.86	21.75	15.79	60.00	50.00	-38.25	-34.21

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

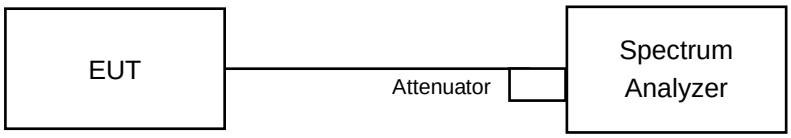


4.3 6dB Bandwidth Measurement

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) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
1	2412	7.1	7.04	7.11	0.5	PASS
6	2437	7.08	7.09	7.07	0.5	PASS
11	2462	7.1	7.1	7.1	0.5	PASS

802.11g

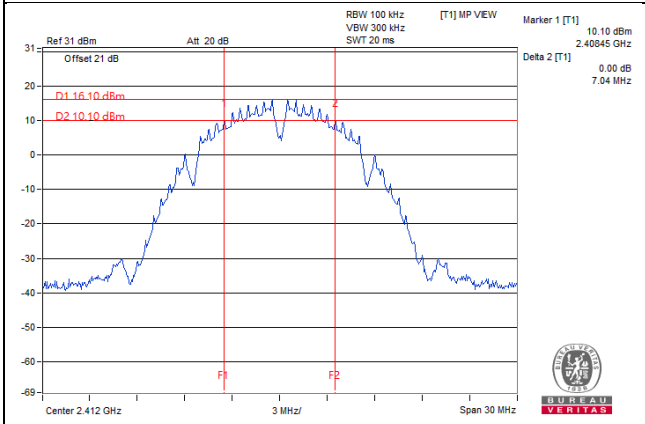
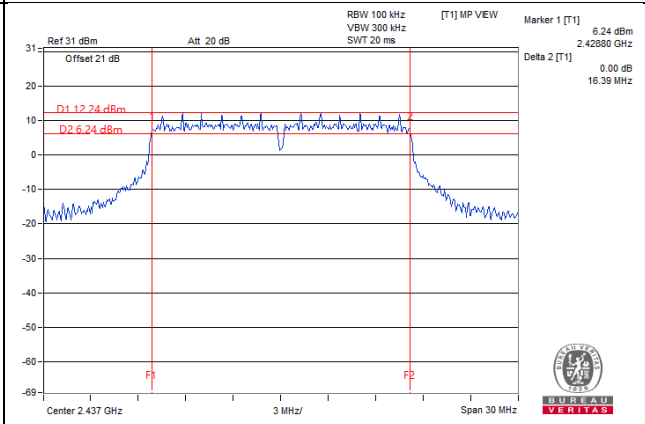
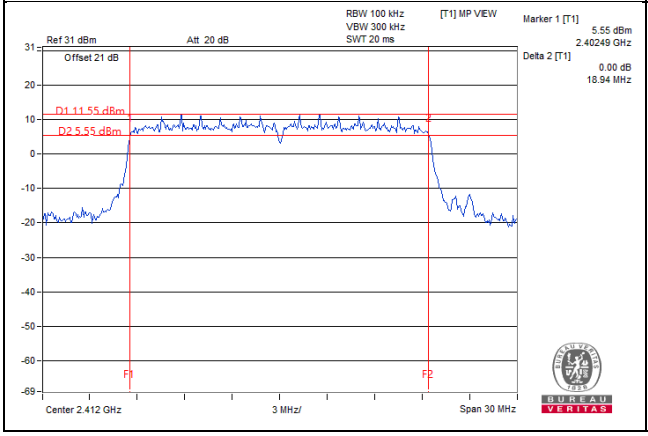
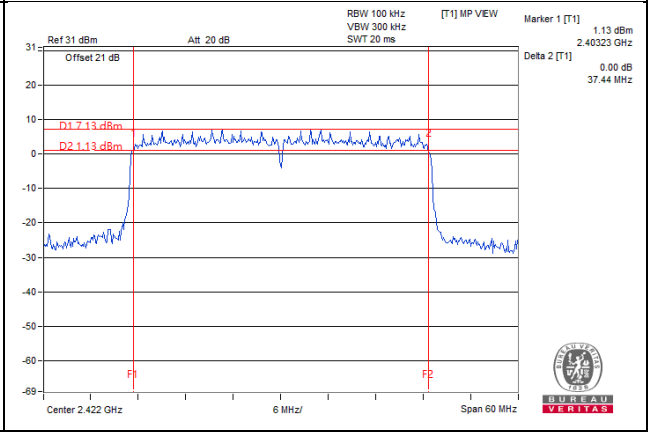
Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
1	2412	16.42	16.43	16.43	0.5	PASS
6	2437	16.39	16.41	16.39	0.5	PASS
11	2462	16.39	16.4	16.41	0.5	PASS

802.11ax (HE20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
1	2412	19.01	18.99	18.94	0.5	PASS
6	2437	18.95	19	18.95	0.5	PASS
11	2462	19.01	19.03	19.01	0.5	PASS

802.11ax (HE40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
3	2422	37.44	37.64	37.59	0.5	PASS
6	2437	37.82	37.69	37.76	0.5	PASS
9	2452	37.81	37.76	37.65	0.5	PASS

Spectrum Plot of Worst Value	
802.11b / Chain 1 : CH1	**802.11g / Chain 0 : CH6**
	
802.11ax (HE20) / Chain 2 : CH1	**802.11ax (HE40) / Chain 0 : CH3**
	

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

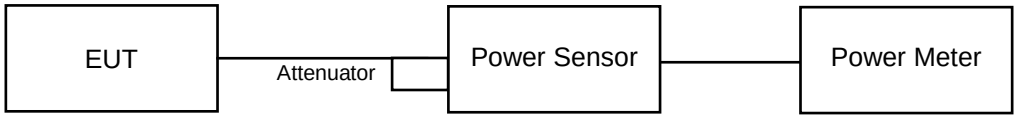
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

CDD Mode

802.11b

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	24.93	25.06	25.13	957.635	29.81	30	Pass
6	2437	25.00	25.04	25.01	952.338	29.79	30	Pass
11	2462	25.01	25.04	25.10	959.704	29.82	30	Pass

802.11g

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	23.63	23.34	23.46	668.269	28.25	30	Pass
6	2437	25.28	25.02	24.75	953.513	29.79	30	Pass
11	2462	23.73	23.35	23.11	656.964	28.18	30	Pass

VHT20

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	23.21	22.96	23.20	616.038	27.90	30	Pass
6	2437	24.96	24.75	24.65	903.61	29.56	30	Pass
11	2462	23.45	23.27	23.02	634.081	28.02	30	Pass

VHT40

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
3	2422	21.70	21.51	21.45	429.127	26.33	30	Pass
6	2437	23.79	23.72	23.60	703.923	28.48	30	Pass
9	2452	22.09	21.95	21.83	470.888	26.73	30	Pass

802.11ax (HE20)

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	23.49	23.26	23.46	657.013	28.18	30	Pass
6	2437	25.26	25.02	24.87	960.327	29.82	30	Pass
11	2462	23.73	23.52	23.27	673.278	28.28	30	Pass

802.11ax (HE40)

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
3	2422	21.98	21.75	21.66	453.939	26.57	30	Pass
6	2437	24.08	23.98	23.84	747.996	28.74	30	Pass
9	2452	22.39	22.17	22.06	498.891	26.98	30	Pass

Beamforming Mode

VHT20

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	22.85	22.61	22.81	566.127	27.53	27.77	Pass
6	2437	22.98	22.74	22.58	567.675	27.54	27.77	Pass
11	2462	23.02	22.81	22.50	569.26	27.55	27.77	Pass

Note: 1. The directional gain= 10 log[($10^{G0/20}$ + $10^{G1/20}$ + $10^{G2/20}$ / 3] = 8.23dBi > 6dBi, therefore the limit needs to reduce, so the power limit shall be reduced to 30-(8.23-6) = 27.77dBm.

VHT40

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
3	2422	21.70	21.51	21.45	429.127	26.33	27.77	Pass
6	2437	22.90	22.75	22.60	565.319	27.52	27.77	Pass
9	2452	22.09	21.95	21.83	470.888	26.73	27.77	Pass

Note: 1. The directional gain= 10 log[($10^{G0/20}$ + $10^{G1/20}$ + $10^{G2/20}$ / 3] = 8.23dBi > 6dBi, therefore the limit needs to reduce, so the power limit shall be reduced to 30-(8.23-6) = 27.77dBm.

802.11ax (HE20)

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	23.07	22.84	23.05	596.914	27.76	27.77	Pass
6	2437	23.20	22.96	22.77	595.861	27.75	27.77	Pass
11	2462	23.22	23.01	22.70	596.089	27.75	27.77	Pass

Note: 1. The directional gain= 10 log[($10^{G0/20}$ + $10^{G1/20}$ + $10^{G2/20}$ / 3] = 8.23dBi > 6dBi, therefore the limit needs to reduce, so the power limit shall be reduced to 30-(8.23-6) = 27.77dBm.

802.11ax (HE40)

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
3	2422	21.98	21.75	21.66	453.939	26.57	27.77	Pass
6	2437	23.10	22.97	22.85	595.079	27.75	27.77	Pass
9	2452	22.39	22.17	22.06	498.891	26.98	27.77	Pass

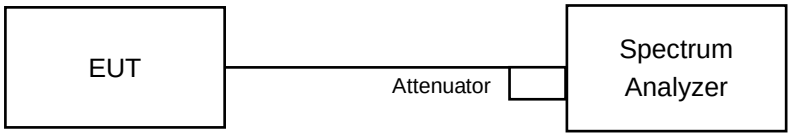
Note: 1. The directional gain= 10 log[($10^{G0/20}$ + $10^{G1/20}$ + $10^{G2/20}$ / 3] = 8.23dBi > 6dBi, therefore the limit needs to reduce, so the power limit shall be reduced to 30-(8.23-6) = 27.77dBm.

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 instrument center frequency to DTS channel center frequency.
b) Set span to at least 1.5 times the OBW.
c) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz. .
d) Set VBW ≥3 x RBW.
e) Detector = power averaging (RMS) or sample detector (when RMS not available).
f) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
g) Sweep time = auto couple.
h) Employ trace averaging (RMS) mode over a minimum of 100 traces.
i) Use the peak marker function to determine the maximum amplitude level.

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 (mW/3kHz)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	-5.64	-6.33	-5.53	0.7852	-1.05	5.77	PASS
6	2437	-5.38	-7.21	-5.25	0.778	-1.09	5.77	PASS
11	2462	-6.41	-5.88	-6.61	0.7047	-1.52	5.77	PASS

Note: 1. The directional gain= 10 log[($10^{G0/20}$ + $10^{G1/20}$ + $10^{G2/20}$ / 3] = 8.23dBi > 6dBi, therefore the limit needs to reduce, so the power density limit shall be reduced to 8-(8.23-6) = 5.77dBm.

802.11g

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)			Total PSD (mW/3kHz)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	-7.16	-8.23	-7.88	0.5058	-2.96	5.77	PASS
6	2437	-8.64	-7.55	-8.76	0.4457	-3.51	5.77	PASS
11	2462	-8.26	-9.14	-8.76	0.4046	-3.93	5.77	PASS

Note: 1. The directional gain= 10 log[($10^{G0/20}$ + $10^{G1/20}$ + $10^{G2/20}$ / 3] = 8.23dBi > 6dBi, therefore the limit needs to reduce, so the power density limit shall be reduced to 8-(8.23-6) = 5.77dBm.

802.11ax (HE20)

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)			Total PSD (mW/3kHz)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	-9.61	-9.87	-10.46	0.30269	-5.19	5.77	PASS
6	2437	-8.19	-8.68	-9.21	0.4074	-3.90	5.77	PASS
11	2462	-10.45	-9.35	-9.92	0.30832	-5.11	5.77	PASS

Note: 1. The directional gain= 10 log[($10^{G0/20}$ + $10^{G1/20}$ + $10^{G2/20}$ / 3] = 8.23dBi > 6dBi, therefore the limit needs to reduce, so the power density limit shall be reduced to 8-(8.23-6) = 5.77dBm.

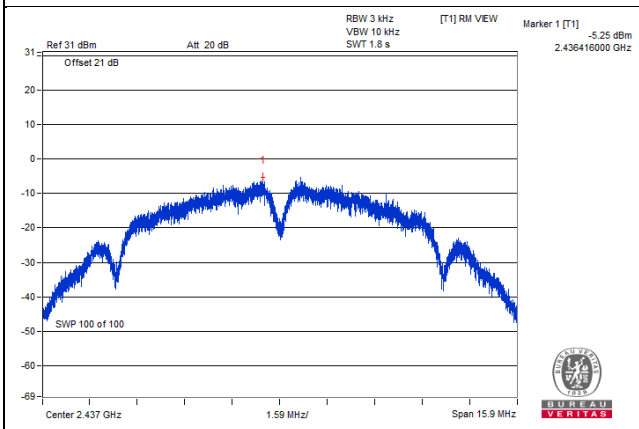
802.11ax (HE40)

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)			Total PSD (mW/3kHz)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
3	2422	-13.43	-14.58	-14.03	0.11967	-9.22	5.77	PASS
6	2437	-11.01	-12.50	-13.55	0.17947	-7.46	5.77	PASS
9	2452	-13.30	-14.23	-14.02	0.12417	-9.06	5.77	PASS

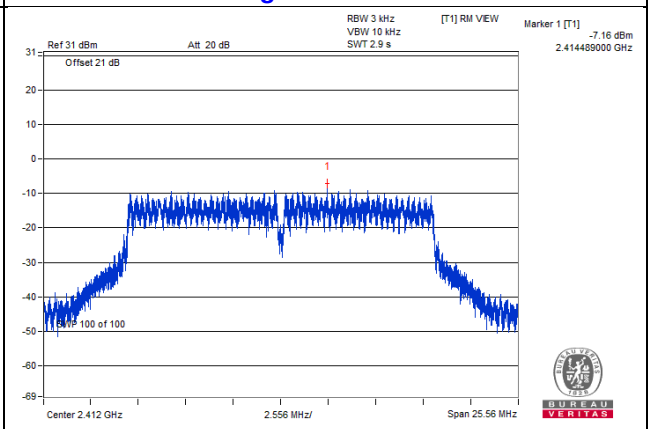
Note: 1. The directional gain= 10 log[($10^{G0/20}$ + $10^{G1/20}$ + $10^{G2/20}$ / 3] = 8.23dBi > 6dBi, therefore the limit needs to reduce, so the power density limit shall be reduced to 8-(8.23-6) = 5.77dBm.

Spectrum Plot of Worst Value

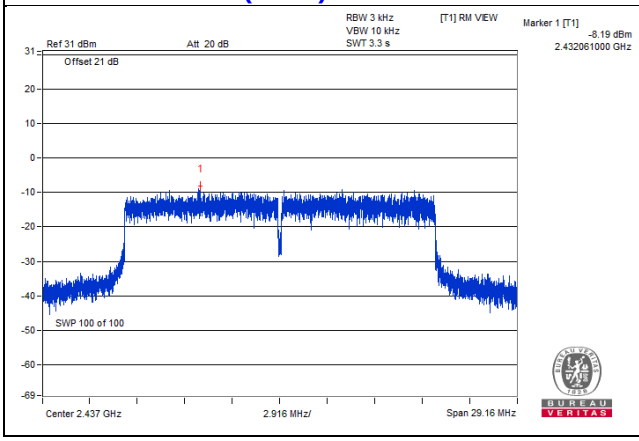
802.11b / Chain 2 : CH6



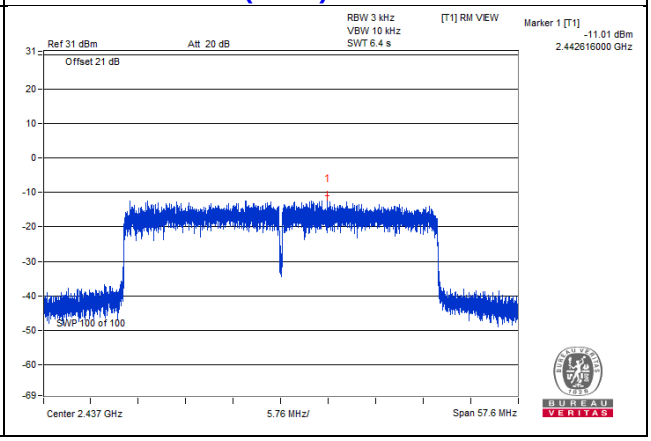
802.11g / Chain 0 : CH1



802.11ax (HE20) / Chain 0 : CH6



802.11ax (HE40) / Chain 0 : CH6

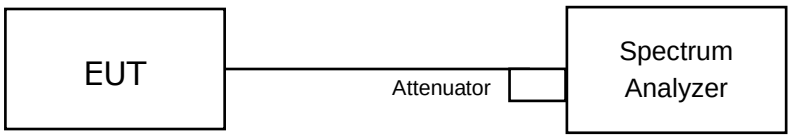


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 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 OOBE

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

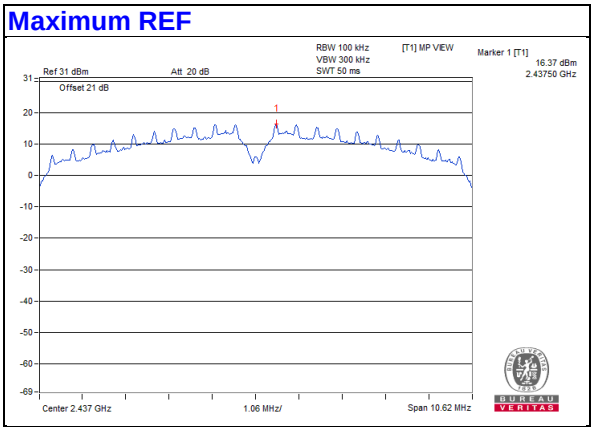
Same as Item 4.3.6

4.6.7 Test Results

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

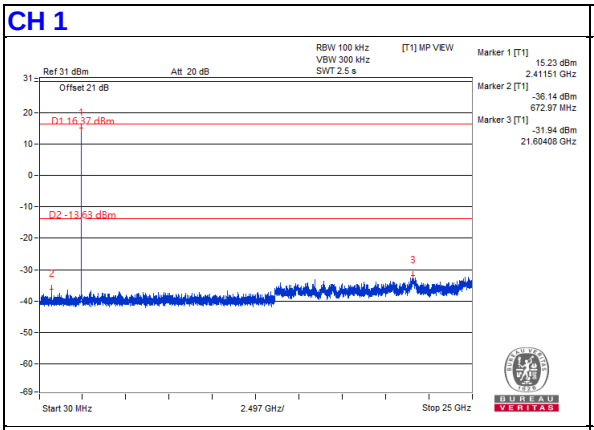
802.11b

Maximum REF

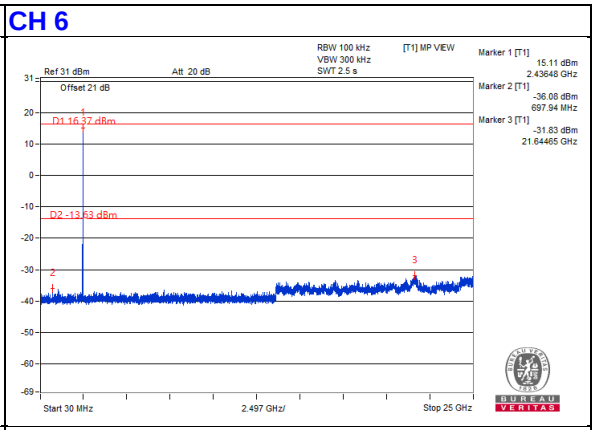


Chain 0

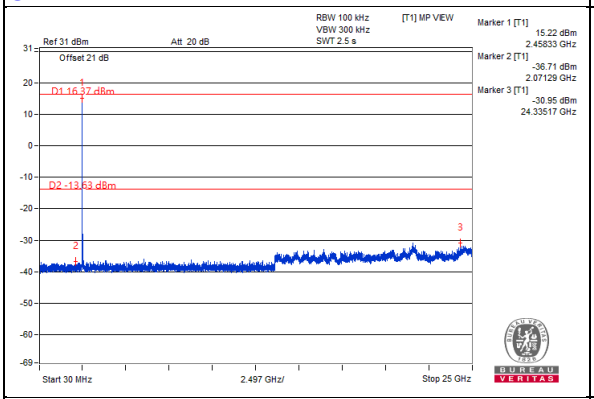
CH 1



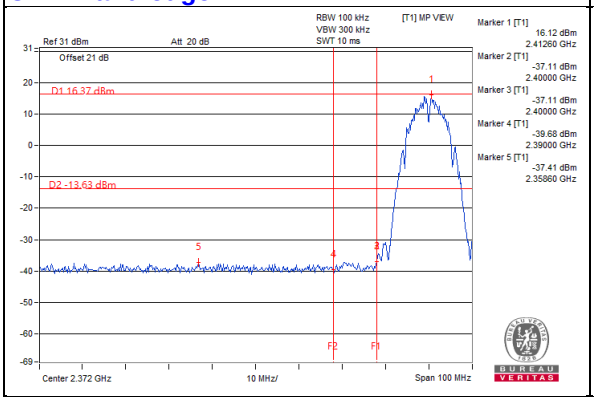
CH 6



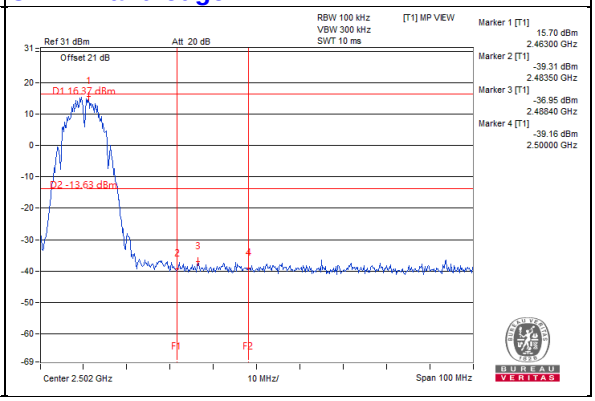
CH 11



CH 1 Band edge

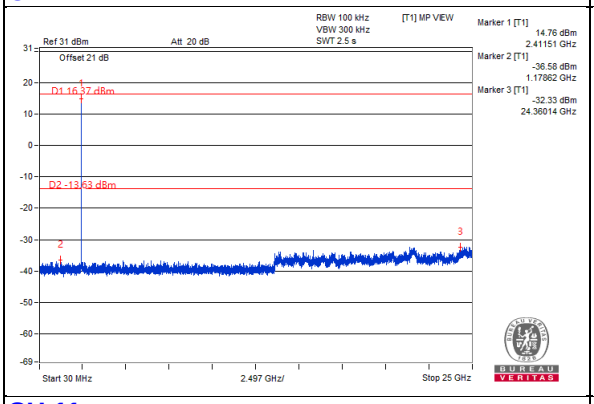


CH 11 Band edge

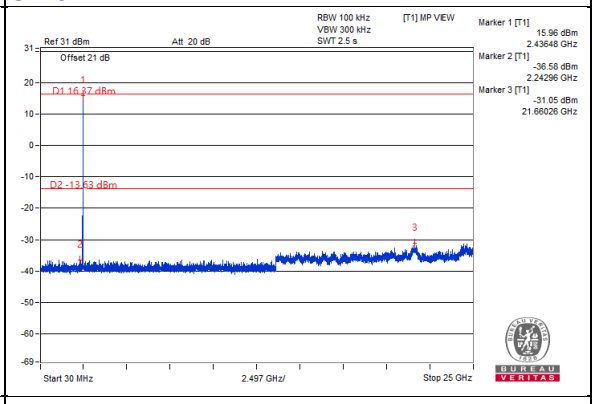


Chain 1

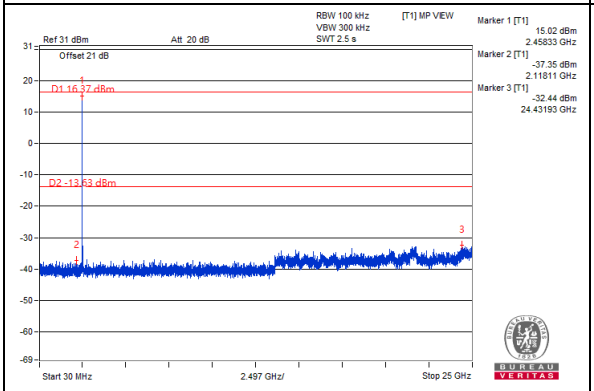
CH 1



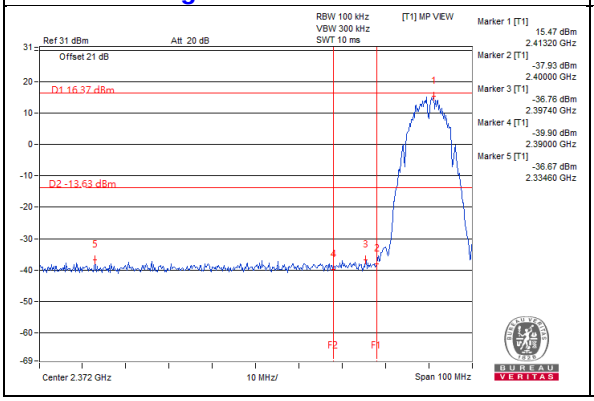
CH 6



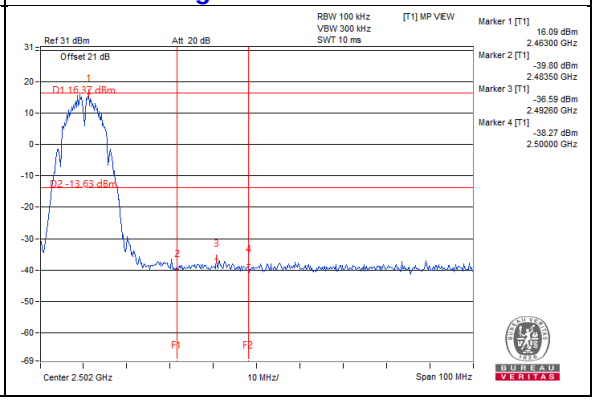
CH 11



CH 1 Band edge

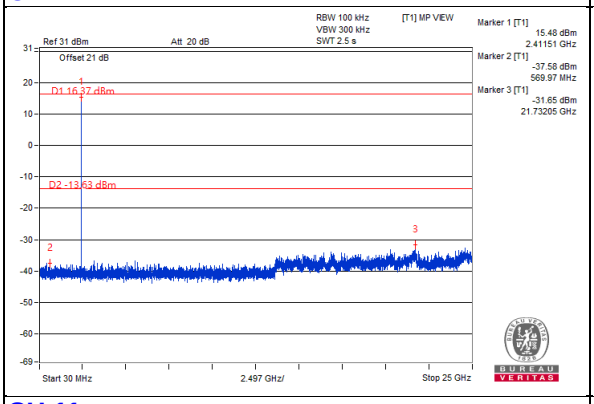


CH 11 Band edge

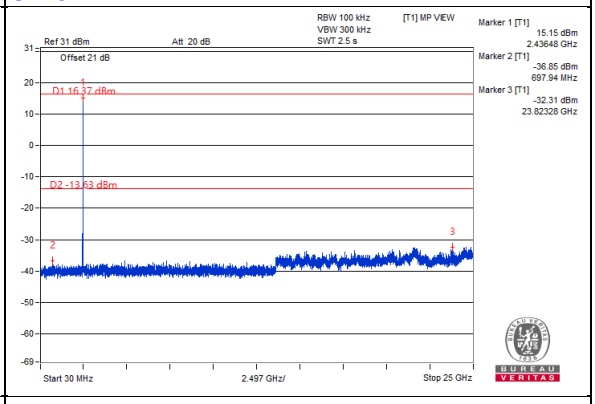


Chain 2

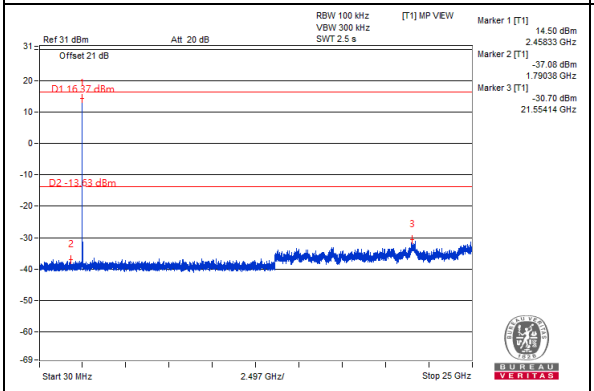
CH 1



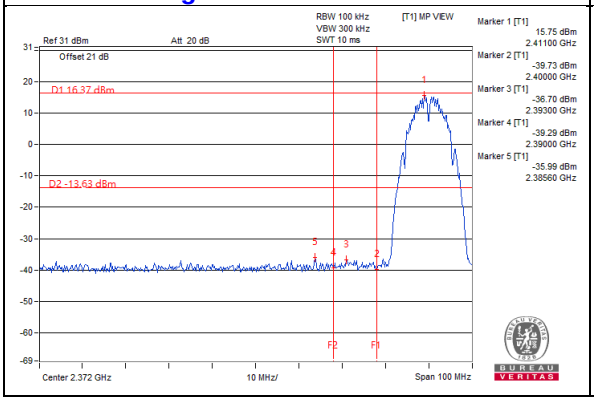
CH 6



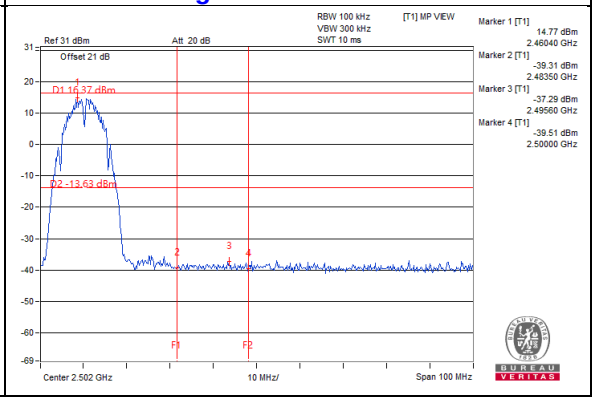
CH 11



CH 1 Band edge

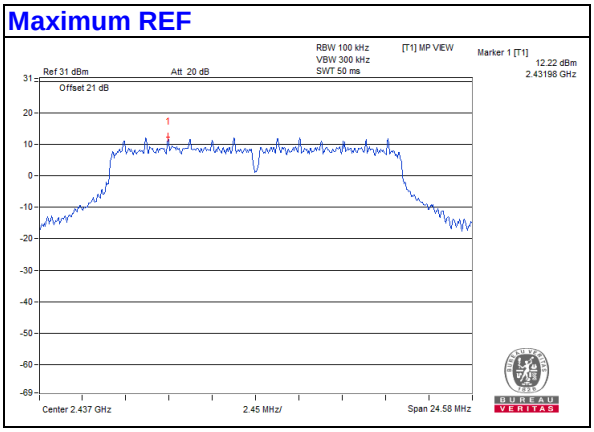


CH 11 Band edge



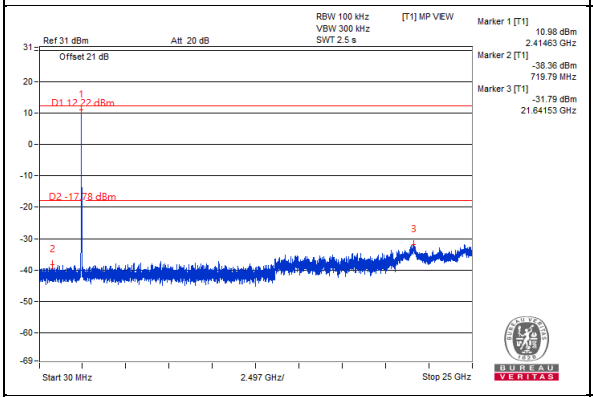
802.11g

Maximum REF

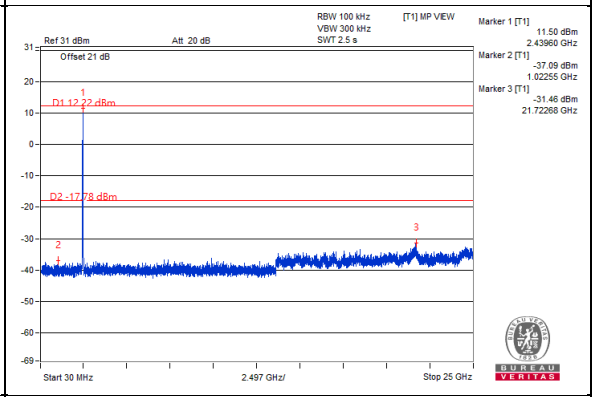


Chain 0

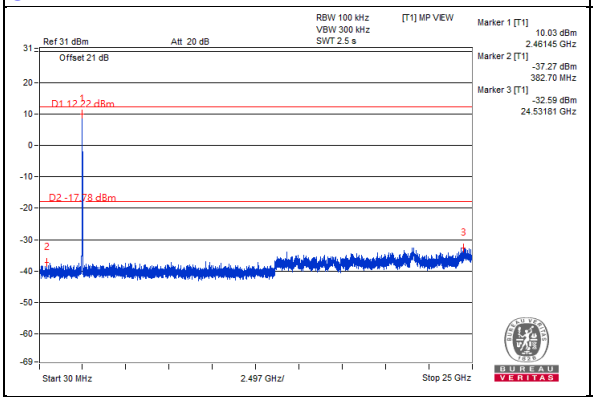
CH 1



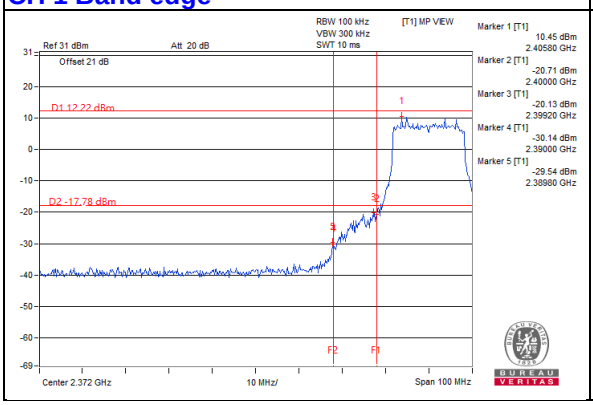
CH 6



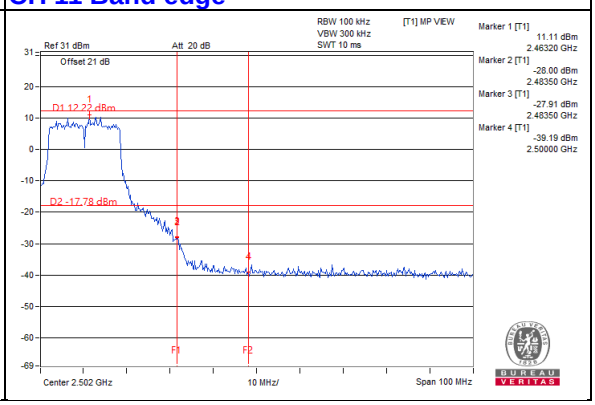
CH 11



CH 1 Band edge

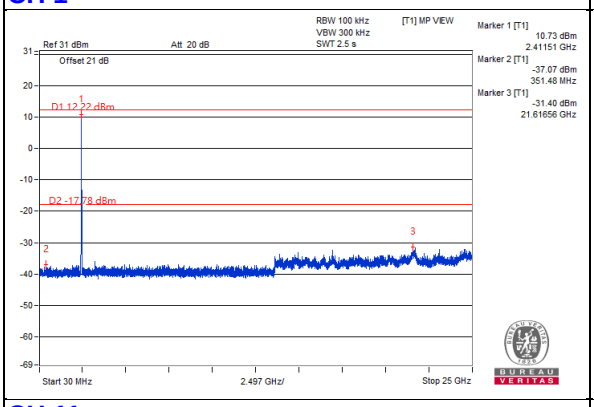


CH 11 Band edge

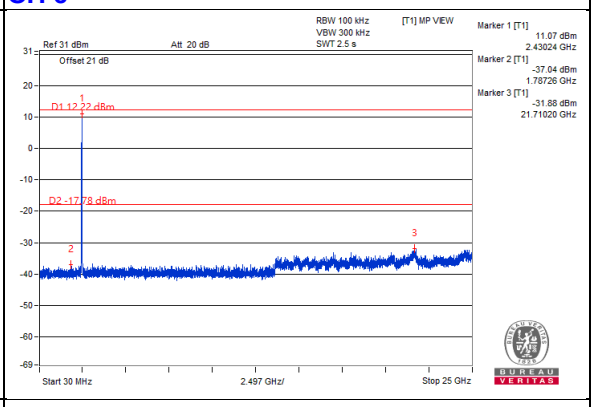


Chain 1

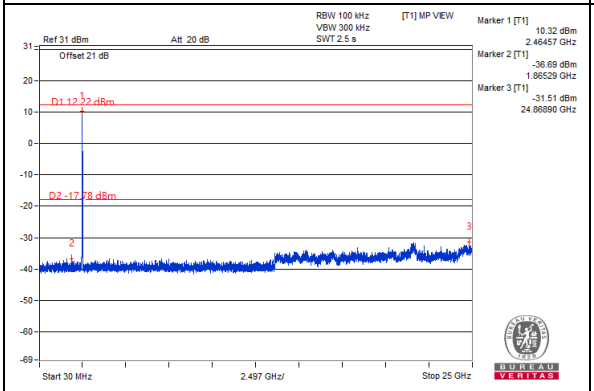
CH 1



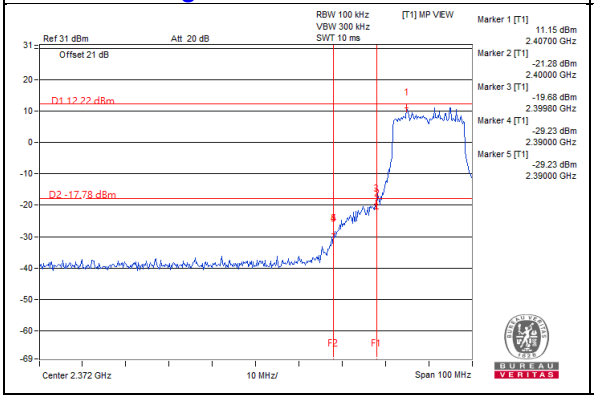
CH 6



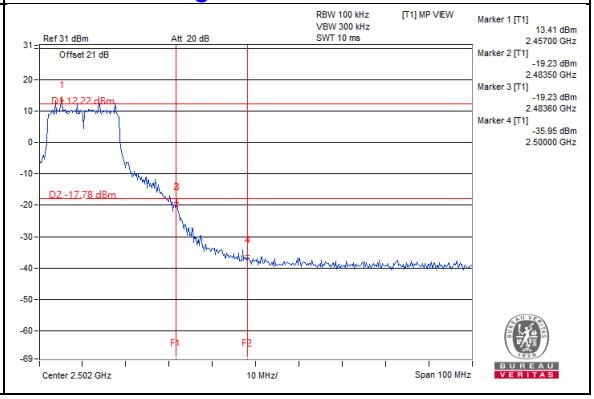
CH 11



CH 1 Band edge

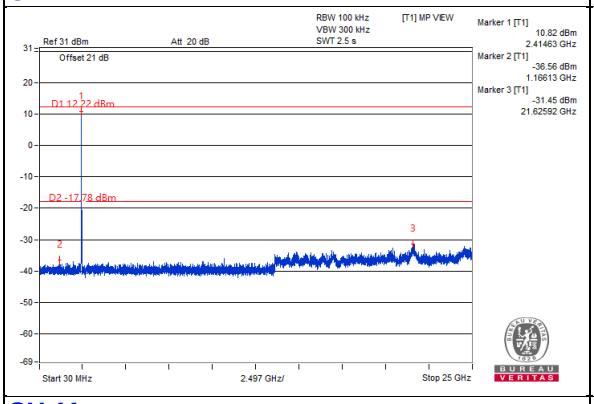


CH 11 Band edge

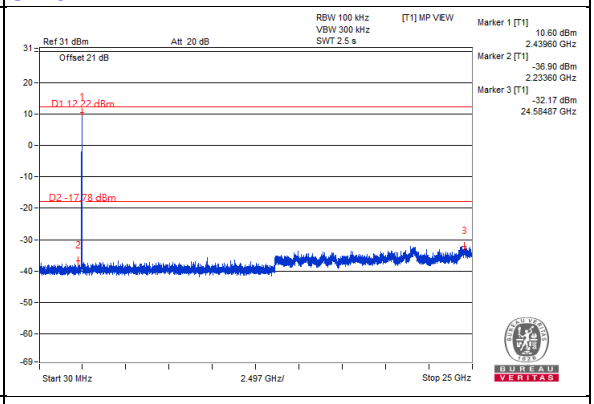


Chain 2

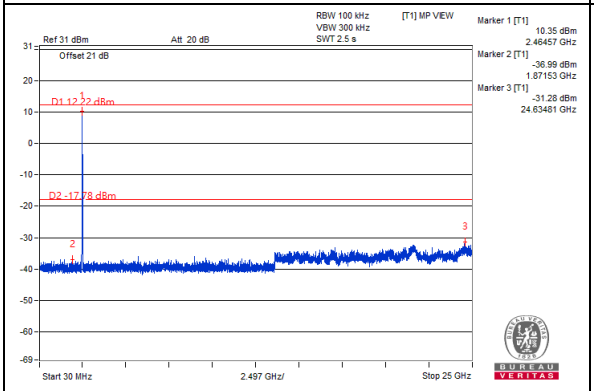
CH 1



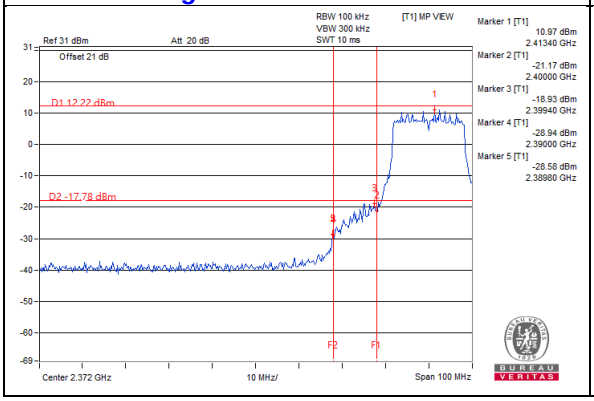
CH 6



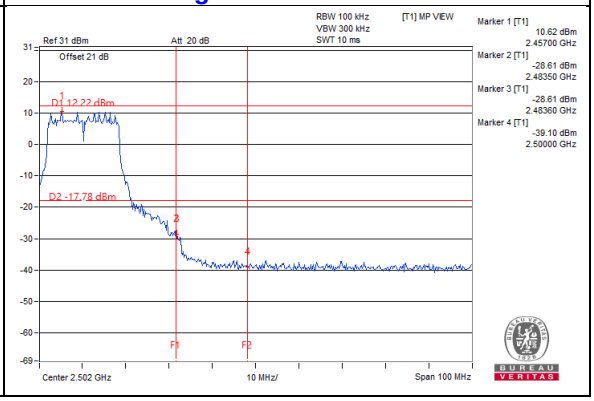
CH 11



CH 1 Band edge

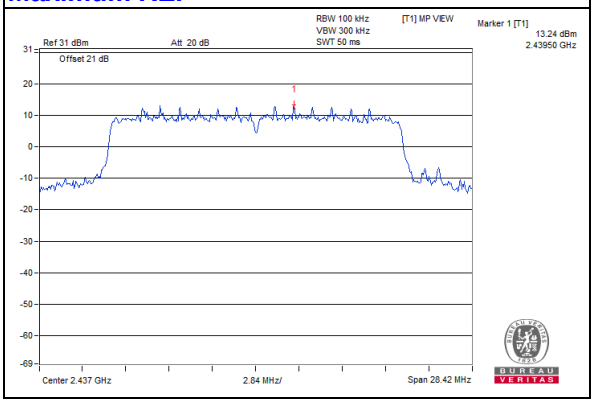


CH 11 Band edge



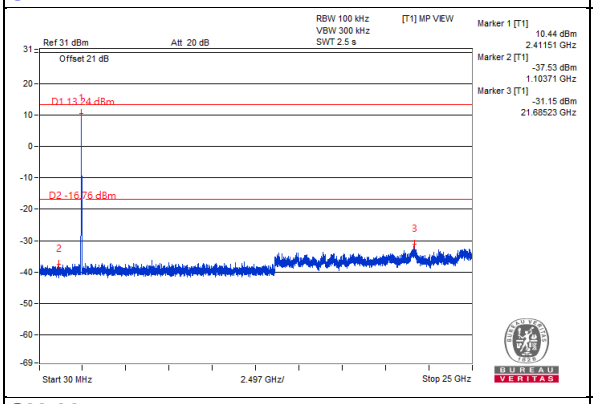
802.11ax (HE20)

Maximum REF

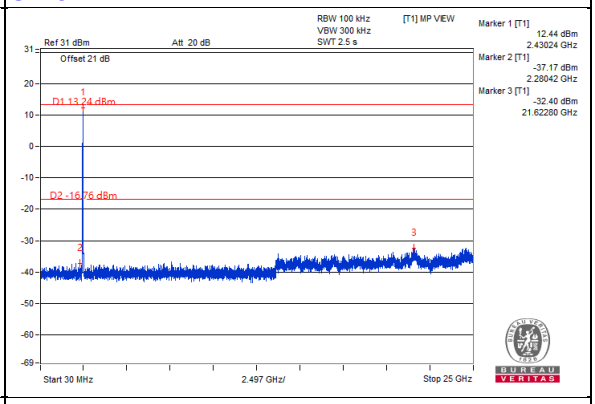


Chain 0

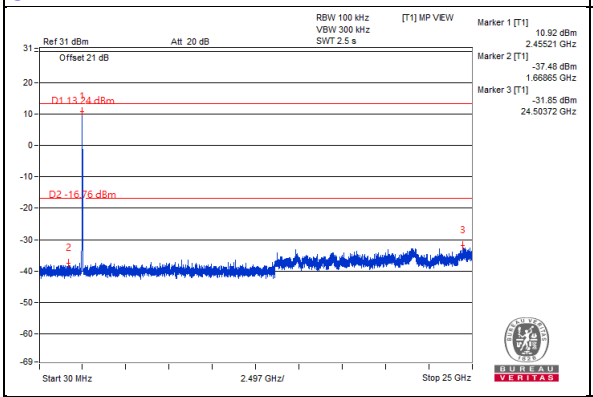
CH 1



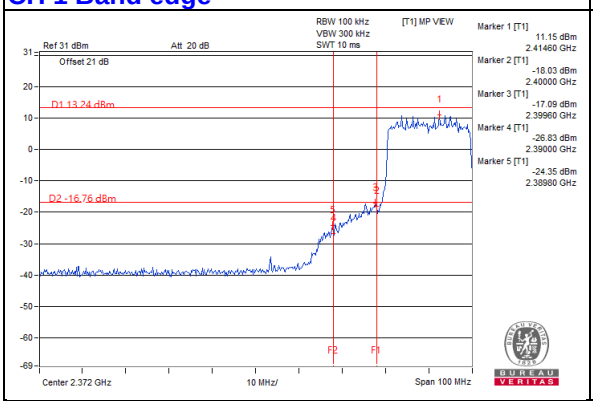
CH 6



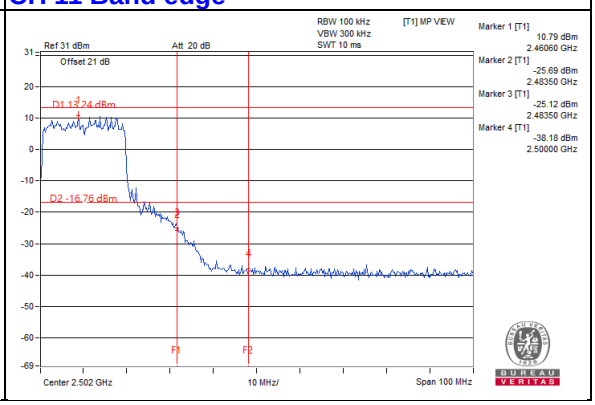
CH 11



CH 1 Band edge

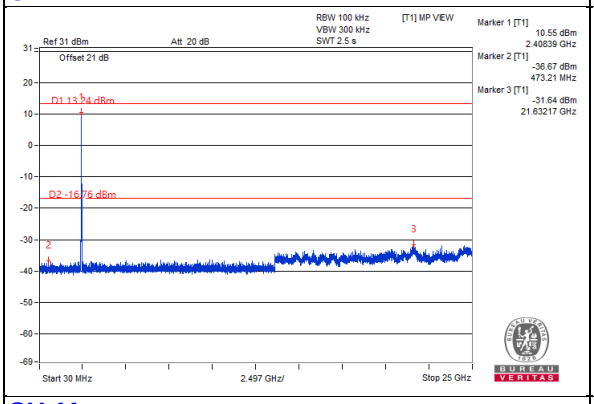


CH 11 Band edge

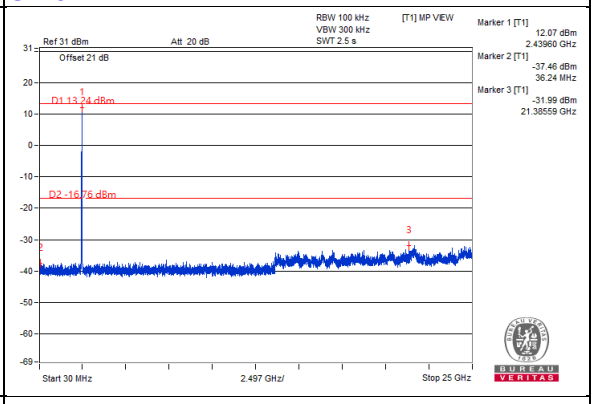


Chain 1

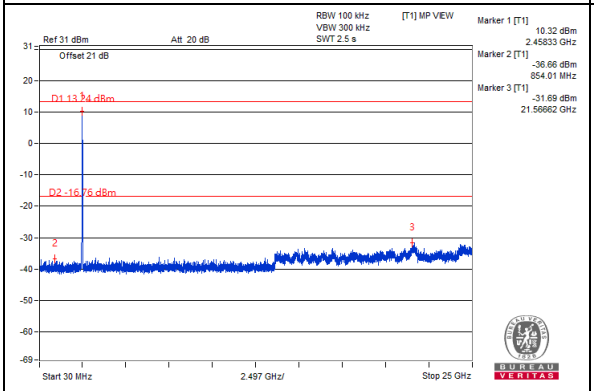
CH 1



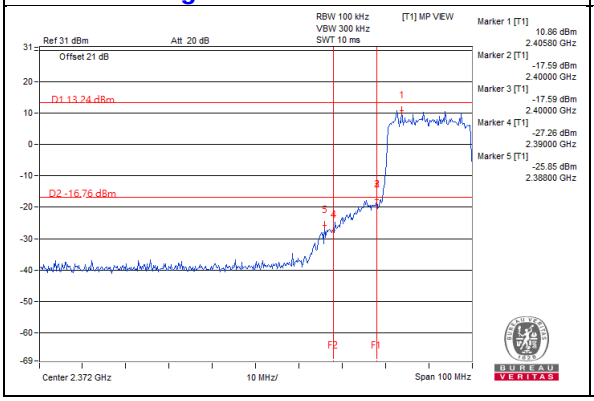
CH 6



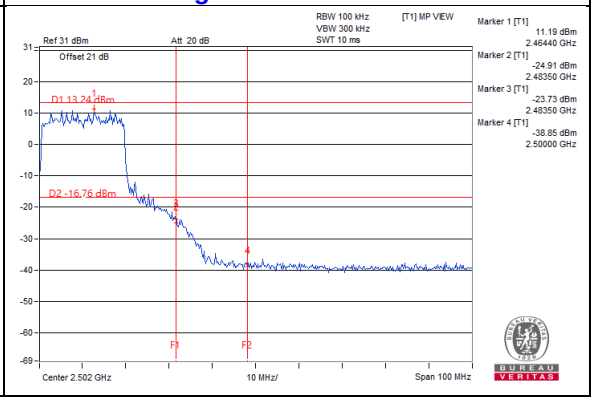
CH 11



CH 1 Band edge

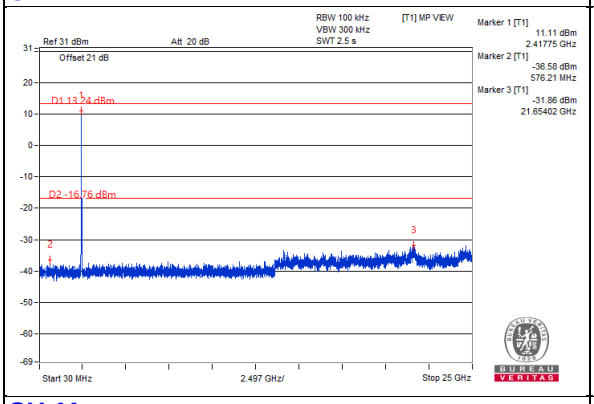


CH 11 Band edge

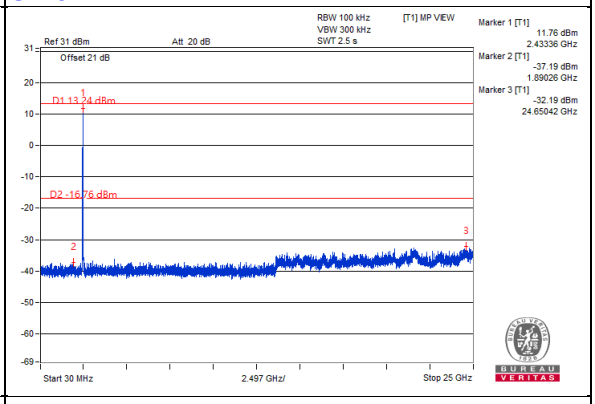


Chain 2

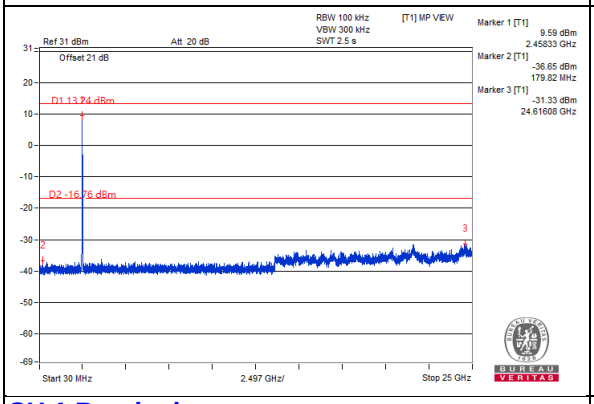
CH 1



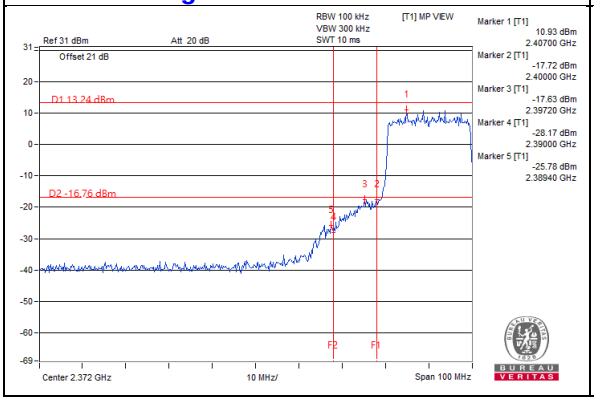
CH 6



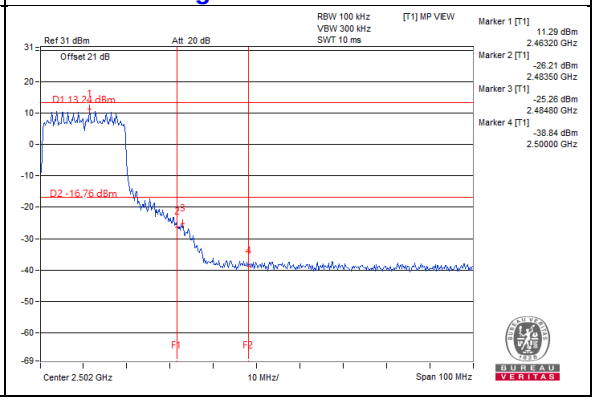
CH 11



CH 1 Band edge

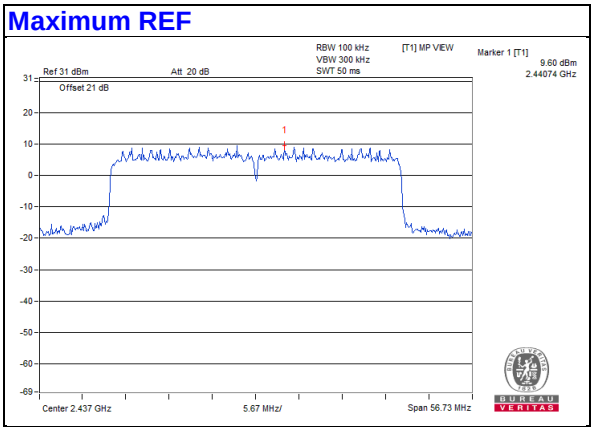


CH 11 Band edge



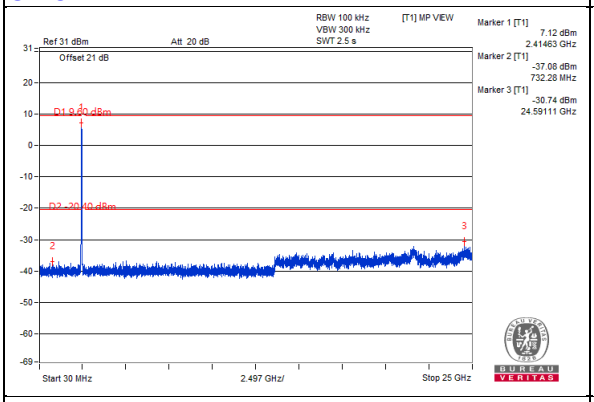
802.11ax (HE40)

Maximum REF

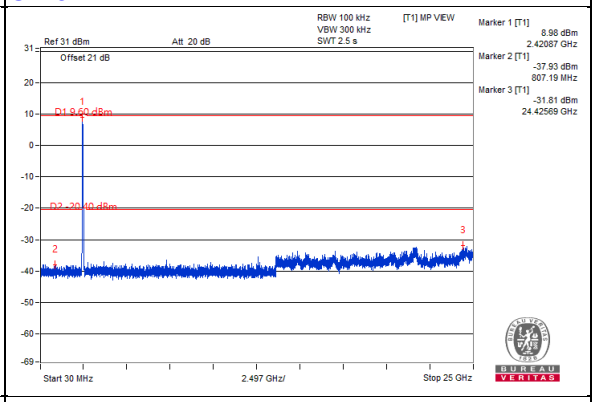


Chain 0

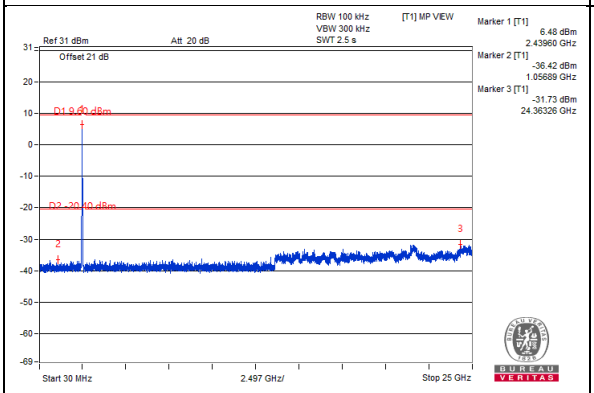
CH 3



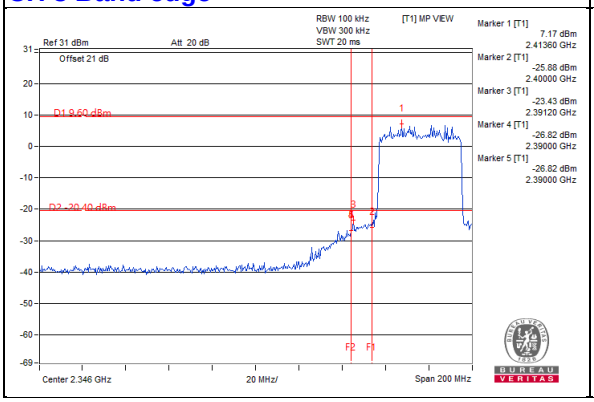
CH 6



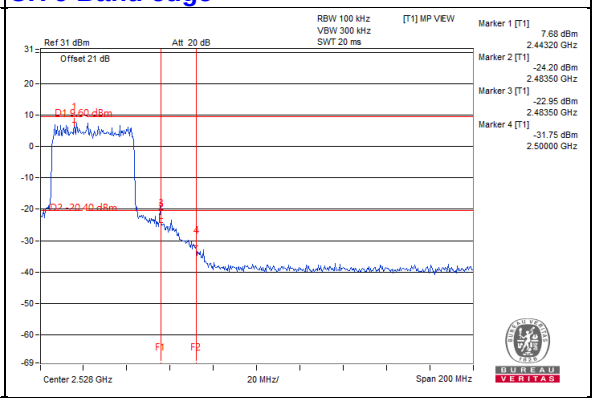
CH 9



CH 3 Band edge

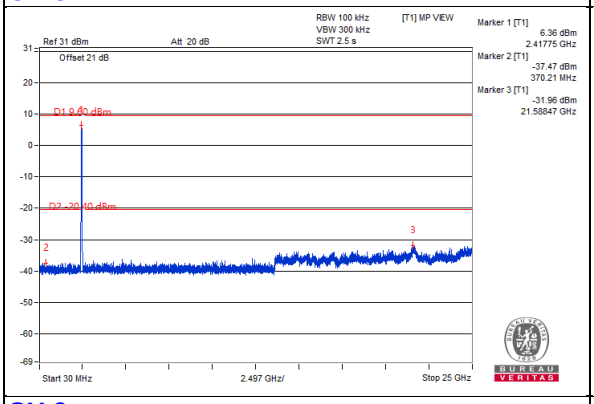


CH 9 Band edge

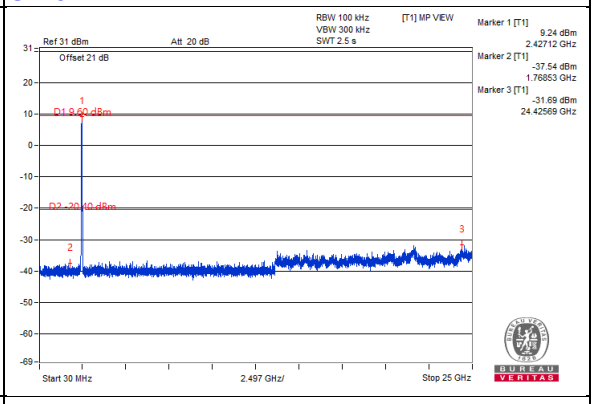


Chain 1

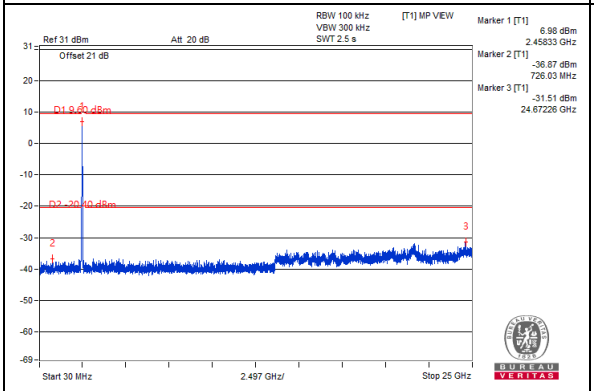
CH 3



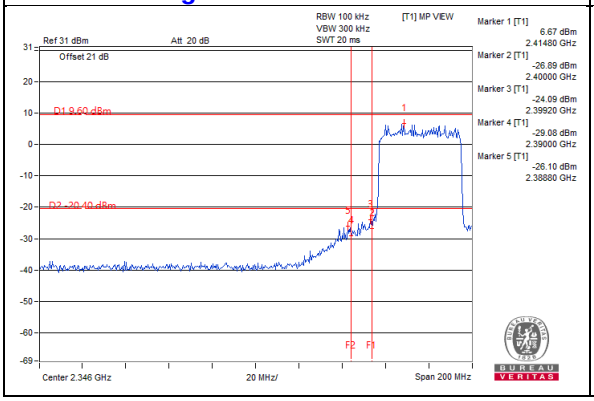
CH 6



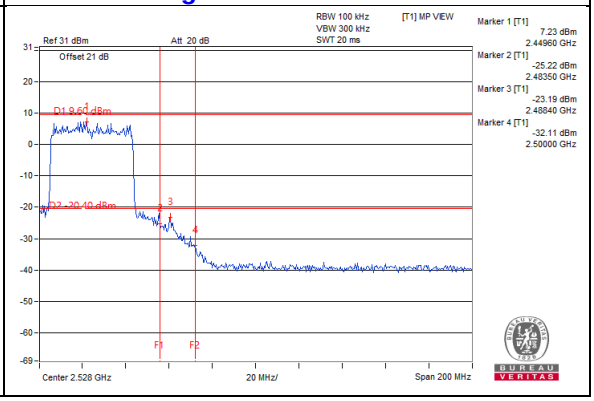
CH 9



CH 3 Band edge

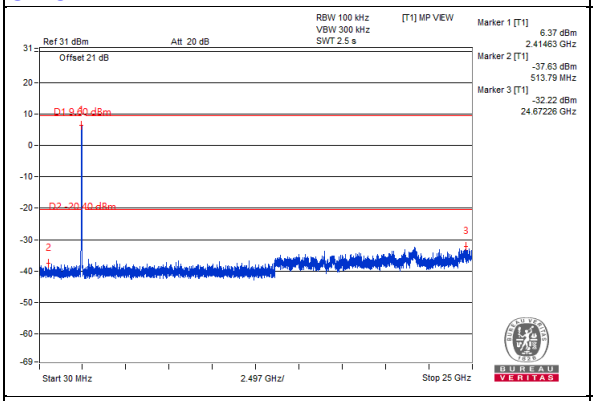


CH 9 Band edge

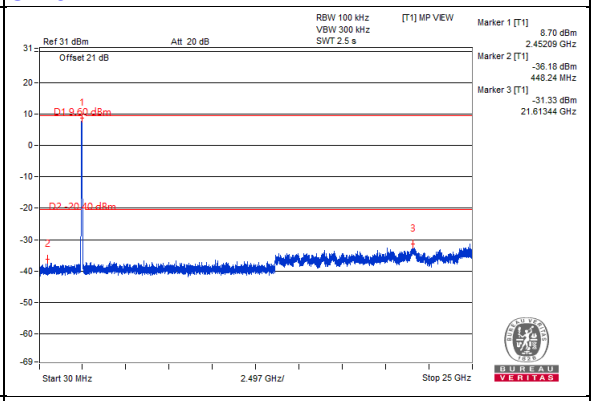


Chain 2

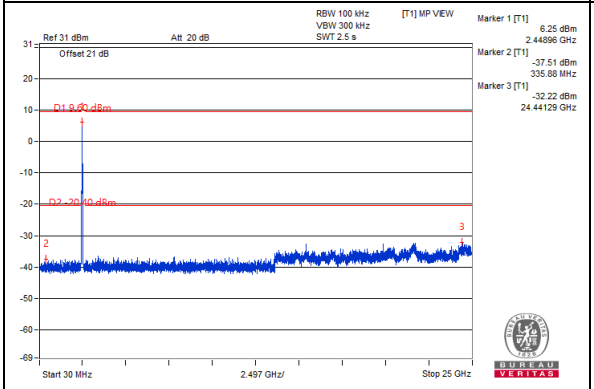
CH 3



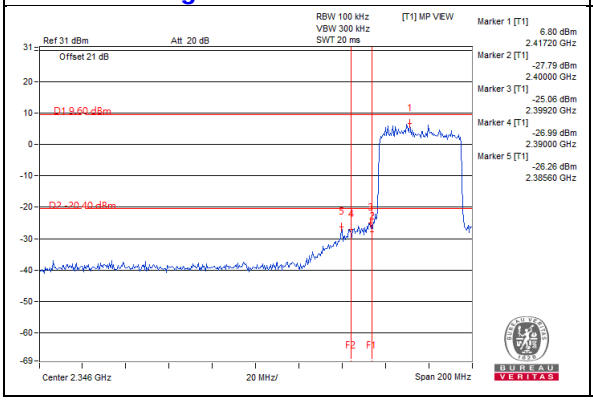
CH 6



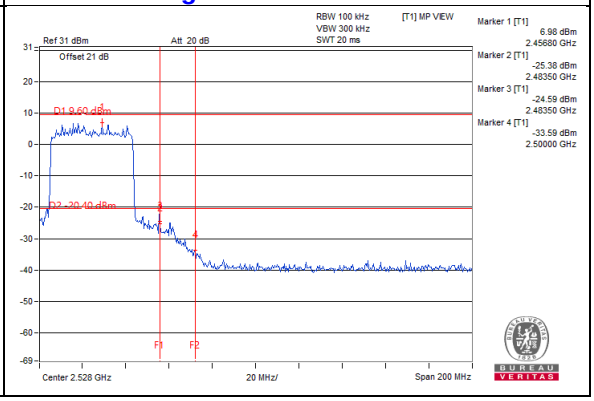
CH 9



CH 3 Band edge



CH 9 Band edge



5 Pictures of Test Arrangements

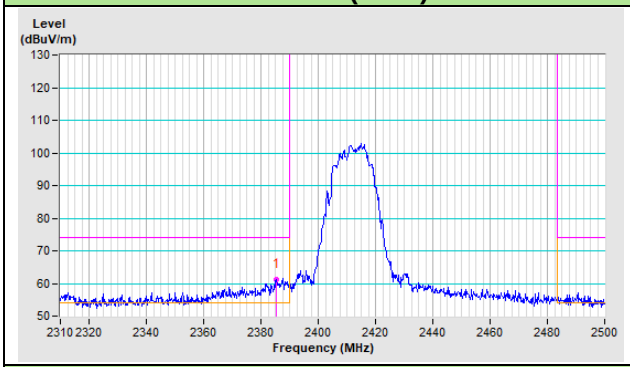
Please refer to the attached file (Test Setup Photo).

Annex A - Band-Edge Measurement

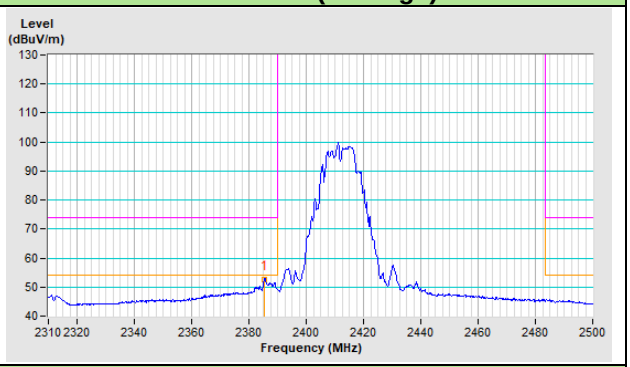
802.11b

Channel 1

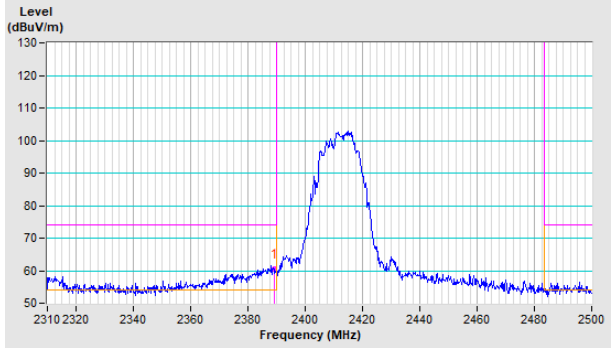
Horizontal (Peak)



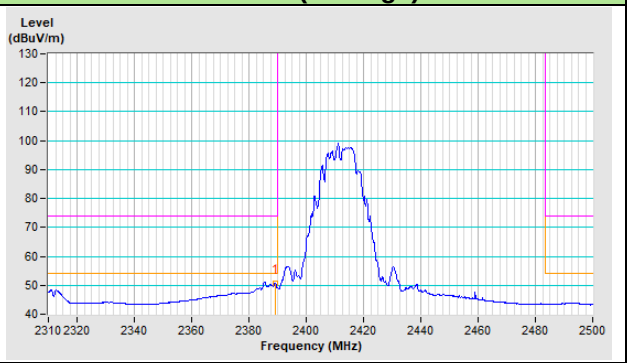
Horizontal (Average)



Vertical (Peak)

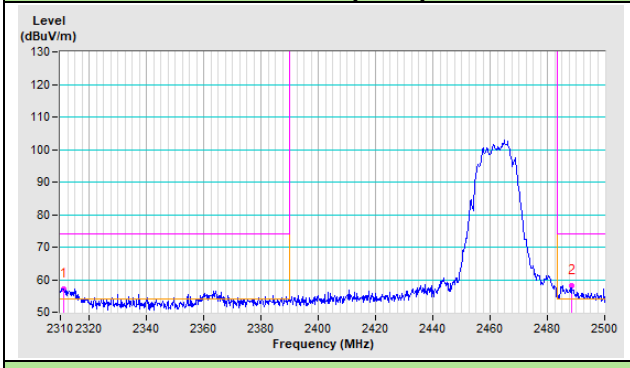


Vertical (Average)

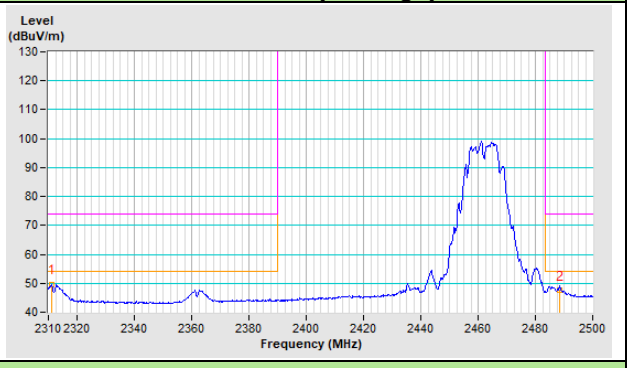


Channel 11

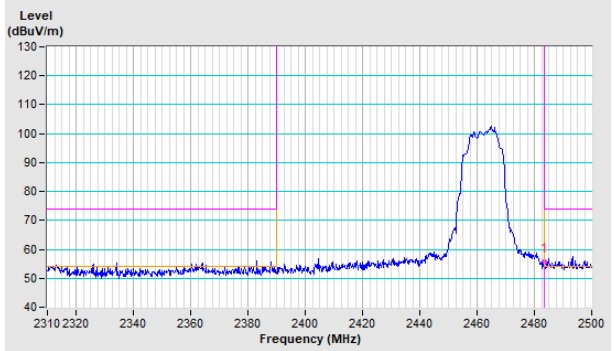
Horizontal (Peak)



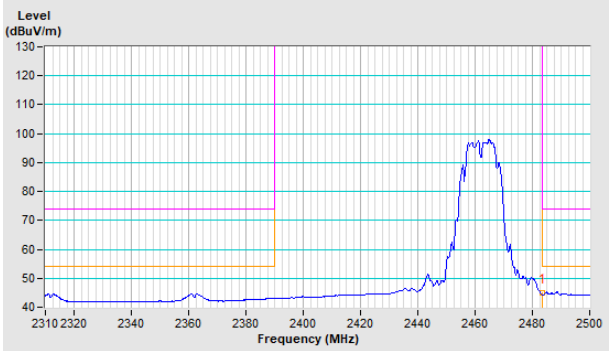
Horizontal (Average)



Vertical (Peak)



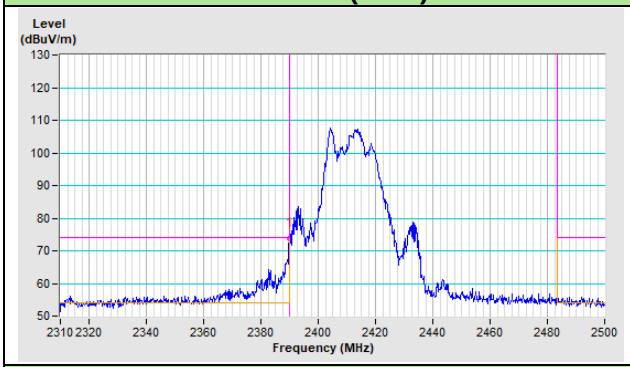
Vertical (Average)



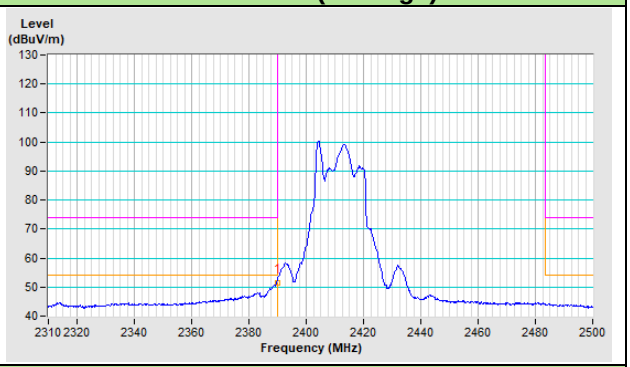
802.11g

Channel 1

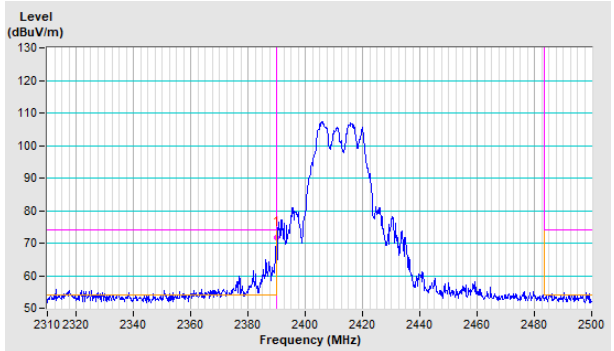
Horizontal (Peak)



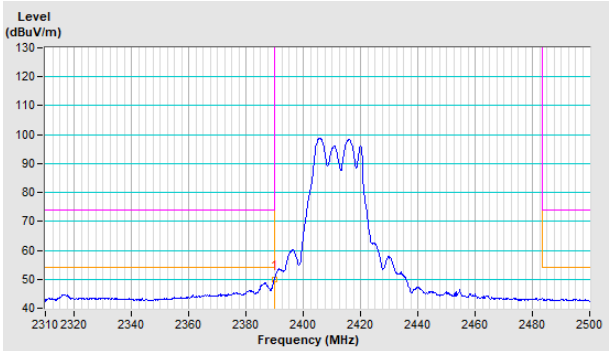
Horizontal (Average)



Vertical (Peak)

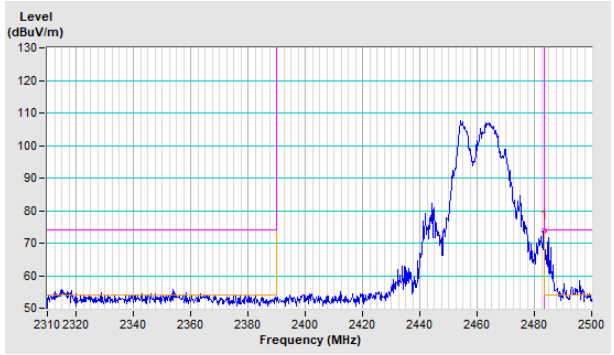


Vertical (Average)

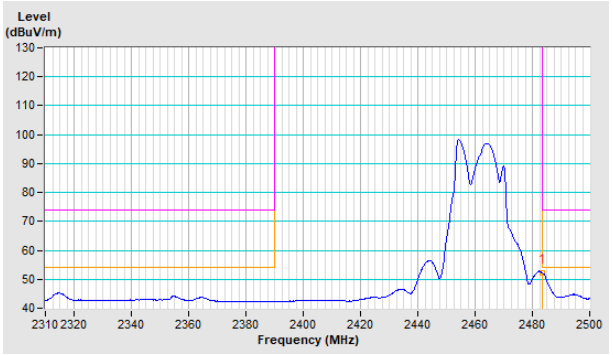


Channel 11

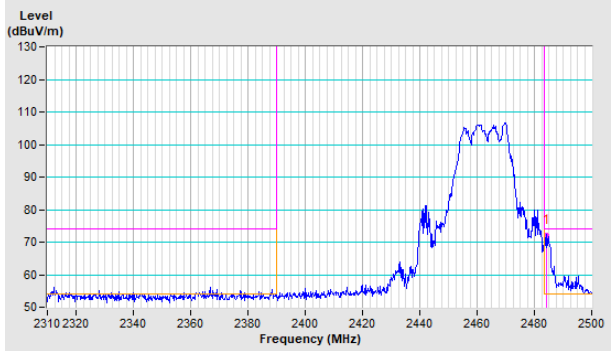
Horizontal (Peak)



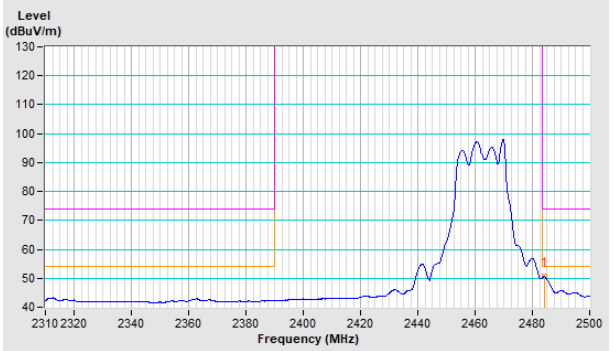
Horizontal (Average)



Vertical (Peak)



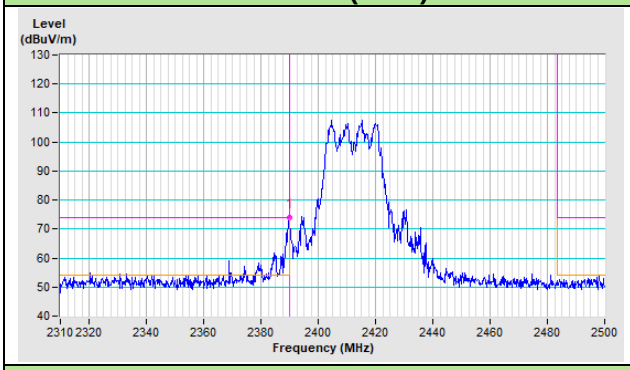
Vertical (Average)



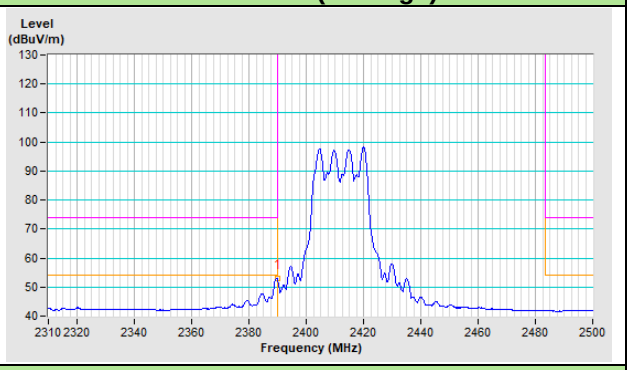
802.11ax (HE20)

Channel 1

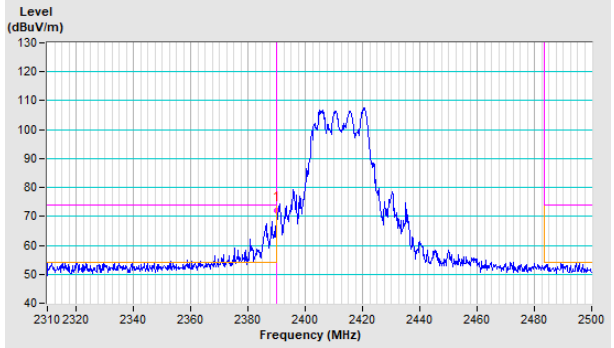
Horizontal (Peak)



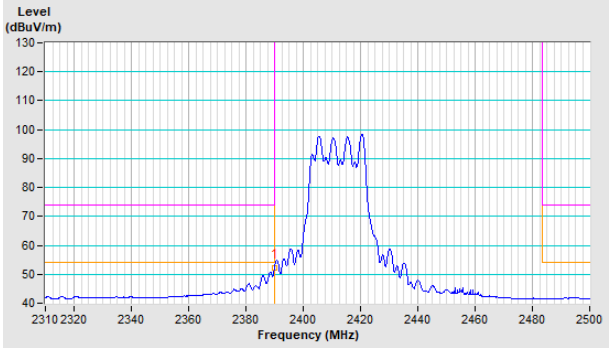
Horizontal (Average)



Vertical (Peak)

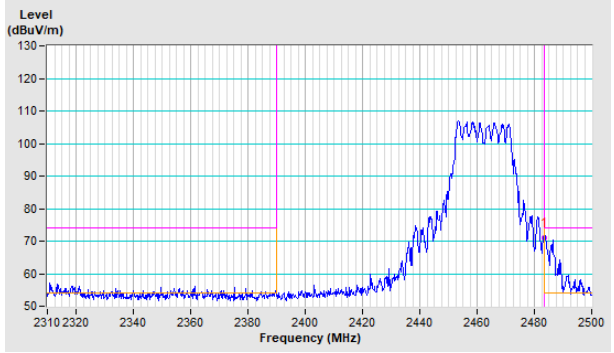


Vertical (Average)

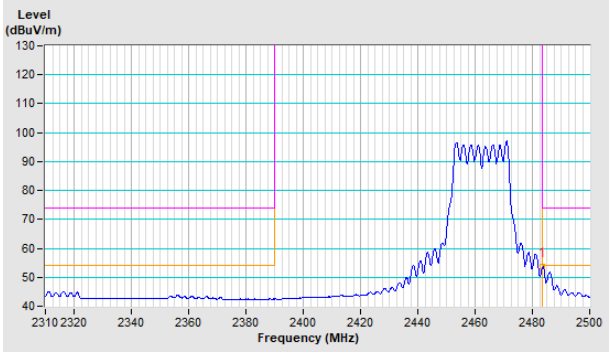


Channel 11

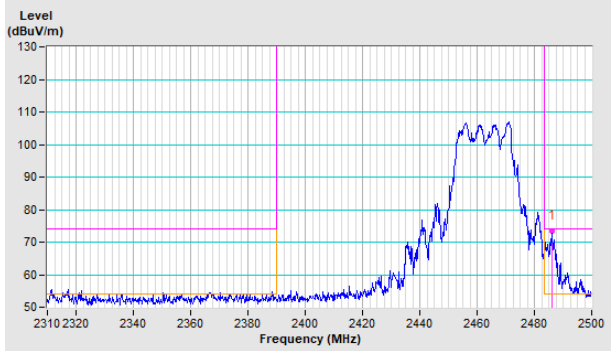
Horizontal (Peak)



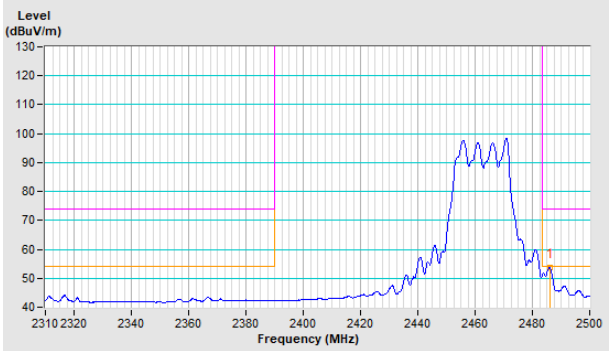
Horizontal (Average)



Vertical (Peak)



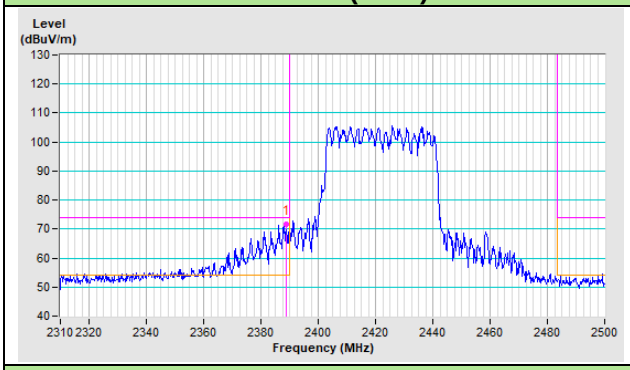
Vertical (Average)



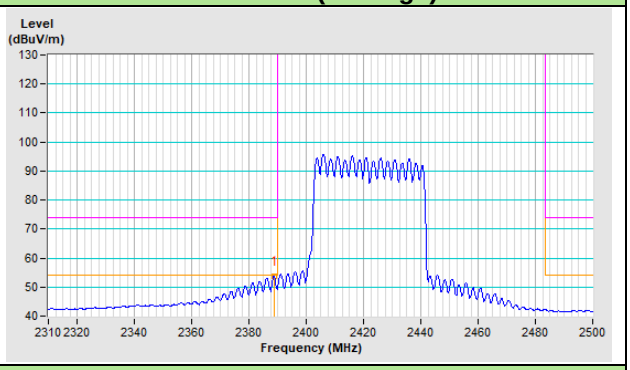
802.11ax (HE40)

Channel 3

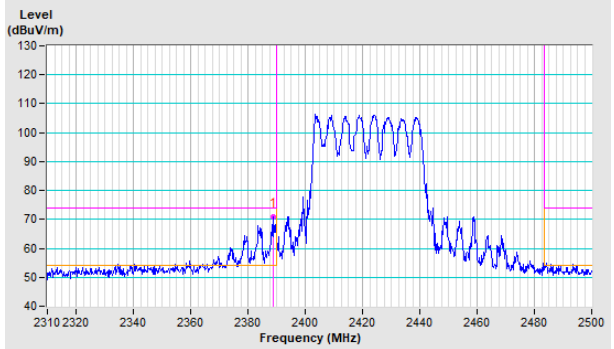
Horizontal (Peak)



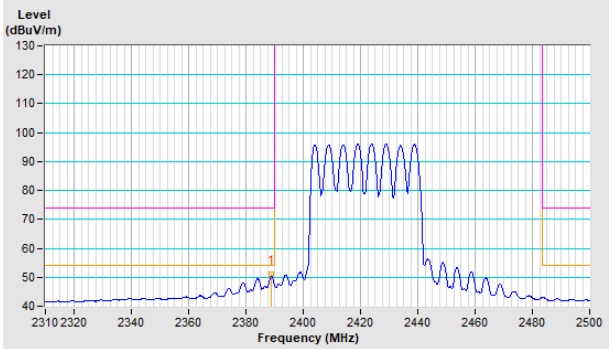
Horizontal (Average)



Vertical (Peak)

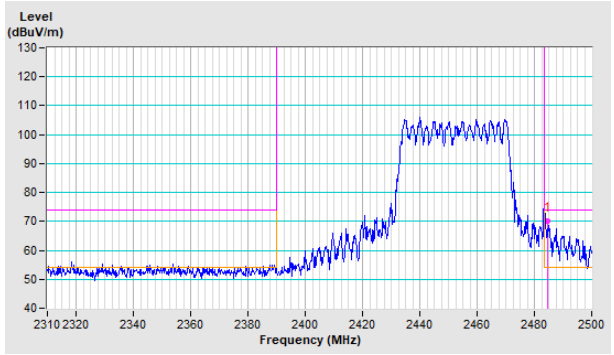


Vertical (Average)

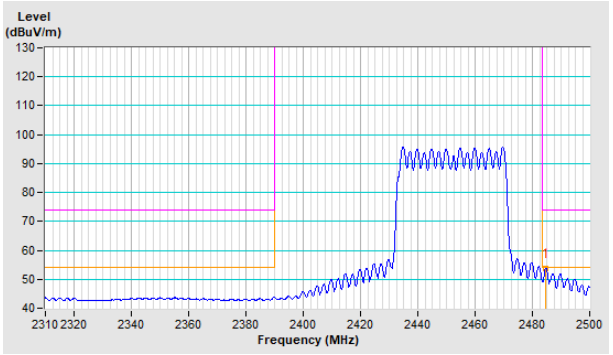


Channel 9

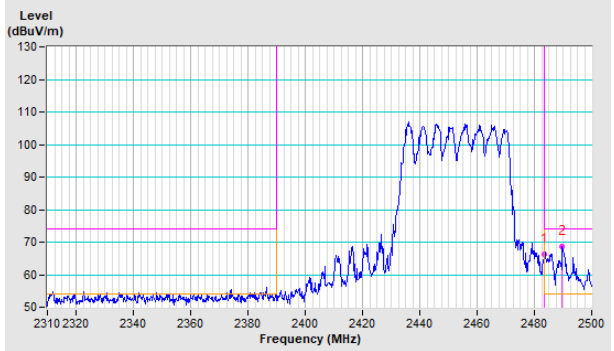
Horizontal (Peak)



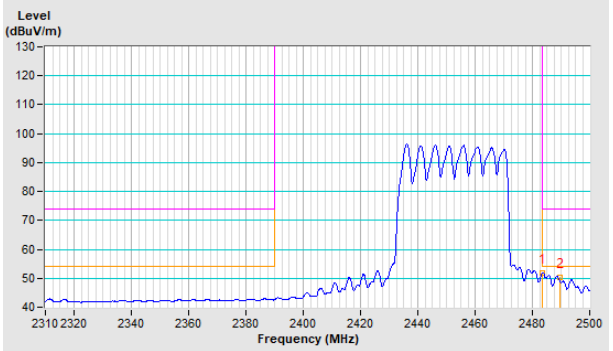
Horizontal (Average)



Vertical (Peak)



Vertical (Average)



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 accredited and approved according to ISO/IEC 17025.

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

Lin Kou EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

--- END ---