FCC Test Report

Report No.:	RFBEBW-WTW-P20110211
FCC ID:	KA2APX2850A1
Test Model:	DAP-X2850
Received Date:	Nov. 06, 2020
Test Date:	Nov. 06 to Dec. 04, 2020
Issued Date:	Dec. 24, 2020
Applicant:	D-Link Corporation
Address:	17595 Mt. Herrmann Street Fountain Valley, CA92708 USA
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
FCC Registration / Designation Number:	723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
RFBEBW-WTW-P20110211	Original release.	Dec. 24, 2020

1 Certificate of Conformity

Product:	Nuclias Connect AX3600 Access Point
Brand:	D-Link
Test Model:	DAP-X2850
Sample Status:	Engineering sample
Applicant:	D-Link Corporation
Test Date:	Nov. 06 to Dec. 04, 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 : Vivian Huang , **Date:** Dec. 24, 2020

Vivian Hunag / Specialist

Approved by : , **Date:** Dec. 24, 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 -12.39dB at 0.35703MHz.
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 2380.30MHz.
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	Nuclias Connect AX3600 Access Point
Brand	D-Link
Test Model	DAP-X2850
Status of EUT	Engineering sample
Power Supply Rating	12 Vdc from power adapter or 12 Vdc from PoE
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT (20/40) mode 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 1733.3 Mbps 802.11ax: up to 2401.9 Mbps
Operating Frequency	**2.4GHz:** 2.412 ~ 2.462 GHz **5GHz:** 5.18~ 5.24 GHz, 5.745 ~ 5.825 GHz
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): 2 802.11ac (VHT80+80), 802.11ax (HE80+80): 1 set
Output Power	**CDD Mode:** **2.412 ~ 2.462 GHz:** 880.485 mW **5.18 ~ 5.24 GHz:** 313.331 mW **5.745 ~ 5.825 GHz:** 881.993 mW **Beamforming Mode:** **2.412 ~ 2.462 GHz:** 475.518 mW **5.18 ~ 5.24 GHz:** 274.07 mW **5.745 ~ 5.825 GHz:** 290.921 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	NA

Note:

1. The EUT has below 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 antennas provided to the EUT, please refer to the following table:

Antenna No.	RF Chain No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type	Cable Length (mm)
1	Chain0	M.gear	C037-511532-A	2.59	2.4~2.4835GHz	PIFA	i-pex(MHF)	194
2	Chain1	M.gear	C037-511532-A	2.72	2.4~2.4835GHz	PIFA	i-pex(MHF)	150
3	Chain2	M.gear	C037-511532-A	3.77	2.4~2.4835GHz	PIFA	i-pex(MHF)	75
4	Chain3	M.gear	C037-511532-A	3.57	2.4~2.4835GHz	PIFA	i-pex(MHF)	157
5	Chain0	M.gear	C037-511532-A	5.39	5.15~5.85GHz	PIFA	i-pex(MHF)	131
6	Chain1	M.gear	C037-511532-A	5.08	5.15~5.85GHz	PIFA	i-pex(MHF)	186
7	Chain2	M.gear	C037-511532-A	5.46	5.15~5.85GHz	PIFA	i-pex(MHF)	118
8	Chain3	M.gear	C037-511532-A	5.3	5.15~5.85GHz	PIFA	i-pex(MHF)	73

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

Brand	Model No.	Spec.
APD	WA-30P12R	Input: 100-240Vac, 0.9A, 50-60Hz Output: 12V, 2.5A DC cable: 1.2m, unshielded

5. The EUT was pre-tested under the following modes:

Test Mode	Description
Mode A	With adapter mode
Mode B	With POE mode
Note: From the above modes, conducted emission the worst case was found in **Mode A** and radiated emission the worst case was found in **Mode B**. Therefore only the test data of the mode was recorded in this report.	

6. The EUT incorporates a MIMO function.

2.4GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11b	4TX	4RX
802.11g	4TX	4RX
802.11n (HT20)	4TX	4RX
802.11n (HT40)	4TX	4RX
VHT20	4TX	4RX
VHT40	4TX	4RX
802.11ax (HE20)	4TX	4RX
802.11ax (HE40)	4TX	4RX
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
802.11ac (VHT80+80)	2TX+2TX	2RX+2RX
802.11ax (HE20)	4TX	4RX
802.11ax (HE40)	4TX	4RX
802.11ax (HE80)	4TX	4RX
802.11ax (HE80+80)	2TX+2TX	2RX+2RX

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

7. 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.
8. 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

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.

Radiated Emission Test (Above 1GHz):

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

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

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

Radiated Emission Test (Below 1GHz):

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

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

CDD Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	Data Rate Parameter
802.11g	1 to 11	6	OFDM	BPSK	6Mb/s

Power Line Conducted Emission Test:

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

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

CDD Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	Data Rate Parameter
802.11g	1 to 11	6	OFDM	BPSK	6Mb/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.

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:

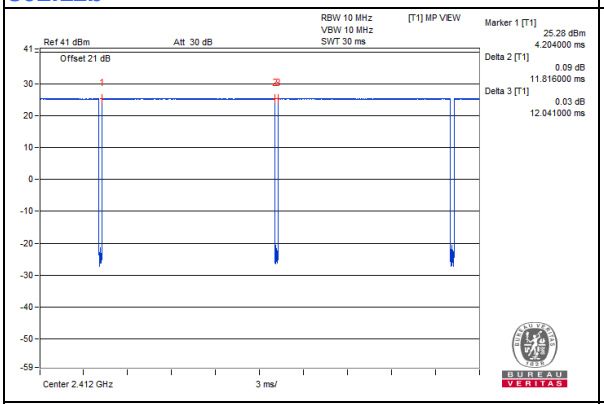
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 75%RH	120Vac, 60Hz	Benson Chao
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Carter Lin
PLC	25deg. C, 67%RH	120Vac, 60Hz	Sampson Chen
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

3.3 Duty Cycle of Test Signal

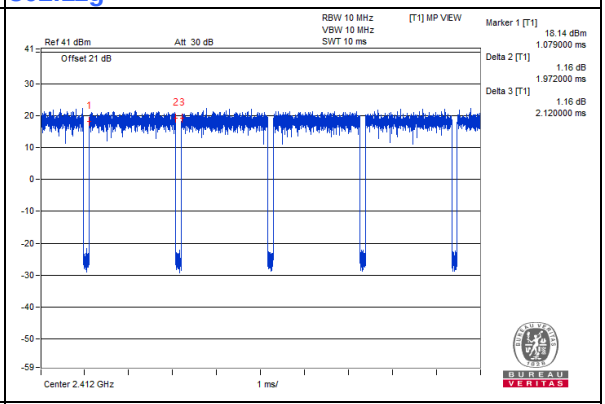
If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b: Duty cycle = 11.816 ms /12.041 ms=0.981
802.11g: Duty cycle = 1.972 ms /2.12 ms=0.93, Duty factor = 10 * log (1/Duty cycle) = 0.31 dB
802.11ax (HE20): Duty cycle = 5.442 ms /5.735 ms=0.949, Duty factor = 10 * log (1/Duty cycle) = 0.23 dB
802.11ax (HE40): Duty cycle = 5.44 ms /5.685 ms=0.957, Duty factor = 10 * log (1/Duty cycle) = 0.19 dB

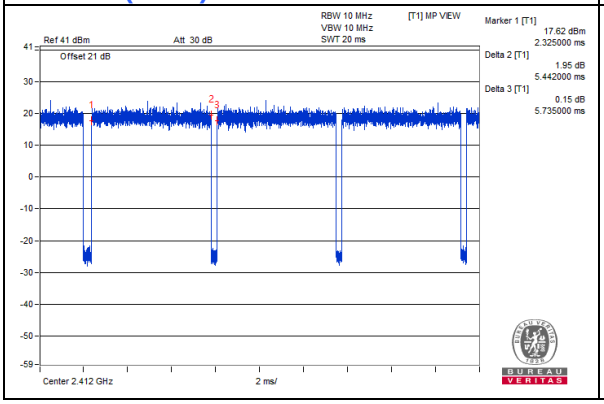
802.11b



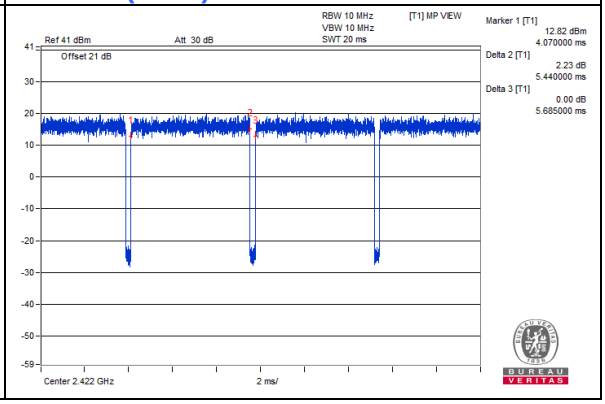
802.11g



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.	Laptop	DELL	Inspiron 3000	DP9YQ52	NA	Provided by Lab
B.	PoE	PowerDsine	PD-3501G/AC	NA	NA	Provided by Lab
C.	Laptop	DELL	E5430	HYV4VY1	DoC	Provided by Lab

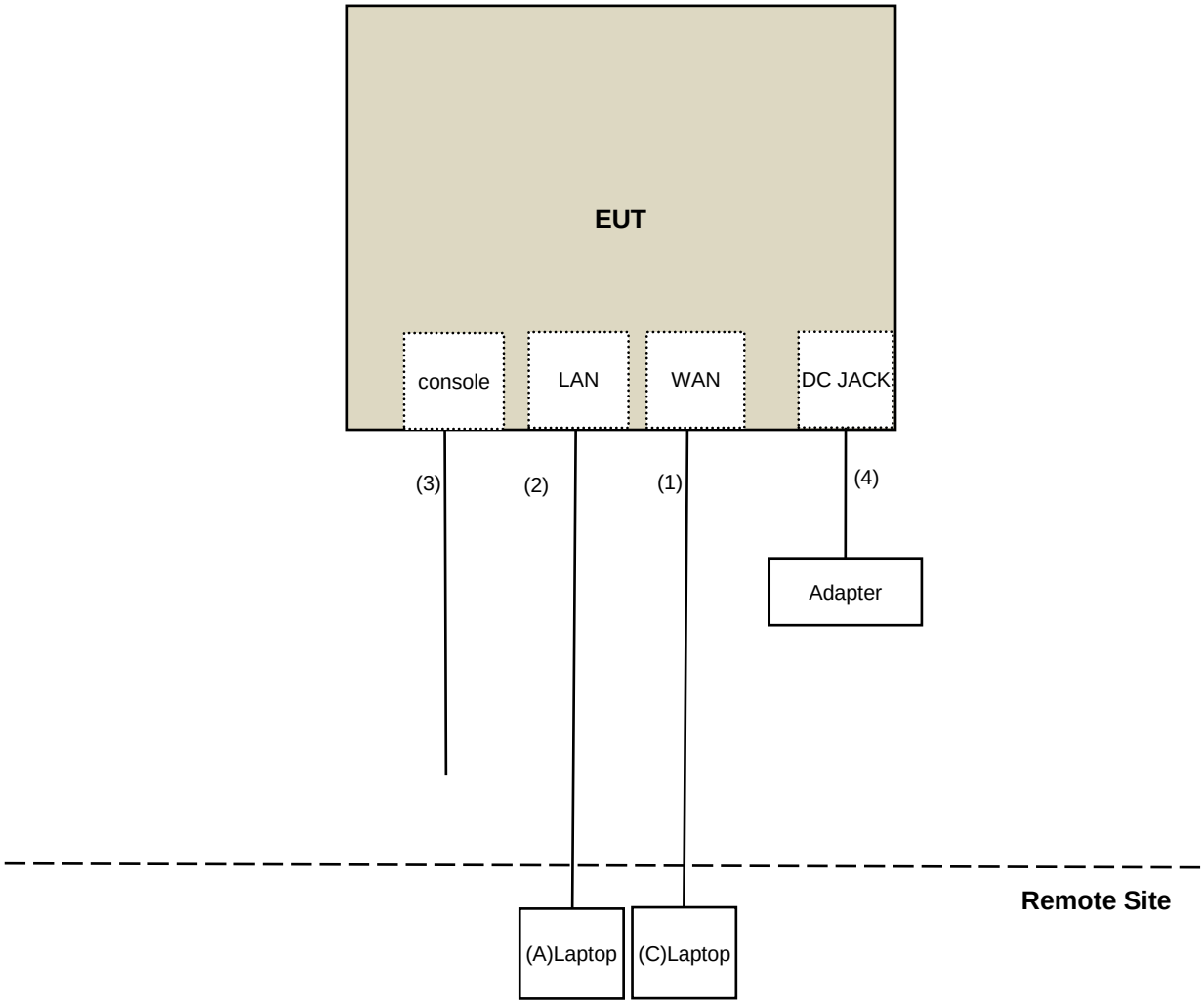
Note:

1. All power cords of the above support units are non-shielded (1.5m).

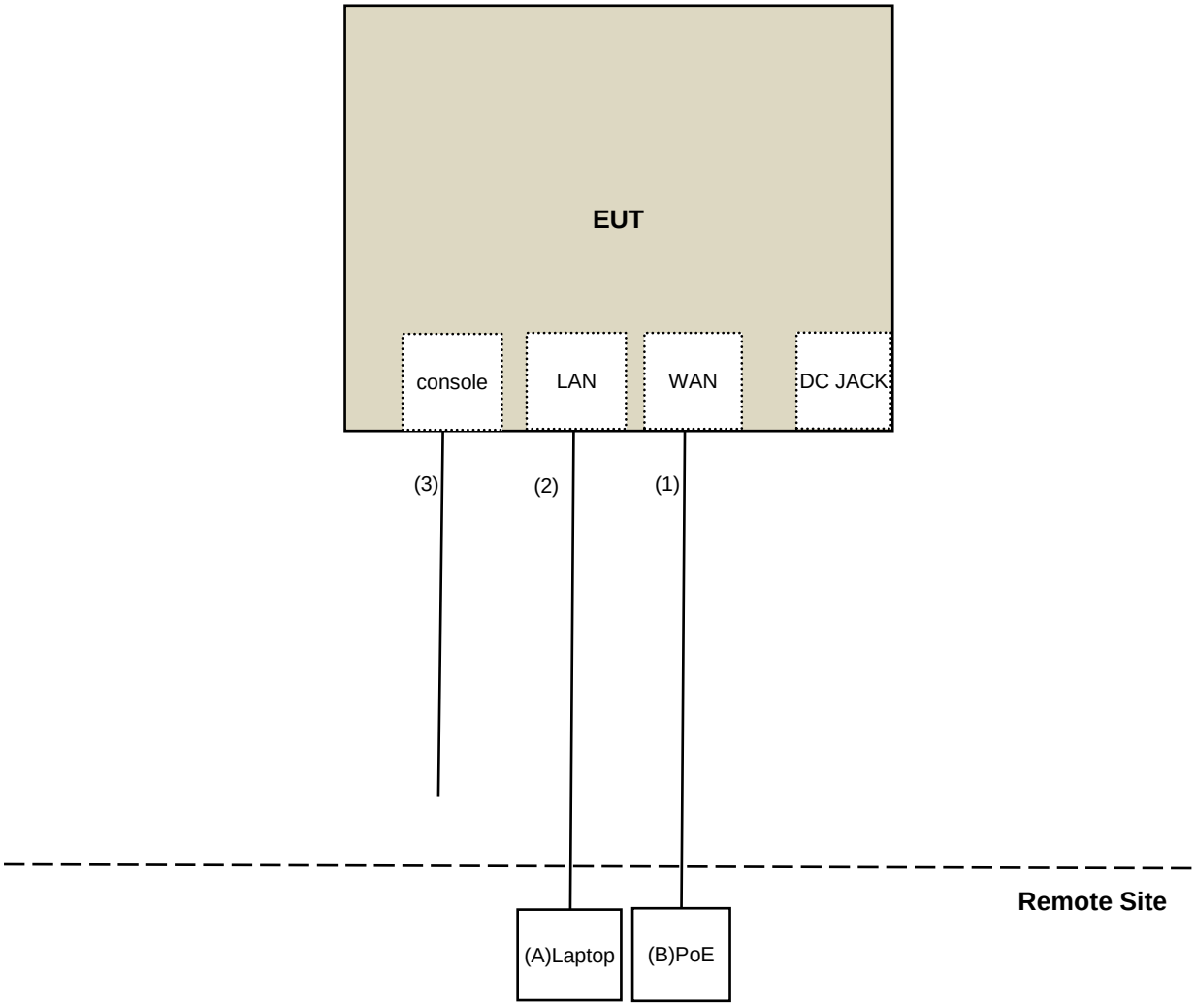
ID	Descriptions (Cables)	Qty	Length (m)	Shielding (Yes/No)	Cores (Number)	Remarks
1	RJ-45 Cable	1	10	No	0	Provided by Lab
2	RJ-45 Cable	1	10	No	0	Provided by Lab
3	Console Cable	1	1.5	No	0	Provided by Lab
4	DC Cable	1	1.2	No	0	Supplied by client

3.4.1 Configuration of System under Test

For Conducted Emission test:



For other test items:



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 R&S	ESR7	102026	Apr. 22, 2020	Apr. 21, 2021
Spectrum Analyzer Keysight	N9030B	MY57141948	May 22, 2020	May 21, 2021
Pre-Amplifier EMCI	EMC001340	980142	May 25, 2020	May 24, 2021
Loop Antenna Electro-Metrics	EM-6879	264	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 EMCI	EMC330N	980538	Apr. 28, 2020	Apr. 27, 2021
Trilog Broadband Antenna SCHWARZBECK	VULB9168	9168-0842	Nov. 03, 2020	Nov. 02, 2021
RF Cable	8D	966-5-1	Apr. 29, 2020	Apr. 28, 2021
RF Cable	8D	966-5-2	Apr. 29, 2020	Apr. 28, 2021
RF Cable	8D	966-5-3	Apr. 29, 2020	Apr. 28, 2021
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-ATT5-02	Jan. 14, 2020	Jan. 13, 2021
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-1819	Nov. 22, 2020	Nov. 21, 2021
Pre-Amplifier EMCI	EMC12630SE	980509	Apr. 29, 2020	Apr. 28, 2021
RF Cable EMCI	EMC104-SM-SM-1500	180503	Apr. 29, 2020	Apr. 28, 2021
RF Cable EMCI	EMC104-SM-SM-2000	180501	Apr. 29, 2020	Apr. 28, 2021
RF Cable EMCI	EMC104-SM-SM-6000	180506	Apr. 29, 2020	Apr. 28, 2021
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 15, 2020	Jan. 14, 2021
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 22, 2020	Nov. 21, 2021
RF Cable	EMC102-KM-KM-1200	160924	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC-KM-KM-4000	200214	Mar. 11, 2020	Mar. 10, 2021
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 5.
3. Loop antenna was used for all emissions below 30 MHz.
4. Tested Date: Nov. 28, 2020

For BandEdge test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESR7	102026	Apr. 22, 2020	Apr. 21, 2021
Spectrum Analyzer Keysight	N9030B	MY57141948	May 22, 2020	May 21, 2021
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-1819	Nov. 24, 2019	Nov. 23, 2020
Pre-Amplifier EMCI	EMC12630SE	980509	Apr. 29, 2020	Apr. 28, 2021
RF Cable EMCI	EMC104-SM-SM-1500	180503	Apr. 29, 2020	Apr. 28, 2021
RF Cable EMCI	EMC104-SM-SM-2000	180501	Apr. 29, 2020	Apr. 28, 2021
RF Cable EMCI	EMC104-SM-SM-6000	180506	Apr. 29, 2020	Apr. 28, 2021
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 15, 2020	Jan. 14, 2021
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 24, 2019	Nov. 23, 2020
RF Cable	EMC102-KM-KM-1200	160924	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC-KM-KM-4000	200214	Mar. 11, 2020	Mar. 10, 2021
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 5.
3. Loop antenna was used for all emissions below 30 MHz.
4. Tested Date: Nov. 06 to 18, 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: Nov. 24, 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:

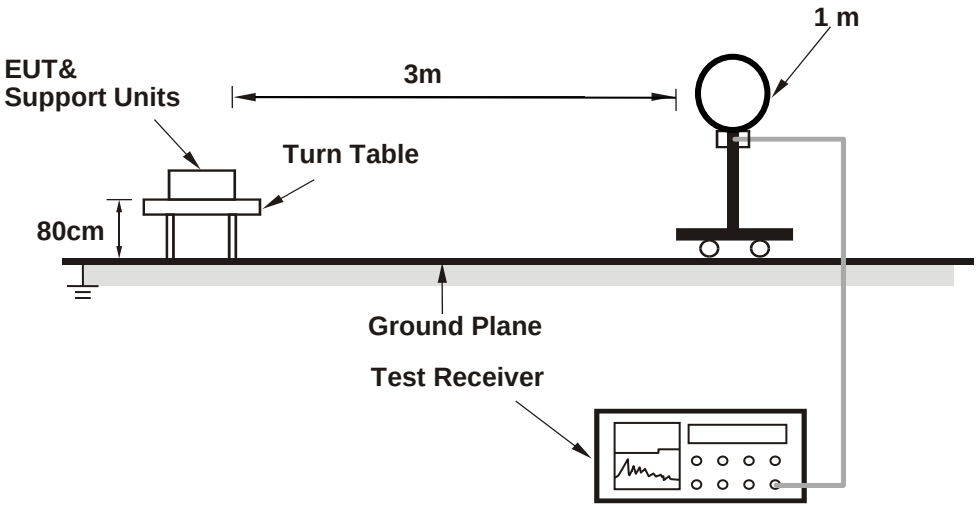
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

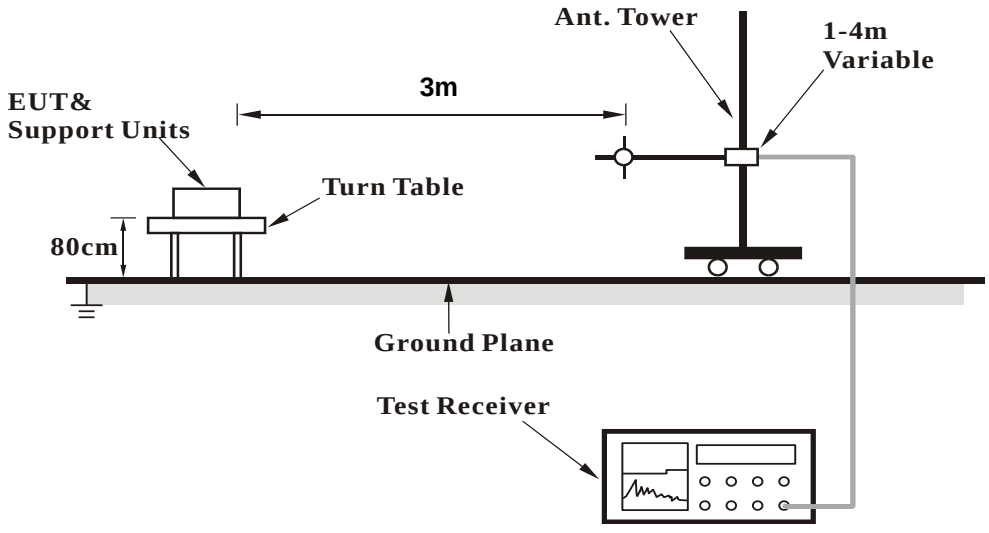
No deviation.

4.1.5 Test Setup

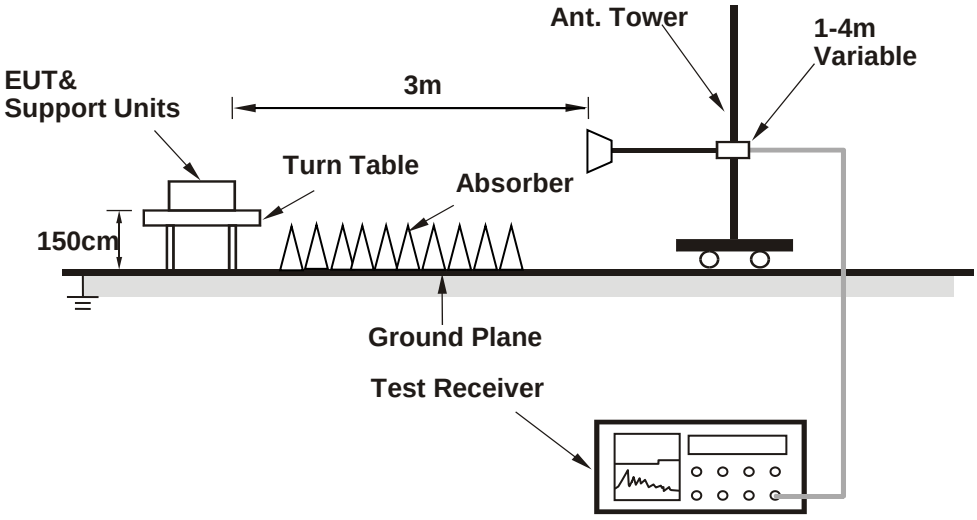
For Radiated emission below 30MHz



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 (Tx_Rx_CONTROL_V1.2.exe) has been activated to set the EUT under transmission condition continuously at specific channel frenquency.

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	61.7 PK	74.0	-12.3	2.69 H	302	64.8	-3.1
2	2390.00	53.6 AV	54.0	-0.4	2.69 H	302	56.7	-3.1
3	*2412.00	120.3 PK			2.69 H	302	123.3	-3.0
4	*2412.00	117.8 AV			2.69 H	302	120.8	-3.0
5	4824.00	47.0 PK	74.0	-27.0	1.43 H	344	46.0	1.0
6	4824.00	42.6 AV	54.0	-11.4	1.43 H	344	41.6	1.0
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	2390.00	57.0 PK	74.0	-17.0	1.11 V	343	60.1	-3.1
2	2390.00	48.3 AV	54.0	-5.7	1.11 V	343	51.4	-3.1
3	*2412.00	118.3 PK			1.11 V	343	121.3	-3.0
4	*2412.00	115.1 AV			1.11 V	343	118.1	-3.0
5	4824.00	45.2 PK	74.0	-28.8	1.40 V	174	44.2	1.0
6	4824.00	40.9 AV	54.0	-13.1	1.40 V	174	39.9	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.
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	2.49 H	290	60.9	-3.1
2	2390.00	41.8 AV	54.0	-12.2	2.49 H	290	44.9	-3.1
3	*2437.00	120.7 PK			2.49 H	290	123.7	-3.0
4	*2437.00	117.6 AV			2.49 H	290	120.6	-3.0
5	2483.50	60.1 PK	74.0	-13.9	2.49 H	290	63.2	-3.1
6	2483.50	42.5 AV	54.0	-11.5	2.49 H	290	45.6	-3.1
7	4874.00	49.8 PK	74.0	-24.2	1.05 H	325	48.9	0.9
8	4874.00	47.3 AV	54.0	-6.7	1.05 H	325	46.4	0.9
9	7311.00	57.3 PK	74.0	-16.7	1.00 H	297	50.3	7.0
10	7311.00	53.3 AV	54.0	-0.7	1.00 H	297	46.3	7.0
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	2390.00	58.4 PK	74.0	-15.6	1.34 V	340	61.5	-3.1
2	2390.00	45.1 AV	54.0	-8.9	1.34 V	340	48.2	-3.1
3	*2437.00	118.0 PK			1.34 V	340	121.0	-3.0
4	*2437.00	115.0 AV			1.34 V	340	118.0	-3.0
5	2483.50	58.1 PK	74.0	-15.9	1.34 V	340	61.2	-3.1
6	2483.50	44.8 AV	54.0	-9.2	1.34 V	340	47.9	-3.1
7	4874.00	48.3 PK	74.0	-25.7	1.41 V	166	47.4	0.9
8	4874.00	44.6 AV	54.0	-9.4	1.41 V	166	43.7	0.9
9	7311.00	55.2 PK	74.0	-18.8	2.32 V	15	48.2	7.0
10	7311.00	50.3 AV	54.0	-3.7	2.32 V	15	43.3	7.0

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.

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	120.2 PK			1.87 H	33	123.3	-3.1
2	*2462.00	117.1 AV			1.87 H	33	120.2	-3.1
3	2483.78	60.3 PK	74.0	-13.7	1.87 H	33	63.4	-3.1
4	2483.78	52.4 AV	54.0	-1.6	1.87 H	33	55.5	-3.1
5	4924.00	50.1 PK	74.0	-23.9	1.25 H	329	49.1	1.0
6	4924.00	47.5 AV	54.0	-6.5	1.25 H	329	46.5	1.0
7	7386.00	56.5 PK	74.0	-17.5	1.83 H	46	49.4	7.1
8	7386.00	53.1 AV	54.0	-0.9	1.83 H	46	46.0	7.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	117.2 PK			1.06 V	344	120.3	-3.1
2	*2462.00	114.1 AV			1.06 V	344	117.2	-3.1
3	2483.93	58.5 PK	74.0	-15.5	1.06 V	344	61.6	-3.1
4	2483.93	49.3 AV	54.0	-4.7	1.06 V	344	52.4	-3.1
5	4924.00	48.0 PK	74.0	-26.0	1.40 V	158	47.0	1.0
6	4924.00	44.2 AV	54.0	-9.8	1.40 V	158	43.2	1.0
7	7386.00	55.8 PK	74.0	-18.2	2.27 V	23	48.7	7.1
8	7386.00	50.7 AV	54.0	-3.3	2.27 V	23	43.6	7.1

Remarks:

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

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	65.9 PK	74.0	-8.1	2.39 H	302	69.0	-3.1
2	2390.00	53.1 AV	54.0	-0.9	2.39 H	302	56.2	-3.1
3	*2412.00	116.8 PK			2.39 H	302	119.8	-3.0
4	*2412.00	106.7 AV			2.39 H	302	109.7	-3.0
5	4824.00	41.5 PK	74.0	-32.5	1.61 H	319	40.5	1.0
6	4824.00	28.8 AV	54.0	-25.2	1.61 H	319	27.8	1.0
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	2390.00	58.0 PK	74.0	-16.0	1.10 V	342	61.1	-3.1
2	2390.00	47.3 AV	54.0	-6.7	1.10 V	342	50.4	-3.1
3	*2412.00	113.9 PK			1.10 V	342	116.9	-3.0
4	*2412.00	104.2 AV			1.10 V	342	107.2	-3.0
5	4824.00	45.5 PK	74.0	-28.5	1.43 V	165	44.5	1.0
6	4824.00	41.2 AV	54.0	-12.8	1.43 V	165	40.2	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.
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	64.9 PK	74.0	-9.1	2.48 H	313	68.0	-3.1
2	2390.00	51.4 AV	54.0	-2.6	2.48 H	313	54.5	-3.1
3	*2437.00	125.1 PK			2.48 H	313	128.1	-3.0
4	*2437.00	115.2 AV			2.48 H	313	118.2	-3.0
5	2483.50	67.7 PK	74.0	-6.3	2.48 H	313	70.8	-3.1
6	2483.50	53.1 AV	54.0	-0.9	2.48 H	313	56.2	-3.1
7	4874.00	41.6 PK	74.0	-32.4	1.62 H	316	40.7	0.9
8	4874.00	29.0 AV	54.0	-25.0	1.62 H	316	28.1	0.9
9	7311.00	59.8 PK	74.0	-14.2	1.54 H	340	52.8	7.0
10	7311.00	44.4 AV	54.0	-9.6	1.54 H	340	37.4	7.0
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	2390.00	67.1 PK	74.0	-6.9	1.00 V	10	70.2	-3.1
2	2390.00	50.0 AV	54.0	-4.0	1.00 V	10	53.1	-3.1
3	*2437.00	122.0 PK			1.00 V	10	125.0	-3.0
4	*2437.00	109.8 AV			1.00 V	10	112.8	-3.0
5	2483.50	69.9 PK	74.0	-4.1	1.00 V	10	73.0	-3.1
6	2483.50	52.2 AV	54.0	-1.8	1.00 V	10	55.3	-3.1
7	4874.00	47.9 PK	74.0	-26.1	1.44 V	174	47.0	0.9
8	4874.00	44.3 AV	54.0	-9.7	1.44 V	174	43.4	0.9
9	7311.00	55.3 PK	74.0	-18.7	2.27 V	15	48.3	7.0
10	7311.00	50.6 AV	54.0	-3.4	2.27 V	15	43.6	7.0

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.

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	116.1 PK			2.12 H	301	119.2	-3.1
2	*2462.00	106.2 AV			2.12 H	301	109.3	-3.1
3	2483.80	63.6 PK	74.0	-10.4	2.12 H	301	66.7	-3.1
4	2483.80	53.0 AV	54.0	-1.0	2.12 H	301	56.1	-3.1
5	4924.00	40.4 PK	74.0	-33.6	1.49 H	322	39.4	1.0
6	4924.00	27.8 AV	54.0	-26.2	1.49 H	322	26.8	1.0
7	7386.00	45.8 PK	74.0	-28.2	1.31 H	42	38.7	7.1
8	7386.00	32.9 AV	54.0	-21.1	1.31 H	42	25.8	7.1
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	113.2 PK			1.00 V	9	116.3	-3.1
2	*2462.00	103.5 AV			1.00 V	9	106.6	-3.1
3	2484.03	61.3 PK	74.0	-12.7	1.00 V	9	64.4	-3.1
4	2484.03	48.5 AV	54.0	-5.5	1.00 V	9	51.6	-3.1
5	4924.00	48.1 PK	74.0	-25.9	1.36 V	172	47.1	1.0
6	4924.00	44.5 AV	54.0	-9.5	1.36 V	172	43.5	1.0
7	7386.00	55.1 PK	74.0	-18.9	2.30 V	23	48.0	7.1
8	7386.00	50.1 AV	54.0	-3.9	2.30 V	23	43.0	7.1

Remarks:

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

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	2389.77	66.1 PK	74.0	-7.9	1.49 H	295	69.2	-3.1
2	2389.77	53.6 AV	54.0	-0.4	1.49 H	295	56.7	-3.1
3	*2412.00	121.9 PK			1.49 H	295	124.9	-3.0
4	*2412.00	109.9 AV			1.49 H	295	112.9	-3.0
5	4824.00	41.3 PK	74.0	-32.7	1.58 H	330	40.3	1.0
6	4824.00	28.8 AV	54.0	-25.2	1.58 H	330	27.8	1.0
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	2389.84	59.4 PK	74.0	-14.6	1.04 V	10	62.5	-3.1
2	2389.84	46.5 AV	54.0	-7.5	1.04 V	10	49.6	-3.1
3	*2412.00	117.3 PK			1.04 V	10	120.3	-3.0
4	*2412.00	104.8 AV			1.04 V	10	107.8	-3.0
5	4824.00	41.3 PK	74.0	-32.7	1.36 V	162	40.3	1.0
6	4824.00	28.2 AV	54.0	-25.8	1.36 V	162	27.2	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.
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	68.0 PK	74.0	-6.0	1.55 H	299	71.1	-3.1
2	2390.00	53.5 AV	54.0	-0.5	1.55 H	299	56.6	-3.1
3	*2437.00	125.2 PK			1.55 H	299	128.2	-3.0
4	*2437.00	114.6 AV			1.55 H	299	117.6	-3.0
5	2483.50	71.9 PK	74.0	-2.1	1.55 H	299	75.0	-3.1
6	2483.50	52.8 AV	54.0	-1.2	1.55 H	299	55.9	-3.1
7	4874.00	41.0 PK	74.0	-33.0	1.56 H	320	40.1	0.9
8	4874.00	28.7 AV	54.0	-25.3	1.56 H	320	27.8	0.9
9	7311.00	55.1 PK	74.0	-18.9	2.41 H	323	48.1	7.0
10	7311.00	35.1 AV	54.0	-18.9	2.41 H	323	28.1	7.0
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	2390.00	67.3 PK	74.0	-6.7	1.00 V	11	70.4	-3.1
2	2390.00	51.4 AV	54.0	-2.6	1.00 V	11	54.5	-3.1
3	*2437.00	121.3 PK			1.00 V	11	124.3	-3.0
4	*2437.00	109.5 AV			1.00 V	11	112.5	-3.0
5	2483.50	64.4 PK	74.0	-9.6	1.00 V	11	67.5	-3.1
6	2483.50	48.8 AV	54.0	-5.2	1.00 V	11	51.9	-3.1
7	4874.00	41.1 PK	74.0	-32.9	1.37 V	176	40.2	0.9
8	4874.00	28.2 AV	54.0	-25.8	1.37 V	176	27.3	0.9
9	7311.00	45.4 PK	74.0	-28.6	2.31 V	31	38.4	7.0
10	7311.00	32.5 AV	54.0	-21.5	2.31 V	31	25.5	7.0

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.

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	121.7 PK			1.42 H	299	124.8	-3.1
2	*2462.00	109.3 AV			1.42 H	299	112.4	-3.1
3	2484.13	67.7 PK	74.0	-6.3	1.42 H	299	70.8	-3.1
4	2484.13	53.6 AV	54.0	-0.4	1.42 H	299	56.7	-3.1
5	4924.00	41.4 PK	74.0	-32.6	1.62 H	335	40.4	1.0
6	4924.00	28.7 AV	54.0	-25.3	1.62 H	335	27.7	1.0
7	7386.00	45.1 PK	74.0	-28.9	2.36 H	140	38.0	7.1
8	7386.00	32.3 AV	54.0	-21.7	2.36 H	140	25.2	7.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	117.4 PK			1.00 V	12	120.5	-3.1
2	*2462.00	104.1 AV			1.00 V	12	107.2	-3.1
3	2485.40	68.3 PK	74.0	-5.7	1.00 V	12	71.4	-3.1
4	2485.40	53.1 AV	54.0	-0.9	1.00 V	12	56.2	-3.1
5	4924.00	40.9 PK	74.0	-33.1	1.33 V	181	39.9	1.0
6	4924.00	28.2 AV	54.0	-25.8	1.33 V	181	27.2	1.0
7	7386.00	45.2 PK	74.0	-28.8	2.29 V	25	38.1	7.1
8	7386.00	32.4 AV	54.0	-21.6	2.29 V	25	25.3	7.1

Remarks:

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

RF Mode	TX 802.11ax (HE40)	Channel	CH 3：2422 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2380.30	68.2 PK	74.0	-5.8	1.61 H	299	71.3	-3.1
2	**2380.30**	**53.9 AV**	**54.0**	**-0.1**	**1.61 H**	**299**	**57.0**	**-3.1**
3	*2422.00	118.1 PK			1.61 H	299	121.1	-3.0
4	*2422.00	106.9 AV			1.61 H	299	109.9	-3.0
5	4844.00	40.1 PK	74.0	-33.9	1.43 H	334	39.1	1.0
6	4844.00	27.5 AV	54.0	-26.5	1.43 H	334	26.5	1.0
7	7266.00	45.5 PK	74.0	-28.5	1.30 H	54	38.5	7.0
8	7266.00	32.7 AV	54.0	-21.3	1.30 H	54	25.7	7.0
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	2375.62	58.3 PK	74.0	-15.7	1.04 V	7	61.4	-3.1
2	2375.62	47.0 AV	54.0	-7.0	1.04 V	7	50.1	-3.1
3	*2422.00	115.0 PK			1.04 V	7	118.0	-3.0
4	*2422.00	102.4 AV			1.04 V	7	105.4	-3.0
5	4844.00	41.4 PK	74.0	-32.6	1.39 V	173	40.4	1.0
6	4844.00	28.5 AV	54.0	-25.5	1.39 V	173	27.5	1.0
7	7266.00	45.1 PK	74.0	-28.9	2.30 V	360	38.1	7.0
8	7266.00	32.3 AV	54.0	-21.7	2.30 V	360	25.3	7.0

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.

RF Mode	TX 802.11ax (HE40)	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	64.1 PK	74.0	-9.9	1.68 H	289	67.2	-3.1
2	2390.00	48.1 AV	54.0	-5.9	1.68 H	289	51.2	-3.1
3	*2437.00	118.9 PK			1.68 H	289	121.9	-3.0
4	*2437.00	107.4 AV			1.68 H	289	110.4	-3.0
5	2483.50	69.2 PK	74.0	-4.8	1.68 H	289	72.3	-3.1
6	2483.50	53.1 AV	54.0	-0.9	1.68 H	289	56.2	-3.1
7	4874.00	40.2 PK	74.0	-33.8	1.55 H	308	39.3	0.9
8	4874.00	27.8 AV	54.0	-26.2	1.55 H	308	26.9	0.9
9	7311.00	45.5 PK	74.0	-28.5	1.26 H	30	38.5	7.0
10	7311.00	32.5 AV	54.0	-21.5	1.26 H	30	25.5	7.0
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	2390.00	63.9 PK	74.0	-10.1	1.00 V	9	67.0	-3.1
2	2390.00	51.1 AV	54.0	-2.9	1.00 V	9	54.2	-3.1
3	*2437.00	116.2 PK			1.00 V	9	119.2	-3.0
4	*2437.00	103.7 AV			1.00 V	9	106.7	-3.0
5	2483.50	66.7 PK	74.0	-7.3	1.00 V	9	69.8	-3.1
6	2483.50	48.6 AV	54.0	-5.4	1.00 V	9	51.7	-3.1
7	4874.00	41.6 PK	74.0	-32.4	1.40 V	181	40.7	0.9
8	4874.00	28.6 AV	54.0	-25.4	1.40 V	181	27.7	0.9
9	7311.00	45.1 PK	74.0	-28.9	2.28 V	37	38.1	7.0
10	7311.00	32.2 AV	54.0	-21.8	2.28 V	37	25.2	7.0

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.

RF Mode	TX 802.11ax (HE40)	Channel	CH 9：2452 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2452.00	116.0 PK			1.69 H	303	119.1	-3.1
2	*2452.00	104.4 AV			1.69 H	303	107.5	-3.1
3	2488.47	66.3 PK	74.0	-7.7	1.69 H	303	69.4	-3.1
4	2488.47	53.5 AV	54.0	-0.5	1.69 H	303	56.6	-3.1
5	4904.00	40.0 PK	74.0	-34.0	1.54 H	333	39.0	1.0
6	4904.00	27.5 AV	54.0	-26.5	1.54 H	333	26.5	1.0
7	7356.00	45.6 PK	74.0	-28.4	1.26 H	35	38.5	7.1
8	7356.00	32.6 AV	54.0	-21.4	1.26 H	35	25.5	7.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2452.00	111.7 PK			1.00 V	10	114.8	-3.1
2	*2452.00	99.2 AV			1.00 V	10	102.3	-3.1
3	2486.11	65.3 PK	74.0	-8.7	1.00 V	10	68.4	-3.1
4	2486.11	50.1 AV	54.0	-3.9	1.00 V	10	53.2	-3.1
5	4904.00	40.6 PK	74.0	-33.4	1.37 V	163	39.6	1.0
6	4904.00	27.8 AV	54.0	-26.2	1.37 V	163	26.8	1.0
7	7356.00	45.6 PK	74.0	-28.4	2.26 V	39	38.5	7.1
8	7356.00	32.8 AV	54.0	-21.2	2.26 V	39	25.7	7.1

Remarks:

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

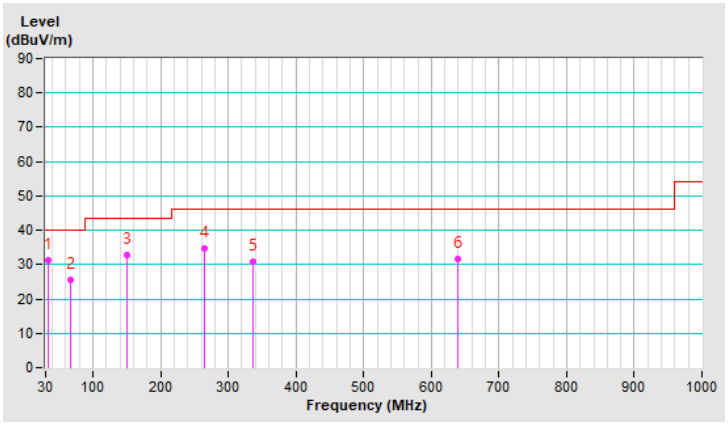
Below 1GHz Data:

RF Mode	TX 802.11g	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	34.03	31.4 QP	40.0	-8.6	1.00 H	242	45.0	-13.6
2	66.72	25.5 QP	40.0	-14.5	1.50 H	81	39.8	-14.3
3	149.70	32.7 QP	43.5	-10.8	1.50 H	295	45.2	-12.5
4	265.58	34.6 QP	46.0	-11.4	1.00 H	290	48.0	-13.4
5	336.00	30.7 QP	46.0	-15.3	1.00 H	182	41.9	-11.2
6	640.02	31.7 QP	46.0	-14.3	1.00 H	144	36.2	-4.5

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.

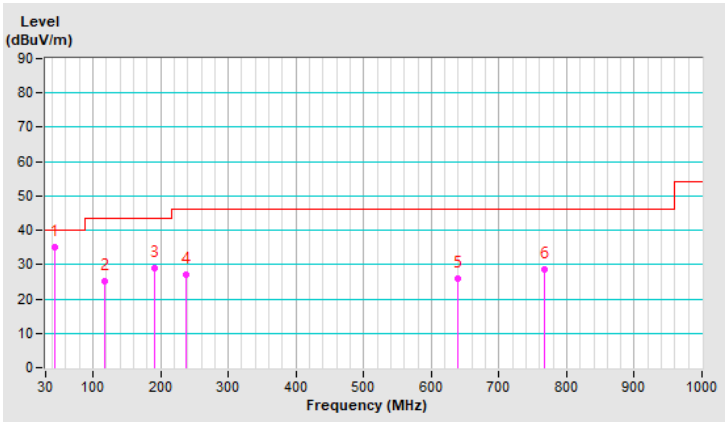


RF Mode	TX 802.11g	Channel	CH 6：2437 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	43.44	35.0 QP	40.0	-5.0	1.00 V	0	47.9	-12.9
2	117.35	25.1 QP	43.5	-18.4	1.00 V	96	40.2	-15.1
3	190.93	29.0 QP	43.5	-14.5	1.00 V	301	44.5	-15.5
4	238.37	26.9 QP	46.0	-19.1	1.50 V	334	41.3	-14.4
5	640.02	25.9 QP	46.0	-20.1	1.50 V	177	30.4	-4.5
6	768.01	28.6 QP	46.0	-17.4	1.50 V	184	30.9	-2.3

Remarks:

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



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 20, 2020	Oct. 19, 2021
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 27, 2020	Oct. 26, 2021
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 19, 2020	Mar. 18, 2021
50 ohms Terminator	50	3	Oct. 26, 2020	Oct. 25, 2021
RF Cable	5D-FB	COCCAB-001	Sep. 26, 2020	Sep. 25, 2021
Fixed attenuator EMCI	STI02-2200-10	005	Aug. 29, 2020	Aug. 28, 2021
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conduction 1.
3 Tested Date: Dec. 04, 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.

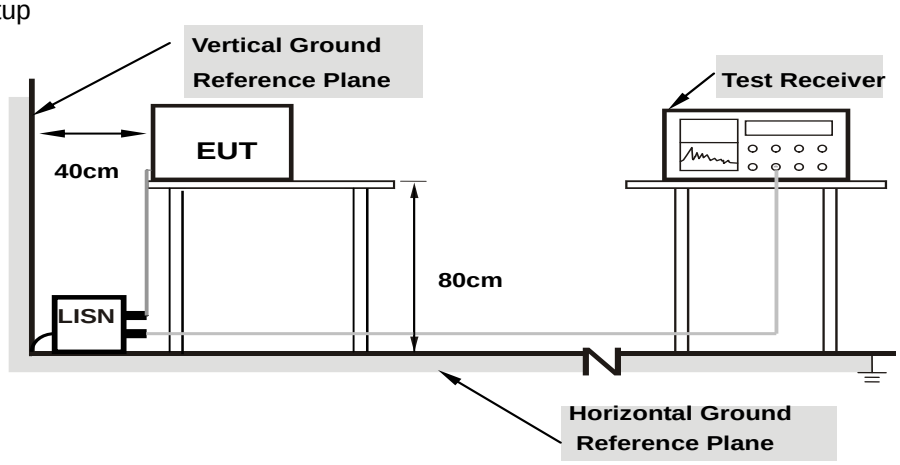
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

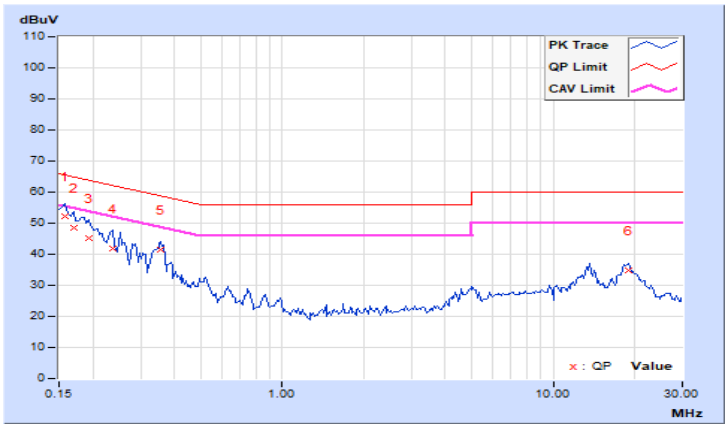
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	25℃, 67%RH
Test Mode	Mode 1	**Tested by**	Sampson Chen

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	0.15781	9.96	42.44	30.25	52.40	40.21	65.58	55.58	-13.18	-15.37
2	0.16953	9.97	38.38	25.89	48.35	35.86	64.98	54.98	-16.63	-19.12
3	0.19297	9.99	35.08	22.93	45.07	32.92	63.91	53.91	-18.84	-20.99
4	0.23594	10.00	31.81	21.78	41.81	31.78	62.24	52.24	-20.43	-20.46
5	**0.35703**	**10.01**	**31.63**	**26.40**	**41.64**	**36.41**	**58.80**	**48.80**	**-17.16**	**-12.39**
6	18.98438	11.39	23.58	17.51	34.97	28.90	60.00	50.00	-25.03	-21.10

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

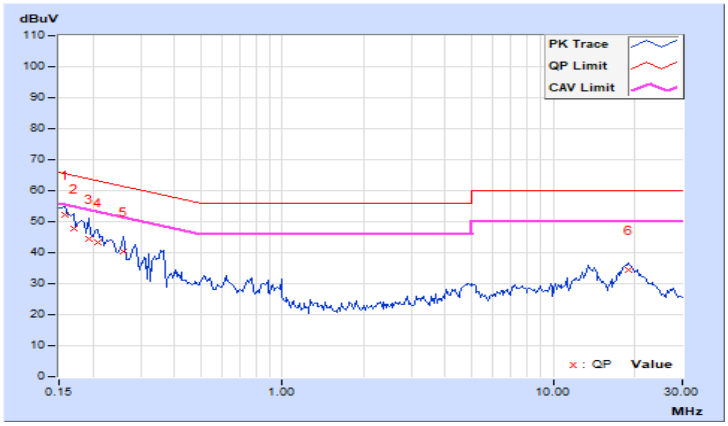


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	25℃, 67%RH
Test Mode	Mode 1	**Tested by**	Sampson Chen

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	0.15781	9.95	42.14	30.01	52.09	39.96	65.58	55.58	-13.49	-15.62
2	0.16953	9.96	37.96	22.86	47.92	32.82	64.98	54.98	-17.06	-22.16
3	0.19297	9.97	34.36	22.42	44.33	32.39	63.91	53.91	-19.58	-21.52
4	0.20859	9.98	33.49	22.68	43.47	32.66	63.26	53.26	-19.79	-20.60
5	0.25938	9.99	30.23	22.87	40.22	32.86	61.45	51.45	-21.23	-18.59
6	19.07422	11.13	23.48	16.90	34.61	28.03	60.00	50.00	-25.39	-21.97

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

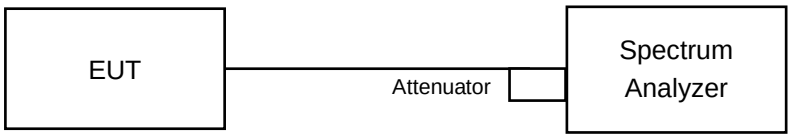


4.3 6dB Bandwidth Measurement

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	Chain 3		
1	2412	7.61	8.1	8.11	8.11	0.5	PASS
6	2437	8.1	7.65	8.1	8.09	0.5	PASS
11	2462	8.05	7.62	7.64	7.1	0.5	PASS

802.11g

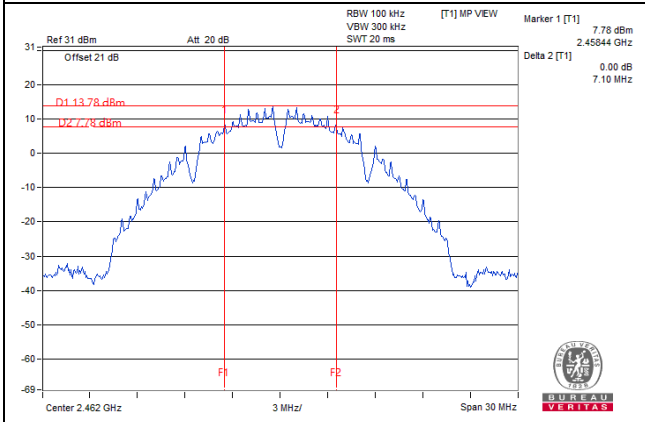
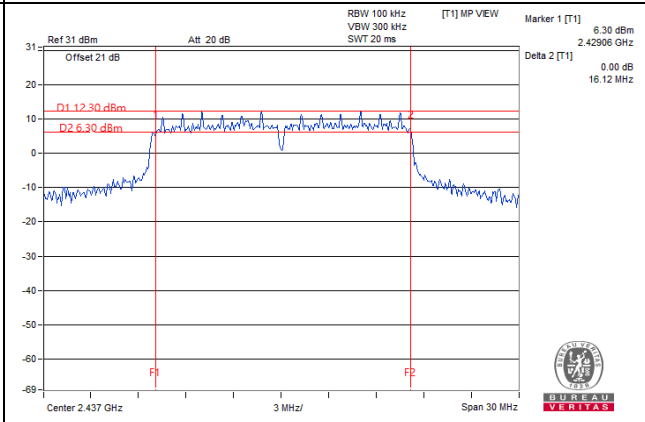
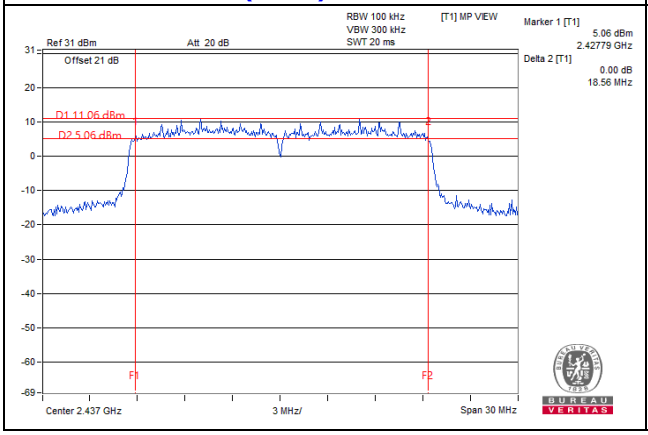
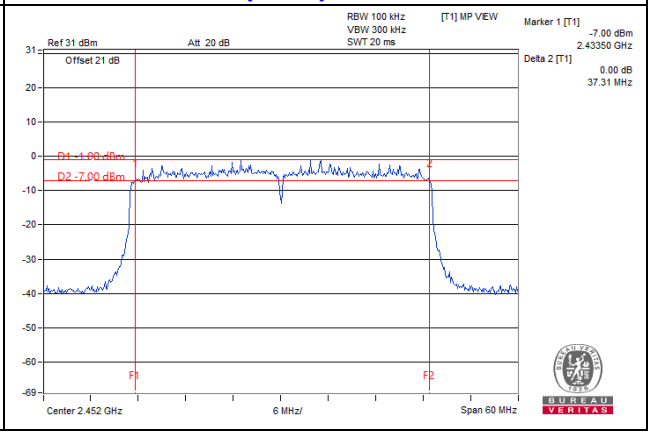
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	16.35	16.36	16.39	16.38	0.5	PASS
6	2437	16.34	16.12	16.37	16.34	0.5	PASS
11	2462	16.35	16.37	16.35	16.35	0.5	PASS

802.11ax (HE20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	18.9	18.96	18.88	18.9	0.5	PASS
6	2437	18.76	18.95	18.56	18.8	0.5	PASS
11	2462	18.86	18.88	18.81	18.88	0.5	PASS

802.11ax (HE40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
3	2422	38.05	37.78	37.83	38	0.5	PASS
6	2437	37.6	37.86	37.79	38.11	0.5	PASS
9	2452	37.58	37.6	37.31	37.87	0.5	PASS

Spectrum Plot of Worst Value	
802.11b / Chain 3 : CH11	**802.11g / Chain 1 : CH6**
	
802.11ax (HE20) / Chain 2 : CH6	**802.11ax (HE40) / Chain 2 : CH9**
	

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

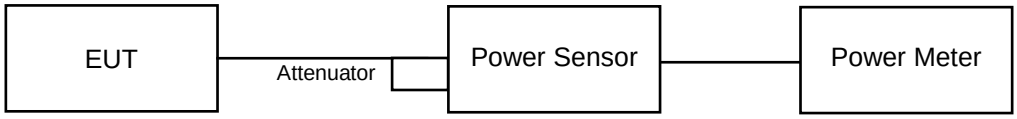
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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	Chain 3				
1	2412	22.96	22.83	22.69	22.41	749.525	28.75	30	Pass
6	2437	23.49	23.22	23.03	22.77	823.395	29.16	30	Pass
11	2462	22.67	22.55	22.10	21.93	682.95	28.34	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	Chain 3				
1	2412	17.02	17.27	17.42	17.22	211.614	23.26	30	Pass
6	2437	23.44	23.39	23.60	23.27	880.485	29.45	30	Pass
11	2462	17.29	17.58	17.35	17.21	217.786	23.38	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	Chain 3				
1	2412	16.58	16.63	16.66	16.77	185.403	22.68	30	Pass
6	2437	21.98	21.92	21.87	21.81	618.878	27.92	30	Pass
11	2462	17.12	17.28	17.18	17.15	209.099	23.20	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	Chain 3				
3	2422	16.88	16.95	16.89	16.82	195.247	22.91	30	Pass
6	2437	17.48	17.55	17.68	17.60	229.019	23.60	30	Pass
9	2452	12.91	12.99	12.96	12.94	78.899	18.97	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	Chain 3				
1	2412	16.71	16.86	16.88	16.97	193.937	22.88	30	Pass
6	2437	22.25	22.19	22.15	22.11	660.071	28.20	30	Pass
11	2462	17.42	17.60	17.53	17.44	224.838	23.52	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	Chain 3				
3	2422	17.05	17.13	17.11	17.08	204.796	23.11	30	Pass
6	2437	17.80	17.87	17.96	17.91	245.81	23.91	30	Pass
9	2452	13.08	13.17	13.15	13.12	82.238	19.15	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	Chain 3				
1	2412	16.58	16.63	16.66	16.77	185.403	22.68	26.8	Pass
6	2437	20.48	20.55	20.68	20.52	454.857	26.58	26.8	Pass
11	2462	17.12	17.28	17.18	17.15	209.099	23.20	26.8	Pass

Note: 1. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$+ $10^{G2/20}$+ $10^{G3/20}$)^2 /4] = 9.2dBi > 6dBi , so the power limit shall be reduced to 30-(9.2-6) = 26.8dBm.

VHT40

Chan.	Frequency (MHz)	Avg. Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	16.88	16.95	16.89	16.82	195.247	22.91	26.8	Pass
6	2437	17.48	17.55	17.68	17.60	229.019	23.60	26.8	Pass
9	2452	12.91	12.99	12.96	12.94	78.899	18.97	26.8	Pass

Note: 1. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$+ $10^{G2/20}$+ $10^{G3/20}$)^2 /4] = 9.2dBi > 6dBi , so the power limit shall be reduced to 30-(9.2-6) = 26.8dBm.

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	Chain 3				
1	2412	16.71	16.86	16.88	16.97	193.937	22.88	26.8	Pass
6	2437	20.68	20.74	20.91	20.67	475.518	26.77	26.8	Pass
11	2462	17.42	17.60	17.53	17.44	224.838	23.52	26.8	Pass

Note: 1. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$+ $10^{G2/20}$+ $10^{G3/20}$)^2 /4] = 9.2dBi > 6dBi , so the power limit shall be reduced to 30-(9.2-6) = 26.8dBm.

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	Chain 3				
3	2422	17.05	17.13	17.11	17.08	204.796	23.11	26.8	Pass
6	2437	17.80	17.87	17.96	17.91	245.81	23.91	26.8	Pass
9	2452	13.08	13.17	13.15	13.12	82.238	19.15	26.8	Pass

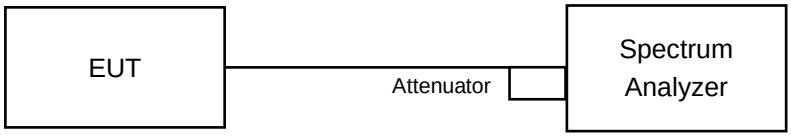
Note: 1. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$+ $10^{G2/20}$+ $10^{G3/20}$)^2 /4] = 9.2dBi > 6dBi , so the power limit shall be reduced to 30-(9.2-6) = 26.8dBm.

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

For 802.11b:
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.

For 802.11g, 802.11ax (HE20) and 802.11ax (HE40):
a) Measure the duty cycle (x).
b) Set instrument center frequency to DTS channel center frequency.
c) Set span to at least 1.5 times the OBW.
d) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz..
e) Set VBW ≥3 x RBW.
f) Detector = power averaging (RMS) or sample detector (when RMS not available).
g) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
h) Sweep time = auto couple.
i) Do not use sweep triggering. Allow sweep to “free run”.
j) Employ trace averaging (RMS) mode over a minimum of 100 traces.
k) Use the peak marker function to determine the maximum amplitude level.
l) Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)				Total PSD (mW/3kHz)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	-5.70	-5.53	-5.84	-6.16	1.0518	0.22	4.80	PASS
6	2437	-5.67	-5.95	-6.24	-6.17	1.0043	0.02	4.80	PASS
11	2462	-6.40	-6.33	-6.84	-6.73	0.8812	-0.55	4.80	PASS

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.

2. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ /4] = 9.2dBi > 6dBi , so the power limit shall be reduced to 8-(9.2-6) = 4.8dBm.

802.11g

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/3kHz)				Duty Factor (dB)	Total PSD (mW/3kHz)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3					
1	2412	-14.94	-15.59	-15.77	-15.79	0.31	0.12096	-9.17	4.80	PASS
6	2437	-9.77	-10.00	-9.03	-9.66	0.31	0.4715	-3.27	4.80	PASS
11	2462	-15.18	-15.78	-15.57	-15.92	0.31	0.11834	-9.27	4.80	PASS

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.

2. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ /4] = 9.2dBi > 6dBi , so the power limit shall be reduced to 8-(9.2-6) = 4.8dBm.

3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE20)

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/3kHz)				Duty Factor (dB)	Total PSD (mW/3kHz)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3					
1	2412	-17.72	-18.64	-18.16	-17.54	0.23	0.06689	-11.75	4.80	PASS
6	2437	-12.82	-14.05	-13.55	-13.22	0.23	0.19327	-7.14	4.80	PASS
11	2462	-17.96	-18.27	-17.94	-18.35	0.23	0.0649	-11.88	4.80	PASS

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.

2. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ /4] = 9.2dBi > 6dBi , so the power limit shall be reduced to 8-(9.2-6) = 4.8dBm.

3. Refer to section 3.3 for duty cycle spectrum plot.

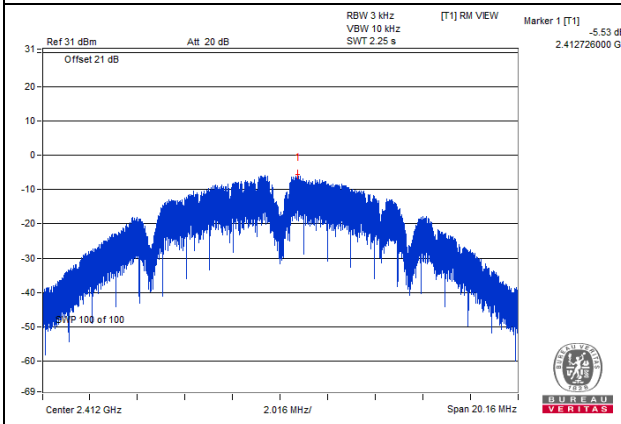
802.11ax (HE40)

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/3kHz)				Duty Factor (dB)	Total PSD (mW/3kHz)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3					
3	2422	-21.16	-21.23	-21.02	-20.68	0.19	0.033072	-14.81	4.80	PASS
6	2437	-20.42	-20.23	-20.65	-20.31	0.19	0.038127	-14.19	4.80	PASS
9	2452	-24.57	-24.46	-25.24	-24.98	0.19	0.013838	-18.59	4.80	PASS

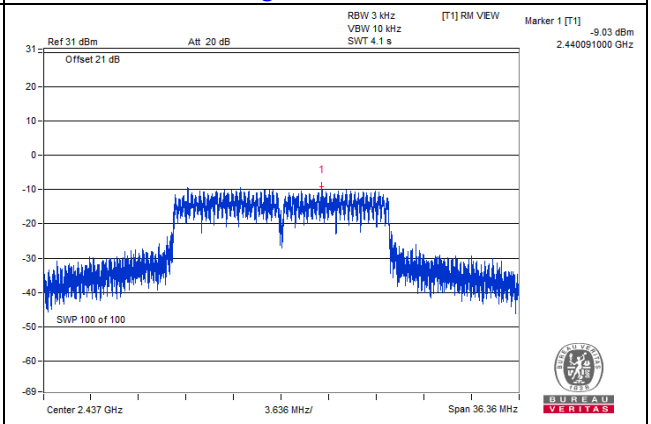
Note:
1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$+ $10^{G2/20}$+ $10^{G3/20}$)^2 /4] = 9.2dBi > 6dBi , so the power limit shall be reduced to 8-(9.2-6) = 4.8dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

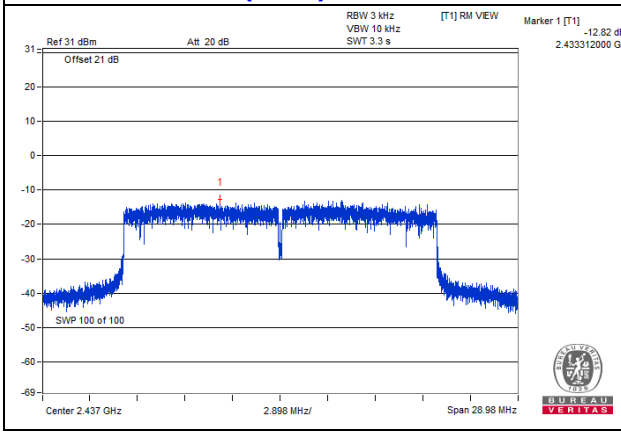
802.11b / Chain 1 : CH1



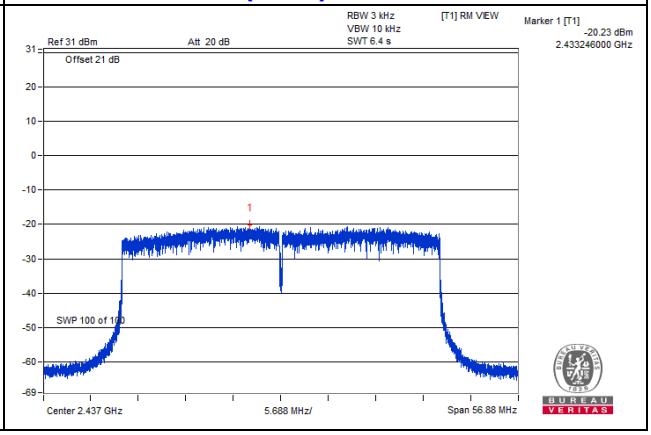
802.11g / Chain 2 : CH6



802.11ax (HE20) / Chain 0 : CH6



802.11ax (HE40) / Chain 1 : CH6

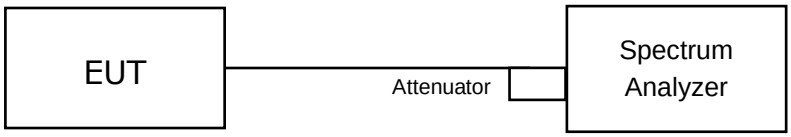


4.6 Conducted Out of Band Emission Measurement

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

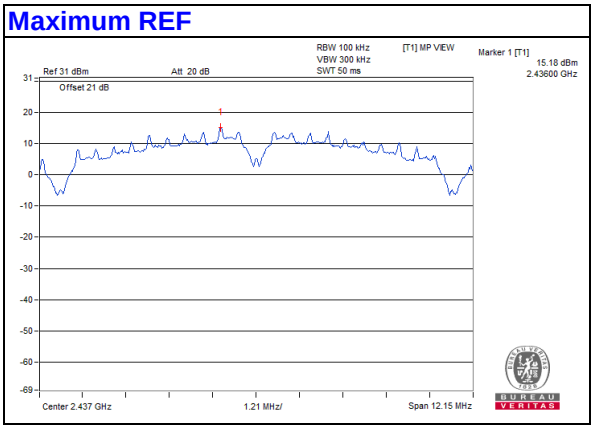
Same as Item 4.3.6

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.

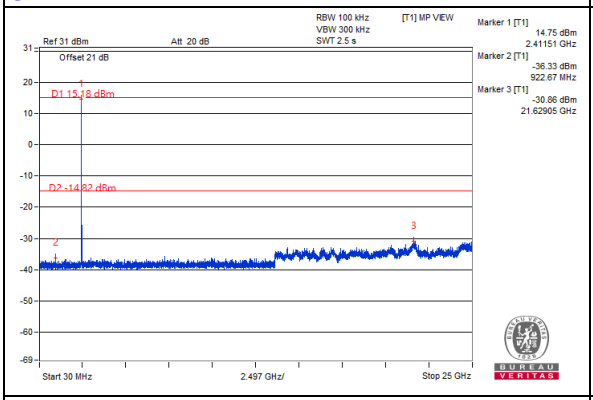
802.11b

Maximum REF

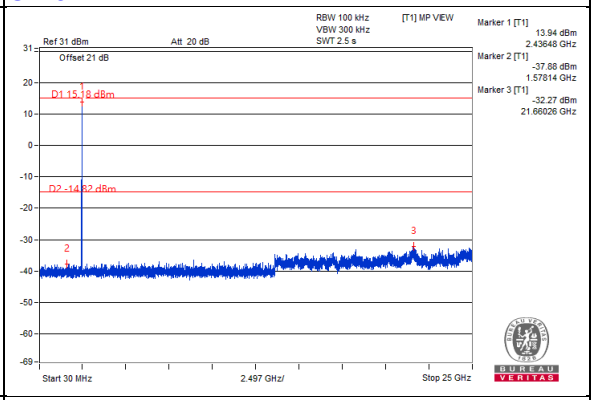


Chain 0

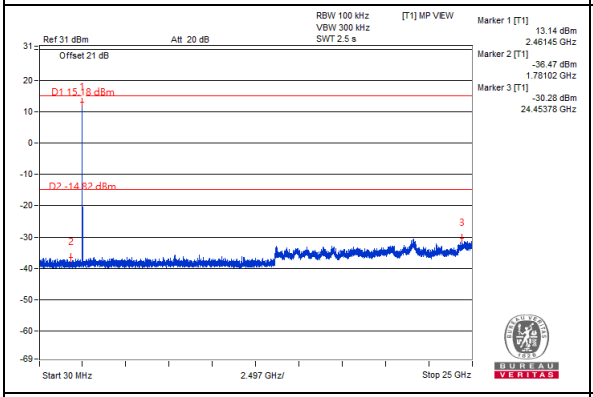
CH 1



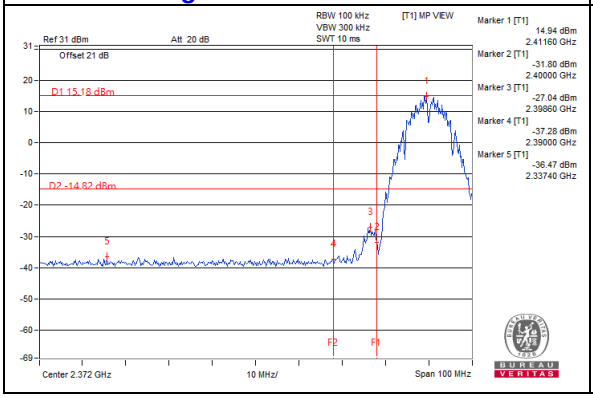
CH 6



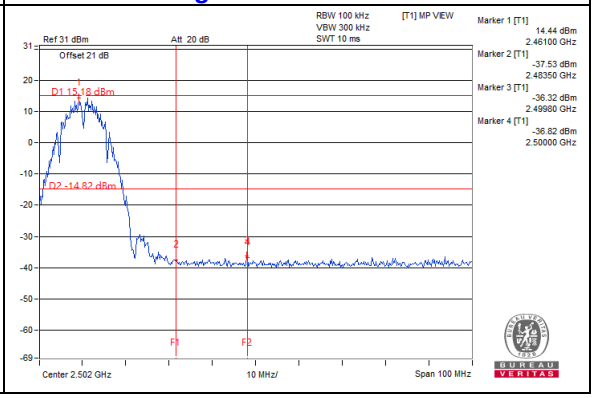
CH 11



CH 1 Band edge

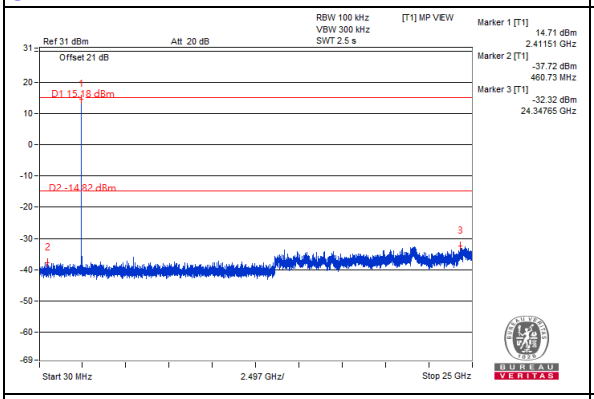


CH 11 Band edge

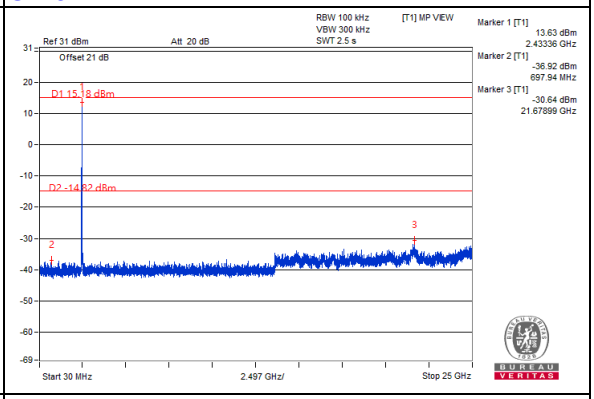


Chain 1

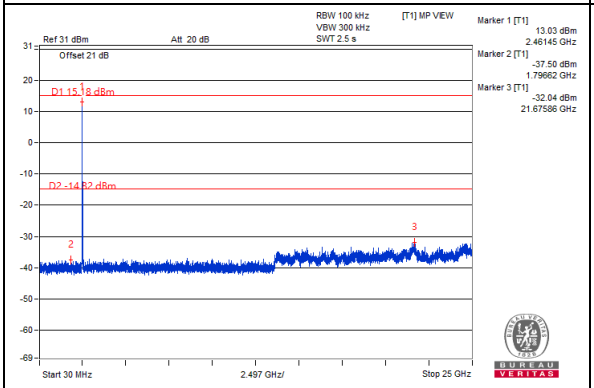
CH 1



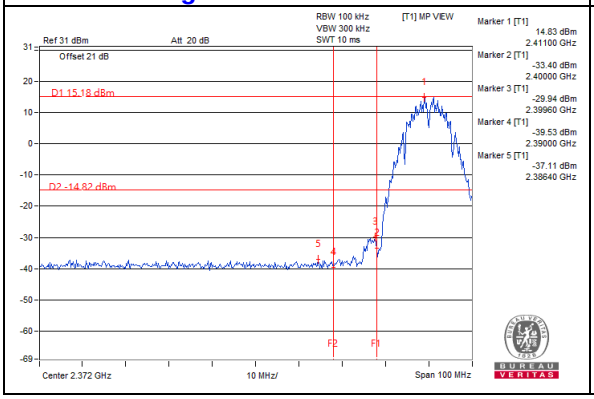
CH 6



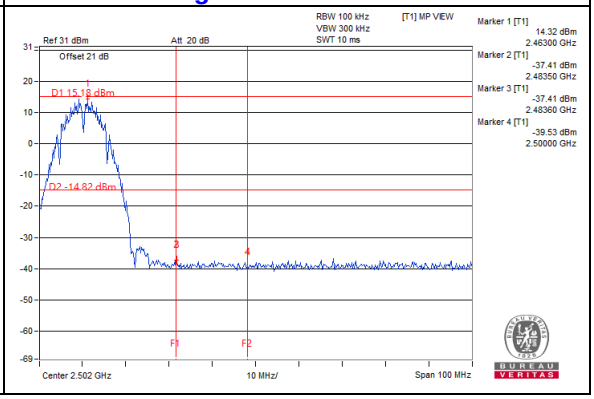
CH 11



CH 1 Band edge

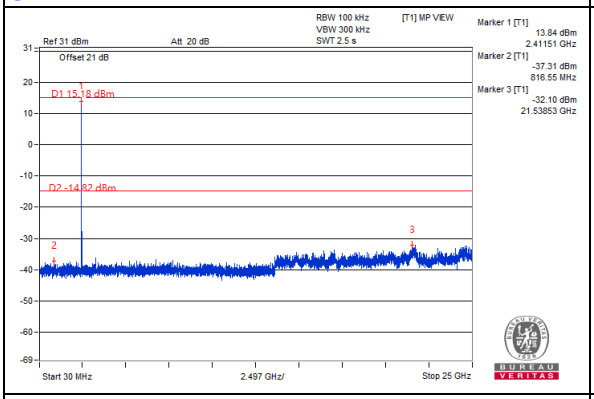


CH 11 Band edge

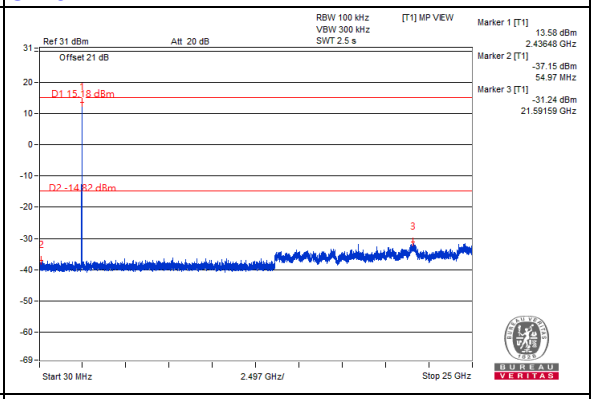


Chain 2

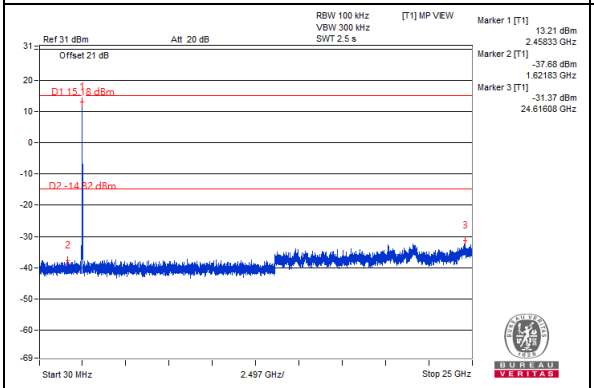
CH 1



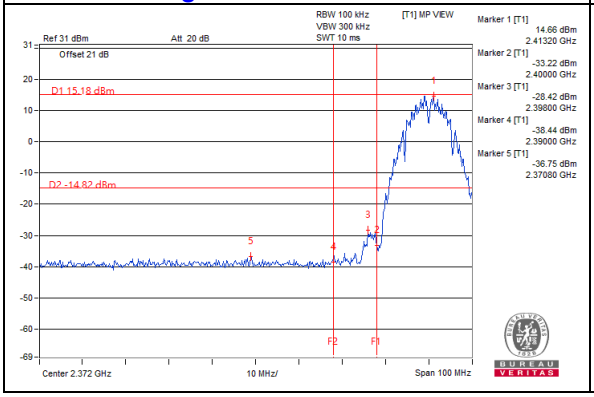
CH 6



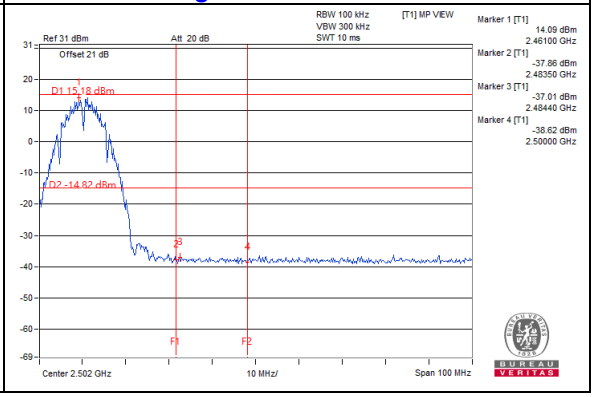
CH 11



CH 1 Band edge

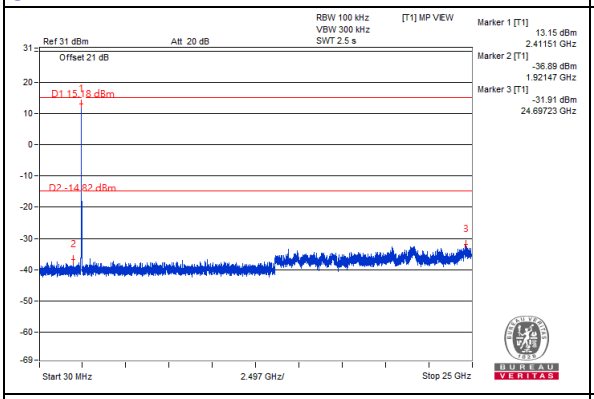


CH 11 Band edge

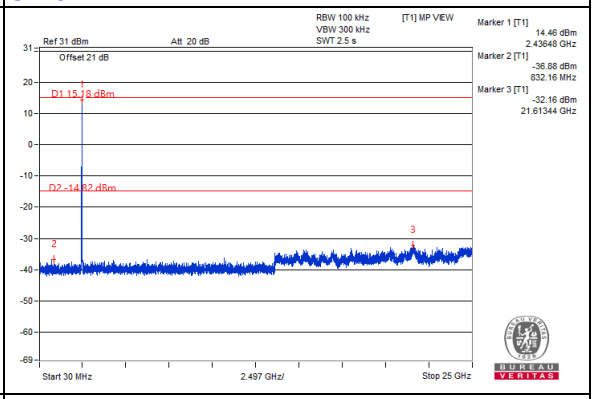


Chain 3

CH 1



CH 6



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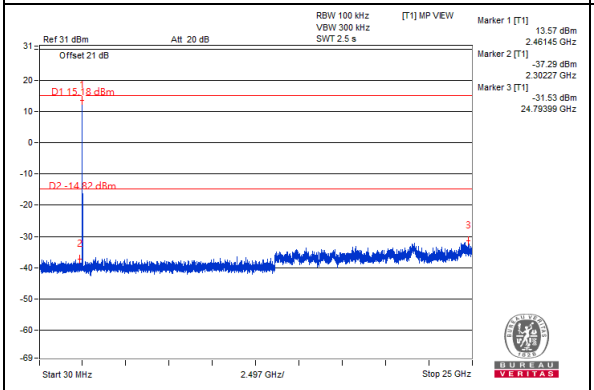

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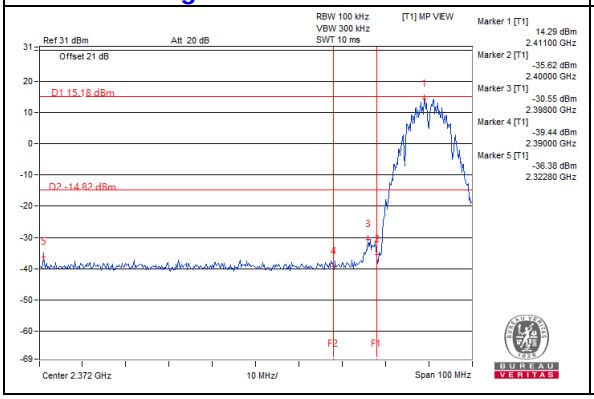

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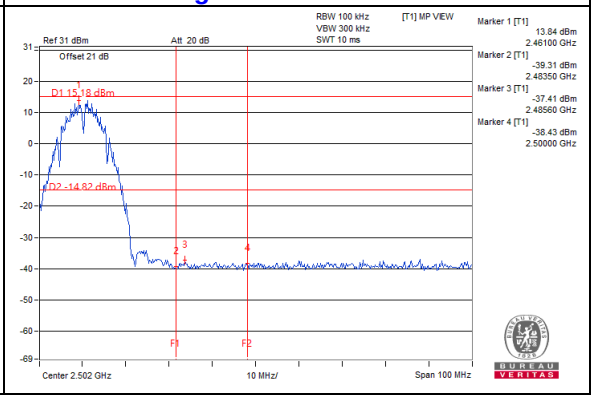
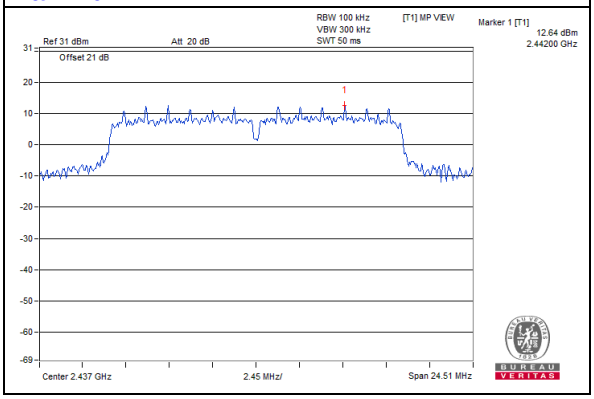


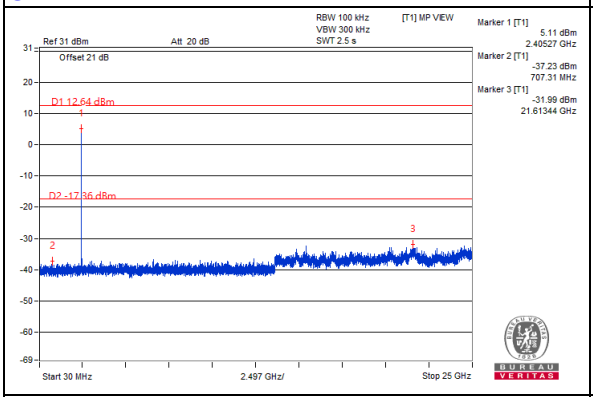
802.11g

Maximum REF

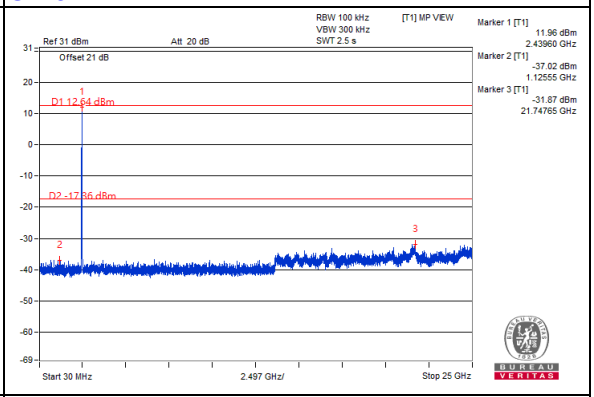


Chain 0

CH 1



CH 6



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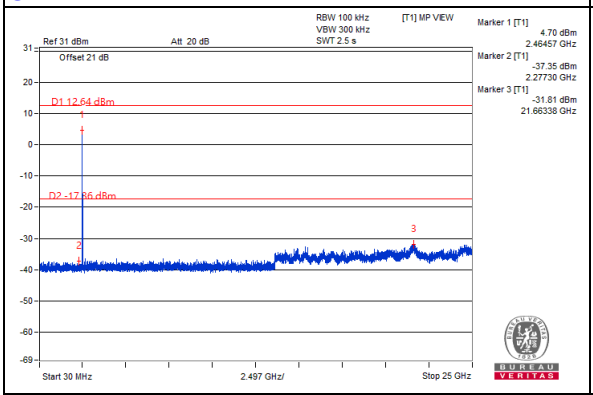
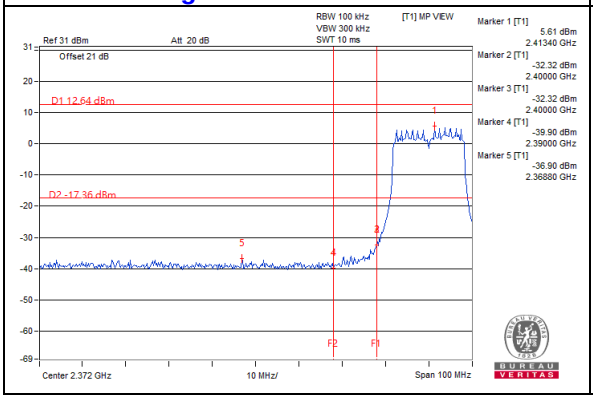
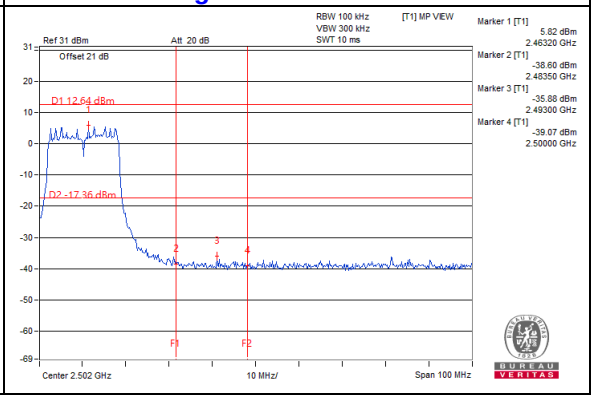


CH 1 Band edge

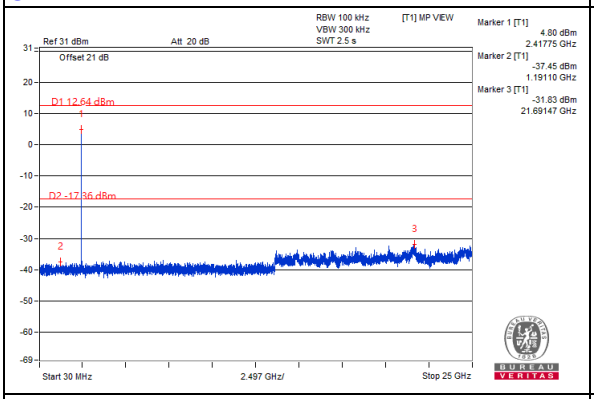


CH 11 Band edge



Chain 1

CH 1



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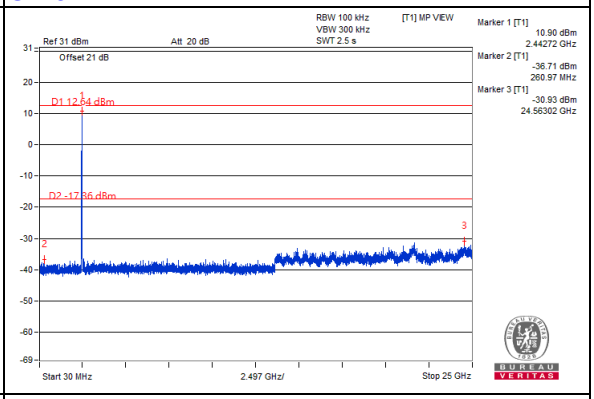
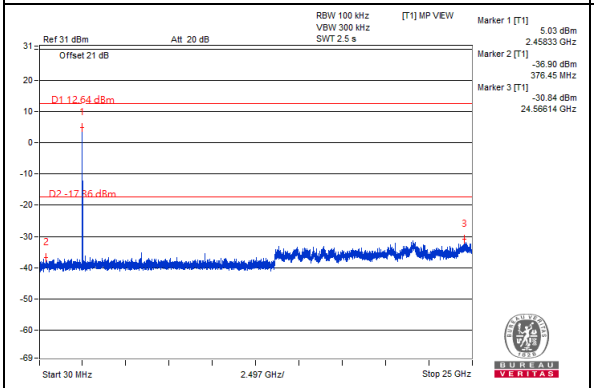
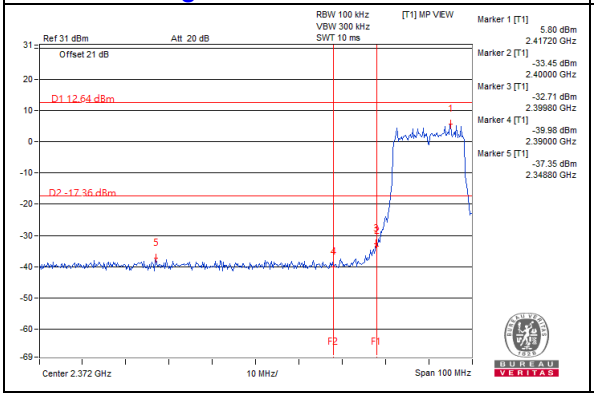


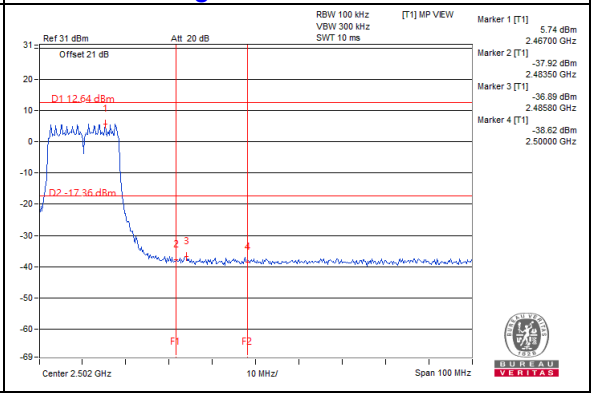
CH 11



CH 1 Band edge

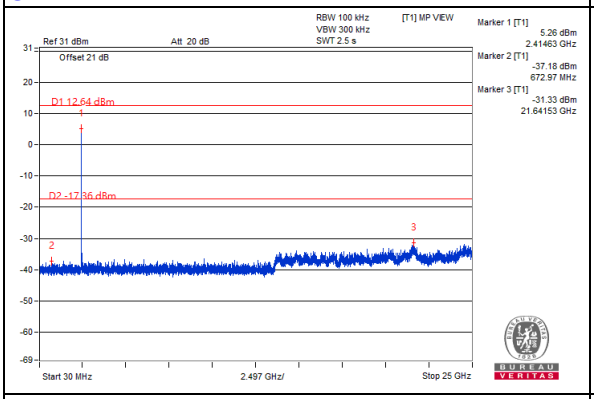


CH 11 Band edge

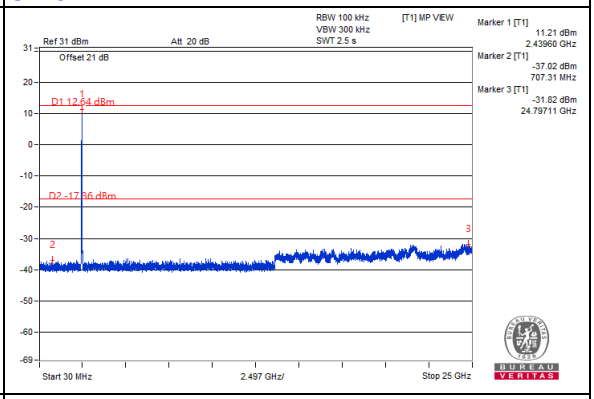


Chain 2

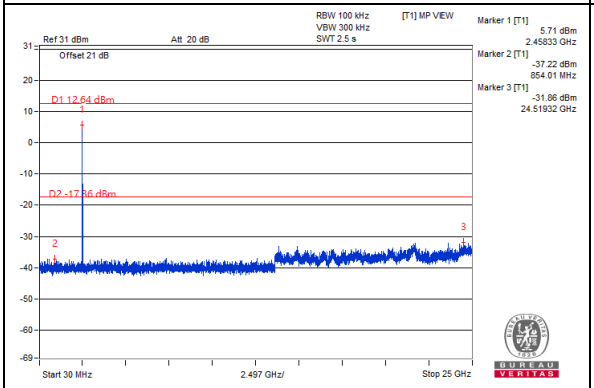
CH 1



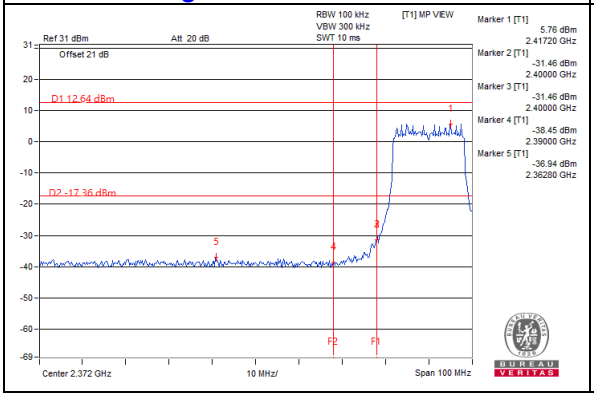
CH 6



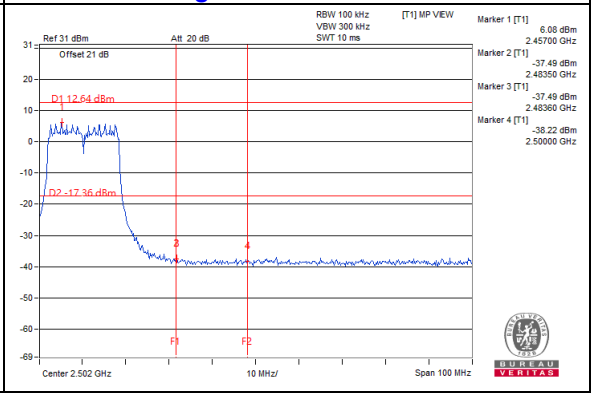
CH 11



CH 1 Band edge

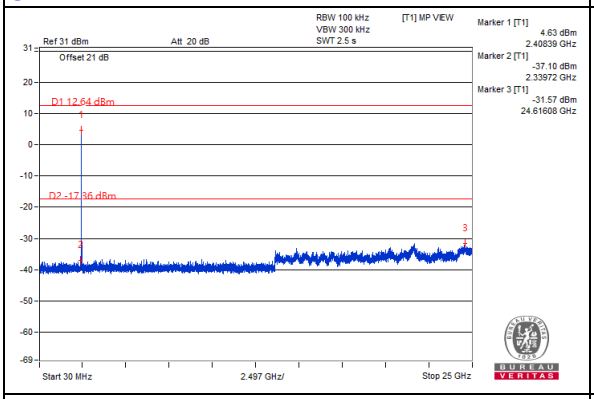


CH 11 Band edge

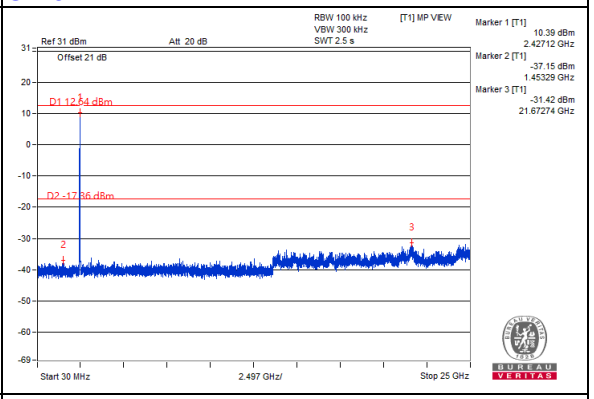


Chain 3

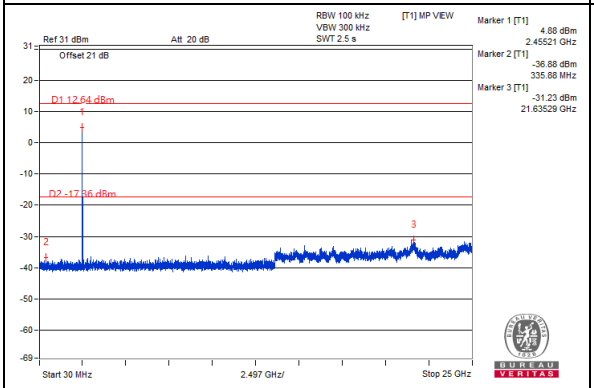
CH 1



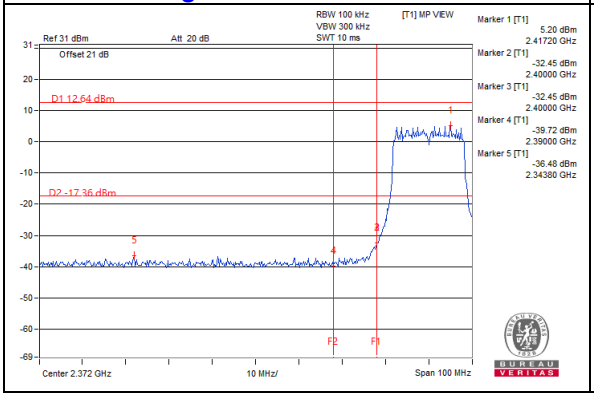
CH 6



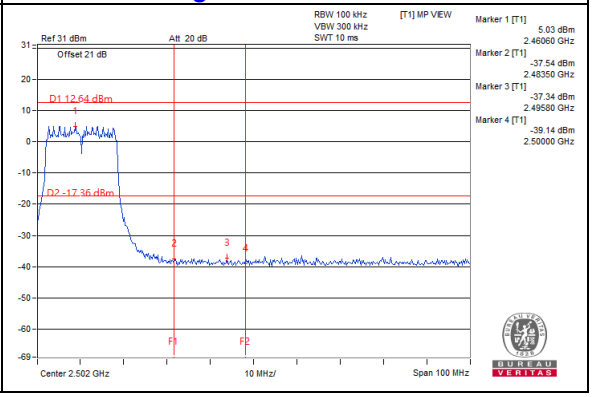
CH 11



CH 1 Band edge

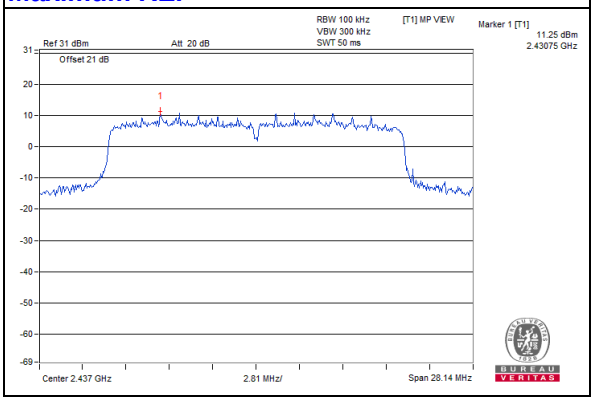


CH 11 Band edge



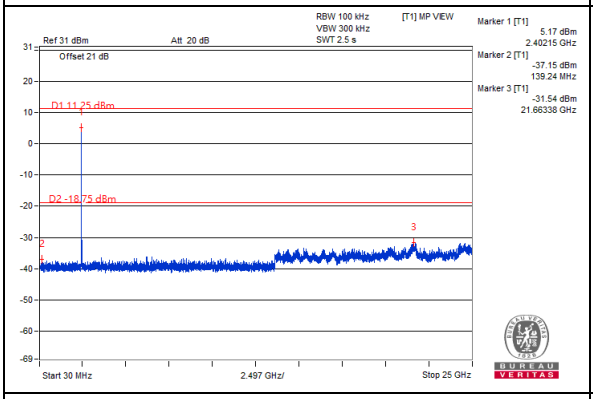
802.11ax (HE20)

Maximum REF

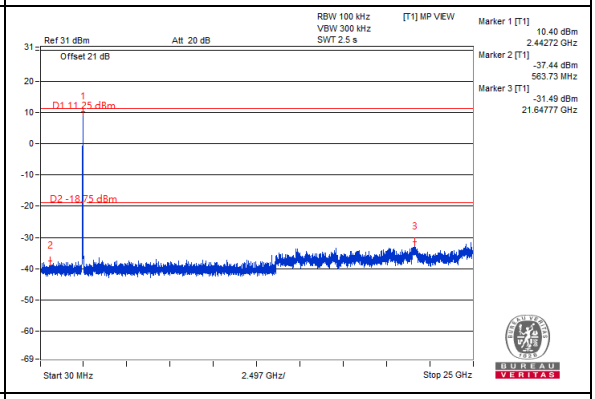


Chain 0

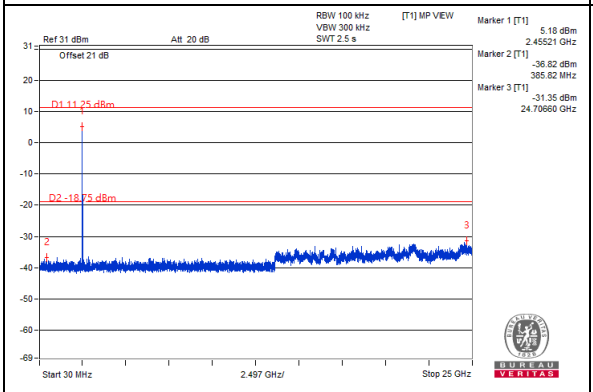
CH 1



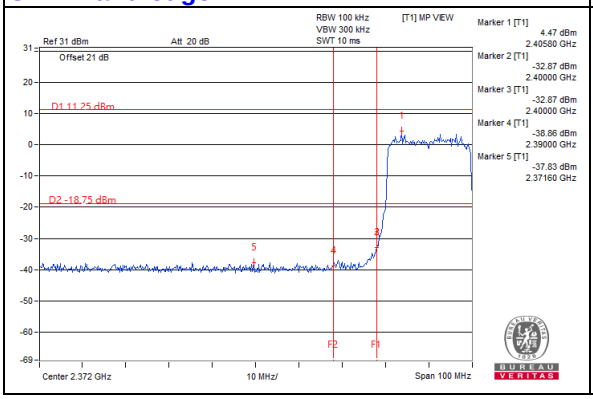
CH 6



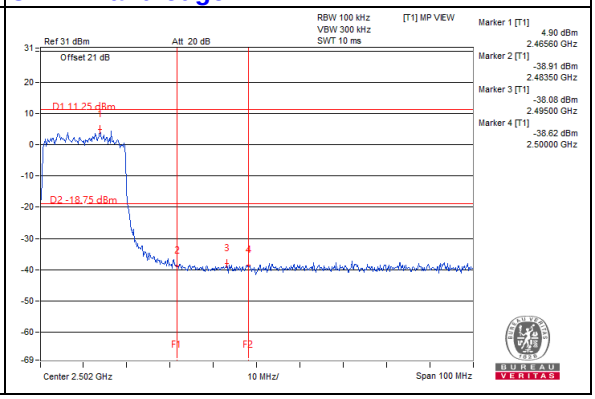
CH 11



CH 1 Band edge

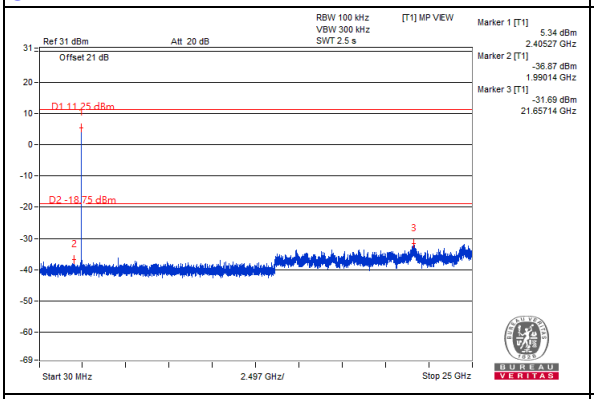


CH 11 Band edge

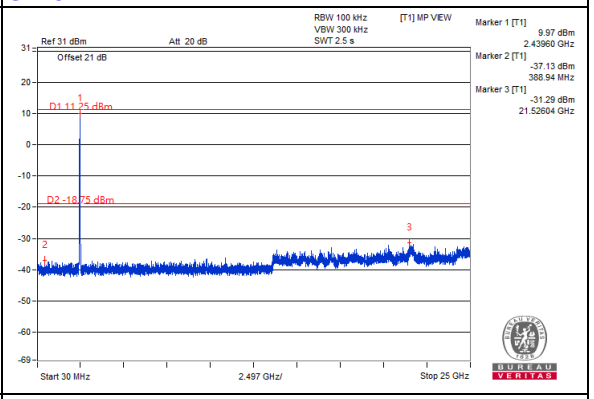


Chain 1

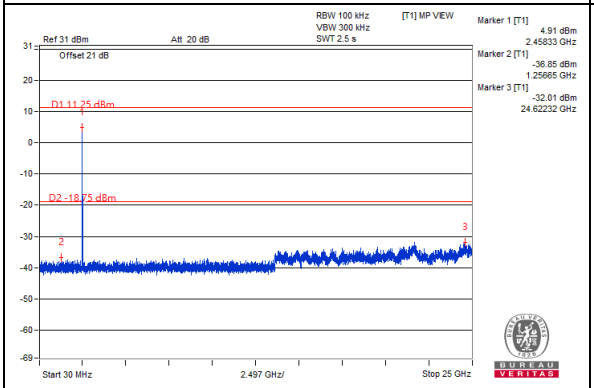
CH 1



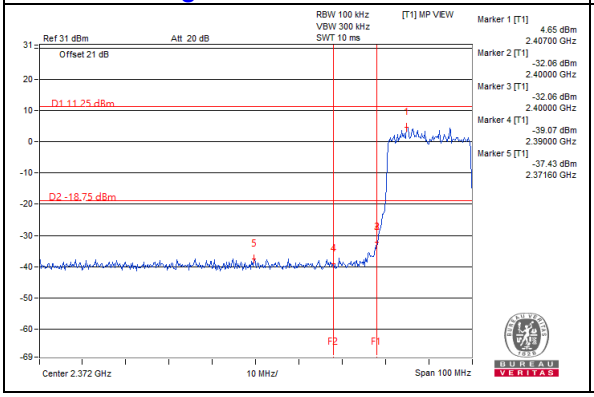
CH 6



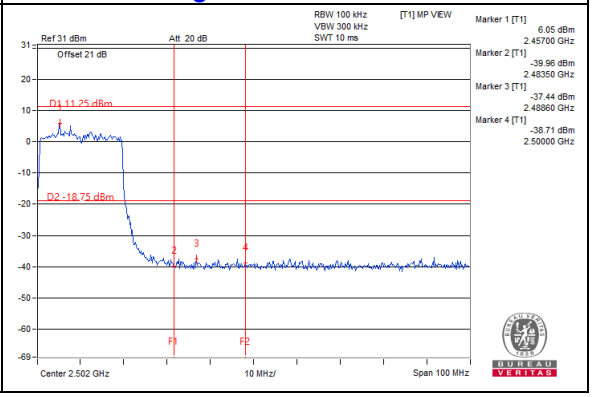
CH 11



CH 1 Band edge

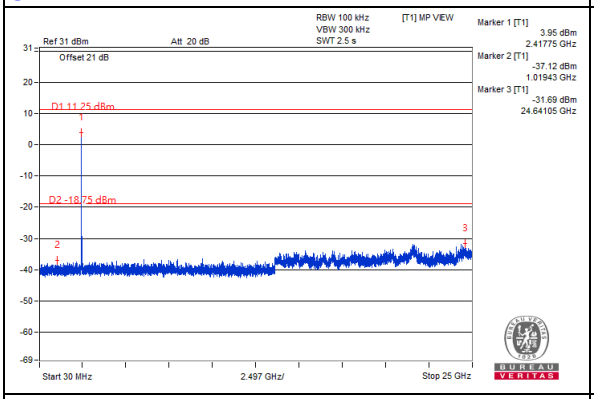


CH 11 Band edge

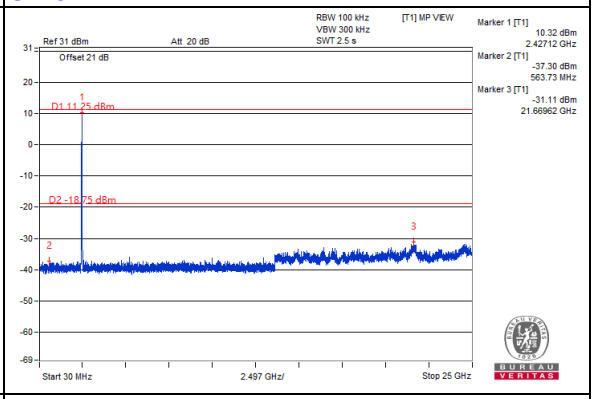


Chain 2

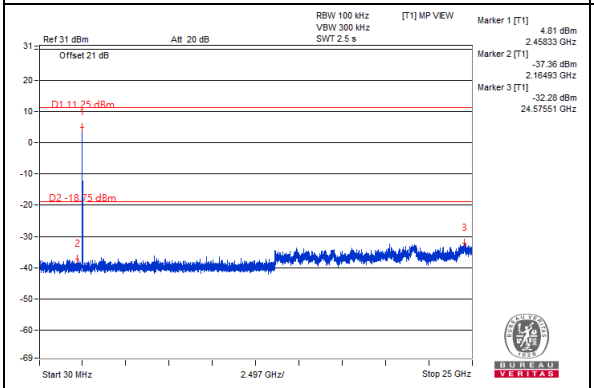
CH 1



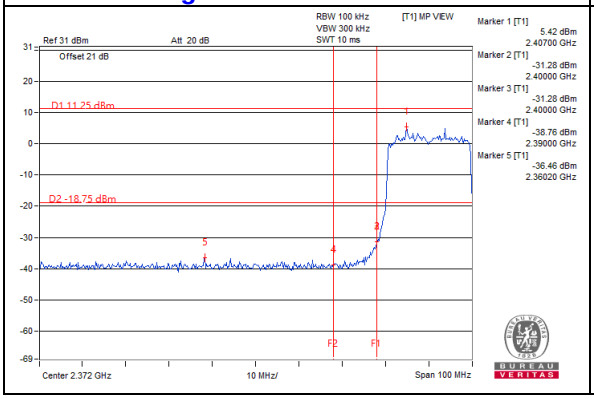
CH 6



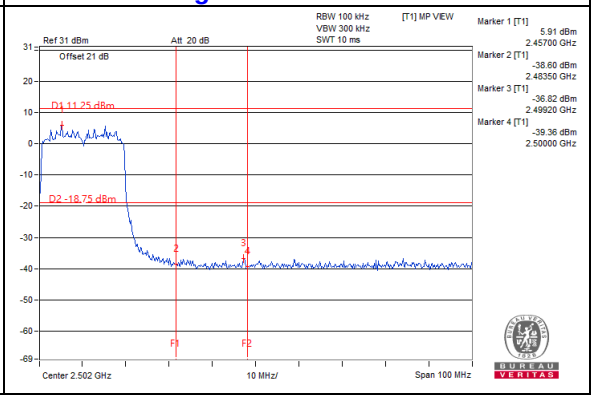
CH 11



CH 1 Band edge

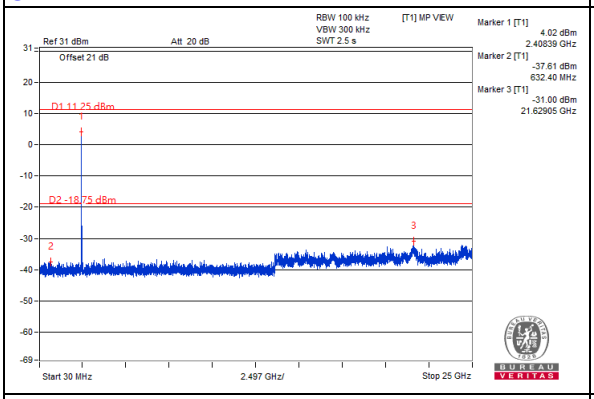


CH 11 Band edge

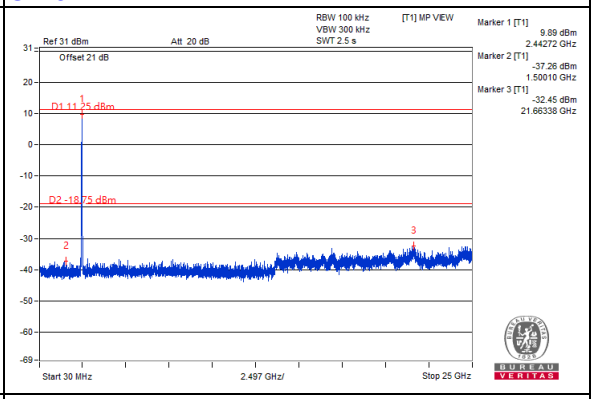


Chain 3

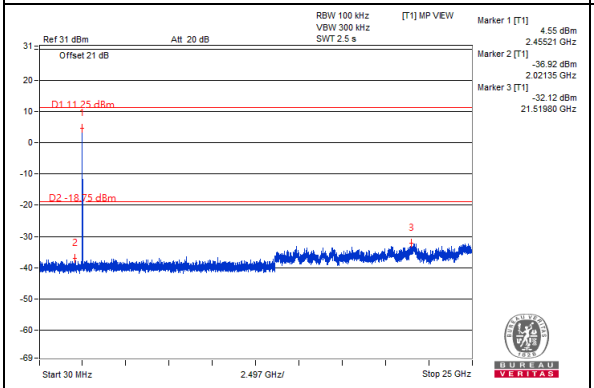
CH 1



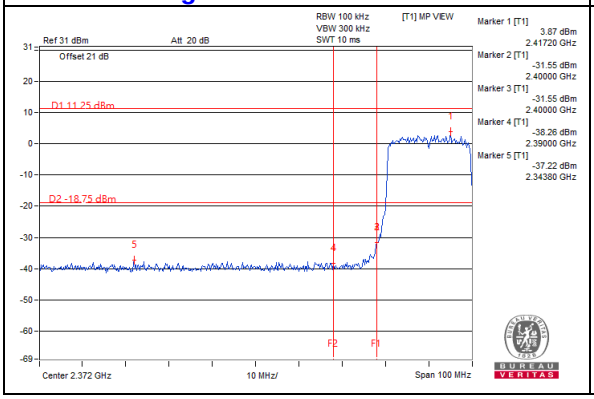
CH 6



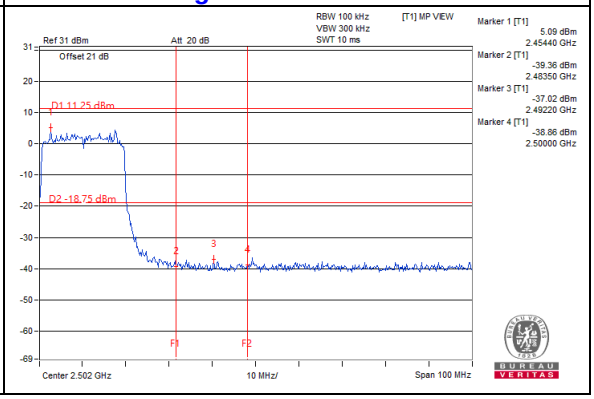
CH 11



CH 1 Band edge

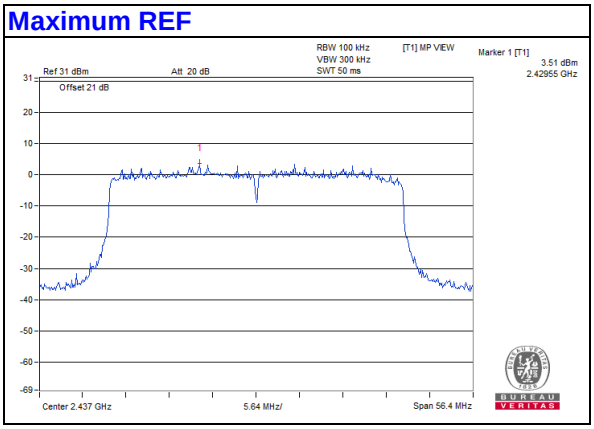


CH 11 Band edge



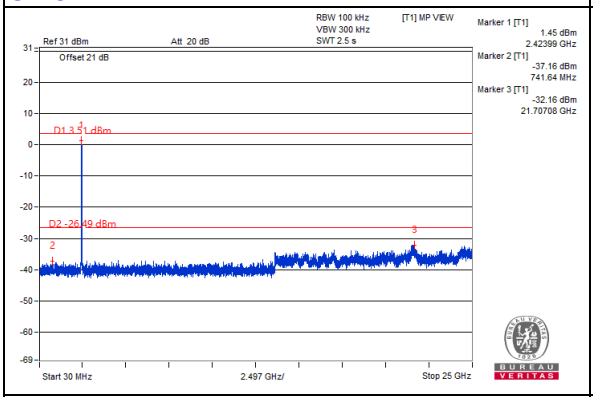
802.11ax (HE40)

Maximum REF

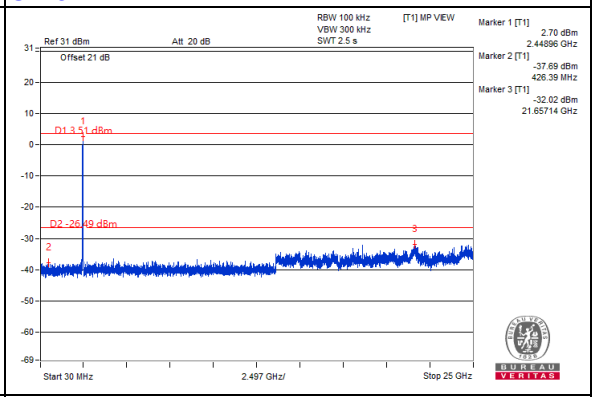


Chain 0

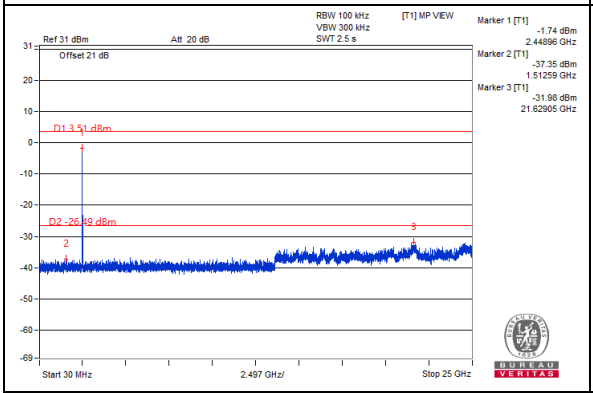
CH 3



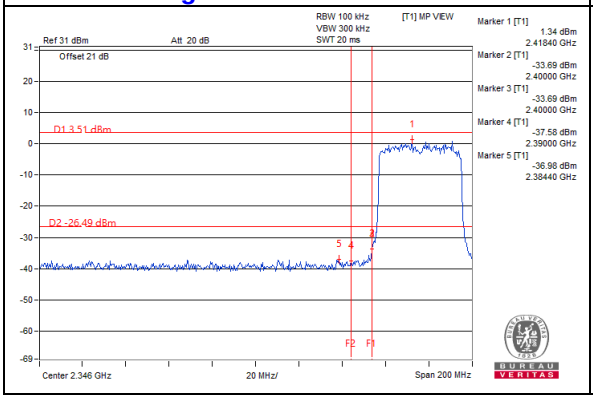
CH 6



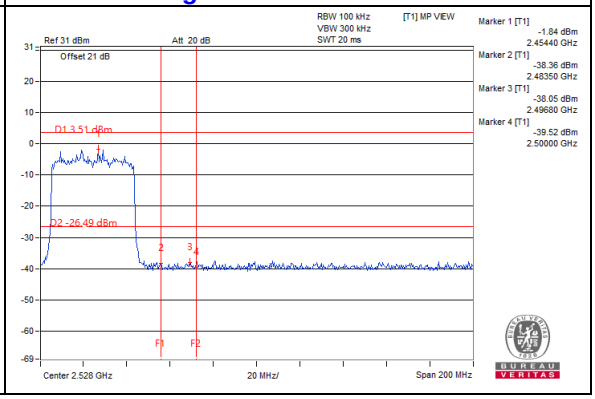
CH 9



CH 3 Band edge

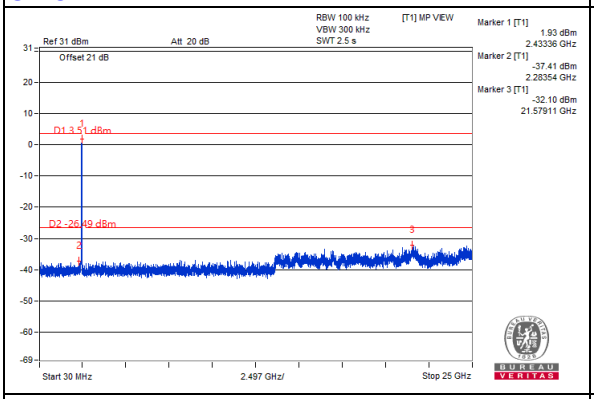


CH 9 Band edge

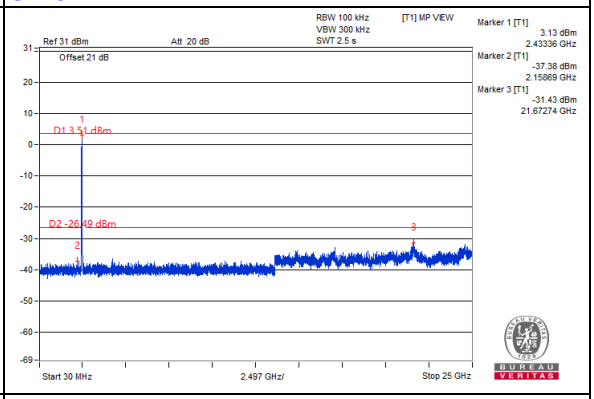


Chain 1

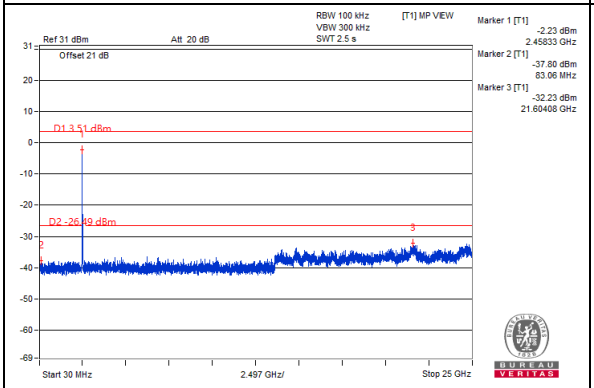
CH 3



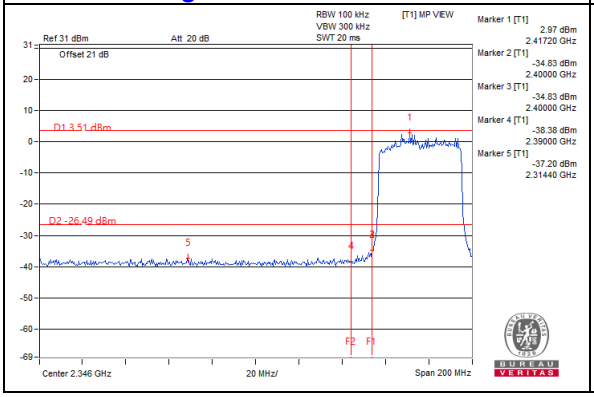
CH 6



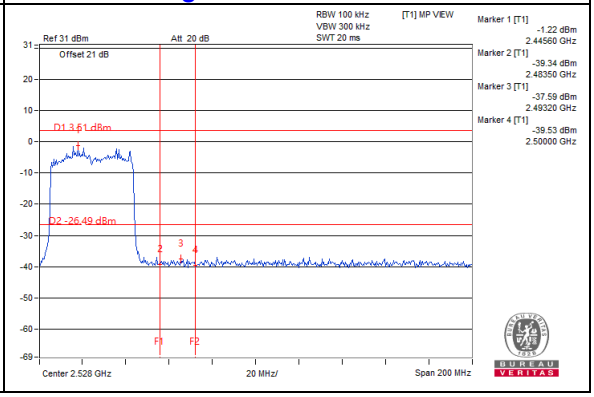
CH 9



CH 3 Band edge

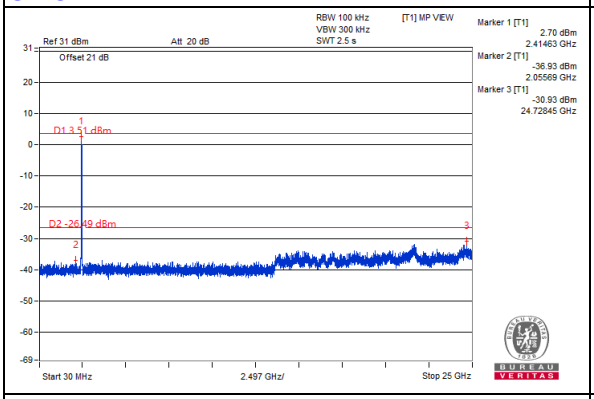


CH 9 Band edge

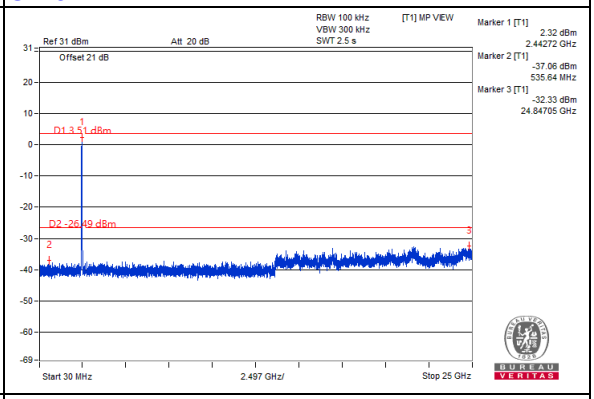


Chain 2

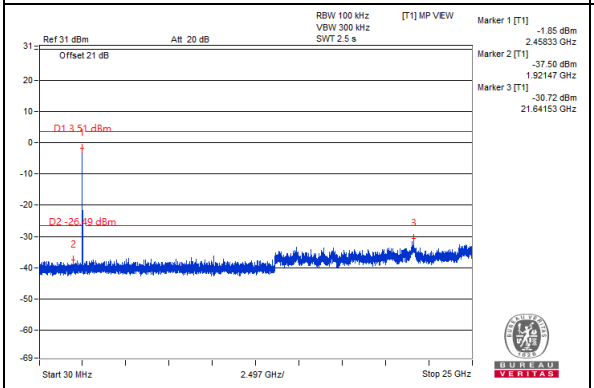
CH 3



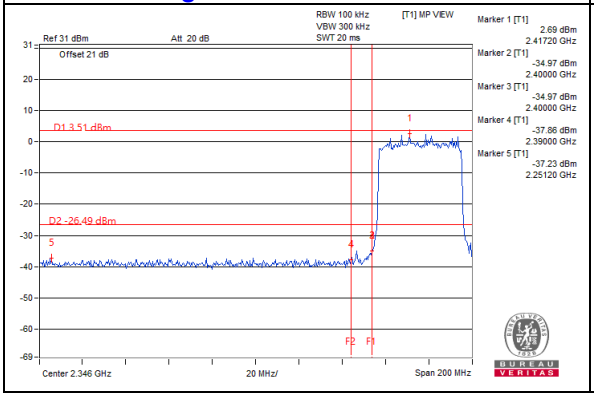
CH 6



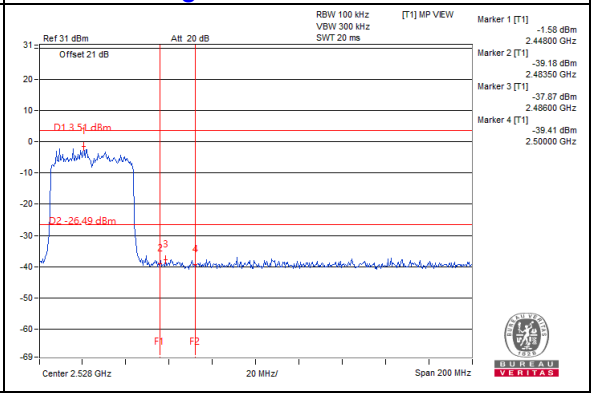
CH 9



CH 3 Band edge

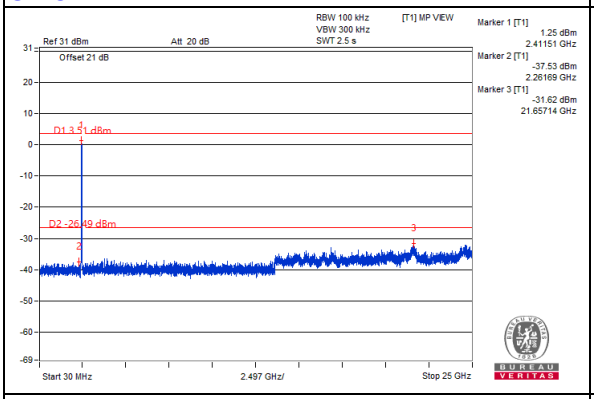


CH 9 Band edge

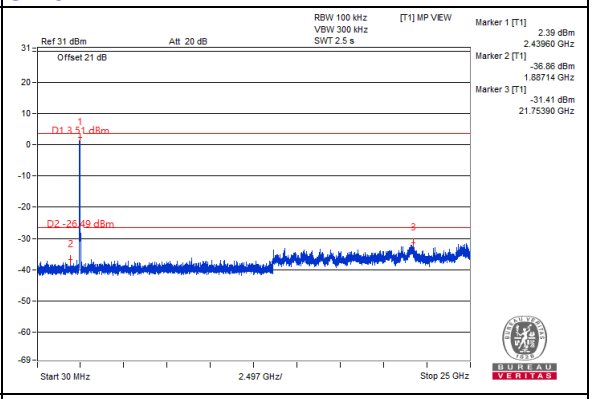


Chain 3

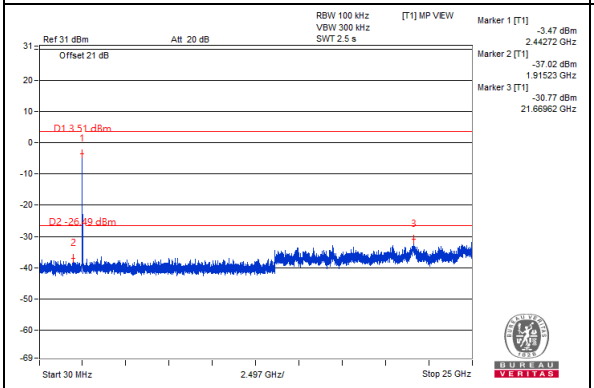
CH 3



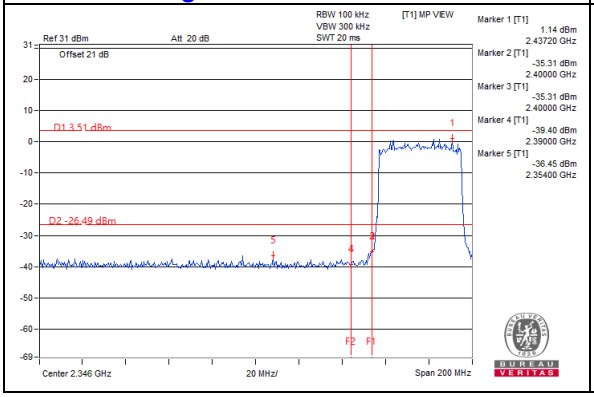
CH 6



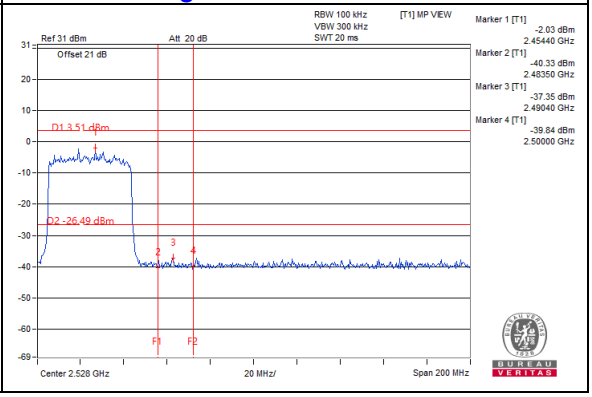
CH 9



CH 3 Band edge



CH 9 Band edge



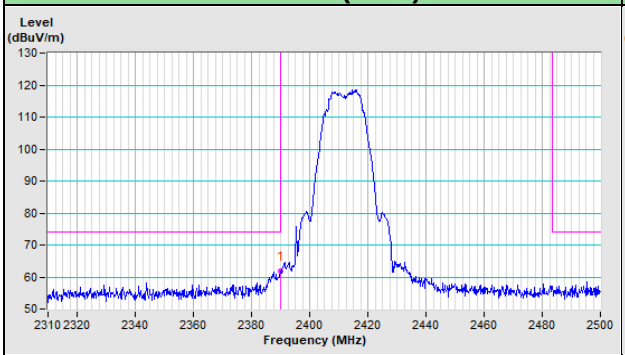
5 Pictures of Test Arrangements

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

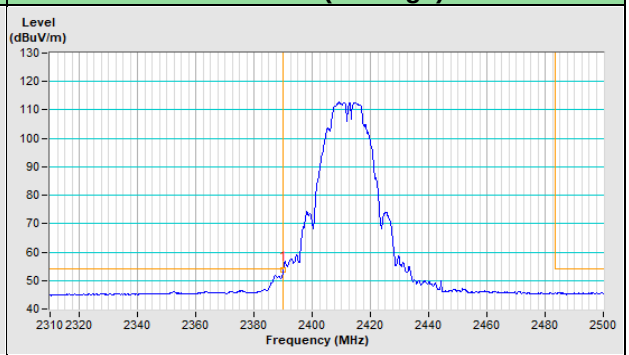
Annex A - Band-Edge Measurement

802.11b Channel 1

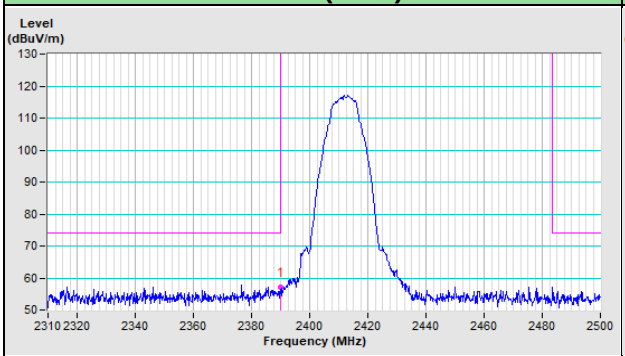
Horizontal (Peak)



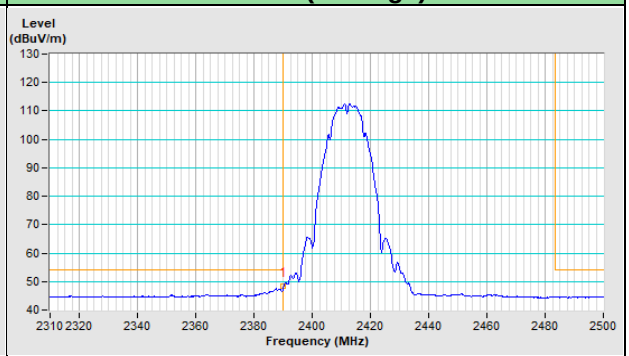
Horizontal (Average)



Vertical (Peak)

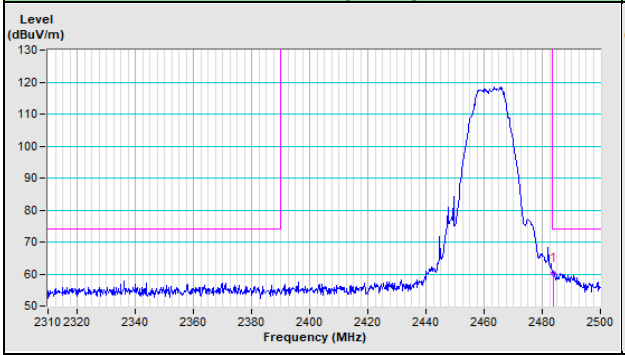


Vertical (Average)

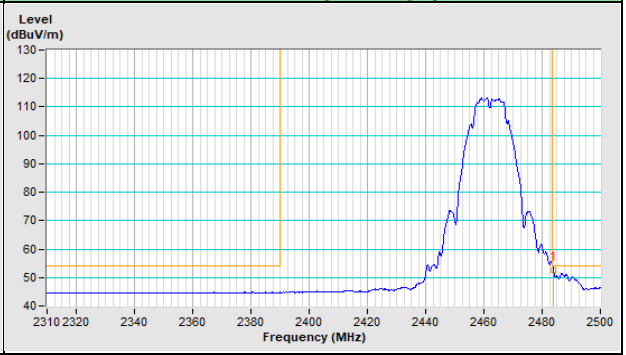


802.11b Channel 11

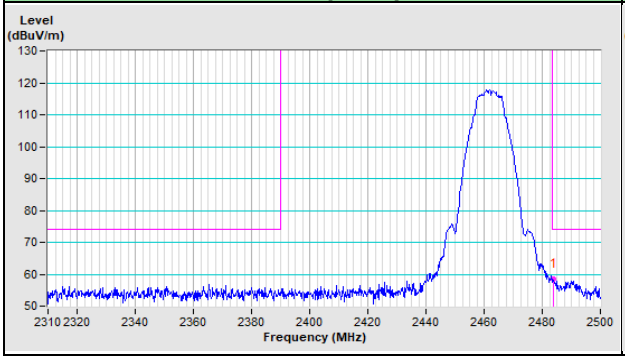
Horizontal (Peak)



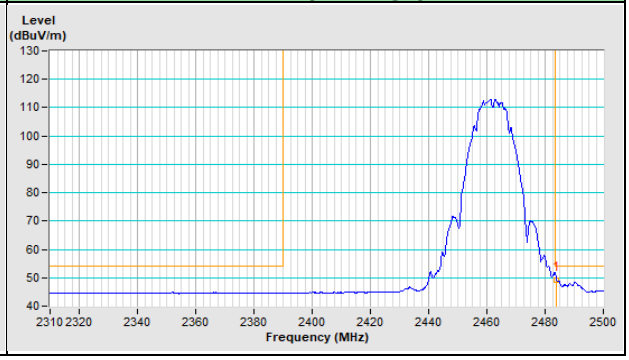
Horizontal (Average)



Vertical (Peak)

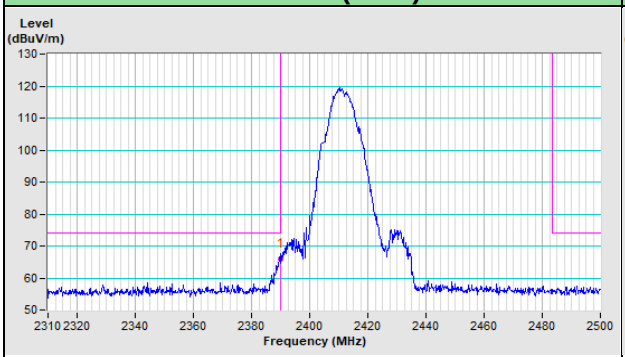


Vertical (Average)

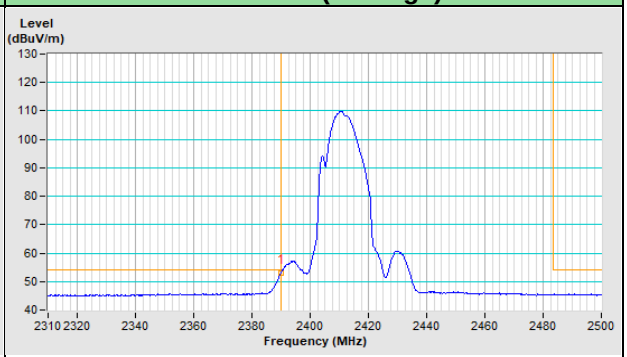


802.11g Channel 1

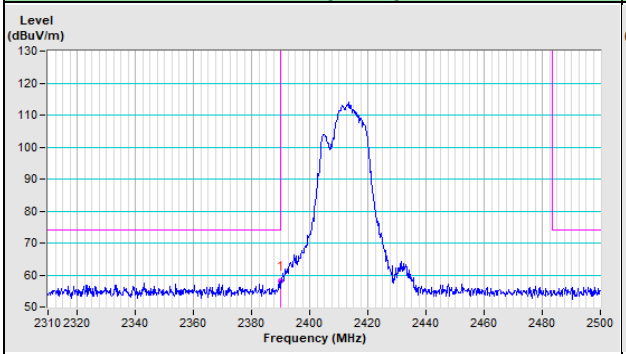
Horizontal (Peak)



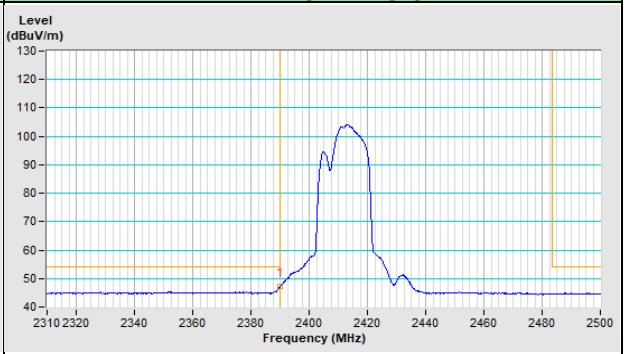
Horizontal (Average)



Vertical (Peak)

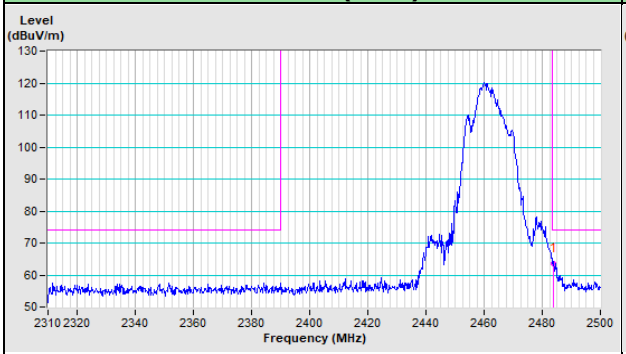


Vertical (Average)

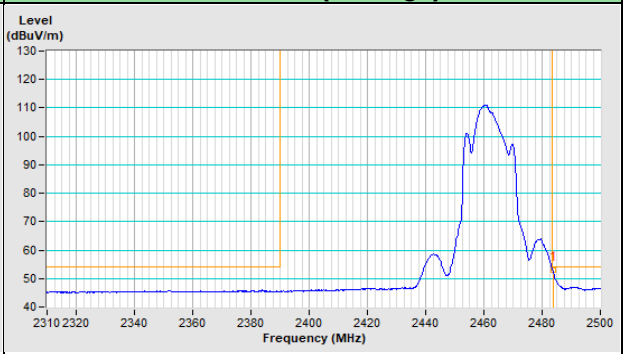


802.11g Channel 11

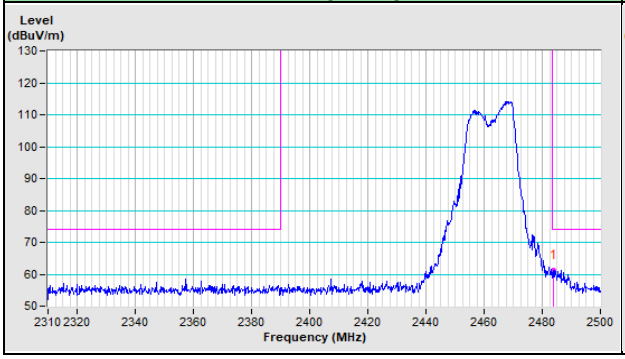
Horizontal (Peak)



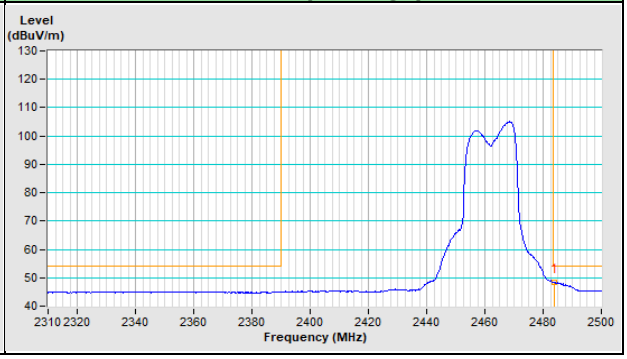
Horizontal (Average)



Vertical (Peak)

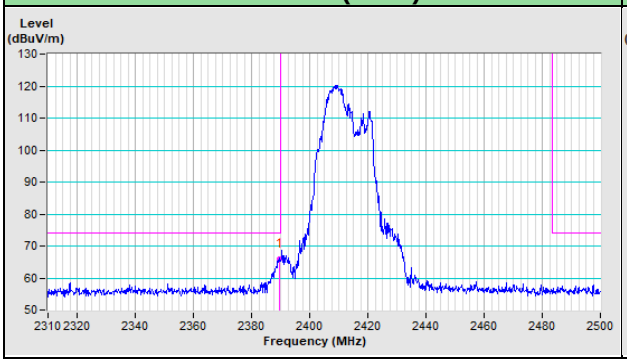


Vertical (Average)

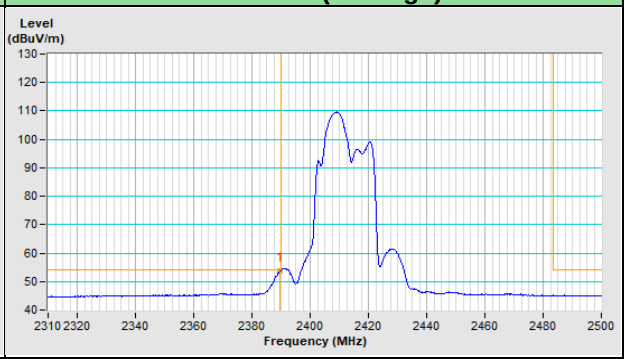


802.11ax (HE20) Channel 1

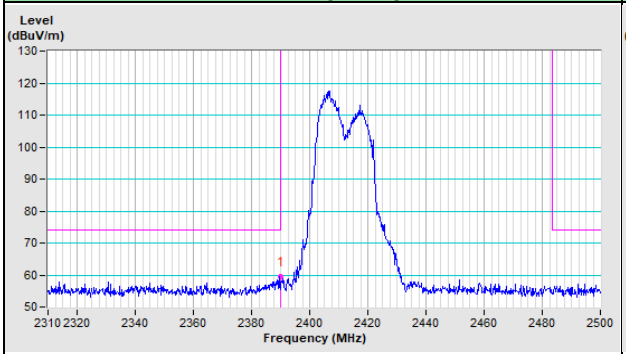
Horizontal (Peak)



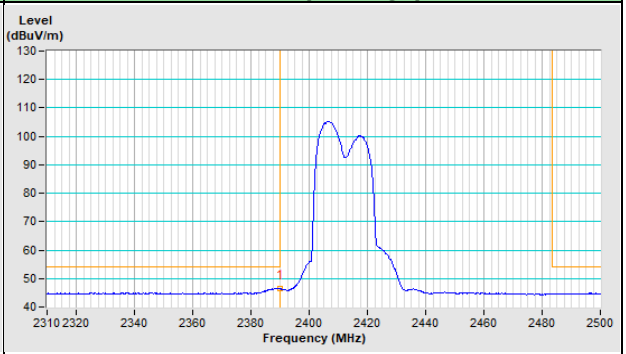
Horizontal (Average)



Vertical (Peak)

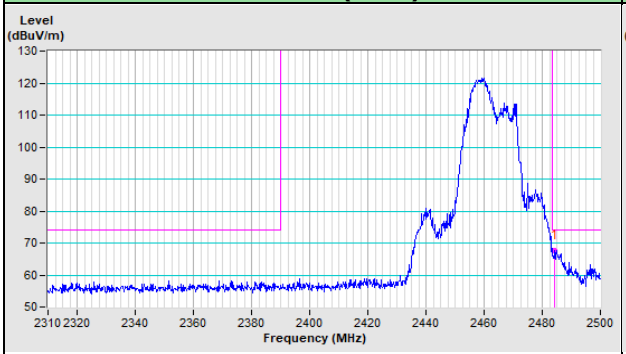


Vertical (Average)

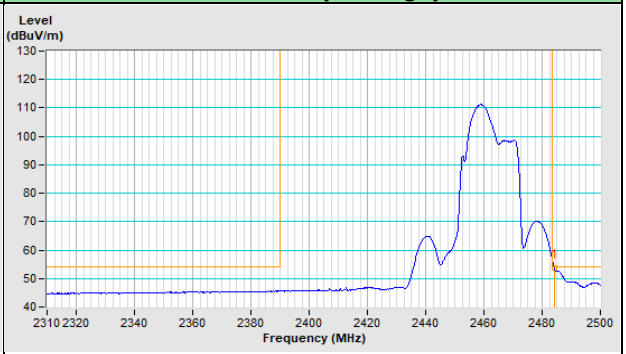


802.11ax (HE20) Channel 11

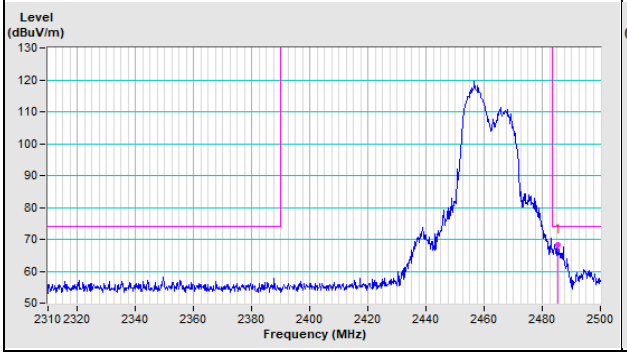
Horizontal (Peak)



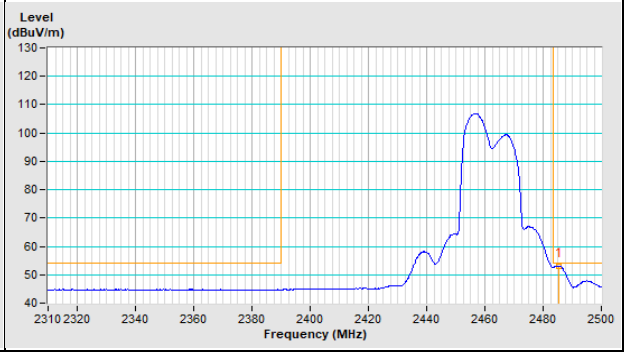
Horizontal (Average)



Vertical (Peak)

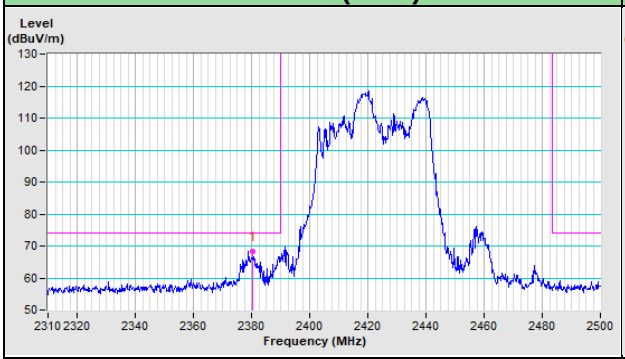


Vertical (Average)

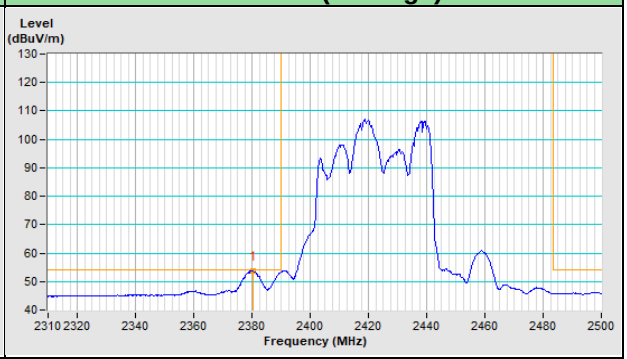


802.11ax (HE40) Channel 3

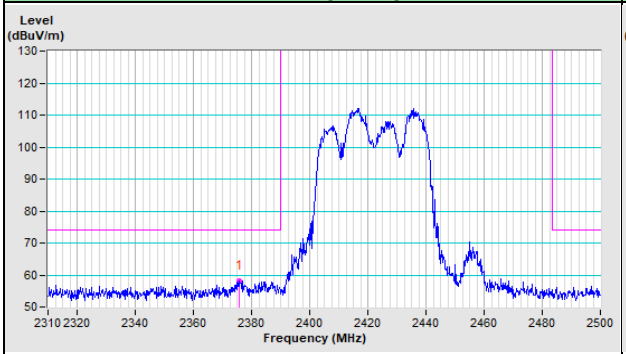
Horizontal (Peak)



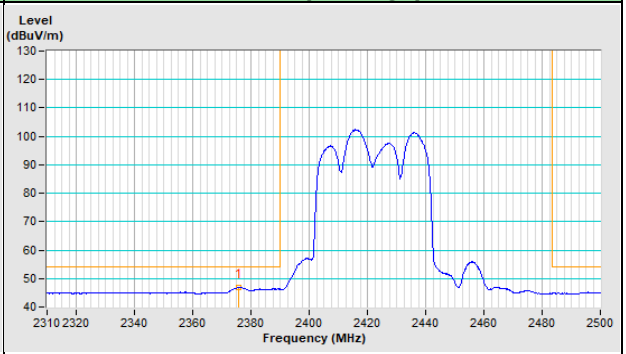
Horizontal (Average)



Vertical (Peak)

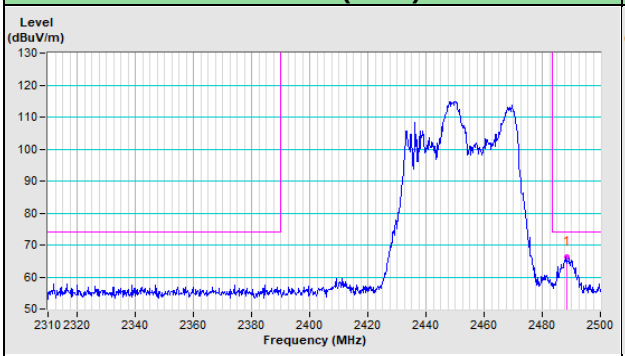


Vertical (Average)

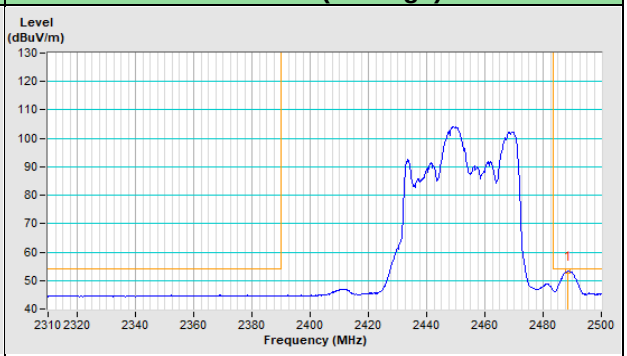


802.11ax (HE40) Channel 9

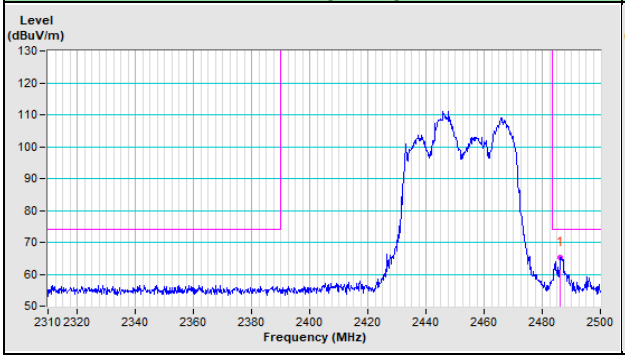
Horizontal (Peak)



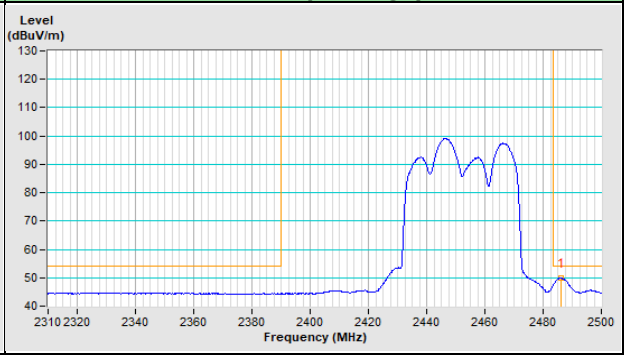
Horizontal (Average)



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:

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

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