FCC Test Report

Report No.:	RFBEAD-WTW-P21060534
FCC ID:	M82-AIM78S6
Model:	AIM-78S-6
Series Model:	AIM-78H-6, AIM-78H-6XXXXXXXXXXXXXXX, AIM-78S-6XXXXXXXXXXXXXXX (X: maybe 1-9, A-Z, or blank) (refer to item 3.1 for more details)
Received Date:	Jun. 16, 2021
Test Date:	Jul. 26 ~ Aug. 25, 2021
Issued Date:	Dec. 27, 2021
Applicant:	ADVANTECH CO., LTD
Address:	No. 1, Alley 20, Lane 26, Rueiguang Rd, Neihu District, Taipei, Taiwan 114
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location(1):	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number(1):	788550 / TW0003
Test Location(2):	B2F., No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan
FCC Registration / Designation Number(2):	427177 / TW0011

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Release Control Record

Issue No.	Description	Date Issued
RFBEAD-WTW-P21060534	Original release.	Dec. 27, 2021

1 Certificate of Conformity

Product:	10.1” Tablet PC
Brand:	ADVANTECH
Model:	AIM-78S-6
Series Model:	AIM-78H-6, AIM-78H-6XXXXXXXXXXXXXXXX, AIM-78S-6XXXXXXXXXXXXXXXX (X: maybe 1-9, A-Z, or blank) (refer to item 3.1 for more details)
Sample Status:	Engineering sample
Applicant:	ADVANTECH CO., LTD
Test Date:	Jul. 26 ~ Aug. 25, 2021
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample’s RF characteristics under the conditions specified in this report.

Prepared by : Pettie Chen , **Date:** Dec. 27, 2021

Pettie Chen / Senior Specialist

Approved by : Jeremy Lin , **Date:** Dec. 27, 2021

Jeremy Lin / Project Engineer

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 -0.17dB at 0.61400MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.04dB at 2390.000MHz.
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_IV not a standard connector.

Note:

1. For 2.4G 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	2.79 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.44 dB
	30MHz ~ 200MHz	2.0153 dB
	200MHz ~1000MHz	2.0224 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	1.0121 dB
	18GHz ~ 40GHz	1.1508 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	10.1” Tablet PC
Brand	ADVANTECH
Model	AIM-78S-6
Series Model	AIM-78H-6, AIM-78H-6XXXXXXXXXXXXXXXX, AIM-78S-6XXXXXXXXXXXXXXXX (X: maybe 1-9, A-Z, or blank)
Model Difference	Refer to note
Sample Status	Engineering sample
Power Supply Rating	10.8Vdc (Battery) 19Vdc (Adapter)
Modulation Type	802.11b: BPSK, QPSK, CCK 802.11g/n: BPSK, QPSK, 16QAM, 64QAM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b:11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 300Mbps
Operating Frequency	2412~2462MHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7
Output Power	79.093mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	Refer to note
Cable Supplied	Refer to note

Note:

1. The following models are provided to this EUT. The model of the AIM-78S-6 was chosen for final test.

Model	Description
AIM-78S-6, AIM-78H-6, AIM-78H-6XXXXXXXXXXXXXXXX, AIM-78S-6XXXXXXXXXXXXXXXX (X: maybe 1-9, A-Z, or blank)	For marketing purpose

2. The EUT incorporates a MIMO function. Physically, the EUT provides 2 completed transmitters and 2 receivers.

Modulation Mode	TX Function
802.11b	2TX
802.11g	2TX
802.11n (HT20)	2TX
802.11n (HT40)	2TX

3. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter 1	Tamura	XEW1934N	Input: 100-240Vac~1.5A, 50/60Hz Output: 19Vdc / 3.42A Power Line: AC: 1.5m cable without core DC: 1.2m cable without core
Adapter 2 (option)	FSP	FSP065-DBCM1	Input: 100-240Vac~ 2.0-1.0A, 50-60Hz Output: 19Vdc / 3.43A Power Line: AC: 1.5m cable without core DC: 1.5m cable with 1 core
Battery	ADVANTECH	AIM-BAT-10	Rating: 10.8Vdc, 24.84Wh, 2300mAh
WWAN+WLAN module	USI	MS-01 Pro	-
Docking Stations (option)	ADVANTECH	AIM-DOC-0001	Rating: 19Vdc, 3.42A (VESA Dock)
Docking Stations (option)	ADVANTECH	AIM-VED0	Rating: 9 ~ 32Vdc (Vehicle Dock)
Docking Stations (option)	ADVANTECH	AIM-OFD-0000	Rating: 19Vdc (Office Dock)
Extension Modules-Barcode scanner (20°) (option)	ADVANTECH	AIM-EXT0-0040 (20 degree)	Sensor: 640 x 480 CMOS sensor
Extension Modules-Barcode scanner (70°) (option)	ADVANTECH	AIM-EXT0-0041 (70 degree)	Sensor: 640 x 480 CMOS sensor

4. The EUT uses the following antennas.

Ant. Type	PIFA										
Ant. Connector	I-PEX_IV										
WiFi _Main / BT											
Frequency (MHz)	2400	2410	2420	2430	2440	2450	2460	2470	2480	2490	2500
Peak Gain (dBi)	3.36	3.36	3.15	3.16	3.06	3.25	3.22	3.23	3.32	3.01	3.12
Frequency (MHz)	5150	5250	5350	5450	5550	5650	5750	5850			
Peak Gain (dBi)	4.31	3.23	2.63	1.97	2.33	2.76	2.61	2.71			
WiFi _Aux											
Frequency (MHz)	2400	2410	2420	2430	2440	2450	2460	2470	2480	2490	2500
Peak Gain (dBi)	4.19	4.09	4.25	4.12	4.07	3.95	3.86	3.86	3.71	3.46	3.43
Frequency (MHz)	5150	5250	5350	5450	5550	5650	5750	5850			
Peak Gain (dBi)	0.97	1.81	2.02	1.08	1.63	1.95	0.30	0.41			

* The max. gain was chosen for final tests.
* 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.

5. The device WLAN 2.4GHz, BT and NFC can transmit simultaneously.
   The device WLAN 5GHz, BT and NFC can transmit simultaneously.
6. Spurious emission of the simultaneous operation (WLAN 2.4GHz, BT and NFC or WLAN 5GHz, BT and NFC) has been evaluated and no non-compliance was found.

3.2 Description of Test Modes

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

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):

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	
A	√	√	√	√	EUT + Adapter
B	-	√	√	-	EUT + VESA Dock
C	-	√	√	-	EUT + Vehicle Dock
D	-	√	√	-	EUT + Office Dock

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:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z plane**.
2. For radiated emission (below 1GHz) and power line conducted emission test items chosen the worst maximum fundamental emission level channel.
3. "-": Means no effect.

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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
A	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Radiated Emission Test (Below 1GHz):

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A, B, C, D	802.11g	1 to 11	6	OFDM	BPSK	6.0

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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A, B, C, D	802.11g	1 to 11	6	OFDM	BPSK	6.0

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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
A	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Test Condition:

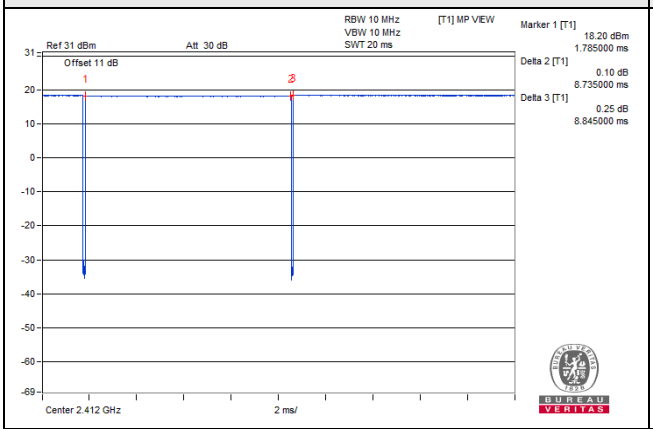
Applicable to	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 75% RH	120Vac, 60Hz	Karl Lee
RE<1G	25 deg. C, 75% RH	120Vac, 60Hz	Karl Lee
PLC	25 deg. C, 75% RH 23 deg. C, 66% RH	120Vac, 60Hz	Edison Lee Cookie Ku
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Jisyong Wang

3.3 Duty Cycle of Test Signal

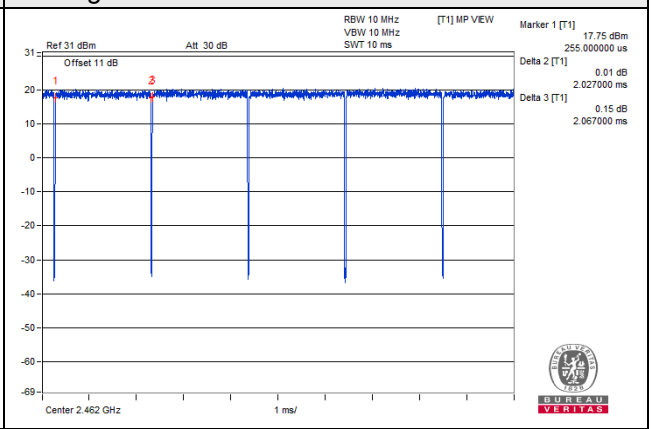
Duty cycle of test signal is > 98 %, duty factor is not required.
Duty cycle of test signal is < 98 %, duty factor is required.

802.11b: Duty cycle = 8.735/8.845 = 0.988
802.11g: Duty cycle = 2.027/2.067 = 0.981
802.11n (HT20): Duty cycle = 1.894/1.952 = 0.970, Duty factor = 10 * log(1/0.970) = 0.13
802.11n (HT40): Duty cycle = 0.934/0.995 = 0.939, Duty factor = 10 * log(1/0.939) = 0.27

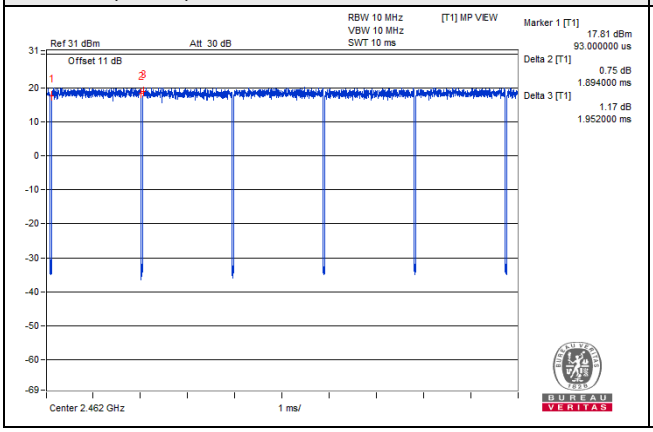
802.11b



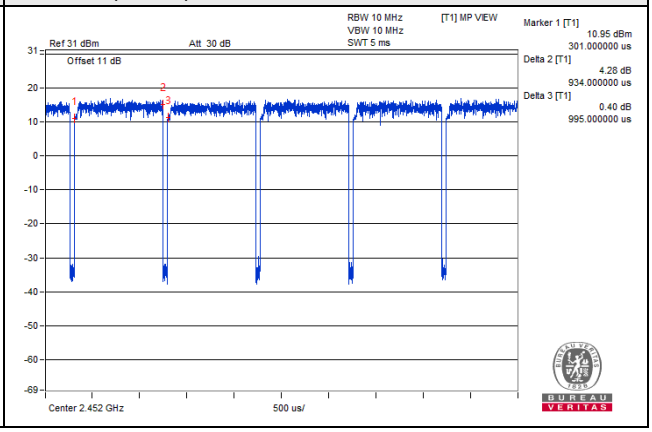
802.11g



802.11n (HT20)



802.11n (HT40)



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.	Flash	HP	v250W	05	NA	Type-A
B.	Flash	HP	v250W	03	NA	Type-A
C.	Earphone	APPLE	NA	NA	NA	-
D.	Load	NA	NA	NA	NA	-
E.	Power Supply	TOPWARD	6306D	809760	NA	-
F.	GPS Antenna	CONNECTEC	SP070809-001	3-6004-031R000	NA	Provided by client
G.	Monitor	DELL	SE2416Hc	CN-OWJKMC-641 80-66D-013B-A00	NA	-
H.	Docking Station	ADVANTECH	AIM-DOC-0001	NA	NA	Provided by client
I.	Docking Station	ADVANTECH	AIM-VED0	NA	NA	Provided by client
J.	Docking Station	ADVANTECH	AIM-OFD-0000	NA	NA	Provided by client
K.	Adapter	FSP	FSP065-DBCM1	NA	NA	Provided by client

Note:

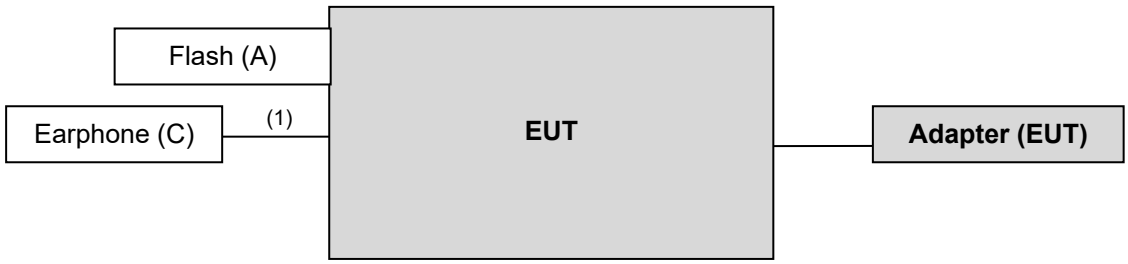
1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Audio cable	1	1.2	N	0	-
2.	RS232 cable	1	1.5	N	0	-
3.	LAN cable	1	7	N	0	RJ45, Cat.5e
4.	Antenna cable	1	5	N	0	Provided by client
5.	Power cable	1	1	N	0	Provided by client
6.	HDMI cable	1	2.0	Y	0	Provided by Lab. (Brand: Amber, Model: HDMI-AA120)
7.	DC Power cable	1	1.5	N	1	Provided by client
8.	AC Power cable	1	1.5	N	0	Provided by client

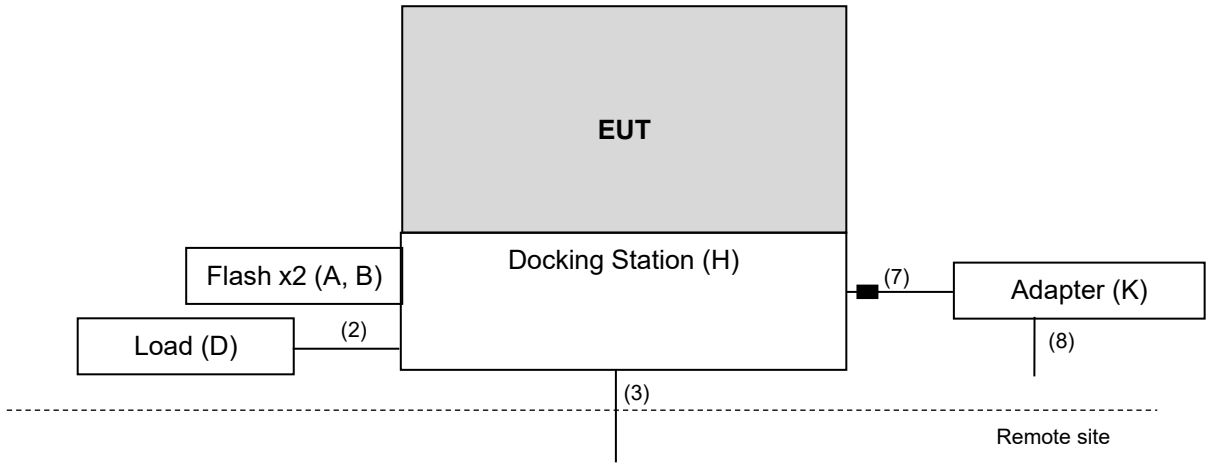
Note: The core(s) is(are) originally attached to the cable(s).

3.4.1 Configuration of System under Test

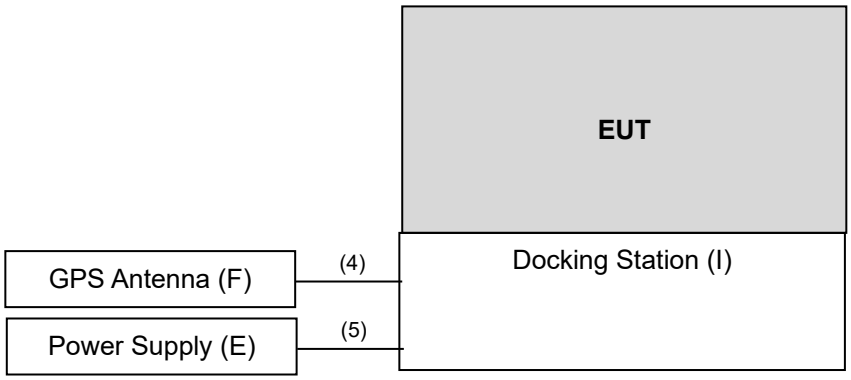
Mode A



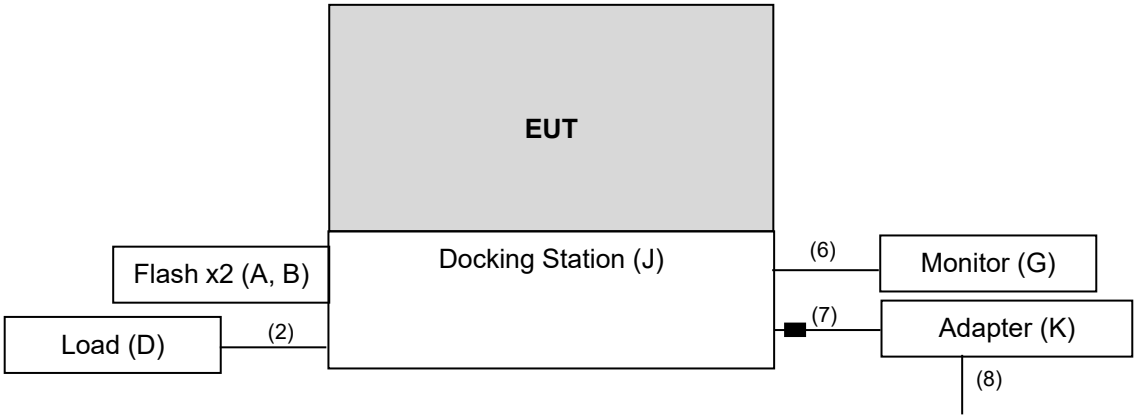
Mode B



Mode C



Mode D



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

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver Agilent Technologies	N9038A	MY55420137	Apr. 09, 2021	Apr. 08, 2022
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 12, 2021	Apr. 11, 2022
HORN Antenna ETS-Lindgren	3117	00143293	Nov. 22, 2020	Nov. 21, 2021
BILOG Antenna SCHWARZBECK	VULB 9168	9168-616	Nov. 09, 2020	Nov. 08, 2021
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Nov. 22, 2020	Nov. 21, 2021
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 13, 2021	Apr. 12, 2022
MXG Vector signal generator Agilent	N5182B	MY53050430	Nov. 25, 2020	Nov. 24, 2021
Preamplifier Agilent	310N	187226	Jun. 17, 2021	Jun. 16, 2022
Preamplifier Agilent	83017A	MY39501357	Jun. 17, 2021	Jun. 16, 2022
Preamplifier EMCI	EMC 184045	980116	Oct. 07, 2020	Oct. 06, 2021
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-400)	Jun. 17, 2021	Jun. 16, 2022
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(RFC-SMS-100-SMS-24)	Jun. 17, 2021	Jun. 16, 2022
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA
Peak Power Analyzer KEYSIGHT	8990B	MY51000485	Jan. 19, 2021	Jan. 18, 2022
Wideband Power Sensor KEYSIGHT	N1923A	MY58020002	Jan. 11, 2021	Jan. 10, 2022

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 Xindian Chamber 6.

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 detect 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.

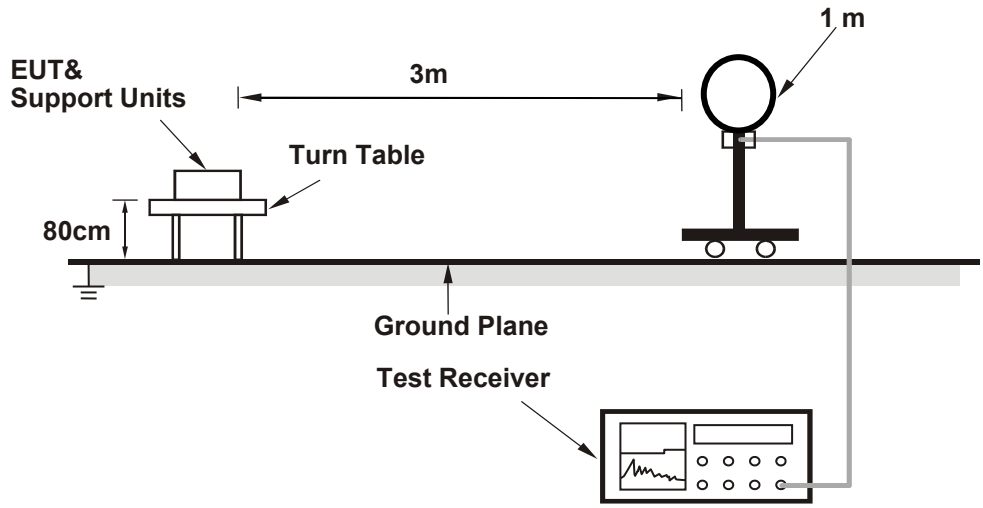
   (802.11b: RBW = 1MHz, VBW = 10Hz; 802.11g: RBW = 1MHz, VBW = 10Hz;
   802.11n (HT20): RBW = 1MHz, VBW = 1kHz; 802.11n (HT40): RBW = 1MHz, VBW = 3kHz)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

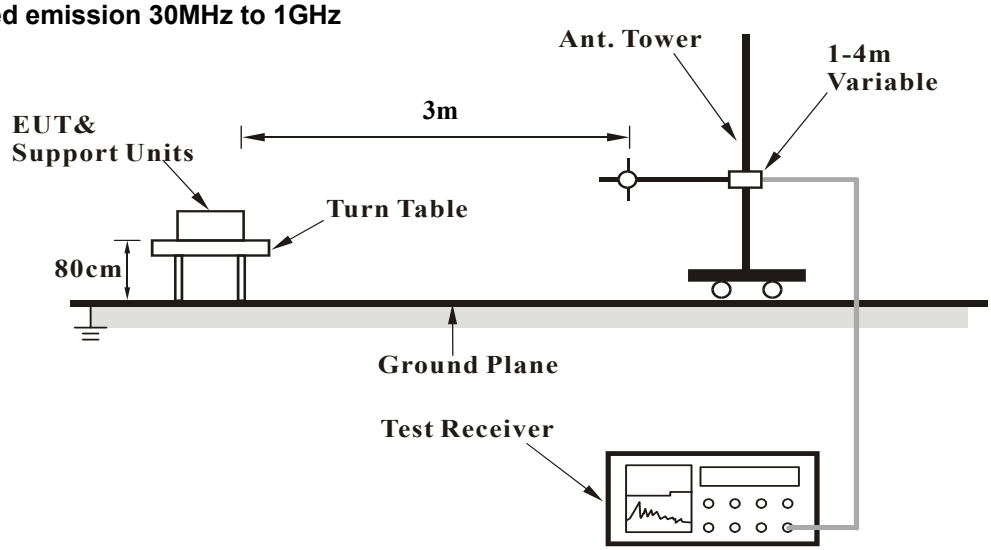
No deviation.

4.1.5 Test Setup

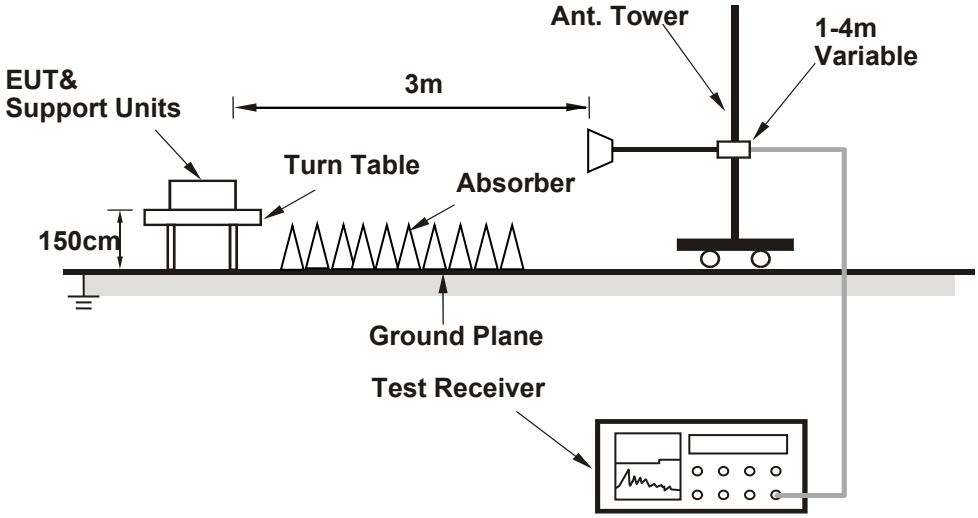
For Radiated emission below 30MHz



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

Mode A
a. The EUT powered by adapter.
b. Prepared a notebook to act as a communication partner and placed it outside of testing area.
c. The communication partner connected with EUT via USB cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.

Mode B
a. The EUT powered by cradle.
b. Prepared a notebook to act as a communication partner and placed it outside of testing area.
c. The communication partner connected with EUT via LAN cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.

Mode C
a. The EUT powered by cradle.
b. The EUT under transmission condition continuously at specific channel frequency.

Mode D
a. The EUT powered by cradle.
b. The EUT communicated with monitor via HDMI cables and transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1 GHz Data：

802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	45.35	40.85	4.5	54	-8.65	104	67	Average
2390	64.42	59.92	4.5	74	-9.58	104	67	Peak
2412	109.59	105.04	4.55			104	67	Average
2412	111.42	106.87	4.55			104	67	Peak
4824	43.04	32.75	10.29	54	-10.96	184	236	Average
4824	49.31	39.02	10.29	74	-24.69	184	236	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	42.5	38	4.5	54	-11.5	300	112	Average
2390	59.89	55.39	4.5	74	-14.11	300	112	Peak
2412	105.56	101.01	4.55			300	112	Average
2412	107.65	103.1	4.55			300	112	Peak
4824	42.41	32.12	10.29	54	-11.59	259	178	Average
4824	48.8	38.51	10.29	74	-25.2	259	178	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	43.05	38.55	4.5	54	-10.95	104	67	Average
2390	61	56.5	4.5	74	-13	104	67	Peak
2437	108.32	103.73	4.59			104	67	Average
2437	110	105.41	4.59			104	67	Peak
2483.5	42.6	37.94	4.66	54	-11.4	104	67	Average
2483.5	59.7	55.04	4.66	74	-14.3	104	67	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	41	36.5	4.5	54	-13	300	112	Average
2390	54.36	49.86	4.5	74	-19.64	300	112	Peak
2437	104.41	99.82	4.59			300	112	Average
2437	106.2	101.61	4.59			300	112	Peak
2483.5	41.98	37.32	4.66	54	-12.02	300	112	Average
2483.5	56.98	52.32	4.66	74	-17.02	300	112	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	108.67	104.05	4.62			104	67	Average
2462	110.95	106.33	4.62			104	67	Peak
2483.5	43.59	38.93	4.66	54	-10.41	104	67	Average
2483.5	62.52	57.86	4.66	74	-11.48	104	67	Peak
4924	42.48	32.23	10.25	54	-11.52	136	122	Average
4924	48.7	38.45	10.25	74	-25.3	136	122	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	104.16	99.54	4.62			300	112	Average
2462	106.04	101.42	4.62			300	112	Peak
2483.5	42.61	37.95	4.66	54	-11.39	300	112	Average
2483.5	58.2	53.54	4.66	74	-15.8	300	112	Peak
4924	42.26	32.01	10.25	54	-11.74	223	56	Average
4924	48.58	38.33	10.25	74	-25.42	223	56	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

802.11g

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	52.09	47.59	4.5	54	-1.91	105	66	Average
2390	67.53	63.03	4.5	74	-6.47	104	67	Peak
2412	104.24	99.69	4.55			104	67	Average
2412	111.1	106.55	4.55			104	67	Peak
4824	42.74	32.45	10.29	54	-11.26	250	131	Average
4824	49.15	38.86	10.29	74	-24.85	250	131	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	45.1	40.6	4.5	54	-8.9	300	112	Average
2390	60.75	56.25	4.5	74	-13.25	300	112	Peak
2412	100.33	95.78	4.55			300	112	Average
2412	107.38	102.83	4.55			300	112	Peak
4824	43.29	33	10.29	54	-10.71	276	153	Average
4824	49.66	39.37	10.29	74	-24.34	276	153	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	**52.96**	**48.46**	**4.5**	**54**	**-1.04**	**103**	**68**	**Average**
2390	66.46	61.96	4.5	74	-7.54	103	68	Peak
2437	109.59	105	4.59			104	67	Average
2437	116.95	112.36	4.59			104	67	Peak
2483.5	49.38	44.72	4.66	54	-4.62	104	67	Average
2483.5	66.75	62.09	4.66	74	-7.25	104	67	Peak
4874	41.44	31.23	10.21	54	-12.56	105	324	Average
4874	48.3	38.09	10.21	74	-25.7	105	324	Peak
7311	52.06	39.6	12.46	54	-1.94	198	247	Average
7311	61.56	49.1	12.46	74	-12.44	198	247	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	46.47	41.97	4.5	54	-7.53	300	112	Average
2390	60.26	55.76	4.5	74	-13.74	300	112	Peak
2437	105.84	101.25	4.59			300	112	Average
2437	112.59	108	4.59			300	112	Peak
2483.5	47.85	43.19	4.66	54	-6.15	300	112	Average
2483.5	60.7	56.04	4.66	74	-13.3	300	112	Peak
4874	41.2	30.99	10.21	54	-12.8	174	208	Average
4874	48.14	37.93	10.21	74	-25.86	174	208	Peak
7311	51.23	38.77	12.46	54	-2.77	192	220	Average
7311	60.65	48.19	12.46	74	-13.35	192	220	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	105.86	101.24	4.62			104	67	Average
2462	112.38	107.76	4.62			104	67	Peak
2483.5	52.5	47.84	4.66	54	-1.5	106	111	Average
2483.5	66.58	61.92	4.66	74	-7.42	106	111	Peak
4924	42.55	32.3	10.25	54	-11.45	167	117	Average
4924	48.73	38.48	10.25	74	-25.27	167	117	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	101.43	96.81	4.62			300	112	Average
2462	108.76	104.14	4.62			300	112	Peak
2483.5	47.84	43.18	4.66	54	-6.16	300	112	Average
2483.5	59.47	54.81	4.66	74	-14.53	300	112	Peak
4924	42.69	32.44	10.25	54	-11.31	231	284	Average
4924	48.96	38.71	10.25	74	-25.04	231	284	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

802.11n (HT20)

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	51.31	46.81	4.5	54	-2.69	105	66	Average
2390	62.8	58.3	4.5	74	-11.2	105	66	Peak
2412	102.15	97.6	4.55			104	67	Average
2412	109.52	104.97	4.55			104	67	Peak
4824	42.39	32.1	10.29	54	-11.61	251	174	Average
4824	49.03	38.74	10.29	74	-24.97	251	174	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	44.41	39.91	4.5	54	-9.59	300	112	Average
2390	54.83	50.33	4.5	74	-19.17	300	112	Peak
2412	98.66	94.11	4.55			300	112	Average
2412	105.76	101.21	4.55			300	112	Peak
4824	42.37	32.08	10.29	54	-11.63	129	140	Average
4824	48.79	38.5	10.29	74	-25.21	129	140	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	52.45	47.95	4.5	54	-1.55	105	64	Average
2390	66.53	62.03	4.5	74	-7.47	105	64	Peak
2437	107.84	103.25	4.59			104	67	Average
2437	114.17	109.58	4.59			104	67	Peak
2483.5	49.6	44.94	4.66	54	-4.4	104	67	Average
2483.5	66.77	62.11	4.66	74	-7.23	104	67	Peak
4874	41.26	31.05	10.21	54	-12.74	157	144	Average
4874	47.66	37.45	10.21	74	-26.34	157	144	Peak
7311	50.58	38.12	12.46	54	-3.42	198	247	Average
7311	60.71	48.25	12.46	74	-13.29	198	247	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	46.06	41.56	4.5	54	-7.94	300	112	Average
2390	60.08	55.58	4.5	74	-13.92	300	112	Peak
2437	103.29	98.7	4.59			300	112	Average
2437	110.83	106.24	4.59			300	112	Peak
2483.5	47.15	42.49	4.66	54	-6.85	300	112	Average
2483.5	61.44	56.78	4.66	74	-12.56	300	112	Peak
4874	41.46	31.25	10.21	54	-12.54	134	305	Average
4874	49.01	38.8	10.21	74	-24.99	134	305	Peak
7311	49.42	36.96	12.46	54	-4.58	192	220	Average
7311	59.3	46.84	12.46	74	-14.7	192	220	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	103.59	98.97	4.62			104	67	Average
2462	110.54	105.92	4.62			104	67	Peak
2483.5	52.48	47.82	4.66	54	-1.52	106	65	Average
2483.5	64.6	59.94	4.66	74	-9.4	106	65	Peak
4924	43.11	32.86	10.25	54	-10.89	194	265	Average
4924	49.37	39.12	10.25	74	-24.63	194	265	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	99.22	94.6	4.62			300	112	Average
2462	106.07	101.45	4.62			300	112	Peak
2483.5	47.2	42.54	4.66	54	-6.8	300	112	Average
2483.5	61.35	56.69	4.66	74	-12.65	300	112	Peak
4924	41.94	31.69	10.25	54	-12.06	152	107	Average
4924	48.29	38.04	10.25	74	-25.71	152	107	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

802.11n (HT40)

EUT Test Condition		Measurement Detail	
Channel	Channel 3	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	52.55	48.05	4.5	54	-1.45	105	66	Average
2390	61.08	56.58	4.5	74	-12.92	105	66	Peak
2422	96.77	92.21	4.56			104	67	Average
2422	103.58	99.02	4.56			104	67	Peak
2483.5	42.93	38.27	4.66	54	-11.07	104	67	Average
2483.5	57.87	53.21	4.66	74	-16.13	104	67	Peak
4824	43.06	32.77	10.29	54	-10.94	118	16	Average
4824	49.38	39.09	10.29	74	-24.62	118	16	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	46.4	41.9	4.5	54	-7.6	300	112	Average
2390	56.42	51.92	4.5	74	-17.58	300	112	Peak
2422	92.46	87.9	4.56			300	112	Average
2422	99.57	95.01	4.56			300	112	Peak
2483.5	42.14	37.48	4.66	54	-11.86	300	112	Average
2483.5	55.26	50.6	4.66	74	-18.74	300	112	Peak
4824	42.26	31.97	10.29	54	-11.74	184	117	Average
4824	48.5	38.21	10.29	74	-25.5	184	117	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2422 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	52.44	47.94	4.5	54	-1.56	104	67	Average
2390	65.8	61.3	4.5	74	-8.2	104	67	Peak
2437	100.44	95.85	4.59			104	67	Average
2437	107.83	103.24	4.59			104	67	Peak
2483.5	49.45	44.79	4.66	54	-4.55	104	67	Average
2483.5	64.08	59.42	4.66	74	-9.92	104	67	Peak
4874	42.54	32.33	10.21	54	-11.46	136	84	Average
4874	48.82	38.61	10.21	74	-25.18	136	84	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	46.32	41.82	4.5	54	-7.68	300	112	Average
2390	61.37	56.87	4.5	74	-12.63	300	112	Peak
2437	97.43	92.84	4.59			300	112	Average
2437	104.3	99.71	4.59			300	112	Peak
2483.5	48.35	43.69	4.66	54	-5.65	300	112	Average
2483.5	62.85	58.19	4.66	74	-11.15	300	112	Peak
4874	42.37	32.16	10.21	54	-11.63	182	156	Average
4874	48.62	38.41	10.21	74	-25.38	182	156	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 9	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	44.27	39.77	4.5	54	-9.73	104	67	Average
2390	62.14	57.64	4.5	74	-11.86	104	67	Peak
2452	97.66	93.06	4.6			104	67	Average
2452	104.73	100.13	4.6			104	67	Peak
2483.5	52.1	47.44	4.66	54	-1.9	108	109	Average
2483.5	62.58	57.92	4.66	74	-11.42	108	109	Peak
4904	41.76	31.62	10.14	54	-12.24	263	93	Average
4904	48.07	37.93	10.14	74	-25.93	263	93	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	41.83	37.33	4.5	54	-12.17	300	112	Average
2390	56.29	51.79	4.5	74	-17.71	300	112	Peak
2452	93.57	88.97	4.6			300	112	Average
2452	100.13	95.53	4.6			300	112	Peak
2483.5	47.29	42.63	4.66	54	-6.71	300	112	Average
2483.5	59.19	54.53	4.66	74	-14.81	300	112	Peak
4904	41.92	31.78	10.14	54	-12.08	174	102	Average
4904	48.32	38.18	10.14	74	-25.68	174	102	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2452 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

9 kHz ~ 30 MHz Data:

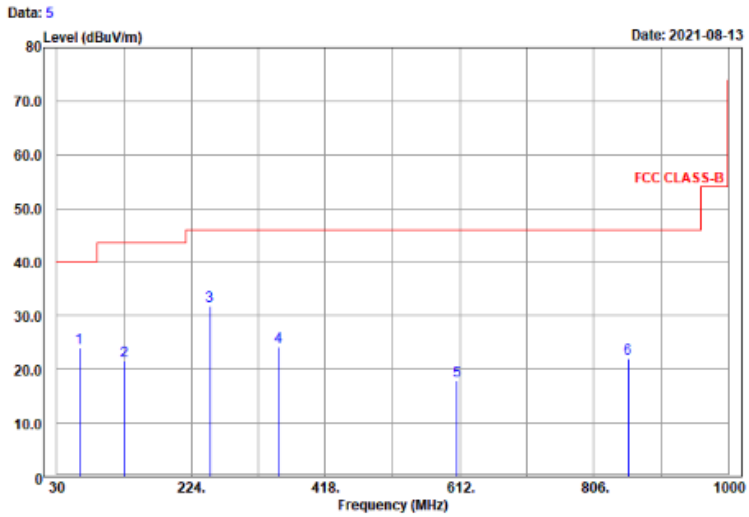
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Worst-Case Data:

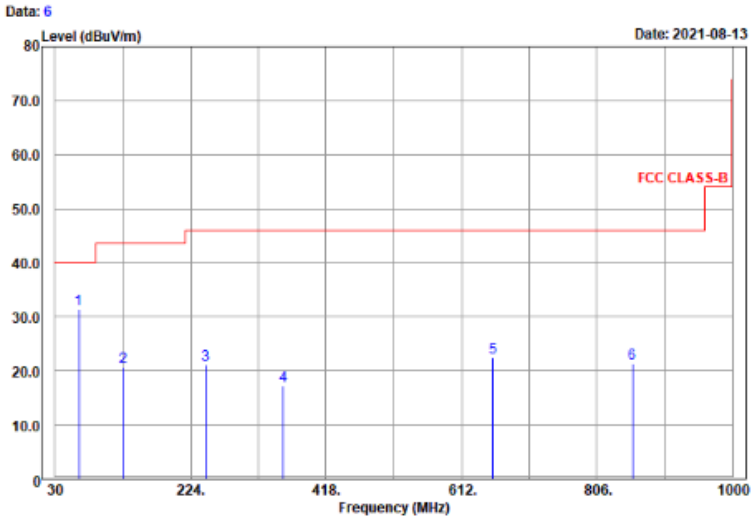
802.11g

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee
Test Mode	A		

Horizontal



Vertical



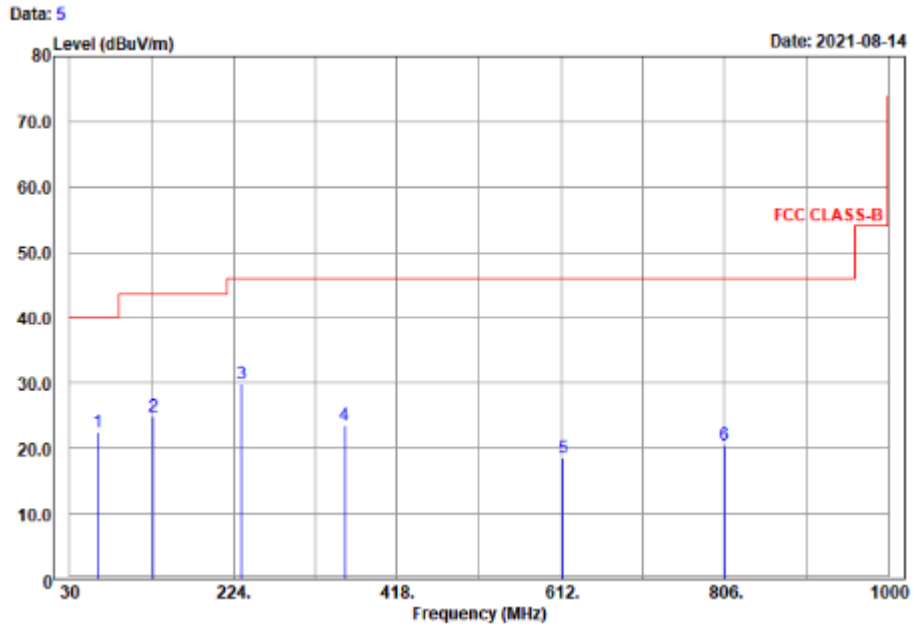
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
62.84	24.07	41.04	-16.97	40	-15.93	136	327	QP
127.45	21.49	41.68	-20.19	43.5	-22.01	128	199	QP
251.56	31.75	48.57	-16.82	46	-14.25	126	278	QP
350.62	24.23	38.94	-14.71	46	-21.77	152	127	QP
608.46	17.82	28.3	-10.48	46	-28.18	126	37	QP
855.25	22.09	28.76	-6.67	46	-23.91	271	131	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
63.82	31.46	48.7	-17.24	40	-8.54	129	236	QP
127.59	20.64	40.92	-20.28	43.5	-22.86	159	253	QP
246.38	21.08	37.99	-16.91	46	-24.92	112	176	QP
356.74	17.21	31.84	-14.63	46	-28.79	118	268	QP
657.41	22.51	32.43	-9.92	46	-23.49	206	182	QP
856.79	21.36	28.01	-6.65	46	-24.64	142	172	QP

Remarks:

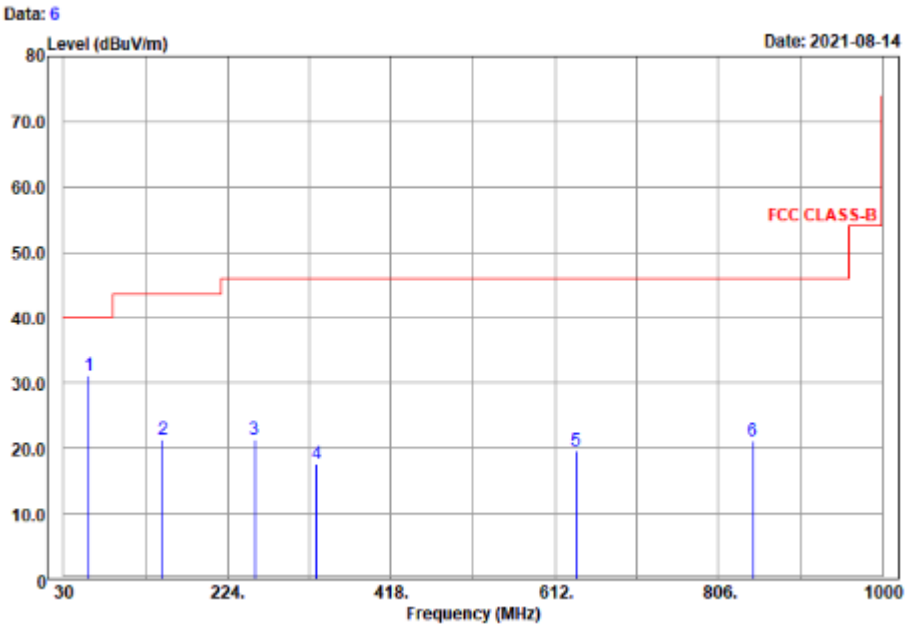
1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value.
2. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee
Test Mode	B		

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
63.2	22.49	39.46	-16.97	40	-17.51	207	121	QP
128.69	24.84	45.23	-20.39	43.5	-18.66	196	285	QP
233.69	29.84	47.12	-17.28	46	-16.16	126	207	QP
356.28	23.46	38.1	-14.64	46	-22.54	198	125	QP
614.83	18.47	28.82	-10.35	46	-27.53	102	61	QP
806.34	20.58	28.1	-7.52	46	-25.42	117	216	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
59.72	31.24	47.38	-16.14	40	-8.76	126	263	QP
147.25	21.36	42.36	-21	43.5	-22.14	211	264	QP
256.13	21.29	38.02	-16.73	46	-24.71	132	187	QP
329.48	17.58	32.86	-15.28	46	-28.42	131	20	QP
637.59	19.57	29.89	-10.32	46	-26.43	239	236	QP
847.26	21.17	28.01	-6.84	46	-24.83	210	261	QP

Remarks:

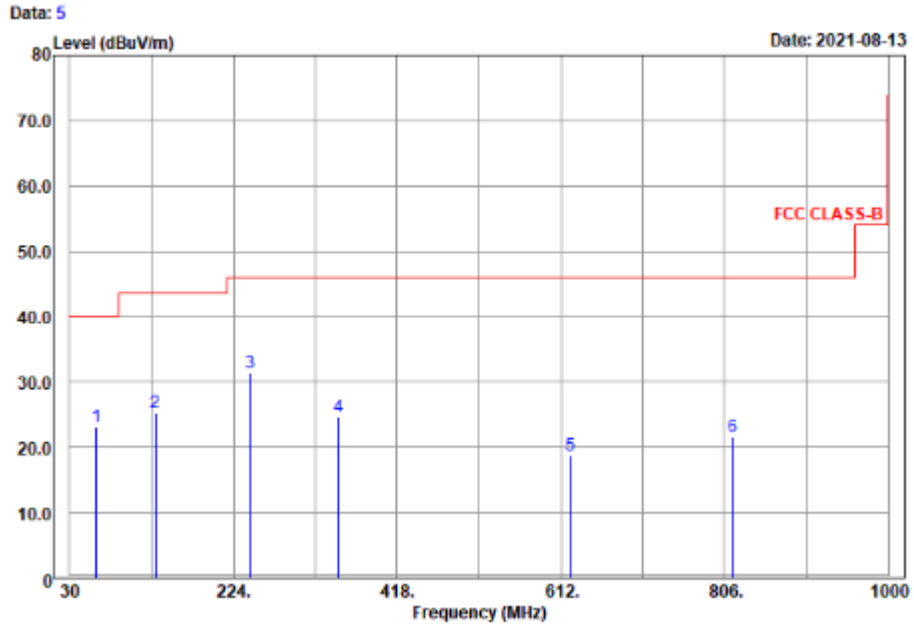
1. Emission Level = Read Level + Factor

   Margin value = Emission level – Limit value.

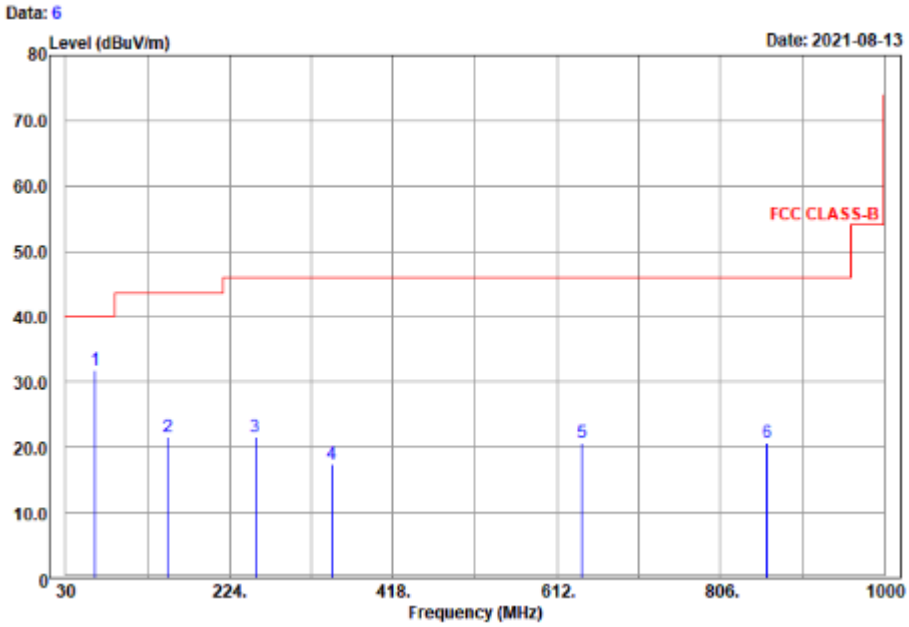
2. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee
Test Mode	C		

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
61.75	23.16	39.85	-16.69	40	-16.84	223	81	QP
131.56	25.24	45.79	-20.55	43.5	-18.26	216	327	QP
243.63	31.41	48.38	-16.97	46	-14.59	131	245	QP
348.15	24.74	39.5	-14.76	46	-21.26	231	70	QP
623.28	18.74	29.09	-10.35	46	-27.26	135	226	QP
815.74	21.65	29.08	-7.43	46	-24.35	225	125	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
64.92	31.74	49.25	-17.51	40	-8.26	136	208	QP
151.17	21.53	42.47	-20.94	43.5	-21.97	226	71	QP
254.64	21.52	38.26	-16.74	46	-24.48	142	201	QP
346.28	17.51	32.31	-14.8	46	-28.49	120	174	QP
642.28	20.63	30.88	-10.25	46	-25.37	241	182	QP
861.46	20.8	27.34	-6.54	46	-25.2	161	73	QP

Remarks:

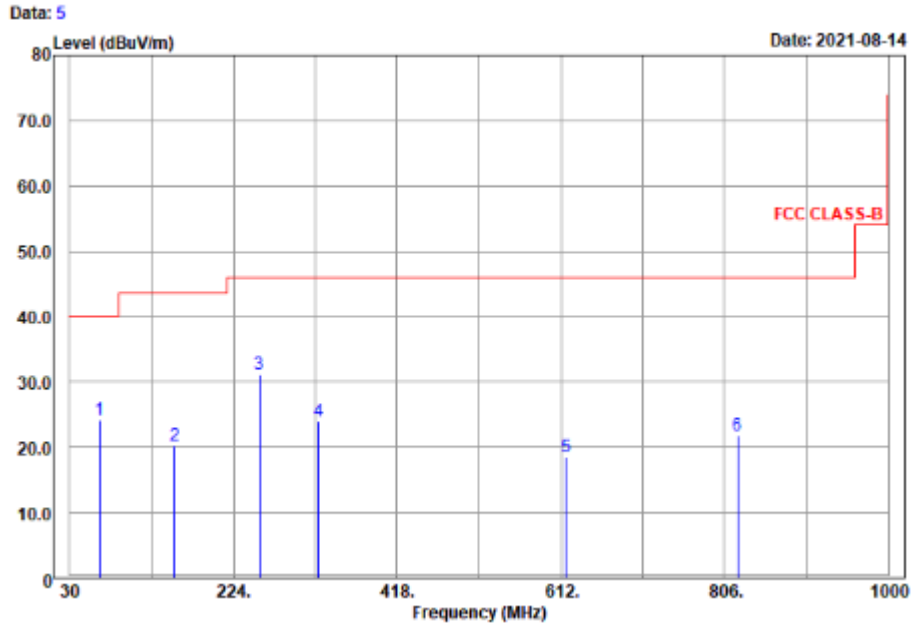
1. Emission Level = Read Level + Factor

   Margin value = Emission level – Limit value.

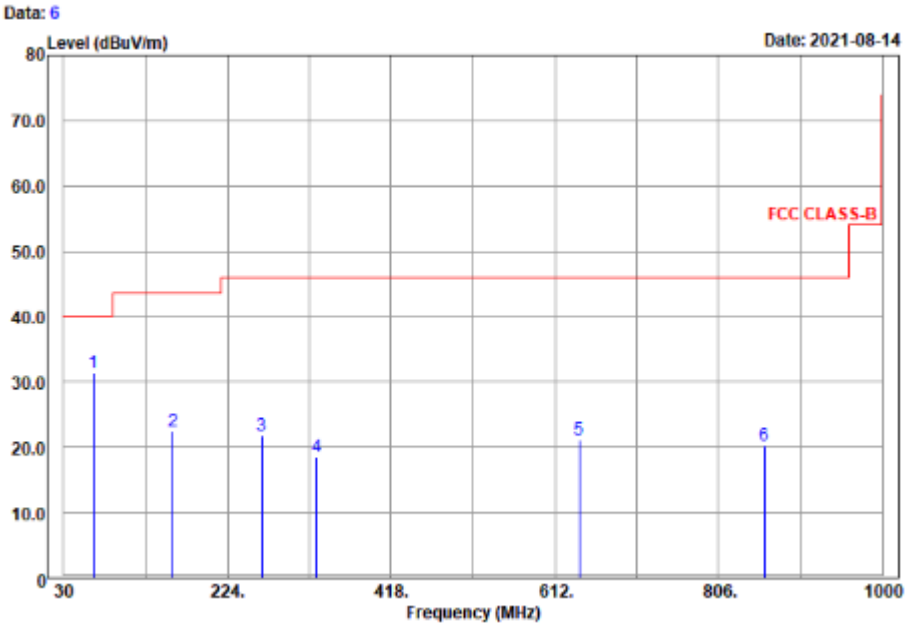
2. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee
Test Mode	D		

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
65.87	24.12	42.04	-17.92	40	-15.88	126	257	QP
154.15	20.36	41.19	-20.83	43.5	-23.14	291	142	QP
254.62	31.28	48.06	-16.78	46	-14.72	112	75	QP
324.45	23.88	39.32	-15.44	46	-22.12	179	124	QP
618.56	18.47	28.79	-10.32	46	-27.53	182	206	QP
821.54	21.79	29.13	-7.34	46	-24.21	216	181	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
66.23	31.47	49.39	-17.92	40	-8.53	131	82	QP
159.56	22.48	43.07	-20.59	43.5	-21.02	207	164	QP
265.23	21.81	38.4	-16.59	46	-24.19	161	87	QP
329.62	18.47	33.75	-15.28	46	-27.53	162	180	QP
641.47	21.16	31.43	-10.27	46	-24.84	219	151	QP
860.77	20.26	26.82	-6.56	46	-25.74	164	258	QP

Remarks:

1. Emission Level = Read Level + Factor

   Margin value = Emission level – Limit value.

2. The emission levels of other frequencies were very low against the limit.

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.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Dec. 04, 2020	Dec. 03, 2021
RF signal cable Woken	5D-FB	Cable-cond1-01	Jan. 16, 2021	Jan. 15, 2022
LISN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 25, 2021	Feb. 24, 2022
V-LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 28, 2020	Aug. 27, 2021
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	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 HwaYa Shielded Room 1 (Conduction 1).
3. The VCCI Site Registration No. is C-12040.

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.

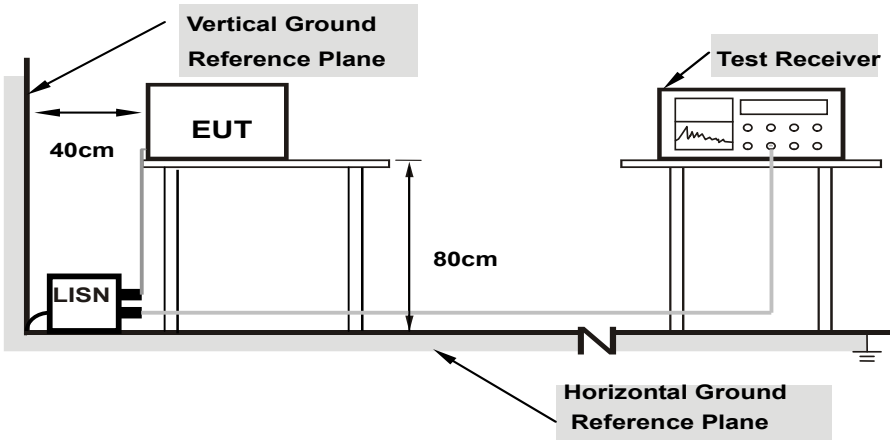
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

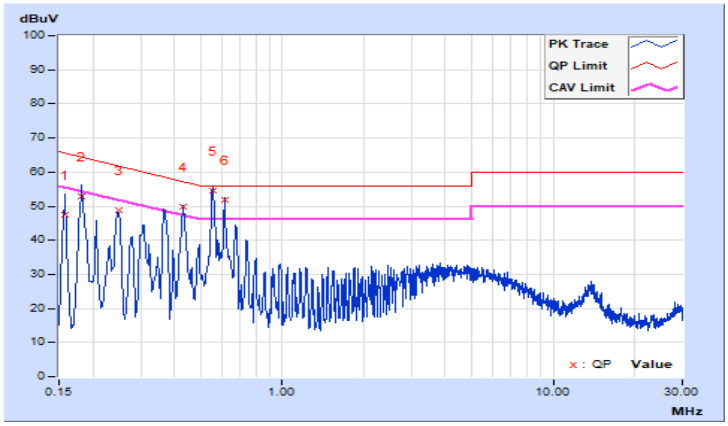
Worst-case data: 802.11g

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

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15800	9.71	37.85	10.62	47.56	20.33	65.57	55.57	-18.01	-35.24
2	0.18200	9.71	43.21	36.74	52.92	46.45	64.39	54.39	-11.47	-7.94
3	0.24810	9.71	39.05	32.47	48.76	42.18	61.82	51.82	-13.06	-9.64
4	0.43000	9.73	40.00	37.03	49.73	46.76	57.25	47.25	-7.52	-0.49
5	0.55704	9.74	44.70	35.79	54.44	45.53	56.00	46.00	-1.56	-0.47
6	**0.61400**	**9.74**	**42.07**	**36.09**	**51.81**	**45.83**	**56.00**	**46.00**	**-4.19**	**-0.17**

Remarks:

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

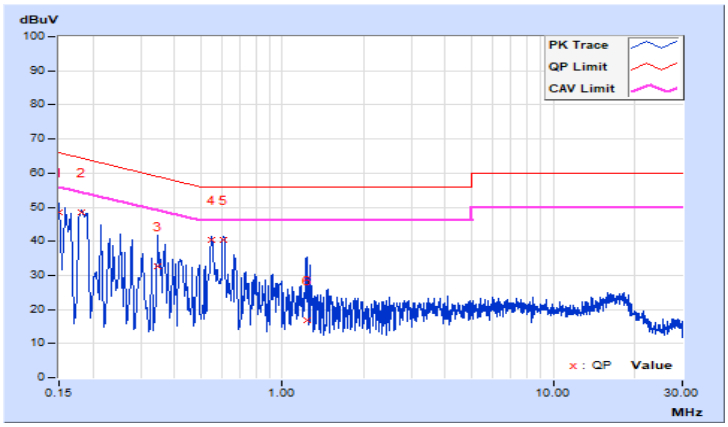


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.76	38.74	9.69	48.50	19.45	66.00	56.00	-17.50	-36.55
2	0.18180	9.77	38.62	27.31	48.39	37.08	64.40	54.40	-16.01	-17.32
3	0.34600	9.78	22.73	0.09	32.51	9.87	59.06	49.06	-26.55	-39.19
4	0.55000	9.80	30.65	25.12	40.45	34.92	56.00	46.00	-15.55	-11.08
5	0.60600	9.80	30.58	24.55	40.38	34.35	56.00	46.00	-15.62	-11.65
6	1.24084	9.82	7.16	1.74	16.98	11.56	56.00	46.00	-39.02	-34.44

Remarks:

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

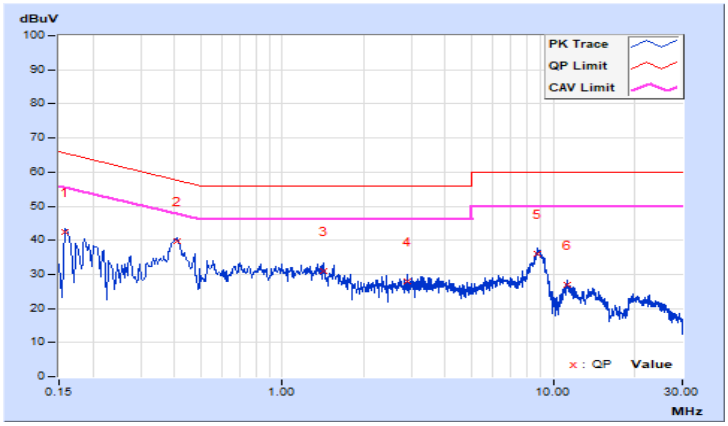


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15782	9.71	32.78	18.32	42.49	28.03	65.58	55.58	-23.09	-27.55
2	0.40800	9.73	30.03	22.52	39.76	32.25	57.69	47.69	-17.93	-15.44
3	1.41293	9.76	21.31	12.66	31.07	22.42	56.00	46.00	-24.93	-23.58
4	2.88309	9.78	18.03	8.01	27.81	17.79	56.00	46.00	-28.19	-28.21
5	8.69726	9.84	26.08	18.13	35.92	27.97	60.00	50.00	-24.08	-22.03
6	11.26222	9.85	17.15	8.62	27.00	18.47	60.00	50.00	-33.00	-31.53

Remarks:

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

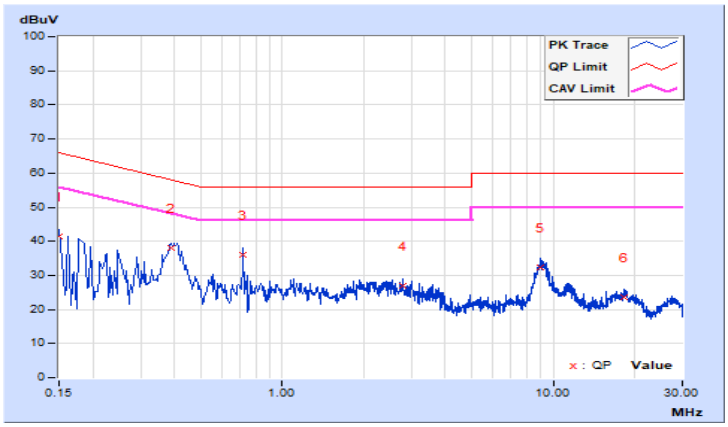


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.76	31.63	15.80	41.39	25.56	66.00	56.00	-24.61	-30.44
2	0.38808	9.79	28.20	20.38	37.99	30.17	58.10	48.10	-20.11	-17.93
3	0.71695	9.81	26.35	6.46	36.16	16.27	56.00	46.00	-19.84	-29.73
4	2.79316	9.84	17.10	9.18	26.94	19.02	56.00	46.00	-29.06	-26.98
5	9.02179	9.92	22.37	16.49	32.29	26.41	60.00	50.00	-27.71	-23.59
6	18.24157	9.98	13.67	7.29	23.65	17.27	60.00	50.00	-36.35	-32.73

Remarks:

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

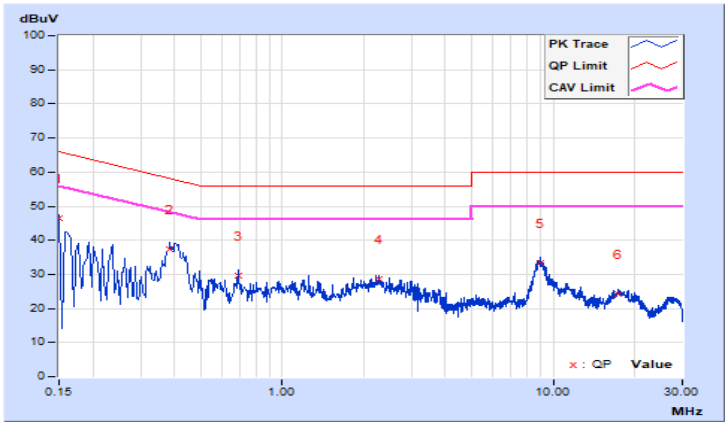


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	C		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.71	36.78	15.23	46.49	24.94	66.00	56.00	-19.51	-31.06
2	0.38460	9.73	27.66	21.02	37.39	30.75	58.18	48.18	-20.79	-17.43
3	0.68564	9.74	20.01	8.90	29.75	18.64	56.00	46.00	-26.25	-27.36
4	2.28095	9.77	18.76	8.61	28.53	18.38	56.00	46.00	-27.47	-27.62
5	8.93577	9.85	23.33	16.35	33.18	26.20	60.00	50.00	-26.82	-23.80
6	17.36182	9.83	14.50	6.97	24.33	16.80	60.00	50.00	-35.67	-33.20

Remarks:

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

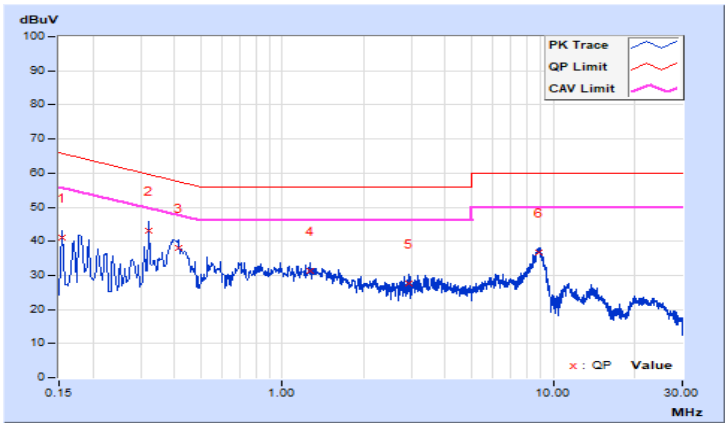


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	C		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	9.77	31.43	18.49	41.20	28.26	65.79	55.79	-24.59	-27.53
2	0.32204	9.78	33.43	13.66	43.21	23.44	59.65	49.65	-16.44	-26.21
3	0.41197	9.79	28.17	21.50	37.96	31.29	57.61	47.61	-19.65	-16.32
4	1.26044	9.82	21.43	12.13	31.25	21.95	56.00	46.00	-24.75	-24.05
5	2.92610	9.84	17.62	8.70	27.46	18.54	56.00	46.00	-28.54	-27.46
6	8.87712	9.92	26.94	18.86	36.86	28.78	60.00	50.00	-23.14	-21.22

Remarks:

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

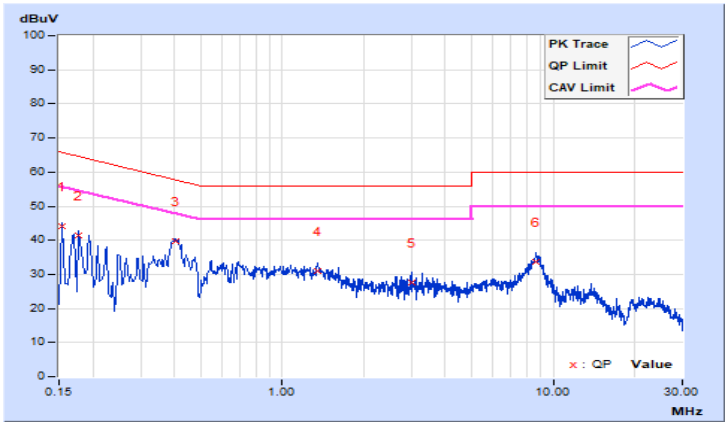


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	D		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	9.71	34.45	18.59	44.16	28.30	65.79	55.79	-21.63	-27.49
2	0.17737	9.71	31.73	17.35	41.44	27.06	64.61	54.61	-23.17	-27.55
3	0.40160	9.73	30.14	22.25	39.87	31.98	57.82	47.82	-17.95	-15.84
4	1.35428	9.76	21.05	12.64	30.81	22.40	56.00	46.00	-25.19	-23.60
5	2.99648	9.78	17.67	8.42	27.45	18.20	56.00	46.00	-28.55	-27.80
6	8.68944	9.84	23.80	16.69	33.64	26.53	60.00	50.00	-26.36	-23.47

Remarks:

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

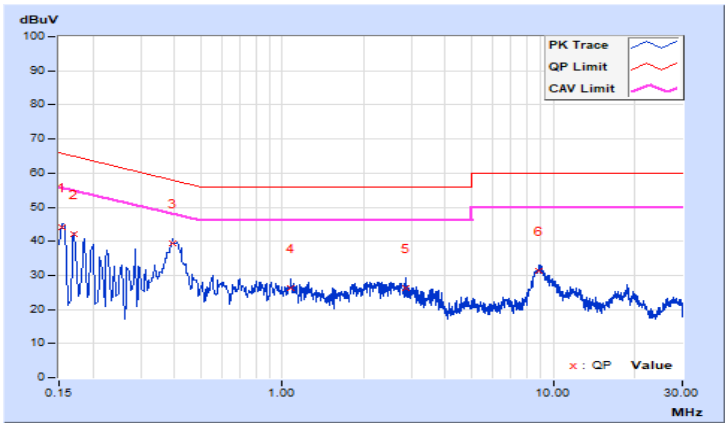


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	D		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	9.77	34.39	18.32	44.16	28.09	65.79	55.79	-21.63	-27.70
2	0.16955	9.77	32.41	13.34	42.18	23.11	64.98	54.98	-22.80	-31.87
3	0.39531	9.79	29.60	20.50	39.39	30.29	57.95	47.95	-18.56	-17.66
4	1.08058	9.82	16.36	7.49	26.18	17.31	56.00	46.00	-29.82	-28.69
5	2.85963	9.84	16.45	7.54	26.29	17.38	56.00	46.00	-29.71	-28.62
6	8.89667	9.92	21.39	14.67	31.31	24.59	60.00	50.00	-28.69	-25.41

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.

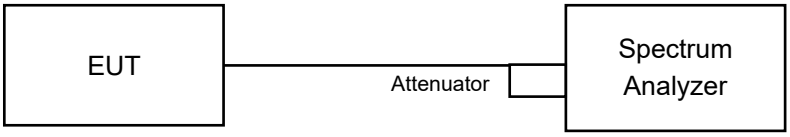


4.3 6dB Bandwidth Measurement

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		
1	2412	8.59	8.59	0.5	Pass
6	2437	9.08	9.02	0.5	Pass
11	2462	9.07	8.59	0.5	Pass

802.11g

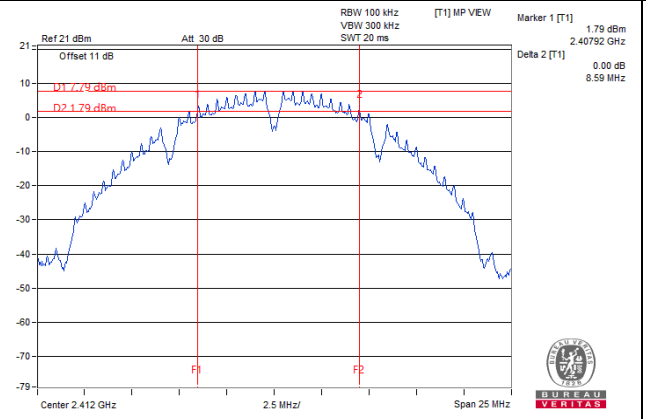
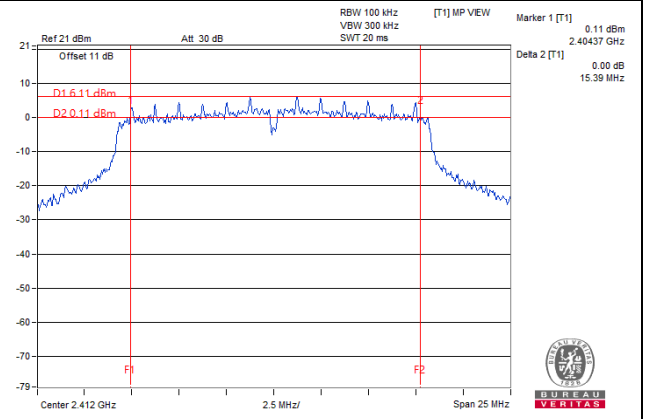
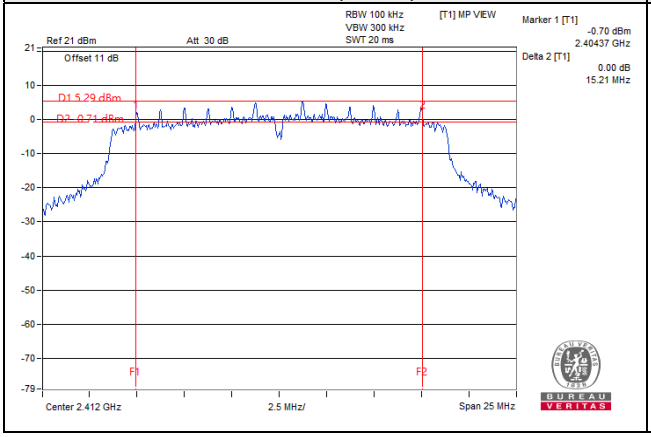
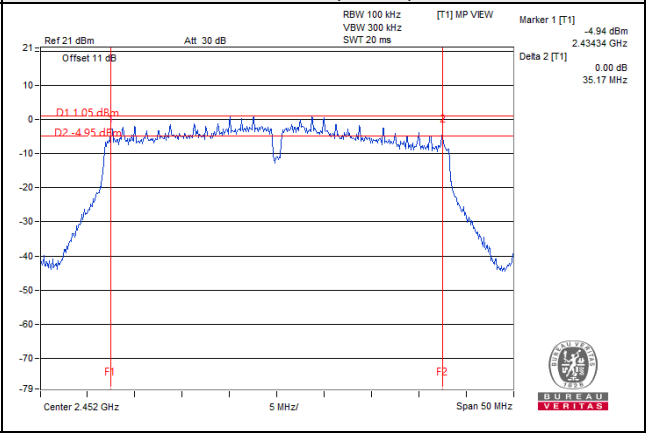
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	15.39	15.52	0.5	Pass
6	2437	16.33	16.08	0.5	Pass
11	2462	15.79	15.79	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	15.21	15.38	0.5	Pass
6	2437	17.55	17.08	0.5	Pass
11	2462	16.41	16.42	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	35.26	35.26	0.5	Pass
6	2437	36.43	36.46	0.5	Pass
9	2452	35.17	35.17	0.5	Pass

Spectrum Plot of Worst Value	
802.11b	802.11g
	
802.11n (HT20)	802.11n (HT40)
	

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

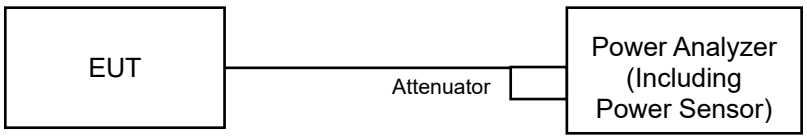
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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

802.11b

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	14.87	15.86	69.238	18.40	30	Pass
6	2437	14.77	15.55	65.884	18.19	30	Pass
11	2462	14.96	15.62	67.808	18.31	30	Pass

802.11g

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	15.12	16.02	72.503	18.60	30	Pass
6	2437	15.38	15.99	74.234	18.71	30	Pass
11	2462	15.65	16.21	78.511	18.95	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	14.27	14.57	55.372	17.43	30	Pass
6	2437	15.51	16.25	77.733	18.91	30	Pass
11	2462	15.65	16.27	**79.093**	18.98	30	Pass

802.11n (HT40)

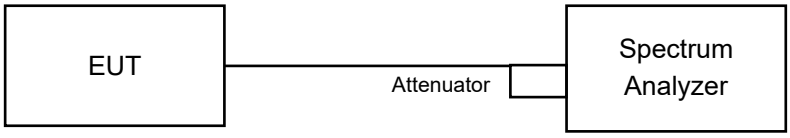
Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	10.87	11.53	26.441	14.22	30	Pass
6	2437	15.68	16.02	76.977	18.86	30	Pass
9	2452	12.08	12.62	34.425	15.37	30	Pass

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 band during any time interval of continuous transmission.

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 Average Power (Duty cycle ≥ 98%)
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 Average Power (Duty cycle < 98%)
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

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-16.56	3.01	-13.55	7.17	Pass
	6	2437	-16.69	3.01	-13.68	7.17	Pass
	11	2462	-17.00	3.01	-13.99	7.17	Pass
1	1	2412	-17.20	3.01	-14.19	7.17	Pass
	6	2437	-17.36	3.01	-14.35	7.17	Pass
	11	2462	-16.75	3.01	-13.74	7.17	Pass

Note:
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional Gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/2$] = 6.83dBi > 6dBi, so the power density limit shall be reduced to 8 - (6.83 - 6) = 7.17dBm.

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-19.26	3.01	-16.25	7.17	Pass
	6	2437	-18.90	3.01	-15.89	7.17	Pass
	11	2462	-18.12	3.01	-15.11	7.17	Pass
1	1	2412	-18.73	3.01	-15.72	7.17	Pass
	6	2437	-18.60	3.01	-15.59	7.17	Pass
	11	2462	-18.17	3.01	-15.16	7.17	Pass

Note:
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional Gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/2$] = 6.83dBi > 6dBi, so the power density limit shall be reduced to 8 - (6.83 - 6) = 7.17dBm.

802.11n (HT20)

TX chain	Channel	Freq. (MHz)	PSD W/O Duty Factor (dBm/3kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-20.27	3.01	0.13	-17.13	7.17	Pass
	6	2437	-19.22	3.01	0.13	-16.08	7.17	Pass
	11	2462	-19.35	3.01	0.13	-16.21	7.17	Pass
1	1	2412	-20.43	3.01	0.13	-17.29	7.17	Pass
	6	2437	-19.14	3.01	0.13	-16.00	7.17	Pass
	11	2462	-18.79	3.01	0.13	-15.65	7.17	Pass

Note:
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional Gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/2$] = 6.83dBi > 6dBi, so the power density limit shall be reduced to 8 - (6.83 - 6) = 7.17dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

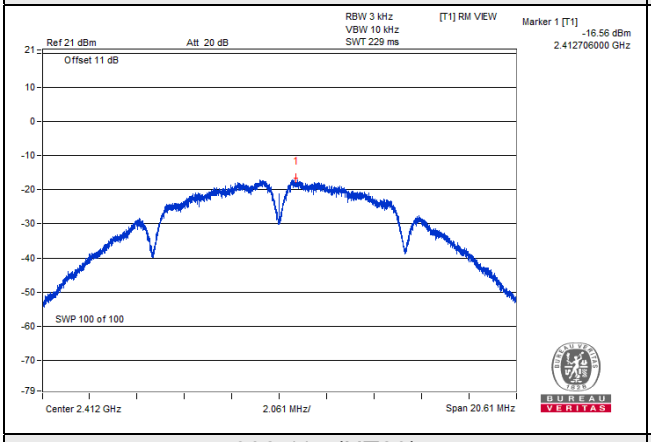
802.11n (HT40)

TX chain	Channel	Freq. (MHz)	PSD W/O Duty Factor (dBm/3kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	3	2422	-24.50	3.01	0.27	-21.22	7.17	Pass
	6	2437	-22.38	3.01	0.27	-19.10	7.17	Pass
	9	2452	-22.69	3.01	0.27	-19.41	7.17	Pass
1	3	2422	-24.35	3.01	0.27	-21.07	7.17	Pass
	6	2437	-22.42	3.01	0.27	-19.14	7.17	Pass
	9	2452	-22.75	3.01	0.27	-19.47	7.17	Pass

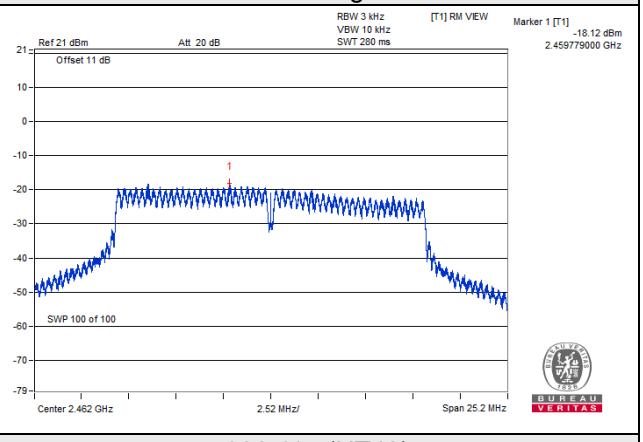
Note:
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional Gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/2$] = 6.83dBi > 6dBi, so the power density limit shall be reduced to 8 - (6.83 - 6) = 7.17dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

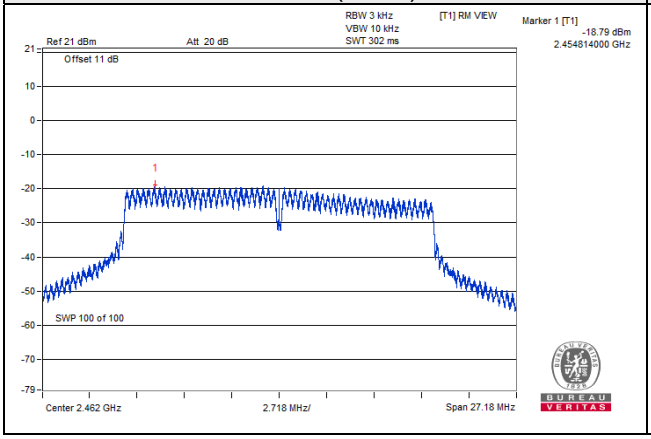
802.11b



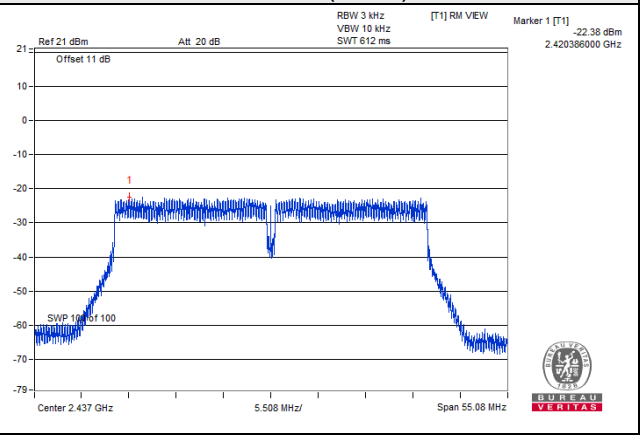
802.11g



802.11n (HT20)



802.11n (HT40)

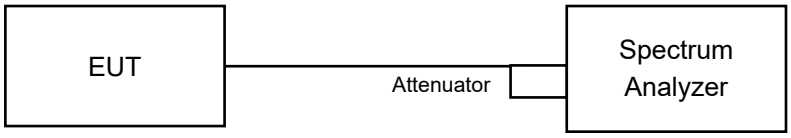


4.6 Conducted Out of Band Emission Measurement

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

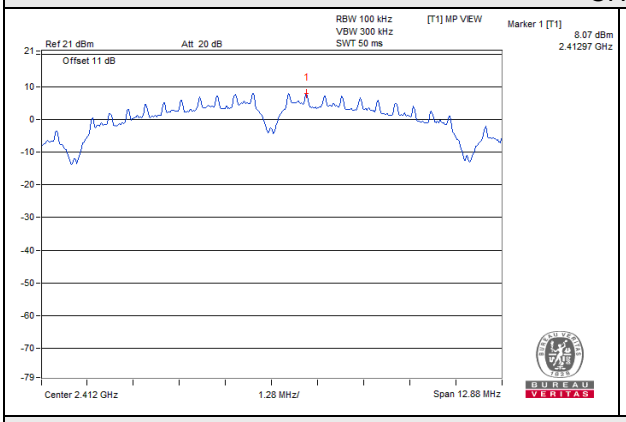
Same as item 4.3.6.

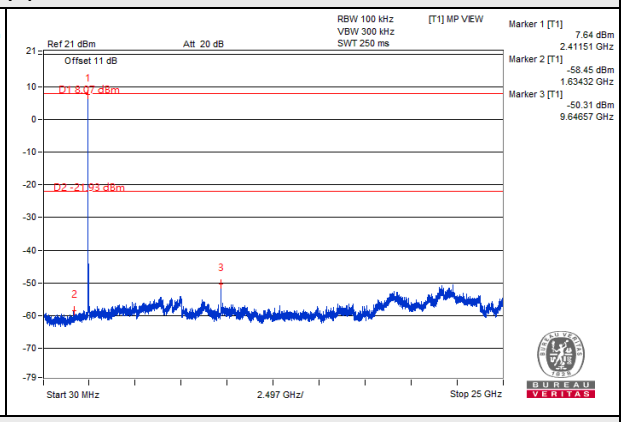
4.6.7 Test Results

The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

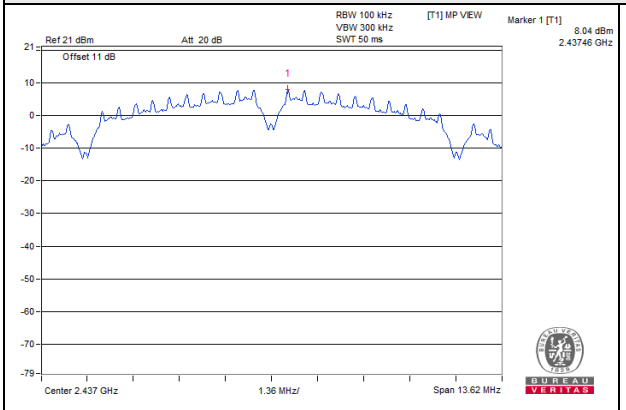
802.11b_Chain 0

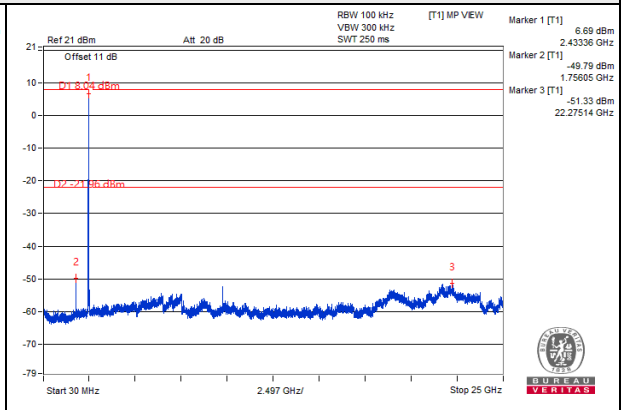
CH 1



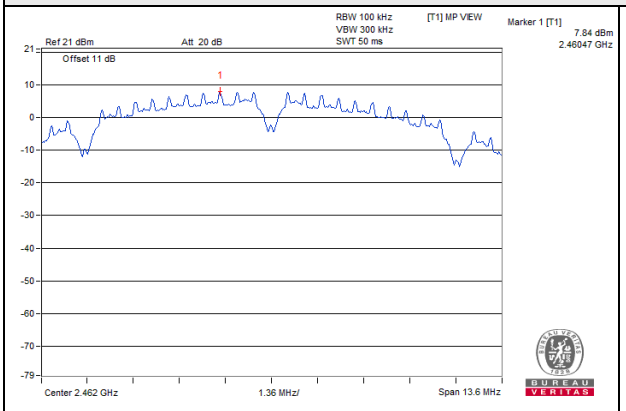


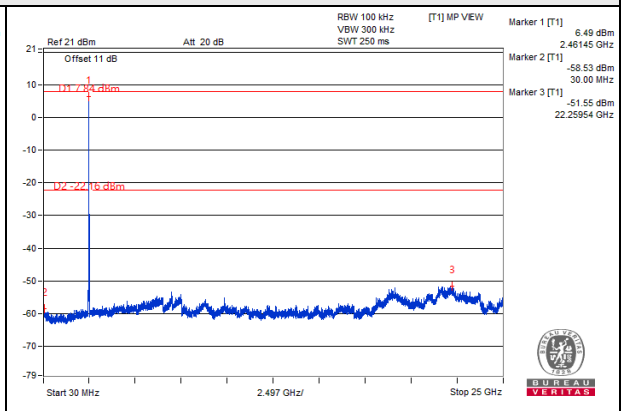
CH 6



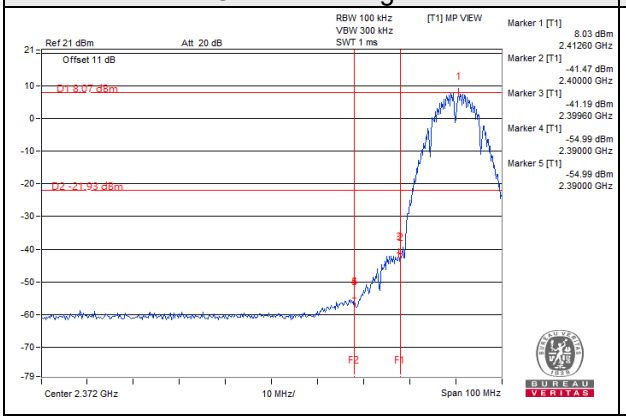


CH 11

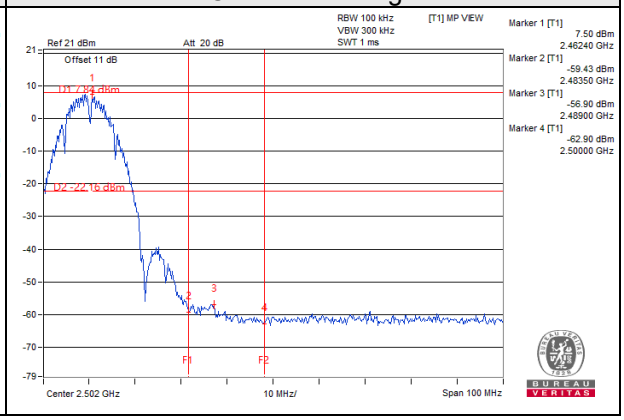




CH 1 Band edge

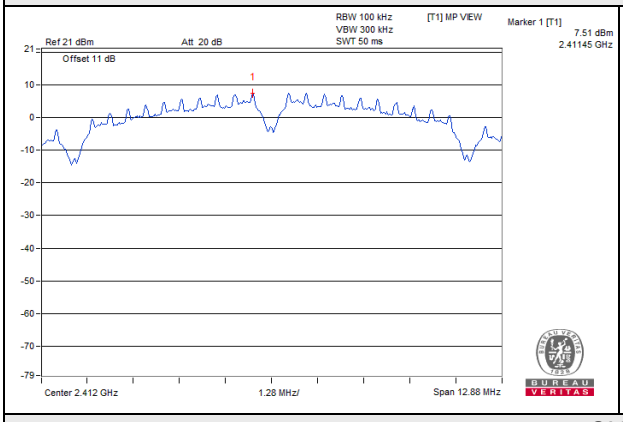


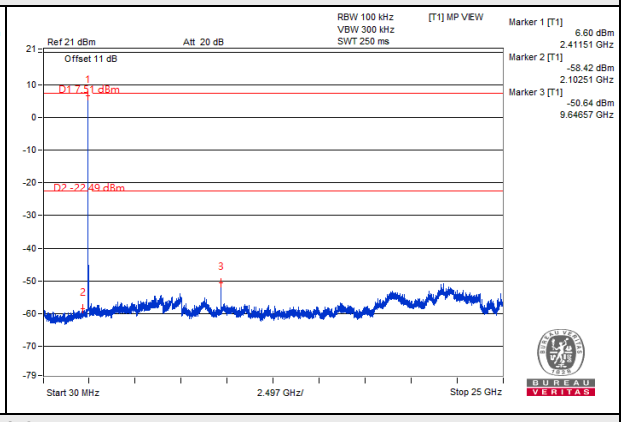
CH 11 Band edge



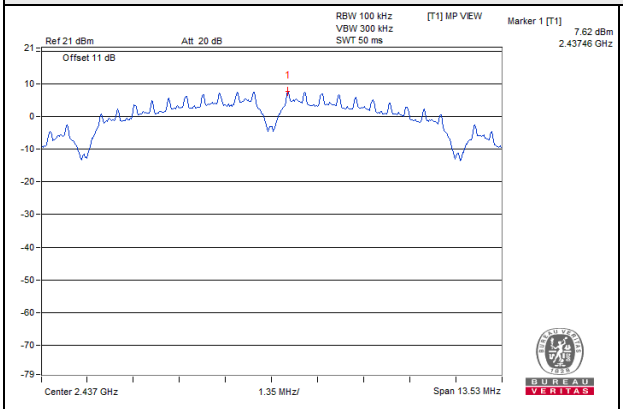
802.11b_Chain 1

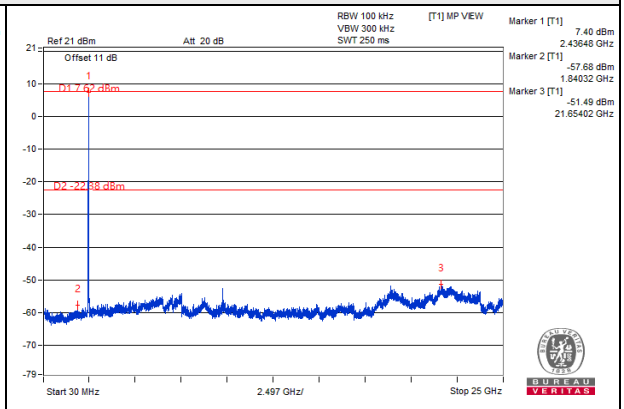
CH 1



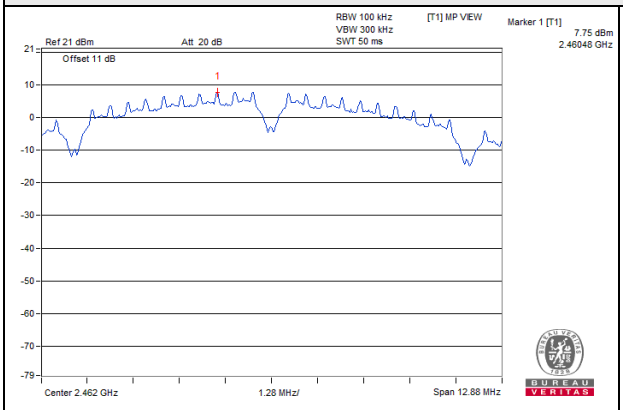


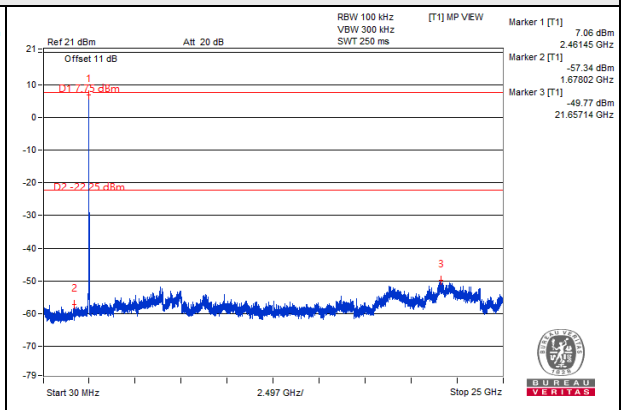
CH 6



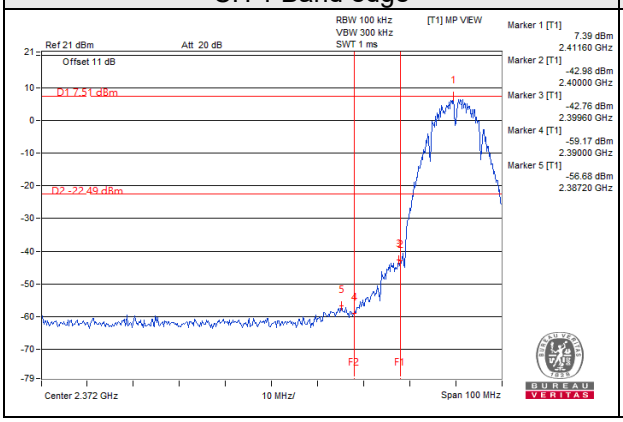


CH 11

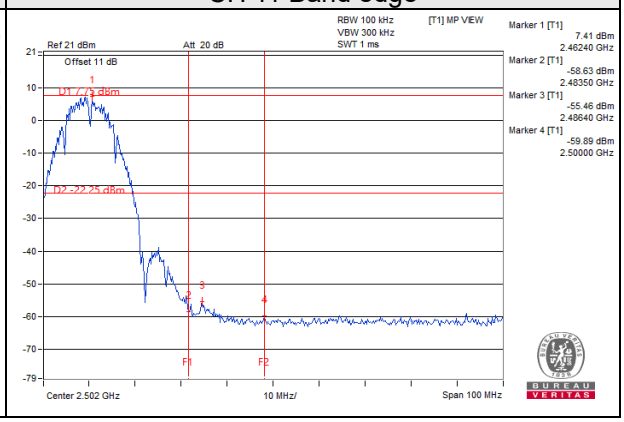




CH 1 Band edge

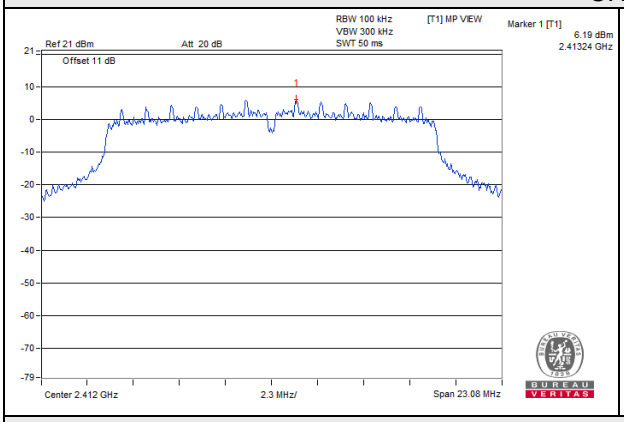


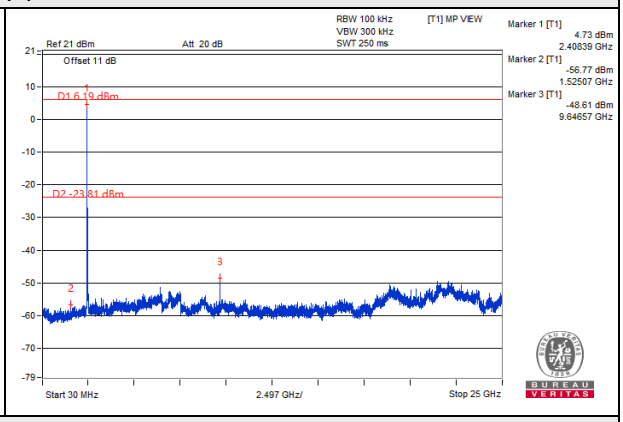
CH 11 Band edge



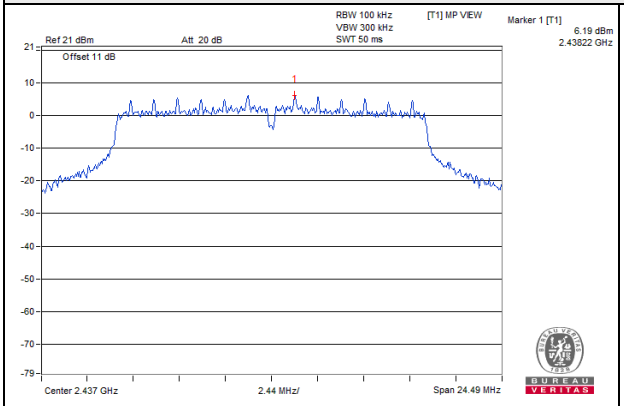
802.11g_Chain 0

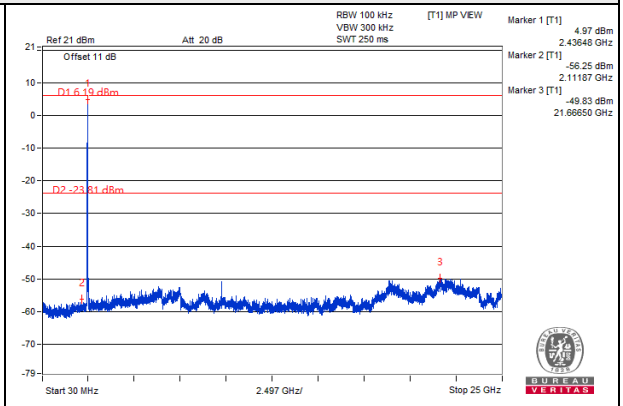
CH 1



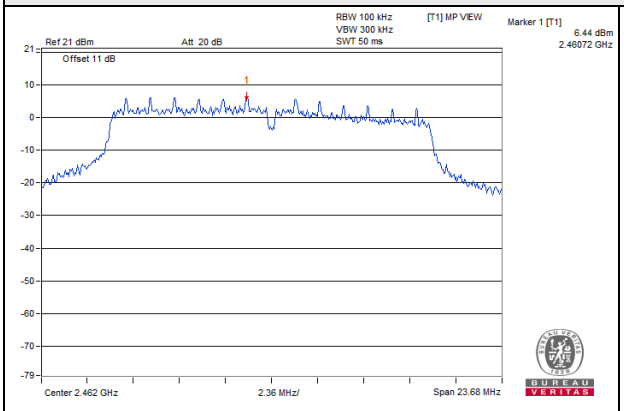


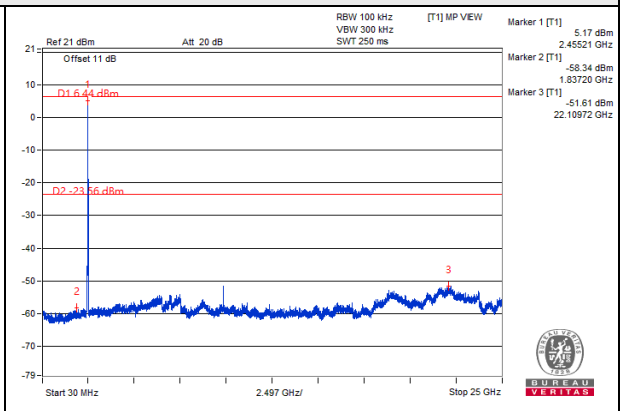
CH 6



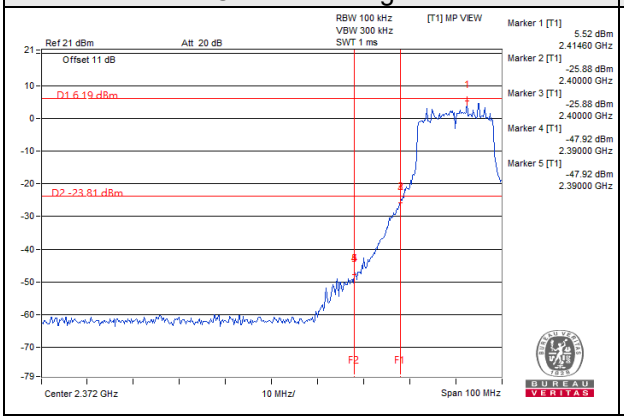


CH 11

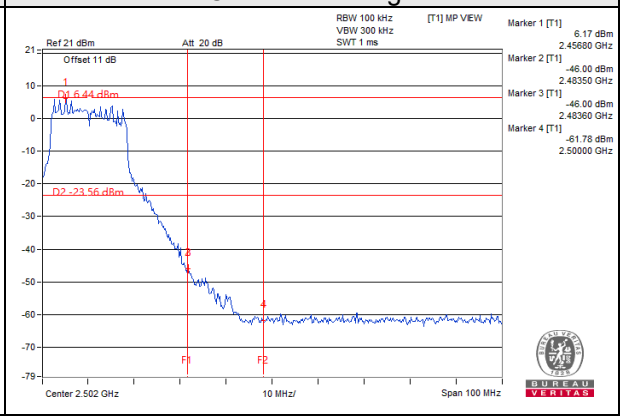




CH 1 Band edge

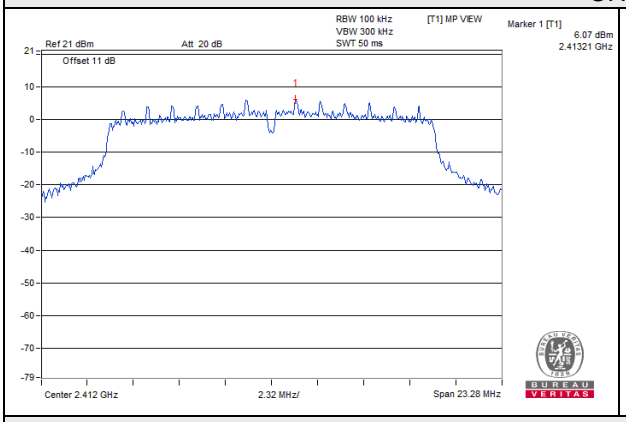


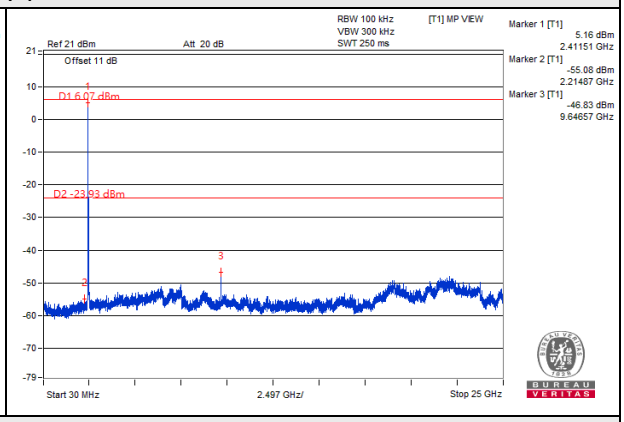
CH 11 Band edge



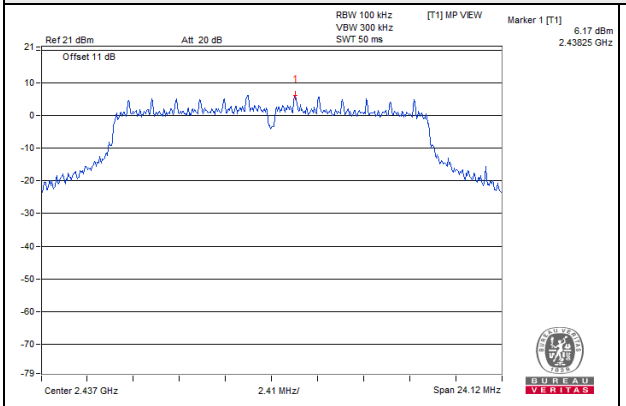
802.11g_Chain 1

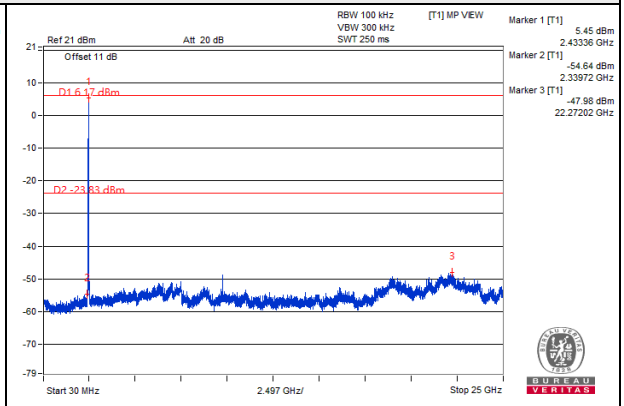
CH 1



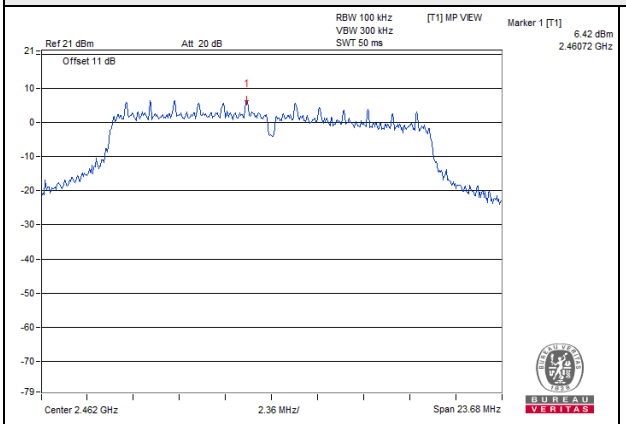


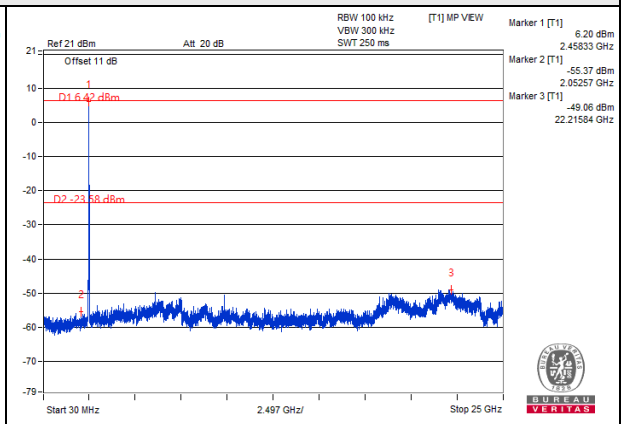
CH 6



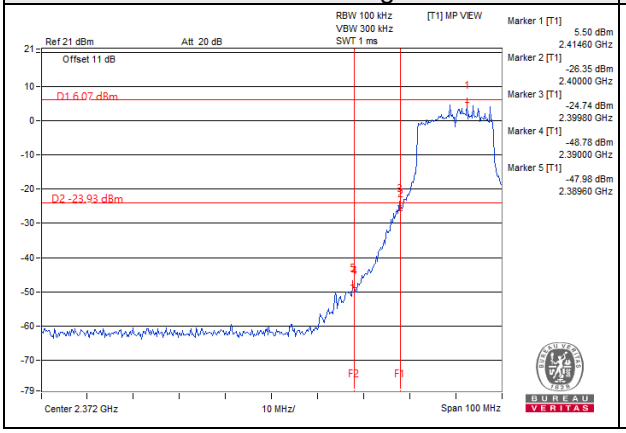


CH 11

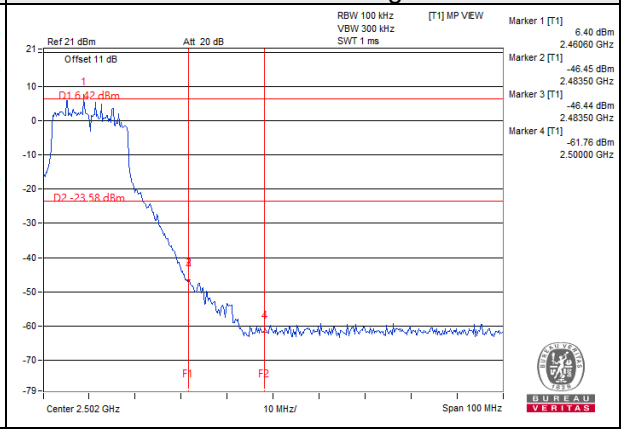




CH 1 Band edge

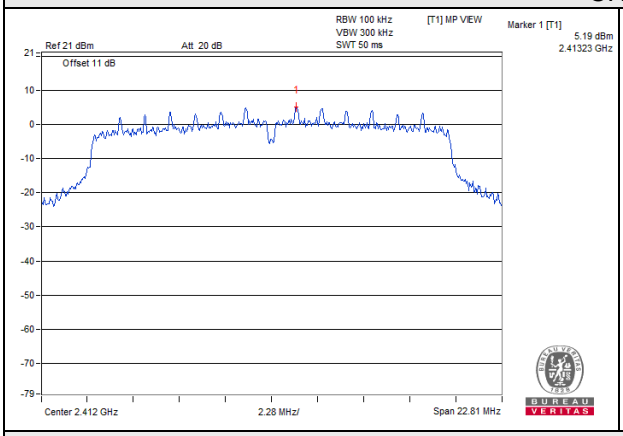


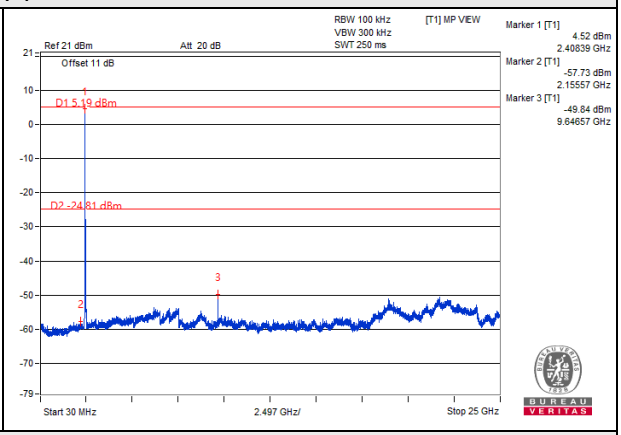
CH 11 Band edge



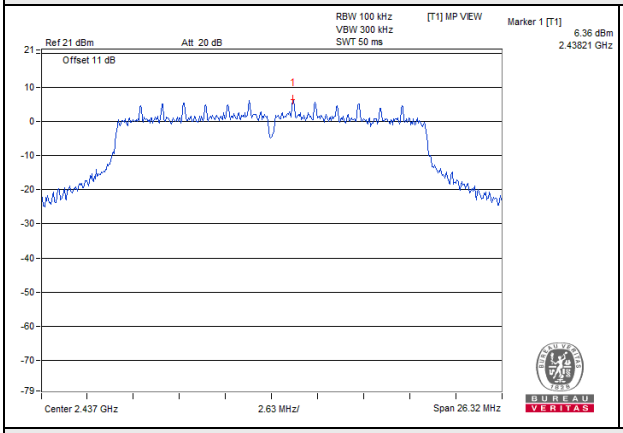
802.11n (HT20)_Chain 0

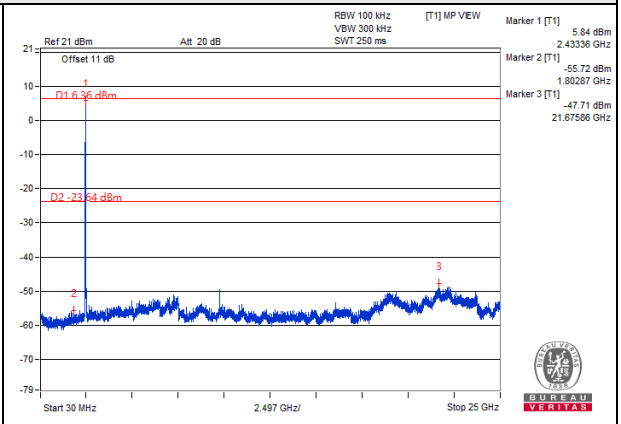
CH 1



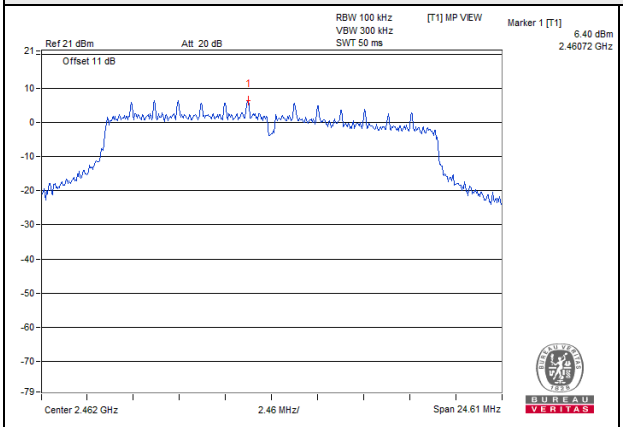


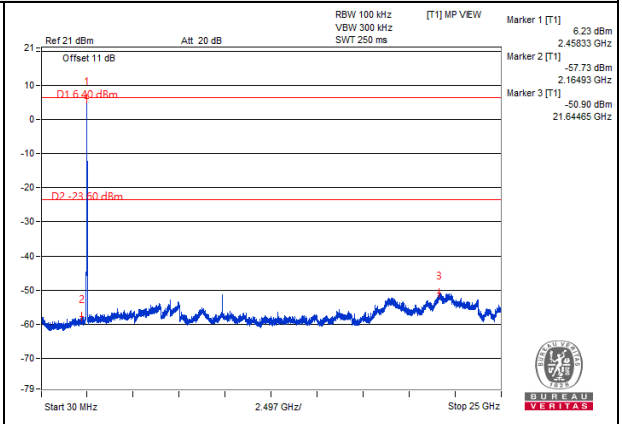
CH 6



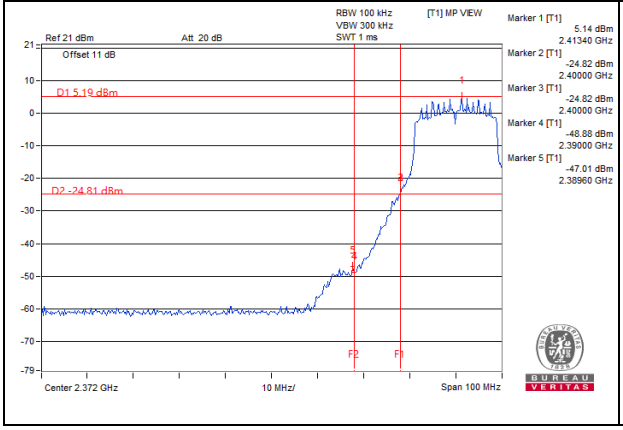


CH 11

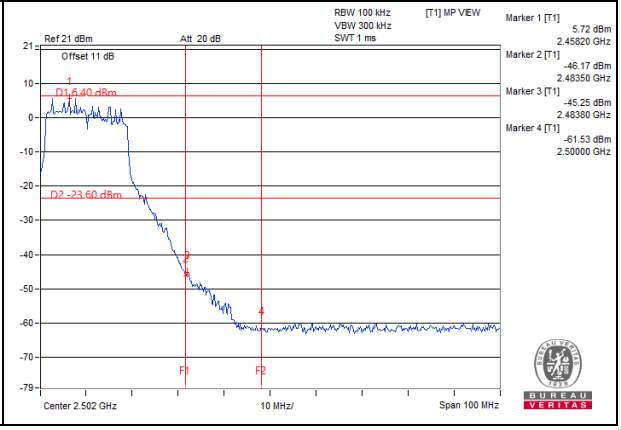




CH 1 Band edge

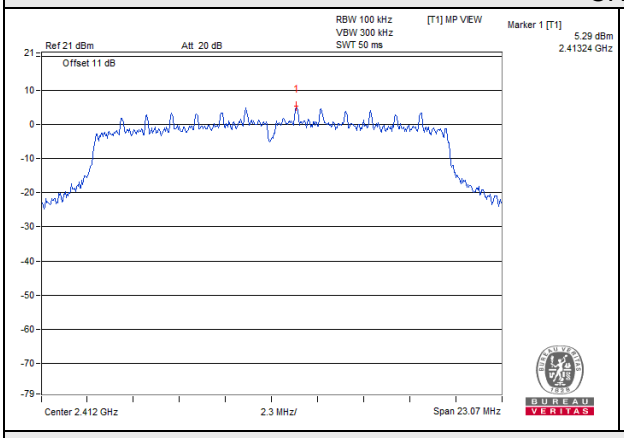


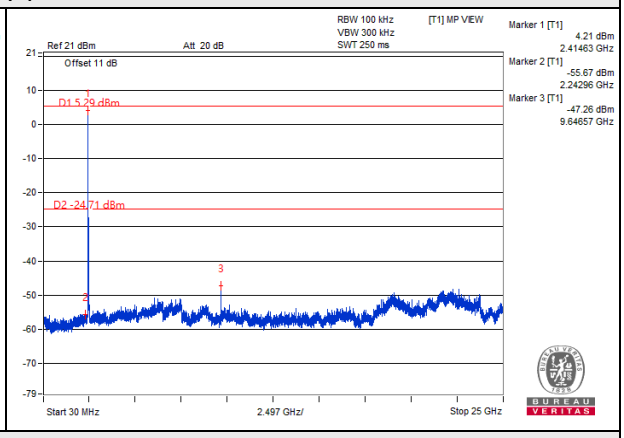
CH 11 Band edge



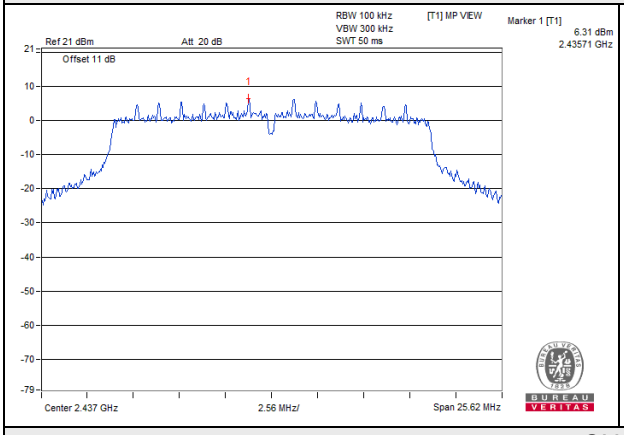
802.11n (HT20)_Chain 1

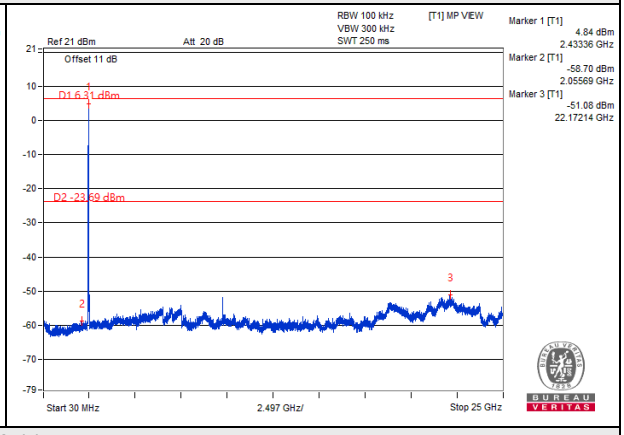
CH 1



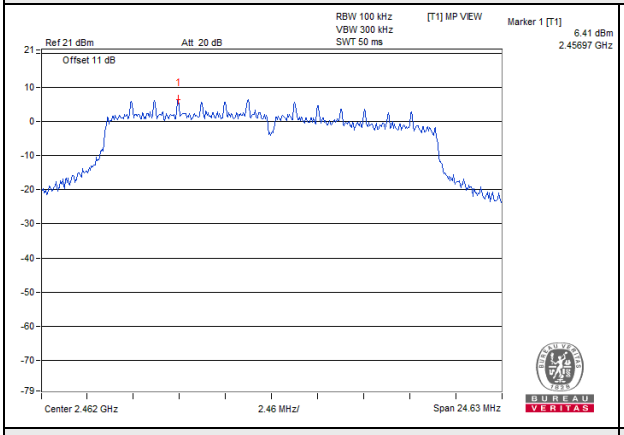


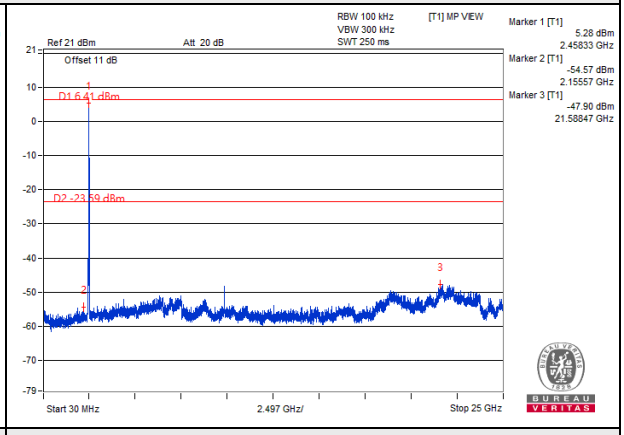
CH 6



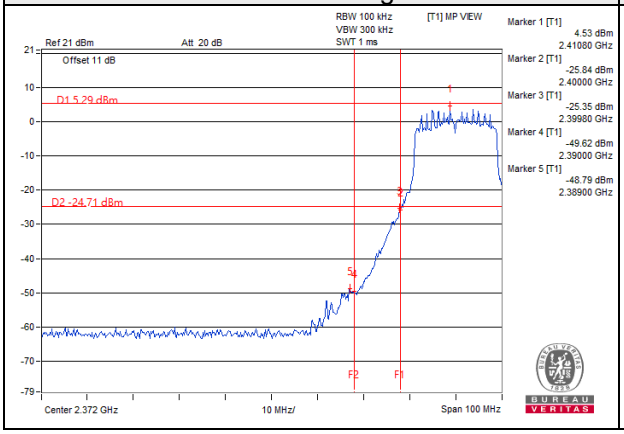


CH 11

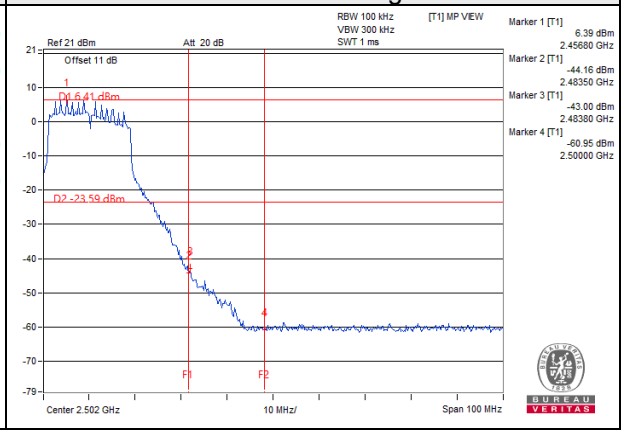




CH 1 Band edge

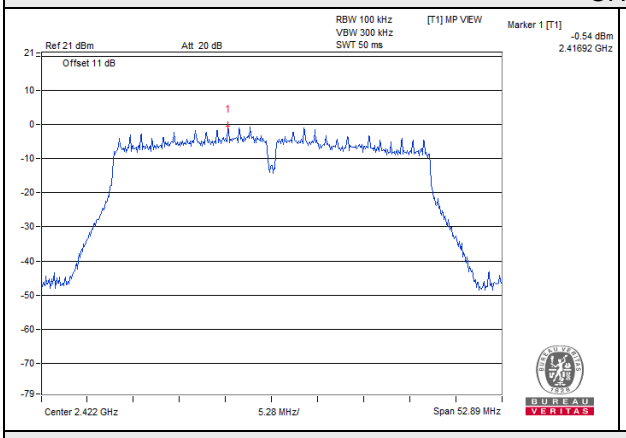


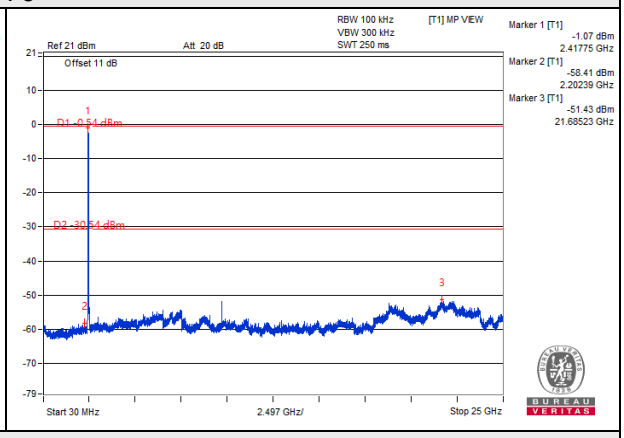
CH 11 Band edge



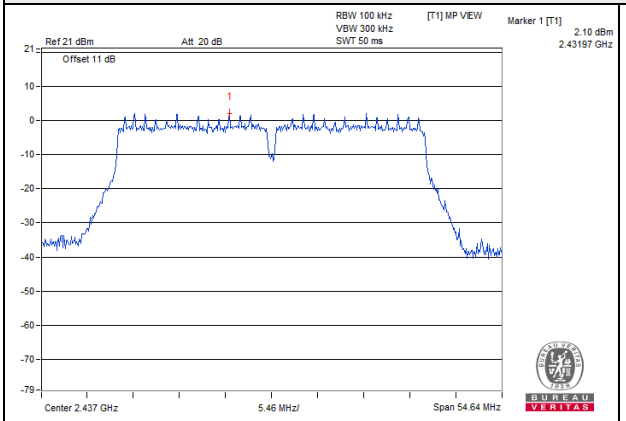
802.11n (HT40)_Chain 0

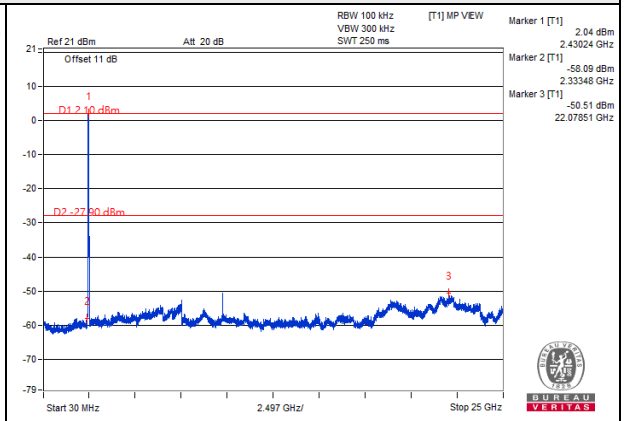
CH 3



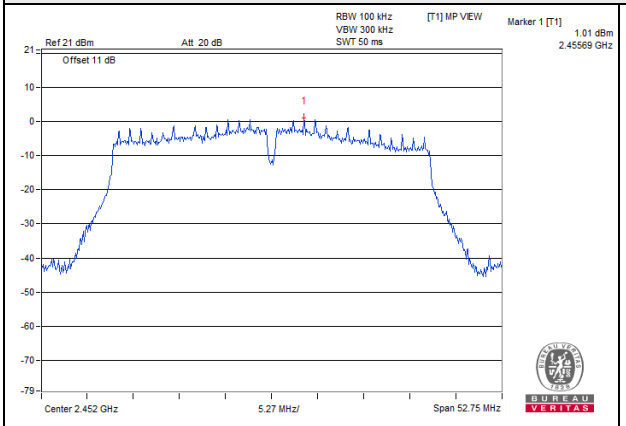


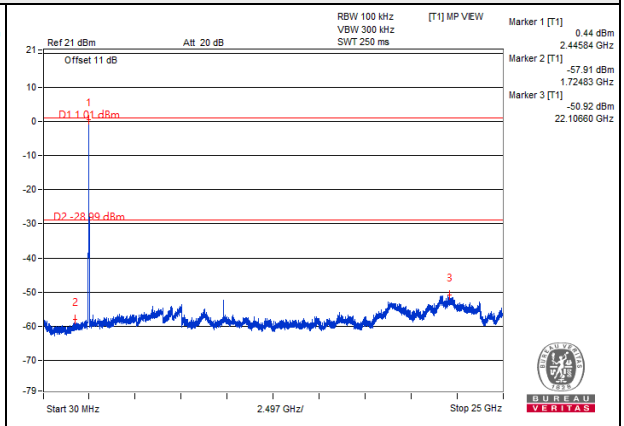
CH 6



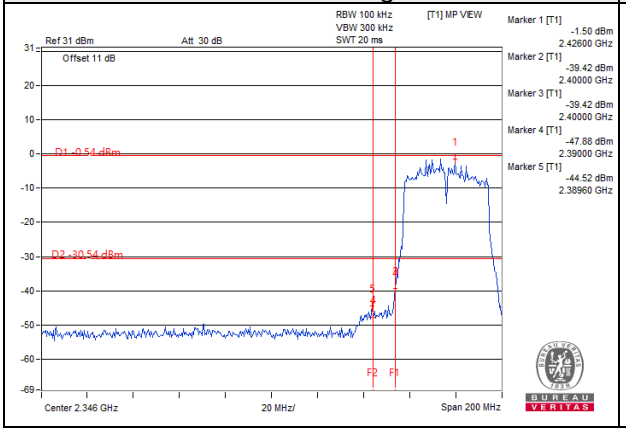


CH 9

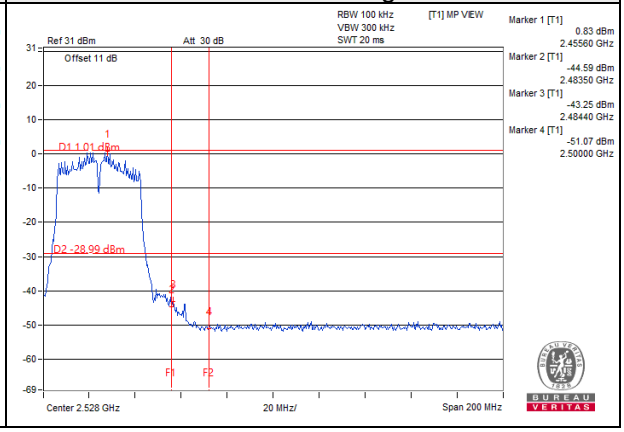




CH 3 Band edge

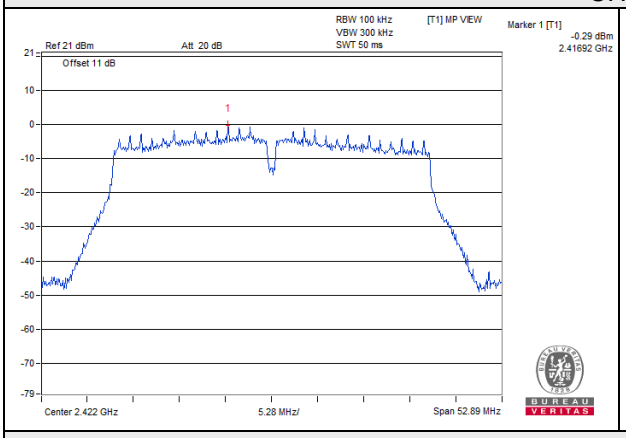


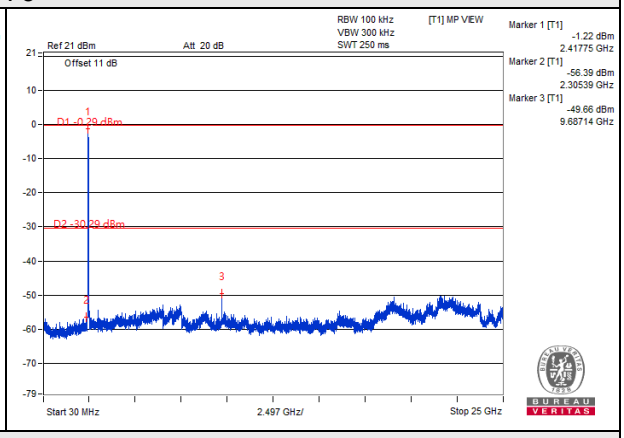
CH 9 Band edge



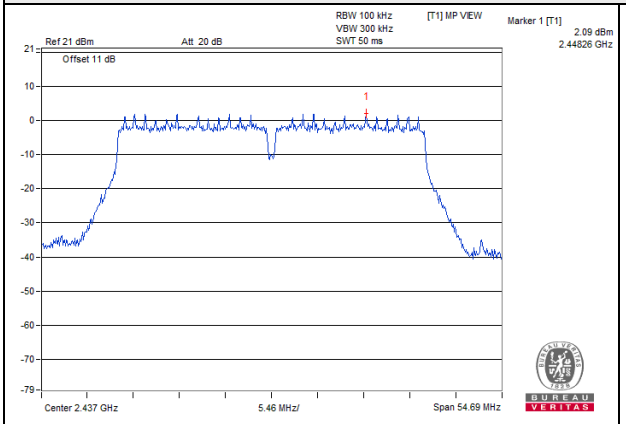
802.11n (HT40)_Chain 1

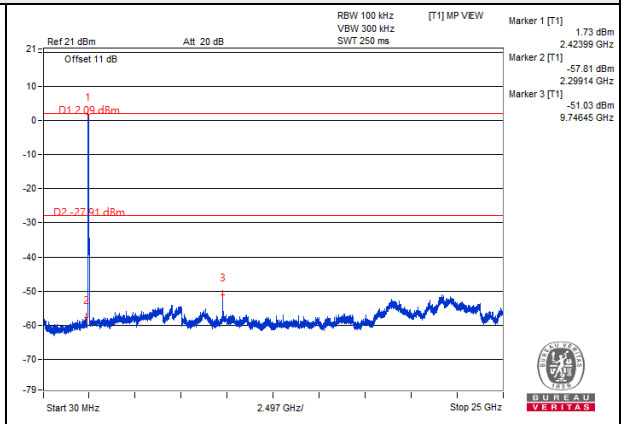
CH 3



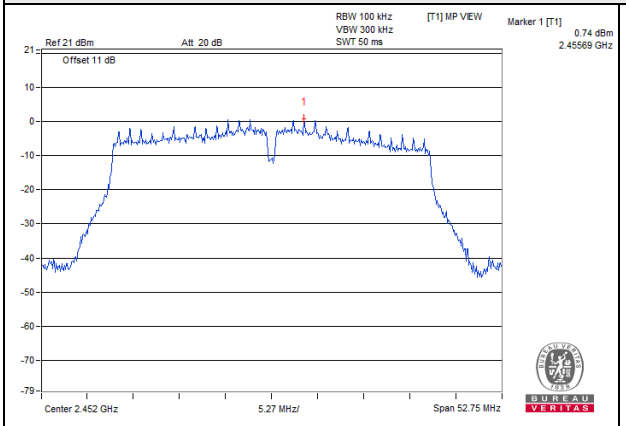


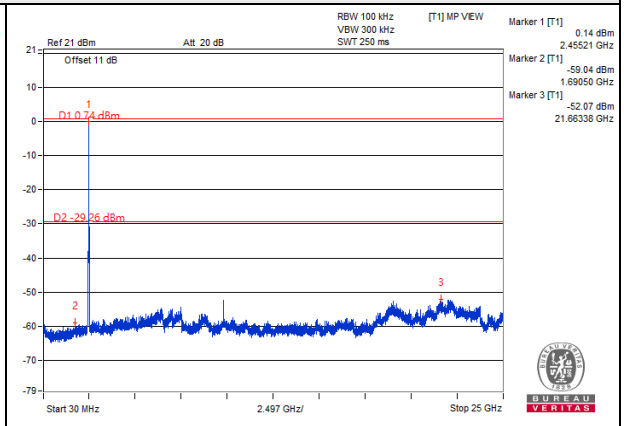
CH 6



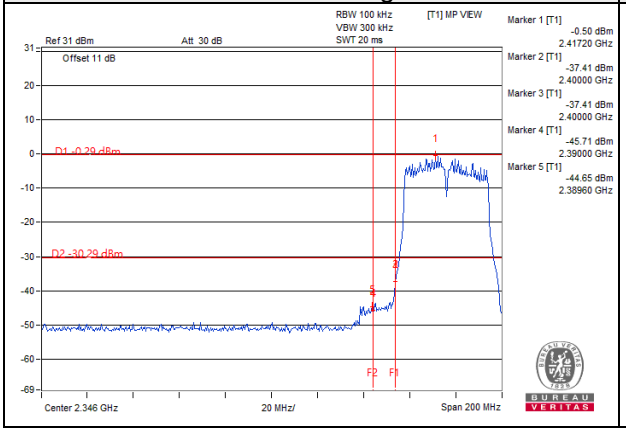


CH 9

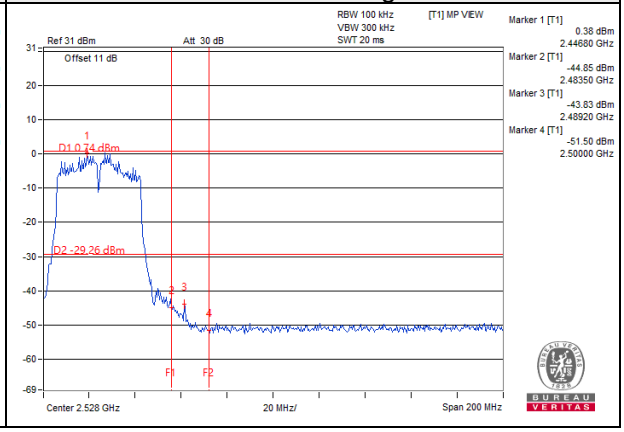




CH 3 Band edge



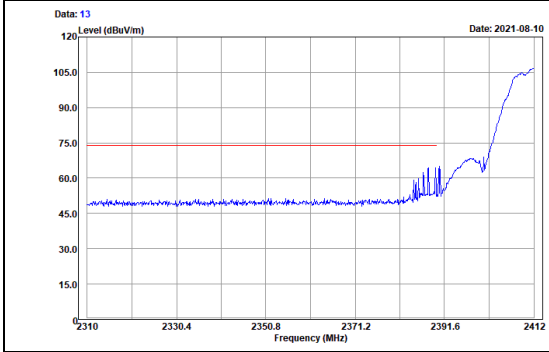
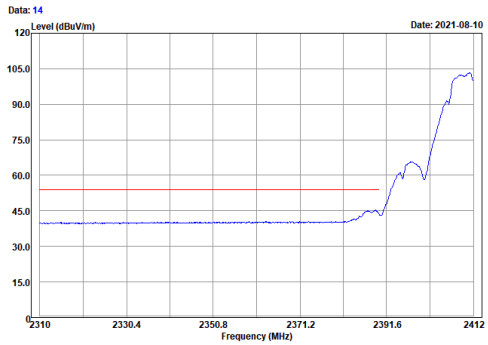
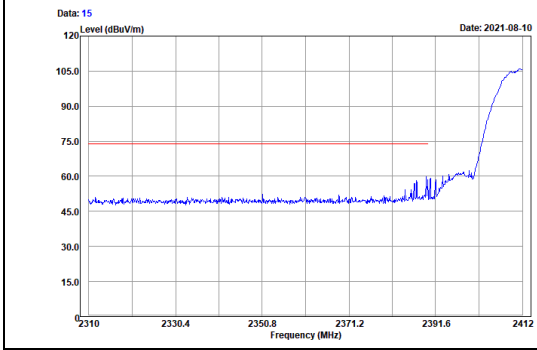
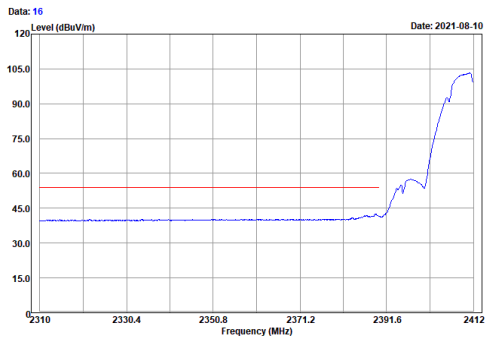
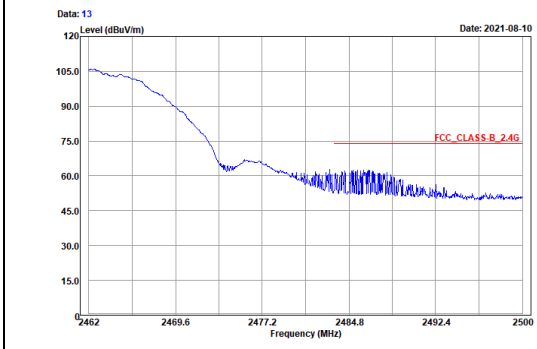
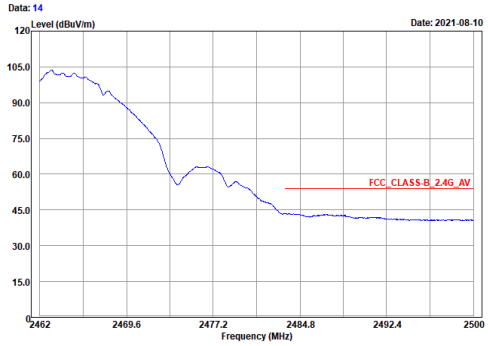
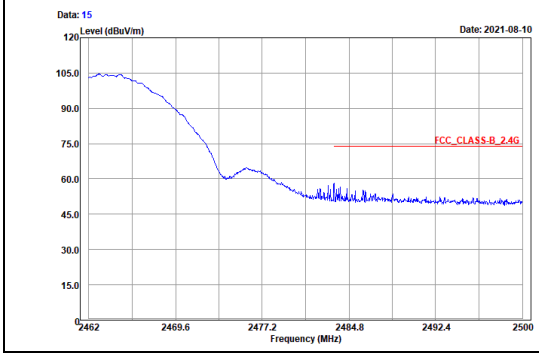
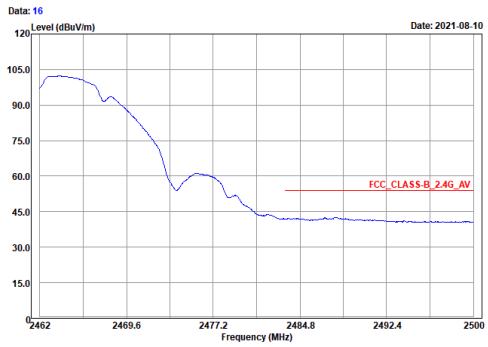
CH 9 Band edge

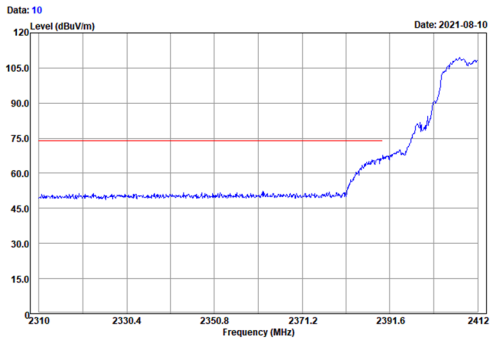
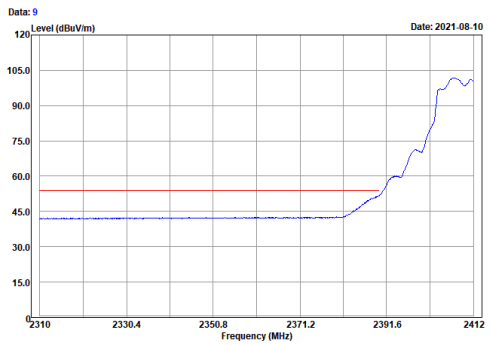
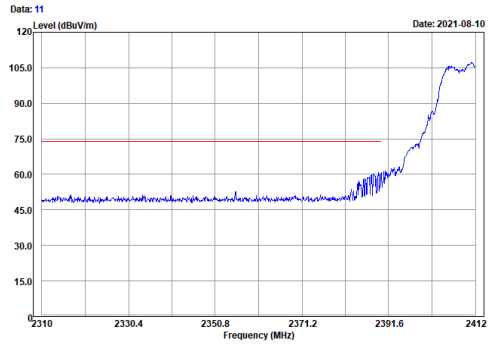
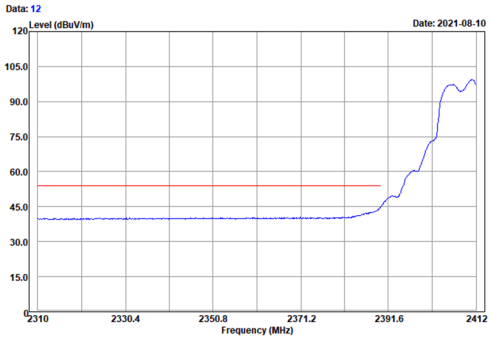
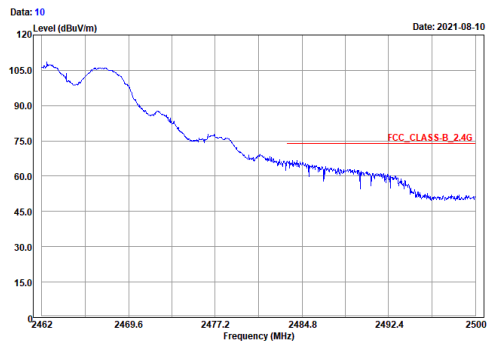
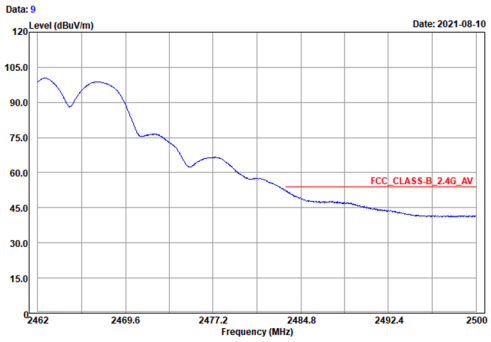
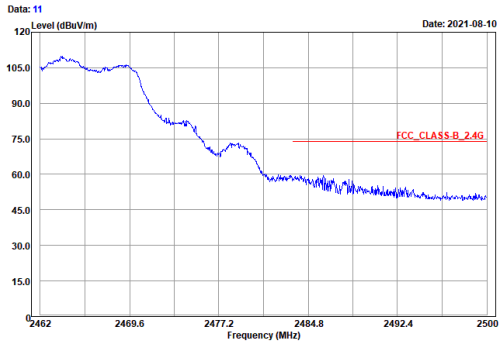
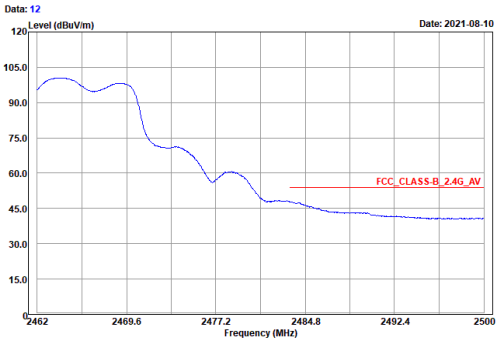


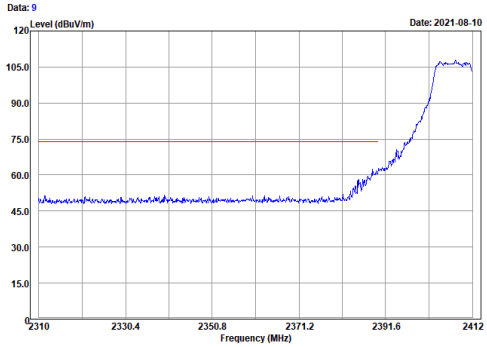
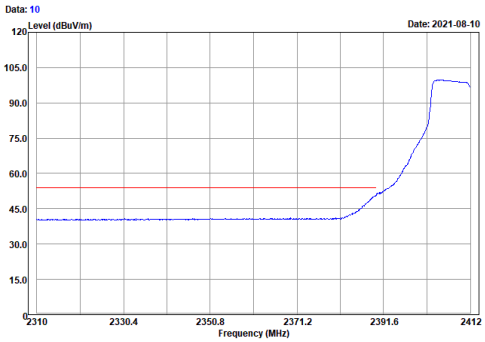
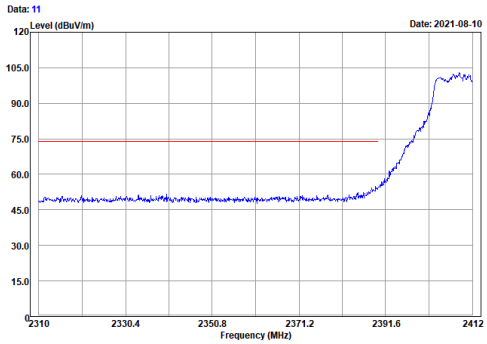
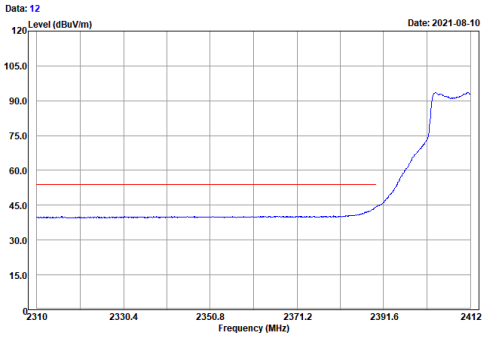
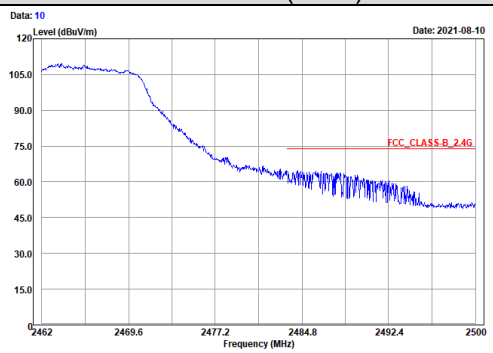
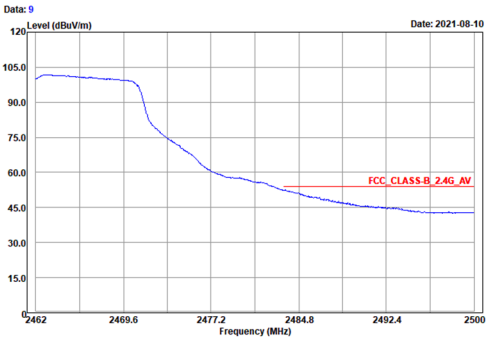
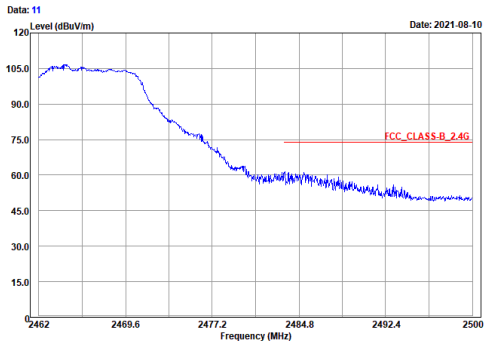
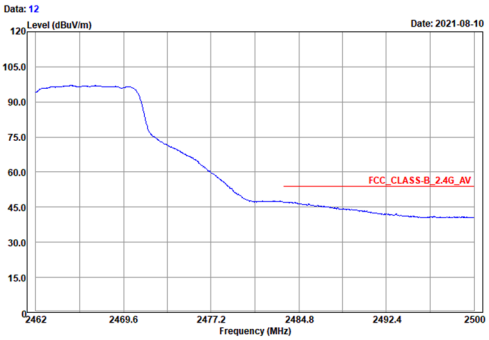
5 Pictures of Test Arrangements

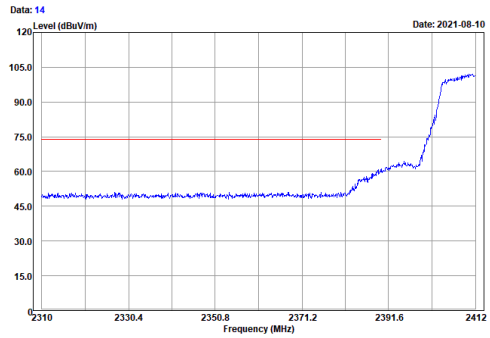
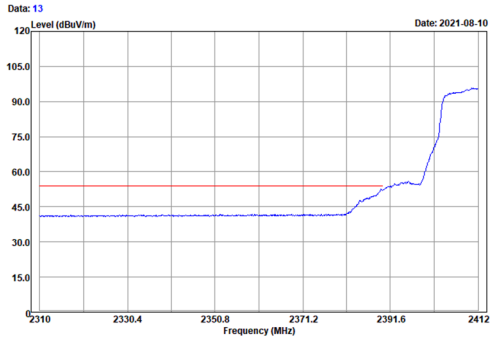
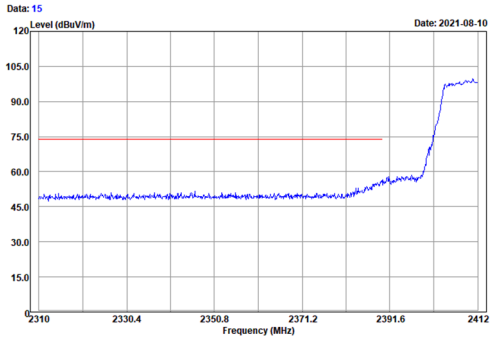
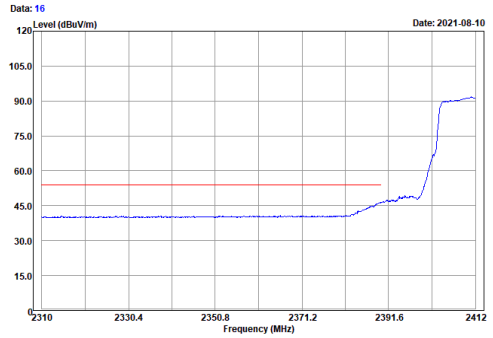
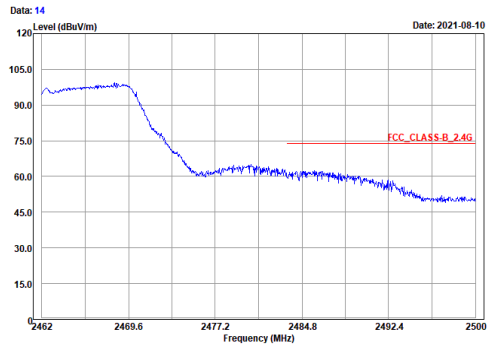
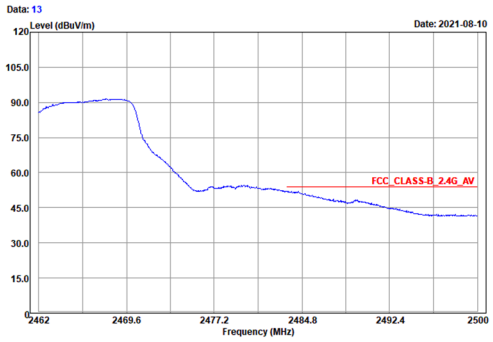
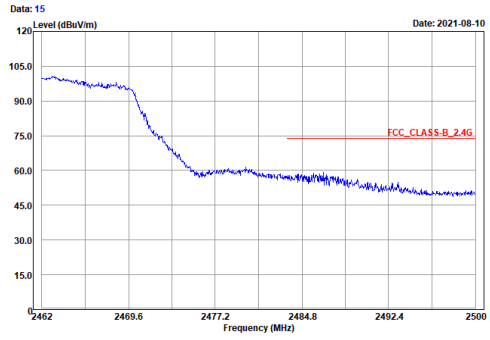
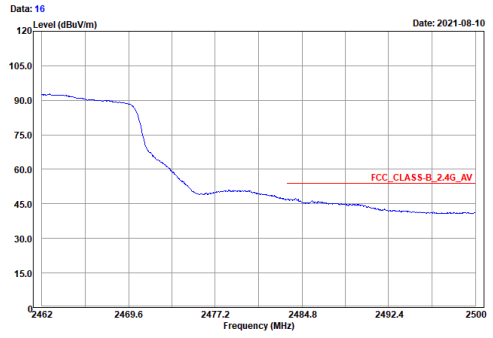
Please refer to the attached file (Test Setup Photo).

Annex A- Band Edge Measurement

802.11b 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)
	

802.11n (HT20) Channel 1	
Horizontal (Peak)	Horizontal (Average)
	
Vertical (Peak)	Vertical (Average)
	
802.11n (HT20) Channel 11	
Horizontal (Peak)	Horizontal (Average)
	
Vertical (Peak)	Vertical (Average)
	

802.11n (HT40) Channel 3	
Horizontal (Peak)	Horizontal (Average)
	
Vertical (Peak)	Vertical (Average)
	
802.11n (HT40) 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 FCC recognized accredited test firms and 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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Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

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