FCC Test Report

Report No.:	RFBEIH-WTW-P20120866A
FCC ID:	P27DG4244
Test Model:	DG4244
Series Model:	DG4244XXXXXXXXXX (the x could be 0 to 9, A to Z, "blank", "-" or "/" , for marketing purpose)
Received Date:	Apr. 9, 2021
Test Date:	May 5 to 28, 2021
Issued Date:	Jun. 15, 2021
Applicant:	Sercomm Corp.
Address:	8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan, R.O.C. (NanKang Software Park)
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
FCC Registration / Designation Number:	198487 / TW2021

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
RFBEIH-WTW-P20120866A	Original release.	Jun. 15, 2021

1 Certificate of Conformity

Product:	DOCSIS 3.1 WiFi 6 Gateway
Brand:	Sercomm
Test Model:	DG4244
Series Model:	DG4244XXXXXXXXXX (the x could be 0 to 9, A to Z, "blank", "-" or "/" , for marketing purpose)
Sample Status:	Engineering sample
Applicant:	Sercomm Corp.
Test Date:	May 5 to 28, 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 : Jessica Cheng , **Date:** Jun. 15, 2021

Jessica Cheng / Senior Specialist

Approved by : Rex. Lai , **Date:** Jun. 15, 2021

Rex Lai / Associate Technical Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -9.37dB at 0.15215MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.08dB at 2483.50MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

Note:
1. For 2.4GHz band compliance with rule 15.247(d) of the band-edge items, the test plots were recorded in Annex A. Test Procedures refer to report 4.1.3.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	3.00 dB
Conducted Emissions	9kHz ~ 40GHz	2.63 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.61 dB
	30MHz ~ 1GHz	5.43 dB
Radiated Emissions above 1 GHz	Above 1GHz	5.42 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	DOCSIS 3.1 WiFi 6 Gateway
Brand	Sercomm
Test Model	DG4244
Series Model	DG4244XXXXXXXXX (the x could be 0 to 9, A to Z, "blank", "-" or "/" , for marketing purpose)
Model Difference	Marketing Differentiation
Test software Version	DUT_setup.610.32
Status of EUT	Engineering sample
Power Supply Rating	12Vdc from Adapter
Modulation Type	256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM 1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDMA
Modulation Technology	DSSS, OFDM, OFDMA
Transfer Rate	802.11b: up to 11Mbps 802.11g: up to 54Mbps 802.11n (20MHz/40MHz): up to 600Mbps 802.11ac (20MHz/40MHz): up to 800Mbps 802.11ax (20MHz/40MHz): up to 1147.1Mbps
Operating Frequency	2412MHz ~ 2462MHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20)/802.11ac (VHT20) /802.11ax (HE20): 11 802.11n (40MHz)/802.11ac (VHT40)/802.11ax (HE40): 7
Output Power	422.66mW
Antenna Type	Refer to note
Antenna Connector	N/A
Accessory Device	Adapter
Data Cable Supplied	Non-shielded LAN cable (1.5m)

Note:

1. This report is prepared for FCC class II permissive change.
2. This report is issued as a supplementary report of original BV CPS report no. RFBEIH-WTW-P20120866. The difference compared with original report is adding Beamforming function; therefore the EUT is re-tested in this report.

3. The EUT provides 4 completed transmitters and 4 receivers.

Modulation Mode	TX Function	
	CDD Mode	Beamforming Mode
802.11b	1TX	No support
802.11g	4TX	No support
802.11n (20MHz)	4TX	Support
802.11n (40MHz)	4TX	Support
802.11ac (20MHz)	4TX	Support
802.11ac (VHT40)	4TX	Support
802.11ax (HE20)	4TX	Support
802.11ax (HE40)	4TX	Support

* The bandwidth and modulation are similar for HT20/HT40 on 802.11n mode and VHT20/VHT40 on 802.11 ac mode and HE20/HE40 on 802.11ax mode. Therefore the investigated worst case is the representative mode in test report. (Final test mode refer section 3.2.1)

4. The EUT uses following antenna.

Type	Dipole					
Connector	IPEX					
Antenna	Ant 0 (dBi)	Ant 1 (dBi)	Ant 2 (dBi)	Ant 3 (dBi)	Peak Gain(dBi) for each band	Directional Gain with correlated signal(dBi)
2.4G	3.67	3.76	3.60	3.12	3.76	9.56
5G B1	3.52	2.21	2.01	2.17	3.52	8.52
5G B2	3.90	2.92	2.18	2.62	3.90	8.95
5G B3	3.90	2.92	2.18	2.62	3.90	8.95
5G B4	4.17	2.31	2.32	2.26	4.17	8.82

5. WLAN 2.4GHz + WLAN 5GHz technologies can transmit at same time.

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

7. The EUT consumes power from a switching power adapter, which has several models could be chosen, as the following:

Adapter	Brand	Model No.	Specification
1	ADP	WA-48B12FU	AC I/P: 100-240V, 50/60Hz, 1.5A DC O/P: 12V, 4A AC 2 Pin Non-shielded DC cable (1.5m)
2	LEI	MU48AY120400-A1	AC I/P: 100-120V, 50/60Hz, 1.5A DC O/P: 12V, 4A AC 2 Pin Non-shielded DC cable (1.5m)

The above two adapters were pre-tested, and Adapter 1 was the worst case for final test.

8. Spurious emission of the simultaneous operation (WLAN 2.4GHz and WLAN 5GHz technologies) has been evaluated and no non-compliance was found.

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

3.2 Description of Test Modes

11 channels are provided for 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

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

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

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥1G:** Radiated Emission above 1GHz & Bandedge Measurement **RE<1G:** Radiated Emission below 1GHz

PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

Radiated Emission Test (Above 1GHz):

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

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

Beamforming Mode						
EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11ax (HE20)	1 to 11	1, 6, 11	OFDMA	BPSK	MCS0
	802.11ax (HE40)	3 to 9	3, 6, 9	OFDMA	BPSK	MCS0

Radiated Emission Test (Below 1GHz):

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

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

Beamforming Mode						
EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11ax (HE20)	1 to 11	1	OFDMA	BPSK	MCS0

Power Line Conducted Emission Test:

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

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

Beamforming Mode						
EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11ax (HE20)	1 to 11	1	OFDMA	BPSK	MCS0

Antenna Port Conducted Measurement:

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

Beamforming Mode						
EUT Configure Mode	**Mode**	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate (Mbps)**
-	802.11n (HT20)*	1 to 11	1, 6, 11	OFDM	BPSK	6.5
	802.11n (HT40)*	3 to 9	3, 6, 9	OFDM	BPSK	13.5
	802.11ac (VHT20)*	1 to 11	1, 6, 11	OFDM	BPSK	6.5
	802.11ac (VHT40)*	3 to 9	3, 6, 9	OFDM	BPSK	13.5
	802.11ax (HE20)	1 to 11	1, 6, 11	OFDMA	BPSK	MCS0
	802.11ax (HE40)	3 to 9	3, 6, 9	OFDMA	BPSK	MCS0
* 802.11n (HT20), 802.11n (HT40), 802.11ac (VHT20), 802.11ac (VHT40) are for Conducted Power Measurement only.						

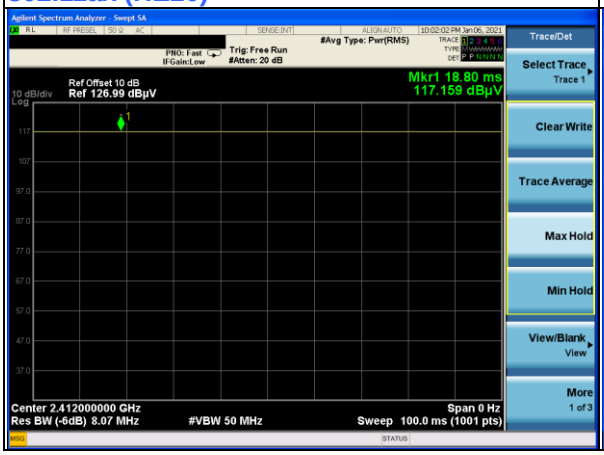
Test Condition:

Beamforming Mode			
Applicable To	**Environmental Conditions**	**Input Power**	**Tested By**
RE≥1G	18deg. C, 72%RH	120Vac, 60Hz	Ian Chang
RE<1G	24deg. C, 63%RH	120Vac, 60Hz	Ian Chang
PLC	25deg. C, 75%RH	120Vac, 60Hz	Ian Chang
APCM	25deg. C, 76%RH	120Vac, 60Hz	Pirar Hsieh

3.3 Duty Cycle of Test Signal

If duty cycle of test signal is ≥ 98 %, duty factor is not required.
802.11ax (HE20): Duty cycle = 100%
802.11ax (HE40): Duty cycle = 100%

802.11ax (HE20)



802.11ax (HE40)

3.4 Description of Support Units

The ET has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

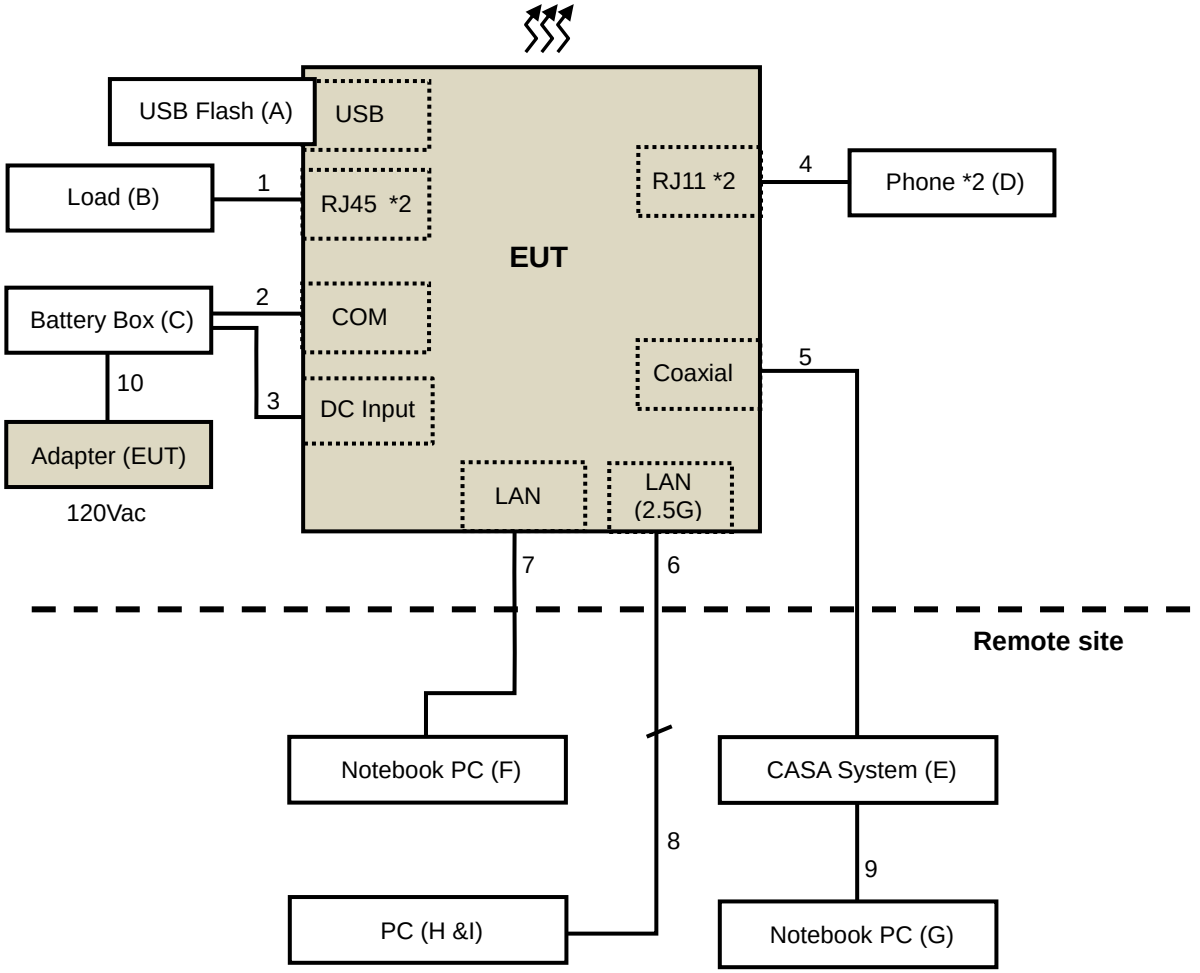
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	USB Flash	SANDISK	16GB	N/A	N/A	Provided by Lab
B.	Load	N/A	N/A	N/A	N/A	Provided by Lab
C.	Battery Box	N/A	N/A	N/A	N/A	Supplied by client
D.	Phone	WONDER	IS-333	06014	N/A	Provided by Lab
	Phone	WONDER	IS-333	06004	N/A	Provided by Lab
E.	CASA System	N/A	C2200	N/A	N/A	Supplied by client
F.	Notebook PC	DELL	P41G	GT4W952	N/A	Provided by Lab
G.	Notebook PC	DELL	E6440	N/A	N/A	Supplied by client
H.	PC	DELL	VOSTRO 470	JTBJYBX	N/A	Provided by Lab
I.	LAN Card	ASUS	XG-C100C	H4QSRT000277	N/A	Provided by Lab

Note:
1. All power cords of the above support units are non-shielded (1.8m).
2. Items E~I acted as communication partners to transfer data.

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	LAN Cable	2	1.8	N	0	Provided by Lab (RJ45,CAT.5e)
2.	COM (Audio) Cable	1	0.2	N	0	Provided by Lab
3.	DC Cable	1	1.8	N	0	Provided by Lab
4.	RJ11 Cable	2	1.8	N	0	Provided by Lab
5.	Coaxial Cable	1	10	Y	0	Provided by Lab
6.	LAN Cable	1	1.5	N	0	Supplied by client (RJ45,CAT.5e)
7.	LAN Cable	1	10	N	0	Provided by Lab (RJ45,CAT.5e)
8.	LAN Cable	1	10	N	0	Provided by Lab (RJ45,CAT.5e)
9.	LAN Cable	1	1.8	N	0	Provided by Lab (RJ45,CAT.5e)
10.	DC Cable	1	1.8	N	0	Supplied by client

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

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards and references

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

Test standard:
FCC Part 15, Subpart C (15.247)
ANSI C63.10-2013
All test items have been performed and recorded as per the above standards.

References Test Guidance:
KDB 558074 D01 15.247 Meas Guidance v05r02
All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 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.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	Feb. 18, 2021	Feb. 17, 2022
HP Preamplifier	8449B	3008A01201	Feb. 19, 2021	Feb. 18, 2022
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 18, 2021	Feb. 17, 2022
Agilent TEST RECEIVER	N9038A	MY51210129	Mar. 12, 2021	Mar. 11, 2022
Schwarzbeck Antenna	VULB 9168	139	Nov. 6, 2020	Nov. 5, 2021
Schwarzbeck Antenna	VHBA 9123	480	Jun. 3, 2019	Jun. 2, 2021
Schwarzbeck Horn Antenna	BBHA-9170	212	Nov. 22, 2020	Nov. 21, 2021
EMCO Horn Antenna	3115	00027024	Nov. 22, 2020	Nov.21, 2021
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	Radiated_V7.6.15.9.5	NA	NA	NA
SUHNER RF cable With 4dB PAD	SF102	Cable-CH6-01	Jul. 9, 2020	Jul. 8, 2021
EMEC RF cable With 3/4dB PAD	EM102-KMKM	01	Aug. 21, 2020	Aug. 20, 2021
KEYSIGHT MIMO Powermeasurement Test set	U2021XA	U2021XA-001	Jun. 16, 2020	Jun. 15, 2021
KEYSIGHT Spectrum Analyzer	N9030A	MY54490260	Jul. 22, 2020	Jul. 21, 2021
Loop Antenna EMCI	LPA600	270	Aug. 23, 2019	Aug. 22, 2021
EMCO Horn Antenna	3115	00028257	Nov. 22, 2020	Nov. 21, 2021
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 8, 2020	Sep. 7, 2021
Anritsu Power Sensor	MA2411B	0738404	Apr. 15, 2021	Apr. 14, 2022
Anritsu Power Meter	ML2495A	0842014	Apr. 14, 2021	Apr. 13, 2022

NOTE: 1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 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 detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

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

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

3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz. (802.11ax (HE20): RBW = 1MHz, VBW = 10Hz; 802.11ax (HE40): RBW = 1MHz, VBW = 10Hz)

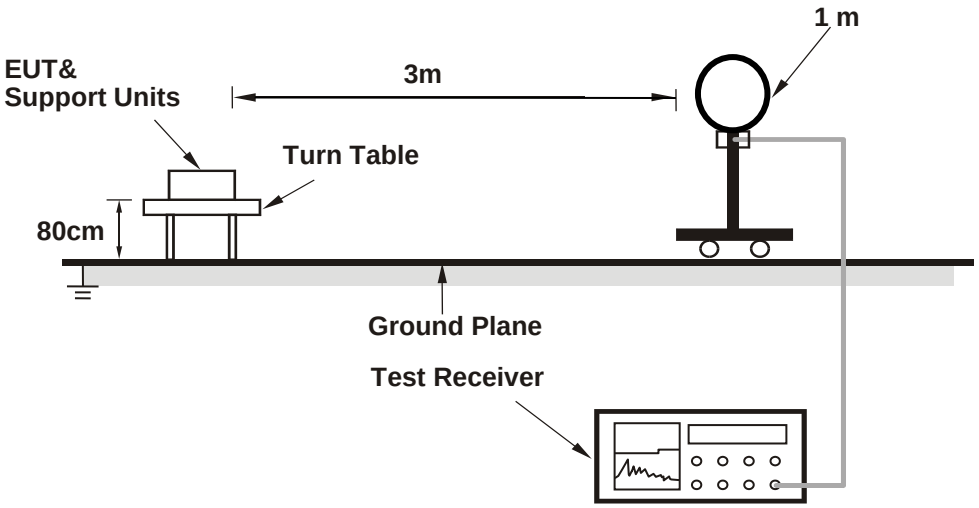
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

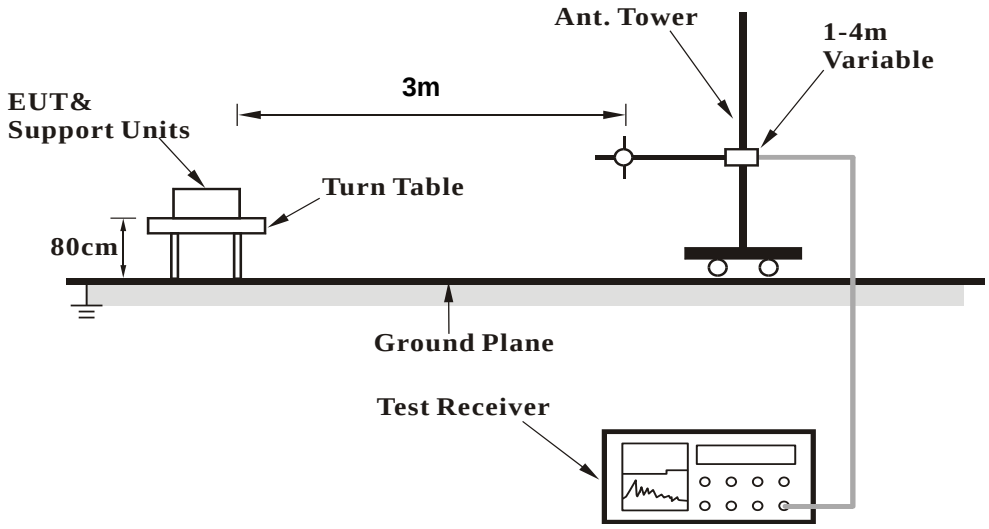
No deviation.

4.1.5 Test Setup

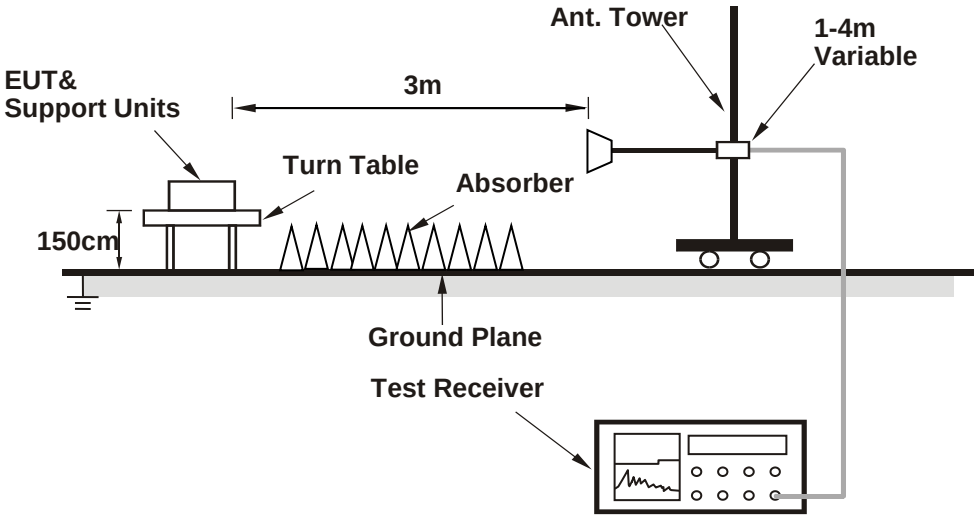
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

a. Placed the EUT on the testing table.
b. Prepared a notebook to act as a communication partner and placed it outside of testing area.
c. The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
d. The communication partner sent data to EUT by command "PING".

4.1.7 Test Results

ABOVE 1GHz DATA

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	2390.00	67.67 PK	74.00	-6.33	2.06 H	286	65.79	1.88
2	2390.00	52.68 AV	54.00	-1.32	2.06 H	286	50.80	1.88
3	*2412.00	117.17 PK			2.06 H	286	115.20	1.97
4	*2412.00	109.50 AV			2.06 H	286	107.53	1.97
5	4824.00	50.56 PK	74.00	-23.44	1.64 H	238	40.36	10.20
6	4824.00	38.75 AV	54.00	-15.25	1.64 H	238	28.55	10.20
Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	2390.00	62.26 PK	74.00	-11.74	1.17 V	234	60.38	1.88
2	2390.00	48.90 AV	54.00	-5.10	1.17 V	234	47.02	1.88
3	*2412.00	110.94 PK			1.17 V	234	108.97	1.97
4	*2412.00	102.52 AV			1.17 V	234	100.55	1.97
5	4824.00	49.56 PK	74.00	-24.44	1.94 V	235	39.36	10.20
6	4824.00	37.89 AV	54.00	-16.11	1.94 V	235	27.69	10.20

Remarks:

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

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	119.04 PK			2.06 H	243	117.02	2.02
2	*2437.00	110.88 AV			2.06 H	243	108.86	2.02
3	4874.00	50.42 PK	74.00	-23.58	1.64 H	288	40.25	10.17
4	4874.00	38.81 AV	54.00	-15.19	1.64 H	288	28.64	10.17
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	113.38 PK			1.18 V	245	111.36	2.02
2	*2437.00	104.86 AV			1.18 V	245	102.84	2.02
3	4874.00	49.52 PK	74.00	-24.48	1.74 V	264	39.35	10.17
4	4874.00	37.86 AV	54.00	-16.14	1.74 V	264	27.69	10.17

Remarks:

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

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	116.38 PK			2.60 H	248	114.27	2.11
2	*2462.00	107.47 AV			2.60 H	248	105.36	2.11
3	2483.50	66.95 PK	74.00	-7.05	2.60 H	248	64.72	2.23
4	2483.50	52.61 AV	54.00	-1.39	2.60 H	248	50.38	2.23
5	4924.00	50.37 PK	74.00	-23.63	1.84 H	265	40.16	10.21
6	4924.00	38.85 AV	54.00	-15.15	1.84 H	265	28.64	10.21
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	110.76 PK			1.25 V	252	108.65	2.11
2	*2462.00	102.37 AV			1.25 V	252	100.26	2.11
3	2483.50	62.49 PK	74.00	-11.51	1.25 V	252	60.26	2.23
4	2483.50	48.59 AV	54.00	-5.41	1.25 V	252	46.36	2.23
5	4924.00	49.86 PK	74.00	-24.14	1.68 V	298	39.65	10.21
6	4924.00	37.55 AV	54.00	-16.45	1.68 V	298	27.34	10.21

Remarks:

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

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	66.22 PK	74.00	-7.78	2.63 H	0	64.34	1.88
2	2390.00	52.85 AV	54.00	-1.15	2.63 H	0	50.97	1.88
3	*2422.00	114.58 PK			2.63 H	0	112.58	2.00
4	*2422.00	105.44 AV			2.63 H	0	103.44	2.00
5	4844.00	50.56 PK	74.00	-23.44	1.98 H	235	40.36	10.20
6	4844.00	39.89 AV	54.00	-14.11	1.98 H	235	29.69	10.20
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	66.23 PK	74.00	-7.77	1.36 V	280	64.35	1.88
2	2390.00	51.56 AV	54.00	-2.44	1.36 V	280	49.68	1.88
3	*2422.00	115.90 PK			1.36 V	280	113.90	2.00
4	*2422.00	106.64 AV			1.36 V	280	104.64	2.00
5	4844.00	51.06 PK	74.00	-22.94	1.69 V	235	40.86	10.20
6	4844.00	40.09 AV	54.00	-13.91	1.69 V	235	29.89	10.20

Remarks:

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

RF Mode	TX 802.11ax (HE40)	Channel	CH 6：2437 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	115.67 PK			2.66 H	2	113.65	2.02
2	*2437.00	106.53 AV			2.66 H	2	104.51	2.02
3	2483.50	69.35 PK	74.00	-4.65	2.66 H	2	67.12	2.23
4	2483.50	52.62 AV	54.00	-1.38	2.66 H	2	50.39	2.23
5	4874.00	49.53 PK	74.00	-24.47	2.34 H	158	39.36	10.17
6	4874.00	38.84 AV	54.00	-15.16	2.34 H	158	28.67	10.17
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	116.54 PK			1.41 V	277	114.52	2.02
2	*2437.00	107.18 AV			1.41 V	277	105.16	2.02
3	2483.50	64.26 PK	74.00	-9.74	1.41 V	277	62.03	2.23
4	2483.50	46.89 AV	54.00	-7.11	1.41 V	277	44.66	2.23
5	4874.00	50.42 PK	74.00	-23.58	1.84 V	245	40.25	10.17
6	4874.00	39.52 AV	54.00	-14.48	1.84 V	245	29.35	10.17

Remarks:

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

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2452.00	113.02 PK			2.59 H	13	110.96	2.06
2	*2452.00	104.95 AV			2.59 H	13	102.89	2.06
3	2483.50	64.65 PK	74.00	-9.35	2.59 H	13	62.42	2.23
4	2483.50	52.82 AV	54.00	-1.18	2.59 H	13	50.59	2.23
5	4904.00	49.83 PK	74.00	-24.17	1.78 H	45	39.68	10.15
6	4904.00	39.12 AV	54.00	-14.88	1.78 H	45	28.97	10.15
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2452.00	114.05 PK			1.34 V	278	111.99	2.06
2	*2452.00	105.23 AV			1.34 V	278	103.17	2.06
3	2483.50	64.73 PK	74.00	-9.27	1.34 V	278	62.50	2.23
4	**2483.50**	**52.92 AV**	**54.00**	**-1.08**	**1.34 V**	**278**	**50.69**	**2.23**
5	4904.00	50.44 PK	74.00	-23.56	1.88 V	257	40.29	10.15
6	4904.00	39.68 AV	54.00	-14.32	1.88 V	257	29.53	10.15

Remarks:

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

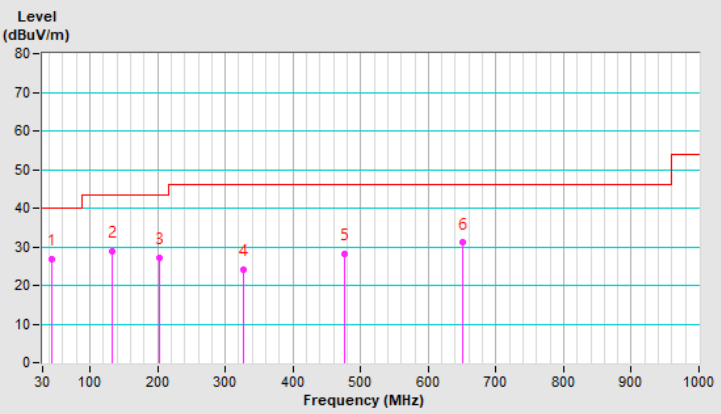
BELOW 1GHz WORST-CASE DATA

RF Mode	TX 802.11ax (HE20)	Channel	CH 1：2412 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	43.58	26.86 QP	40.00	-13.14	1.00 H	167	34.17	-7.31
2	132.82	28.97 QP	43.50	-14.53	1.14 H	196	36.53	-7.56
3	201.69	27.24 QP	43.50	-16.26	1.35 H	217	36.17	-8.93
4	326.82	24.10 QP	46.00	-21.90	1.70 H	252	27.42	-3.32
5	475.23	28.11 QP	46.00	-17.89	2.01 H	282	28.33	-0.22
6	649.83	31.10 QP	46.00	-14.90	2.34 H	314	27.92	3.18

Remarks:

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

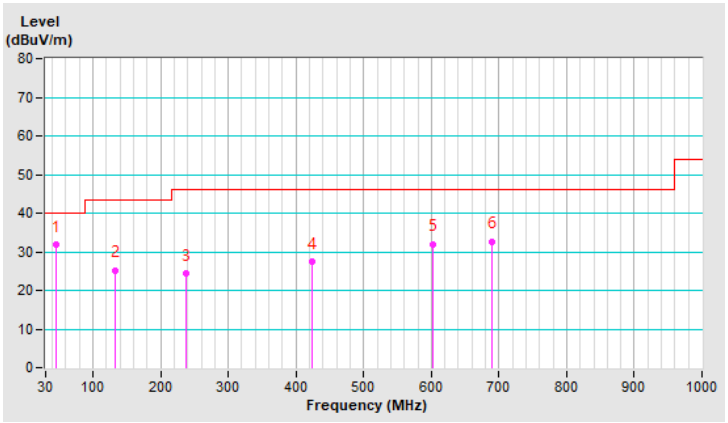


RF Mode	TX 802.11ax (HE20)	Channel	CH 1：2412 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	45.52	31.70 QP	40.00	-8.30	1.00 V	78	38.76	-7.06
2	132.82	25.09 QP	43.50	-18.41	1.00 V	112	32.65	-7.56
3	237.58	24.32 QP	46.00	-21.68	1.26 V	160	31.62	-7.30
4	423.82	27.34 QP	46.00	-18.66	1.74 V	207	28.68	-1.34
5	601.33	31.90 QP	46.00	-14.10	1.96 V	228	29.52	2.38
6	689.60	32.58 QP	46.00	-13.42	2.43 V	275	28.95	3.63

Remarks:

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



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	100276	Apr. 15, 2021	Apr. 14, 2022
SCHWARZBECK Artificial Mains Network (for EUT)	NSLK 8128	8128-244	Nov. 19, 2020	Nov. 18, 2021
LISN With Adapter (for EUT)	AD10	C05Ada-001	Nov. 19, 2020	Nov. 18, 2021
R&S Artificial Mains Network (for peripheral)	ESH3-Z5	100220	Dec. 1, 2020	Nov. 30, 2021
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C05.01	Jan. 29, 2021	Jan. 28, 2022
LYNICS Terminator (For R&S LISN)	0900510	E1-01-305	Feb. 17, 2021	Feb. 16, 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 Shielded Room No. 5. (Conduction 5)
3. The VCCI Site Registration No. C-11093.
4. The Industry Canada Reference No. IC 3789-5.

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.

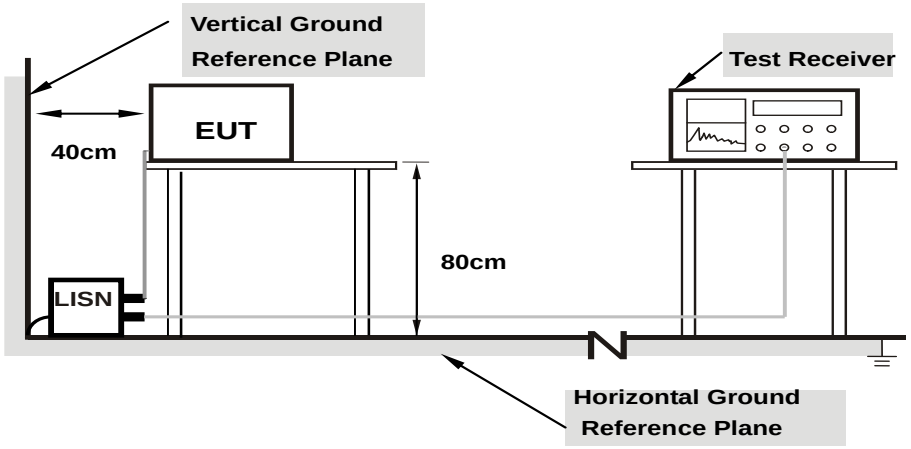
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

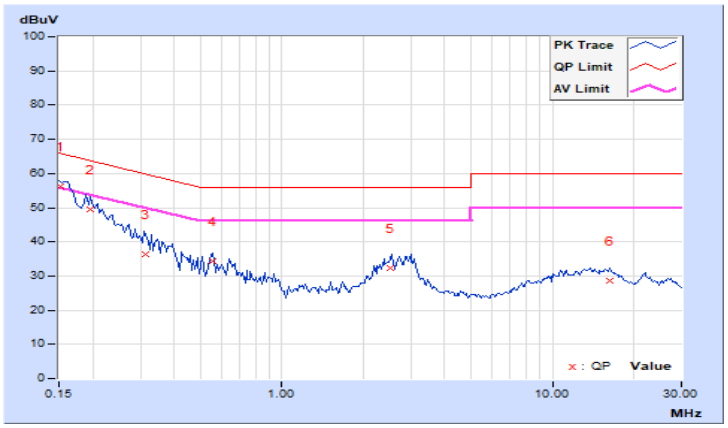
4.2.7 Test Results

RF Mode	TX 802.11ax (HE20)	Channel	CH 1：2412 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

Phase Of Power : Line (L)										
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	0.15235	10.01	46.36	31.26	56.37	41.27	65.87	55.87	-9.50	-14.60
2	0.19516	10.01	39.33	26.34	49.34	36.35	63.81	53.81	-14.47	-17.46
3	0.31237	10.02	26.43	19.29	36.45	29.31	59.91	49.91	-23.46	-20.60
4	0.55228	10.04	24.42	18.44	34.46	28.48	56.00	46.00	-21.54	-17.52
5	2.53167	10.18	22.28	16.57	32.46	26.75	56.00	46.00	-23.54	-19.25
6	16.29336	11.00	17.56	13.84	28.56	24.84	60.00	50.00	-31.44	-25.16

REMARKS:

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

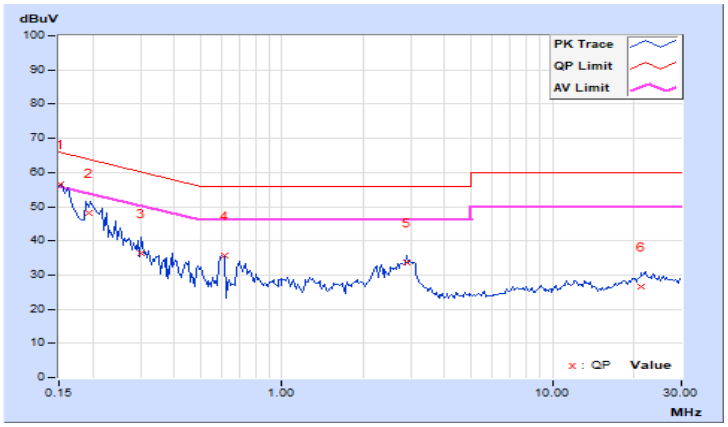


RF Mode	TX 802.11ax (HE20)	Channel	CH 1：2412 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

Phase Of Power : Neutral (N)										
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	**0.15215**	**9.93**	**46.58**	**32.84**	**56.51**	**42.77**	**65.88**	**55.88**	**-9.37**	**-13.11**
2	0.19365	9.94	38.23	26.63	48.17	36.57	63.88	53.88	-15.71	-17.31
3	0.30159	9.95	26.46	18.84	36.41	28.79	60.20	50.20	-23.79	-21.41
4	0.61247	9.98	25.78	20.46	35.76	30.44	56.00	46.00	-20.24	-15.56
5	2.90336	10.12	23.63	19.74	33.75	29.86	56.00	46.00	-22.25	-16.14
6	21.26157	11.22	15.48	9.59	26.70	20.81	60.00	50.00	-33.30	-29.19

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

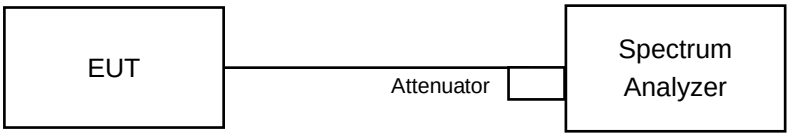


4.3 6dB Bandwidth Measurement

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 fromTest 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

802.11ax (HE20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	19.01	19.17	19.06	19.12	0.5	Pass
6	2437	19.3	19.3	19.29	19.29	0.5	Pass
11	2462	19.23	19.13	19.13	19.13	0.5	Pass

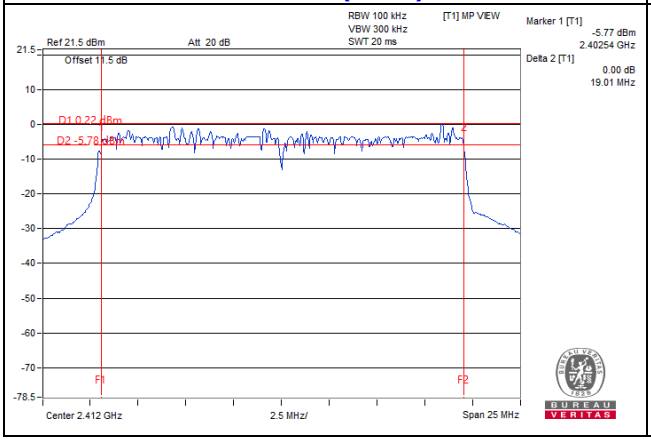
802.11ax (HE40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
3	2422	38.18	38.18	38.18	38.18	0.5	Pass
6	2437	38.29	38.29	38.29	38.29	0.5	Pass
9	2452	38.39	38.39	38.24	38.24	0.5	Pass

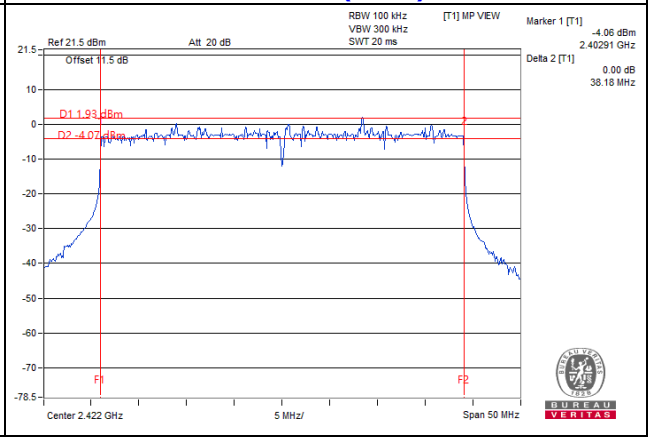
Spectrum Plot of Worst Value

Beamforming Mode

802.11ax (HE20)



802.11ax (HE40)

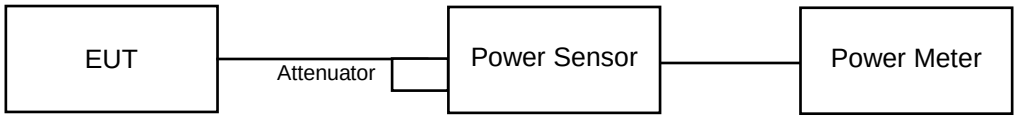


4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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

802.11n (HT20)

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	17.39	17.50	17.00	17.46	216.899	23.36	26.44	Pass
6	2437	19.09	18.93	19.10	19.28	325.265	25.12	26.44	Pass
11	2462	16.66	16.28	16.59	16.67	180.862	22.57	26.44	Pass

Note: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/4$]=9.56dBi > 6dBi, so the power limit shall be reduced to 30-(9.56-6) = 26.44dBm.

802.11n (HT40)

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	16.37	16.45	16.27	16.18	171.368	22.34	26.44	Pass
6	2437	17.17	17.16	17.59	17.17	213.65	23.30	26.44	Pass
9	2452	15.02	14.91	14.85	15.19	126.329	21.02	26.44	Pass

Note: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/4$]=9.56dBi > 6dBi, so the power limit shall be reduced to 30-(9.56-6) = 26.44dBm.

802.11ac (VHT20)

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	17.70	17.84	17.30	17.75	232.967	23.67	26.44	Pass
6	2437	19.40	19.16	19.43	19.51	346.541	25.40	26.44	Pass
11	2462	16.93	16.49	16.90	16.94	192.292	22.84	26.44	Pass

Note: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/4$]=9.56dBi > 6dBi, so the power limit shall be reduced to 30-(9.56-6) = 26.44dBm.

802.11ac (VHT40)

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	16.60	16.70	16.48	16.48	181.409	22.59	26.44	Pass
6	2437	17.50	17.43	17.84	17.44	227.845	23.58	26.44	Pass
9	2452	15.27	15.25	15.19	15.39	134.779	21.30	26.44	Pass

Note: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/4$]=9.56dBi > 6dBi, so the power limit shall be reduced to 30-(9.56-6) = 26.44dBm.

802.11ax (HE20)

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	18.52	18.67	18.18	18.65	283.79	24.53	26.44	Pass
6	2437	20.23	20.04	20.30	20.38	422.66	26.26	26.44	Pass
11	2462	17.82	17.31	17.80	17.84	235.431	23.72	26.44	Pass

Note: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/4$]=9.56dBi > 6dBi, so the power limit shall be reduced to 30-(9.56-6) = 26.44dBm.

802.11ax (HE40)

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	17.48	17.59	17.31	17.35	221.539	23.45	26.44	Pass
6	2437	18.36	18.29	18.73	18.33	278.723	24.45	26.44	Pass
9	2452	16.16	16.13	16.02	16.28	164.782	22.17	26.44	Pass

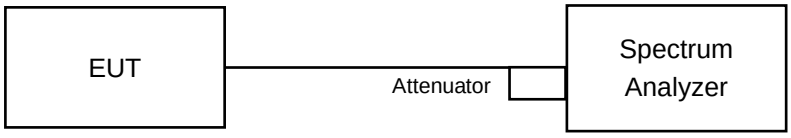
Note: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/4$]=9.56dBi > 6dBi, so the power limit shall be reduced to 30-(9.56-6) = 26.44dBm.

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For 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.

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

802.11ax (HE20)

Chan.	Freq. (MHz)	PSD (dBm/10kHz)				Total PSD (dBm/10kHz)	Max. Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
1	2412	-5.91	-6.02	-6.11	-5.71	0.09	4.44	Pass
6	2437	-3.66	-3.69	-3.84	-3.76	2.28	4.44	Pass
11	2462	-6.47	-6.58	-6.57	-6.57	-0.53	4.44	Pass

Note:
1. Method E) 2) b) of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/4$]=9.56dBi > 6dBi, so the power limit shall be reduced to 8-(9.56-6) = 4.44dBm.

802.11ax (HE40)

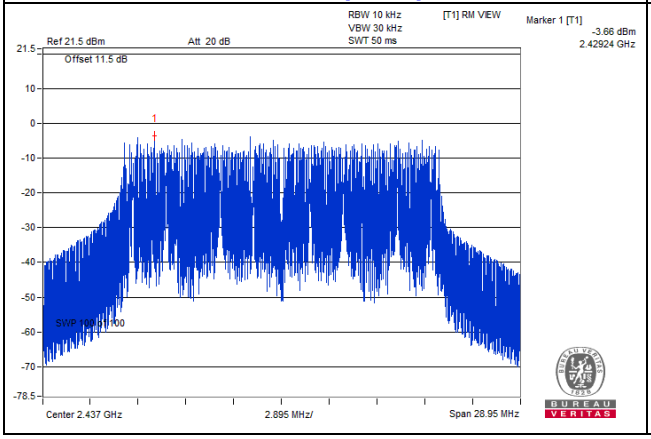
Chan.	Freq. (MHz)	PSD (dBm/10kHz)				Total PSD (dBm/10kHz)	Max. Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
3	2422	-6.48	-6.53	-6.49	-6.33	-0.44	4.44	Pass
6	2437	-6.47	-6.55	-6.57	-6.54	-0.51	4.44	Pass
9	2452	-7.56	-7.58	-7.47	-8.55	-1.75	4.44	Pass

Note:
1. Method E) 2) b) of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/4$]=9.56dBi > 6dBi, so the power limit shall be reduced to 8-(9.56-6) = 4.44dBm.

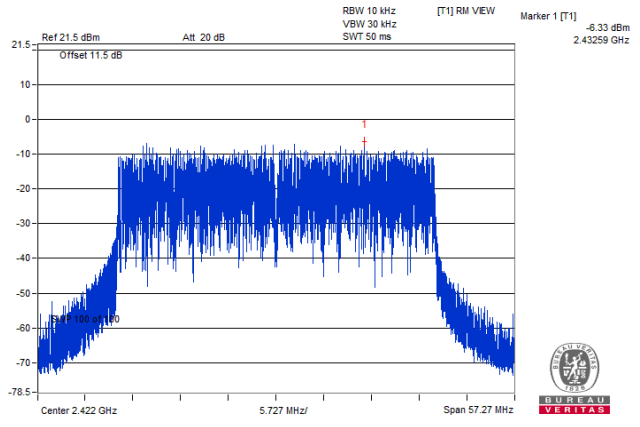
Spectrum Plot of Worst Value

Beamforming Mode

802.11ax (HE20)



802.11ax (HE40)

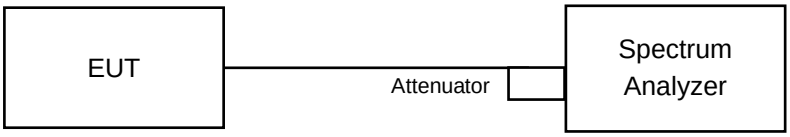


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

Same as Item 4.3.6

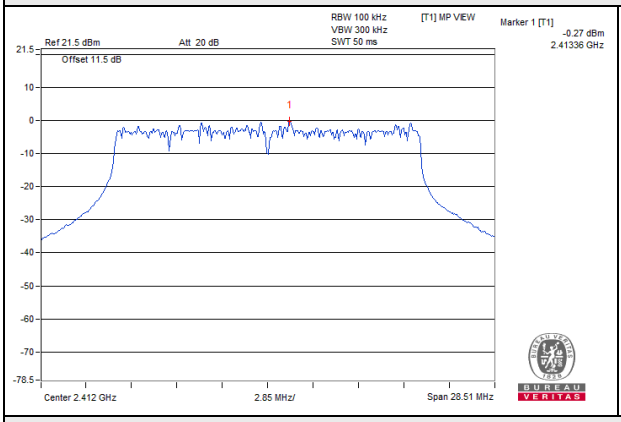
4.6.7 Test Results

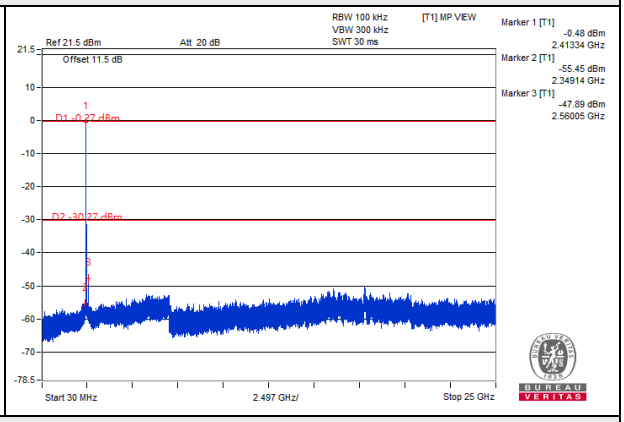
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

Beamforming Mode:

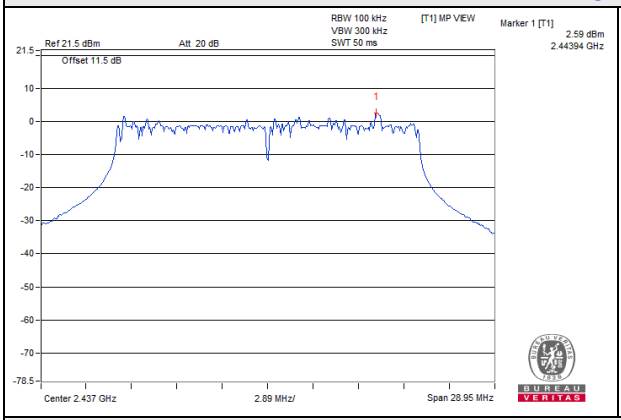
802.11ax (HE20)_Chain 0

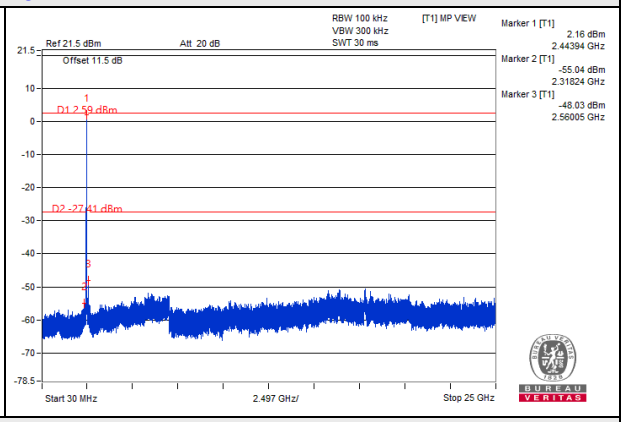
CH 1



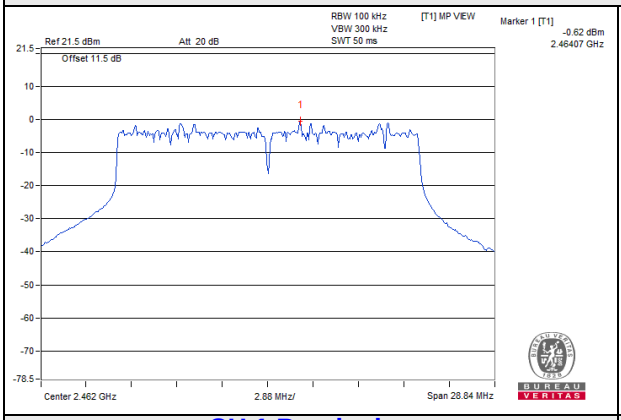


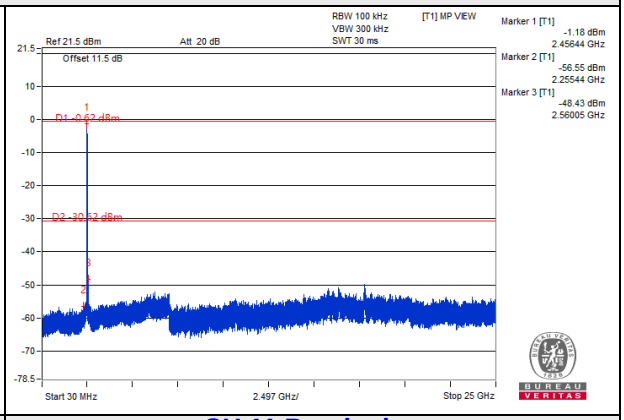
CH 6



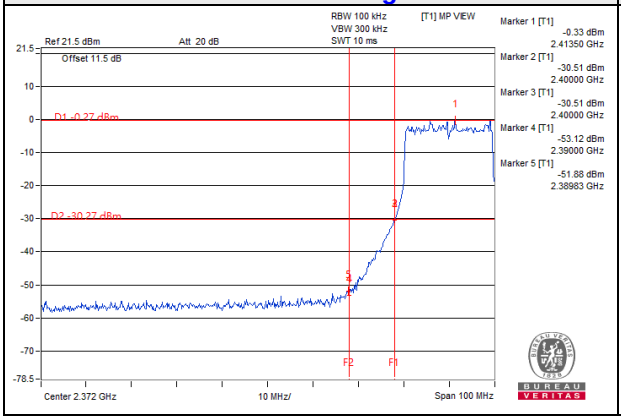


CH 11

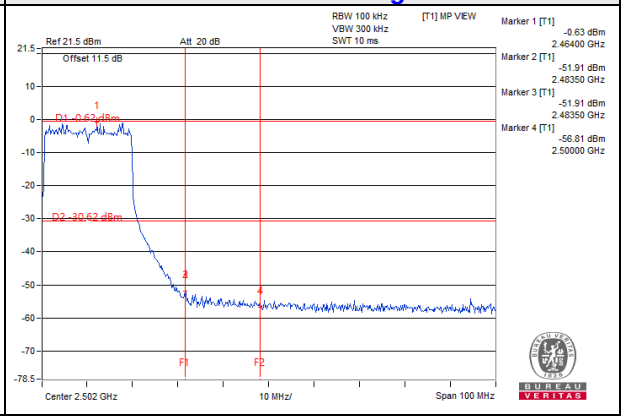




CH 1 Band edge

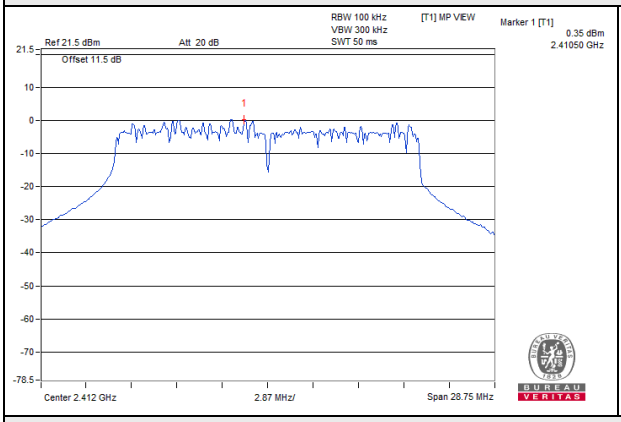


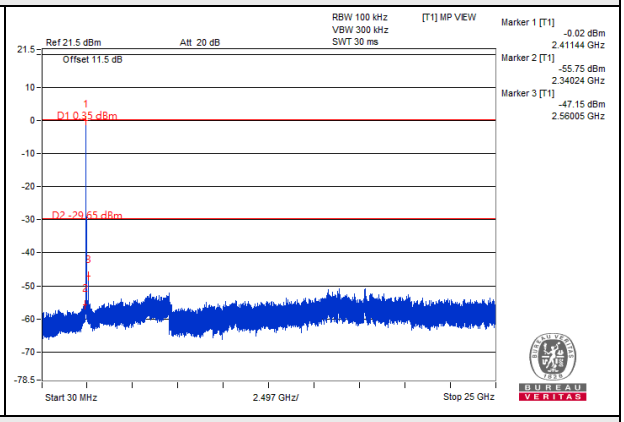
CH 11 Band edge



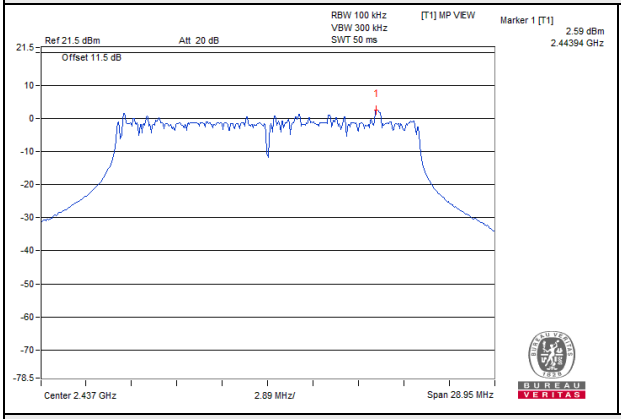
802.11ax (HE20)_Chain 1

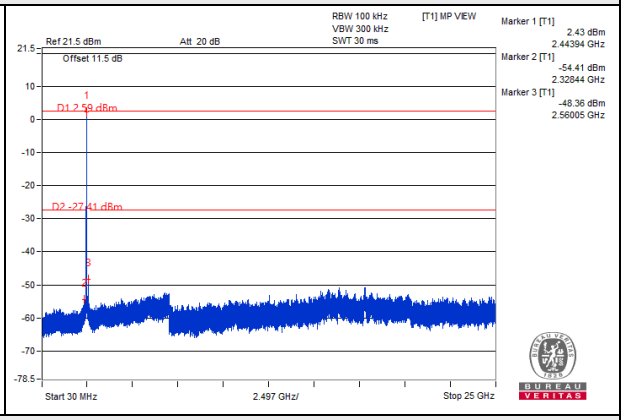
CH 1



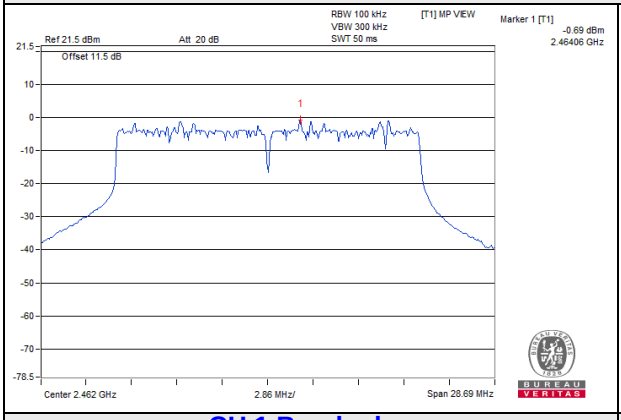


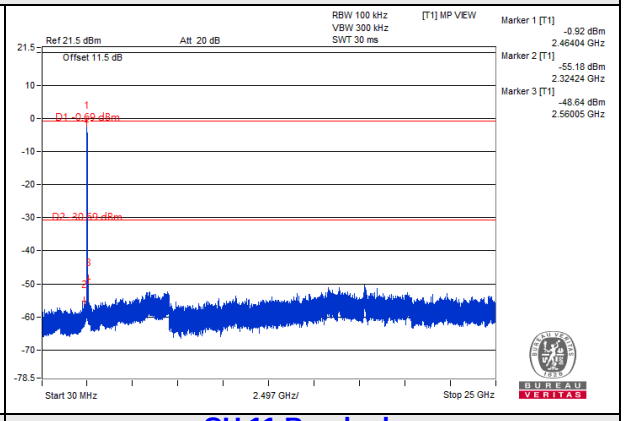
CH 6



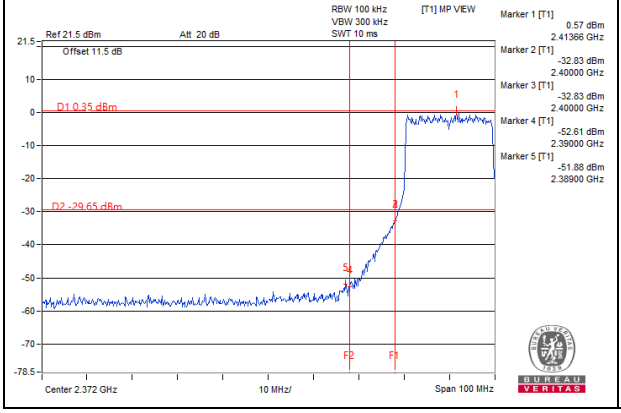


CH 11

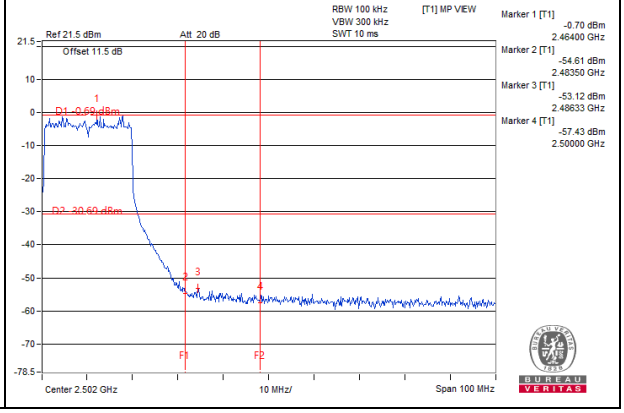




CH 1 Band edge

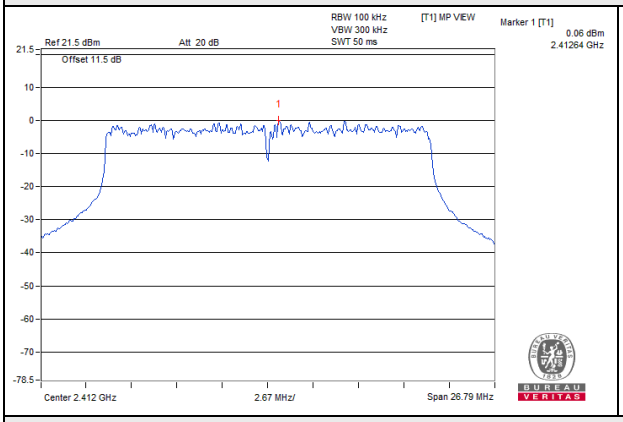


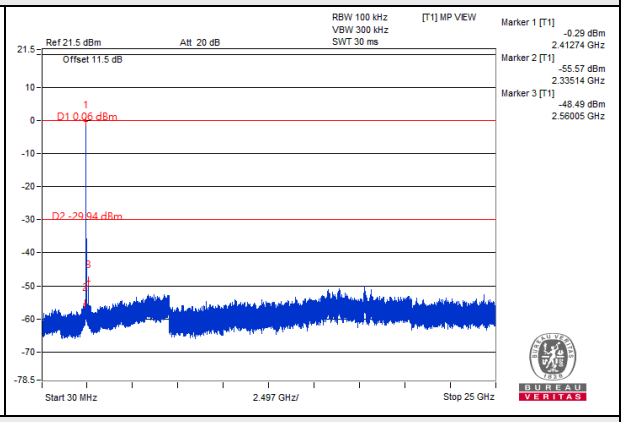
CH 11 Band edge



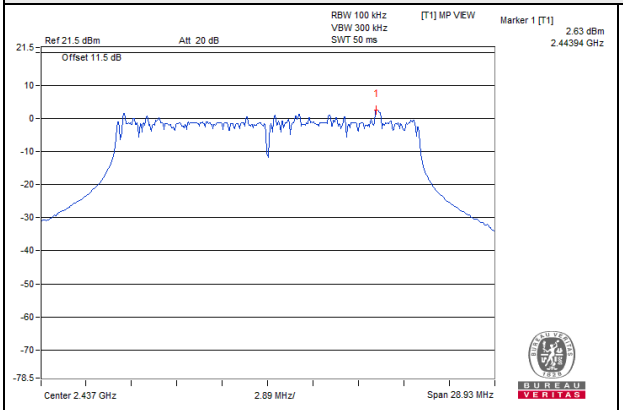
802.11ax (HE20)_Chain 2

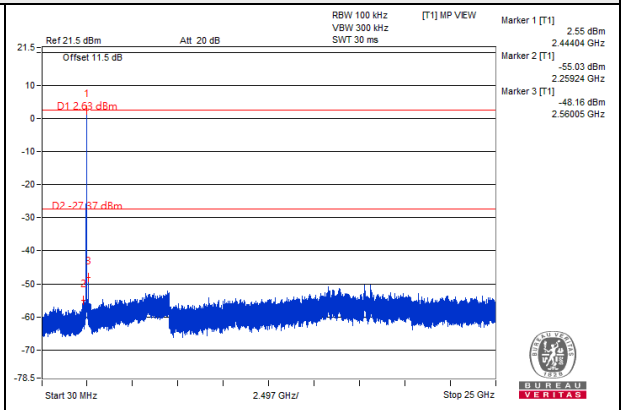
CH 1



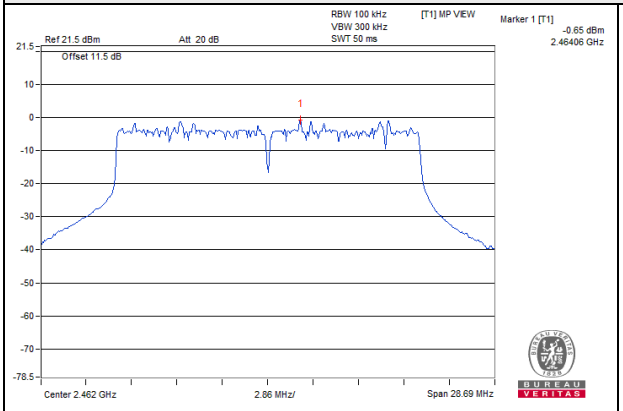


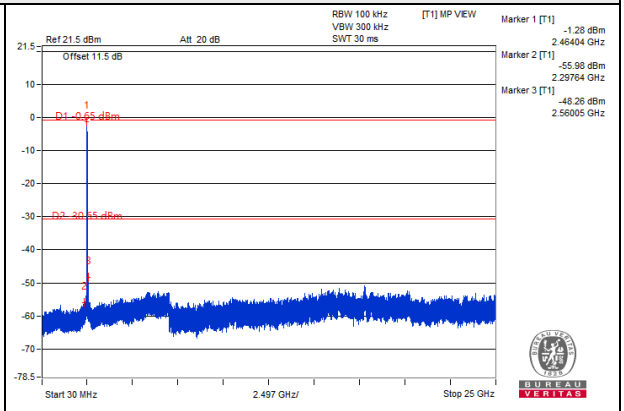
CH 6



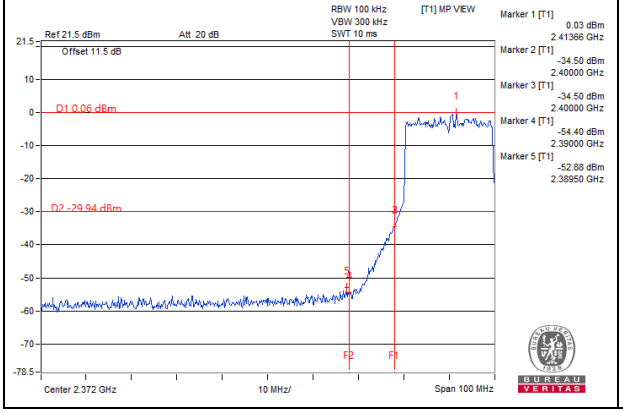


CH 11

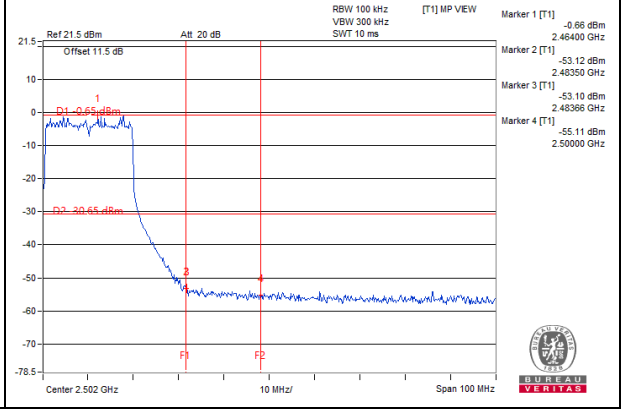




CH 1 Band edge

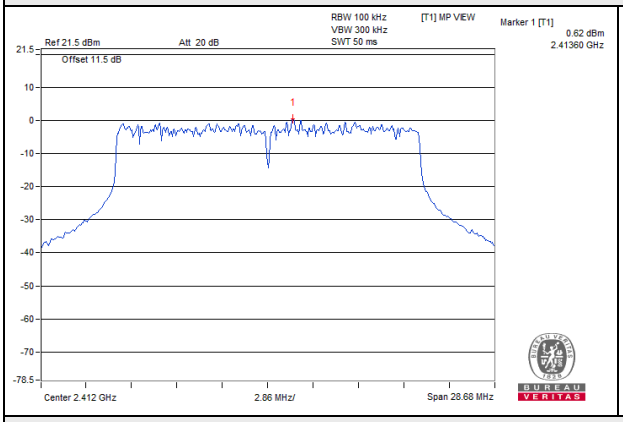


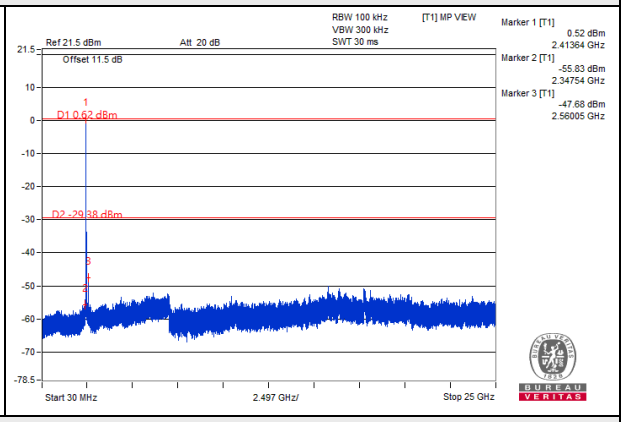
CH 11 Band edge



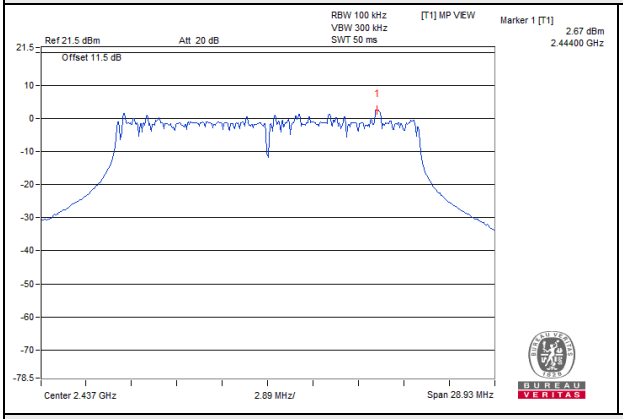
802.11ax (HE20)_Chain 3

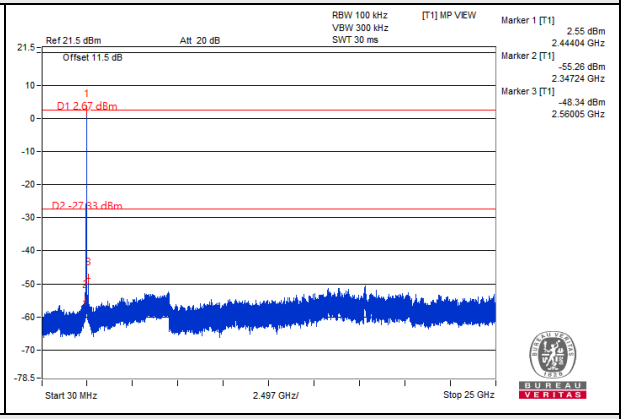
CH 1



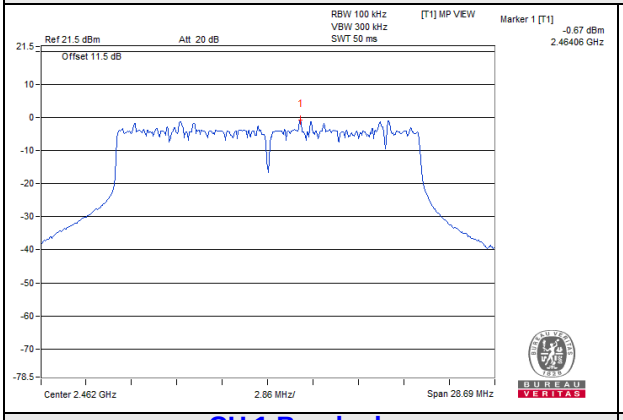


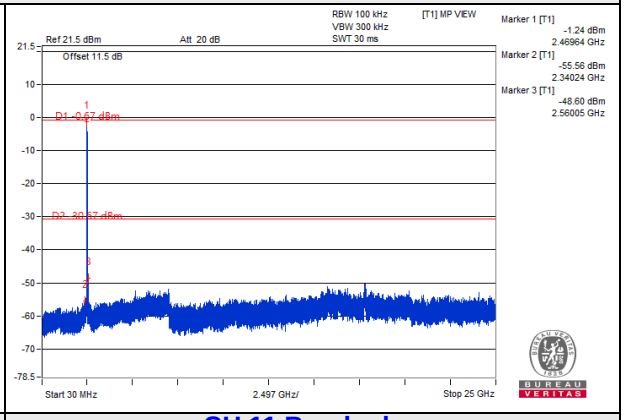
CH 6



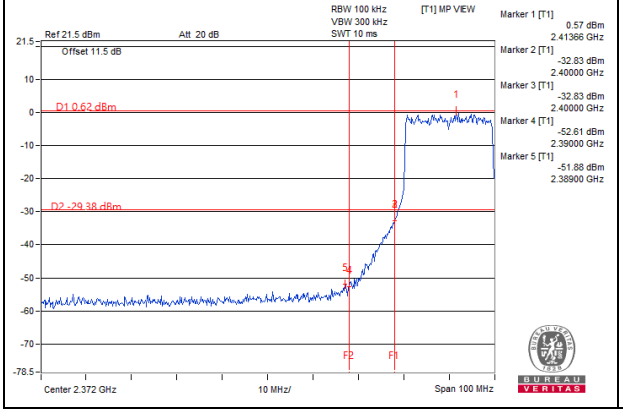


CH 11

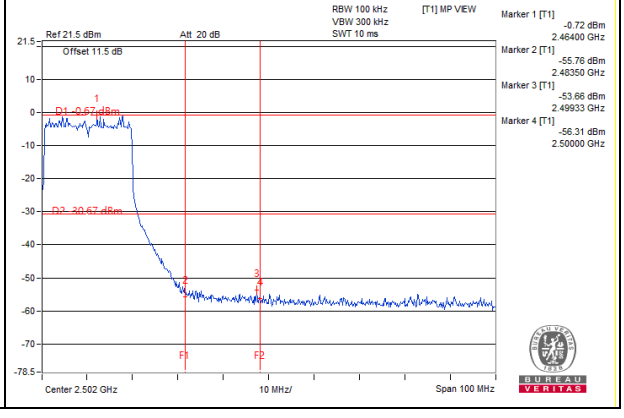




CH 1 Band edge

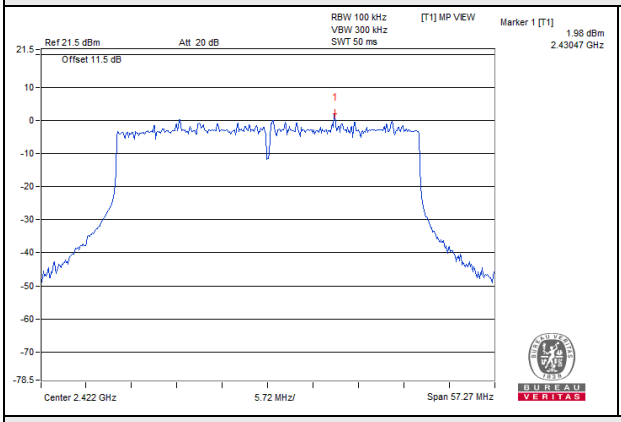


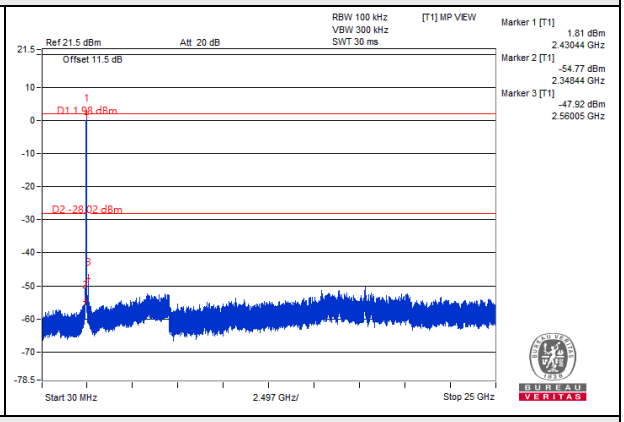
CH 11 Band edge



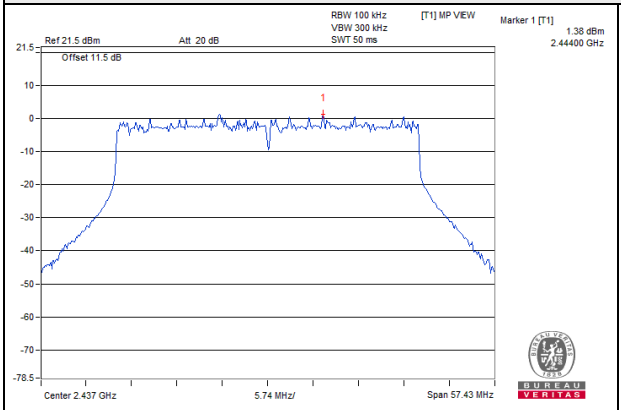
802.11ax (HE40)_Chain 0

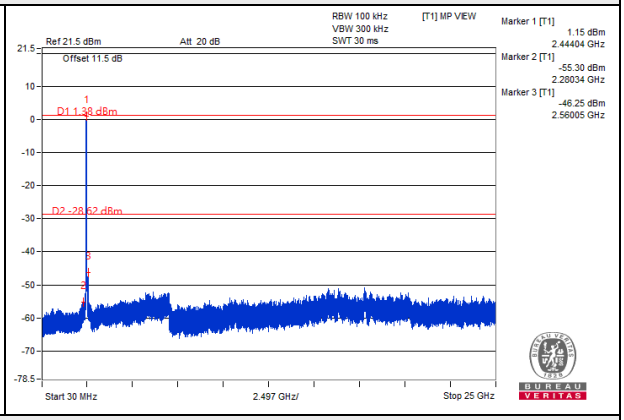
CH 3



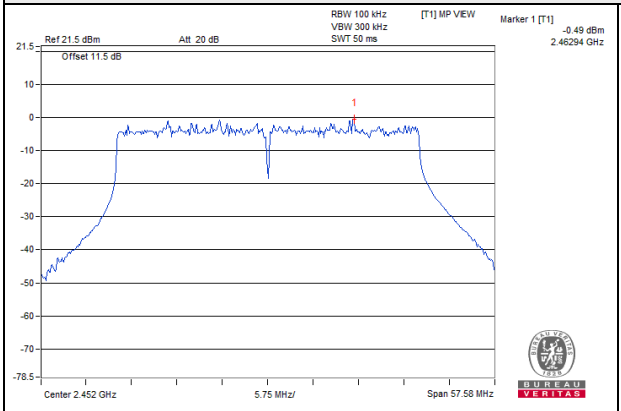


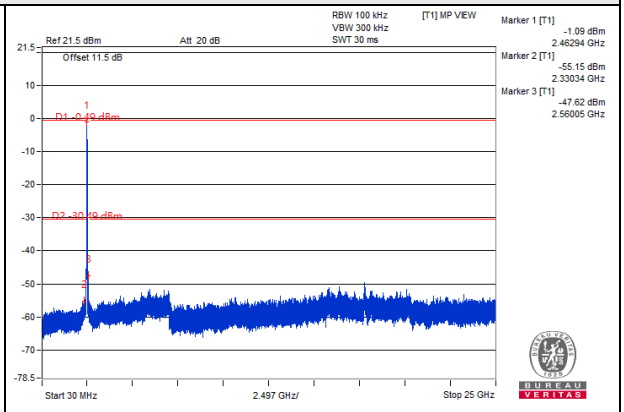
CH 6



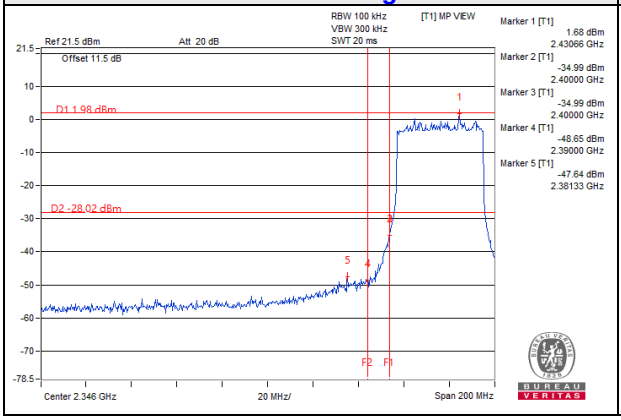


CH 9

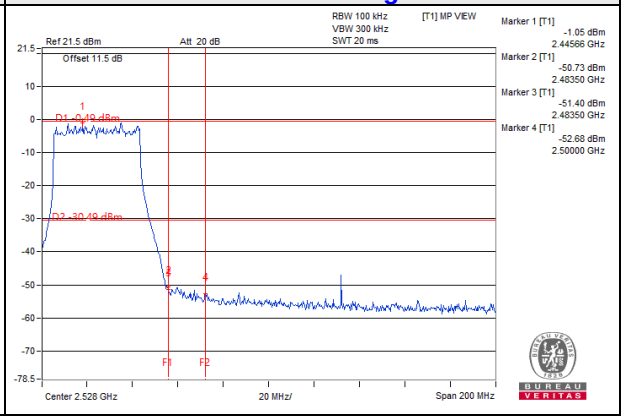




CH 3 Band edge

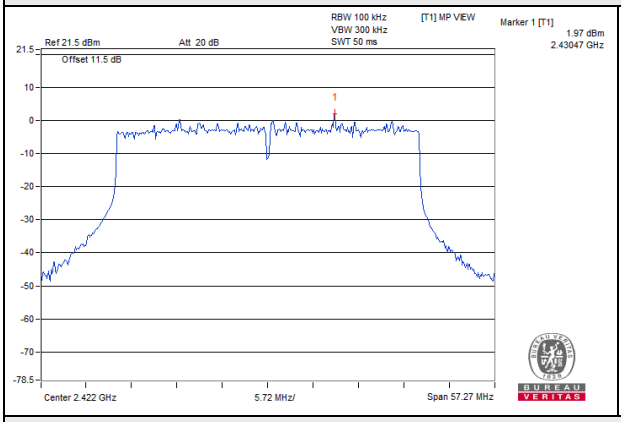


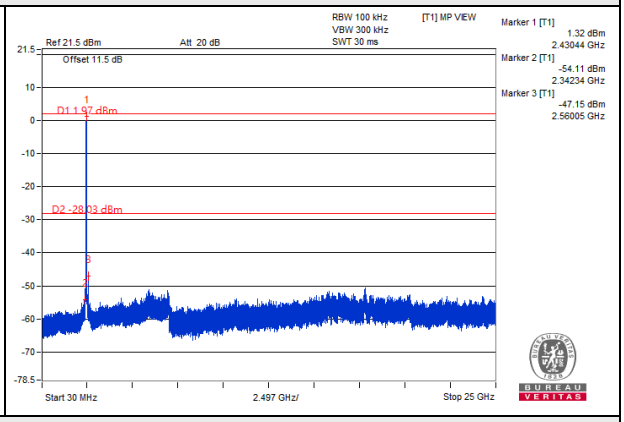
CH 9 Band edge



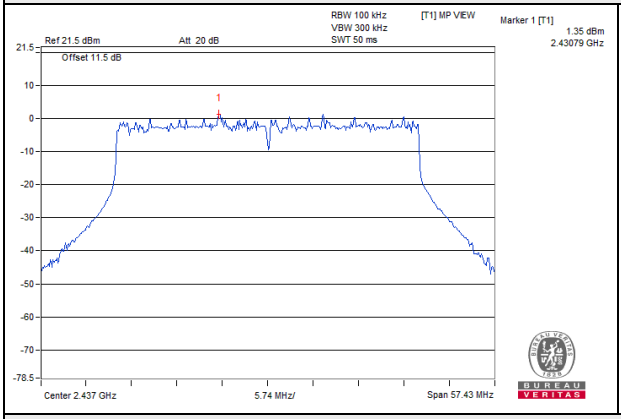
802.11ax (HE40)_Chain 1

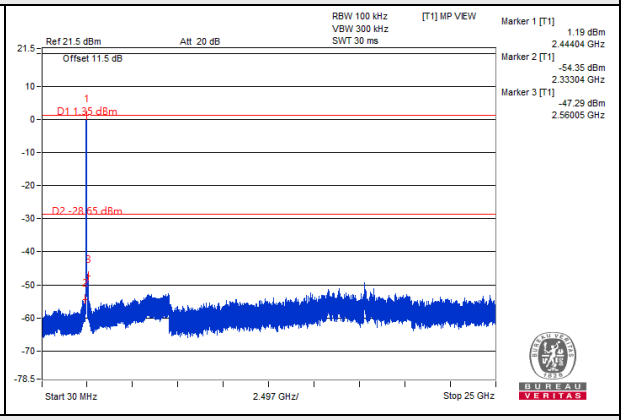
CH 3



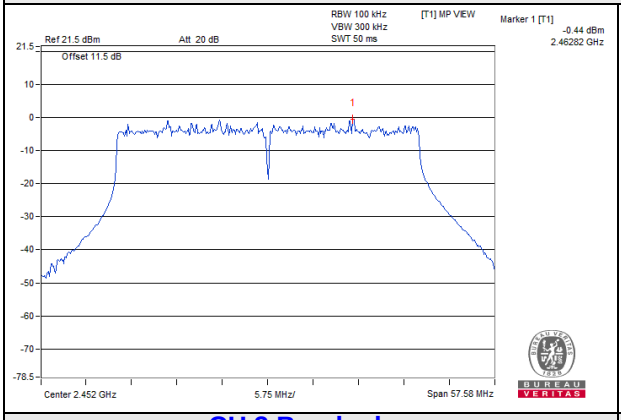


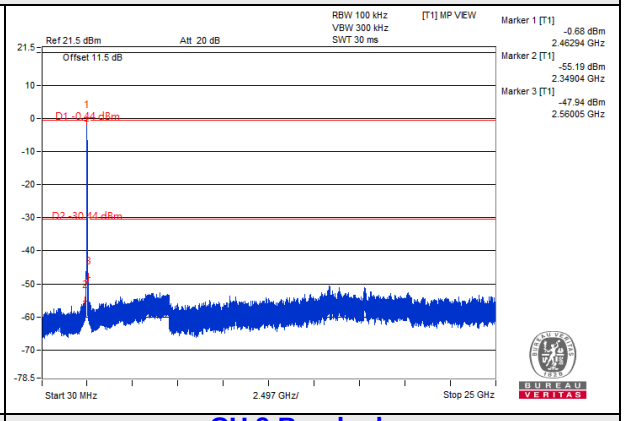
CH 6



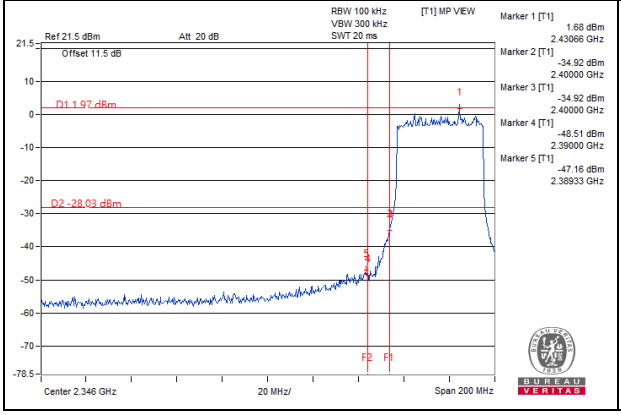


CH 9

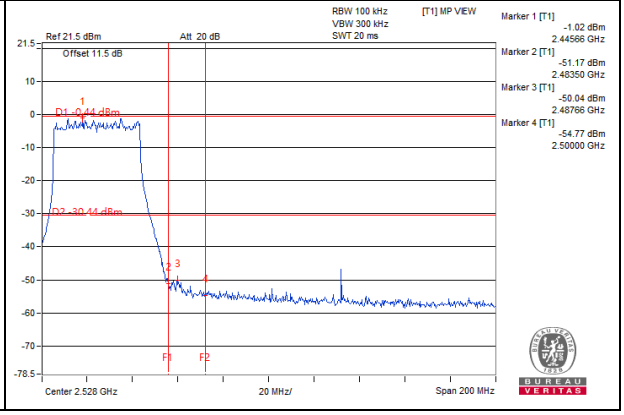




CH 3 Band edge

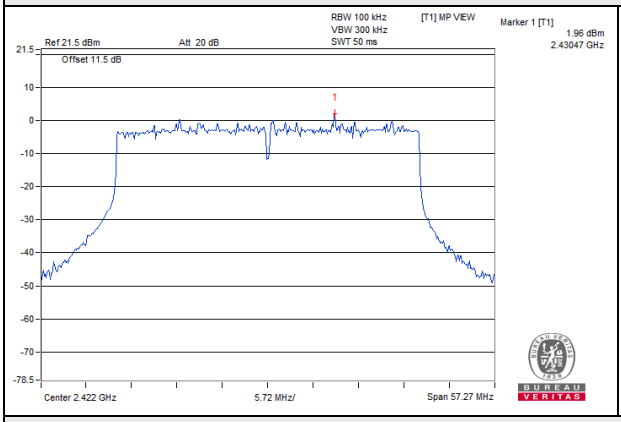


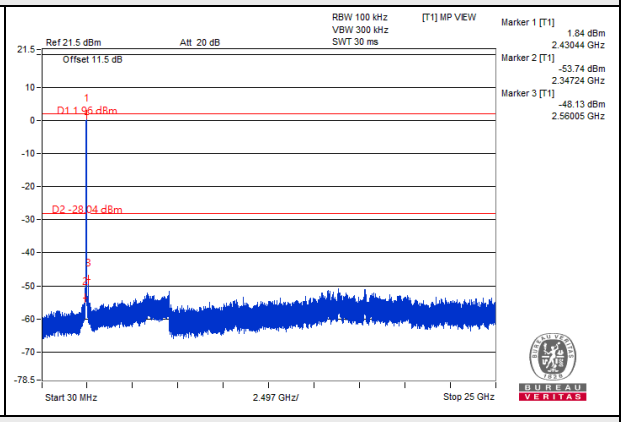
CH 9 Band edge



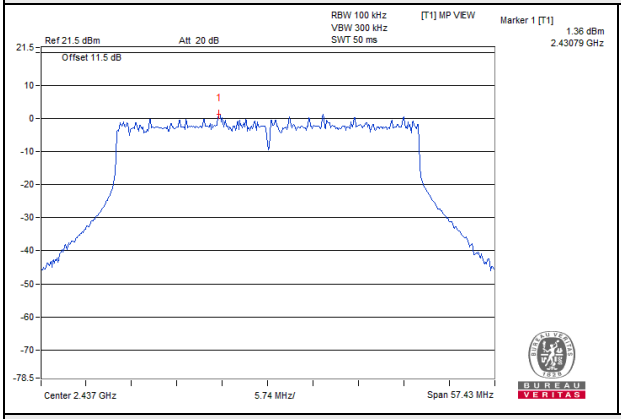
802.11ax (HE40)_Chain 2

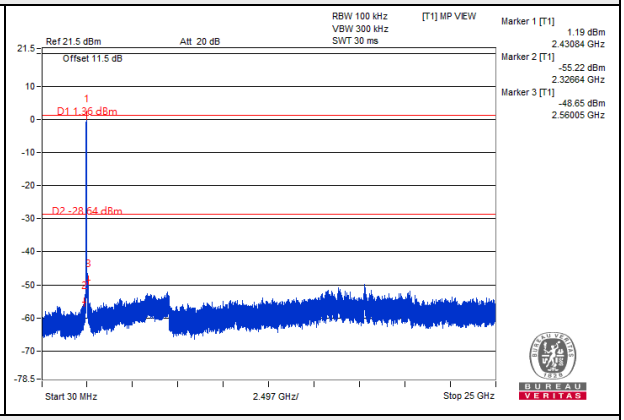
CH 3



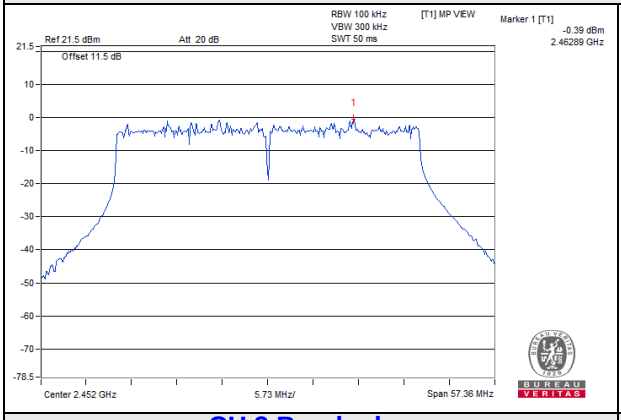


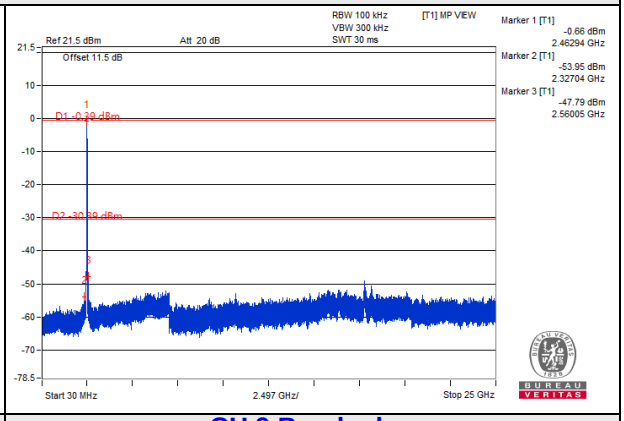
CH 6



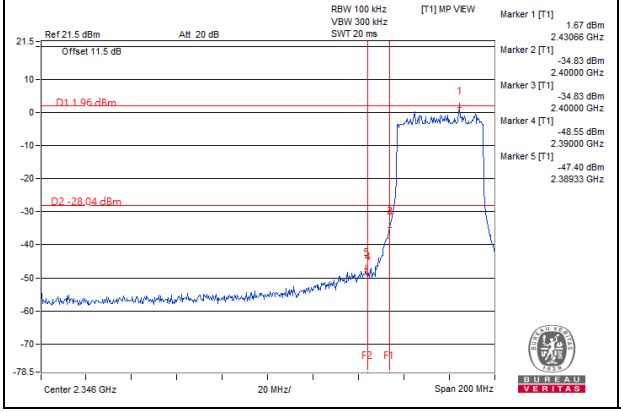


CH 9

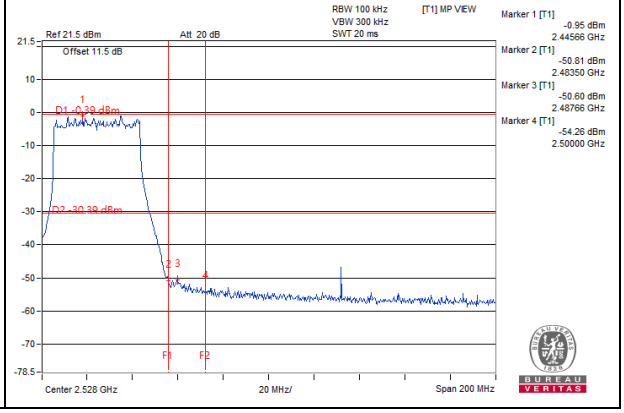




CH 3 Band edge

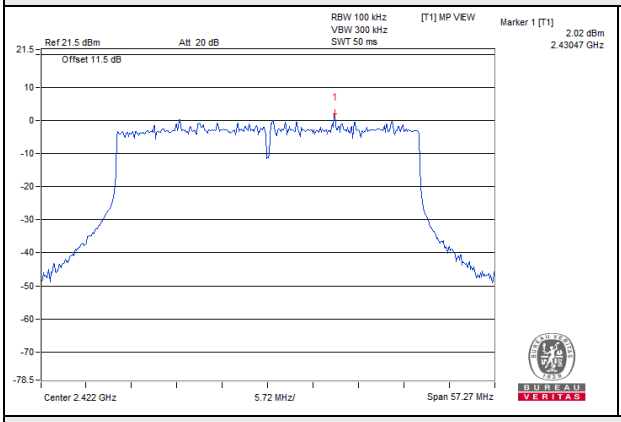


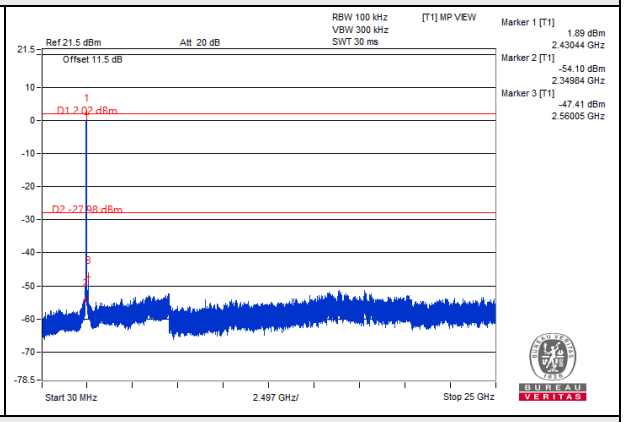
CH 9 Band edge



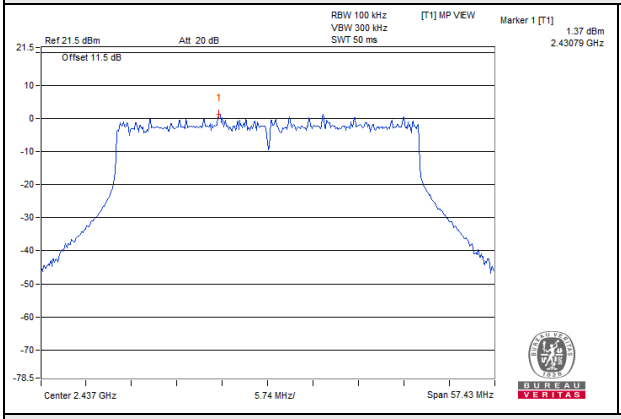
802.11ax (HE40)_Chain 3

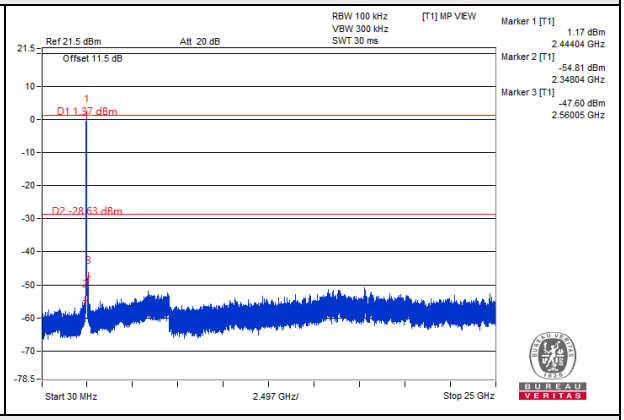
CH 3



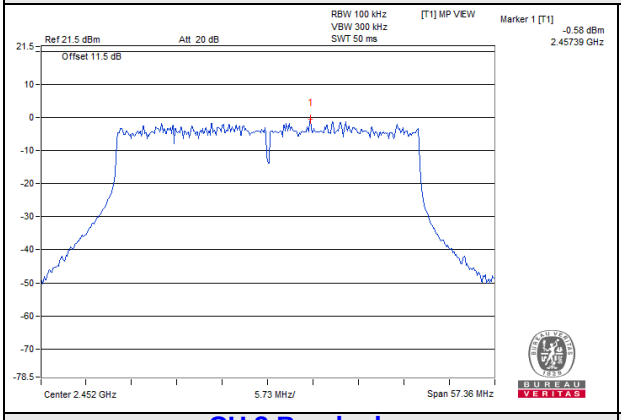


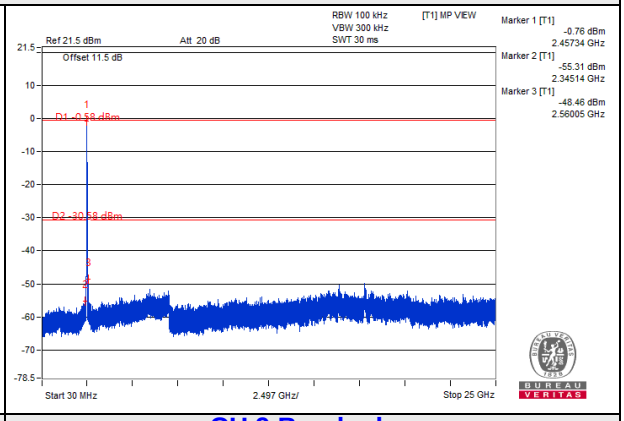
CH 6



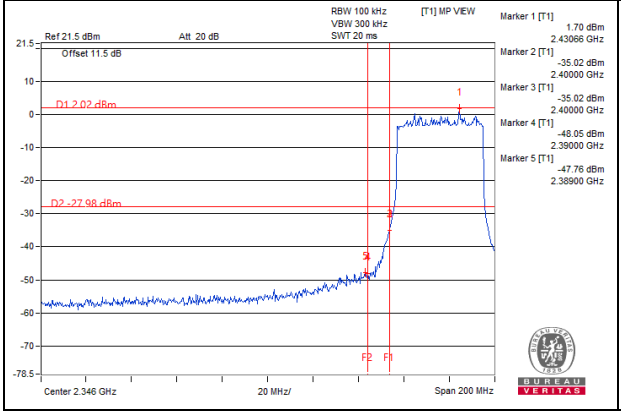


CH 9

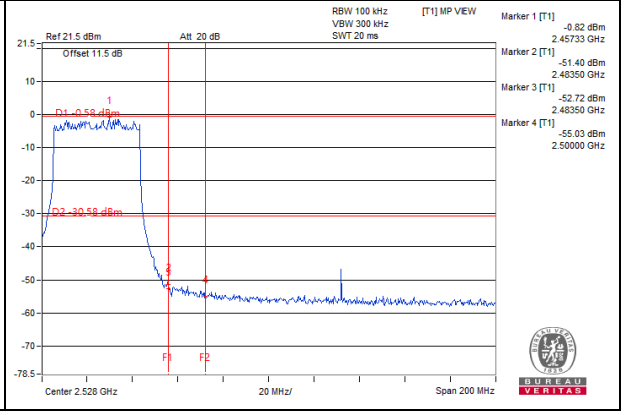




CH 3 Band edge



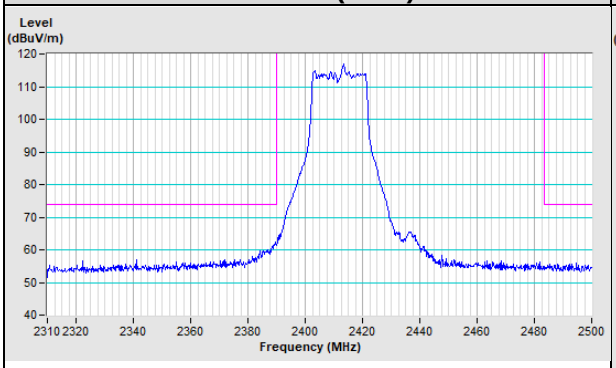
CH 9 Band edge



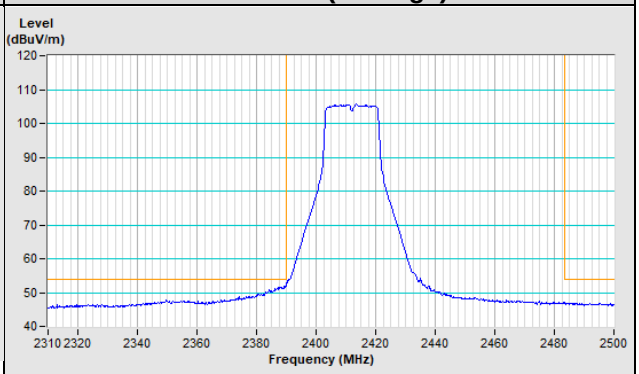
Annex A- Band Edge Measurement

802.11ax (HE20) Channel 1

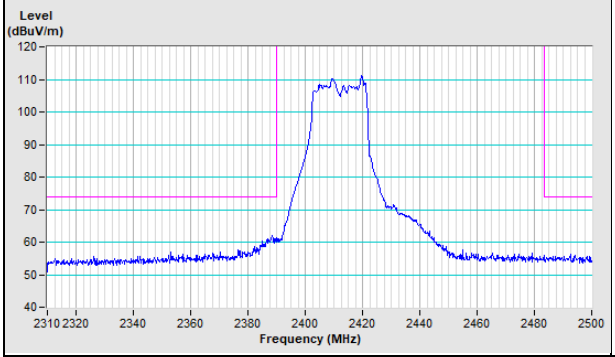
Horizontal (Peak)



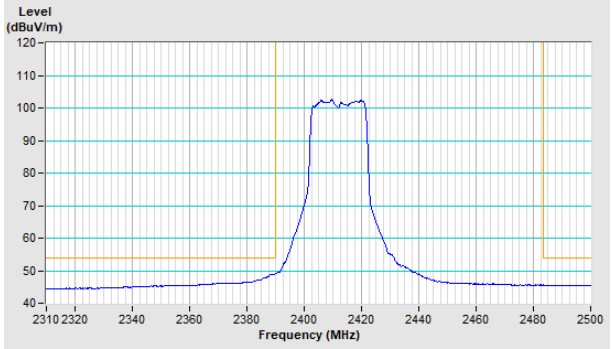
Horizontal (Average)



Vertical (Peak)

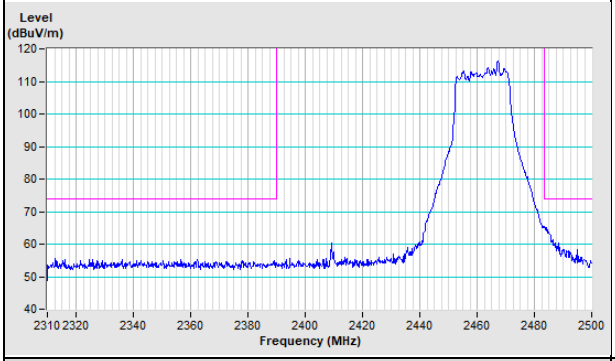


Vertical (Average)

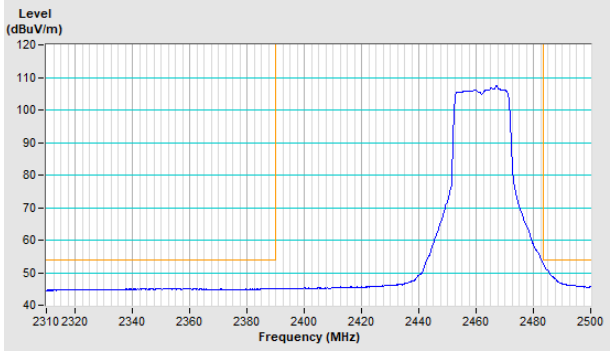


802.11ax (HE20) Channel 11

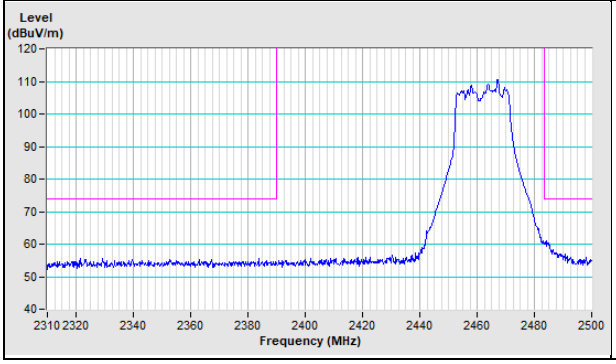
Horizontal (Peak)



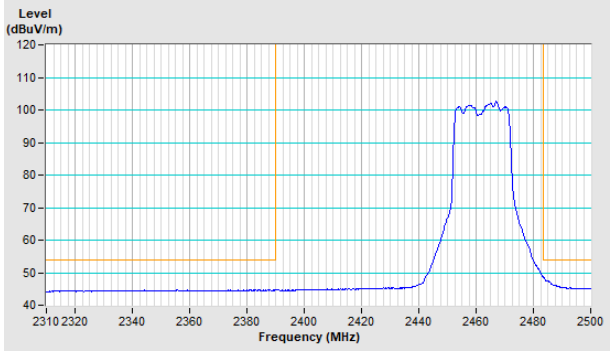
Horizontal (Average)



Vertical (Peak)

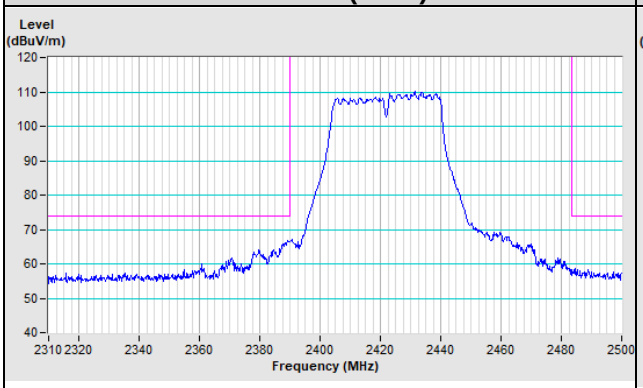


Vertical (Average)

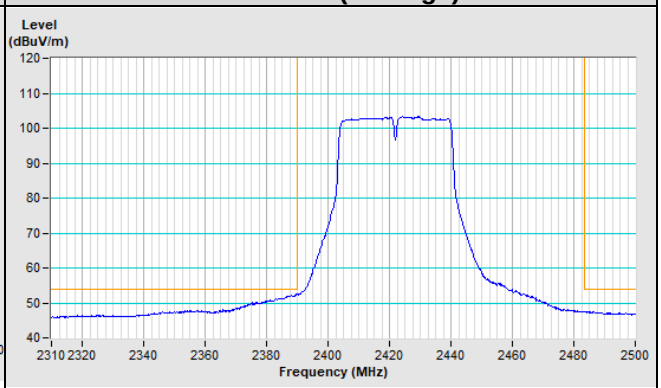


802.11ax (HE40) Channel 3

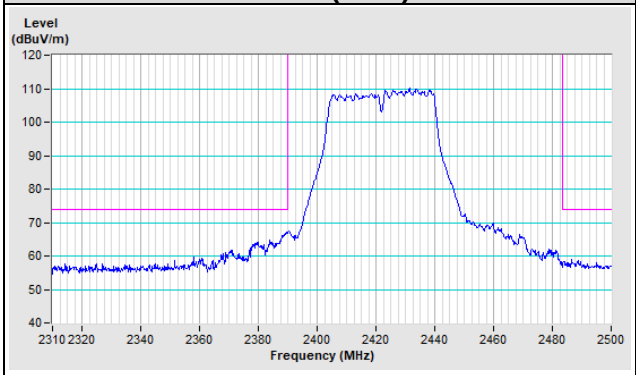
Horizontal (Peak)



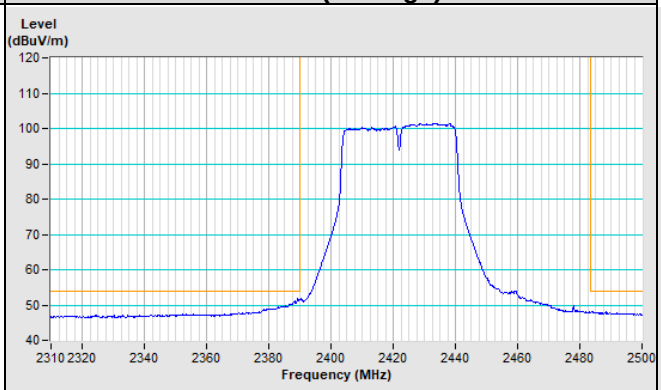
Horizontal (Average)



Vertical (Peak)

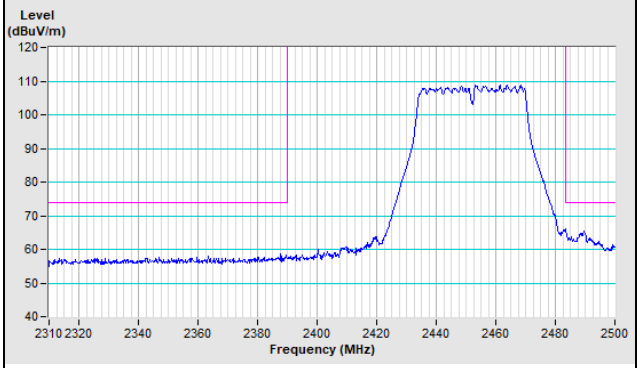


Vertical (Average)

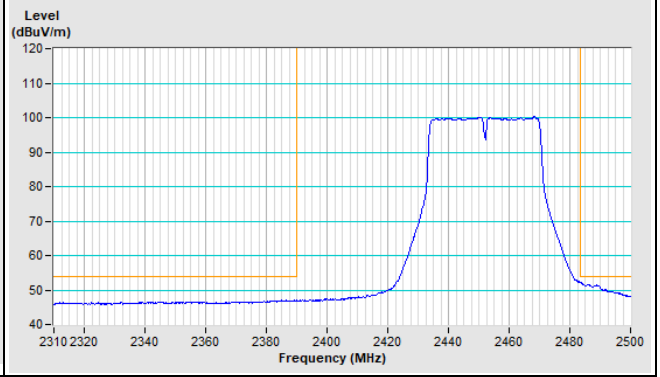


802.11ax (HE40) Channel 9

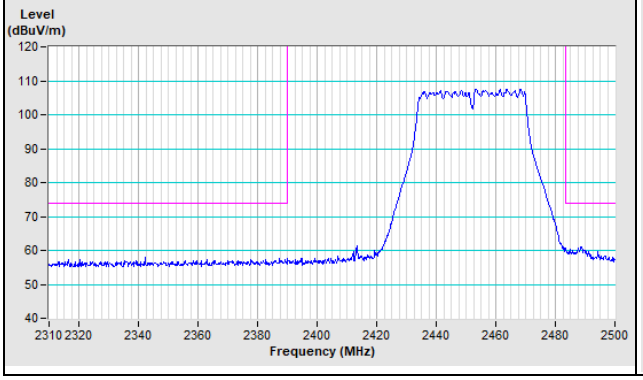
Horizontal (Peak)



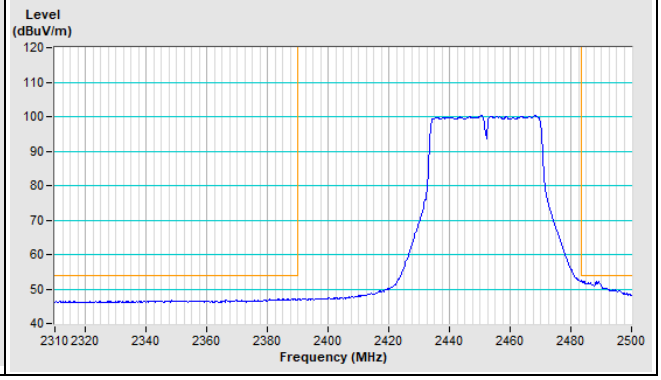
Horizontal (Average)



Vertical (Peak)



Vertical (Average)



5 Pictures of Test Arrangements

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

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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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