FCC Test Report

Report No.:	RF200605E14
FCC ID:	K7S-03628
Test Model:	MR9600 V2
Series Model:	MR9610 V2, EA9350 V2
Received Date:	June 05, 2020
Test Date:	Sep. 22 to 29, 2020
Issued Date:	Nov. 09, 2020
Applicant:	Belkin International, Inc.
Address:	12045 East Waterfront Drive Playa Vista, CA. 90094, USA
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
Test Location :	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
FCC Registration / Designation Number:	723255 / TW2022

Testing Laboratory
2022

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Release Control Record

Issue No.	Description	Date Issued
RF200605E14	Original release.	Nov. 09, 2020

1 Certificate of Conformity

Product:	Dual-Band 802.11ax Wireless Router
Brand:	Linksys
Test Model:	MR9600 V2
Series Model:	MR9610 V2, EA9350 V2
Sample Status:	ENGINEERING SAMPLE
Applicant:	Belkin International, Inc.
Test Date:	Sep. 22 to 29, 2020
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10: 2013

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

Prepared by : Cherry Chuo , **Date:** Nov. 09, 2020

Cherry Chuo / Specialist

Approved by : , **Date:** Nov. 09, 2020

Clark Lin / Technical Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -15.22 dB at 0.15781 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.2 dB at 2483.50MHz and 2485.70MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is i-pex(MHF) not a standard connector.

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

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.9 dB
Conducted Emissions	-	2.5 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.1 dB
	30MHz ~ 1GHz	5.4 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.0 dB
	18GHz ~ 40GHz	5.3 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Dual-Band 802.11ax Wireless Router
Brand	Linksys
Test Model	MR9600 V2
Series Model	MR9610 V2, EA9350 V2
Status of EUT	ENGINEERING SAMPLE
Driver version	17.10.99.17(r780087 WLTEST)
Power Supply Rating	12Vdc from power adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT20/40 in 2.4GHz 1024QAM for OFDMA in 11ax HE mode
Modulation Technology	DSSS, OFDM, OFDMA
Transfer Rate	802.11b: up to 11 Mbps 802.11a/g: up to 54 Mbps 802.11n: up to 600 Mbps 802.11ac: up to 3466.7 Mbps 802.11ax: up to 4803.9 Mbps
Operating Frequency	**2.4GHz:** 2.412 ~ 2.462GHz **5GHz:** 5.18~5.32GHz, 5.50~5.70GHz, 5.745 ~ 5.825GHz
Number of Channel	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20), VHT20, 802.11ax (HE20): 11 802.11n (HT40), VHT40, 802.11ax (HE40): 7 **5GHz:** 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20): 24 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 11 802.11ac (VHT80), 802.11ax (HE80): 5 802.11ac (VHT160), 802.11ax (HE160): 2
Output Power	**CDD Mode:** **2.412 ~ 2.462 GHz:** 984.722 mW **5.18 ~ 5.25 GHz:** 948.995 mW **5.25 ~ 5.32GHz:** 249.921 mW **5.5 ~ 5.7GHz:** 245.213 mW **5.745 ~ 5.825 GHz:** 979.87 mW **Beamforming Mode:** **2.412 ~ 2.462 GHz:** 425.171 mW **5.18 ~ 5.25 GHz:** 440.884 mW **5.25 ~ 5.32GHz:** 117.046 mW **5.5 ~ 5.7GHz:** 110.882 mW **5.745 ~ 5.825 GHz:** 464.91 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x1
Data Cable Supplied	RJ45 cable x1 (Unshielded, 1m)

Note:

1. The EUT has three model names, which are identical to each other in all aspects except for the following information:

Brand Name	Model Name	Difference
Linksys	MR9610 V2	For marketing
	EA9350 V2	
	MR9600 V2	

From the above models, model: **MR9600 V2** was selected as representative model for the test and its data are recorded in this report.

2. The EUT has below radios as following table:

Radio 1	Radio 2	Radio 3
WLAN 2.4GHz	WLAN 5GHz	Bluetooth

3. Simultaneously transmission condition.

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

4. The EUT must be supplied one power adapter and following different models could be chosen as following table:

No.	Brand	Model name	Spec	plug
1	LEI	MU48AY120400-A1	Intput: 100-240Vac, 50/60Hz, 1.5A Output: 12Vdc, 4A Output Cable: Unshielded, 1.5m	US
2	Ktec	KSAS0501200400HU	Intput: 100-240Vac, 50/60Hz, 1.2A Output: 12Vdc, 4A Output Cable: Unshielded, 1.5m	US
3	APD	DA-48T12	Intput: 100-240Vac, 50/60Hz, 1.4A Output: 12Vdc, 4A Output Cable: Unshielded, 1.5m	US/EU/UK (Detachable)
4	Ktec	KSAS0501200400M2	Intput: 100-240Vac, 50/60Hz, 1.2A Output: 12Vdc, 4A Output Cable: Unshielded, 1.5m	US/EU/UK (Detachable)
Note: 1. From the above adapters, the worst Radiated Emissions and Conducted Emissions test was found in Adapter 1. Therefore only the test data of the modes were recorded in this report.				

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

Antenna No.	Antenna Net Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector Type
1	4.04 3.31	2.4~2.4835 5.15-5.85	Dipole	i-pex(MHF)
2	3.66 3.31	2.4~2.4835 5.15-5.85	Dipole	i-pex(MHF)
3	3.66 3.25	2.4~2.4835 5.15-5.85	Dipole	i-pex(MHF)
4	3.33 3.23	2.4~2.4835 5.15-5.85	Dipole	i-pex(MHF)
Bluetooth	2.7	2.4~2.4835	PIFA	none

6. The EUT incorporates a MIMO function.

2.4GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11b	4TX	4RX
802.11g	4TX	4RX
802.11n (HT20)	4TX	4RX
802.11n (HT40)	4TX	4RX
VHT20	4TX	4RX
VHT40	4TX	4RX
802.11ax (HE20)	4TX	4RX
802.11ax (HE40)	4TX	4RX
5GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11a	4TX	4RX
802.11n (HT20)	4TX	4RX
802.11n (HT40)	4TX	4RX
802.11ac (VHT20)	4TX	4RX
802.11ac (VHT40)	4TX	4RX
802.11ac (VHT80)	4TX	4RX
802.11ac (VHT160)	4TX	4RX
802.11ax (HE20)	4TX	4RX
802.11ax (HE40)	4TX	4RX
802.11ax (HE80)	4TX	4RX
802.11ax (HE160)	4TX	4RX

Note:

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

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

3.2 Description of Test Modes

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

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

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

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

3.2.1 Test Mode Applicability and Tested Channel Detail

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

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

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

Note: The EUT had been pre-tested on the positioned of laying-flat and wall-mount. The worst case was found when positioned of on laying-flat.

Radiated Emission Test (Above 1GHz):

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

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

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

Radiated Emission Test (Below 1GHz):

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

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

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

Power Line Conducted Emission Test:

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

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

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

Antenna Port Conducted Measurement:

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

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

Test Condition:

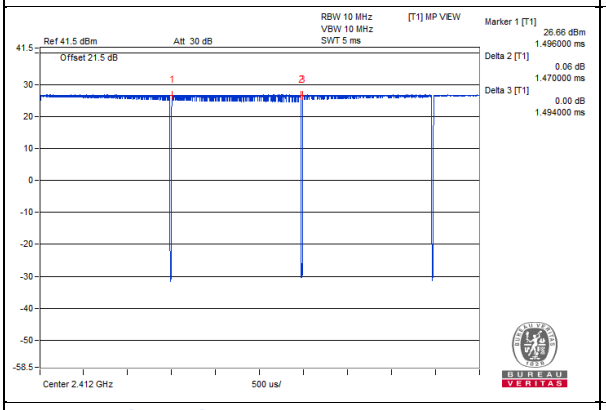
Applicable To	Environmental Conditions	Input Power	Tested By
RE≥1G	25deg. C, 75%RH	120Vac, 60Hz	Gary Cheng
RE<1G	26deg. C, 68%RH	120Vac, 60Hz	Tom Yang
PLC	26deg. C, 68%RH	120Vac, 60Hz	Tom Yang
APCM	25deg. C, 60%RH	120Vac, 60Hz	Kevin Ko

3.3 Duty Cycle of Test Signal

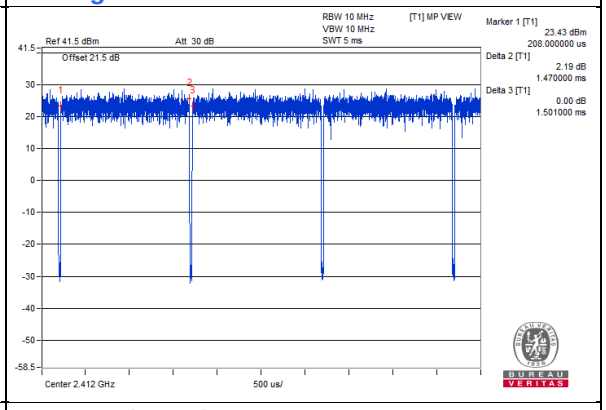
If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b: Duty cycle = 1.47 ms/1.494 ms= 0.984
802.11g: Duty cycle = 1.47 ms/1.501 ms= 0.979, Duty factor = 10 * log(1/Duty cycle) = 0.09 dB
802.11ax (HE20): Duty cycle = 1.145 ms/1.179 ms= 0.971, Duty factor = 10 * log(1/Duty cycle) = 0.13 dB
802.11ax (HE40): Duty cycle = 1.599 ms/ 1.642 ms= 0.974, Duty factor = 10 * log(1/Duty cycle) = 0.12 dB

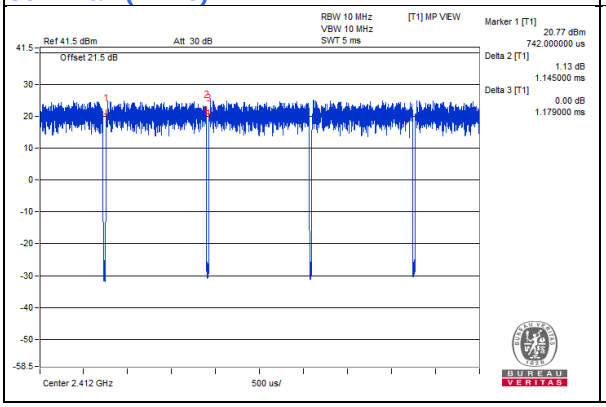
802.11b



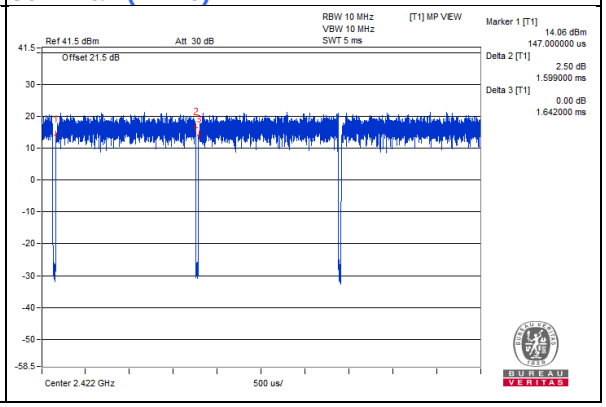
802.11g



802.11ax (HE20)



802.11ax (HE40)



3.4 Description of Support Units

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

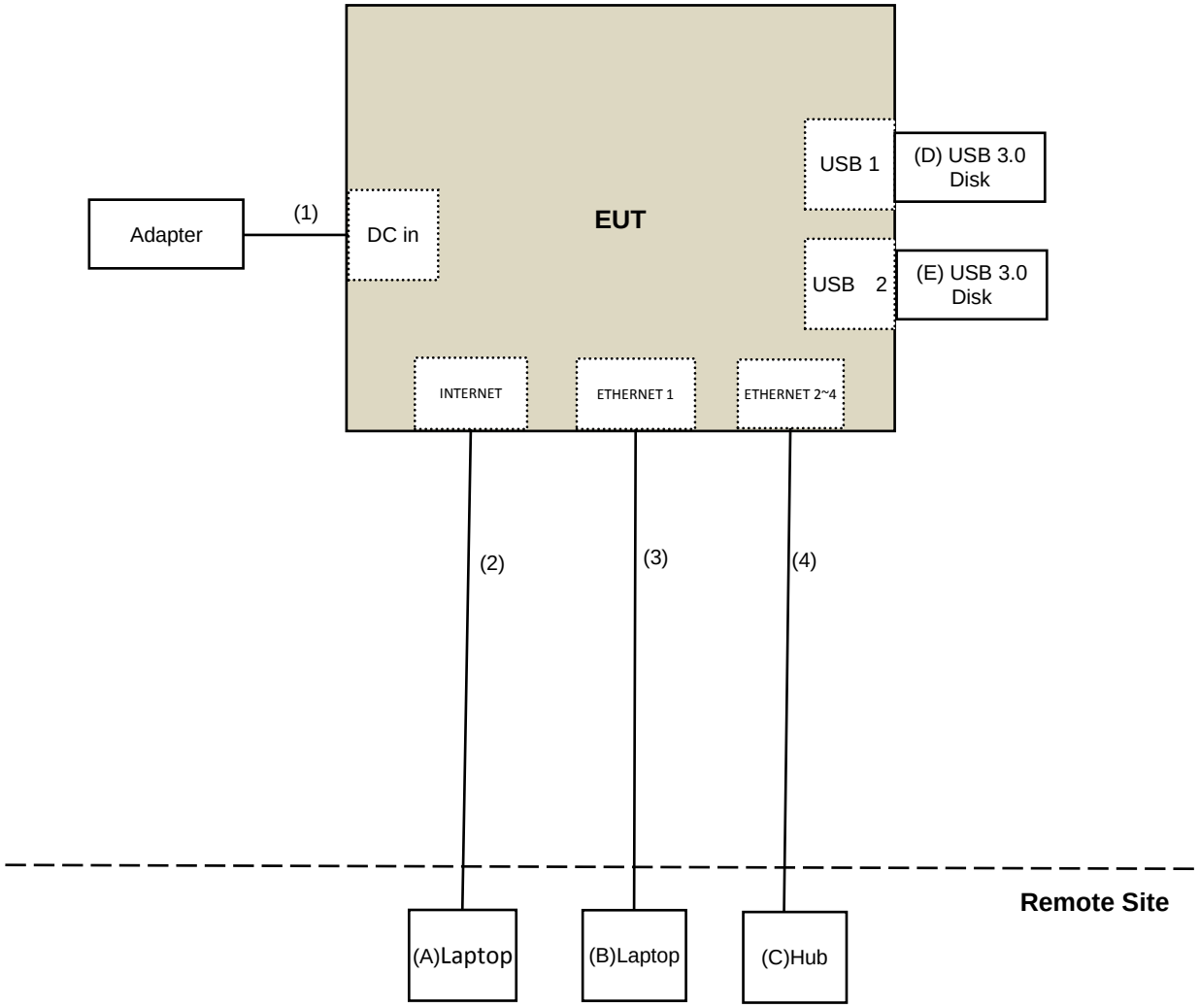
ID	Product	Brand	Model No.	Serial No	FCC ID	Remarks
A.	Laptop	WONDER	WD-303	7C17KA 04011	NA	Provided by Lab
B.	Laptop	DELL	E5430	HYV4VY1	FCC DoC	Provided by Lab
C.	HUB	ZyXEL	GS1100-16	S150H44000046	FCC DoC	Provided by Lab
D.	USB 3.0 Disk	SanDisk	SDCZ73-032G-G46	NA	NA	Provided by Lab
E.	USB 3.0 Disk	SanDisk	SDCZ73-032G-G46	NA	NA	Provided by Lab

Note:

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

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

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards and references

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

Test standard:

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

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

References Test Guidance :

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

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

4.1.2 Test Instruments

For Radiated Emission & Bangedge test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 06, 2020	July 05, 2021
Pre-Amplifier EMCI	EMC001340	980142	May 25, 2020	May 24, 2021
Loop Antenna Electro-Metrics	EM-6879	264	Feb. 18, 2020	Feb. 17, 2021
RF Cable	NA	LOOPCAB-001	Jan. 08, 2020	Jan. 07, 2021
RF Cable	NA	LOOPCAB-002	Jan. 08, 2020	Jan. 07, 2021
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	Apr. 28, 2020	Apr. 27, 2021
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 11, 2019	Nov. 10, 2020
RF Cable	8D	966-3-1	Mar. 17, 2020	Mar. 16, 2021
RF Cable	8D	966-3-2	Mar. 17, 2020	Mar. 16, 2021
RF Cable	8D	966-3-3	Mar. 17, 2020	Mar. 16, 2021
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Sep. 24, 2020	Sep. 23, 2021
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Nov. 24, 2019	Nov. 23, 2020
Pre-Amplifier EMCI	EMC12630SE	980384	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC104-SM-SM-1200	160922	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC104-SM-SM-2000	180601	June 09, 2020	June 08, 2021
RF Cable	EMC104-SM-SM-6000	180602	June 09, 2020	June 08, 2021
Spectrum Analyzer Keysight	N9030A	MY54490679	July 13, 2020	July 12, 2021
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 15, 2020	Jan. 14, 2021
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 24, 2019	Nov. 23, 2020
RF Cable	EMC102-KM-KM-1200	160924	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC-KM-KM-4000	200214	Mar. 11, 2020	Mar. 10, 2021
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 3.
3. Tested Date: Sep. 26 to 29, 2020

For other test items:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	100964	May 29, 2020	May 28, 2021
Power meter Anritsu	ML2495A	1529002	July 22, 2020	July 21, 2021
Power sensor Anritsu	MA2411B	1339443	July 22, 2020	July 21, 2021
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 14, 2020	Apr. 13, 2021
Software	ADT_RF Test Software V6.6.5.4	NA	NA	NA

NOTE:
1. The test was performed in Oven room 2.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: Sep. 22, 2020

4.1.3 Test Procedures

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

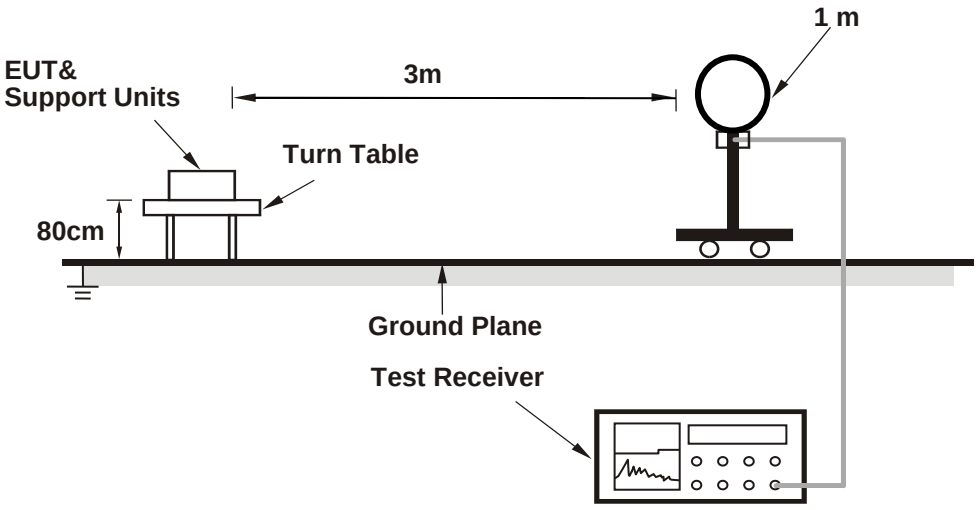
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

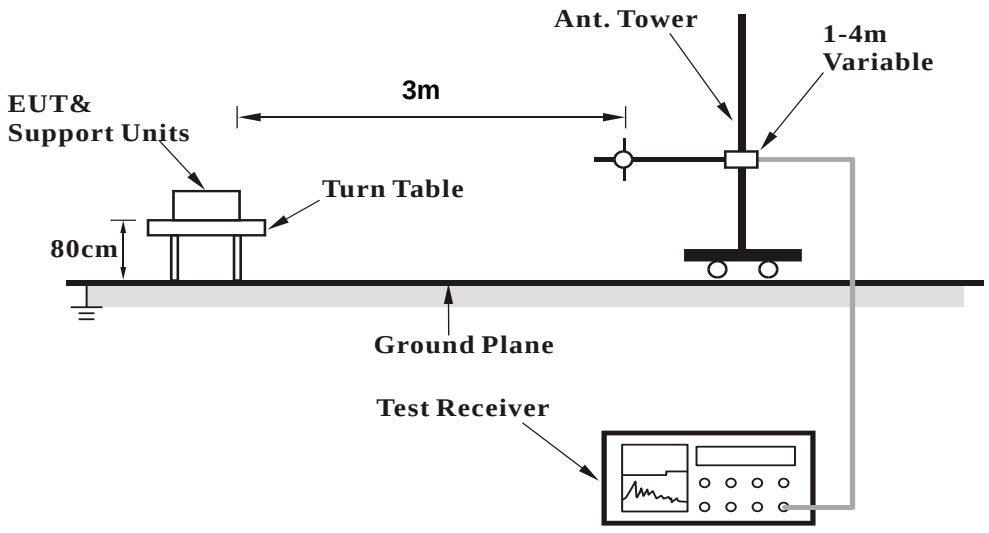
No deviation.

4.1.5 Test Setup

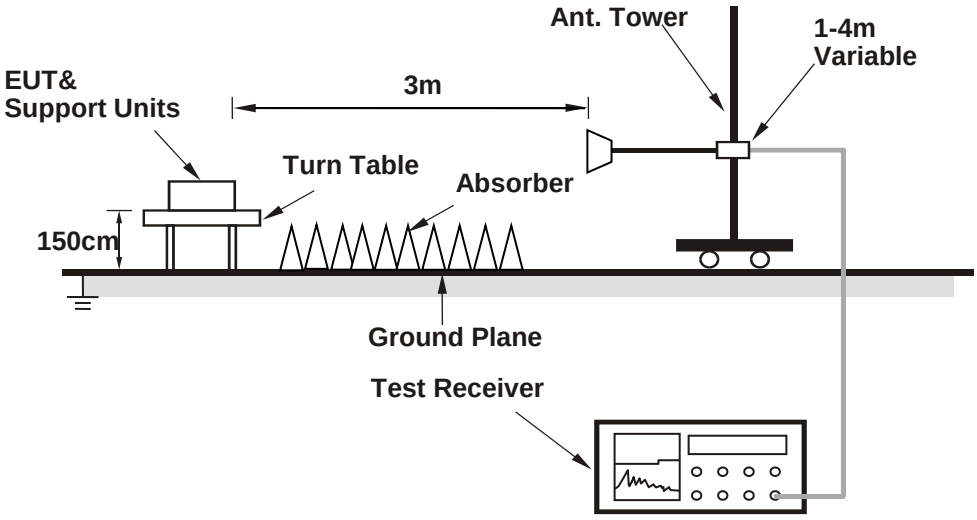
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

a. Connected the EUT with the Laptop which is placed on remote site.
b. Controlling software (MTool 3.2.0.2) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data：

802.11b

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	2390.00	55.9 PK	74.0	-18.1	1.27 H	220	57.5	-1.6
2	2390.00	43.2 AV	54.0	-10.8	1.27 H	220	44.8	-1.6
3	*2412.00	108.7 PK			1.27 H	220	110.3	-1.6
4	*2412.00	106.4 AV			1.27 H	220	108.0	-1.6
5	4824.00	50.8 PK	74.0	-23.2	2.95 H	296	47.6	3.2
6	4824.00	48.7 AV	54.0	-5.3	2.95 H	296	45.5	3.2
Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	2390.00	58.8 PK	74.0	-15.2	3.42 V	322	60.4	-1.6
2	2390.00	47.9 AV	54.0	-6.1	3.42 V	322	49.5	-1.6
3	*2412.00	121.4 PK			3.42 V	322	123.0	-1.6
4	*2412.00	119.1 AV			3.42 V	322	120.7	-1.6
5	4824.00	55.0 PK	74.0	-19.0	1.15 V	314	51.8	3.2
6	4824.00	53.7 AV	54.0	-0.3	1.15 V	314	50.5	3.2

Remarks:

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

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	57.5 PK	74.0	-16.5	1.32 H	218	59.1	-1.6
2	2390.00	46.9 AV	54.0	-7.1	1.32 H	218	48.5	-1.6
3	*2437.00	112.3 PK			1.32 H	218	113.9	-1.6
4	*2437.00	109.7 AV			1.32 H	218	111.3	-1.6
5	2483.50	56.7 PK	74.0	-17.3	1.32 H	218	58.3	-1.6
6	2483.50	45.8 AV	54.0	-8.2	1.32 H	218	47.4	-1.6
7	4874.00	53.5 PK	74.0	-20.5	2.84 H	299	50.3	3.2
8	4874.00	51.6 AV	54.0	-2.4	2.84 H	299	48.4	3.2
9	7311.00	42.8 PK	74.0	-31.2	1.77 H	342	33.4	9.4
10	7311.00	31.1 AV	54.0	-22.9	1.77 H	342	21.7	9.4
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	58.4 PK	74.0	-15.6	3.23 V	176	60.0	-1.6
2	2390.00	47.5 AV	54.0	-6.5	3.23 V	176	49.1	-1.6
3	*2437.00	122.3 PK			3.23 V	176	123.9	-1.6
4	*2437.00	120.2 AV			3.23 V	176	121.8	-1.6
5	2483.50	58.6 PK	74.0	-15.4	3.23 V	176	60.2	-1.6
6	2483.50	46.7 AV	54.0	-7.3	3.23 V	176	48.3	-1.6
7	4874.00	55.1 PK	74.0	-18.9	1.27 V	311	51.9	3.2
8	**4874.00**	**53.8 AV**	**54.0**	**-0.2**	**1.27 V**	**311**	**50.6**	**3.2**
9	7311.00	44.4 PK	74.0	-29.6	1.39 V	166	35.0	9.4
10	7311.00	33.1 AV	54.0	-20.9	1.39 V	166	23.7	9.4

Remarks:

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

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	107.3 PK			1.53 H	122	108.9	-1.6
2	*2462.00	105.0 AV			1.53 H	122	106.6	-1.6
3	2483.50	54.7 PK	74.0	-19.3	1.53 H	122	56.3	-1.6
4	2483.50	42.7 AV	54.0	-11.3	1.53 H	122	44.3	-1.6
5	4924.00	52.6 PK	74.0	-21.4	2.83 H	300	49.5	3.1
6	4924.00	50.8 AV	54.0	-3.2	2.83 H	300	47.7	3.1
7	7386.00	43.7 PK	74.0	-30.3	1.80 H	338	34.0	9.7
8	7386.00	32.6 AV	54.0	-21.4	1.80 H	338	22.9	9.7
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	119.3 PK			3.28 V	172	120.9	-1.6
2	*2462.00	116.9 AV			3.28 V	172	118.5	-1.6
3	2483.50	59.2 PK	74.0	-14.8	3.28 V	172	60.8	-1.6
4	2483.50	46.9 AV	54.0	-7.1	3.28 V	172	48.5	-1.6
5	4924.00	54.2 PK	74.0	-19.8	1.24 V	311	51.1	3.1
6	4924.00	53.4 AV	54.0	-0.6	1.24 V	311	50.3	3.1
7	7386.00	44.2 PK	74.0	-29.8	1.47 V	168	34.5	9.7
8	7386.00	32.9 AV	54.0	-21.1	1.47 V	168	23.2	9.7

Remarks:

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

802.11g

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	56.8 PK	74.0	-17.2	1.26 H	155	58.4	-1.6
2	2390.00	44.8 AV	54.0	-9.2	1.26 H	155	46.4	-1.6
3	*2412.00	106.1 PK			1.26 H	218	107.7	-1.6
4	*2412.00	99.2 AV			1.26 H	218	100.8	-1.6
5	4824.00	48.5 PK	74.0	-25.5	2.54 H	276	45.3	3.2
6	4824.00	36.7 AV	54.0	-17.3	2.54 H	276	33.5	3.2
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	67.1 PK	74.0	-6.9	3.13 V	171	68.7	-1.6
2	2390.00	53.4 AV	54.0	-0.6	3.13 V	171	55.0	-1.6
3	*2412.00	118.1 PK			3.13 V	171	119.7	-1.6
4	*2412.00	109.6 AV			3.13 V	171	111.2	-1.6
5	4824.00	50.6 PK	74.0	-23.4	1.13 V	307	47.4	3.2
6	4824.00	38.8 AV	54.0	-15.2	1.13 V	307	35.6	3.2

Remarks:

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

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	63.7 PK	74.0	-10.3	1.28 H	220	65.3	-1.6
2	2390.00	50.8 AV	54.0	-3.2	1.28 H	220	52.4	-1.6
3	*2437.00	113.8 PK			1.28 H	220	115.4	-1.6
4	*2437.00	104.9 AV			1.28 H	220	106.5	-1.6
5	2483.50	64.3 PK	74.0	-9.7	1.28 H	220	65.9	-1.6
6	2483.50	51.5 AV	54.0	-2.5	1.28 H	220	53.1	-1.6
7	4874.00	50.4 PK	74.0	-23.6	2.68 H	289	47.2	3.2
8	4874.00	38.8 AV	54.0	-15.2	2.68 H	289	35.6	3.2
9	7311.00	51.3 PK	74.0	-22.7	1.74 H	328	41.9	9.4
10	7311.00	39.6 AV	54.0	-14.4	1.74 H	328	30.2	9.4
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	66.1 PK	74.0	-7.9	3.09 V	103	67.7	-1.6
2	2390.00	51.5 AV	54.0	-2.5	3.09 V	103	53.1	-1.6
3	*2437.00	123.4 PK			3.09 V	103	125.0	-1.6
4	*2437.00	115.7 AV			3.09 V	103	117.3	-1.6
5	2483.50	66.8 PK	74.0	-7.2	3.09 V	103	68.4	-1.6
6	2483.50	53.6 AV	54.0	-0.4	3.09 V	103	55.2	-1.6
7	4874.00	51.1 PK	74.0	-22.9	1.11 V	309	47.9	3.2
8	4874.00	39.2 AV	54.0	-14.8	1.11 V	309	36.0	3.2
9	7311.00	52.5 PK	74.0	-21.5	1.68 V	274	43.1	9.4
10	7311.00	40.3 AV	54.0	-13.7	1.68 V	274	30.9	9.4

Remarks:

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

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	107.3 PK			1.19 H	148	108.9	-1.6
2	*2462.00	98.7 AV			1.19 H	148	100.3	-1.6
3	2483.50	55.6 PK	74.0	-18.4	1.19 H	148	57.2	-1.6
4	2483.50	47.0 AV	54.0	-7.0	1.19 H	148	48.6	-1.6
5	4924.00	49.8 PK	74.0	-24.2	2.66 H	275	46.7	3.1
6	4924.00	38.1 AV	54.0	-15.9	2.66 H	275	35.0	3.1
7	7386.00	51.1 PK	74.0	-22.9	1.83 H	320	41.4	9.7
8	7386.00	39.3 AV	54.0	-14.7	1.83 H	320	29.6	9.7
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	116.9 PK			3.52 V	242	118.5	-1.6
2	*2462.00	108.6 AV			3.52 V	242	110.2	-1.6
3	2483.50	64.7 PK	74.0	-9.3	3.52 V	242	66.3	-1.6
4	2483.50	53.6 AV	54.0	-0.4	3.52 V	242	55.2	-1.6
5	4924.00	50.4 PK	74.0	-23.6	1.12 V	308	47.3	3.1
6	4924.00	38.6 AV	54.0	-15.4	1.12 V	308	35.5	3.1
7	7386.00	52.2 PK	74.0	-21.8	1.69 V	275	42.5	9.7
8	7386.00	40.1 AV	54.0	-13.9	1.69 V	275	30.4	9.7

Remarks:

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

802.11ax (HE20)

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	54.9 PK	74.0	-19.1	1.46 H	100	56.5	-1.6
2	2390.00	44.6 AV	54.0	-9.4	1.46 H	100	46.2	-1.6
3	*2412.00	104.8 PK			1.46 H	100	106.4	-1.6
4	*2412.00	95.7 AV			1.46 H	100	97.3	-1.6
5	4824.00	50.1 PK	74.0	-23.9	2.60 H	275	46.9	3.2
6	4824.00	38.6 AV	54.0	-15.4	2.60 H	275	35.4	3.2
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	68.3 PK	74.0	-5.7	1.27 V	65	69.9	-1.6
2	**2390.00**	**53.8 AV**	**54.0**	**-0.2**	**1.27 V**	**65**	**55.4**	**-1.6**
3	*2412.00	119.3 PK			1.27 V	65	120.9	-1.6
4	*2412.00	109.5 AV			1.27 V	65	111.1	-1.6
5	4824.00	50.8 PK	74.0	-23.2	1.14 V	304	47.6	3.2
6	4824.00	39.2 AV	54.0	-14.8	1.14 V	304	36.0	3.2

Remarks:

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

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	63.9 PK	74.0	-10.1	1.48 H	100	65.5	-1.6
2	2390.00	50.2 AV	54.0	-3.8	1.48 H	100	51.8	-1.6
3	*2437.00	113.2 PK			1.48 H	100	114.8	-1.6
4	*2437.00	103.8 AV			1.48 H	100	105.4	-1.6
5	2483.50	65.4 PK	74.0	-8.6	1.48 H	100	67.0	-1.6
6	2483.50	52.1 AV	54.0	-1.9	1.48 H	100	53.7	-1.6
7	4874.00	51.1 PK	74.0	-22.9	2.65 H	278	47.9	3.2
8	4874.00	39.5 AV	54.0	-14.5	2.65 H	278	36.3	3.2
9	7311.00	53.2 PK	74.0	-20.8	1.81 H	313	43.8	9.4
10	7311.00	42.4 AV	54.0	-11.6	1.81 H	313	33.0	9.4
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	65.7 PK	74.0	-8.3	3.04 V	90	67.3	-1.6
2	2390.00	51.0 AV	54.0	-3.0	3.04 V	90	52.6	-1.6
3	*2437.00	122.7 PK			3.04 V	90	124.3	-1.6
4	*2437.00	115.3 AV			3.04 V	90	116.9	-1.6
5	2483.50	67.5 PK	74.0	-6.5	3.04 V	90	69.1	-1.6
6	2483.50	53.7 AV	54.0	-0.3	3.04 V	90	55.3	-1.6
7	4874.00	51.2 PK	74.0	-22.8	1.09 V	299	48.0	3.2
8	4874.00	39.5 AV	54.0	-14.5	1.09 V	299	36.3	3.2
9	7311.00	53.9 PK	74.0	-20.1	1.38 V	271	44.5	9.4
10	7311.00	42.8 AV	54.0	-11.2	1.38 V	271	33.4	9.4

Remarks:

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

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	105.8 PK			1.34 H	150	107.4	-1.6
2	*2462.00	95.7 AV			1.34 H	150	97.3	-1.6
3	2483.50	56.9 PK	74.0	-17.1	1.34 H	150	58.5	-1.6
4	2483.50	45.3 AV	54.0	-8.7	1.34 H	150	46.9	-1.6
5	4924.00	51.0 PK	74.0	-23.0	2.48 H	275	47.9	3.1
6	4924.00	39.3 AV	54.0	-14.7	2.48 H	275	36.2	3.1
7	7386.00	52.5 PK	74.0	-21.5	1.82 H	310	42.8	9.7
8	7386.00	41.9 AV	54.0	-12.1	1.82 H	310	32.2	9.7
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	117.8 PK			1.02 V	64	119.4	-1.6
2	*2462.00	107.4 AV			1.02 V	64	109.0	-1.6
3	2483.50	67.7 PK	74.0	-6.3	1.02 V	64	69.3	-1.6
4	**2483.50**	**53.8 AV**	**54.0**	**-0.2**	**1.02 V**	**64**	**55.4**	**-1.6**
5	4924.00	51.2 PK	74.0	-22.8	1.09 V	304	48.1	3.1
6	4924.00	39.4 AV	54.0	-14.6	1.09 V	304	36.3	3.1
7	7386.00	53.1 PK	74.0	-20.9	1.34 V	269	43.4	9.7
8	7386.00	42.4 AV	54.0	-11.6	1.34 V	269	32.7	9.7

Remarks:

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

802.11ax (HE40)

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2386.60	56.7 PK	74.0	-17.3	3.20 H	235	58.3	-1.6
2	2386.60	46.3 AV	54.0	-7.7	3.20 H	235	47.9	-1.6
3	*2422.00	104.1 PK			3.20 H	235	105.7	-1.6
4	*2422.00	95.4 AV			3.20 H	235	97.0	-1.6
5	4844.00	50.1 PK	74.0	-23.9	2.50 H	278	46.8	3.3
6	4844.00	38.8 AV	54.0	-15.2	2.50 H	278	35.5	3.3
7	7266.00	51.9 PK	74.0	-22.1	1.79 H	312	42.6	9.3
8	7266.00	41.5 AV	54.0	-12.5	1.79 H	312	32.2	9.3
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	2386.60	69.1 PK	74.0	-4.9	1.44 V	175	70.7	-1.6
2	2386.60	53.6 AV	54.0	-0.4	1.44 V	175	55.2	-1.6
3	*2422.00	112.9 PK			1.44 V	175	114.5	-1.6
4	*2422.00	103.3 AV			1.44 V	175	104.9	-1.6
5	4844.00	50.7 PK	74.0	-23.3	1.10 V	312	47.4	3.3
6	4844.00	39.2 AV	54.0	-14.8	1.10 V	312	35.9	3.3
7	7266.00	52.4 PK	74.0	-21.6	1.32 V	271	43.1	9.3
8	7266.00	41.8 AV	54.0	-12.2	1.32 V	271	32.5	9.3

Remarks:

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

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	62.9 PK	74.0	-11.1	3.11 H	237	64.5	-1.6
2	2390.00	48.7 AV	54.0	-5.3	3.11 H	237	50.3	-1.6
3	*2437.00	108.3 PK			3.11 H	237	109.9	-1.6
4	*2437.00	100.8 AV			3.11 H	237	102.4	-1.6
5	2483.50	63.6 PK	74.0	-10.4	3.11 H	237	65.2	-1.6
6	2483.50	52.3 AV	54.0	-1.7	3.11 H	237	53.9	-1.6
7	4874.00	50.5 PK	74.0	-23.5	2.51 H	283	47.3	3.2
8	4874.00	39.2 AV	54.0	-14.8	2.51 H	283	36.0	3.2
9	7311.00	51.8 PK	74.0	-22.2	1.77 H	308	42.4	9.4
10	7311.00	41.7 AV	54.0	-12.3	1.77 H	308	32.3	9.4
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	64.1 PK	74.0	-9.9	1.14 V	66	65.7	-1.6
2	2390.00	49.2 AV	54.0	-4.8	1.14 V	66	50.8	-1.6
3	*2437.00	115.1 PK			1.14 V	66	116.7	-1.6
4	*2437.00	106.1 AV			1.14 V	66	107.7	-1.6
5	2483.50	65.4 PK	74.0	-8.6	1.14 V	66	67.0	-1.6
6	2483.50	53.6 AV	54.0	-0.4	1.14 V	66	55.2	-1.6
7	4874.00	51.0 PK	74.0	-23.0	1.10 V	309	47.8	3.2
8	4874.00	39.6 AV	54.0	-14.4	1.10 V	309	36.4	3.2
9	7311.00	52.6 PK	74.0	-21.4	1.34 V	273	43.2	9.4
10	7311.00	42.1 AV	54.0	-11.9	1.34 V	273	32.7	9.4

Remarks:

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

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2452.00	100.1 PK			3.29 H	146	101.7	-1.6
2	*2452.00	91.0 AV			3.29 H	146	92.6	-1.6
3	2485.70	56.7 PK	74.0	-17.3	3.29 H	146	58.3	-1.6
4	2485.70	45.1 AV	54.0	-8.9	3.29 H	146	46.7	-1.6
5	4904.00	49.7 PK	74.0	-24.3	2.54 H	282	46.6	3.1
6	4904.00	38.8 AV	54.0	-15.2	2.54 H	282	35.7	3.1
7	7356.00	50.6 PK	74.0	-23.4	1.84 H	308	41.1	9.5
8	7356.00	40.8 AV	54.0	-13.2	1.84 H	308	31.3	9.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2452.00	111.9 PK			1.09 V	190	113.5	-1.6
2	*2452.00	101.8 AV			1.09 V	190	103.4	-1.6
3	2485.70	64.6 PK	74.0	-9.4	1.09 V	190	66.2	-1.6
4	**2485.70**	**53.8 AV**	**54.0**	**-0.2**	**1.09 V**	**190**	**55.4**	**-1.6**
5	4904.00	50.8 PK	74.0	-23.2	1.11 V	314	47.7	3.1
6	4904.00	39.3 AV	54.0	-14.7	1.11 V	314	36.2	3.1
7	7356.00	52.2 PK	74.0	-21.8	1.34 V	270	42.7	9.5
8	7356.00	41.7 AV	54.0	-12.3	1.34 V	270	32.2	9.5

Remarks:

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

Below 1GHz Data:

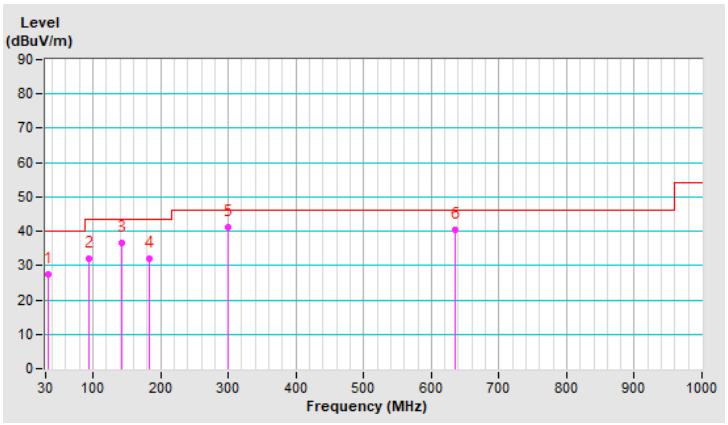
802.11ax (HE20)

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	34.70	27.5 QP	40.0	-12.5	1.50 H	62	36.1	-8.6
2	93.49	32.1 QP	43.5	-11.4	2.00 H	280	44.9	-12.8
3	141.70	36.6 QP	43.5	-6.9	2.00 H	152	43.8	-7.2
4	183.53	32.0 QP	43.5	-11.5	1.00 H	279	40.9	-8.9
5	300.02	41.1 QP	46.0	-4.9	1.00 H	225	46.9	-5.8
6	635.91	40.5 QP	46.0	-5.5	1.50 H	189	37.5	3.0

Remarks:

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

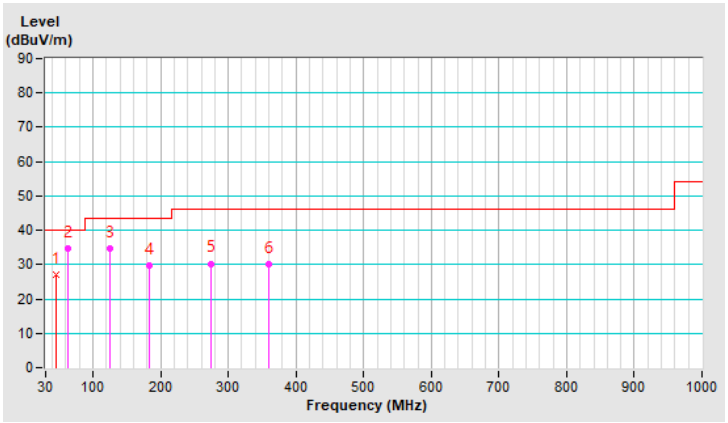


Channel	TX Channel 6	Detector Function	Quasi-Peak (QP)
Frequency Range	9kHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	46.33	26.9 QP	40.0	-13.1	1.00 V	53	34.6	-7.7
2	62.86	34.6 QP	40.0	-5.4	1.00 V	180	43.2	-8.6
3	125.01	34.5 QP	43.5	-9.0	1.00 V	169	43.1	-8.6
4	183.99	29.7 QP	43.5	-13.8	1.00 V	164	38.6	-8.9
5	274.83	30.3 QP	46.0	-15.7	1.50 V	234	37.2	-6.9
6	359.10	30.2 QP	46.0	-15.8	1.50 V	176	34.1	-3.9

Remarks:

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



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 23, 2019	Oct. 22, 2020
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 23, 2019	Oct. 22, 2020
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 19, 2020	Mar. 18, 2021
50 ohms Terminator	50	3	Oct. 23, 2019	Oct. 22, 2020
RF Cable	5D-FB	COCCAB-001	Sep. 26, 2020	Sep. 25, 2021
Fixed attenuator EMCI	STI02-2200-10	005	Aug. 29, 2020	Aug. 28, 2021
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

Note:
1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conduction 1.
3 Tested Date: Sep. 29, 2020

4.2.3 Test Procedures

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

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

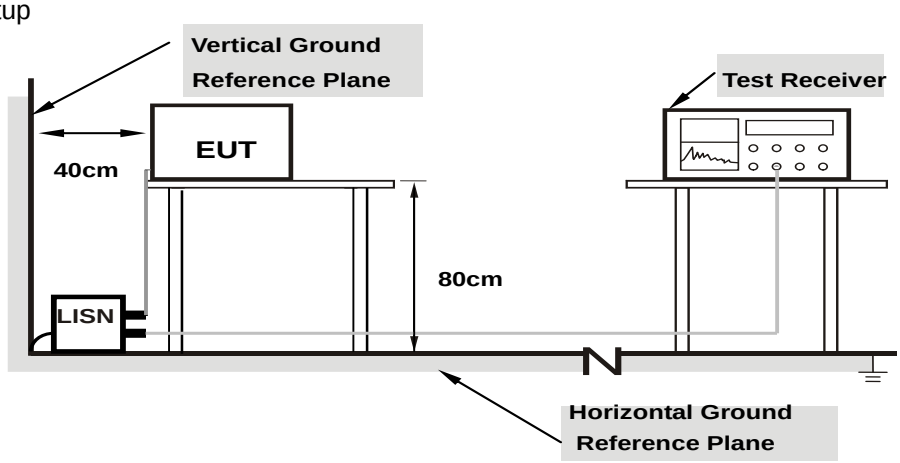
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

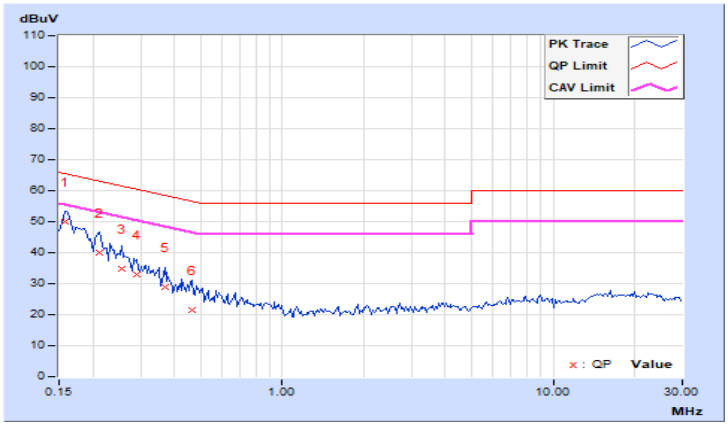
4.2.7 Test Results

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

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	9.92	39.90	26.42	49.82	36.34	65.58	55.58	-15.76	-19.24
2	0.21250	9.95	30.18	15.05	40.13	25.00	63.11	53.11	-22.98	-28.11
3	0.25547	9.96	24.86	9.03	34.82	18.99	61.58	51.58	-26.76	-32.59
4	0.29063	9.96	23.11	10.49	33.07	20.45	60.51	50.51	-27.44	-30.06
5	0.36875	9.98	19.02	10.11	29.00	20.09	58.53	48.53	-29.53	-28.44
6	0.46641	9.98	11.68	0.66	21.66	10.64	56.58	46.58	-34.92	-35.94

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

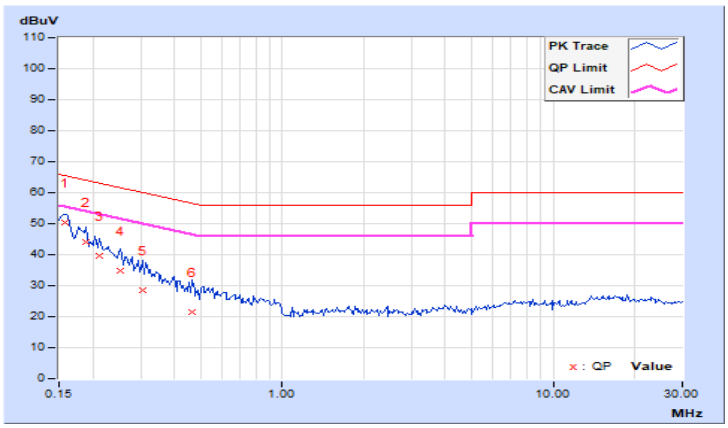


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	**0.15781**	**9.93**	**40.43**	**26.80**	**50.36**	**36.73**	**65.58**	**55.58**	**-15.22**	**-18.85**
2	0.18906	9.95	33.94	16.37	43.89	26.32	64.08	54.08	-20.19	-27.76
3	0.21250	9.96	29.70	13.54	39.66	23.50	63.11	53.11	-23.45	-29.61
4	0.25156	9.97	24.84	6.99	34.81	16.96	61.71	51.71	-26.90	-34.75
5	0.30625	9.98	18.38	3.66	28.36	13.64	60.07	50.07	-31.71	-36.43
6	0.46250	10.01	11.56	-2.81	21.57	7.20	56.65	46.65	-35.08	-39.45

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

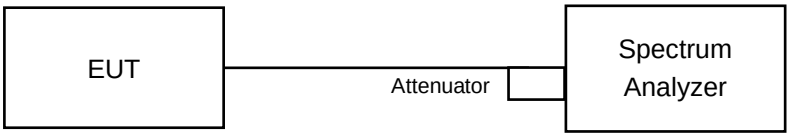


4.3 6dB Bandwidth Measurement

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

CDD Mode

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	7.57	7.06	6.59	7.58	0.5	Pass
6	2437	7.09	7.07	7.09	7.6	0.5	Pass
11	2462	6.61	7.05	6.64	6.61	0.5	Pass

802.11g

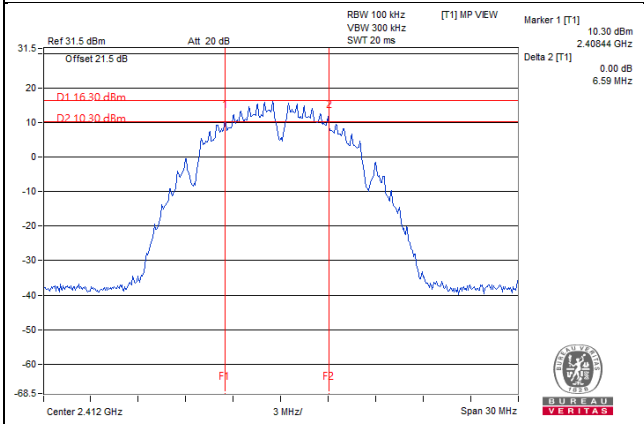
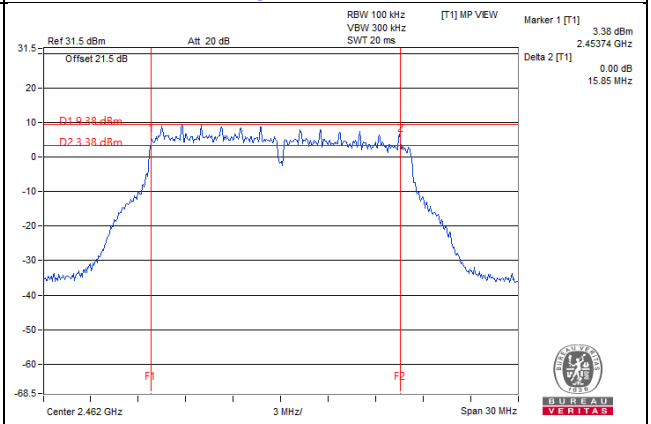
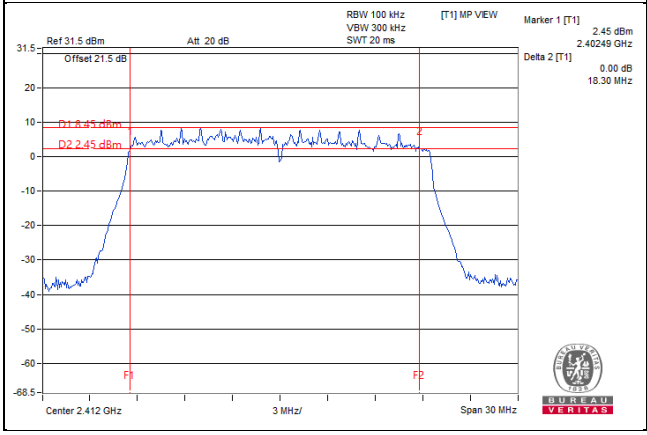
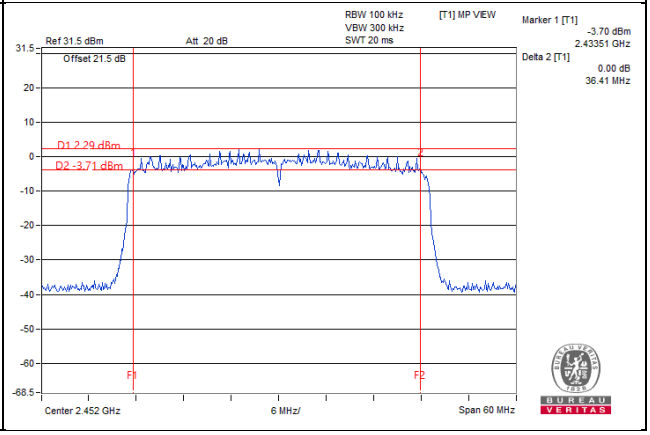
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	16.02	16.01	16.4	16.42	0.5	Pass
6	2437	16.39	16.43	16.47	16.39	0.5	Pass
11	2462	15.85	16.35	16.35	16.37	0.5	Pass

802.11ax (HE20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	18.59	18.48	18.3	18.72	0.5	Pass
6	2437	19.01	19.06	19.1	19.02	0.5	Pass
11	2462	18.78	18.76	18.89	18.81	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	37.76	36.45	36.5	37.49	0.5	Pass
6	2437	37.54	37.94	38	37.34	0.5	Pass
9	2452	36.54	36.56	36.57	36.41	0.5	Pass

Spectrum Plot of Worst Value	
802.11b / Chain 2 : CH1	**802.11g / Chain 0 : CH11**
	
802.11ax (HE20) / Chain 2 : CH1	**802.11ax (HE40) / Chain 3 : CH9**
	

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

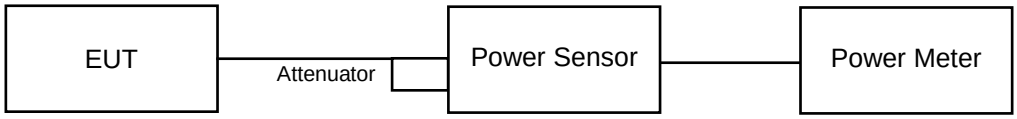
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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

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

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

CDD Mode

802.11b

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	23.88	23.85	23.84	23.76	966.791	29.85	30.00	Pass
6	2437	23.92	23.90	23.89	23.71	971.944	29.88	30.00	Pass
11	2462	23.86	23.84	23.85	23.67	960.793	29.83	30.00	Pass

802.11g

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	22.13	22.15	22.16	22.07	652.866	28.15	30.00	Pass
6	2437	23.90	23.86	23.84	23.76	968.478	29.86	30.00	Pass
11	2462	20.23	20.34	20.27	20.21	424.951	26.28	30.00	Pass

VHT20

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	19.89	19.93	19.86	19.86	389.556	25.91	30.00	Pass
6	2437	23.67	23.67	23.65	23.64	928.564	29.68	30.00	Pass
11	2462	18.11	18.20	18.07	18.19	260.822	24.16	30.00	Pass

VHT40

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	19.01	18.87	19.02	19.08	317.415	25.02	30.00	Pass
6	2437	19.79	19.64	19.78	19.55	372.542	25.71	30.00	Pass
9	2452	16.22	16.22	16.29	16.35	169.47	22.29	30.00	Pass

802.11ax (HE20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	20.13	20.15	20.09	20.12	411.448	26.14	30.00	Pass
6	2437	23.94	23.91	23.91	23.89	984.722	29.93	30.00	Pass
11	2462	18.33	18.44	18.28	18.41	274.54	24.39	30.00	Pass

802.11ax (HE40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	19.23	19.13	19.26	19.28	334.656	25.25	30.00	Pass
6	2437	20.03	19.88	20.00	19.77	392.81	25.94	30.00	Pass
9	2452	16.45	16.47	16.49	16.61	178.898	22.53	30.00	Pass

Beamforming Mode

VHT20

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	19.89	19.93	19.86	19.86	389.556	25.91	26.30	Pass
6	2437	20.26	20.28	20.25	20.21	423.709	26.27	26.30	Pass
11	2462	18.11	18.20	18.07	18.19	260.822	24.16	26.30	Pass

Note: Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 9.7dBi > 6dBi , so the power limit shall be reduced to 30-(9.7-6) = 26.30dBm.

VHT40

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	19.01	18.87	19.02	19.08	317.415	25.02	26.30	Pass
6	2437	19.79	19.64	19.78	19.55	372.542	25.71	26.30	Pass
9	2452	16.22	16.22	16.29	16.35	169.47	22.29	26.30	Pass

Note: Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 9.7dBi > 6dBi , so the power limit shall be reduced to 30-(9.7-6) = 26.30dBm.

802.11ax (HE20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	20.13	20.15	20.09	20.12	411.448	26.14	26.30	Pass
6	2437	20.26	20.29	20.27	20.24	425.171	26.29	26.30	Pass
11	2462	18.33	18.44	18.28	18.41	274.54	24.39	26.30	Pass

Note: Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 9.7dBi > 6dBi , so the power limit shall be reduced to 30-(9.7-6) = 26.30dBm.

802.11ax (HE40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	19.23	19.13	19.26	19.28	334.656	25.25	26.30	Pass
6	2437	20.03	19.88	20.00	19.77	392.81	25.94	26.30	Pass
9	2452	16.45	16.47	16.49	16.61	178.898	22.53	26.30	Pass

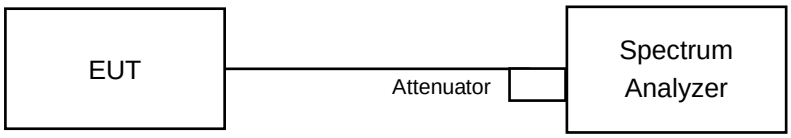
Note: Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 9.7dBi > 6dBi , so the power limit shall be reduced to 30-(9.7-6) = 26.30dBm.

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For 802.11b:

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

For 802.11g, 802.11ax (HE20), 802.11ax (HE40):

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

CDD Mode

802.11b

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)				Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain0	Chain1	Chain2	Chain3			
1	2412	-4.85	-5.39	-5.72	-6.19	0.51	4.30	Pass
6	2437	-5.84	-4.42	-6.01	-5.86	0.54	4.30	Pass
11	2462	-5.72	-5.93	-5.76	-5.24	0.37	4.30	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 9.7dBi > 6dBi, so the power density limit shall be reduced to 8-(9.7-6) = 4.30dBm.

802.11g

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)				Duty Factor (dB)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain0	Chain1	Chain2	Chain3				
1	2412	-8.75	-9.42	-9.72	-9.11	0.09	-3.12	4.30	Pass
6	2437	-7.55	-7.19	-8.46	-6.32	0.09	-1.20	4.30	Pass
11	2462	-11.42	-10.15	-11.22	-11.26	0.09	-4.87	4.30	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 9.7dBi > 6dBi, so the power density limit shall be reduced to 8-(9.7-6) = 4.30dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE20)

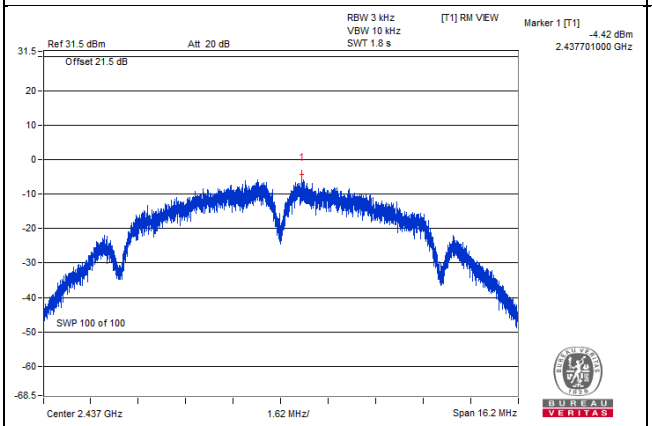
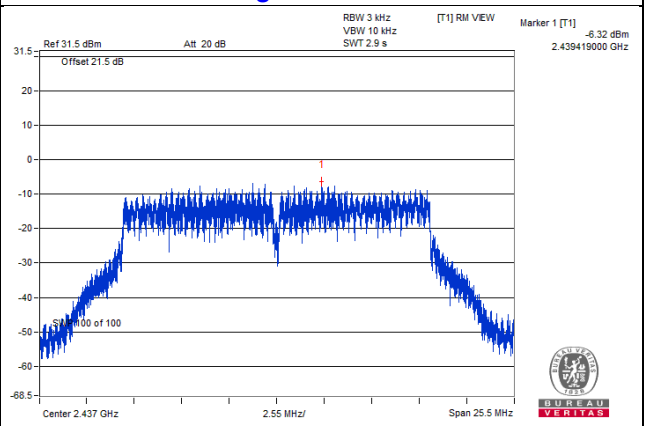
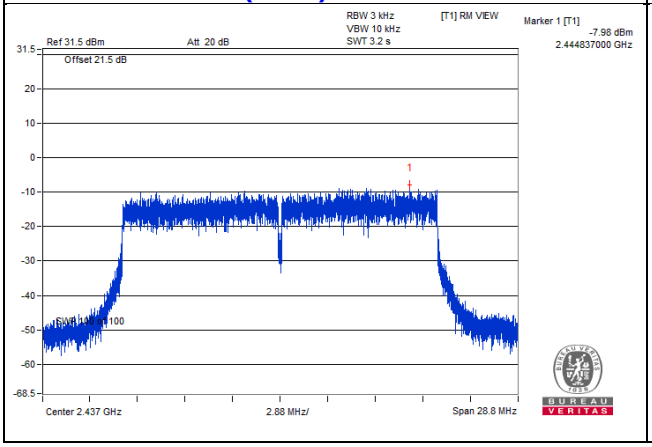
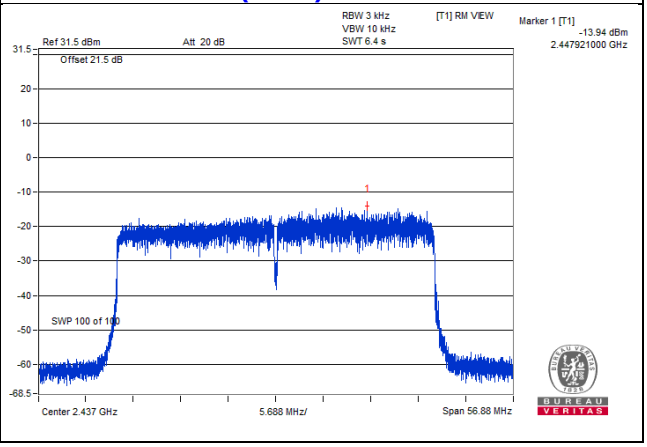
Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)				Duty Factor (dB)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain0	Chain1	Chain2	Chain3				
1	2412	-11.78	-12.66	-12.51	-12.02	0.13	-6.08	4.30	Pass
6	2437	-7.98	-8.23	-9.62	-8.69	0.13	-2.44	4.30	Pass
11	2462	-13.94	-13.53	-13.91	-13.69	0.13	-7.62	4.30	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 9.7dBi > 6dBi, so the power density limit shall be reduced to 8-(9.7-6) = 4.30dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE40)

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)				Duty Factor (dB)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain0	Chain1	Chain2	Chain3				
3	2422	-16.63	-15.87	-16.15	-16.23	0.12	-10.08	4.30	Pass
6	2437	-13.94	-15.25	-15.98	-15.31	0.12	-8.92	4.30	Pass
9	2452	-19.46	-17.65	-19.18	-18.00	0.12	-12.37	4.30	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 9.7dBi > 6dBi, so the power density limit shall be reduced to 8-(9.7-6) = 4.30dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

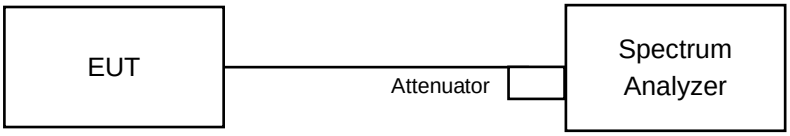
Spectrum Plot of Worst Value	
802.11b / Chain 1 : CH6	**802.11g / Chain 3 : CH6**
	
802.11ax (HE20) / Chain 0 : CH6	**802.11ax (HE40) / Chain 0 : CH6**
	

4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOBE

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

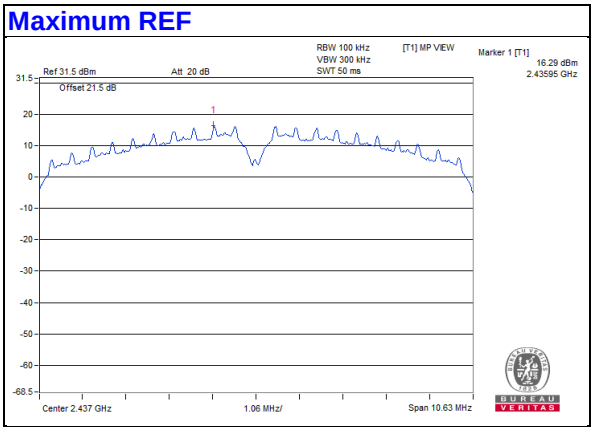
Same as Item 4.3.6

4.6.7 Test Results

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

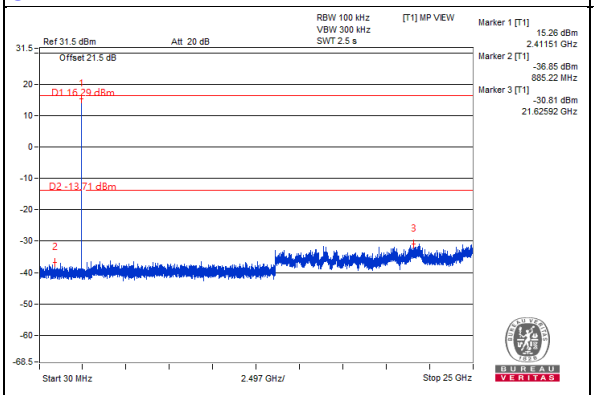
802.11b

Maximum REF

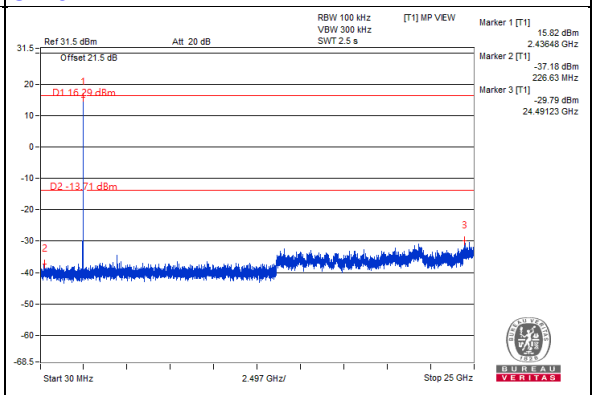


Chain 0

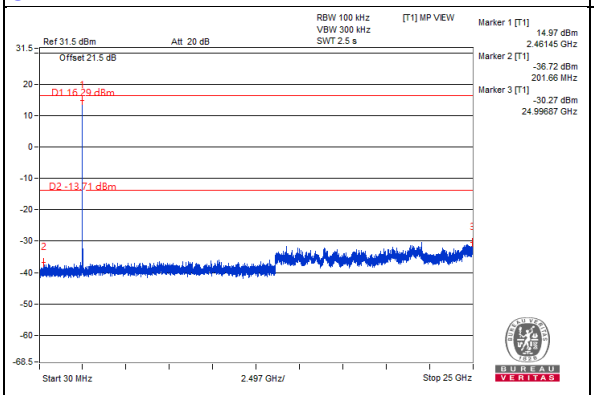
CH 1



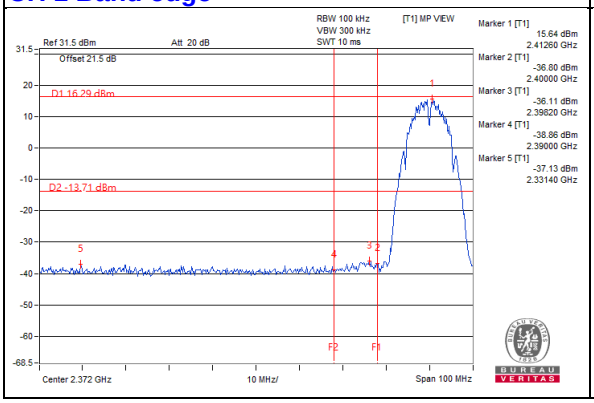
CH 6



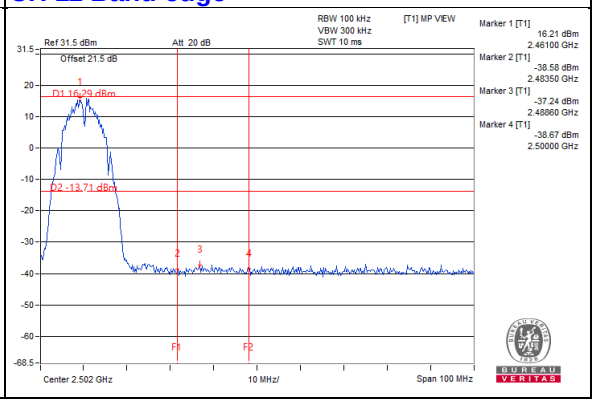
CH 11



CH 1 Band edge

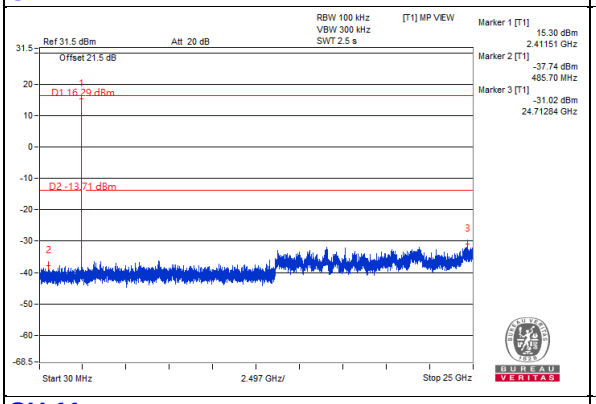


CH 11 Band edge

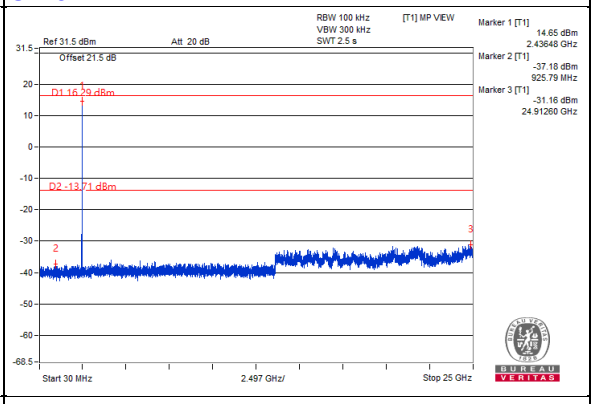


Chain 1

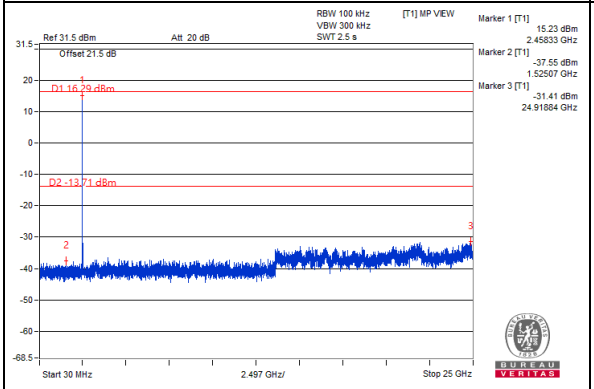
CH 1



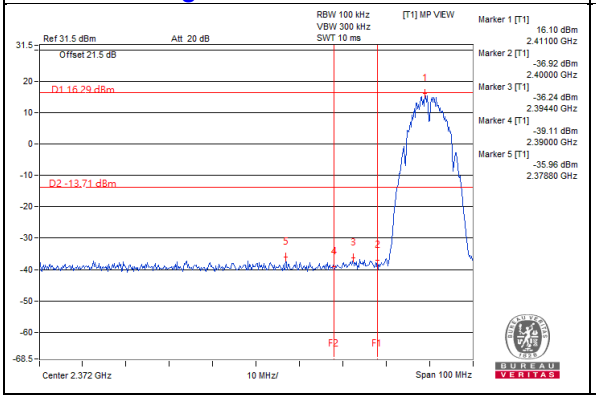
CH 6



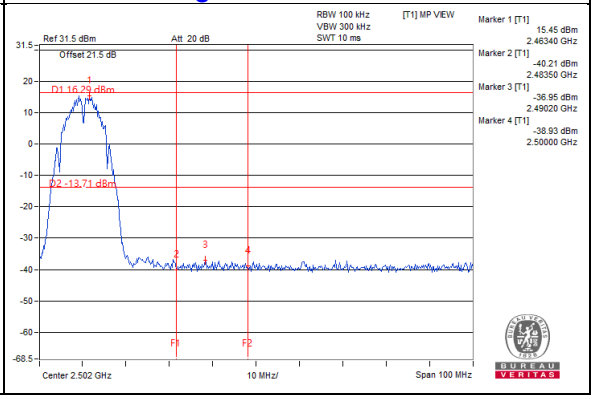
CH 11



CH 1 Band edge

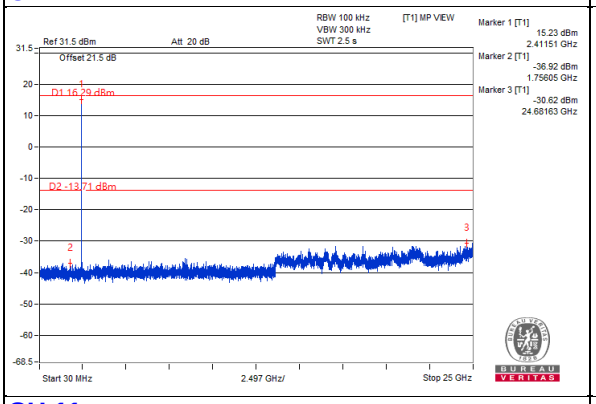


CH 11 Band edge

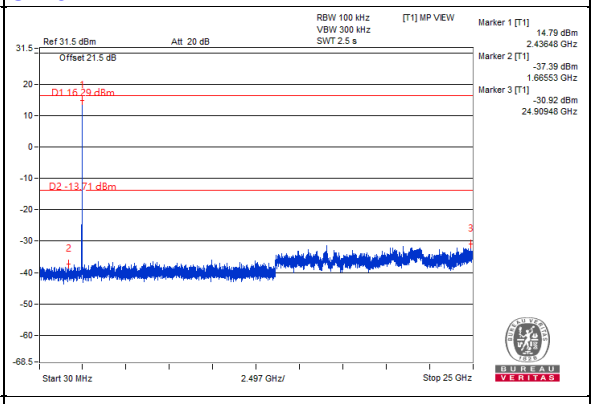


Chain 2

CH 1



CH 6



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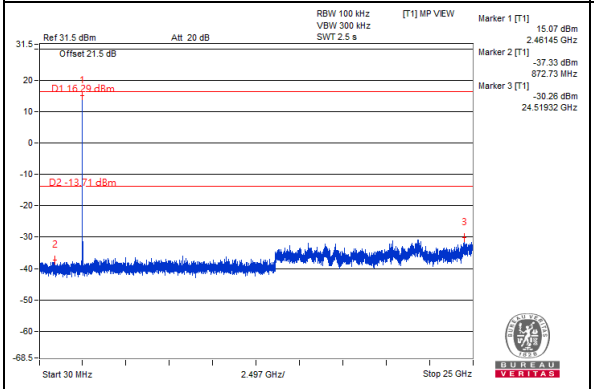

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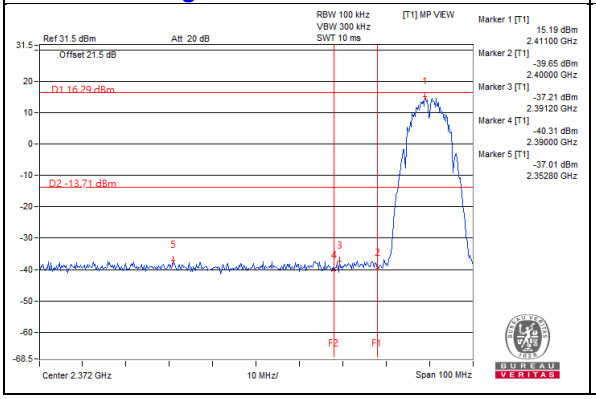

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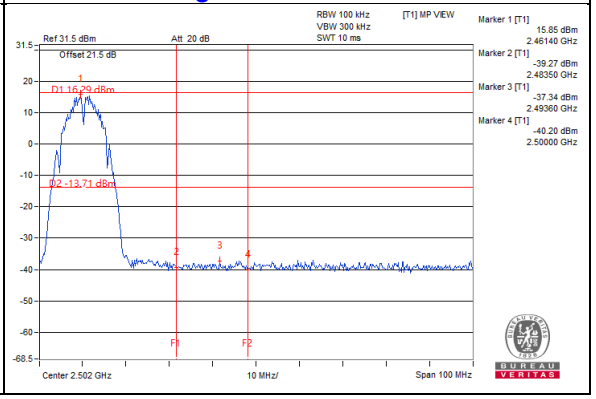
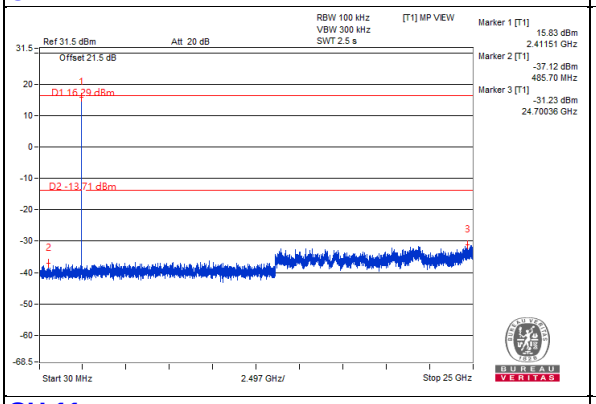


Chain 3

CH 1



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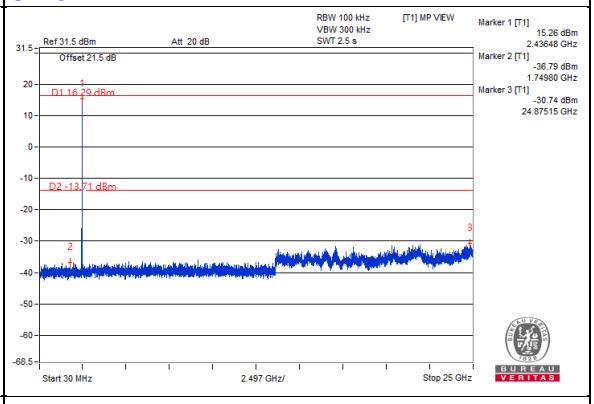

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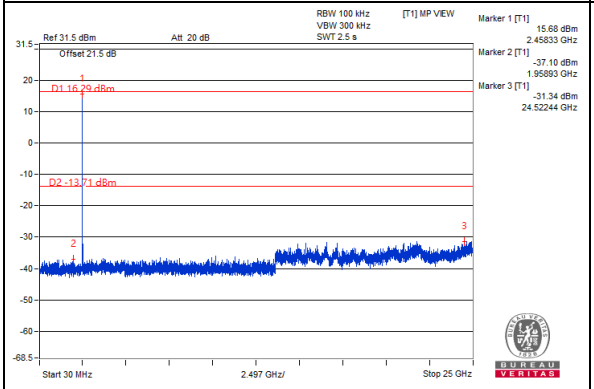

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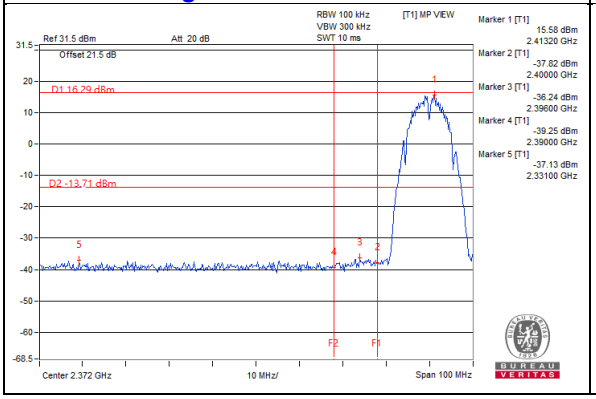

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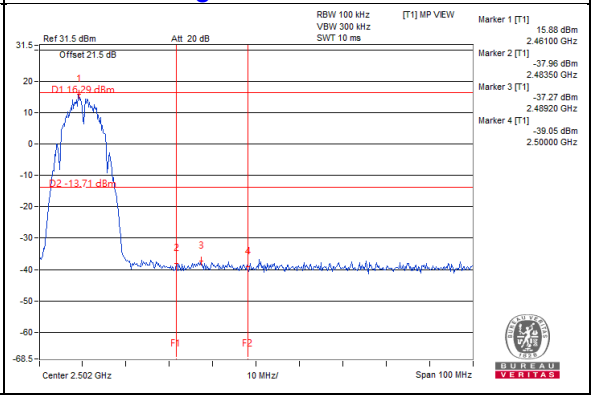
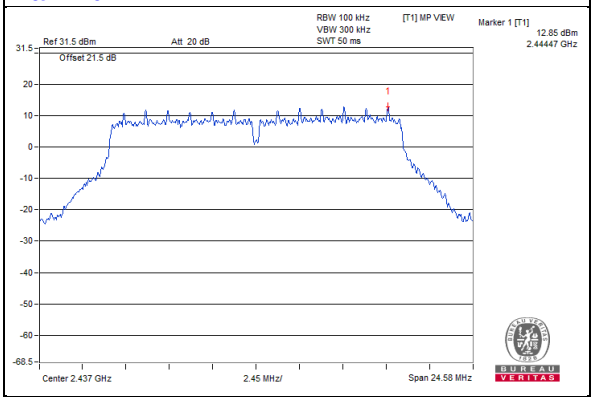


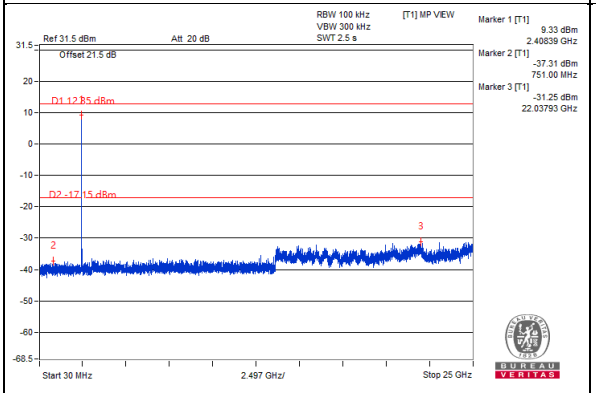
802.11g

Maximum REF



Chain 0

CH 1



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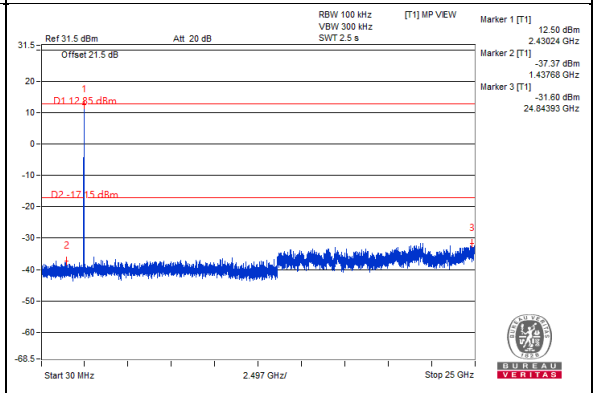

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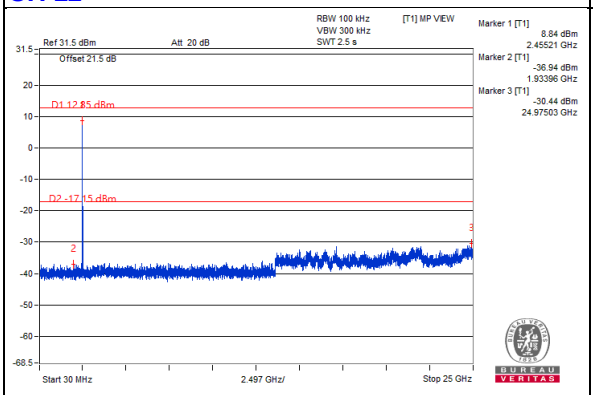

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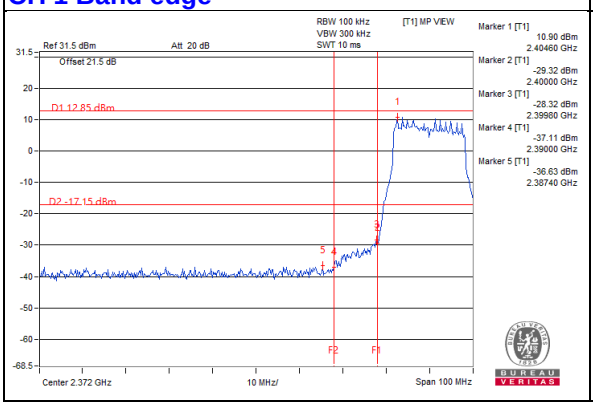

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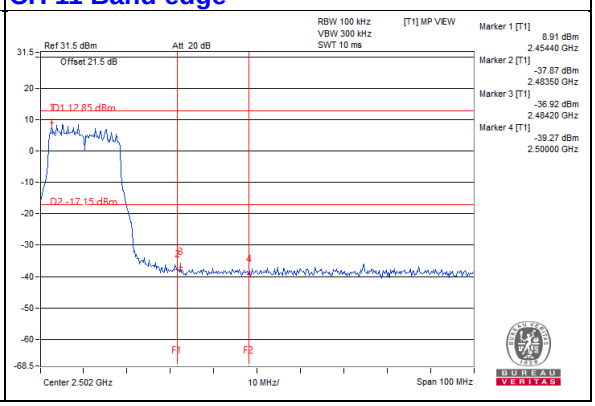
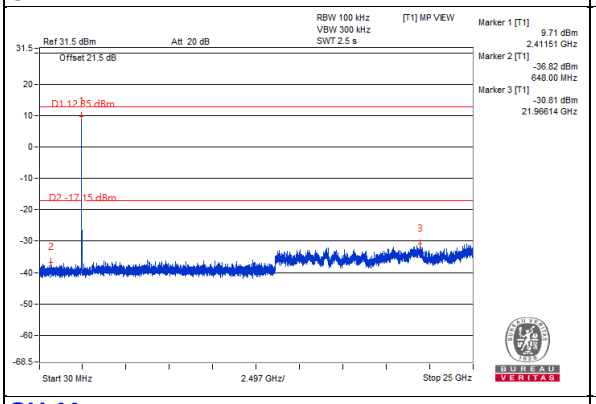


Chain 1

CH 1



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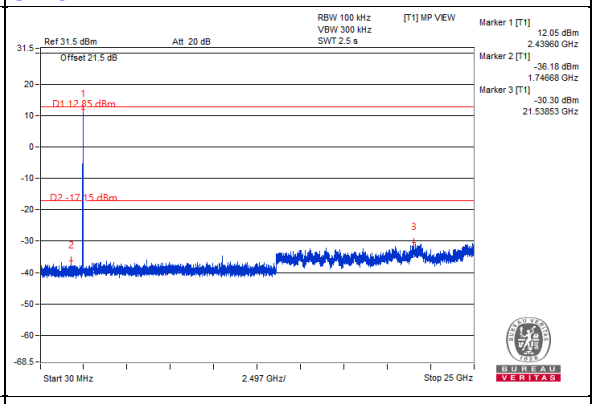

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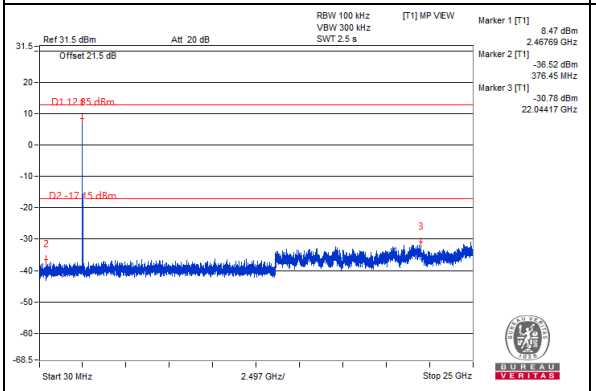

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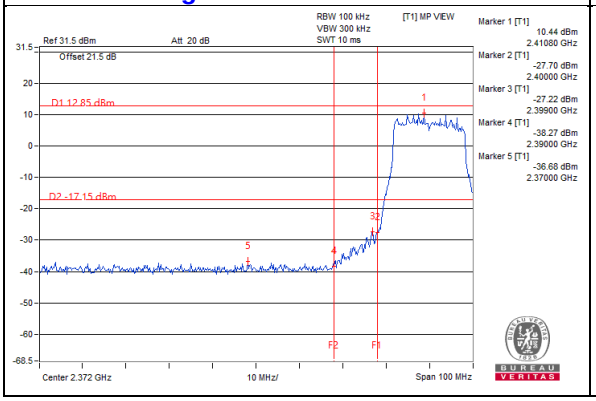

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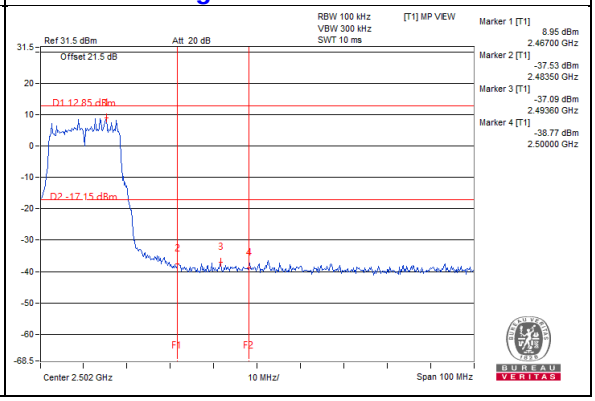
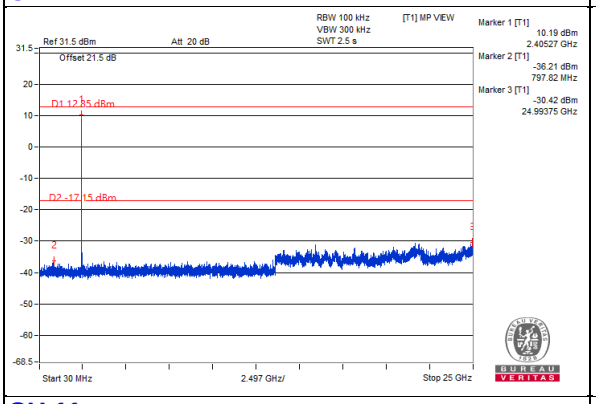


Chain 2

CH 1



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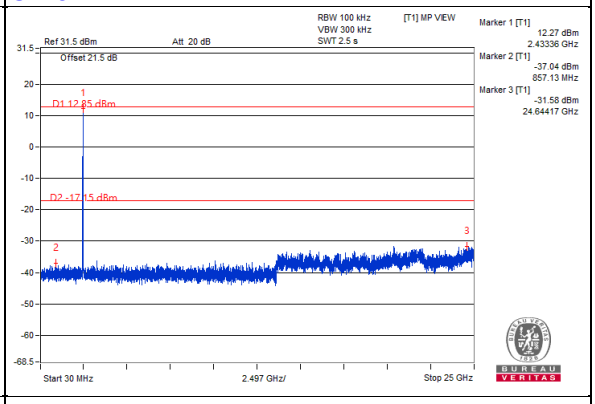

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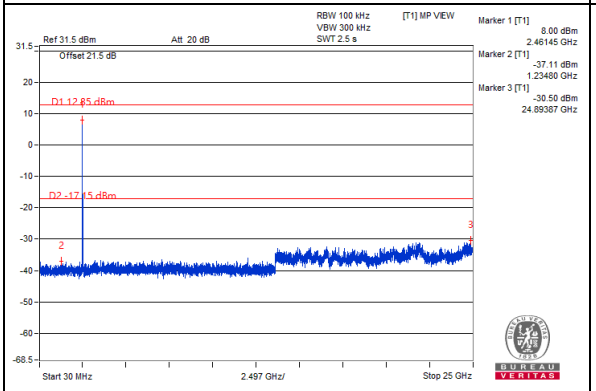

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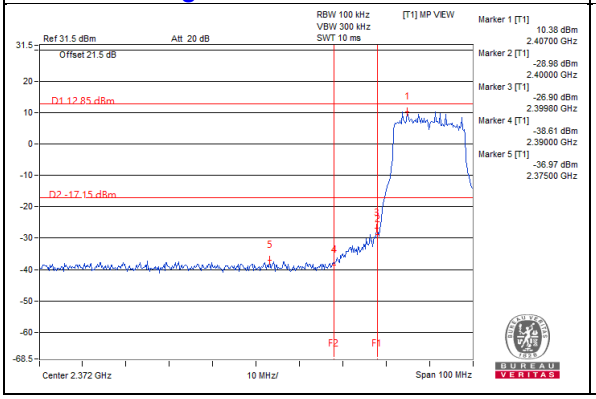

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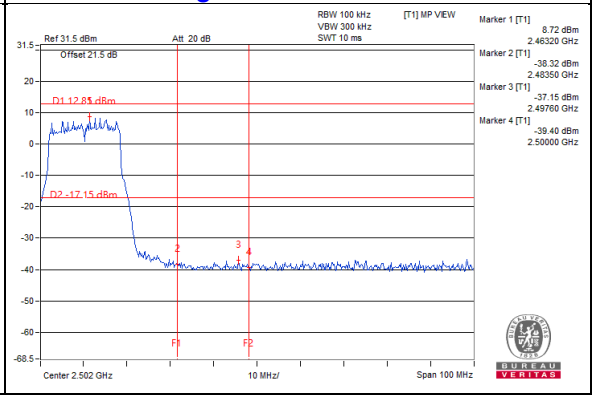
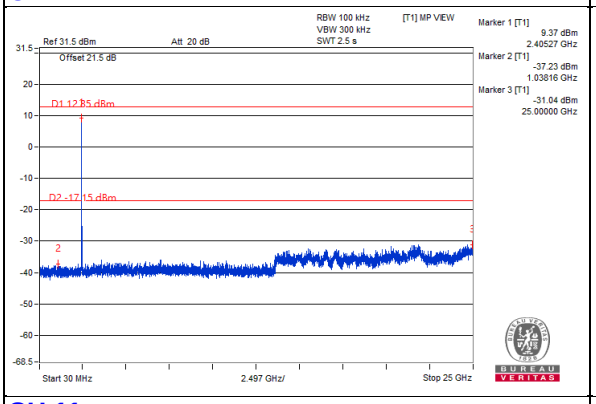
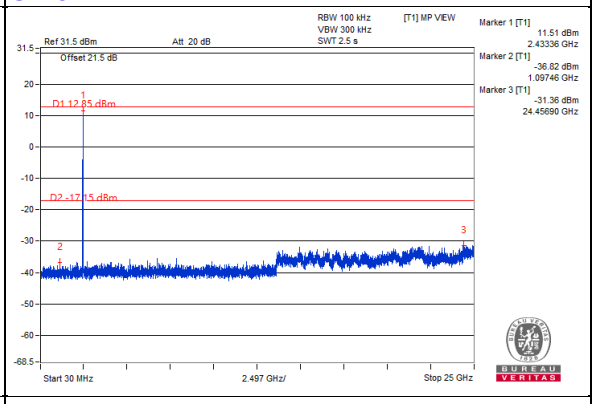


Chain 3

CH 1



CH 6



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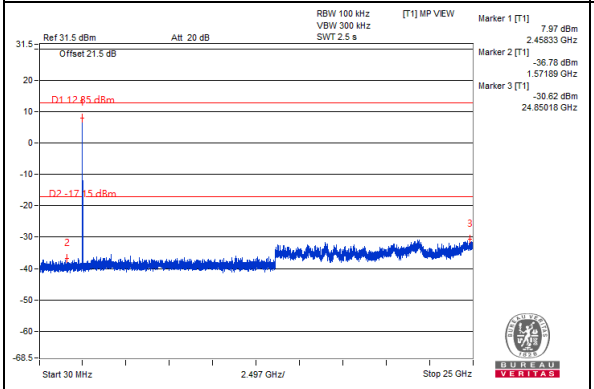

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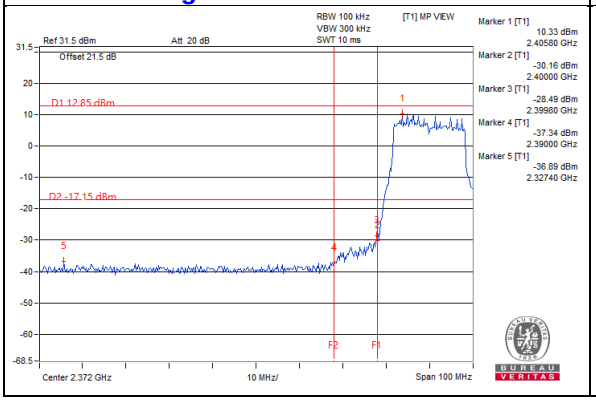

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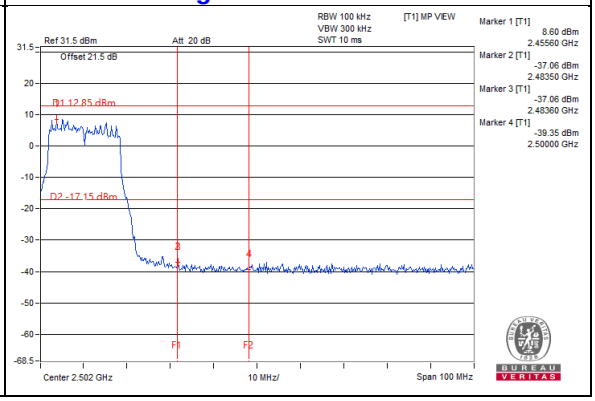
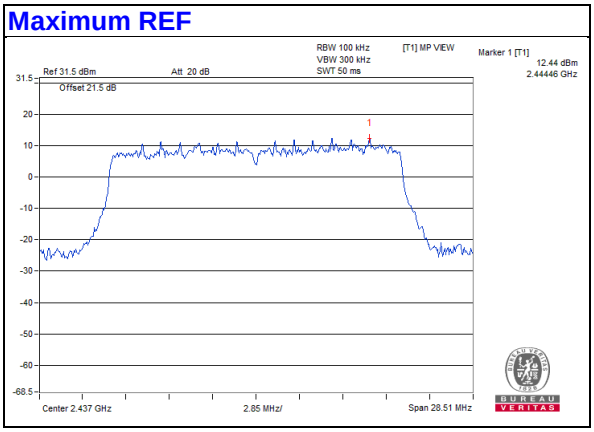


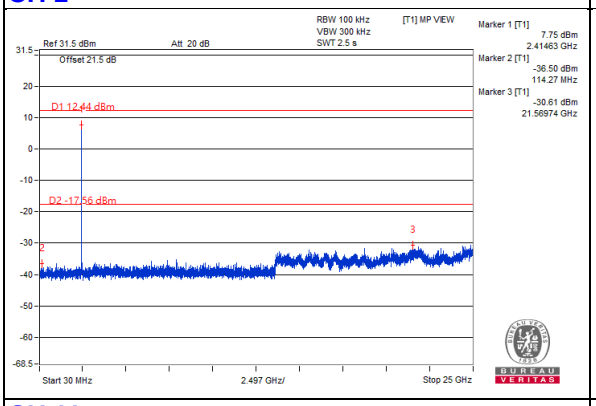
802.11ax (HE20)

Maximum REF

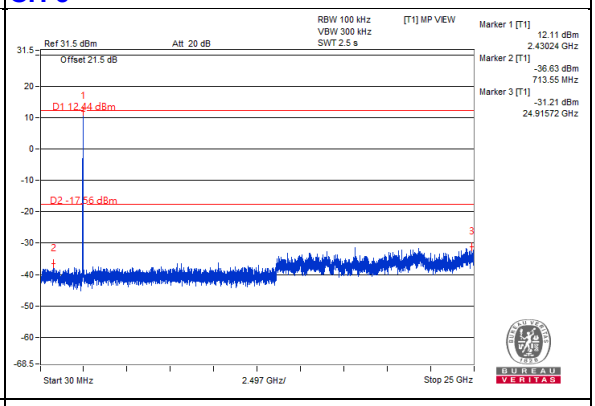


Chain 0

CH 1



CH 6



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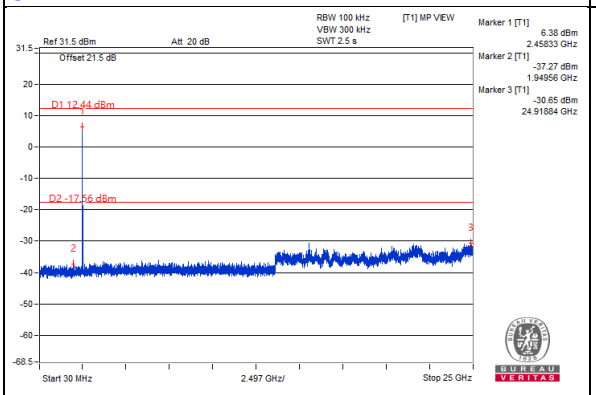

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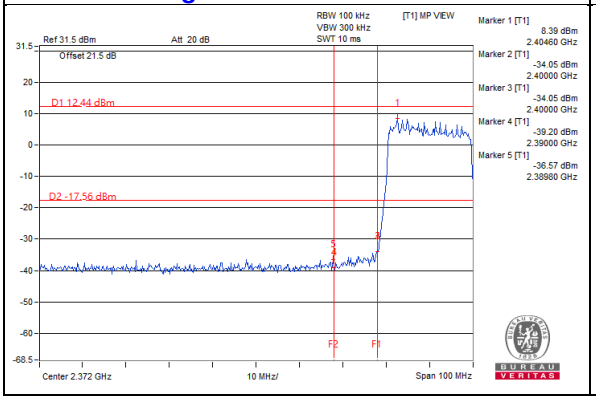

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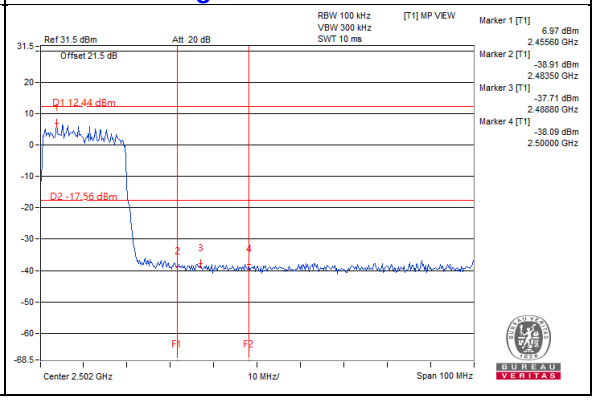
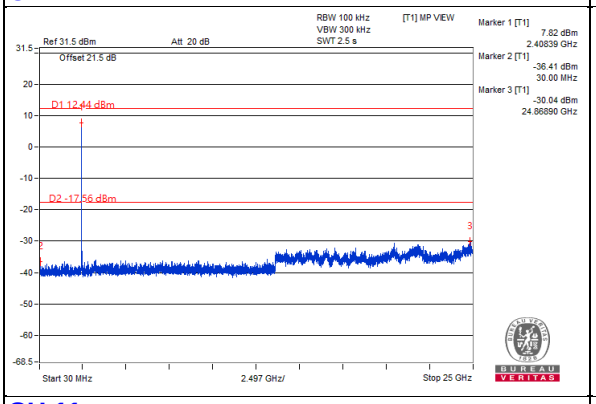


Chain 1

CH 1



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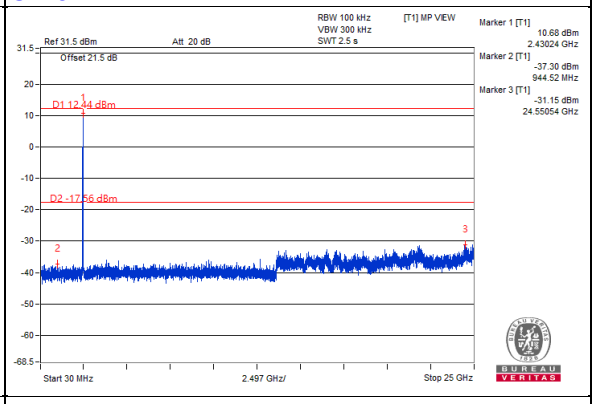

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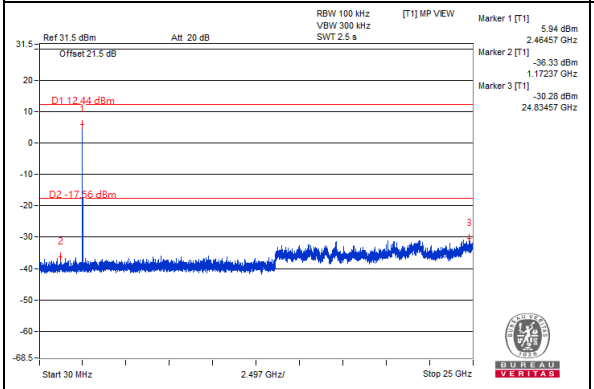
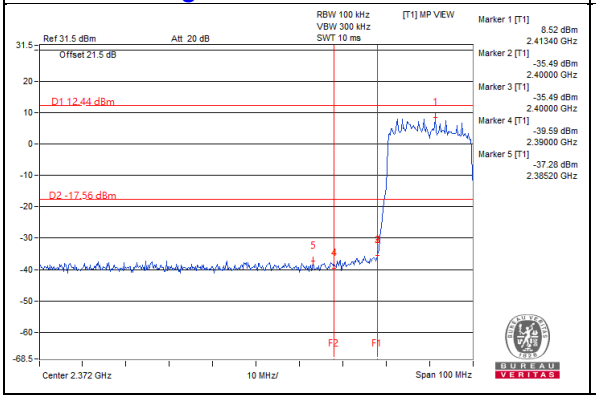
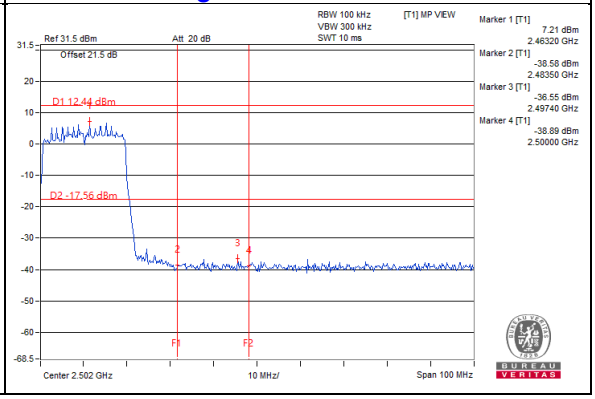


CH 1 Band edge

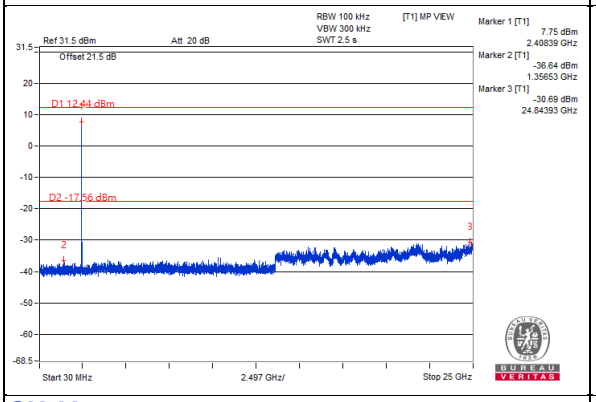


CH 11 Band edge

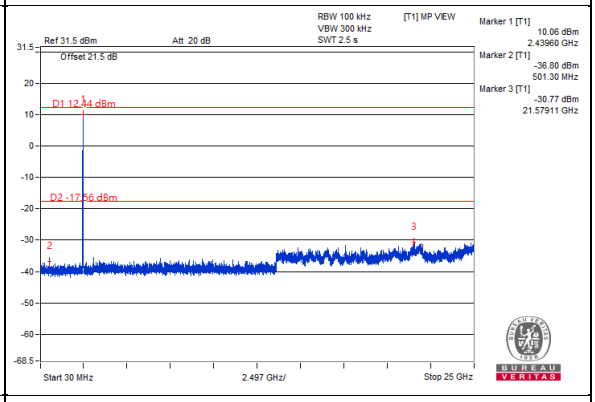


Chain 2

CH 1



CH 6



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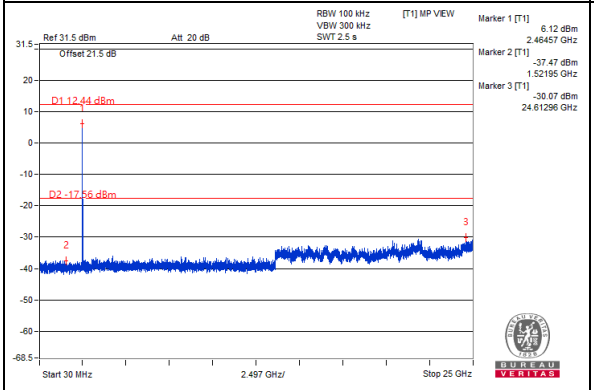
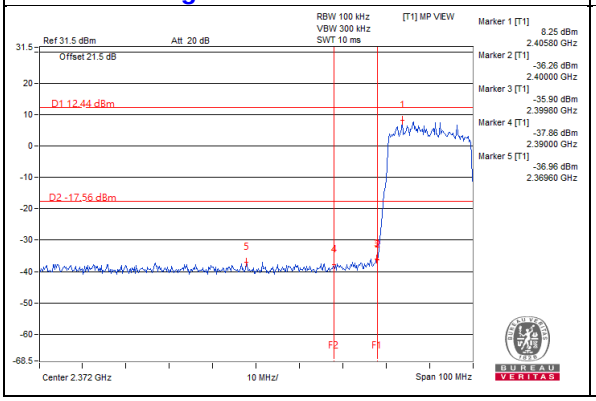
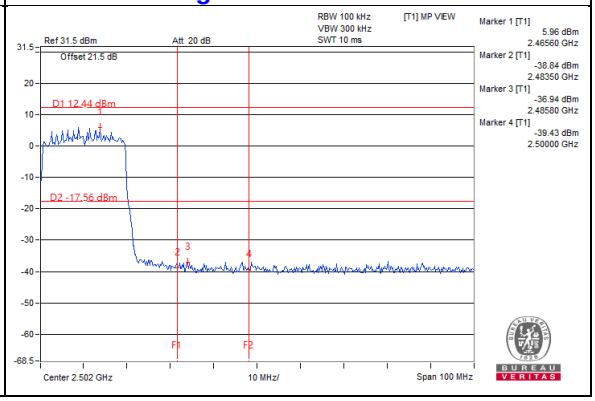


CH 1 Band edge

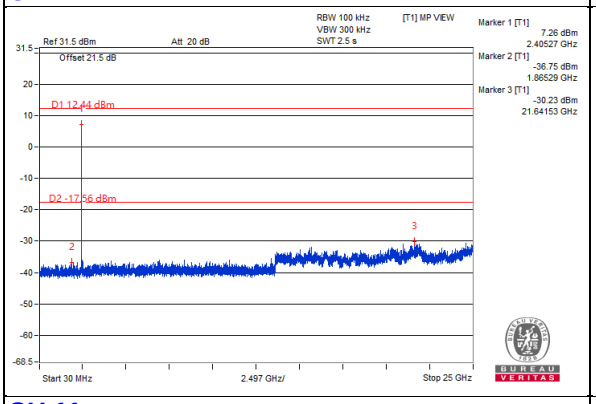


CH 11 Band edge

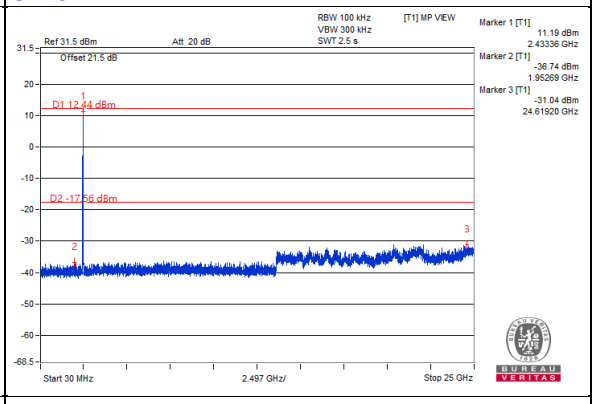


Chain 3

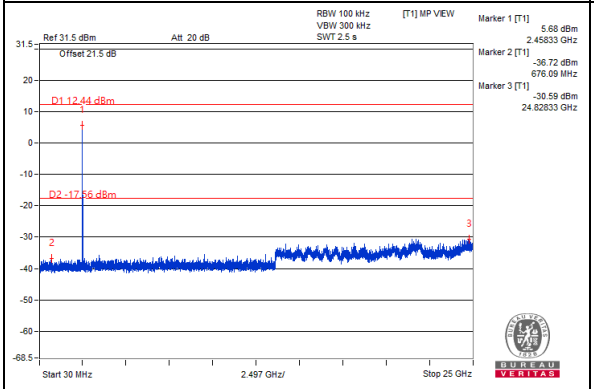
CH 1



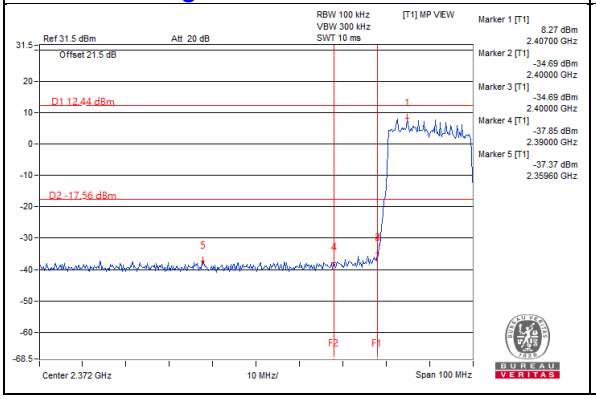
CH 6



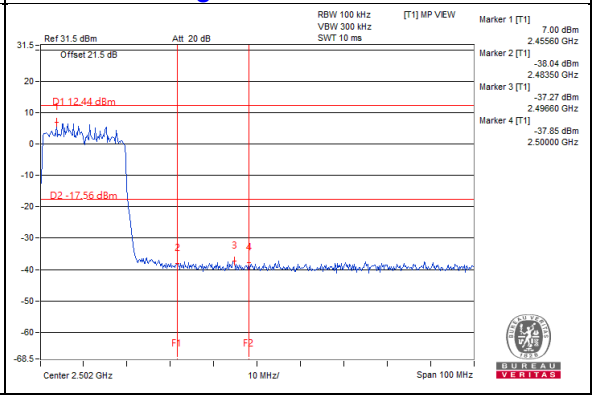
CH 11



CH 1 Band edge

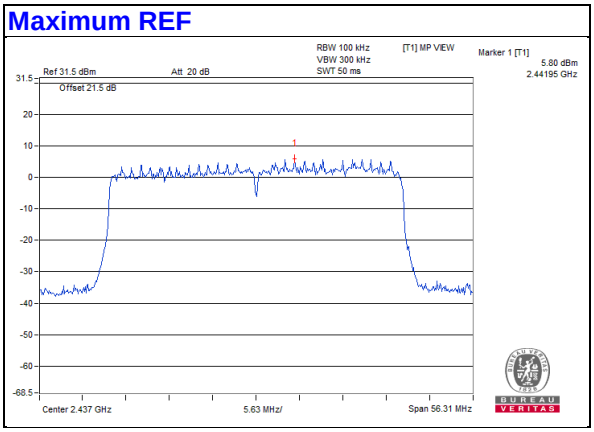


CH 11 Band edge



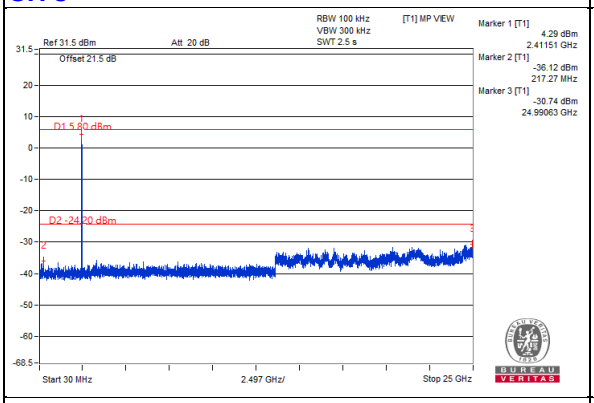
802.11ax (HE40)

Maximum REF

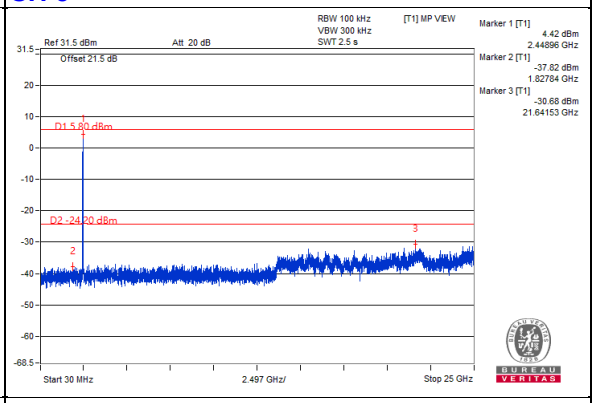


Chain 0

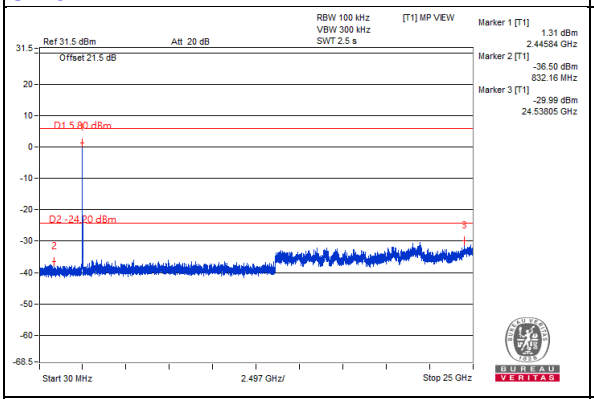
CH 3



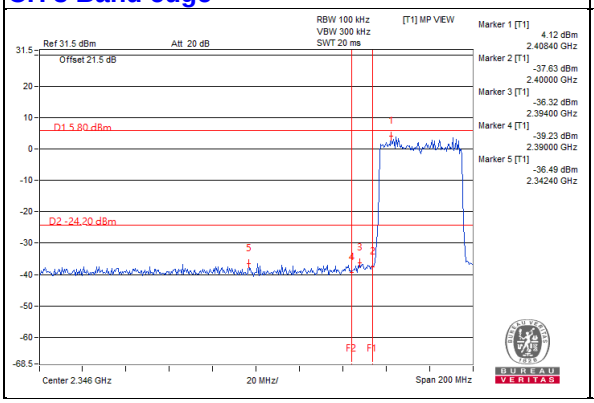
CH 6



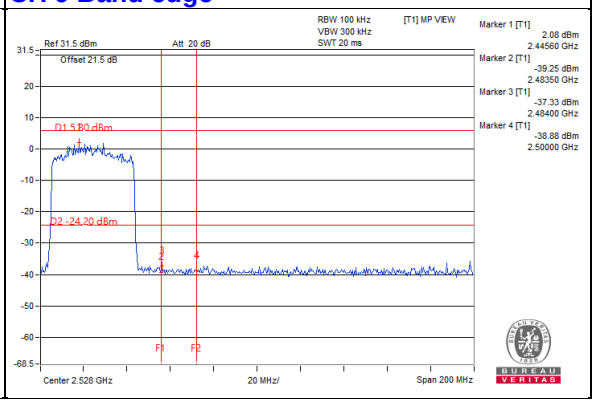
CH 9



CH 3 Band edge

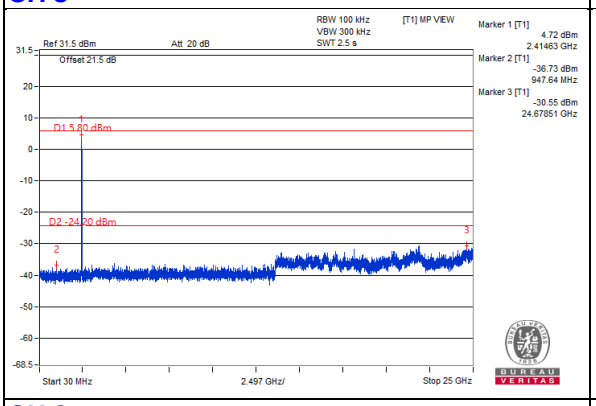


CH 9 Band edge

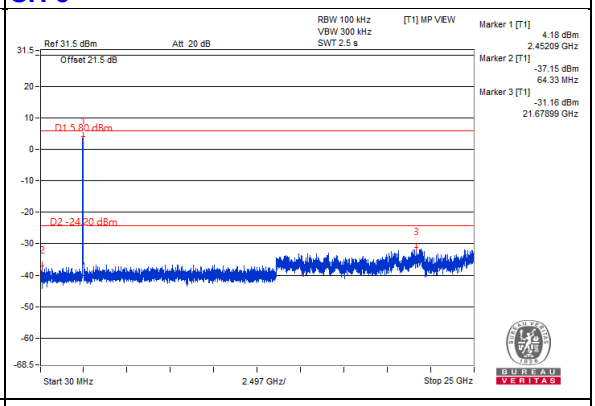


Chain 1

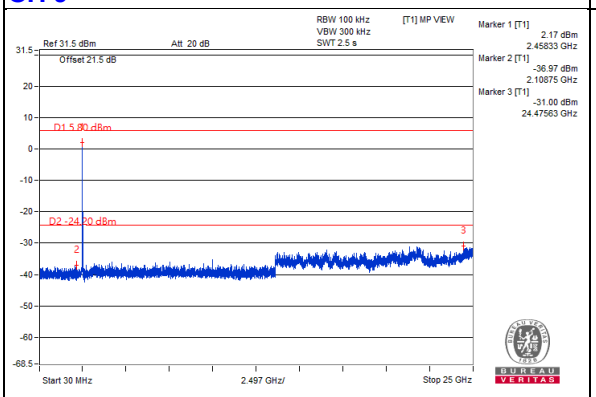
CH 3



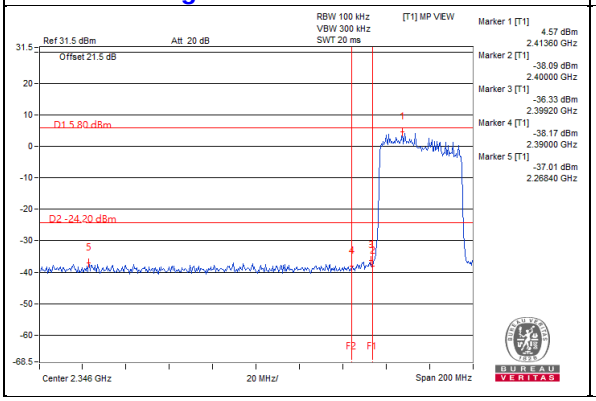
CH 6



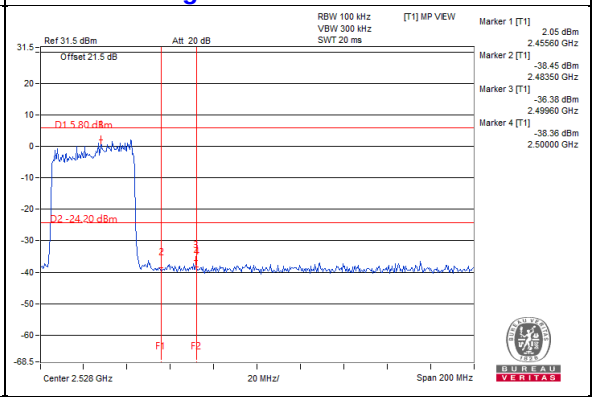
CH 9



CH 3 Band edge

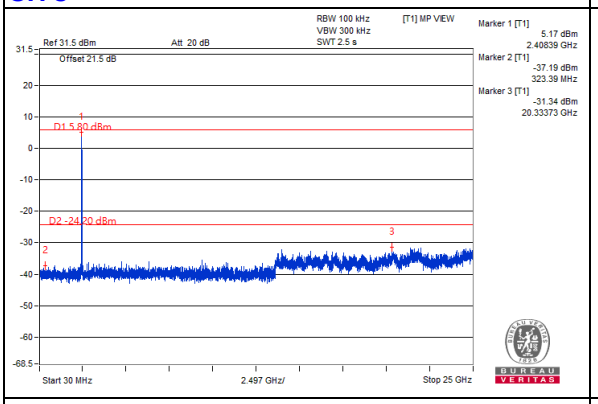


CH 9 Band edge

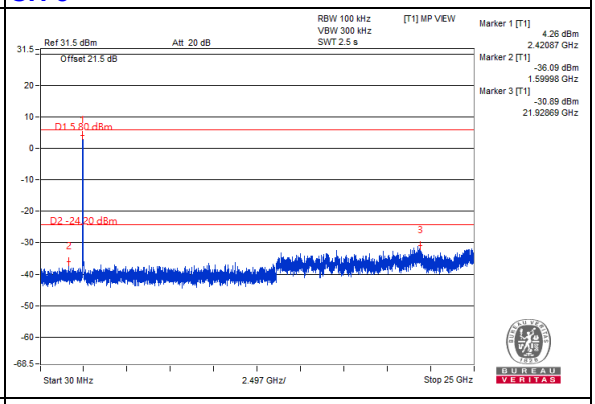


Chain 2

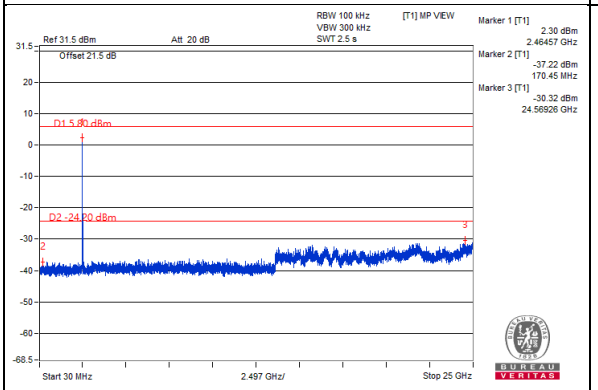
CH 3



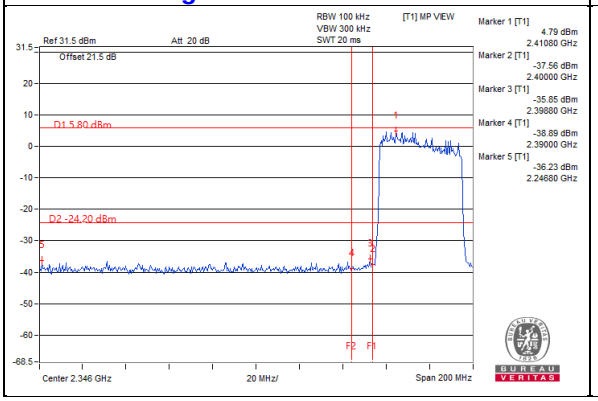
CH 6



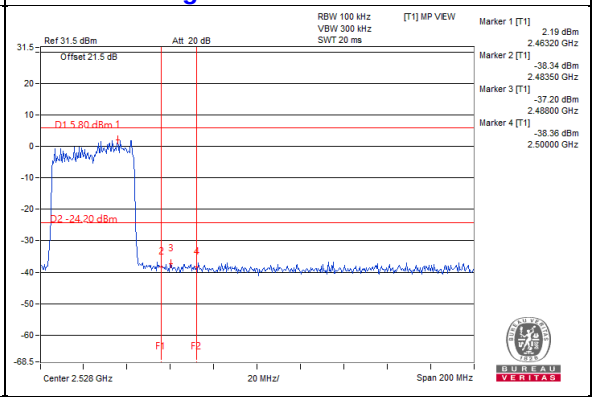
CH 9



CH 3 Band edge

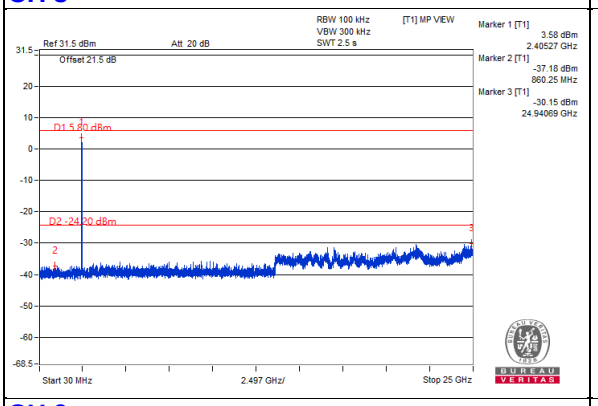


CH 9 Band edge

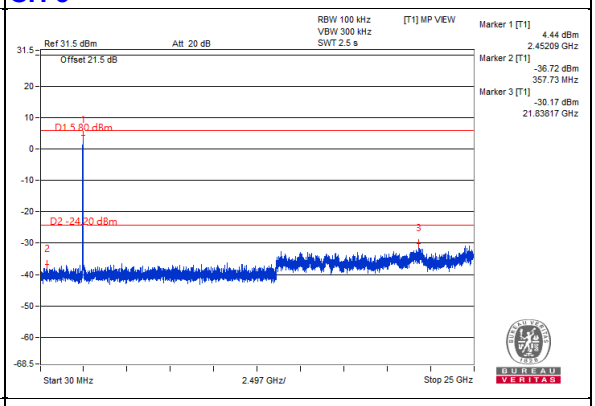


Chain 3

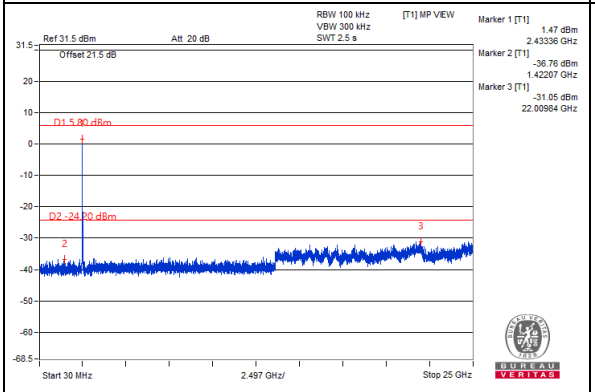
CH 3



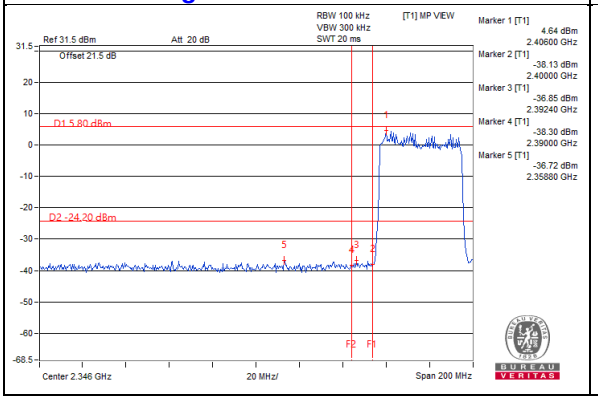
CH 6



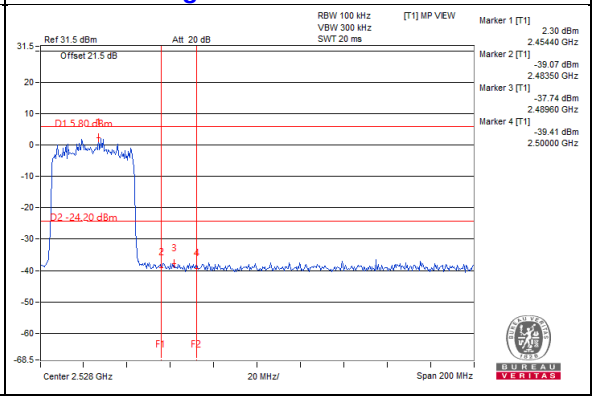
CH 9



CH 3 Band edge



CH 9 Band edge



5 Pictures of Test Arrangements

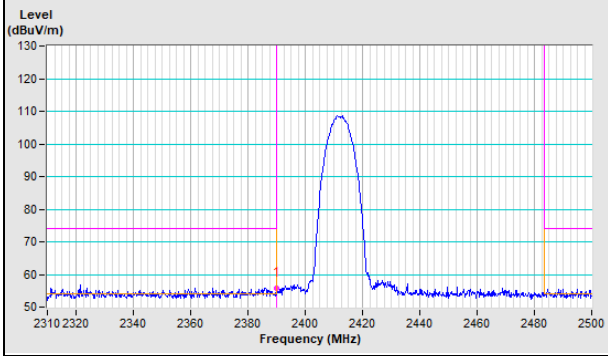
Please refer to the attached file (Test Setup Photo).

Annex A - Band-Edge Measurement

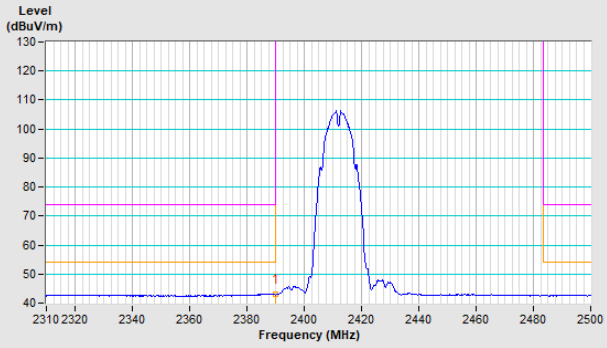
802.11b

Channel 1

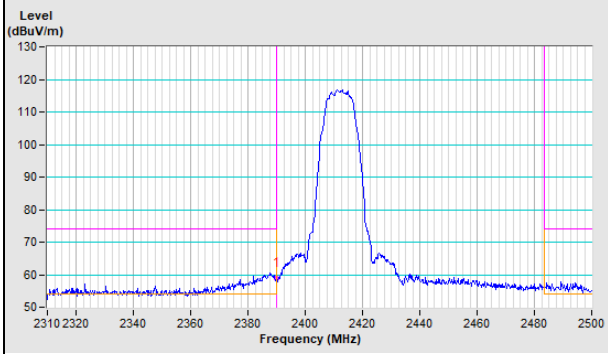
Horizontal (Peak)



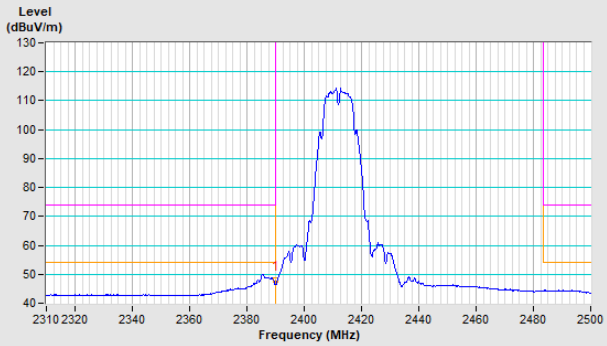
Horizontal (Average)



Vertical (Peak)

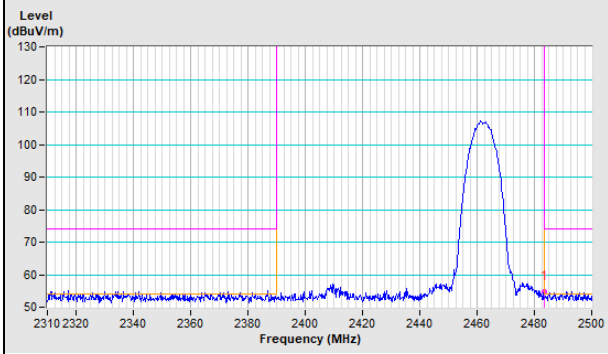


Vertical (Average)

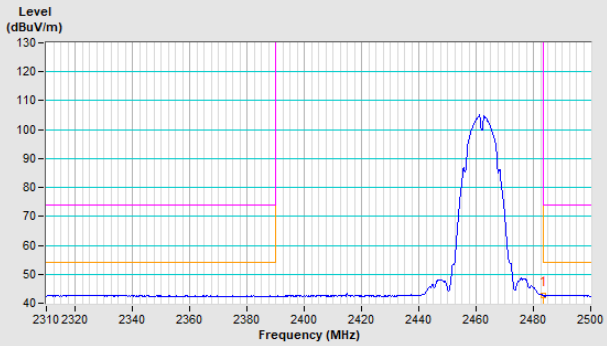


Channel 11

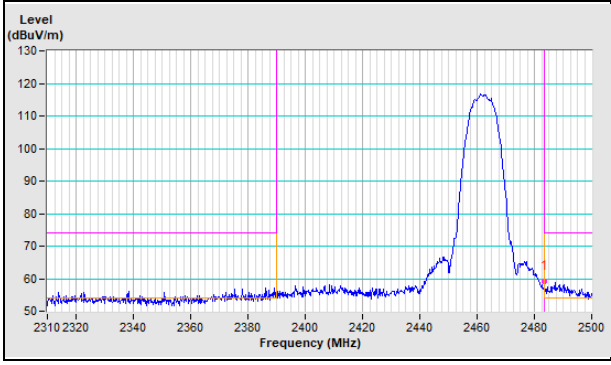
Horizontal (Peak)



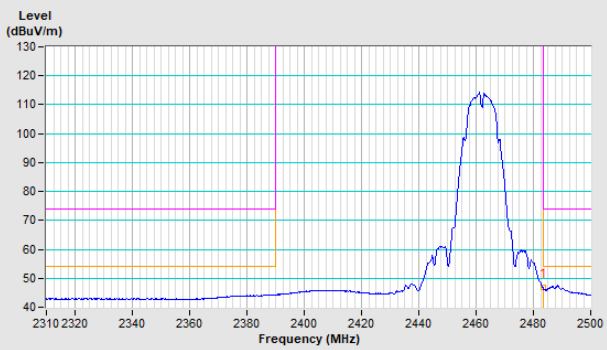
Horizontal (Average)



Vertical (Peak)



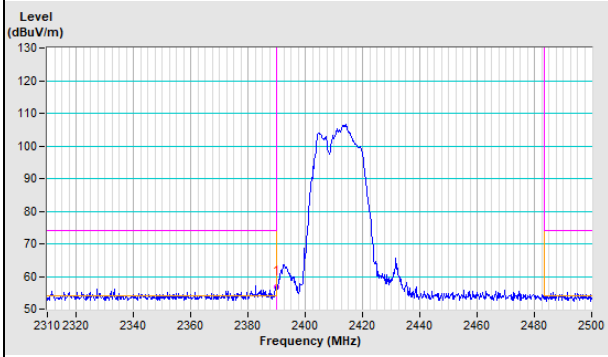
Vertical (Average)



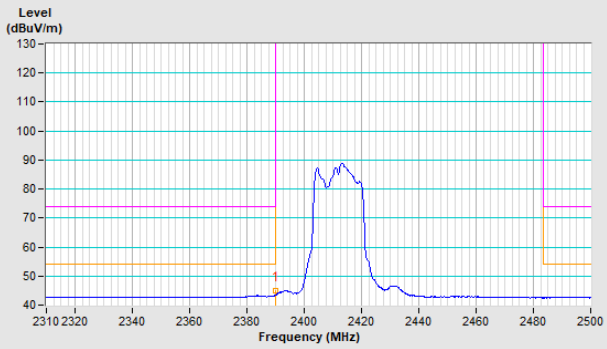
802.11g

Channel 1

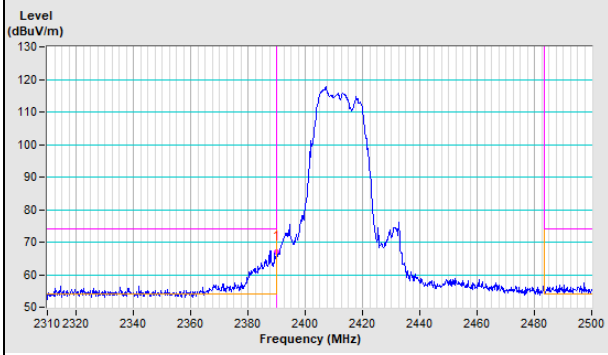
Horizontal (Peak)



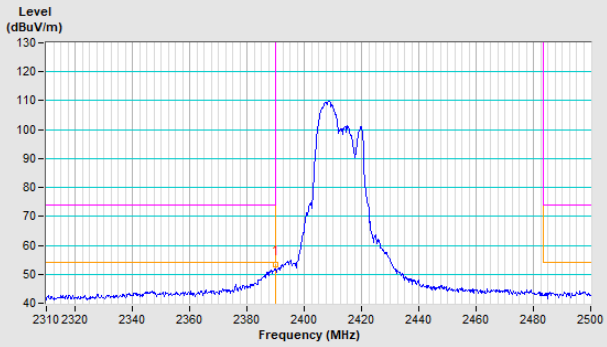
Horizontal (Average)



Vertical (Peak)

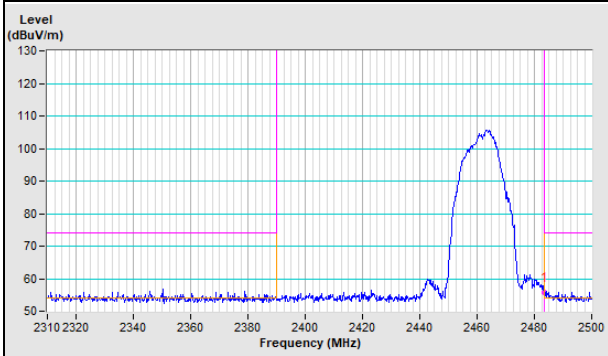


Vertical (Average)

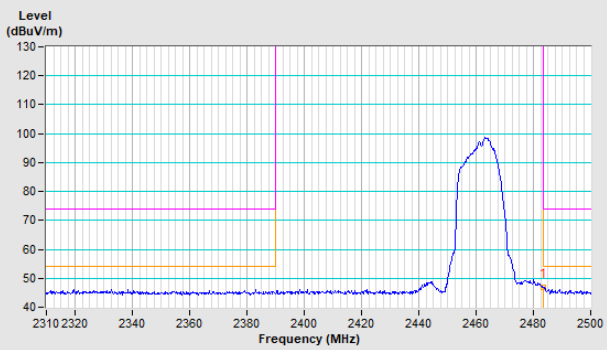


Channel 11

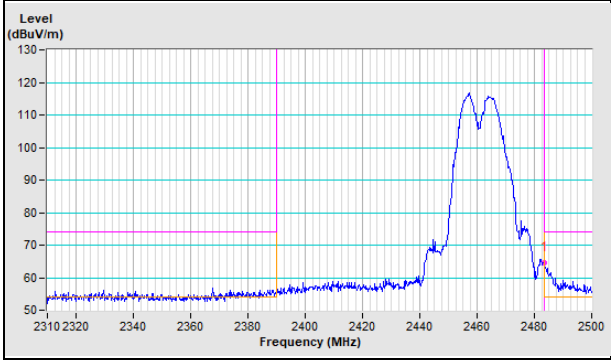
Horizontal (Peak)



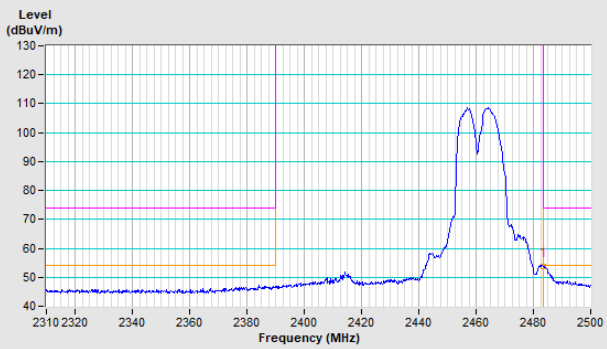
Horizontal (Average)



Vertical (Peak)



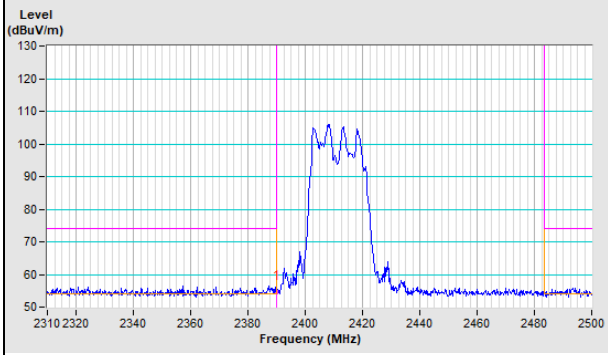
Vertical (Average)



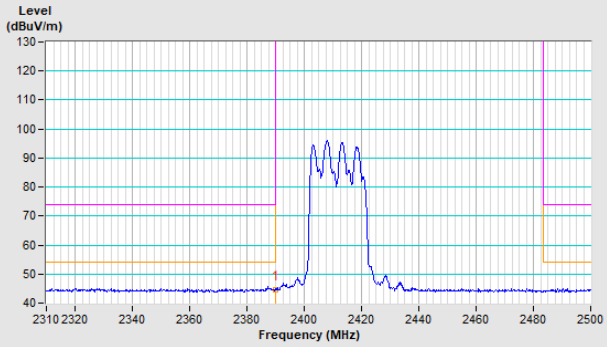
802.11ax (HE20)

Channel 1

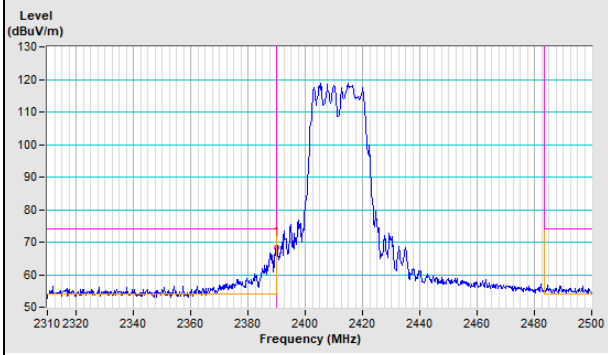
Horizontal (Peak)



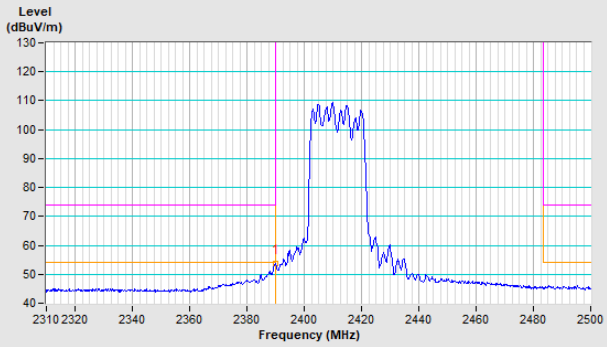
Horizontal (Average)



Vertical (Peak)

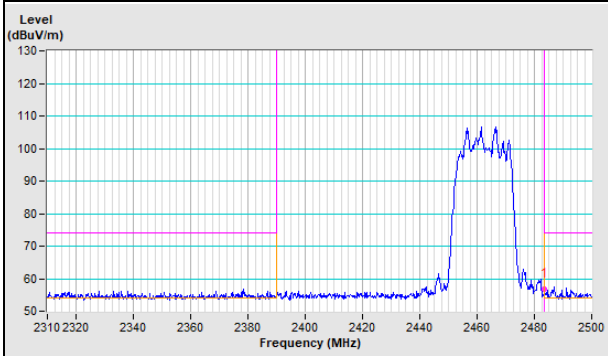


Vertical (Average)

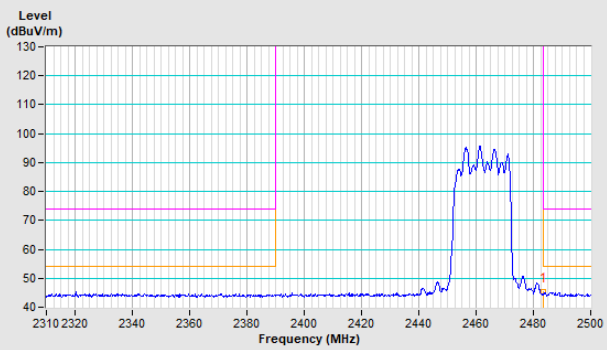


Channel 11

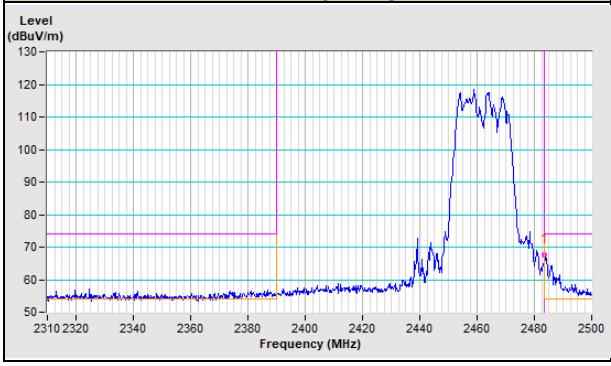
Horizontal (Peak)



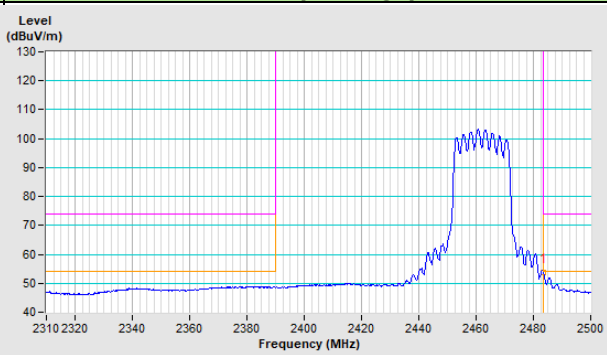
Horizontal (Average)



Vertical (Peak)



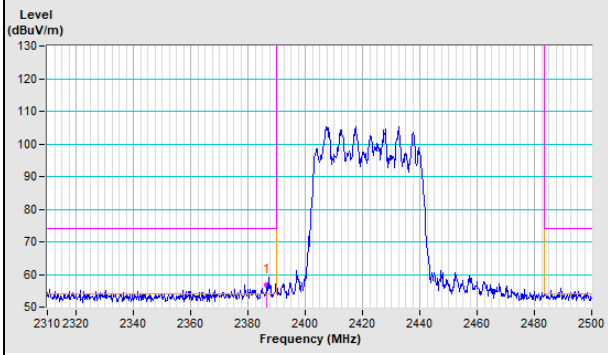
Vertical (Average)



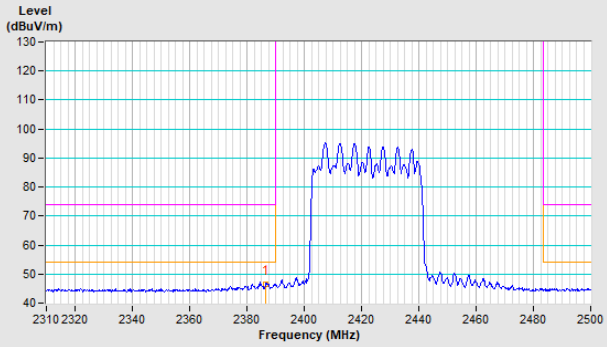
802.11ax (HE40)

Channel 3

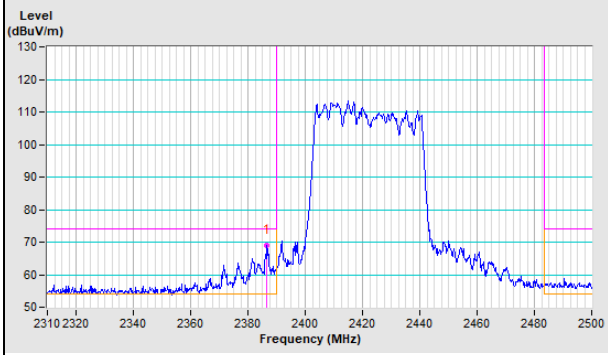
Horizontal (Peak)



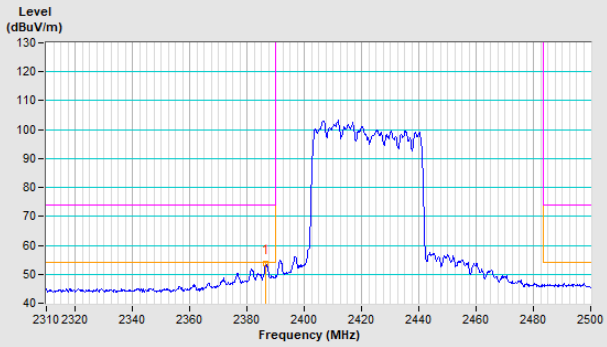
Horizontal (Average)



Vertical (Peak)

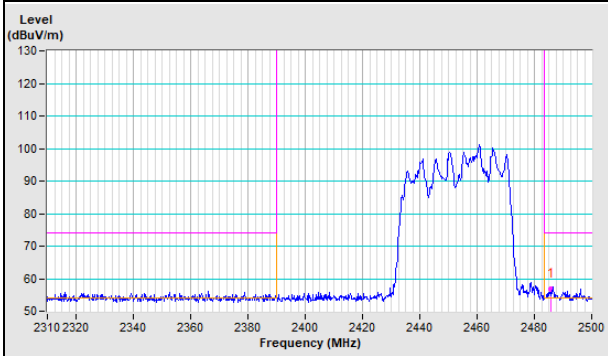


Vertical (Average)

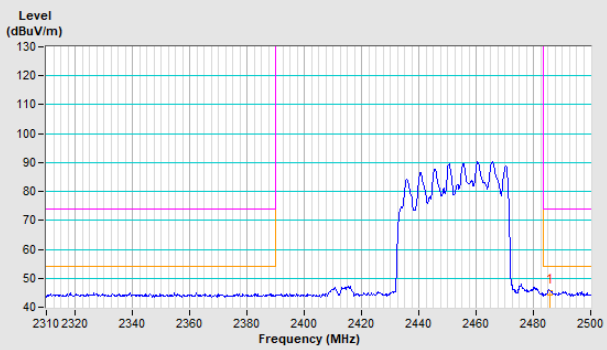


Channel 9

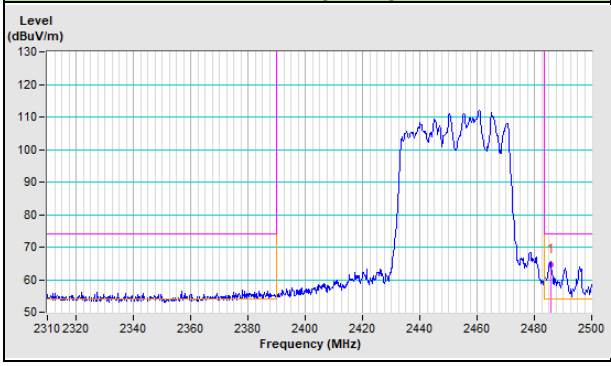
Horizontal (Peak)



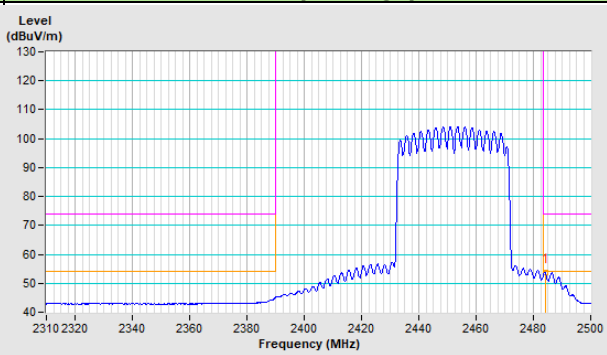
Horizontal (Average)



Vertical (Peak)



Vertical (Average)



Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are 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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