FCC Test Report

Report No.:	RFBDHL-WTW-P20080206
FCC ID:	GZ5NVG578HLX
Test Model:	NVG578HLX
Series Model:	NVG568HLX
Received Date:	Aug. 11, 2020
Test Date:	Aug. 11 to Oct. 26, 2020
Issued Date:	Nov. 26, 2020
Applicant:	ARRIS
Address:	2500 Walsh Ave., Santa Clara, CA 95051 United States
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 (1):	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
Test Location (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan
FCC Registration / Designation Number:	723255 / TW2022 for Test Location (1) / 736135 / TW0004 for Test Location (2)

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Release Control Record

Issue No.	Description	Date Issued
RFBDHL-WTW-P20080206	Original release.	Nov. 26, 2020

1 Certificate of Conformity

Product: 2.5G PON GATEWAY

Brand: ARRIS

Test Model: NVG578HLX

Series Model: NVG568HLX

Sample Status: ENGINEERING SAMPLE

Applicant: ARRIS

Test Date: Aug. 11 to Oct. 26, 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. 26, 2020
Cherry Chuo/ Specialist

Approved by : , **Date:** Nov. 26, 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 -14.69dB at 0.15781MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.2dB at 2390.00MHz
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	2.5G PON GATEWAY
Brand	ARRIS
Test Model	NVG578HLX
Series Model	NVG568HLX
Status of EUT	ENGINEERING SAMPLE
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 1733.3 Mbps 802.11ax: up to 2401.9 Mbps
Operating Frequency	**2.4GHz:** 2.412GHz ~ 2.462GHz **5GHz:** 5.18 ~ 5.25GHz, 5.745 ~ 5.825GHz
Number of Channel	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20), VHT20, 802.11ax (HE20): 11 802.11n (HT40), VHT40, 802.11ax (HE40): 7 **5GHz:** 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20): 9 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 4 802.11ac (VHT80), 802.11ax (HE80): 2
Output Power	**CDD Mode:** **2.412 ~ 2.462 GHz:** 349.696 mW **5.18 ~ 5.25 GHz:** 913.035 mW **5.745 ~ 5.825 GHz:** 993.722 mW **Beamforming Mode:** **2.412 ~ 2.462 GHz:** 311.479 mW **5.18 ~ 5.25 GHz:** 487.26 mW **5.745 ~ 5.825 GHz:** 417.227 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x1
Data Cable	NA

Note:

1. The EUT has two radios as following table:

Radio 1	Radio 2
WLAN 2.4GHz	WLAN 5GHz

2. Simultaneously transmission condition.

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

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

Different	Model No. NVG578HLX	Model No. NVG568HLX
Feature	5G High power	5G High power
Target Market	NA	NA
Key IC	Main IC: BCM68360 LD: BCM68901 WIFI 2.4G: BCM6710 WIFI 5G：BCM43684	Main IC: BCM68360 WIFI 2.4G: BCM6710 WIFI 5G：BCM43684
2.5 G Phy	BCM54991EL	BCM54991EL
Slic	Microsemi Le9642	Microsemi Le9642
Flash	256MB	256MB
DDR	512MB	512MB
802.11ax 2.4G	3 x 3	3 x 3
802.11ax 5G	4 x 4	4 x 4
B+ BOSA with STIA SC/APC	yes	no
5G FEM	SKY85743-21	SKY85743-21
USB 3.0	1	1
VOIP port	2	2
LAN port	RJ45 with 1 LED 2.5G LAN x1 1G LAN x3	RJ45 with 1 LED 2.5G LAN x1 1G LAN x3
Power on/off button	yes	yes
WPS button	yes	yes
Reset button	yes	yes
LEDs	Power, Broadband, WAN, WiFi, Voice	Power, Broadband, WAN, WiFi, Voice

From the above models, model: **NVG578HLX** was selected as representative model for the test and its data was recorded in this report.

4. The EUT must be supplied with a power adapter as following table:

Brand	Model No.	Spec.
NetBit	NBS36J120300VU	Input: 100-120 Vac, 1 A, 50-60 Hz Output: 12 Vdc, 3 A DC Output cable: Unshielded, 2 m

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

Ant. Set	RF Chain No.	Ant. Net Gain (dBi)	Freq. Range (GHz)	Ant. Type	Connector Type	Cable Length (mm)
0	5G Chain0	3.93	5.15~5.25	PIFA	RF switch	on-board no cable
		3.45	5.25~5.35			
		4.15	5.47~5.725			
		4.33	5.725~5.85			
1	5G Chain1 / 2.4G Chain 2	4.69	2.4~2.4835	PIFA	RF switch	on-board no cable
		2.77	5.15~5.25			
		3.33	5.25~5.35			
		4.33	5.47~5.725			
		4.54	5.725~5.85			
2	5G Chain2 / 2.4G Chain 1	2.27	2.4~2.4835	Dipole	i-pex(MHF)	200
		2.65	5.15~5.25			
		2.86	5.25~5.35			
		3.12	5.47~5.725			
		3.12	5.725~5.85			
3	5G Chain3 / 2.4G Chain 0	3.36	2.4~2.4835	Dipole	i-pex(MHF)	200
		2.83	5.15~5.25			
		2.77	5.25~5.35			
		2.65	5.47~5.725			
		2.83	5.725~5.85			

6. The EUT incorporates a MIMO function:

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

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

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

3.2 Description of Test Modes

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

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

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

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

3.2.1 Test Mode Applicability and Tested Channel Detail

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

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

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

Radiated Emission Test (Above 1GHz):

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

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

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

Radiated Emission Test (Below 1GHz):

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

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

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

Power Line Conducted Emission Test:

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

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

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

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

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

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

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

Test Condition:

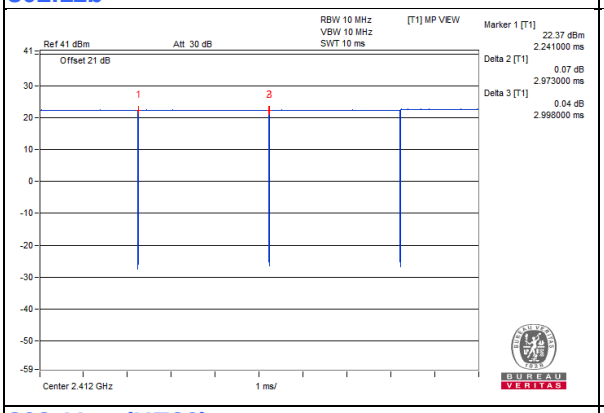
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 68%RH	120Vac, 60Hz	Nelson Teng
RE<1G	23deg. C, 71%RH	120Vac, 60Hz	Ryan Du
PLC	25deg. C, 68%RH	120Vac, 60Hz	Eagle Chen
APCM	25deg. C, 60%RH	120Vac, 60Hz	Kevin Ko

3.3 Duty Cycle of Test Signal

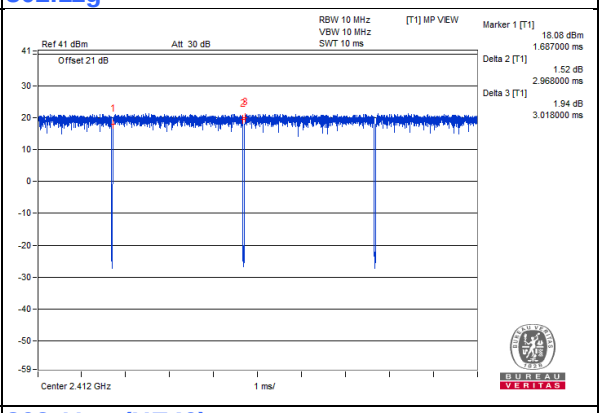
If duty cycle of test signal is ≥ 98 %, duty factor is not required.

802.11b: Duty cycle = 2.973 ms /2.998 ms=0.992
802.11g: Duty cycle = 2.968 ms /3.018 ms=0.983
802.11ax (HE20): Duty cycle = 2.318 ms /2.351 ms=0.986
802.11ax (HE40): Duty cycle = 2.399 ms /2.433 ms=0.986

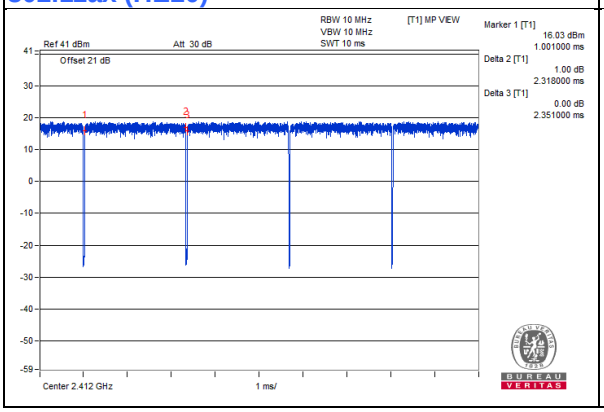
802.11b



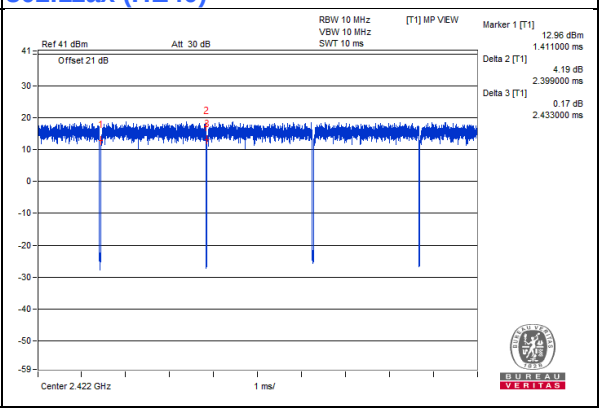
802.11g



802.11ax (HE20)



802.11ax (HE40)



3.4 Description of Support Units

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

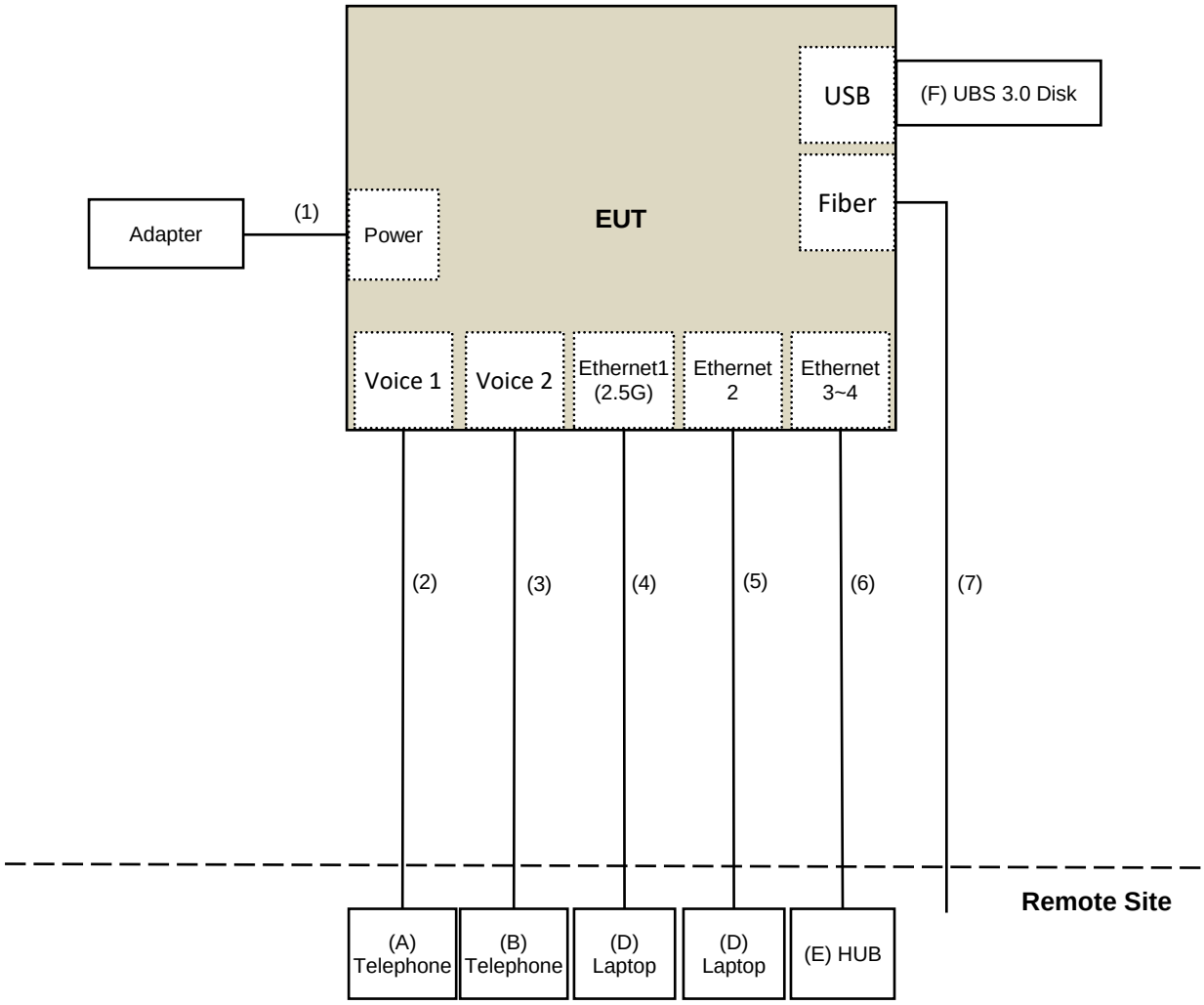
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Telephone	Romeo	TE-812	97285638	NA	Provided by Lab
B.	Telephone	Romeo	TE-812	97280903	NA	Provided by Lab
C.	Laptop	DELL	PP36S	25733582128	NA	Provided by Lab
D.	Laptop	DELL	E5430	HYV4VY1	FCC DoC	Provided by Lab
E.	HUB	ZyXEL	GS1100-16	S150H44000046	FCC DoC	Provided by Lab
F.	UBS 3.0 Disk	Transcend	16GB JetFlash 700	F80093 0291	NA	Provided by Lab

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	1	2	No	0	Supplied by client
2.	RJ-11 Cable	1	10	No	0	Provided by Lab
3.	RJ-11 Cable	1	10	No	0	Provided by Lab
4.	RJ-45 Cable	1	10	No	0	Provided by Lab
5.	RJ-45 Cable	1	10	No	0	Provided by Lab
6.	RJ-45 Cable	2	10	No	0	Provided by Lab
7.	Fiber Cable	1	10	No	0	Provided by Lab

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards and References

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

Test Standard:

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

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

References Test Guidance:

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

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

4.1.2 Test Instruments

For Radiated emission test

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 06, 2020	July 05, 2021
Pre-Amplifier EMCI	EMC001340	980142	May 25, 2020	May 24, 2021
Loop Antenna Electro-Metrics	EM-6879	264	Feb. 18, 2020	Feb. 17, 2021
RF Cable	NA	LOOPCAB-001	Jan. 08, 2020	Jan. 07, 2021
RF Cable	NA	LOOPCAB-002	Jan. 08, 2020	Jan. 07, 2021
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	Apr. 28, 2020	Apr. 27, 2021
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 11, 2019	Nov. 10, 2020
RF Cable	8D	966-3-1	Mar. 17, 2020	Mar. 16, 2021
RF Cable	8D	966-3-2	Mar. 17, 2020	Mar. 16, 2021
RF Cable	8D	966-3-3	Mar. 17, 2020	Mar. 16, 2021
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Sep. 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-1500	180504	Apr. 29, 2020	Apr. 28, 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: Oct. 13 to 16, 2020

For Bandedge test

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 06, 2020	July 05, 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: Aug. 11 to Oct. 16, 2020

For other test

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

NOTE:

1. The test was performed in Oven room 2.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: Oct. 26, 2020

4.1.3 Test Procedures

For Radiated emission below 30MHz

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

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

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

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

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

NOTE:

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

For Radiated emission above 30MHz

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

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

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

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

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

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

Note:

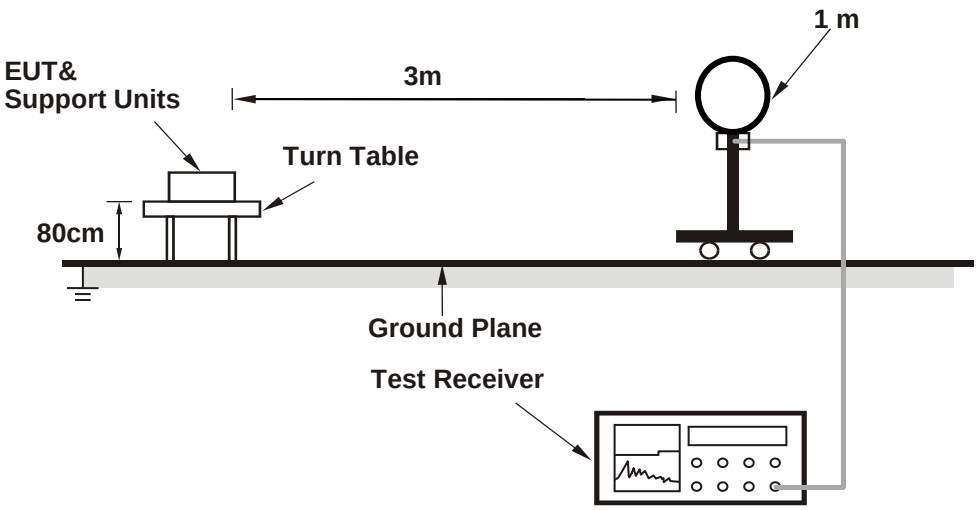
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

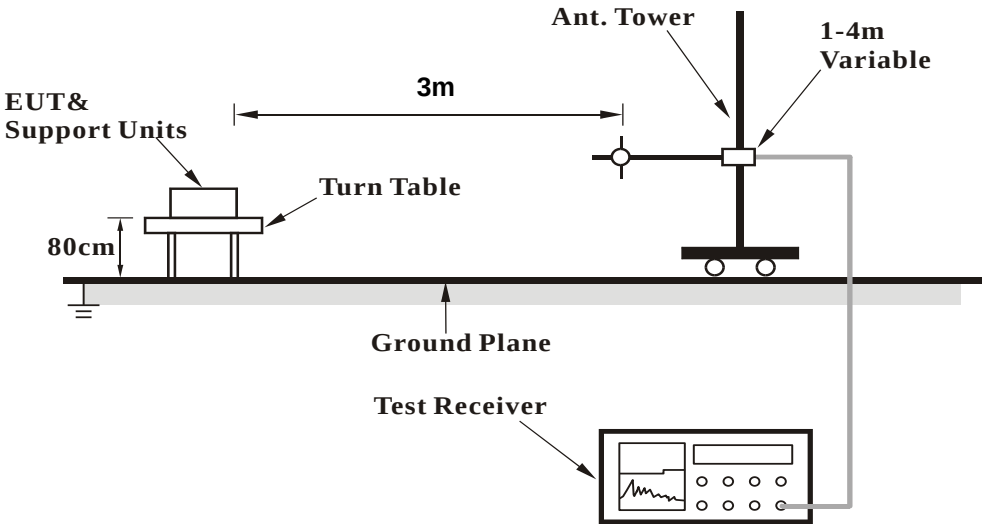
No deviation.

4.1.5 Test Setup

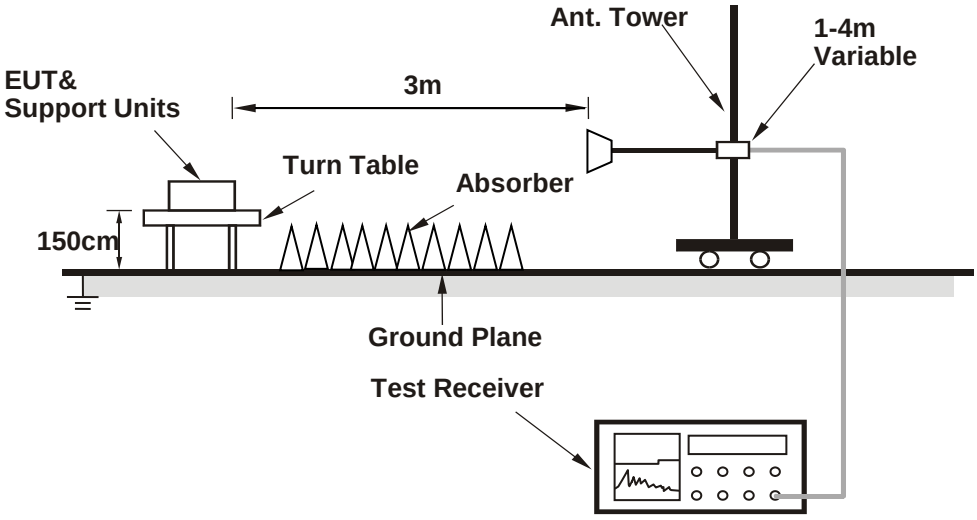
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

a. Connected the EUT with the Laptop which is placed on remote site.
b. Controlling software (accessMTool_REL_3_2_0_0) has been activated to set the EUT under transmission condition continuously at specific channel frenquency.

4.1.7 Test Results

Above 1GHz Data：

802.11b

CHANNEL	TX Channel 1	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	2389.04	60.2 PK	74.0	-13.8	2.44 H	57	61.8	-1.6
2	2389.04	52.6 AV	54.0	-1.4	2.44 H	57	54.2	-1.6
3	*2412.00	111.6 PK			2.44 H	57	113.2	-1.6
4	*2412.00	109.2 AV			2.44 H	57	110.8	-1.6
5	4824.00	47.5 PK	74.0	-26.5	1.99 H	42	44.3	3.2
6	4824.00	45.6 AV	54.0	-8.4	1.99 H	42	42.4	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	2389.21	59.5 PK	74.0	-14.5	2.68 V	64	61.1	-1.6
2	2389.21	52.3 AV	54.0	-1.7	2.68 V	64	53.9	-1.6
3	*2412.00	113.1 PK			2.68 V	64	114.7	-1.6
4	*2412.00	110.0 AV			2.68 V	64	111.6	-1.6
5	4824.00	54.6 PK	74.0	-19.4	1.74 V	130	51.4	3.2
6	4824.00	51.9 AV	54.0	-2.1	1.74 V	130	48.7	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	59.1 PK	74.0	-14.9	2.39 H	64	60.7	-1.6
2	2390.00	49.8 AV	54.0	-4.2	2.39 H	64	51.4	-1.6
3	*2437.00	112.2 PK			2.39 H	64	113.8	-1.6
4	*2437.00	109.7 AV			2.39 H	64	111.3	-1.6
5	2483.50	57.7 PK	74.0	-16.3	2.39 H	64	59.3	-1.6
6	2483.50	48.5 AV	54.0	-5.5	2.39 H	64	50.1	-1.6
7	4874.00	50.7 PK	74.0	-23.3	1.69 H	143	47.5	3.2
8	4874.00	48.4 AV	54.0	-5.6	1.69 H	143	45.2	3.2
9	7311.00	56.6 PK	74.0	-17.4	1.01 H	117	47.2	9.4
10	7311.00	52.8 AV	54.0	-1.2	1.01 H	117	43.4	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	58.8 PK	74.0	-15.2	2.63 V	49	60.4	-1.6
2	2390.00	49.4 AV	54.0	-4.6	2.63 V	49	51.0	-1.6
3	*2437.00	115.2 PK			2.63 V	49	116.8	-1.6
4	*2437.00	111.5 AV			2.63 V	49	113.1	-1.6
5	2483.50	57.9 PK	74.0	-16.1	2.63 V	49	59.5	-1.6
6	2483.50	48.6 AV	54.0	-5.4	2.63 V	49	50.2	-1.6
7	4874.00	53.9 PK	74.0	-20.1	1.73 V	112	50.7	3.2
8	4874.00	51.2 AV	54.0	-2.8	1.73 V	112	48.0	3.2
9	7311.00	53.5 PK	74.0	-20.5	1.64 V	315	44.1	9.4
10	7311.00	49.1 AV	54.0	-4.9	1.64 V	315	39.7	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	112.7 PK			1.05 H	235	114.3	-1.6
2	*2462.00	110.1 AV			1.05 H	235	111.7	-1.6
3	2483.50	60.4 PK	74.0	-13.6	1.05 H	235	62.0	-1.6
4	2483.50	52.3 AV	54.0	-1.7	1.05 H	235	53.9	-1.6
5	4924.00	54.0 PK	74.0	-20.0	1.47 H	157	50.9	3.1
6	4924.00	51.7 AV	54.0	-2.3	1.47 H	157	48.6	3.1
7	7386.00	56.5 PK	74.0	-17.5	1.26 H	11	46.8	9.7
8	7386.00	53.0 AV	54.0	-1.0	1.26 H	11	43.3	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	114.7 PK			2.54 V	337	116.3	-1.6
2	*2462.00	111.7 AV			2.54 V	337	113.3	-1.6
3	2484.78	61.9 PK	74.0	-12.1	2.54 V	337	63.5	-1.6
4	2484.78	51.3 AV	54.0	-2.7	2.54 V	337	52.9	-1.6
5	4924.00	54.6 PK	74.0	-19.4	1.69 V	119	51.5	3.1
6	4924.00	51.7 AV	54.0	-2.3	1.69 V	119	48.6	3.1
7	7386.00	53.3 PK	74.0	-20.7	1.58 V	320	43.6	9.7
8	7386.00	48.6 AV	54.0	-5.4	1.58 V	320	38.9	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	2387.55	62.3 PK	74.0	-11.7	2.54 H	43	63.9	-1.6
2	2387.55	49.3 AV	54.0	-4.7	2.54 H	43	50.9	-1.6
3	2390.00	65.3 PK	74.0	-8.7	2.54 H	43	66.9	-1.6
4	2390.00	49.0 AV	54.0	-5.0	2.54 H	43	50.6	-1.6
5	*2412.00	113.4 PK			2.54 H	43	115.0	-1.6
6	*2412.00	102.9 AV			2.54 H	43	104.5	-1.6
7	4824.00	59.2 PK	74.0	-14.8	1.61 H	180	56.0	3.2
8	4824.00	47.1 AV	54.0	-6.9	1.61 H	180	43.9	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	73.0 PK	74.0	-1.0	2.53 V	14	74.6	-1.6
2	2390.00	53.7 AV	54.0	-0.3	2.53 V	14	55.3	-1.6
3	*2412.00	114.9 PK			2.53 V	14	116.5	-1.6
4	*2412.00	104.0 AV			2.53 V	14	105.6	-1.6
5	4824.00	59.8 PK	74.0	-14.2	1.84 V	97	56.6	3.2
6	4824.00	47.7 AV	54.0	-6.3	1.84 V	97	44.5	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	61.9 PK	74.0	-12.1	1.09 H	221	63.5	-1.6
2	2390.00	49.1 AV	54.0	-4.9	1.09 H	221	50.7	-1.6
3	*2437.00	114.8 PK			1.09 H	221	116.4	-1.6
4	*2437.00	103.6 AV			1.09 H	221	105.2	-1.6
5	2483.50	58.9 PK	74.0	-15.1	1.09 H	221	60.5	-1.6
6	2483.50	46.4 AV	54.0	-7.6	1.09 H	221	48.0	-1.6
7	4874.00	61.7 PK	74.0	-12.3	1.63 H	150	58.5	3.2
8	4874.00	49.3 AV	54.0	-4.7	1.63 H	150	46.1	3.2
9	7311.00	63.4 PK	74.0	-10.6	1.57 H	312	54.0	9.4
10	7311.00	51.1 AV	54.0	-2.9	1.57 H	312	41.7	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	71.0 PK	74.0	-3.0	2.02 V	346	72.6	-1.6
2	**2390.00**	**53.8 AV**	**54.0**	**-0.2**	**2.02 V**	**346**	**55.4**	**-1.6**
3	*2437.00	117.3 PK			2.02 V	346	118.9	-1.6
4	*2437.00	106.7 AV			2.02 V	346	108.3	-1.6
5	2485.62	66.5 PK	74.0	-7.5	2.02 V	346	68.1	-1.6
6	2485.62	48.2 AV	54.0	-5.8	2.02 V	346	49.8	-1.6
7	4874.00	61.5 PK	74.0	-12.5	1.74 V	103	58.3	3.2
8	4874.00	49.3 AV	54.0	-4.7	1.74 V	103	46.1	3.2
9	7311.00	63.7 PK	74.0	-10.3	1.63 V	319	54.3	9.4
10	7311.00	51.4 AV	54.0	-2.6	1.63 V	319	42.0	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	110.9 PK			1.01 H	225	112.5	-1.6
2	*2462.00	100.8 AV			1.01 H	225	102.4	-1.6
3	2483.50	63.6 PK	74.0	-10.4	1.01 H	225	65.2	-1.6
4	2483.50	47.4 AV	54.0	-6.6	1.01 H	225	49.0	-1.6
5	4924.00	59.4 PK	74.0	-14.6	1.60 H	167	56.3	3.1
6	4924.00	47.1 AV	54.0	-6.9	1.60 H	167	44.0	3.1
7	7386.00	60.9 PK	74.0	-13.1	1.60 H	347	51.2	9.7
8	7386.00	48.7 AV	54.0	-5.3	1.60 H	347	39.0	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	112.9 PK			2.41 V	16	114.5	-1.6
2	*2462.00	102.7 AV			2.41 V	16	104.3	-1.6
3	2483.50	72.2 PK	74.0	-1.8	2.41 V	16	73.8	-1.6
4	2483.50	50.3 AV	54.0	-3.7	2.41 V	16	51.9	-1.6
5	4924.00	60.5 PK	74.0	-13.5	1.77 V	87	57.4	3.1
6	4924.00	48.1 AV	54.0	-5.9	1.77 V	87	45.0	3.1
7	7386.00	61.6 PK	74.0	-12.4	1.70 V	308	51.9	9.7
8	7386.00	49.2 AV	54.0	-4.8	1.70 V	308	39.5	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	60.0 PK	74.0	-14.0	2.20 H	71	61.6	-1.6
2	2390.00	48.1 AV	54.0	-5.9	2.20 H	71	49.7	-1.6
3	*2412.00	110.8 PK			2.20 H	71	112.4	-1.6
4	*2412.00	98.5 AV			2.20 H	71	100.1	-1.6
5	4824.00	57.8 PK	74.0	-16.2	1.64 H	160	54.6	3.2
6	4824.00	45.5 AV	54.0	-8.5	1.64 H	160	42.3	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	71.4 PK	74.0	-2.6	2.82 V	4	73.0	-1.6
2	2390.00	53.1 AV	54.0	-0.9	2.82 V	4	54.7	-1.6
3	*2412.00	113.5 PK			2.82 V	4	115.1	-1.6
4	*2412.00	100.8 AV			2.82 V	4	102.4	-1.6
5	4824.00	57.3 PK	74.0	-16.7	1.61 V	117	54.1	3.2
6	4824.00	45.4 AV	54.0	-8.6	1.61 V	117	42.2	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	59.6 PK	74.0	-14.4	2.49 H	41	61.2	-1.6
2	2390.00	48.0 AV	54.0	-6.0	2.49 H	41	49.6	-1.6
3	*2437.00	115.3 PK			2.49 H	41	116.9	-1.6
4	*2437.00	104.2 AV			2.49 H	41	105.8	-1.6
5	2483.50	58.2 PK	74.0	-15.8	2.49 H	41	59.8	-1.6
6	2483.50	46.3 AV	54.0	-7.7	2.49 H	41	47.9	-1.6
7	4874.00	59.0 PK	74.0	-15.0	1.58 H	127	55.8	3.2
8	4874.00	46.7 AV	54.0	-7.3	1.58 H	127	43.5	3.2
9	7311.00	60.6 PK	74.0	-13.4	1.53 H	324	51.2	9.4
10	7311.00	48.7 AV	54.0	-5.3	1.53 H	324	39.3	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	70.2 PK	74.0	-3.8	2.00 V	350	71.8	-1.6
2	**2390.00**	**53.8 AV**	**54.0**	**-0.2**	**2.00 V**	**350**	**55.4**	**-1.6**
3	*2437.00	118.4 PK			2.00 V	350	120.0	-1.6
4	*2437.00	106.2 AV			2.00 V	350	107.8	-1.6
5	2483.50	65.0 PK	74.0	-9.0	2.00 V	350	66.6	-1.6
6	2483.50	49.9 AV	54.0	-4.1	2.00 V	350	51.5	-1.6
7	4874.00	58.6 PK	74.0	-15.4	1.62 V	99	55.4	3.2
8	4874.00	46.4 AV	54.0	-7.6	1.62 V	99	43.2	3.2
9	7311.00	60.9 PK	74.0	-13.1	1.66 V	305	51.5	9.4
10	7311.00	48.7 AV	54.0	-5.3	1.66 V	305	39.3	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	112.9 PK			2.10 H	74	114.5	-1.6
2	*2462.00	100.0 AV			2.10 H	74	101.6	-1.6
3	2484.10	64.9 PK	74.0	-9.1	2.10 H	74	66.5	-1.6
4	2484.10	50.1 AV	54.0	-3.9	2.10 H	74	51.7	-1.6
5	4924.00	57.1 PK	74.0	-16.9	1.55 H	144	54.0	3.1
6	4924.00	44.8 AV	54.0	-9.2	1.55 H	144	41.7	3.1
7	7386.00	60.1 PK	74.0	-13.9	1.48 H	306	50.4	9.7
8	7386.00	48.3 AV	54.0	-5.7	1.48 H	306	38.6	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	114.3 PK			1.96 V	349	115.9	-1.6
2	*2462.00	102.4 AV			1.96 V	349	104.0	-1.6
3	2483.50	72.7 PK	74.0	-1.3	1.96 V	349	74.3	-1.6
4	2483.50	52.5 AV	54.0	-1.5	1.96 V	349	54.1	-1.6
5	4924.00	57.1 PK	74.0	-16.9	1.67 V	117	54.0	3.1
6	4924.00	44.8 AV	54.0	-9.2	1.67 V	117	41.7	3.1
7	7386.00	60.4 PK	74.0	-13.6	1.68 V	277	50.7	9.7
8	7386.00	48.5 AV	54.0	-5.5	1.68 V	277	38.8	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	2388.53	60.9 PK	74.0	-13.1	1.02 H	227	62.5	-1.6
2	2388.53	49.0 AV	54.0	-5.0	1.02 H	227	50.6	-1.6
3	*2422.00	109.9 PK			1.02 H	227	111.5	-1.6
4	*2422.00	95.5 AV			1.02 H	227	97.1	-1.6
5	4844.00	57.0 PK	74.0	-17.0	1.64 H	129	53.7	3.3
6	4844.00	45.1 AV	54.0	-8.9	1.64 H	129	41.8	3.3
7	7266.00	59.1 PK	74.0	-14.9	1.50 H	310	49.8	9.3
8	7266.00	47.2 AV	54.0	-6.8	1.50 H	310	37.9	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	2390.00	65.7 PK	74.0	-8.3	2.18 V	335	67.3	-1.6
2	2390.00	53.6 AV	54.0	-0.4	2.18 V	335	55.2	-1.6
3	*2422.00	109.3 PK			2.18 V	335	110.9	-1.6
4	*2422.00	97.0 AV			2.18 V	335	98.6	-1.6
5	4844.00	57.9 PK	74.0	-16.1	1.66 V	109	54.6	3.3
6	4844.00	45.7 AV	54.0	-8.3	1.66 V	109	42.4	3.3
7	7266.00	59.5 PK	74.0	-14.5	1.61 V	290	50.2	9.3
8	7266.00	47.9 AV	54.0	-6.1	1.61 V	290	38.6	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	61.2 PK	74.0	-12.8	1.03 H	216	62.8	-1.6
2	2390.00	49.3 AV	54.0	-4.7	1.03 H	216	50.9	-1.6
3	*2437.00	110.3 PK			1.03 H	216	111.9	-1.6
4	*2437.00	98.8 AV			1.03 H	216	100.4	-1.6
5	2483.50	58.4 PK	74.0	-15.6	1.03 H	216	60.0	-1.6
6	2483.50	46.7 AV	54.0	-7.3	1.03 H	216	48.3	-1.6
7	4874.00	57.4 PK	74.0	-16.6	1.56 H	173	54.2	3.2
8	4874.00	45.2 AV	54.0	-8.8	1.56 H	173	42.0	3.2
9	7311.00	60.1 PK	74.0	-13.9	1.56 H	321	50.7	9.4
10	7311.00	48.3 AV	54.0	-5.7	1.56 H	321	38.9	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	71.4 PK	74.0	-2.6	2.21 V	334	73.0	-1.6
2	2390.00	53.6 AV	54.0	-0.4	2.21 V	334	55.2	-1.6
3	*2437.00	112.1 PK			2.21 V	334	113.7	-1.6
4	*2437.00	100.5 AV			2.21 V	334	102.1	-1.6
5	2486.17	67.0 PK	74.0	-7.0	2.21 V	334	68.6	-1.6
6	2486.17	49.8 AV	54.0	-4.2	2.21 V	334	51.4	-1.6
7	4874.00	57.8 PK	74.0	-16.2	1.56 V	101	54.6	3.2
8	4874.00	45.3 AV	54.0	-8.7	1.56 V	101	42.1	3.2
9	7311.00	60.2 PK	74.0	-13.8	1.69 V	289	50.8	9.4
10	7311.00	48.3 AV	54.0	-5.7	1.69 V	289	38.9	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 9	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2452.00	110.1 PK			3.02 H	68	111.7	-1.6
2	*2452.00	96.2 AV			3.02 H	68	97.8	-1.6
3	2491.91	64.1 PK	74.0	-9.9	3.02 H	68	65.7	-1.6
4	2491.91	50.0 AV	54.0	-4.0	3.02 H	68	51.6	-1.6
5	4904.00	57.3 PK	74.0	-16.7	1.66 H	147	54.2	3.1
6	4904.00	45.0 AV	54.0	-9.0	1.66 H	147	41.9	3.1
7	7356.00	59.0 PK	74.0	-15.0	1.54 H	307	49.5	9.5
8	7356.00	47.2 AV	54.0	-6.8	1.54 H	307	37.7	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	109.4 PK			2.12 V	334	111.0	-1.6
2	*2452.00	97.5 AV			2.12 V	334	99.1	-1.6
3	2483.50	68.3 PK	74.0	-5.7	2.12 V	334	69.9	-1.6
4	2483.50	53.4 AV	54.0	-0.6	2.12 V	334	55.0	-1.6
5	4904.00	57.9 PK	74.0	-16.1	1.62 V	104	54.8	3.1
6	4904.00	45.5 AV	54.0	-8.5	1.62 V	104	42.4	3.1
7	7356.00	59.3 PK	74.0	-14.7	1.59 V	275	49.8	9.5
8	7356.00	47.4 AV	54.0	-6.6	1.59 V	275	37.9	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:

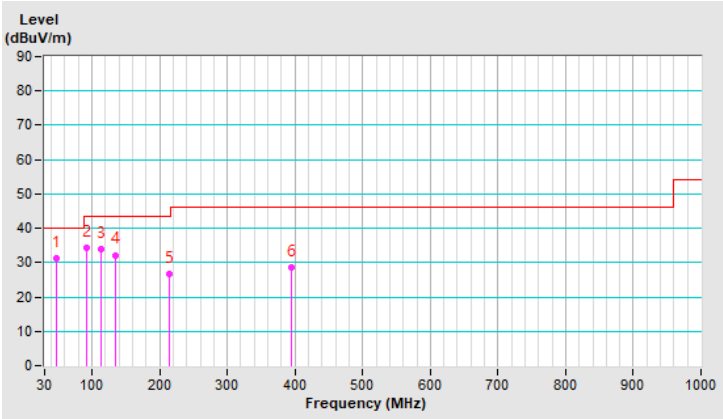
802.11g

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	47.63	31.2 QP	40.0	-8.8	2.00 H	0	38.8	-7.6
2	91.79	34.2 QP	43.5	-9.3	2.00 H	100	47.2	-13.0
3	113.91	33.9 QP	43.5	-9.6	1.50 H	252	43.6	-9.7
4	134.08	32.2 QP	43.5	-11.3	1.50 H	108	40.0	-7.8
5	214.78	26.5 QP	43.5	-17.0	2.00 H	97	36.5	-10.0
6	394.65	28.5 QP	46.0	-17.5	3.00 H	233	31.6	-3.1

Remarks:

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

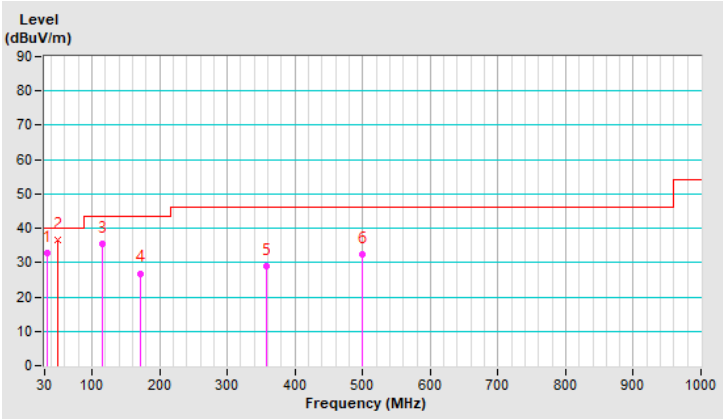


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	33.44	32.7 QP	40.0	-7.3	1.00 V	243	41.5	-8.8
2	49.38	36.6 QP	40.0	-3.4	1.00 V	0	44.1	-7.5
3	115.12	35.5 QP	43.5	-8.0	1.00 V	262	45.0	-9.5
4	170.84	26.9 QP	43.5	-16.6	1.50 V	228	34.3	-7.4
5	356.94	29.0 QP	46.0	-17.0	1.50 V	299	33.1	-4.1
6	500.01	32.5 QP	46.0	-13.5	1.00 V	102	32.9	-0.4

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 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	100287	Apr. 16, 2020	Apr. 15, 2021
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100071	Oct. 30, 2019	Oct. 29, 2020
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 08, 2020	Sep. 07, 2021
RF Cable	5D-FB	COACAB-001	Mar. 13, 2020	Mar. 12, 2021
10 dB PAD EMEC	STI02-2200-10	006	Aug. 28, 2020	Aug. 27, 2021
50 ohms Terminator	N/A	EMC-02	Sep. 16, 2020	Sep. 15, 2021
50 ohms Terminator	N/A	EMC-03	Sep. 30, 2020	Sep. 29, 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 Conducted Room C
3 The VCCI Con C Registration No. is C-13611.
4 Tested Date: Oct. 19, 2020

4.2.3 Test Procedures

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

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

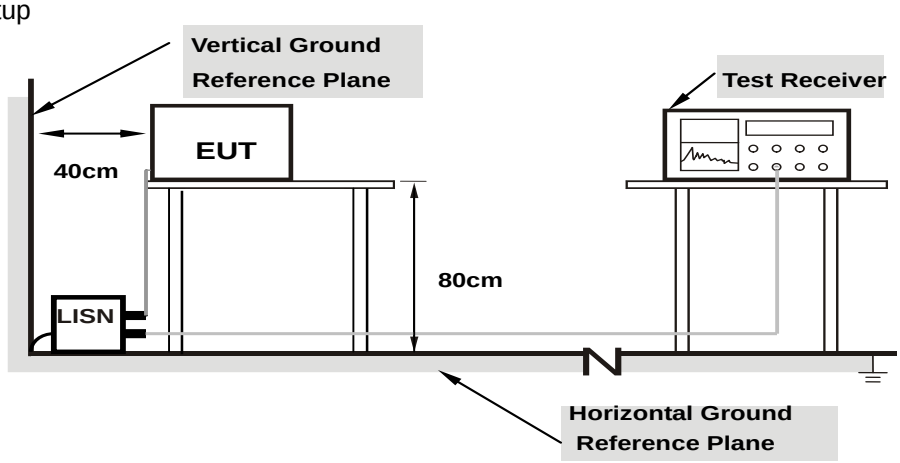
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

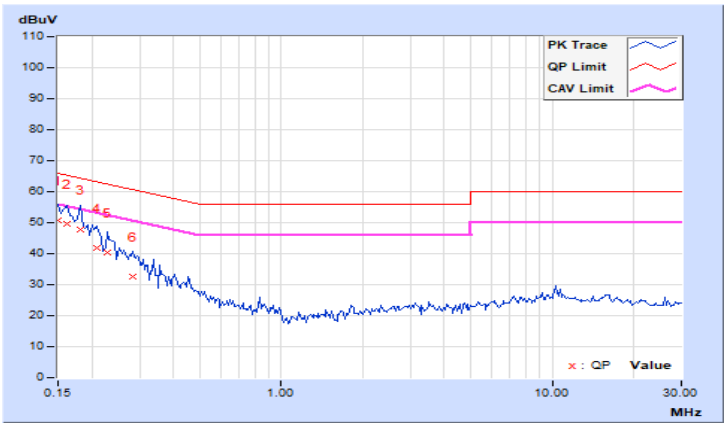
4.2.7 Test Results

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

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15022	9.94	40.95	23.66	50.89	33.60	65.99	55.99	-15.10	-22.39
2	0.16172	9.94	39.61	22.62	49.55	32.56	65.38	55.38	-15.83	-22.82
3	0.18125	9.95	37.90	21.93	47.85	31.88	64.43	54.43	-16.58	-22.55
4	0.20859	9.95	31.76	15.79	41.71	25.74	63.26	53.26	-21.55	-27.52
5	0.22812	9.95	30.41	14.87	40.36	24.82	62.52	52.52	-22.16	-27.70
6	0.28281	9.96	22.62	7.65	32.58	17.61	60.73	50.73	-28.15	-33.12

Remarks:

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

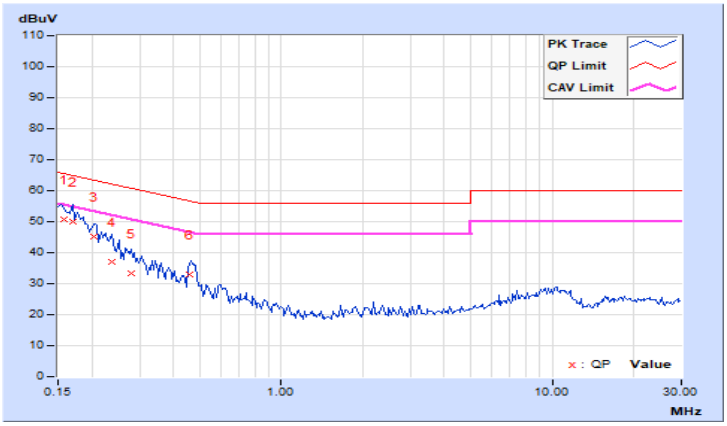


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.15781**	**9.95**	**40.94**	**24.11**	**50.89**	**34.06**	**65.58**	**55.58**	**-14.69**	**-21.52**
2	0.16953	9.95	39.95	21.00	49.90	30.95	64.98	54.98	-15.08	-24.03
3	0.20469	9.96	35.37	18.69	45.33	28.65	63.42	53.42	-18.09	-24.77
4	0.23594	9.96	27.04	10.86	37.00	20.82	62.24	52.24	-25.24	-31.42
5	0.27891	9.97	23.45	8.73	33.42	18.70	60.85	50.85	-27.43	-32.15
6	0.45859	9.98	23.01	18.28	32.99	28.26	56.72	46.72	-23.73	-18.46

Remarks:

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

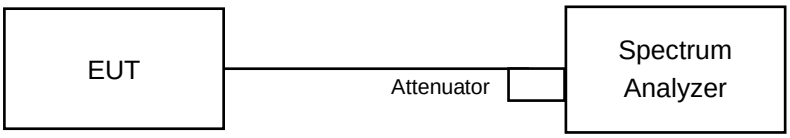


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

a. Set resolution bandwidth (RBW) = 100kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
1	2412	7.09	7.12	7.1	0.5	PASS
6	2437	7.1	7.11	7.1	0.5	PASS
11	2462	7.11	7.1	7.12	0.5	PASS

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
1	2412	16.43	16.43	16.43	0.5	PASS
6	2437	16.43	16.45	16.42	0.5	PASS
11	2462	16.43	16.43	16.41	0.5	PASS

802.11ax (HE20)

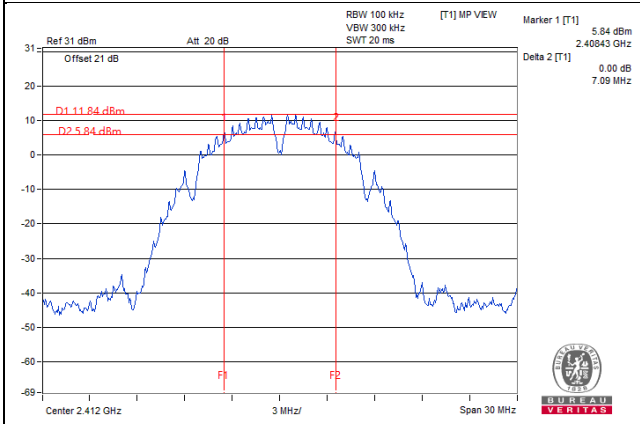
Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
1	2412	18.99	18.87	19.02	0.5	PASS
6	2437	19.03	19.02	19	0.5	PASS
11	2462	19.03	18.89	19.03	0.5	PASS

802.11ax (HE40)

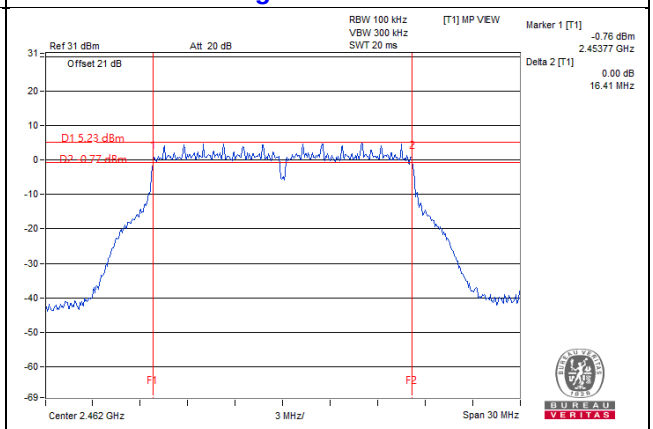
Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
3	2422	37.62	37.43	37.61	0.5	PASS
6	2437	37.67	37.57	37.74	0.5	PASS
9	2452	37.62	37.41	37.63	0.5	PASS

Spectrum Plot of Worst Value

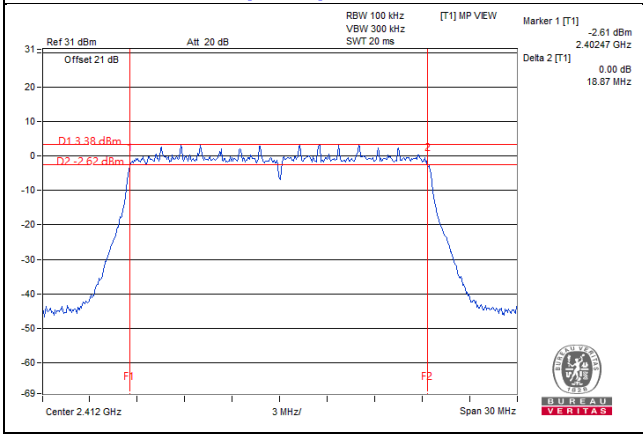
802.11b / Chain 0 : CH1



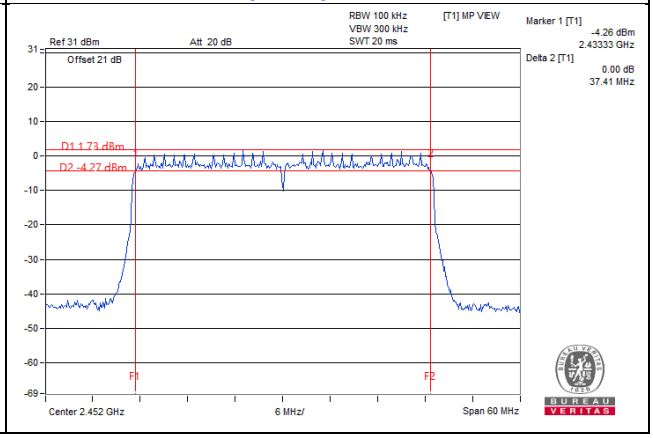
802.11g / Chain 2 : CH11



802.11ax (HE20) / Chain 1 : CH1



802.11ax (HE40) / Chain 1 : CH9



4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

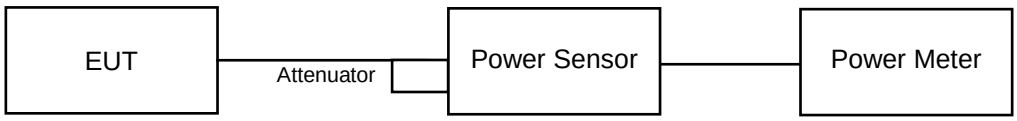
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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

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

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

CDD Mode

802.11b

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	19.38	19.87	19.74	277.936	24.44	30	Pass
6	2437	19.16	19.89	19.11	261.383	24.17	30	Pass
11	2462	20.44	20.17	19.73	308.627	24.89	30	Pass

802.11g

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	16.65	16.71	16.59	138.723	21.42	30	Pass
6	2437	20.58	21.03	20.36	349.696	25.44	30	Pass
11	2462	17.02	16.59	16.39	139.505	21.45	30	Pass

VHT20

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	14.47	14.88	14.33	85.853	19.34	30	Pass
6	2437	19.92	20.60	19.75	307.396	24.88	30	Pass
11	2462	15.96	16.05	15.68	116.7	20.67	30	Pass

VHT40

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
3	2422	15.23	15.21	14.74	96.317	19.84	30	Pass
6	2437	17.01	16.92	16.45	143.595	21.57	30	Pass
9	2452	15.31	15.21	14.75	97.006	19.87	30	Pass

802.11ax (HE20)

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	14.79	14.45	14.63	87.031	19.40	30	Pass
6	2437	20.29	20.31	19.88	311.579	24.94	30	Pass
11	2462	16.36	15.68	15.90	119.139	20.76	30	Pass

802.11ax (HE40)

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
3	2422	15.90	15.48	15.17	107.108	20.30	30	Pass
6	2437	17.27	17.10	16.67	151.071	21.79	30	Pass
9	2452	15.77	15.36	15.22	105.379	20.23	30	Pass

Beamforming Mode

VHT20

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	14.47	14.88	14.33	85.853	19.34	27.73	Pass
6	2437	19.92	20.60	19.75	307.396	24.88	27.73	Pass
11	2462	15.96	16.05	15.68	116.7	20.67	27.73	Pass

Note: 1. Directional gain=10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20})^2$ / 3] = 8.27dBi > 6dBi, so the power density limit shall be reduced to 30-(8.27-6) = 27.73dBm.

VHT40

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
3	2422	15.23	15.21	14.74	96.317	19.84	27.73	Pass
6	2437	17.01	16.92	16.45	143.595	21.57	27.73	Pass
9	2452	15.31	15.21	14.75	97.006	19.87	27.73	Pass

Note: 1. Directional gain=10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20})^2$ / 3] = 8.27dBi > 6dBi, so the power density limit shall be reduced to 30-(8.27-6) = 27.73dBm.

802.11ax (HE20)

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	14.79	14.45	14.63	87.031	19.40	27.73	Pass
6	2437	20.29	20.31	19.88	311.579	24.94	27.73	Pass
11	2462	16.36	15.68	15.90	119.139	20.76	27.73	Pass

Note: 1. Directional gain=10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20})^2$ / 3] = 8.27dBi > 6dBi, so the power density limit shall be reduced to 30-(8.27-6) = 27.73dBm.

802.11ax (HE40)

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
3	2422	15.90	15.48	15.17	107.108	20.30	27.73	Pass
6	2437	17.27	17.10	16.67	151.071	21.79	27.73	Pass
9	2452	15.77	15.36	15.22	105.379	20.23	27.73	Pass

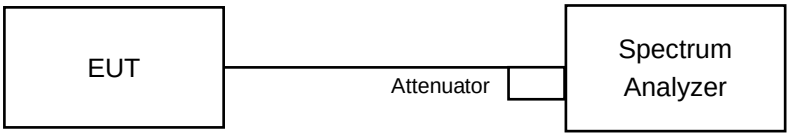
Note: 1. Directional gain=10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20})^2$ / 3] = 8.27dBi > 6dBi, so the power density limit shall be reduced to 30-(8.27-6) = 27.73dBm.

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)			Total PSD (mW/3kHz)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	-11.85	-12.13	-12.31	0.1853	-7.32	5.73	PASS
6	2437	-12.92	-12.27	-12.32	0.16896	-7.72	5.73	PASS
11	2462	-11.84	-12.16	-12.14	0.18737	-7.27	5.73	PASS

Note: 1. Directional gain=10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20})^2$ / 3] = 8.27dBi > 6dBi, so the power density limit shall be reduced to 8-(8.27-6) = 5.73dBm.

802.11g

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)			Total PSD (mW/3kHz)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	-17.29	-17.29	-17.04	0.0571	-12.43	5.73	PASS
6	2437	-12.65	-12.58	-12.79	0.16213	-7.90	5.73	PASS
11	2462	-17.20	-17.18	-17.37	0.05652	-12.48	5.73	PASS

Note: 1. Directional gain=10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20})^2$ / 3] = 8.27dBi > 6dBi, so the power density limit shall be reduced to 8-(8.27-6) = 5.73dBm.

802.11ax (HE20)

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)			Total PSD (mW/3kHz)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	-18.76	-18.68	-18.84	0.03992	-13.99	5.73	PASS
6	2437	-14.56	-12.61	-14.13	0.12846	-8.91	5.73	PASS
11	2462	-18.22	-18.62	-17.23	0.04773	-13.21	5.73	PASS

Note: 1. Directional gain=10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20})^2$ / 3] = 8.27dBi > 6dBi, so the power density limit shall be reduced to 8-(8.27-6) = 5.73dBm.

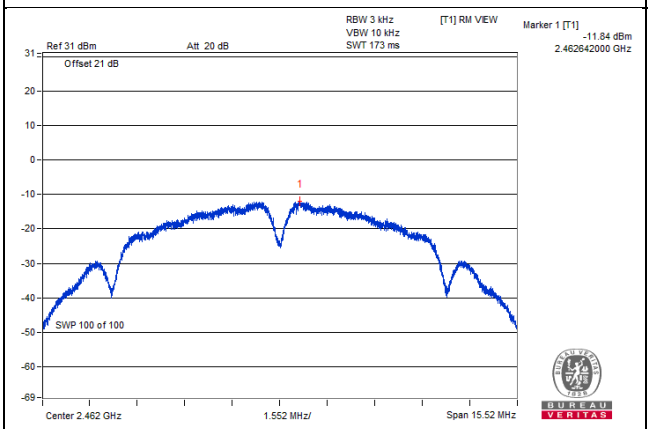
802.11ax (HE40)

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)			Total PSD (mW/3kHz)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
3	2422	-22.12	-21.64	-22.19	0.019032	-17.21	5.73	PASS
6	2437	-19.13	-20.53	-20.50	0.029982	-15.23	5.73	PASS
9	2452	-21.57	-21.72	-22.40	0.01945	-17.11	5.73	PASS

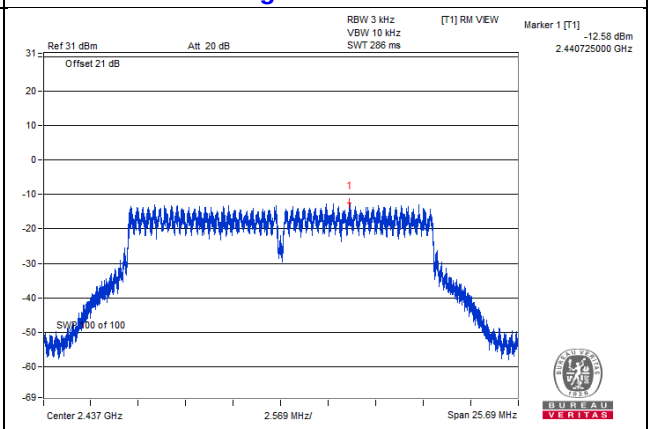
Note: 1. Directional gain=10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20})^2$ / 3] = 8.27dBi > 6dBi, so the power density limit shall be reduced to 8-(8.27-6) = 5.73dBm.

Spectrum Plot of Worst Value

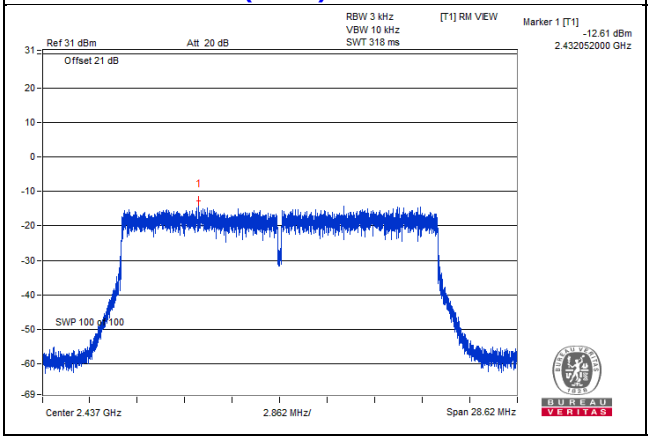
802.11b / Chain 0 : CH11



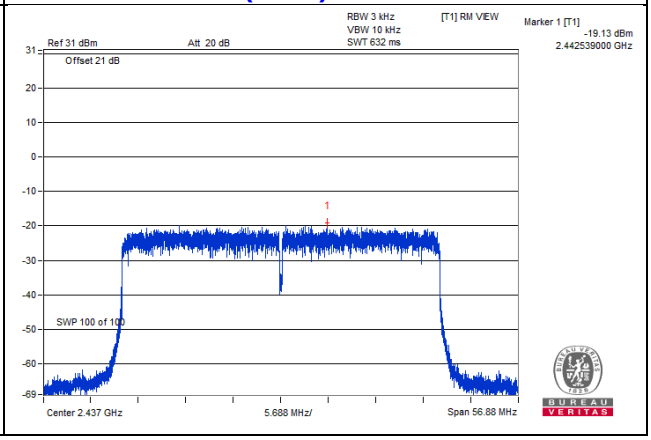
802.11g / Chain 1 : CH6



802.11ax (HE20) / Chain 1 : CH6



802.11ax (HE40) / Chain 0 : CH6

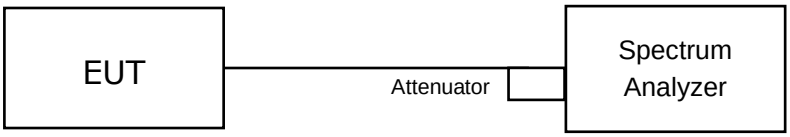


4.6 Conducted Out of Band Emission Measurement

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

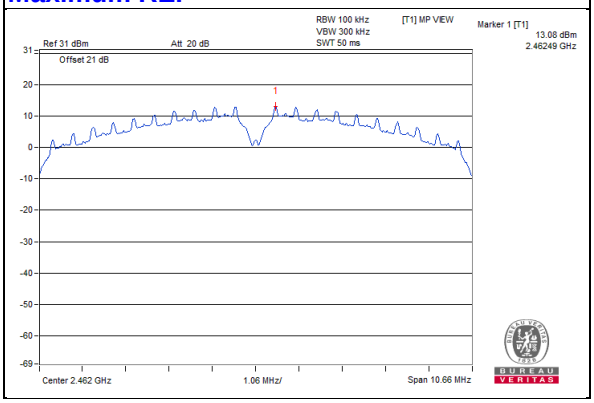
Same as Item 4.3.6

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.

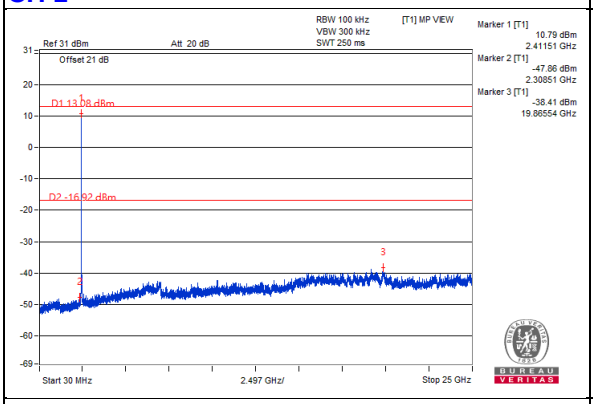
802.11b

Maximum REF

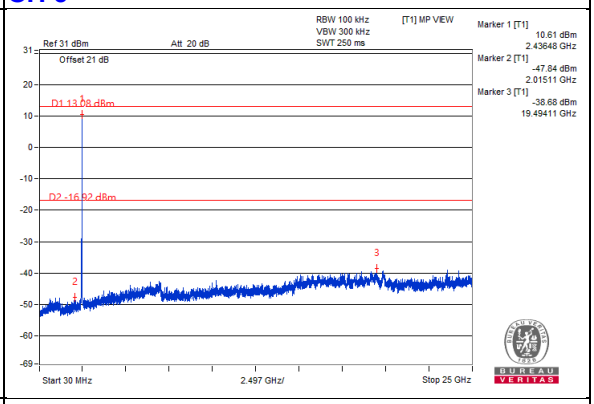


Chain 0

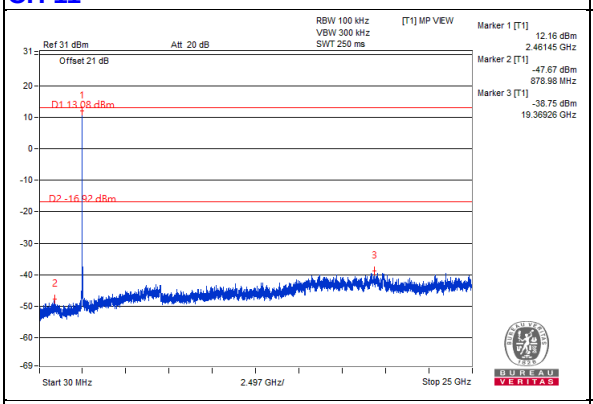
CH 1



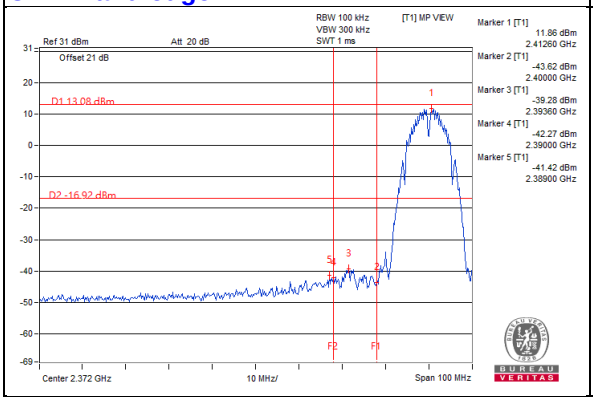
CH 6



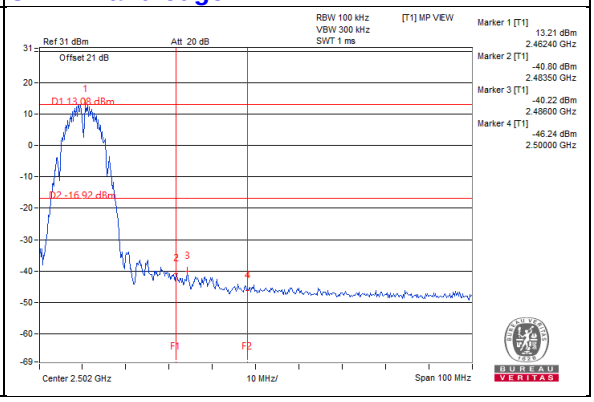
CH 11



CH 1 Band edge

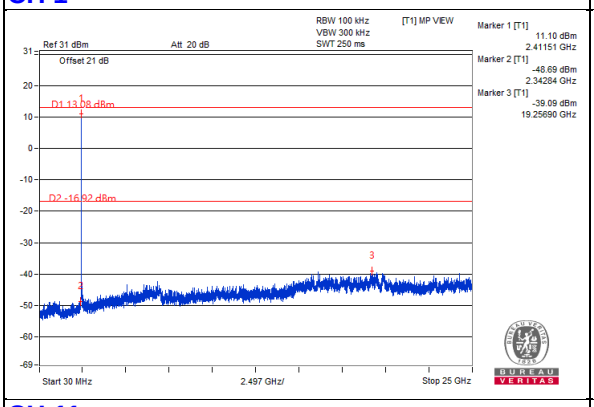


CH 11 Band edge

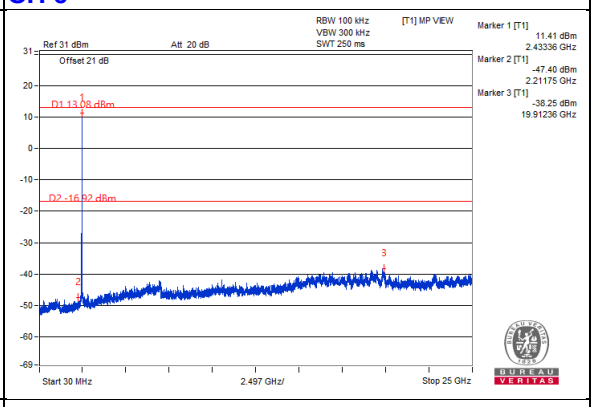


Chain 1

CH 1



CH 6



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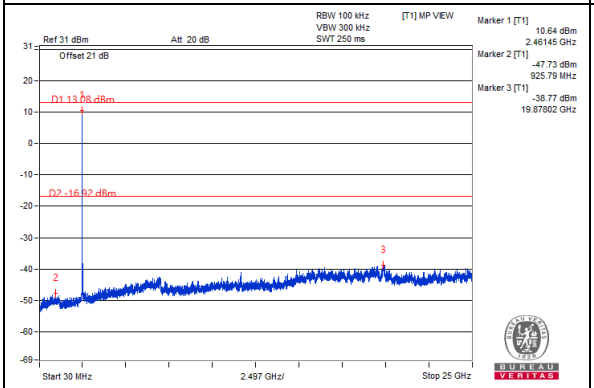
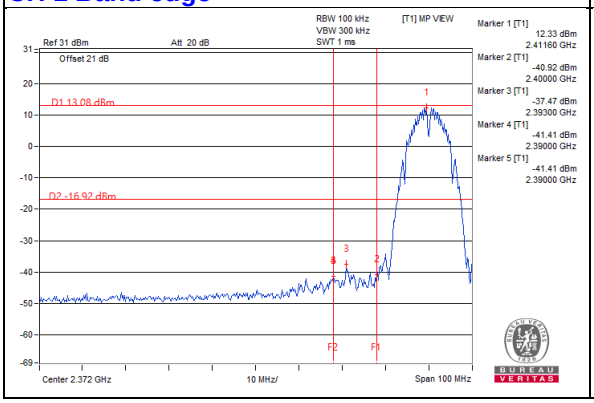


CH 1 Band edge



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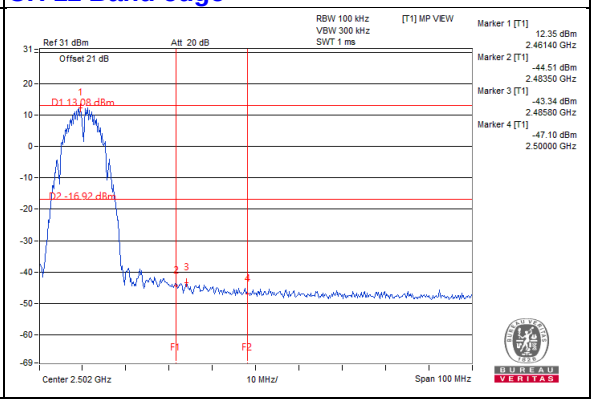
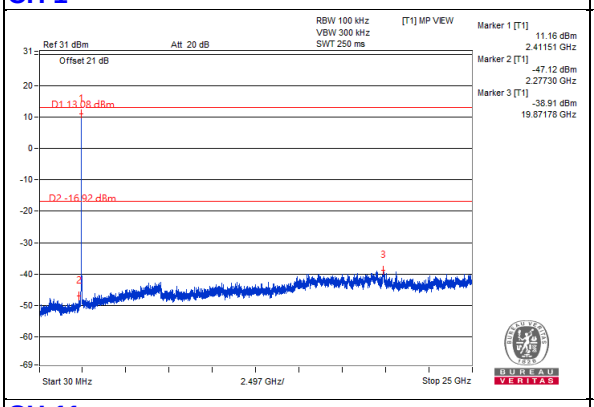
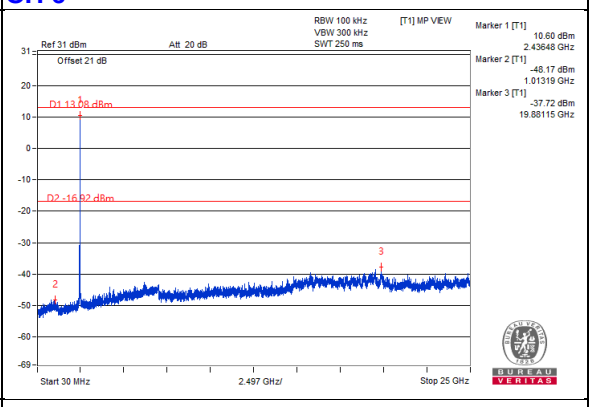


Chain 2

CH 1



CH 6



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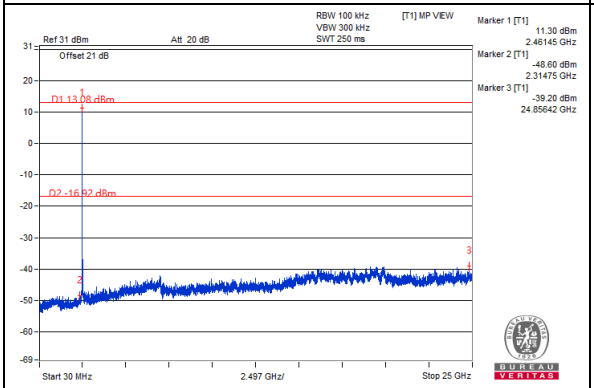

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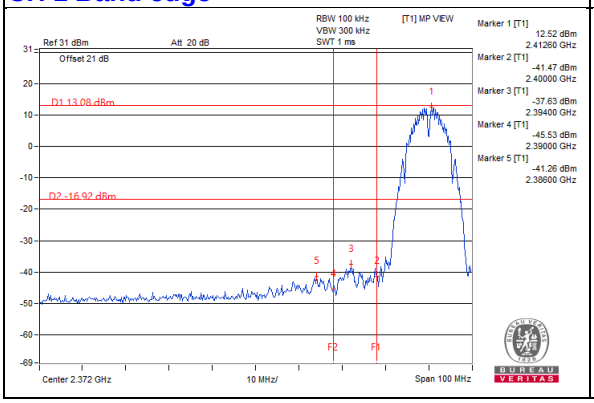

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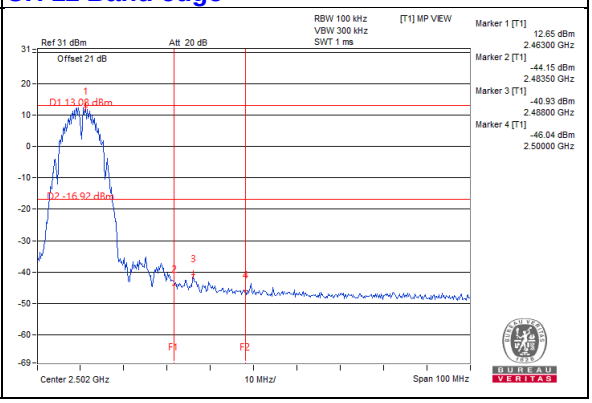
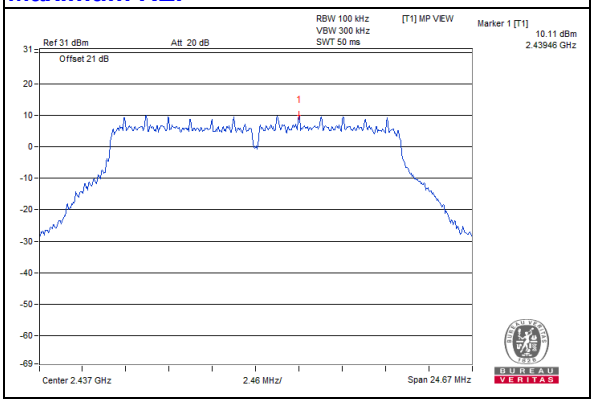


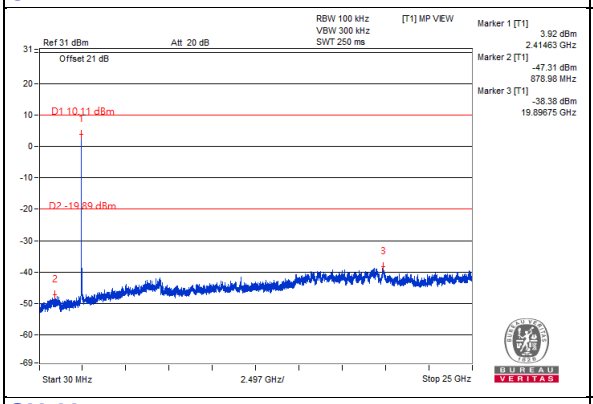
802.11g

Maximum REF

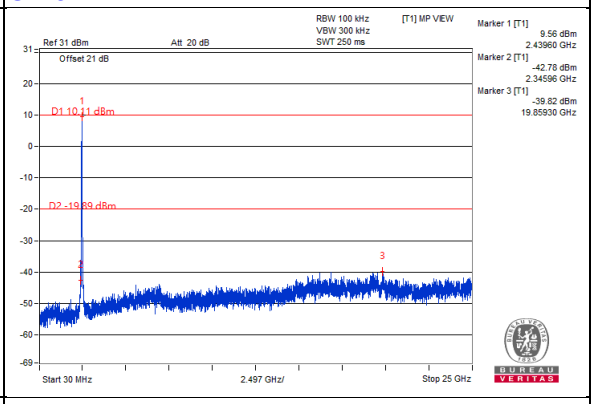


Chain 0

CH 1



CH 6



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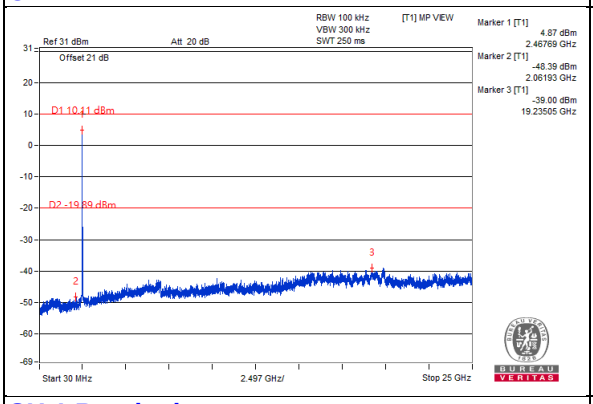

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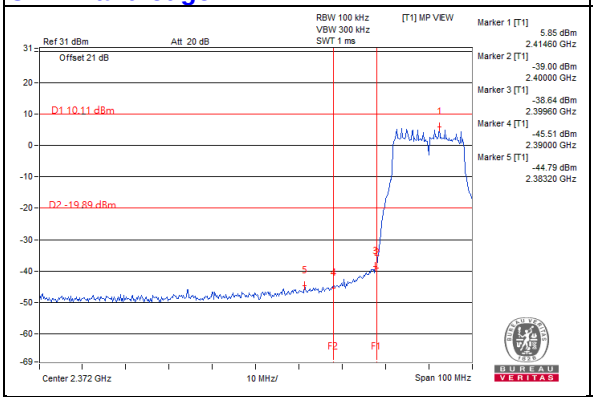

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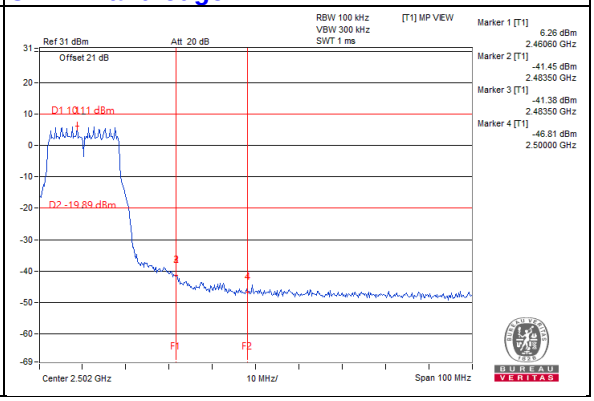
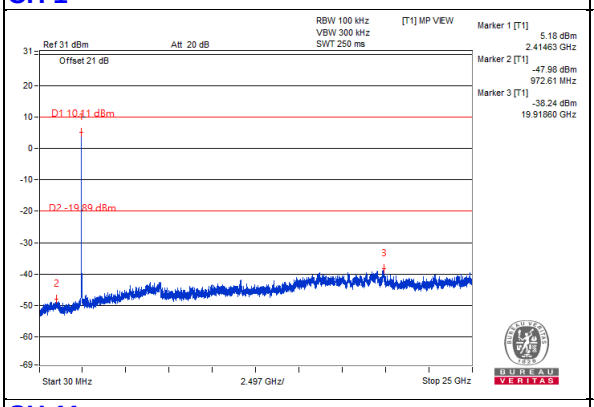


Chain 1

CH 1



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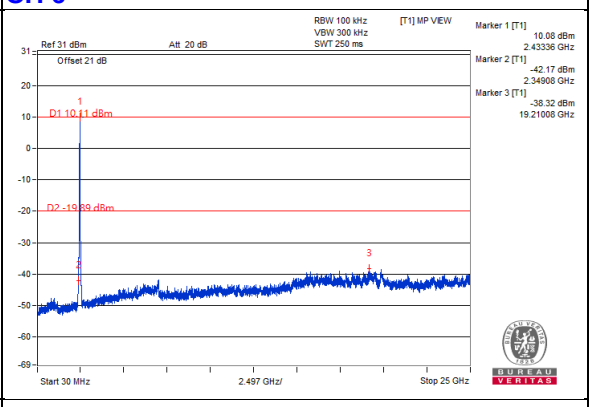

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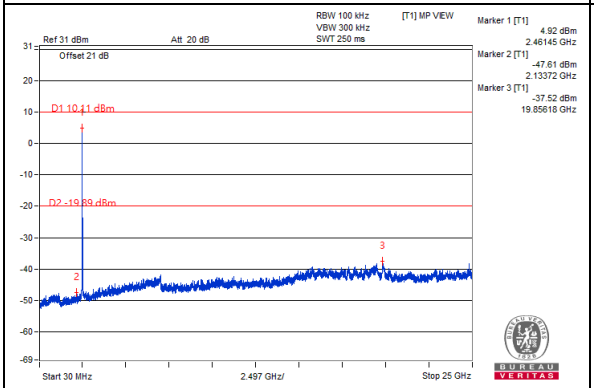

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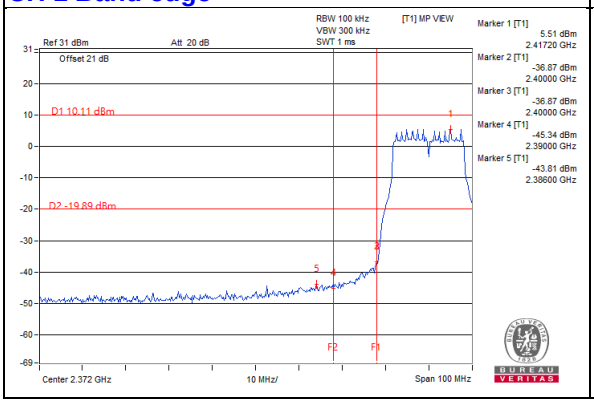

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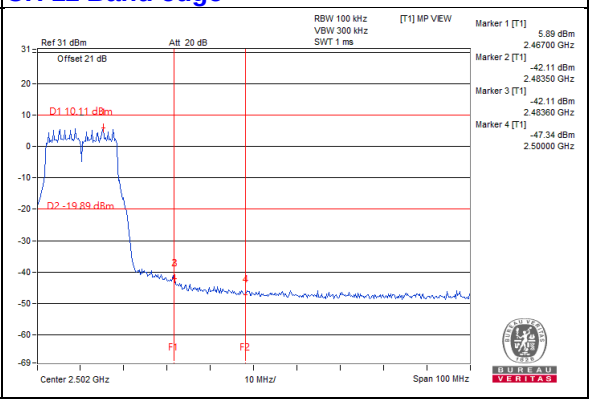
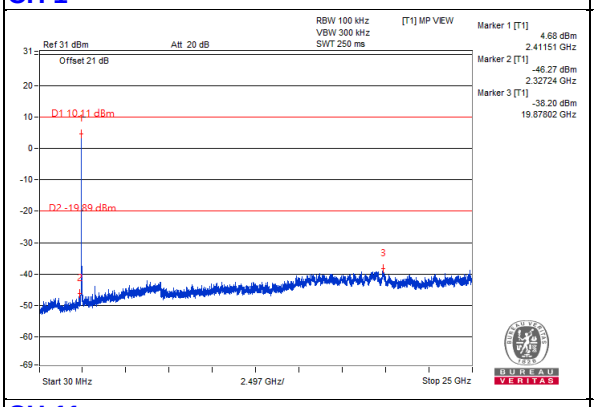


Chain 2

CH 1



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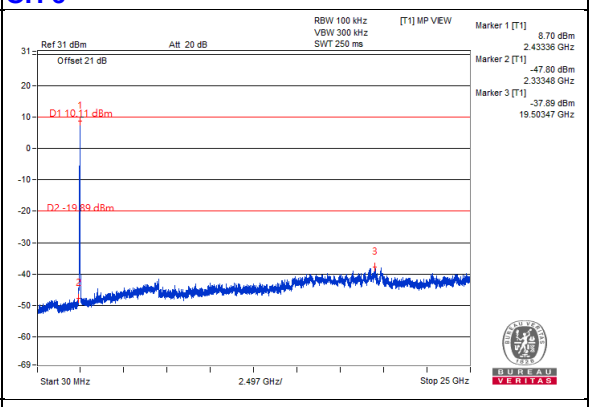

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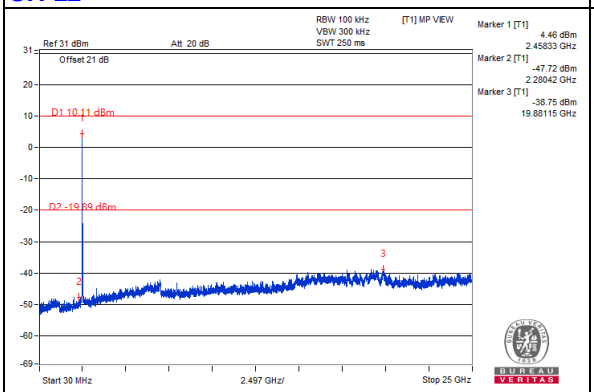

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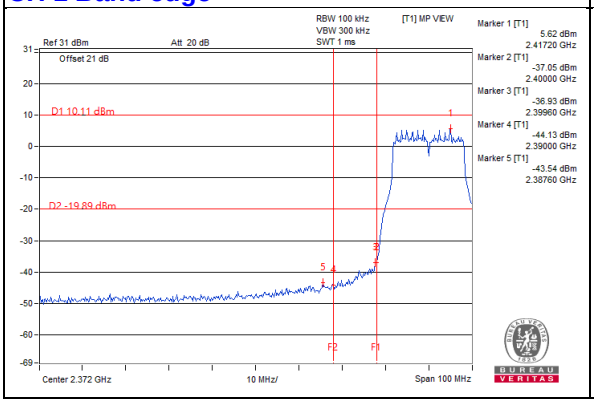
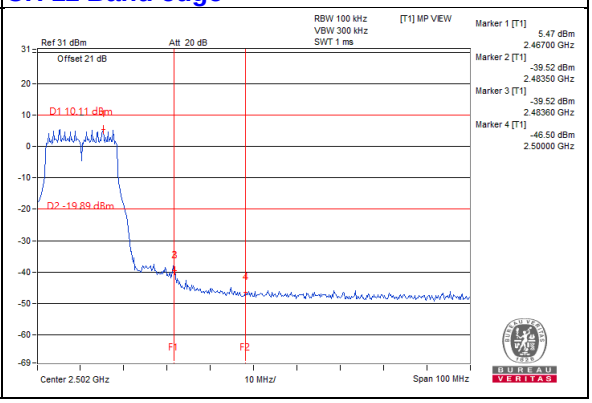
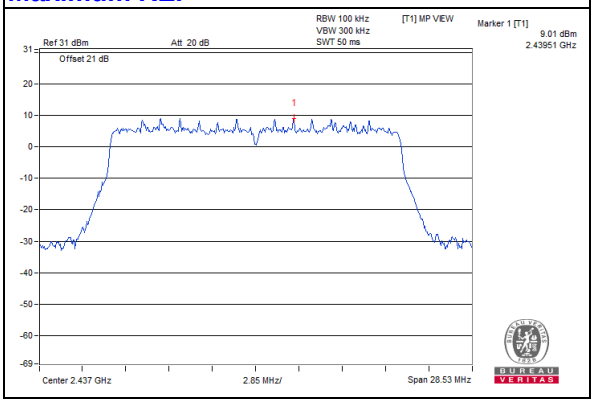


CH 11 Band edge



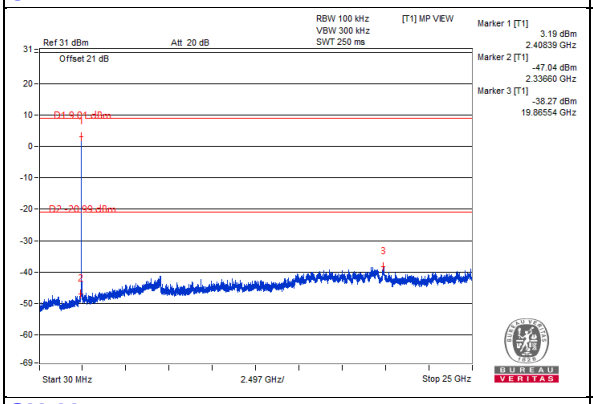
802.11ax (HE20)

Maximum REF

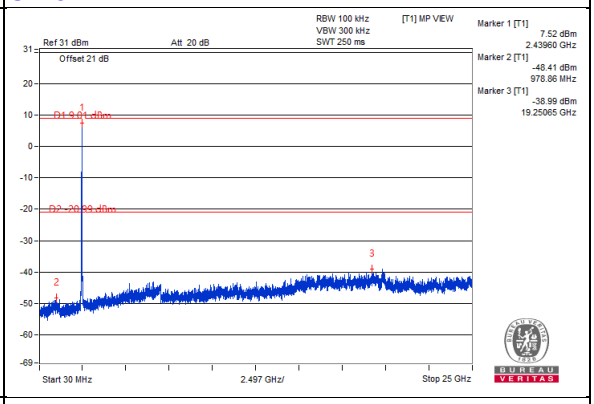


Chain 0

CH 1



CH 6



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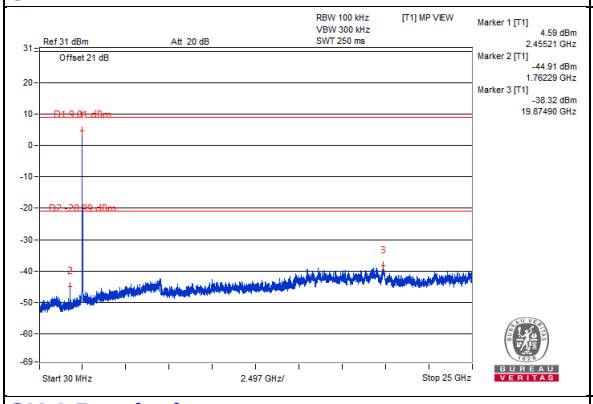
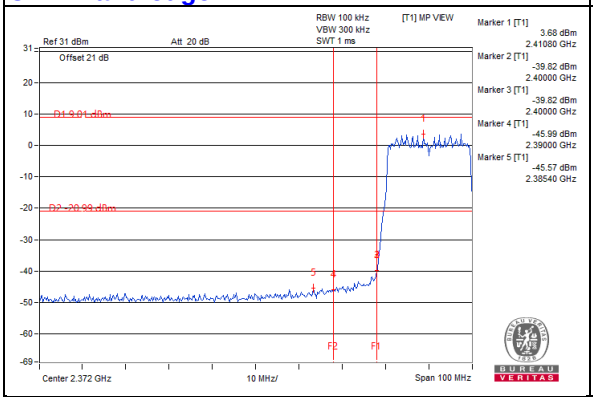
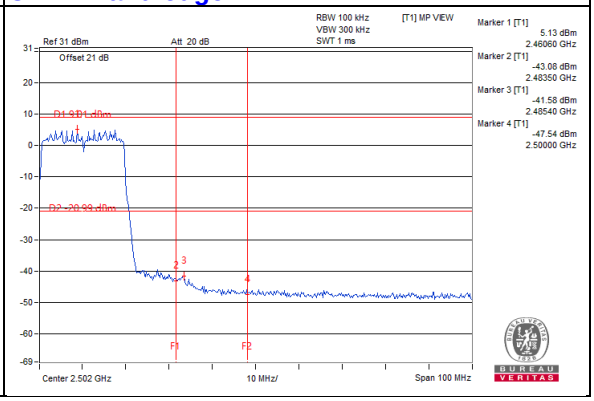


CH 1 Band edge

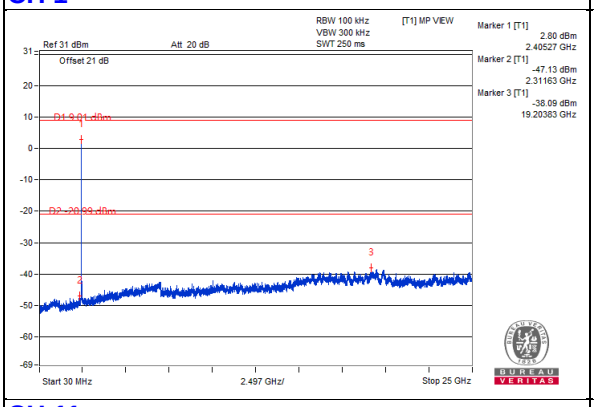


CH 11 Band edge

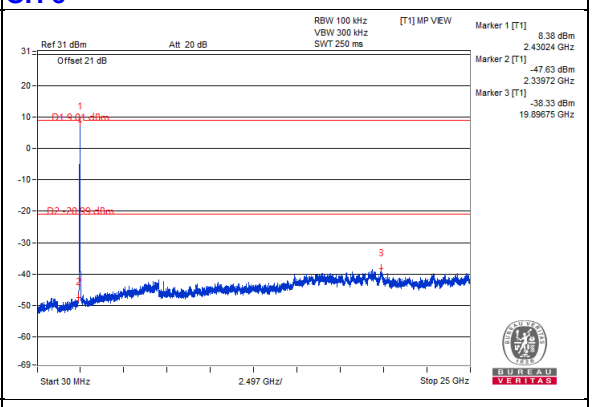


Chain 1

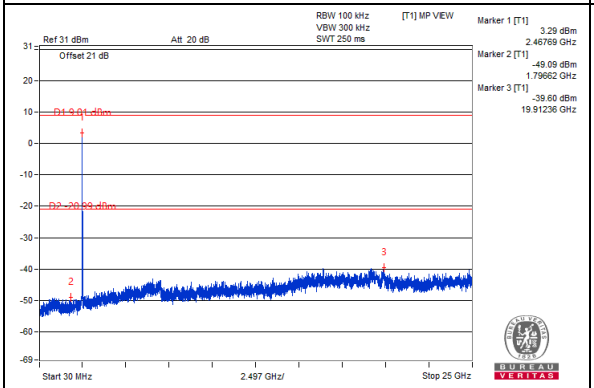
CH 1



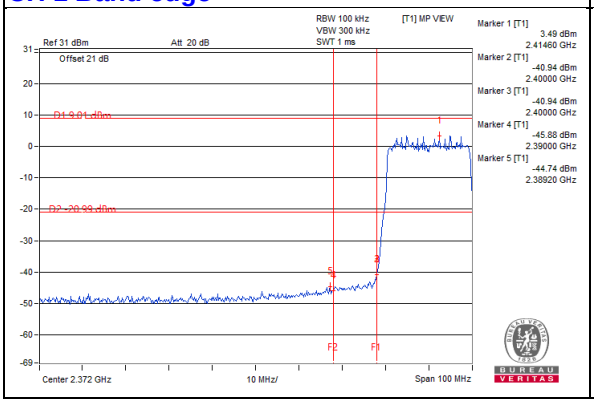
CH 6



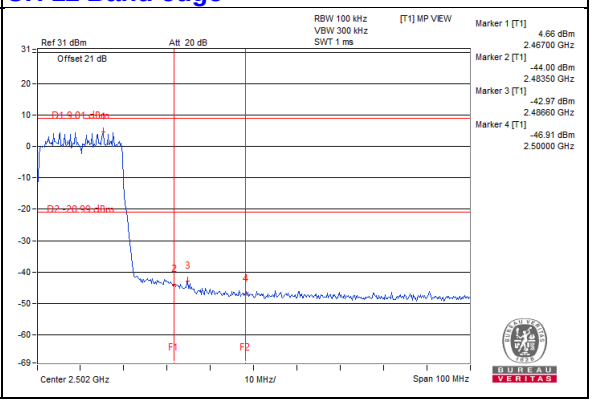
CH 11



CH 1 Band edge

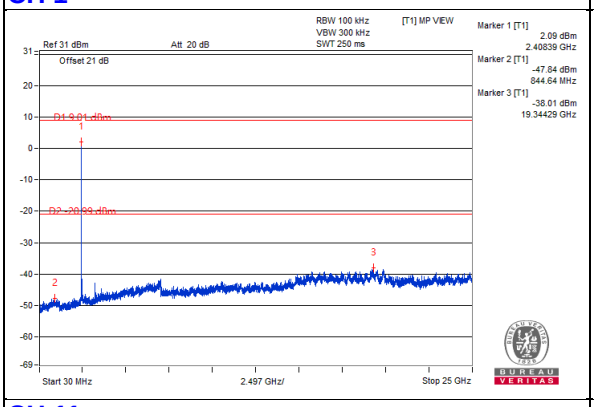


CH 11 Band edge

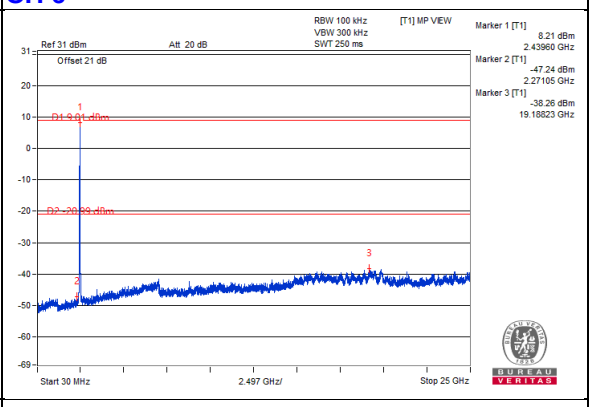


Chain 2

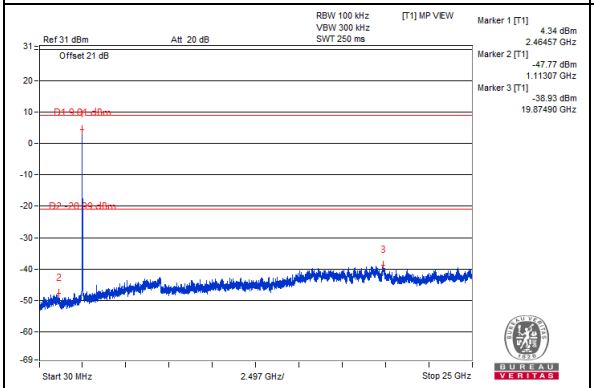
CH 1



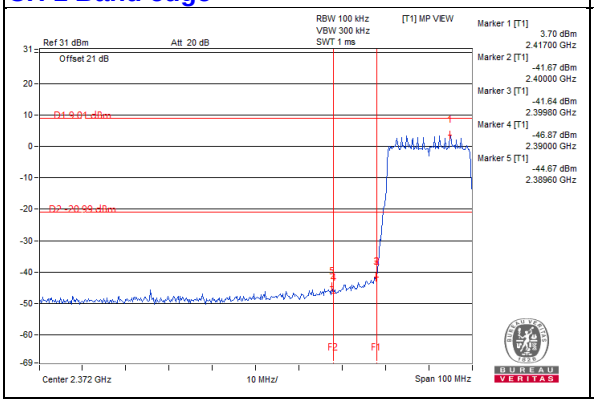
CH 6



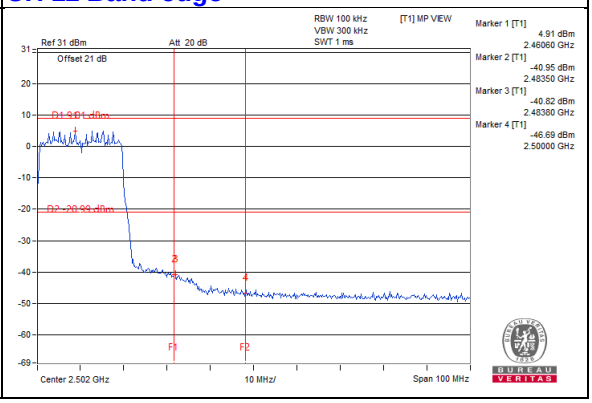
CH 11



CH 1 Band edge

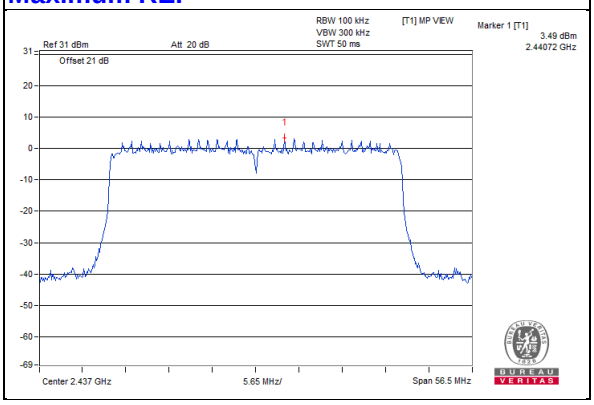


CH 11 Band edge



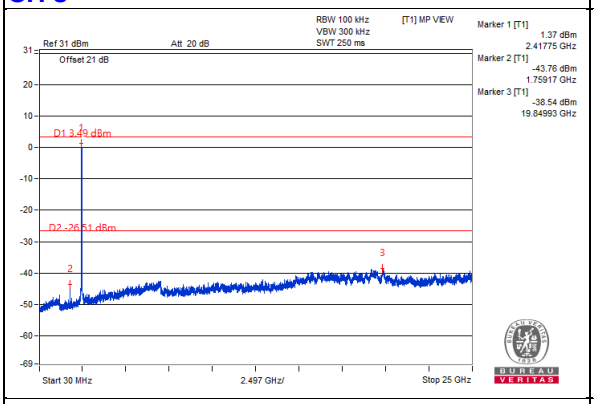
802.11ax (HE40)

Maximum REF

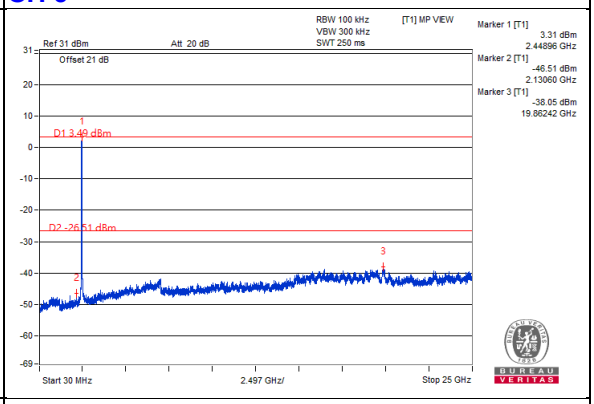


Chain 0

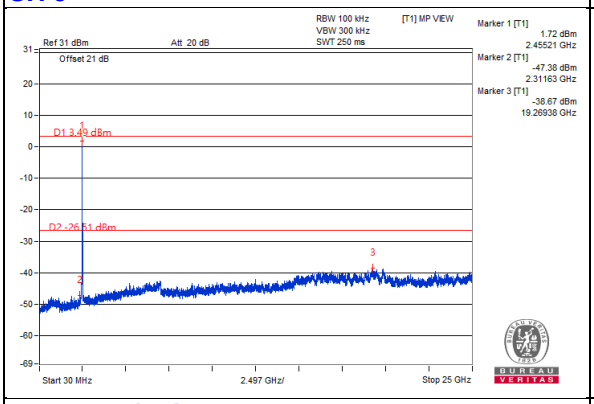
CH 3



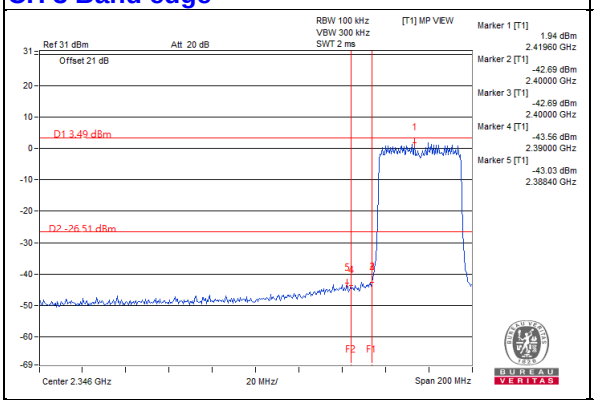
CH 6



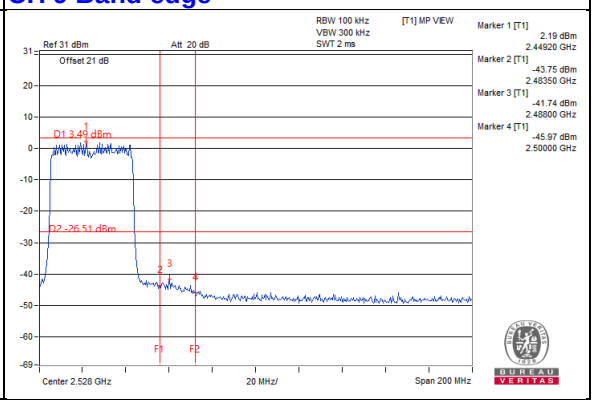
CH 9



CH 3 Band edge

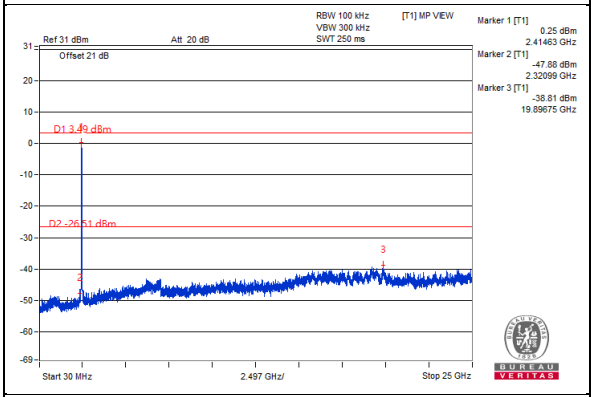


CH 9 Band edge

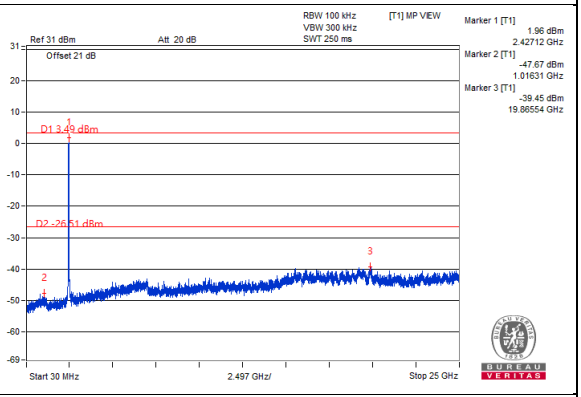


Chain 1

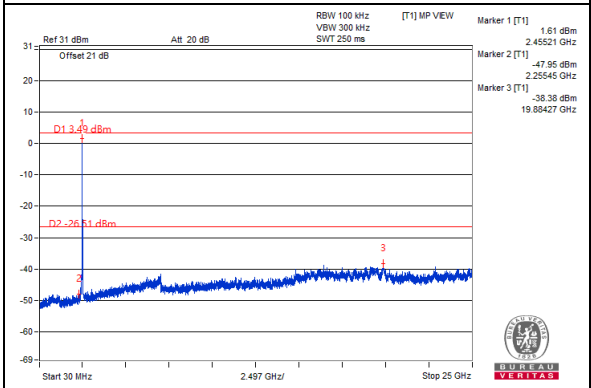
CH 3



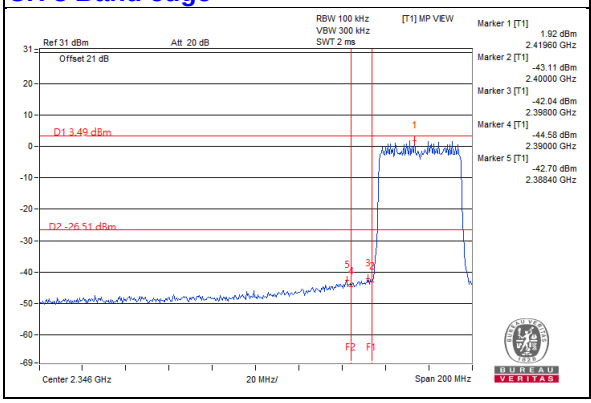
CH 6



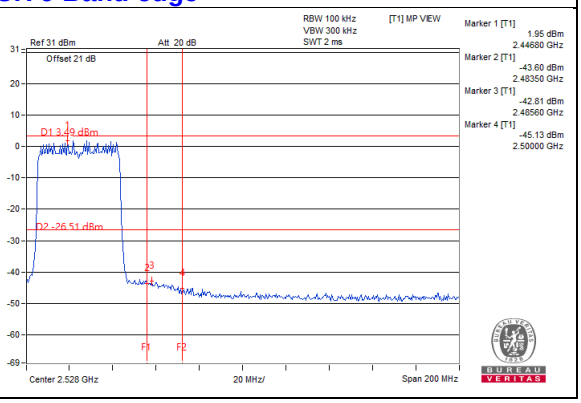
CH 9



CH 3 Band edge

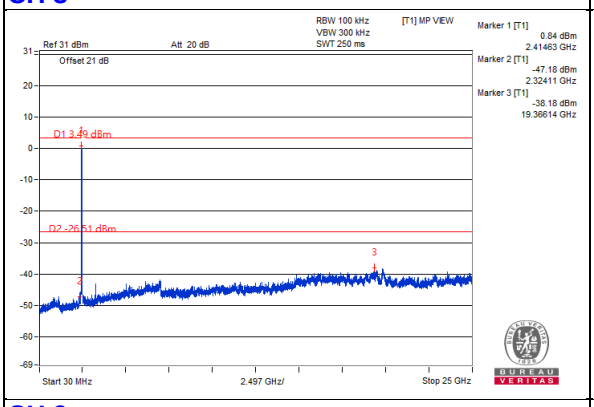


CH 9 Band edge

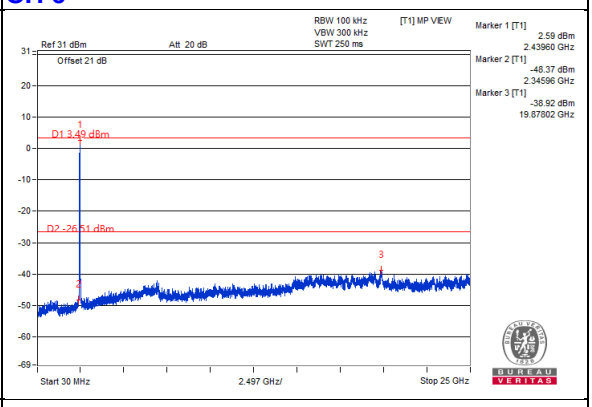


Chain 2

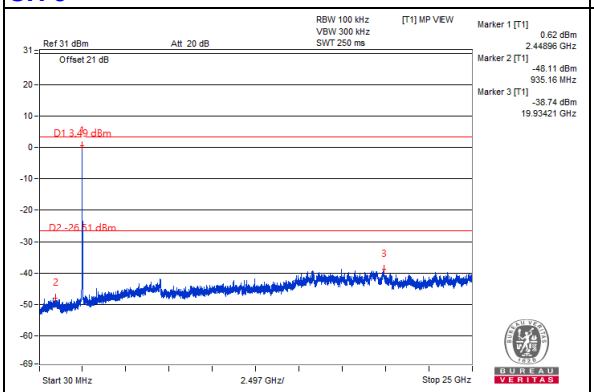
CH 3



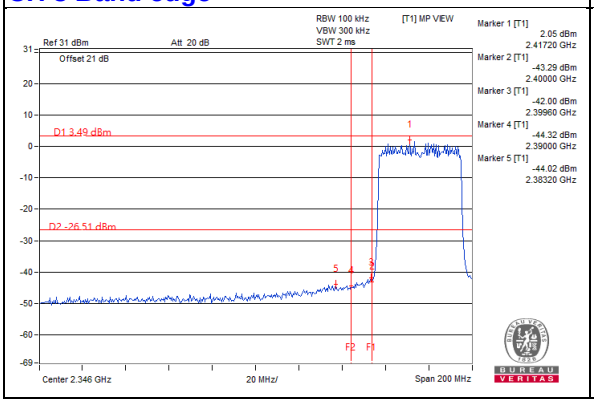
CH 6



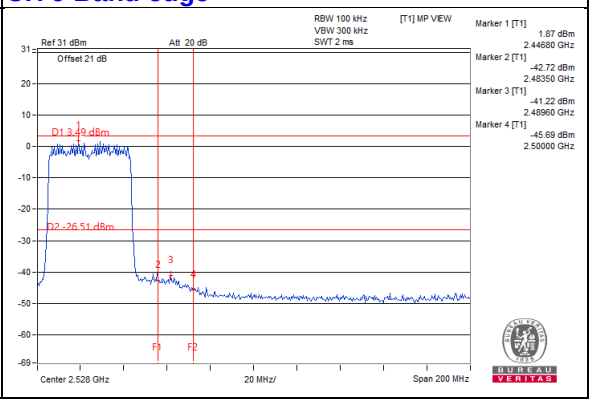
CH 9



CH 3 Band edge



CH 9 Band edge



5 Pictures of Test Arrangements

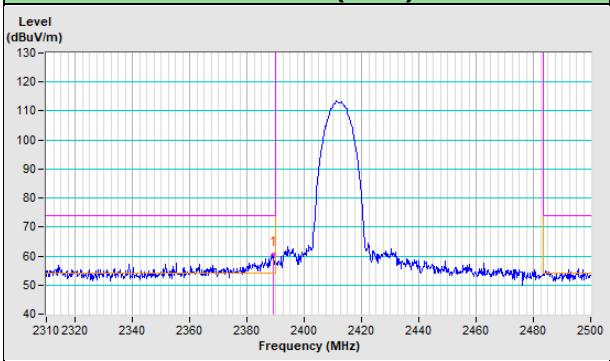
Please refer to the attached file (Test Setup Photo).

Annex A - Band-Edge Measurement

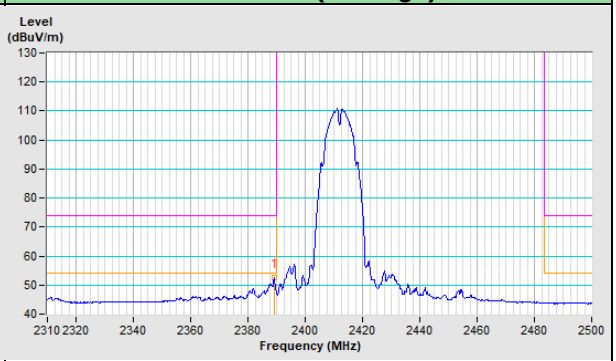
802.11b

Channel 1

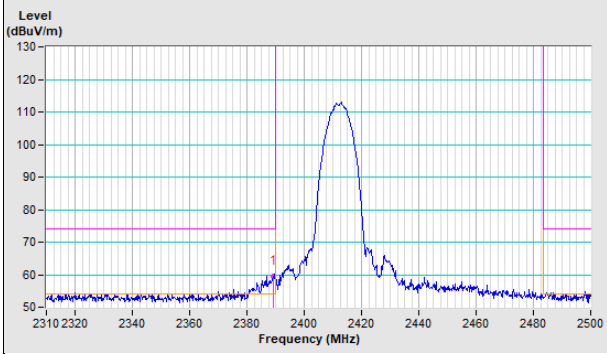
Horizontal (Peak)



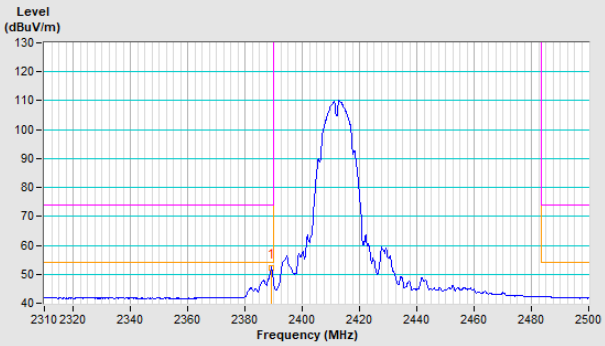
Horizontal (Average)



Vertical (Peak)

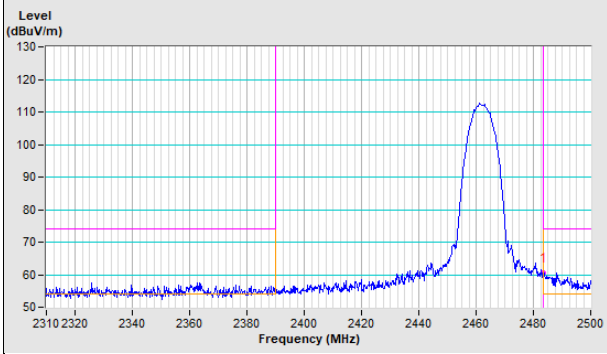


Vertical (Average)

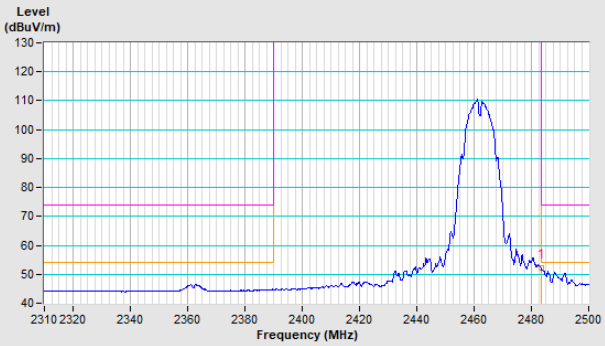


Channel 11

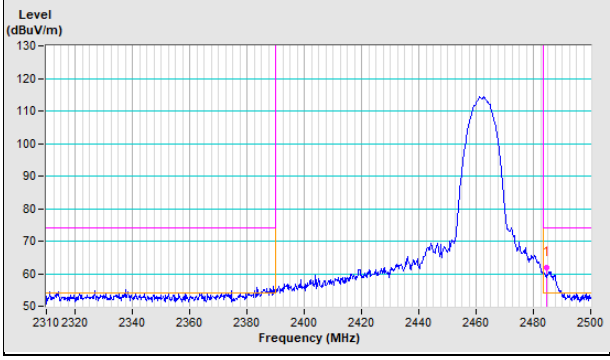
Horizontal (Peak)



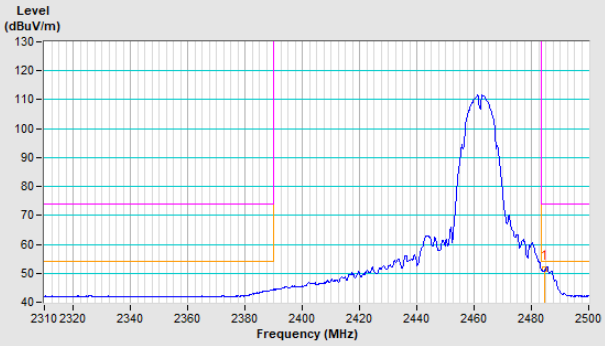
Horizontal (Average)



Vertical (Peak)



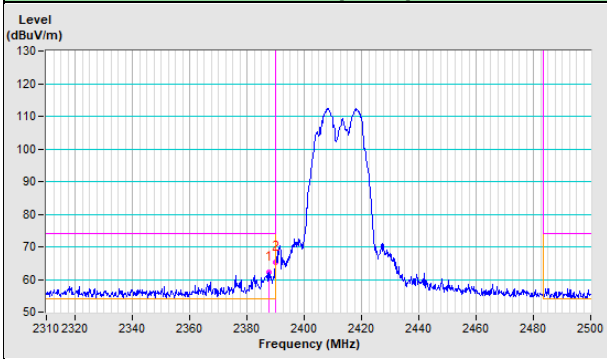
Vertical (Average)



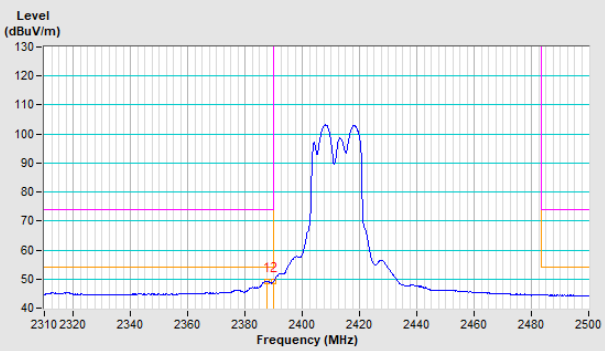
802.11g

Channel 1

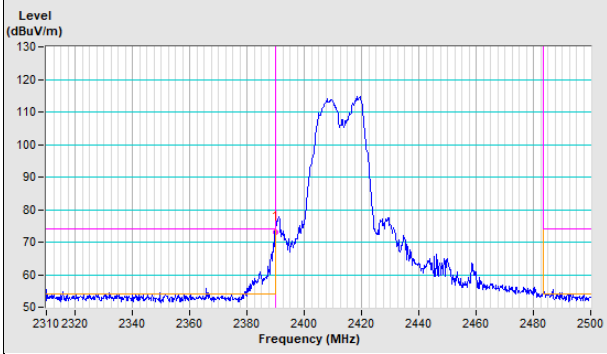
Horizontal (Peak)



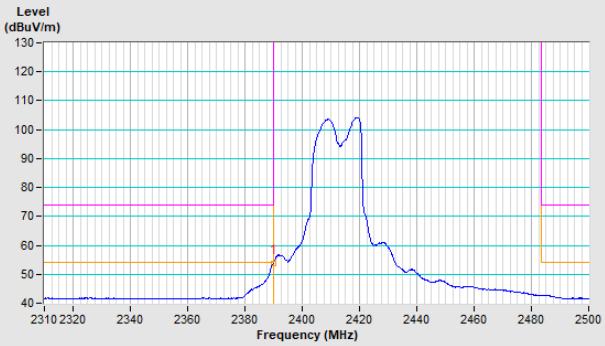
Horizontal (Average)



Vertical (Peak)

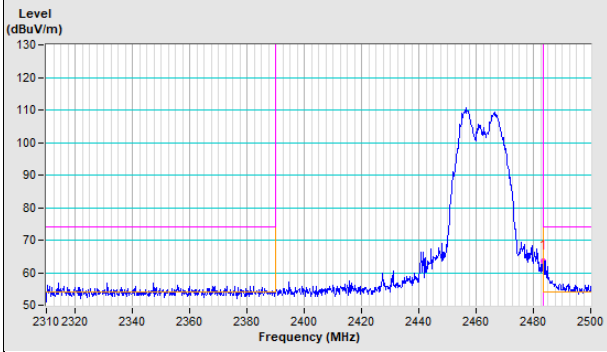


Vertical (Average)

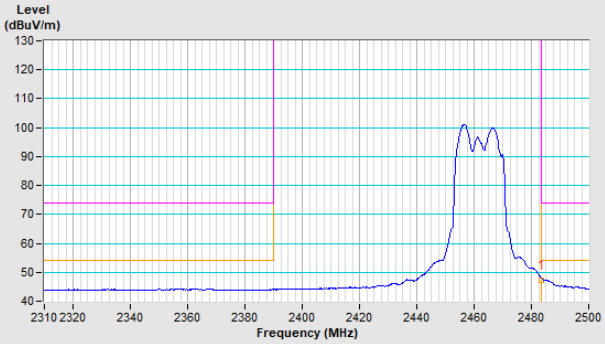


Channel 11

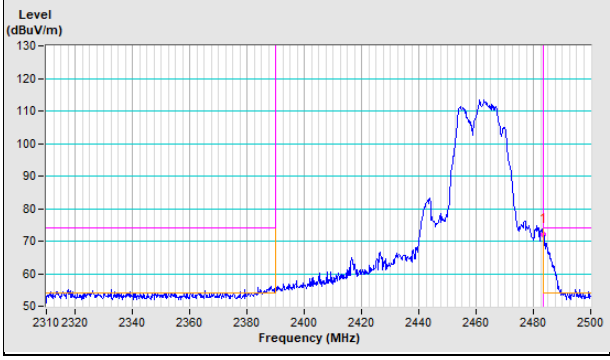
Horizontal (Peak)



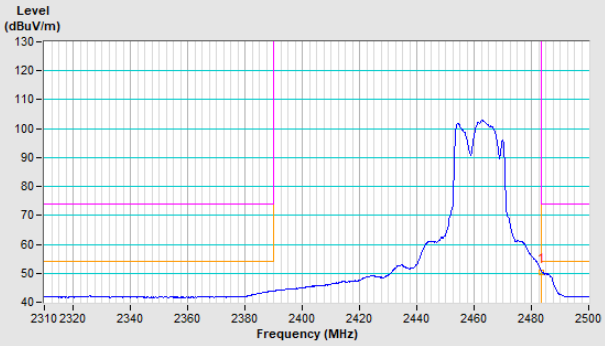
Horizontal (Average)



Vertical (Peak)



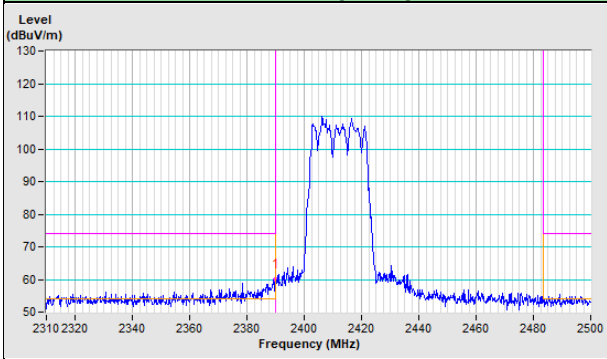
Vertical (Average)



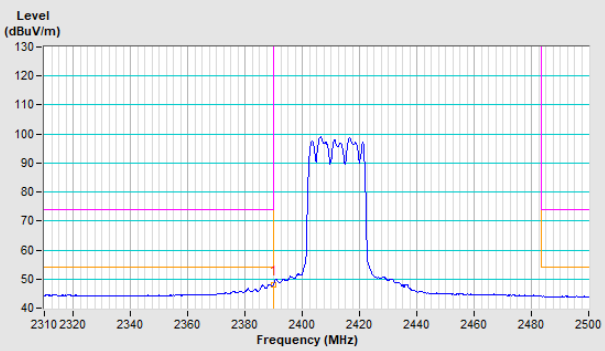
802.11ax (HE20)

Channel 1

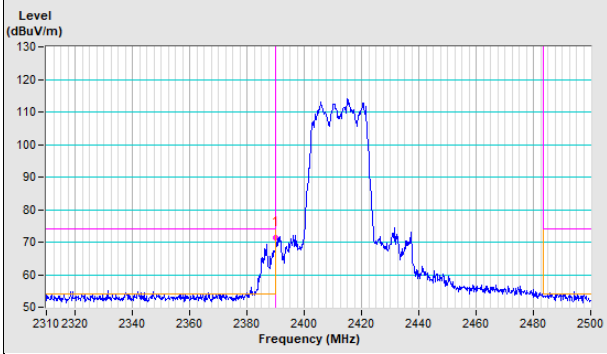
Horizontal (Peak)



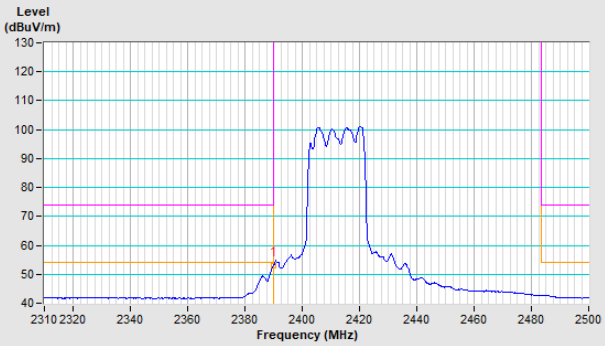
Horizontal (Average)



Vertical (Peak)

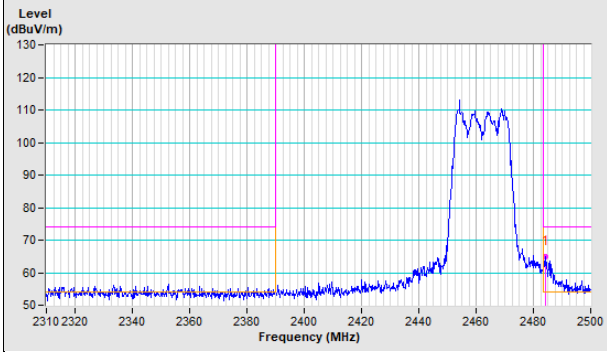


Vertical (Average)

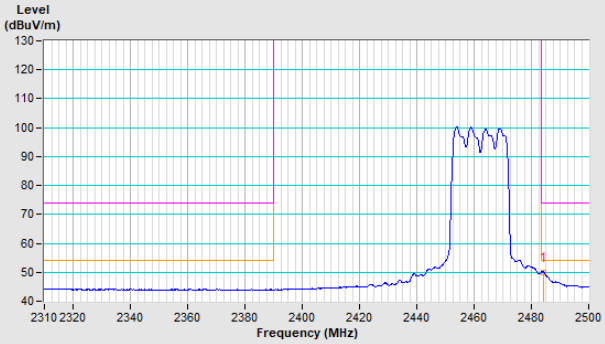


Channel 11

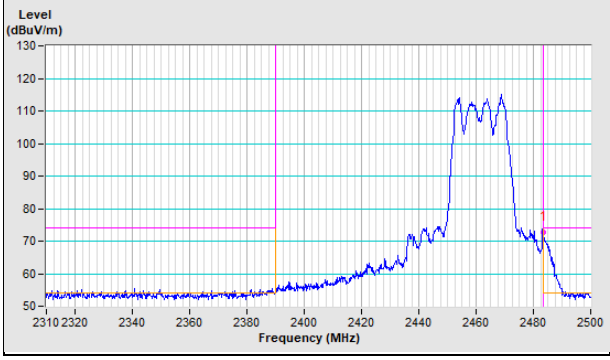
Horizontal (Peak)



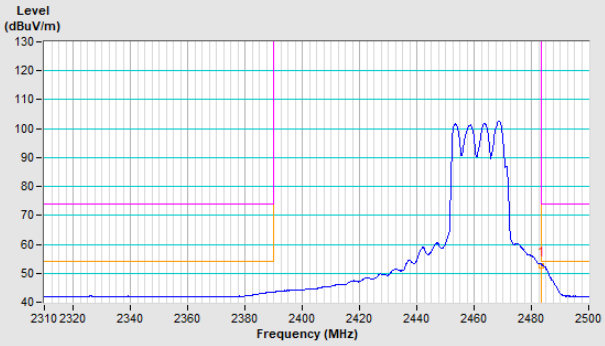
Horizontal (Average)



Vertical (Peak)



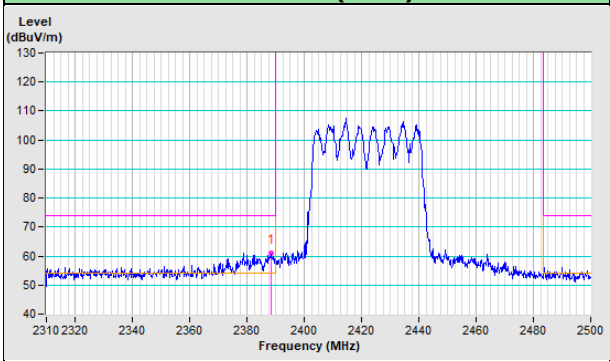
Vertical (Average)



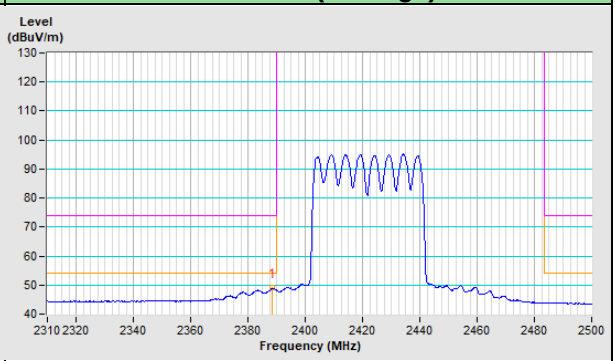
802.11ax (HE40)

Channel 3

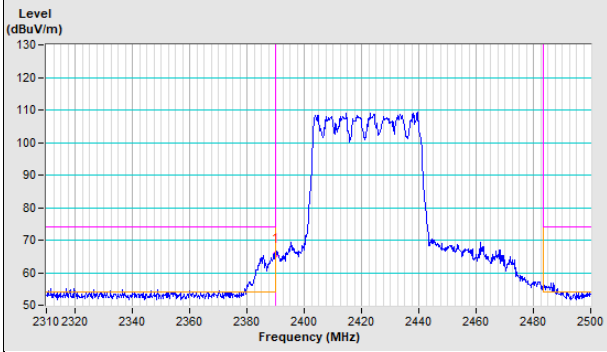
Horizontal (Peak)



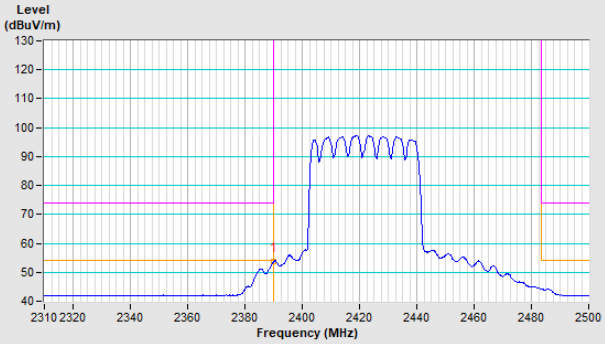
Horizontal (Average)



Vertical (Peak)

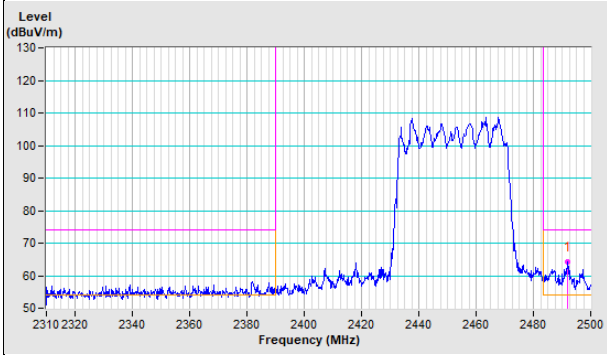


Vertical (Average)

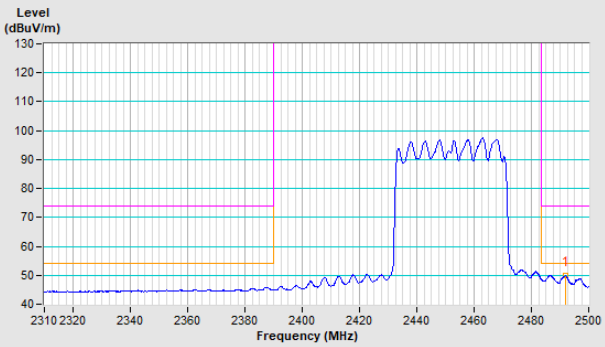


Channel 9

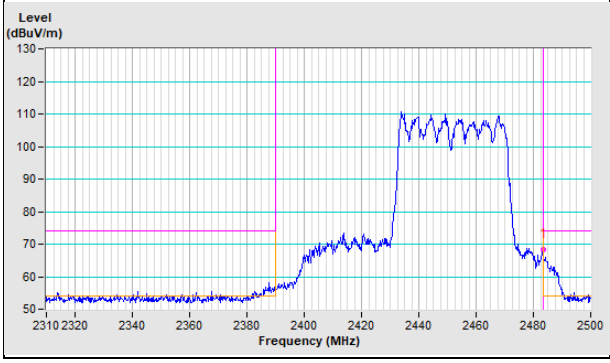
Horizontal (Peak)



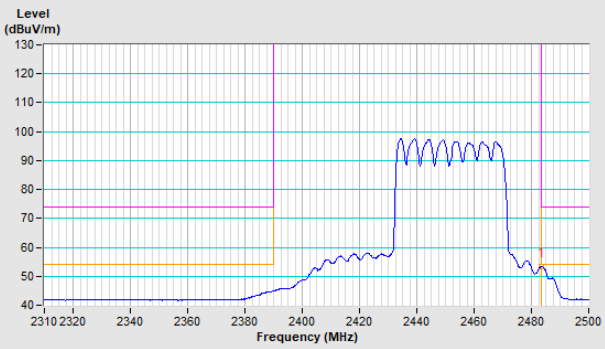
Horizontal (Average)



Vertical (Peak)



Vertical (Average)



Appendix – Information of the Testing Laboratories

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

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

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

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

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

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

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

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