Report No.:	RFBAOZ-WTW-P20090121
FCC ID:	2AHKM-HIVE2210
Test Model:	HIVE-2210
Received Date:	Sep. 04, 2020
Test Date:	Sep. 23 to Oct. 07, 2020
Issued Date:	Oct. 22, 2020
Applicant:	Hitron Technologies Inc.
Address:	No. 1-8, Li-Hsin 1st Rd., Hsinchu Science Park, Hsinchu 30078, Taiwan, R.O.C.
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
FCC Registration / Designation Number:	723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
RFBAOZ-WTW-P20090121	Original release.	Oct. 22, 2020

1 Certificate of Conformity

Product:	WiFi Extender
Brand:	hitron
Test Model:	HIVE-2210
Sample Status:	ENGINEERING SAMPLE
Applicant:	Hitron Technologies Inc.
Test Date:	Sep. 23 to Oct. 07, 2020
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10: 2013

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

Prepared by : Vivian Huang , **Date:** Oct. 22, 2020

Vivian Hunag / Specialist

Approved by : , **Date:** Oct. 22, 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 -3.85dB at 0.34141MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 2483.50MHz, 2384.44MHz, 2484.6MHz and 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	WiFi Extender
Brand	hitron
Test Model	HIVE-2210
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 300 Mbps 802.11ac: up to 866.7 Mbps 802.11ax: up to 1201.0 Mbps
Operating Frequency	**2.4GHz:** 2.412 ~ 2.462GHz **5GHz:** 5.18~5.24GHz, 5.745 ~ 5.825GHz
Number of Channel	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20), VHT20, 80211ax (HE20): 11 802.11n (HT40), VHT40, 80211ax (HE40): 7 **5GHz:** 802.11a, 802.11n (HT20), 802.11ac (VHT20), 80211ax (HE20): 9 802.11n (HT40), 802.11ac (VHT40), 80211ax (HE40): 4 802.11ac (VHT80), 80211ax (HE80): 2
Output Power	**CDD Mode:** **2.412 ~ 2.462 GHz:** 912.141 mW **5.18 ~ 5.24 GHz:** Master: 735.268 mW Client: 235.285 mW **5.745 ~ 5.825 GHz:** 664.858 mW **Beamforming Mode:** **2.412 ~ 2.462 GHz:** 686.38 mW **5.18 ~ 5.24 GHz:** Master: 651.514 mW Client: 208.804 mW **5.745 ~ 5.825 GHz:** 659.305 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x1
Data Cable Supplied	NA

Note:

1. There are WLAN and Bluetooth technology used for the EUT. The EUT has three radios as following table:

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

2. Simultaneously transmission condition.

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

3. The EUT must be supplied with a power adapter:

No.	Brand	Model No.	Spec.
1	UNIVERSAL MICROELECTRONICS CO., LTD.	UP0181M-12PA	Input: 100-240Vac, 0.4A, 50/60Hz Output: 12Vdc, 1.5A 18W DC Output cable: Unshielded, 1.2m

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

Antenna NO.	Chain No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type	Cable Length (mm)
WiFi 2.4G	1	ALPHA	RFPCA252007IMAB301	3.5	2.4~2.4835GHz	PIFA	i-pex(MHF)	7
	2		RFPCA252023IMAB301	2.7	2.4~2.4835GHz			23.5
WiFi 5G	1		RFPCA251812IM5B302	4	5.15~5.85GHz			12
	2		RFPCA251817IM5B301	3.5	5.15~5.85GHz			18
BT	-		RFPCA252019IMAB302	2.8	2.4~2.4835GHz			19

5. The EUT incorporates a MIMO function:

2.4GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11b	2TX	2RX
802.11g	2TX	2RX
802.11n (HT20)	2TX	2RX
802.11n (HT40)	2TX	2RX
VHT20	2TX	2RX
VHT40	2TX	2RX
802.11ax (HE20)	2TX	2RX
802.11ax (HE40)	2TX	2RX
5GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11a	2TX	2RX
802.11n (HT20)	2TX	2RX
802.11n (HT40)	2TX	2RX
802.11ac (VHT20)	2TX	2RX
802.11ac (VHT40)	2TX	2RX
802.11ac (VHT80)	2TX	2RX
802.11ax (HE20)	2TX	2RX
802.11ax (HE40)	2TX	2RX
802.11ax (HE80)	2TX	2RX

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

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

3.2 Description of Test Modes

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

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

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

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

3.2.1 Test Mode Applicability and Tested Channel Detail

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

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

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

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

Radiated Emission Test (Above 1GHz):

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

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

CDD Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	Data Rate Parameter
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	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
802.11b	1 to 11	1	DSSS	DBPSK	1Mb/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
802.11b	1 to 11	1	DSSS	DBPSK	1Mb/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:

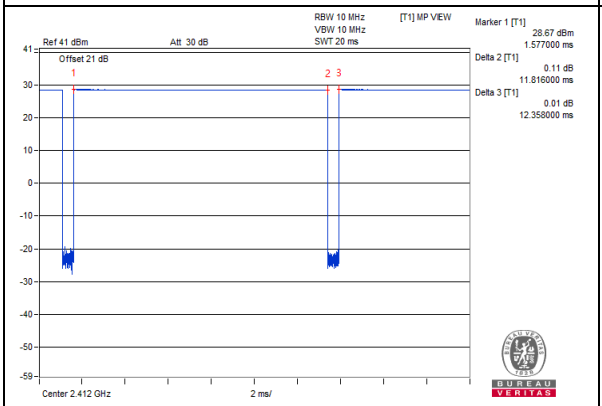
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 68%RH	120Vac, 60Hz	Ryan Du
RE<1G	25deg. C, 67%RH	120Vac, 60Hz	Tom Yang
PLC	25deg. C, 64%RH	120Vac, 60Hz	Sampson Chen
APCM	25deg. C, 60%RH	120Vac, 60Hz	Kevin Ko

3.3 Duty Cycle of Test Signal

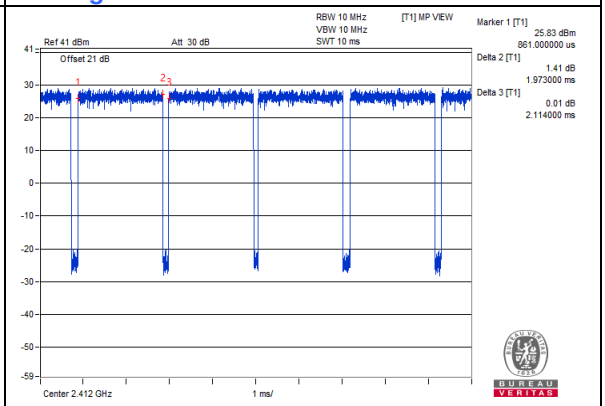
Duty cycle of test signal is < 98 %, duty factor shall be considered.

802.11b: Duty cycle = 11.816 ms /12.358 ms=0.956, Duty factor = 10 * log (1/Duty cycle) = 0.19 dB
802.11g: Duty cycle = 1.973 ms /2.114 ms=0.933, Duty factor = 10 * log (1/Duty cycle) = 0.30 dB
802.11ax (HE20): Duty cycle = 5.44 ms /5.693 ms=0.956, Duty factor = 10 * log (1/Duty cycle) = 0.20 dB
802.11ax (HE40): Duty cycle = 5.435 ms /5.693 ms=0.955, Duty factor = 10 * log (1/Duty cycle) = 0.20 dB

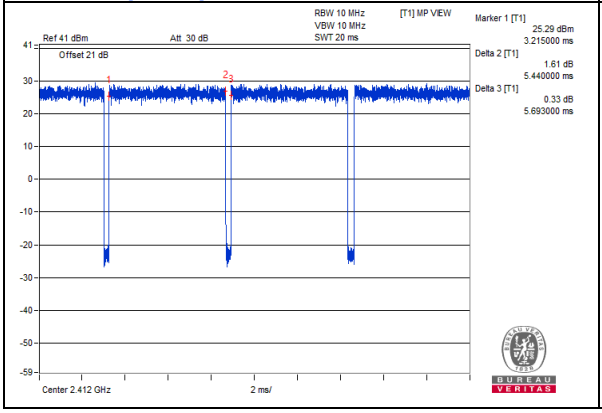
802.11b



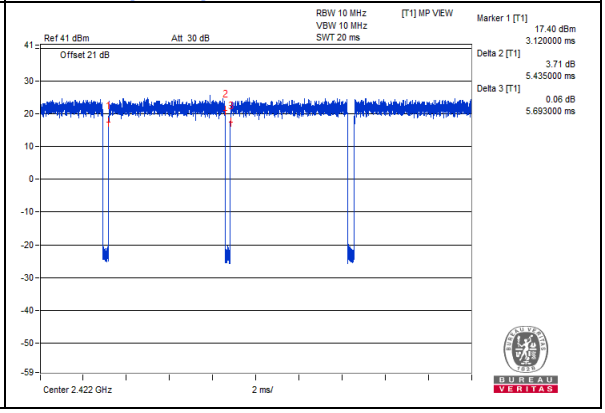
802.11g



802.11ax (HE20)



802.11ax (HE40)



3.4 Description of Support Units

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

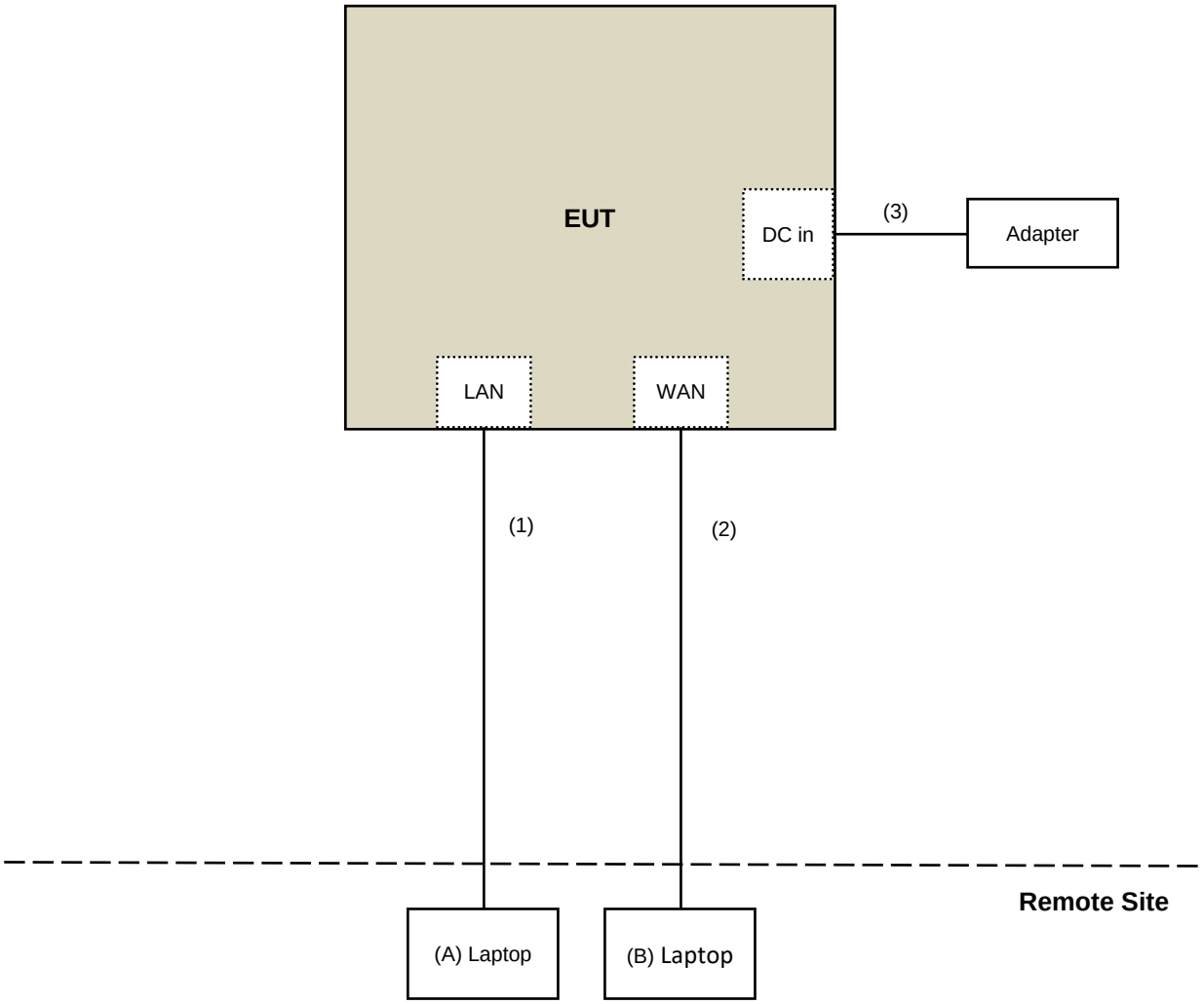
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	Dell	E5430	HYV4VY1	FCC DoC	Provided by Lab
B.	Laptop	Dell	E6420	B92T3R1	FCC DoC	Provided by Lab

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.	RJ-45 Cable	1	10	No	0	Provided by Lab
2.	RJ-45 Cable	1	10	No	0	Provided by Lab
3.	DC Cable	1	1.2	No	0	Supplied by client

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. 07, 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-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: Sep. 23 to 25, 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. 07, 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:

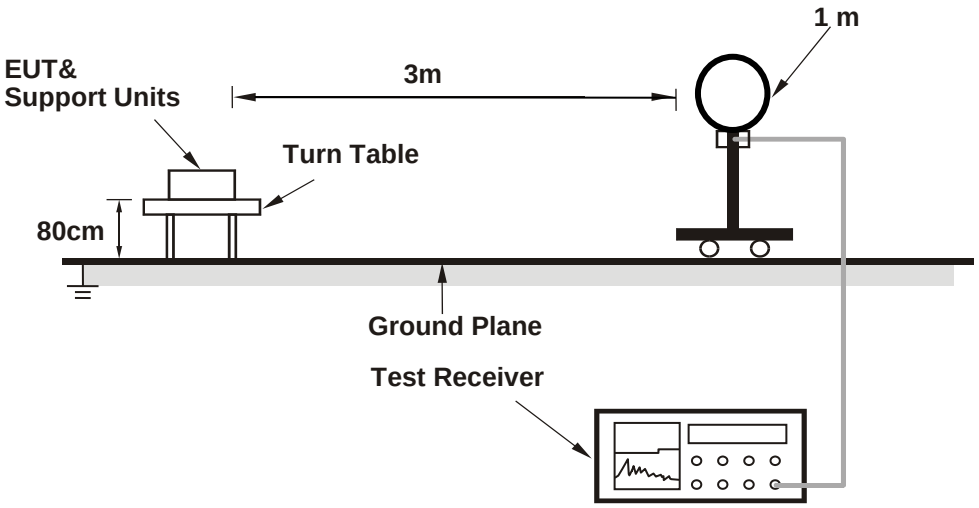
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

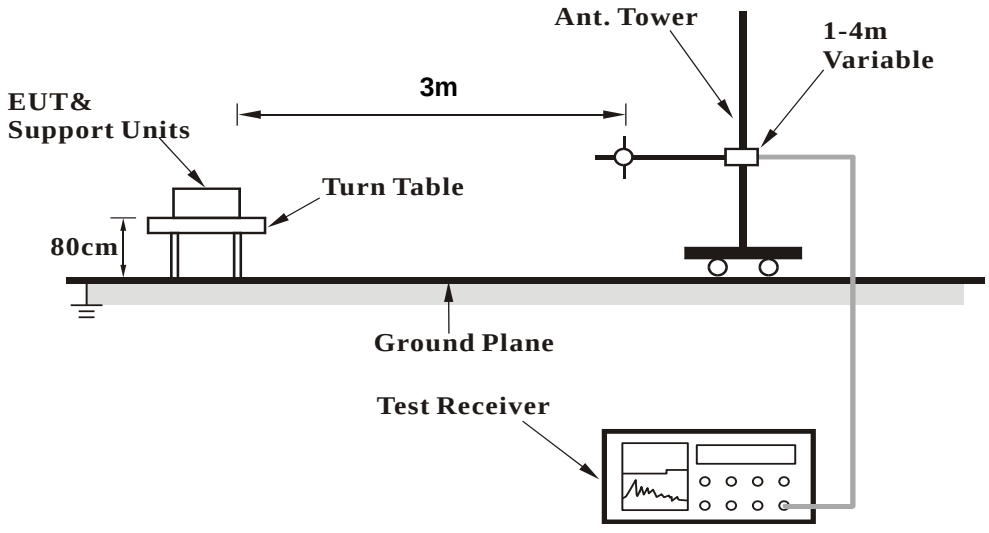
No deviation.

4.1.5 Test Setup

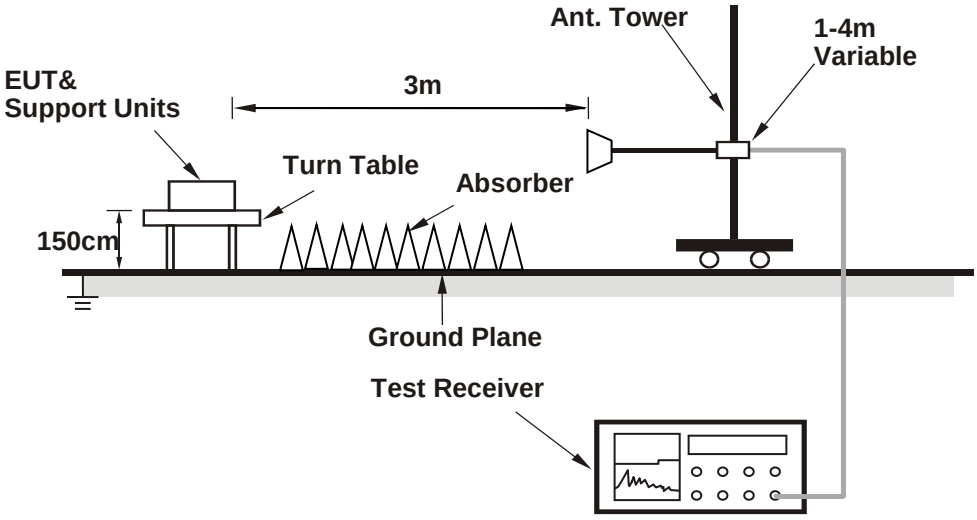
For Radiated emission below 30MHz



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 (AX14_Tx_Rx_CONTROL_V1.2.exe) has been activated to set the EUT under transmission condition continuously at specific channel frenquency.

4.1.7 Test Results

Above 1GHz Data：

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	2385.27	56.4 PK	74.0	-17.6	1.00 H	322	58.0	-1.6
2	2385.27	45.7 AV	54.0	-8.3	1.00 H	322	47.3	-1.6
3	*2412.00	112.8 PK			1.00 H	322	114.4	-1.6
4	*2412.00	110.3 AV			1.00 H	322	111.9	-1.6
5	4824.00	37.6 PK	74.0	-36.4	2.61 H	119	34.4	3.2
6	4824.00	26.3 AV	54.0	-27.7	2.61 H	119	23.1	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	2385.19	59.5 PK	74.0	-14.5	1.00 V	299	61.1	-1.6
2	2385.19	51.4 AV	54.0	-2.6	1.00 V	299	53.0	-1.6
3	*2412.00	118.6 PK			1.00 V	299	120.2	-1.6
4	*2412.00	116.2 AV			1.00 V	299	117.8	-1.6
5	4824.00	36.7 PK	74.0	-37.3	1.73 V	175	33.5	3.2
6	4824.00	25.4 AV	54.0	-28.6	1.73 V	175	22.2	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	54.9 PK	74.0	-19.1	1.05 H	307	56.5	-1.6
2	2390.00	42.3 AV	54.0	-11.7	1.05 H	307	43.9	-1.6
3	*2437.00	113.1 PK			1.05 H	307	114.7	-1.6
4	*2437.00	110.8 AV			1.05 H	307	112.4	-1.6
5	2483.50	56.6 PK	74.0	-17.4	1.05 H	307	58.2	-1.6
6	2483.50	43.4 AV	54.0	-10.6	1.05 H	307	45.0	-1.6
7	4874.00	36.9 PK	74.0	-37.1	2.62 H	104	33.7	3.2
8	4874.00	25.8 AV	54.0	-28.2	2.62 H	104	22.6	3.2
9	7311.00	43.3 PK	74.0	-30.7	1.83 H	91	33.9	9.4
10	7311.00	31.1 AV	54.0	-22.9	1.83 H	91	21.7	9.4
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	55.4 PK	74.0	-18.6	1.27 V	307	57.0	-1.6
2	2390.00	42.7 AV	54.0	-11.3	1.27 V	307	44.3	-1.6
3	*2437.00	119.7 PK			1.27 V	307	121.3	-1.6
4	*2437.00	117.1 AV			1.27 V	307	118.7	-1.6
5	2483.50	56.8 PK	74.0	-17.2	1.27 V	307	58.4	-1.6
6	2483.50	43.7 AV	54.0	-10.3	1.27 V	307	45.3	-1.6
7	4874.00	37.6 PK	74.0	-36.4	1.66 V	183	34.4	3.2
8	4874.00	26.1 AV	54.0	-27.9	1.66 V	183	22.9	3.2
9	7311.00	44.3 PK	74.0	-29.7	2.09 V	73	34.9	9.4
10	7311.00	31.7 AV	54.0	-22.3	2.09 V	73	22.3	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	114.3 PK			1.17 H	340	115.9	-1.6
2	*2462.00	110.7 AV			1.17 H	340	112.3	-1.6
3	2483.50	54.7 PK	74.0	-19.3	1.17 H	340	56.3	-1.6
4	2483.50	44.3 AV	54.0	-9.7	1.17 H	340	45.9	-1.6
5	4924.00	37.0 PK	74.0	-37.0	2.61 H	118	33.9	3.1
6	4924.00	25.8 AV	54.0	-28.2	2.61 H	118	22.7	3.1
7	7386.00	43.7 PK	74.0	-30.3	1.80 H	88	34.0	9.7
8	7386.00	31.4 AV	54.0	-22.6	1.80 H	88	21.7	9.7
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	117.5 PK			1.00 V	308	119.1	-1.6
2	*2462.00	115.1 AV			1.00 V	308	116.7	-1.6
3	2488.68	56.8 PK	74.0	-17.2	1.00 V	308	58.4	-1.6
4	2488.68	45.2 AV	54.0	-8.8	1.00 V	308	46.8	-1.6
5	4924.00	37.1 PK	74.0	-36.9	1.71 V	180	34.0	3.1
6	4924.00	25.6 AV	54.0	-28.4	1.71 V	180	22.5	3.1
7	7386.00	44.0 PK	74.0	-30.0	2.09 V	88	34.3	9.7
8	7386.00	31.5 AV	54.0	-22.5	2.09 V	88	21.8	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.

802.11g

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	61.0 PK	74.0	-13.0	3.98 H	107	62.6	-1.6
2	2390.00	50.8 AV	54.0	-3.2	3.98 H	107	52.4	-1.6
3	*2412.00	117.4 PK			3.98 H	107	119.0	-1.6
4	*2412.00	108.1 AV			3.98 H	107	109.7	-1.6
5	4824.00	37.3 PK	74.0	-36.7	2.63 H	103	34.1	3.2
6	4824.00	26.0 AV	54.0	-28.0	2.63 H	103	22.8	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	2388.80	62.9 PK	74.0	-11.1	1.21 V	291	64.5	-1.6
2	2388.80	51.0 AV	54.0	-3.0	1.21 V	291	52.6	-1.6
3	*2412.00	120.5 PK			1.21 V	291	122.1	-1.6
4	*2412.00	110.5 AV			1.21 V	291	112.1	-1.6
5	4824.00	37.3 PK	74.0	-36.7	1.73 V	191	34.1	3.2
6	4824.00	25.6 AV	54.0	-28.4	1.73 V	191	22.4	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	55.5 PK	74.0	-18.5	3.94 H	109	57.1	-1.6
2	2390.00	43.4 AV	54.0	-10.6	3.94 H	109	45.0	-1.6
3	*2437.00	117.1 PK			3.94 H	109	118.7	-1.6
4	*2437.00	108.1 AV			3.94 H	109	109.7	-1.6
5	2483.50	58.4 PK	74.0	-15.6	3.94 H	109	60.0	-1.6
6	2483.50	44.5 AV	54.0	-9.5	3.94 H	109	46.1	-1.6
7	4874.00	37.1 PK	74.0	-36.9	2.57 H	122	33.9	3.2
8	4874.00	26.4 AV	54.0	-27.6	2.57 H	122	23.2	3.2
9	7311.00	42.9 PK	74.0	-31.1	1.92 H	103	33.5	9.4
10	7311.00	31.1 AV	54.0	-22.9	1.92 H	103	21.7	9.4
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	55.5 PK	74.0	-18.5	1.22 V	287	57.1	-1.6
2	2390.00	43.3 AV	54.0	-10.7	1.22 V	287	44.9	-1.6
3	*2437.00	121.2 PK			1.22 V	287	122.8	-1.6
4	*2437.00	111.6 AV			1.22 V	287	113.2	-1.6
5	2483.50	58.2 PK	74.0	-15.8	1.22 V	287	59.8	-1.6
6	2483.50	44.2 AV	54.0	-9.8	1.22 V	287	45.8	-1.6
7	4874.00	37.4 PK	74.0	-36.6	1.61 V	193	34.2	3.2
8	4874.00	25.8 AV	54.0	-28.2	1.61 V	193	22.6	3.2
9	7311.00	44.5 PK	74.0	-29.5	2.10 V	86	35.1	9.4
10	7311.00	31.7 AV	54.0	-22.3	2.10 V	86	22.3	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	117.0 PK			3.29 H	103	118.6	-1.6
2	*2462.00	107.4 AV			3.29 H	103	109.0	-1.6
3	2484.50	63.5 PK	74.0	-10.5	3.29 H	103	65.1	-1.6
4	2484.50	51.7 AV	54.0	-2.3	3.29 H	103	53.3	-1.6
5	4924.00	37.0 PK	74.0	-37.0	2.58 H	108	33.9	3.1
6	4924.00	26.0 AV	54.0	-28.0	2.58 H	108	22.9	3.1
7	7386.00	42.6 PK	74.0	-31.4	1.87 H	97	32.9	9.7
8	7386.00	30.7 AV	54.0	-23.3	1.87 H	97	21.0	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	118.2 PK			1.00 V	284	119.8	-1.6
2	*2462.00	107.8 AV			1.00 V	284	109.4	-1.6
3	2483.50	65.3 PK	74.0	-8.7	1.00 V	284	66.9	-1.6
4	2483.50	52.6 AV	54.0	-1.4	1.00 V	284	54.2	-1.6
5	4924.00	37.6 PK	74.0	-36.4	1.69 V	176	34.5	3.1
6	4924.00	26.2 AV	54.0	-27.8	1.69 V	176	23.1	3.1
7	7386.00	44.7 PK	74.0	-29.3	2.07 V	70	35.0	9.7
8	7386.00	31.8 AV	54.0	-22.2	2.07 V	70	22.1	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	67.0 PK	74.0	-7.0	3.58 H	95	68.6	-1.6
2	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**3.58 H**	**95**	**55.5**	**-1.6**
3	*2412.00	118.8 PK			3.58 H	95	120.4	-1.6
4	*2412.00	106.3 AV			3.58 H	95	107.9	-1.6
5	4824.00	38.0 PK	74.0	-36.0	2.61 H	142	34.8	3.2
6	4824.00	25.7 AV	54.0	-28.3	2.61 H	142	22.5	3.2
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2386.61	68.2 PK	74.0	-5.8	1.04 V	277	69.8	-1.6
2	2386.61	52.6 AV	54.0	-1.4	1.04 V	277	54.2	-1.6
3	*2412.00	116.9 PK			1.04 V	277	118.5	-1.6
4	*2412.00	107.7 AV			1.04 V	277	109.3	-1.6
5	4824.00	37.4 PK	74.0	-36.6	1.68 V	186	34.2	3.2
6	4824.00	26.2 AV	54.0	-27.8	1.68 V	186	23.0	3.2

Remarks:

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

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	55.9 PK	74.0	-18.1	3.91 H	82	57.5	-1.6
2	2390.00	43.4 AV	54.0	-10.6	3.91 H	82	45.0	-1.6
3	*2437.00	117.1 PK			3.91 H	82	118.7	-1.6
4	*2437.00	108.0 AV			3.91 H	82	109.6	-1.6
5	2483.50	56.5 PK	74.0	-17.5	3.91 H	82	58.1	-1.6
6	2483.50	43.6 AV	54.0	-10.4	3.91 H	82	45.2	-1.6
7	4874.00	36.8 PK	74.0	-37.2	2.61 H	135	33.6	3.2
8	4874.00	26.4 AV	54.0	-27.6	2.61 H	135	23.2	3.2
9	7311.00	43.1 PK	74.0	-30.9	1.82 H	95	33.7	9.4
10	7311.00	30.9 AV	54.0	-23.1	1.82 H	95	21.5	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	55.9 PK	74.0	-18.1	1.36 V	290	57.5	-1.6
2	2390.00	43.6 AV	54.0	-10.4	1.36 V	290	45.2	-1.6
3	*2437.00	124.3 PK			1.36 V	290	125.9	-1.6
4	*2437.00	110.9 AV			1.36 V	290	112.5	-1.6
5	2483.50	57.1 PK	74.0	-16.9	1.36 V	290	58.7	-1.6
6	2483.50	44.1 AV	54.0	-9.9	1.36 V	290	45.7	-1.6
7	4874.00	37.3 PK	74.0	-36.7	1.73 V	182	34.1	3.2
8	4874.00	26.2 AV	54.0	-27.8	1.73 V	182	23.0	3.2
9	7311.00	45.1 PK	74.0	-28.9	2.03 V	68	35.7	9.4
10	7311.00	32.0 AV	54.0	-22.0	2.03 V	68	22.6	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	117.6 PK			3.92 H	90	119.2	-1.6
2	*2462.00	105.6 AV			3.92 H	90	107.2	-1.6
3	2487.50	59.3 PK	74.0	-14.7	3.92 H	90	60.9	-1.6
4	2487.50	47.0 AV	54.0	-7.0	3.92 H	90	48.6	-1.6
5	4924.00	37.8 PK	74.0	-36.2	2.57 H	138	34.7	3.1
6	4924.00	25.5 AV	54.0	-28.5	2.57 H	138	22.4	3.1
7	7386.00	43.0 PK	74.0	-31.0	1.87 H	98	33.3	9.7
8	7386.00	31.5 AV	54.0	-22.5	1.87 H	98	21.8	9.7
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	119.2 PK			1.19 V	292	120.8	-1.6
2	*2462.00	106.8 AV			1.19 V	292	108.4	-1.6
3	2483.50	65.4 PK	74.0	-8.6	1.19 V	292	67.0	-1.6
4	2483.50	53.7 AV	54.0	-0.3	1.19 V	292	55.3	-1.6
5	4924.00	37.6 PK	74.0	-36.4	1.57 V	188	34.5	3.1
6	4924.00	26.2 AV	54.0	-27.8	1.57 V	188	23.1	3.1
7	7386.00	44.7 PK	74.0	-29.3	2.14 V	99	35.0	9.7
8	7386.00	31.6 AV	54.0	-22.4	2.14 V	99	21.9	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.

802.11ax (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	2390.00	62.7 PK	74.0	-11.3	3.43 H	96	64.3	-1.6
2	2390.00	52.2 AV	54.0	-1.8	3.43 H	96	53.8	-1.6
3	*2422.00	113.5 PK			3.43 H	96	115.1	-1.6
4	*2422.00	102.0 AV			3.43 H	96	103.6	-1.6
5	4844.00	37.7 PK	74.0	-36.3	2.58 H	153	34.4	3.3
6	4844.00	25.6 AV	54.0	-28.4	2.58 H	153	22.3	3.3
7	7266.00	43.1 PK	74.0	-30.9	1.90 H	91	33.8	9.3
8	7266.00	31.4 AV	54.0	-22.6	1.90 H	91	22.1	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	2384.44	66.3 PK	74.0	-7.7	1.39 V	274	67.9	-1.6
2	**2384.44**	**53.9 AV**	**54.0**	**-0.1**	**1.39 V**	**274**	**55.5**	**-1.6**
3	*2422.00	115.9 PK			1.39 V	274	117.5	-1.6
4	*2422.00	104.7 AV			1.39 V	274	106.3	-1.6
5	4844.00	38.0 PK	74.0	-36.0	1.70 V	181	34.7	3.3
6	4844.00	26.5 AV	54.0	-27.5	1.70 V	181	23.2	3.3
7	7266.00	45.1 PK	74.0	-28.9	2.04 V	66	35.8	9.3
8	7266.00	32.3 AV	54.0	-21.7	2.04 V	66	23.0	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	59.9 PK	74.0	-14.1	3.52 H	97	61.5	-1.6
2	2390.00	47.8 AV	54.0	-6.2	3.52 H	97	49.4	-1.6
3	*2437.00	117.0 PK			3.52 H	97	118.6	-1.6
4	*2437.00	104.4 AV			3.52 H	97	106.0	-1.6
5	2483.50	67.2 PK	74.0	-6.8	3.52 H	97	68.8	-1.6
6	**2483.50**	**53.9 AV**	**54.0**	**-0.1**	**3.52 H**	**97**	**55.5**	**-1.6**
7	4874.00	36.8 PK	74.0	-37.2	2.65 H	146	33.6	3.2
8	4874.00	26.2 AV	54.0	-27.8	2.65 H	146	23.0	3.2
9	7311.00	43.2 PK	74.0	-30.8	1.79 H	94	33.8	9.4
10	7311.00	31.1 AV	54.0	-22.9	1.79 H	94	21.7	9.4
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	65.5 PK	74.0	-8.5	1.18 V	288	67.1	-1.6
2	2390.00	53.6 AV	54.0	-0.4	1.18 V	288	55.2	-1.6
3	*2437.00	119.6 PK			1.18 V	288	121.2	-1.6
4	*2437.00	107.3 AV			1.18 V	288	108.9	-1.6
5	2483.50	68.1 PK	74.0	-5.9	1.18 V	288	69.7	-1.6
6	**2483.50**	**53.9 AV**	**54.0**	**-0.1**	**1.18 V**	**288**	**55.5**	**-1.6**
7	4874.00	37.2 PK	74.0	-36.8	1.59 V	195	34.0	3.2
8	4874.00	26.0 AV	54.0	-28.0	1.59 V	195	22.8	3.2
9	7311.00	45.0 PK	74.0	-29.0	2.14 V	105	35.6	9.4
10	7311.00	32.0 AV	54.0	-22.0	2.14 V	105	22.6	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	113.1 PK			3.92 H	90	114.7	-1.6
2	*2452.00	101.4 AV			3.92 H	90	103.0	-1.6
3	2488.67	61.2 PK	74.0	-12.8	3.92 H	90	62.8	-1.6
4	2488.67	51.5 AV	54.0	-2.5	3.92 H	90	53.1	-1.6
5	4904.00	37.6 PK	74.0	-36.4	2.61 H	125	34.5	3.1
6	4904.00	25.2 AV	54.0	-28.8	2.61 H	125	22.1	3.1
7	7356.00	43.1 PK	74.0	-30.9	1.82 H	101	33.6	9.5
8	7356.00	31.5 AV	54.0	-22.5	1.82 H	101	22.0	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	114.2 PK			1.17 V	288	115.8	-1.6
2	*2452.00	103.8 AV			1.17 V	288	105.4	-1.6
3	2484.60	64.8 PK	74.0	-9.2	1.17 V	288	66.4	-1.6
4	**2484.60**	**53.9 AV**	**54.0**	**-0.1**	**1.17 V**	**288**	**55.5**	**-1.6**
5	4904.00	37.1 PK	74.0	-36.9	1.68 V	186	34.0	3.1
6	4904.00	25.7 AV	54.0	-28.3	1.68 V	186	22.6	3.1
7	7356.00	44.9 PK	74.0	-29.1	1.98 V	81	35.4	9.5
8	7356.00	31.7 AV	54.0	-22.3	1.98 V	81	22.2	9.5

Remarks:

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

Below 1GHz Data:

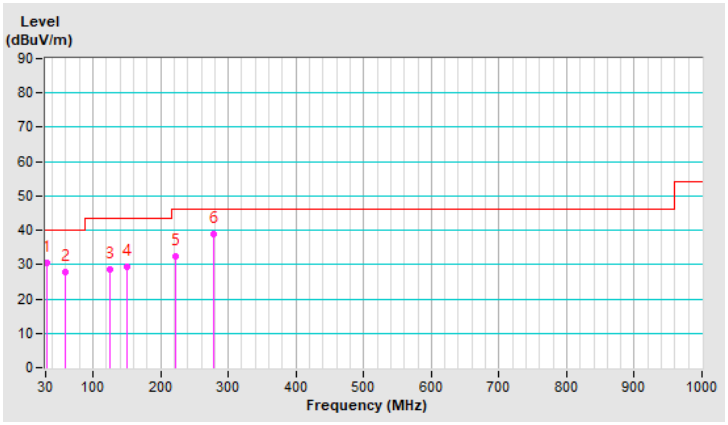
802.11b

CHANNEL	TX Channel 1	**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	32.64	30.4 QP	40.0	-9.6	1.00 H	78	39.2	-8.8
2	59.61	27.8 QP	40.0	-12.2	3.00 H	264	36.1	-8.3
3	125.50	28.6 QP	43.5	-14.9	3.00 H	96	37.1	-8.5
4	150.30	29.3 QP	43.5	-14.2	2.00 H	238	36.2	-6.9
5	221.74	32.3 QP	46.0	-13.7	1.50 H	73	42.1	-9.8
6	278.15	39.0 QP	46.0	-7.0	1.00 H	98	45.6	-6.6

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.

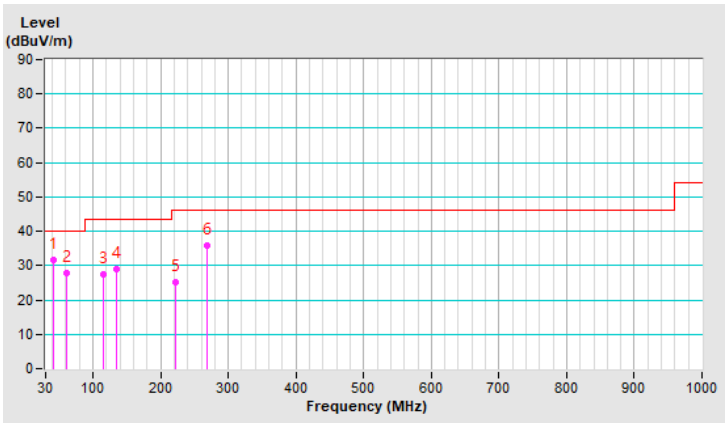


CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	41.25	31.7 QP	40.0	-8.3	1.00 V	248	39.6	-7.9
2	60.68	27.8 QP	40.0	-12.2	1.50 V	335	36.1	-8.3
3	115.09	27.6 QP	43.5	-15.9	1.00 V	92	37.1	-9.5
4	135.34	29.0 QP	43.5	-14.5	1.50 V	54	36.7	-7.7
5	222.01	25.0 QP	46.0	-21.0	2.00 V	165	34.8	-9.8
6	268.09	35.8 QP	46.0	-10.2	1.50 V	239	42.9	-7.1

REMARKS:

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



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

4.2.2 Test Instruments

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

Note:
1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conduction 1.
3 Tested Date: Oct. 06, 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.

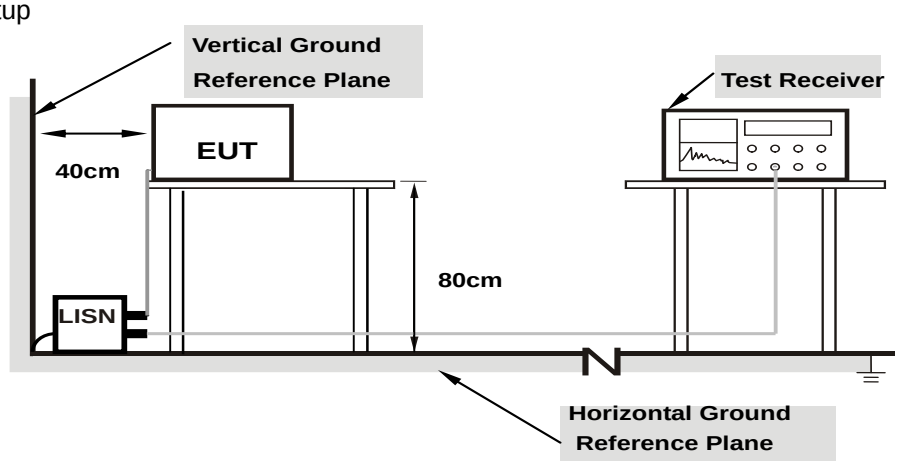
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

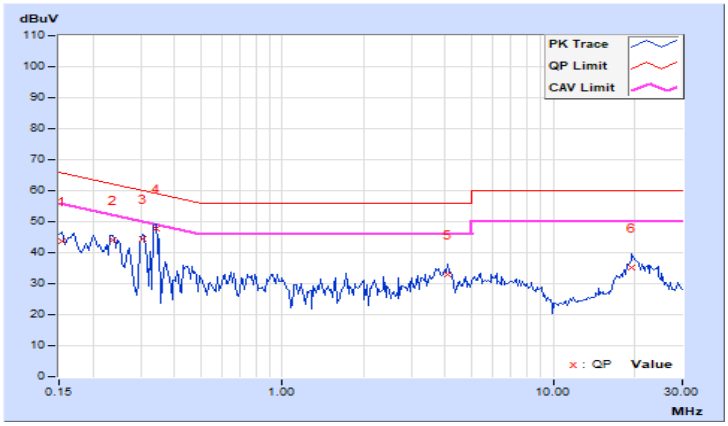
4.2.7 Test Results

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	9.92	33.61	18.42	43.53	28.34	65.79	55.79	-22.26	-27.45
2	0.23594	9.96	34.03	29.70	43.99	39.66	62.24	52.24	-18.25	-12.58
3	0.30625	9.97	34.57	33.10	44.54	43.07	60.07	50.07	-15.53	-7.00
4	**0.34141**	**9.97**	**37.81**	**35.35**	**47.78**	**45.32**	**59.17**	**49.17**	**-11.39**	**-3.85**
5	4.08984	10.24	22.73	14.92	32.97	25.16	56.00	46.00	-23.03	-20.84
6	19.57813	11.32	24.01	17.16	35.33	28.48	60.00	50.00	-24.67	-21.52

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

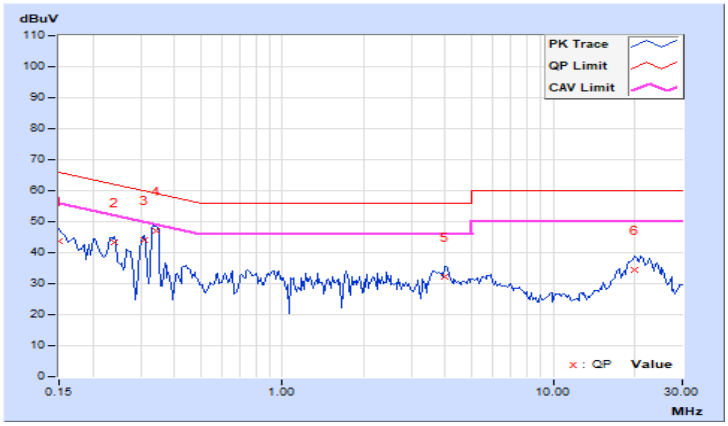


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	0.15000	9.93	33.92	19.88	43.85	29.81	66.00	56.00	-22.15	-26.19
2	0.23984	9.97	33.48	29.50	43.45	39.47	62.10	52.10	-18.65	-12.63
3	0.31016	9.98	34.16	31.39	44.14	41.37	59.97	49.97	-15.83	-8.60
4	0.34141	9.99	37.09	34.44	47.08	44.43	59.17	49.17	-12.09	-4.74
5	3.96484	10.23	21.92	13.60	32.15	23.83	56.00	46.00	-23.85	-22.17
6	19.97656	11.09	23.27	15.91	34.36	27.00	60.00	50.00	-25.64	-23.00

Remarks:

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

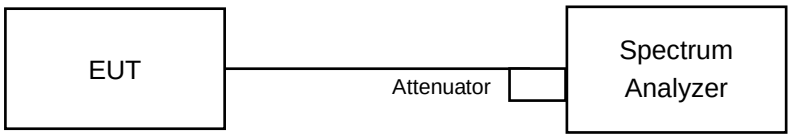


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	8.08	8.09	0.5	PASS
6	2437	7.59	8.09	0.5	PASS
11	2462	8.09	8.15	0.5	PASS

802.11g

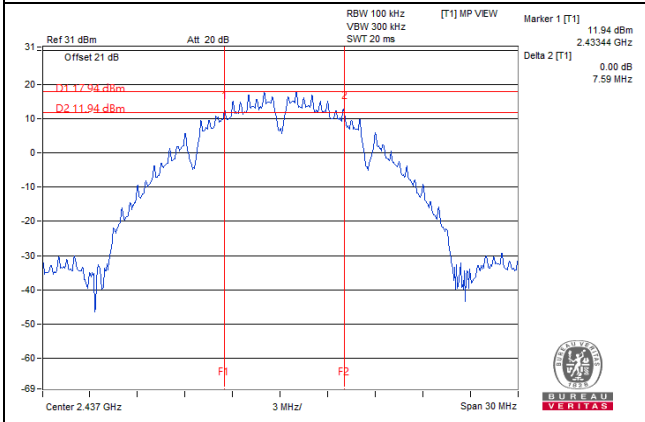
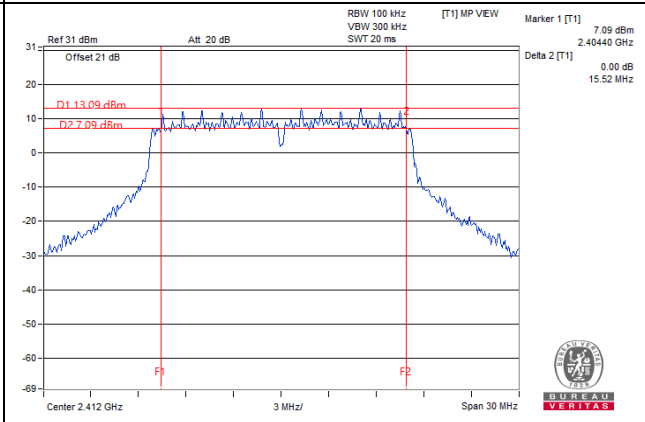
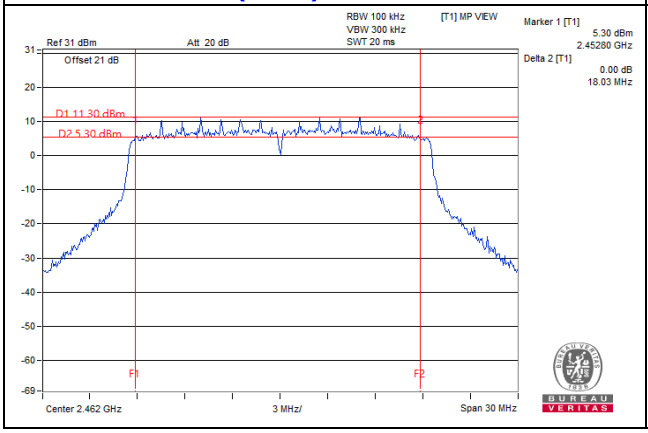
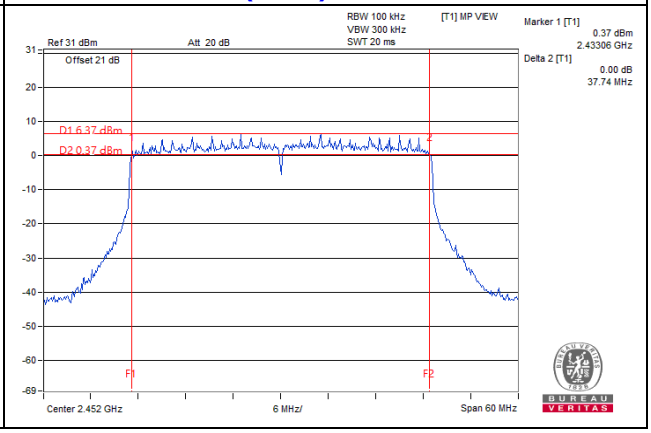
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	15.77	15.52	0.5	PASS
6	2437	15.73	15.68	0.5	PASS
11	2462	15.73	15.99	0.5	PASS

802.11ax (HE20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	18.32	18.17	0.5	PASS
6	2437	18.56	18.22	0.5	PASS
11	2462	18.46	18.03	0.5	PASS

802.11ax (HE40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	37.99	37.77	0.5	PASS
6	2437	37.95	37.84	0.5	PASS
9	2452	38.02	37.74	0.5	PASS

Spectrum Plot of Worst Value	
802.11b / Chain 0 : CH6	**802.11g / Chain 1 : CH1**
	
802.11ax (HE20) / Chain 1 : CH11	**802.11ax (HE40) / Chain 1 : CH9**
	

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

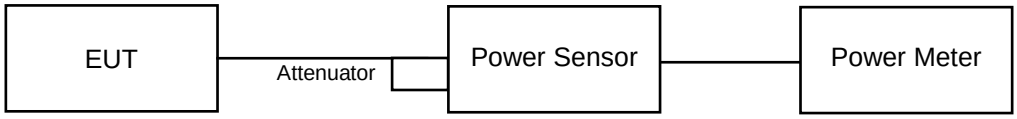
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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				
1	2412	26.21	26.94	912.141	29.60	30	Pass
6	2437	25.96	26.77	869.793	29.39	30	Pass
11	2462	25.96	26.63	854.714	29.32	30	Pass

802.11g

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	25.51	25.13	681.468	28.33	30	Pass
6	2437	25.98	25.40	743.015	28.71	30	Pass
11	2462	23.52	24.06	479.588	26.81	30	Pass

VHT20

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	23.03	23.80	440.793	26.44	30	Pass
6	2437	25.16	25.09	650.945	28.14	30	Pass
11	2462	20.84	21.39	259.06	24.13	30	Pass

VHT40

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	20.93	21.58	267.76	24.28	30	Pass
6	2437	22.69	23.48	408.624	26.11	30	Pass
9	2452	19.23	19.98	183.293	22.63	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				
1	2412	23.30	24.01	465.564	26.68	30	Pass
6	2437	25.41	25.30	686.38	28.37	30	Pass
11	2462	21.05	21.63	272.896	24.36	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				
3	2422	21.16	21.86	284.079	24.53	30	Pass
6	2437	22.95	23.73	433.29	26.37	30	Pass
9	2452	19.48	20.25	194.641	22.89	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				
1	2412	23.03	23.80	440.793	26.44	29.88	Pass
6	2437	25.16	25.09	650.945	28.14	29.88	Pass
11	2462	20.84	21.39	259.06	24.13	29.88	Pass

Note: 1. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)^2 / 2] = 6.12dBi > 6dBi , so the power limit shall be reduced to 30-(6.12-6) = 29.88dBm.

VHT40

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	20.93	21.58	267.76	24.28	29.88	Pass
6	2437	22.69	23.48	408.624	26.11	29.88	Pass
9	2452	19.23	19.98	183.293	22.63	29.88	Pass

Note: 1. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)^2 / 2] = 6.12dBi > 6dBi , so the power limit shall be reduced to 30-(6.12-6) = 29.88dBm.

802.11ax (HE20)

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	23.30	24.01	465.564	26.68	29.88	Pass
6	2437	25.41	25.30	686.38	28.37	29.88	Pass
11	2462	21.05	21.63	272.896	24.36	29.88	Pass

Note: 1. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)^2 / 2] = 6.12dBi > 6dBi , so the power limit shall be reduced to 30-(6.12-6) = 29.88dBm.

802.11ax (HE40)

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	21.16	21.86	284.079	24.53	29.88	Pass
6	2437	22.95	23.73	433.29	26.37	29.88	Pass
9	2452	19.48	20.25	194.641	22.89	29.88	Pass

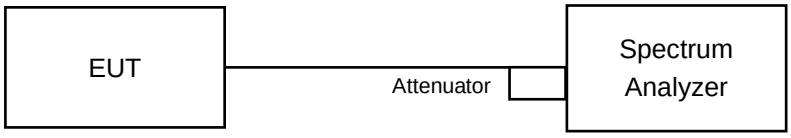
Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 6.12dBi > 6dBi , so the power limit shall be reduced to 30-(6.12-6) = 29.88dBm.

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

Chan.	Chan. Freq.	PSD w/o Duty Factor (dBm/3kHz)		Duty Factor (dB)	Total PSD (mW/3kHz)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
	(MHz)	Chain 0	Chain 1					
1	2412	-2.80	-2.88	0.19	1.0877	0.37	7.88	PASS
6	2437	-3.25	-3.62	0.19	0.9493	-0.23	7.88	PASS
11	2462	-3.17	-2.52	0.19	1.0895	0.37	7.88	PASS

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)2 / 2] = 6.12dBi > 6dBi , so the power density limit shall be reduced to 8-(6.12-6) = 7.88dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11g

Chan.	Chan. Freq.	PSD w/o Duty Factor (dBm/3kHz)		Duty Factor (dB)	Total PSD (mW/3kHz)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
	(MHz)	Chain 0	Chain 1					
1	2412	-8.73	-10.00	0.30	0.2507	-6.01	7.88	PASS
6	2437	-8.68	-9.10	0.30	0.277	-5.58	7.88	PASS
11	2462	-10.11	-9.42	0.30	0.22692	-6.44	7.88	PASS

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)2 / 2] = 6.12dBi > 6dBi , so the power density limit shall be reduced to 8-(6.12-6) = 7.88dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE20)

Chan.	Chan. Freq.	PSD w/o Duty Factor (dBm/3kHz)		Duty Factor (dB)	Total PSD (mW/3kHz)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
	(MHz)	Chain 0	Chain 1					
1	2412	-13.82	-13.55	0.20	0.08964	-10.47	7.88	PASS
6	2437	-11.93	-12.97	0.20	0.11992	-9.21	7.88	PASS
11	2462	-15.89	-15.61	0.20	0.05572	-12.54	7.88	PASS

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)2 / 2] = 6.12dBi > 6dBi , so the power density limit shall be reduced to 8-(6.12-6) = 7.88dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE40)

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/3kHz)		Duty Factor (dB)	Total PSD (mW/3kHz)	Total PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1					
3	2422	-17.94	-17.46	0.20	0.03563	-14.48	7.88	PASS
6	2437	-16.15	-15.40	0.20	0.05563	-12.55	7.88	PASS
9	2452	-19.27	-18.83	0.20	0.02611	-15.83	7.88	PASS

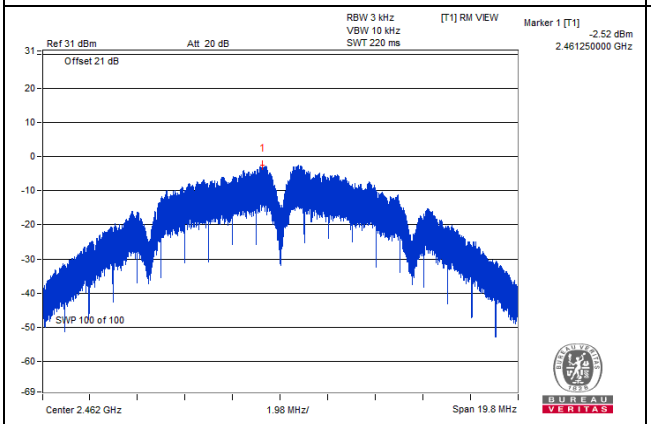
Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.

2. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)2 / 2] = 6.12dBi > 6dBi , so the power density limit shall be reduced to 8-(6.12-6) = 7.88dBm.

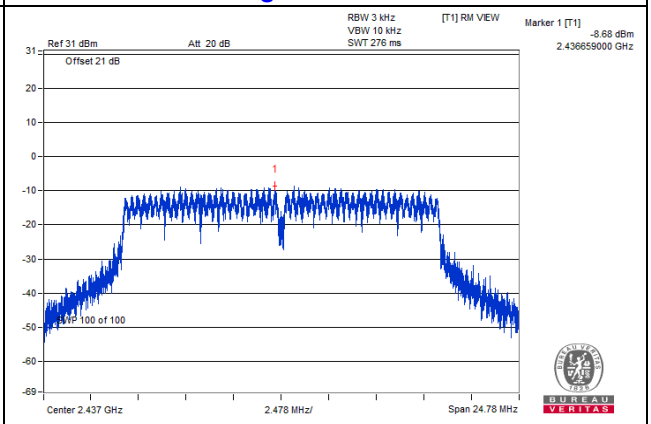
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

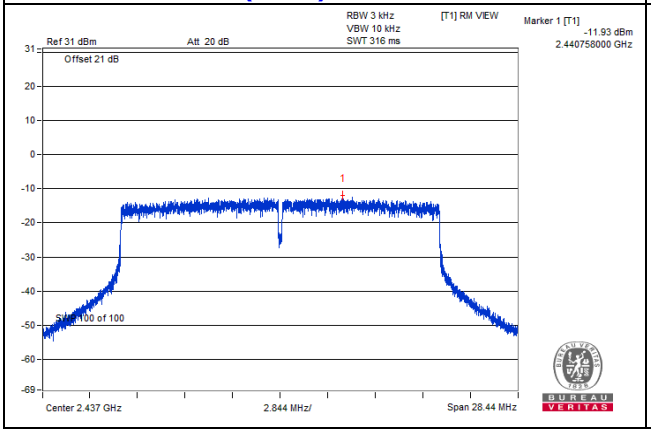
802.11b / Chain 1 : CH11



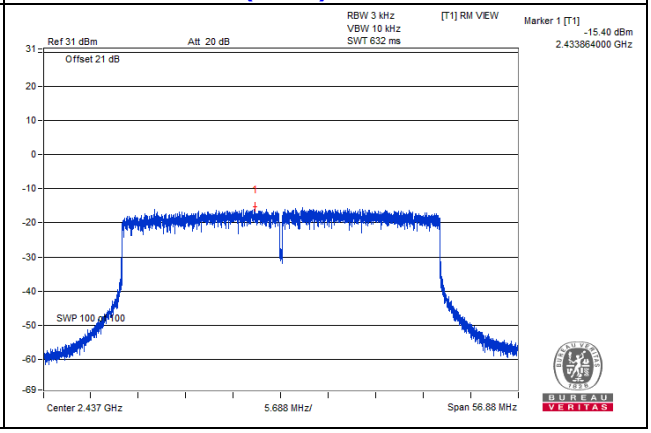
802.11g / Chain 0 : CH6



802.11ax (HE20) / Chain 0 : CH6



802.11ax (HE40) / Chain 1 : CH6

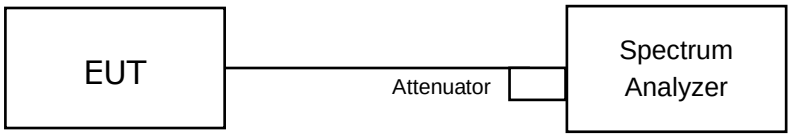


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOBE

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

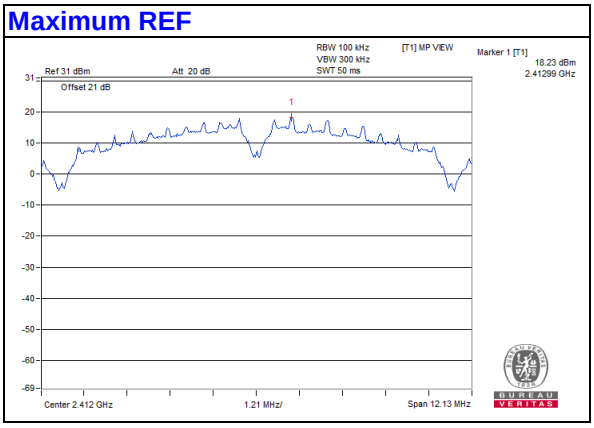
Same as Item 4.3.6

4.6.7 Test Results

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

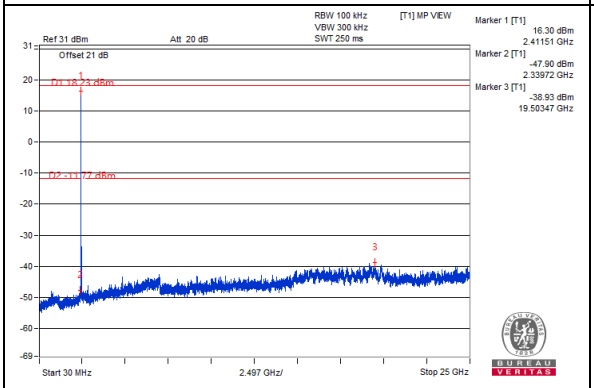
802.11b

Maximum REF

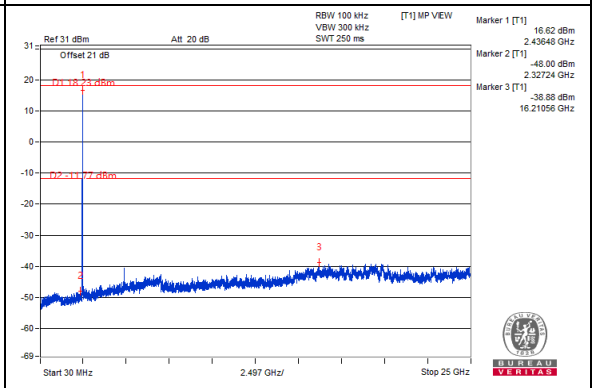


Chain 0

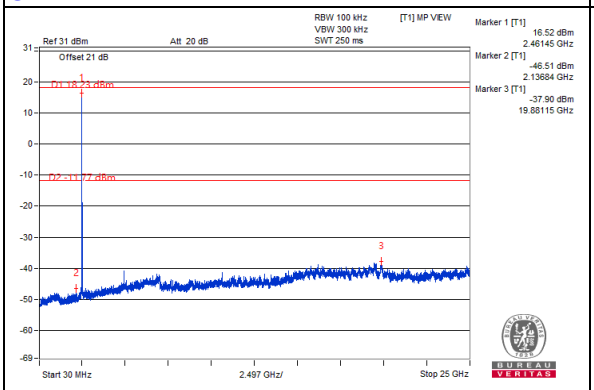
CH 1



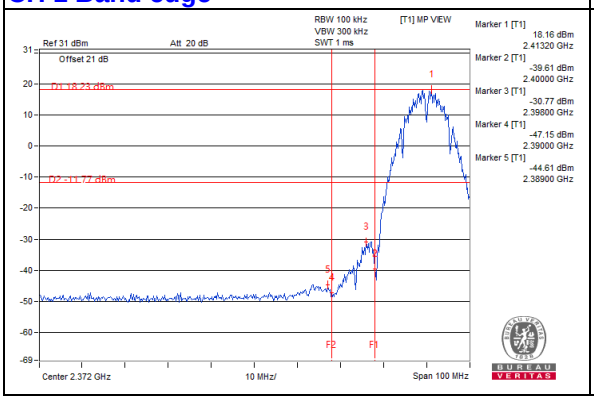
CH 6



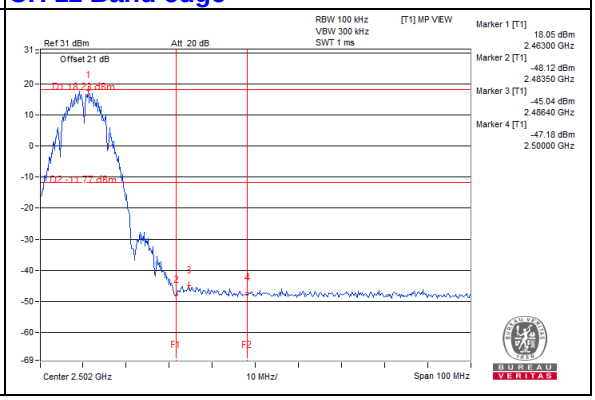
CH 11



CH 1 Band edge

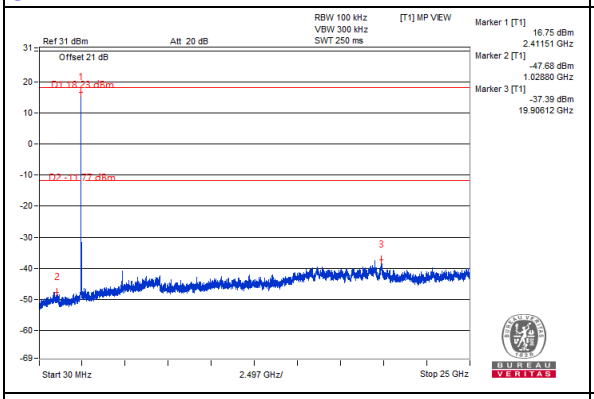


CH 11 Band edge

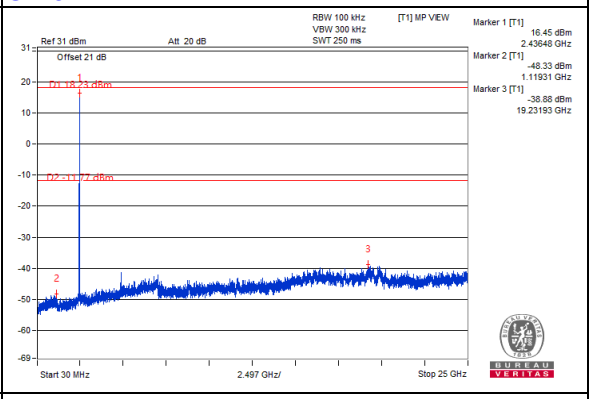


Chain 1

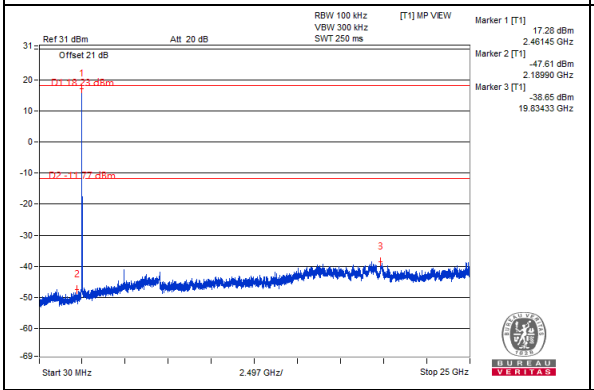
CH 1



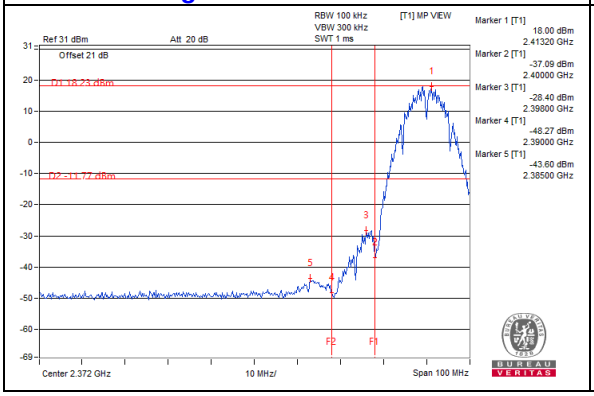
CH 6



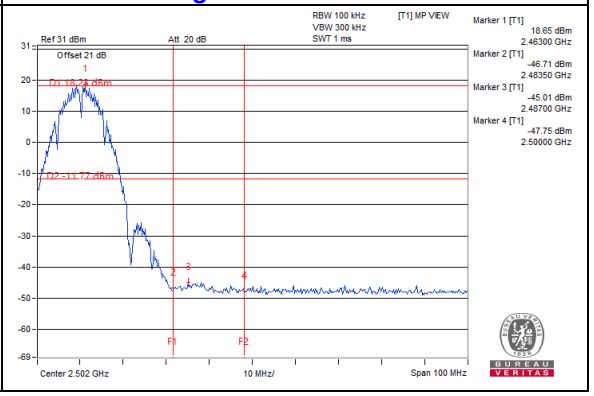
CH 11



CH 1 Band edge

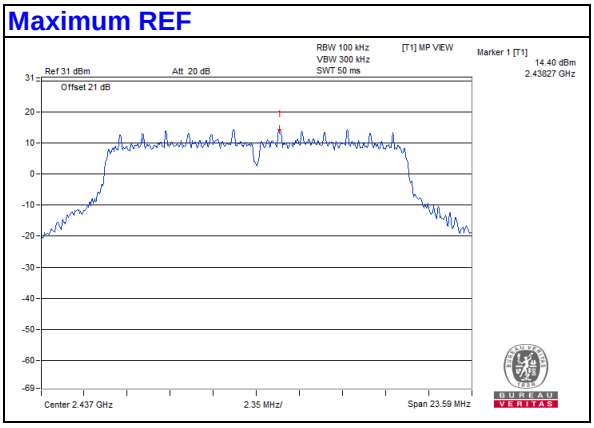


CH 11 Band edge



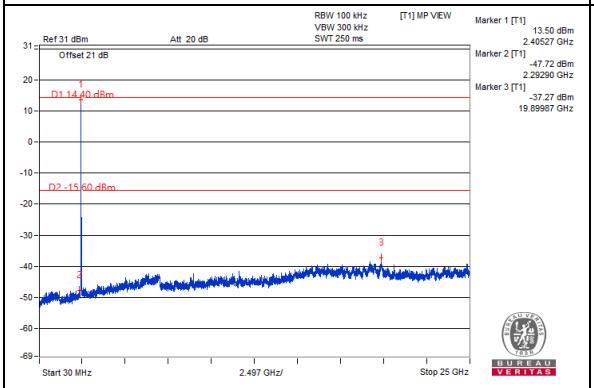
802.11g

Maximum REF

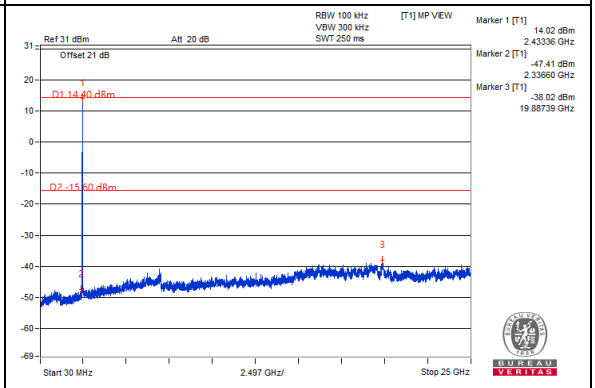


Chain 0

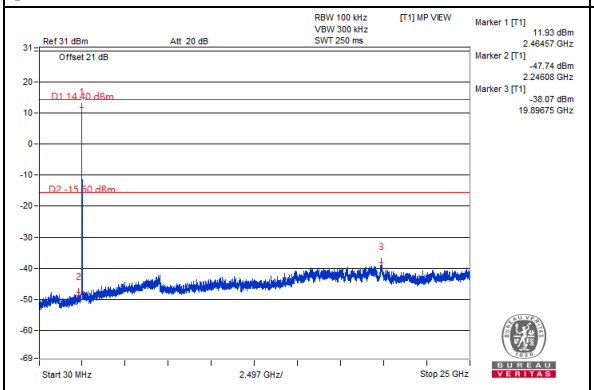
CH 1



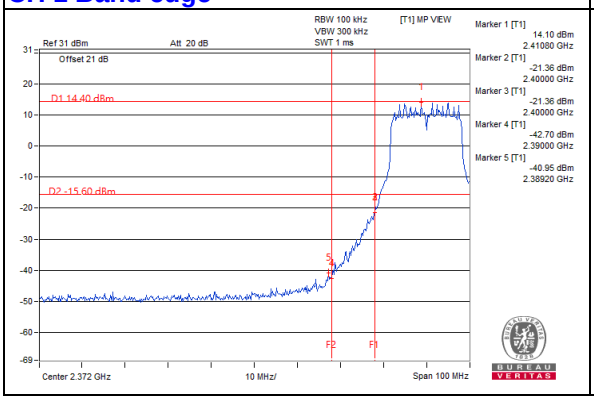
CH 6



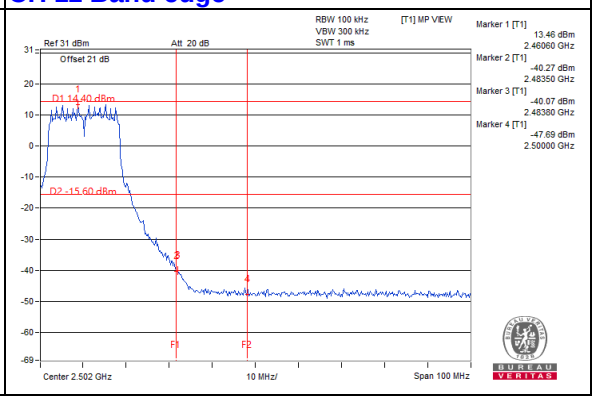
CH 11



CH 1 Band edge

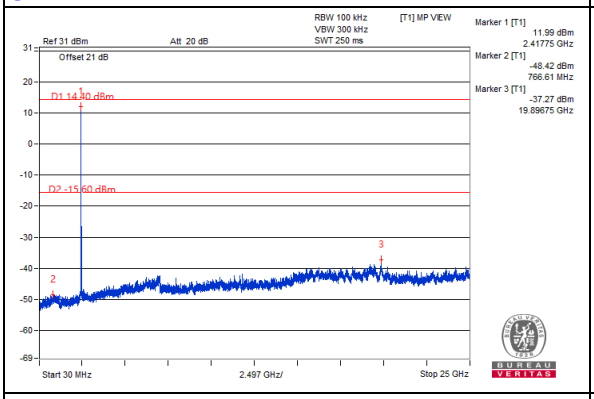


CH 11 Band edge

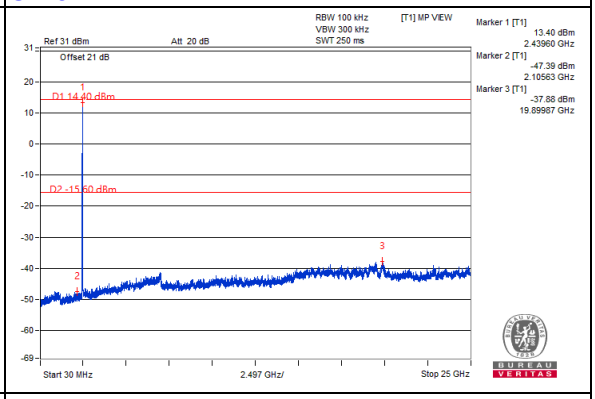


Chain 1

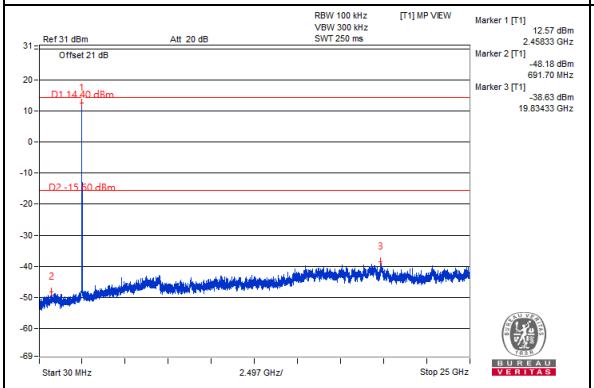
CH 1



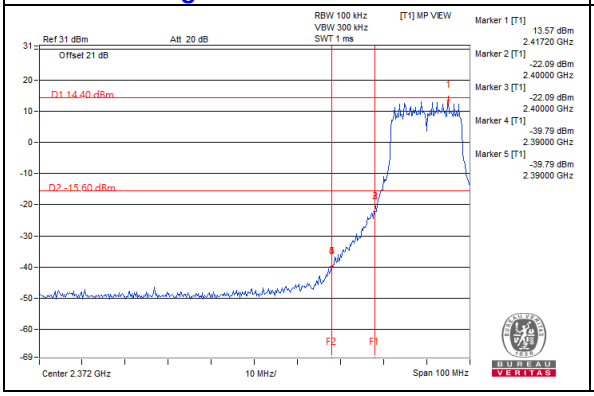
CH 6



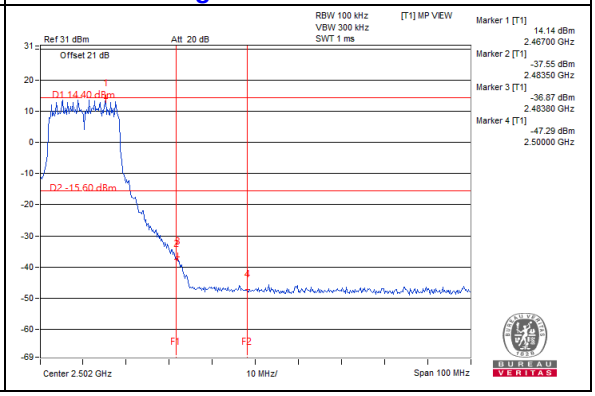
CH 11



CH 1 Band edge

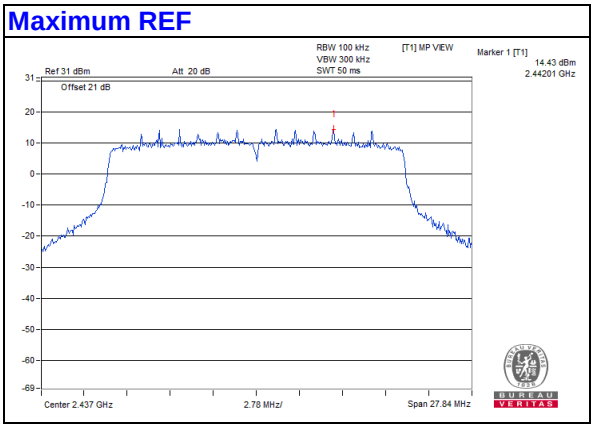


CH 11 Band edge



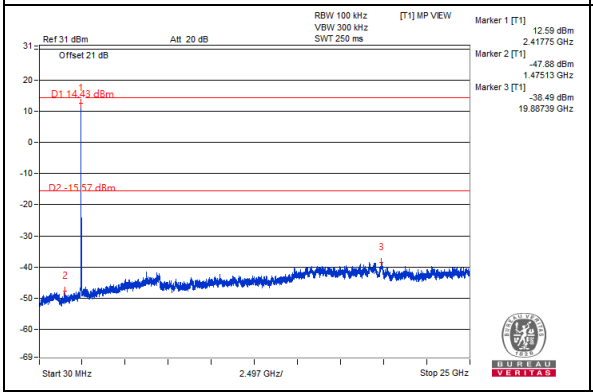
802.11ax (HE20)

Maximum REF

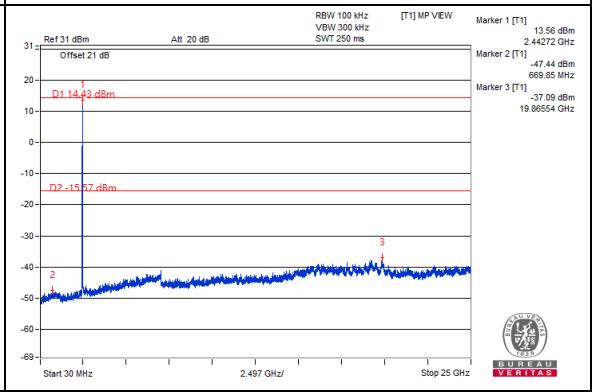


Chain 0

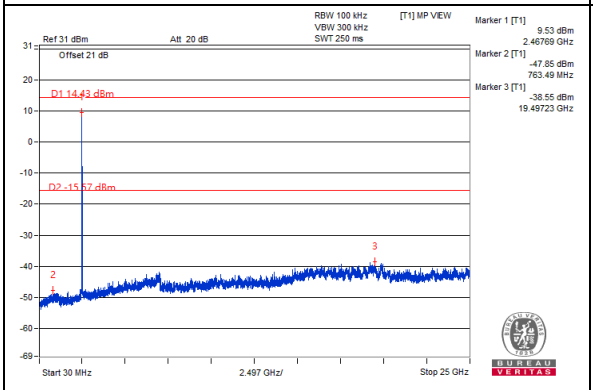
CH 1



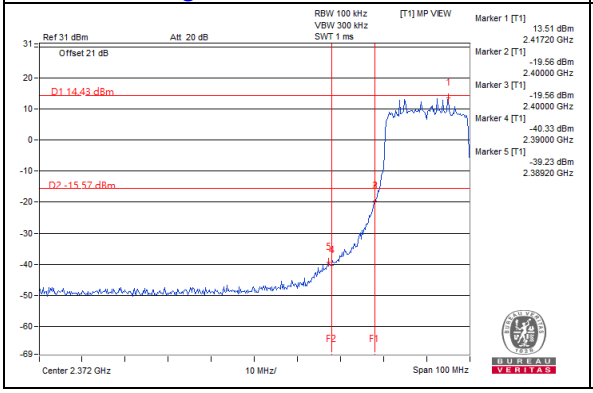
CH 6



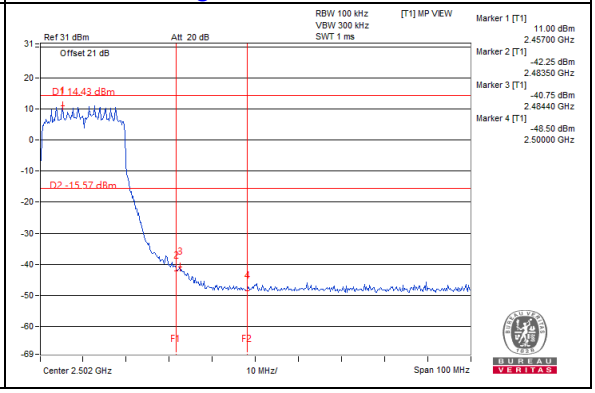
CH 11



CH 1 Band edge

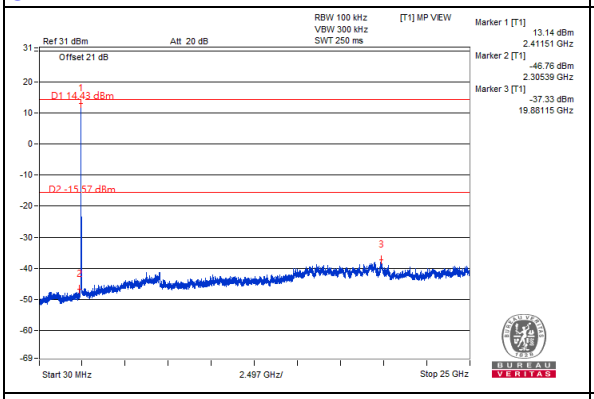


CH 11 Band edge

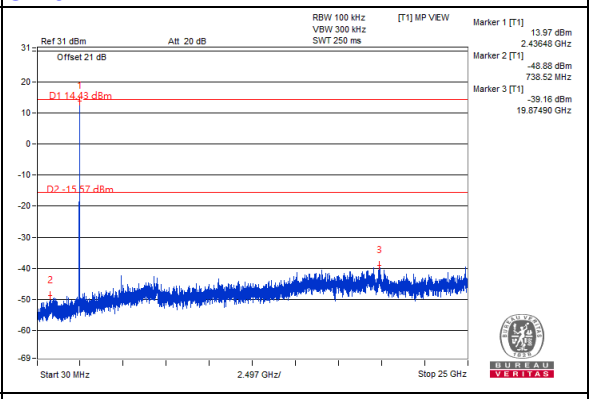


Chain 1

CH 1



CH 6



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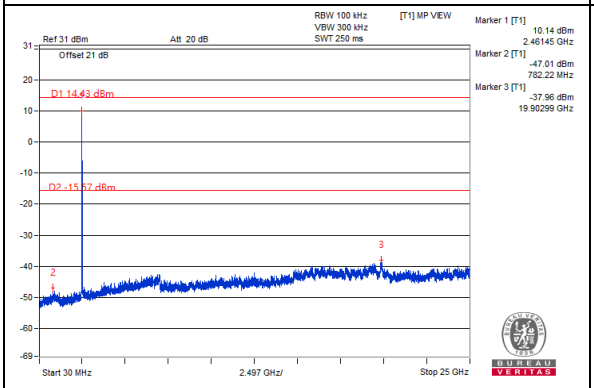
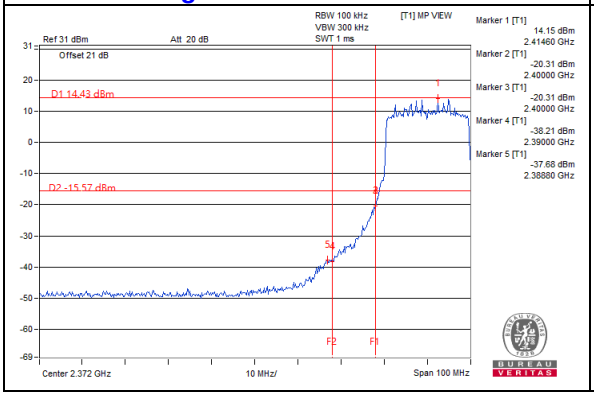
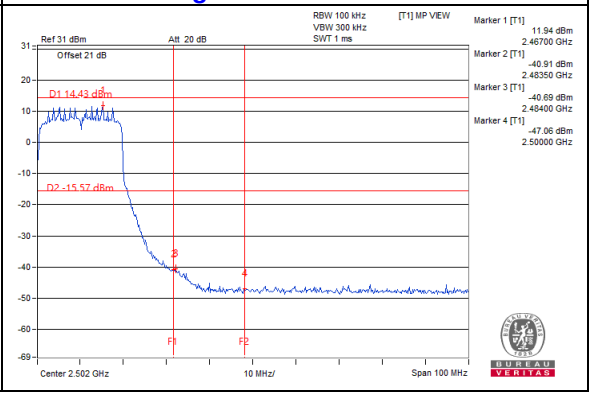


CH 1 Band edge

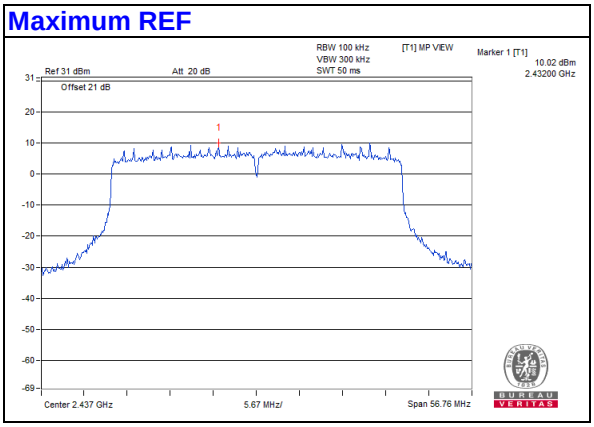


CH 11 Band edge



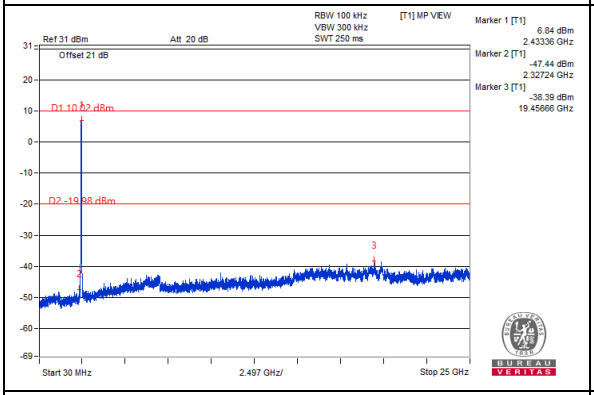
802.11ax (HE40)

Maximum REF

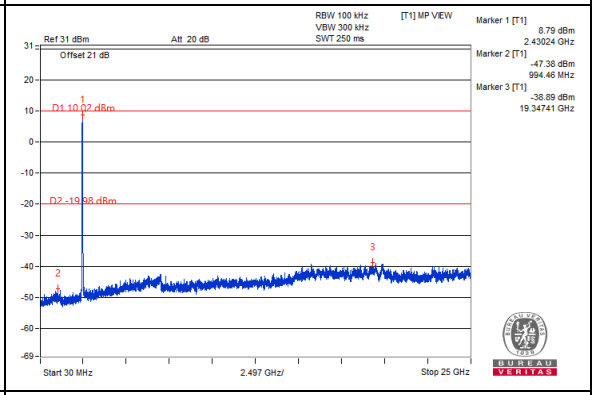


Chain 0

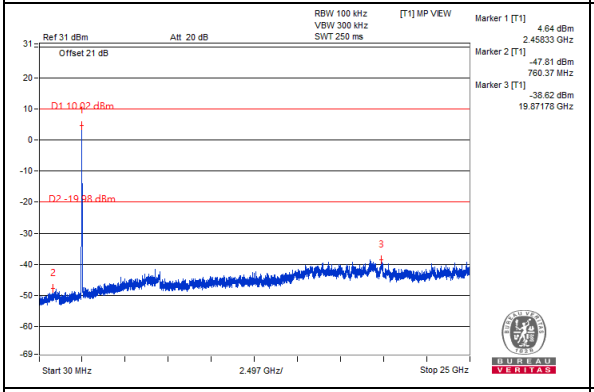
CH 3



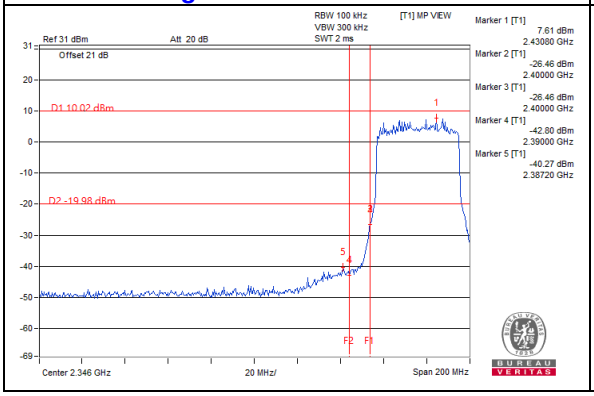
CH 6



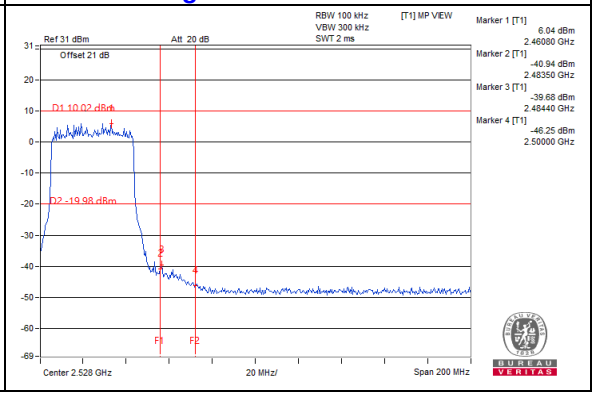
CH 9



CH 3 Band edge

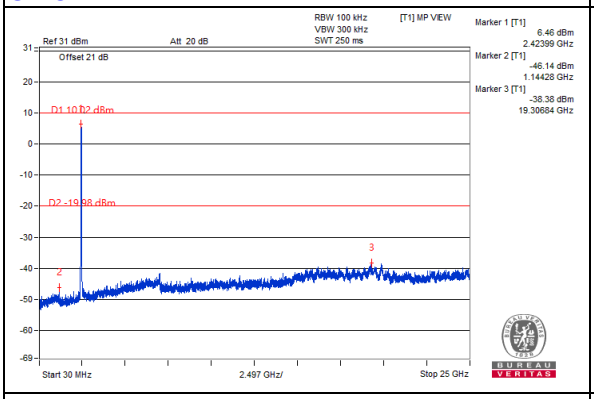


CH 9 Band edge

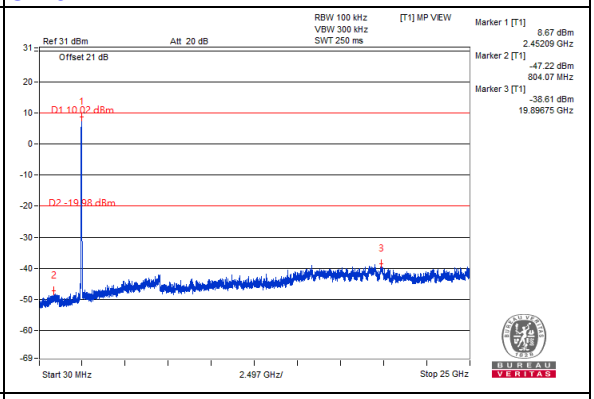


Chain 1

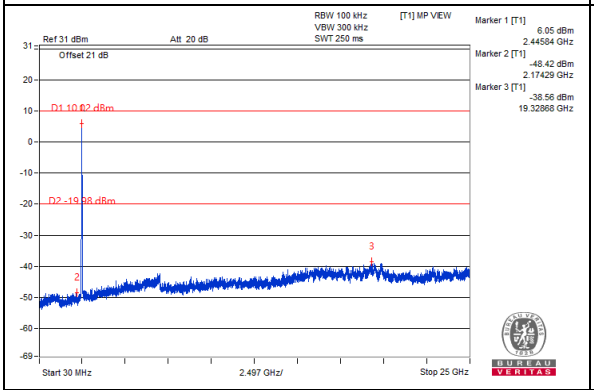
CH 3



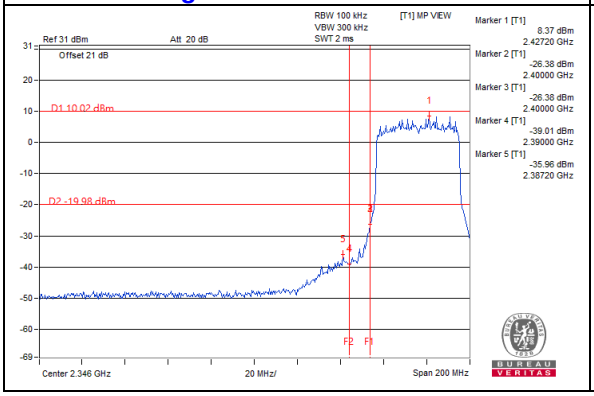
CH 6



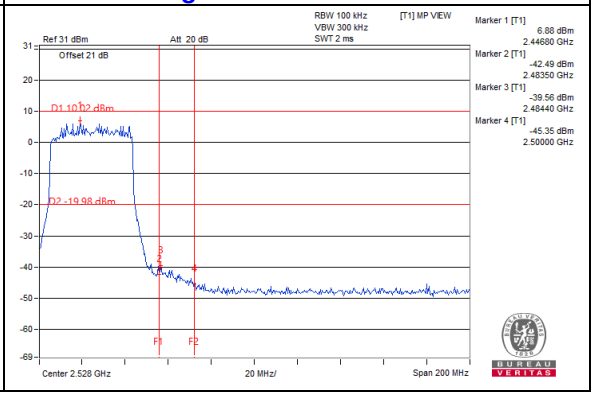
CH 9



CH 3 Band edge



CH 9 Band edge

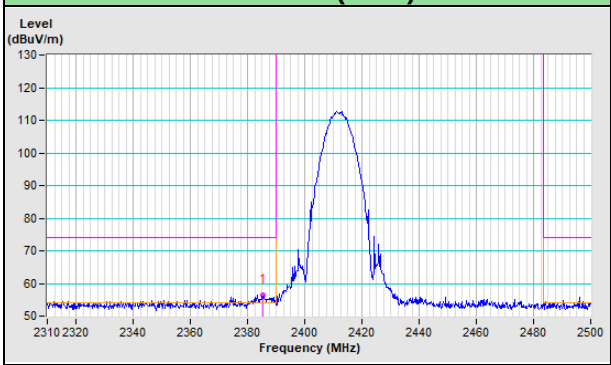
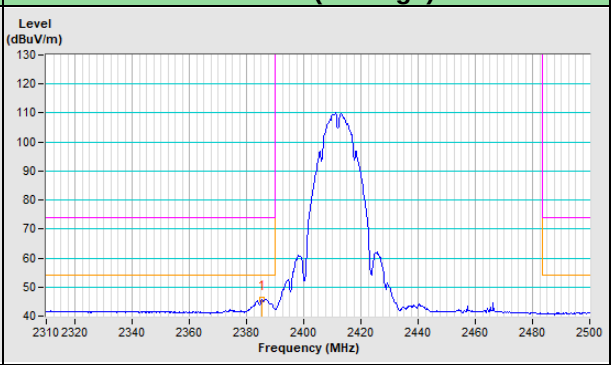
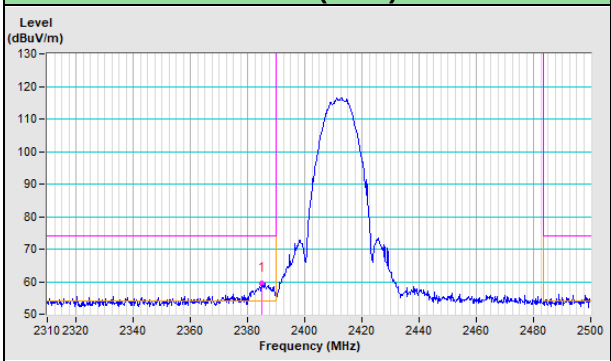
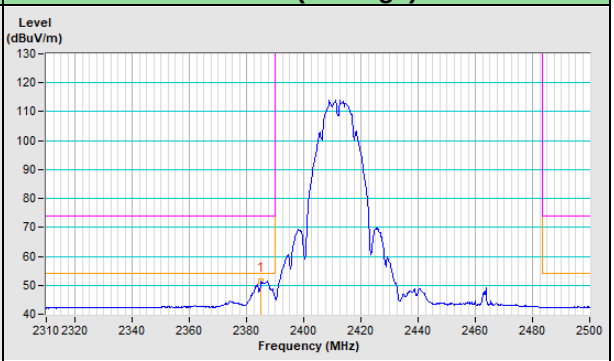
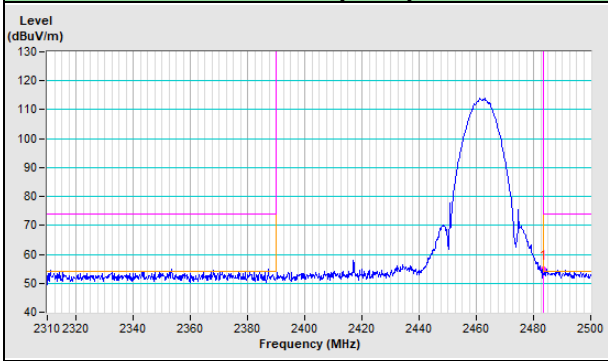
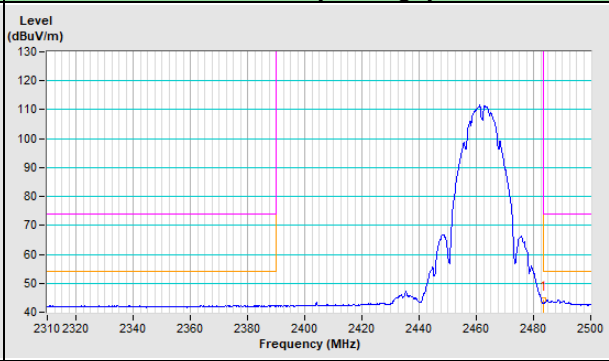
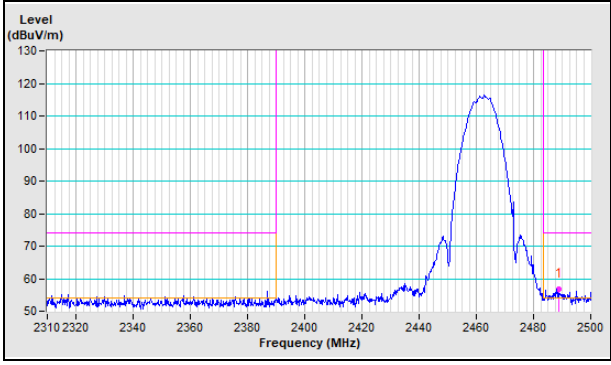
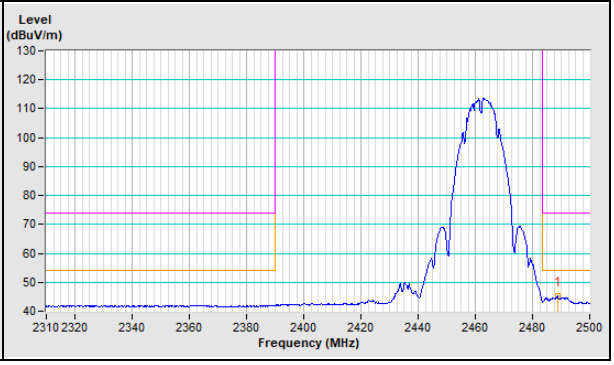


5 Pictures of Test Arrangements

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

Annex A - Band-Edge Measurement

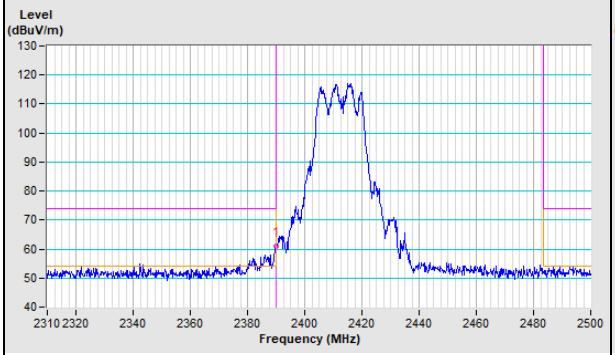
802.11b

Channel 1	
Horizontal (Peak)	Horizontal (Average)
	
Vertical (Peak)	Vertical (Average)
	
Channel 11	
Horizontal (Peak)	Horizontal (Average)
	
Vertical (Peak)	Vertical (Average)
	

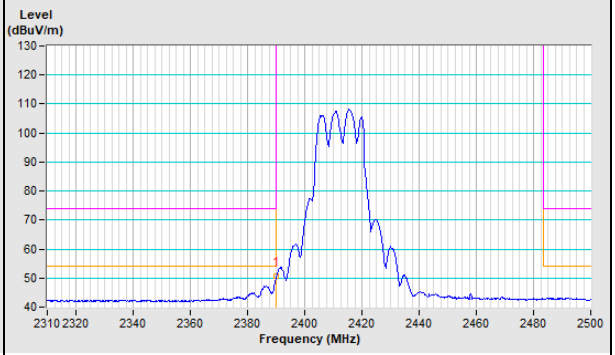
802.11g

Channel 1

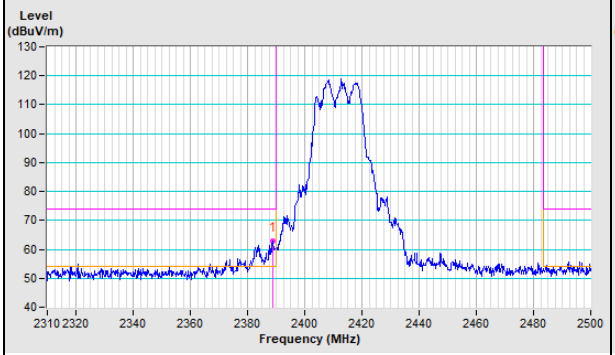
Horizontal (Peak)



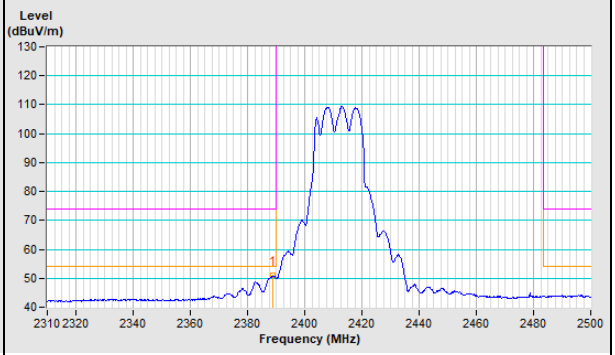
Horizontal (Average)



Vertical (Peak)

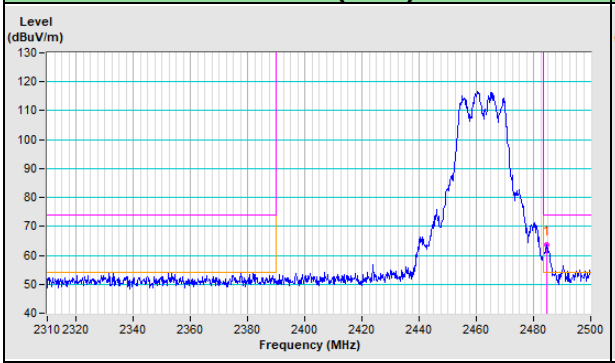


Vertical (Average)

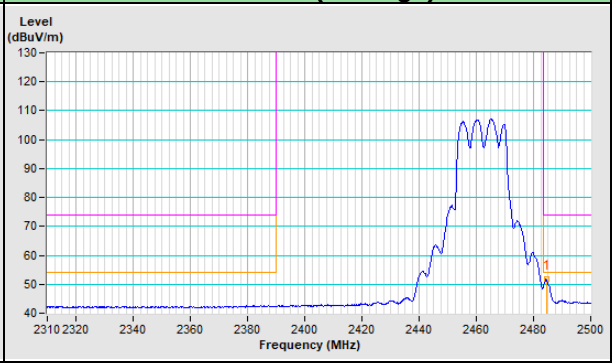


Channel 11

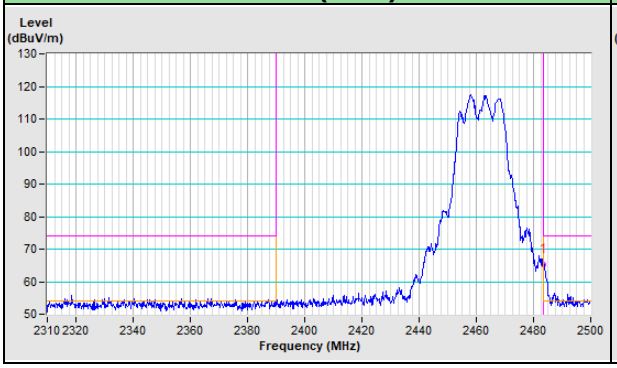
Horizontal (Peak)



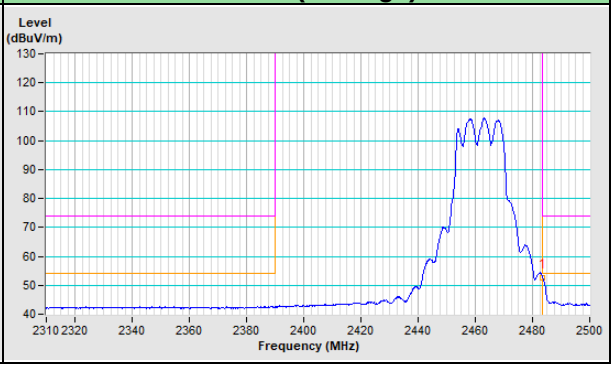
Horizontal (Average)



Vertical (Peak)



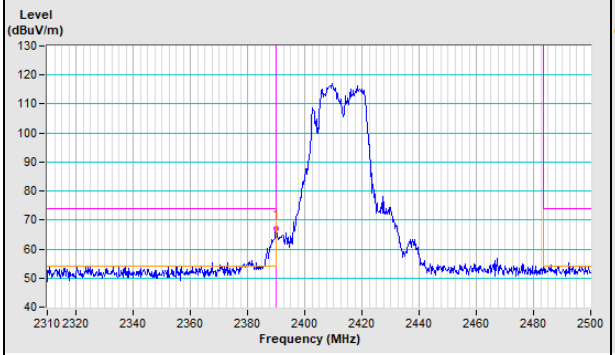
Vertical (Average)



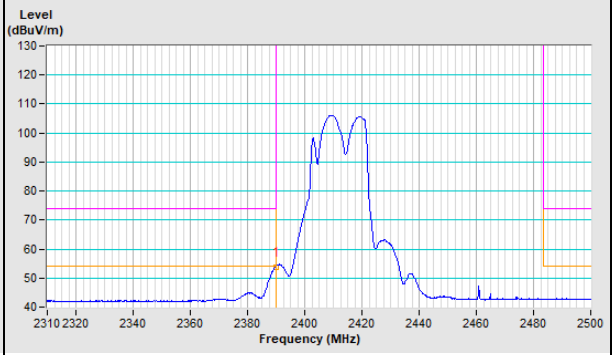
802.11ax (HE20)

Channel 1

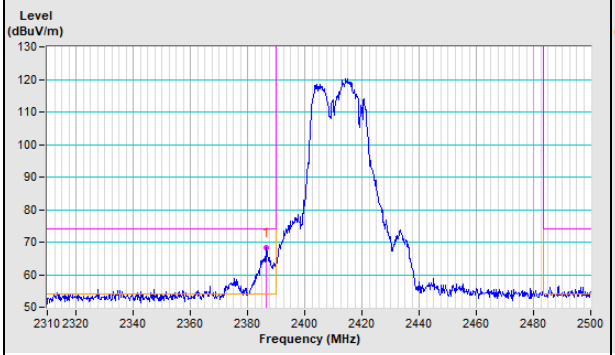
Horizontal (Peak)



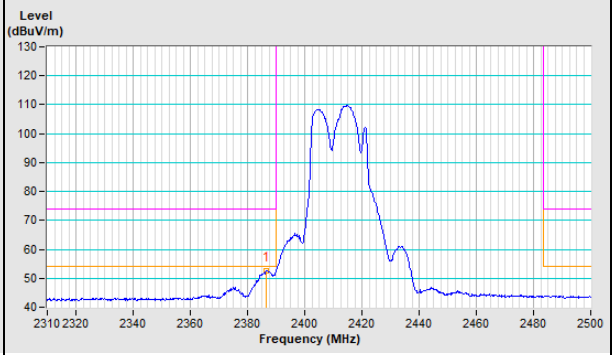
Horizontal (Average)



Vertical (Peak)

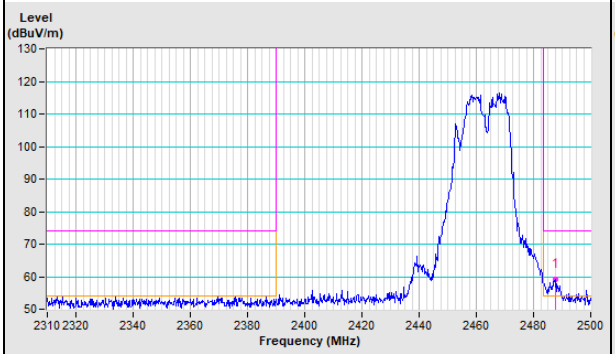


Vertical (Average)

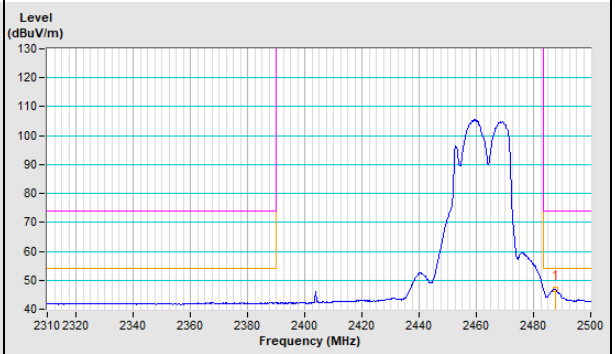


Channel 11

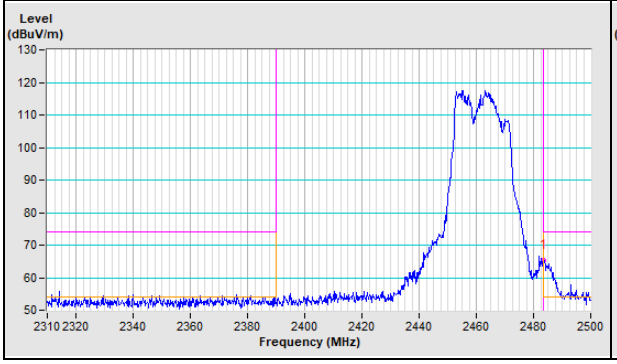
Horizontal (Peak)



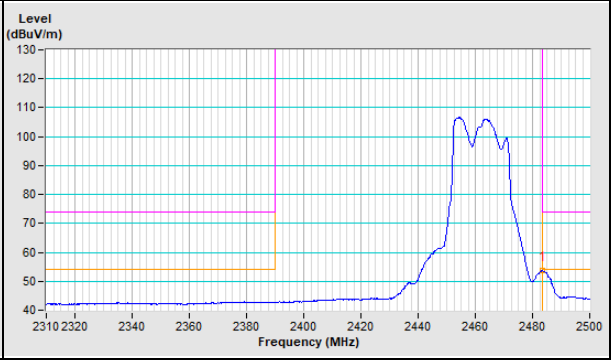
Horizontal (Average)



Vertical (Peak)



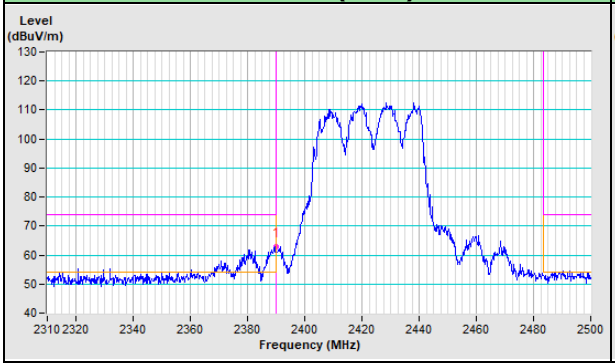
Vertical (Average)



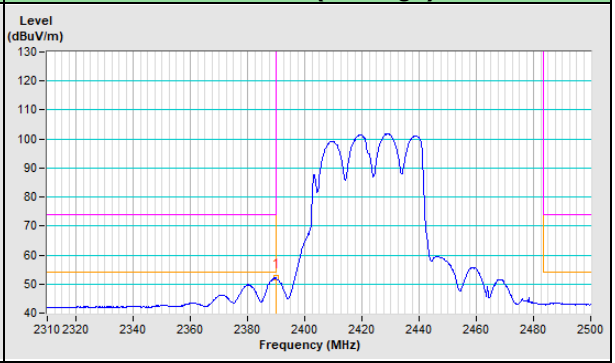
802.11ax (HE40)

Channel 3

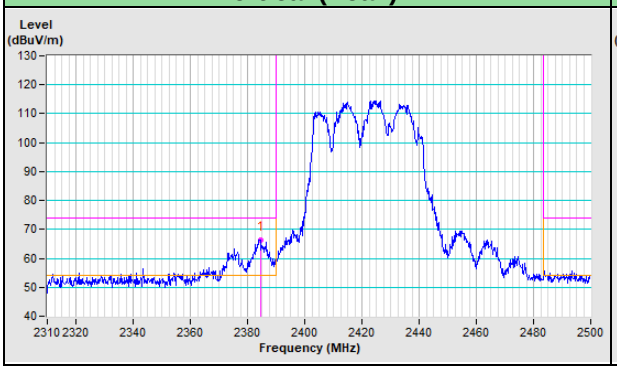
Horizontal (Peak)



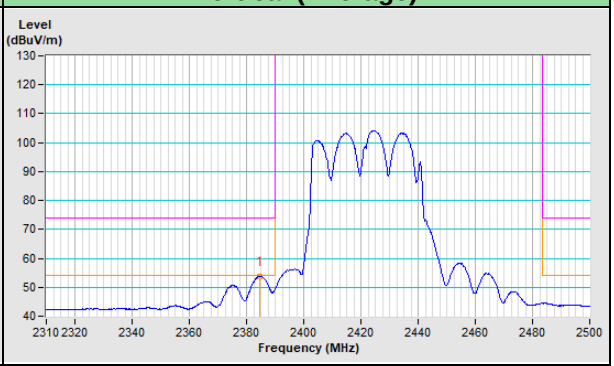
Horizontal (Average)



Vertical (Peak)

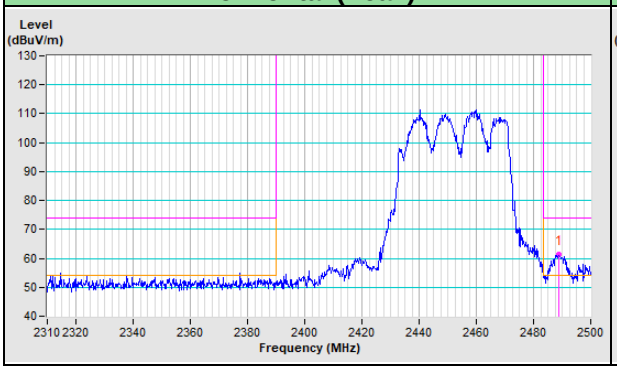


Vertical (Average)

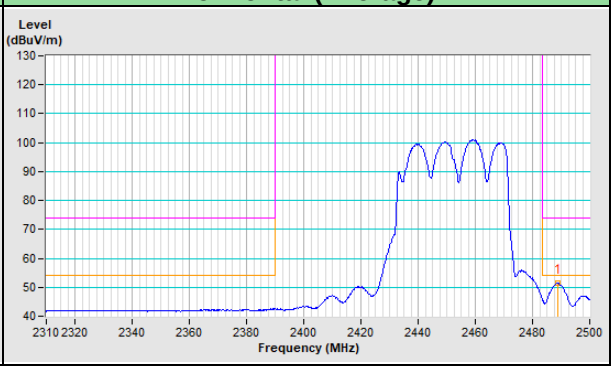


Channel 9

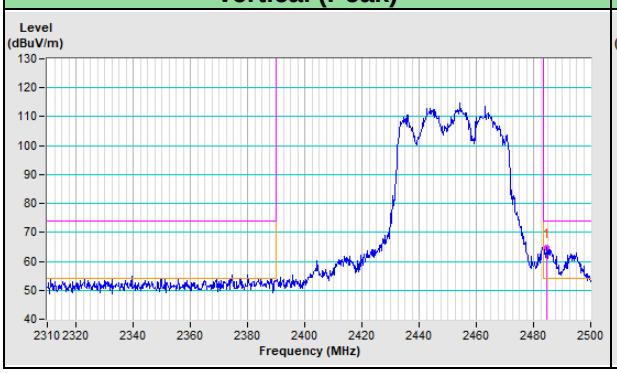
Horizontal (Peak)



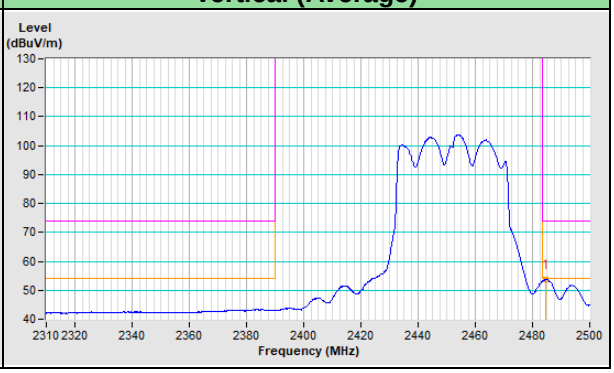
Horizontal (Average)



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:

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

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