FCC Test Report (WLAN)

Report No.:	RF200603E15
FCC ID:	K7S-03580
Test Model:	MX4200
Series Model:	MX4050, MX4000, MX4200C
Received Date:	June 03, 2020
Test Date:	June 08 to July 02, 2020
Issued Date:	July 17, 2020
Applicant:	Belkin International, Inc.
Address:	12045 East Waterfront Drive Playa Vista, CA. 90094, USA
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
FCC Registration / Designation Number:	723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
RF200603E15	Original release.	July 17, 2020

1 Certificate of Conformity

Product:	Velop AX4200 WiFi 6 System
Brand:	Linksys
Test Model:	MX4200
Series Model:	MX4050, MX4000, MX4200C
Sample Status:	ENGINEERING SAMPLE
Applicant:	Belkin International, Inc.
Test Date:	June 08 to July 02, 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 : Phoenix Huang , **Date:** July 17, 2020

Phoenix Huang / Specialist

Approved by : , **Date:** July 17, 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 -11.55 dB at 0.15000 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.3 dB at 2390.00 MHz.
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 2.4 GHz band compliance with rule 15.247(d) of the band-edge items, the test plots were recorded in Annex A.
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 (WLAN)

Product	Velop AX4200 WiFi 6 System
Brand	Linksys
Test Model	MX4200
Series Model	MX4050, MX4000, MX4200C
Status of EUT	ENGINEERING SAMPLE
Driver Version	2.2
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 VHT (20/40) mode 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:** 2.412 ~ 2.462 GHz **5GHz:** 5.18~ 5.24 GHz, 5.745 ~ 5.825 GHz
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:** 799.923 mW **5.18 ~ 5.24 GHz:** 648.459 mW **5.745 ~ 5.825 GHz:** 961.375 mW **Beamforming Mode:** **2.412 ~ 2.462 GHz:** 650.202 mW **5.18 ~ 5.24 GHz:** 575.535 mW **5.745 ~ 5.825 GHz:** 423.595 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	NA

Note:

1. All models are listed as below.

Brand	Model	Difference
Linksys	MX4200	for marketing request
	MX4050	
	MX4000	
	MX4200C	
Note: From the above models, model: MX4200 was selected as representative model for the test and its data was recorded in this report.		

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

Radio 1	Radio 2	Radio 3	Radio 4
WLAN 2.4GHz	WLAN 5GHz (low band)	WLAN 5GHz (high band)	Bluetooth

3. Simultaneously transmission condition.

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

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

No.	Brand	Model No.	Spec.	Plug
1	APD	WA-36N12R	Input: 100-240Vac, 0.9A, 50-60Hz Output: 12Vdc, 3.0A DC Output cable: Unshielded, 1.5m	Interchangeable
2	APD	WA-36N12FU	Input: 100-240Vac, 0.9A, 50-60Hz Output: 12Vdc, 3.0A DC Output cable: Unshielded, 1.5m	US
3	LEI	MU36B1120300-A1	Input: 100-240Vac, 1A, 50/60Hz Output: 12Vdc, 3.0A DC Output cable: Unshielded, 1.5m	US
Note: From the above adapters, the worst Radiated Emissions and AC Power Conducted Emission was found in **Adapter 2.** Therefore only the test data of the mode was recorded in this report.				

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

Ant. No.	Transmitter Circuit	Ant.Net Gain (dBi)	Freq. Range (GHz)	Ant. Type	Connector Type
WIFi LB_1	Dual A	3.1	2.4~2.4835	PCB	i-pex(MHF)
		3.5	5.15~5.25		
		5	5.25~5.35		
		3.7	5.47~5.725		
		4.6	5.725~5.85		
WIFi LB_2	Dual B	2.8	2.4~2.4835	PCB	i-pex(MHF)
		4.8	5.15~5.25		
		5.1	5.25~5.35		
		5	5.47~5.725		
		4.7	5.725~5.85		
WIFi HB_1	5/6G A	3	5.15~5.25	PCB	i-pex(MHF)
		3.8	5.25~5.35		
		3.7	5.47~5.725		
		3.7	5.725~5.85		
WIFi HB_2	5/6G B	3.3	5.15~5.25	PCB	i-pex(MHF)
		4.1	5.25~5.35		
		3.3	5.47~5.725		
		3.3	5.725~5.85		
WIFi HB_3	5/6G C	2.6	5.15~5.25	PCB	i-pex(MHF)
		3.6	5.25~5.35		
		4.1	5.47~5.725		
		3.9	5.725~5.85		
WIFi HB_4	5/6G D	2.4	5.15~5.25	PCB	i-pex(MHF)
		2.9	5.25~5.35		
		2.6	5.47~5.725		
		3.8	5.725~5.85		
BT	-	2.1	2.4~2.4835	PCB	i-pex(MHF)

6. The EUT incorporates a MIMO function.

MODULATION MODE	Radio 1 - 2.4GHz Band 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

MODULATION MODE	Radio 2 - 5GHz Band (low band) TX & RX CONFIGURATION		Radio 3 - 5GHz Band (high band) TX & RX CONFIGURATION	
802.11a	2TX	2RX	4TX	4RX
802.11n (HT20)	2TX	2RX	4TX	4RX
802.11n (HT40)	2TX	2RX	4TX	4RX
802.11ac (VHT20)	2TX	2RX	4TX	4RX
802.11ac (VHT40)	2TX	2RX	4TX	4RX
802.11ac (VHT80)	2TX	2RX	4TX	4RX
802.11ax (HE20)	2TX	2RX	4TX	4RX
802.11ax (HE40)	2TX	2RX	4TX	4RX
802.11ax (HE80)	2TX	2RX	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 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 refer 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 and 802.11n (HT20), VHT20, 802.11ax (HE20):

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

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

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

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
802.11b	1 to 11	6	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	6	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:

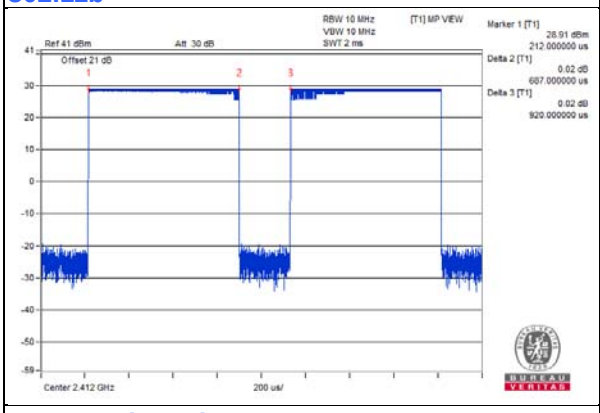
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Nelson Teng
RE<1G	23deg. C, 67%RH	120Vac, 60Hz	Ryan Du
PLC	25deg. C, 75%RH	120Vac, 60Hz	Sampson Chen
APCM	24deg. C, 60%RH	120Vac, 60Hz	Jyunchun Lin

3.3 Duty Cycle of Test Signal

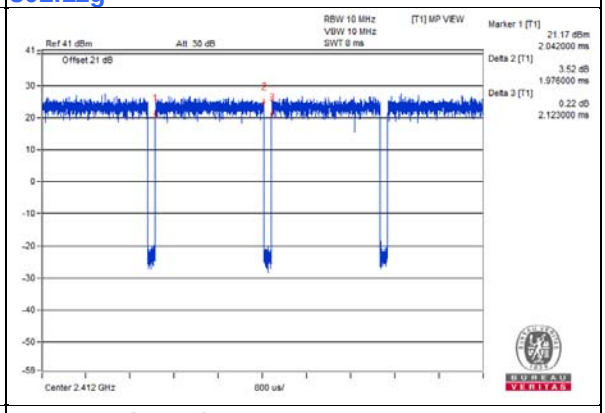
Duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b: Duty cycle = 0.687 ms/0.92 ms = 0.747, Duty factor = 10 * log (1/Duty cycle) = 1.27 dB
802.11g: Duty cycle = 1.976 ms/2.123 ms = 0.931, Duty factor = 10 * log (1/Duty cycle) = 0.31 dB
802.11ax (HE20): Duty cycle = 5.446 ms/5.731 ms = 0.95, Duty factor = 10 * log (1/Duty cycle) = 0.22 dB
802.11ax (HE40): Duty cycle = 5.443 ms/5.775 ms = 0.943, Duty factor = 10 * log (1/Duty cycle) = 0.26 dB

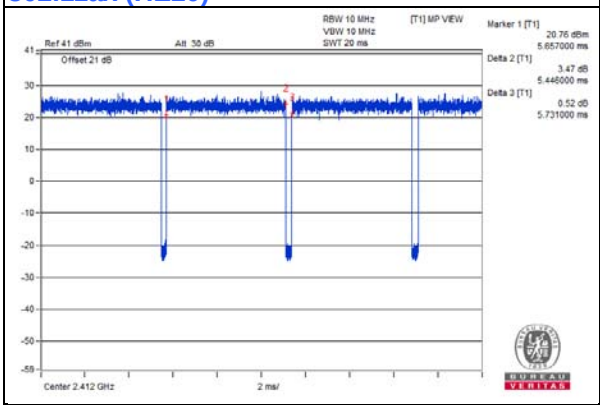
802.11b



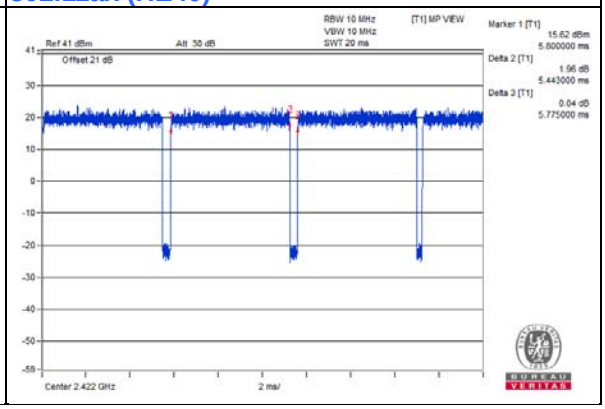
802.11g



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.

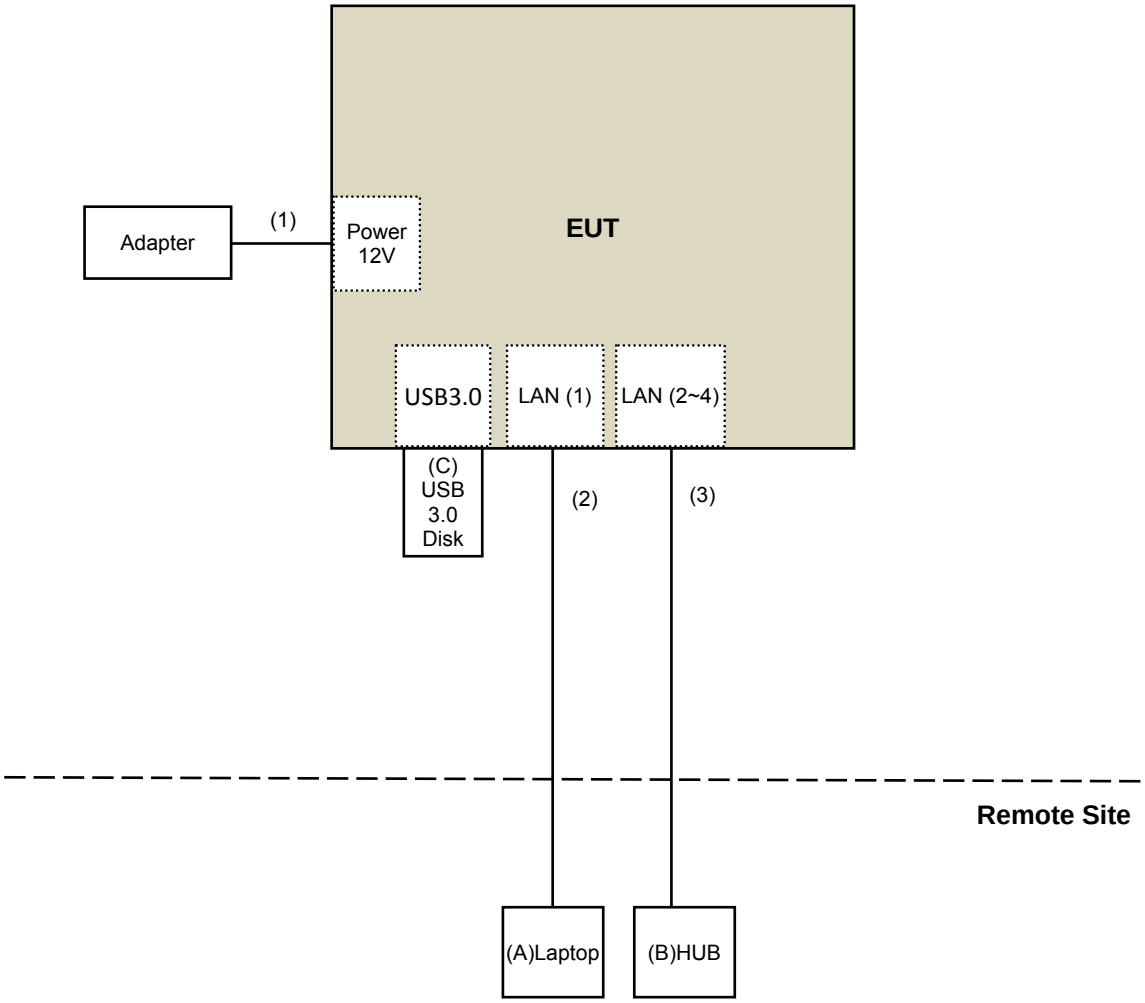
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	Lenovo	81A4	YD02YN76	PD93165NGU	Provided by Lab
B.	HUB	ZyXEL	GS1100-16	S150H44000046	DoC	Provided by Lab
C.	USB 3.0 Disk	SanDisk	Ultra Flalr USB 3.0	NA	NA	Provided by Lab

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

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards and References

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

Test Standard:

FCC Part 15, Subpart C (15.247)

ANSI C63.10-2013

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

References Test Guidance:

KDB 558074 D01 15.247 Meas Guidance v05r02

KDB 662911 D01 Multiple Transmitter Output v02r01

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

Note:

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

4.1.2 Test Instruments

For Radiated Emission test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 03, 2019	July 02, 2020
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. 26, 2019	Sep. 25, 2020
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 17, 2019	July 16, 2020
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: June 26, 2020

For Bandedge test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 03, 2019	July 02, 2020
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 10, 2019	June 09, 2020
RF Cable	EMC104-SM-SM-6000	180602	June 10, 2019	June 09, 2020
Spectrum Analyzer Keysight	N9030A	MY54490679	July 17, 2019	July 16, 2020
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: June 08, 2020

For other test items:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	100964	May 29, 2020	May 28, 2021
Power meter Anritsu	ML2495A	1529002	July 26, 2019	July 25, 2020
Power sensor Anritsu	MA2411B	1339443	July 26, 2019	July 25, 2020
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: July 02, 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:

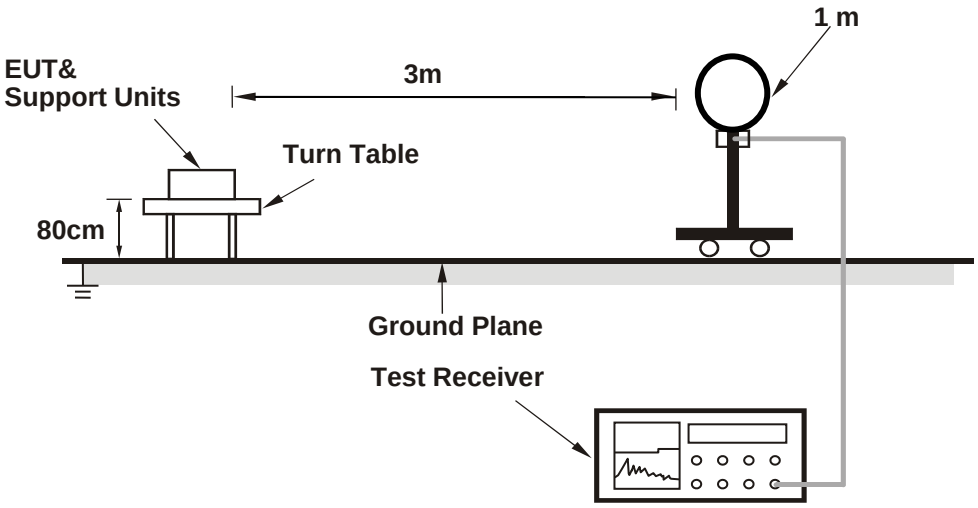
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

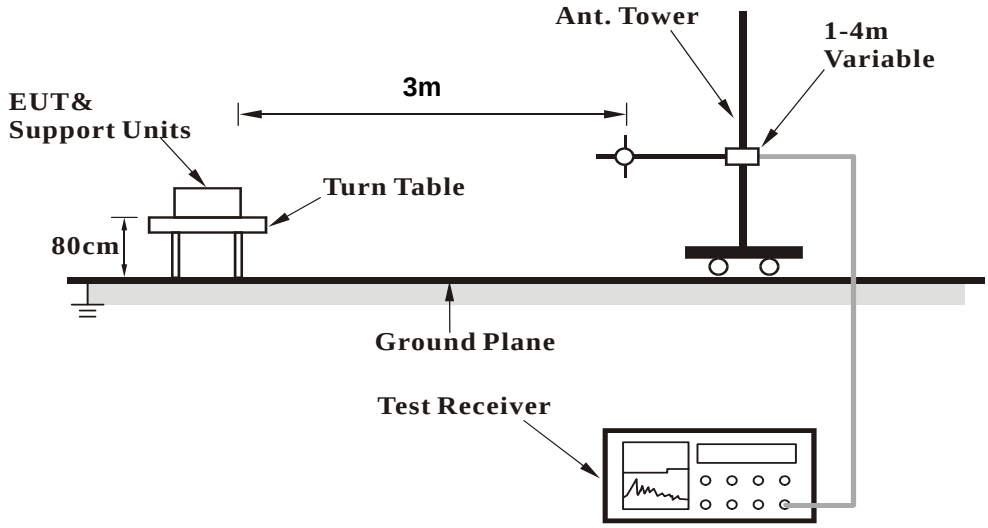
No deviation.

4.1.5 Test Setup

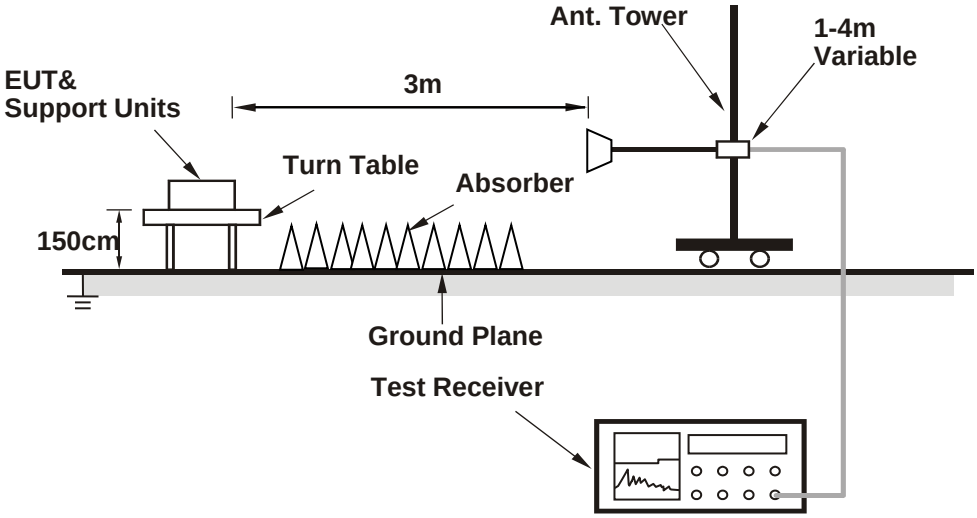
For Radiated emission below 30MHz



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. Placed the EUT on the testing table.
b. Controlling software (QDART-Connectivity1.0-00074.1) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data:

802.11b

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

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	2383.50	58.8 PK	74.0	-15.2	1.98 H	229	60.7	-1.9
2	2383.50	50.5 AV	54.0	-3.5	1.98 H	229	52.4	-1.9
3	*2412.00	115.7 PK			1.98 H	229	117.6	-1.9
4	*2412.00	113.7 AV			1.98 H	229	115.6	-1.9
5	4824.00	45.5 PK	74.0	-28.5	1.68 H	360	42.6	2.9
6	4824.00	35.0 AV	54.0	-19.0	1.68 H	360	32.1	2.9
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	2383.73	58.8 PK	74.0	-15.2	2.13 V	268	60.7	-1.9
2	2383.73	52.8 AV	54.0	-1.2	2.13 V	268	54.7	-1.9
3	*2412.00	118.1 PK			2.13 V	268	120.0	-1.9
4	*2412.00	116.7 AV			2.13 V	268	118.6	-1.9
5	4824.00	45.4 PK	74.0	-28.6	1.58 V	121	42.5	2.9
6	4824.00	36.0 AV	54.0	-18.0	1.58 V	121	33.1	2.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	59.3 PK	74.0	-14.7	1.74 H	255	61.2	-1.9
2	2390.00	45.6 AV	54.0	-8.4	1.74 H	255	47.5	-1.9
3	*2437.00	116.4 PK			1.74 H	255	118.4	-2.0
4	*2437.00	114.3 AV			1.74 H	255	116.3	-2.0
5	2483.50	56.6 PK	74.0	-17.4	1.74 H	255	58.5	-1.9
6	2483.50	44.7 AV	54.0	-9.3	1.74 H	255	46.6	-1.9
7	4874.00	45.5 PK	74.0	-28.5	1.64 H	360	42.7	2.8
8	4874.00	35.2 AV	54.0	-18.8	1.64 H	360	32.4	2.8
9	7311.00	51.8 PK	74.0	-22.2	1.93 H	160	42.9	8.9
10	7311.00	44.7 AV	54.0	-9.3	1.93 H	160	35.8	8.9
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	61.4 PK	74.0	-12.6	2.36 V	272	63.3	-1.9
2	2390.00	47.7 AV	54.0	-6.3	2.36 V	272	49.6	-1.9
3	*2437.00	119.4 PK			2.36 V	272	121.4	-2.0
4	*2437.00	116.5 AV			2.36 V	272	118.5	-2.0
5	2483.50	58.8 PK	74.0	-15.2	2.36 V	272	60.7	-1.9
6	2483.50	47.2 AV	54.0	-6.8	2.36 V	272	49.1	-1.9
7	4874.00	45.8 PK	74.0	-28.2	1.54 V	129	43.0	2.8
8	4874.00	36.5 AV	54.0	-17.5	1.54 V	129	33.7	2.8
9	7311.00	49.7 PK	74.0	-24.3	2.11 V	162	40.8	8.9
10	7311.00	39.1 AV	54.0	-14.9	2.11 V	162	30.2	8.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	115.9 PK			1.70 H	240	117.8	-1.9
2	*2462.00	114.0 AV			1.70 H	240	115.9	-1.9
3	2489.23	57.7 PK	74.0	-16.3	1.70 H	240	59.6	-1.9
4	2489.23	51.3 AV	54.0	-2.7	1.70 H	240	53.2	-1.9
5	4924.00	45.4 PK	74.0	-28.6	1.61 H	360	42.7	2.7
6	4924.00	35.2 AV	54.0	-18.8	1.61 H	360	32.5	2.7
7	7386.00	52.0 PK	74.0	-22.0	1.95 H	165	43.0	9.0
8	7386.00	44.8 AV	54.0	-9.2	1.95 H	165	35.8	9.0
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	117.1 PK			2.12 V	271	119.0	-1.9
2	*2462.00	115.8 AV			2.12 V	271	117.7	-1.9
3	2489.23	59.3 PK	74.0	-14.7	2.12 V	271	61.2	-1.9
4	2489.23	53.4 AV	54.0	-0.6	2.12 V	271	55.3	-1.9
5	4924.00	45.2 PK	74.0	-28.8	1.49 V	122	42.5	2.7
6	4924.00	36.2 AV	54.0	-17.8	1.49 V	122	33.5	2.7
7	7386.00	49.8 PK	74.0	-24.2	2.05 V	150	40.8	9.0
8	7386.00	39.4 AV	54.0	-14.6	2.05 V	150	30.4	9.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	2387.36	58.6 PK	74.0	-15.4	1.95 H	230	60.5	-1.9
2	2387.36	49.0 AV	54.0	-5.0	1.95 H	230	50.9	-1.9
3	*2412.00	111.3 PK			1.95 H	230	113.2	-1.9
4	*2412.00	104.3 AV			1.95 H	230	106.2	-1.9
5	4824.00	39.6 PK	74.0	-34.4	1.62 H	360	36.7	2.9
6	4824.00	31.9 AV	54.0	-22.1	1.62 H	360	29.0	2.9
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	64.0 PK	74.0	-10.0	2.10 V	232	65.9	-1.9
2	2390.00	52.9 AV	54.0	-1.1	2.10 V	232	54.8	-1.9
3	*2412.00	114.2 PK			2.10 V	232	116.1	-1.9
4	*2412.00	106.0 AV			2.10 V	232	107.9	-1.9
5	4824.00	40.3 PK	74.0	-33.7	1.57 V	138	37.4	2.9
6	4824.00	31.2 AV	54.0	-22.8	1.57 V	138	28.3	2.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	60.3 PK	74.0	-13.7	1.95 H	242	62.2	-1.9
2	2390.00	49.1 AV	54.0	-4.9	1.95 H	242	51.0	-1.9
3	*2437.00	112.2 PK			1.95 H	242	114.2	-2.0
4	*2437.00	105.2 AV			1.95 H	242	107.2	-2.0
5	2483.50	63.2 PK	74.0	-10.8	1.95 H	242	65.1	-1.9
6	2483.50	49.5 AV	54.0	-4.5	1.95 H	242	51.4	-1.9
7	4874.00	40.3 PK	74.0	-33.7	1.62 H	360	37.5	2.8
8	4874.00	32.1 AV	54.0	-21.9	1.62 H	360	29.3	2.8
9	7311.00	46.4 PK	74.0	-27.6	1.96 H	175	37.5	8.9
10	7311.00	39.2 AV	54.0	-14.8	1.96 H	175	30.3	8.9
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	62.9 PK	74.0	-11.1	1.88 V	236	64.8	-1.9
2	2390.00	51.3 AV	54.0	-2.7	1.88 V	236	53.2	-1.9
3	*2437.00	121.0 PK			1.88 V	236	123.0	-2.0
4	*2437.00	111.9 AV			1.88 V	236	113.9	-2.0
5	2483.50	66.0 PK	74.0	-8.0	1.88 V	236	67.9	-1.9
6	2483.50	51.5 AV	54.0	-2.5	1.88 V	236	53.4	-1.9
7	4874.00	40.4 PK	74.0	-33.6	1.60 V	132	37.6	2.8
8	4874.00	31.3 AV	54.0	-22.7	1.60 V	132	28.5	2.8
9	7311.00	44.8 PK	74.0	-29.2	2.06 V	175	35.9	8.9
10	7311.00	35.4 AV	54.0	-18.6	2.06 V	175	26.5	8.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	111.5 PK			1.98 H	241	113.4	-1.9
2	*2462.00	104.7 AV			1.98 H	241	106.6	-1.9
3	2483.50	63.8 PK	74.0	-10.2	1.98 H	241	65.7	-1.9
4	2483.50	51.5 AV	54.0	-2.5	1.98 H	241	53.4	-1.9
5	4924.00	39.9 PK	74.0	-34.1	1.62 H	360	37.2	2.7
6	4924.00	32.0 AV	54.0	-22.0	1.62 H	360	29.3	2.7
7	7386.00	44.9 PK	74.0	-29.1	1.99 H	169	35.9	9.0
8	7386.00	37.7 AV	54.0	-16.3	1.99 H	169	28.7	9.0
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	115.0 PK			1.99 V	241	116.9	-1.9
2	*2462.00	107.0 AV			1.99 V	241	108.9	-1.9
3	2484.46	65.8 PK	74.0	-8.2	1.99 V	241	67.7	-1.9
4	2484.46	53.4 AV	54.0	-0.6	1.99 V	241	55.3	-1.9
5	4924.00	40.0 PK	74.0	-34.0	1.61 V	123	37.3	2.7
6	4924.00	30.9 AV	54.0	-23.1	1.61 V	123	28.2	2.7
7	7386.00	42.9 PK	74.0	-31.1	2.11 V	173	33.9	9.0
8	7386.00	33.3 AV	54.0	-20.7	2.11 V	173	24.3	9.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	2387.70	60.6 PK	74.0	-13.4	2.24 H	248	62.5	-1.9
2	2387.70	47.8 AV	54.0	-6.2	2.24 H	248	49.7	-1.9
3	*2412.00	113.2 PK			2.24 H	248	115.1	-1.9
4	*2412.00	104.3 AV			2.24 H	248	106.2	-1.9
5	4824.00	40.2 PK	74.0	-33.8	1.60 H	360	37.3	2.9
6	4824.00	32.0 AV	54.0	-22.0	1.60 H	360	29.1	2.9
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	63.4 PK	74.0	-10.6	2.09 V	270	65.3	-1.9
2	**2390.00**	**53.7 AV**	**54.0**	**-0.3**	**2.09 V**	**270**	**55.6**	**-1.9**
3	*2412.00	117.9 PK			2.09 V	270	119.8	-1.9
4	*2412.00	107.2 AV			2.09 V	270	109.1	-1.9
5	4824.00	40.1 PK	74.0	-33.9	1.64 V	124	37.2	2.9
6	4824.00	30.8 AV	54.0	-23.2	1.64 V	124	27.9	2.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	61.8 PK	74.0	-12.2	2.19 H	245	63.7	-1.9
2	2390.00	48.4 AV	54.0	-5.6	2.19 H	245	50.3	-1.9
3	*2437.00	119.9 PK			2.19 H	245	121.9	-2.0
4	*2437.00	108.9 AV			2.19 H	245	110.9	-2.0
5	2483.50	63.5 PK	74.0	-10.5	2.19 H	245	65.4	-1.9
6	2483.50	51.0 AV	54.0	-3.0	2.19 H	245	52.9	-1.9
7	4874.00	40.1 PK	74.0	-33.9	1.58 H	360	37.3	2.8
8	4874.00	32.2 AV	54.0	-21.8	1.58 H	360	29.4	2.8
9	7311.00	45.0 PK	74.0	-29.0	2.02 H	178	36.1	8.9
10	7311.00	37.7 AV	54.0	-16.3	2.02 H	178	28.8	8.9
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	64.0 PK	74.0	-10.0	2.20 V	249	65.9	-1.9
2	2390.00	50.5 AV	54.0	-3.5	2.20 V	249	52.4	-1.9
3	*2437.00	123.5 PK			2.20 V	249	125.5	-2.0
4	*2437.00	111.0 AV			2.20 V	249	113.0	-2.0
5	2483.50	66.8 PK	74.0	-7.2	2.20 V	249	68.7	-1.9
6	2483.50	53.2 AV	54.0	-0.8	2.20 V	249	55.1	-1.9
7	4874.00	40.1 PK	74.0	-33.9	1.63 V	111	37.3	2.8
8	4874.00	30.8 AV	54.0	-23.2	1.63 V	111	28.0	2.8
9	7311.00	42.9 PK	74.0	-31.1	2.08 V	177	34.0	8.9
10	7311.00	33.5 AV	54.0	-20.5	2.08 V	177	24.6	8.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	113.6 PK			2.04 H	247	115.5	-1.9
2	*2462.00	102.8 AV			2.04 H	247	104.7	-1.9
3	2483.50	63.4 PK	74.0	-10.6	2.04 H	247	65.3	-1.9
4	2483.50	53.2 AV	54.0	-0.8	2.04 H	247	55.1	-1.9
5	4924.00	39.9 PK	74.0	-34.1	1.67 H	360	37.2	2.7
6	4924.00	32.3 AV	54.0	-21.7	1.67 H	360	29.6	2.7
7	7386.00	42.7 PK	74.0	-31.3	2.04 H	158	33.7	9.0
8	7386.00	35.5 AV	54.0	-18.5	2.04 H	158	26.5	9.0
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	116.1 PK			2.14 V	252	118.0	-1.9
2	*2462.00	105.2 AV			2.14 V	252	107.1	-1.9
3	2487.75	62.3 PK	74.0	-11.7	2.14 V	252	64.2	-1.9
4	2487.75	50.8 AV	54.0	-3.2	2.14 V	252	52.7	-1.9
5	4924.00	39.9 PK	74.0	-34.1	1.66 V	117	37.2	2.7
6	4924.00	30.7 AV	54.0	-23.3	1.66 V	117	28.0	2.7
7	7386.00	43.3 PK	74.0	-30.7	2.12 V	178	34.3	9.0
8	7386.00	33.6 AV	54.0	-20.4	2.12 V	178	24.6	9.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	2385.05	58.6 PK	74.0	-15.4	1.95 H	250	60.5	-1.9
2	2385.05	49.2 AV	54.0	-4.8	1.95 H	250	51.1	-1.9
3	*2422.00	111.3 PK			1.95 H	250	113.2	-1.9
4	*2422.00	100.6 AV			1.95 H	250	102.5	-1.9
5	4844.00	40.0 PK	74.0	-34.0	1.62 H	360	37.1	2.9
6	4844.00	32.1 AV	54.0	-21.9	1.62 H	360	29.2	2.9
7	7266.00	43.2 PK	74.0	-30.8	1.98 H	174	34.4	8.8
8	7266.00	34.1 AV	54.0	-19.9	1.98 H	174	25.3	8.8
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	64.1 PK	74.0	-9.9	2.05 V	247	66.0	-1.9
2	2390.00	53.6 AV	54.0	-0.4	2.05 V	247	55.5	-1.9
3	*2422.00	113.3 PK			2.05 V	247	115.2	-1.9
4	*2422.00	103.0 AV			2.05 V	247	104.9	-1.9
5	4844.00	40.1 PK	74.0	-33.9	1.64 V	111	37.2	2.9
6	4844.00	31.3 AV	54.0	-22.7	1.64 V	111	28.4	2.9
7	7266.00	43.0 PK	74.0	-31.0	2.14 V	181	34.2	8.8
8	7266.00	33.6 AV	54.0	-20.4	2.14 V	181	24.8	8.8

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	56.7 PK	74.0	-17.3	1.97 H	248	58.6	-1.9
2	2390.00	44.2 AV	54.0	-9.8	1.97 H	248	46.1	-1.9
3	*2437.00	112.1 PK			1.97 H	248	114.1	-2.0
4	*2437.00	101.3 AV			1.97 H	248	103.3	-2.0
5	2483.50	60.4 PK	74.0	-13.6	1.97 H	248	62.3	-1.9
6	2483.50	50.8 AV	54.0	-3.2	1.97 H	248	52.7	-1.9
7	4874.00	40.2 PK	74.0	-33.8	1.65 H	360	37.4	2.8
8	4874.00	32.4 AV	54.0	-21.6	1.65 H	360	29.6	2.8
9	7311.00	43.5 PK	74.0	-30.5	1.97 H	176	34.6	8.9
10	7311.00	34.0 AV	54.0	-20.0	1.97 H	176	25.1	8.9
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	61.2 PK	74.0	-12.8	1.96 V	254	63.1	-1.9
2	2390.00	46.6 AV	54.0	-7.4	1.96 V	254	48.5	-1.9
3	*2437.00	115.9 PK			1.96 V	254	117.9	-2.0
4	*2437.00	102.8 AV			1.96 V	254	104.8	-2.0
5	2483.50	66.8 PK	74.0	-7.2	1.96 V	254	68.7	-1.9
6	2483.50	53.3 AV	54.0	-0.7	1.96 V	254	55.2	-1.9
7	4874.00	39.8 PK	74.0	-34.2	1.55 V	116	37.0	2.8
8	4874.00	30.5 AV	54.0	-23.5	1.55 V	116	27.7	2.8
9	7311.00	42.5 PK	74.0	-31.5	2.08 V	160	33.6	8.9
10	7311.00	32.8 AV	54.0	-21.2	2.08 V	160	23.9	8.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	108.5 PK			1.94 H	246	110.4	-1.9
2	*2452.00	98.6 AV			1.94 H	246	100.5	-1.9
3	2487.88	63.5 PK	74.0	-10.5	1.94 H	246	65.4	-1.9
4	2487.88	50.2 AV	54.0	-3.8	1.94 H	246	52.1	-1.9
5	4904.00	39.8 PK	74.0	-34.2	1.57 H	360	37.1	2.7
6	4904.00	31.8 AV	54.0	-22.2	1.57 H	360	29.1	2.7
7	7356.00	43.6 PK	74.0	-30.4	1.96 H	174	34.7	8.9
8	7356.00	34.3 AV	54.0	-19.7	1.96 H	174	25.4	8.9
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2452.00	111.0 PK			1.98 V	252	112.9	-1.9
2	*2452.00	100.0 AV			1.98 V	252	101.9	-1.9
3	2486.38	64.2 PK	74.0	-9.8	1.98 V	252	66.1	-1.9
4	2486.38	52.1 AV	54.0	-1.9	1.98 V	252	54.0	-1.9
5	4904.00	40.4 PK	74.0	-33.6	1.65 V	126	37.7	2.7
6	4904.00	31.0 AV	54.0	-23.0	1.65 V	126	28.3	2.7
7	7356.00	43.2 PK	74.0	-30.8	2.11 V	188	34.3	8.9
8	7356.00	33.7 AV	54.0	-20.3	2.11 V	188	24.8	8.9

Remarks:

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

Below 1GHz Data:

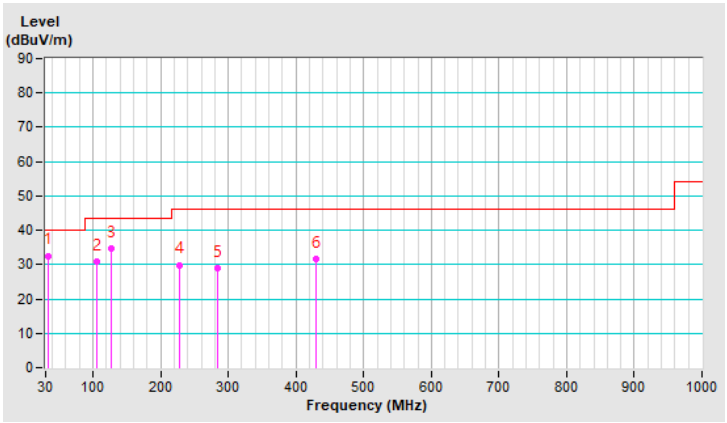
802.11b

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	32.91	32.6 QP	40.0	-7.4	2.50 H	75	41.4	-8.8
2	105.32	30.9 QP	43.5	-12.6	2.50 H	279	41.6	-10.7
3	127.86	34.6 QP	43.5	-8.9	1.50 H	157	42.9	-8.3
4	227.26	29.9 QP	46.0	-16.1	1.50 H	335	39.3	-9.4
5	284.55	28.8 QP	46.0	-17.2	1.00 H	319	35.2	-6.4
6	428.95	31.6 QP	46.0	-14.4	2.50 H	342	33.6	-2.0

Remarks:

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

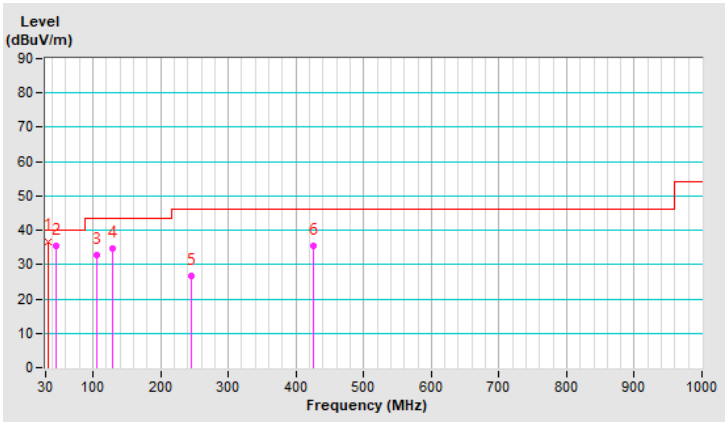


Channel	TX Channel 6	Detector Function	Quasi-Peak (QP)
Frequency Range	9kHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	34.39	36.8 QP	40.0	-3.2	1.00 V	360	45.4	-8.6
2	45.11	35.3 QP	40.0	-4.7	1.00 V	1	43.0	-7.7
3	106.48	32.9 QP	43.5	-10.6	1.50 V	263	43.4	-10.5
4	128.19	34.5 QP	43.5	-9.0	1.00 V	74	42.8	-8.3
5	246.12	26.7 QP	46.0	-19.3	2.00 V	0	34.7	-8.0
6	426.41	35.3 QP	46.0	-10.7	1.50 V	93	37.3	-2.0

Remarks:

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



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. 27, 2019	Sep. 26, 2020
Fixed attenuator EMCI	STI02-2200-10	005	Aug. 30, 2019	Aug. 29, 2020
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: July 01, 2020

4.2.3 Test Procedures

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

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

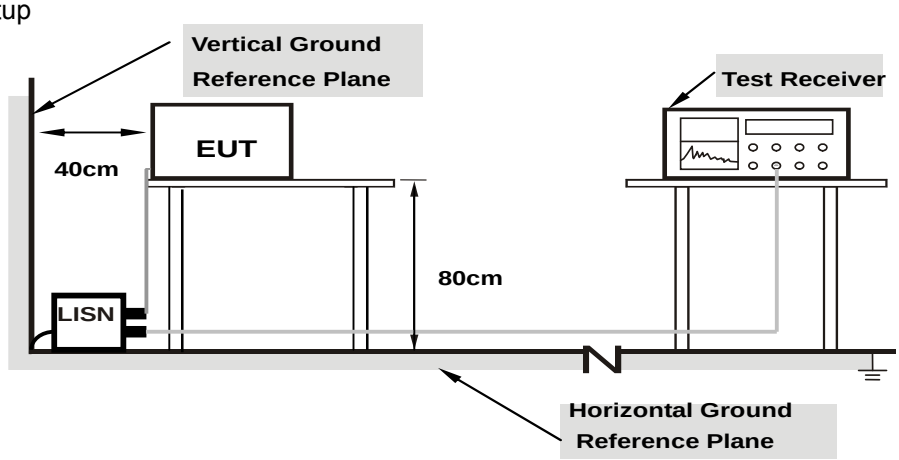
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

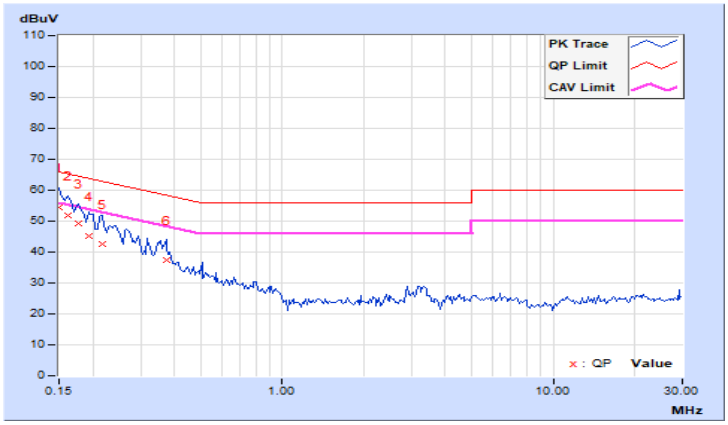
4.2.7 Test Results

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

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.15000**	**9.98**	**44.47**	**30.32**	**54.45**	**40.30**	**66.00**	**56.00**	**-11.55**	**-15.70**
2	0.16172	9.98	41.99	26.36	51.97	36.34	65.38	55.38	-13.41	-19.04
3	0.17734	9.99	39.18	24.53	49.17	34.52	64.61	54.61	-15.44	-20.09
4	0.19297	9.99	35.18	22.40	45.17	32.39	63.91	53.91	-18.74	-21.52
5	0.21641	9.99	32.73	21.04	42.72	31.03	62.96	52.96	-20.24	-21.93
6	0.37266	10.01	27.48	20.44	37.49	30.45	58.44	48.44	-20.95	-17.99

Remarks:

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

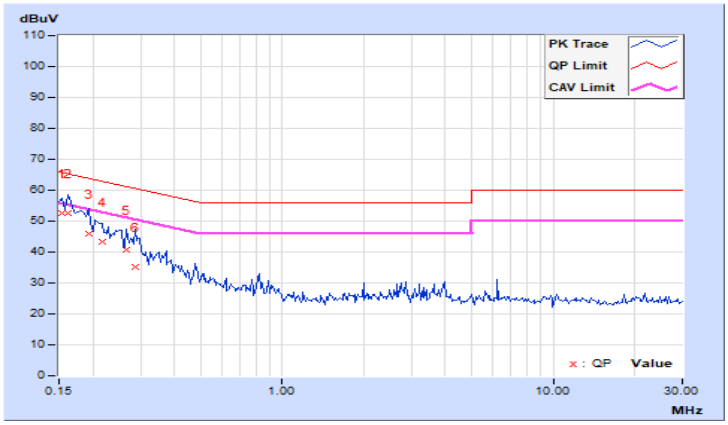


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	9.99	42.70	28.12	52.69	38.11	65.79	55.79	-13.10	-17.68
2	0.16172	9.99	42.72	26.72	52.71	36.71	65.38	55.38	-12.67	-18.67
3	0.19297	10.00	36.11	22.48	46.11	32.48	63.91	53.91	-17.80	-21.43
4	0.21641	10.00	33.46	20.61	43.46	30.61	62.96	52.96	-19.50	-22.35
5	0.26719	10.01	30.78	21.07	40.79	31.08	61.20	51.20	-20.41	-20.12
6	0.28672	10.01	25.22	13.46	35.23	23.47	60.62	50.62	-25.39	-27.15

Remarks:

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

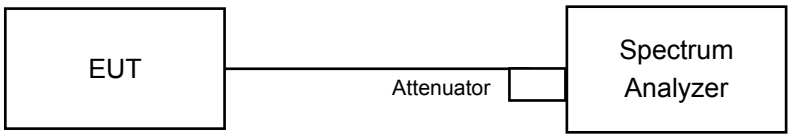


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

CDD Mode:

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	8.08	8.58	0.5	Pass
6	2437	8.56	9.12	0.5	Pass
11	2462	8.09	9.11	0.5	Pass

802.11g

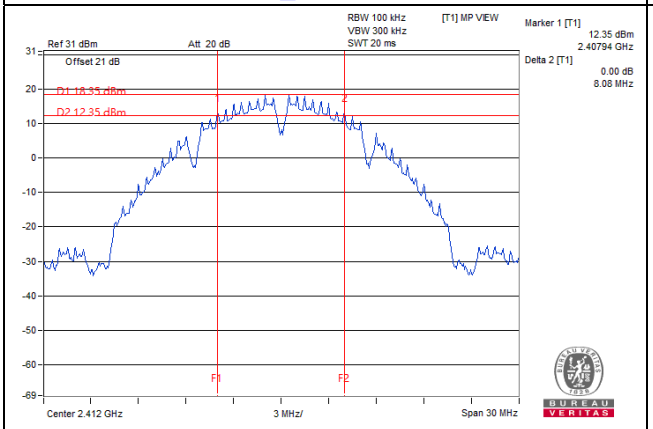
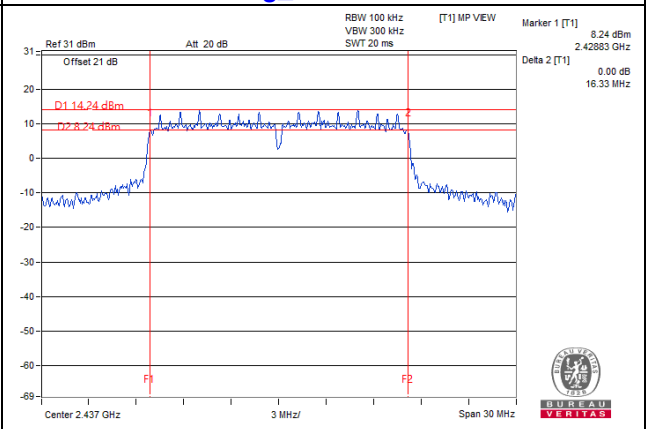
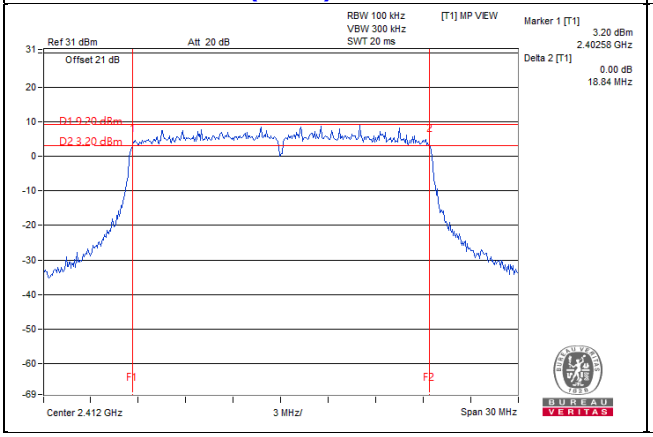
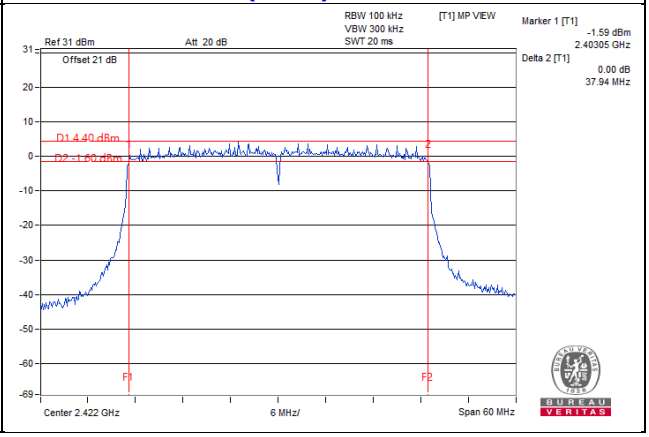
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.38	16.36	0.5	Pass
6	2437	16.36	16.33	0.5	Pass
11	2462	16.36	16.38	0.5	Pass

802.11ax (HE20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	18.95	18.84	0.5	Pass
6	2437	18.96	18.91	0.5	Pass
11	2462	19.07	18.96	0.5	Pass

802.11ax (HE40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	38.2	37.94	0.5	Pass
6	2437	38.05	37.97	0.5	Pass
9	2452	38.2	38.04	0.5	Pass

Spectrum Plot of Worst Value	
802.11b_Chain 0 / CH1	**802.11g_Chain 1 / CH6**
	
802.11ax (HE20)_Chain 1 / CH1	**802.11ax (HE40)_Chain 1 / CH3**
	

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

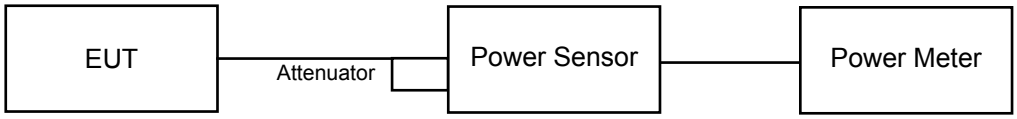
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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

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

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

CDD Mode:

802.11b

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	24.98	25.03	633.195	28.02	30.00	Pass
6	2437	25.98	26.06	799.923	29.03	30.00	Pass
11	2462	24.89	25.28	645.606	28.10	30.00	Pass

802.11b

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	20.52	20.48	224.406	23.51	30.00	Pass
6	2437	24.49	24.56	566.949	27.54	30.00	Pass
11	2462	20.03	19.93	199.094	22.99	30.00	Pass

VHT20

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	20.02	19.86	197.289	22.95	30.00	Pass
6	2437	24.93	24.82	614.561	27.89	30.00	Pass
11	2462	18.41	18.38	138.208	21.41	30.00	Pass

VHT40

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	18.43	18.37	138.369	21.41	30.00	Pass
6	2437	19.54	19.44	177.852	22.50	30.00	Pass
9	2452	16.61	16.30	88.472	19.47	30.00	Pass

802.11ax (HE20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	20.24	20.06	207.073	23.16	30.00	Pass
6	2437	25.16	25.08	650.202	28.13	30.00	Pass
11	2462	18.62	18.56	144.557	21.60	30.00	Pass

802.11ax (HE40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	18.62	18.56	144.557	21.60	30.00	Pass
6	2437	19.72	19.67	186.439	22.71	30.00	Pass
9	2452	16.82	16.52	92.958	19.68	30.00	Pass

Beamforming Mode:

VHT20

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	20.02	19.86	197.289	22.95	30.00	Pass
6	2437	24.93	24.82	614.561	27.89	30.00	Pass
11	2462	18.41	18.38	138.208	21.41	30.00	Pass

Note: The directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 5.96dBi < 6dBi , so the power limit shall not be reduced.

VHT40

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	18.43	18.37	138.369	21.41	30.00	Pass
6	2437	19.54	19.44	177.852	22.50	30.00	Pass
9	2452	16.61	16.30	88.472	19.47	30.00	Pass

Note: The directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 5.96dBi < 6dBi , so the power limit shall not be reduced.

802.11ax (HE20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	20.24	20.06	207.073	23.16	30.00	Pass
6	2437	25.16	25.08	650.202	28.13	30.00	Pass
11	2462	18.62	18.56	144.557	21.60	30.00	Pass

Note: The directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 5.96dBi < 6dBi , so the power limit shall not be reduced.

802.11ax (HE40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	18.62	18.56	144.557	21.60	30.00	Pass
6	2437	19.72	19.67	186.439	22.71	30.00	Pass
9	2452	16.82	16.52	92.958	19.68	30.00	Pass

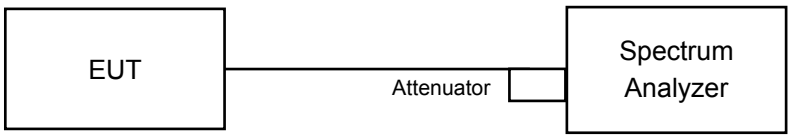
Note: The directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 5.96dBi < 6dBi , so the power limit shall not be reduced.

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

CDD Mode:

802.11b

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					
1	2412	-7.02	-7.66	1.27	0.4955	-3.05	8.00	Pass
6	2437	-7.30	-7.33	1.27	0.4977	-3.03	8.00	Pass
11	2462	-7.93	-8.81	1.27	0.3917	-4.07	8.00	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)^2 / 2] = 5.96dBi < 6dBi , so the power density limit shall not be reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11g

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					
1	2412	-14.99	-12.48	0.31	0.09462	-10.24	8.00	Pass
6	2437	-10.01	-8.91	0.31	0.24547	-6.10	8.00	Pass
11	2462	-15.36	-13.25	0.31	0.08204	-10.86	8.00	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)^2 / 2] = 5.96dBi < 6dBi , so the power density limit shall not be reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE20)

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					
1	2412	-16.57	-16.74	0.22	0.0455	-13.42	8.00	Pass
6	2437	-11.45	-11.69	0.22	0.14655	-8.34	8.00	Pass
11	2462	-17.72	-18.09	0.22	0.03412	-14.67	8.00	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)^2 / 2] = 5.96dBi < 6dBi , so the power density limit shall not be reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

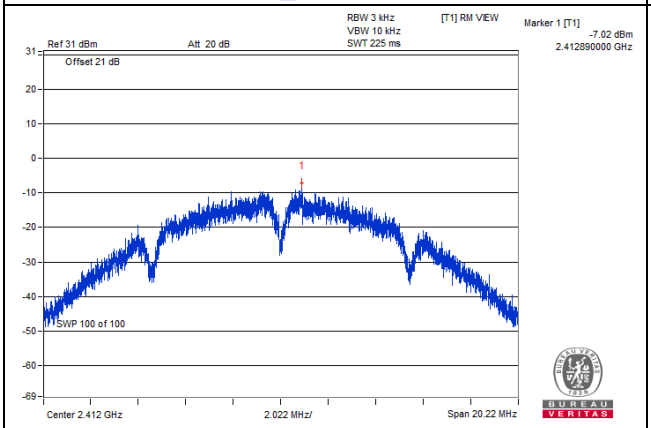
802.11ax (HE40)

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	-20.29	-20.83	0.26	0.018707	-17.28	8.00	Pass
6	2437	-18.35	-19.57	0.26	0.02723	-15.65	8.00	Pass
9	2452	-21.74	-22.31	0.26	0.013335	-18.75	8.00	Pass

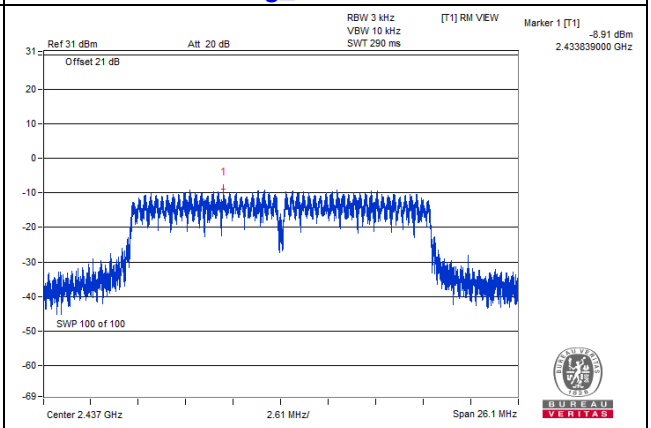
Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)^2 / 2] = 5.96dBi < 6dBi , so the power density limit shall not be reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

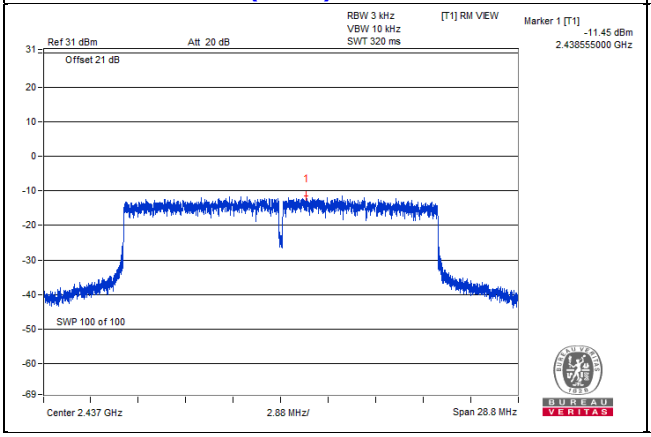
802.11b_Chain 0 / CH1



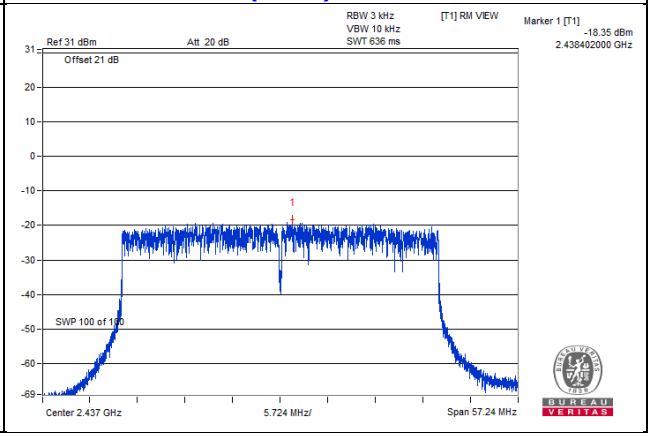
802.11g_Chain 1 / CH6



802.11ax (HE20)_Chain 0 / CH6



802.11ax (HE40)_Chain 0 / CH6

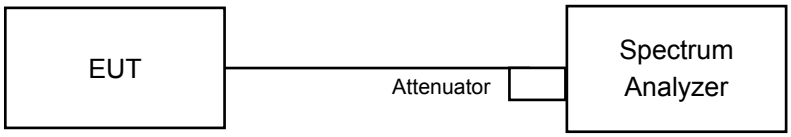


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOBE

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

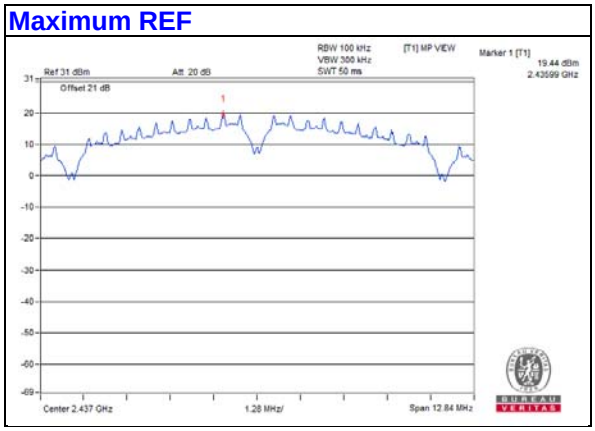
Same as Item 4.3.6

4.6.7 Test Results

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

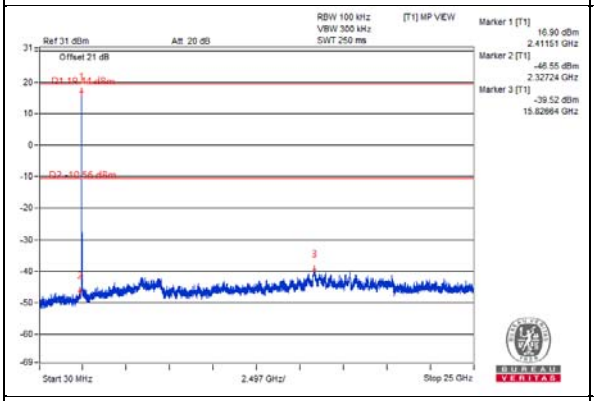
802.11b

Maximum REF

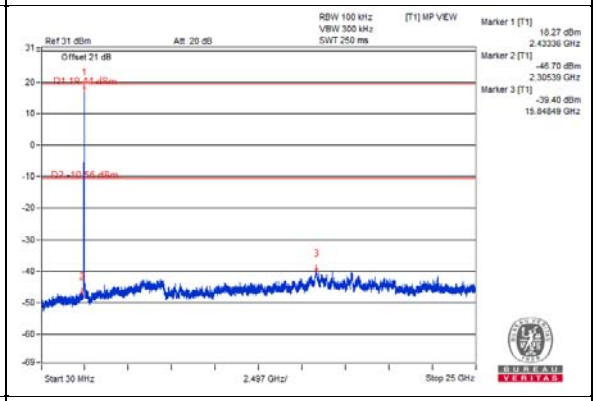


Chain 0

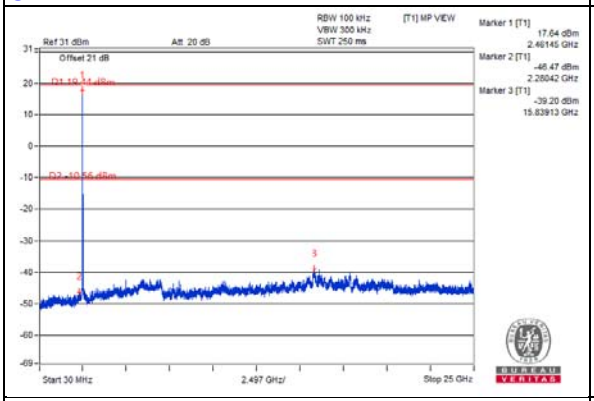
CH 1



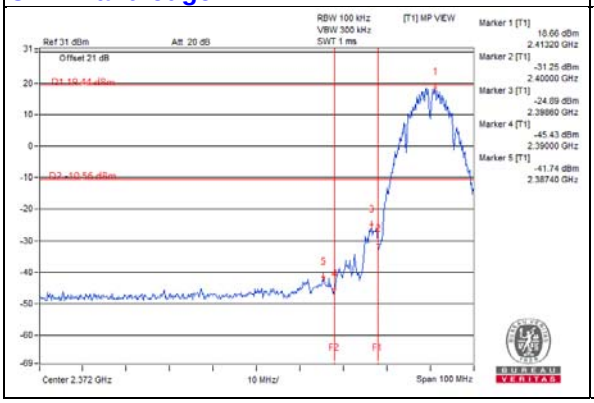
CH 6



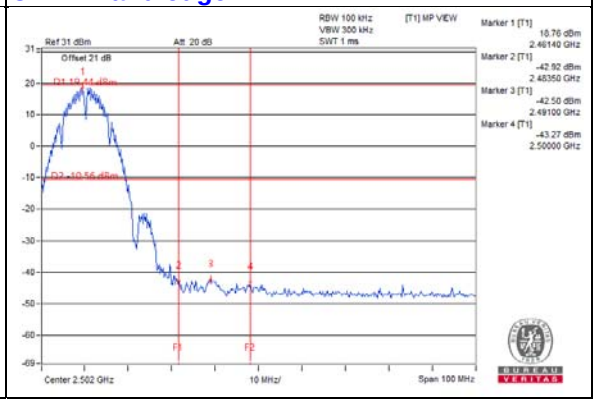
CH 11



CH 1 Band edge

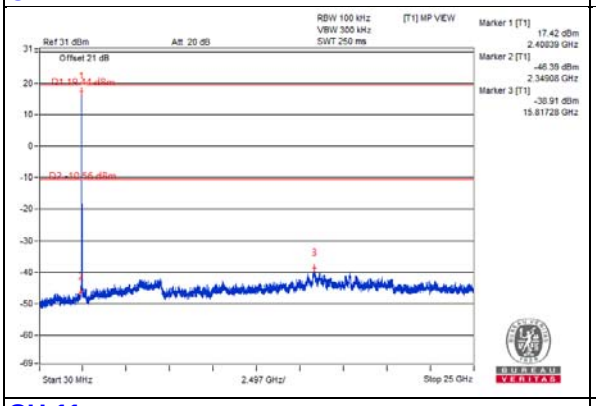


CH 11 Band edge

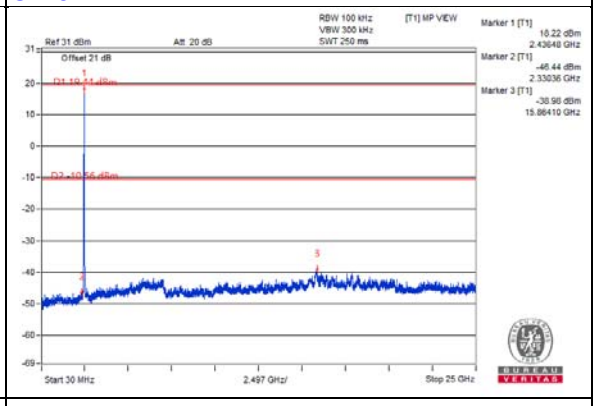


Chain 1

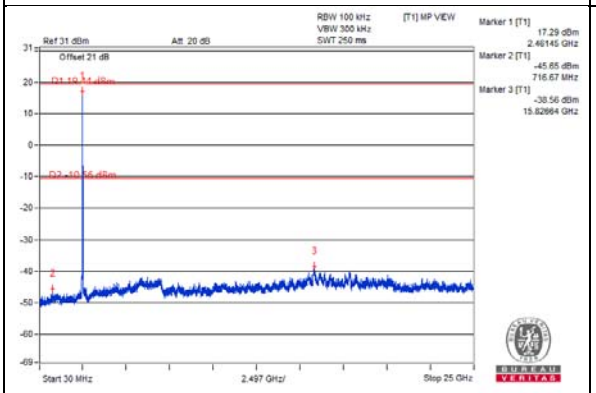
CH 1



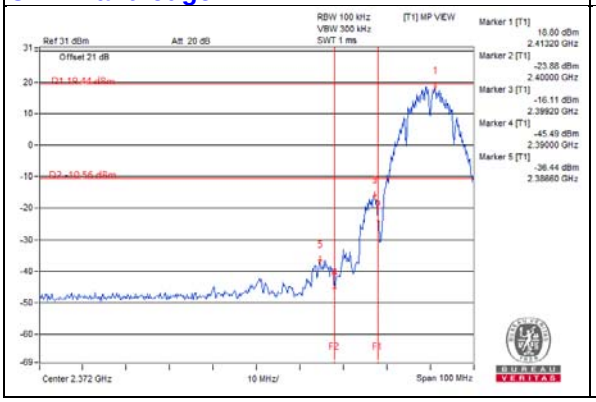
CH 6



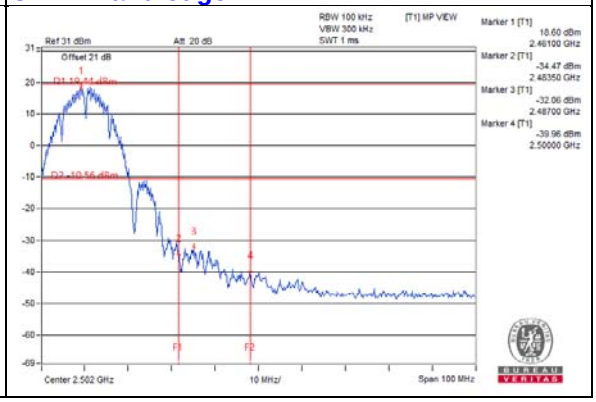
CH 11



CH 1 Band edge

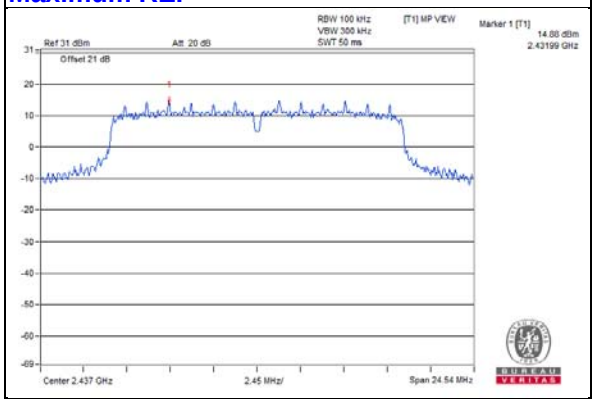


CH 11 Band edge



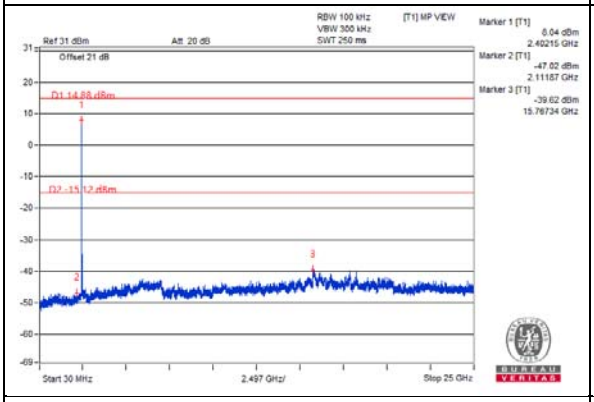
802.11g

Maximum REF

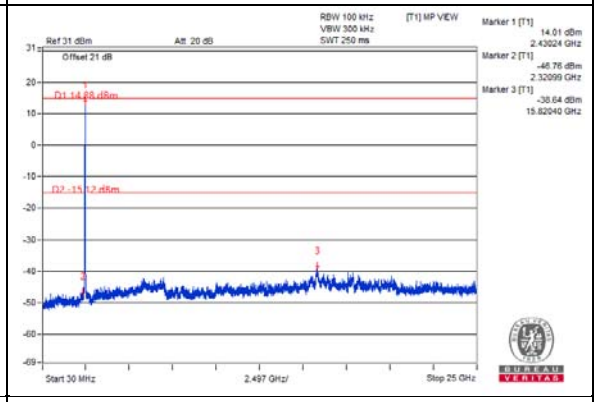


Chain 0

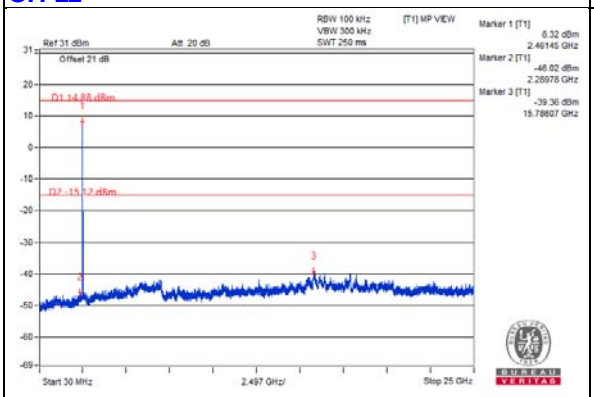
CH 1



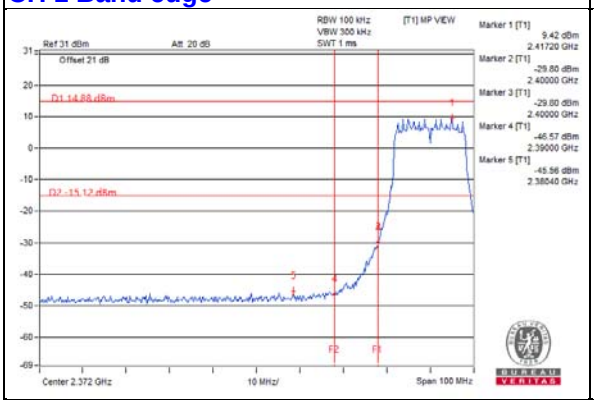
CH 6



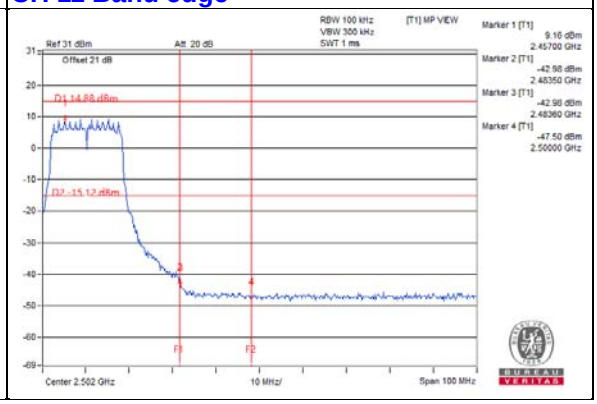
CH 11



CH 1 Band edge

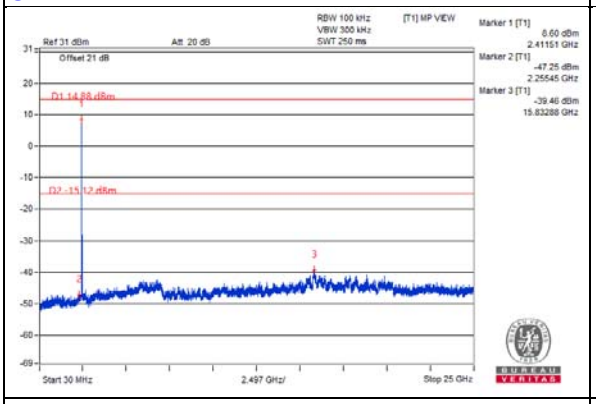


CH 11 Band edge

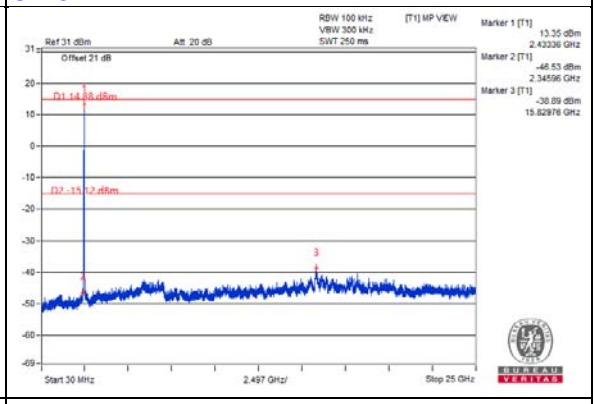


Chain 1

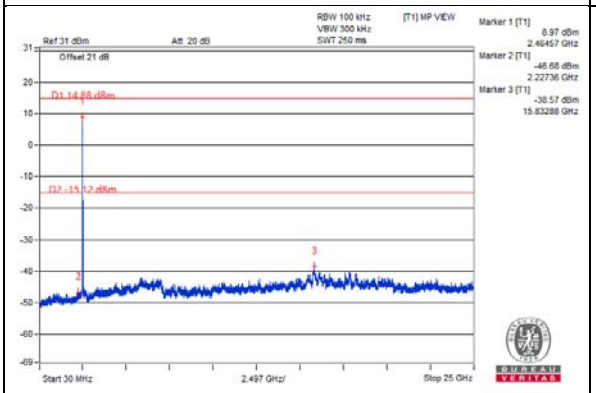
CH 1



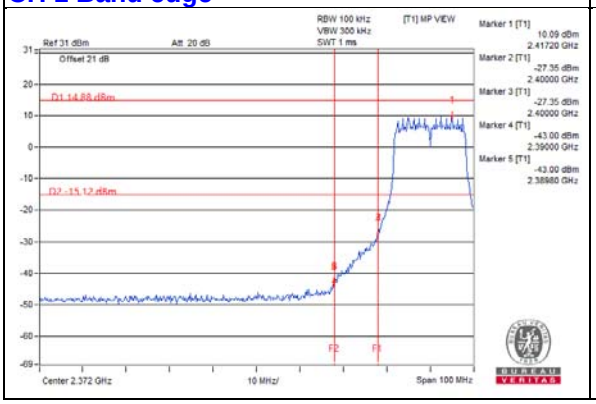
CH 6



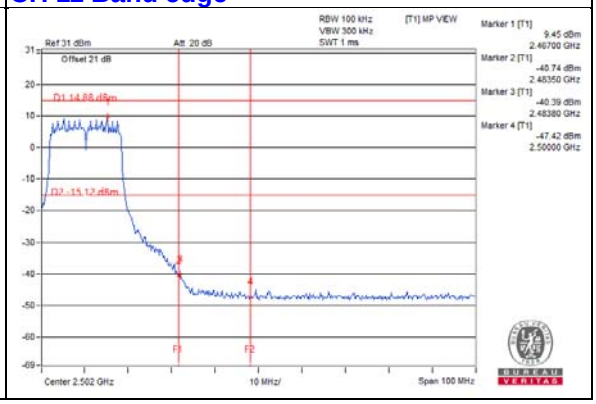
CH 11



CH 1 Band edge

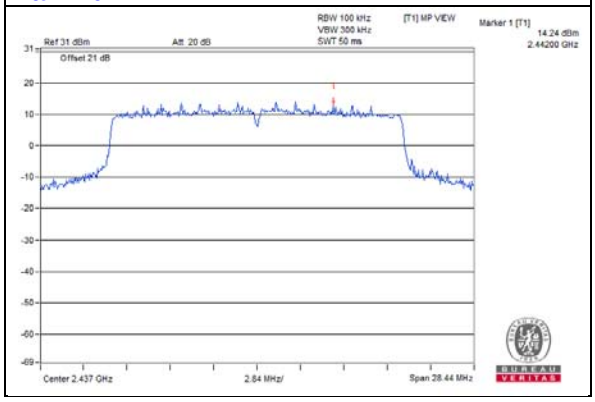


CH 11 Band edge



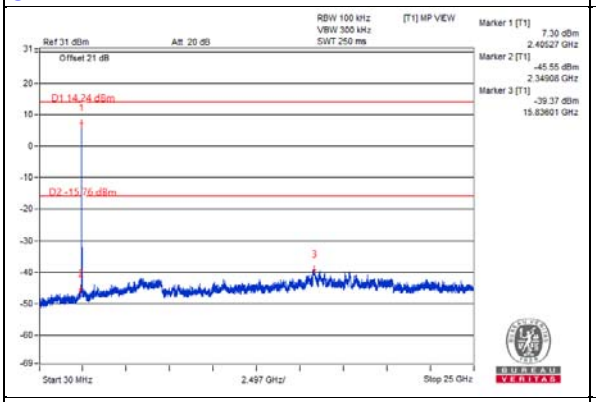
802.11ax (HE20)

Maximum REF

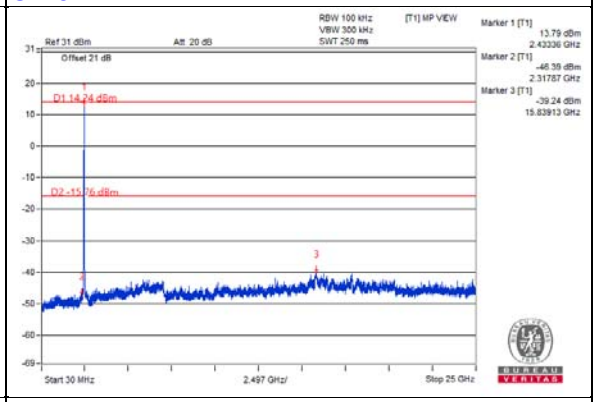


Chain 0

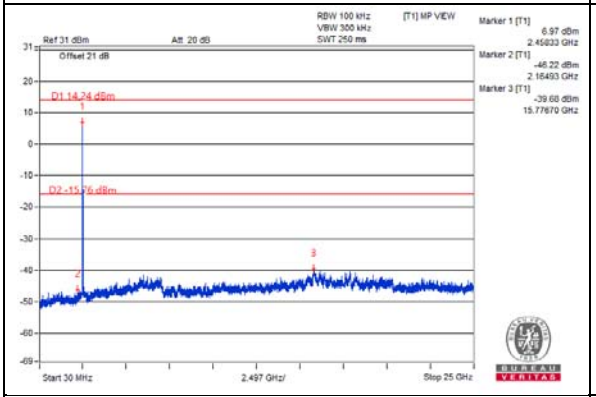
CH 1



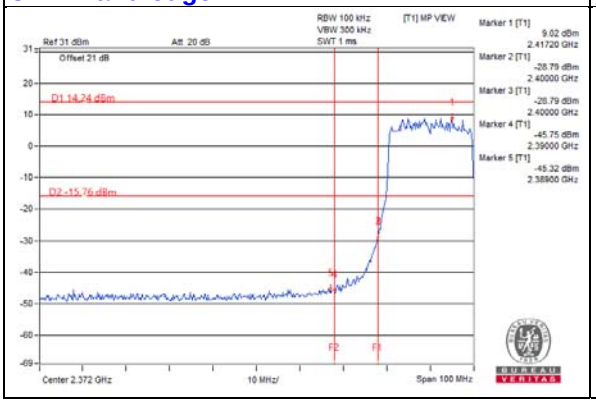
CH 6



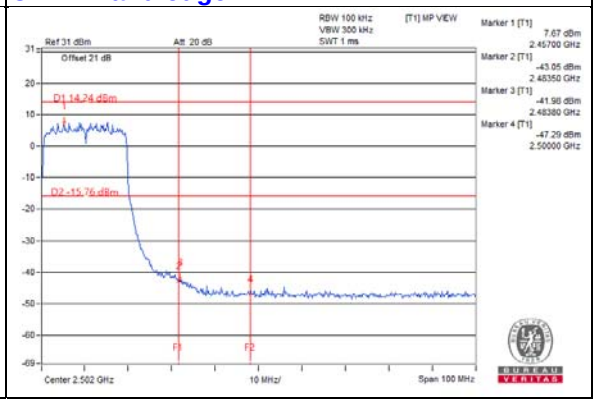
CH 11



CH 1 Band edge

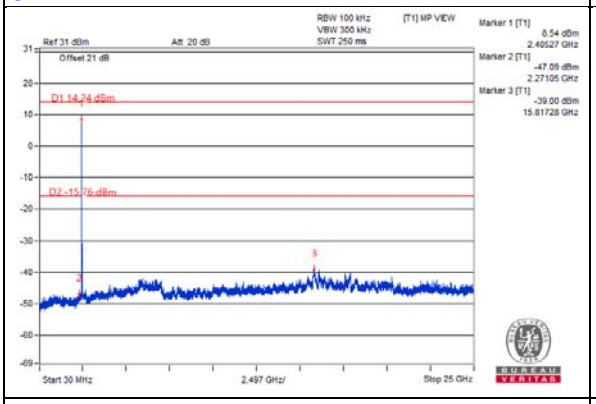


CH 11 Band edge

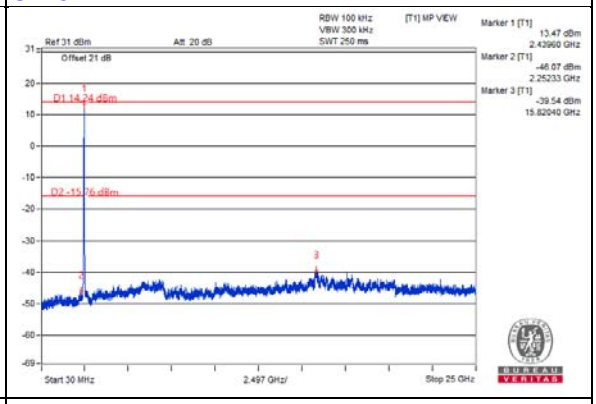


Chain 1

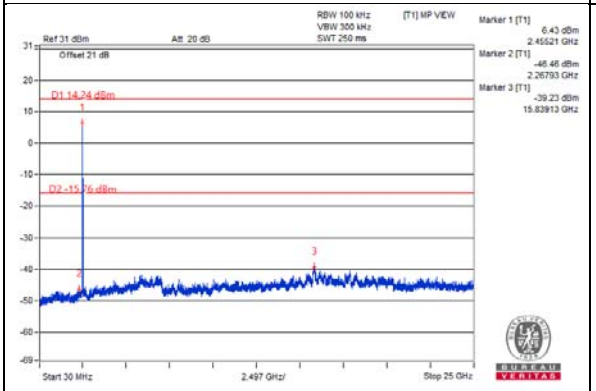
CH 1



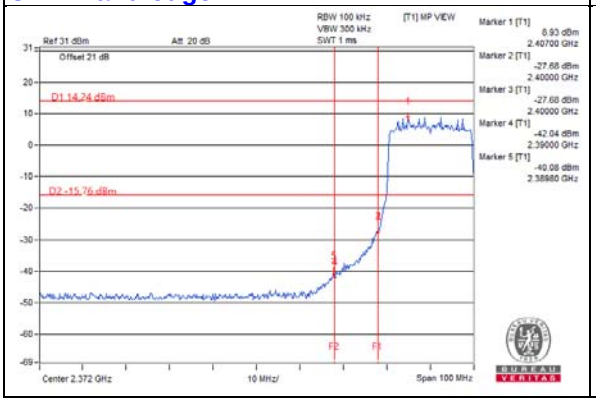
CH 6



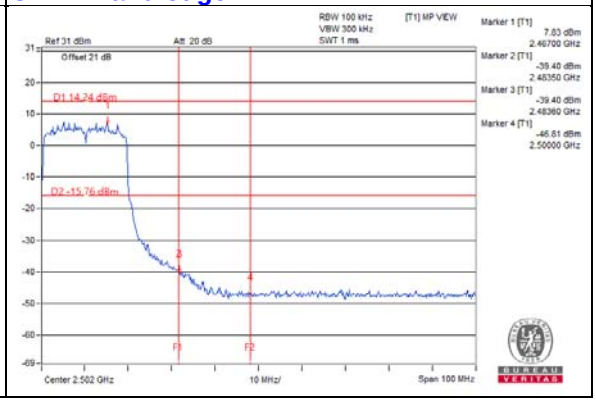
CH 11



CH 1 Band edge

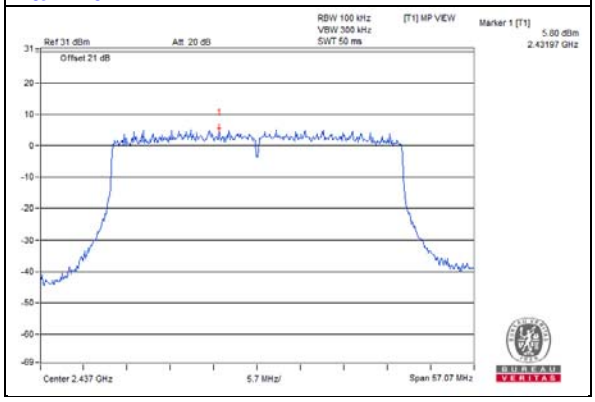


CH 11 Band edge



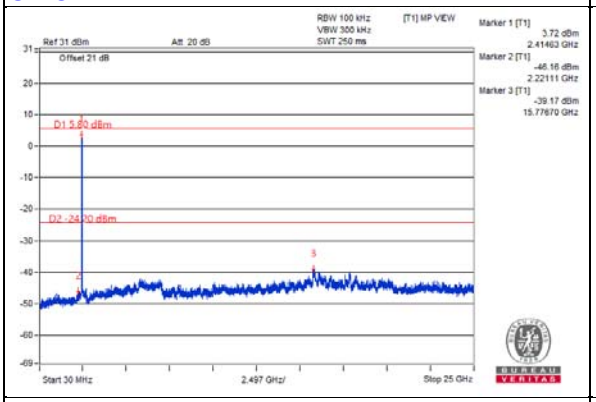
802.11ax (HE40)

Maximum REF

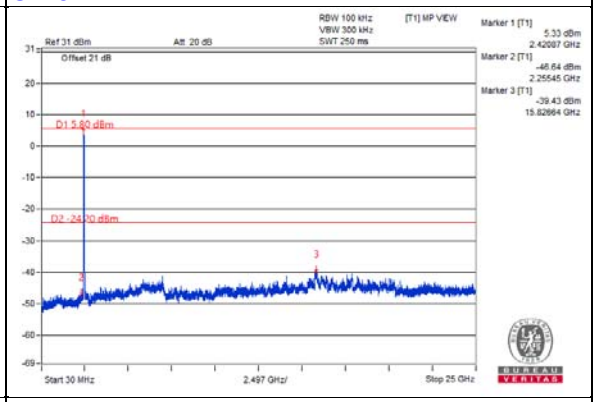


Chain 0

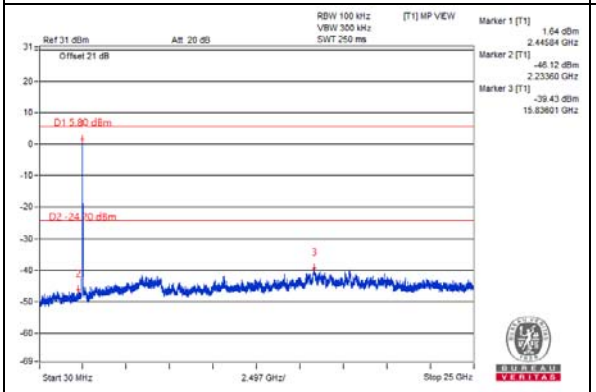
CH 3



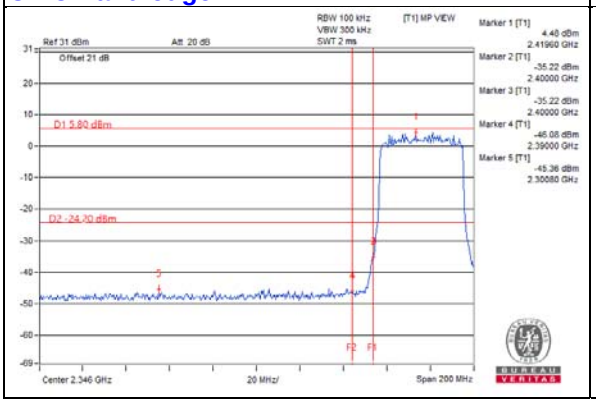
CH 6



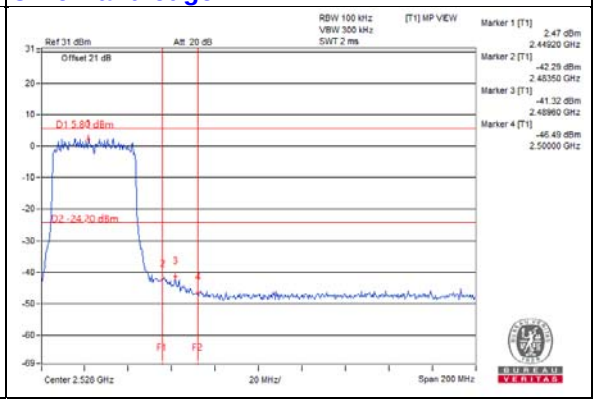
CH 9



CH 3 Band edge

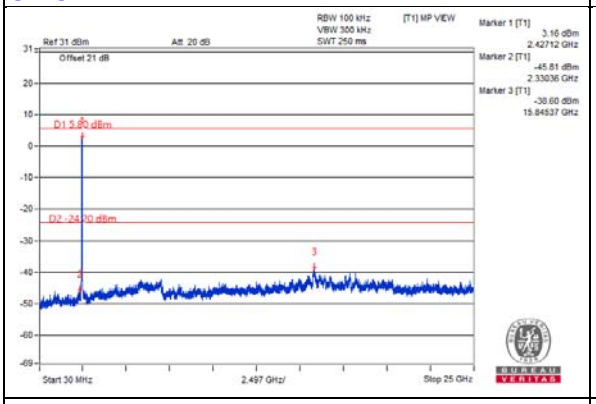


CH 9 Band edge

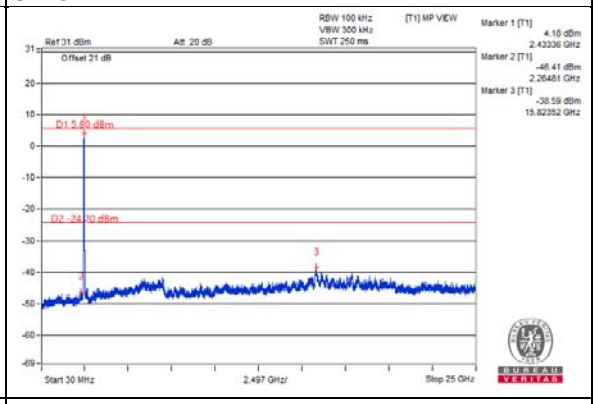


Chain 1

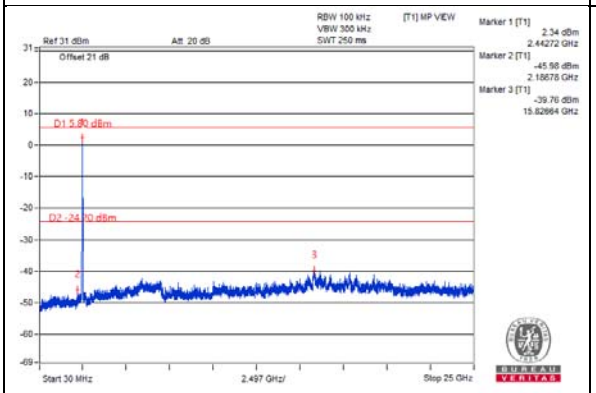
CH 3



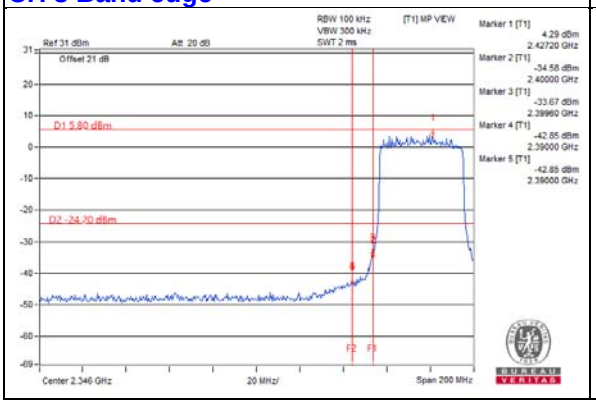
CH 6



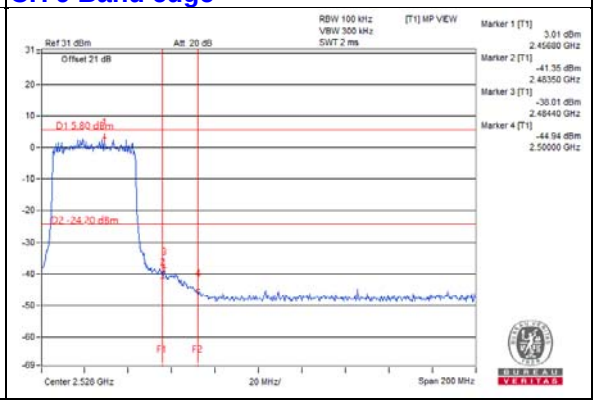
CH 9



CH 3 Band edge



CH 9 Band edge

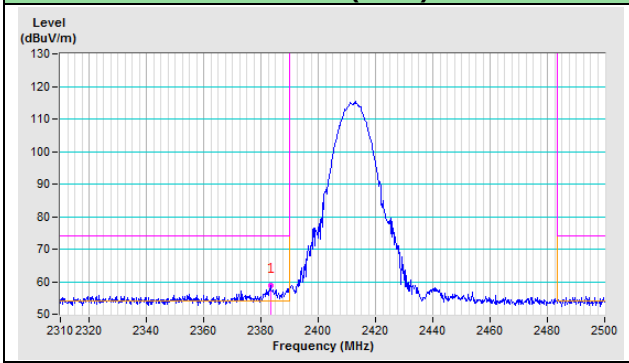
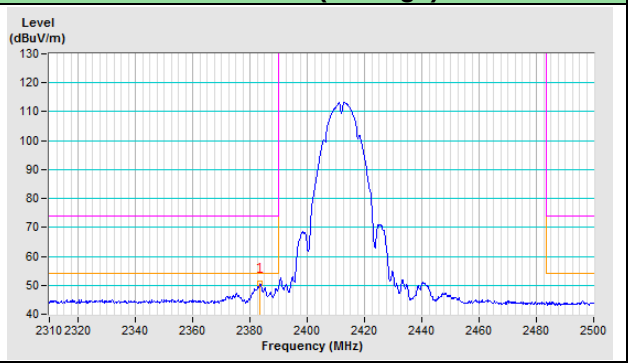
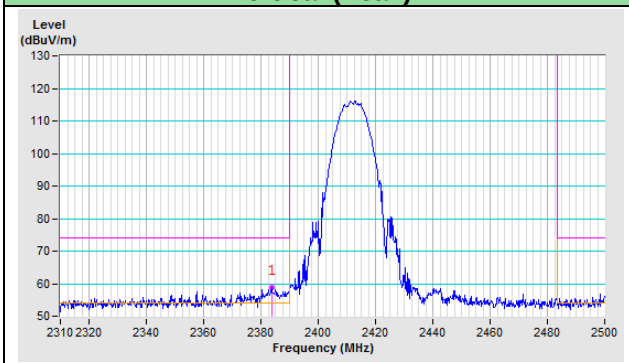
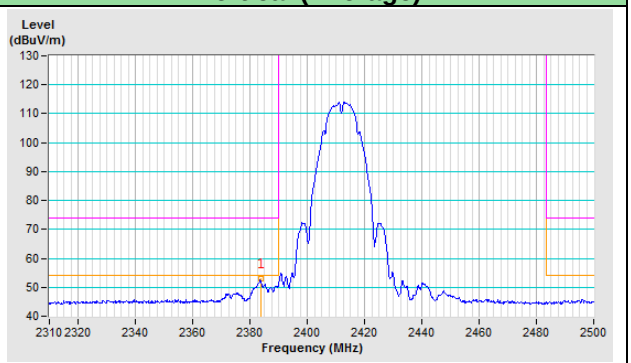
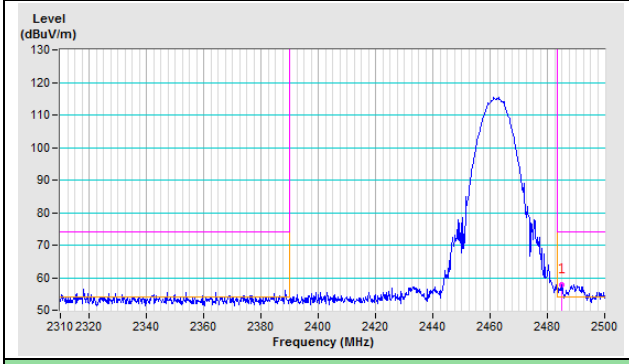
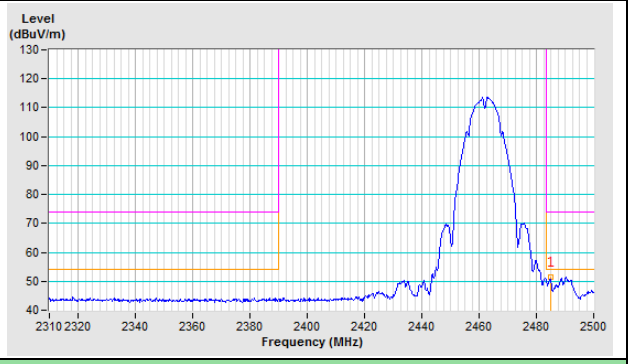
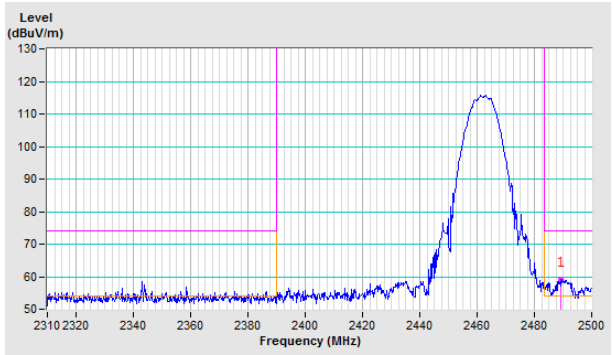
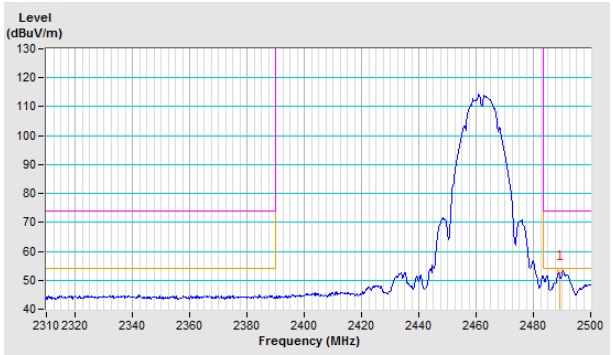


5 Pictures of Test Arrangements

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

Annex A - Band-Edge Measurement

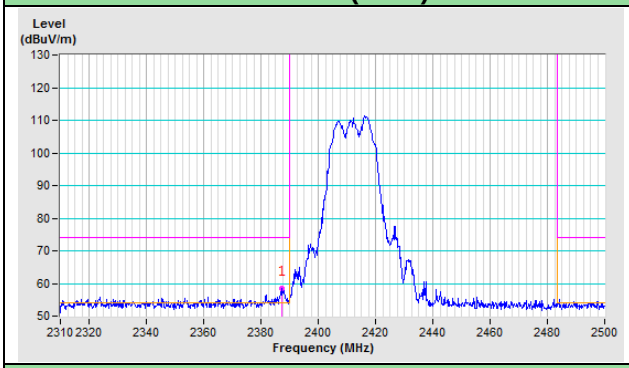
802.11b

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

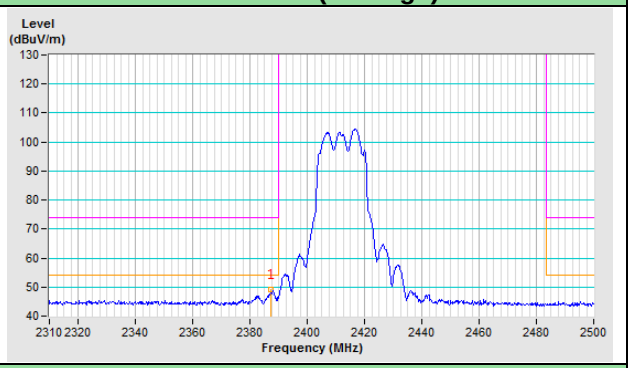
802.11g

Channel 1

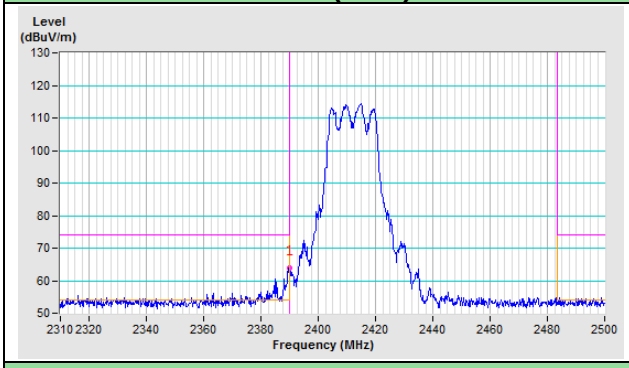
Horizontal (Peak)



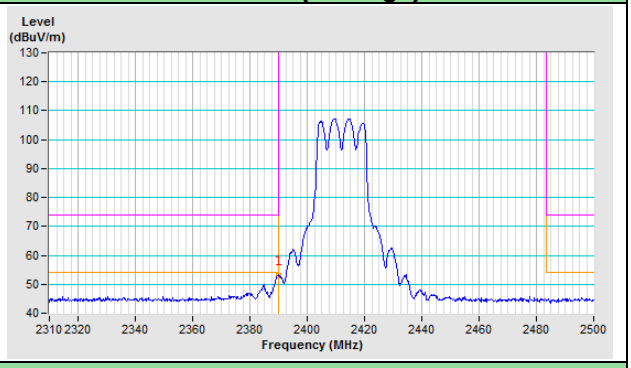
Horizontal (Average)



Vertical (Peak)

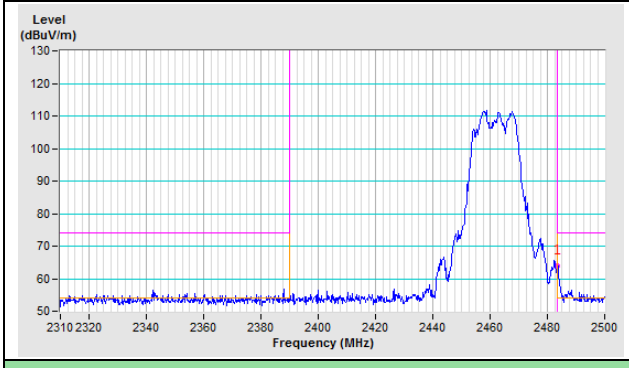


Vertical (Average)

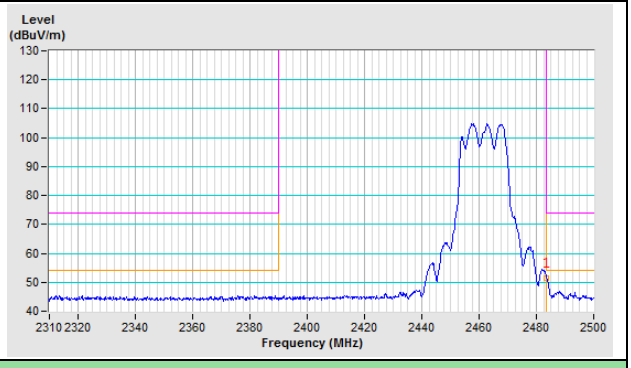


Channel 11

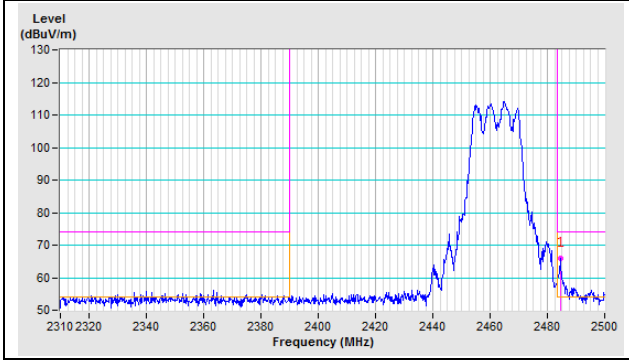
Horizontal (Peak)



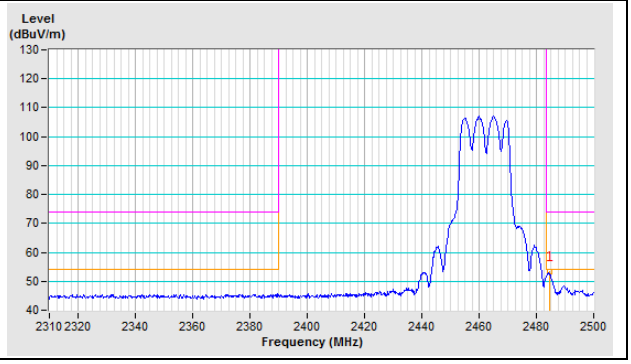
Horizontal (Average)



Vertical (Peak)



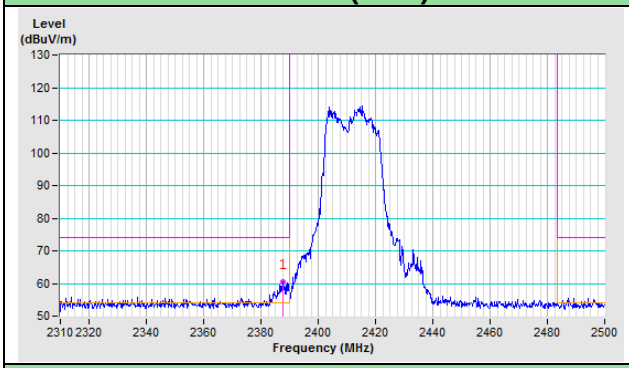
Vertical (Average)



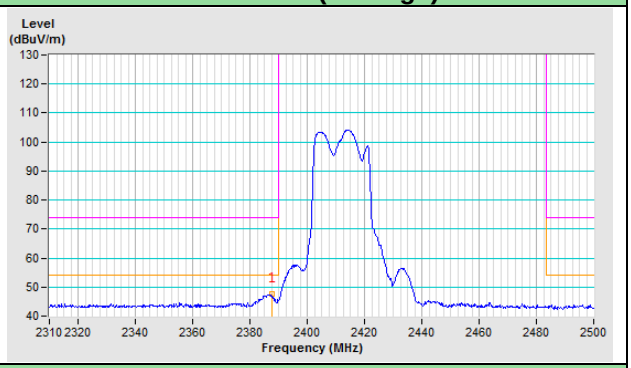
802.11ax (HE20)

Channel 1

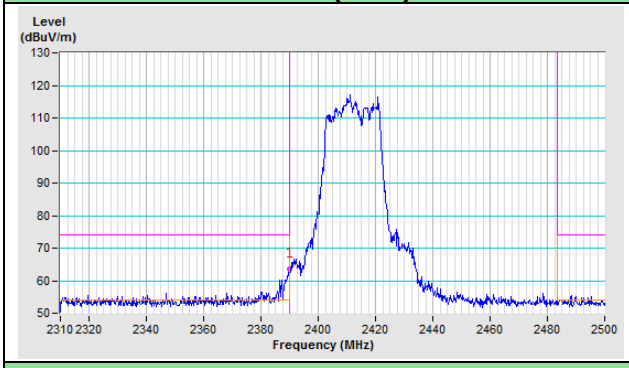
Horizontal (Peak)



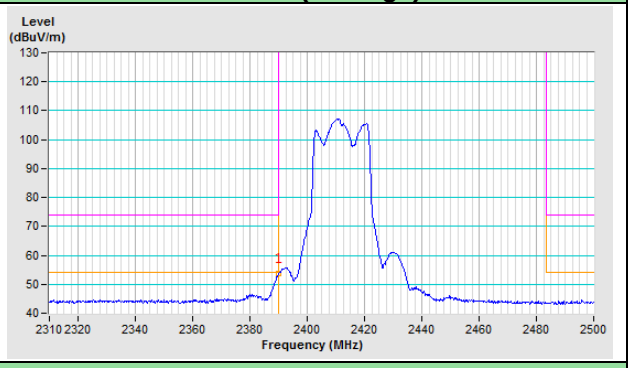
Horizontal (Average)



Vertical (Peak)

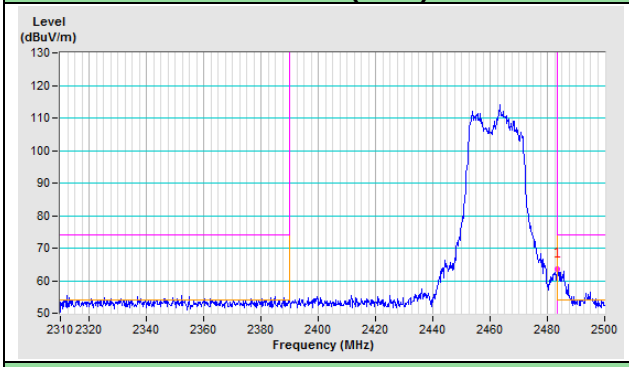


Vertical (Average)

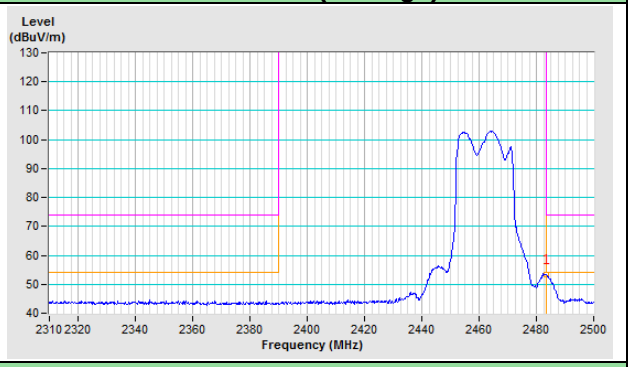


Channel 11

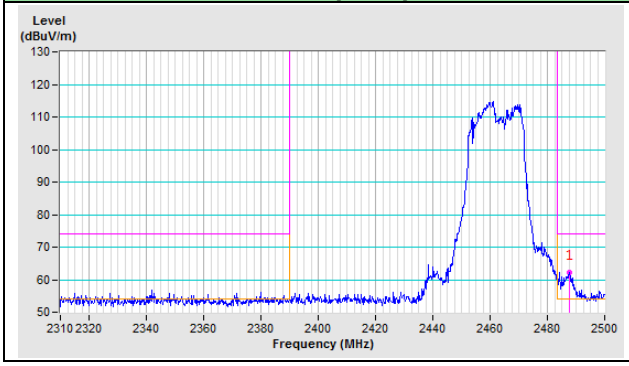
Horizontal (Peak)



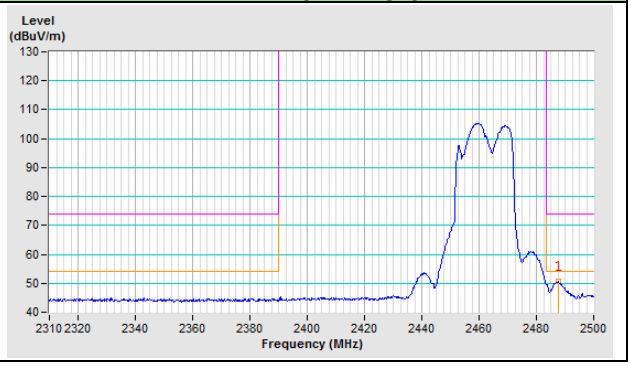
Horizontal (Average)



Vertical (Peak)



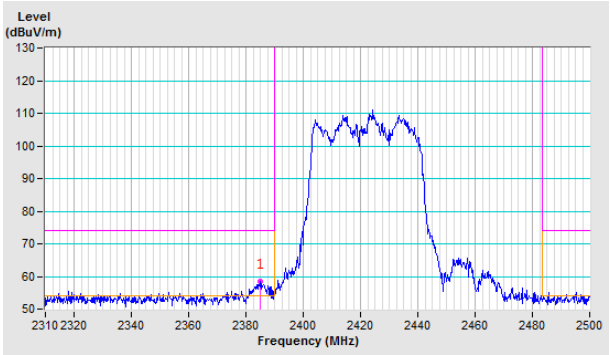
Vertical (Average)



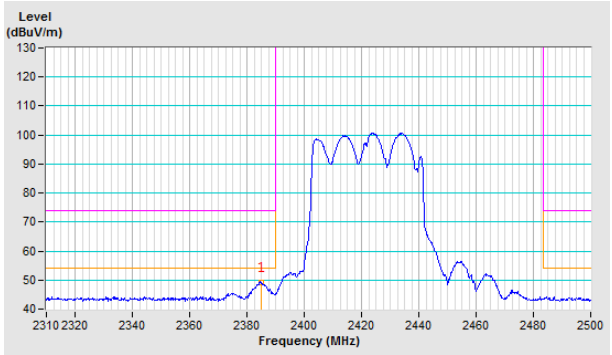
802.11ax (HE40)

Channel 3

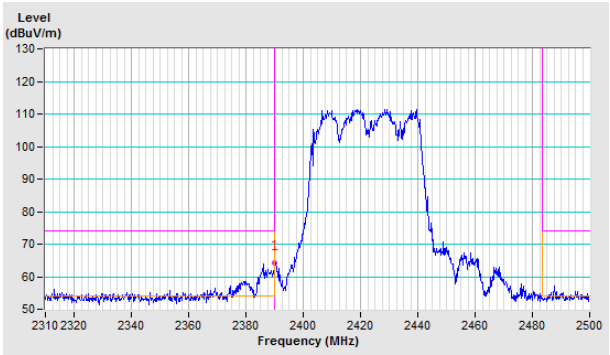
Horizontal (Peak)



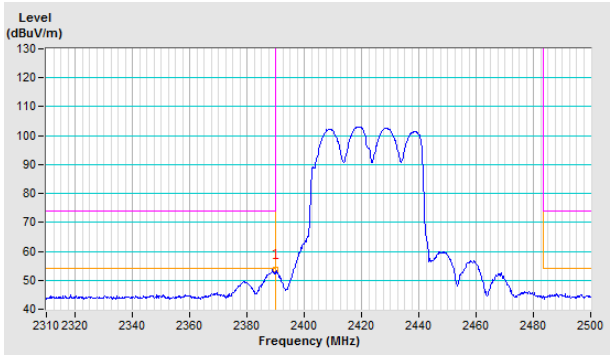
Horizontal (Average)



Vertical (Peak)

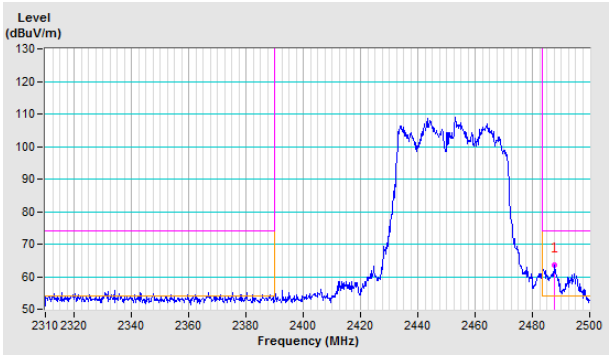


Vertical (Average)

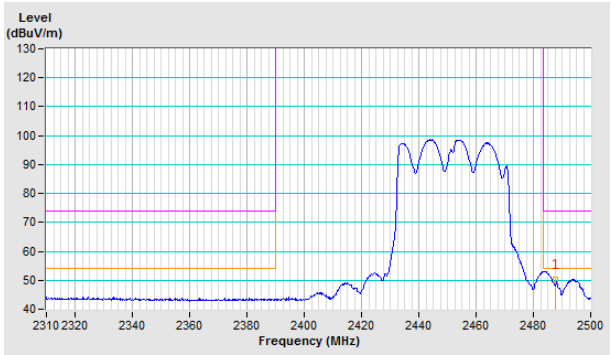


Channel 9

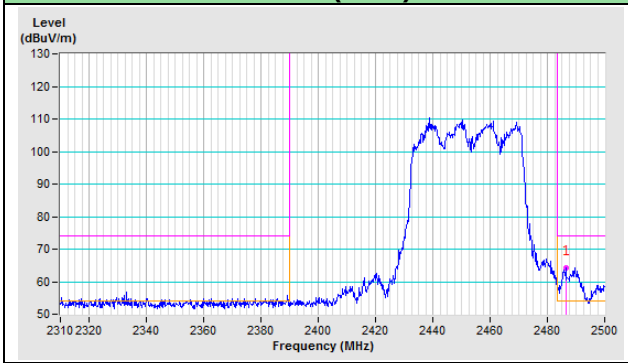
Horizontal (Peak)



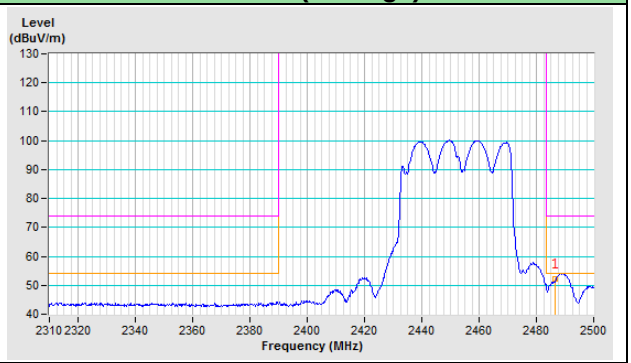
Horizontal (Average)



Vertical (Peak)



Vertical (Average)



Appendix – Information of the Testing Laboratories

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

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

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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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