

FCC Test Report

Report No.: RF181101C08

FCC ID: PY318300430

Test Model: AAA

Received Date: Nov. 01, 2018

Test Date: Jan. 04 to 09, 2019

Issued Date: Jan. 28, 2019

Applicant: NETGEAR, INC.

Address: 350 East Plumeria Drive San Jose, CA 95134

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 R.O.C.

Test Location: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan R.O.C.

**FCC Registration /
Designation Number:** 723255 / TW2022



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Release Control Record

Issue No.	Description	Date Issued
RF181101C08	Original release.	

1 Certificate of Conformity

Product: NIGHTHAWK AX4 AX3000 4-Stream WiFi Router

Brand: Netgear

Test Model: AAA

Sample Status: ENGINEERING SAMPLE

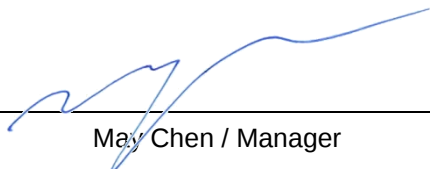
Applicant: NETGEAR, INC.

Test Date: Jan. 04 to 09, 2019

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 :  , **Date:** Jan. 28, 2019
Claire Kuan / Specialist

Approved by :  , **Date:** Jan. 28, 2019
May Chen / 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 -8.93dB at 0.40391MHz.
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 2368.30MHz, 2483.50MHz, 2383.70MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is i-pex(MHF) not a standard connector.s

Note:

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) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.33 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.10 dB
	6GHz ~ 18GHz	4.85 dB
	18GHz ~ 40GHz	5.24 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	NIGHTHAWK AX4 AX3000 4-Stream WiFi Router
Brand	Netgear
Test Model	AAA
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 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 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 1733.3Mbps 802.11ax: up to 2401.9Mbps
Operating Frequency	2.4GHz: 2.412 ~ 2.462GHz 5GHz: 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz, 5.5 ~ 5.72GHz, 5.745 ~ 5.825GHz
Number of Channel	2.4GHz: 802.11b, 802.11g, 802.11n (HT20), VHT20, 802.11ax (HE20): 11 802.11n (HT40), VHT40, 802.11ax (HE40): 7 5GHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20): 25 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 12 802.11ac (VHT80), 802.11ax (HE80): 6 802.11ac (VHT160), 802.11ax (HE160): 2
Output Power	Non-Beamforming Mode: 2.4GHz: 455.166mW 5.18 ~ 5.24GHz: 857.679mW 5.26 ~ 5.32GHz: 222.315mW 5.5 ~ 5.72GHz: 230.935mW 5.745 ~ 5.825GHz: 920.206mW Beamforming Mode: 2.4GHz: 671.379mW 5.18 ~ 5.24GHz: 886.409mW 5.26 ~ 5.32GHz: 225.092mW 5.5 ~ 5.72GHz: 230.865mW 5.745 ~ 5.825GHz: 912.355mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	RJ45 cable x 1 (Unshielded, 1.5m)

Note:

1. Simultaneously transmission condition.

Condition	Technology	
1	WLAN (2.4GHz)	WLAN (5GHz)

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

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

No.	Brand	Model No.	P/N	Spec.
1	NETGEAR	AD2096F10	332-10935-01	Input: 100-120V~50/60Hz 1.0A Output: 12V / 2.5A DC Output cable: Unshielded, 1.8m
2	NETGEAR	2ABL030F 1 NA	332-10758-01	Input: 100-120V~50/60Hz 1.0A Output: 12V / 2.5A DC Output cable: Unshielded, 1.85m

Note: From the above adapters, the worst radiated emission and AC power conducted emission test was found in **Adapter 1**. Therefore only the test data of the mode was recorded in this report.

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

Antenna No.	Antenna Net Gain (dBi)	Frequency range	Antenna Type	Connector Type
1	3.01	2.4~2.4835GHz	Dipole	i-pex(MHF)
	3.3	5.15~5.85GHz		
2	3.19	2.4~2.4835GHz	Dipole	i-pex(MHF)
	3.38	5.15~5.85GHz		

3. The EUT incorporates a MIMO function:

2.4GHz Band		
MODULATION MODE	TX & RX CONFIGURATION	
802.11b	1TX (Fixed Chain 0)	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
802.11ac (VHT160)	2TX	2RX
802.11ax (HE20)	2TX	2RX
802.11ax (HE40)	2TX	2RX
802.11ax (HE80)	2TX	2RX
802.11ax (HE160)	2TX	2RX

Note:

- All of modulation mode support beamforming function except 802.11a/b/g modulation mode.
- The EUT support Beamforming and non-beamforming mode, therefore both mode were investigated and the worst case scenario was identified. The worst case data were presented in test report.
- The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz), 802.11ac mode for 20MHz (40MHz, 80MHz, 160MHz) and 802.11ax mode for 20MHz (40MHz, 80MHz, 160MHz), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)
- The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

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

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

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

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

3.2.1 Test Mode Applicability and Tested Channel Detail

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

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

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

Note: The EUT had been pre-tested on the positioned of each 2 axis. The worst case was found when positioned on **X-plane**.

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.

Non-Beamforming 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
Beamforming Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	Data Rate Parameter
802.11ax (HE20)	1 to 11	1, 6, 11	OFDMA	BPSK	MCS0
802.11ax (HE40)	3 to 9	3, 6, 9	OFDMA	BPSK	MCS0

Radiated Emission Test (Below 1GHz):

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

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

Power Line Conducted Emission Test:

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

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

Antenna Port Conducted Measurement:

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

Non-Beamforming 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
Beamforming Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	Data Rate Parameter
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

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	24deg. C, 69%RH	120Vac, 60Hz	Steven Chiang
RE<1G	22deg. C, 67%RH	120Vac, 60Hz	Steven Chiang
PLC	25deg. C, 75%RH	120Vac, 60Hz	Frank Chuang
APCM	25deg. C, 60%RH	120Vac, 60Hz	Jyunchun Lin

3.3 Duty Cycle of Test Signal

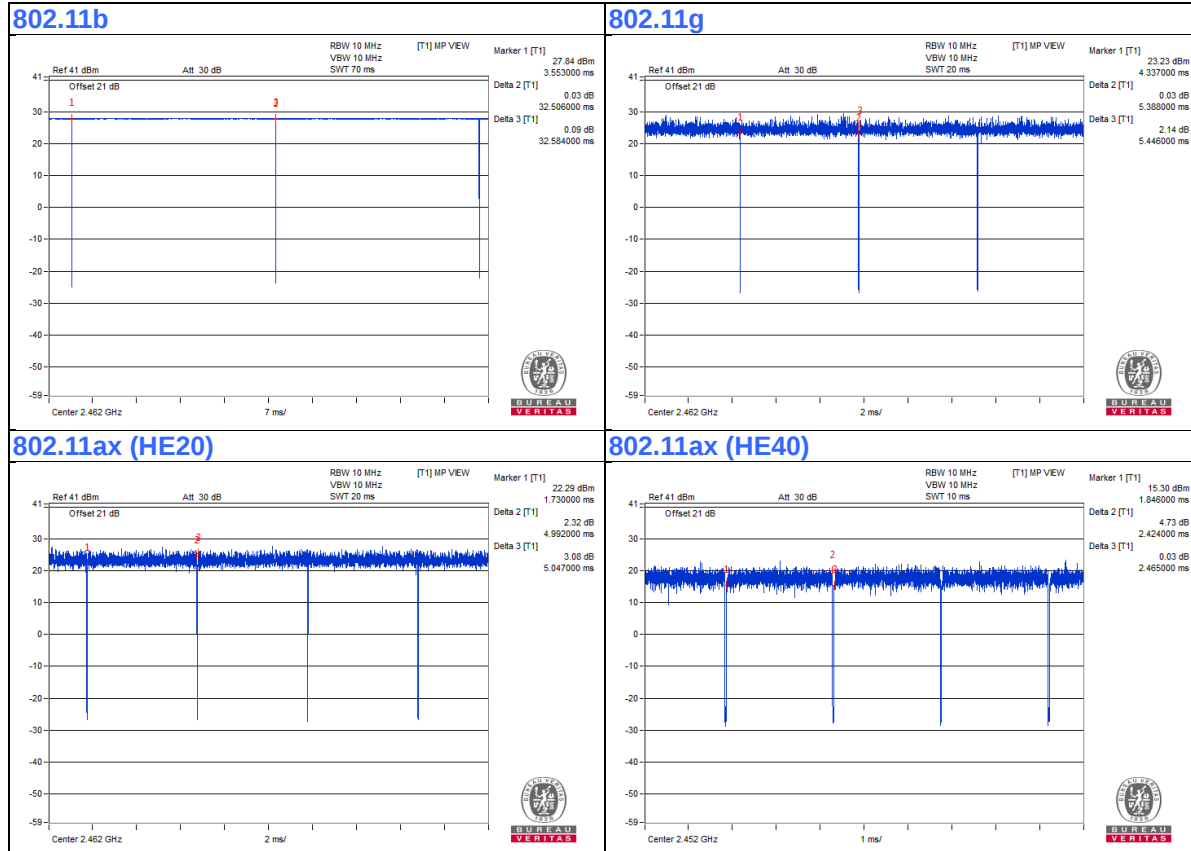
Duty cycle of test signal is $\geq 98\%$, duty factor is not required.

802.11b: Duty cycle = $32.506/32.584 = 0.998$

802.11g: Duty cycle = $5.388/5.446 = 0.989$

802.11ax (HE20): Duty cycle = $4.992/5.047 = 0.989$

802.11ax (HE40): Duty cycle = $2.424/2.465 = 0.983$



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.

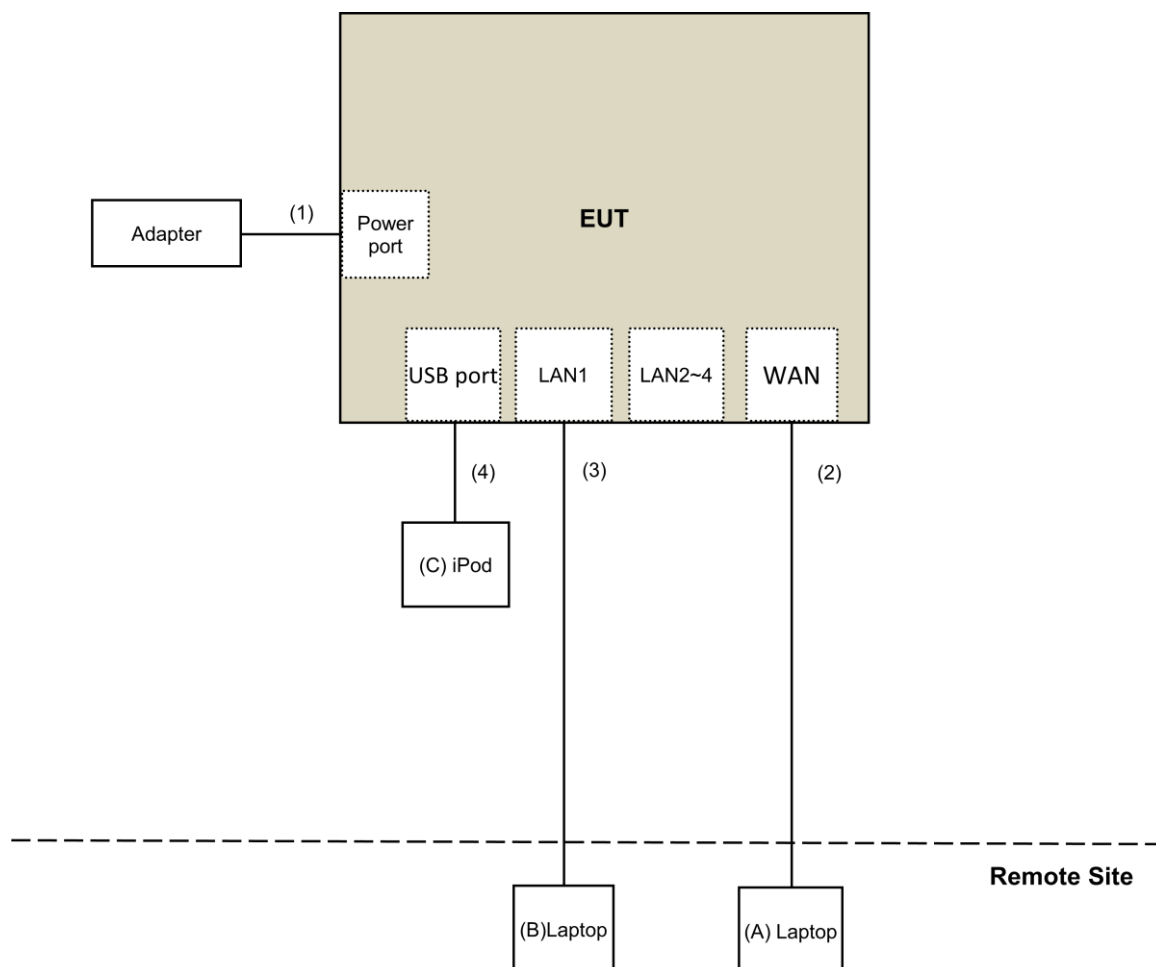
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab
B.	Laptop	HP	Pavilion 14-ab023TU	5CD5340WXZ	NA	Provided by Lab
C.	iPod	Apple	MD778TA/A	CC4JMFLOF4T1	NA	Provided by Lab

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	1.8	No	0	Supplied by client
2.	RJ-45 Cable	1	10	No	0	Provided by Lab
3.	RJ-45 Cable	1	10	No	0	Provided by Lab
4.	USB Cable	1	0.1	Yes	0	Provided by Lab

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)
KDB 558074 D01 15.247 Meas Guidance v05
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 05, 2018	July 04, 2019
Pre-Amplifier EMCi	EMC001340	980142	Feb. 09, 2018	Feb. 08, 2019
Loop Antenna Electro-Metrics	EM-6879	269	Sep. 07, 2018	Sep. 06, 2019
RF Cable	NA	LOOPCAB-001	Jan. 15, 2018	Jan. 14, 2019
RF Cable	NA	LOOPCAB-002	Jan. 15, 2018	Jan. 14, 2019
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Oct. 30, 2018	Oct. 29, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Nov. 22, 2018	Nov. 21, 2019
RF Cable	8D	966-4-1	Mar. 21, 2018	Mar. 20, 2019
RF Cable	8D	966-4-2	Mar. 21, 2018	Mar. 20, 2019
RF Cable	8D	966-4-3	Mar. 21, 2018	Mar. 20, 2019
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-4-01	Sep. 27, 2018	Sep. 26, 2019
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Nov. 25, 2018	Nov. 24, 2019
Pre-Amplifier Mini-Circuits	ZVA-183-S+	AMP-ZVA-03	May 10, 2018	May 09, 2019
RF Cable	EMC104-SM-SM-1200	160923	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-2000	150318	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-5000	150321	Jan. 29, 2018	Jan. 28, 2019
Pre-Amplifier EMCi	EMC184045SE	980387	Jan. 29, 2018	Jan. 28, 2019
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Nov. 25, 2018	Nov. 24, 2019
RF Cable	EMC102-KM-KM-1200	160925	Jan. 29, 2018	Jan. 28, 2019
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA
Spectrum Analyzer R&S	FSV40	100964	June 20, 2018	June 19, 2019
Power meter Anritsu	ML2495A	1014008	May 09, 2018	May 08, 2019
Power sensor Anritsu	MA2411B	0917122	May 09, 2018	May 08, 2019
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 16, 2018	Apr. 15, 2019

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. 4.
3. The CANADA Site Registration No. is 20331-2
4. Loop antenna was used for all emissions below 30 MHz.
5. Tested Date: Jan. 04 to 09, 2019

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:

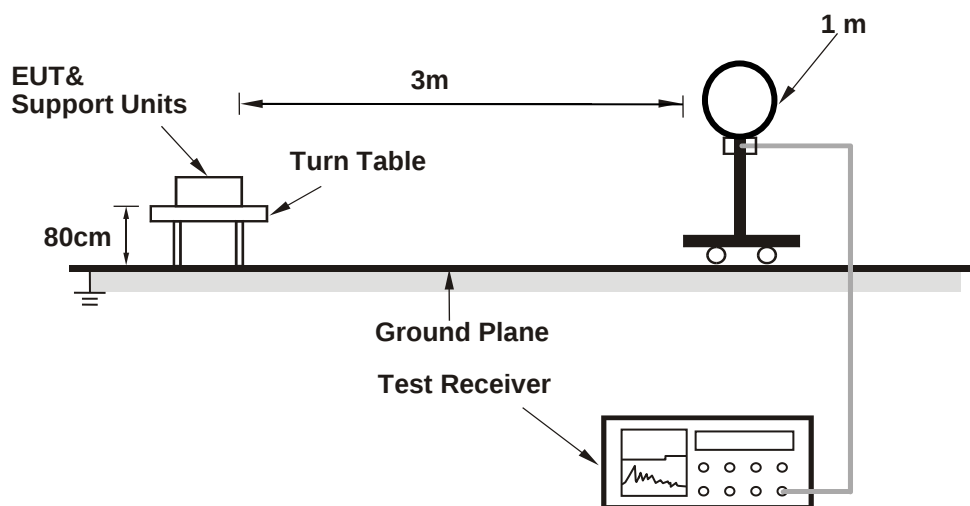
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10Hz (Duty cycle $\geq 98\%$) 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

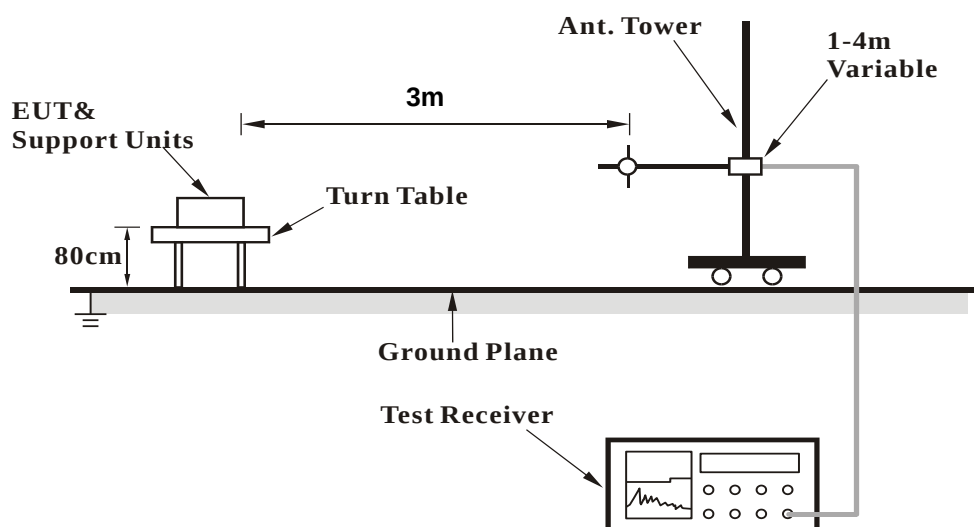
No deviation.

4.1.5 Test Setup

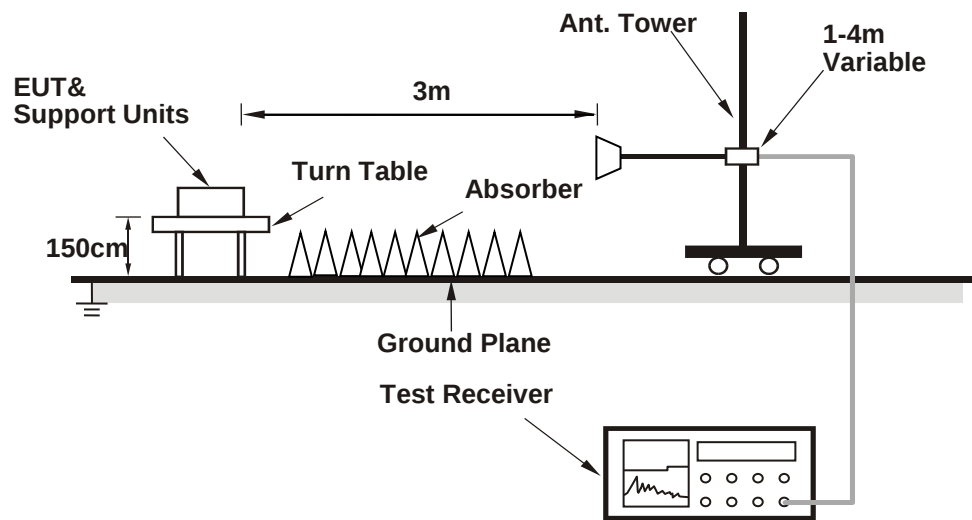
For Radiated emission below 30MHz



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

- Connected the EUT with the Laptop which is placed on remote site.
- Controlling software (Lantiq DUT [608.52]) has been activated to set the EUT under transmission/receiving condition continuously.

4.1.7 Test Results

Above 1GHz Data:

Non-Beamforming Mode

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL 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	2343.00	57.9 PK	74.0	-16.1	1.53 H	104	59.8	-1.9
2	2343.00	48.5 AV	54.0	-5.5	1.53 H	104	50.4	-1.9
3	2390.00	57.8 PK	74.0	-16.2	1.53 H	104	59.8	-2.0
4	2390.00	44.5 AV	54.0	-9.5	1.53 H	104	46.5	-2.0
5	*2412.00	107.0 PK			1.53 H	104	109.1	-2.1
6	*2412.00	104.8 AV			1.53 H	104	106.9	-2.1
7	2483.50	55.7 PK	74.0	-18.3	1.53 H	104	57.9	-2.2
8	2483.50	45.4 AV	54.0	-8.6	1.53 H	104	47.6	-2.2
9	4824.00	40.5 PK	74.0	-33.5	1.11 H	59	38.5	2.0
10	4824.00	30.9 AV	54.0	-23.1	1.11 H	59	28.9	2.0
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	2343.00	61.2 PK	74.0	-12.8	1.65 V	341	63.1	-1.9
2	2343.00	53.5 AV	54.0	-0.5	1.65 V	341	55.4	-1.9
3	2390.00	59.7 PK	74.0	-14.3	1.65 V	341	61.7	-2.0
4	2390.00	46.4 AV	54.0	-7.6	1.65 V	341	48.4	-2.0
5	*2412.00	113.3 PK			1.65 V	341	115.4	-2.1
6	*2412.00	111.1 AV			1.65 V	341	113.2	-2.1
7	2483.50	57.5 PK	74.0	-16.5	1.65 V	341	59.7	-2.2
8	2483.50	47.1 AV	54.0	-6.9	1.65 V	341	49.3	-2.2
9	4824.00	42.9 PK	74.0	-31.1	1.34 V	75	40.9	2.0
10	4824.00	35.1 AV	54.0	-18.9	1.34 V	75	33.1	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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL 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	2368.30	58.2 PK	74.0	-15.8	1.53 H	116	60.1	-1.9
2	2368.30	48.8 AV	54.0	-5.2	1.53 H	116	50.7	-1.9
3	2390.00	59.1 PK	74.0	-14.9	1.53 H	116	61.1	-2.0
4	2390.00	49.3 AV	54.0	-4.7	1.53 H	116	51.3	-2.0
5	*2437.00	107.5 PK			1.53 H	116	109.7	-2.2
6	*2437.00	105.3 AV			1.53 H	116	107.5	-2.2
7	2483.50	55.7 PK	74.0	-18.3	1.53 H	116	57.9	-2.2
8	2483.50	44.7 AV	54.0	-9.3	1.53 H	116	46.9	-2.2
9	4874.00	40.4 PK	74.0	-33.6	1.08 H	71	38.4	2.0
10	4874.00	30.8 AV	54.0	-23.2	1.08 H	71	28.8	2.0
11	7311.00	45.6 PK	74.0	-28.4	1.63 H	154	37.1	8.5
12	7311.00	32.5 AV	54.0	-21.5	1.63 H	154	24.0	8.5

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	2368.30	62.0 PK	74.0	-12.0	1.67 V	340	63.9	-1.9
2	2368.30	53.9 AV	54.0	-0.1	1.67 V	340	55.8	-1.9
3	2390.00	61.3 PK	74.0	-12.7	1.67 V	340	63.3	-2.0
4	2390.00	51.4 AV	54.0	-2.6	1.67 V	340	53.4	-2.0
5	*2437.00	113.7 PK			1.67 V	340	115.9	-2.2
6	*2437.00	111.5 AV			1.67 V	340	113.7	-2.2
7	2483.50	58.0 PK	74.0	-16.0	1.67 V	340	60.2	-2.2
8	2483.50	47.0 AV	54.0	-7.0	1.67 V	340	49.2	-2.2
9	4874.00	42.8 PK	74.0	-31.2	1.31 V	90	40.8	2.0
10	4874.00	35.1 AV	54.0	-18.9	1.31 V	90	33.1	2.0
11	7311.00	45.9 PK	74.0	-28.1	1.88 V	144	37.4	8.5
12	7311.00	33.1 AV	54.0	-20.9	1.88 V	144	24.6	8.5

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL 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	2383.70	58.1 PK	74.0	-15.9	1.47 H	113	60.1	-2.0
2	2383.70	48.9 AV	54.0	-5.1	1.47 H	113	50.9	-2.0
3	*2462.00	108.1 PK			1.47 H	113	110.3	-2.2
4	*2462.00	105.9 AV			1.47 H	113	108.1	-2.2
5	2483.50	57.4 PK	74.0	-16.6	1.47 H	113	59.6	-2.2
6	2483.50	46.2 AV	54.0	-7.8	1.47 H	113	48.4	-2.2
7	4924.00	40.4 PK	74.0	-33.6	1.12 H	56	38.4	2.0
8	4924.00	30.7 AV	54.0	-23.3	1.12 H	56	28.7	2.0
9	7386.00	45.7 PK	74.0	-28.3	1.63 H	162	37.1	8.6
10	7386.00	32.9 AV	54.0	-21.1	1.63 H	162	24.3	8.6

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	2383.70	62.6 PK	74.0	-11.4	1.50 V	340	64.6	-2.0
2	2383.70	53.9 AV	54.0	-0.1	1.50 V	340	55.9	-2.0
3	*2462.00	114.4 PK			1.50 V	340	116.6	-2.2
4	*2462.00	112.2 AV			1.50 V	340	114.4	-2.2
5	2483.50	58.8 PK	74.0	-15.2	1.50 V	340	61.0	-2.2
6	2483.50	48.2 AV	54.0	-5.8	1.50 V	340	50.4	-2.2
7	4924.00	42.4 PK	74.0	-31.6	1.33 V	89	40.4	2.0
8	4924.00	34.9 AV	54.0	-19.1	1.33 V	89	32.9	2.0
9	7386.00	46.2 PK	74.0	-27.8	1.88 V	157	37.6	8.6
10	7386.00	33.2 AV	54.0	-20.8	1.88 V	157	24.6	8.6

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

802.11g

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL 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	2390.00	67.9 PK	74.0	-6.1	1.51 H	107	69.9	-2.0
2	2390.00	46.3 AV	54.0	-7.7	1.51 H	107	48.3	-2.0
3	*2412.00	113.0 PK			1.51 H	107	115.1	-2.1
4	*2412.00	103.2 AV			1.51 H	107	105.3	-2.1
5	4824.00	41.0 PK	74.0	-33.0	1.27 H	130	39.0	2.0
6	4824.00	28.9 AV	54.0	-25.1	1.27 H	130	26.9	2.0
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	2390.00	73.6 PK	74.0	-0.4	2.04 V	339	75.6	-2.0
2	2390.00	51.1 AV	54.0	-2.9	2.04 V	339	53.1	-2.0
3	*2412.00	116.3 PK			2.04 V	339	118.4	-2.1
4	*2412.00	106.6 AV			2.04 V	339	108.7	-2.1
5	4824.00	43.3 PK	74.0	-30.7	1.27 V	65	41.3	2.0
6	4824.00	30.6 AV	54.0	-23.4	1.27 V	65	28.6	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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL 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	2390.00	59.4 PK	74.0	-14.6	1.44 H	116	61.4	-2.0
2	2390.00	48.5 AV	54.0	-5.5	1.44 H	116	50.5	-2.0
3	*2437.00	112.8 PK			1.44 H	116	115.0	-2.2
4	*2437.00	103.1 AV			1.44 H	116	105.3	-2.2
5	2483.50	58.9 PK	74.0	-15.1	1.44 H	116	61.1	-2.2
6	2483.50	45.8 AV	54.0	-8.2	1.44 H	116	48.0	-2.2
7	4874.00	41.1 PK	74.0	-32.9	1.31 H	145	39.1	2.0
8	4874.00	28.8 AV	54.0	-25.2	1.31 H	145	26.8	2.0
9	7311.00	44.6 PK	74.0	-29.4	1.77 H	212	36.1	8.5
10	7311.00	32.8 AV	54.0	-21.2	1.77 H	212	24.3	8.5

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	2390.00	65.2 PK	74.0	-8.8	1.74 V	328	67.2	-2.0
2	2390.00	53.5 AV	54.0	-0.5	1.74 V	328	55.5	-2.0
3	*2437.00	119.1 PK			1.74 V	328	121.3	-2.2
4	*2437.00	109.5 AV			1.74 V	328	111.7	-2.2
5	2483.50	62.3 PK	74.0	-11.7	1.74 V	328	64.5	-2.2
6	2483.50	49.2 AV	54.0	-4.8	1.74 V	328	51.4	-2.2
7	4874.00	43.2 PK	74.0	-30.8	1.31 V	68	41.2	2.0
8	4874.00	30.7 AV	54.0	-23.3	1.31 V	68	28.7	2.0
9	7311.00	45.1 PK	74.0	-28.9	2.11 V	172	36.6	8.5
10	7311.00	33.0 AV	54.0	-21.0	2.11 V	172	24.5	8.5

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL 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	*2462.00	111.3 PK			1.46 H	107	113.5	-2.2
2	*2462.00	101.7 AV			1.46 H	107	103.9	-2.2
3	2483.50	67.5 PK	74.0	-6.5	1.46 H	107	69.7	-2.2
4	2483.50	46.0 AV	54.0	-8.0	1.46 H	107	48.2	-2.2
5	4924.00	41.0 PK	74.0	-33.0	1.30 H	140	39.0	2.0
6	4924.00	28.8 AV	54.0	-25.2	1.30 H	140	26.8	2.0
7	7386.00	44.2 PK	74.0	-29.8	1.76 H	207	35.6	8.6
8	7386.00	32.6 AV	54.0	-21.4	1.76 H	207	24.0	8.6
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	*2462.00	117.8 PK			1.90 V	326	120.0	-2.2
2	*2462.00	108.3 AV			1.90 V	326	110.5	-2.2
3	2483.50	73.5 PK	74.0	-0.5	1.90 V	326	75.7	-2.2
4	2483.50	53.9 AV	54.0	-0.1	1.90 V	326	56.1	-2.2
5	4924.00	43.4 PK	74.0	-30.6	1.35 V	69	41.4	2.0
6	4924.00	30.7 AV	54.0	-23.3	1.35 V	69	28.7	2.0
7	7386.00	44.8 PK	74.0	-29.2	2.07 V	168	36.2	8.6
8	7386.00	32.8 AV	54.0	-21.2	2.07 V	168	24.2	8.6

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

Beamforming Mode

802.11ax (HE20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL 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	2390.00	59.3 PK	74.0	-14.7	1.43 H	126	61.3	-2.0
2	2390.00	48.3 AV	54.0	-5.7	1.43 H	126	50.3	-2.0
3	*2412.00	108.0 PK			1.43 H	126	110.1	-2.1
4	*2412.00	98.3 AV			1.43 H	126	100.4	-2.1
5	4824.00	41.5 PK	74.0	-32.5	1.29 H	153	39.5	2.0
6	4824.00	29.1 AV	54.0	-24.9	1.29 H	153	27.1	2.0
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	2390.00	63.2 PK	74.0	-10.8	1.82 V	324	65.2	-2.0
2	2390.00	53.8 AV	54.0	-0.2	1.82 V	324	55.8	-2.0
3	*2412.00	114.6 PK			1.82 V	324	116.7	-2.1
4	*2412.00	104.8 AV			1.82 V	324	106.9	-2.1
5	4824.00	43.6 PK	74.0	-30.4	1.27 V	69	41.6	2.0
6	4824.00	30.8 AV	54.0	-23.2	1.27 V	69	28.8	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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL 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	2390.00	61.0 PK	74.0	-13.0	1.47 H	118	63.0	-2.0
2	2390.00	49.0 AV	54.0	-5.0	1.47 H	118	51.0	-2.0
3	*2437.00	115.8 PK			1.47 H	118	118.0	-2.2
4	*2437.00	106.1 AV			1.47 H	118	108.3	-2.2
5	2483.50	58.7 PK	74.0	-15.3	1.47 H	118	60.9	-2.2
6	2483.50	46.4 AV	54.0	-7.6	1.47 H	118	48.6	-2.2
7	4874.00	41.4 PK	74.0	-32.6	1.27 H	146	39.4	2.0
8	4874.00	28.9 AV	54.0	-25.1	1.27 H	146	26.9	2.0
9	7311.00	44.5 PK	74.0	-29.5	1.78 H	226	36.0	8.5
10	7311.00	32.7 AV	54.0	-21.3	1.78 H	226	24.2	8.5

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	2390.00	65.8 PK	74.0	-8.2	2.06 V	331	67.8	-2.0
2	2390.00	53.6 AV	54.0	-0.4	2.06 V	331	55.6	-2.0
3	*2437.00	120.7 PK			2.06 V	331	122.9	-2.2
4	*2437.00	112.4 AV			2.06 V	331	114.6	-2.2
5	2483.50	64.1 PK	74.0	-9.9	2.06 V	331	66.3	-2.2
6	2483.50	51.8 AV	54.0	-2.2	2.06 V	331	54.0	-2.2
7	4874.00	43.5 PK	74.0	-30.5	1.31 V	64	41.5	2.0
8	4874.00	31.2 AV	54.0	-22.8	1.31 V	64	29.2	2.0
9	7311.00	44.4 PK	74.0	-29.6	2.11 V	175	35.9	8.5
10	7311.00	32.5 AV	54.0	-21.5	2.11 V	175	24.0	8.5

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL 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	*2462.00	110.6 PK			1.49 H	127	112.8	-2.2
2	*2462.00	100.9 AV			1.49 H	127	103.1	-2.2
3	2483.50	64.2 PK	74.0	-9.8	1.49 H	127	66.4	-2.2
4	2483.50	48.5 AV	54.0	-5.5	1.49 H	127	50.7	-2.2
5	4924.00	41.2 PK	74.0	-32.8	1.29 H	151	39.2	2.0
6	4924.00	28.9 AV	54.0	-25.1	1.29 H	151	26.9	2.0
7	7386.00	44.4 PK	74.0	-29.6	1.74 H	226	35.8	8.6
8	7386.00	32.7 AV	54.0	-21.3	1.74 H	226	24.1	8.6
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	*2462.00	116.5 PK			1.81 V	331	118.7	-2.2
2	*2462.00	107.1 AV			1.81 V	331	109.3	-2.2
3	2483.50	70.2 PK	74.0	-3.8	1.81 V	331	72.4	-2.2
4	2483.50	53.9 AV	54.0	-0.1	1.81 V	331	56.1	-2.2
5	4924.00	42.9 PK	74.0	-31.1	1.30 V	77	40.9	2.0
6	4924.00	30.6 AV	54.0	-23.4	1.30 V	77	28.6	2.0
7	7386.00	44.9 PK	74.0	-29.1	2.07 V	182	36.3	8.6
8	7386.00	33.1 AV	54.0	-20.9	2.07 V	182	24.5	8.6

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

802.11ax (HE40)

CHANNEL	TX Channel 3	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL 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	2390.00	60.0 PK	74.0	-14.0	1.49 H	126	62.0	-2.0
2	2390.00	48.9 AV	54.0	-5.1	1.49 H	126	50.9	-2.0
3	*2422.00	102.4 PK			1.49 H	126	104.5	-2.1
4	*2422.00	92.5 AV			1.49 H	126	94.6	-2.1
5	4844.00	41.7 PK	74.0	-32.3	1.31 H	137	39.8	1.9
6	4844.00	29.2 AV	54.0	-24.8	1.31 H	137	27.3	1.9
7	7266.00	44.6 PK	74.0	-29.4	1.73 H	214	36.1	8.5
8	7266.00	32.9 AV	54.0	-21.1	1.73 H	214	24.4	8.5
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	2390.00	64.2 PK	74.0	-9.8	2.21 V	319	66.2	-2.0
2	2390.00	53.5 AV	54.0	-0.5	2.21 V	319	55.5	-2.0
3	*2422.00	108.7 PK			2.21 V	319	110.8	-2.1
4	*2422.00	99.0 AV			2.21 V	319	101.1	-2.1
5	4844.00	43.3 PK	74.0	-30.7	1.33 V	82	41.4	1.9
6	4844.00	31.0 AV	54.0	-23.0	1.33 V	82	29.1	1.9
7	7266.00	45.3 PK	74.0	-28.7	2.10 V	169	36.8	8.5
8	7266.00	33.2 AV	54.0	-20.8	2.10 V	169	24.7	8.5

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL 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	2390.00	59.2 PK	74.0	-14.8	1.49 H	103	61.2	-2.0
2	2390.00	48.5 AV	54.0	-5.5	1.49 H	103	50.5	-2.0
3	*2437.00	107.2 PK			1.49 H	103	109.4	-2.2
4	*2437.00	97.3 AV			1.49 H	103	99.5	-2.2
5	2483.50	57.5 PK	74.0	-16.5	1.49 H	103	59.7	-2.2
6	2483.50	44.5 AV	54.0	-9.5	1.49 H	103	46.7	-2.2
7	4874.00	40.6 PK	74.0	-33.4	1.25 H	148	38.6	2.0
8	4874.00	28.6 AV	54.0	-25.4	1.25 H	148	26.6	2.0
9	7311.00	44.5 PK	74.0	-29.5	1.78 H	212	36.0	8.5
10	7311.00	33.0 AV	54.0	-21.0	1.78 H	212	24.5	8.5

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	2390.00	65.5 PK	74.0	-8.5	1.82 V	338	67.5	-2.0
2	2390.00	53.5 AV	54.0	-0.5	1.82 V	338	55.5	-2.0
3	*2437.00	113.3 PK			1.82 V	338	115.5	-2.2
4	*2437.00	103.3 AV			1.82 V	338	105.5	-2.2
5	2483.50	62.6 PK	74.0	-11.4	1.82 V	338	64.8	-2.2
6	2483.50	49.8 AV	54.0	-4.2	1.82 V	338	52.0	-2.2
7	4874.00	43.4 PK	74.0	-30.6	1.34 V	77	41.4	2.0
8	4874.00	30.7 AV	54.0	-23.3	1.34 V	77	28.7	2.0
9	7311.00	45.8 PK	74.0	-28.2	2.08 V	164	37.3	8.5
10	7311.00	33.4 AV	54.0	-20.6	2.08 V	164	24.9	8.5

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 9	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL 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	*2452.00	107.4 PK			1.48 H	102	109.6	-2.2
2	*2452.00	97.7 AV			1.48 H	102	99.9	-2.2
3	2483.50	59.1 PK	74.0	-14.9	1.48 H	102	61.3	-2.2
4	2483.50	48.5 AV	54.0	-5.5	1.48 H	102	50.7	-2.2
5	4904.00	40.6 PK	74.0	-33.4	1.34 H	156	38.6	2.0
6	4904.00	28.4 AV	54.0	-25.6	1.34 H	156	26.4	2.0
7	7356.00	44.9 PK	74.0	-29.1	1.77 H	217	36.4	8.5
8	7356.00	32.8 AV	54.0	-21.2	1.77 H	217	24.3	8.5
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	*2452.00	114.7 PK			2.19 V	336	116.9	-2.2
2	*2452.00	103.5 AV			2.19 V	336	105.7	-2.2
3	2483.50	65.8 PK	74.0	-8.2	2.19 V	336	68.0	-2.2
4	2483.50	53.6 AV	54.0	-0.4	2.19 V	336	55.8	-2.2
5	4904.00	42.9 PK	74.0	-31.1	1.26 V	55	40.9	2.0
6	4904.00	30.5 AV	54.0	-23.5	1.26 V	55	28.5	2.0
7	7356.00	45.4 PK	74.0	-28.6	2.16 V	177	36.9	8.5
8	7356.00	33.2 AV	54.0	-20.8	2.16 V	177	24.7	8.5

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

Below 1GHz Data:

Beamforming Mode

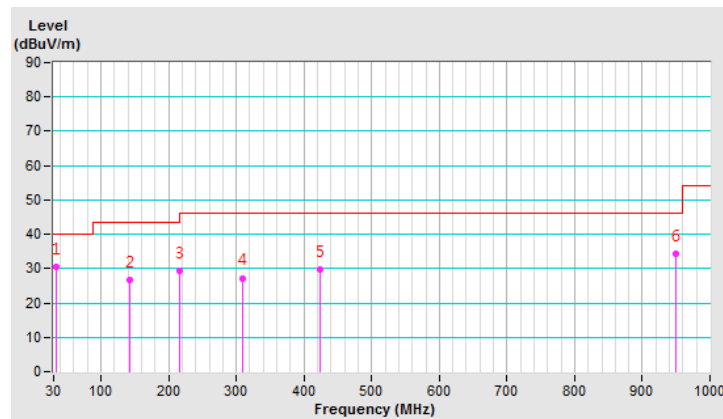
802.11ax (HE20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	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	33.18	30.5 QP	40.0	-9.5	1.00 H	50	40.1	-9.6
2	143.34	26.8 QP	43.5	-16.7	2.00 H	72	34.9	-8.1
3	215.34	29.4 QP	43.5	-14.1	2.00 H	0	39.8	-10.4
4	308.68	27.3 QP	46.0	-18.7	1.00 H	93	34.2	-6.9
5	424.06	29.8 QP	46.0	-16.2	1.00 H	344	33.4	-3.6
6	950.24	34.3 QP	46.0	-11.7	2.00 H	0	28.0	6.3

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 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.

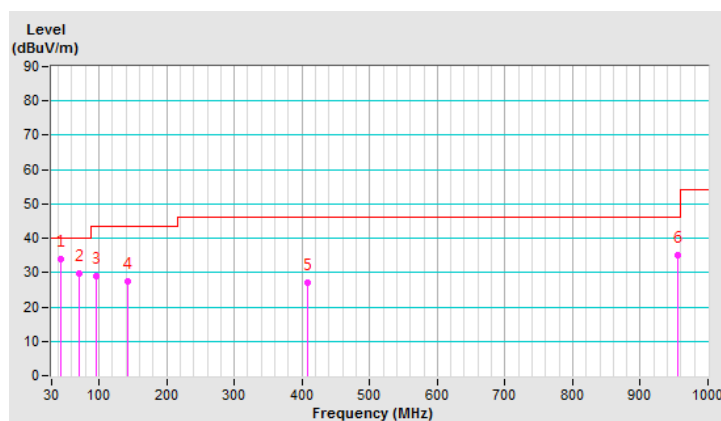


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	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	43.85	33.8 QP	40.0	-6.2	1.00 V	308	42.2	-8.4
2	70.79	29.7 QP	40.0	-10.3	1.00 V	360	40.3	-10.6
3	96.37	28.9 QP	43.5	-14.6	1.00 V	72	41.5	-12.6
4	143.32	27.3 QP	43.5	-16.2	1.00 V	14	35.4	-8.1
5	407.84	27.2 QP	46.0	-18.8	2.00 V	316	31.4	-4.2
6	955.77	35.2 QP	46.0	-10.8	1.50 V	120	28.9	6.3

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 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. 24, 2018	Oct. 23, 2019
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 22, 2018	Oct. 21, 2019
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 04, 2018	June 03, 2019
50 ohms Terminator	N/A	3	Oct. 22, 2018	Oct. 21, 2019
RF Cable	5D-FB	COCCAB-001	Sep. 28, 2018	Sep. 27, 2019
Fixed attenuator EMCI	STI02-2200-10	003	Mar. 16, 2018	Mar. 15, 2019
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: Jan. 08, 2019

4.2.3 Test Procedures

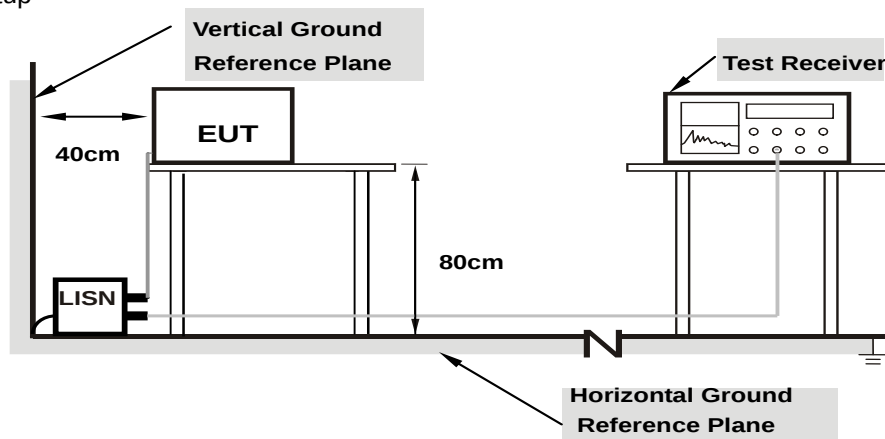
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

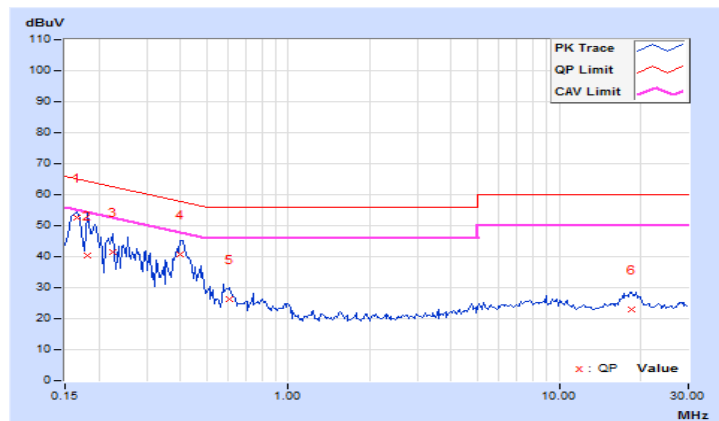
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	10.04	42.53	30.76	52.57	40.80	65.18	55.18	-12.61	-14.38
2	0.18125	10.04	30.18	13.68	40.22	23.72	64.43	54.43	-24.21	-30.71
3	0.22422	10.05	31.25	20.61	41.30	30.66	62.66	52.66	-21.36	-22.00
4	0.40000	10.08	30.83	24.08	40.91	34.16	57.85	47.85	-16.94	-13.69
5	0.60703	10.10	16.28	11.59	26.38	21.69	56.00	46.00	-29.62	-24.31
6	18.58203	11.27	11.86	6.80	23.13	18.07	60.00	50.00	-36.87	-31.93

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.

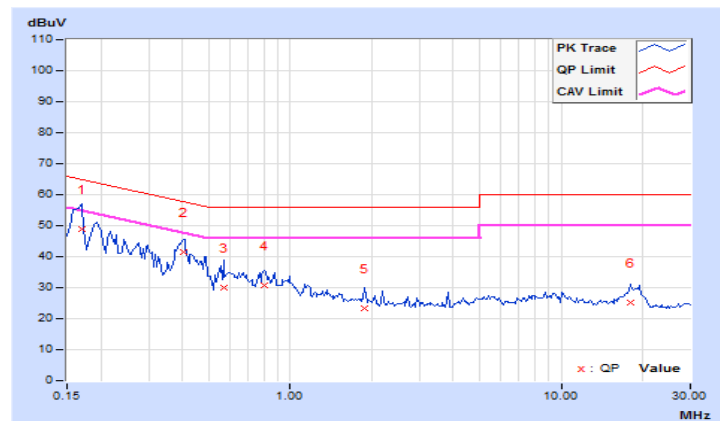


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16953	9.94	39.00	27.99	48.94	37.93	64.98	54.98	-16.04	-17.05
2	0.40391	9.98	31.35	28.86	41.33	38.84	57.77	47.77	-16.44	-8.93
3	0.56797	9.99	20.02	16.15	30.01	26.14	56.00	46.00	-25.99	-19.86
4	0.79844	9.99	20.63	15.44	30.62	25.43	56.00	46.00	-25.38	-20.57
5	1.88672	10.06	13.21	8.59	23.27	18.65	56.00	46.00	-32.73	-27.35
6	18.10156	11.02	14.02	9.19	25.04	20.21	60.00	50.00	-34.96	-29.79

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.

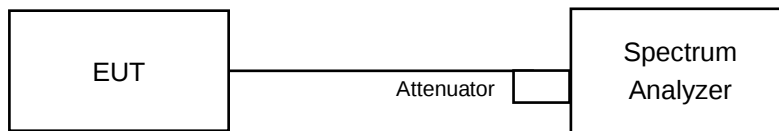


4.3 6dB Bandwidth Measurement

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

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- 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

Non-Beamforming Mode

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	8.12	0.5	Pass
6	2437	8.11	0.5	Pass
11	2462	8.13	0.5	Pass

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.51	16.49	0.5	PASS
6	2437	16.48	16.43	0.5	PASS
11	2462	16.43	16.46	0.5	PASS

Beamforming Mode

802.11ax (HE20)

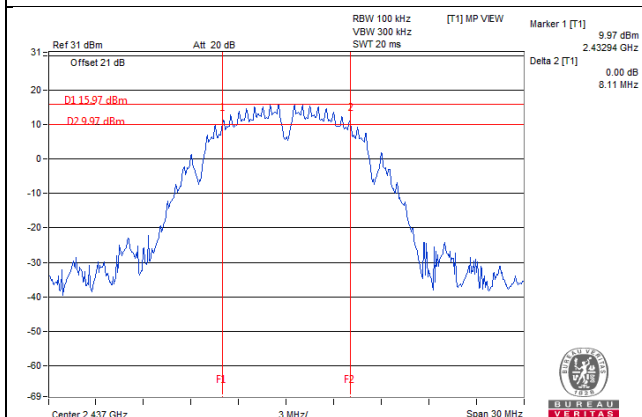
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	17.74	17.70	0.5	PASS
6	2437	17.70	17.70	0.5	PASS
11	2462	17.71	17.72	0.5	PASS

802.11ax (HE40)

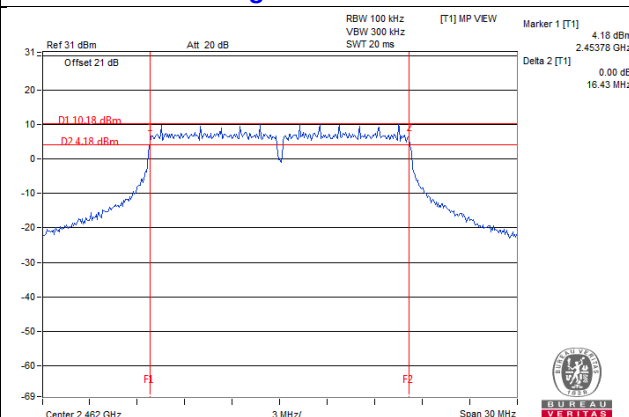
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	36.51	36.51	0.5	Pass
6	2437	36.55	36.80	0.5	Pass
9	2452	36.55	36.76	0.5	Pass

Spectrum Plot of Worst Value

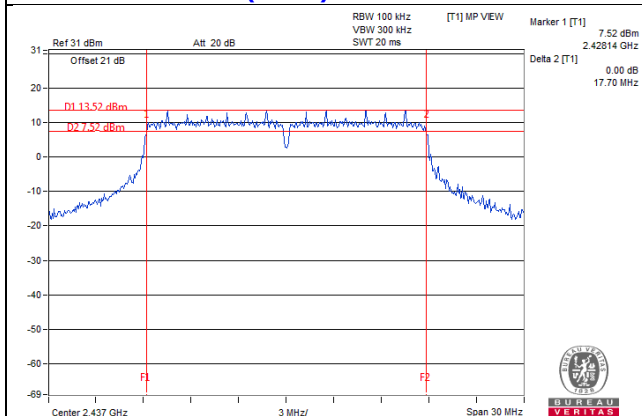
802.11b : CH6



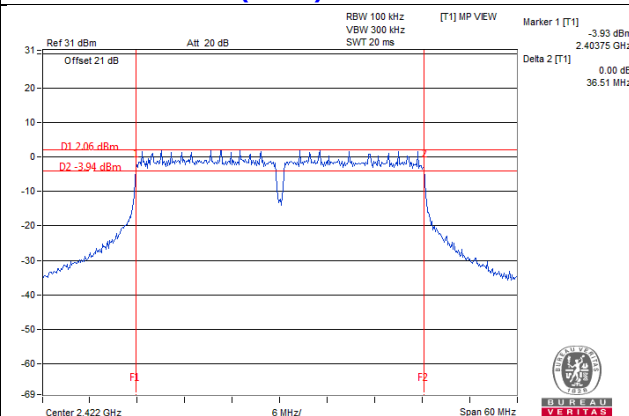
802.11g / Chain 0 : CH11



802.11ax (HE20) / Chain 0 : CH6



802.11ax (HE40) / Chain 0 : 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,

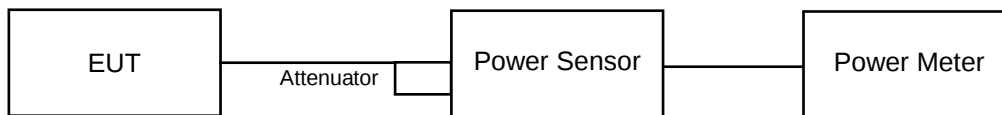
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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

Non-Beamforming Mode

802.11b

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	180.717	22.57	30.00	Pass
6	2437	274.789	24.39	30.00	Pass
11	2462	319.154	25.04	30.00	Pass

802.11g

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	20.75	20.63	234.461	23.70	30.00	Pass
6	2437	23.68	23.46	455.166	26.58	30.00	Pass
11	2462	21.99	21.58	302.005	24.80	30.00	Pass

Beamforming Mode

VHT20

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	19.31	18.77	160.646	22.06	29.89	Pass
6	2437	25.33	25.00	657.421	28.18	29.89	Pass
11	2462	21.00	20.24	231.575	23.65	29.89	Pass

Note: 1. Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 6.11\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30 - (6.11 - 6) = 29.89\text{dBm}$

VHT40

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	17.06	16.67	97.268	19.88	29.89	Pass
6	2437	20.03	19.43	188.393	22.75	29.89	Pass
9	2452	19.64	19.63	183.878	22.65	29.89	Pass

Note: 1. Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 6.11\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30 - (6.11 - 6) = 29.89\text{dBm}$

802.11ax (HE20)

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	19.44	18.88	165.17	22.18	29.89	Pass
6	2437	25.45	25.06	671.379	28.27	29.89	Pass
11	2462	21.09	20.43	238.937	23.78	29.89	Pass

Note: 1. Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 6.11\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30-(6.11-6) = 29.89\text{dBm}$

802.11ax (HE40)

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	17.19	16.77	99.894	20.00	29.89	Pass
6	2437	20.17	19.59	194.983	22.90	29.89	Pass
9	2452	19.87	19.79	192.331	22.84	29.89	Pass

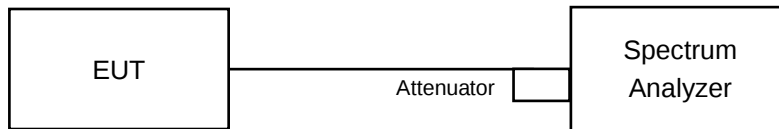
Note: 1. Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 6.11\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30-(6.11-6) = 29.89\text{dBm}$

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

- Set instrument center frequency to DTS channel center frequency.
- Set span to at least 1.5 times the OBW.
- Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set VBW $\geq 3 \times \text{RBW}$.
- Detector = power averaging (RMS) or sample detector (when RMS not available).
- Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span/RBW}$.
- Sweep time = auto couple.
- Employ trace averaging (RMS) mode over a minimum of 100 traces.
- Use the peak marker function to determine the maximum amplitude level.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

Non-Beamforming Mode

802.11b

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-8.00	8	Pass
6	2437	-5.65	8	Pass
11	2462	-5.68	8	Pass

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-11.81	3.01	-8.80	7.89	Pass
	6	2437	-9.16	3.01	-6.15	7.89	Pass
	11	2462	-10.71	3.01	-7.70	7.89	Pass
1	1	2412	-12.53	3.01	-9.52	7.89	Pass
	6	2437	-9.25	3.01	-6.24	7.89	Pass
	11	2462	-11.64	3.01	-8.63	7.89	Pass

Note: 1. Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 6.11\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $8-(6.11-6) = 7.89\text{dBm}$

Beamforming Mode

802.11ax (HE20)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-13.50	3.01	-10.49	7.89	Pass
	6	2437	-7.67	3.01	-4.66	7.89	Pass
	11	2462	-11.46	3.01	-8.45	7.89	Pass
1	1	2412	-14.57	3.01	-11.56	7.89	Pass
	6	2437	-10.16	3.01	-7.15	7.89	Pass
	11	2462	-14.03	3.01	-11.02	7.89	Pass

Note: 1. Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 6.11\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $8-(6.11-6) = 7.89\text{dBm}$

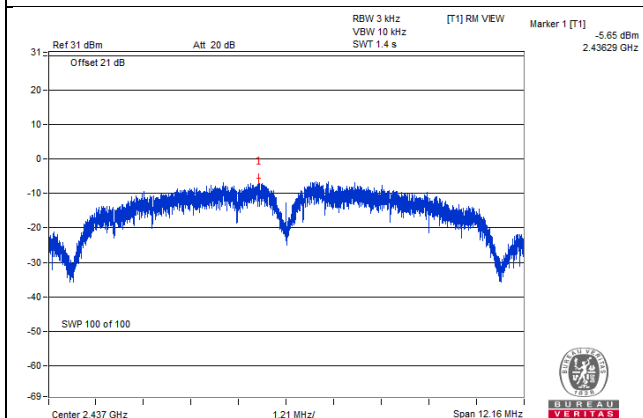
802.11ax (HE40)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	3	2422	-18.31	3.01	-15.30	7.89	Pass
	6	2437	-14.58	3.01	-11.57	7.89	Pass
	9	2452	-16.63	3.01	-13.62	7.89	Pass
1	3	2422	-21.76	3.01	-18.75	7.89	Pass
	6	2437	-18.77	3.01	-15.76	7.89	Pass
	9	2452	-17.43	3.01	-14.42	7.89	Pass

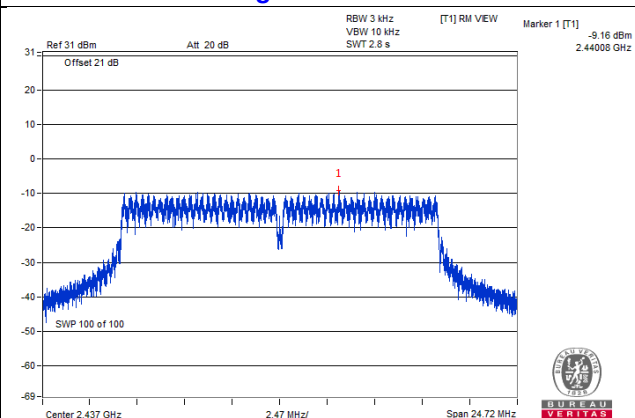
Note: 1. Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 6.11\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $8-(6.11-6) = 7.89\text{dBm}$

Spectrum Plot of Worst Value

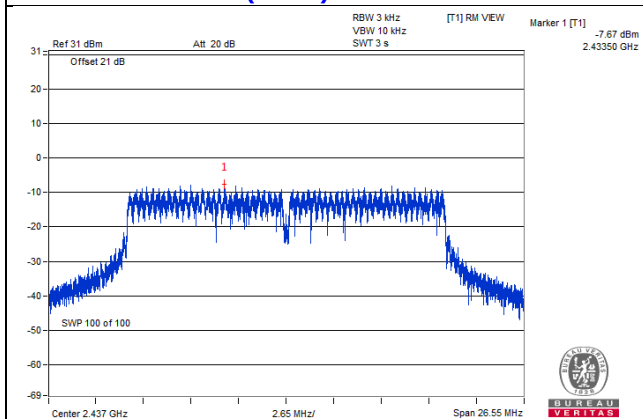
802.11b : CH6



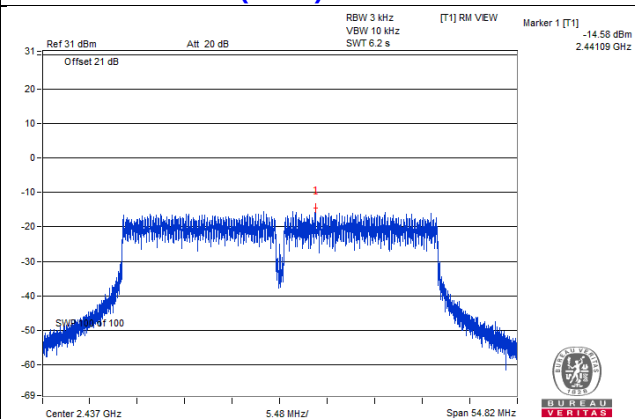
802.11g / Chain 0 : CH6



802.11ax (HE20) / Chain 0 : CH6



802.11ax (HE40) / Chain 0 : CH6

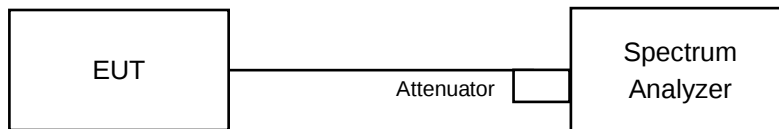


4.6 Conducted Out of Band Emission Measurement

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 $\geq$ 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 $\geq$ 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

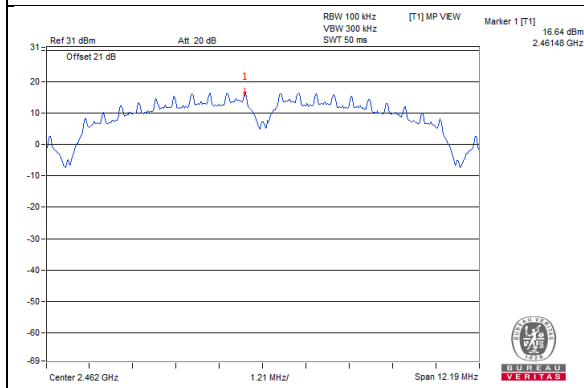
Same as Item 4.3.6

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

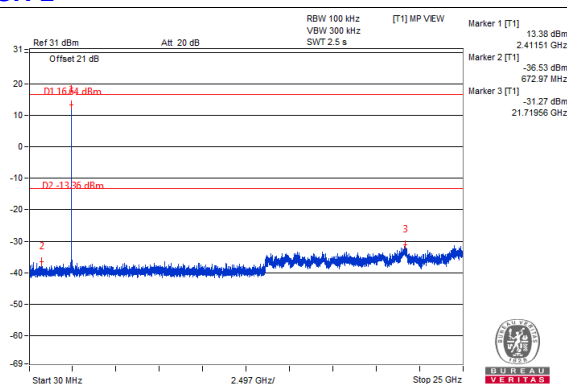
802.11b

Maximum REF

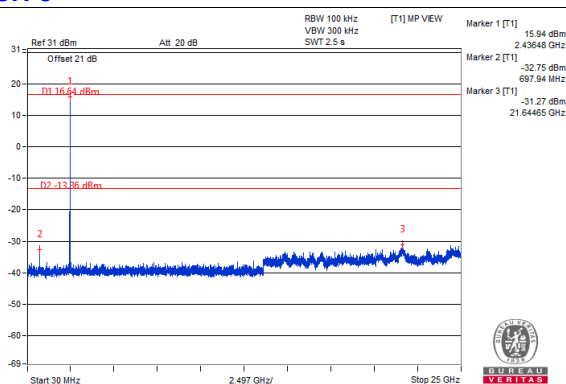


Chain 0

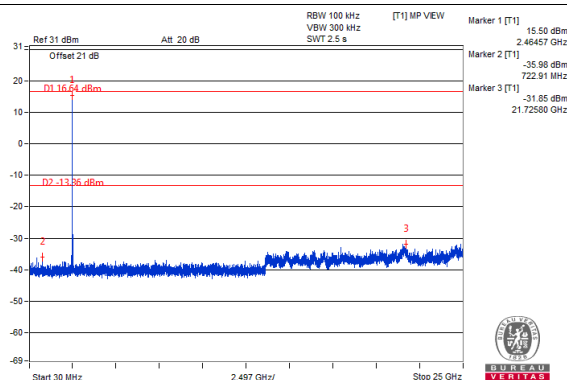
CH 1



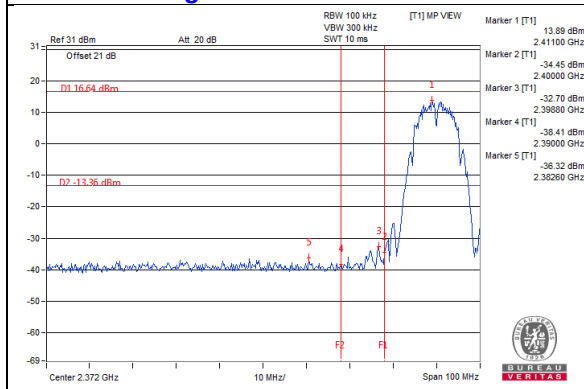
CH 6



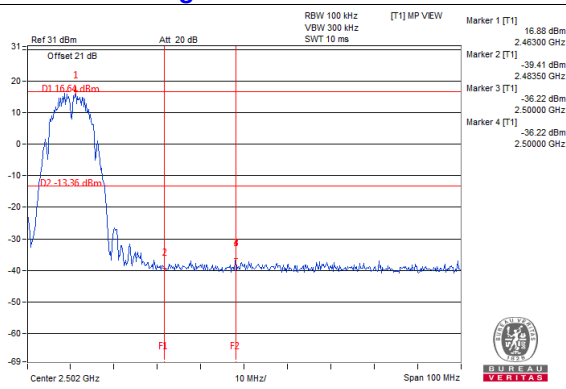
CH 11



CH 1 Band edge

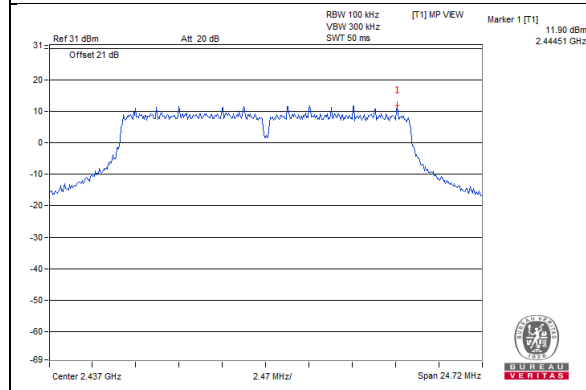


CH 11 Band edge



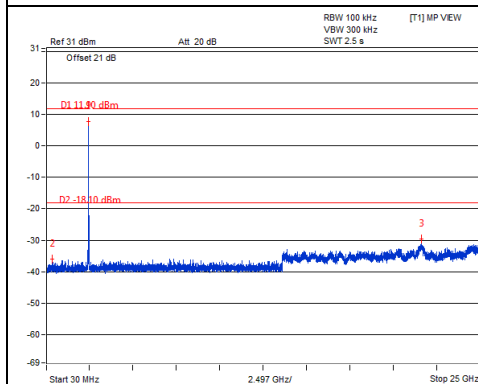
802.11g

Maximum REF

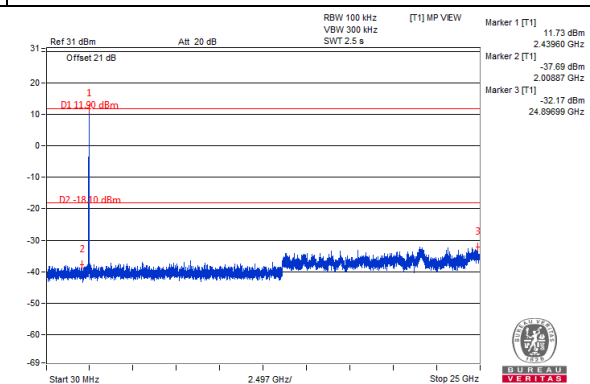


Chain 0

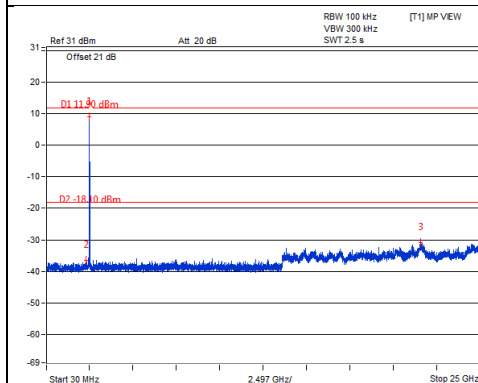
CH 1



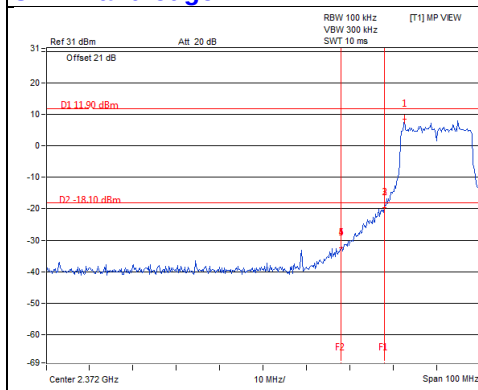
CH 6



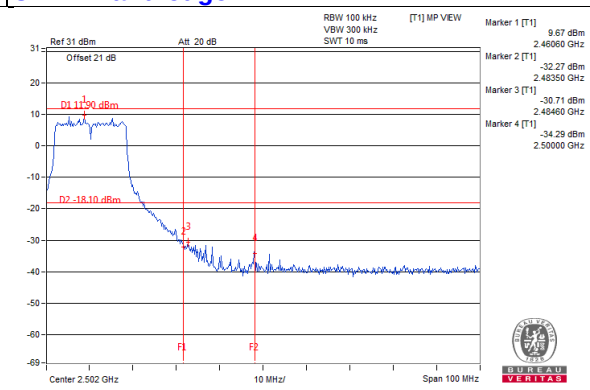
CH 11



CH 1 Band edge

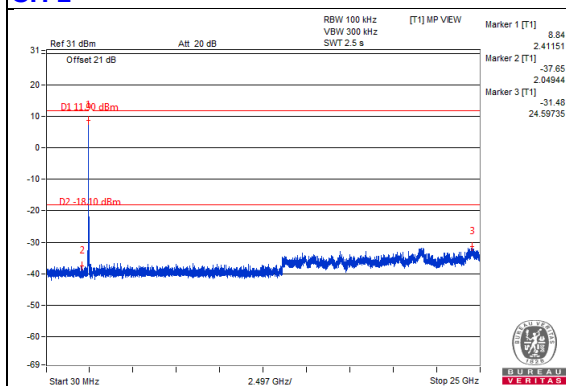


CH 11 Band edge

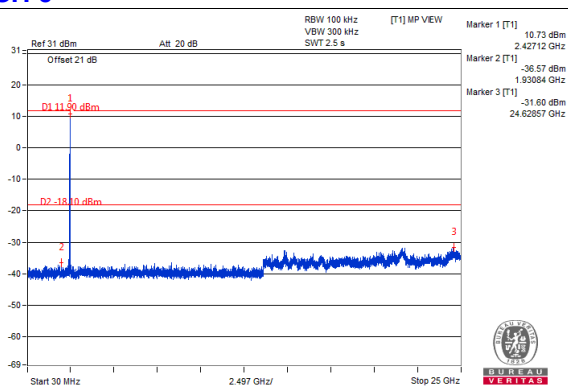


Chain 1

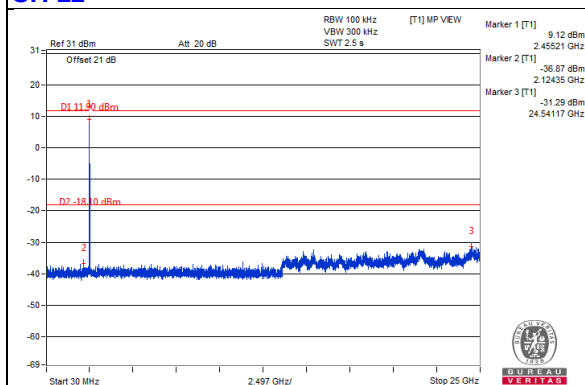
CH 1



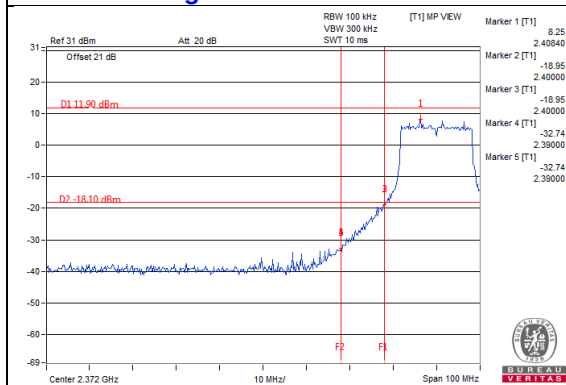
CH 6



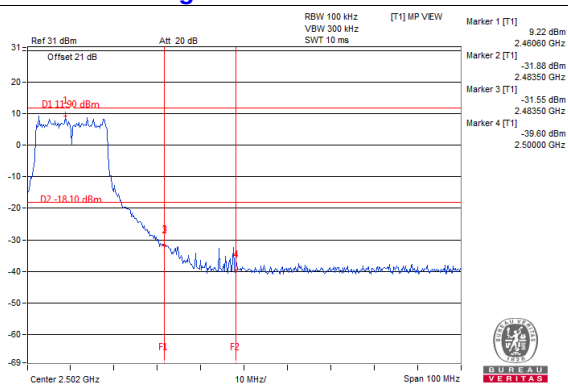
CH 11



CH 1 Band edge

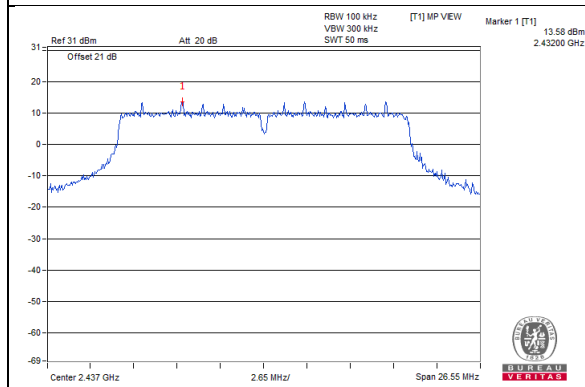


CH 11 Band edge



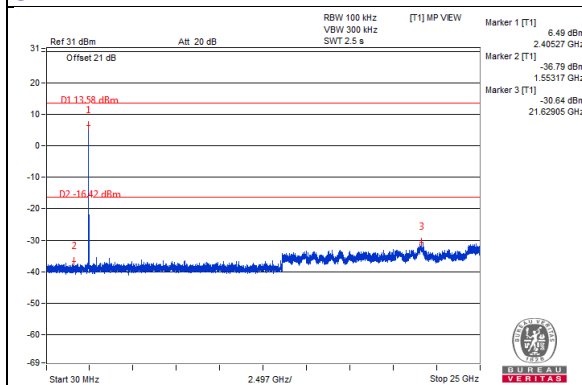
802.11ax (HE20)

Maximum REF

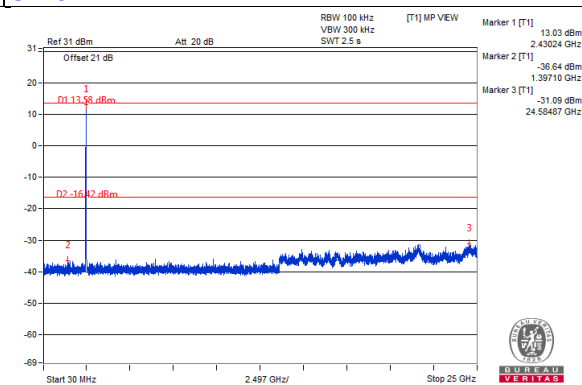


Chain 0

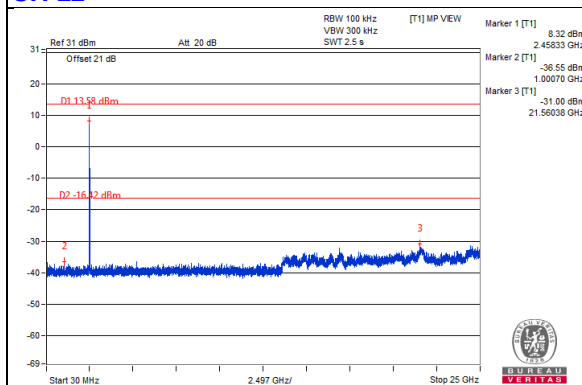
CH 1



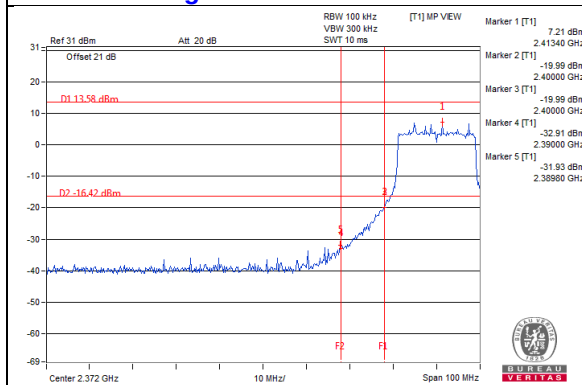
CH 6



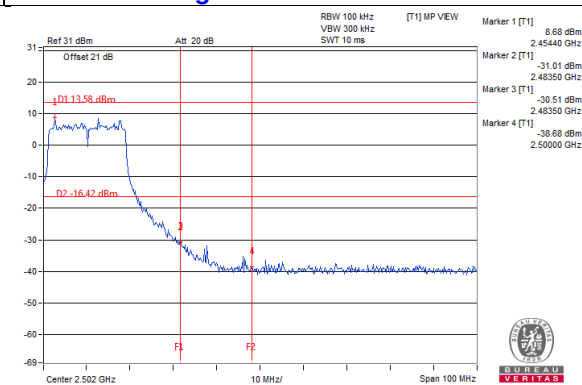
CH 11



CH 1 Band edge

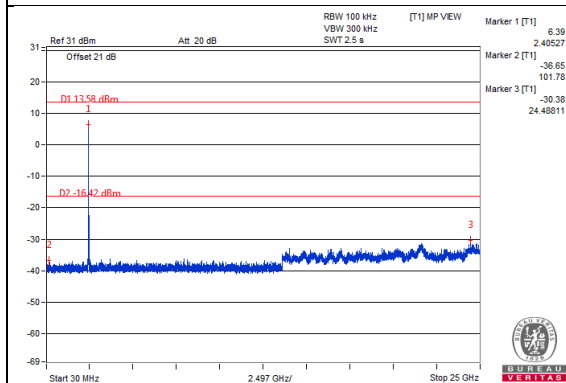


CH 11 Band edge

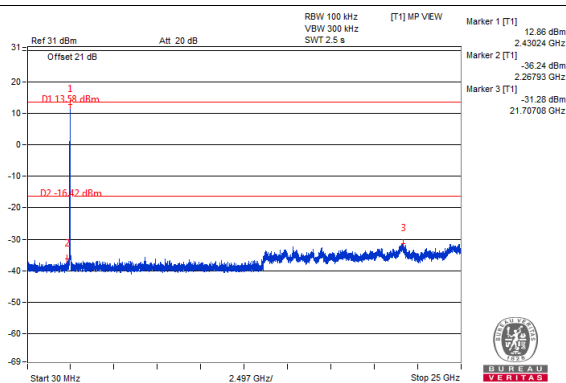


Chain 1

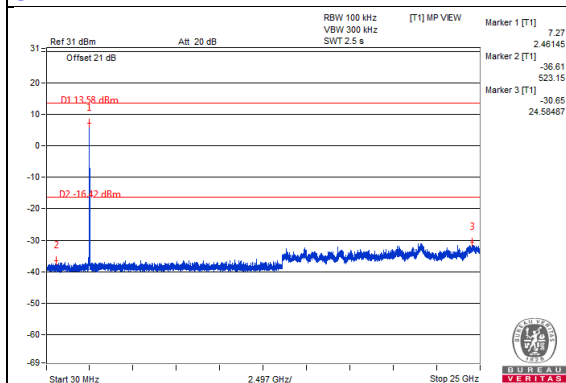
CH 1



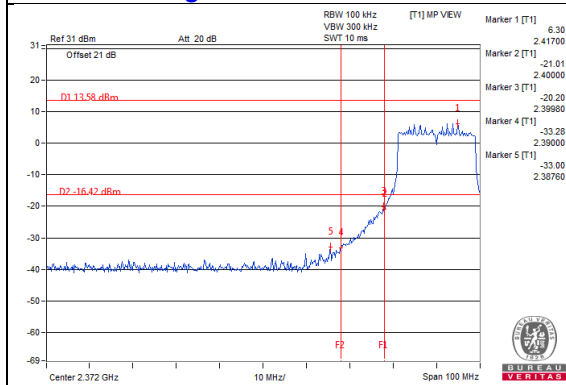
CH 6



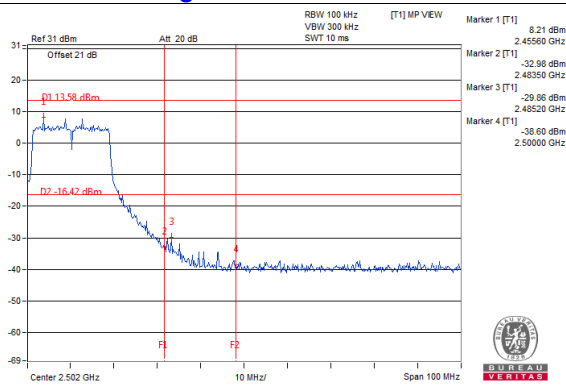
CH 11



CH 1 Band edge

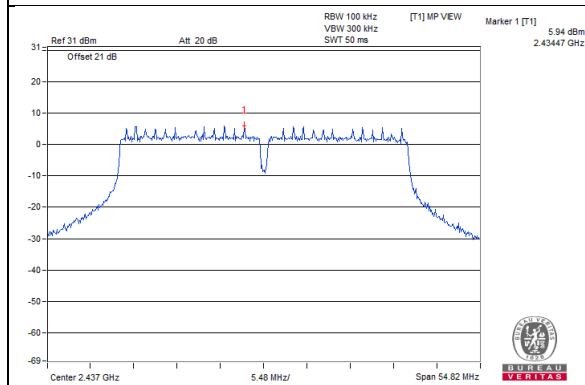


CH 11 Band edge



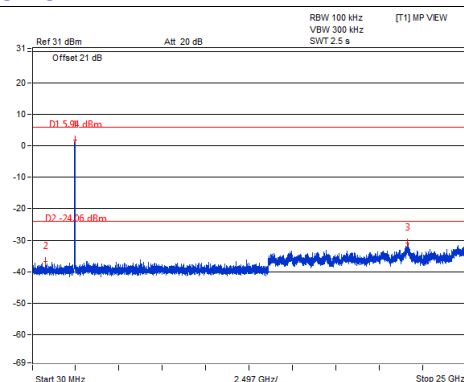
802.11ax (HE40)

Maximum REF

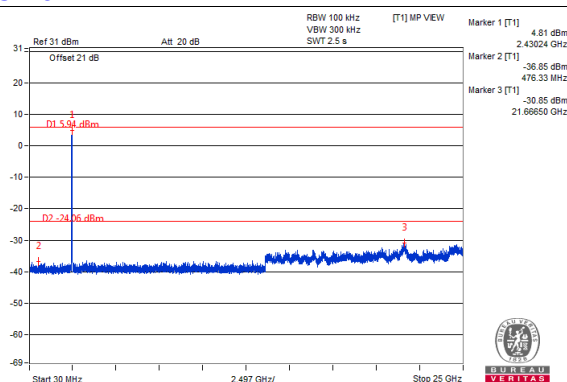


Chain 0

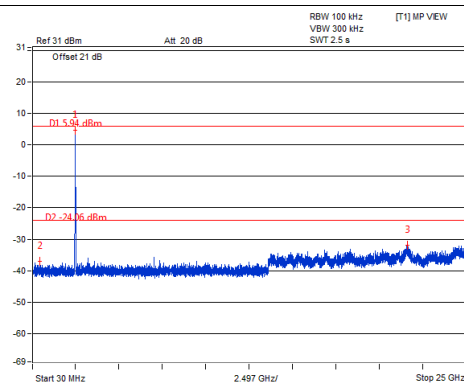
CH 3



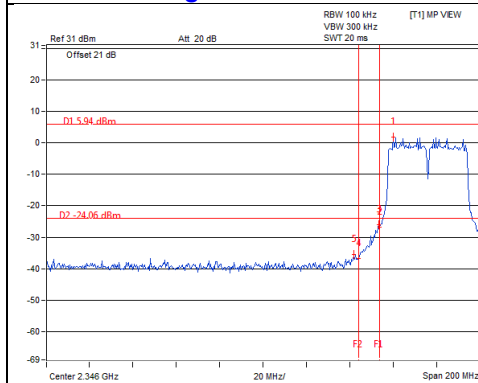
CH 6



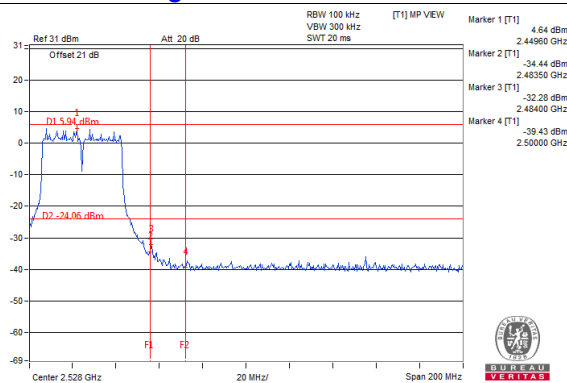
CH 9



CH 3 Band edge

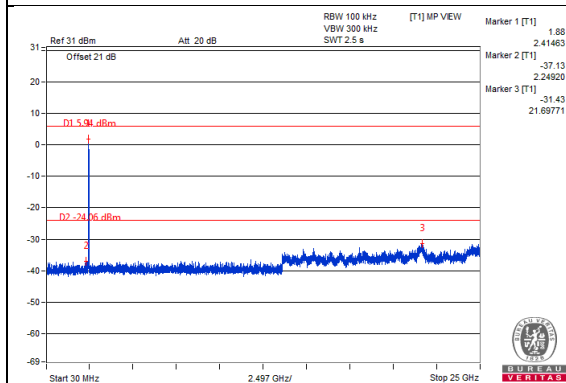


CH 9 Band edge

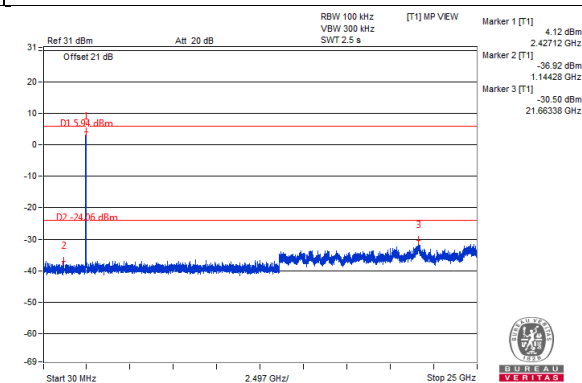


Chain 1

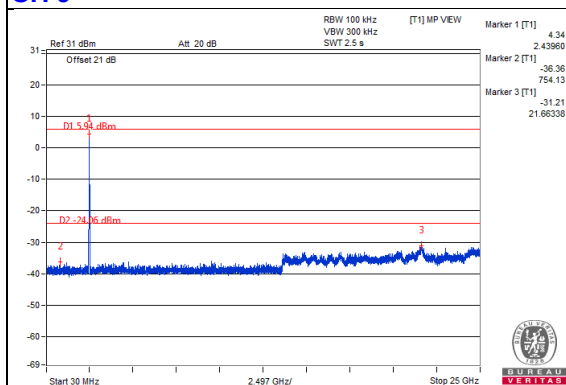
CH 3



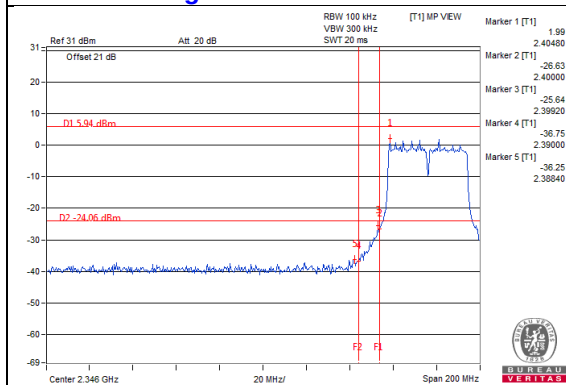
CH 6



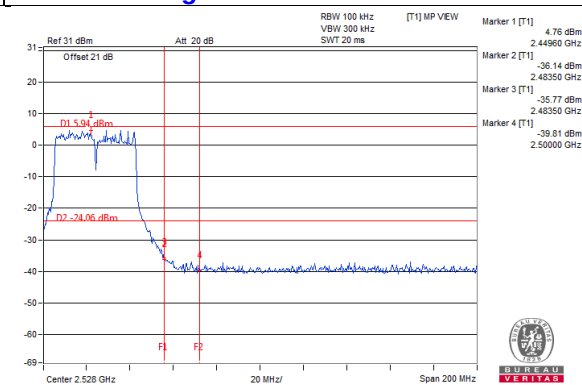
CH 9



CH 3 Band edge



CH 9 Band edge



5 Pictures of Test Arrangements

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

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:

Linkou EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

--- END ---