

FCC Test Report (WLAN)

Report No.: RF180117E07S-1

FCC ID: PPD-QCNFA324

Test Model: QCNFA324

Received Date: Sep. 18, 2019

Test Date: Sep. 26, 2019

Issued Date: Oct. 15, 2019

Applicant: Qualcomm Atheros, Inc.

Address: 1700 Technology Drive, San Jose, CA 95110

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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Test Location: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
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**FCC Registration /
Designation Number:** 723255 / TW2022



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Release Control Record

Issue No.	Description	Date Issued
RF180117E07S-1	Original release.	Oct. 15, 2019

1 Certificate of Conformity

Product: 2x2 802.11A/B/G/N/AC WiFi + Bluetooth Module

Brand: Qualcomm Atheros

Test Model: QCNFA324

Sample Status: R&D SAMPLE

Applicant: Qualcomm Atheros, Inc.

Test Date: Sep. 26, 2019

Standard: 47 CFR FCC Part 15, Subpart E (Section 15.407)
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:

Oct. 15, 2019

Claire Kuan / Specialist

Approved by :



Date:

Oct. 15, 2019

Clark Lin / Technical Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions & Band Edge Measurement*	Pass	Meet the requirement of limit. Minimum passing margin is -15.1dB at 11650.00MHz
15.407(a) (1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	-	Reference only.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.203	Antenna Requirement	Pass	Antenna connector is IPEX not a standard connector.

*For U-NII-3 band compliance with rule part 15.407(b)(4)(i), the OOB test plots were recorded in Annex A.
Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. This report is prepared for FCC Class II change.

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) (±)
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.0 dB
	6GHz ~ 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	2x2 802.11A/B/G/N/AC WiFi + Bluetooth Module
Brand	Qualcomm Atheros
Test Model	QCNFA324
Status of EUT	R&D SAMPLE
Power Supply Rating	3.3Vdc form host equipment
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
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n : up to 300Mbps 802.11ac: up to 866.7Mbps
Operating Frequency	2.4GHz: 2.412 ~ 2.472GHz 5GHz: 5.18~ 5.24GHz, 5.26 ~ 5.32GHz, 5.5 ~ 5.72GHz, 5.745 ~ 5.825GHz
Number of Channel	2.4GHz: 13 for 802.11b/g, 802.11n (HT20), VHT20 9 for 802.11n (HT40), VHT40 5GHz: 25 for 802.11a, 802.11n (HT20), VHT20 12 for 802.11n (HT40), VHT40 6 for 802.11ac (VHT80)
Output Power	5.745 ~ 5.825GHz: 63.699mW
Antenna Type	See item 3.2
Antenna Connector	See item 3.2
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. This report is prepared for FCC class II change. The difference compared with the Report No.: RF140808E04B-1 design is as the following information:
 - ◆ Update UNII-3 band test data in comply with FCC ORDER ON RECONSIDERATION FCC16-24.
2. According to above conditions, only U-NII-3 band: Radiated Emissions above 1GHz & Band Edge Measurement, Max Average Transmit Power, Occupied Bandwidth Measurement, Peak Power Spectral Density and 6dB bandwidth need to be performed. And all data was verified to meet the requirements.
3. There are Bluetooth technology and WLAN technology used for the EUT.
4. WLAN <5GHz> and Bluetooth technology can transmit at same time.
5. QCNFA324 supports two digital interfaces (USB and UART) for Bluetooth digital end data communication. The Bluetooth RF end is exactly same in both implementations.

Variant No.	Interface
SKU #1	USB interface for BT
SKU #2	UART interface for BT
From the above Variants, SKU #1 was selected as representative model for the test and its data was recorded in this report.	

6. The EUT incorporates a 2T2R function with beamforming.

For 2.4G Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	2TX	2RX
802.11g	6 ~ 54Mbps	2TX	2RX
802.11n (HT20) & 802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
VHT20	MCS0~8 Nss=1	2TX	2RX
	MCS0~8 Nss=2	2TX	2RX
VHT40	MCS0~9 Nss=1	2TX	2RX
	MCS0~9 Nss=2	2TX	2RX
For 5G Band			
802.11a	6 ~ 54Mbps	2TX	2RX
802.11n (HT20) & 802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11ac (VHT20)	MCS0~8 Nss=1	2TX	2RX
	MCS0~8 Nss=2	2TX	2RX
802.11ac (VHT40) & 802.11ac (VHT80)	MCS0~9 Nss=1	2TX	2RX
	MCS0~9 Nss=2	2TX	2RX

7. Simultaneously transmission condition.

Condition	Technology	
1	WLAN 5GHz	Bluetooth

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

8. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Description of Antenna

The antenna gain was declared by client; please refer to the following table:

Antenna set 1									
Transmitter Circuit	Brand	Model	Antenna Type	2.4GHz Gain with cable loss (dBi)	5GHz Gain with cable loss (dBi)	2.4GHz Cable Loss (dBi)	5G Cable Loss (dBi)	Connector Type	Cable Length (mm)
Chain (0)	WNC	81-EBJ15.005	PIFA	3.62	Band 1&2: 3.08 Band 3: 4.76 Band 4: 4.76	1.15	Band 1&2:1.70 Band 3: 1.74 Band 4: 1.79	IPEX	300
Chain (1)	WNC	81-EBJ15.005	PIFA	3.62	Band 1&2: 3.08 Band 3: 4.76 Band 4: 4.76	1.15	Band 1&2:1.70 Band 3: 1.74 Band 4: 1.79	IPEX	300
Antenna set 2									
Transmitter Circuit	Brand	Model	Antenna Type	2.4GHz Gain with cable loss (dBi)	5GHz Gain with cable loss (dBi)	Cable Loss (dBi)	Connector Type	Cable Length (mm)	
Chain (0)	Tongda	T-543-8201044-A (Ant 1)	PIFA	3.572	Band 1&2: 3.002 Band 3: 4.546 Band 4: 4.416	NA	IPEX	77	
Chain (1)	Tongda	T-543-8201044-A (Ant 2)	PIFA	3.325	Band 1&2: 2.942 Band 3: 4.622 Band 4: 4.586	NA	IPEX	71	

- Note: 1. Above antenna gains of antenna are Total (H+V).
2. All of antenna can be application for WLAN and Bluetooth.

3.3 Description of Test Modes

FOR 5745 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz		

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
151	5755 MHz	159	5795 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775 MHz

3.3.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To		Description
	RE≥1G	APCM	
-	√	√	-

Where **RE≥1G**: Radiated Emission above 1GHz

APCM: Antenna Port Conducted Measurement

Note: In the original test report, the EUT's antenna had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on Z-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.

MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	DATA RATE (Mbps)
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6
802.11ac (VHT20)		149 to 165	149, 157, 165	OFDM	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	13.5
802.11ac (VHT80)		155	155	OFDM	29.3

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.

MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	DATA RATE (Mbps)
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6
802.11ac (VHT20)		149 to 165	149, 157, 165	OFDM	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	13.5
802.11ac (VHT80)		155	155	OFDM	29.3

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE≥1G	22deg. C, 72%RH	120Vac, 60Hz	Jeff Lee
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

3.4 Duty Cycle of Test Signal

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

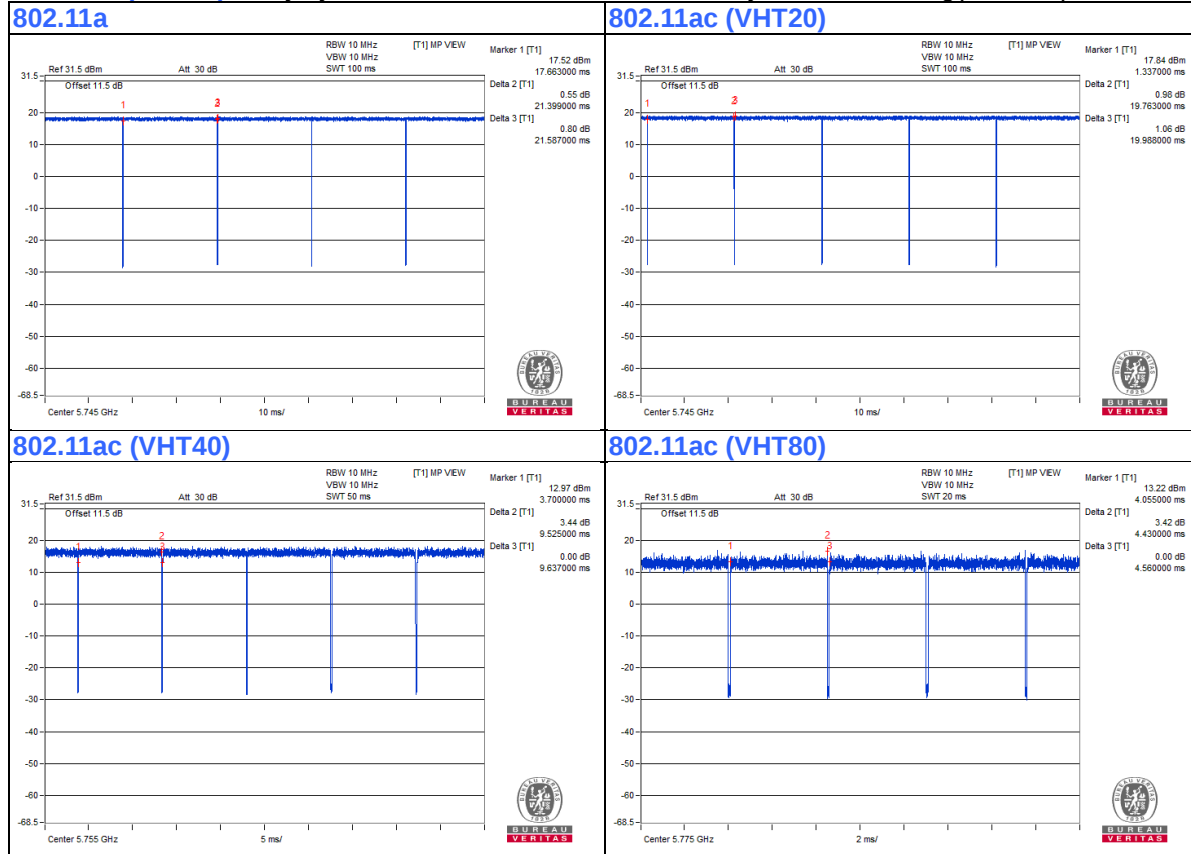
If duty cycle of test signal is $< 98\%$, duty factor shall be considered.

802.11a: Duty cycle = 21.399 ms/21.587 ms = 0.991

802.11ac (VHT20): Duty cycle = 19.763 ms/19.988 ms = 0.989

802.11ac (VHT40): Duty cycle = 9.525 ms/9.637 ms = 0.988

802.11ac (VHT80): Duty cycle = 4.43 ms/4.56 ms = 0.971, Duty factor = $10 * \log(1/0.971) = 0.13$



3.5 Description of Support Units

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

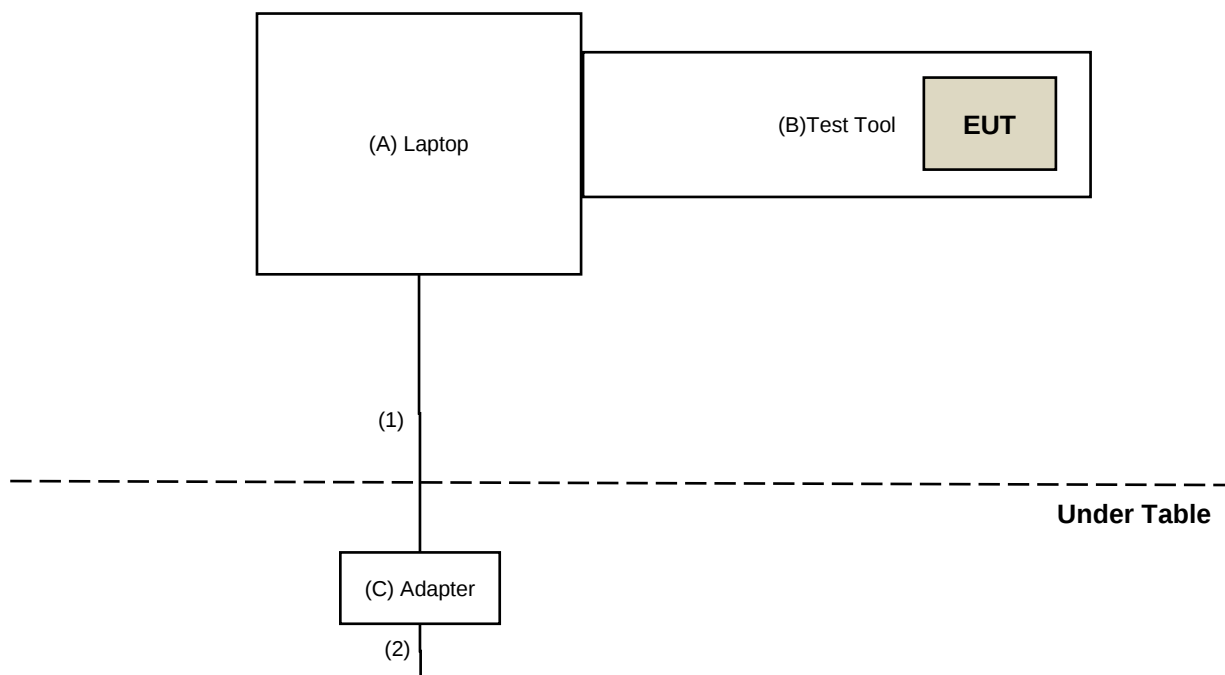
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E5430	GM1SKV1	FCC DoC	Provided by Lab
B.	Test Tool	Qualcomm Atheros, Inc.	NA	NA	NA	Supplied by client
C.	Adapter	DELL	LA65NS2-01	NA	NA	Provided by Lab

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	2	No	0	Provided by Lab
2.	AC Cable	1	1	No	0	Provided by Lab

3.5.1 Configuration of System under Test



3.6 General Description of Applied Standard

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 E (15.407)

KDB 789033 D02 General UNII Test Procedure New Rules v02r01

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 (Radiated Versus Conducted)

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.

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:

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- 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.

Limits of unwanted emission out of the restricted bands

Applicable To			Limit	
789033 D02 General UNII Test Procedure New Rules v02r01			Field Strength at 3m	
			PK:74 (dBμV/m)	AV:54 (dBμV/m)
Frequency Band	Applicable To		EIRP Limit	Equivalent Field Strength at 3m
5150~5250 MHz	15.407(b)(1)		PK:-27 (dBm/MHz)	PK:68.2(dBμV/m)
5250~5350 MHz	15.407(b)(2)			
5470~5725 MHz	15.407(b)(3)			
5725~5850 MHz	☒	15.407(b)(4)(i)	PK:-27 (dBm/MHz) ^{*1} PK:10 (dBm/MHz) ^{*2} PK:15.6 (dBm/MHz) ^{*3} PK:27 (dBm/MHz) ^{*4}	PK: 68.2(dBμV/m) ^{*1} PK:105.2 (dBμV/m) ^{*2} PK: 110.8(dBμV/m) ^{*3} PK:122.2 (dBμV/m) ^{*4}
	☐	15.407(b)(4)(ii)	Emission limits in section 15.247(d)	
^{*1} beyond 75 MHz or more above of the band edge.			^{*2} below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.	
^{*3} below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.			^{*4} from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.	

Note:

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts).}$$

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ESR7 R&S	ESR7	102026	Apr. 24, 2019	Apr. 23, 2020
Spectrum Analyzer Keysight	N9030B	MY57141948	May 25, 2019	May 24, 2020
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-1819	Nov. 25, 2018	Nov. 24, 2019
Pre-Amplifier EMCI	EMC12630SE	980509	May 03, 2019	May 02, 2020
RF Cable EMCI	EMC104-SM-SM-1500	180503	May 03, 2019	May 02, 2020
RF Cable EMCI	EMC104-SM-SM-2000	180501	May 03, 2019	May 02, 2020
RF Cable EMCI	EMC104-SM-SM-6000	180505	May 03, 2019	May 02, 2020
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 28, 2019	Jan. 27, 2020
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 25, 2018	Nov. 24, 2019
RF Cable	EMC102-KM-KM-1200	160924	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC102-KM-KM-1200	160925	Jan. 28, 2019	Jan. 27, 2020
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 04, 2019	June 03, 2020
Power meter Anritsu	ML2495A	1014008	May 13, 2019	May 12, 2020
Power sensor Anritsu	MA2411B	0917122	May 13, 2019	May 12, 2020

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. 5.
3. Tested Date: Sep. 26, 2019

4.1.3 Test Procedure

Following FCC KDB 789033 D02 General UNII Test Procedures:

Radiated versus Conducted Measurements.

The unwanted emission limits in both the restricted and non-restricted bands are based on antenna-port conducted measurements in conjunction with cabinet emissions tests are permitted to demonstrate compliance.

The following steps was performed:

- a. Cabinet emissions measurements. Radiated measurement was performed to ensure that cabinet emissions are below the emission limits. For the cabinet-emission measurements the antenna was replaced by a termination matching the nominal impedance of the antenna.
- b. Conducted tests was performed using equipment that matches the nominal impedance of the antenna assembly used with the EUT
- c. EIRP calculation. A value representative of an upper bound on out-of-band antenna gain (in dBi) shall be added to the measured antenna-port conducted emission power to compute EIRP within the specified measurement bandwidth. (For emissions in the restricted bands, additional calculations are required to convert EIRP to field strength at the specified distance.) The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater
- d. EIRP adjustments for multiple outputs. (Follow the procedures specified in FCC KDB Publication 662911)
- e. For all of Radiation emission test
 - e-1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meters chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
 - e-2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
 - e-3. 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.
 - e-4. 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-5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
 - e-6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:

1. 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.
2. 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.
3. All modes of operation were investigated and the worst-case emissions are reported.

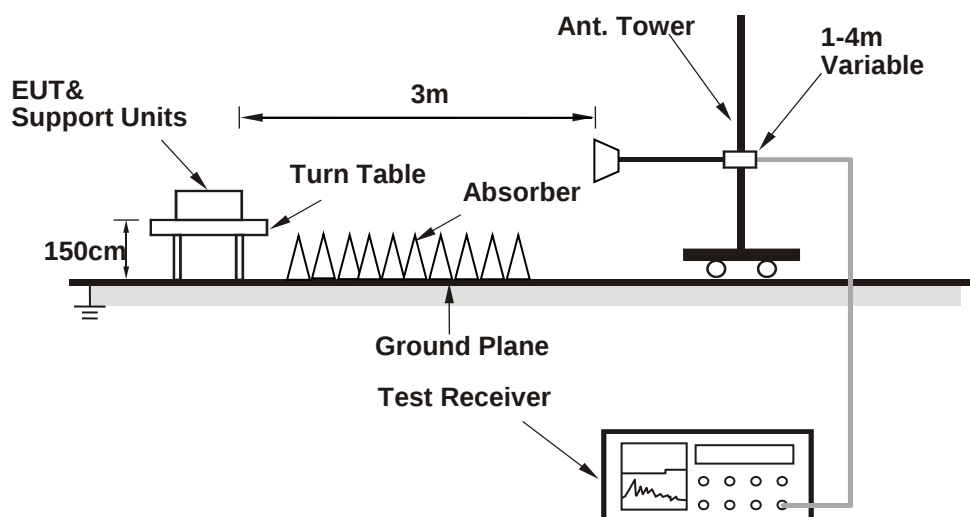
4.1.4 Deviation from Test Standard

No deviation.

4.1.5 Test Setup

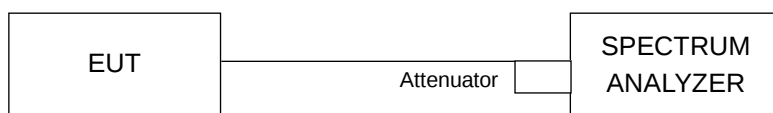
For radiated configuration:

For Radiated emission above 1GHz



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

For conducted configuration:



4.1.6 EUT Operating Condition

- Connected the EUT with the Laptop which is placed.
- Controlling software (QRCT-CON30033_0919) has been activated to set the EUT under transmission/receiving condition continuously.

4.1.7 Test Results (Radiated Measurement)

Radiated versus Conducted Measurement	
☐ Conducted measurement	☒ Radiated measurement
<u>For Radiated measurement:</u> The level of unwanted emissions was measured when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation) <u>For Conducted measurement:</u> The level of unwanted emissions was measured as their power in a specified load (conducted spurious emissions).	

Radiated test was done with 50ohm terminator on antenna port

ABOVE 1GHz DATA

802.11a

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	11490.00	52.0 PK	74.0	-22.0	1.09 H	101	37.9	14.1
2	11490.00	38.5 AV	54.0	-15.5	1.09 H	101	24.4	14.1
3	#17235.00	44.6 PK	68.2	-23.6	2.19 H	11	26.9	17.7
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	11490.00	47.4 PK	74.0	-26.6	1.30 V	74	33.3	14.1
2	11490.00	36.4 AV	54.0	-17.6	1.30 V	74	22.3	14.1
3	#17235.00	42.5 PK	68.2	-25.7	1.79 V	275	24.8	17.7

REMARKS:

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

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	11570.00	52.0 PK	74.0	-22.0	1.09 H	89	37.9	14.1
2	11570.00	38.5 AV	54.0	-15.5	1.09 H	89	24.4	14.1
3	#17355.00	44.1 PK	68.2	-24.1	2.16 H	2	25.8	18.3
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	11570.00	47.3 PK	74.0	-26.7	1.29 V	68	33.2	14.1
2	11570.00	36.2 AV	54.0	-17.8	1.29 V	68	22.1	14.1
3	#17355.00	43.3 PK	68.2	-24.9	1.82 V	278	25.0	18.3

REMARKS:

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

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	11650.00	52.1 PK	74.0	-21.9	1.14 H	98	38.2	13.9
2	11650.00	38.9 AV	54.0	-15.1	1.14 H	98	25.0	13.9
3	#17475.00	44.5 PK	68.2	-23.7	2.25 H	24	25.0	19.5

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	11650.00	48.0 PK	74.0	-26.0	1.34 V	87	34.1	13.9
2	11650.00	36.9 AV	54.0	-17.1	1.34 V	87	23.0	13.9
3	#17475.00	42.6 PK	68.2	-25.6	1.77 V	273	23.1	19.5

REMARKS:

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

802.11ac (VHT20)

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	11490.00	49.6 PK	74.0	-24.4	1.04 H	101	35.5	14.1
2	11490.00	37.2 AV	54.0	-16.8	1.04 H	101	23.1	14.1
3	#17235.00	44.1 PK	68.2	-24.1	2.19 H	11	26.4	17.7
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	11490.00	47.3 PK	74.0	-26.7	1.30 V	65	33.2	14.1
2	11490.00	36.6 AV	54.0	-17.4	1.30 V	65	22.5	14.1
3	#17235.00	42.4 PK	68.2	-25.8	1.80 V	275	24.7	17.7

REMARKS:

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

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	11570.00	49.8 PK	74.0	-24.2	1.07 H	85	35.7	14.1
2	11570.00	37.4 AV	54.0	-16.6	1.07 H	85	23.3	14.1
3	#17355.00	44.4 PK	68.2	-23.8	2.20 H	7	26.1	18.3

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	11570.00	47.5 PK	74.0	-26.5	1.26 V	64	33.4	14.1
2	11570.00	36.4 AV	54.0	-17.6	1.26 V	64	22.3	14.1
3	#17355.00	42.0 PK	68.2	-26.2	1.76 V	278	23.7	18.3

REMARKS:

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

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	11650.00	50.2 PK	74.0	-23.8	1.01 H	96	36.3	13.9
2	11650.00	37.7 AV	54.0	-16.3	1.01 H	96	23.8	13.9
3	#17475.00	44.1 PK	68.2	-24.1	2.25 H	6	24.6	19.5

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	11650.00	47.5 PK	74.0	-26.5	1.27 V	85	33.6	13.9
2	11650.00	36.2 AV	54.0	-17.8	1.27 V	85	22.3	13.9
3	#17475.00	42.4 PK	68.2	-25.8	1.80 V	261	22.9	19.5

REMARKS:

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

802.11ac (VHT40)

CHANNEL	TX Channel 151	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	11510.00	50.5 PK	74.0	-23.5	1.01 H	106	36.4	14.1
2	11510.00	37.8 AV	54.0	-16.2	1.01 H	106	23.7	14.1
3	#17265.00	44.8 PK	68.2	-23.4	2.23 H	22	27.0	17.8
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	11510.00	47.8 PK	74.0	-26.2	1.30 V	66	33.7	14.1
2	11510.00	36.5 AV	54.0	-17.5	1.30 V	66	22.4	14.1
3	#17265.00	42.9 PK	68.2	-25.3	1.77 V	273	25.1	17.8

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. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 159	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	11590.00	50.0 PK	74.0	-24.0	1.03 H	98	35.9	14.1
2	11590.00	37.6 AV	54.0	-16.4	1.03 H	98	23.5	14.1
3	#17385.00	44.2 PK	68.2	-24.0	2.21 H	26	25.7	18.5

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	11590.00	46.8 PK	74.0	-27.2	1.30 V	74	32.7	14.1
2	11590.00	36.0 AV	54.0	-18.0	1.30 V	74	21.9	14.1
3	#17385.00	42.2 PK	68.2	-26.0	1.81 V	274	23.7	18.5

REMARKS:

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

802.11ac (VHT80)

CHANNEL	TX Channel 155	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	11550.00	48.7 PK	74.0	-25.3	1.00 H	108	34.5	14.2
2	11550.00	37.5 AV	54.0	-16.5	1.00 H	108	23.3	14.2
3	#17325.00	42.2 PK	68.2	-26.0	2.22 H	7	24.1	18.1
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	11550.00	45.0 PK	74.0	-29.0	1.25 V	78	30.8	14.2
2	11550.00	36.9 AV	54.0	-17.1	1.25 V	78	22.7	14.2
3	#17325.00	40.2 PK	68.2	-28.0	1.84 V	259	22.1	18.1

REMARKS:

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

4.1.8 Test Results (Conducted Measurement)

Radiated versus Conducted Measurement	
☒ Conducted measurement	☐ Radiated measurement
<u>For Radiated measurement:</u> The level of unwanted emissions was measured when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation) <u>For Conducted measurement:</u> The level of unwanted emissions was measured as their power in a specified load (conducted spurious emissions).	

Conducted Measurement Factor
a. The composite gain will be used when signal support the correlated signal. Composite gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi}$ b. For the out of band spurious the gain for the specific band may have been used rather than the highest gain across all bands. c. For the band edge the gain for the specific band may have been used. Note: The conducted emission test was considered some factor to compute test result.

Above 1GHz Data
802.11a - Channel 149

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	3829.68 PK	61.13	74	-12.87	-47.74	-43.21	7.77	-34.13
2	3829.68 AV	56.79	54	* 2.79	-54.97	-46.86	7.77	-38.47
3	7668.75 PK	58.93	74	-15.07	-47.59	-46.67	7.77	-36.33
4	7659.37 AV	47.96	54	-6.04	-57.5	-58.74	7.77	-47.3
5	11485.93 PK	60.07	74	-13.93	-45.92	-46.02	7.77	-35.19
6	11492.18 AV	48.8	54	-5.2	-58.27	-56.41	7.77	-46.46
7	17240.37 PK	63.09	68.2	-5.11	-41.14	-46.11	7.77	-32.17

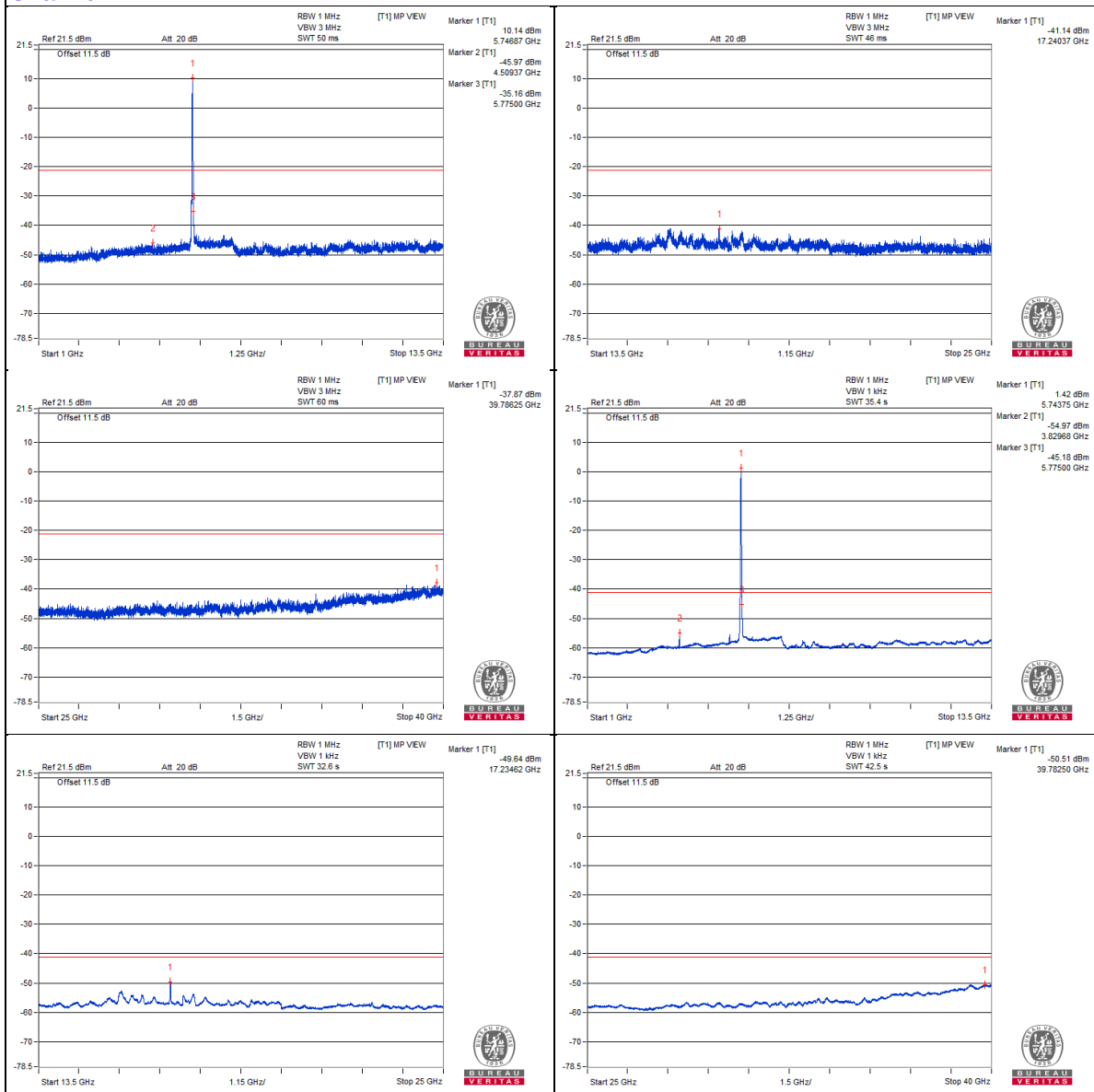
Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

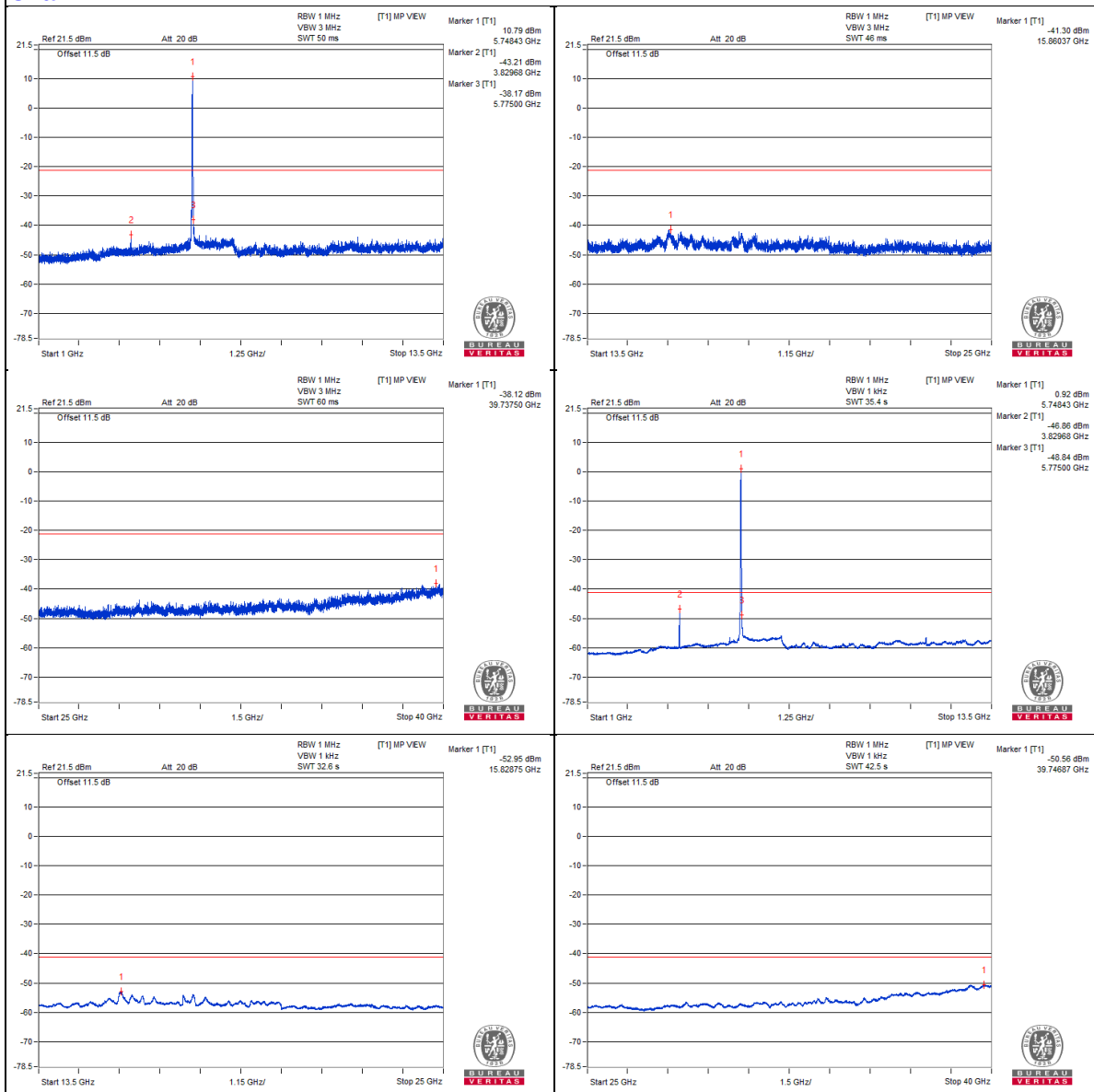
d = measurement distance in 3 meters.

* The unwanted emission was verified and the test result was passed by radiated measurement.
(Please refer APPENDIX A)

Chain 0

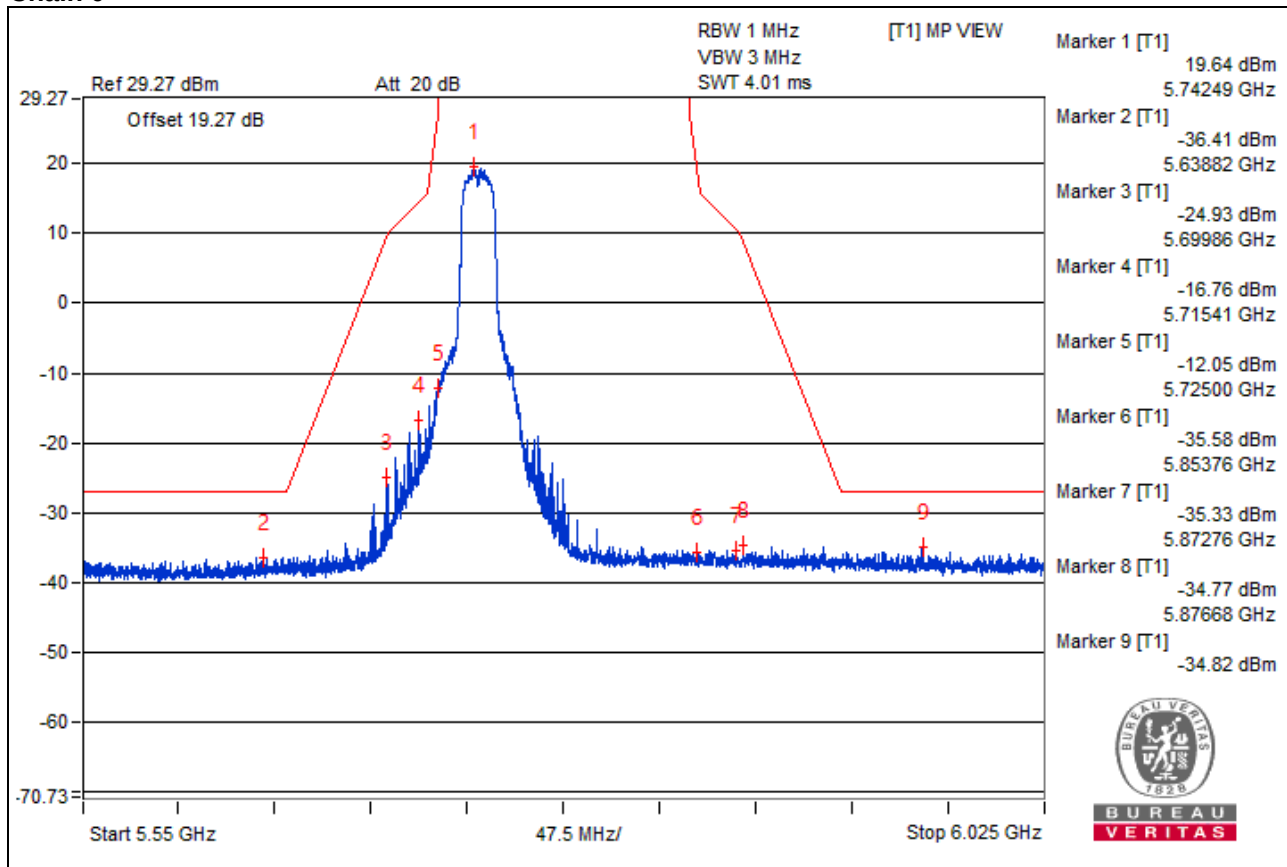


Chain 1



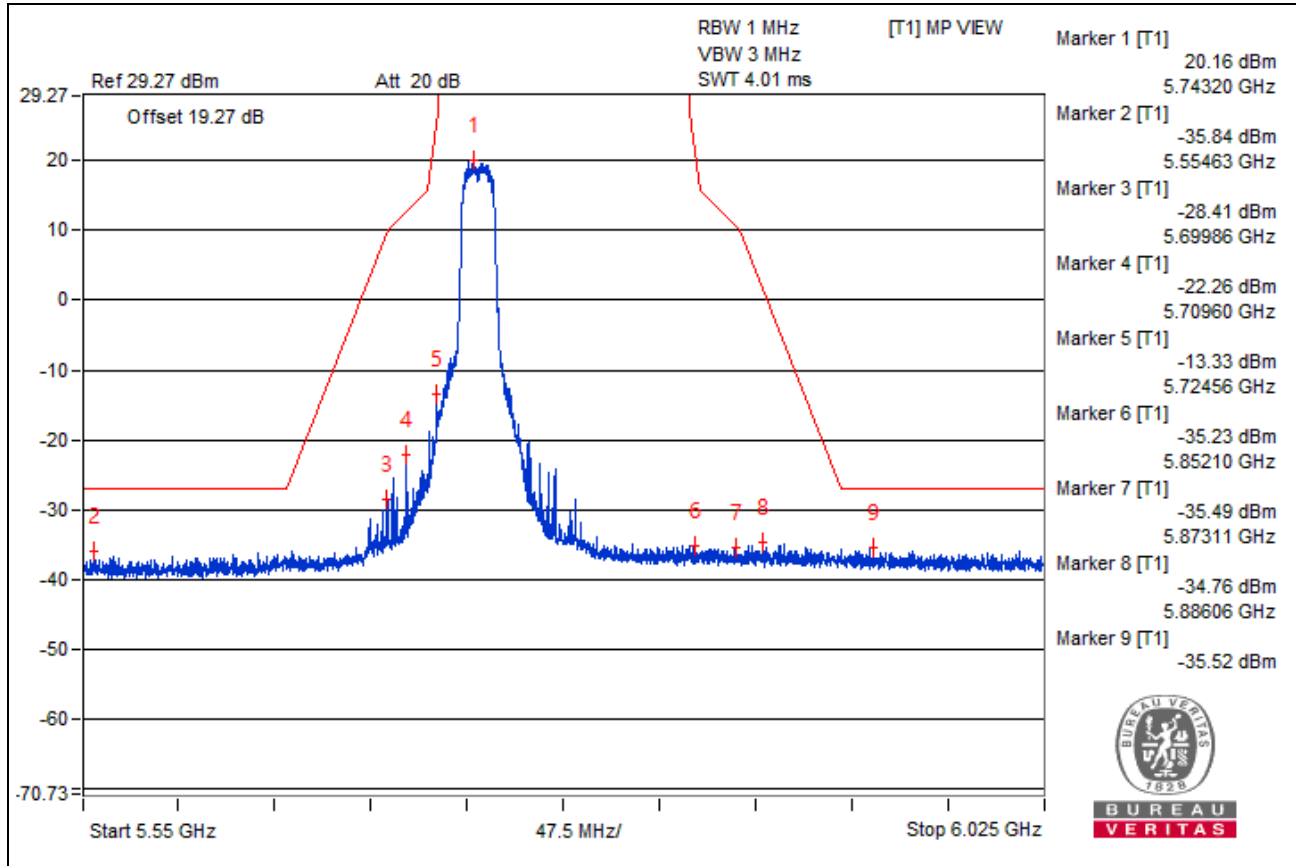
Bandedge Measurement

Chain 0



Bandedge Measurement

Chain 1



802.11a - Channel 157

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	3856.25 PK	62.2	74	-11.8	-46.71	-42.13	7.77	-33.06
2	3856.25 AV	57.69	54	*3.69	-53.21	-46.11	7.77	-37.57
3	7704.68 PK	59.16	74	-14.84	-46.89	-46.87	7.77	-36.1
4	7714.06 AV	48.22	54	-5.78	-57.41	-58.28	7.77	-47.04
5	11573.43 PK	60.95	74	-13.05	-46.16	-44.23	7.77	-34.31
6	11573.43 AV	49.59	54	-4.41	-58.47	-55.08	7.77	-45.67
7	17355.37 PK	62.74	68.2	-5.46	-41.53	-46.32	7.77	-32.52

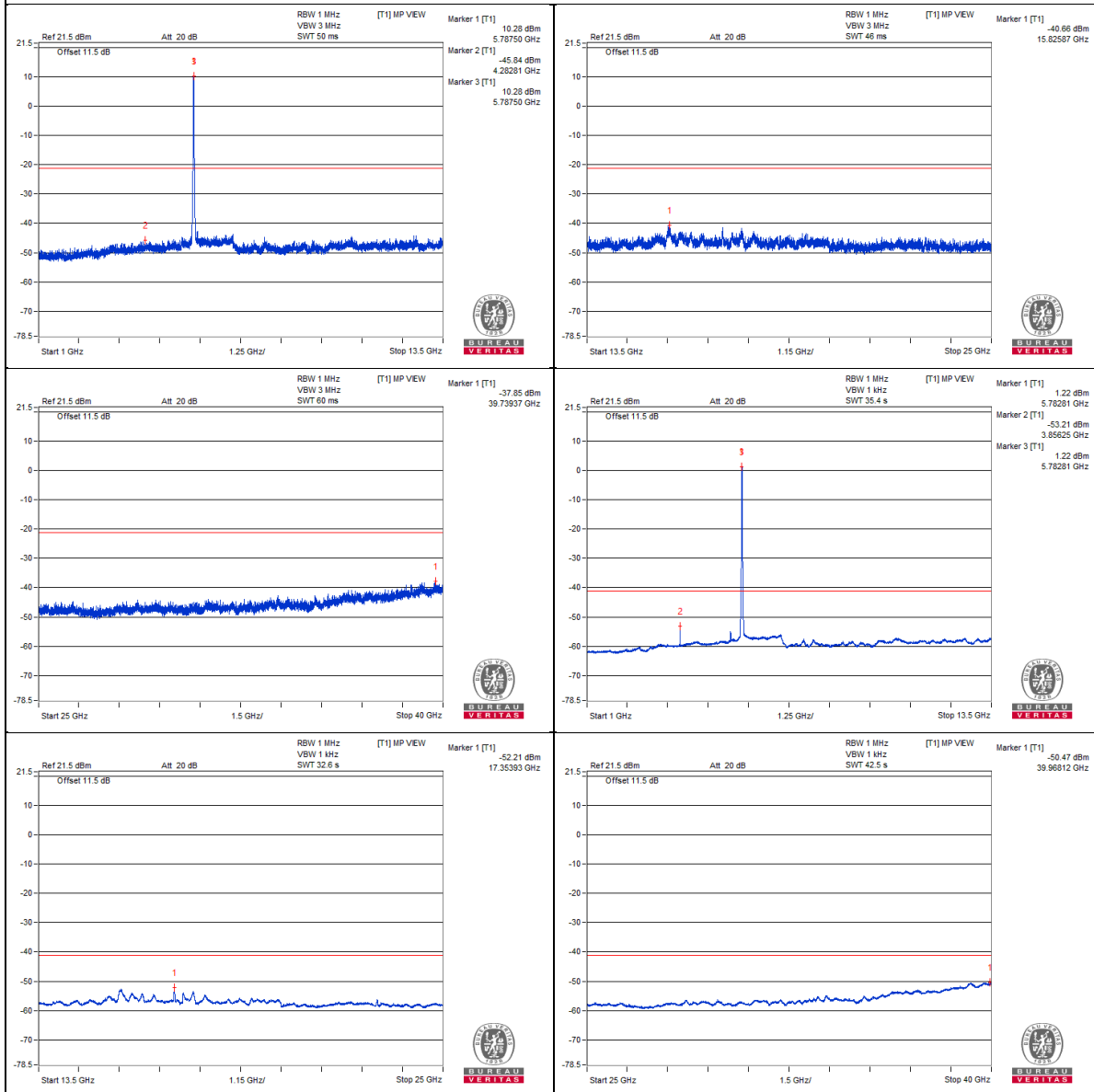
Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

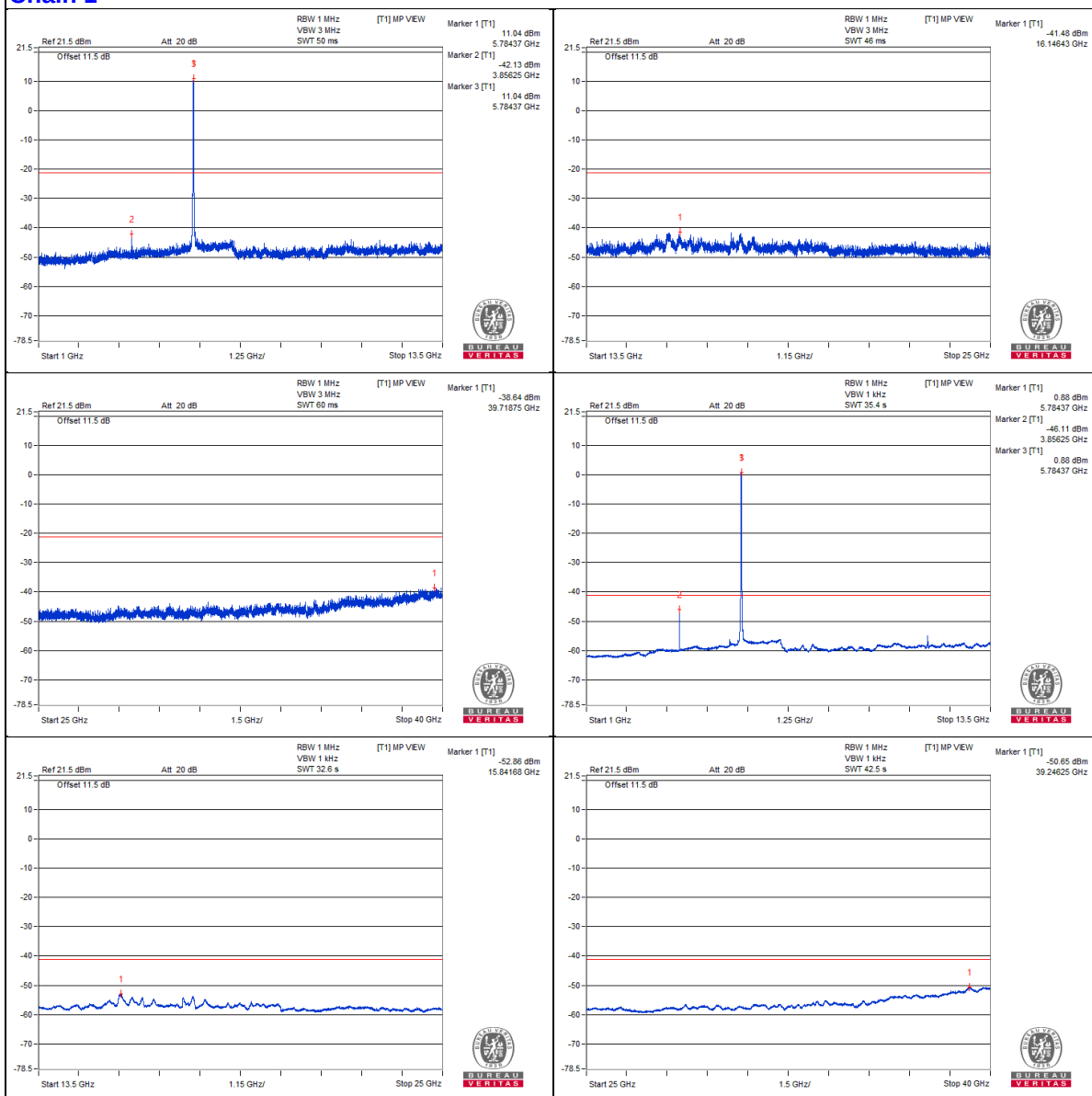
d = measurement distance in 3 meters.

* The unwanted emission was verified and the test result was passed by radiated measurement.
(Please refer APPENDIX A)

Chain 0

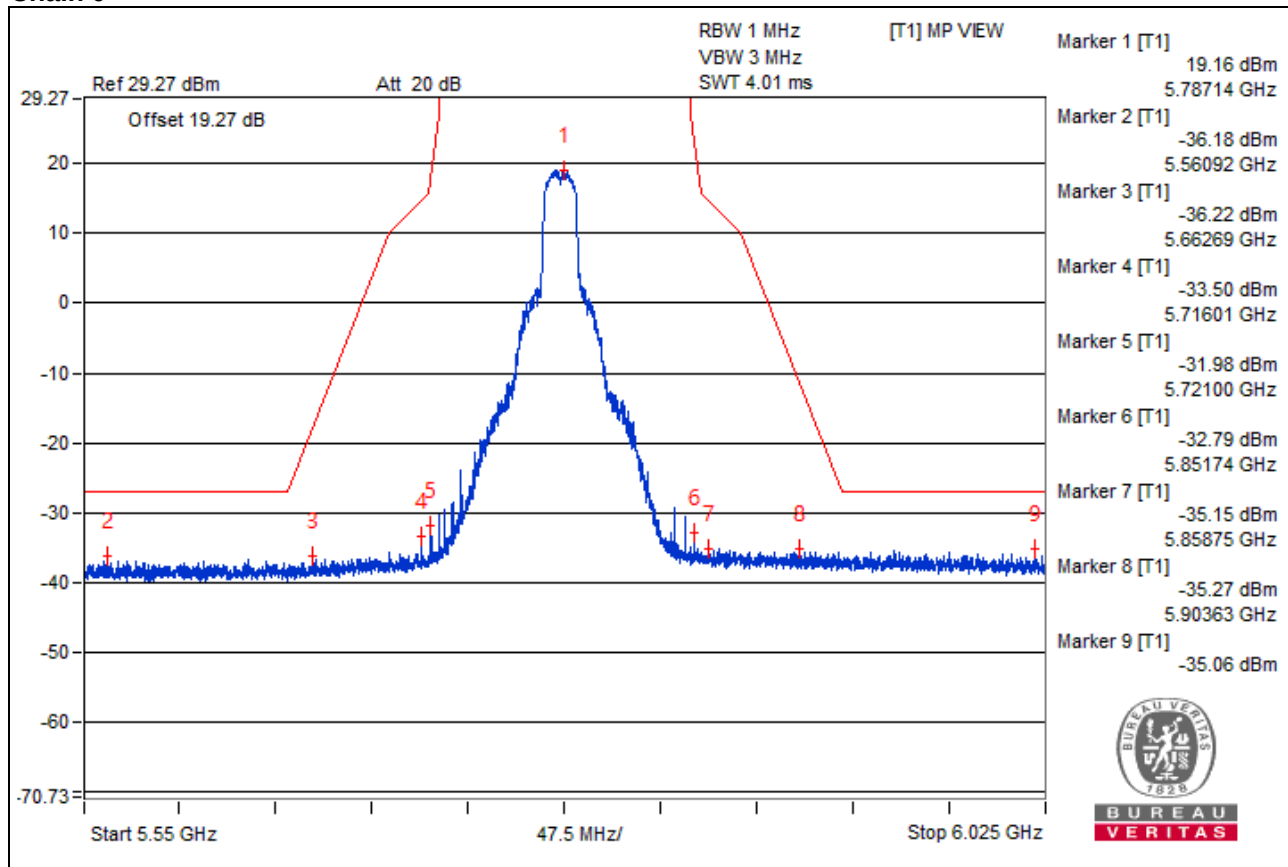


Chain 1



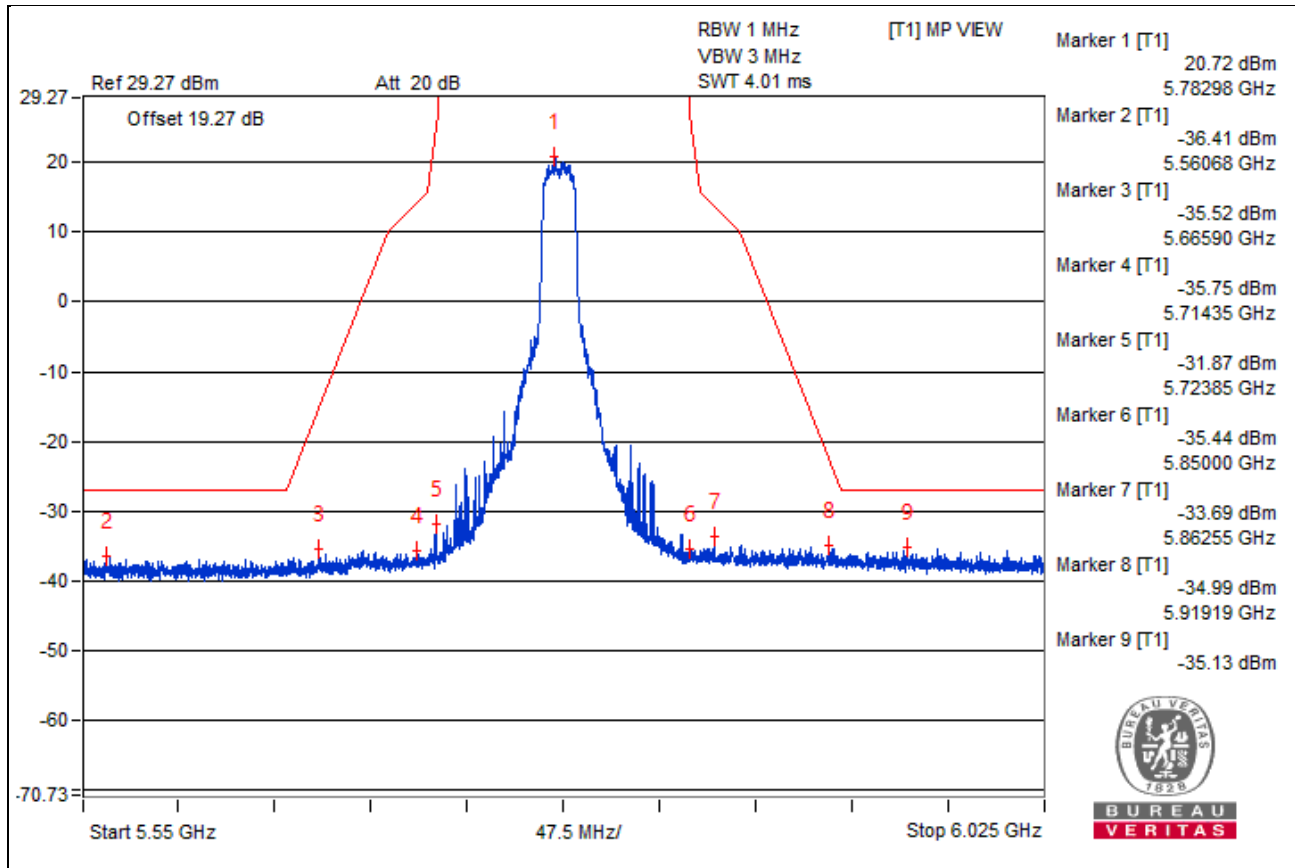
Bandedge Measurement

Chain 0



Bandedge Measurement

Chain 1



802.11a - Channel 165

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	3882.81 PK	62.95	74	-11.05	-45.77	-41.45	7.77	-32.31
2	3882.81 AV	59.48	54	*5.48	-51.23	-44.36	7.77	-35.78
3	7748.43 PK	57.75	74	-16.25	-49.03	-47.65	7.77	-37.51
4	11651.56 PK	61.43	74	-12.57	-48.3	-42.65	7.77	-33.83
5	11651.56 AV	50.51	54	-3.49	-57.97	-53.98	7.77	-44.75
6	17471.81 PK	61.96	68.2	-6.24	-42.41	-46.82	7.77	-33.3

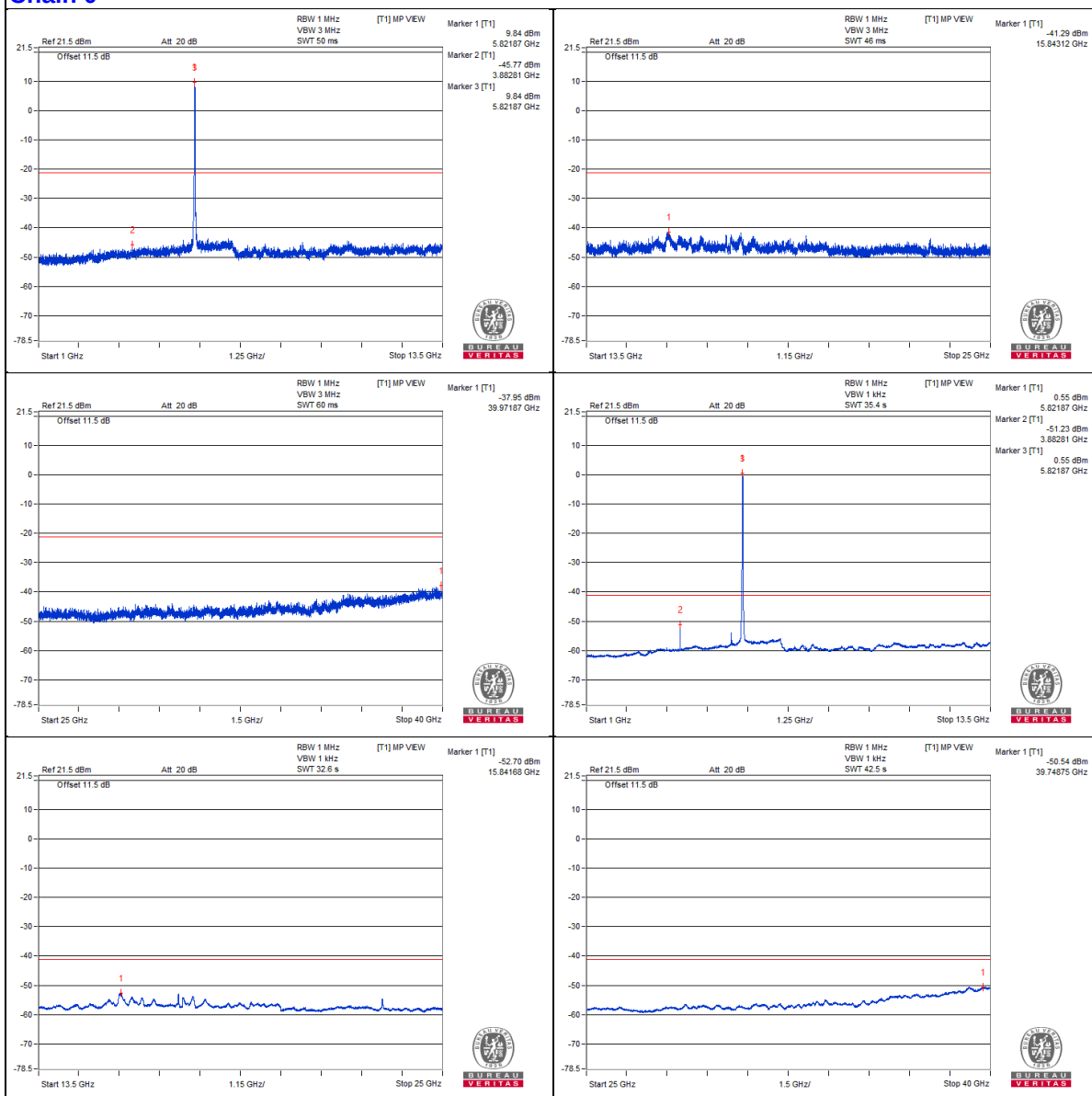
Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

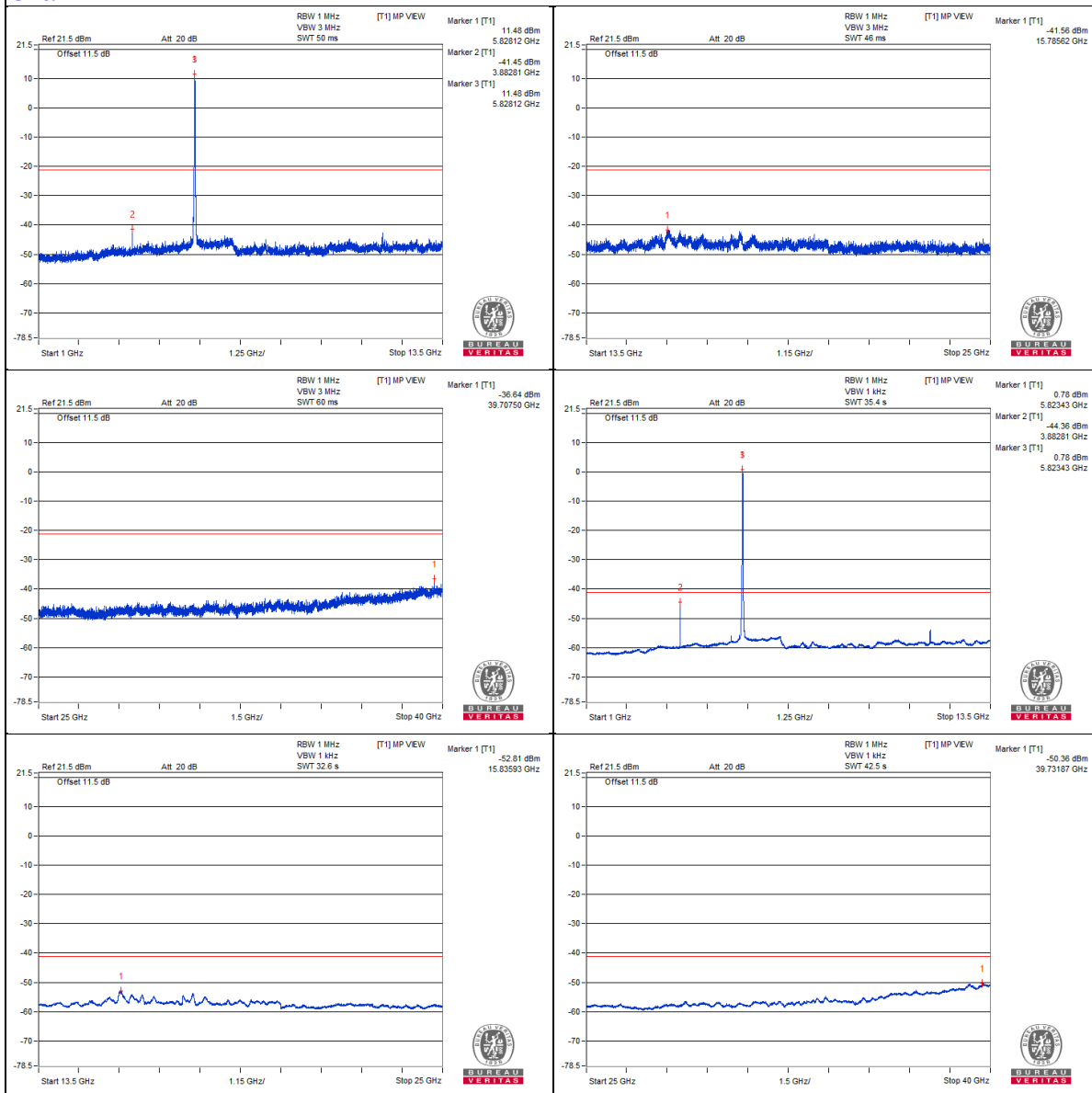
d = measurement distance in 3 meters.

* The unwanted emission was verified and the test result was passed by radiated measurement.
(Please refer APPENDIX A)

Chain 0

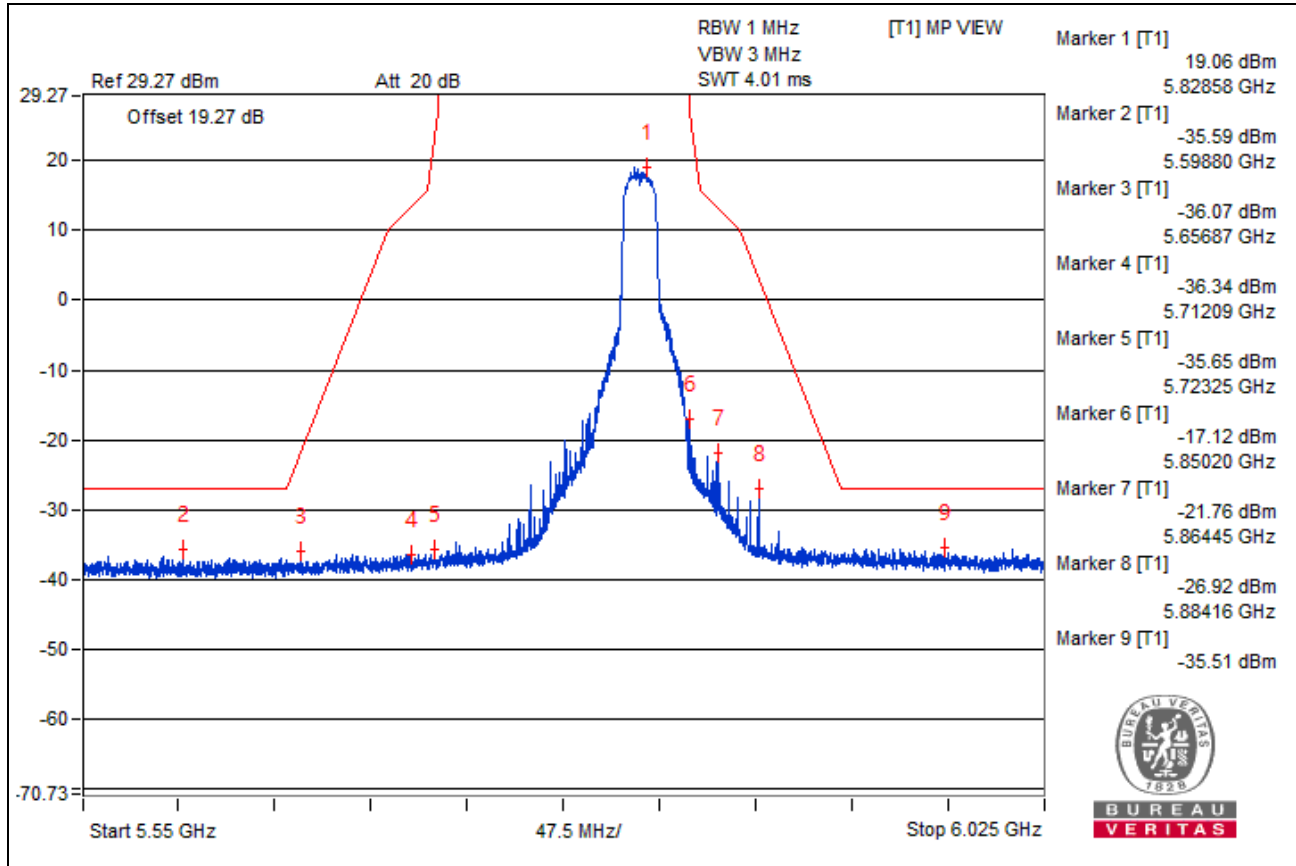


Chain 1



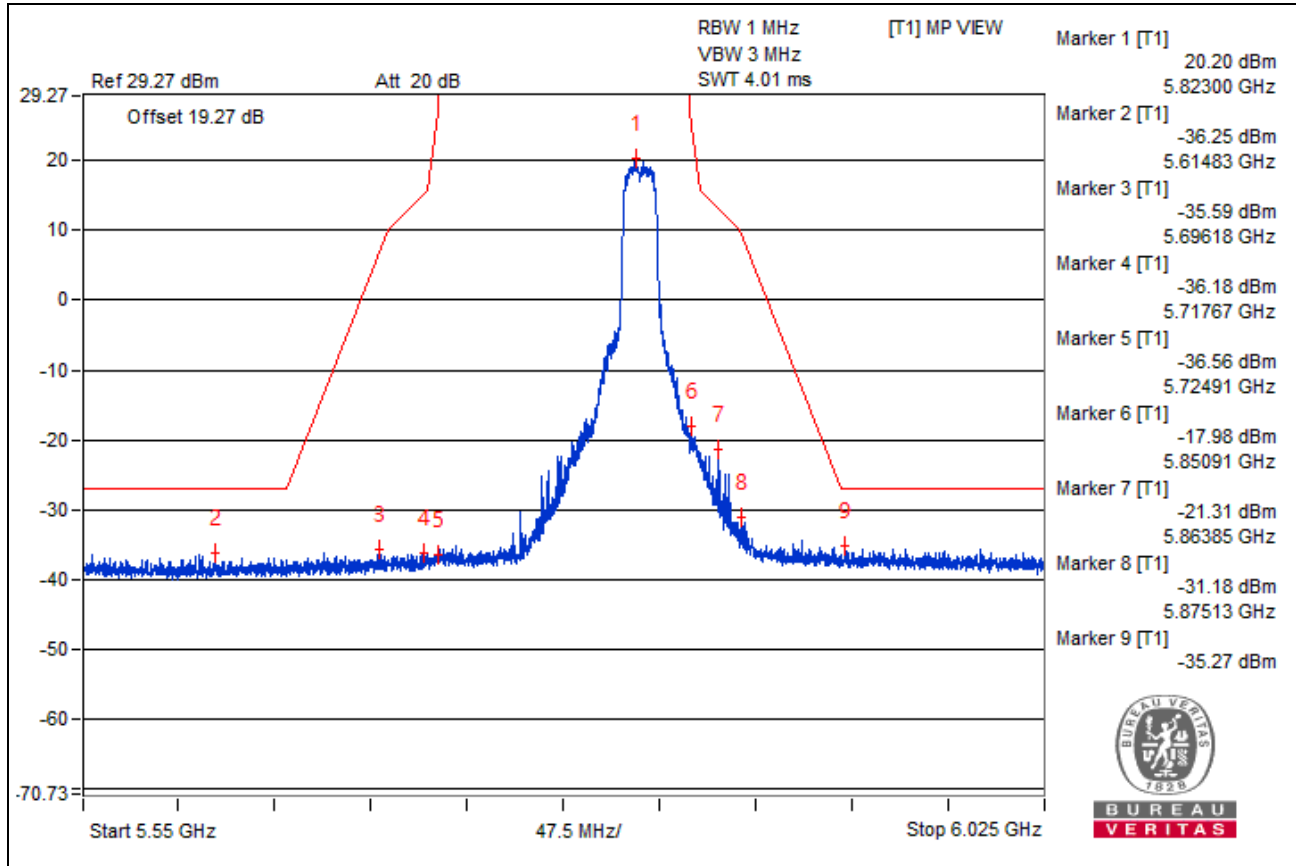
Bandedge Measurement

Chain 0



Bandedge Measurement

Chain 1



802.11ac (VHT20) - Channel 149

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	3829.68 PK	61.44	74	-12.56	-47.59	-42.84	7.77	-33.82
2	3829.68 AV	56.84	54	*2.84	-55.99	-46.67	7.77	-38.42
3	7665.62 PK	58.85	74	-15.15	-47.83	-46.64	7.77	-36.41
4	7659.37 AV	48.1	54	-5.9	-57.34	-58.64	7.77	-47.16
5	11482.81 PK	59.98	74	-14.02	-46.48	-45.68	7.77	-35.28
6	11496.87 AV	48.47	54	-5.53	-58.67	-56.69	7.77	-46.79
7	17227.43 PK	65.36	68.2	-2.84	-38.33	-46.16	7.77	-29.9

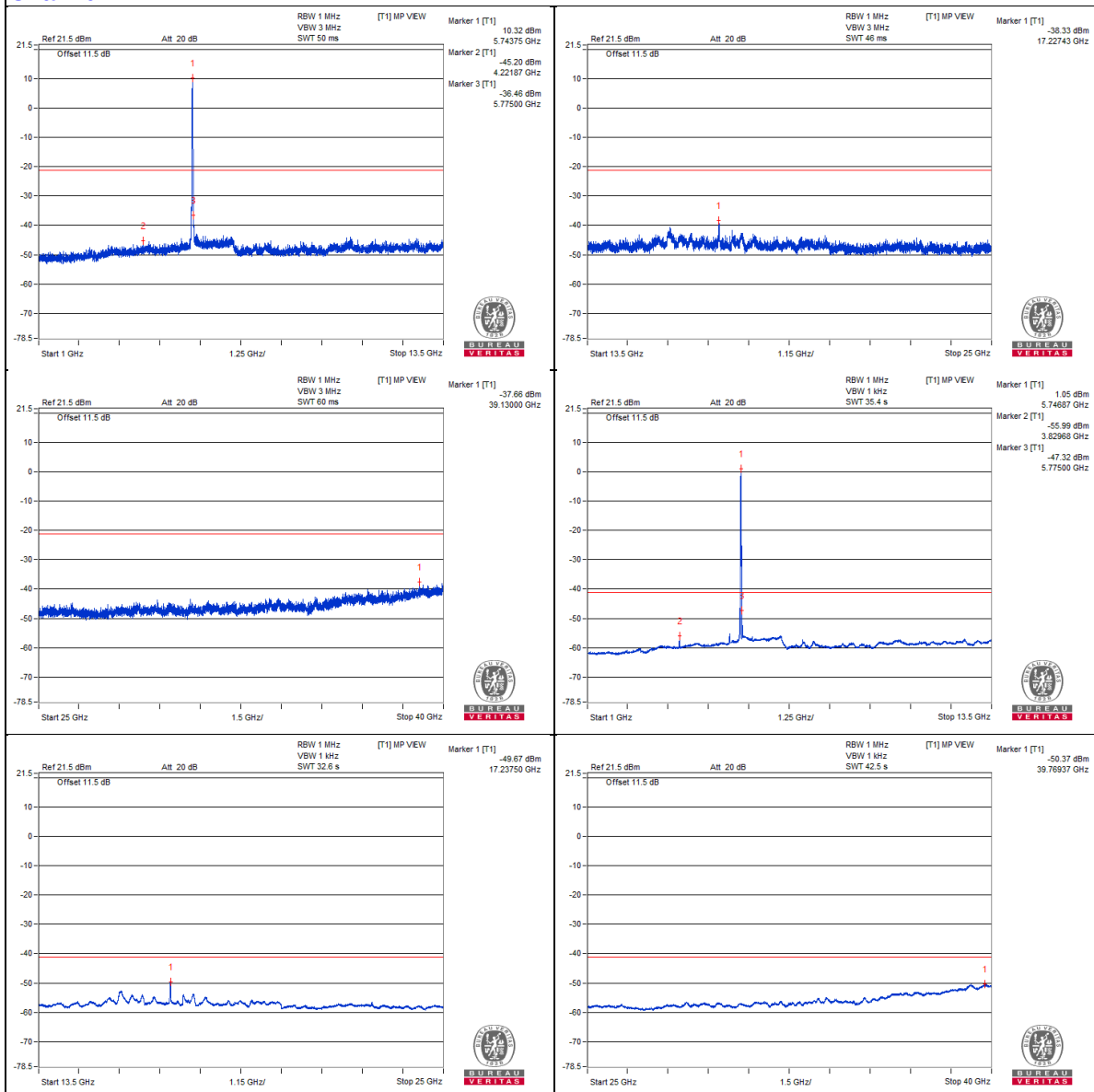
Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

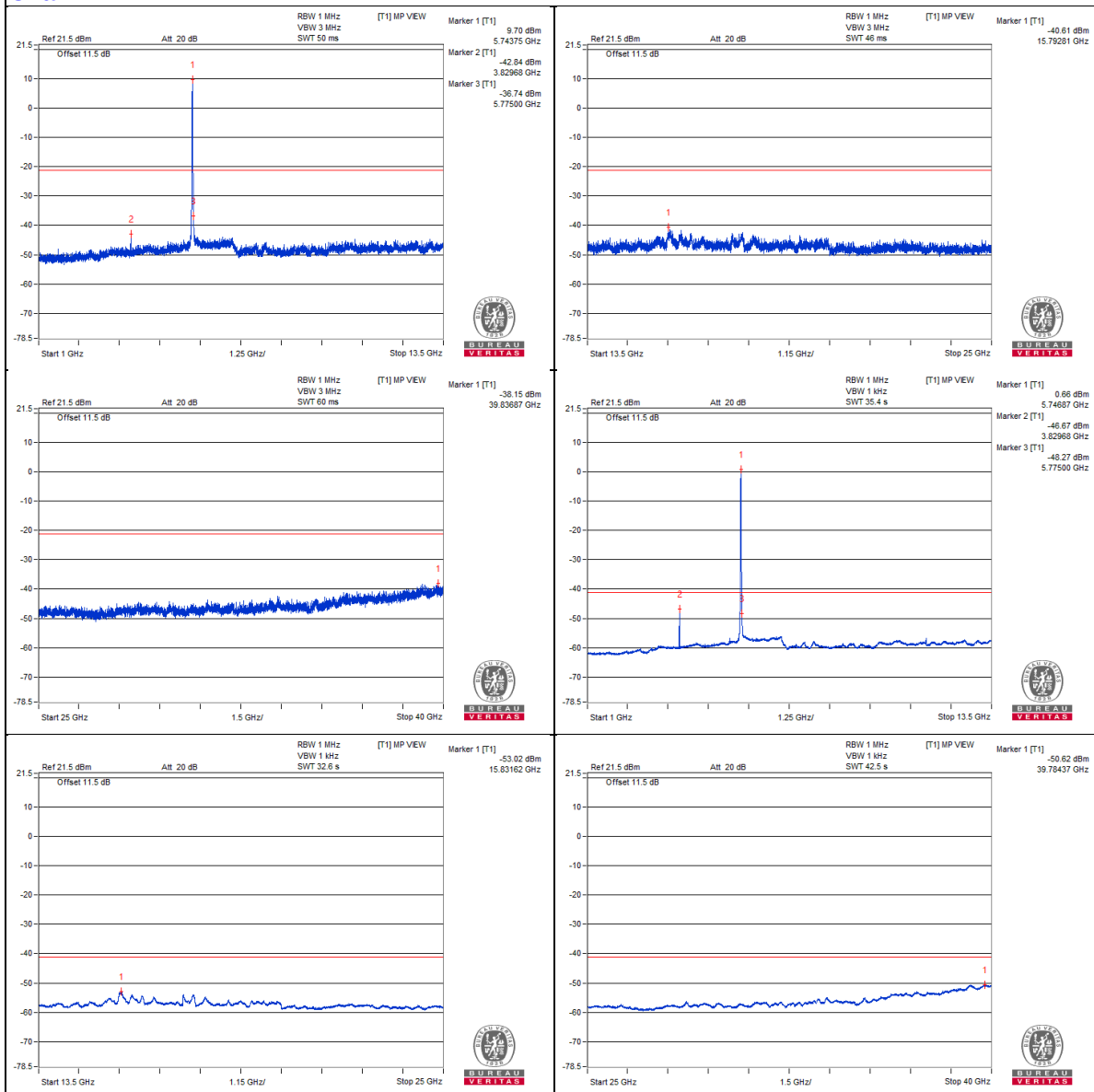
d = measurement distance in 3 meters.

* The unwanted emission was verified and the test result was passed by radiated measurement.
(Please refer APPENDIX A)

Chain 0

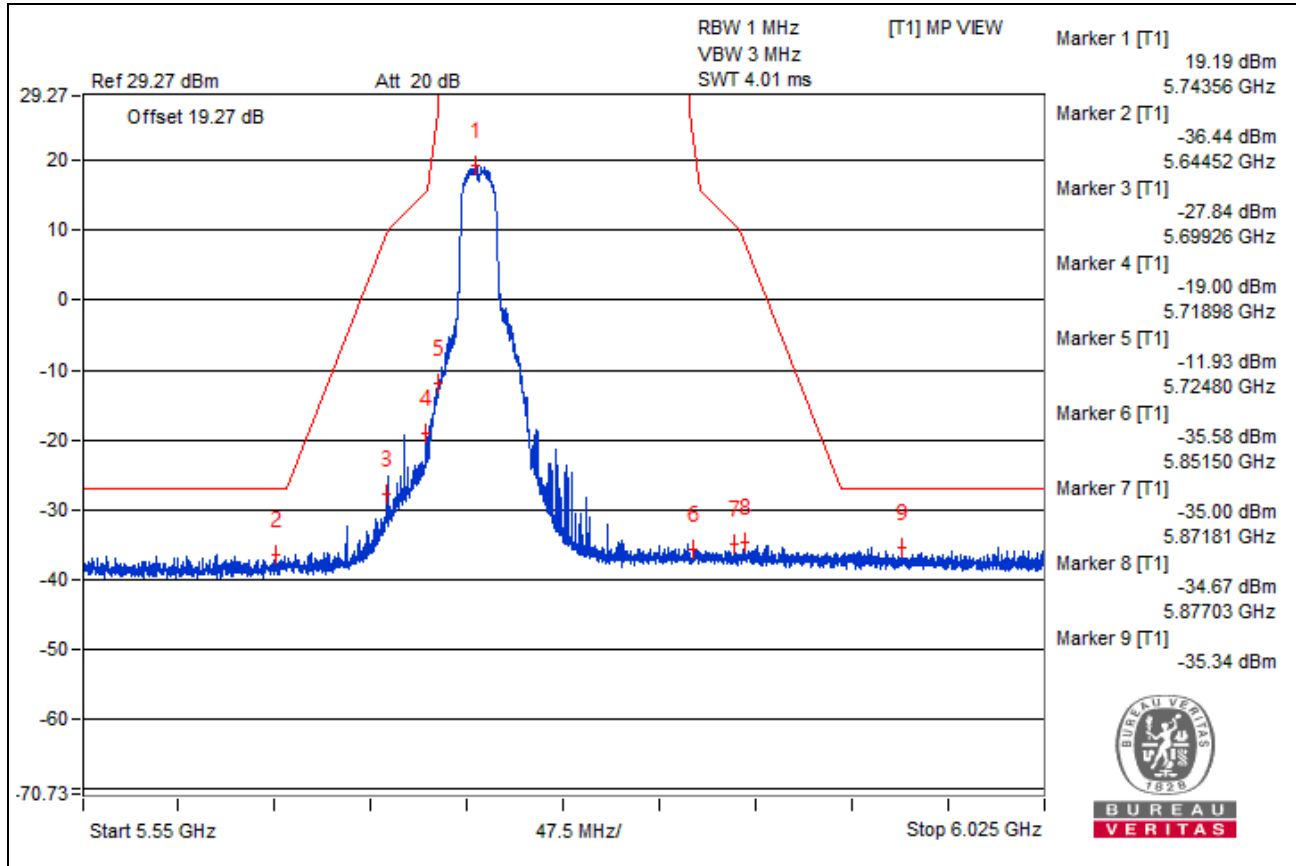


Chain 1



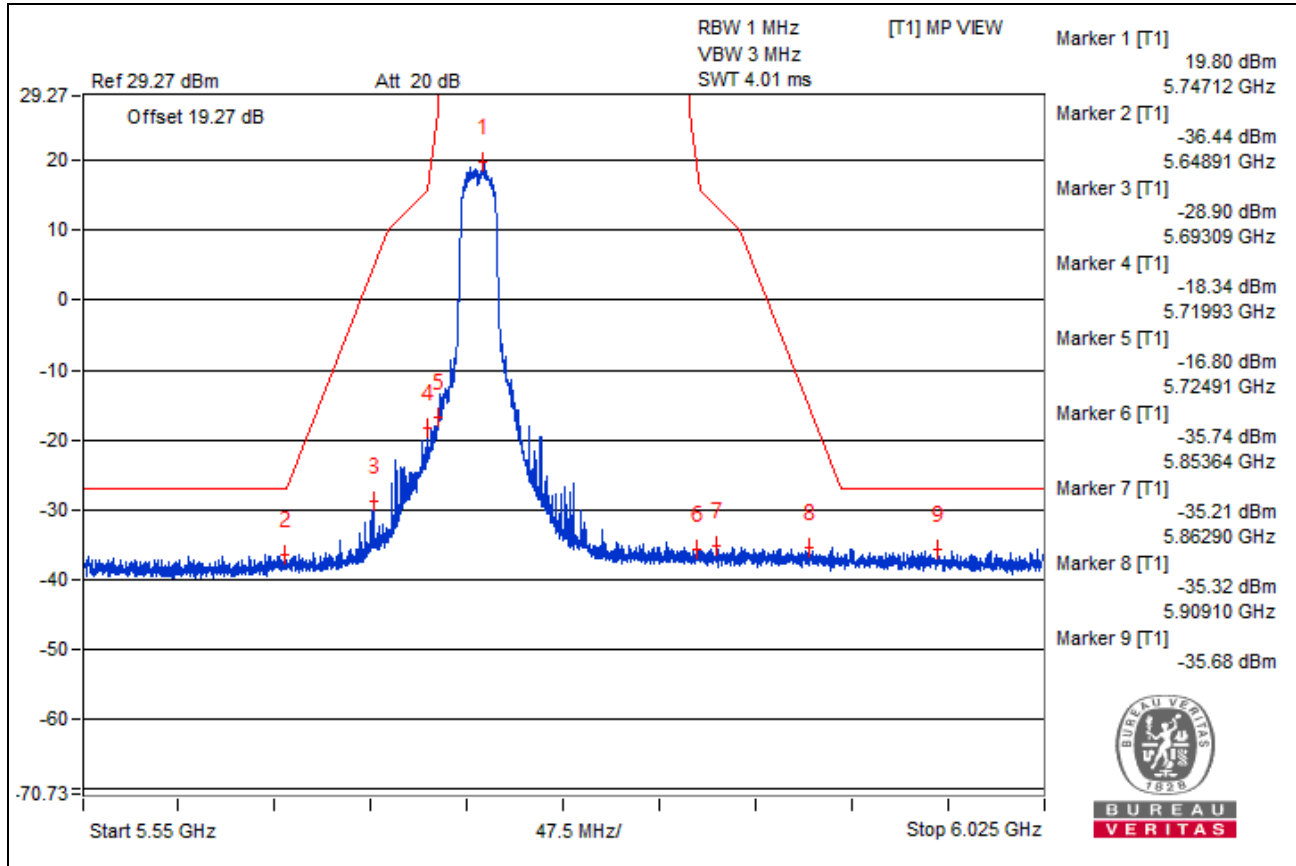
Bandedge Measurement

Chain 0



Bandedge Measurement

Chain 1



802.11ac (HT20) - Channel 157

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	3856.25 PK	61.77	74	-12.23	-48.05	-42.28	7.77	-33.49
2	3856.25 AV	57.8	54	*3.8	-53.62	-45.91	7.77	-37.46
3	7701.56 PK	58.96	74	-15.04	-47.82	-46.44	7.77	-36.3
4	7714.06 AV	48.21	54	-5.79	-57.37	-58.34	7.77	-47.05
5	11573.43 PK	61.25	74	-12.75	-48.03	-42.96	7.77	-34.01
6	11575 AV	49.13	54	-4.87	-59.02	-55.5	7.77	-46.13
7	17345.31 PK	65.3	68.2	-2.9	-38.17	-47.85	7.77	-29.96

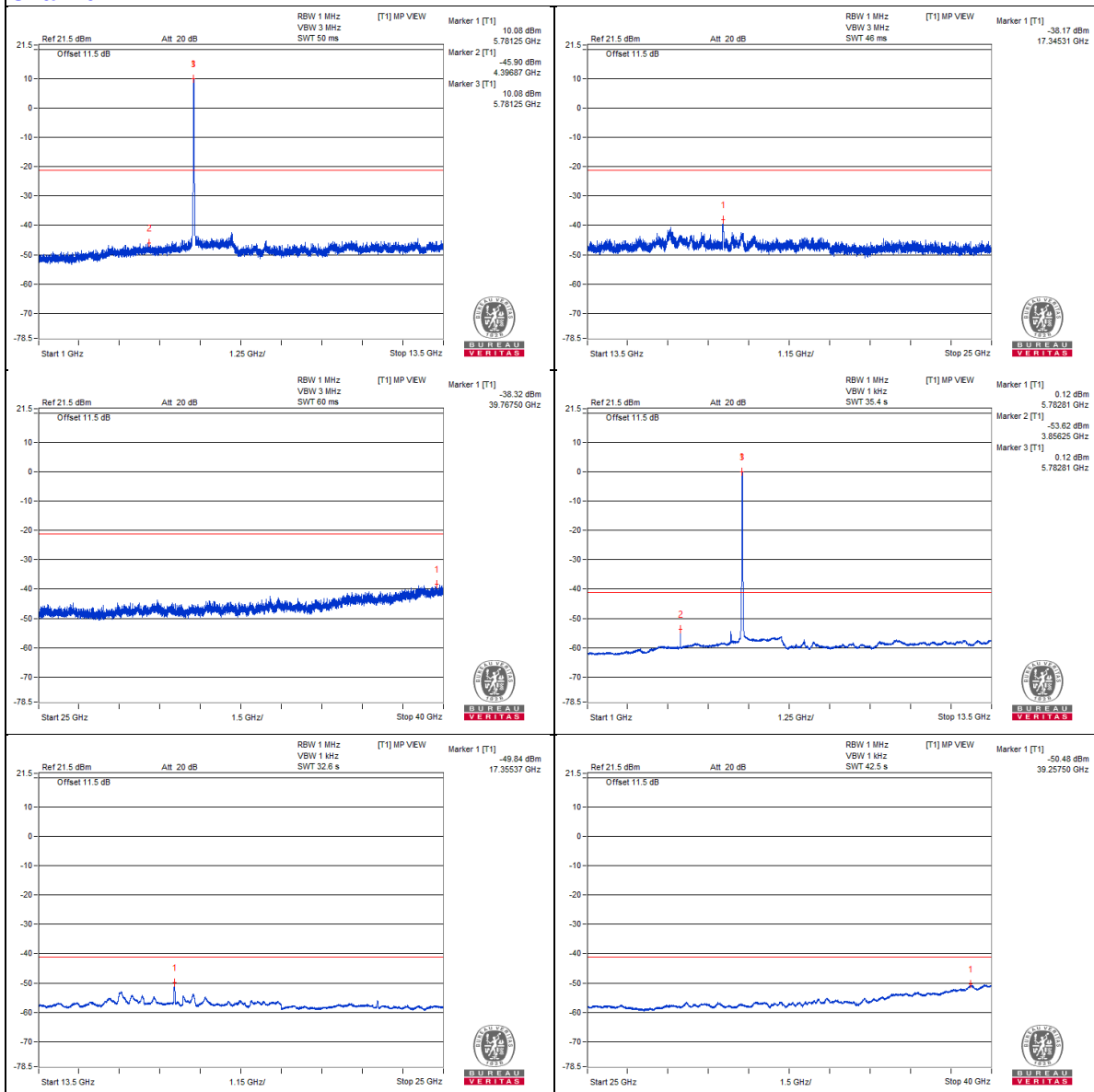
Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

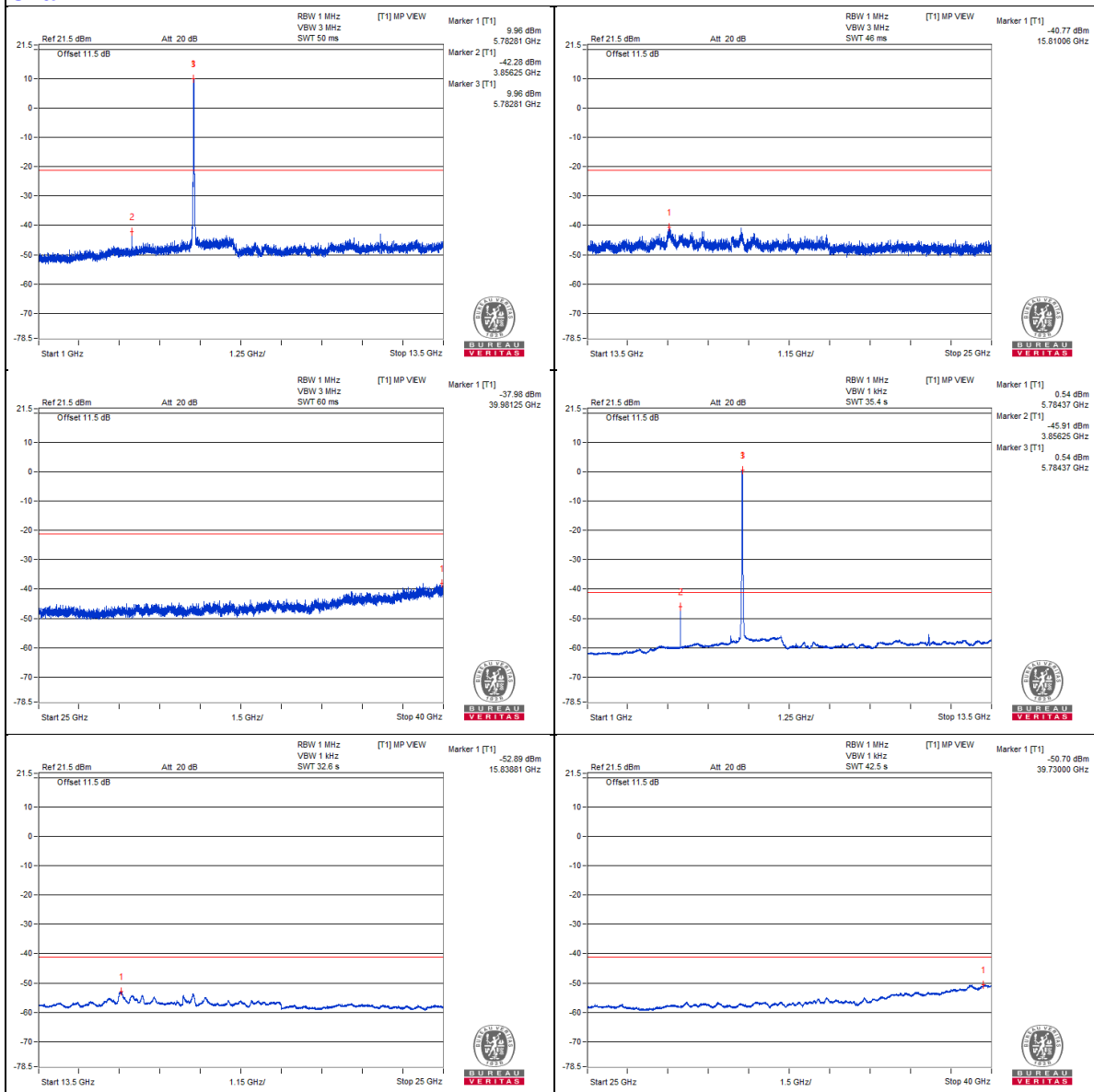
d = measurement distance in 3 meters.

* The unwanted emission was verified and the test result was passed by radiated measurement.
(Please refer APPENDIX A)

Chain 0

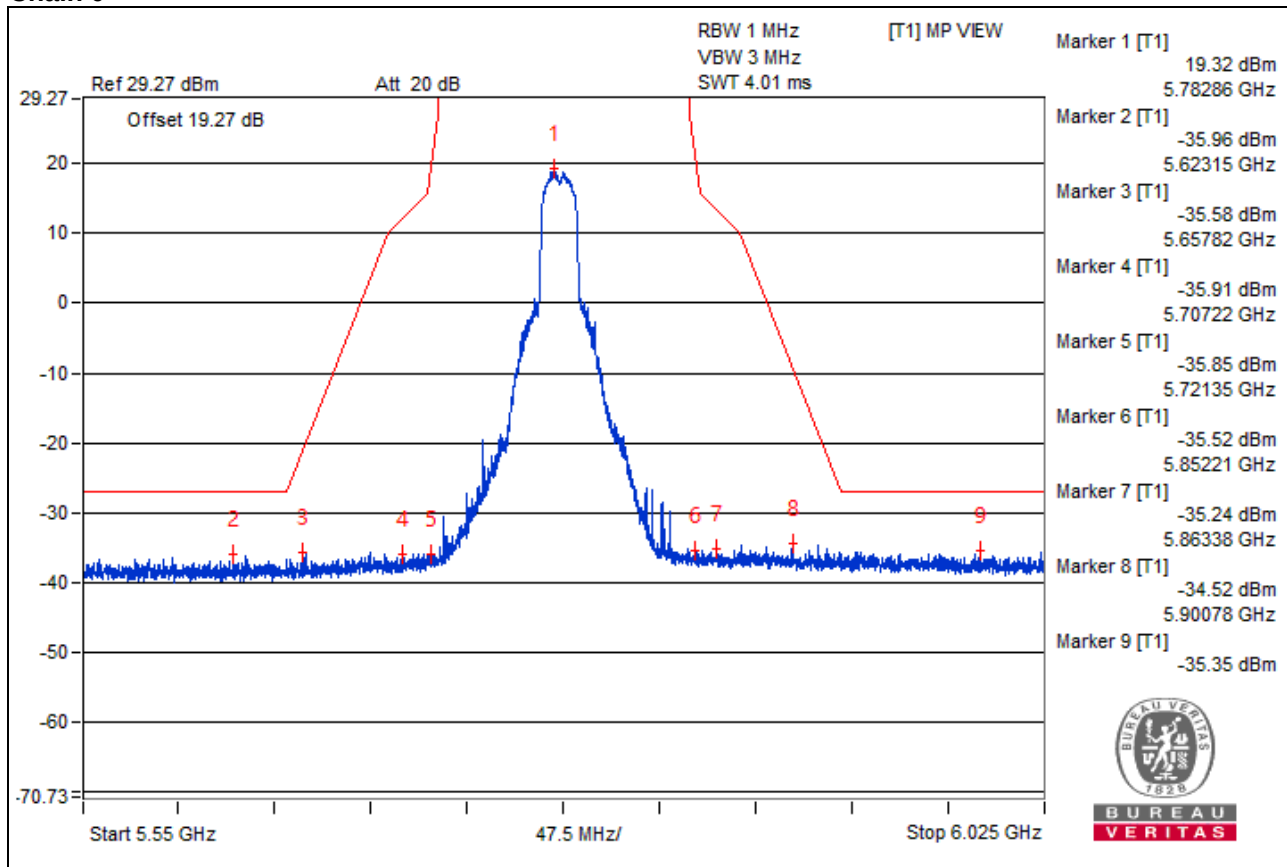


Chain 1



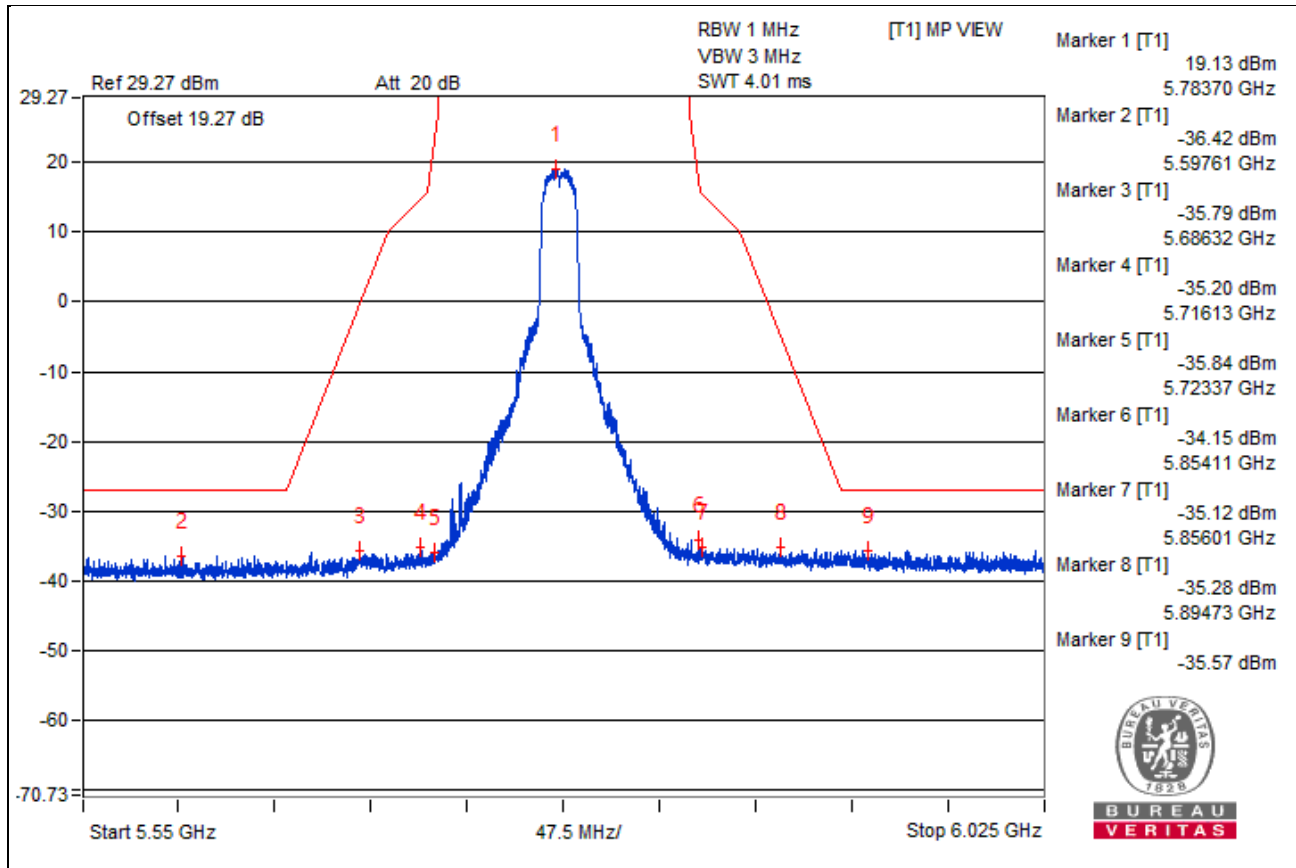
Bandedge Measurement

Chain 0



Bandedge Measurement

Chain 1



802.11ac (HT20) - Channel 165

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	3882.81 PK	63.2	74	-10.8	-44.88	-41.46	7.77	-32.06
2	3882.81 AV	59.51	54	*5.51	-51.24	-44.33	7.77	-35.75
3	7756.25 PK	58.39	68.2	-9.81	-46.7	-48.87	7.77	-36.87
4	11653.12 PK	61.48	74	-12.52	-47.65	-42.77	7.77	-33.78
5	11651.56 AV	50.27	54	-3.73	-57.79	-54.4	7.77	-44.99
6	17473.25 PK	60.95	68.2	-7.25	-44.6	-45.65	7.77	-34.31

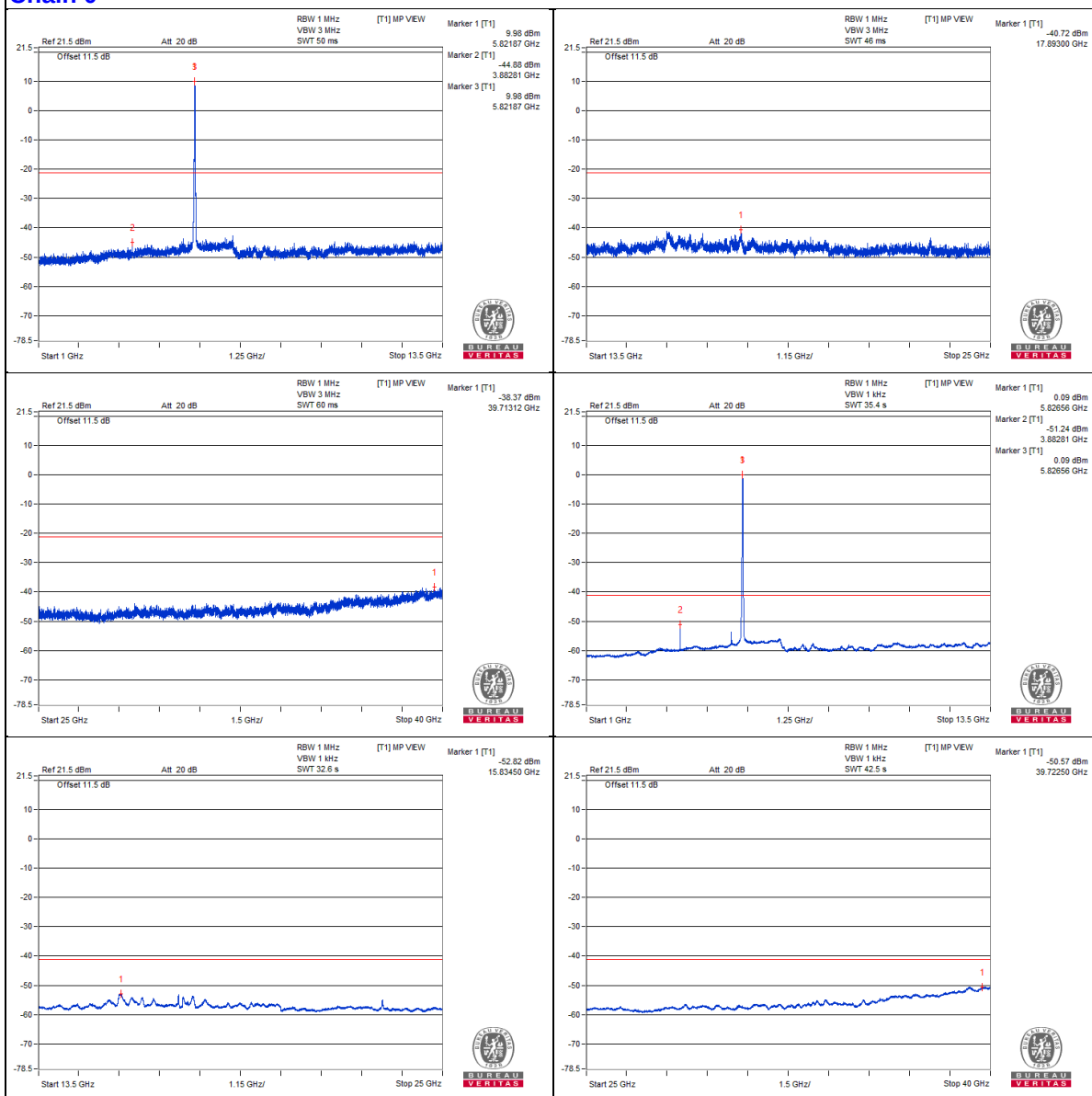
Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

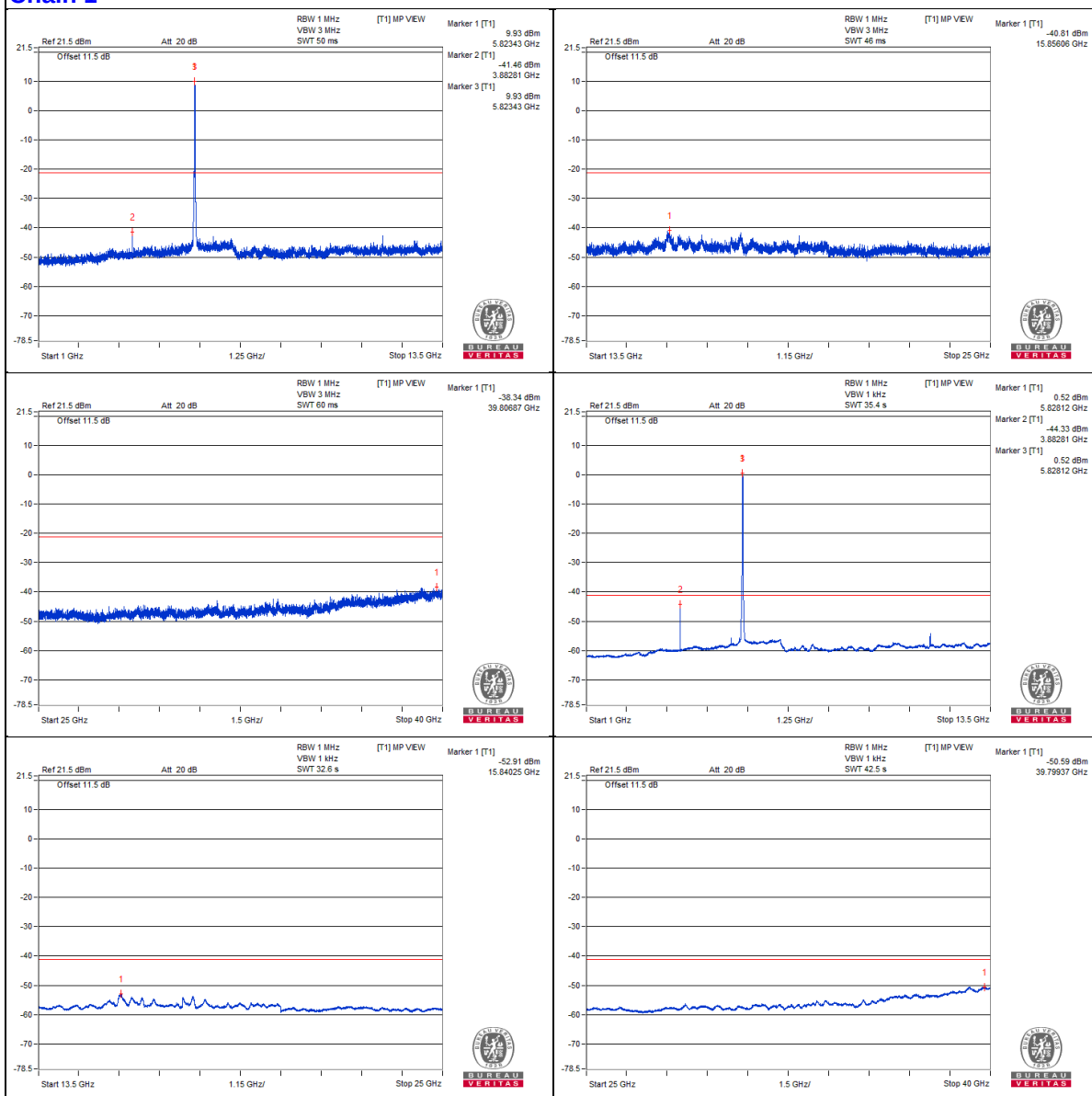
d = measurement distance in 3 meters.

* The unwanted emission was verified and the test result was passed by radiated measurement.
(Please refer APPENDIX A)

Chain 0

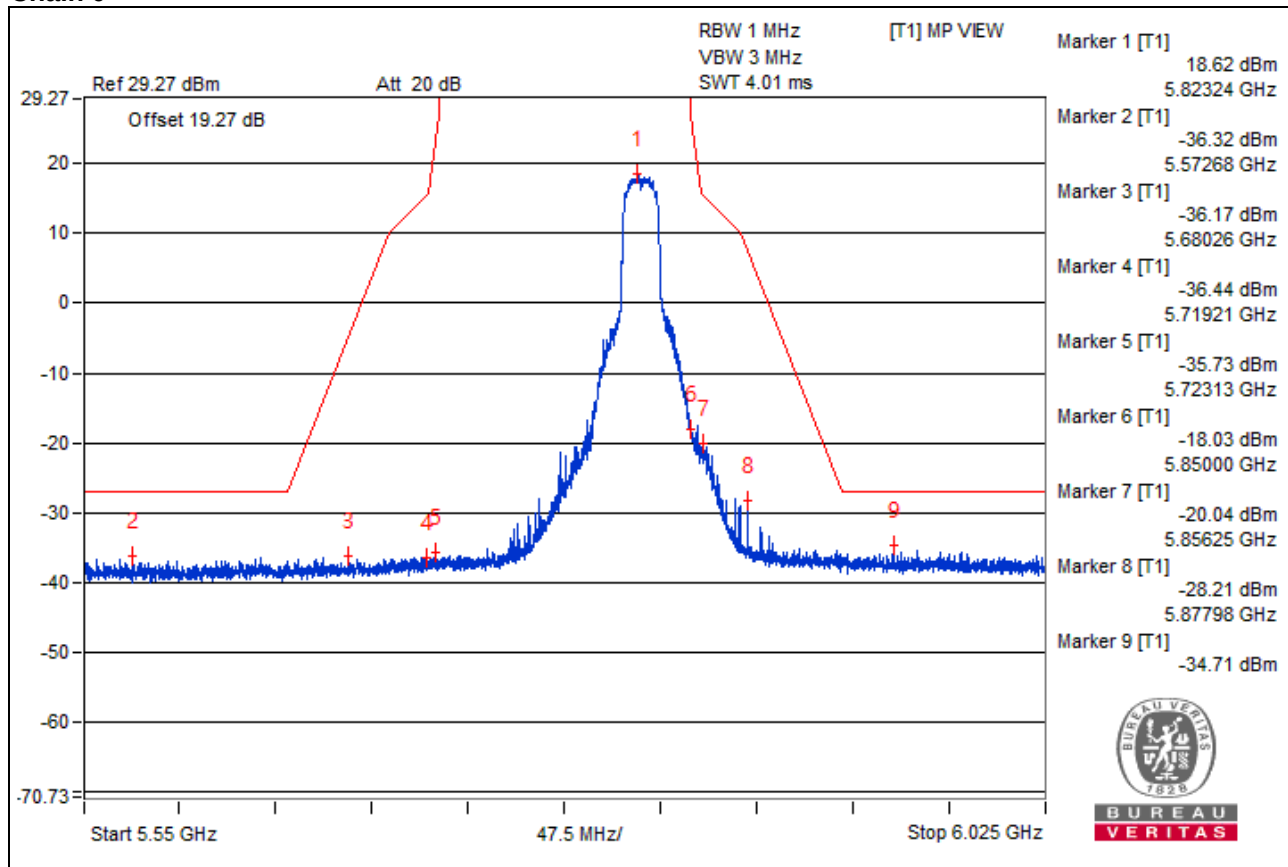


Chain 1



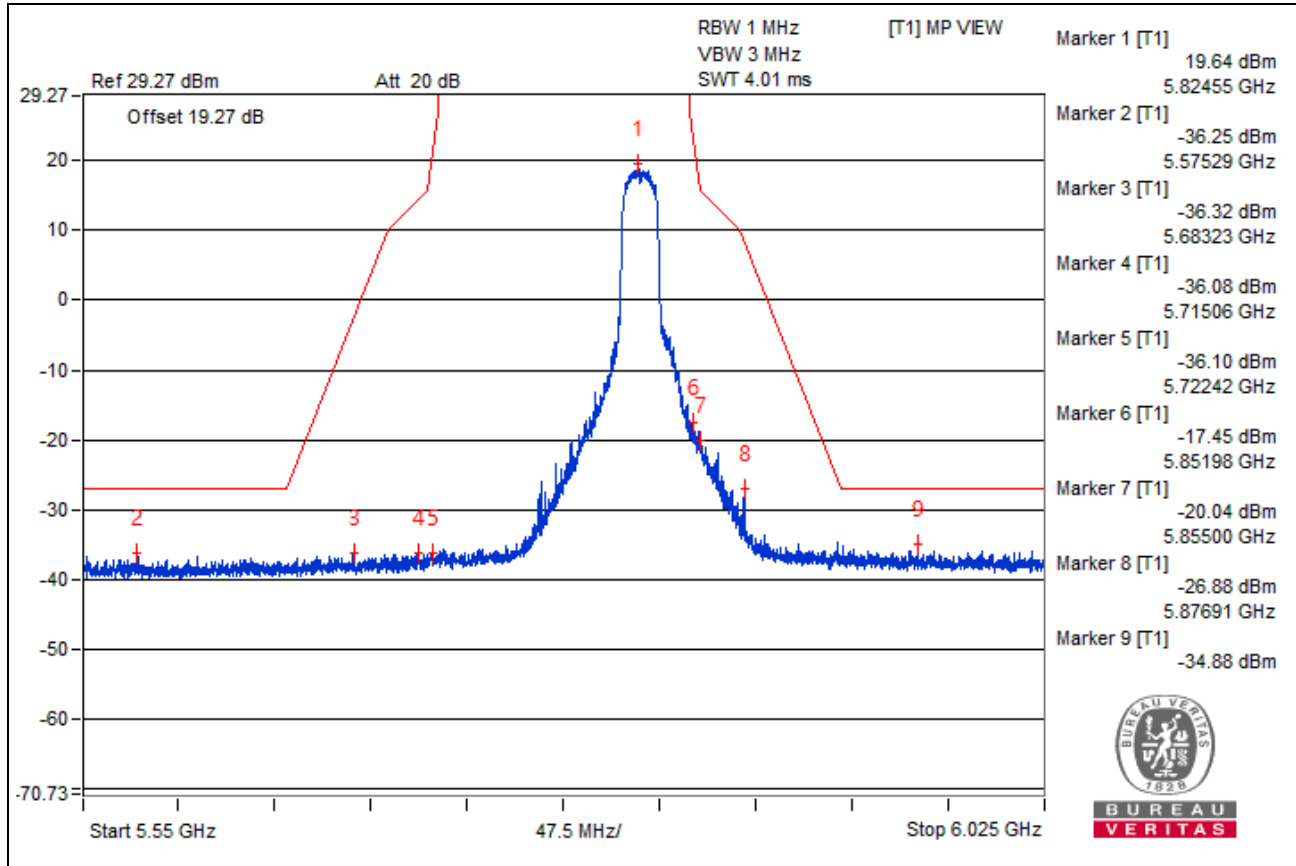
Bandedge Measurement

Chain 0



Bandedge Measurement

Chain 1



802.11ac (VHT40) - Channel 151

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	3835.93 PK	62.44	74	-11.56	-46.53	-41.87	7.77	-32.82
2	3835.93 AV	57.38	54	*3.38	-54.46	-46.26	7.77	-37.88
3	7682.81 PK	59.79	74	-14.21	-47.21	-45.47	7.77	-35.47
4	7673.43 AV	48.19	54	-5.81	-57.21	-58.6	7.77	-47.07
5	11518.75 PK	59.58	74	-14.42	-46.4	-46.53	7.77	-35.68
6	11517.18 AV	48.06	54	-5.94	-58.84	-57.26	7.77	-47.2
7	17253.31 PK	64.1	68.2	-4.1	-39.76	-46.54	7.77	-31.16

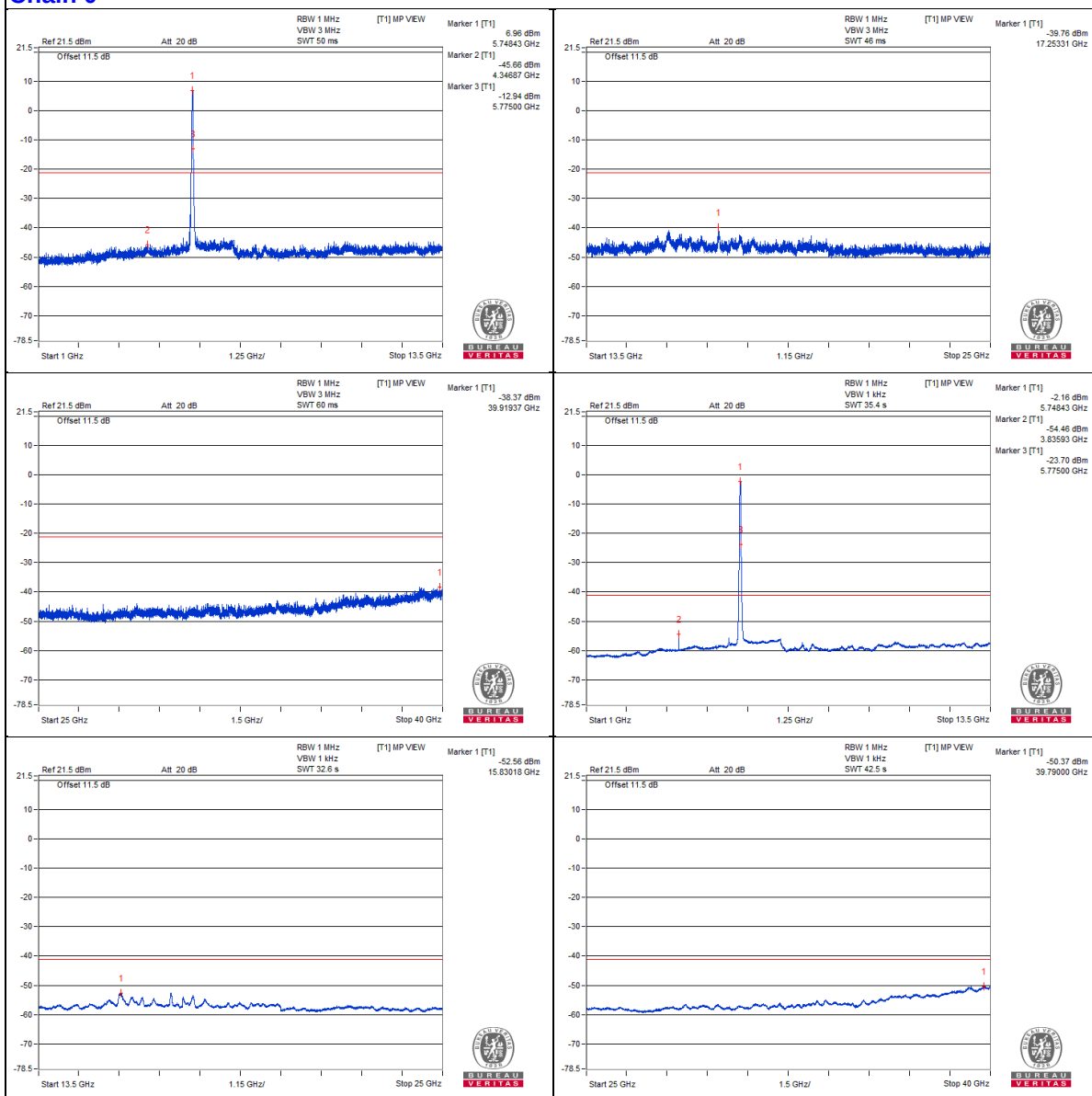
Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

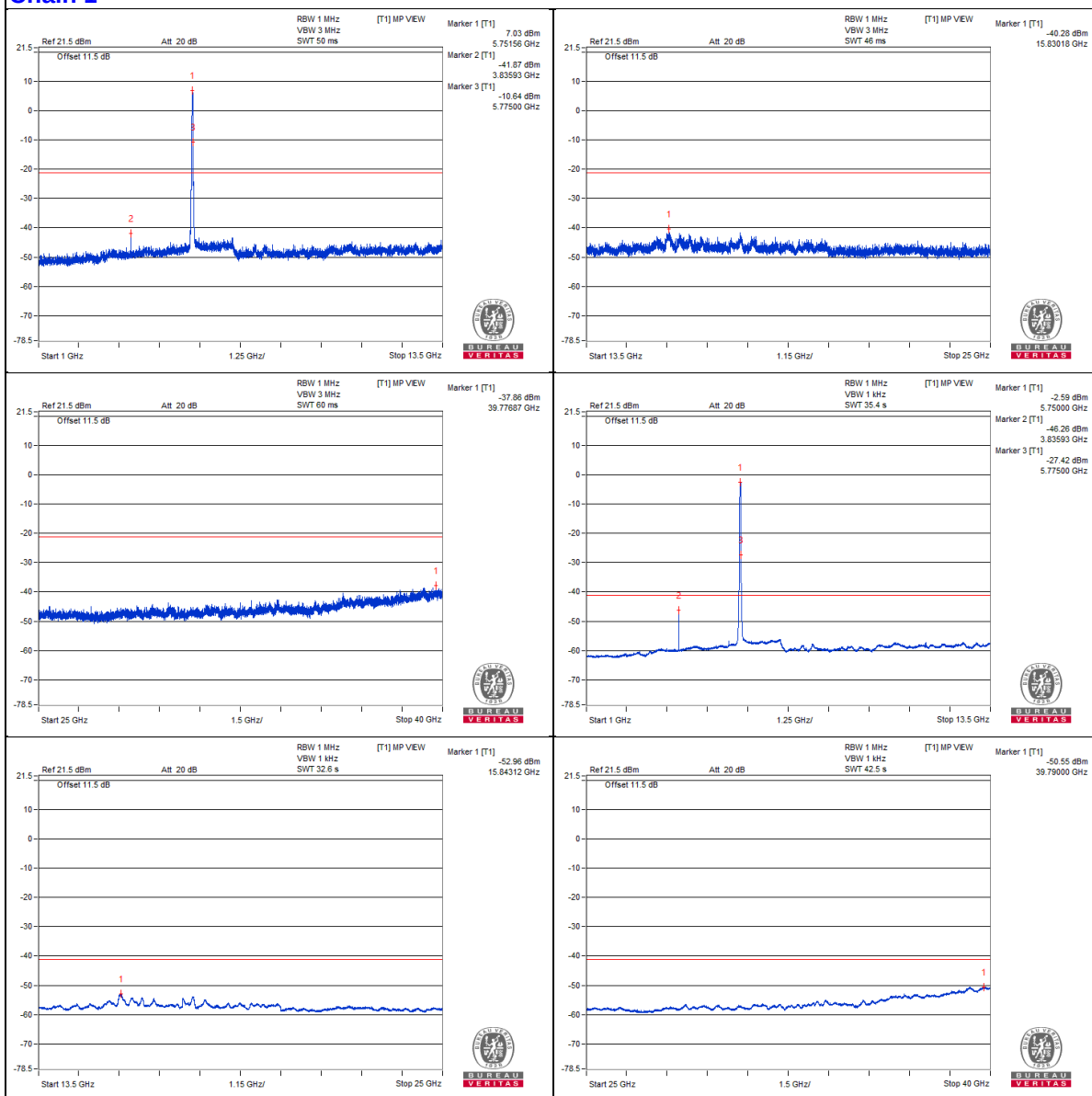
d = measurement distance in 3 meters.

* The unwanted emission was verified and the test result was passed by radiated measurement.
(Please refer APPENDIX A)

Chain 0

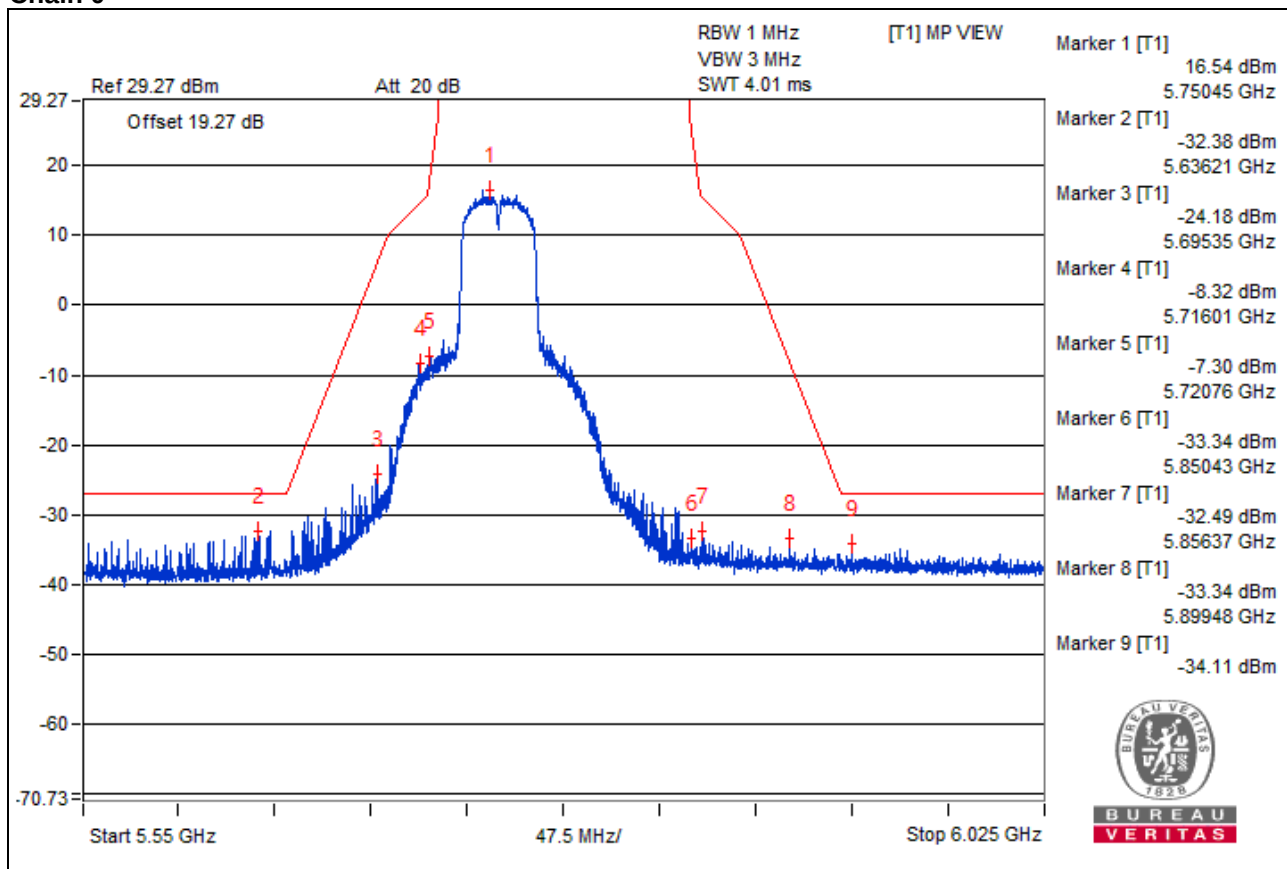


Chain 1



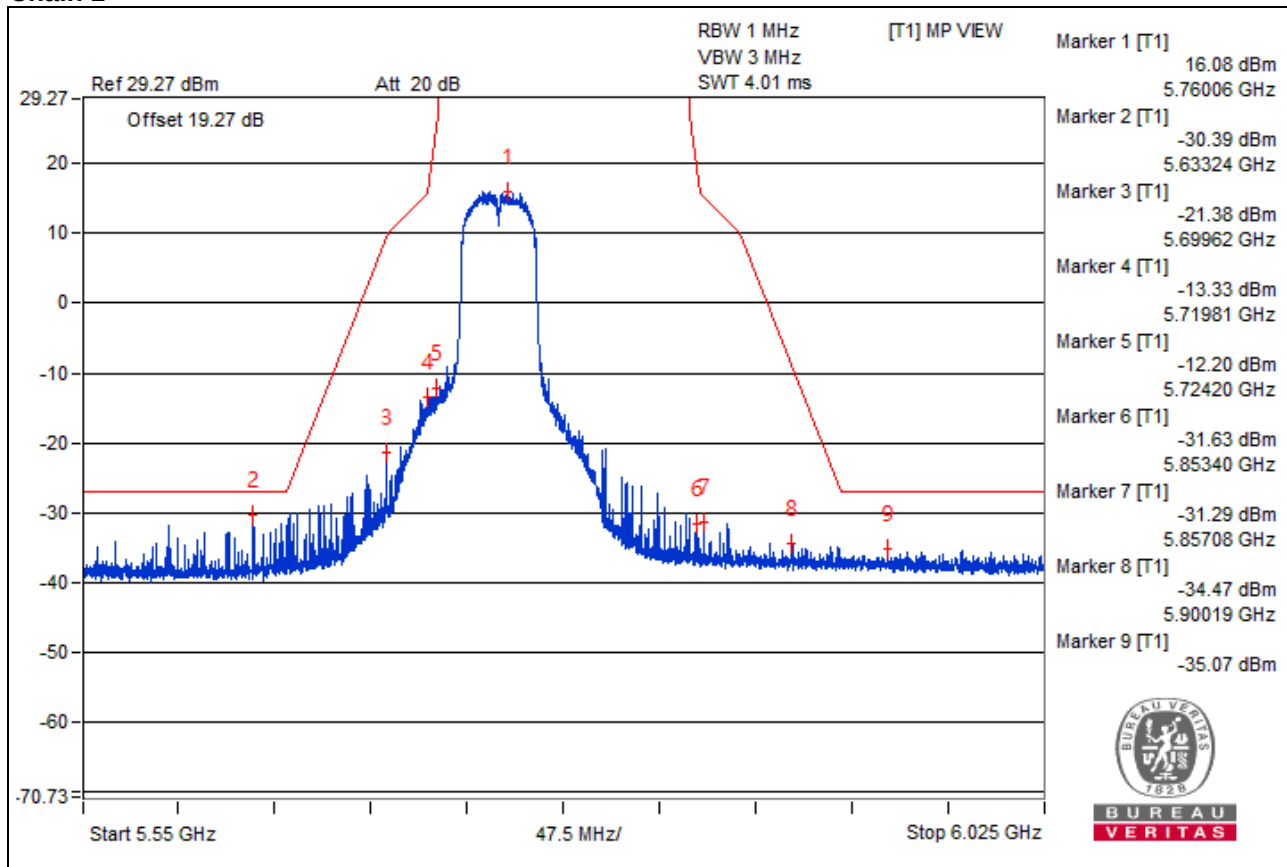
Bandedge Measurement

Chain 0



Bandedge Measurement

Chain 1



802.11ac (VHT40) - Channel 159

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	3862.5 PK	61.81	74	-12.19	-46.4	-42.79	7.77	-33.45
2	3862.5 AV	58.26	54	*4.26	-52.46	-45.58	7.77	-37
3	7726.56 PK	59.71	74	-14.29	-45.63	-47.17	7.77	-35.55
4	7709.37 AV	47.92	54	-6.08	-58.06	-58.18	7.77	-47.34
5	11592.18 PK	60.06	74	-13.94	-46.94	-45.2	7.77	-35.2
6	11596.87 AV	48.58	54	-5.42	-59	-56.33	7.77	-46.68
7	17379.81 PK	62.24	68.2	-5.96	-42.04	-46.81	7.77	-33.02

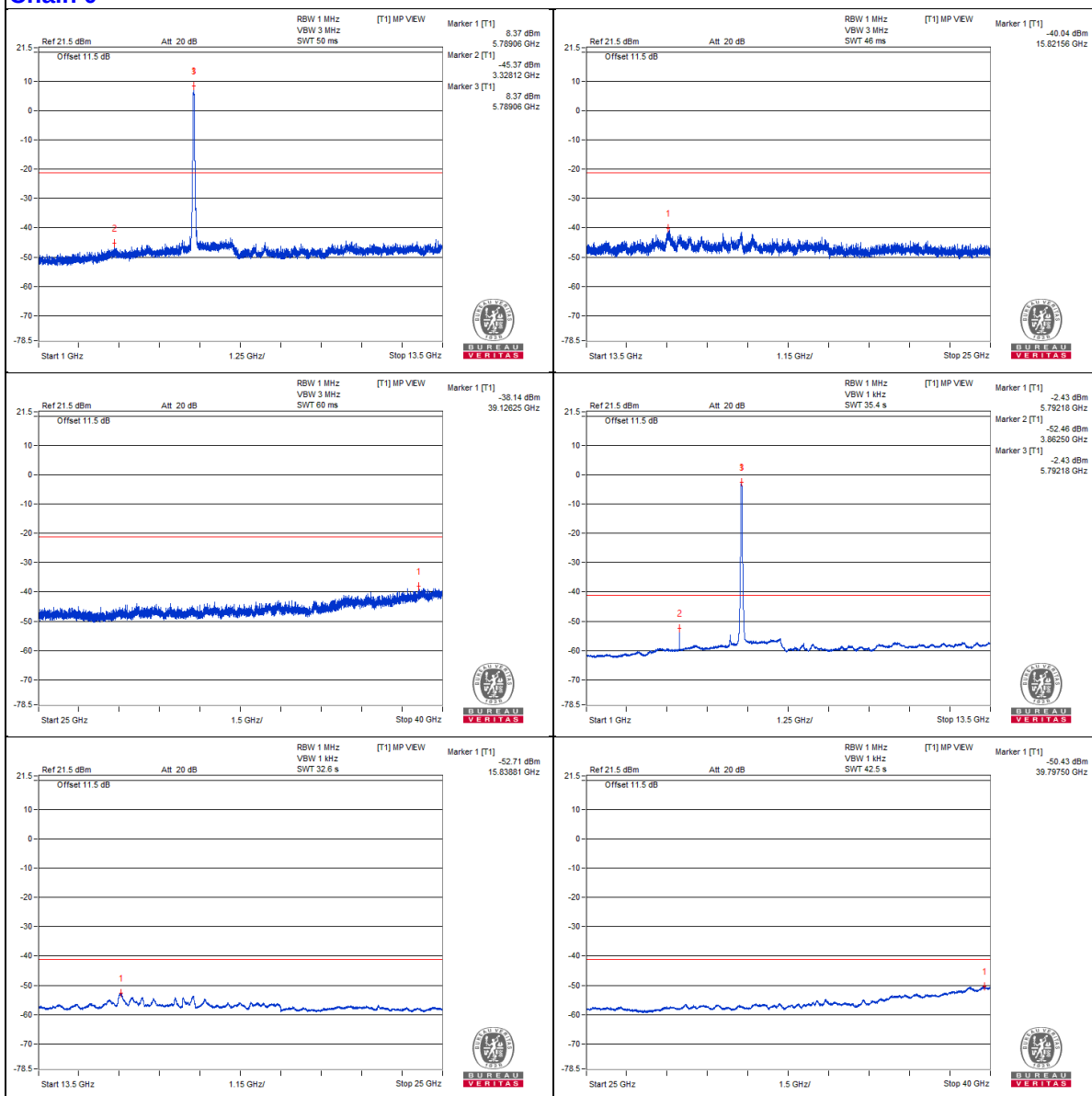
Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

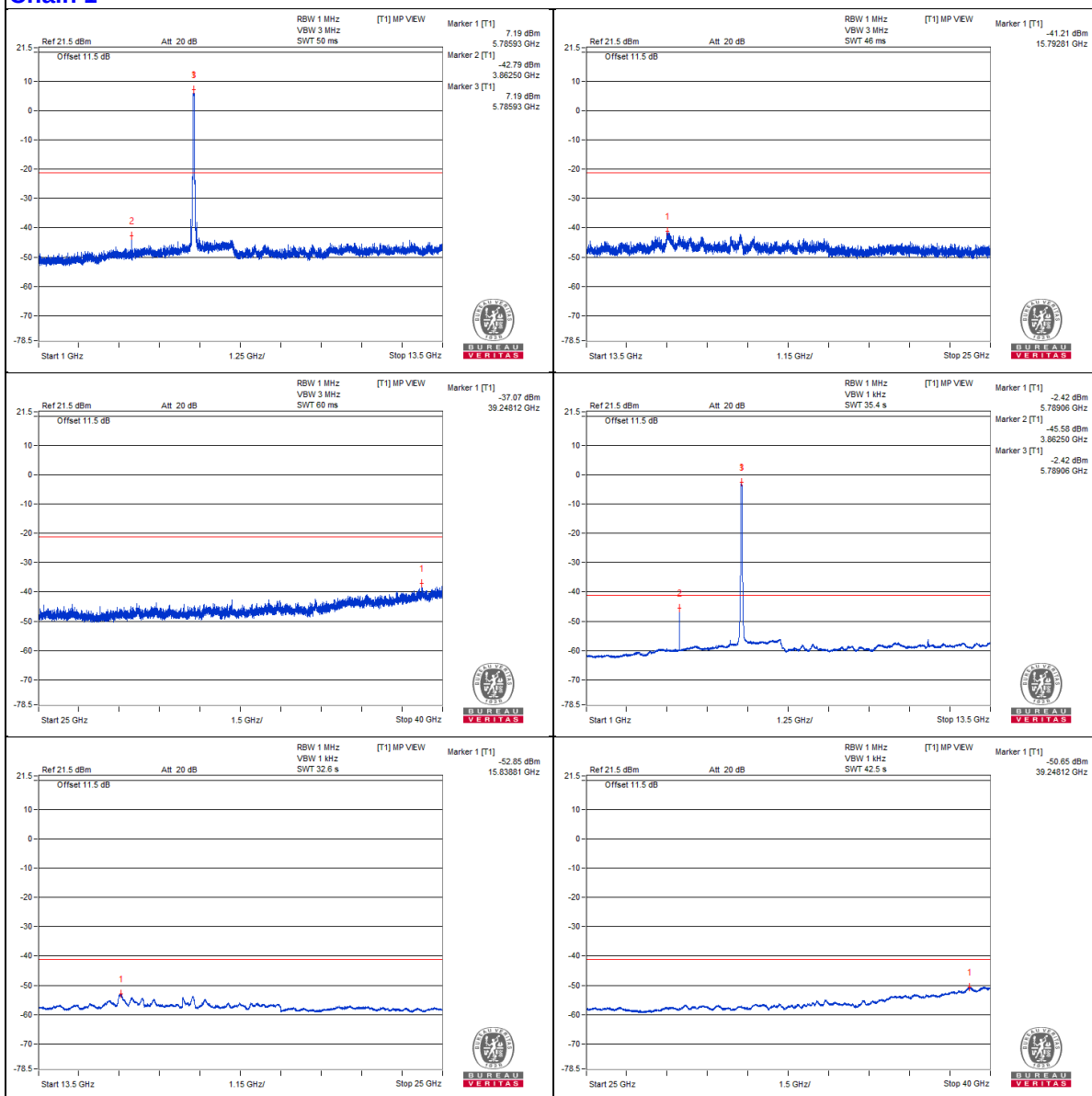
d = measurement distance in 3 meters.

* The unwanted emission was verified and the test result was passed by radiated measurement.
(Please refer APPENDIX A)

Chain 0

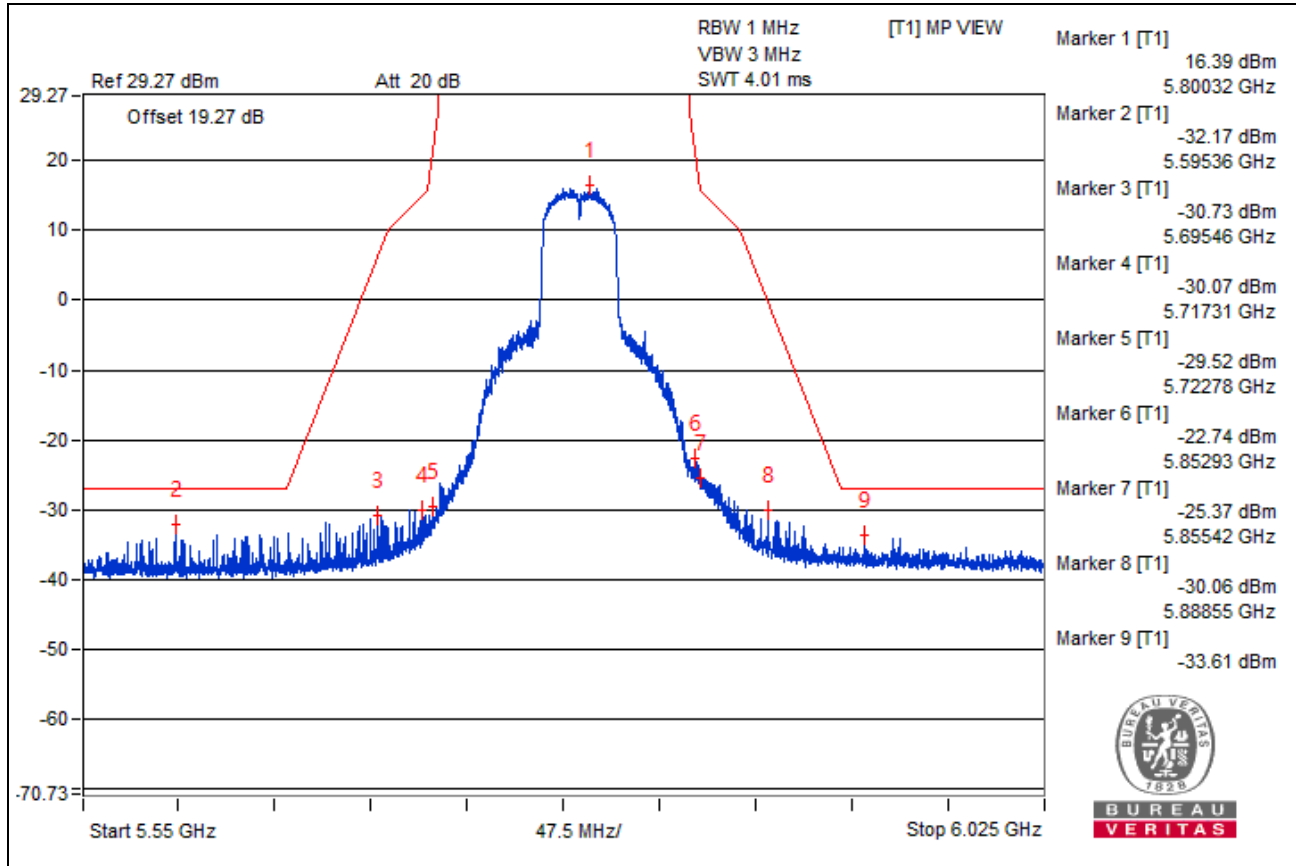


Chain 1



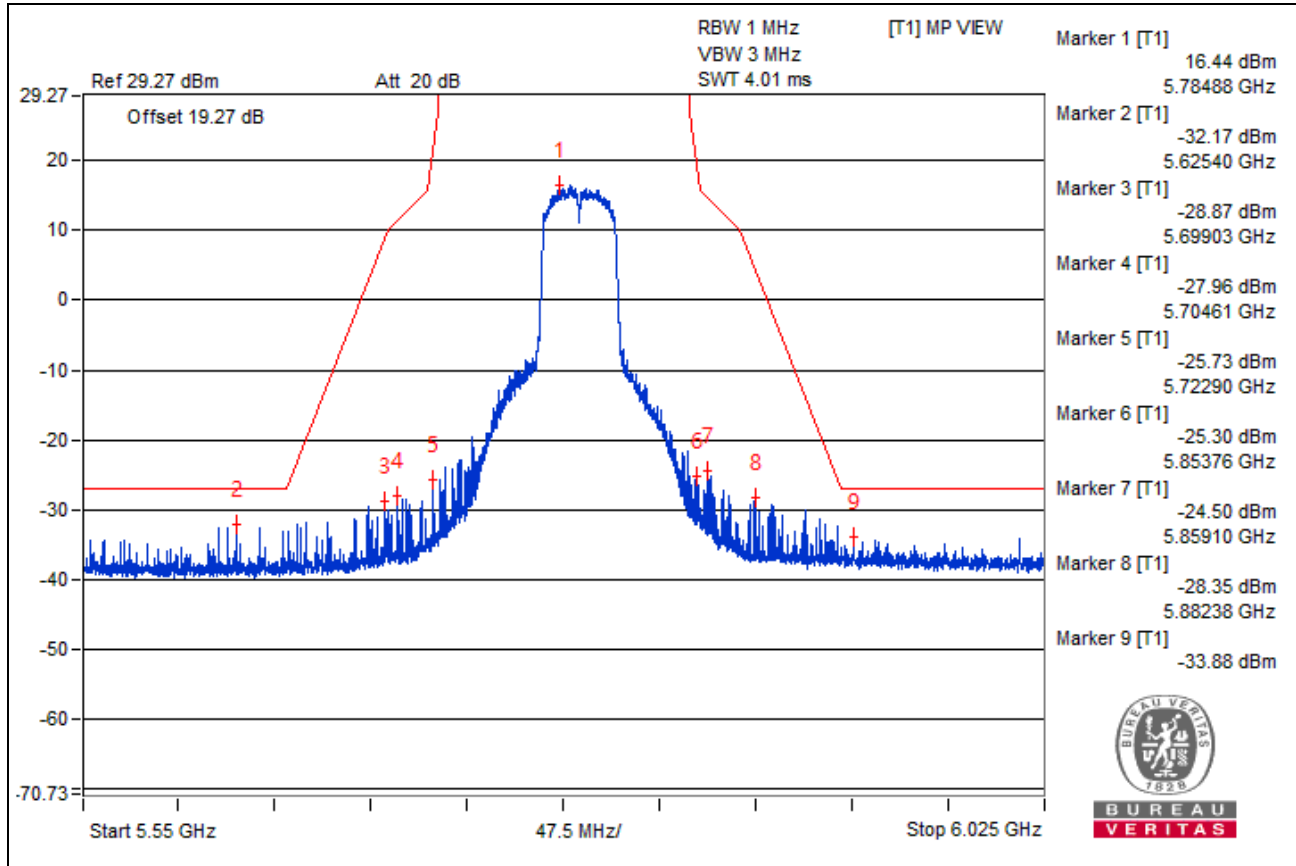
Bandedge Measurement

Chain 0



Bandedge Measurement

Chain 1



802.11ac (VHT80) - Channel 155

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	3850 PK	61.86	74	-12.14	-46.99	-42.49	7.77	-33.4
2	3850 AV	57.89	54	*3.89	-53.24	-45.87	7.77	-37.37
3	7687.5 PK	59.69	74	-14.31	-47.25	-45.6	7.77	-35.57
4	7700 AV	48.19	54	-5.81	-57.42	-58.32	7.77	-47.07
5	11562.5 PK	59.4	74	-14.6	-46.99	-46.31	7.77	-35.86
6	11557.81 AV	47.93	54	-6.07	-58.72	-57.57	7.77	-47.33
7	17326.62 PK	62.66	68.2	-5.54	-41.38	-47.19	7.77	-32.6

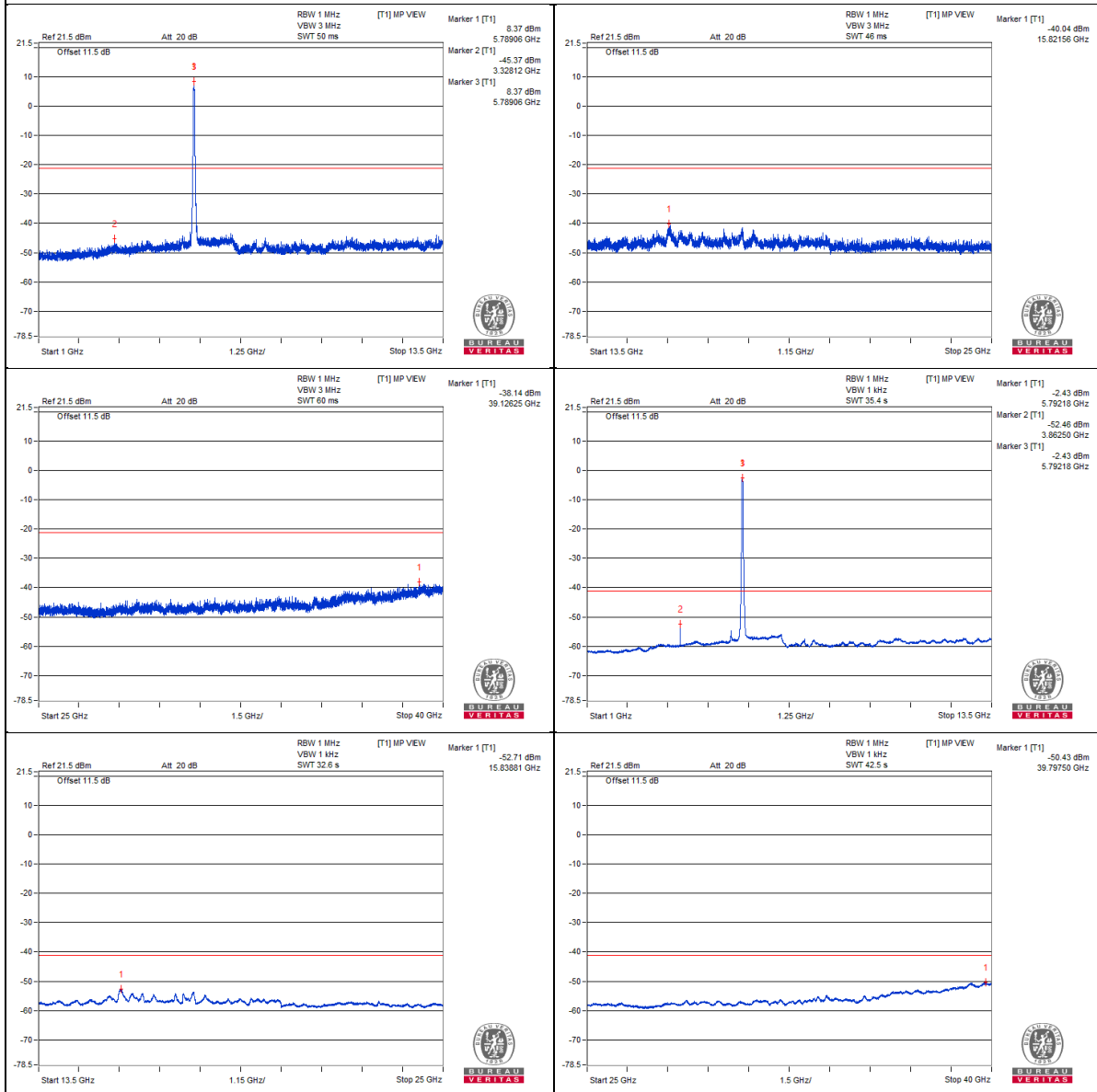
Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

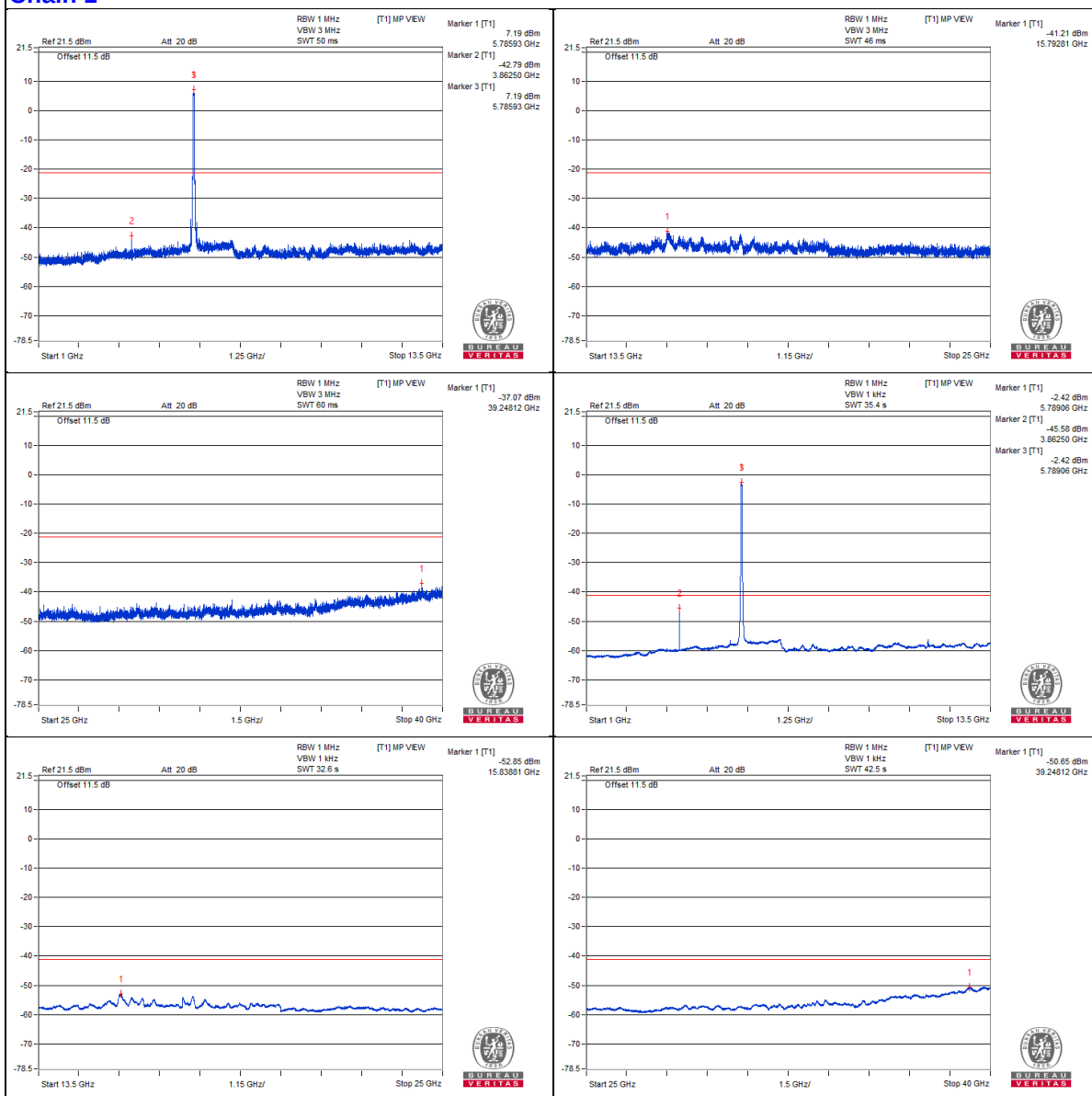
d = measurement distance in 3 meters.

* The unwanted emission was verified and the test result was passed by radiated measurement.
(Please refer APPENDIX A)

Chain 0

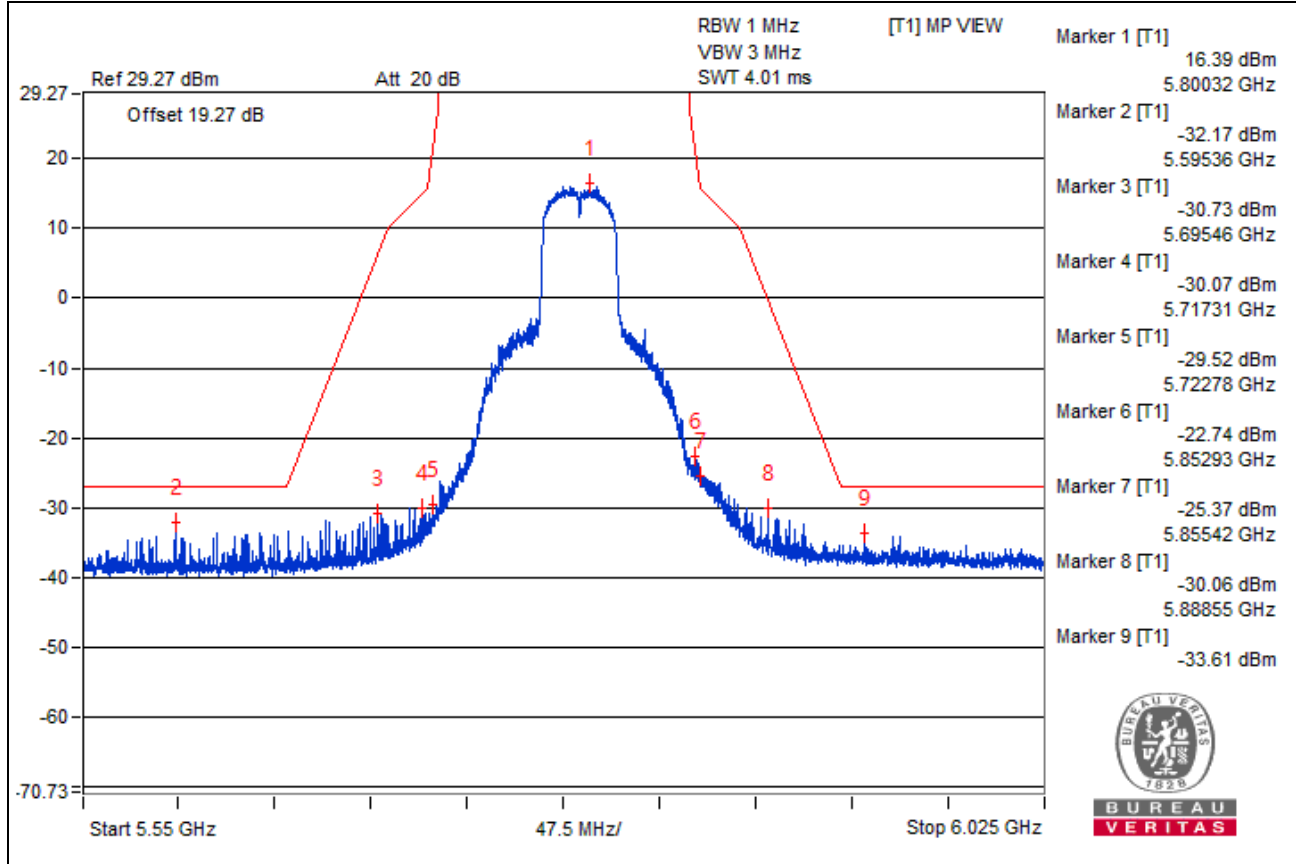


Chain 1



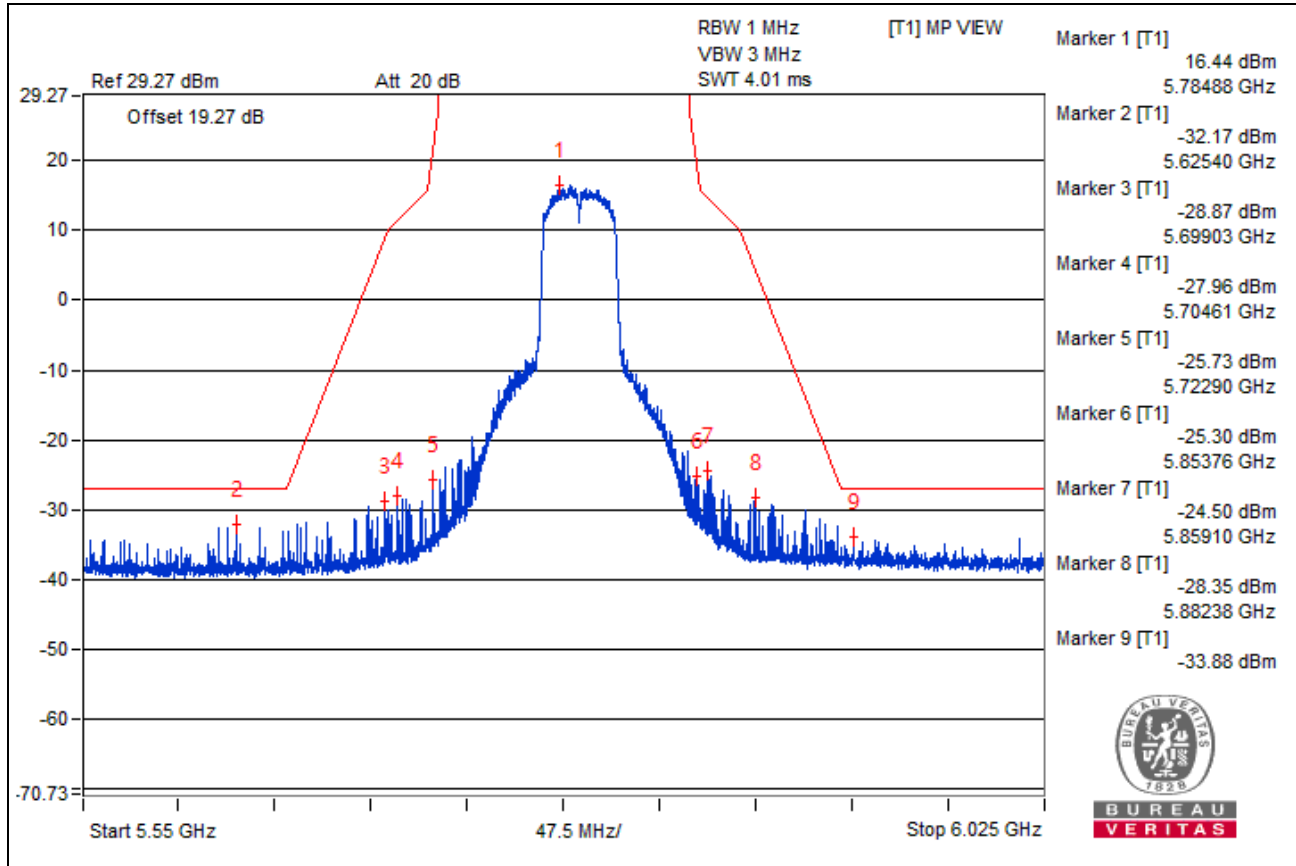
Bandedge Measurement

Chain 0



Bandedge Measurement

Chain 1



4.2 Transmit Power Measurement

4.2.1 Limits of Transmit Power Measurement

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p $\leq$ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
		Indoor Access Point	1 Watt (30 dBm)
		Client device	250mW (24 dBm)
U-NII-2A			250mW (24 dBm) or 11 dBm+10 log B*
U-NII-2C			250mW (24 dBm) or 11 dBm+10 log B*
U-NII-3	√		1 Watt (30 dBm)

*B is the 26 dB emission bandwidth in megahertz

Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

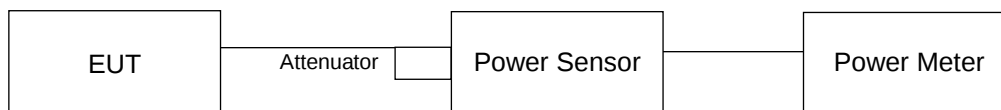
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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.

4.2.2 Test Setup



4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.2.4 Test Procedure

Method PM is 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.

4.2.5 Deviation from Test Standard

No deviation.

4.2.6 EUT Operating Condition

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

4.2.7 Test Results

802.11a

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
149	5745	15.04	14.96	63.248	18.01	28.23	Pass
157	5785	14.71	15.33	63.699	18.04	28.23	Pass
165	5825	14.65	15.00	60.797	17.84	28.23	Pass

Note: 1. Directional gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi} > 6\text{dBi}$, therefore the limit needs to reduce, so the power limit shall be reduced to $30 - (7.77 - 6) = 28.23\text{dBm}$.

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
149	5745	14.88	14.96	62.094	17.93	28.23	Pass
157	5785	14.60	14.97	60.245	17.80	28.23	Pass
165	5825	14.72	15.22	62.914	17.99	28.23	Pass

Note: 1. Directional gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi} > 6\text{dBi}$, therefore the limit needs to reduce, so the power limit shall be reduced to $30 - (7.77 - 6) = 28.23\text{dBm}$.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
151	5755	14.79	14.62	59.103	17.72	28.23	Pass
159	5795	14.70	15.16	62.322	17.95	28.23	Pass

Note: 1. Directional gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi} > 6\text{dBi}$, therefore the limit needs to reduce, so the power limit shall be reduced to $30 - (7.77 - 6) = 28.23\text{dBm}$.

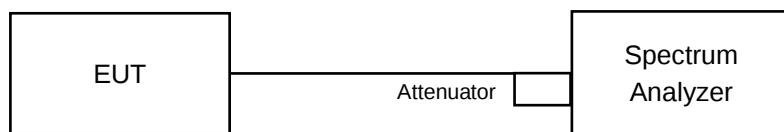
802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
155	5775	12.74	12.89	38.247	15.83	28.23	Pass

Note: 1. Directional gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi} > 6\text{dBi}$, therefore the limit needs to reduce, so the power limit shall be reduced to $30 - (7.77 - 6) = 28.23\text{dBm}$.

4.3 Occupied Bandwidth Measurement

4.3.1 Test Setup



4.3.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.3 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to SAMPLE. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean power of a given emission.

4.3.4 Test Results

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
149	5745	18.09	16.35
157	5785	22.92	16.44
165	5825	23.64	16.44

802.11ac (VHT20)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
149	5745	19.32	17.52
157	5785	23.04	17.64
165	5825	18.12	17.64

802.11ac (VHT40)

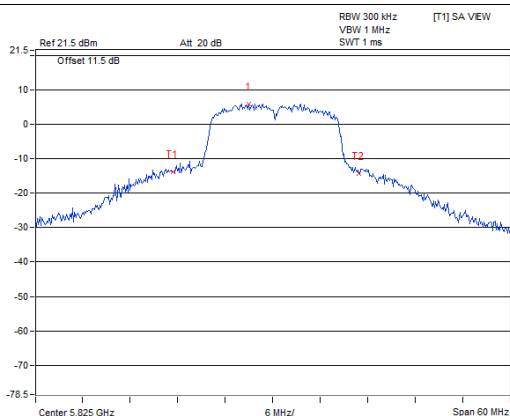
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
151	5755	37.44	36.24
159	5795	47.52	36.48

802.11ac (VHT80)

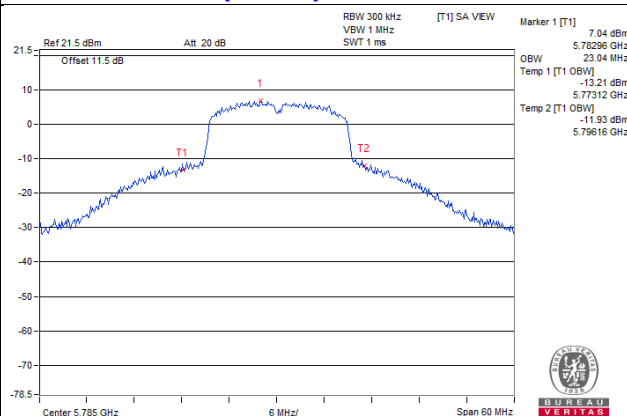
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
155	5775	103.20	75.36

Spectrum Plot of Max. Value

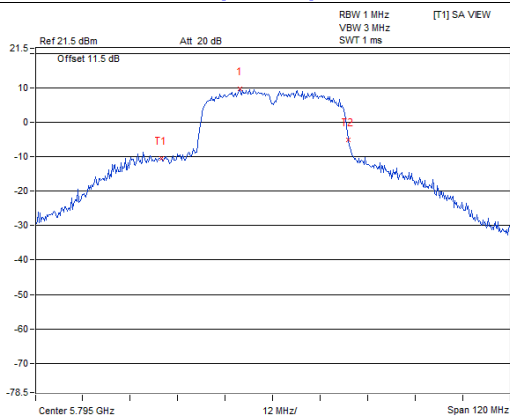
802.11a_Chain 0 / CH165



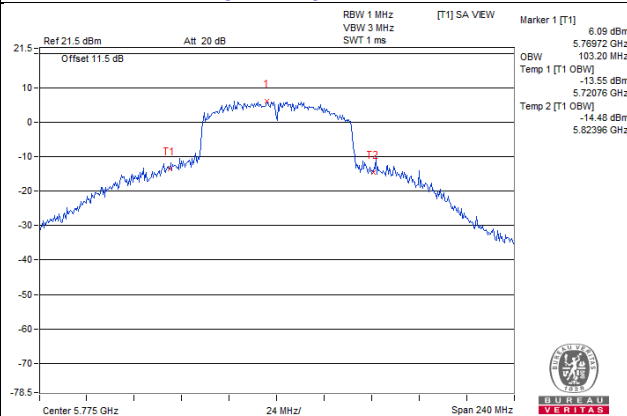
802.11ac (VHT20)_Chain 0 / CH157



802.11ac (VHT40)_Chain 0 / CH159

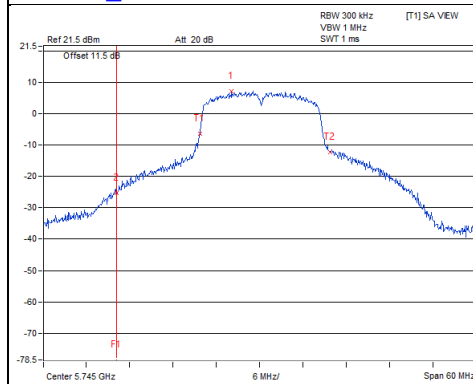


802.11ac (VHT80)_Chain 0 / CH155

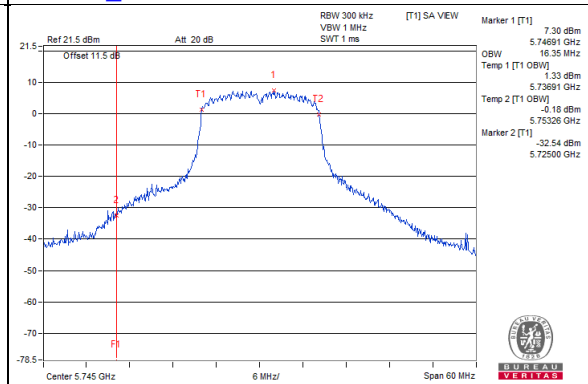


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2C band)

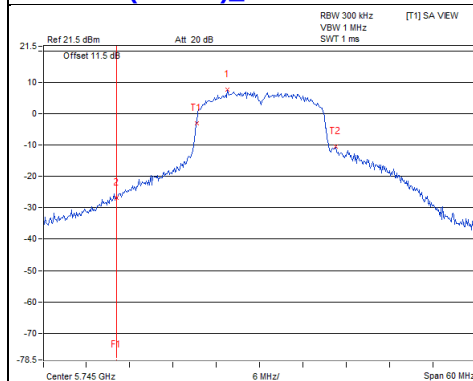
802.11a_Chain 0 / CH149



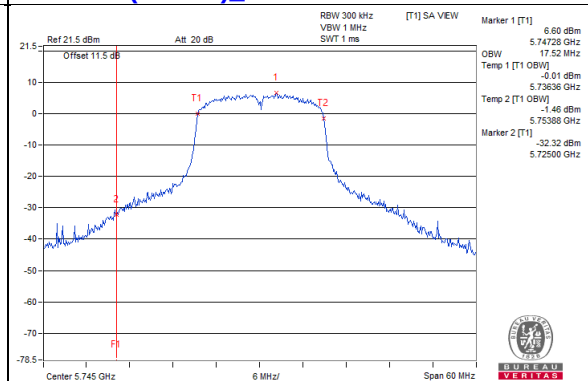
802.11a_Chain 1 / CH149



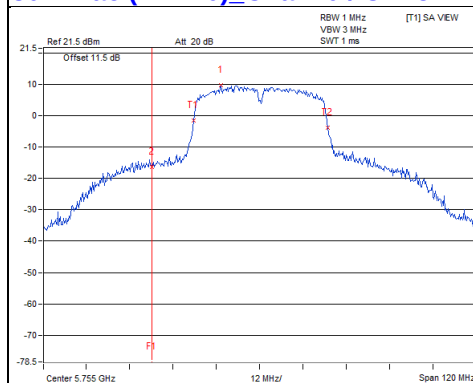
802.11ac (VHT20)_Chain 0 / CH149



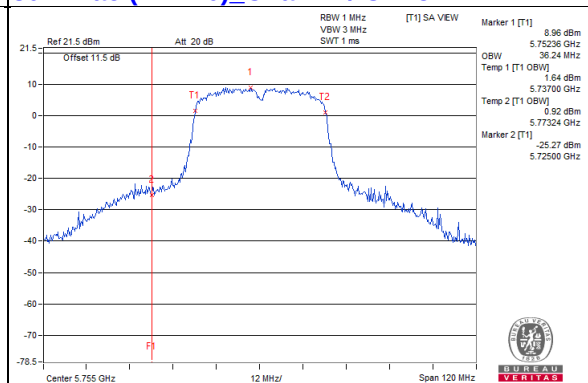
802.11ac (VHT20)_Chain 1 / CH149



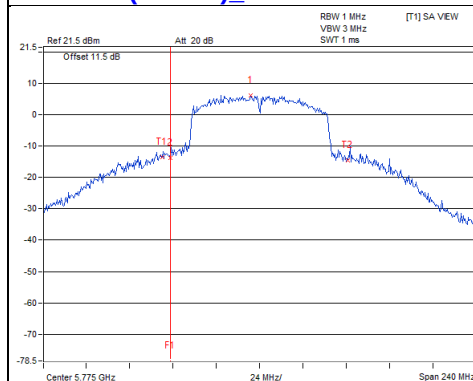
802.11ac (VHT40)_Chain 0 / CH151



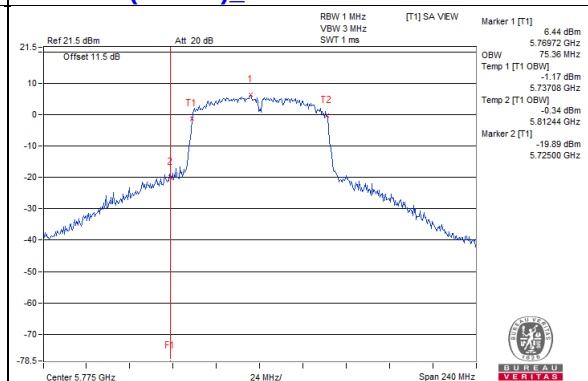
802.11ac (VHT40)_Chain 1 / CH151



802.11ac (VHT80)_Chain 0 / CH155



802.11ac (VHT80)_Chain 1 / CH155

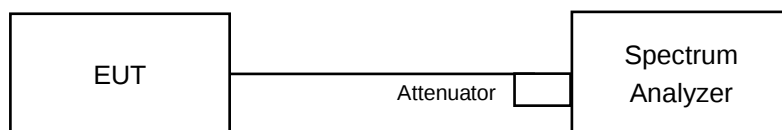


4.4 Peak Power Spectral Density Measurement

4.4.1 Limits of Peak Power Spectral Density Measurement

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	17dBm/ MHz
		Fixed point-to-point Access Point	
		Indoor Access Point	
		Client device	11dBm/ MHz
U-NII-2A			11dBm/ MHz
U-NII-2C			11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

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 Procedure

For U-NII-3:

For 802.11ac (VHT80):

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 300 kHz, Set VBW $\geq$ 1 MHz, Detector = RMS
3. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(500\text{kHz}/300\text{kHz})$
5. Sweep time = auto, trigger set to "free run".
6. Trace average at least 100 traces in power averaging mode.
7. Record the max value and add 10 log (1/duty cycle)

For other Modulation test:

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 300 kHz, Set VBW $\geq$ 1 MHz, Detector = RMS
3. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(500\text{kHz}/300\text{kHz})$
5. Sweep time = auto, trigger set to "free run".
6. Trace average at least 100 traces in power averaging mode.
7. Record the max value

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Condition

Same as Item 4.2.6.

4.4.7 Test Results

For U-NII-3:

802.11a

Chan.	Freq. (MHz)	PSD (dBm/300kHz)		Total PSD		Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
		Chain 0	Chain 1	mW/300kHz	dBm/300kHz			
149	5745	-5.60	-5.94	0.5301	-2.76	-0.54	28.23	Pass
157	5785	-5.85	-5.82	0.5218	-2.82	-0.60	28.23	Pass
165	5825	-6.36	-6.15	0.4739	-3.24	-1.02	28.23	Pass

- Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
 2. Directional gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi} > 6\text{dBi}$, therefore the limit needs to reduce, so the power density limit shall be reduced to $30-(7.77-6) = 28.23\text{dBm}$.

802.11ac (VHT20)

Chan.	Freq. (MHz)	PSD (dBm/300kHz)		Total PSD		Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
		Chain 0	Chain 1	mW/300kHz	dBm/300kHz			
149	5745	-5.82	-6.05	0.5101	-2.92	-0.70	28.23	Pass
157	5785	-5.90	-6.16	0.4991	-3.02	-0.80	28.23	Pass
165	5825	-6.24	-6.32	0.471	-3.27	-1.05	28.23	Pass

- Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
 2. Directional gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi} > 6\text{dBi}$, therefore the limit needs to reduce, so the power density limit shall be reduced to $30-(7.77-6) = 28.23\text{dBm}$.

802.11ac (VHT40)

Chan.	Freq. (MHz)	PSD (dBm/300kHz)		Total PSD		Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
		Chain 0	Chain 1	mW/300kHz	dBm/300kHz			
151	5755	-9.77	-10.19	0.20116	-6.96	-4.74	28.23	Pass
159	5795	-9.74	-9.52	0.2179	-6.62	-4.40	28.23	Pass

- Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
 2. Directional gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi} > 6\text{dBi}$, therefore the limit needs to reduce, so the power density limit shall be reduced to $30-(7.77-6) = 28.23\text{dBm}$.

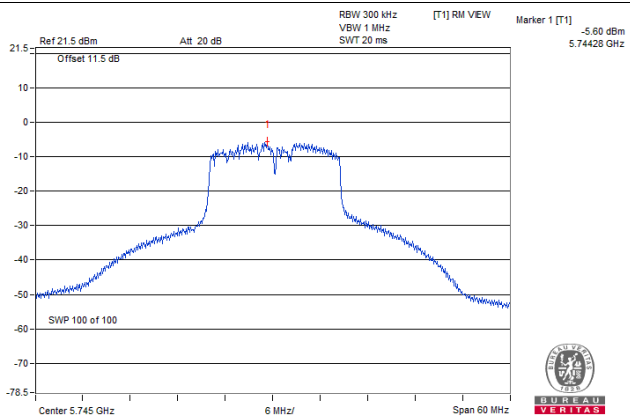
802.11ac (VHT80)

Chan.	Freq. (MHz)	PSD W/O Duty Factor (dBm/300kHz)		Duty Factor (dB)	Total PSD With Duty Factor		Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass /Fail
		Chain 0	Chain 1		mW/ 300kHz	dBm/ 300kHz			
155	5775	-13.18	-13.31	0.13	0.09753	-10.11	-7.89	28.23	Pass

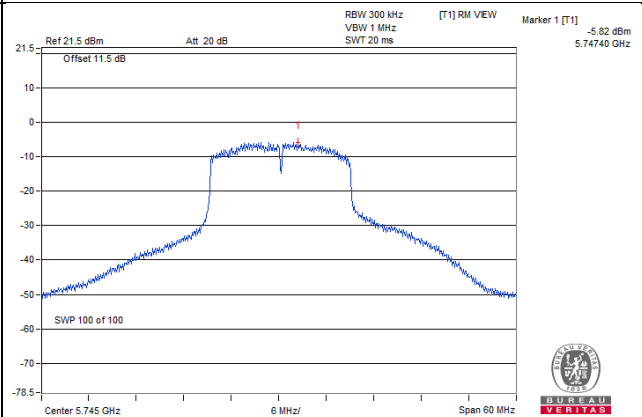
- Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. Directional gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi} > 6\text{dBi}$, therefore the limit needs to reduce, so the power density limit shall be reduced to $30 - (7.77 - 6) = 28.23\text{dBm}$.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

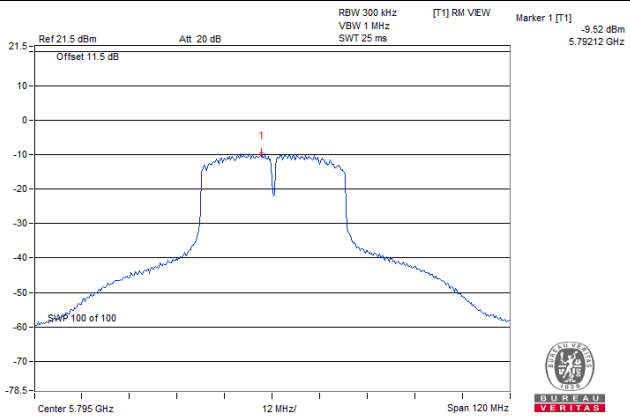
802.11a_Chain 0 / CH149



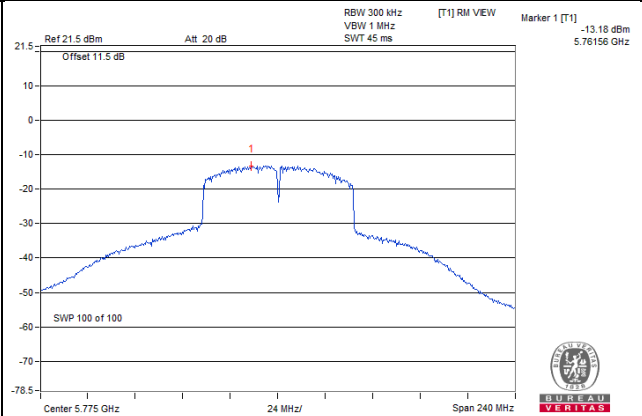
802.11ac (VHT20)_Chain 0 / CH149



802.11ac (VHT40)_Chain 1 / CH159



802.11ac (VHT80)_Chain 0 / CH155

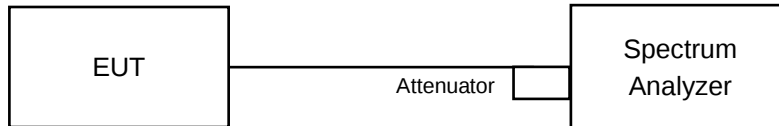


4.5 6dB Bandwidth Measurement

4.5.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

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

MEASUREMENT PROCEDURE REF

- 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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

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

4.5.7 Test Results

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	15.09	16.07	0.5	Pass
157	5785	15.32	15.15	0.5	Pass
165	5825	15.39	15.12	0.5	Pass

802.11ac (VHT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	15.09	16.34	0.5	Pass
157	5785	14.71	15.36	0.5	Pass
165	5825	15.67	15.19	0.5	Pass

802.11ac (VHT40)

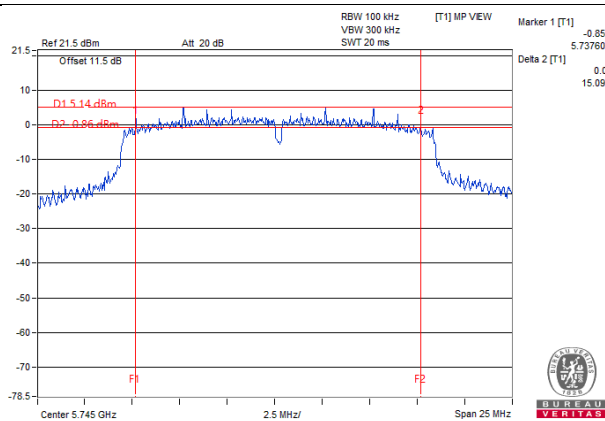
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	34.01	35.06	0.5	Pass
159	5795	32.60	35.06	0.5	Pass

802.11ac (VHT80)

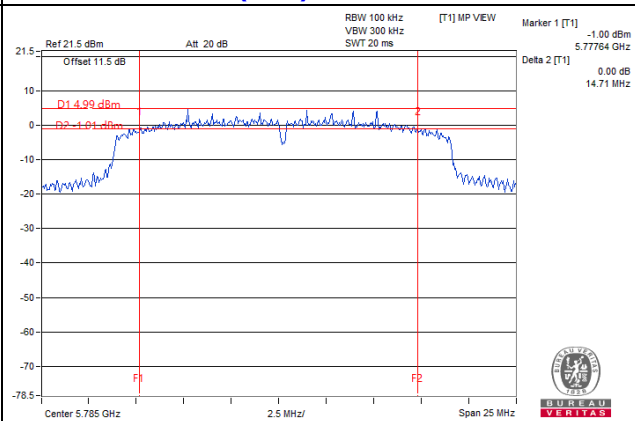
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	72.68	72.73	0.5	Pass

Spectrum Plot of Worst Value

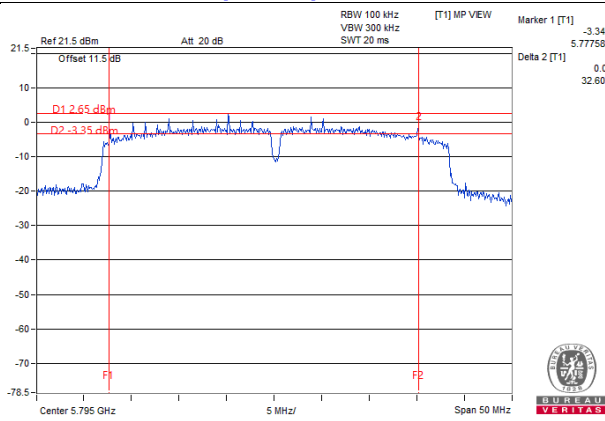
802.11a_Chain 0 / CH149



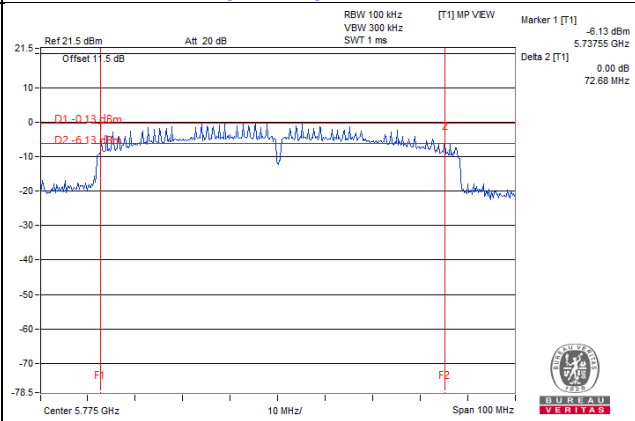
802.11ac (VHT)_Chain 0 / CH157



802.11ac (VHT40)_Chain 0 / CH159



802.11ac (VHT80)_Chain 0 / CH155



5 Pictures of Test Arrangements

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

6 Appendix A – Radiated Emission Measurement

6.1.1 Limits of Radiated Emission Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

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.

6.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ESR7 R&S	ESR7	102026	Apr. 24, 2019	Apr. 23, 2020
Spectrum Analyzer Keysight	N9030B	MY57141948	May 25, 2019	May 24, 2020
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-1819	Nov. 25, 2018	Nov. 24, 2019
Pre-Amplifier EMCI	EMC12630SE	980509	May 03, 2019	May 02, 2020
RF Cable EMCI	EMC104-SM-SM-1500	180503	May 03, 2019	May 02, 2020
RF Cable EMCI	EMC104-SM-SM-2000	180501	May 03, 2019	May 02, 2020
RF Cable EMCI	EMC104-SM-SM-6000	180505	May 03, 2019	May 02, 2020
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 28, 2019	Jan. 27, 2020
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 25, 2018	Nov. 24, 2019
RF Cable	EMC102-KM-KM-1200	160924	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC102-KM-KM-1200	160925	Jan. 28, 2019	Jan. 27, 2020
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	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. 5.
3. Tested Date: Sep. 26, 2019

6.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 1.5 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. 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 peak and average detect 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.

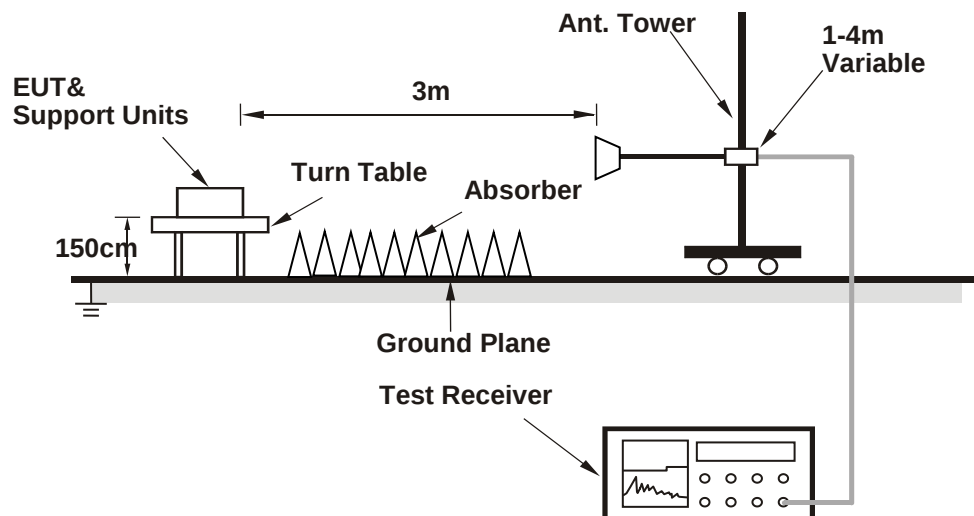
NOTE:

1. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
2. 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.
3. All modes of operation were investigated and the worst-case emissions are reported.

6.1.4 Deviation from Test Standard

No deviation

6.1.5 Test Setup



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

6.1.6 EUT Operating Conditions

Same as 4.1.6.

6.1.7 Test Results

ABOVE 1GHz DATA

802.11a

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	3829.68	40.8 PK	74.0	-33.2	1.29 H	324	41.5	-0.7
2	3829.68	34.7 AV	54.0	-19.3	1.29 H	324	35.4	-0.7
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	3829.68	37.3 PK	74.0	-36.7	1.32 V	241	38.0	-0.7
2	3829.68	27.2 AV	54.0	-26.8	1.32 V	241	27.9	-0.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	3856.25	39.1 PK	74.0	-34.9	1.26 H	331	39.8	-0.7
2	3856.25	32.1 AV	54.0	-21.9	1.26 H	331	32.8	-0.7
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	3856.25	37.1 PK	74.0	-36.9	1.36 V	233	37.8	-0.7
2	3856.25	27.2 AV	54.0	-26.8	1.36 V	233	27.9	-0.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	3882.81	40.6 PK	74.0	-33.4	1.30 H	309	41.2	-0.6
2	3882.81	34.6 AV	54.0	-19.4	1.30 H	309	35.2	-0.6
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	3882.81	37.5 PK	74.0	-36.5	1.28 V	252	38.1	-0.6
2	3882.81	27.1 AV	54.0	-26.9	1.28 V	252	27.7	-0.6

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value

802.11ac (VHT20)

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	3829.68	52.7 PK	74.0	-21.3	2.20 H	324	53.4	-0.7
2	3829.68	46.6 AV	54.0	-7.4	2.20 H	324	47.3	-0.7
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	3829.68	49.1 PK	74.0	-24.9	1.18 V	222	49.8	-0.7
2	3829.68	38.0 AV	54.0	-16.0	1.18 V	222	38.7	-0.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	3856.25	52.7 PK	74.0	-21.3	2.25 H	315	53.4	-0.7
2	3856.25	46.6 AV	54.0	-7.4	2.25 H	315	47.3	-0.7

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	3856.25	48.9 PK	74.0	-25.1	1.22 V	218	49.6	-0.7
2	3856.25	38.0 AV	54.0	-16.0	1.22 V	218	38.7	-0.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	3882.81	53.1 PK	74.0	-20.9	2.16 H	322	53.7	-0.6
2	3882.81	46.9 AV	54.0	-7.1	2.16 H	322	47.5	-0.6

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	3882.81	49.0 PK	74.0	-25.0	1.15 V	228	49.6	-0.6
2	3882.81	38.1 AV	54.0	-15.9	1.15 V	228	38.7	-0.6

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value

802.11ac (VHT40)

CHANNEL	TX Channel 151	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	3835.93	53.5 PK	74.0	-20.5	2.67 H	303	54.2	-0.7
2	3835.93	48.0 AV	54.0	-6.0	2.67 H	303	48.7	-0.7
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	3835.93	49.5 PK	74.0	-24.5	2.63 V	292	50.2	-0.7
2	3835.93	39.9 AV	54.0	-14.1	2.63 V	292	40.6	-0.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value

CHANNEL	TX Channel 159	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	3862.50	53.3 PK	74.0	-20.7	2.58 H	305	54.0	-0.7
2	3862.50	46.7 AV	54.0	-7.3	2.58 H	305	47.4	-0.7
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	3862.50	49.3 PK	74.0	-24.7	2.66 V	288	50.0	-0.7
2	3862.50	38.6 AV	54.0	-15.4	2.66 V	288	39.3	-0.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value

802.11ac (VHT80)

CHANNEL	TX Channel 155	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	3850.00	53.0 PK	74.0	-21.0	2.26 H	282	53.7	-0.7
2	3850.00	47.6 AV	54.0	-6.4	2.26 H	282	48.3	-0.7
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	3850.00	49.7 PK	74.0	-24.3	2.68 V	288	50.4	-0.7
2	3850.00	39.8 AV	54.0	-14.2	2.68 V	288	40.5	-0.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value

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

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