

## Supplemental “Transmit Simultaneously” Test Report

**Report No.:** RF200102E06-2

**FCC ID:** RAXCM4652442

**Test Model:** CM4652442-MM

**Received Date:** Jan. 02, 2020

**Test Date:** Jan. 13 to Feb. 17, 2020

**Issued Date:** Mar. 30, 2020

**Applicant:** Arcadyan Technology Corporation

**Address:** No.8, Sec.2, Guangfu Rd.,Hsinchu City 30071, Taiwan, R.O.C.

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Hsin Chu Laboratory

**Lab Address:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan

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

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



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### Release Control Record

Issue No.	Description	Date Issued
RF200102E06-2	Original release.	Mar. 30, 2020

## 1 Certificate of Conformity

**Product:** DOCSIS® 3.1 Dual-band AX6000 Wi-Fi 6 Cable Gateway

**Brand:** XTREAM

**Test Model:** CM4652442-MM

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** Arcadyan Technology Corporation

**Test Date:** Jan. 13 to Feb. 17, 2020

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.247)

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 :** Phoenix Huang , **Date:** Mar. 30, 2020  
Phoenix Huang / Specialist

**Approved by :** Clark Lin , **Date:** Mar. 30, 2020  
Clark Lin / Technical Manager

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C, E (SECTION 15.247, 15.407)			
FCC Clause	Test Item	Result	Remarks
15.207 15.407(b)(6)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -21.63 dB at 3.35156 MHz.
15.205 / 15.209 / 15.247(d) 15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -11.0 dB at 4824.00 MHz.

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	1.8 dB
Conducted emissions	-	3.1 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.0 dB
	30MHz ~ 1GHz	4.8 dB
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

Product	DOCSIS® 3.1 Dual-band AX6000 Wi-Fi 6 Cable Gateway
Brand	XTREAM
Test Model	CM4652442-MM
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 11 Mbps 802.11a/g: up to 54 Mbps 802.11n: up to 600 Mbps 802.11ac: up to 1733.3 Mbps 802.11ax: up to 2401.9 Mbps
Operating Frequency	<b>2.4GHz:</b> 2.412 ~ 2.462 GHz <b>5GHz:</b> 5.18 ~ 5.24 GHz, 5.745 ~ 5.825 GHz
Number of Channel	<b>2.4GHz:</b> 802.11b, 802.11g, 802.11n (HT20), VHT20, 802.11ax (HE20): 11 802.11n (HT40), VHT40, 802.11ax (HE40): 7 <b>5GHz:</b> 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20): 9 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 4 802.11ac (VHT80), 802.11ax (HE80): 2
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	RJ-45 Cable x 1 (Unshielded, 1 m)

Note:

1. Simultaneously transmission condition.

Condition	Technology	
	1	WLAN (2.4GHz)

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

Brand	Model No.	Spec.
Asian Power Devices Inc.	WA-36A12FU	Input: 100-240Vac, 0.9A, 50/60Hz Output: 12Vdc, 3A DC Output cable: Unshielded, 1.5 m

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

Ant. No.	Transmitter Circuit	Model No.	Ant. Net Gain (dBi) (Including cable loss)	Freq. Range (GHz)	Ant. Type	Connector Type	Cable Length (mm)
1	Chain 0	CM4652442- MM R0B	2.42	2.4~2.4835	PIFA	i-pex(MHF)	227
			0.49	5.15~5.85			
2	Chain 1	CM4652442- MM R0B	0.09	2.4~2.4835	PIFA	i-pex(MHF)	171
			1.42	5.15~5.85			
3	Chain 2	CM4652442- MM R0B	1.38	2.4~2.4835	PIFA	i-pex(MHF)	145
			1.44	5.15~5.85			
4	Chain 3	CM4652442- MM R0B	3.69	2.4~2.4835	PIFA	i-pex(MHF)	73
			2.46	5.15~5.85			

4. The directional gain table:

Frequency Range (GHz)	Directional Antenna Gain (dBi)	Antenna Type	Antenna Connector
2.4~2.4835	8.02	PIFA	i-pex(MHF)
5.15~5.85	7.5		

Note: The directional gain =  $10 \log[(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 4]$

5. The EUT incorporates a MIMO function:

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

Note: All of modulation mode support beamforming function except 802.11a/b/g modulation mode.

6. 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.

### 3.1.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE $<$ 1G	PLC	OB	
-	√	√	√	√	-

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz & Bandedge Measurement  
**RE $<$ 1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission  
**OB**: Conducted Out-Band Emission Measurement

#### **Radiated Emission Test (Above 1GHz):**

- The tested configurations represent the worst-case mode from all possible combinations by the maximum power.  
 Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
802.11b + 802.11ax (HE20)	1 to 11	1	DSSS	DBPSK
	36 to 48, 149 to 165	149	OFDMA	BPSK

#### **Radiated Emission Test (Below 1GHz):**

- The tested configurations represent the worst-case mode from all possible combinations by the maximum power.  
 Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
802.11b + 802.11ax (HE20)	1 to 11	1	DSSS	DBPSK
	36 to 48, 149 to 165	149	OFDMA	BPSK

#### **Power Line Conducted Emission Test:**

- The tested configurations represent the worst-case mode from all possible combinations by the maximum power.  
 Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
802.11b + 802.11ax (HE20)	1 to 11	1	DSSS	DBPSK
	36 to 48, 149 to 165	149	OFDMA	BPSK



**Conducted Out-Band Emission Measurement:**

- The tested configurations represent the worst-case mode from all possible combinations by the maximum power.
- Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
802.11b + 802.11ax (HE20)	1 to 11	1	DSSS	DBPSK
	36 to 48, 149 to 165	149	OFDMA	BPSK

**Test Condition:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	22deg. C, 55%RH	120Vac, 60Hz	Jeff Lee
RE $<$ 1G	22deg. C, 57%RH	120Vac, 60Hz	Jeff Lee
PLC	25deg. C, 75%RH	120Vac, 60Hz	Kevin Ko
OB	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

### 3.2 Description of Support Units

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

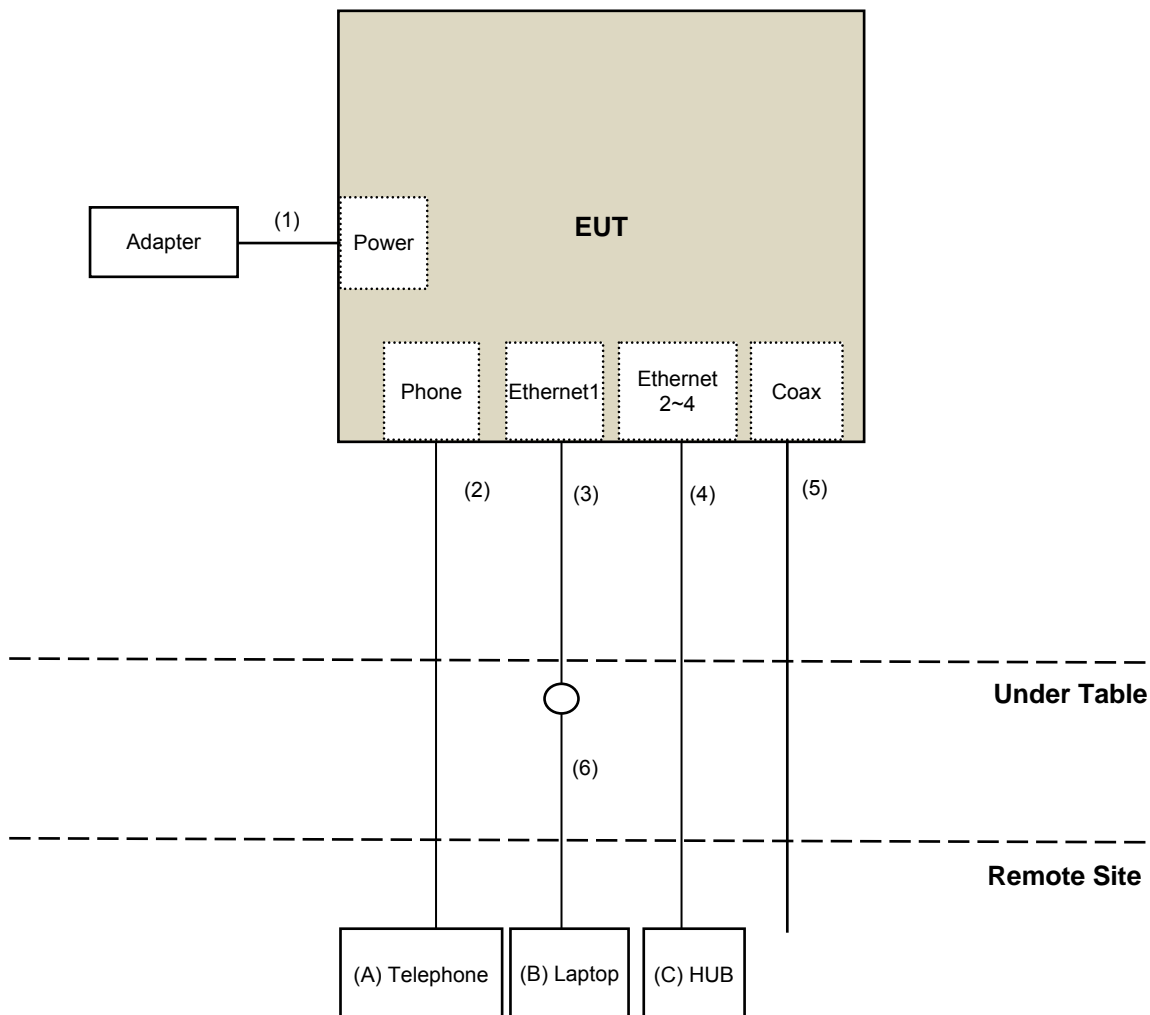
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Telephone	WONDER	WD-303	7C17KA 04011	NA	Provided by Lab
B.	Laptop	DELL	E6400	D814C A00 APCC	NA	Provided by Lab
C.	HUB	ZyXEL	GS1100-16	S150H44000046	FCC DoC	Provided by Lab

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	1	1.5	No	0	Supplied by client
2.	RJ-11 Cable	1	10	No	0	Provided by Lab
3.	RJ-45 Cable	1	1	No	0	Supplied by client
4.	RJ-45 Cable	3	10	No	0	Provided by Lab
5.	Coaxial Cable	1	10	Yes	0	Provided by Lab
6.	RJ-45 Cable	1	10	No	0	Provided by Lab

### 3.2.1 Configuration of System under Test



## 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.

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.

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) <sup>*1</sup> PK: 10 (dBm/MHz) <sup>*2</sup> PK: 15.6 (dBm/MHz) <sup>*3</sup> PK: 27 (dBm/MHz) <sup>*4</sup>	PK: 68.2(dBµV/m) <sup>*1</sup> PK: 105.2 (dBµV/m) <sup>*2</sup> PK: 110.8(dBµV/m) <sup>*3</sup> PK: 122.2 (dBµV/m) <sup>*4</sup>
*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

**For Radiated Emission (Below 1GHz) test:**

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
Pre-Amplifier EMCI	EMC001340	980142	May 30, 2019	May 29, 2020
Loop Antenna Electro-Metrics	EM-6879	264	Jan. 22, 2019	Jan. 21, 2020
RF Cable	NA	LOOPCAB-001	Jan. 08, 2020	Jan. 07, 2021
RF Cable	NA	LOOPCAB-002	Jan. 08, 2020	Jan. 07, 2021
Pre-Amplifier EMCI	EMC330N	980538	Apr. 30, 2019	Apr. 29, 2020
Trilog Broadband Antenna SCHWARZBECK	VULB9168	9168-0842	Nov. 08, 2019	Nov. 07, 2020
RF Cable	8D	966-5-1	May 03, 2019	May 02, 2020
RF Cable	8D	966-5-2	May 03, 2019	May 02, 2020
RF Cable	8D	966-5-3	May 03, 2019	May 02, 2020
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-ATT5-02	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. Loop antenna was used for all emissions below 30 MHz.
4. Tested Date: Jan. 13, 2020

**For Radiated Emission (Above 1GHz) test:**

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. 24, 2019	Nov. 23, 2020
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. 15, 2020	Jan. 14, 2021
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 24, 2019	Nov. 23, 2020
RF Cable	EMC102-KM-KM-1200	160924	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC102-KM-KM-4500	181205	Aug. 26, 2019	Aug. 25, 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. Loop antenna was used for all emissions below 30 MHz.
4. Tested Date: Feb. 04, 2020

**For other test items:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	100964	June 04, 2019	June 03, 2020
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 15, 2019	Apr. 14, 2020
Software	ADT_RF Test Software V6.6.5.4	NA	NA	NA

- NOTE:**
1. The test was performed in Oven room 2.
  2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  3. Tested Date: Feb. 17, 2020

#### 4.1.3 Test Procedures

##### **For Radiated emission below 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

##### **Note:**

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

##### **For Radiated emission above 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average 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:**

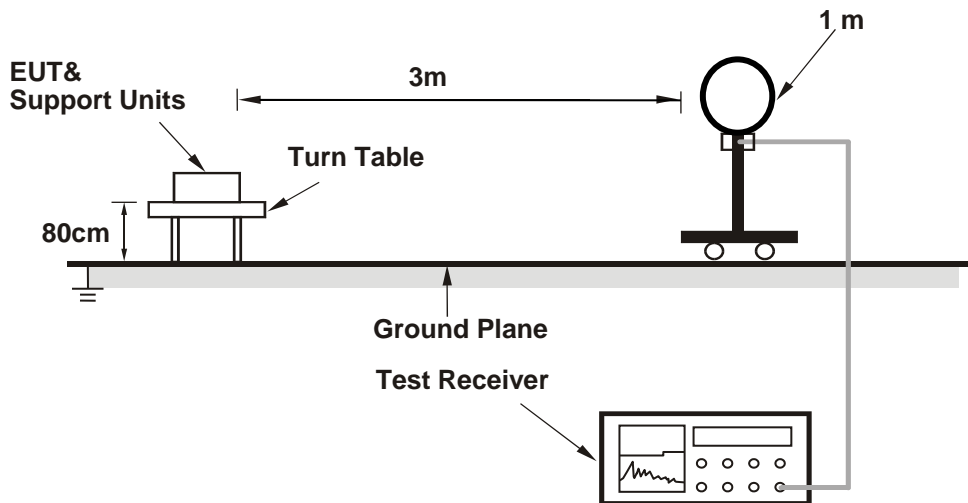
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

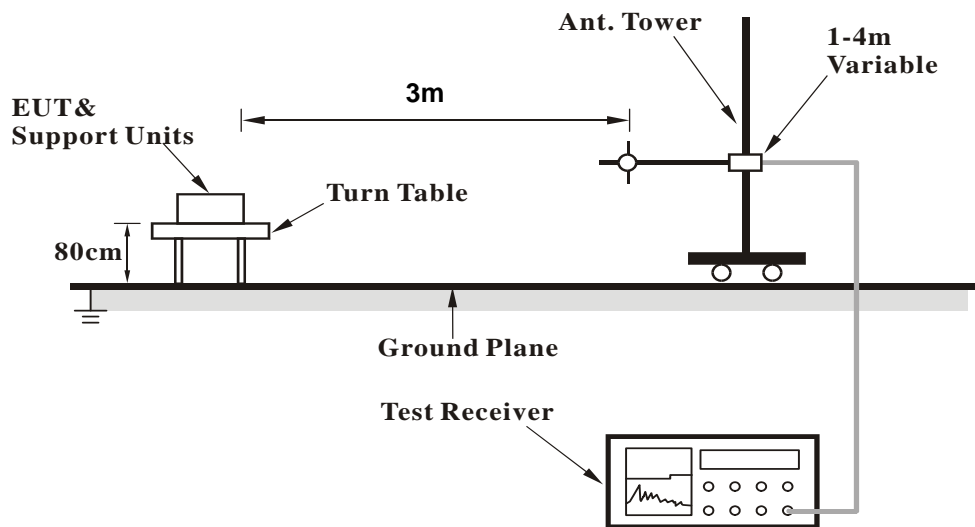
No deviation.

#### 4.1.5 Test Setup

##### For Radiated emission below 30MHz

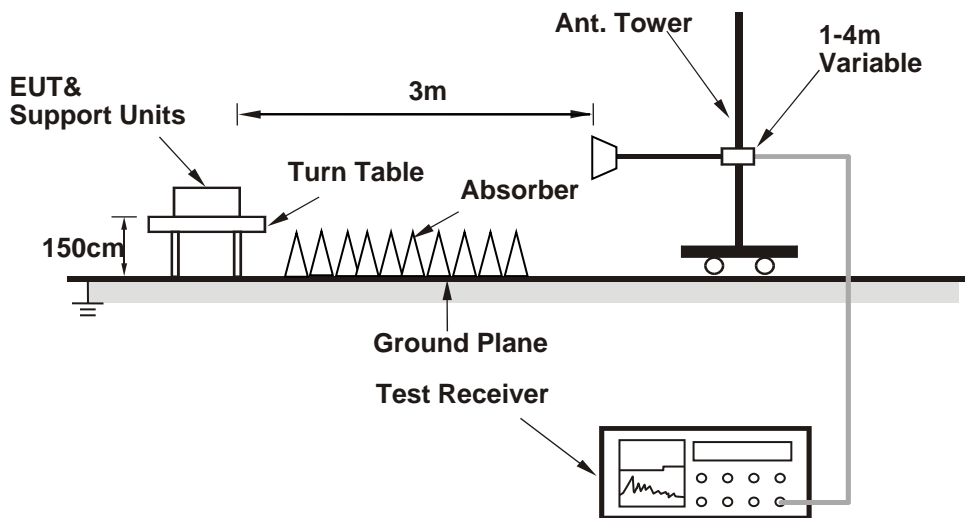


##### For Radiated emission 30MHz to 1GHz





**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**

- a. Connected the EUT with the Laptop which is placed on remote site.
- b. Controlling software (accessMTool\_3.1.0.1) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

## 4.1.7 Test Results

## Above 1GHz Data:

<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz	<b>DETECTOR FUNCTION</b>	Peak (PK) 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	4824.00	46.8 PK	74.0	-27.2	1.79 H	251	45.6	1.2
2	4824.00	42.7 AV	54.0	-11.3	1.79 H	251	41.5	1.2
3	11490.00	45.1 PK	74.0	-28.9	2.17 H	98	31.2	13.9
4	11490.00	32.8 AV	54.0	-21.2	2.17 H	98	18.9	13.9
5	17235.00	41.6 PK	68.2	-26.6	1.38 H	314	24.3	17.3

**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	4824.00	47.2 PK	74.0	-26.8	2.66 V	219	46.0	1.2
2	<b>4824.00</b>	<b>43.0 AV</b>	<b>54.0</b>	<b>-11.0</b>	<b>2.66 V</b>	<b>219</b>	<b>41.8</b>	<b>1.2</b>
3	11490.00	44.4 PK	74.0	-29.6	1.87 V	222	30.5	13.9
4	11490.00	32.8 AV	54.0	-21.2	1.87 V	222	18.9	13.9
5	17235.00	42.2 PK	68.2	-26.0	2.45 V	183	24.9	17.3

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

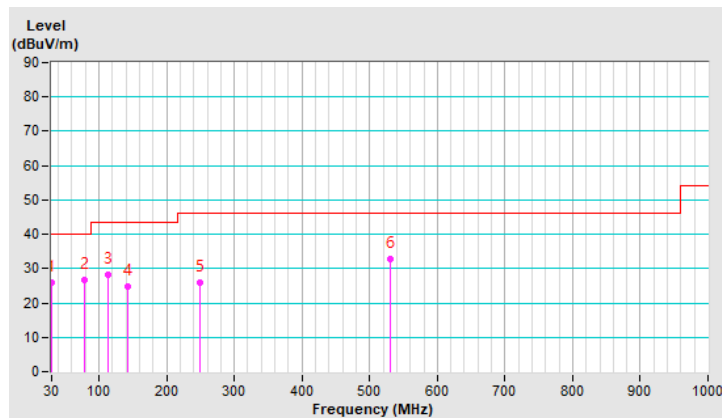
**Below 1GHz Data:**

<b>FREQUENCY RANGE</b>	9kHz ~ 1GHz	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
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<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>								
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	30.58	25.9 QP	40.0	-14.1	1.00 H	175	40.1	-14.2
2	78.94	26.8 QP	40.0	-13.2	2.00 H	79	44.0	-17.2
3	112.75	28.1 QP	43.5	-15.4	1.50 H	93	43.6	-15.5
4	142.23	24.7 QP	43.5	-18.8	1.50 H	236	37.6	-12.9
5	250.01	25.8 QP	46.0	-20.2	1.00 H	253	39.7	-13.9
6	531.32	32.9 QP	46.0	-13.1	1.50 H	240	39.8	-6.9

**REMARKS:**

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



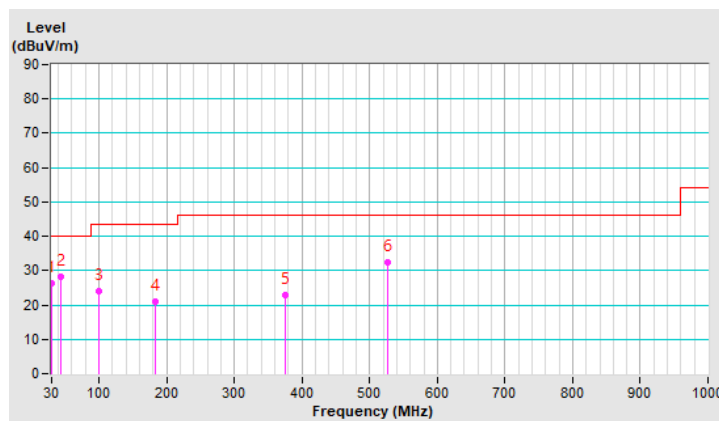
<b>FREQUENCY RANGE</b>	9kHz ~ 1GHz	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
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**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

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	30.58	26.2 QP	40.0	-13.8	1.50 V	193	40.4	-14.2
2	43.48	28.3 QP	40.0	-11.7	1.00 V	24	41.2	-12.9
3	99.99	23.8 QP	43.5	-19.7	1.50 V	220	41.0	-17.2
4	182.35	21.0 QP	43.5	-22.5	1.00 V	157	35.7	-14.7
5	375.73	23.0 QP	46.0	-23.0	1.50 V	327	33.1	-10.1
6	526.86	32.3 QP	46.0	-13.7	1.50 V	252	39.2	-6.9

**REMARKS:**

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



## 4.2 Conducted Emission Measurement

### 4.2.1 Limits of Conducted Emission Measurement

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

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

### 4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 23, 2019	Oct. 22, 2020
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 23, 2019	Oct. 22, 2020
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 17, 2019	Mar. 16, 2020
50 ohms Terminator	50	3	Oct. 23, 2019	Oct. 22, 2020
RF Cable	5D-FB	COCCAB-001	Sep. 27, 2019	Sep. 26, 2020
Fixed attenuator EMCI	STI02-2200-10	003	Mar. 14, 2019	Mar. 13, 2020
Software BVADT	BVADT_Cond_V7.3.7.4	NA	NA	NA

**Note:**

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conduction 1.
- 3 Tested Date: Feb. 05, 2020

#### 4.2.3 Test Procedures

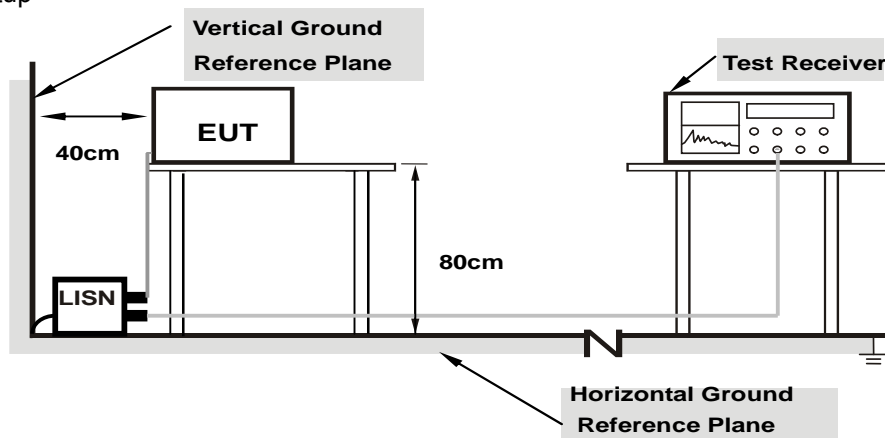
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

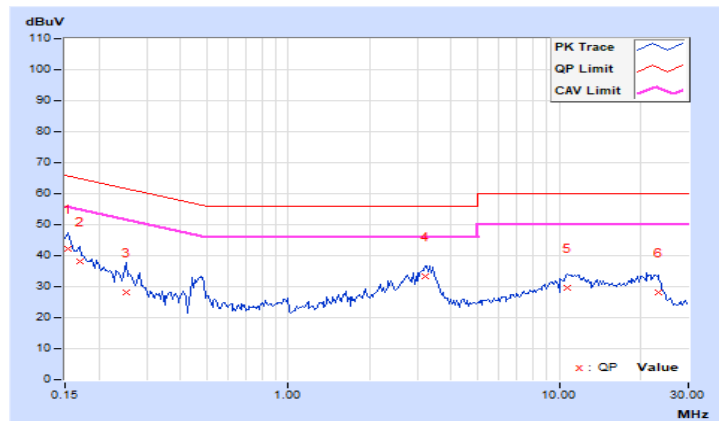
#### 4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBUV)		Emission Level (dBUV)		Limit (dBUV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	9.99	32.36	21.14	42.35	31.13	65.79	55.79	-23.44	-24.66
2	0.16953	9.99	28.16	16.72	38.15	26.71	64.98	54.98	-26.83	-28.27
3	0.25156	9.99	18.29	10.41	28.28	20.40	61.71	51.71	-33.43	-31.31
4	3.19531	10.20	23.18	11.35	33.38	21.55	56.00	46.00	-22.62	-24.45
5	10.73828	10.70	19.04	13.63	29.74	24.33	60.00	50.00	-30.26	-25.67
6	23.25391	11.49	16.50	10.48	27.99	21.97	60.00	50.00	-32.01	-28.03

**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

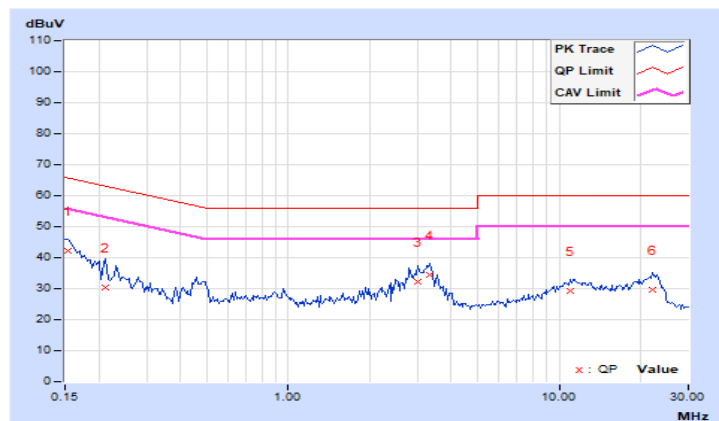


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	9.99	32.40	21.57	42.39	31.56	65.79	55.79	-23.40	-24.23
2	0.21250	9.99	20.26	8.50	30.25	18.49	63.11	53.11	-32.86	-34.62
3	3.01563	10.17	22.03	12.10	32.20	22.27	56.00	46.00	-23.80	-23.73
<b>4</b>	<b>3.35156</b>	<b>10.19</b>	<b>24.18</b>	<b>11.72</b>	<b>34.37</b>	<b>21.91</b>	<b>56.00</b>	<b>46.00</b>	<b>-21.63</b>	<b>-24.09</b>
5	10.99609	10.63	18.81	13.76	29.44	24.39	60.00	50.00	-30.56	-25.61
6	22.15234	11.16	18.53	12.78	29.69	23.94	60.00	50.00	-30.31	-26.06

**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



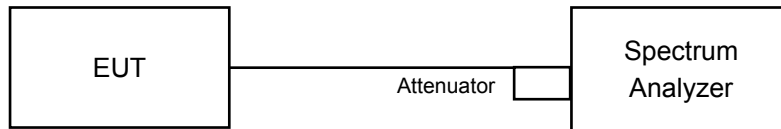


### 4.3 Conducted Out of Band Emission Measurement

#### 4.3.1 Limits of Conducted Out of Band Emission Measurement

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

#### 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 Procedures

##### 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 OOB

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.

#### 4.3.5 Deviation from Test Standard

No deviation.

#### 4.3.6 EUT Operating Conditions

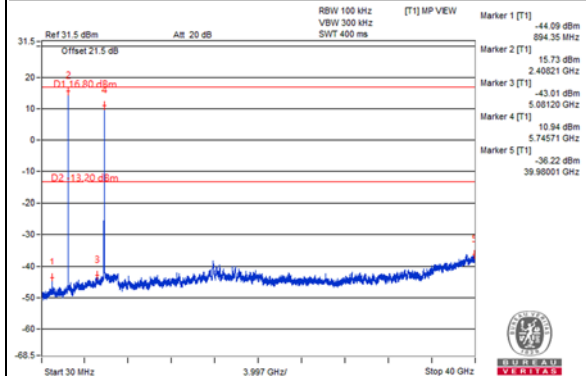
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

#### 4.3.7 Test Results

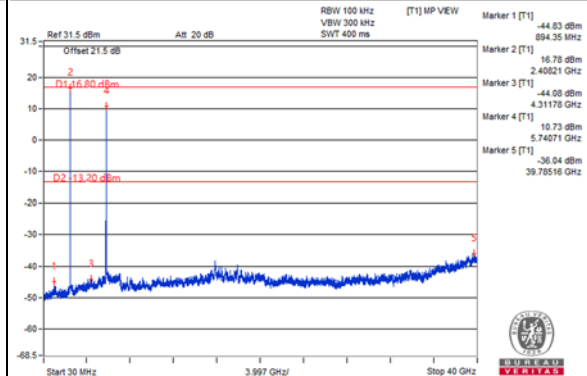
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

2.4GHz\_802.11b CH1 + 5GHz\_802.11ax (HE20) CH149

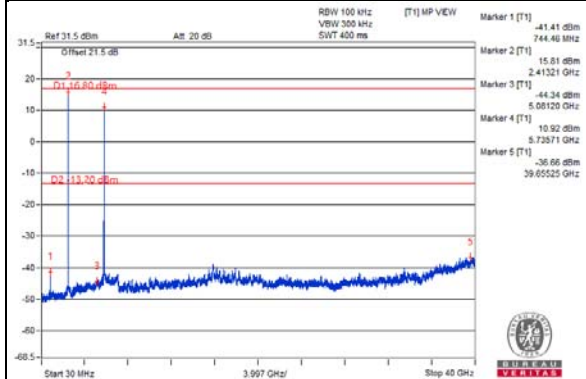
Chain 0



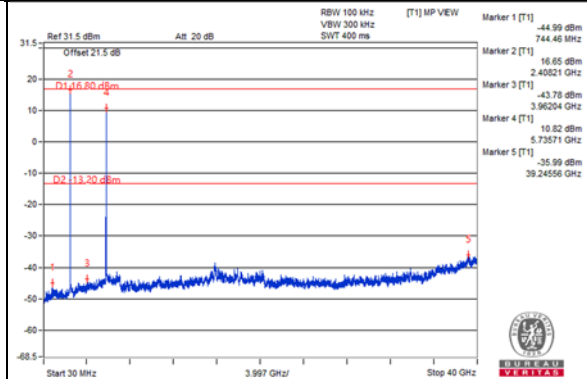
Chain 1



Chain 2



Chain 3



## 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.

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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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