

FCC Test Report (Co-Located)

Report No.: RF181025C10D-2

FCC ID: XU8TEW830MDR

Test Model: TEW-830MDR

Series Model: TEW-830MDR2K, TEW-830MDR3K (refer to item 3.1 for more details)

Received Date: Jun. 21, 2019

Test Date: Jul. 07, 2019

Issued Date: Jul. 23, 2019

Applicant: TRENDnet, Inc.

Address: 20675 Manhattan Place, Torrance, CA 90501 U.S.A.

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Test Location: No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City
33383, Taiwan

**FCC Registration /
Designation Number:** 788550 / TW0003



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

Table of Contents

Release Control Record	3
1 Certificate of Conformity.....	4
2 Summary of Test Results	5
2.1 Measurement Uncertainty	5
2.2 Modification Record	5
3 General Information.....	6
3.1 General Description of EUT	6
3.2 Description of Test Modes	8
3.2.1 Test Mode Applicability and Tested Channel Detail.....	9
3.3 Description of Support Units	10
3.3.1 Configuration of System under Test	10
3.4 General Description of Applied Standards	10
4 Test Types and Results	11
4.1 Radiated Emission and Bandedge Measurement.....	11
4.1.1 Limits of Radiated Emission and Bandedge Measurement	11
4.1.2 Test Instruments	12
4.1.3 Test Procedures.....	13
4.1.4 Deviation from Test Standard	13
4.1.5 Test Setup.....	14
4.1.6 EUT Operating Conditions.....	15
4.1.7 Test Results	16
5 Pictures of Test Arrangements.....	20
Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)	21
Appendix – Information of the Testing Laboratories	22

Release Control Record

Issue No.	Description	Date Issued
RF181025C10D-2	Original release.	Jul. 23, 2019

1 Certificate of Conformity

Product: AC2200 WiFi Mesh Router, AC2200 WiFi Mesh Router System

Brand: TRENDnet

Test Model: TEW-830MDR

Series Model: TEW-830MDR2K, TEW-830MDR3K (refer to item 3.1 for more details)

Sample Status: Engineering sample

Applicant: TRENDnet, Inc.

Test Date: Jul. 07, 2019

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 RF characteristics under the conditions specified in this report.

Prepared by : Pettie Chen , **Date:** Jul. 23, 2019
Pettie Chen / Senior Specialist

Approved by : Bruce Chen , **Date:** Jul. 23, 2019
Bruce Chen / Project Engineer

2 Summary of Test Results

Applied Standard	47 CFR FCC Part 15, Subpart C (Section 15.247) 47 CFR FCC Part 15, Subpart E (Section 15.407)		
FCC Clause	Test Item	Result	Remarks
15.205 / 15.209 / 15.247(d) 15.407(b) (1/2/3/4/6)	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -1.3dB at 5650.00MHz.

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

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) (±)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.86 dB
	200MHz ~ 1000MHz	3.87 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	AC2200 WiFi Mesh Router, AC2200 WiFi Mesh Router System
Brand	TRENDnet
Test Model	TEW-830MDR
Series Model	TEW-830MDR2K, TEW-830MDR3K
Model Difference	Refer to note
Sample Status	Engineering sample
Power Supply Rating	12Vdc (adapter)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11a: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 300Mbps 802.11ac: up to 867Mbps
Operating Frequency	2412~2462MHz, 5180~5240MHz, 5745~5825MHz
Number of Channel	2412~2462MHz: 802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7 5180~5240MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 4 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1 5745~5825MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 5 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter
Cable Supplied	NA

Note:

1. All models are listed as below. Model: TEW-830MDR was chosen for final test.

Brand	Model	Product Name	Description
TRENDnet	TEW-830MDR	AC2200 WiFi Mesh Router	For marketing purpose
	TEW-830MDR2K	AC2200 WiFi Mesh Router System	
	TEW-830MDR3K	AC2200 WiFi Mesh Router System	

2. The EUT incorporates a MIMO function. Physically, the EUT provides 2 completed transmitters and 2 receivers.

Modulation Mode	CDD Mode	Beamforming Mode	Radio
802.11b	Support	Not Support	Radio 1 (IPQ4019 2G) 2.4G only
802.11g	Support	Not Support	
802.11n (HT20)	Support	Support	
802.11n (HT40)	Support	Support	
802.11a	Support	Not Support	Radio 3 (QCA9886) 5GHz Band 1 only
802.11n (HT20)	Support	Support	
802.11n (HT40)	Support	Support	
802.11ac (VHT20)	Support	Support	
802.11ac (VHT40)	Support	Support	
802.11ac (VHT80)	Support	Support	Radio 2 (IPQ4019 5G) 5GHz Band 4 only
802.11a	Support	Not Support	
802.11n (HT20)	Support	Support	
802.11n (HT40)	Support	Support	
802.11ac (VHT20)	Support	Support	
802.11ac (VHT40)	Support	Support	
802.11ac (VHT80)	Support	Support	

* The modulation and bandwidth are similar for 802.11n mode for 20MHz/40MHz and 802.11ac mode for 20MHz/40MHz, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

* For 802.11n and 802.11ac, CDD mode and Beamforming mode are presented in power output test item. For other test items, CDD mode is the worst case for final tests after pretesting.

3. The EUT uses following adapter.

Brand	JG
Model	ZZU1588-150120-2A
Input Power	100-240Vac~1.5A Max 50-60Hz
Output Power	12Vdc, 1.5A
Power Line	1.5m DC cable without core attached on adapter

4. The following antennas were provided to the EUT.

Radio	3		2		1	
Ant. No.	1	4	2	3	5	6
Frequency (MHz)	5150-5850				2400-2500	
Peak Gain (dBi)	4.87	5.16	5.45	5.64	3.32	4.03
Ant. Type	PIFA					
Connector	IPEX					

* The maximum antenna gains of Radio 1, 2, 3 are chosen for final test.

5. Radio 1 & Radio 2 & Radio 3 technologies can transmit at same time.

6. Spurious emission of the simultaneous operation (Radio 1 & Radio 2 & Radio 3) has been evaluated and no non-compliance was found.

3.2 Description of Test Modes

2412~2462MHz:

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

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

7 channels are provided for 802.11n (HT40):

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

5180~5240MHz:

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

Channel	Frequency	Channel	Frequency
36	5180MHz	44	5220MHz
40	5200MHz	48	5240MHz

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

Channel	Frequency	Channel	Frequency
38	5190MHz	46	5230MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210MHz

5745~5825MHz:

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

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

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

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to		Description
	RE $\geq$ 1G	RE<1G	
-	√	√	-

Where RE $\geq$ 1G: Radiated Emission above 1GHz & Bandedge Measurement RE<1G: Radiated Emission below 1GHz

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on Z-plane.
2. Radiated emission test items chosen the worst maximum fundamental frequency emission level of 2.4GHz and 5GHz Radio channel.

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.

EUT Configure Mode	Radio	Mode	Tested Channel	Remark
-	1	802.11g	6	-
	2	802.11ac (VHT80)	155	-
	3	802.11a	40	-

Radiated Emission Test (Below 1GHz):

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

EUT Configure Mode	Radio	Mode	Tested Channel	Remark
-	1	802.11g	6	-
	2	802.11ac (VHT80)	155	-
	3	802.11a	40	-

Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	24 deg. C, 64% RH	120Vac, 60Hz	Adair Peng
RE<1G	24 deg. C, 64% RH	120Vac, 60Hz	Adair Peng

3.3 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.

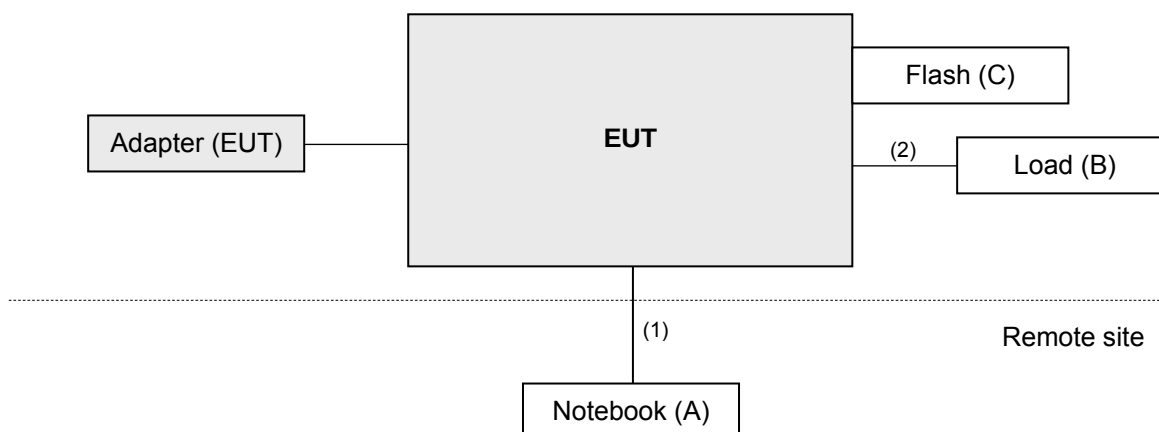
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved	-
B.	Load	NA	NA	NA	NA	-
C.	Flash	HP	v250W	08	NA	-

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45, Cat5e	1	6	N	0	-
2.	RJ45, Cat5e	1	1.5	N	0	-

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)

FCC Part 15, Subpart E (15.407)

ANSI C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

FCC PART 15.209:

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) ^{*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:

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

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	May 30, 2019	May 29, 2020
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Nov. 22, 2018	Nov. 21, 2019
HORN Antenna SCHWARZBECK	9120D	209	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 25, 2018	Nov. 24, 2019
Loop Antenna TESEQ	HLA 6121	45745	Jul. 01, 2019	Jun. 30, 2020
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 21, 2018	Aug. 20, 2019
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	Mar. 27, 2019	Mar. 26, 2020
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 21, 2018	Aug. 20, 2019
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM-SM-8 000	Cable-CH3-03 (309224+170907)	Aug. 21, 2018	Aug. 20, 2019
RF signal cable WOKEN	8D-FB	Cable-CH3-01	Aug. 21, 2018	Aug. 20, 2019
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Pre-amplifier (18GHz-40GHz) EMC	EMC184045B	980175	Nov. 14, 2018	Nov. 13, 2019
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY5519 0004/MY55190007/MY 55210005	Jul. 17, 2018 Jul. 15, 2019	Jul. 16, 2019 Jul. 14, 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 HwaYa Chamber 3.

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:

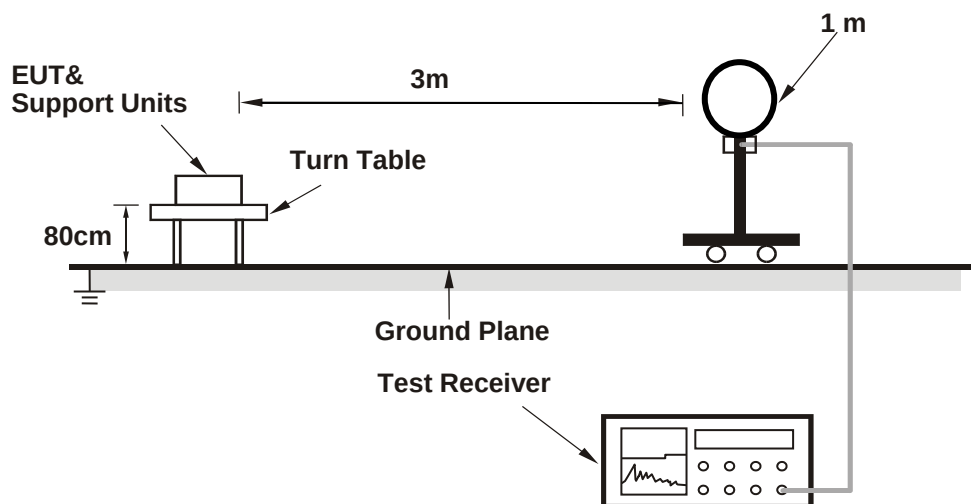
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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. (2.4GHz: 802.11g: RBW = 1MHz, VBW = 1kHz; 5GHz: 802.11a: RBW = 1MHz, VBW = 1kHz; 802.11n (HT20): RBW = 1MHz, VBW = 300Hz)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

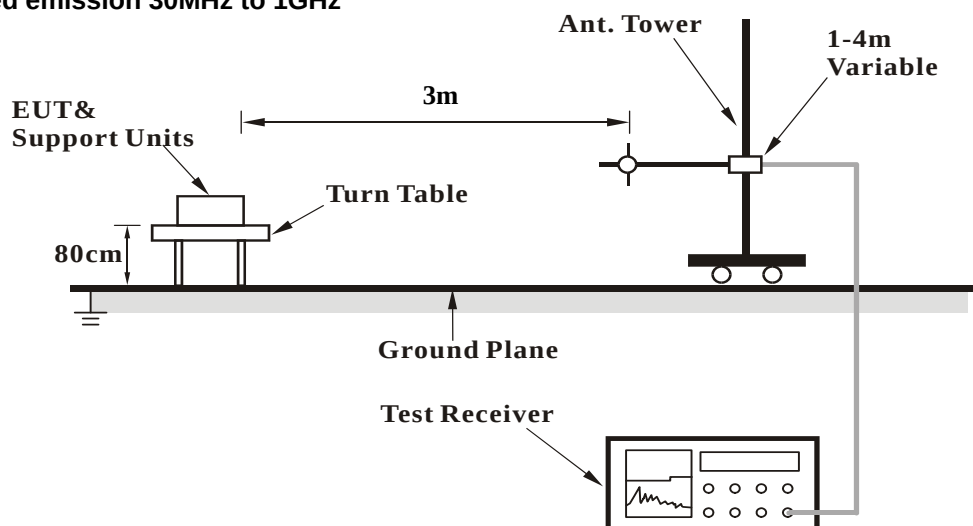
No deviation.

4.1.5 Test Setup

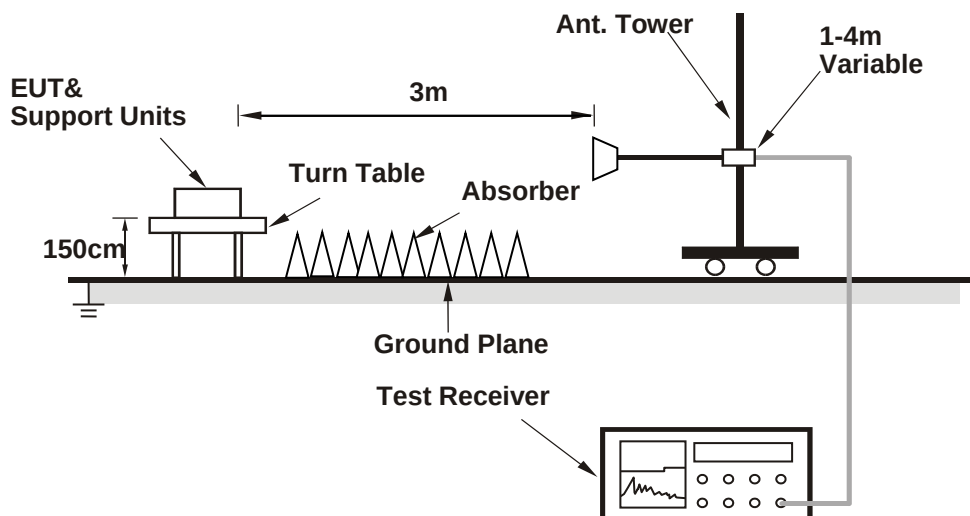
For Radiated emission below 30MHz



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

- Placed the EUT on the testing table.
- Prepared a notebook to act as a communication partner and placed it outside of testing area.
- The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- The communication partner sent data to EUT by command "PING".

4.1.7 Test Results

Above 1GHz data:

Radio 1, 802.11g, CH 6 +

Radio 2, 802.11ac (VHT80), CH 155 +

Radio 3, 802.11a, CH 40

Frequency Range	1GHz ~ 40GHz	Detector Function	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	2390.00	60.8 PK	74.0	-13.2	1.88 H	19	27.8	33.0
2	2390.00	48.5 AV	54.0	-5.5	1.88 H	19	15.5	33.0
3	*2437.00	113.7 PK			1.77 H	0	80.8	32.9
4	*2437.00	102.9 AV			1.77 H	0	70.0	32.9
5	2483.50	60.8 PK	74.0	-13.2	1.79 H	15	28.1	32.7
6	2483.50	48.2 AV	54.0	-5.8	1.79 H	15	15.5	32.7
7	4874.00	51.2 PK	74.0	-22.8	1.38 H	56	47.9	3.3
8	4874.00	41.7 AV	54.0	-12.3	1.38 H	56	38.4	3.3
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	2390.00	62.0 PK	74.0	-12.0	2.98 V	356	29.0	33.0
2	2390.00	49.6 AV	54.0	-4.4	2.98 V	356	16.6	33.0
3	*2437.00	115.3 PK			2.90 V	330	82.4	32.9
4	*2437.00	104.3 AV			2.90 V	330	71.4	32.9
5	2483.50	62.7 PK	74.0	-11.3	2.99 V	342	30.0	32.7
6	2483.50	49.7 AV	54.0	-4.3	2.99 V	342	17.0	32.7
7	4874.00	49.0 PK	74.0	-25.0	2.66 V	200	45.7	3.3
8	4874.00	39.5 AV	54.0	-14.5	2.66 V	200	36.2	3.3

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
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

Frequency Range	1GHz ~ 40GHz	Detector Function	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	5150.00	64.3 PK	74.0	-9.7	1.26 H	13	60.8	3.5
2	5150.00	46.2 AV	54.0	-7.8	1.26 H	11	42.7	3.5
3	*5200.00	113.3 PK			1.29 H	29	74.0	39.3
4	*5200.00	101.3 AV			1.29 H	29	62.0	39.3
5	5350.00	56.8 PK	74.0	-17.2	1.25 H	29	53.1	3.7
6	5350.00	43.0 AV	54.0	-11.0	1.25 H	29	39.3	3.7
7	#5650.00	57.6 PK	68.2	-10.6	2.01 H	348	53.3	4.3
8	*5775.00	106.5 PK			1.59 H	353	66.5	40.0
9	*5775.00	95.1 AV			1.59 H	353	55.1	40.0
10	#5925.00	58.8 PK	68.2	-9.4	1.53 H	342	53.9	4.9
11	#10400.00	57.9 PK	68.2	-10.3	2.09 H	303	42.3	15.6
12	11550.00	60.4 PK	74.0	-13.6	2.59 H	160	43.4	17.0
13	11550.00	46.5 AV	54.0	-7.5	2.59 H	160	29.5	17.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	65.2 PK	74.0	-8.8	2.29 V	43	61.7	3.5
2	5150.00	47.1 AV	54.0	-6.9	2.29 V	43	43.6	3.5
3	*5200.00	116.2 PK			1.90 V	12	76.9	39.3
4	*5200.00	105.1 AV			1.90 V	12	65.8	39.3
5	5350.00	58.2 PK	74.0	-15.8	1.99 V	22	54.5	3.7
6	5350.00	44.4 AV	54.0	-9.6	1.99 V	22	40.7	3.7
7	#5650.00	66.9 PK	68.2	-1.3	1.79 V	1	62.6	4.3
8	*5775.00	105.5 PK			1.69 V	345	65.5	40.0
9	*5775.00	94.8 AV			1.49 V	345	54.8	40.0
10	#5925.00	63.5 PK	68.2	-4.7	1.70 V	359	58.6	4.9
11	#10400.00	58.4 PK	68.2	-9.8	2.59 V	330	42.8	15.6
12	11550.00	59.0 PK	74.0	-15.0	2.82 V	266	42.0	17.0
13	11550.00	45.4 AV	54.0	-8.6	2.82 V	269	28.4	17.0

Remarks:

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

Below 1GHz data:

Radio 1, 802.11g, CH 6 +

Radio 2, 802.11ac (VHT80), CH 155 +

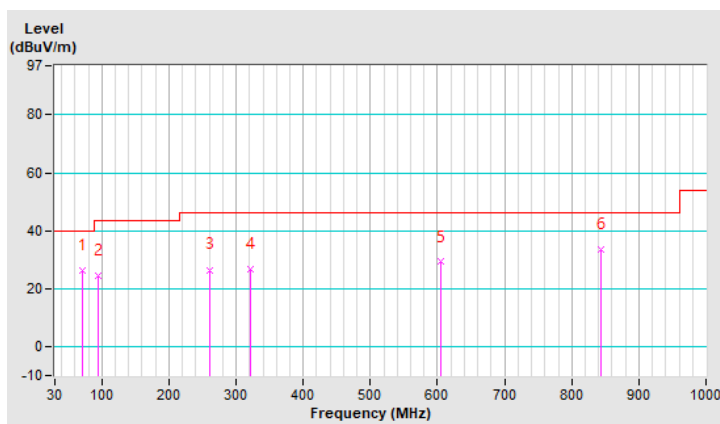
Radio 3, 802.11a, CH 40

Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
-----------------	--------------	-------------------	-----------------

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	70.73	26.2 QP	40.0	-13.8	1.99 H	329	37.7	-11.5
2	94.06	24.3 QP	43.5	-19.2	1.99 H	283	38.8	-14.5
3	261.27	26.5 QP	46.0	-19.5	1.50 H	106	35.5	-9.0
4	321.54	26.8 QP	46.0	-19.2	1.00 H	139	33.7	-6.9
5	605.41	29.2 QP	46.0	-16.8	1.50 H	314	30.1	-0.9
6	842.61	33.5 QP	46.0	-12.5	1.99 H	59	30.6	2.9

Remarks:

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

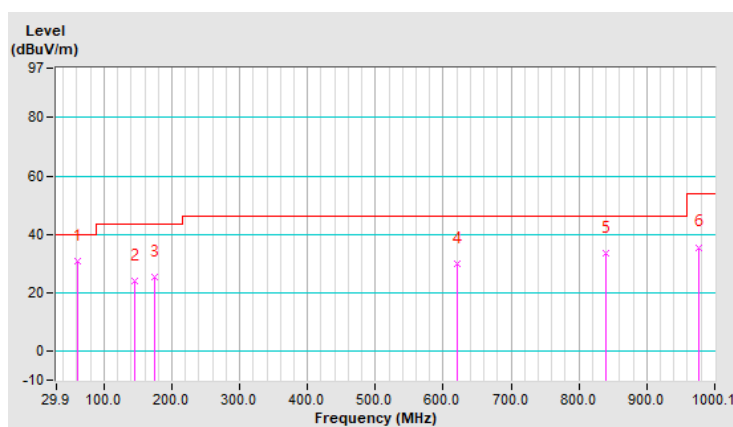


Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
-----------------	--------------	-------------------	-----------------

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	61.01	30.6 QP	40.0	-9.4	1.51 V	327	40.4	-9.8
2	144.61	24.1 QP	43.5	-19.4	1.00 V	183	33.4	-9.3
3	173.78	25.5 QP	43.5	-18.0	1.00 V	154	35.1	-9.6
4	620.96	29.7 QP	46.0	-16.3	1.00 V	16	30.4	-0.7
5	840.67	33.7 QP	46.0	-12.3	1.00 V	197	30.8	2.9
6	976.77	35.6 QP	54.0	-18.4	1.51 V	6	30.2	5.4

Remarks:

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



5 Pictures of Test Arrangements

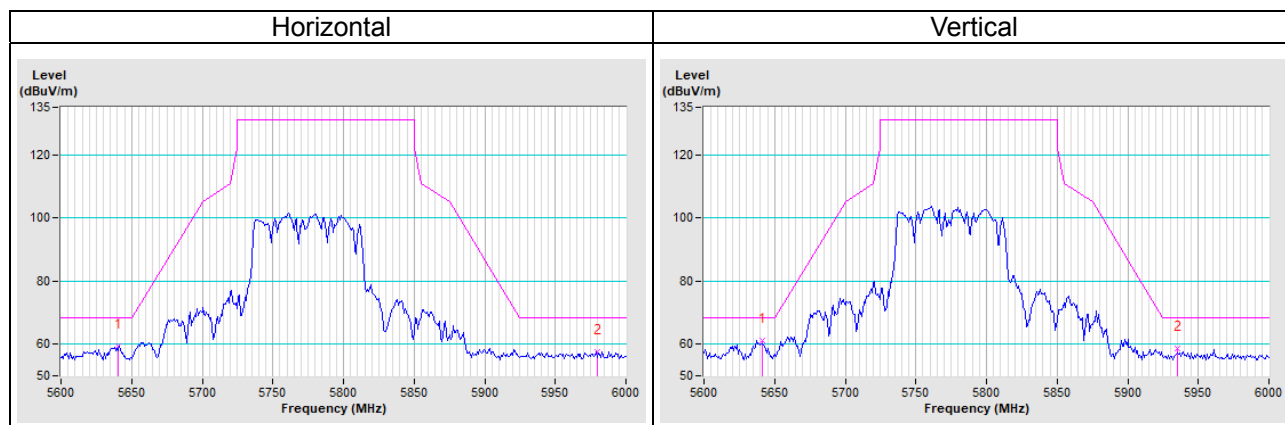
Please refer to the attached file (Test Setup Photo).

Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

Radio 1, 802.11g, CH 6 +

Radio 2, 802.11ac (VHT80), CH 155 +

Radio 3, 802.11a, CH 40



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 and approved according to ISO/IEC 17025.

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

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

--- END ---