Supplemental “Transmit Simultaneously” Test Report

Report No.:	RFBECO-WTW-P22120330-4
FCC ID:	TLZ-AM497617
Test Model:	AW-AM497
Series Model:	AW-AM617
Received Date:	2022/12/12
Test Date:	2023/1/17
Issued Date:	2023/8/14
Applicant:	AzureWave Technologies, Inc.
Address:	8F., No.94, Baozhong Rd., Xindian Dist., New Taipei City 23144, Taiwan
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. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
FCC Registration / Designation Number:	198487 / TW2021

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Release Control Record

Issue No.	Description	Date Issued
RFBECO-WTW-P22120330-4	Original release.	2023/8/14

1 Certificate of Conformity

Product:	802.11ac with BT5.2 Combo Module,802.11ac with BT 5.3 Combo Module
Brand:	AzureWave
Test Model:	AW-AM497
Series Model:	AW-AM617
Sample Status:	Engineering sample
Applicant:	AzureWave Technologies, Inc.
Test Date:	2023/1/17
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 : Vito Lung , **Date:** 2023/8/14

Vito Lung / Specialist

Approved by : Jeremy Lin , **Date:** 2023/8/14

Jeremy Lin / Project Engineer

2 Summary of Test Results

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 -14.02 dB at 0.74320 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 -8.5 dB at 251.23 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) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	3.00 dB
Conducted emissions	-	2.63 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.38 dB
	30MHz ~ 1GHz	5.7 dB
Radiated Emissions above 1 GHz	1 GHz ~ 6 GHz	4.83 dB
	1GHz ~ 18GHz	5.37 dB
	18GHz ~ 40GHz	5.24 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	802.11ac with BT5.2 Combo Module,802.11ac with BT 5.3 Combo Module
Brand	AzureWave
Test Model	AW-AM497
Series Model	AW-AM617
Status of EUT	Engineering sample
Power Supply Rating	3.6 Vdc from host equipment
Modulation Type	**WLAN:** CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode **BT-EDR:** GFSK, π/4-DQPSK, 8DPSK **BT-LE:** GFSK
Modulation Technology	**WLAN:** DSSS, OFDM **BT-EDR:** FHSS **BT-LE:** DTS
Transfer Rate	**WLAN:** 802.11b: up to 11 Mbps 802.11a/g: up to 54 Mbps 802.11n: up to 72.2 Mbps 802.11ac: up to 86.7 Mbps **BT-EDR:** Up to 3 Mbps **BT-LE:** Up to 2 Mbps
Operating Frequency	**2.4GHz:** 2.412 ~ 2.462 GHz **5GHz:** 5.18~ 5.24 GHz, 5.26 ~ 5.32 GHz, 5.50 ~ 5.72 GHz, 5.745 ~ 5.825 GHz **BT-EDR, BT-LE:** 2.402 ~ 2.480 GHz
Number of Channel	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20): 11 **5GHz:** 802.11a, 802.11n (HT20), 802.11ac (VHT20): 25 **BT-EDR:** 79 **BT-LE:** 40
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. There are Bluetooth and WLAN (2.4 GHz & 5 GHz) technology used for the EUT.
2. Simultaneously transmission condition.

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

3. The antenna information is listed as below.

Antenna NO.	RF Chain NO.	Brand	Model	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type	Cable Length
1	Chain 0	MAG.LAYERS	MSA-4008-25GC1-A2	2.98	2.4~2.4835GHz	PIFA	ipex(MHF)	150 mm
				5.16	5.15~5.85GHz			

4. Please refer to as below for the detail of model differences.

Model Name	PMN	IC Chip no.
AW-AM497	802.11ac with BT5.2 Combo Module	CYW43012
AW-AM617	802.11ac with BT5.3 Combo Module	CYW43022

Note:

1. From the above models, model: **AW-AM497** was selected as representative model for the test and its data was recorded in this report after pretest with AW-AM617.
2. CYW43022 is a pin-compatible IC chip similar to the CYW43012, designed to support the same wireless specifications.
   - New deep sleep mode
   - Improved security for firmware and memory
   - SDIO support for both Wi-Fi and Bluetooth

   No changes were made to the radio circuits for WLAN and Bluetooth and wireless emissions, RF performance, RF power are unaffected by the ROM change
3. FVIN version independent of RF characteristics

5. The EUT incorporates a SISO function.

2.4GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11b	1TX	1RX
802.11g	1TX	1RX
802.11n (HT20)	1TX	1RX
5GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11a	1TX	1RX
802.11n (HT20)	1TX	1RX
802.11ac (VHT20)	1TX	1RX

6. 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.
7. Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

3.1.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE≥1G	RE<1G	PLC	OB	
-	√	√	√	√	-

Where **RE≥1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **OB:** Conducted Out-Band Emission Measurement

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

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 + BT-EDR	1 to 11	11	DSSS	DBPSK
	0 to 78	78	FHSS	GFSK

Radiated Emission Test (Below 1GHz):

☒ The tested configurations represent the worst-case mode from all possible combinations by the maximum power.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
802.11b + BT-EDR	1 to 11	11	DSSS	DBPSK
	0 to 78	78	FHSS	GFSK

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 + BT-EDR	1 to 11	11	DSSS	DBPSK
	0 to 78	78	FHSS	GFSK

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 + BT-EDR	1 to 11	11	DSSS	DBPSK
	0 to 78	78	FHSS	GFSK

Test Condition:

Applicable To	Environmental Conditions	INPUT POWER	Tested By
RE≥1G	20deg. C, 69%RH	120Vac, 60Hz	Sampson Chen
RE<1G	16deg. C, 59%RH	120Vac, 60Hz	Sampson Chen
PLC	20deg. C, 66%RH	120Vac, 60Hz	Sampson Chen
OB	25deg. C, 76%RH	120Vac, 60Hz	Dalen Dai

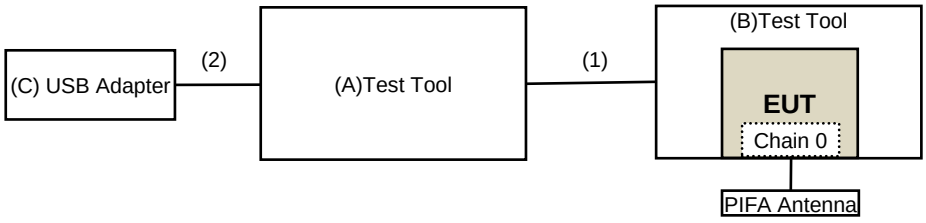
3.2 Description of Support Units

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	Test Tool	AzureWave	N/A	N/A	N/A	Supplied by applicant
B	Test Tool	AzureWave	N/A	N/A	N/A	Supplied by applicant
C	USB Adapter	APPLE	N/A	N/A	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	Type-C to Type-C cable	1	1	Yes	0	Provided by Lab
2	Type-C to USB cable	1	1	Yes	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) *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

*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:

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

4.1.2 Test Instruments

For Radiated emission test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210129	2022/4/8	2023/4/7
Test Receiver Agilent	N9038A	MY51210137	2022/6/9	2023/6/8
Spectrum Analyzer R&S	FSV40	101544	2022/5/9	2023/5/8
Pre_Amplifier EMCI	EMC001340	980269	2022/6/28	2023/6/27
LOOP ANTENNA EMCI	LPA600	270	2021/9/2	2023/9/1
RF Coaxial Cable Pacific	8D-FB	Cable-CH6-02	2022/6/30	2023/6/29
Turn Table ADT	TT100	0306	NA	NA
Tower ADT	AT100	0306	NA	NA
Software BVADT	Radiated_V8.7.08	NA	NA	NA
Software BVADT	Radiated_V7.7.1.1.1	NA	NA	NA
Pre_Amplifier HP	8447D	2432A03504	2022/2/17	2023/2/16
Bi_Log Antenna Schwarzbeck	VULB 9168	137	2022/10/21	2023/10/20
Coupling/Dcoupling Network Schwarzbeck	CDNE-M2	00097	2022/6/1	2023/5/31
Coupling/Dcoupling Network Schwarzbeck	CDNE-M3	00091	2022/6/1	2023/5/31
Spectrum Analyzer R&S	FSV40	101042	2022/9/5	2023/9/4
Pre-amplifier HP	8449B	3008A01201	2022/2/17	2023/2/16
Pre_Amplifier EMCI	EMC0126545	980076	2022/2/17	2023/2/16
Horn Antenna ETS-Lindgren	3117-PA	00215857	2022/11/13	2023/11/12
Horn Antenna EMCO	3115	00028257	2022/11/13	2023/11/12
Pre-amplifier (18GHz-40GHz) EMCI	EMC184045B	980175	2022/9/3	2023/9/2
Pre_Amplifier EMCI	EMC184045B	980235	2022/2/17	2023/2/16
Horn Antenna Schwarzbeck	BBHA 9170	212	2022/10/20	2023/10/19
RF Coaxial Cable HUBER SUHNER	SF-104	Cable-CH6-01	2022/9/20	2023/9/19
RF Coaxial Cable EM	EM102-KMKM-3.5+1M	EM102-KMKM-3.5+1M-01	2022/7/7	2023/7/6
Band Pass Filter MICRO-TRONICS	BRM17690	005	2022/5/26	2023/5/25
Notch Filter MICRO-TRONICS	BRC50703-01	010	2022/5/26	2023/5/25
High Pass Filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	2022/5/26	2023/5/25

RF Coaxial Cable EM	EM102-KMKM-3.5+1M	EM102-KMKM-3.5+1M-01	2022/7/7	2023/7/6
Boresight antenna tower fixture BV	BAF-02	6	NA	NA
Horn Antenna EMCO	3115	00028257	2022/11/13	2023/11/12
RF Coaxial Cable EMCI	EMC104	190801	2022/7/7	2023/7/6
RF Coaxial Cable EMCI	EMC104	190804	2022/7/7	2023/7/6

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 Linkou 966 Chamber 6 (CH 6).
3. Tested Date: 2023/1/17

For other test

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	101042	2022/9/5	2023/9/4
		101544	2022/5/9	2023/5/8
Spectrum Analyzer KEYSIGHT	N9030A	MY54490260	2022/7/14	2023/7/13

NOTE:

1. The test was performed in Oven room.
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: 2023/1/17

4.1.3 Test Procedures

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

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

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

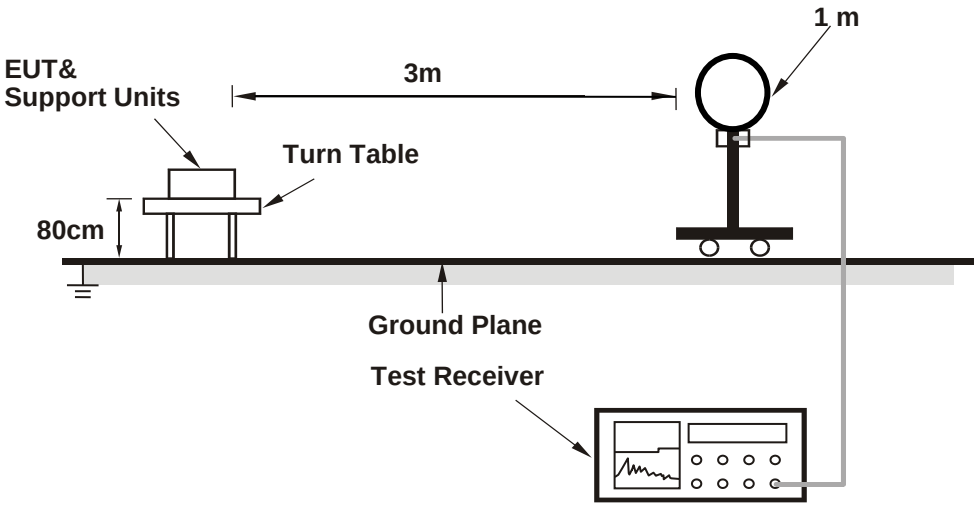
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

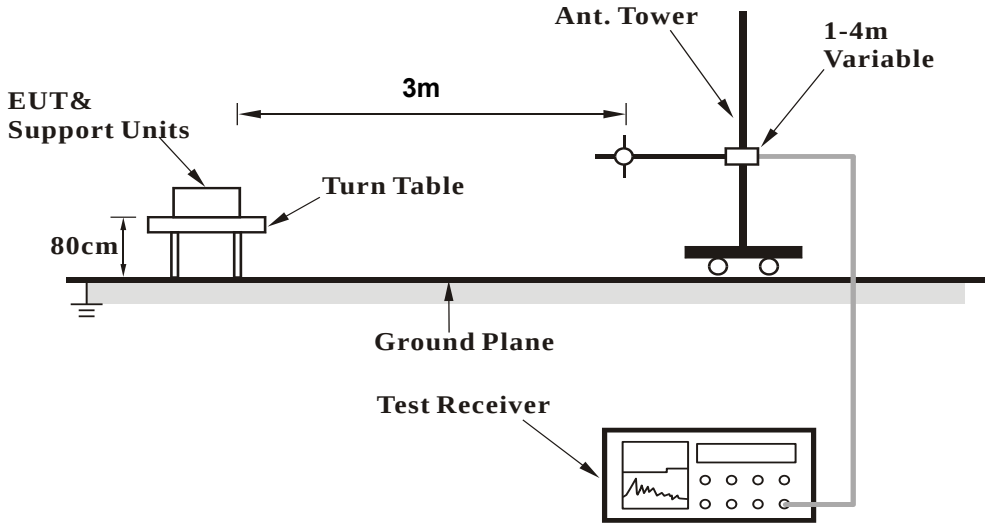
No deviation.

4.1.5 Test Setup

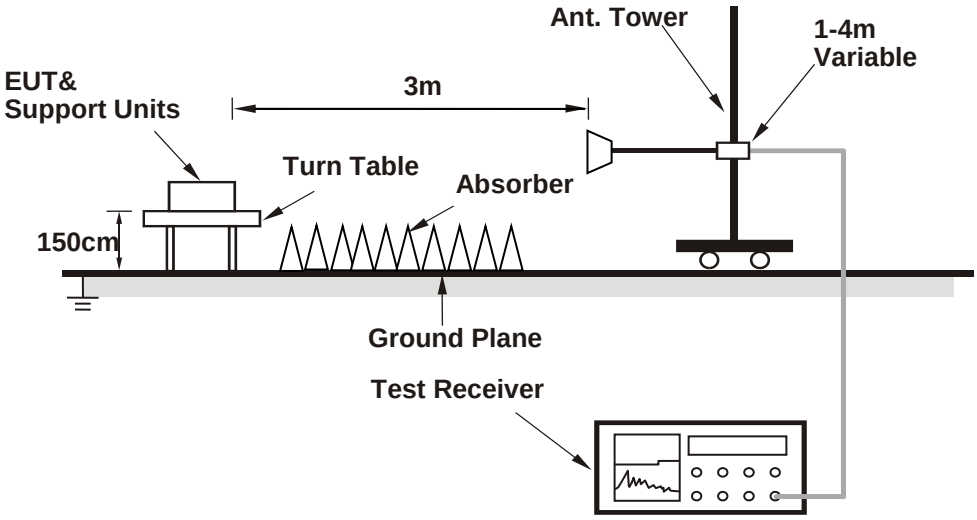
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

a. Connected the EUT with the Laptop Computer which is placed on remote site.

b. Controlling software (TeraTerm v4.8) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data:

FREQUENCY RANGE	1GHz ~ 40GHz	DETECTOR FUNCTION	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	4924.00	52.9 PK	74.0	-21.1	2.39 H	211	48.4	4.5
2	4924.00	42.1 AV	54.0	-11.9	2.39 H	211	37.6	4.5
3	4960.00	48.7 PK	74.0	-25.3	1.88 H	331	44.2	4.5
4	4960.00	37.7 AV	54.0	-16.3	1.88 H	331	33.2	4.5
5	7386.00	50.0 PK	74.0	-24.0	1.72 H	138	39.8	10.2
6	7386.00	39.5 AV	54.0	-14.5	1.72 H	138	29.3	10.2
7	7440.00	46.2 PK	74.0	-27.8	1.54 H	157	35.6	10.6
8	7440.00	34.6 AV	54.0	-19.4	1.54 H	157	24.0	10.6
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	4924.00	53.4 PK	74.0	-20.6	3.30 V	194	48.9	4.5
2	4924.00	41.7 AV	54.0	-12.3	3.30 V	194	37.2	4.5
3	4960.00	46.9 PK	74.0	-27.1	2.03 V	295	42.4	4.5
4	4960.00	36.1 AV	54.0	-17.9	2.03 V	295	31.6	4.5
5	7386.00	48.9 PK	74.0	-25.1	2.93 V	169	38.7	10.2
6	7386.00	39.1 AV	54.0	-14.9	2.93 V	169	28.9	10.2
7	7440.00	44.2 PK	74.0	-29.8	1.43 V	124	33.6	10.6
8	7440.00	33.1 AV	54.0	-20.9	1.43 V	124	22.5	10.6

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
4. The other emission levels were very low against the limit.

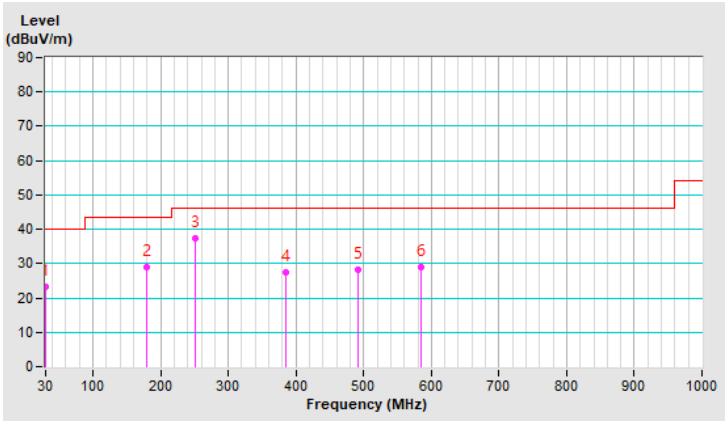
Below 1GHz Data:

FREQUENCY RANGE	30MHz ~ 1GHz	DETECTOR FUNCTION	Quasi-Peak (QP)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	30.68	23.1 QP	40.0	-16.9	1.35 H	222	33.6	-10.5
2	180.25	29.1 QP	43.5	-14.4	1.47 H	197	38.5	-9.4
3	**251.23**	**37.5 QP**	**46.0**	**-8.5**	**1.64 H**	**155**	**45.4**	**-7.9**
4	385.44	27.4 QP	46.0	-18.6	1.85 H	220	31.2	-3.8
5	492.65	28.3 QP	46.0	-17.7	1.54 H	77	29.7	-1.4
6	585.64	29.0 QP	46.0	-17.0	1.50 H	211	28.3	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
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

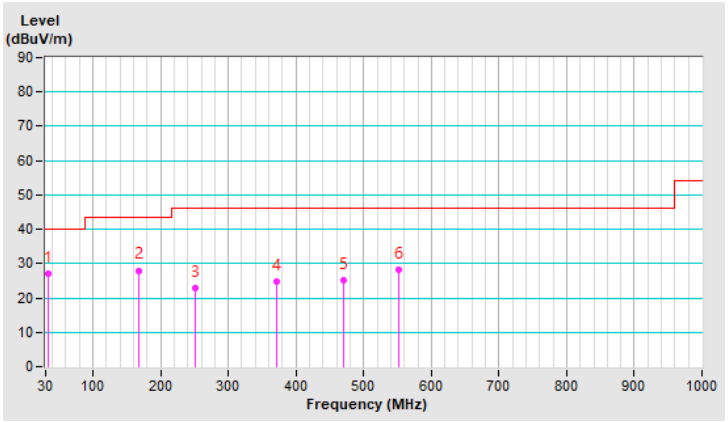


FREQUENCY RANGE	30MHz ~ 1GHz	DETECTOR FUNCTION	Quasi-Peak (QP)

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	34.56	27.0 QP	40.0	-13.0	1.20 V	244	37.2	-10.2
2	168.29	28.0 QP	43.5	-15.5	1.73 V	123	36.2	-8.2
3	250.23	23.0 QP	46.0	-23.0	2.07 V	97	31.0	-8.0
4	371.23	24.9 QP	46.0	-21.1	1.55 V	267	29.0	-4.1
5	470.75	25.2 QP	46.0	-20.8	1.40 V	111	27.0	-1.8
6	551.03	28.1 QP	46.0	-17.9	1.94 V	211	28.6	-0.5

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 of frequency range 30 MHz ~ 1 GHz.
5. The emission levels were very low against the limit of frequency range 9 kHz ~ 30 MHz: 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	ESR3	102412	2022/12/21	2023/12/20
LISN Schwarzbeck	NSLK 8128	8128-244	2022/11/8	2023/11/7
LISN Schwarzbeck	NNLK8129	8129229	2022/6/8	2023/6/7
DC LISN Schwarzbeck	NNLK 8121	8121-808	2022/4/29	2023/4/28
LISN Schwarzbeck	NNLK 8121	8121-731	2022/5/26	2023/5/25
LISN Schwarzbeck	NNLK 8121	8121-00759	2022/8/18	2023/8/17
LISN R&S	ENV216	101196	2022/5/24	2023/5/23
DC LISN R&S	ESH3-Z6	844950/018	2022/8/2	2023/8/1
DC LISN R&S	ESH3-Z6	100219	2022/8/2	2023/8/1
High Voltage Probe Schwarzbeck	TK9420	00982	2022/12/14	2023/12/13
RF Coaxial Cable Commate	5D-FB	Cable-CO5-01	2022/1/28	2023/1/27
Attenuator STI	STI02-2200-10	NO.4	2022/9/2	2023/9/1
50 Ohms Terminator LYNICS	0900510	E1-01-305	2022/2/9	2023/2/8
50 ohm terminal LYNICS	0900510	E1-011286	2022/9/19	2023/9/18
50 ohm terminal LYNICS	0900510	E1-011285	2022/9/19	2023/9/18
Isolation Transformer Erika Fiedler	D-65396	017	2022/9/8	2023/9/7

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 Linkou Conduction 5.
3 Tested Date: 2023/1/17

4.2.3 Test Procedures

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

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

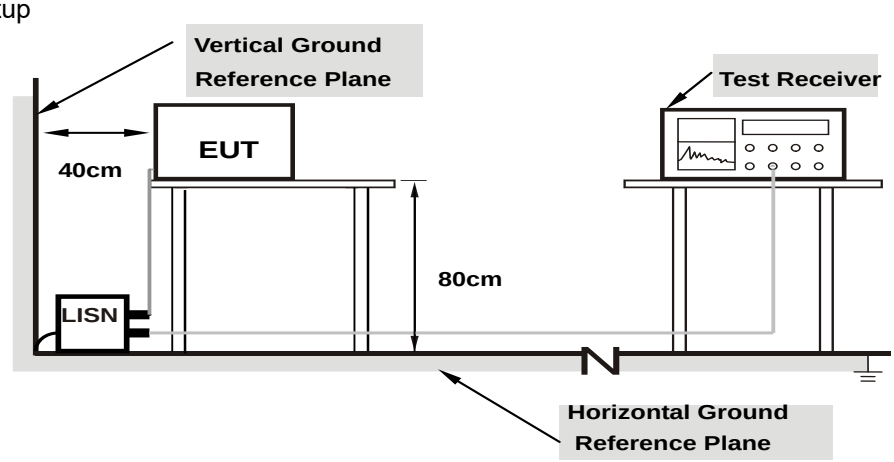
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

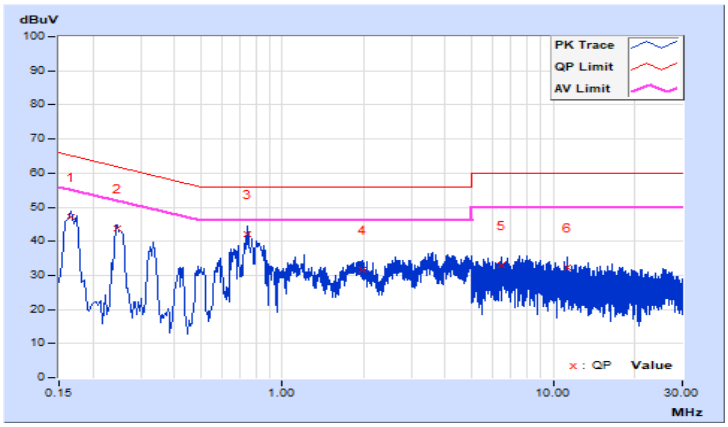
4.2.7 Test Results

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

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16613	9.95	37.23	19.23	47.18	29.18	65.15	55.15	-17.97	-25.97
2	0.24561	9.96	33.76	16.97	43.72	26.93	61.90	51.90	-18.18	-24.97
3	**0.74320**	**9.98**	**32.00**	**21.79**	**41.98**	**31.77**	**56.00**	**46.00**	**-14.02**	**-14.23**
4	1.97743	10.07	21.63	12.50	31.70	22.57	56.00	46.00	-24.30	-23.43
5	6.42647	10.37	22.61	15.30	32.98	25.67	60.00	50.00	-27.02	-24.33
6	11.22741	10.68	21.79	14.33	32.47	25.01	60.00	50.00	-27.53	-24.99

Remarks:

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

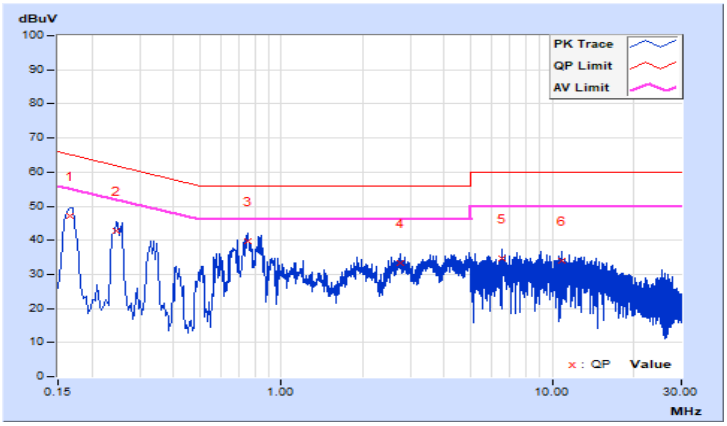


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16602	9.95	37.03	19.23	46.98	29.18	65.16	55.16	-18.18	-25.98
2	0.24623	9.96	32.80	13.32	42.76	23.28	61.88	51.88	-19.12	-28.60
3	0.75531	9.98	29.59	21.00	39.57	30.98	56.00	46.00	-16.43	-15.02
4	2.76300	10.11	23.23	16.23	33.34	26.34	56.00	46.00	-22.66	-19.66
5	6.55423	10.33	24.46	18.50	34.79	28.83	60.00	50.00	-25.21	-21.17
6	10.84320	10.57	23.56	16.23	34.13	26.80	60.00	50.00	-25.87	-23.20

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

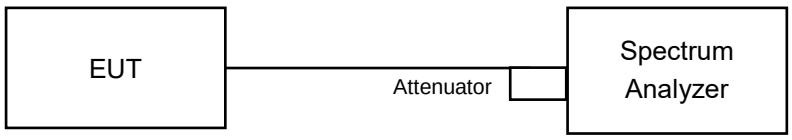


4.3 Conducted Out of Band Emission Measurement

4.3.1 Limits of Conducted Out of Band Emission Measurement

Below 20dB 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 ≥ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

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

4.3.5 Deviation from Test Standard

No deviation.

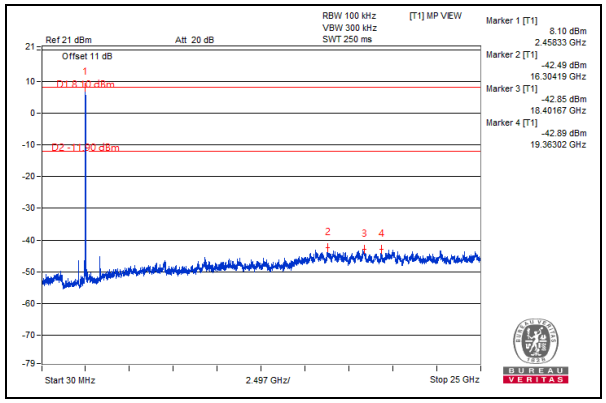
4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at specific 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 20dB offset below D1. It shows compliance with the requirement.

2.4GHz_802.11b CH11 + BT-EDR_CH78



5 Pictures of Test Arrangements

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

Appendix – Information of the Testing Laboratories

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

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

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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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