Supplemental “Transmit Simultaneously” Test Report

Report No.:	RFBAMQ-WTW-P24050205-5
FCC ID:	UXX-S5A435A
Test Model:	S5A435A
Received Date:	2024/5/9
Test Date:	2024/7/4 ~ 2024/7/5
Issued Date:	2024/7/29
Applicant:	Ericsson Enterprise Solutions, Inc.
Address:	1100 West Idaho Street ,Boise ,ID 83702 USA
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
RFBAMQ-WTW-P24050205-5	Original release.	2024/7/29

1 Certificate of Conformity

Product:	Ruggedized 5G Router
Brand:	Ericsson
Test Model:	S5A435A
Sample Status:	Engineering sample
Applicant:	Ericsson Enterprise Solutions, Inc.
Test Date:	2024/7/4 ~ 2024/7/5
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) 47 CFR FCC Part 15, Subpart E (Section 15.407) FCC 47 CFR Part 27, Subpart M FCC Part 2

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:** 2024/7/29

Claire Kuan / Specialist

Approved by : _____ , **Date:** 2024/7/29

May Chen / Manager

2 Summary of Test Results

FCC Part 15, Subpart C, E (SECTION 15.247, 15.407), Part 27			
FCC Clause	Test Item	Result	Remarks
15.205 / 15.209 / 15.247(d) 15.407(b) (1/2/3/4(i)/9/10)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -2.2 dB at 4874.00 MHz.
2.1053 27.53	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -18.6 dB at 53.28 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	Specification	Expanded Uncertainty (k=2) (±)
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	3.1 dB
	30 MHz ~ 1 GHz	5.4 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 18 GHz	5.1 dB
	18 GHz ~ 40 GHz	5.3 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Ruggedized 5G Router
Brand	Ericsson
Test Model	S5A435A
Status of EUT	Engineering sample
Power Supply Rating	12 Vdc or 24 Vdc
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in VHT mode 1024QAM for OFDMA in 11ax 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 300 Mbps VHT: up to 400 Mbps 802.11ac: up to 1733.3 Mbps 802.11ax: up to 2401.9 Mbps
Operating Frequency	**2.4GHz:** 2.412 GHz ~ 2.462 GHz **5GHz:** 5.18 GHz ~ 5.25 GHz, 5.26 GHz ~ 5.32 GHz, 5.5 GHz ~ 5.72 GHz, 5.745 GHz ~ 5.825 GHz
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Refer to Note
Data Cable Supplied	NA

Note:

1. The EUT uses following accessories.

Item	Brand	Sku	length
DC cable 4PIN	Cradlepoint	170864-000	3m

2. The EUT has below radios as following table:

Radio 1	Radio 2	Radio 3
WLAN (2.4GHz + 5GHz)	WWAN (5G nR + LTE + WCDMA)	GPS

3. The EUT contains certified WWAN module which FCC ID: RI7FN990A28HP.

4. Simultaneously transmission condition.

Condition	Technology
1	Wi-Fi 2.4GHz + Wi-Fi 5GHz + WWAN (5G nR or LTE or 3G)
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.	

5. The antenna information is listed as below.

For WLAN							
Ant Set.	RF Chain No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range (GHz)	Antenna Type	Connector Type
1	Chain 0 Chain 1	CRADLEPOINT, INC.	CP01	5.74	2.4~2.4835	Monopole	R-SMA
				4.40	5.15~5.25		
				4.63	5.25~5.35		
				5.60	5.47~5.725		
				5.19	5.725~5.85		
2	Chain 0 Chain 1	CRADLEPOINT, INC.	170836-000	2.47	2.4~2.4835	Dipole	R-SMA
				2.18	5.15~5.25		
				2.19	5.25~5.35		
				2.14	5.47~5.725		
				2.47	5.725~5.85		
3	Chain 0 (MIMO 1)	TAOGLAS	MA530.A.CG.003	2.60	2.4~2.4835	Monopole	R-SMA
	Chain 1 (MIMO 2)			0.00	5.15~5.85		
				1.80	2.4~2.4835		
				0.50	5.15~5.85		

For WWAN							
Ant Set.	RF Chain No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range (GHz)	Antenna Type	Connector Type
1	Chain 0	TAOGLAS	MA1504_AK_001	-2.70	6.17~6.98	Monopole	SMA
				-2.00	6.98~8.24		
				-0.10	8.24~9.6		
				1.50	1.427~1.518		
				2.70	1.71~1.88		
				2.50	1.85~1.99		
				3.30	1.92~2.17		
				4.50	2.3~2.69		
				1.30	3.3~5		
				2.30	5.15-5.925		
	Chain 1	TAOGLAS	MA1504_AK_001	-4.00	6.17~6.98	Monopole	SMA
				-1.60	6.98~8.24		
				1.20	8.24~9.60		
				2.10	1.427~1.518		
				2.40	1.71~1.88		
				2.90	1.85~1.99		
				1.60	1.92~2.17		
				1.50	2.3~2.69		
				1.00	3.3~5		
				2.00	5.15-5.925		
	Chain 2	TAOGLAS	MA1504_AK_001	-3.80	6.17~6.98	Monopole	SMA
				-3.50	6.98~8.24		
				-0.60	8.24~9.6		
				2.30	1.427~1.518		
				2.30	1.71~1.88		
				1.70	1.85~1.99		
				2.70	1.92~2.17		
				4.10	2.3~2.69		
				1.60	3.3~5		
				2.30	5.15~5.925		
	Chain 3	TAOGLAS	MA1504_AK_001	-3.60	6.17~6.98	Monopole	SMA
				-2.30	6.98~8.24		
				1.80	8.24~9.6		
				1.10	1.427~1.518		
				2.60	1.71~1.88		
				2.90	1.85~1.99		
				2.10	1.92~2.17		
				1.80	2.3~2.69		
				-0.20	3.3~5		
				2.40	5.15~5.925		

For WWAN							
Ant Set.	RF Chain No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range (GHz)	Antenna Type	Connector Type
2	Chain 0 Chain 1 Chain 2 Chain 3	CRADLEPOINT, INC.	170801-000	1.42	6.19~7.9	Dipole	SMA
				0.88	1.445~1.515		
				2.69	1.71~2.7		
				4.13	3.4~3.7		
				4.29	5.15~5.925		
For GPS							
1	GPS	Taoglas	AA.162	30	1.562~1.612	Dipole	SMA

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

6. The EUT incorporates a MIMO function:

2.4 GHz Band		
Modulation Mode	**TX & RX Configuration**	
802.11b	2TX	2RX
802.11g	2TX	2RX
802.11n (HT20)	2TX	2RX
802.11n (HT40)	2TX	2RX
VHT20	2TX	2RX
VHT40	2TX	2RX
802.11ax (HE20)	2TX	2RX
802.11ax (HE40)	2TX	2RX

5 GHz Band		
Modulation Mode	**TX & RX Configuration**	
802.11a	2TX	2RX
802.11n (HT20)	2TX	2RX
802.11n (HT40)	2TX	2RX
802.11ac (VHT20)	2TX	2RX
802.11ac (VHT40)	2TX	2RX
802.11ac (VHT80)	2TX	2RX
802.11ax (HE20)	2TX	2RX
802.11ax (HE40)	2TX	2RX
802.11ax (HE80)	2TX	2RX

7. Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.
8. 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≥1G	RE<1G	OB	
1	√	√	√	WLAN Antenna model: CP01 WWAN Antenna model: MA1504_AK_001
2	√	√	-	WLAN Antenna model: 170836-000 WWAN Antenna model: MA1504_AK_001

Where **RE≥1G:** Radiated Emission above 1GHz & Bandedge Measurement **RE<1G:** Radiated Emission below 1GHz
OB: Conducted Out-Band Emission Measurement

Note: 1. Power Supply Worst Condition: Adapter (WA-36N12R)
2. X-axis/ Y-axis/ Z-axis Worst Condition:
Mode 1: WLAN Monopole Antenna ->Y-Axis & WWAN Monopole Antenna ->X-Axis;
Mode 2: EUT->X-Axis
For WWAN test result only test under EUT Configure Mode 1.

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
802.11g + 802.11a + WWAN (5G nR n41)	1 to 11	6	OFDM	BPSK
	36 to 48 52 to 64 100 to 144 149 to 165	149	OFDM	BPSK
	499200 to 537999	518598	-	-

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
802.11g + 802.11a + WWAN (5G nR n41)	1 to 11	6	OFDM	BPSK
	36 to 48 52 to 64 100 to 144 149 to 165	149	OFDM	BPSK
	499200 to 537999	518598	-	-

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
802.11g + 802.11a	1 to 11	6	OFDM	BPSK
	36 to 48 52 to 64 100 to 144 149 to 165	149	OFDM	BPSK

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested By
RE≥1G	22.7deg. C, 68.7%RH 23.0deg. C, 72.0%RH	120Vac, 60Hz	Weiwei Lo
RE<1G	24.1deg. C, 70.8%RH 24.0deg. C, 73.0%RH	120Vac, 60Hz	Weiwei Lo
OB	22.7deg. C, 68.7%RH	120Vac, 60Hz	Weiwei Lo

3.2 Description of Support Units

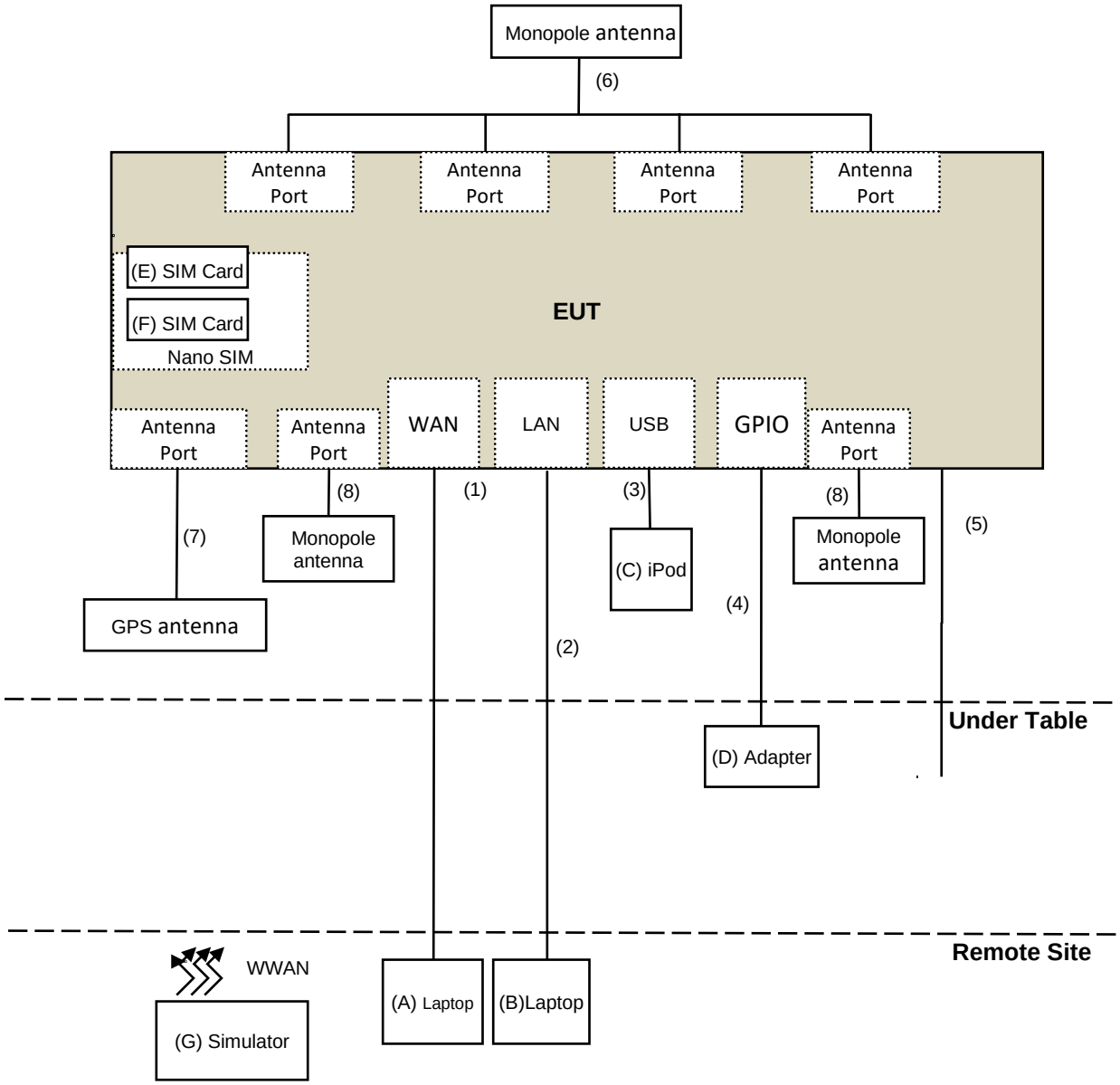
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Laptop	Lenovo	20U5S01X00 L14	PF-28LKK7	N/A	Provided by Lab
B	Laptop	Lenovo	20U5S01X00 L14	PF-1ANPYA	N/A	Provided by Lab
C	iPod	Apple	MC749TA/A	CC4DMFKUDFDM	N/A	Provided by Lab
D	AC Adapter	ADP	WA-36N12R	N/A	N/A	Supplied by applicant
E	SIM Card	Keysight	N/A	N/A	N/A	Provided by Lab
F	SIM Card	Keysight	N/A	N/A	N/A	Provided by Lab
G	LTE Wireless Communication Test Set	Keysight	E7515A	MY55340229	NA	Provided by Lab

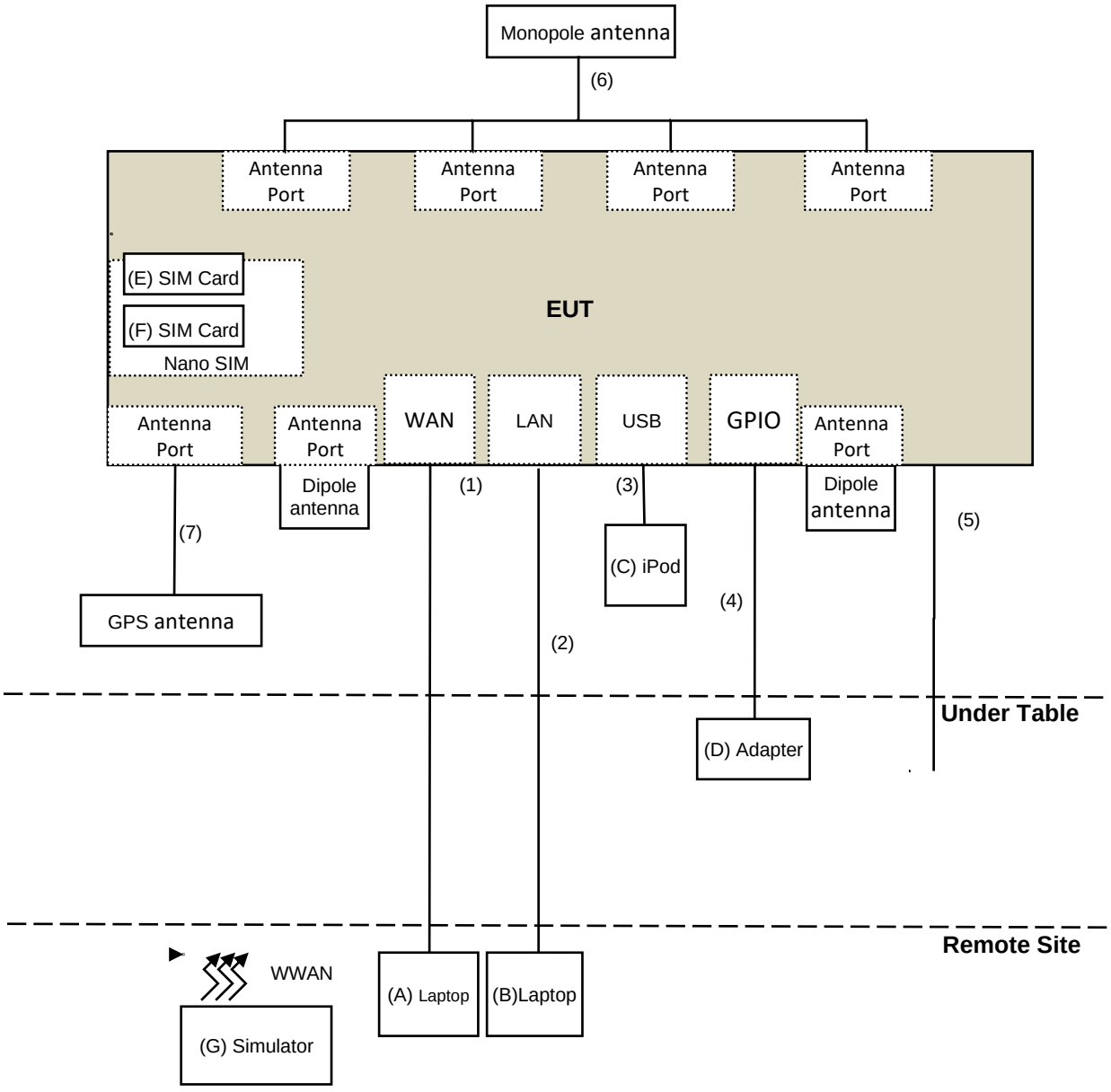
ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	RJ-45 Cable	1	10	No	0	Provided by Lab
2	RJ-45 Cable	1	10	No	0	Provided by Lab
3	USB Cable	1	0.1	YES	0	Provided by Lab
4	DC Cable	1	1.5	No	0	Supplied by applicant
5	GND Cable	1	1.5	No	0	Provided by Lab
7	RF Cable	1	2.8	YES	0	Supplied by applicant
8	RF Cable	2	1.8	YES	0	Supplied by applicant

3.2.1 Configuration of System under Test

Mode A



Mode B :


Monopole antenna
(6)
Antenna Port
Antenna Port
Antenna Port
Antenna Port
(E) SIM Card
(F) SIM Card
Nano SIM
EUT
Antenna Port
Antenna Port
WAN
LAN
USB
GPIO
Antenna Port
Dipole antenna
Dipole antenna
(1)
(2)
(3)
(4)
(5)
(7)
(C) iPod
GPS antenna
Under Table
(D) Adapter
Remote Site
WWAN
(A) Laptop
(B)Laptop
(G) Simulator

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

For 47 CFR FCC Part 15:
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).

For 47 CFR FCC Part 27:

According to FCC 47 CFR part 27.53(m)(4), on any frequency outside a licensee's frequency block, The power of any emission shall be attenuated below the transmitter power (P) by at least 55 + 10 log (P) dB. The emission limit equal to –25 dBm.

4.1.2 Test Instruments

Radiated Emission (Below 1GHz):

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
MXE EMI Receiver Keysight	N9038A	MY59050100	2024/6/19	2025/6/18
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Fix tool for Boresight antenna tower BV	FBA-01	FBA_SIP01	NA	NA
Preamplifier EMCI	EMC001340	980142	2024/2/19	2025/2/18
Loop Antenna Electro-Metrics	EM-6879	264	2024/2/23	2025/2/22
RF Coaxial Cable JYEBAO	5D-FB	LOOPCAB-001	2023/12/12	2024/12/11
RF Coaxial Cable JYEBAO	5D-FB	LOOPCAB-002	2024/2/19	2025/2/18
Preamplifier EMCI	EMC330N	980852	2024/2/17	2025/2/16
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-361	2023/10/13	2024/10/12
RF Coaxial Cable PEWC	8D	001	2024/2/16	2025/2/15
RF Coaxial Cable PEWC	8D	966-3-2	2024/2/16	2025/2/15
RF Coaxial Cable PEWC	8D	966-3-3	2024/2/16	2025/2/15
Fixed Attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	2023/9/7	2024/9/6

Notes:

1. The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 3.
3. Tested Date: 2024/7/4 ~ 2024/7/5

Radiated Emission (Above 1GHz):

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
PXA Signal Analyzer Keysight	N9030B	MY57142938	2024/3/20	2025/3/19
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Fix tool for Boresight antenna tower BV	FBA-01	FBA_SIP01	NA	NA
Horn Antenna Schwarzbeck	BBHA 9120D	9120D-406	2023/11/12	2024/11/11
Preamplifier EMCI	EMC12630SE	980384	2023/8/9	2024/8/8
RF Coaxial Cable EMCI	EMC104-SM-SM-1500	180504	2024/1/29	2025/1/28
RF Coaxial Cable EMCI	EMC104-SM-SM-2000	180601	2024/1/29	2025/1/28
RF Coaxial Cable EMCI	EMC104-SM-SM-6000	210201	2024/1/29	2025/1/28
PXA Signal Analyzer Keysight	N9030B	MY57142938	2024/3/20	2025/3/19
Preamplifier EMCI	EMC184045SE	980387	2023/8/9	2024/8/8
Horn Antenna Schwarzbeck	BBHA 9170	9170-739	2023/11/12	2024/11/11
RF Coaxial Cable EMCI	EMC102-KM-KM-1200	160924	2024/1/29	2025/1/28
RF Coaxial Cable EMCI	EMC102-KM-KM-4000	200214	2024/1/29	2025/1/28

Notes:

1. The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 4.
3. Tested Date: 2024/7/4 ~ 2024/7/5

For other test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
RF Power Meter Anritsu	ML2495A	1529002	2024/6/7	2025/6/6
Pulse Power Sensor Anritsu	MA2411B	1726434	2024/6/7	2025/6/6

Notes:

1. The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Oven room 2.
3. Tested Date: 2024/7/4 ~ 2024/7/5

4.1.3 Test Procedures

For FCC Part 15:

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 ≥ 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.

For FCC Part 27:

a. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) / 1.5 m (above 1GHz) height of turn table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

b. 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.

c. Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP level.

d. Following ANSI C63.26 section 5.5 and 5.2.7

e. EIRP (dBm) = E (dBμV/m) + 20log(D) - 104.8; where D is the measurement distance (in the far field region) in m.

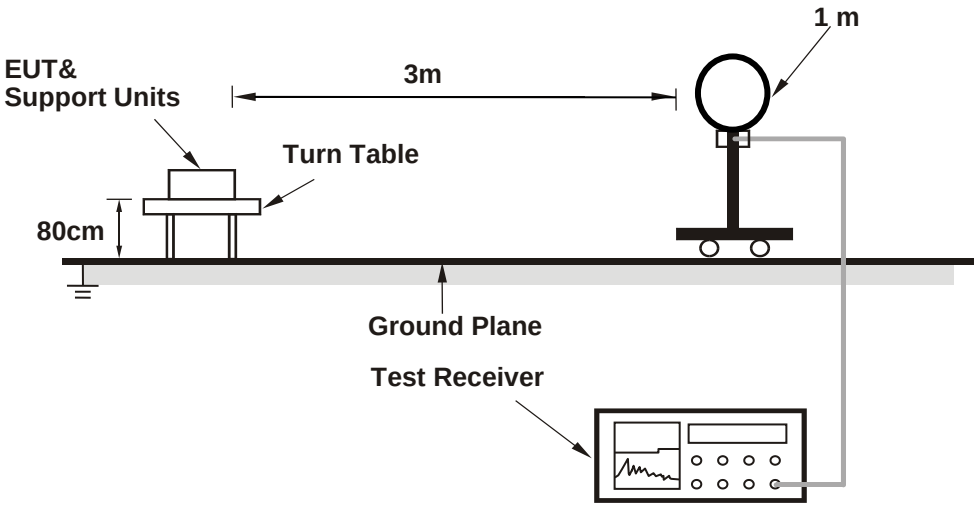
Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz. Set detector = average.

4.1.4 Deviation from Test Standard

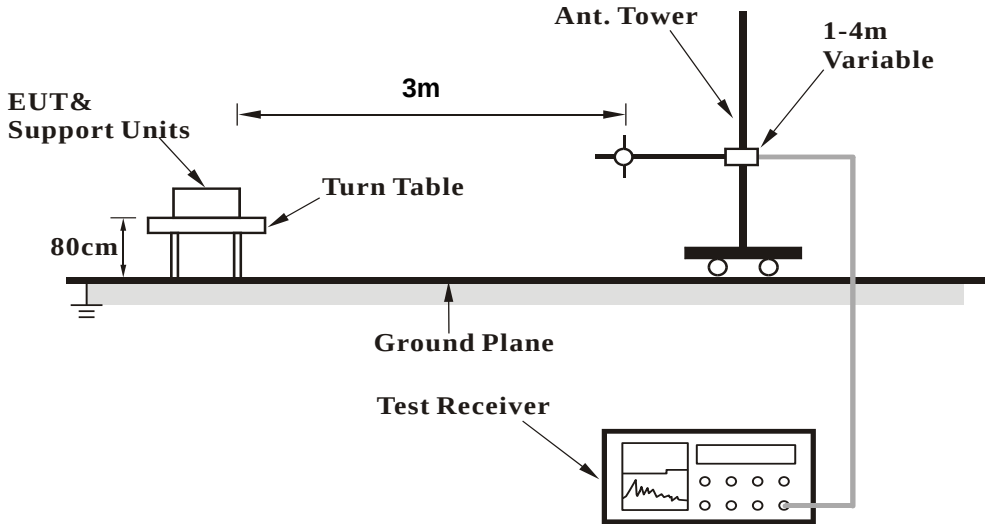
No deviation.

4.1.5 Test Setup

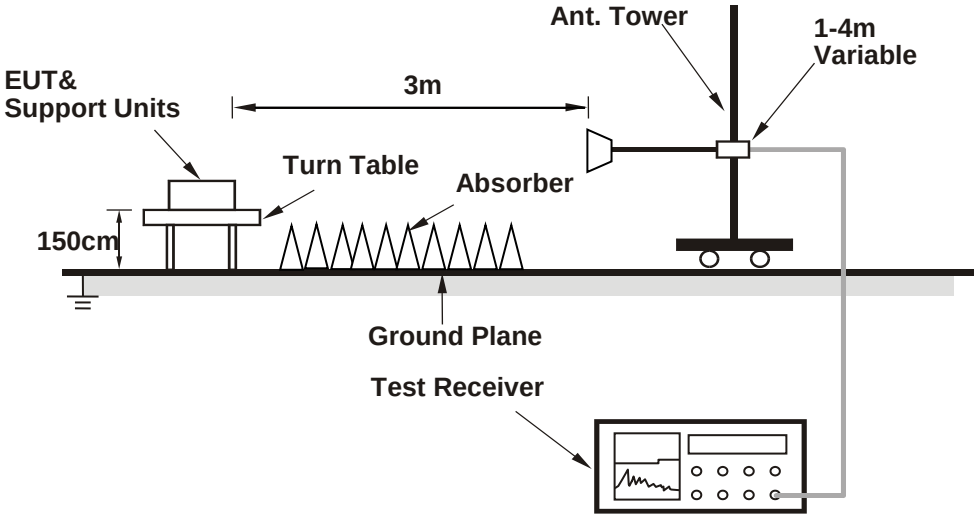
For Radiated emission below 30MHz



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. Placed the EUT on the testing table.
b. Controlling software (qdart_conn.win.1.0_installer_00089.1) has been activated to set the EUT under transmission condition continuously at specific channel frequency using WLAN technology.
c. The EUT is configured by emulator to set data modulation and maximum power using WWAN technology.

4.1.7 Test Results (Mode 1)

Above 1GHz Data:

Frequency Range	1 GHz ~ 40 GHz	**Detector Function & Bandwidth**	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	4874.00	52.7 PK	74.0	-21.3	1.32 H	145	50.8	1.9
2	4874.00	51.6 AV	54.0	-2.4	1.32 H	145	49.7	1.9
3	7311.00	48.2 PK	74.0	-25.8	1.38 H	166	40.6	7.6
4	7311.00	39.7 AV	54.0	-14.3	1.38 H	166	32.1	7.6
5	11490.00	49.4 PK	74.0	-24.6	1.47 H	39	37.0	12.4
6	11490.00	36.0 AV	54.0	-18.0	1.47 H	39	23.6	12.4
7	#17235.00	52.9 PK	68.2	-15.3	1.00 H	210	35.7	17.2
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	4874.00	51.4 PK	74.0	-22.6	1.35 V	109	49.5	1.9
2	4874.00	50.6 AV	54.0	-3.4	1.35 V	109	48.7	1.9
3	7311.00	48.9 PK	74.0	-25.1	1.15 V	165	41.3	7.6
4	7311.00	43.3 AV	54.0	-10.7	1.15 V	165	35.7	7.6
5	11490.00	48.9 PK	74.0	-25.1	1.53 V	28	36.5	12.4
6	11490.00	35.5 AV	54.0	-18.5	1.53 V	28	23.1	12.4
7	#17235.00	53.0 PK	68.2	-15.2	1.00 V	205	35.8	17.2

Mode	TX channel 518598	Frequency Range	Above 1GHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**EIRP (dBm)**	**Limit (dBm)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	5185.98	-51.1	-25.0	-26.1	2.00 H	325	-53.9	2.8
Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**EIRP (dBm)**	**Limit (dBm)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	5185.98	-52.2	-25.0	-27.2	1.45 V	122	-55.0	2.8

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

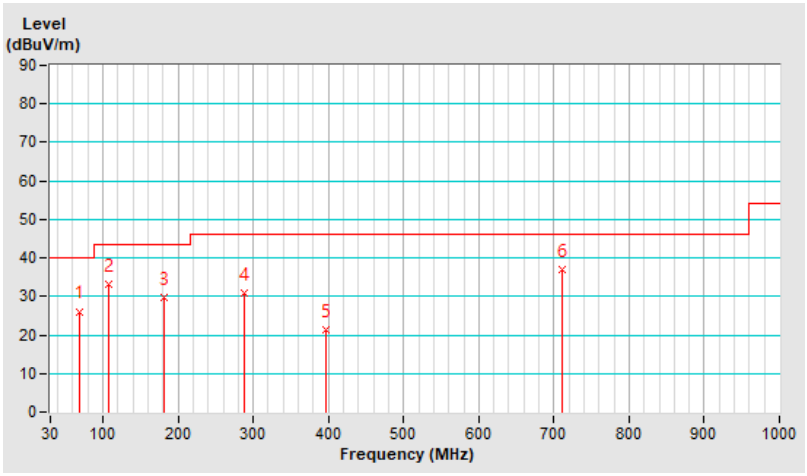
Below 1GHz Data:

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak

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	68.50	26.1 QP	40.0	-13.9	1.50 H	274	45.9	-19.8
2	107.30	33.1 QP	43.5	-10.4	3.00 H	255	53.7	-20.6
3	181.00	29.7 QP	43.5	-13.8	1.50 H	229	49.0	-19.3
4	287.60	30.7 QP	46.0	-15.3	1.50 H	234	47.9	-17.2
5	397.00	21.5 QP	46.0	-24.5	3.00 H	280	35.9	-14.4
6	710.20	36.9 QP	46.0	-9.1	1.50 H	33	44.3	-7.4

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 other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

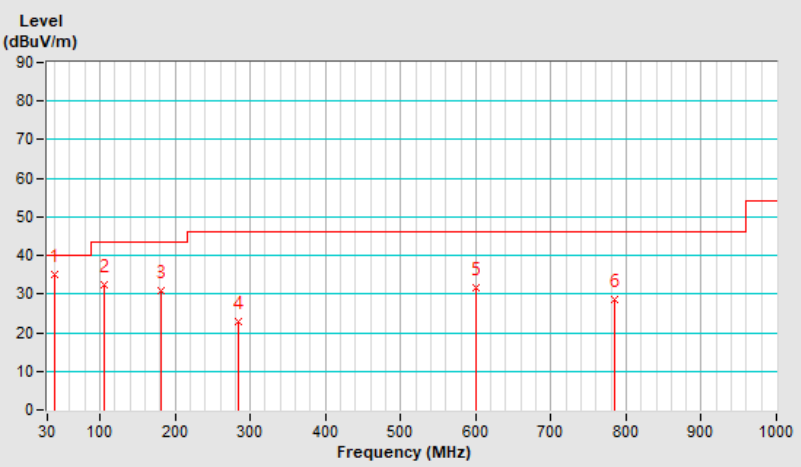


Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak

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	39.90	35.0 QP	40.0	-5.0	3.00 V	360	53.1	-18.1
2	105.10	32.4 QP	43.5	-11.1	3.50 V	262	53.4	-21.0
3	181.50	30.9 QP	43.5	-12.6	1.00 V	320	50.2	-19.3
4	284.90	23.0 QP	46.0	-23.0	1.50 V	154	40.2	-17.2
5	600.10	31.6 QP	46.0	-14.4	1.00 V	51	41.0	-9.4
6	784.80	28.5 QP	46.0	-17.5	2.00 V	4	34.7	-6.2

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 frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.



Mode	TX channel 518598	Frequency Range	Below 1GHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**EIRP (dBm)**	**Limit (dBm)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	78.50	-50.0	-25.0	-25.0	1.00 H	252	-32.9	-17.1
2	148.34	-55.9	-25.0	-30.9	1.00 H	215	-43.4	-12.5
3	373.38	-44.5	-25.0	-19.5	1.50 H	215	-34.8	-9.6
4	534.40	-61.0	-25.0	-36.0	1.50 H	211	-54.9	-6.1
5	640.13	-54.5	-25.0	-29.5	1.00 H	12	-51.1	-3.4
6	911.73	-52.0	-25.0	-27.0	1.00 H	36	-52.7	0.7
Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**EIRP (dBm)**	**Limit (dBm)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	**53.28**	**-43.6**	**-25.0**	**-18.6**	**1.50 V**	**211**	**-30.9**	**-12.7**
2	222.05	-60.1	-25.0	-35.1	1.50 V	325	-44.4	-15.7
3	373.38	-46.7	-25.0	-21.7	1.00 V	125	-37.0	-9.6
4	560.59	-60.9	-25.0	-35.9	1.00 V	215	-55.4	-5.6
5	639.16	-51.9	-25.0	-26.9	2.00 V	123	-48.5	-3.4
6	867.20	-55.3	-25.0	-30.3	1.00 V	32	-55.3	0.0

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.

4.1.8 Test Results (Mode 2)

Above 1GHz Data:

Frequency Range	1 GHz ~ 40 GHz	**Detector Function & Bandwidth**	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	4874.00	52.6 QP	74.0	-21.4	1.29 H	138	50.7	1.9
2	**4874.00**	**51.8 QP**	**54.0**	**-2.2**	**1.29 H**	**138**	**49.9**	**1.9**
3	7311.00	48.0 QP	74.0	-26.0	1.44 H	150	40.4	7.6
4	7311.00	39.3 QP	54.0	-14.7	1.44 H	150	31.7	7.6
5	11490.00	49.6 QP	74.0	-24.4	1.41 H	49	37.2	12.4
6	11490.00	35.9 QP	54.0	-18.1	1.41 H	49	23.5	12.4
7	17235.00	53.0 QP	68.2	-15.2	1.01 H	202	35.8	17.2
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	4874.00	50.9 QP	74.0	-23.1	1.40 V	100	49.0	1.9
2	4874.00	50.3 QP	54.0	-3.7	1.40 V	100	48.4	1.9
3	7311.00	49.1 QP	74.0	-24.9	1.12 V	176	41.5	7.6
4	7311.00	43.6 QP	54.0	-10.4	1.12 V	176	36.0	7.6
5	11490.00	49.2 QP	74.0	-24.8	1.44 V	40	36.8	12.4
6	11490.00	35.8 QP	54.0	-18.2	1.44 V	40	23.4	12.4
7	17235.00	52.8 QP	68.2	-15.4	1.08 V	191	35.6	17.2

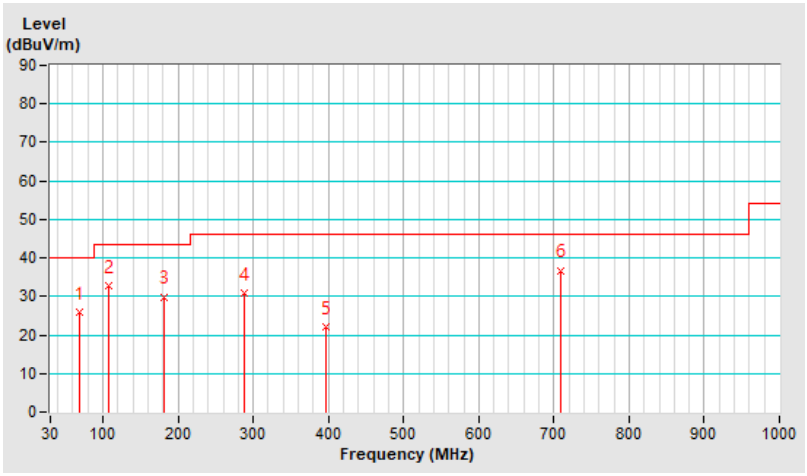
Below 1GHz Data:

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak

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	68.22	25.9 QP	40.0	-14.1	3.00 H	259	45.6	-19.7
2	106.98	32.8 QP	43.5	-10.7	2.50 H	253	53.5	-20.7
3	181.08	29.9 QP	43.5	-13.6	1.50 H	238	49.2	-19.3
4	287.90	30.8 QP	46.0	-15.2	1.00 H	244	47.9	-17.1
5	397.29	22.0 QP	46.0	-24.0	2.50 H	288	36.4	-14.4
6	709.88	36.8 QP	46.0	-9.2	1.50 H	22	44.3	-7.5

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 frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

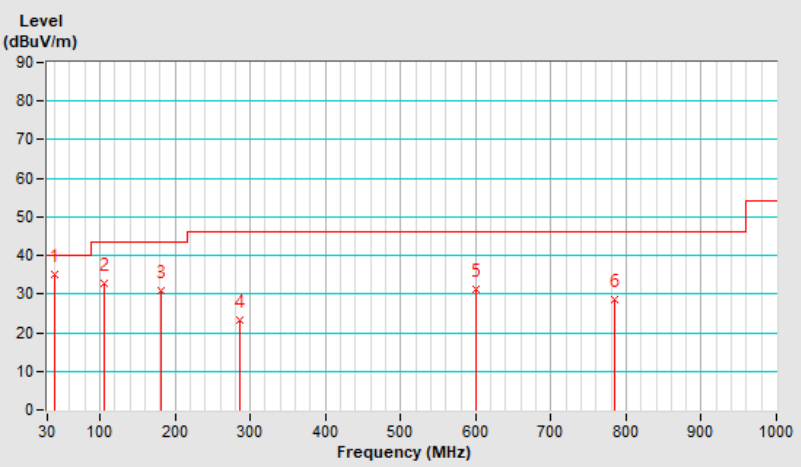


Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak

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	40.10	35.0 QP	40.0	-5.0	1.50 V	360	53.1	-18.1
2	105.30	32.9 QP	43.5	-10.6	1.50 V	251	53.9	-21.0
3	181.50	30.8 QP	43.5	-12.7	2.50 V	306	50.1	-19.3
4	285.20	23.1 QP	46.0	-22.9	4.00 V	157	40.3	-17.2
5	599.90	31.3 QP	46.0	-14.7	3.50 V	36	40.8	-9.5
6	784.90	28.7 QP	46.0	-17.3	1.50 V	13	34.9	-6.2

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 frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

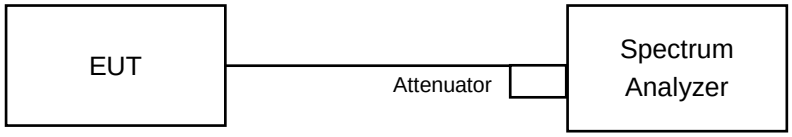


4.2 Conducted Out of Band Emission Measurement

4.2.1 Limits of Conducted Out of Band Emission Measurement

Below 20 dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

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 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.

4.2.5 Deviation from Test Standard

No deviation.

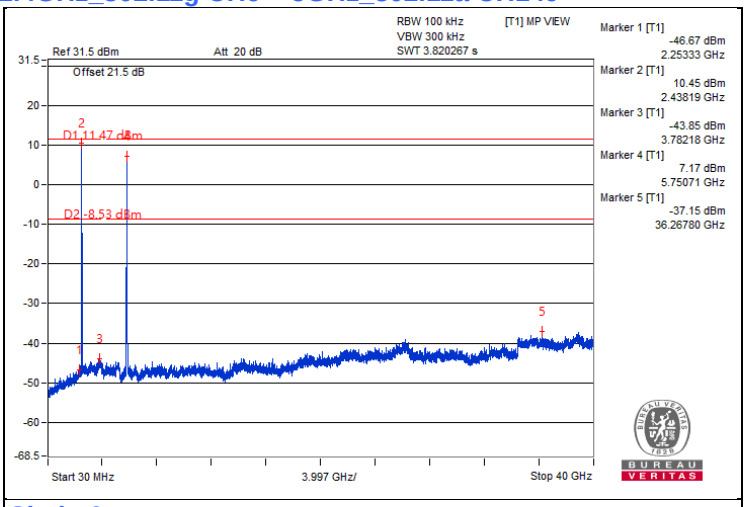
4.2.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

4.2.7 Test Results

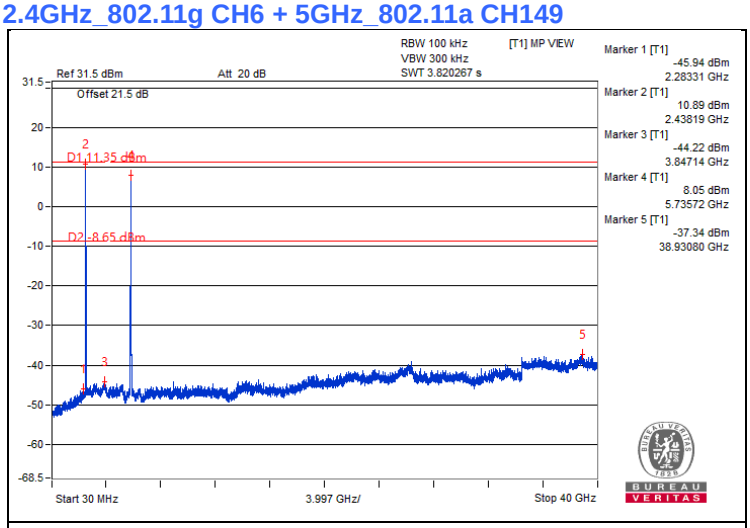
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

2.4GHz_802.11g CH6 + 5GHz_802.11a CH149



Chain 0

2.4GHz_802.11g CH6 + 5GHz_802.11a CH149



Chain 1

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:

Lin Kou 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@bureauveritas.com
Web Site: http://ee.bureauveritas.com.tw

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

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