Canada Test Report

Report No.:	ICAAGC-WTW-P23110065
IC:	28904-NOTE32WL
Test Model:	NOTE-LWUS
Received Date:	Nov. 02, 2023
Test Date:	Dec. 01 ~ Dec. 20, 2023
Issued Date:	Oct. 29, 2024
Applicant:	Blues Inc.
Address:	50 Harbor St Manchester, MA, 01944-1425 United States.
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 (1):	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN
ISED# / CAB Identifier:	7450F / TW2021
Test Location (2):	No. 70, Wenming Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)
ISED# / CAB Identifier:	27127 / TW2021

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Release Control Record

Issue No.	Description	Date Issued
ICAAGC-WTW-P23110065	Original release	Oct. 29, 2024

1 Certificate of Conformity

Product:	Notecard
Brand:	Blues Inc.
Test Model:	NOTE-LWUS
Sample Status:	Engineering sample
Applicant:	Blues Inc.
Test Date:	Dec. 01 ~ Dec. 20, 2023
Standards:	Canada RSS-210 Issue 10, December 2019 Canada RSS-Gen Issue 5, Amendment 2, February 2021 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 : Polly Chien / Specialist , **Date:** Oct. 29, 2024

Approved by : Jeremy Lin / Project Engineer , **Date:** Oct. 29, 2024

2 Summary of Test Results

Applied Standard: RSS-210; RSS-Gen			
Standard Section	Test Item	Result	Remarks
RSS-Gen 8.8	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -12.20dB at 0.48984MHz.
RSS-Gen 6.7 & RSS-210 A1.3	Occupied Bandwidth Measurement	Pass	Meet the requirement of limit.
RSS-210 B.10	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.2dB at 908.70MHz.

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	2.79 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.00 dB
	30MHz ~ 200MHz	2.91 dB
	200MHz ~1000MHz	2.92 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	1.76 dB
	18GHz ~ 40GHz	1.77 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product (PMN)	Notecard
Brand	Blues Inc.
Model Name (HVIN)	NOTE-LWUS
Test Software Version	Tera Term Version 4.79
FW Version (FVIN)	1.4
Sample Status	Engineering sample
Power Supply Rating	3.3Vdc 5Vdc (from host equipment)
Modulation Technology	Chirp spread- spectrum (CSS)
Frequency Rang	902.3~914.9MHz
Operating Frequency	(BW125kHz): 902.3~914.9MHz
Number of Channel	64
Channel Spacing	0.2MHz
Field Strength	93.8dBuV/m (3m)
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	NA
Cable Supplied	NA

Note:

1. The EUT uses following antenna.

Antenna Type	Brand	Model	Connector	Gain(dBi)
Flexible adhesive	Molex	211140-0100	u.fl	1.0

*Only radiated measurements are used to show compliance with FCC limits for fundamental and spurious emissions.

3.2 Description of Test Modes

64 channels are provided for EUT (125kHz Bandwidth):

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	902.3	16	905.5	32	908.7	48	911.9
1	902.5	17	905.7	33	908.9	49	912.1
2	902.7	18	905.9	34	909.1	50	912.3
3	902.9	19	906.1	35	909.3	51	912.5
4	903.1	20	906.3	36	909.5	52	912.7
5	903.3	21	906.5	37	909.7	53	912.9
6	903.5	22	906.7	38	909.9	54	913.1
7	903.7	23	906.9	39	910.1	55	913.3
8	903.9	24	907.1	40	910.3	56	913.5
9	904.1	25	907.3	41	910.5	57	913.7
10	904.3	26	907.5	42	910.7	58	913.9
11	904.5	27	907.7	43	910.9	59	914.1
12	904.7	28	907.9	44	911.1	60	914.3
13	904.9	29	908.1	45	911.3	61	914.5
14	905.1	30	908.3	46	911.5	62	914.7
15	905.3	31	908.5	47	911.7	63	914.9

3.2.1 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 & Bandedge Measurement **RE<1G:** Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **OB:** Occupied Bandwidth

Note:
1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.
2. Power line conducted emission test items chosen the worst case.

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	Available Channel	Tested Channel	Modulation Technology
-	0 to 63	0, 32, 63	CCS

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	Available Channel	Tested Channel	Modulation Technology
-	0 to 63	0, 32, 63	CCS

Power Line Conducted Emission Test:

☒ 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	Available Channel	Operating Frequency	Modulation Technology
-	0 to 63	63	CCS

Occupied Bandwidth Test:

☒ 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.

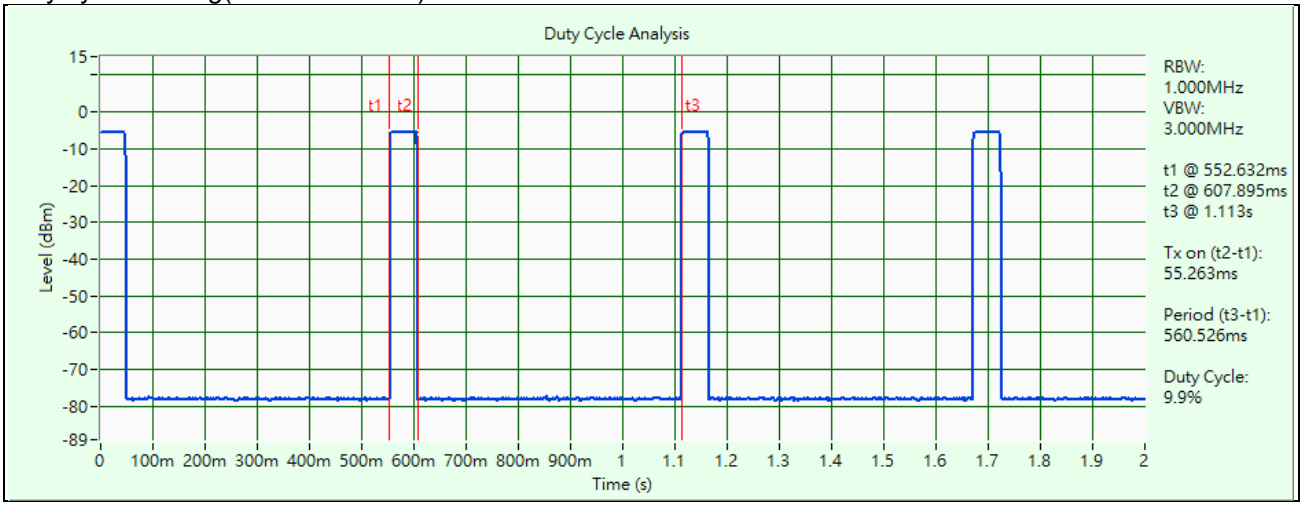
EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology
-	0 to 63	0, 32, 63	CCS

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested By
RE≥1G	23 deg. C, 68% RH	120Vac, 60Hz	Wade Huang
RE<1G	23 deg. C, 67% RH	120Vac, 60Hz	Wade Huang
PLC	25 deg. C, 75% RH	120Vac, 60Hz	Wade Huang
OB	25 deg. C, 75% RH	120Vac, 60Hz	Wade Huang

3.1 Duty Cycle of Test Signal

Duty cycle = 20log(55.263/560.526)= -20.1dB



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.

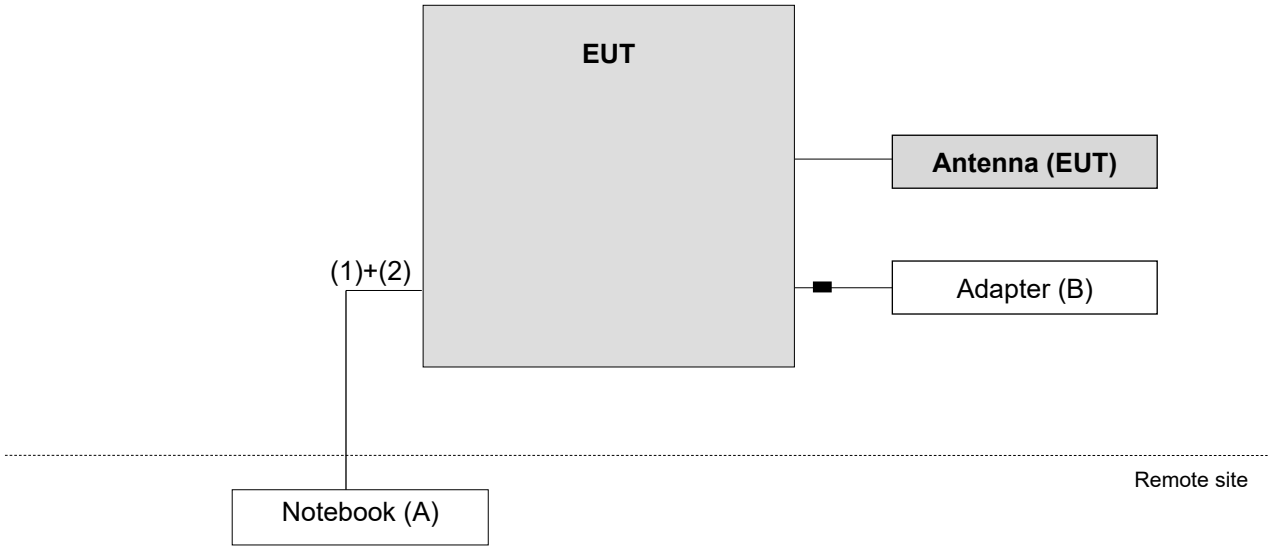
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	HP	15-0003TU	6MU74PA#ABO	FCC DoC Approved	Provided by Lab
B.	Adapter	PHIHONG	PSAA05K-050	NA	NA	Supplied by applicant

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	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	1.1	N	0	Supplied by applicant
2.	USB cable extender	1	2	N	0	Provided by Lab

3.2.1 Configuration of System under Test



3.3 General Description of Applied Standards

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

Canada RSS-210 Issue 10, December 2019

Canada RSS-Gen Issue 5, Amendment 2, February 2021

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

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 ~ 928 MHz	50	500
2400 ~ 2483.5 MHz	50	500
5725 ~ 5875 MHz	50	500
24 ~ 24.25 GHz	250	2500

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits as below table, whichever is the lesser attenuation

Frequencies (MHz)	Magnetic field strength (H-Field) (μA/m)	Measurement distance (meters)
0.009 ~ 0.490	6.37/F (F in kHz)	300
0.490 ~ 1.705	63.7/F (F in kHz)	30
1.705 ~ 30.0	0.08	30
Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
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.
4. The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038B	MY60180018	Feb. 07, 2022	Feb. 06, 2024
BILOG Antenna SCHWARZBECK	VULB9168	9168-995	Oct. 20, 2022	Oct. 19, 2023
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-404	Nov. 12, 2023	Nov. 11, 2024
Loop Antenna EMCI	HLA 6121	45745	Aug. 08, 2023	Aug. 07, 2024
Preamplifier EMCI	EMC330N	980783	Jan. 16, 2023	Jan. 15, 2024
Preamplifier EMCI	EMC330N	980783	Jan. 16, 2023	Jan. 15, 2024
Preamplifier EMCI	EMC118A45SE	980810	Dec. 29, 2022	Dec. 28, 2023
Preamplifier EMCI	EMC184045SE	980787	Jan. 16, 2023	Jan. 15, 2024
RF signal cable EMCI	EMC104-SM-SM-(9000+2000+1000)	201230+ 201242+ 210101	Jan. 16, 2023	Jan. 15, 2024
RF signal cable EMCI	EMCCFD400-NM-NM-(9000+300+500)	201252+ 201250+ 201245	Jan. 16, 2023	Jan. 15, 2024
RF signal cable EMCI	EMC101G-KM-KM-(5000+3000+2000)	201261+201258+ 201249	Jan. 16, 2023	Jan. 15, 2024
Software BV CPS	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Turn Table Max-Full	MFT-151SS-0.5T	NA	NA	NA
Turn Table Controller Max-Full	MF-7802BS	MF780208675	NA	NA
Antenna Tower KaiTuo	NA	NA	NA	NA
Antenna Tower Controller KaiTuo	KT-2000	NA	NA	NA
Peak Power Analyzer KEYSIGHT	8990B	MY51000485	Jan. 19, 2023	Jan. 18, 2024
Wideband Power Sensor KEYSIGHT	N1923A	MY58020002	Jan. 18, 2023	Jan. 17, 2024

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 WM Chamber 7.

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:

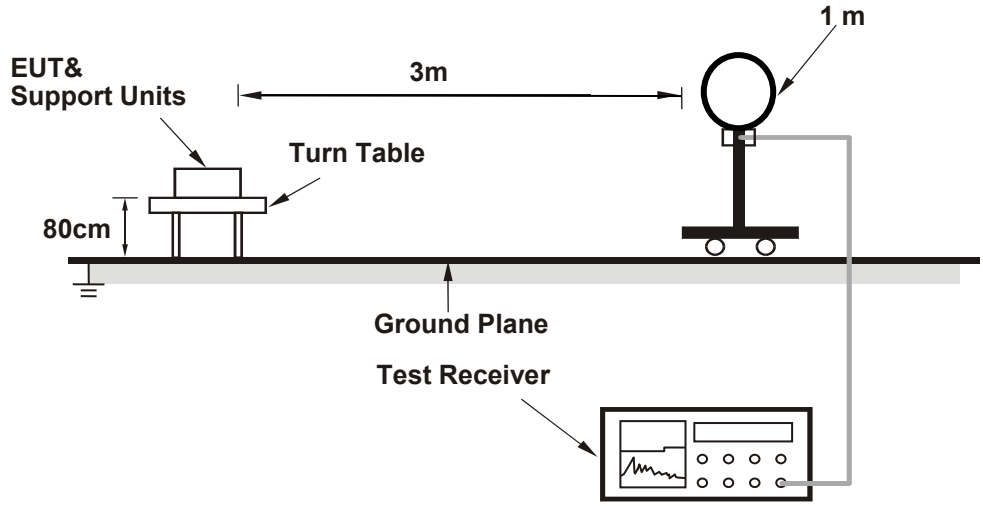
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10 Hz (Duty cycle ≥ 98%) for Peak detection 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

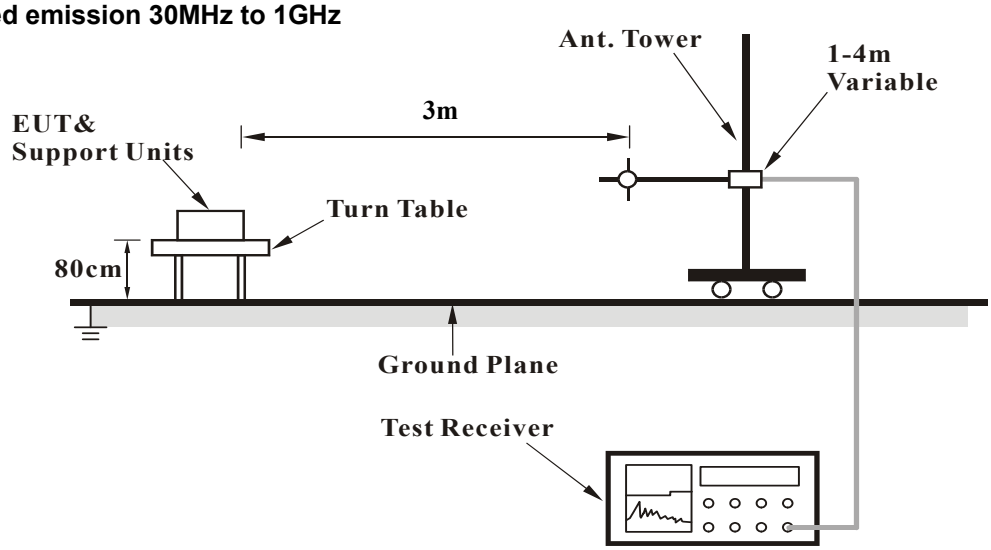
No deviation.

4.1.5 Test Set Up

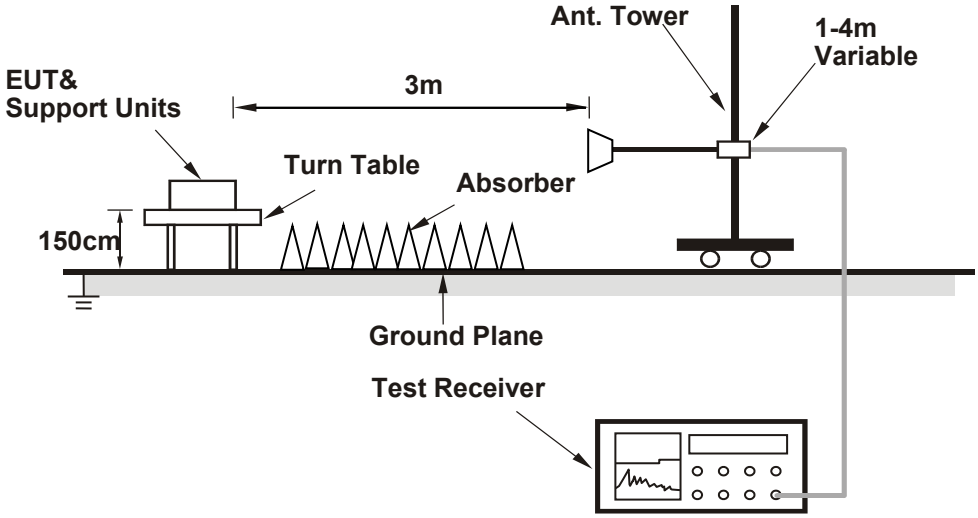
For Radiated emission below 30MHz



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. Prepared a notebook to act as a communication partner and placed it outside of testing area.
b. The communication partner connected with EUT via a USB cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
c. The necessary accessories enable the system in full functions.

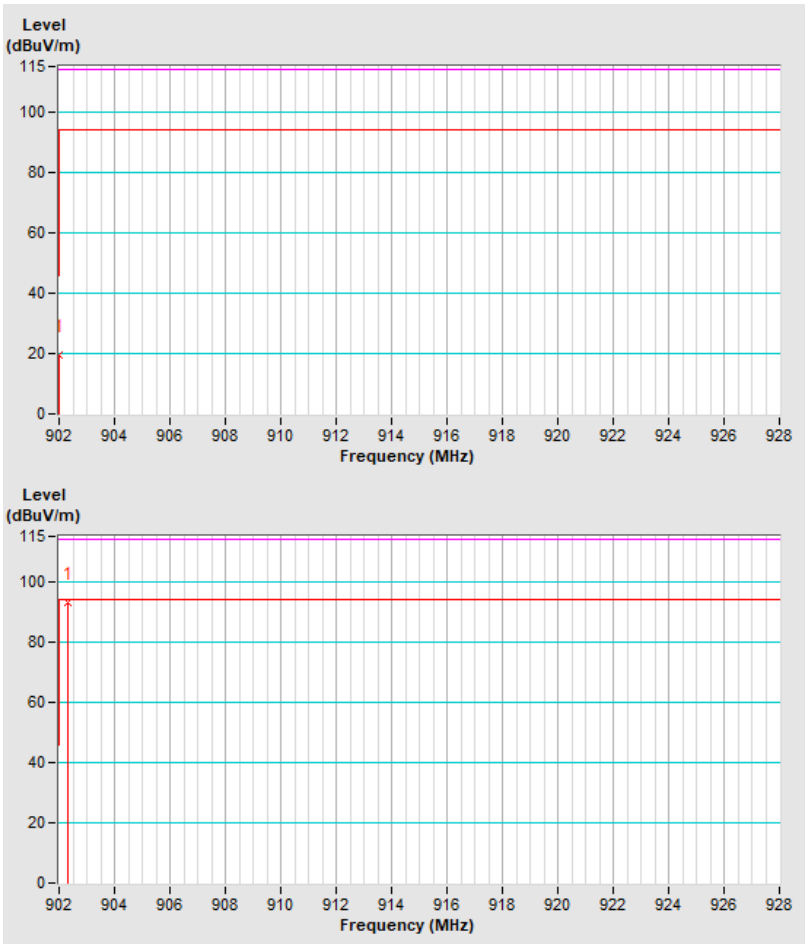
4.1.7 Test Results

RF Mode	TX	Channel	CH 0：902.3 MHz
Frequency Range	902MHz ~ 928MHz	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	902.00	19.3 QP	46.0	-26.7	1.00 H	198	21.0	-1.7
2	*902.30	93.1 QP	94.0	-0.9	1.00 H	198	63.2	29.9

Remarks:

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

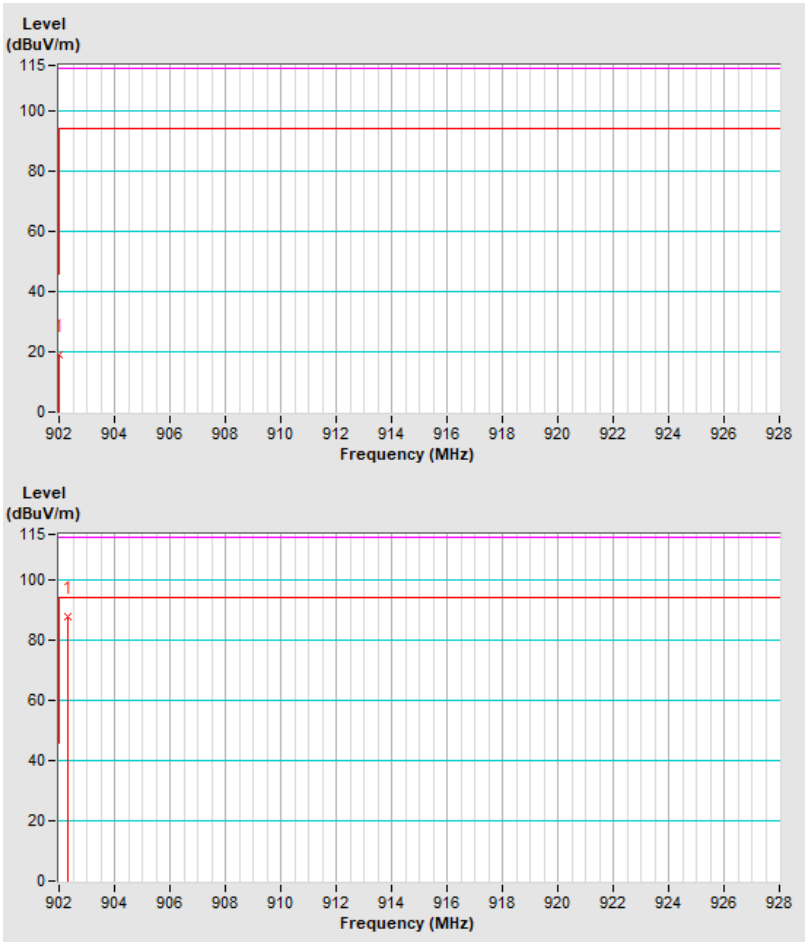


RF Mode	TX	Channel	CH 0：902.3 MHz
Frequency Range	902MHz ~ 928MHz	Detector Function	Quasi-Peak (QP)

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	902.00	19.0 QP	46.0	-27.0	1.07 V	208	20.7	-1.7
2	*902.30	87.6 QP	94.0	-6.4	1.07 V	208	57.7	29.9

Remarks:

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

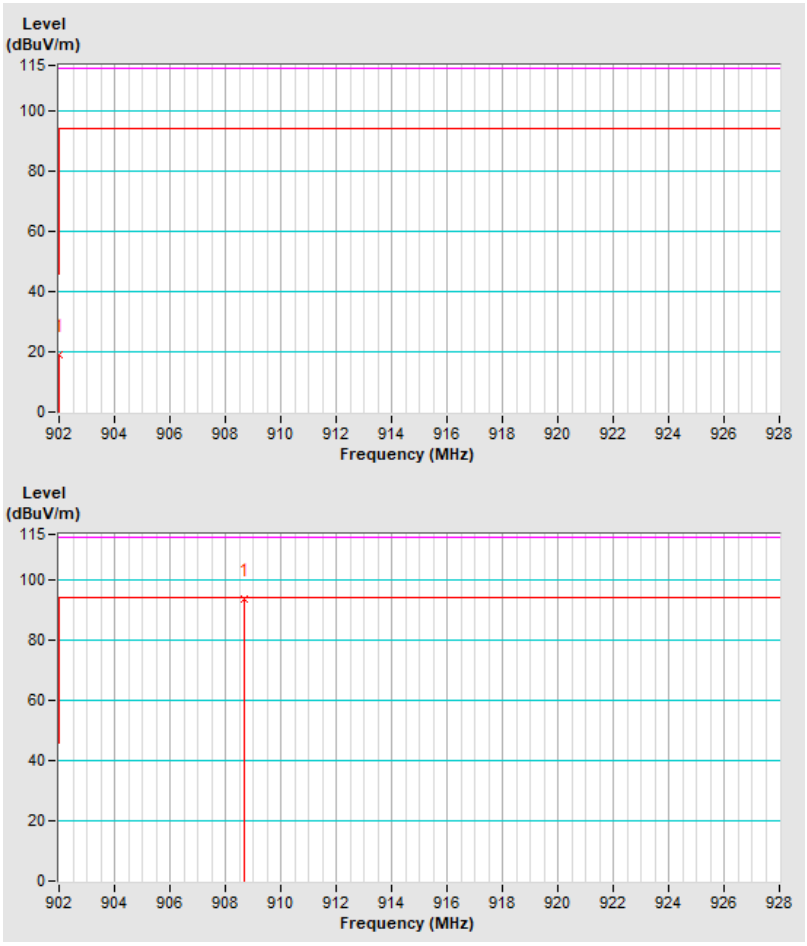


RF Mode	TX	Channel	CH 32：908.7 MHz
Frequency Range	902MHz ~ 928MHz	Detector Function	Quasi-Peak (QP)

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	902.00	19.2 QP	46.0	-26.8	1.00 H	203	20.9	-1.7
2	***908.70**	**93.8 QP**	**94.0**	**-0.2**	**1.00 H**	**203**	**63.8**	**30.0**

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

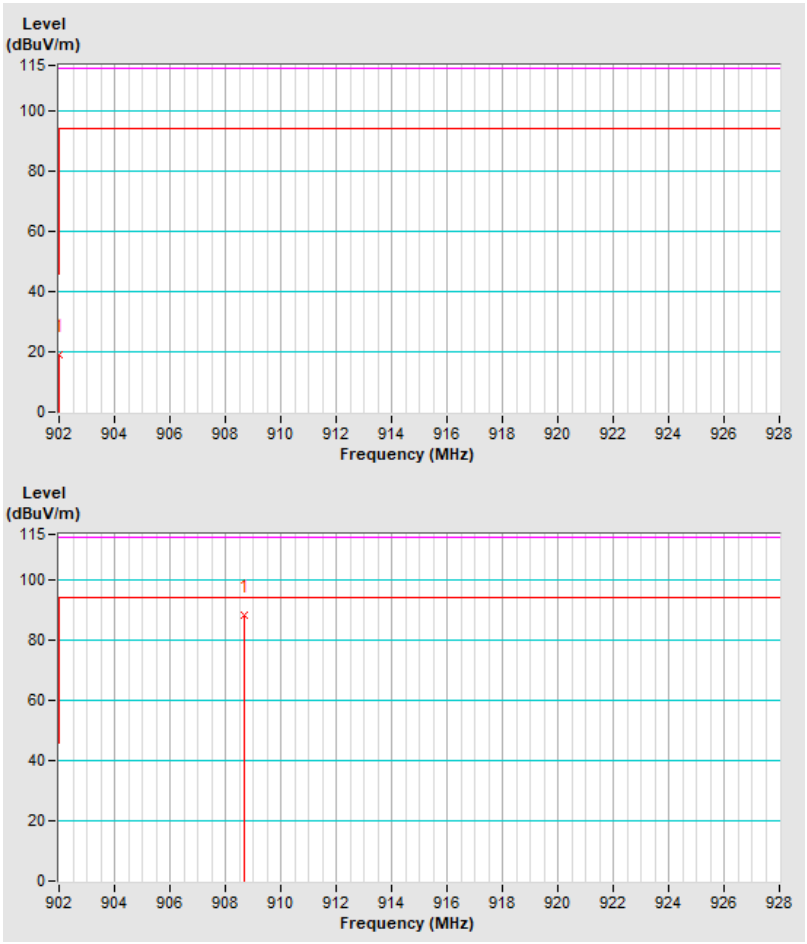


RF Mode	TX	Channel	CH 32：908.7 MHz
Frequency Range	902MHz ~ 928MHz	Detector Function	Quasi-Peak (QP)

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	902.00	18.9 QP	46.0	-27.1	1.10 V	204	20.6	-1.7
2	*908.70	88.3 QP	94.0	-5.7	1.10 V	204	58.3	30.0

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

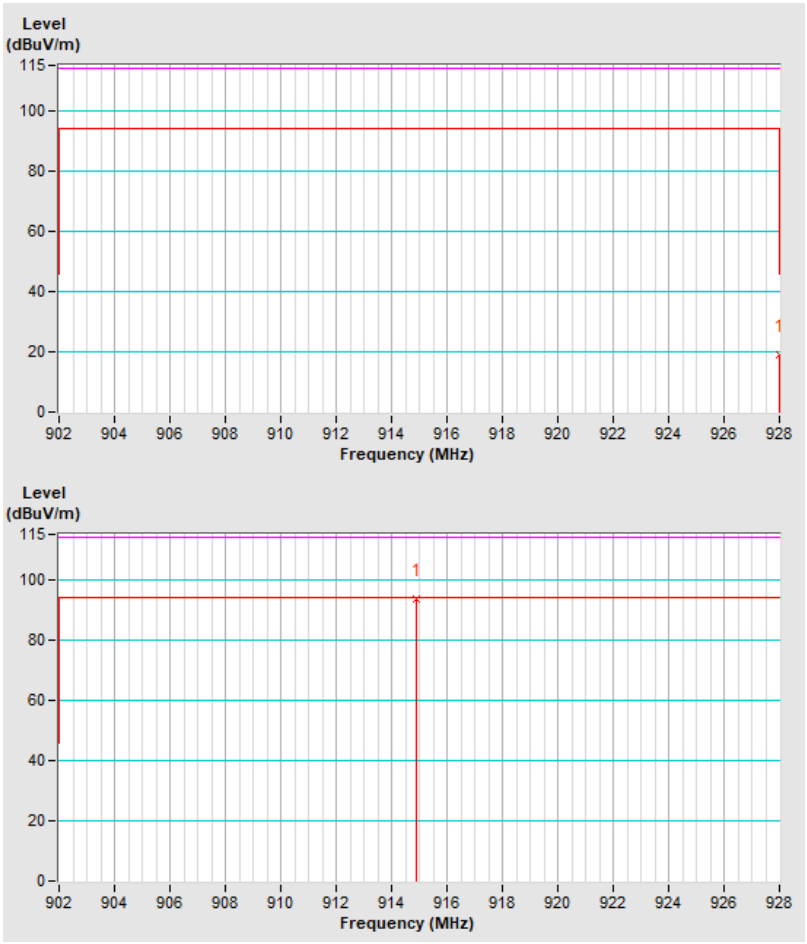


RF Mode	TX	Channel	CH 63：914.8 MHz
Frequency Range	902MHz ~ 928MHz	Detector Function	Quasi-Peak (QP)

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	928.00	19.2 QP	46.0	-26.8	1.00 H	205	20.6	-1.4
2	*914.90	93.7 QP	94.0	-0.3	1.00 H	205	63.7	30.0

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

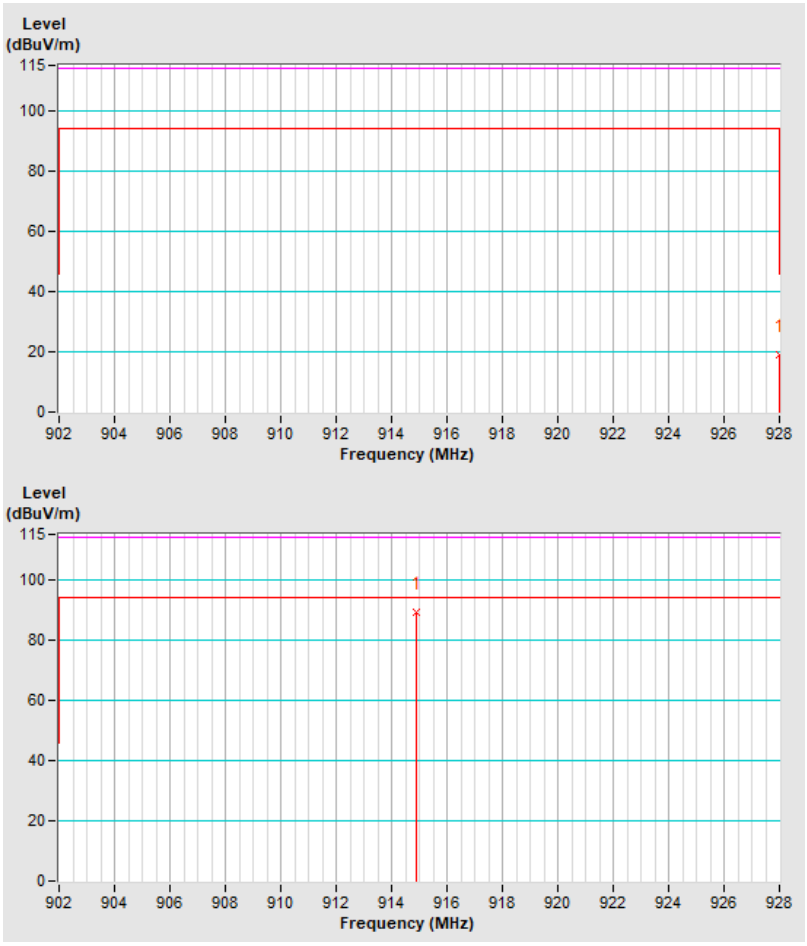


RF Mode	TX	Channel	CH 63：914.8 MHz
Frequency Range	902MHz ~ 928MHz	Detector Function	Quasi-Peak (QP)

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	928.00	18.9 QP	46.0	-27.1	1.03 V	205	20.3	-1.4
2	*914.90	89.0 QP	94.0	-5.0	1.03 V	205	59.0	30.0

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



Above 1GHz Data

RF Mode	TX	Channel	CH 0：902.3 MHz
Frequency Range	1GHz ~ 18GHz	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	1804.60	39.3 PK	74.0	-34.7	1.77 H	43	45.9	-6.6
2	1804.60	19.2 AV	54.0	-34.8	1.77 H	43	25.8	-6.6
3	2706.90	43.4 PK	74.0	-30.6	1.33 H	255	46.9	-3.5
4	2706.90	23.3 AV	54.0	-30.7	1.33 H	255	26.8	-3.5
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	1804.60	39.0 PK	74.0	-35.0	1.92 V	110	45.6	-6.6
2	1804.60	18.9 AV	54.0	-35.1	1.92 V	110	25.5	-6.6
3	2706.90	42.3 PK	74.0	-31.7	1.52 V	192	45.8	-3.5
4	2706.90	22.2 AV	54.0	-31.8	1.52 V	192	25.7	-3.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit.
5. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
   Duty cycle = 20log(55.263/560.526)= -20.1dB
   Please see page 9 for plotted duty.

RF Mode	TX	Channel	CH 32：908.7 MHz
Frequency Range	1GHz ~ 18GHz	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	1817.40	41.1 PK	74.0	-32.9	1.78 H	201	47.6	-6.5
2	1817.40	21.0 AV	54.0	-33.0	1.78 H	201	27.5	-6.5
3	2726.10	44.3 PK	74.0	-29.7	1.63 H	45	47.8	-3.5
4	2726.10	24.2 AV	54.0	-29.8	1.63 H	45	27.7	-3.5
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	1817.40	40.9 PK	74.0	-33.1	1.39 V	231	47.4	-6.5
2	1817.40	20.8 AV	54.0	-33.2	1.39 V	231	27.3	-6.5
3	2726.10	44.1 PK	74.0	-29.9	1.48 V	116	47.6	-3.5
4	2726.10	24.0 AV	54.0	-30.0	1.48 V	116	27.5	-3.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit.
5. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
   Duty cycle = 20log(55.263/560.526)= -20.1dB
   Please see page 9 for plotted duty.

RF Mode	TX	Channel	CH 63：914.8 MHz
Frequency Range	1GHz ~ 18GHz	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	1829.80	39.8 PK	74.0	-34.2	1.64 H	33	46.3	-6.5
2	1829.80	19.7 AV	54.0	-34.3	1.64 H	33	26.2	-6.5
3	2744.70	43.6 PK	74.0	-30.4	1.92 H	101	47.0	-3.4
4	2744.70	23.5 AV	54.0	-30.5	1.92 H	101	26.9	-3.4
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	1829.80	39.6 PK	74.0	-34.4	1.55 V	341	46.1	-6.5
2	1829.80	19.5 AV	54.0	-34.5	1.55 V	341	26.0	-6.5
3	2744.70	43.3 PK	74.0	-30.7	1.77 V	149	46.7	-3.4
4	2744.70	23.2 AV	54.0	-30.8	1.77 V	149	26.6	-3.4

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.
5. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
   Duty cycle = 20log(55.263/560.526)= -20.1dB
   Please see page 9 for plotted duty.

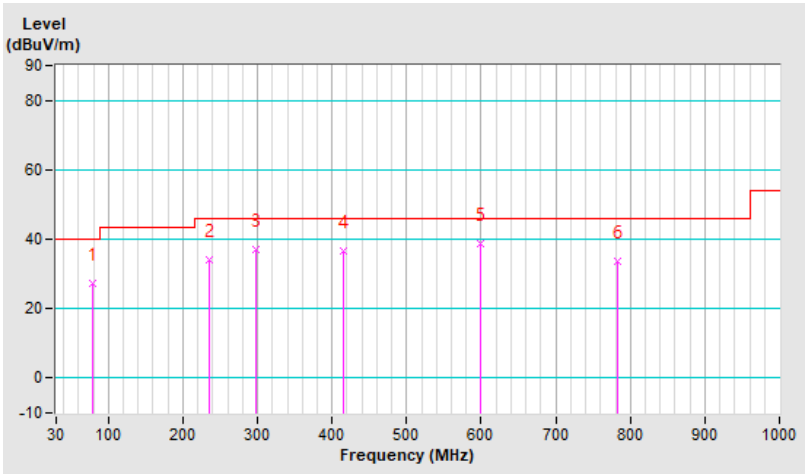
Below 1GHz worst-case data

RF Mode	TX	Channel	CH 0：902.3 MHz
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	78.50	27.3 QP	40.0	-12.7	2.00 H	266	44.1	-16.8
2	235.64	34.1 QP	46.0	-11.9	1.26 H	223	48.6	-14.5
3	298.69	37.1 QP	46.0	-8.9	2.00 H	247	49.3	-12.2
4	415.09	36.5 QP	46.0	-9.5	1.26 H	97	46.0	-9.5
5	599.39	38.7 QP	46.0	-7.3	1.01 H	226	43.9	-5.2
6	783.69	33.8 QP	46.0	-12.2	1.01 H	169	36.4	-2.6

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 of frequency range 30MHz~1000MHz.
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.

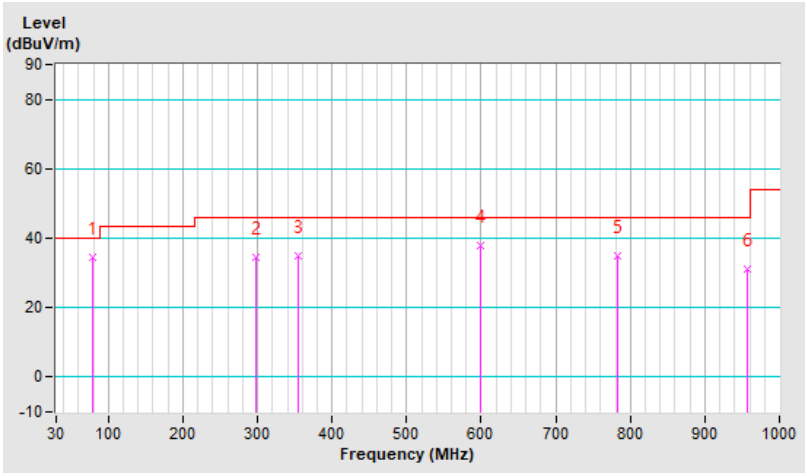


RF Mode	TX	Channel	CH 0：902.3 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	78.50	34.5 QP	40.0	-5.5	1.00 V	130	51.3	-16.8
2	298.69	34.5 QP	46.0	-11.5	1.00 V	162	46.7	-12.2
3	354.95	34.9 QP	46.0	-11.1	1.49 V	146	45.9	-11.0
4	599.39	37.9 QP	46.0	-8.1	1.24 V	246	43.1	-5.2
5	783.69	34.8 QP	46.0	-11.2	1.00 V	165	37.4	-2.6
6	957.32	31.2 QP	46.0	-14.8	1.00 V	289	32.1	-0.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

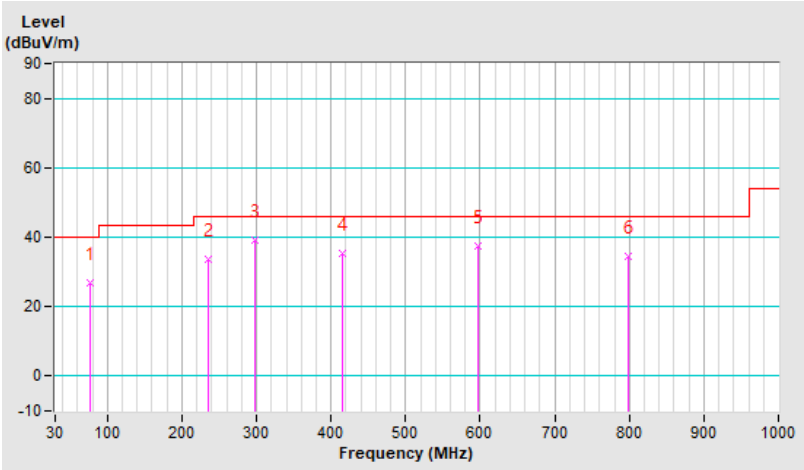


RF Mode	TX	Channel	CH 32：908.7 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	76.56	27.0 QP	40.0	-13.0	1.99 H	98	43.4	-16.4
2	234.67	33.8 QP	46.0	-12.2	1.00 H	196	48.3	-14.5
3	298.69	39.1 QP	46.0	-6.9	1.24 H	223	51.3	-12.2
4	416.06	35.4 QP	46.0	-10.6	1.00 H	74	44.8	-9.4
5	597.45	37.4 QP	46.0	-8.6	1.99 H	218	42.7	-5.3
6	798.24	34.7 QP	46.0	-11.3	1.49 H	135	37.6	-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 other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
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.

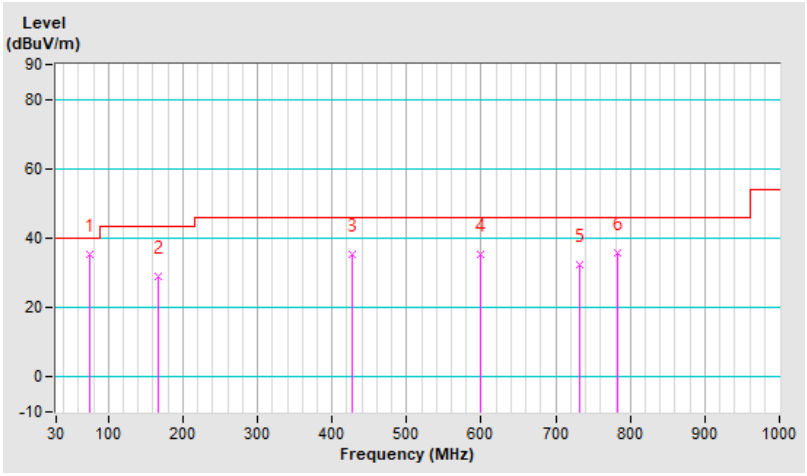


RF Mode	TX	Channel	CH 32：908.7 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	75.59	35.3 QP	40.0	-4.7	1.51 V	130	51.3	-16.0
2	166.77	29.0 QP	43.5	-14.5	1.01 V	76	41.7	-12.7
3	426.73	35.5 QP	46.0	-10.5	1.01 V	161	44.5	-9.0
4	598.42	35.2 QP	46.0	-10.8	1.51 V	259	40.5	-5.3
5	731.31	32.2 QP	46.0	-13.8	1.01 V	153	35.5	-3.3
6	783.69	35.7 QP	46.0	-10.3	1.51 V	42	38.3	-2.6

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 of frequency range 30MHz~1000MHz.
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.

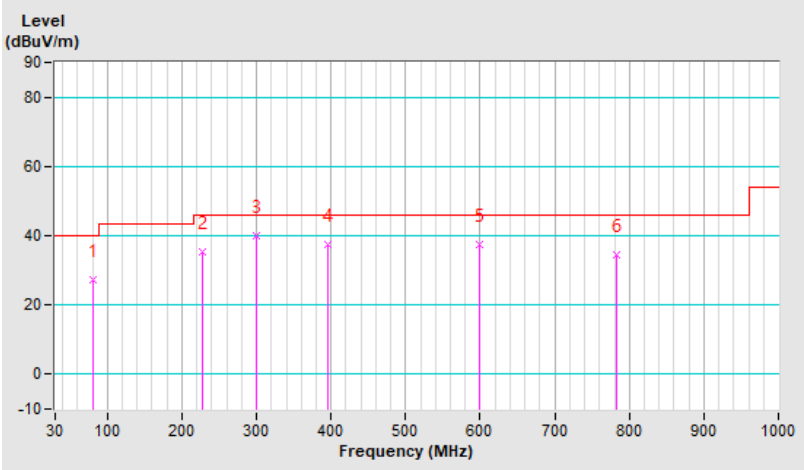


RF Mode	TX	Channel	CH 63：914.8 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	81.41	27.3 QP	40.0	-12.7	2.00 H	105	44.8	-17.5
2	226.91	35.3 QP	46.0	-10.7	1.51 H	228	50.8	-15.5
3	299.66	39.8 QP	46.0	-6.2	1.51 H	288	51.9	-12.1
4	395.69	37.4 QP	46.0	-8.6	1.01 H	119	47.3	-9.9
5	599.39	37.6 QP	46.0	-8.4	1.51 H	234	42.8	-5.2
6	783.69	34.3 QP	46.0	-11.7	1.51 H	106	36.9	-2.6

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 of frequency range 30MHz~1000MHz.
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.

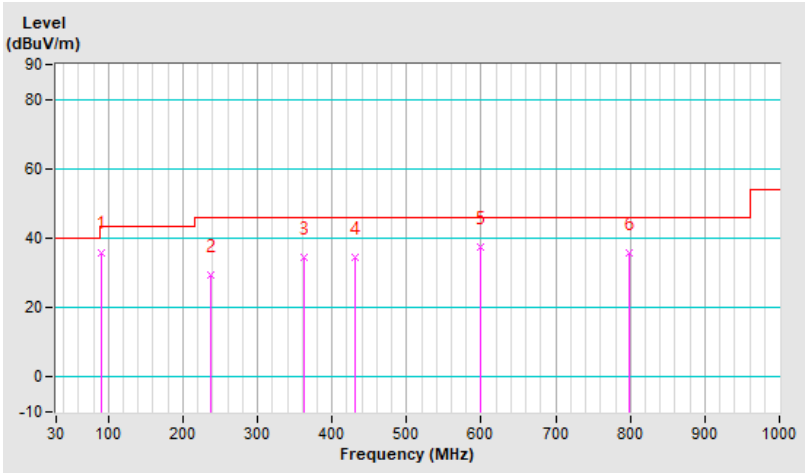


RF Mode	TX	Channel	CH 63：914.8 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	90.14	36.0 QP	43.5	-7.5	1.00 V	139	54.4	-18.4
2	236.61	29.3 QP	46.0	-16.7	2.00 V	177	43.7	-14.4
3	362.71	34.6 QP	46.0	-11.4	1.50 V	152	45.3	-10.7
4	431.58	34.5 QP	46.0	-11.5	1.24 V	173	43.3	-8.8
5	599.39	37.6 QP	46.0	-8.4	1.00 V	150	42.8	-5.2
6	798.24	35.7 QP	46.0	-10.3	1.00 V	19	38.6	-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 other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
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 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.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESR3	102412	Dec. 21, 2022	Dec. 20, 2023
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 02, 2023	Sep. 01, 2024
LISN/AMN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Mar. 07, 2023	Mar. 06, 2024
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Sep. 12, 2023	Sep. 11, 2024
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 2 (Conduction 2).
3. The VCCI Site Registration No. is C-12047.
4. Tested date: Dec. 12, 2023

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.

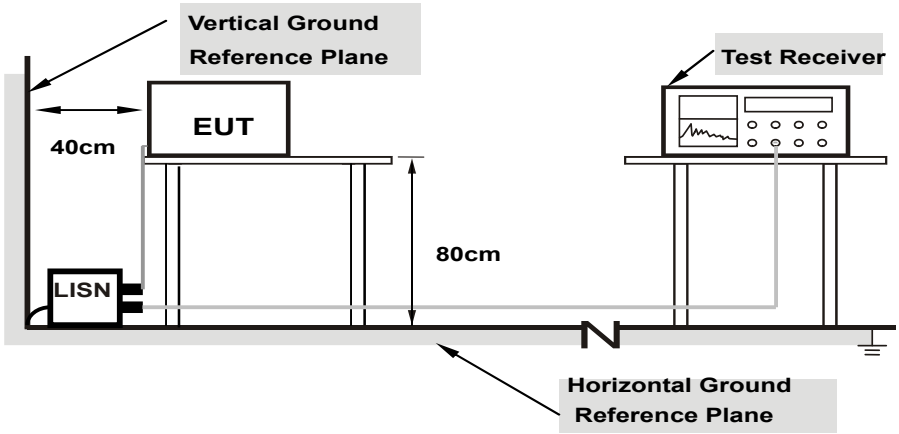
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

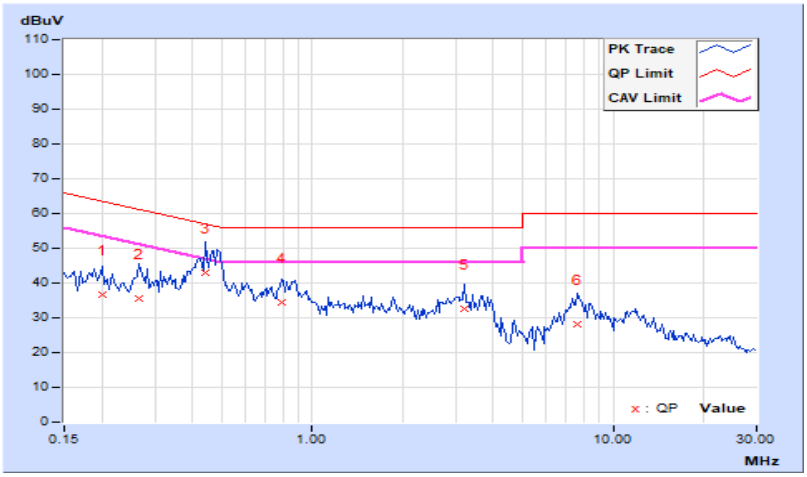
4.2.7 Test Results

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

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.20078	10.40	26.34	16.06	36.74	26.46	63.58	53.58	-26.84	-27.12
2	0.26719	10.43	25.28	15.31	35.71	25.74	61.20	51.20	-25.49	-25.46
3	0.43906	10.49	32.44	22.17	42.93	32.66	57.08	47.08	-14.15	-14.42
4	0.79453	10.52	23.88	12.35	34.40	22.87	56.00	46.00	-21.60	-23.13
5	3.20703	10.62	22.10	14.29	32.72	24.91	56.00	46.00	-23.28	-21.09
6	7.59766	10.70	17.51	4.06	28.21	14.76	60.00	50.00	-31.79	-35.24

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.

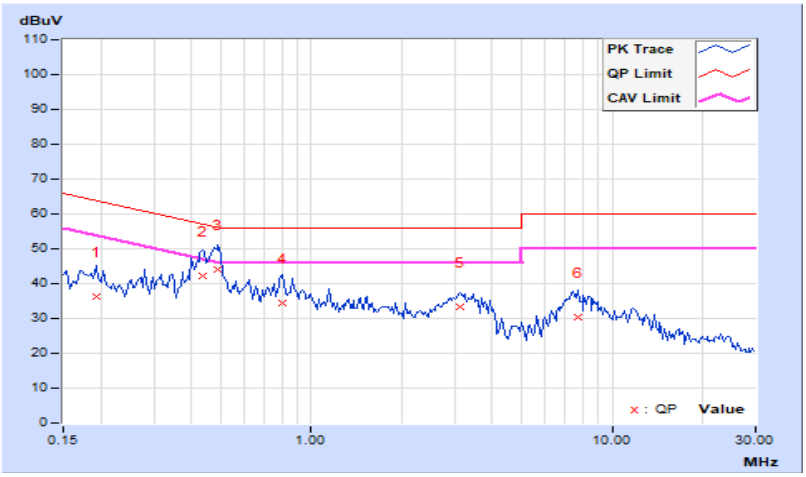


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.19297	10.43	25.96	14.87	36.39	25.30	63.91	53.91	-27.52	-28.61
2	0.43516	10.53	31.80	22.13	42.33	32.66	57.15	47.15	-14.82	-14.49
3	**0.48984**	**10.53**	**33.44**	**17.09**	**43.97**	**27.62**	**56.17**	**46.17**	**-12.20**	**-18.55**
4	0.80625	10.55	23.79	13.57	34.34	24.12	56.00	46.00	-21.66	-21.88
5	3.14453	10.67	22.61	14.71	33.28	25.38	56.00	46.00	-22.72	-20.62
6	7.72656	10.80	19.70	4.35	30.50	15.15	60.00	50.00	-29.50	-34.85

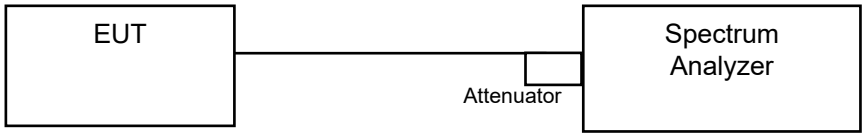
Remarks:

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 Occupied Bandwidth Measurement

4.3.1 Test Setup



4.3.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.3 Test Procedures

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

4.3.4 Deviation from Test Standard

No deviation.

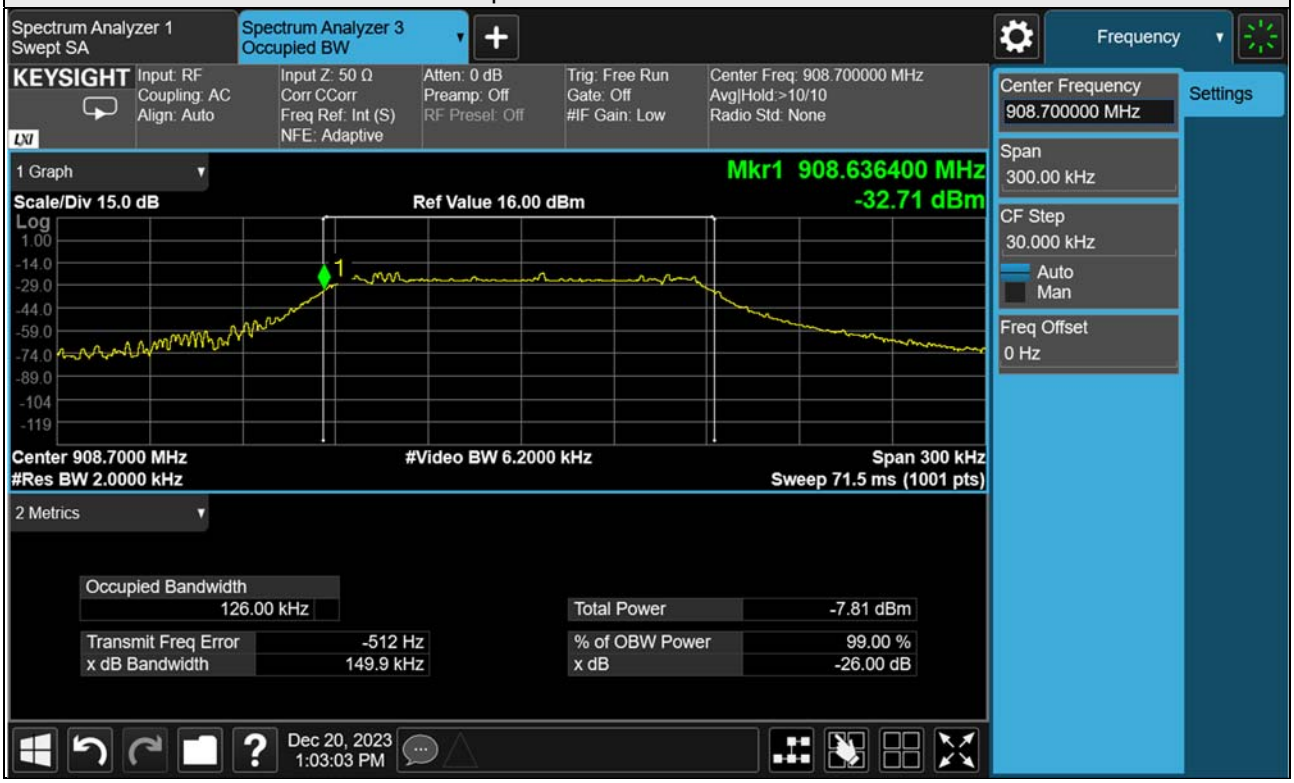
4.3.5 EUT Operating Conditions

Same as Item 4.1.6.

4.3.6 Test Results

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	902.3	0.12548
32	908.7	0.12600
63	914.9	0.12535

Spectrum Plot of Worst Value



5 Pictures of Test Arrangements

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

Appendix – Information on 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:

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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