FCC Test Report

Report No.:	RFBFLI-WTW-P23100363
FCC ID:	OGSADB512
Test Model:	ADB-522
Series Model:	ADB-512
Received Date:	Oct. 17, 2023
Test Date:	Oct. 24, 2023
Issued Date:	Nov. 29, 2023
Applicant:	Applied Wireless Identifications (AWID) Group Inc.
Address:	18300 Sutter Blvd. Morgan Hill, CA, 95037, USA
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN
FCC Registration / Designation Number:	788550 / TW0003

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Release Control Record

Issue No.	Description	Date Issued
RFBFLI-WTW-P23100363	Original release	Nov. 29, 2023

1 Certificate of Conformity

Product:	ADB-512 UHF RFID Reader Module; ADB-522 Reader Module
Brand:	AWID
Test Model:	ADB-522
Series Model:	ADB-512
Sample Status:	Engineering sample
Applicant:	Applied Wireless Identifications (AWID) Group Inc.
Test Date:	Oct. 24, 2023
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) 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 : Celine Chou , **Date:** Nov. 29, 2023

Celine Chou / Senior Specialist

Approved by : Jeremy Lin , **Date:** Nov. 29, 2023

Jeremy Lin / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -10.83dB at 24.05400MHz.
15.247(a)(1)(i)	Number of Hopping Frequency Used	N/A	Refer to Note 1
15.247(a)(1)(i)	Dwell Time on Each Channel	N/A	Refer to Note 1
15.247(a)(1)(i)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	N/A	Refer to Note 1
15.247(b)(2)	Maximum Peak Output Power	N/A	Refer to Note 1
15.205 & 209 & 15.247(d)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -6.3dB at 692.55MHz.
15.247(d)	Antenna Port Emission	N/A	Refer to Note 1
15.203	Antenna Requirement	Pass	Antenna connector is TNC, RP or SMA, RP not a standard connector.

Note:

1. The radiated emission and conducted emission test items are performed for the addendum. Refer to original report for the other test data.
2. 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.
3. 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	2.88 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.44 dB
	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	ADB-512 UHF RFID Reader Module; ADB-522 Reader Module
Brand	AWID
Test Model	ADB-522
Series Model	ADB-512
Model Difference	Refer to note for more details
Sample Status	Engineering sample
Power Supply Rating	5.8-6.0Vdc
Modulation Type	ASK
Channel Spacing	200kHz
Operating Frequency	902.6MHz ~ 927.4MHz
Number of Channel	125
Output Power	872.971mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Cable Supplied	NA

Note:

1. This report is prepared for FCC class II permissive change. This report is issued as a supplementary report to the original BV CPS report no.: RF210520C01. The difference compared with original report is adding one model: ADB-522, the difference from the original model (ADB-512) is updating receiver circuit for signal conditioning for decoding, no any impact on TX function. Therefore, only radiated emission and conducted emission test items are performed for the addendum. Refer to original report for the other test data.
2. The following models are provided to this EUT.

Brand	Product	Model	Description
AWID	**ADB-522 Reader Module**	**ADB-522**	Only receiver circuit for signal conditioning for decoding is different
	ADB-512 UHF RFID Reader Module	ADB-512	

3. The adapter is support unit for interface board used only.

Brand	GME
Model	GME24A-120200FUR
Input Power	100-240Vac, 50-60Hz, 0.8A
Output Power	12Vdc, 2A
Power Line	1.56m cable with 1 core attached on adapter

*The 5.8-6.0Vdc voltage of the EUT is converted from the test kit through a 12Vdc adapter.

4. The following antennas were provided to the EUT.

No.	Antenna type	Connector		Brand	Model	Gain (dBi)
		Module Side	Ant. Side			
1	Patch	MMCX	TNC, RP	AWID	ANT-915CPS	**5.84**
2		MMCX	TNC, RP		ANT-915-CC-05	4.70
3		MMCX	SMA, RP		ANT-915-CP-R	5.50
4		MMCX	SMA, RP		ANT-2012	5.40

*The maximum antenna gain is chosen for final test.

*Detail antenna specification please refer to antenna datasheet an antenna gain measurement report.

3.2 Description of Test Modes

125 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	902.60	25	907.60	50	912.60	75	917.60	100	922.60
1	902.80	26	907.80	51	912.80	76	917.80	101	922.80
2	903.00	27	908.00	52	913.00	77	918.00	102	923.00
3	903.20	28	908.20	53	913.20	78	918.20	103	923.20
4	903.40	29	908.40	54	913.40	79	918.40	104	923.40
5	903.60	30	908.60	55	913.60	80	918.60	105	923.60
6	903.80	31	908.80	56	913.80	81	918.80	106	923.80
7	904.00	32	909.00	57	914.00	82	919.00	107	924.00
8	904.20	33	909.20	58	914.20	83	919.20	108	924.20
9	904.40	34	909.40	59	914.40	84	919.40	109	924.40
10	904.60	35	909.60	60	914.60	85	919.60	110	924.60
11	904.80	36	909.80	61	914.80	86	919.80	111	924.80
12	905.00	37	910.00	62	915.00	87	920.00	112	925.00
13	905.20	38	910.20	63	915.20	88	920.20	113	925.20
14	905.40	39	910.40	64	915.40	89	920.40	114	925.40
15	905.60	40	910.60	65	915.60	90	920.60	115	925.60
16	905.80	41	910.80	66	915.80	91	920.80	116	925.80
17	906.00	42	911.00	67	916.00	92	921.00	117	926.00
18	906.20	43	911.20	68	916.20	93	921.20	118	926.20
19	906.40	44	911.40	69	916.40	94	921.40	119	926.40
20	906.60	45	911.60	70	916.60	95	921.60	120	926.60
21	906.80	46	911.80	71	916.80	96	921.80	121	926.80
22	907.00	47	912.00	72	917.00	97	922.00	122	927.00
23	907.20	48	912.20	73	917.20	98	922.20	123	927.20
24	907.40	49	912.40	74	917.40	99	922.40	124	927.40

3.2.1 Test Mode Applicability and Tested Channel Detail

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

Where RE≥1G: Radiated Emission above 1GHz & Bandedge Measurement RE<1G: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission

Note: The EUT tested under **Y-plane** according to original test report 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 Type
-	0 to 124	0	ASK

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 Type
-	0 to 124	0	ASK

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.

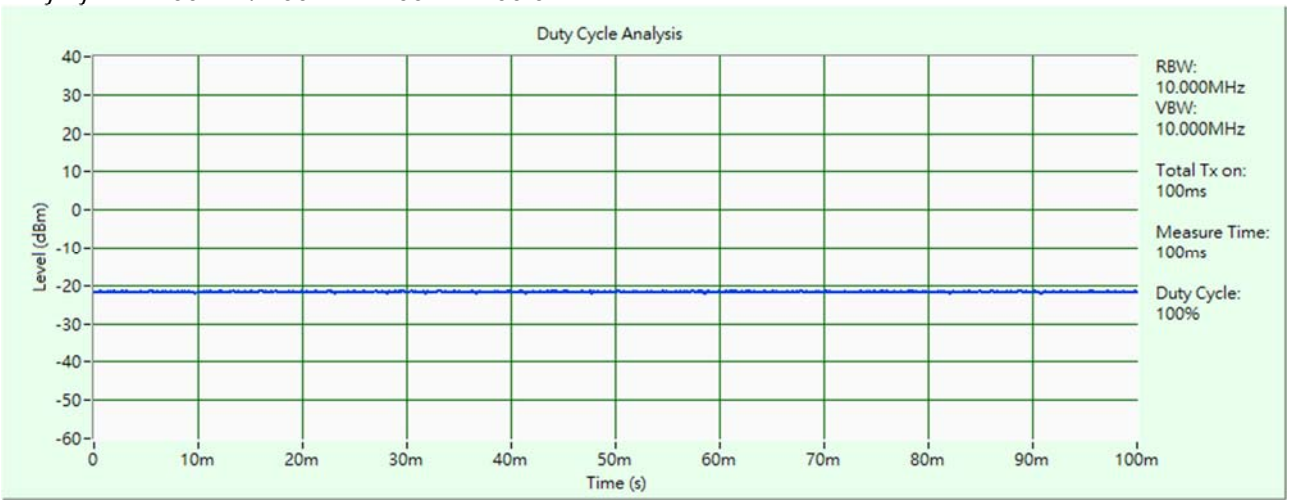
EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 124	0	ASK

Test Condition:

Applicable to	Environmental Conditions	Input Power (System)	Tested by
RE≥1G	23 deg. C, 68% RH	120Vac, 60Hz	Vincent Chen
RE<1G	23 deg. C, 68% RH	120Vac, 60Hz	Vincent Chen
PLC	22 deg. C, 63% RH	120Vac, 60Hz	Vincent Chen

3.3 Duty Cycle of Test Signal

Duty cycle = 100 ms / 100 ms x 100% = 100.0%



3.4 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.

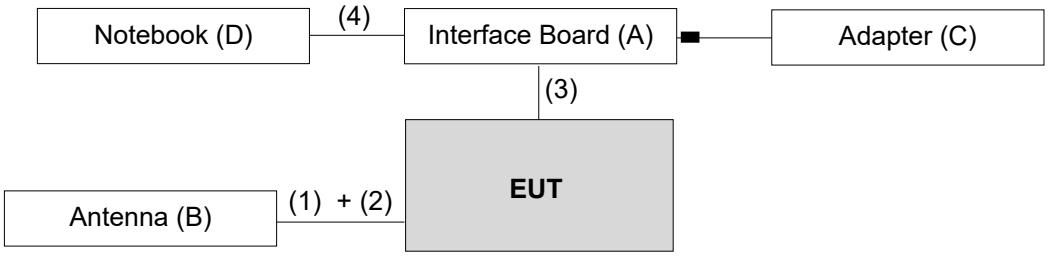
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Interface Board	NA	NA	NA	NA	Provided by manufacturer
B.	Antenna	AWID	ANT-915-CPS	NA	NA	Provided by manufacturer
C.	Adapter	GME	GME24A-120200FUR	NA	NA	Provided by manufacturer
D.	Notebook	Lenovo	80Q7	PF0KUGU6	NA	

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	SMA cable	1	3	Y	0	Provided by manufacturer
2.	SMA to MMCX cable	1	0.08	N	0	Provided by manufacturer
3.	FFC cable	1	0.05	N	0	Provided by manufacturer
4.	Console cable	1	1.5	N	0	Provided by manufacturer

Note**:** The core(s) is(are) originally attached to the cable(s).

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards and References

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

Test standard:
FCC Part 15, Subpart C (15.247)
ANSI C63.10-2013

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

References Test Guidance:
KDB 558074 D01 15.247 Meas Guidance v05r02

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

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.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038A	MY55420137	May 03, 2023	May 02, 2024
Signal Analyzer Agilent	N9010A	MY52220207	Jan. 03, 2023	Jan. 02, 2024
Loop Antenna TESEQ	HLA 6121	45745	Aug. 08, 2023	Aug. 07, 2024
Pre-amplifier EMCI	EMC001340	980201	Sep. 27, 2023	Sep. 26, 2024
RF Coaxial Cable EMCI	5D-NM-BM	140903+140902	Jan. 07, 2023	Jan. 06, 2024
Pre-Ammlifier EMCI	EMC 330H	980112	Sep. 27, 2023	Sep. 26, 2024
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-472	Oct. 16, 2023	Oct. 15, 2024
RF Coaxial Cable WOKEN	8D-FB	Cable-Ch10-01	Sep. 14, 2023	Sep. 13, 2024
Horn Antenna Schwarzbeck	BBHA 9120D	9120D-969	Nov. 13, 2022	Nov. 12, 2023
Pre-Amplifier EMCI	EMC 012645	980115	Sep. 27, 2023	Sep. 26, 2024
RF Coaxial Cable EMCI	EMC104-SM-SM-8000	171005	Sep. 27, 2023	Sep. 26, 2024
RF Coaxial Cable HUBER SUHNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	Sep. 27, 2023	Sep. 26, 2024
RF FLITER MICRO-TRONICS	BRM50716	060	Jan. 11, 2023	Jan. 10, 2024
RF FLITER MICRO-TRONICS	BRM17690	004	Jan. 11, 2023	Jan. 10, 2024
Pre-Ammlifier EMCI	EMC 184045	980116	Sep. 27, 2023	Sep. 26, 2024
Horn Antenna Schwarzbeck	BBHA 9170	148	Nov. 13, 2022	Nov. 12, 2023
RF Coaxial Cable EMCI	EMC102-KM-KM-600	150928	Jul. 08, 2023	Jul. 07, 2024
RF Coaxial Cable EMCI	EMC102-KM-KM-3000	150929	Jul. 08, 2023	Jul. 07, 2024
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower Max-Full	MFA-440H	AT93021705	NA	NA
Turn Table Max-Full	MFT-201SS	NA	NA	NA
Antenna Tower &Turn Table Controller Max-Full	MF-7802	NA	NA	NA
Boresight antenna tower fixture BV	BAF-02	7	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 HY - 966 chamber 5.

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:

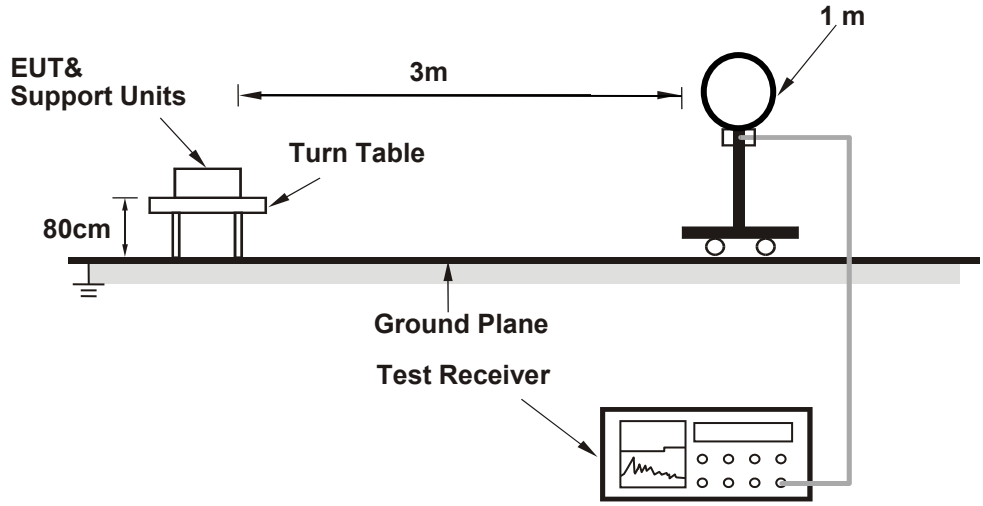
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection (AV) at frequency above 1GHz. The spectrum settings are as follows: Detector: RMS; Sweep time: Auto; Trace count: trace average of at least 100 traces. (for Duty cycle = 100%)
3. For fundamental and harmonic signal measurement, according to ANSI C63.10 section 7.5, the average value = peak value + duty cycle correction factor. The duty cycle correction factor refer to Chapter 3.3 of this report.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

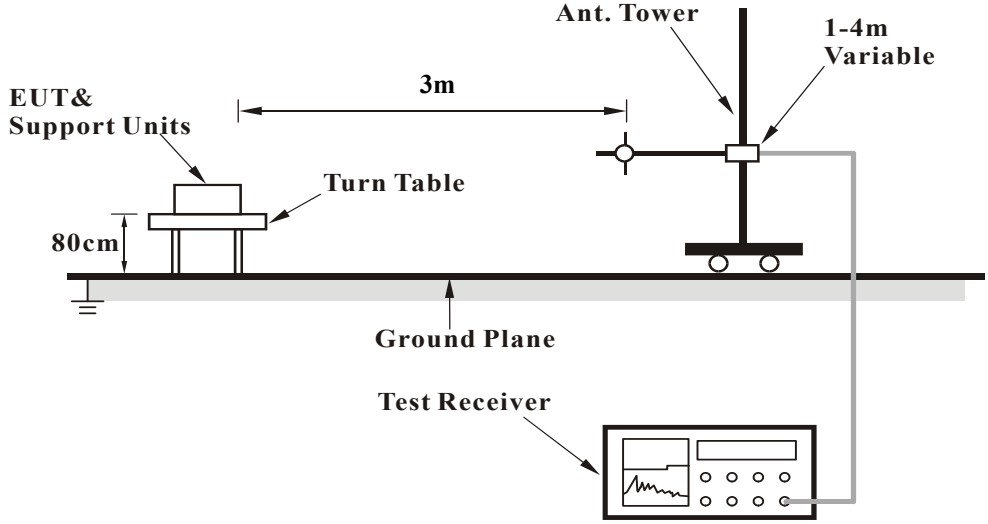
No deviation.

4.1.5 Test Setup

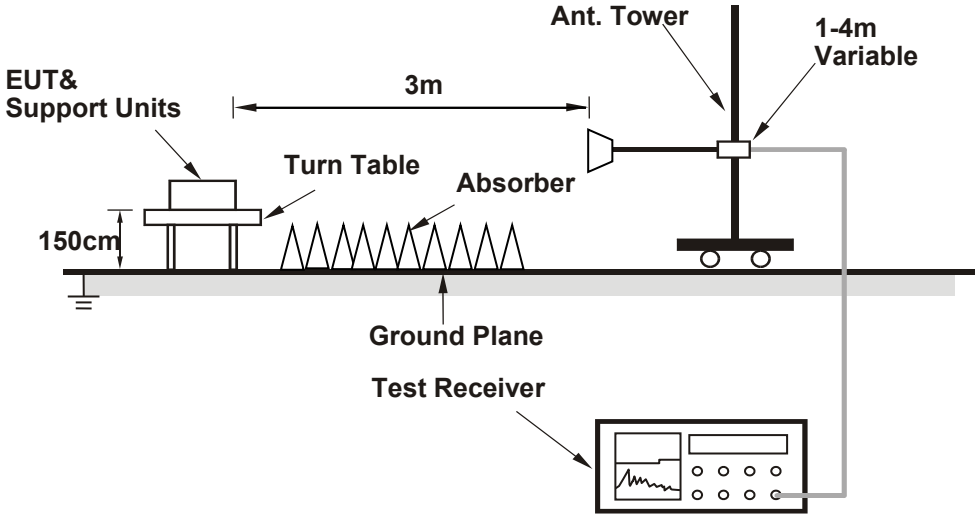
For Radiated emission below 30MHz



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. Set the EUT under transmission condition continuously at specific channel frequency.

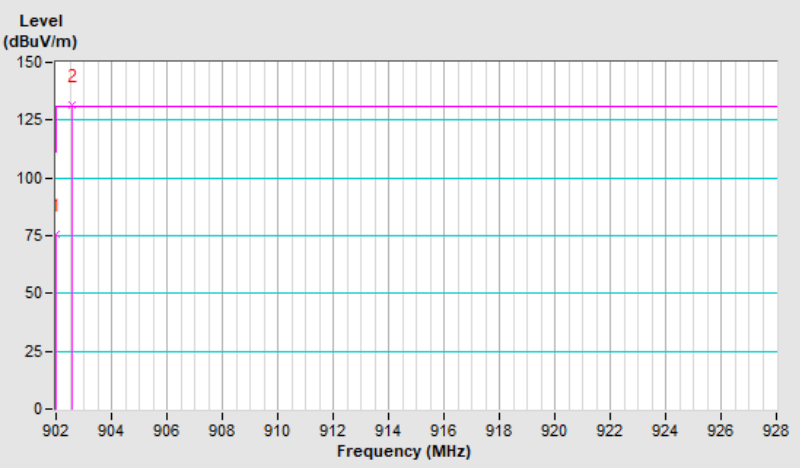
4.1.7 Test Results

RF Mode	TX RFID	Channel	CH 0：902.6 MHz
Frequency Range	902.0MHz ~ 928.0MHz	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	75.7 QP	111.4	-35.7	1.44 H	10	44.4	31.3
2	*902.60	131.4 QP			1.44 H	10	100.1	31.3

Remarks:

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

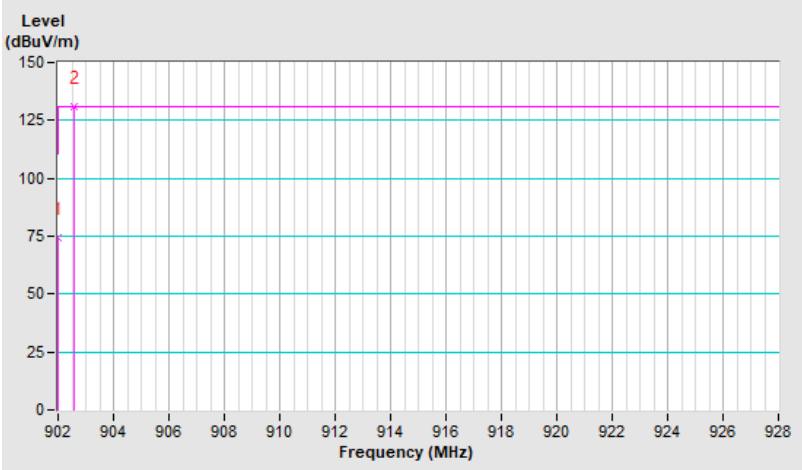


RF Mode	TX RFID	Channel	CH 0：902.6 MHz
Frequency Range	902.0MHz ~ 928.0MHz	Detector Function	Quasi-Peak (QP)

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	74.5 QP	110.8	-36.3	1.09 V	339	43.2	31.3
2	*902.60	130.8 QP			1.09 V	339	99.5	31.3

Remarks:

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



Above 1GHz data:

RF Mode	TX RFID	Channel	CH 0：902.6 MHz
Frequency Range	1GHz ~ 10GHz	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	#1805.20	44.5 PK	111.4	-66.9	2.83 H	197	49.2	-4.7
2	#1805.20	34.9 AV	91.4	-56.5	2.83 H	197	39.6	-4.7
3	7220.80	56.9 PK	74.0	-17.1	2.32 H	118	48.6	8.3
4	7220.80	47.0 AV	54.0	-7.0	2.32 H	118	38.7	8.3
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	#1805.20	42.4 PK	110.8	-68.4	1.64 V	348	47.1	-4.7
2	#1805.20	32.6 AV	90.8	-58.2	1.64 V	348	37.3	-4.7
3	7220.80	54.5 PK	74.0	-19.5	1.31 V	38	46.2	8.3
4	7220.80	44.7 AV	54.0	-9.3	1.31 V	38	36.4	8.3

Remarks:

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

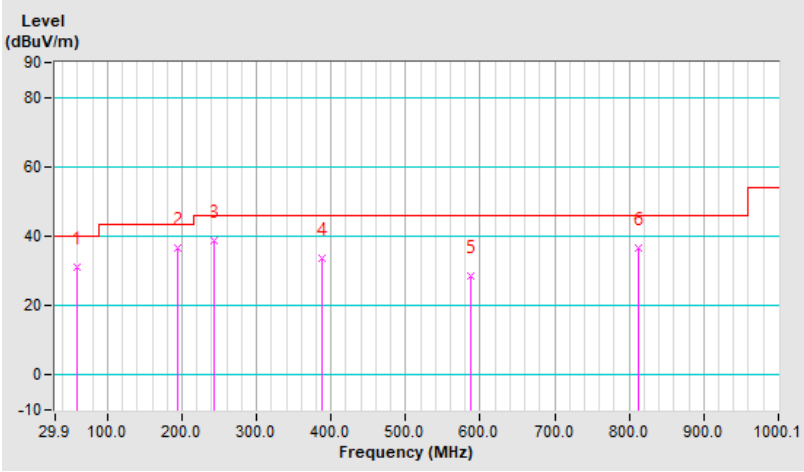
Below 1GHz worst-case data:

RF Mode	TX RFID	Channel	CH 0：902.6 MHz
Frequency Range	9kHz ~ 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	59.98	31.1 QP	40.0	-8.9	2.00 H	169	44.2	-13.1
2	193.86	36.7 QP	43.5	-6.8	2.00 H	299	52.3	-15.6
3	242.37	38.8 QP	46.0	-7.2	1.50 H	217	52.8	-14.0
4	387.90	33.6 QP	46.0	-12.4	1.00 H	332	43.5	-9.9
5	587.76	28.7 QP	46.0	-17.3	1.50 H	293	34.0	-5.3
6	812.85	36.6 QP	46.0	-9.4	1.00 H	2	37.6	-1.0

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 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.

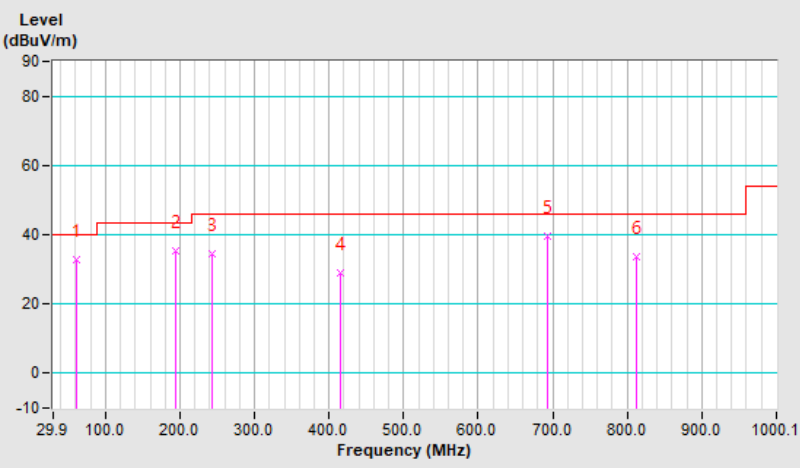


RF Mode	TX RFID	Channel	CH 0：902.6 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	60.95	32.9 QP	40.0	-7.1	1.00 V	313	46.4	-13.5
2	193.86	35.5 QP	43.5	-8.0	1.50 V	89	51.1	-15.6
3	242.37	34.3 QP	46.0	-11.7	2.00 V	262	48.3	-14.0
4	415.07	29.0 QP	46.0	-17.0	1.00 V	212	38.3	-9.3
5	**692.55**	**39.7 QP**	**46.0**	**-6.3**	**2.00 V**	**357**	**43.1**	**-3.4**
6	812.85	33.6 QP	46.0	-12.4	1.50 V	2	34.6	-1.0

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 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 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	ESCI	100613	Dec. 05, 2022	Dec. 04, 2023
RF Coaxial Cable WOKEN	5D-FB	Cable-cond1-01	Jan. 07, 2023	Jan. 06, 2024
LISN ROHDE & SCHWARZ	ENV216	101826	Mar. 23, 2023	Mar. 22, 2024
LISN R&S	ESH3-Z5	100311	Sep. 06, 2023	Sep. 05, 2024
Software BV ADT	BVADT_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 HY - Conduction 1.
3. The VCCI Site Registration No. is C-12040.

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.

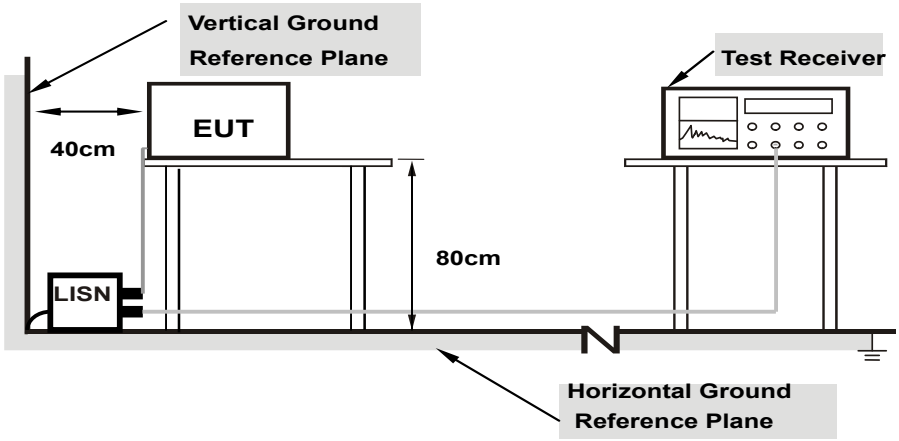
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

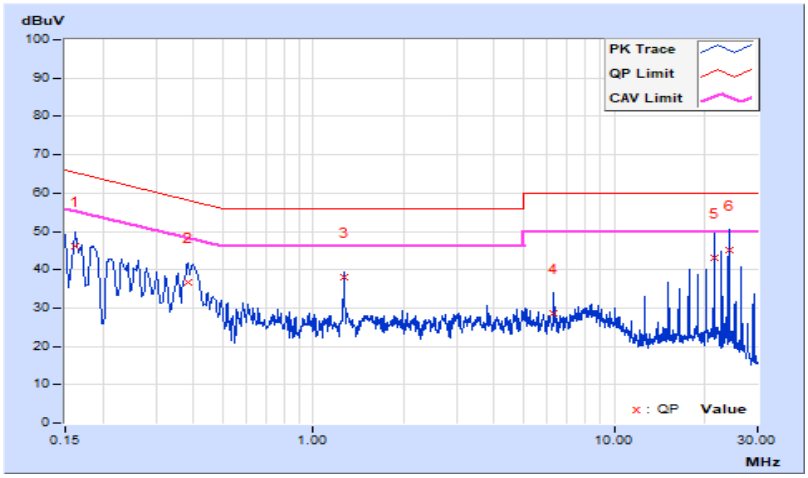
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	CH 0：902.6 MHz		

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	0.16190	9.67	36.55	22.27	46.22	31.94	65.37	55.37	-19.15	-23.43
2	0.38200	9.78	26.88	21.57	36.66	31.35	58.24	48.24	-21.58	-16.89
3	1.26600	9.87	28.11	23.88	37.98	33.75	56.00	46.00	-18.02	-12.25
4	6.32200	9.98	18.48	11.09	28.46	21.07	60.00	50.00	-31.54	-28.93
5	21.50200	10.07	33.16	22.59	43.23	32.66	60.00	50.00	-16.77	-17.34
6	24.03000	10.08	34.98	24.80	45.06	34.88	60.00	50.00	-14.94	-15.12

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.

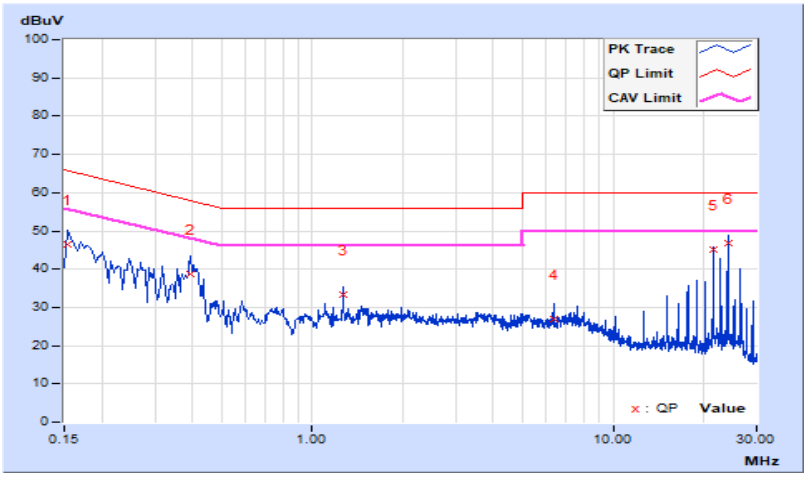


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	CH 0：902.6 MHz		

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	0.15400	9.66	36.93	23.56	46.59	33.22	65.78	55.78	-19.19	-22.56
2	0.39400	9.77	28.84	22.83	38.61	32.60	57.98	47.98	-19.37	-15.38
3	1.26600	9.85	23.58	19.38	33.43	29.23	56.00	46.00	-22.57	-16.77
4	6.33000	10.00	16.98	11.44	26.98	21.44	60.00	50.00	-33.02	-28.56
5	21.52600	10.16	34.98	25.82	45.14	35.98	60.00	50.00	-14.86	-14.02
6	**24.05400**	**10.18**	**36.54**	**28.99**	**46.72**	**39.17**	**60.00**	**50.00**	**-13.28**	**-10.83**

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.



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 and approved according to ISO/IEC 17025.

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

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Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: 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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