FCC Test Report

Report No.:	RFBCWX-WTW-P23120013
FCC ID:	2AGMLEWTJ680E
Test Model:	EWTJ680E
Received Date:	2023/12/4
Test Date:	2023/12/15 ~ 2024/1/12
Issued Date:	2024/1/25
Applicant:	East Wind Technologies, Inc.
Address:	7F-3, No. 390, Sec. 1, Fu-Hsin South Road, Taipei, Taiwan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
FCC Registration / Designation Number:	198487 / TW2021

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Release Control Record

Issue No.	Description	Date Issued
RFBCWX-WTW-P23120013	Original release	2024/1/25

1 Certificate of Conformity

Product:	RF Reader Module
Brand:	EWT
Test Model:	EWTJ680E
Sample Status:	Engineering sample
Applicant:	East Wind Technologies, Inc.
Test Date:	2023/12/15 ~ 2024/1/12
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.225) 47 CFR FCC Part 15, Subpart C (Section 15.215) 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 :  , **Date:** 2024/1/25

Jessica Cheng / Senior Specialist

Approved by :  , **Date:** 2024/1/25

Jeremy Lin / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.225, 15.215)			
FCC Clause	Test Item	Result	Remarks
15.207	Conducted emission test	Pass	Meet the requirement of limit. Minimum passing margin is -12.79dB at 0.54390MHz
15.225 (a)	The field strength of any emissions within the band 13.553-13.567 MHz	Pass	Meet the requirement of limit. Minimum passing margin is -34.9dB at 13.77MHz.
15.225 (b)	The field strength of any emissions within the bands 13.410-13.553 MHz and 13.567-13.710 MHz	Pass	Meet the requirement of limit.
15.225 (c)	The field strength of any emissions within the bands 13.110-13.410 MHz and 13.710-14.010 MHz	Pass	Meet the requirement of limit.
15.225 (d)	The field strength of any emissions appearing outside of the 13.110-14.010 MHz band	Pass	Meet the requirement of limit. Minimum passing margin is -2.1dB at 40.67MHz
15.225 (e)	The frequency tolerance	Pass	Meet the requirement of limit.
15.215 (c)	20dB Bandwidth	Pass	Meet the requirement of limit.

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) (±)
20 dB Bandwidth	-	960 Hz
Frequency tolerance	below 40GHz	0.016 ppm
AC Power Conducted Emissions	150kHz ~ 30MHz	2.9 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.38 dB
	30MHz ~ 1GHz	5.7 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	RF Reader Module
Brand	EWT
Test Model	EWTJ680E
Sample Status	Engineering sample
Power Supply Rating	5Vdc
Modulation Type	ASK
Operating Frequency	13.56MHz
Antenna Type	integrated Antenna
Field Strength	31.1dBuV/m @30m
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. Due to radiated measurements are made and the antenna gain is already accounted for this device, so provide an antenna datasheet and/or antenna measurement report is not required. The antenna dimensions and pictures (include antenna wire length if have) are stated in EUT photo exhibit.
2. 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.

3.2 Description of Test Modes

1 channel is provided to EUT:

Channel	Frequency (MHz)
1	13.56

3.2.1 Test Mode Applicability and Tested Channel Detail

Pre-Scan:	1. EUT can be used in the following ways: XYZ 3-axis. Pre-scan in these ways and find the worst case as a representative test condition. 2. For Radiated Emission Test has mode A~D. Pre-scan these modes and find the worst case as a representative test condition.
Worst Case:	1. X/ Y/ Z Worst Condition: Y Axis. 2. For Radiated Emission Test worst condition: Mode A、Mode B.

Following channel(s) was (were) selected for the final test as listed below:

Test Item	EUT Configure Mode	Tested Channel	Modulation
Conducted emission test	A,B,C,D	13.56MHz	ASK
Radiated Emissions Below 30MHz	A,B	13.56MHz	ASK
Radiated Emissions Above 30MHz	A,B	13.56MHz	ASK
Frequency Stability	B	13.56MHz	unmodulated
20dB Bandwidth	A,B	13.56MHz	ASK
EUT Configure Mode:	A	EUT with NB(Operating mode with RFID card)	
	B	EUT with NB(Operating mode without RFID card)	
	C	EUT with Adapter(Operating mode with RFID card)	
	D	EUT with Adapter(Operating mode without RFID card)	
Note: The distance between EUT and RFID card is 4cm			

3.3 Description of Support Units

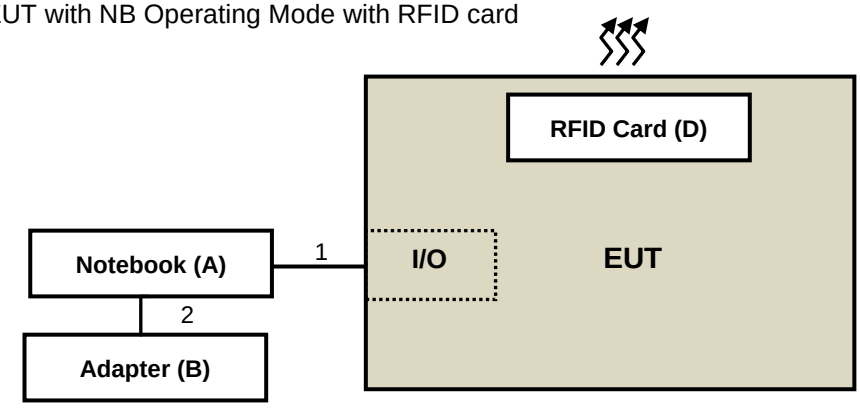
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	NB	Lenovo	81A4	YD02TWDP	NA	Provided by Lab
B.	NB Adapter	Lenovo	ADLX654CCGU2A	NA	NA	Provided by Lab
C.	Adapter	Apple	A1385	NA	NA	Provided by Lab
D.	RFID Card	NA	NA	NA	NA	Provided by Lab

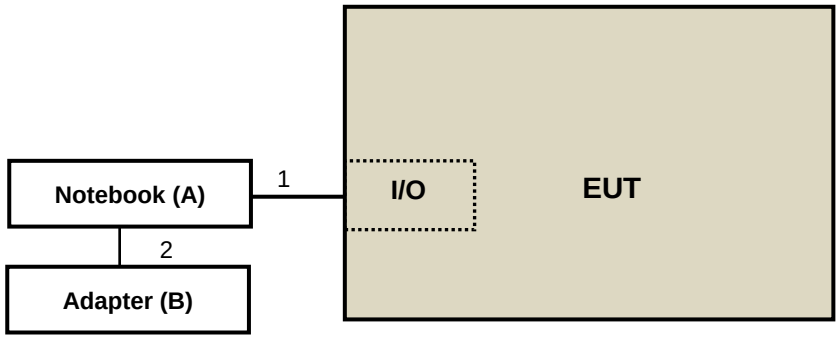
ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/ No)	Cores (Qty.)	Remarks
1.	Test cable	1	1.0	N	0	Supplied by applicant
2.	DC cable	1	1.8	N	0	Provided by Lab

3.3.1 Configuration Of System Under Test

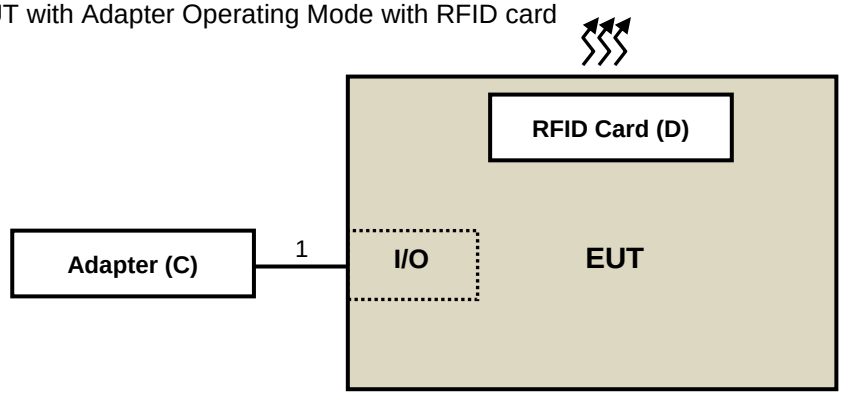
Mode A
EUT with NB Operating Mode with RFID card



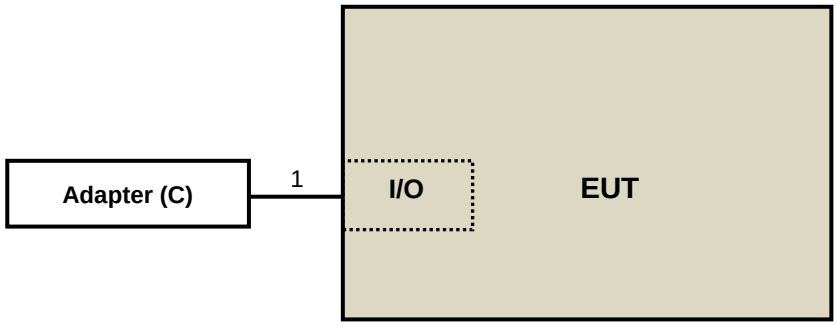
Mode B
EUT with NB Operating Mode without RFID card



Mode C
EUT with Adapter Operating Mode with RFID card



Mode D
EUT with Adapter Operating Mode without RFID card



3.4 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:

FCC Part 15, Subpart C (15.225)

FCC Part 15, Subpart C (15.215)

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 any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 Test Instruments

For Radiated Emission 9 kHz ~ 30 MHz Test:

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until
MXE EMI Receiver Agilent	N9038A	MY51210129	2023/3/24	2024/3/23
MXE EMI Receiver Agilent	N9038A	MY51210137	2023/6/5	2024/6/4
Signal Analyzer R&S	FSV40	101544	2023/5/9	2024/5/8
Preamplifier EMCI	EMC001340	980269	2023/6/27	2024/6/26
Loop Antenna EMCI	LPA600	270	2023/9/4	2024/9/3
RF Coaxial Cable Pacific	8D-FB	Cable-CH6-02	2023/6/27	2024/6/26
Turn Table ADT	TT100	0306	NA	NA
Tower ADT	AT100	0306	NA	NA
Software BVADT	Radiated_V8.7.08	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 Linkou 966 Chamber 6 (CH 6).
3. Tested Date: 2023/12/15

For Radiated Emission 30 MHz ~ 1 GHz Test:

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until
MXE EMI Receiver Agilent	N9038A	MY51210129	2023/3/24	2024/3/23
MXE EMI Receiver Agilent	N9038A	MY51210137	2023/6/5	2024/6/4
Signal Analyzer R&S	FSV40	101544	2023/5/9	2024/5/8
Preamplifier HP	8447D	2432A03504	2023/2/16	2024/2/15
Bi_Log Antenna Schwarzbeck	VULB 9168	137	2023/10/13	2024/10/12
RF Coaxial Cable Pacific	8D-FB	Cable-CH6-02	2023/6/27	2024/6/26
Coupling / Decoupling Network Schwarzbeck	CDNE-M2	00097	2023/5/25	2024/5/24
Coupling / Decoupling Network Schwarzbeck	CDNE-M3	00091	2023/5/25	2024/5/24
Turn Table ADT	TT100	0306	NA	NA
Tower ADT	AT100	0306	NA	NA
Software BVADT	Radiated_V8.7.08	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 Linkou 966 Chamber 6 (CH 6) , The test site validated date: 2023/10/21 (NSA)
3. Tested Date: 2023/12/27

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, except for the frequency band (9kHz-90kHz, 110kHz-490kHz) set to average detect function and peak detect function.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 200Hz at frequency band (9kHz-150kHz) and 9kHz at frequency below 30MHz (except 9kHz-150kHz).
2. There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for below 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.

Note:

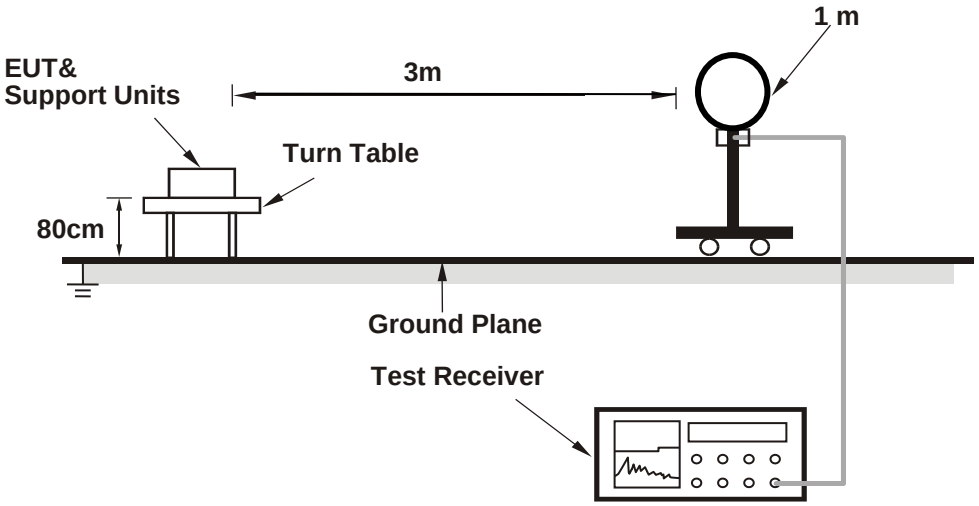
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

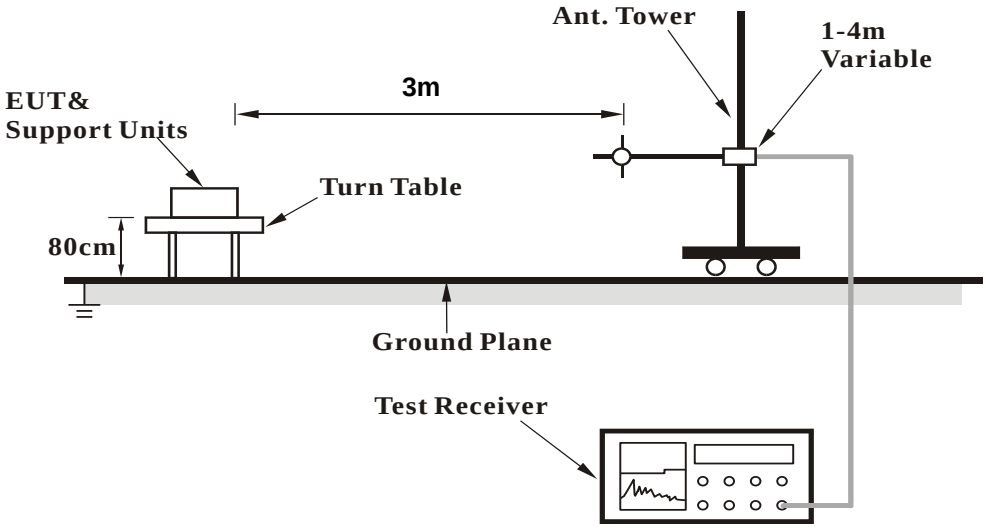
No deviation.

4.1.5 Test Set Up

For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



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

KDB 414788 OFS and Chamber Correlation Justification
- Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in regulations; however, an attempt should be made to avoid making measurements in the near field.
- Open-field site and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

4.1.6 EUT Operating Conditions

Mode A

a. Connected the EUT to Notebook.
b. Put the RFID card on the EUT.
c. Set the EUT under transmission condition continuously at specific channel frequency.

Mode B

a. Connected the EUT to Notebook.
b. Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

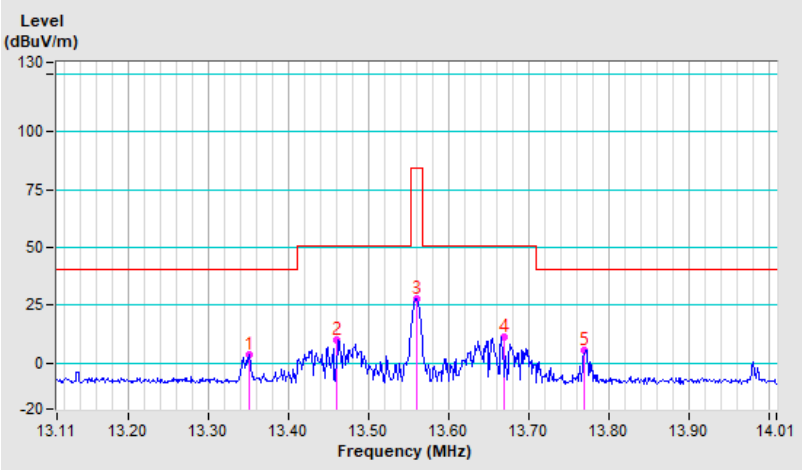
Frequency Range: 13.11 MHz ~ 14.01 MHz
Mode A

RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	13.11 MHz ~ 14.01 MHz	Detector Function & Bandwidth	Quasi-Peak (QP), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Test Date	Jed Wu		

Antenna Polarity : Parallel								
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	13.35	3.5 QP	40.5	-37.0	1.00	264	42.3	-38.8
2	13.46	10.0 QP	50.5	-40.5	1.00	264	48.8	-38.8
3	*13.56	27.8 QP	84.0	-56.2	1.00	264	66.7	-38.9
4	13.67	11.1 QP	50.5	-39.4	1.00	264	50.0	-38.9
5	**13.77**	**5.6 QP**	**40.5**	**-34.9**	**1.00**	**264**	**44.5**	**-38.9**

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) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.
   Distance factor@30 m = 40*log(3/30) = -40 dB

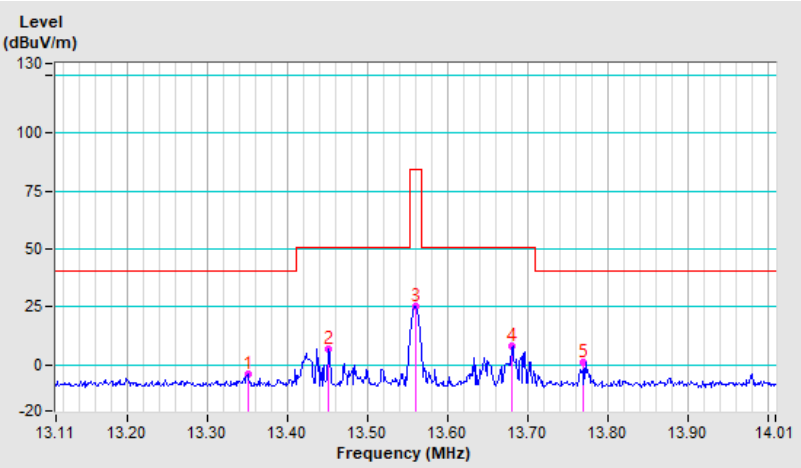


RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	13.11 MHz ~ 14.01 MHz	Detector Function & Bandwidth	Quasi-Peak (QP), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Test Date	Jed Wu		

Antenna Polarity : Perpendicular								
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	13.35	-4.0 QP	40.5	-44.5	1.00	2	34.8	-38.8
2	13.45	6.9 QP	50.5	-43.6	1.00	2	45.7	-38.8
3	*13.56	24.9 QP	84.0	-59.1	1.00	2	63.8	-38.9
4	13.68	7.9 QP	50.5	-42.6	1.00	2	46.8	-38.9
5	13.77	0.9 QP	40.5	-39.6	1.00	2	39.8	-38.9

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) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.
   Distance factor@30 m = 40*log(3/30) = -40 dB

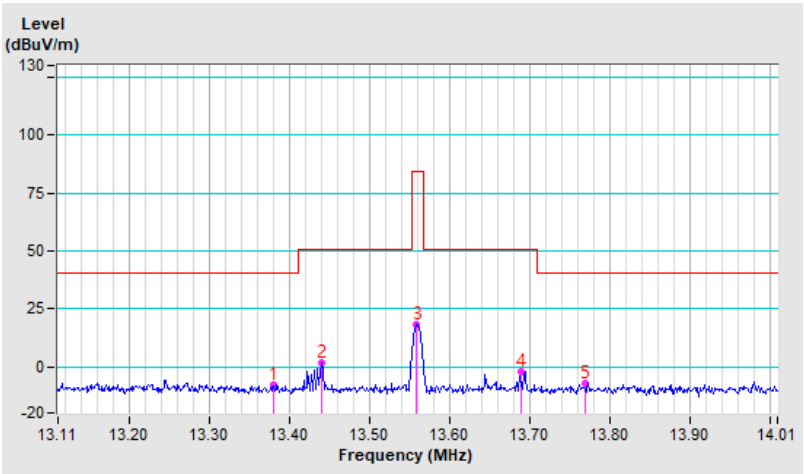


RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	13.11 MHz ~ 14.01 MHz	Detector Function & Bandwidth	Quasi-Peak (QP), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Test Date	Jed Wu		

Antenna Polarity : Ground-parallel								
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	13.38	-8.0 QP	40.5	-48.5	1.00	279	30.8	-38.8
2	13.44	1.7 QP	50.5	-48.8	1.00	279	40.5	-38.8
3	*13.56	18.4 QP	84.0	-65.6	1.00	279	57.3	-38.9
4	13.69	-1.9 QP	50.5	-52.4	1.00	279	37.0	-38.9
5	13.77	-7.1 QP	40.5	-47.6	1.00	279	31.8	-38.9

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) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.
   Distance factor@30 m = 40*log(3/30) = -40 dB



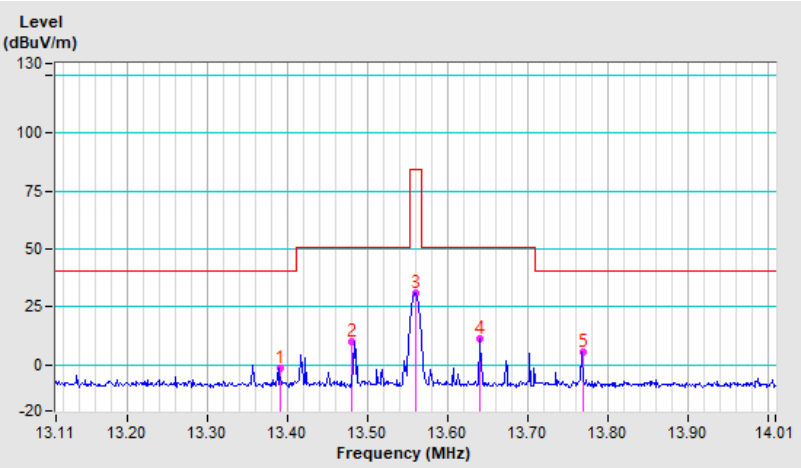
Mode B

RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	13.11 MHz ~ 14.01 MHz	Detector Function & Bandwidth	Quasi-Peak (QP), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Test Date	Jed Wu		

Antenna Polarity : Parallel								
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	13.39	-1.4 QP	40.5	-41.9	1.00	273	37.4	-38.8
2	13.48	9.8 QP	50.5	-40.7	1.00	273	48.6	-38.8
3	*13.56	31.1 QP	84.0	-52.9	1.00	273	70.0	-38.9
4	13.64	11.0 QP	50.5	-39.5	1.00	273	49.9	-38.9
5	13.77	5.5 QP	40.5	-35.0	1.00	273	44.4	-38.9

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) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.
   Distance factor@30 m = 40*log(3/30) = -40 dB

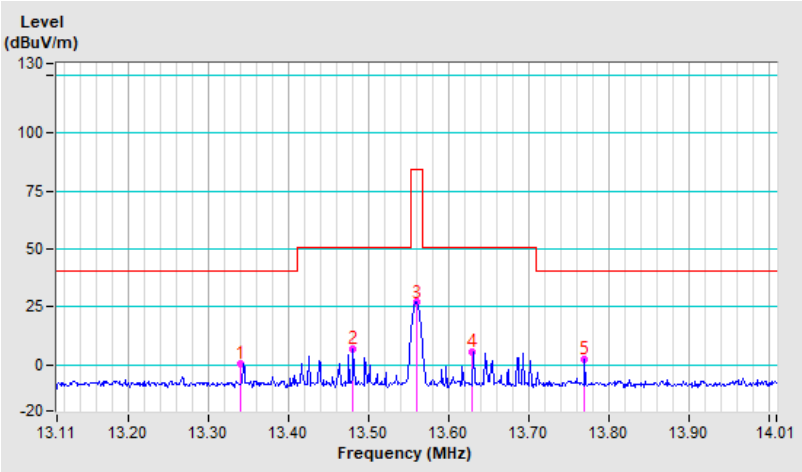


RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	13.11 MHz ~ 14.01 MHz	Detector Function & Bandwidth	Quasi-Peak (QP), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Test Date	Jed Wu		

Antenna Polarity : Perpendicular								
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	13.34	0.3 QP	40.5	-40.2	1.00	171	39.1	-38.8
2	13.48	6.8 QP	50.5	-43.7	1.00	171	45.6	-38.8
3	*13.56	26.8 QP	84.0	-57.2	1.00	171	65.7	-38.9
4	13.63	5.4 QP	50.5	-45.1	1.00	171	44.3	-38.9
5	13.77	2.2 QP	40.5	-38.3	1.00	171	41.1	-38.9

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) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.
   Distance factor@30 m = 40*log(3/30) = -40 dB

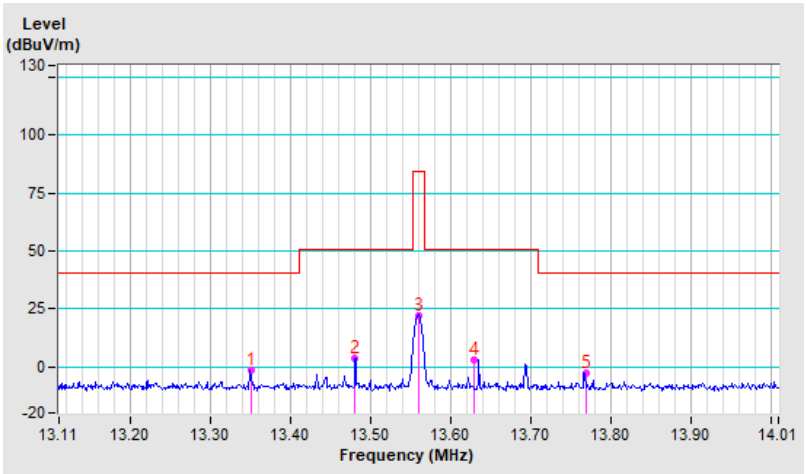


RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	13.11 MHz ~ 14.01 MHz	Detector Function & Bandwidth	Quasi-Peak (QP), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Test Date	Jed Wu		

Antenna Polarity : Ground-parallel								
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	13.35	-1.3 QP	40.5	-41.8	1.00	262	37.5	-38.8
2	13.48	3.7 QP	50.5	-46.8	1.00	262	42.5	-38.8
3	*13.56	22.3 QP	84.0	-61.7	1.00	262	61.2	-38.9
4	13.63	2.8 QP	50.5	-47.7	1.00	262	41.7	-38.9
5	13.77	-2.7 QP	40.5	-43.2	1.00	262	36.2	-38.9

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) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.
   Distance factor@30 m = 40*log(3/30) = -40 dB



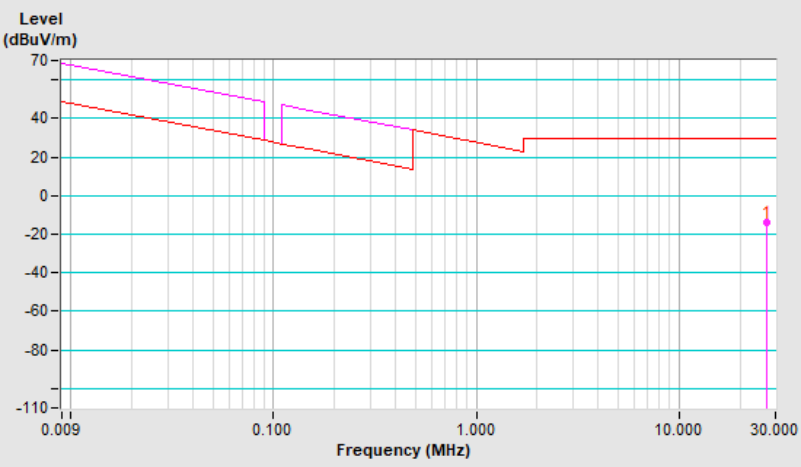
Frequency Range: 9 kHz ~ 30 MHz
Mode A

RF Mode	RFID	**Channel**	CH 1：13.56 MHz
Frequency Range	9 kHz ~ 30 MHz	**Detector Function & Bandwidth**	Quasi-Peak (QP), 9 kHz
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	25°C, 75% RH
Test Date	Jed Wu		

Antenna Polarity : Parallel								
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	27.12	-13.8 QP	29.5	-43.3	1.00	301	26.9	-40.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.
   Distance factor@30 m = 40*log(3/30) = -40 dB

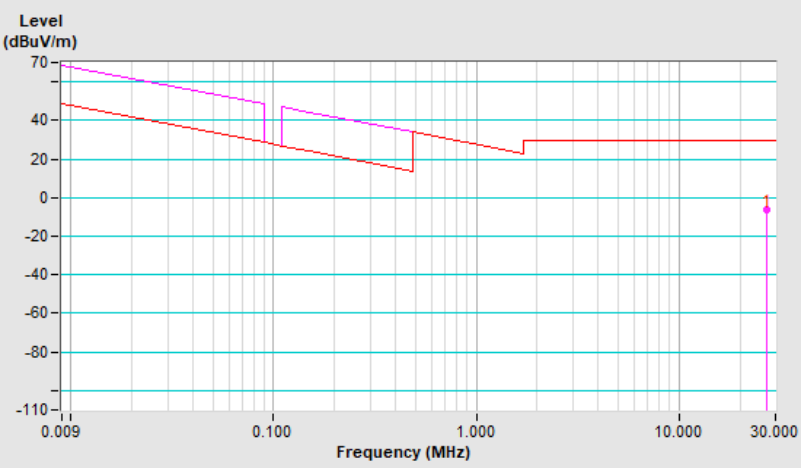


RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	9 kHz ~ 30 MHz	Detector Function & Bandwidth	Quasi-Peak (QP), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Test Date	Jed Wu		

Antenna Polarity : Perpendicular								
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	27.12	-6.6 QP	29.5	-36.1	1.00	180	34.1	-40.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.
   Distance factor@30 m = 40*log(3/30) = -40 dB

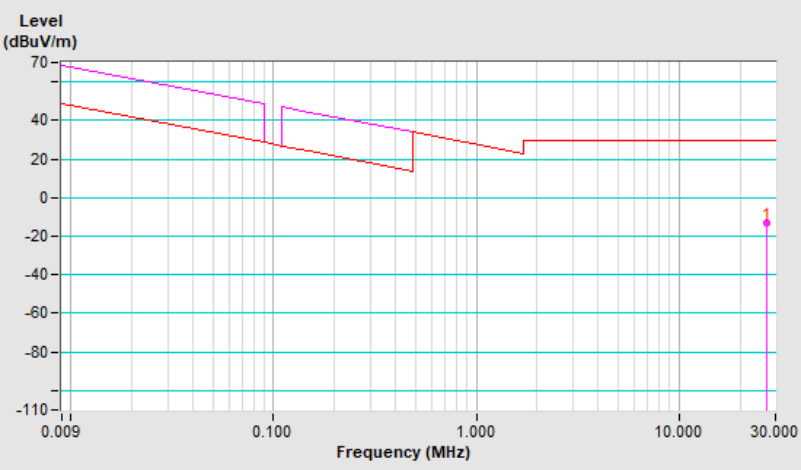


RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	9 kHz ~ 30 MHz	Detector Function & Bandwidth	Quasi-Peak (QP), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Test Date	Jed Wu		

Antenna Polarity : Ground-parallel								
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	27.12	-13.5 QP	29.5	-43.0	1.00	303	27.2	-40.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.
   Distance factor@30 m = 40*log(3/30) = -40 dB



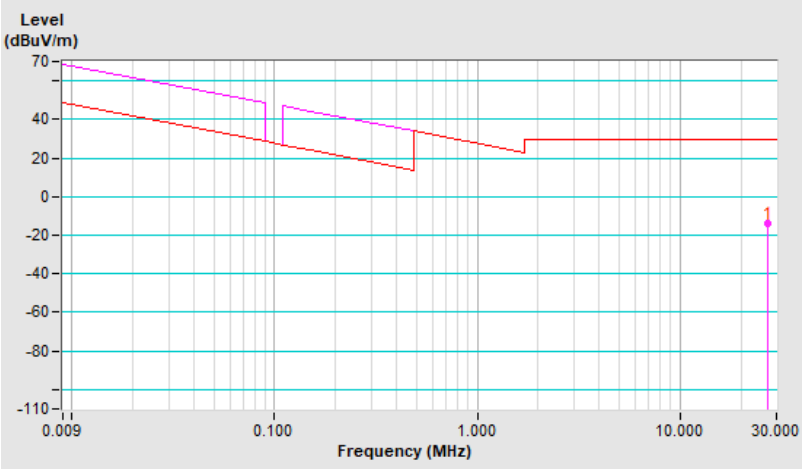
Mode B

RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	9 kHz ~ 30 MHz	Detector Function & Bandwidth	Quasi-Peak (QP), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Test Date	Jed Wu		

Antenna Polarity : Parallel								
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	27.12	-13.8 QP	29.5	-43.3	1.00	231	26.9	-40.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.
   Distance factor@30 m = 40*log(3/30) = -40 dB

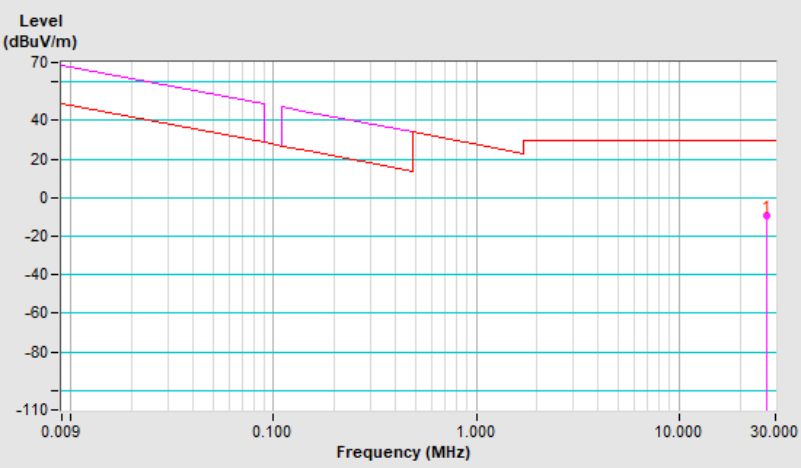


RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	9 kHz ~ 30 MHz	Detector Function & Bandwidth	Quasi-Peak (QP), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Test Date	Jed Wu		

Antenna Polarity : Perpendicular								
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	27.12	-9.5 QP	29.5	-39.0	1.00	257	31.2	-40.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.
   Distance factor@30 m = 40*log(3/30) = -40 dB

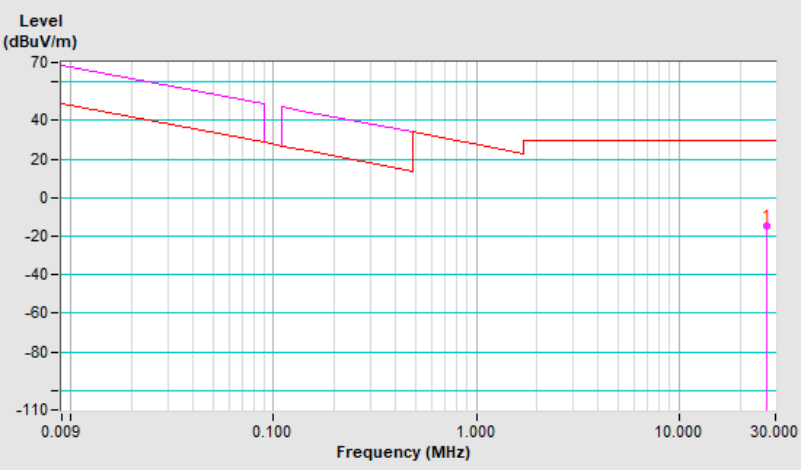


RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	9 kHz ~ 30 MHz	Detector Function & Bandwidth	Quasi-Peak (QP), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Test Date	Jed Wu		

Antenna Polarity : Ground-parallel								
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	27.14	-14.7 QP	29.5	-44.2	1.00	289	26.0	-40.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for 0.49 ~ 30 MHz is 3 m, extrapolate the measured field strength to a distance of 30 meters.
   Distance factor@30 m = 40*log(3/30) = -40 dB



Frequency Range: 30 MHz ~ 1 GHz

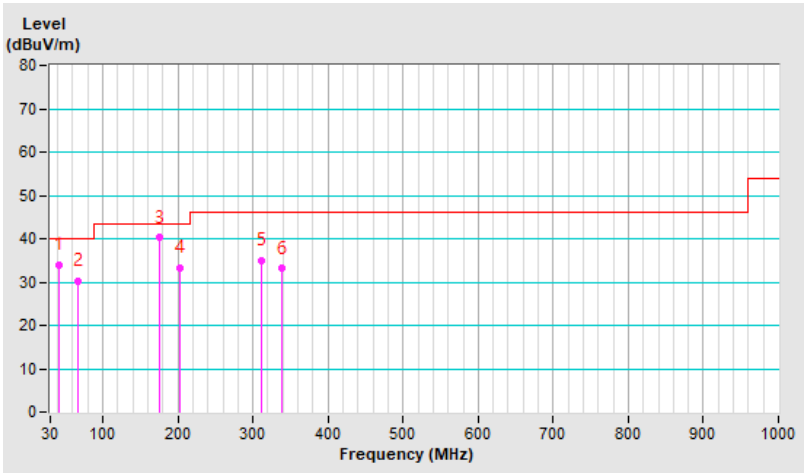
Mode A

RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	Jed Wu		

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	40.67	33.9 QP	40.0	-6.1	1.26 H	158	43.4	-9.5
2	67.78	30.1 QP	40.0	-9.9	1.07 H	143	40.5	-10.4
3	176.28	40.2 QP	43.5	-3.3	1.10 H	214	49.3	-9.1
4	203.39	33.2 QP	43.5	-10.3	1.03 H	224	44.2	-11.0
5	311.88	34.9 QP	46.0	-11.1	1.15 H	214	40.8	-5.9
6	338.99	33.1 QP	46.0	-12.9	1.02 H	214	38.6	-5.5
7	891.36	36.6 QP	46.0	-9.4	1.00 H	340	30.4	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.

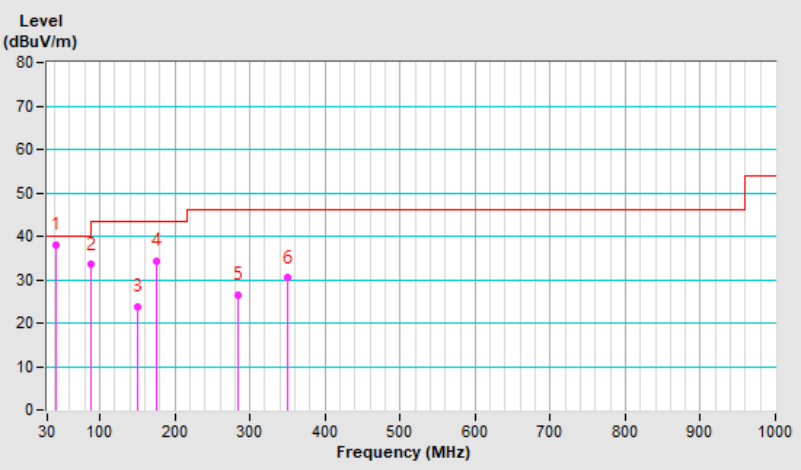


RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	Jed Wu		

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	**40.67**	**37.9 QP**	**40.0**	**-2.1**	**1.05 V**	**140**	**47.4**	**-9.5**
2	88.93	33.4 QP	43.5	-10.1	1.13 V	236	47.7	-14.3
3	150.28	23.8 QP	43.5	-19.7	1.24 V	297	32.2	-8.4
4	176.28	34.2 QP	43.5	-9.3	1.19 V	186	43.3	-9.1
5	284.77	26.4 QP	46.0	-19.6	1.20 V	287	33.2	-6.8
6	350.83	30.4 QP	46.0	-15.6	1.04 V	188	35.9	-5.5

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.



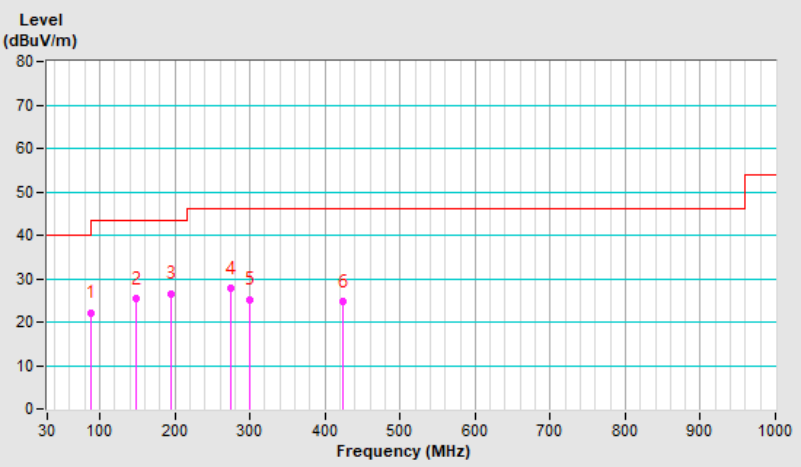
Mode B

RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	Jed Wu		

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	88.35	22.0 QP	43.5	-21.5	1.25 H	140	36.4	-14.4
2	147.71	25.3 QP	43.5	-18.2	1.06 H	202	34.0	-8.7
3	194.71	26.4 QP	43.5	-17.1	1.10 H	349	37.4	-11.0
4	274.83	27.7 QP	46.0	-18.3	1.19 H	182	34.8	-7.1
5	299.27	25.2 QP	46.0	-20.8	1.25 H	207	31.6	-6.4
6	423.00	24.6 QP	46.0	-21.4	1.14 H	281	28.1	-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.

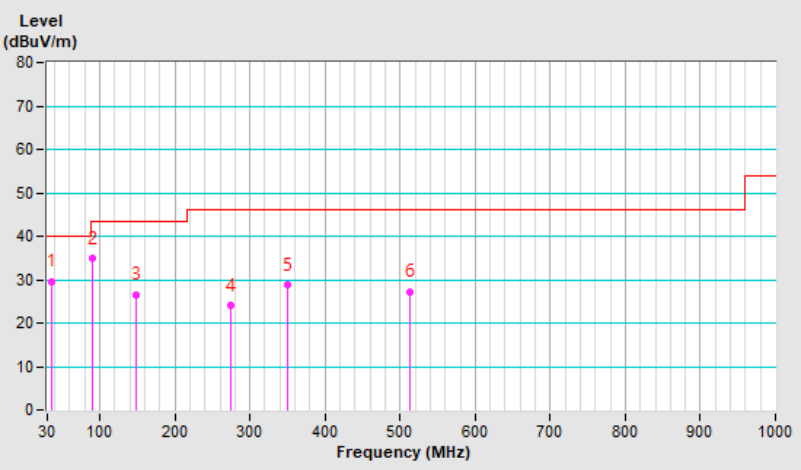


RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	Jed Wu		

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	35.77	29.6 QP	40.0	-10.4	1.05 V	282	39.9	-10.3
2	89.36	34.8 QP	43.5	-8.7	1.16 V	289	49.2	-14.4
3	147.52	26.6 QP	43.5	-16.9	1.21 V	289	35.2	-8.6
4	274.97	23.9 QP	46.0	-22.1	1.03 V	154	31.0	-7.1
5	350.68	28.7 QP	46.0	-17.3	1.18 V	209	34.2	-5.5
6	513.25	27.2 QP	46.0	-18.8	1.23 V	96	28.9	-1.7

Remarks:

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



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until
EMI Test Receiver R&S	ESR3	102413	2023/2/7	2024/2/6
EMI Test Receiver R&S	ESCS 30	100276	2023/4/20	2024/4/19
LISN R&S	ENV216	101197	2023/7/12	2024/7/11
LISN R&S	ENV216	101196	2023/5/22	2024/5/21
LISN Schwarzbeck	NNLK 8121	8121-808	2023/5/2	2024/5/1
LISN Schwarzbeck	NNLK 8121	8121-00759	2023/8/21	2024/8/20
LISN Schwarzbeck	NNLK 8121	8121-731	2023/6/9	2024/6/8
LISN Schwarzbeck	NNLK 8129	8129229	2023/6/27	2024/6/26
LISN R&S	ESH3-Z5	100220	2023/11/22	2024/11/21
Coupling / Decoupling Network TESEQ	CDN A201A	44601	2023/12/14	2024/12/13
RF Coaxial Cable PEWC	5D-FB	Cable-CO3-01	2023/9/13	2024/9/12
Fixed Attenuator STI	STI02-2200-10	NO.3	2023/10/20	2024/10/19
High Voltage Probe Schwarzbeck	TK9420	00982	2023/12/11	2024/12/10
Fixed Attenuator EMEC	EM-ATT30002602NN	NA	2023/3/24	2024/3/23
50 ohm terminal resistance LYNICS	0900510	E1-011286	2023/9/21	2024/9/20
50 ohm terminal resistance LYNICS	0900510	E1-011285	2023/9/21	2024/9/20
50 ohm terminal resistance LYNICS	0900510	E1-01-305	2023/2/13	2024/2/12
Software 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 Linkou Conduction 03.
3. The VCCI Site Registration No. C-10274.
4. Tested Date: 2024/1/12

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.

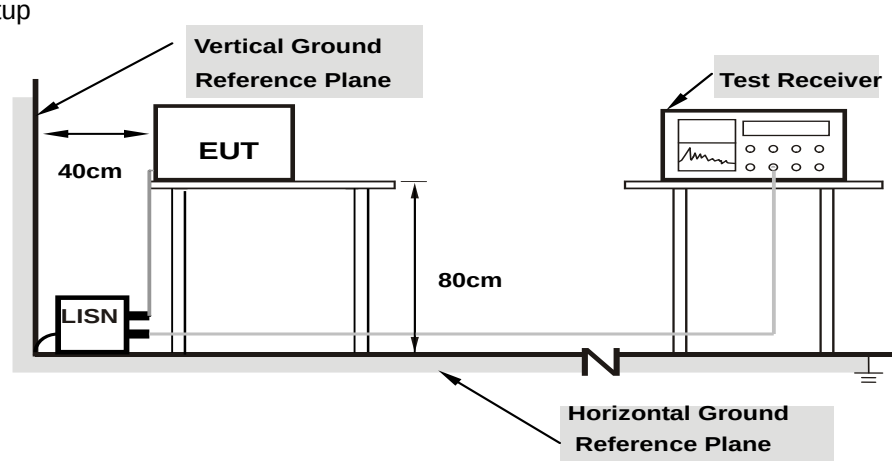
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

Mode A

a. Connected the EUT to Notebook.
b. Put the RFID card on the EUT.
c. Set the EUT under transmission condition continuously at specific channel frequency.

Mode B

a. Connected the EUT to Notebook.
b. Set the EUT under transmission condition continuously at specific channel frequency.

Mode C

a. Connected the EUT to Adapter.
b. Put the RFID card on the EUT.
c. Set the EUT under transmission condition continuously at specific channel frequency.

Mode D

a. Connected the EUT to Adapter.
b. Set the EUT under transmission condition continuously at specific channel frequency.

4.2.7 Test Results

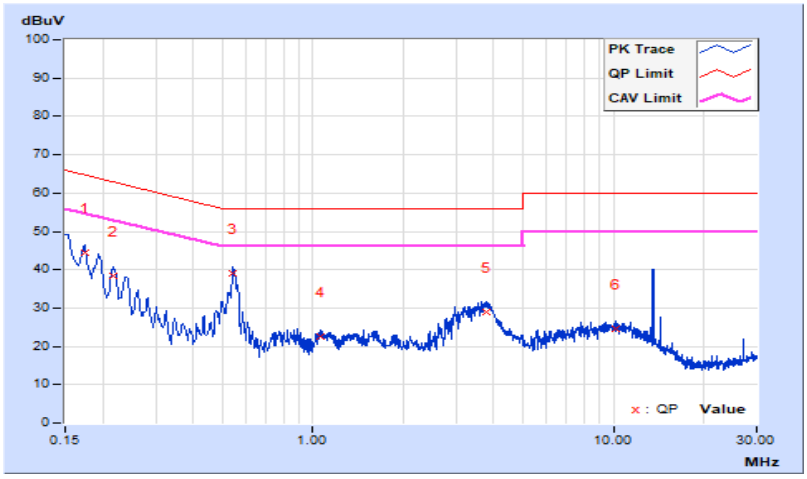
Mode A

RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	William Su		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17395	9.64	34.82	16.08	44.46	25.72	64.77	54.77	-20.31	-29.05
2	0.21746	9.68	28.82	13.14	38.50	22.82	62.92	52.92	-24.42	-30.10
3	**0.54390**	**9.76**	**29.42**	**23.45**	**39.18**	**33.21**	**56.00**	**46.00**	**-16.82**	**-12.79**
4	1.05874	9.79	12.84	7.60	22.63	17.39	56.00	46.00	-33.37	-28.61
5	3.76464	9.99	19.11	8.34	29.10	18.33	56.00	46.00	-26.90	-27.67
6	10.23220	10.35	14.24	7.40	24.59	17.75	60.00	50.00	-35.41	-32.25

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

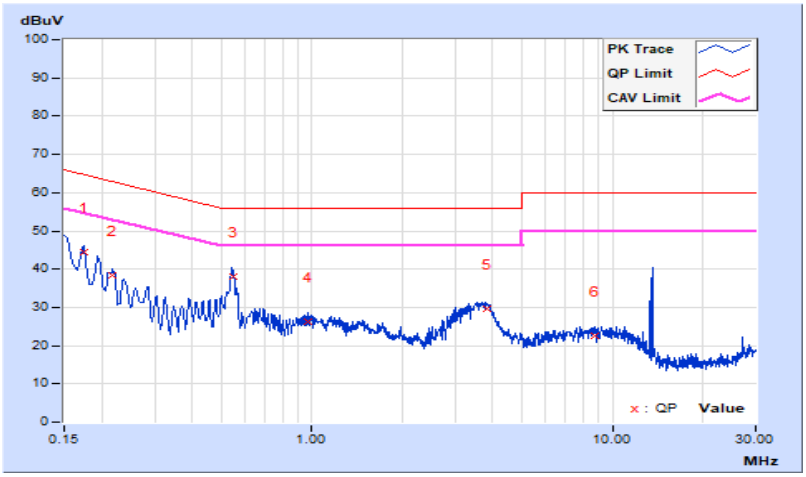


RF Mode	RFID	**Channel**	CH 1：13.56 MHz
Frequency Range	150 kHz ~ 30 MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	25°C, 75% RH
Tested By	William Su		

Phase Of Power : Neutral (N)										
No	**Frequency (MHz)**	**Correction Factor (dB)**	**Reading Value (dBuV)**		**Emission Level (dBuV)**		**Limit (dBuV)**		**Margin (dB)**	
			Q.P.	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**	**Q.P.**	**AV.**
1	0.17395	9.70	34.59	18.85	44.29	28.55	64.77	54.77	-20.48	-26.22
2	0.21746	9.72	28.51	15.96	38.23	25.68	62.92	52.92	-24.69	-27.24
3	0.54789	9.68	28.30	21.68	37.98	31.36	56.00	46.00	-18.02	-14.64
4	0.97374	9.75	16.59	10.63	26.34	20.38	56.00	46.00	-29.66	-25.62
5	3.84446	10.05	19.56	9.56	29.61	19.61	56.00	46.00	-26.39	-26.39
6	8.71163	10.30	12.17	5.27	22.47	15.57	60.00	50.00	-37.53	-34.43

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



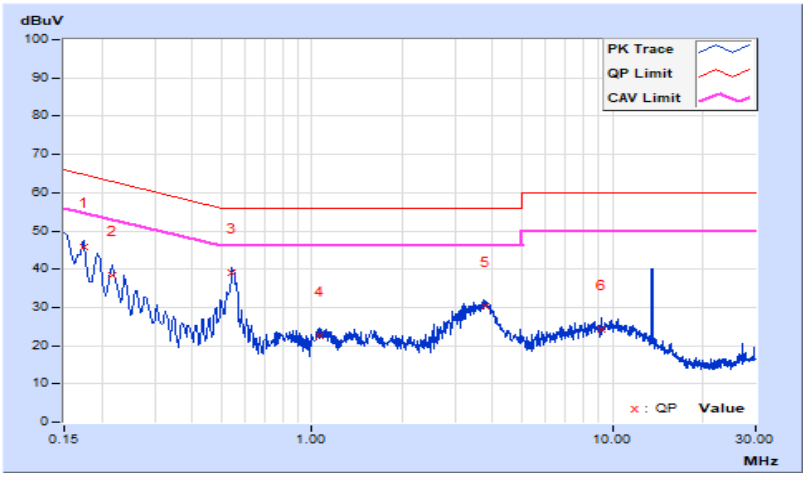
Mode B

RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	William Su		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17383	9.64	36.01	17.46	45.65	27.10	64.78	54.78	-19.13	-27.68
2	0.21785	9.68	28.68	13.12	38.36	22.80	62.90	52.90	-24.54	-30.10
3	0.54390	9.76	29.37	23.39	39.13	33.15	56.00	46.00	-16.87	-12.85
4	1.05475	9.79	12.78	6.17	22.57	15.96	56.00	46.00	-33.43	-30.04
5	3.77262	9.99	20.17	8.34	30.16	18.33	56.00	46.00	-25.84	-27.67
6	9.19454	10.30	13.94	6.68	24.24	16.98	60.00	50.00	-35.76	-33.02

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

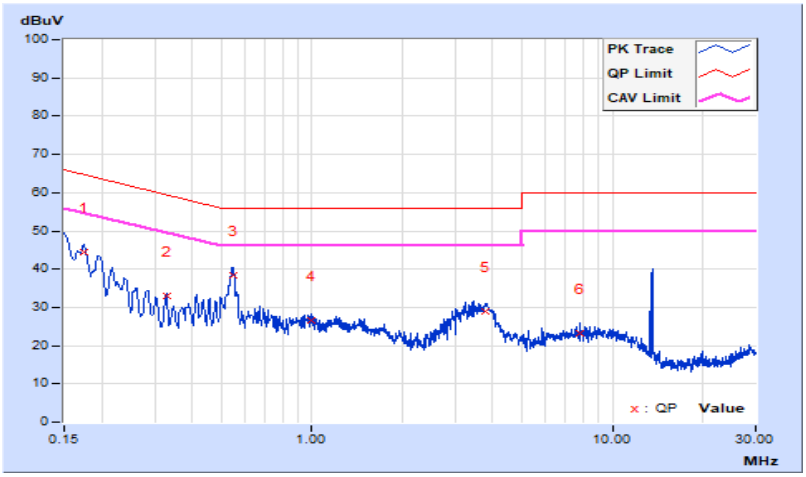


RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	William Su		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17383	9.70	34.91	18.98	44.61	28.68	64.78	54.78	-20.17	-26.10
2	0.32887	9.68	23.40	16.66	33.08	26.34	59.48	49.48	-26.40	-23.14
3	0.54789	9.68	28.71	22.06	38.39	31.74	56.00	46.00	-17.61	-14.26
4	0.99186	9.75	16.89	10.14	26.64	19.89	56.00	46.00	-29.36	-26.11
5	3.76863	10.04	18.80	8.69	28.84	18.73	56.00	46.00	-27.16	-27.27
6	7.80966	10.26	13.12	6.28	23.38	16.54	60.00	50.00	-36.62	-33.46

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



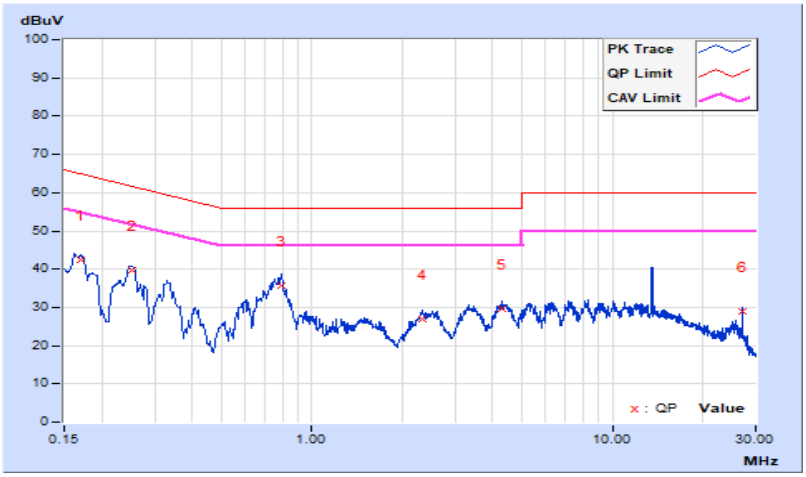
Mode C

RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	William Su		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16976	9.63	32.80	12.47	42.43	22.10	64.97	54.97	-22.54	-32.87
2	0.25137	9.69	29.89	11.15	39.58	20.84	61.71	51.71	-22.13	-30.87
3	0.79533	9.78	25.77	18.31	35.55	28.09	56.00	46.00	-20.45	-17.91
4	2.31990	9.87	17.03	11.20	26.90	21.07	56.00	46.00	-29.10	-24.93
5	4.31540	10.03	19.64	13.24	29.67	23.27	56.00	46.00	-26.33	-22.73
6	27.11812	10.78	18.19	15.86	28.97	26.64	60.00	50.00	-31.03	-23.36

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

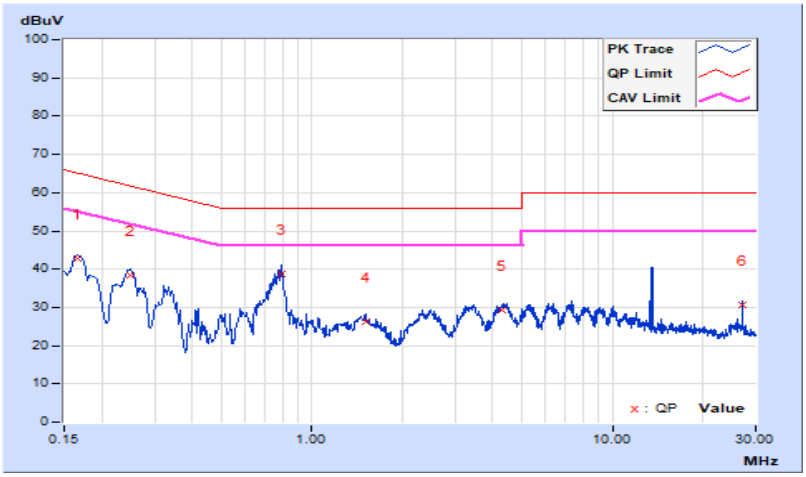


RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	William Su		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16534	9.68	33.00	14.48	42.68	24.16	65.19	55.19	-22.51	-31.03
2	0.24808	9.71	28.75	12.50	38.46	22.21	61.82	51.82	-23.36	-29.61
3	0.79134	9.72	28.84	20.69	38.56	30.41	56.00	46.00	-17.44	-15.59
4	1.50573	9.82	16.59	10.83	26.41	20.65	56.00	46.00	-29.59	-25.35
5	4.27948	10.07	19.08	13.66	29.15	23.73	56.00	46.00	-26.85	-22.27
6	27.11812	10.84	19.94	15.41	30.78	26.25	60.00	50.00	-29.22	-23.75

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



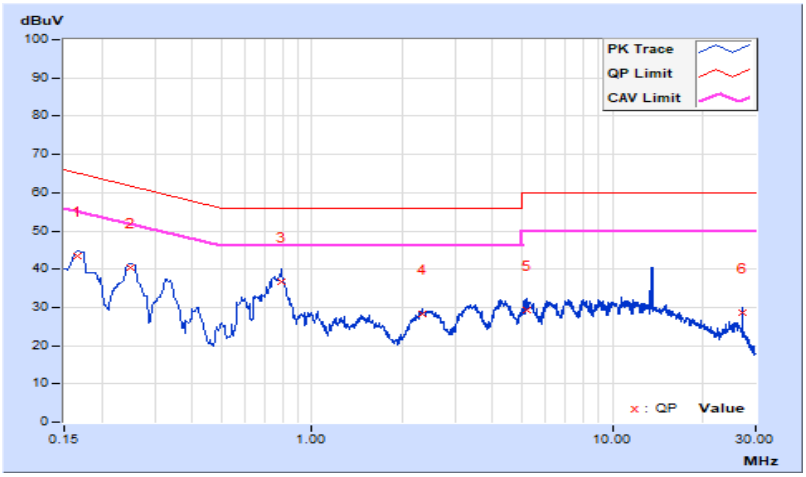
Mode D

RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	William Su		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16534	9.62	33.96	14.94	43.58	24.56	65.19	55.19	-21.61	-30.63
2	0.24977	9.69	30.67	12.53	40.36	22.22	61.76	51.76	-21.40	-29.54
3	0.79077	9.78	26.88	18.37	36.66	28.15	56.00	46.00	-19.34	-17.85
4	2.32290	9.87	18.29	12.69	28.16	22.56	56.00	46.00	-27.84	-23.44
5	5.17161	10.07	19.10	12.86	29.17	22.93	60.00	50.00	-30.83	-27.07
6	27.11812	10.78	17.79	15.14	28.57	25.92	60.00	50.00	-31.43	-24.08

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

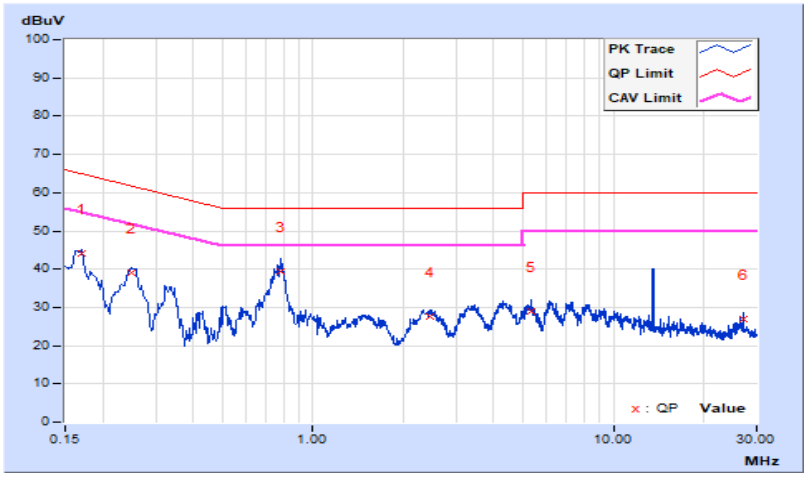


RF Mode	RFID	Channel	CH 1：13.56 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	William Su		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16931	9.69	34.49	15.56	44.18	25.25	64.99	54.99	-20.81	-29.74
2	0.24977	9.71	29.42	13.09	39.13	22.80	61.76	51.76	-22.63	-28.96
3	0.77937	9.72	29.70	20.51	39.42	30.23	56.00	46.00	-16.58	-15.77
4	2.45504	9.92	17.85	12.69	27.77	22.61	56.00	46.00	-28.23	-23.39
5	5.30332	10.13	18.69	13.15	28.82	23.28	60.00	50.00	-31.18	-26.72
6	27.11812	10.84	16.17	10.27	27.01	21.11	60.00	50.00	-32.99	-28.89

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

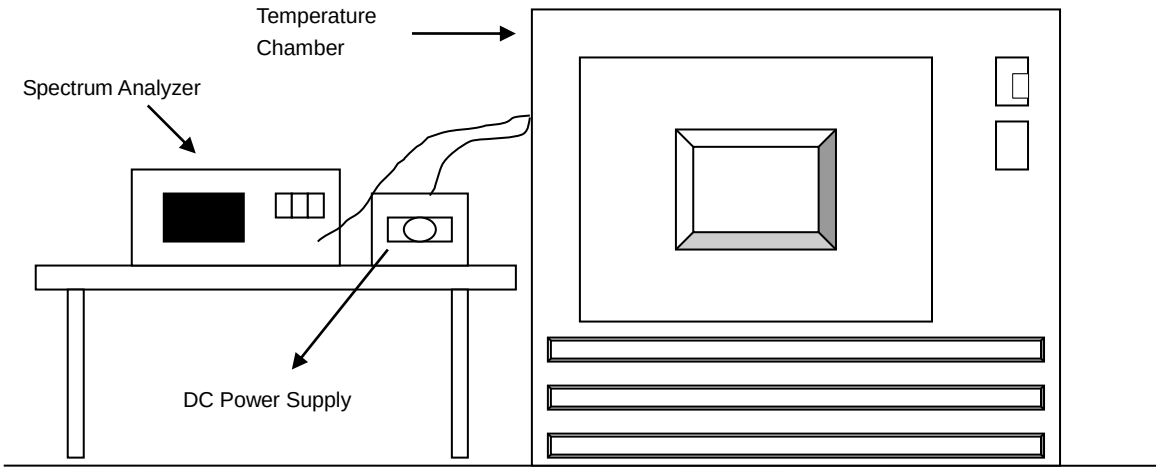


4.3 Frequency Stability

4.3.1 Limits of Frequency Stability Measurement

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of –20 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

4.3.2 Test Setup



4.3.3 Test Instruments

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Programmable DC Power Supply (IDRC)	DSP80-180WE	701217	2023/3/2	2024/3/1
PXA Signal Analyzer Keysight	N9030A	MY54490260	2023/7/13	2024/7/12
Signal Analyzer R&S	FSV40	101042	2023/9/5	2024/9/4
		101544	2023/5/9	2024/5/8
Software	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A
Temperature & Humidity Chamber Terchy	MHU-225AU	920409	2023/6/26	2024/6/25

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 LK - Oven
3. Tested Date: 2023/12/26

4.3.4 Test Procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.

b. Turned the EUT on and coupled its output to a spectrum analyzer.

c. Turned the EUT off and set the chamber to the highest temperature specified.

d. Allowed sufficient time (approximately 30 min) for the temperature of the chamber to stabilize then turned the EUT on and measured the operating frequency.

e. Repeated step c and d with the temperature chamber set to the lowest temperature.

f. The test chamber was allowed to stabilize at +25 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

Same as Item 4.1.6.

4.3.7 Test Result

Mode B

Input Power:	5 Vdc	Environmental Conditions:	25°C, 76% RH	Tested By:	Dalen Dai

Frequency Stability Versus Temperature									
Operating Frequency: 13.56 MHz									
Temp. (℃)	Power Supply (Vdc)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
50	5	13.55929	-0.00524	13.55929	-0.00524	13.55929	-0.00524	13.55929	-0.00524
40	5	13.55931	-0.00509	13.55931	-0.00509	13.55931	-0.00509	13.55931	-0.00509
30	5	13.55937	-0.00465	13.55936	-0.00472	13.55937	-0.00465	13.55937	-0.00465
20	5	13.55935	-0.00479	13.55935	-0.00479	13.55935	-0.00479	13.55934	-0.00487
10	5	13.55931	-0.00509	13.55932	-0.00501	13.55931	-0.00509	13.55931	-0.00509
0	5	13.55934	-0.00487	13.55934	-0.00487	13.55934	-0.00487	13.55935	-0.00479
-10	5	13.5593	-0.00516	13.55931	-0.00509	13.55931	-0.00509	13.55931	-0.00509
-20	5	13.55939	-0.00450	13.55939	-0.00450	13.55939	-0.00450	13.55939	-0.00450

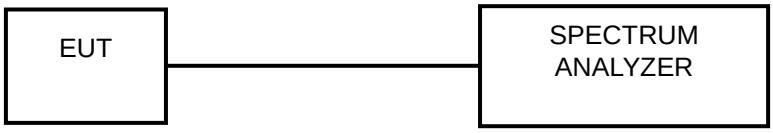
Frequency Stability Versus Voltage									
Operating Frequency: 13.56 MHz									
Temp. (℃)	Power Supply (Vdc)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	5.5	13.55935	-0.00479	13.55935	-0.00479	13.55935	-0.00479	13.55934	-0.00487
	5	13.55935	-0.00479	13.55935	-0.00479	13.55935	-0.00479	13.55934	-0.00487
	4.5	13.55935	-0.00479	13.55935	-0.00479	13.55935	-0.00479	13.55934	-0.00487

4.4 20dB Bandwidth

4.4.1 Limits Of 20dB Bandwidth Measurement

The 20dB bandwidth shall be specified in operating frequency band.

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.3.3 to get information of above instrument.

4.4.4 Test Procedures

RBW=approximately 1~5% of the emission bandwidth and VBW ≥ 3 RBW.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

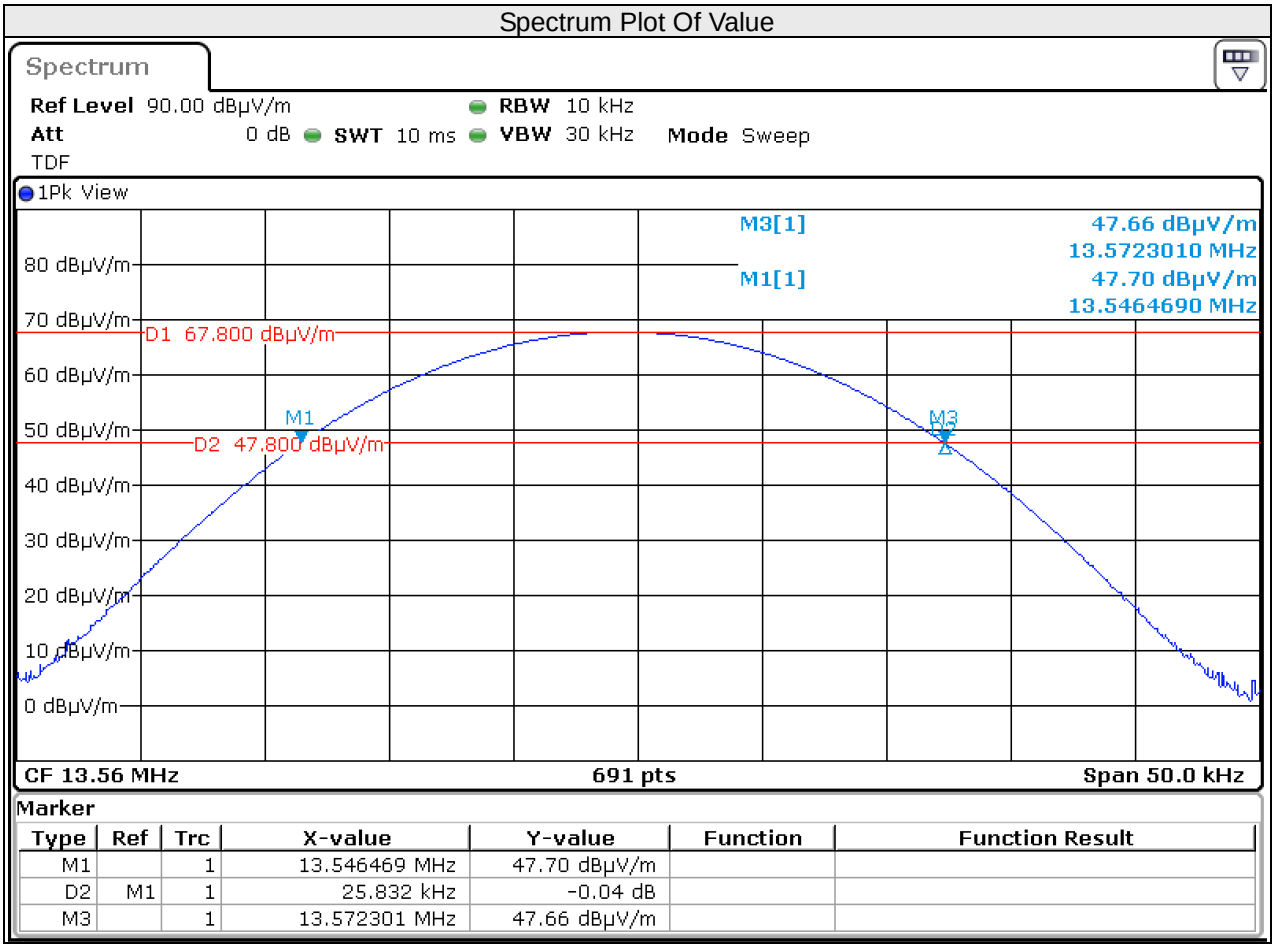
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.4.7 Test Results

Mode A

20dBc Point (Low)	20dBc Point (High)	Operating Frequency Band (MHz)	Pass/Fail
13.5464690 MHz	13.5723010 MHz	13.110-14.010	Pass

Spectrum Plot Of Value

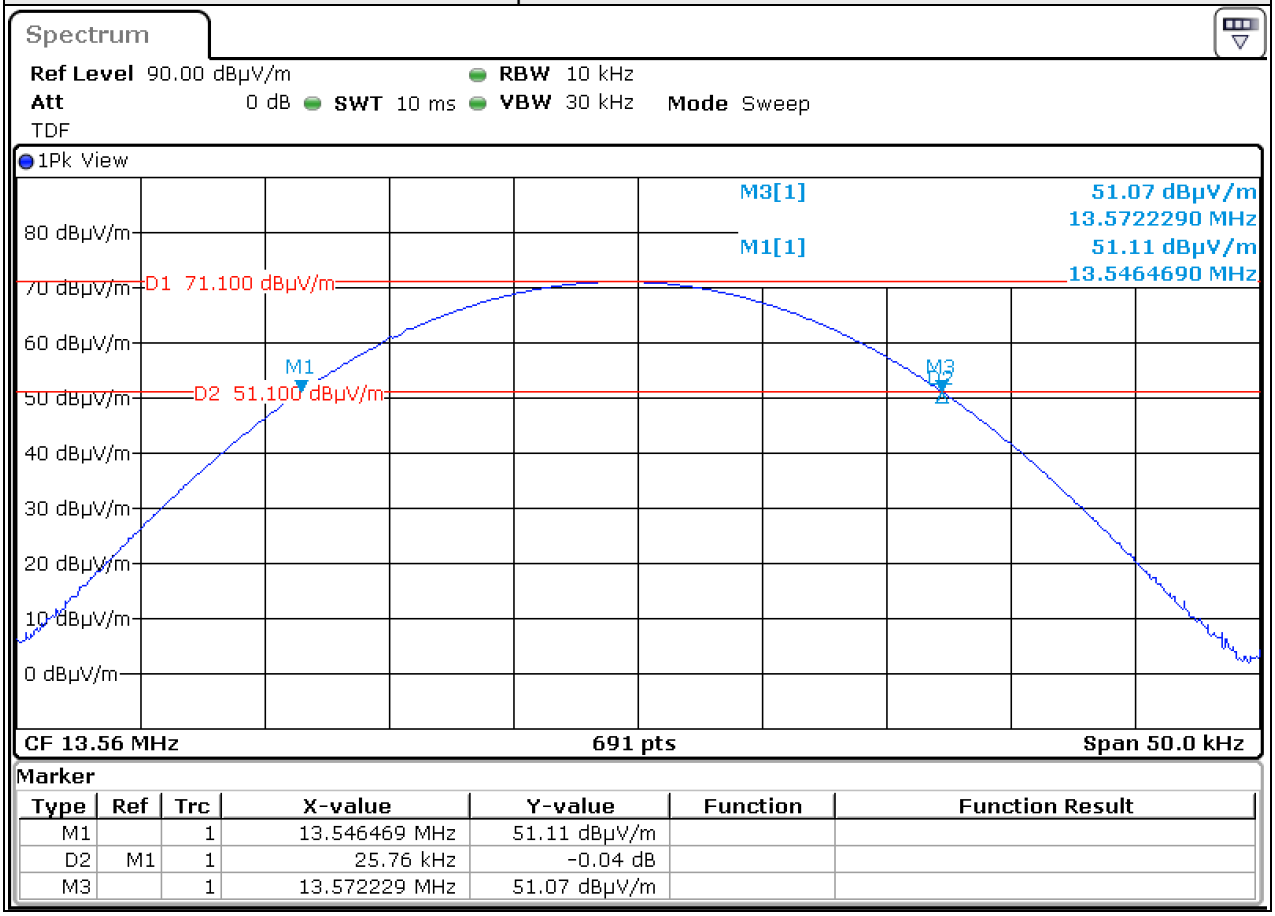


Note: The signal look like CW signal, so RBW can't be match 1~5 % OBW.

Mode B

20dBc Point (Low)	20dBc Point (High)	Operating Frequency Band (MHz)	Pass/Fail
13.5464690 MHz	13.5722230 MHz	13.110-14.010	Pass

Spectrum Plot Of Value



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	13.546469 MHz	51.11 dBµV/m		
D2	M1	1	25.76 kHz	-0.04 dB		
M3		1	13.572229 MHz	51.07 dBµV/m		

Note: The signal look like CW signal, so RBW can't be match 1~5 % OBW.

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:

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@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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