TEST REPORT

CERTIFICATE OF CONFORMITY

Standard:	**47 CFR FCC Part 15, Subpart C (Section 15.225)**
Report No.:	RFBCMN-WTW-P23100614-6
FCC ID:	Q3N-RS38
Product:	Mobile Computer
Brand:	CIPHERLAB
Model No.:	RS38
Series Model:	RS38WO (Refer to item 3.1 for more details)
Received Date:	2023/11/12
Test Date:	2024/1/4 ~ 2024/7/26
Issued Date:	2024/8/5
Applicant:	Cipherlab Co., Ltd.
Address:	12F, 333 Dunhua S. Rd., Sec. 2, Taipei, Taiwan 10669
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., Kewi Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number:	788550 / TW0003

Approved by: Jeremy Lin , **Date:** 2024/8/5

Jeremy Lin / Project Engineer

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Prepared by : Polly Chien / Specialist

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Release Control Record

Issue No.	Description	Date Issued
RFBCMN-WTW-P23100614-6	Original release.	2024/8/5

1 Certificate

Product:	Mobile Computer
Brand:	CIPHERLAB
Test Model:	RS38
Series Model:	RS38WO (Refer to item 3.1 for more details)
Sample Status:	Engineering sample
Applicant:	Cipherlab Co., Ltd.
Test Date:	2024/1/4 ~ 2024/7/26
Standard:	47 CFR FCC Part 15, Subpart C (Section 15.225)
Measurement procedure:	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.

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.225)			
Standard / Clause	Test Item	Result	Remark
15.207	AC Power Conducted Emissions	Pass	Minimum passing margin is -6.26 dB at 13.56000 MHz
15.225 (a)	The field strength of any emissions within the band 13.553-13.567 MHz	Pass	Meet the requirement of limit.
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 below 30MHz	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 above 30MHz	Pass	Minimum passing margin is -11.1 dB at 78.50 MHz
15.225 (e)	Frequency Stability	Pass	Meet the requirement of limit.
15.215 (c)	20 dB Bandwidth	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is Spring not a standard connector.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Specification	Expanded Uncertainty (k=2) (±)
Conducted Emissions from Power Ports	9 kHz ~ 30 MHz	2.88 dB
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	2.44 dB
The field strength of any emissions appearing outside of the 13.110-14.010 MHz band above 30MHz	30 MHz ~ 1 GHz	2.95 dB
Frequency Stability	-	0.176 ppm
20 dB Bandwidth	-	206.5 Hz

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

3 General Information

3.1 General Description

Product	Mobile Computer
Brand	CIPHERLAB
Test Model	RS38
Series Model	RS38WO
Model Difference	Refer to note
Status of EUT	Engineering sample
Power Supply Rating	3.87 Vdc (from battery) 5 Vdc (from adapter or host equipment)
Modulation Type	ASK
NFC Technology Type	NFC-A(ISO/IEC 14443 Type A) NFC-B(ISO/IEC 14443 Type B) NFC-F(ISO/IEC 18092 or FeliCa) NFC-V(ISO/IEC 15693)
Data Rate	Type A: 106 kbit/s Type B: 106 kbit/s Type F: 212 kbit/s, 424 kbit/s Type V: 848 kbit/s
Operating Frequency	13.56 MHz
Number of Channel	1
Output Power	22.20 dBuV/m (QP) (30 m)

Note:

1. All models are listed as below. After pretesting, RS38 was the worst case and chosen for final test.

Brand	Model	Difference
CIPHERLAB	RS38	WWAN+WLAN
	RS38WO	WLAN only

* The hardware of the two models has not changed, only the software is used to turn off WWAN.

2. The EUT uses following accessories.

Item	Brand	Model	Specification
Adapter	Channel WELL Technology	2AEA010BC3D	AC Input: 100-240 Vac, 50/60 Hz, 0.35 A DC Output: 5.0 Vdc, 2.0 A, 10.0 W
Reader 1	Zebra	SE4770	-
Reader 2	Zebra	SE4100	-
Reader 3	Zebra	SE5500	-
1st Battery	CIPHERLAB	BA-0174A5	3.87 Vdc, 4500 mAh, 17.42 Wh
2nd Battery	Chongqing VDL Electronics Co., Ltd	341322PM4	3.85 Vdc, 90 mAh
USB To Type C Cable	SUNCA CO., LTD	1Q11512211-XJ	0.9 m

* After pretesting, Reader 1 and 1st Battery were the worst case and chosen for final test.

3. Simultaneously transmission condition.

Condition	Technology
1	WWAN + WLAN 2.4G (Ant. 4) + WLAN 5G (Ant. 2) + BT
2	WWAN + WLAN 2.4G (MIMO)
3	WWAN + WLAN 5G (MIMO) + BT
4	WWAN + WLAN 6G (MIMO)
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.	

3.2 Antenna Description of EUT

1. The antenna information is listed as below.

Antenna Type	Brand	Model	Connector Type	Frequency (MHz)
FPC	SPEED	Internal	Spring	13.56

* 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.

3.3 Channel List

1 channel is provided to this EUT:

Channel	Frequency (MHz)
1	13.56

3.4 Test Mode Applicability and Tested Channel Detail

Pre-Scan:	1. EUT can be used in the following ways: X-axis/ Y-axis/ Z-axis. Pre-scan these ways and find the worst case as a representative test condition. 2. 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). 3. The EUT had been pre-tested on Type A, Type B, F and Type V data rate. Pre-scan these ways and find the worst case as a representative test condition.
Worst Case:	1. EUT Worst Condition: Y-axis 2. EUT Worst Condition: Type B

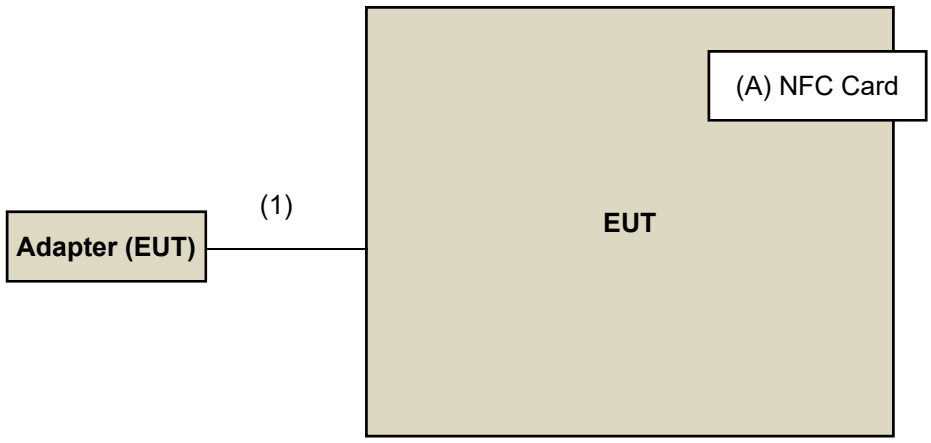
Following channel(s) was (were) selected for the final test as listed below:

Test Item	Type	Tested Channel	Modulation	Data Rate Parameter
AC Power Conducted Emissions	**B**	1	10%, ASK	106 kbit/s
Radiated Emissions below 30 MHz	**B**	1	10%, ASK	106 kbit/s
Radiated Emissions above 30 MHz	**B**	1	10%, ASK	106 kbit/s
Frequency Stability	**B**	1	10%, ASK	106 kbit/s
20 dB Bandwidth	**B**	1	10%, ASK	106 kbit/s

3.5 Test Program Used and Operation Descriptions

Controlling software QRCT V4.0 has been activated to set the EUT under transmission condition continuously at specific channel frequency.

3.6 Connection Diagram of EUT and Peripheral Devices



3.7 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	NFC Card	BV	NFC_B	N/A	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	USB To Type C Cable	1	0.9	Y	0	Accessory of EUT

4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1 AC Power Conducted Emissions

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
50 ohm terminal resistance HUBER+SUHNER	E1-011315	13	2023/11/22	2024/11/21
50 ohm terminal resistance	E1-011279	04	2023/11/22	2024/11/21
	E1-011280	05	2023/11/22	2024/11/21
DC-LISN Schwarzbeck	NNBM 8126G	8126G-069	2023/11/7	2024/11/6
EMI Test Receiver R&S	ESR3	102783	2023/12/13	2024/12/12
Fixed Attenuator SGH	BNC10W10dB	PAD-COND2-01	2023/9/2	2024/9/1
LISN R&S	ESH2-Z5	100100	2024/3/6	2025/3/5
	ESH3-Z5	100312	2023/9/12	2024/9/11
RF Coaxial Cable Woken	5D-FB	Cable-cond2-01	2023/9/2	2024/9/1
Software BVADT	BVADT_Cond_ V7.4.1.0	N/A	N/A	N/A
V-LISN Schwarzbeck	NNBL 8226-2	8226-142	2023/8/31	2024/8/30

Notes:

1. The test was performed in HY - Conduction 2.
2. Tested Date: 2024/4/10

4.2 Radiated Emissions below 30 MHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower &Turn Max-Full	MFA-440H	AT93021705	N/A	N/A
EXA Signal Analyzer Agilent	N9010A	MY52220207	2023/12/28	2024/12/27
Loop Antenna Electro-Metrics	EM-6879	269	2023/9/23	2024/9/22
Loop Antenna TESEQ	HLA 6121	45745	2023/8/8	2024/8/7
MXE EMI Receiver Agilent	N9038A	MY51210203	2023/8/24	2024/8/23
Preamplifier EMCI	EMC001340	980201	2023/9/27	2024/9/26
RF Coaxial Cable Woken	8D-FB	Cable-Ch10-01	2023/9/27	2024/9/26
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Turn Table Max-Full	MFT-201SS	N/A	N/A	N/A
Turn Table Controller Max-Full	MG-7802	N/A	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 5.
2. Tested Date: 2024/1/4

4.3 Radiated Emissions above 30 MHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower &Turn Max-Full	MFA-440H	AT93021705	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-472	2023/10/16	2024/10/15
EXA Signal Analyzer Agilent	N9010A	MY52220207	2023/12/28	2024/12/27
MXE EMI Receiver Agilent	N9038A	MY51210203	2023/8/24	2024/8/23
Preamplifier EMCI	EMC 330H	980112	2023/9/27	2024/9/26
RF Coaxial Cable Woken	8D-FB	Cable-Ch10-01	2023/9/27	2024/9/26
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Turn Table Max-Full	MFT-201SS	N/A	N/A	N/A
Turn Table Controller Max-Full	MG-7802	N/A	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 5.
2. Tested Date: 2024/1/4

4.4 Frequency Stability

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
3-channel DC power supply JIN YIH Technology	ODP3033	ODP30332128138	N/A	N/A
Digital Multimeter Fluke	8050A	4660081	2024/6/14	2025/6/13
Signal & Spectrum Analyzer R&S	FSV3044	101105	2024/2/27	2025/2/26
Software BV	ADT_RF Test Software V7.6.5.4	N/A	N/A	N/A
Temperature & Humidity Chamber Terchy	HRM-120RF	931022	2023/12/19	2024/12/18

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2024/7/26

4.5 20 dB Bandwidth

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Signal & Spectrum Analyzer R&S	FSV3044	101105	2024/2/27	2025/2/26
Software BV	ADT_RF Test Software V7.6.5.4	N/A	N/A	N/A

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2024/5/6

5 Limits of Test Items

5.1 AC Power Conducted Emissions

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

Notes:

a. The lower limit shall apply at the transition frequencies.

b. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

5.2 Radiated Emissions below 30 MHz

(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) 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.

(c) 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.

(d) 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 as below table:

Frequency (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

Notes:

a. The lower limit shall apply at the transition frequencies.

b. Emission level (dBuV/m) = 20 log Emission level (uV/m).

c. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detect or except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, and the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

5.3 Radiated Emissions above 30 MHz

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Notes:

a. The lower limit shall apply at the transition frequencies.

b. Emission level (dBuV/m) = 20 log Emission level (uV/m).

5.4 Frequency Stability

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.

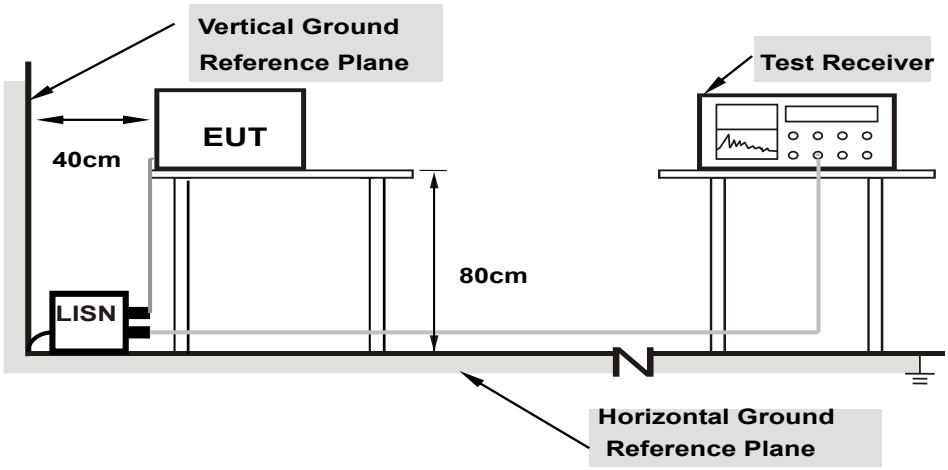
5.5 20 dB Bandwidth

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

6 Test Arrangements

6.1 AC Power Conducted Emissions

6.1.1 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).

6.1.2 Test Procedure

a. The EUT was placed on a 0.8 meter to the top of table and 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/ 50 uH of coupling impedance for the measuring instrument.

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

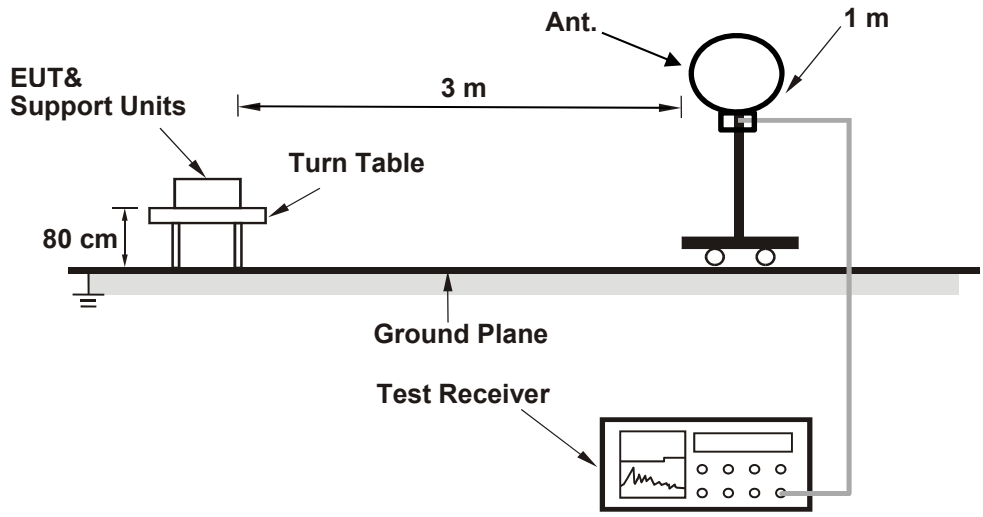
c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

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

6.2 Radiated Emissions below 30 MHz

6.2.1 Test Setup

For Radiated emission below 30 MHz



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

6.2.2 Test Procedure

For Radiated emission below 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters 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. 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 (9 kHz to 90 kHz and 110 kHz to 490 kHz) set to average detect function and peak detect function.

Notes:

a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 200 Hz at frequency below 150 kHz.

b. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz or 10 kHz at frequency (150 kHz to 30 MHz).

c. All modes of operation were investigated and the worst-case emissions are reported.

d. KDB 414788 OATS and Chamber Correlation Justification

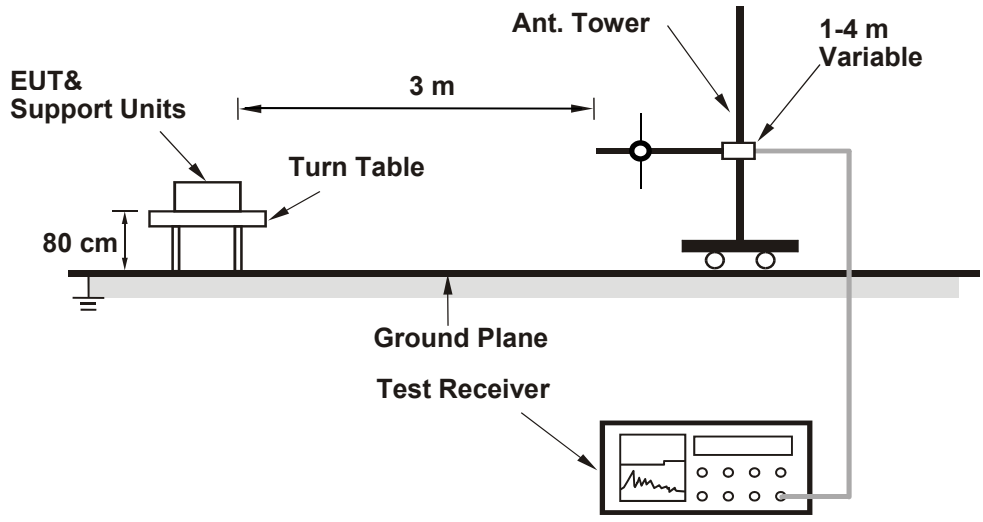
e. -Based on FCC 15.31(f)(2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

f. -OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

6.3 Radiated Emissions above 30 MHz

6.3.1 Test Setup

For Radiated emission above 30 MHz



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

6.3.2 Test Procedure

For Radiated emission above 30 MHz

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

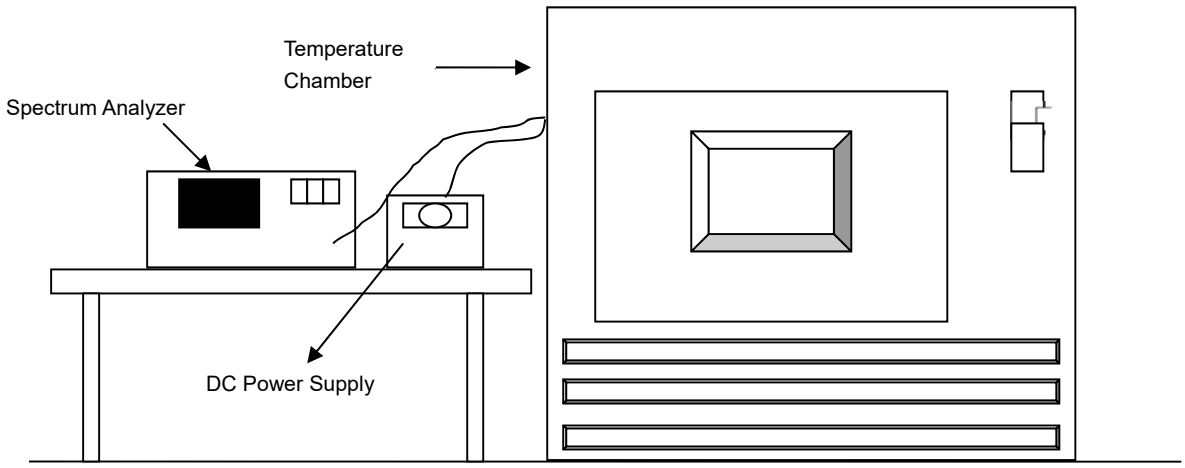
Notes:

a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.

b. All modes of operation were investigated and the worst-case emissions are reported.

6.4 Frequency Stability

6.4.1 Test Setup



6.4.2 Test Procedure

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

b. Turn the EUT on and couple its output to a spectrum analyzer.

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

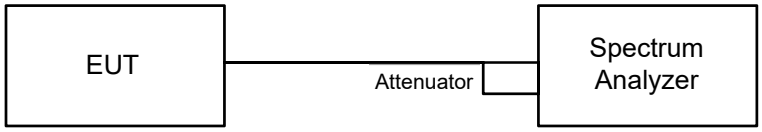
d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.

e. Repeat step (d) with the temperature chamber set to the next desired temperature until measurements down to the lowest specified temperature have been completed.

f. The test chamber was allowed to stabilize at +20 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.

6.5 20 dB Bandwidth

6.5.1 Test Setup



6.5.2 Test Procedure

a. Set resolution bandwidth (RBW) = 1% to 5% of the OBW.
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

7 Test Results of Test Item

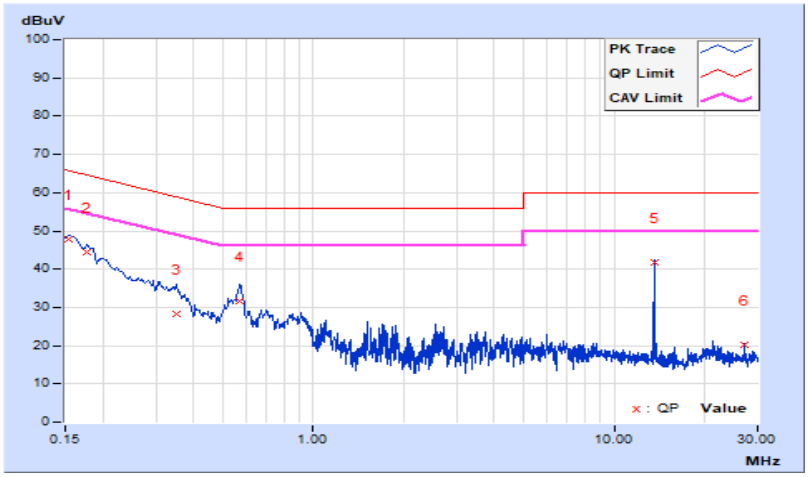
7.1 AC Power Conducted Emissions

RF Mode	NFC-13.56MHz	**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**	23 °C, 67 % RH
Tested By	Adair Peng		

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	0.15400	10.38	37.39	25.51	47.77	35.89	65.78	55.78	-18.01	-19.89
2	0.17755	10.40	34.10	21.73	44.50	32.13	64.60	54.60	-20.10	-22.47
3	0.35000	10.49	17.70	5.10	28.19	15.59	58.96	48.96	-30.77	-33.37
4	0.57000	10.52	21.10	10.58	31.62	21.10	56.00	46.00	-24.38	-24.90
5	13.56000	10.88	31.03	30.91	41.91	41.79	60.00	50.00	-18.09	-8.21
6	27.12000	11.21	8.98	6.70	20.19	17.91	60.00	50.00	-39.81	-32.09

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

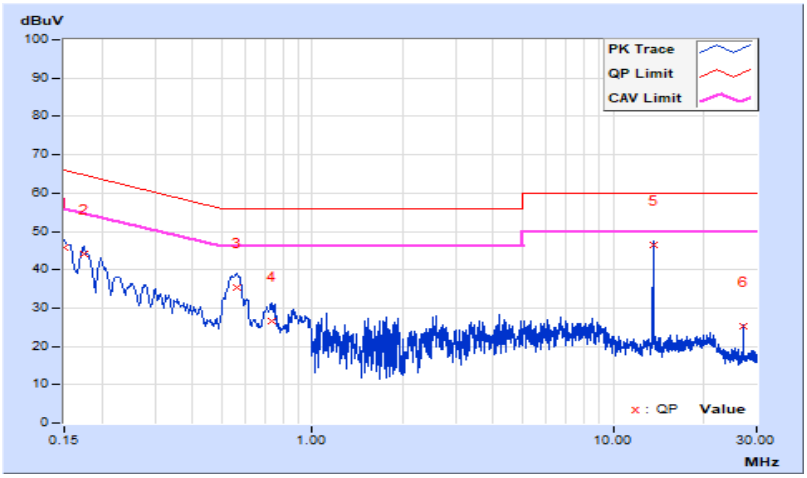


RF Mode	NFC-13.56MHz	**Channel**	CH 1：13.56 MHz
Frequency Range	150 kHz ~ 30 MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	23 °C, 67 % RH
Tested By	Adair Peng		

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	0.15000	10.43	35.23	22.04	45.66	32.47	66.00	56.00	-20.34	-23.53
2	0.17384	10.45	33.64	23.47	44.09	33.92	64.77	54.77	-20.68	-20.85
3	0.55999	10.57	24.73	13.11	35.30	23.68	56.00	46.00	-20.70	-22.32
4	0.73000	10.58	16.11	6.28	26.69	16.86	56.00	46.00	-29.31	-29.14
5	**13.56000**	**10.99**	**35.33**	**32.75**	**46.32**	**43.74**	**60.00**	**50.00**	**-13.68**	**-6.26**
6	27.12000	11.27	14.05	9.85	25.32	21.12	60.00	50.00	-34.68	-28.88

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



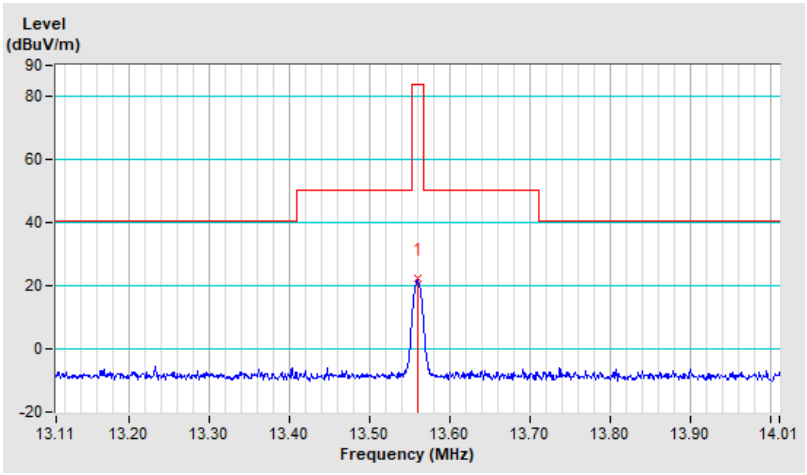
7.2 Radiated Emissions below 30 MHz

RF Mode	NFC-13.56MHz	**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**	21 °C, 68 % RH
Tested By	Vincent Chen		

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	*13.560	22.20 QP	84.00	-61.80	1.00	171	40.80	-18.60

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@3 m = 40*log(3/30) = -40 dB

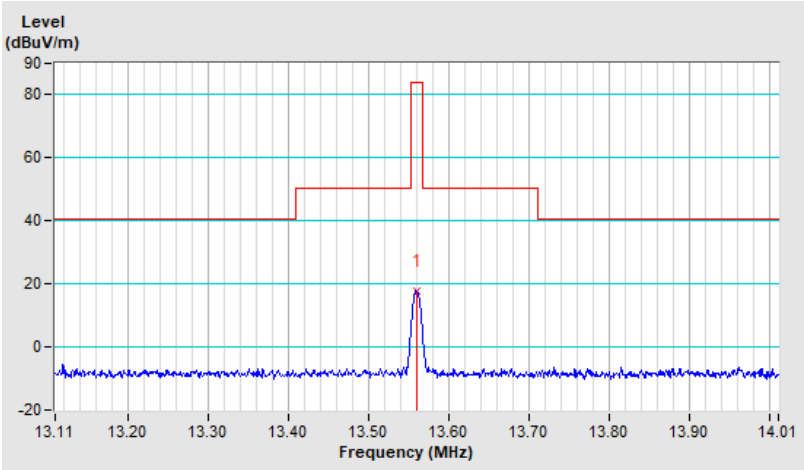


RF Mode	NFC-13.56MHz	Channel	CH 1：13.56 MHz
Frequency Range	13.11 MHz ~ 14.01 MHz	Detector Function & Bandwidth	Quasi-Peak (QP), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21 °C, 68 % RH
Tested By	Vincent Chen		

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	*13.560	18.00 QP	84.00	-66.00	1.00	256	36.60	-18.60

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@3 m = 40*log(3/30) = -40 dB

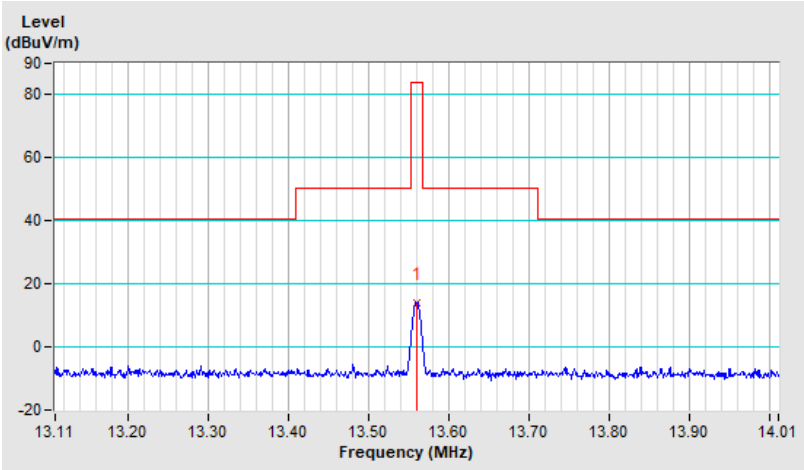


RF Mode	NFC-13.56MHz	Channel	CH 1：13.56 MHz
Frequency Range	13.11 MHz ~ 14.01 MHz	Detector Function & Bandwidth	Quasi-Peak (QP), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21 °C, 68 % RH
Tested By	Vincent Chen		

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	*13.560	14.20 QP	84.00	-69.80	1.00	0	32.80	-18.60

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@3 m = 40*log(3/30) = -40 dB

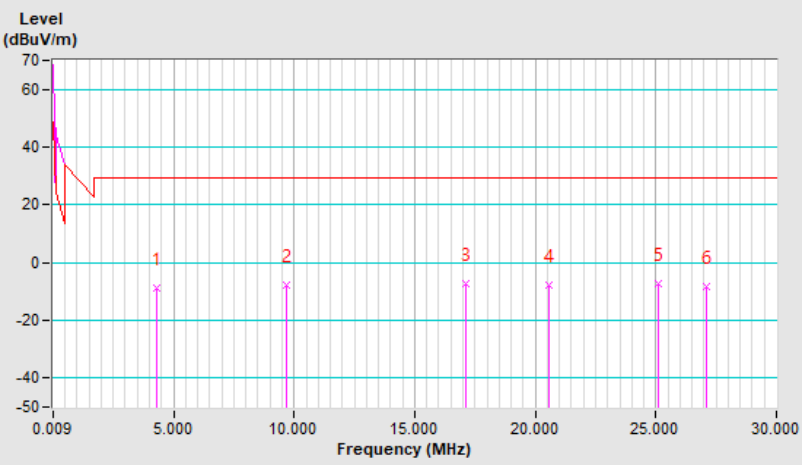


RF Mode	NFC-13.56MHz	**Channel**	CH 1：13.56 MHz
Frequency Range	9 kHz ~ 30 MHz	**Detector Function & Bandwidth**	Quasi-Peak (QP), 9 kHz
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	21 °C, 68 % RH
Tested By	Vincent Chen		

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	4.300	-8.80 QP	29.50	-38.30	1.00	208	11.40	-20.20
2	9.700	-7.60 QP	29.50	-37.10	1.00	205	11.10	-18.70
3	17.130	-7.20 QP	29.50	-36.70	1.00	303	10.80	-18.00
4	20.580	-7.70 QP	29.50	-37.20	1.00	239	10.40	-18.10
5	25.080	-7.40 QP	29.50	-36.90	1.00	174	10.00	-17.40
6	27.120	-8.10 QP	29.50	-37.60	1.00	171	9.70	-17.80

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@3 m = 40*log(3/30) = -40 dB

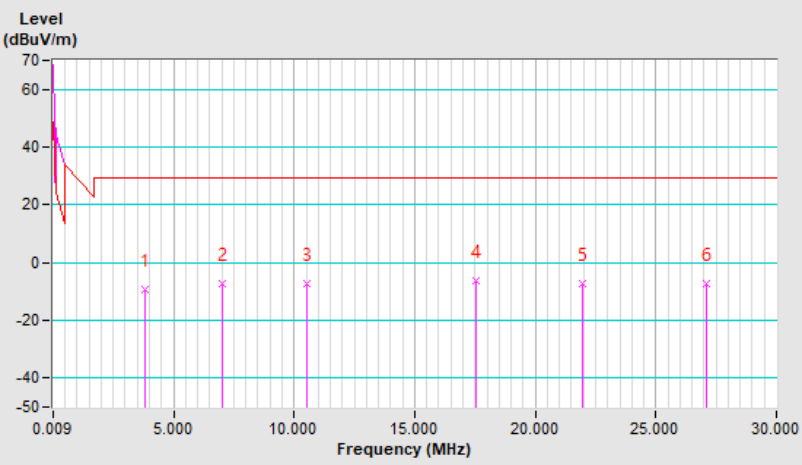


RF Mode	NFC-13.56MHz	**Channel**	CH 1：13.56 MHz
Frequency Range	9 kHz ~ 30 MHz	**Detector Function & Bandwidth**	Quasi-Peak (QP), 9 kHz
Input Power	120 Vac, 60 Hz	**Environmental Conditions**	21 °C, 68 % RH
Tested By	Vincent Chen		

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	3.820	-9.20 QP	29.50	-38.70	1.00	313	11.10	-20.30
2	7.030	-7.20 QP	29.50	-36.70	1.00	274	11.60	-18.80
3	10.540	-7.30 QP	29.50	-36.80	1.00	256	11.20	-18.50
4	17.520	-6.50 QP	29.50	-36.00	1.00	198	11.40	-17.90
5	21.960	-7.20 QP	29.50	-36.70	1.00	14	11.00	-18.20
6	27.120	-7.50 QP	29.50	-37.00	1.00	268	10.30	-17.80

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@3 m = 40*log(3/30) = -40 dB

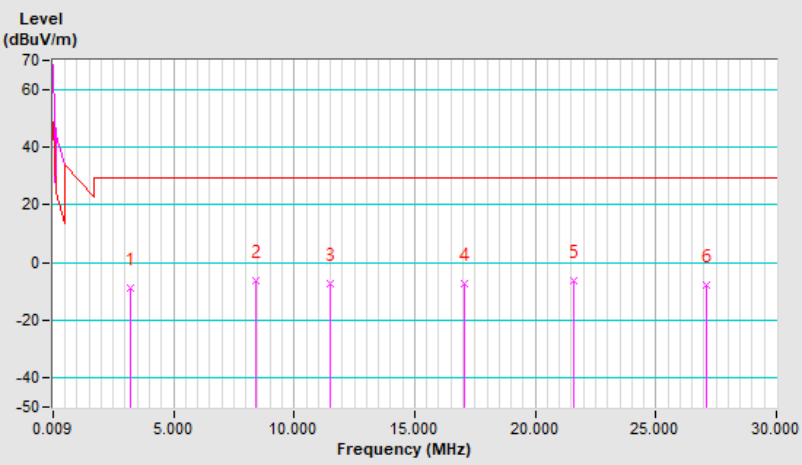


RF Mode	NFC-13.56MHz	Channel	CH 1：13.56 MHz
Frequency Range	9 kHz ~ 30 MHz	Detector Function & Bandwidth	Quasi-Peak (QP), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	21 °C, 68 % RH
Tested By	Vincent Chen		

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	3.190	-8.80 QP	29.50	-38.30	1.00	125	11.60	-20.40
2	8.410	-6.50 QP	29.50	-36.00	1.00	101	12.40	-18.90
3	11.500	-7.40 QP	29.50	-36.90	1.00	18	11.00	-18.40
4	17.040	-7.50 QP	29.50	-37.00	1.00	303	10.50	-18.00
5	**21.570**	**-6.10 QP**	**29.50**	**-35.60**	**1.00**	**238**	**12.10**	**-18.20**
6	27.120	-7.80 QP	29.50	-37.30	1.00	172	10.00	-17.80

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@3 m = 40*log(3/30) = -40 dB



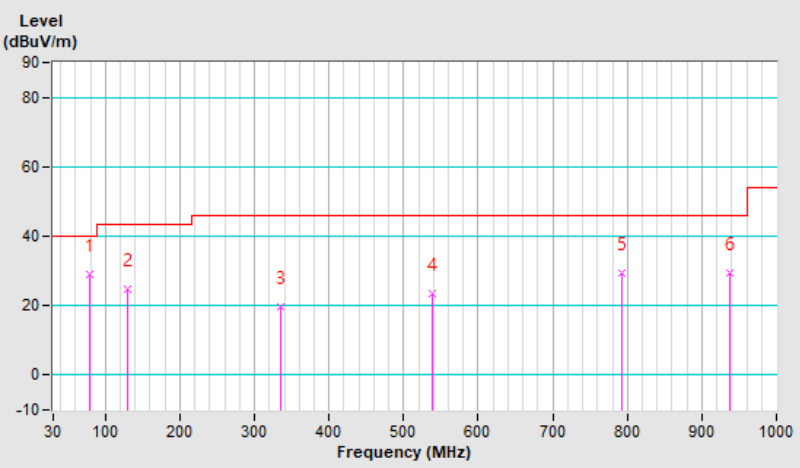
7.3 Radiated Emissions above 30 MHz

RF Mode	NFC-13.56MHz	**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**	21 °C, 68 % RH
Tested By	Vincent Chen		

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**	**28.9 QP**	**40.0**	**-11.1**	**1.00 H**	**157**	**45.9**	**-17.0**
2	129.91	24.6 QP	43.5	-18.9	2.00 H	56	38.3	-13.7
3	334.58	19.6 QP	46.0	-26.4	1.00 H	2	30.8	-11.2
4	539.25	23.3 QP	46.0	-22.7	1.50 H	36	29.5	-6.2
5	793.39	29.5 QP	46.0	-16.5	2.00 H	181	30.5	-1.0
6	936.95	29.6 QP	46.0	-16.4	1.50 H	14	30.0	-0.4

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.

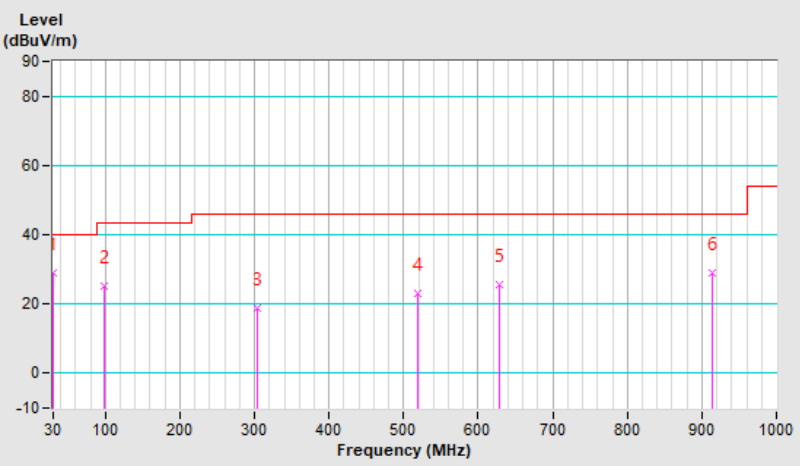


RF Mode	NFC-13.56MHz	Channel	CH 1：13.56 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	21 °C, 68 % RH
Tested By	Vincent Chen		

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	30.97	28.8 QP	40.0	-11.2	1.00 V	348	42.4	-13.6
2	97.90	25.1 QP	43.5	-18.4	2.00 V	102	42.5	-17.4
3	303.54	18.9 QP	46.0	-27.1	1.00 V	352	30.7	-11.8
4	518.88	22.9 QP	46.0	-23.1	1.50 V	13	29.2	-6.3
5	628.49	25.5 QP	46.0	-20.5	1.00 V	214	29.9	-4.4
6	914.64	28.8 QP	46.0	-17.2	2.00 V	78	29.4	-0.6

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.



7.4 Frequency Stability

Environmental Conditions:	22°C, 63% RH	Tested By:	Vincent Chen

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	3.87	13.55998	-0.00015	13.55999	-0.00007	13.55999	-0.00007	13.55998	-0.00015
40	3.87	13.56005	0.00037	13.56005	0.00037	13.56004	0.00029	13.56006	0.00044
30	3.87	13.55998	-0.00015	13.55999	-0.00007	13.55999	-0.00007	13.55999	-0.00007
20	3.87	13.56002	0.00015	13.56002	0.00015	13.56001	0.00007	13.56001	0.00007
10	3.87	13.56000	0.00000	13.56001	0.00007	13.56001	0.00007	13.56001	0.00007
0	3.87	13.55995	-0.00037	13.55995	-0.00037	13.55995	-0.00037	13.55995	-0.00037
-10	3.87	13.55995	-0.00037	13.55995	-0.00037	13.55995	-0.00037	13.55996	-0.00029
-20	3.87	13.56005	0.00037	13.56006	0.00044	13.56005	0.00037	13.56006	0.00044

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	4.4505	13.56002	0.00015	13.56002	0.00015	13.56001	0.00007	13.56001	0.00007
	3.87	13.56002	0.00015	13.56002	0.00015	13.56001	0.00007	13.56001	0.00007
	3.2895	13.56002	0.00015	13.56002	0.00015	13.56001	0.00007	13.56001	0.00007

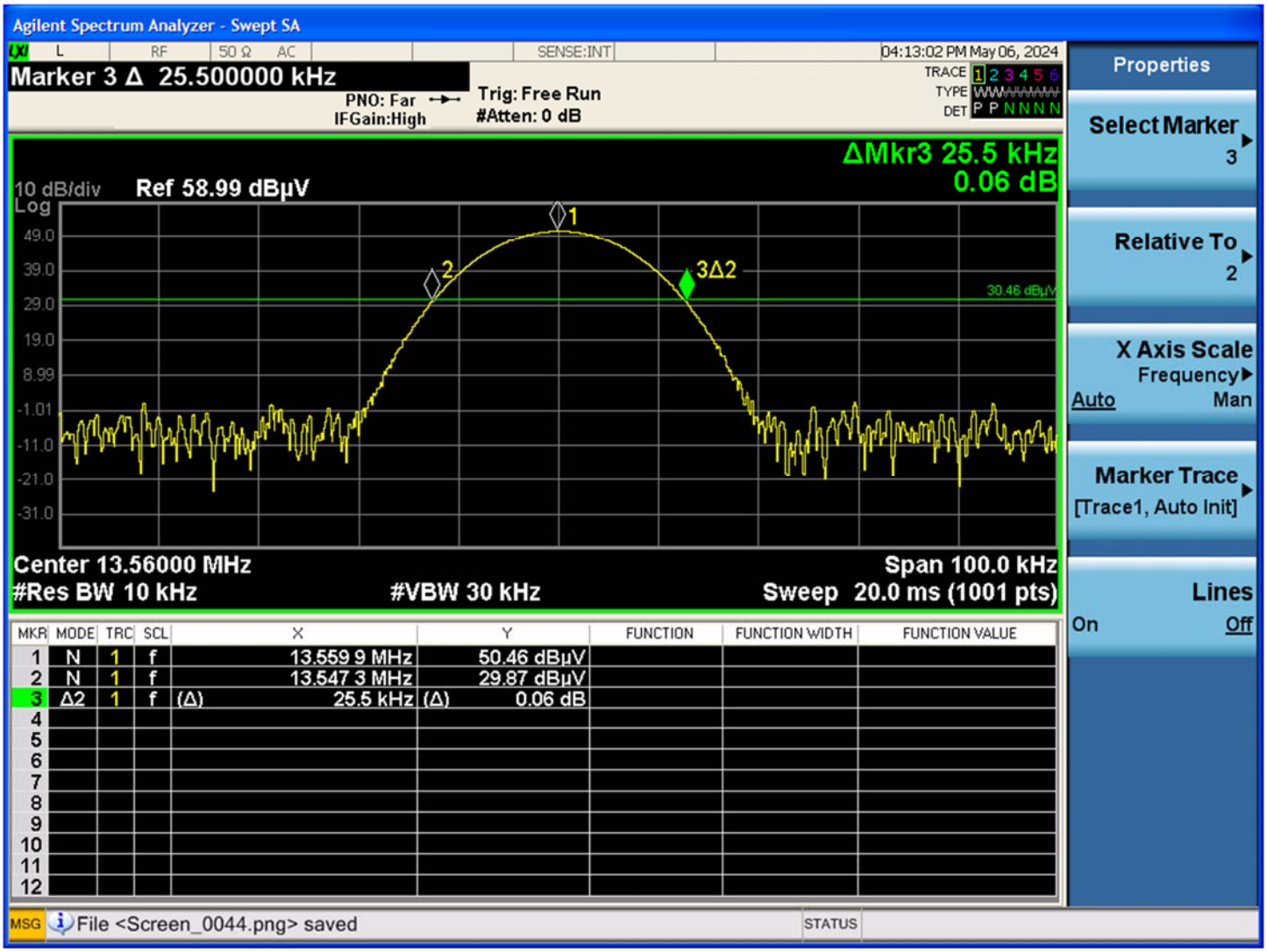
7.5 20 dB Bandwidth

Environmental Conditions:	22°C, 63% RH	Tested By:	Vincent Chen

Channel	Channel Frequency (MHz)	20 dB Bandwidth (MHz)	Measured Frequencies		Operating Frequency Band (MHz)	Test Result
			FL (MHz)	FH (MHz)		
1	13.56	0.0255	13.35473	13.38023	13.11 ~ 14.01	Pass

Notes:

1. FL is the lowest frequency of the 20 dB bandwidth of power envelope.
2. FH is the highest frequency of the 20 dB bandwidth of power envelope.



8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)

9 Information of the Testing Laboratories

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

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

Lin Kou EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

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

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

Email: service.adt@bureauveritas.com
Web Site: http://ee.bureauveritas.com.tw

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

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