

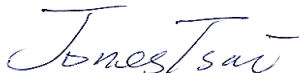
FCC RADIO TEST REPORT

FCC ID : 2AP6E-PROXYPRO-01
Equipment : Proxy Reader Pro
Brand Name : Proxy
Model Name : Proxy Reader Pro
Applicant : Proxy Technologies, Inc.
500 3rd St, San Francisco, CA 94107
Manufacturer : Wistron NeWeb Corp.
20 Park Avenue II, Hsinchu Science Park,
Hsinchu 308, Taiwan, R.O.C
Standard : FCC Part 15 Subpart C §15.225

The product was received on Apr. 19, 2018 and testing was started from May 08, 2018 and completed on May 18, 2018. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Jones Tsai

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issued Date
FR841912A	01	Initial issue of report	Jan. 16, 2019

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	15.207	AC Power Line Conducted Emissions	Not Required	-
3.1	15.215(c)	20dB Spectrum Bandwidth	Pass	-
	2.1049	99% OBW Spectrum Bandwidth	Reporting only	-
3.2	15.225(e)	Frequency Stability	Pass	-
3.3	15.225(a)(b)(c)	Field Strength of Fundamental Emissions	Pass	Max level 72.10 dB μ V/m at 13.560 MHz Max level
3.4	15.225(d) 15.209	Radiated Spurious Emissions	Pass	Under limit 3.19 dB at 65.100MHz
3.5	15.203	Antenna Requirements	Pass	-
Remark: Not required means after assessing, test items are not necessary to carry out.				

Reviewed by: Louis Wu

Report Producer: Natasha Hsieh



1. General Description

1.1 Product Feature of Equipment Under Test

RFID.

Product Specification subjective to this standard	
Antenna Type	RFID: Loop Antenna

1.2 Modification of EUT

No modifications are made to the EUT during all test items.

1.3 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	Sporton Site No.	
	TH03-HY	03CH07-HY
Test Engineer	Louis Chung	Jesse Wang
Temperature	22~24°C	21~23°C
Relative Humidity	53~55%	51~54%

Note: The test site complies with ANSI C63.4 2014 requirement.

1.4 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart C §15.225
- ♦ ANSI C63.10-2013

2. Test Configuration of Equipment Under Test

2.1 Descriptions of Test Mode

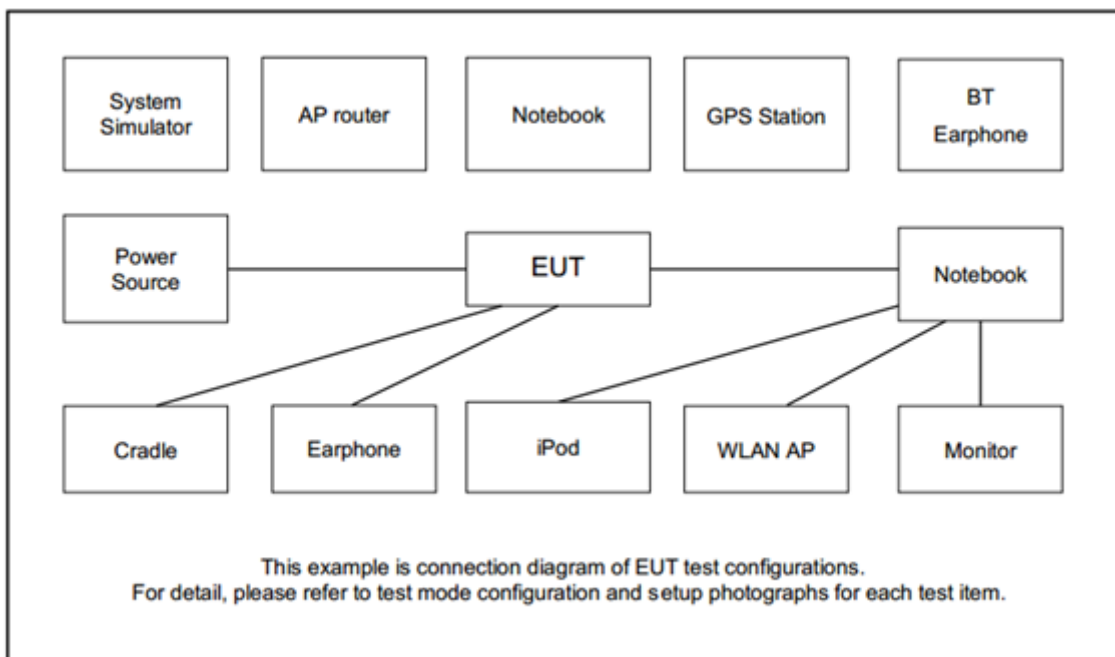
Investigation has been done on all the possible configurations.

The following table is a list of the test modes shown in this test report.

Test Items	
AC Power Line Conducted Emissions	Field Strength of Fundamental Emissions
20dB Spectrum Bandwidth	Frequency Stability
Radiated Emissions 9kHz~30MHz	Radiated Emissions 30MHz~1GHz

The EUT pre-scanned in four NFC type, A, B, F, V. The worst type (type A) was recorded in this report. Pre-scanned tests, X, Y, Z in three orthogonal panels to determine the final configuration (Y plane as worst plane) from all possible combinations.

2.2 Connection Diagram of Test System



2.3 Table for Supporting Units

Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
NFC Card	Winso	Type A	N/A	N/A	N/A

2.4 EUT Operation Test Setup

The EUT was programmed to be in continuously transmitting mode.

The ancillary equipment, NFC card, is used to make the EUT (NFC) continuously transmit at 13.56MHz and is placed around 3 cm gap to the EUT.

3. Test Results

3.1 20dB and 99% OBW Spectrum Bandwidth Measurement

3.1.1 Limit

Intentional radiators must be designed to ensure that the 20dB and 99% emission bandwidth in the specific band 13.553~13.567MHz.

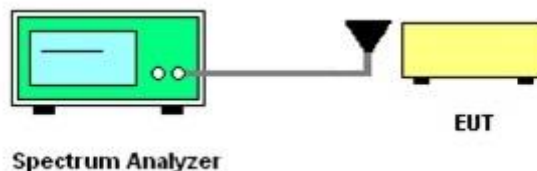
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The spectrum analyzer connected via a receive antenna placed near the EUT in peak Max hold mode.
2. The resolution bandwidth of 1 kHz and the video bandwidth of 3 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.
4. Measured the 99% OBW.

3.1.4 Test Setup



3.1.5 Test Result of Conducted Test Items

Please refer to Appendix A.

3.2 Frequency Stability Measurement

3.2.1 Limit

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% (100ppm) 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. For battery operated equipment, the equipment tests shall be performed using a new battery.

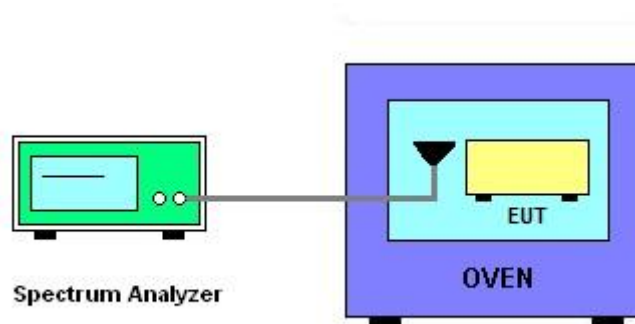
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The spectrum analyzer connected via a receive antenna placed near the EUT.
2. EUT have transmitted signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire emissions bandwidth.
4. Set RBW = 1 kHz, VBW = 3 kHz with peak detector and maxhold settings.
5. The f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f)/f_c \times 10^6$ ppm and the limit is less than ± 100 ppm.
6. Extreme temperature rule is -20°C~50°C.

3.2.4 Test Setup



3.2.5 Test Result of Conducted Test Items

Please refer to Appendix A.

3.3 Field Strength of Fundamental Emissions and Mask Measurement

3.3.1 Limit

Rules and specifications	FCC CFR 47 Part 15 section 15.225			
Description	Compliance with the spectrum mask is tested with RBW set to 9kHz.			
Freq. of Emission (MHz)	Field Strength (μ V/m) at 30m	Field Strength (dB μ V/m) at 30m	Field Strength (dB μ V/m) at 10m	Field Strength (dB μ V/m) at 3m
1.705~13.110	30	29.5	48.58	69.5
13.110~13.410	106	40.5	59.58	80.5
13.410~13.553	334	50.5	69.58	90.5
13.553~13.567	15848	84.0	103.08	124.0
13.567~13.710	334	50.5	69.58	90.5
13.710~14.010	106	40.5	59.58	80.5
14.010~30.000	30	29.5	48.58	69.5

3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

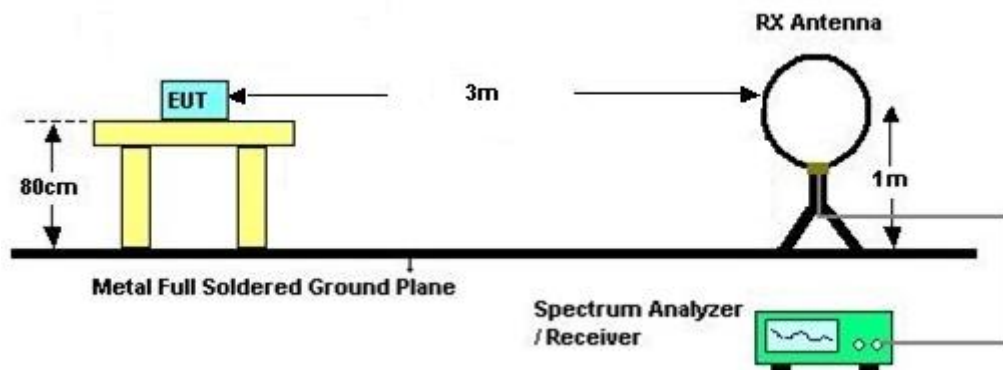
3.3.3 Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the loop receiving antenna mounted antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the receiving antenna was fixed at one meter above ground to find the maximum emissions field strength.
4. For Fundamental emissions, use the receiver to measure QP reading.
5. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
6. Compliance with the spectrum mask is tested with RBW set to 9kHz.

Note: Emission level (dBμV/m) = 20 log Emission level (μV/m).

3.3.4 Test Setup

For radiated emissions below 30MHz



3.3.5 Test Result of Field Strength of Fundamental Emissions and Mask

Please refer to Appendix B.

3.4 Radiated Emissions Measurement

3.4.1 Limit

The field strength of any emissions which appear outside of 13.110 ~14.010MHz band shall not exceed the general radiated emissions limits.

Frequencies (MHz)	Field Strength (μ V/m)	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

3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Measuring Instrument Setting

The following table is the setting of receiver:

Receiver Parameter	Setting
Attenuation	Auto
Frequency Range: 9kHz~150kHz	RBW 200Hz for QP
Frequency Range: 150kHz~30MHz	RBW 9kHz for QP
Frequency Range: 30MHz~1000MHz	RBW 120kHz for Peak

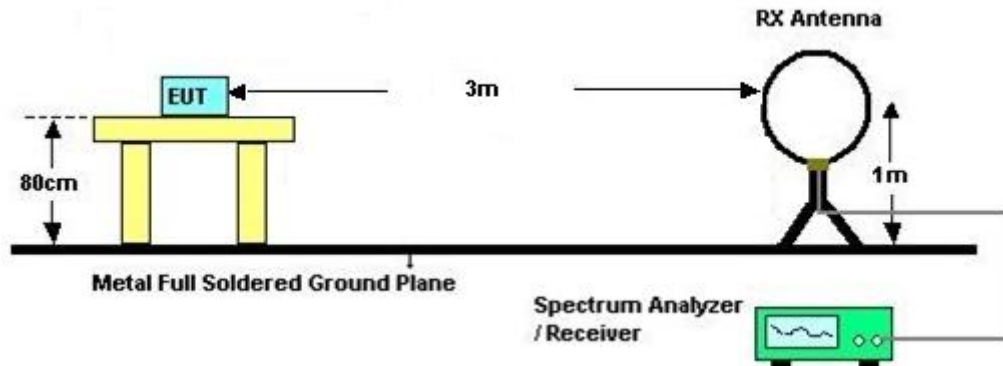
Note: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz and 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

3.4.4 Test Procedures

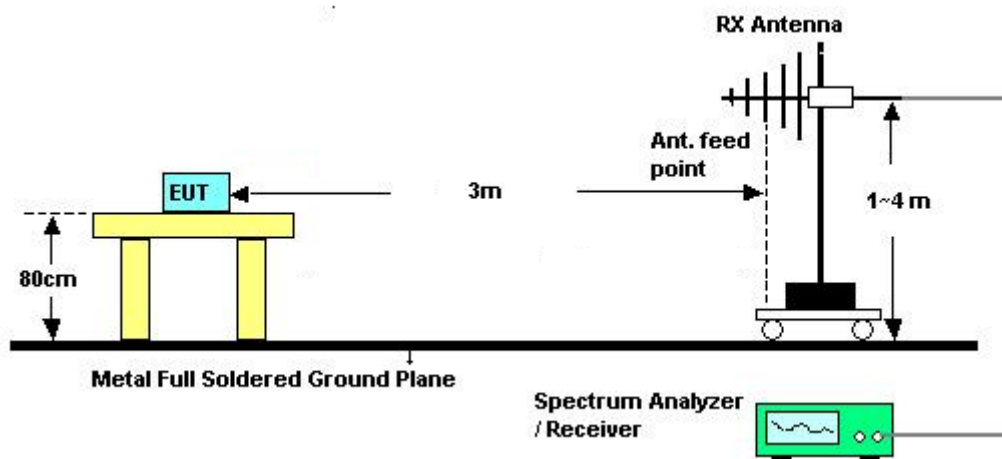
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
7. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver.

3.4.5 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



3.4.6 Test Result of Radiated Emissions Measurement

Please refer to Appendix B.

Remark: There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.



3.5 Antenna Requirements

3.5.1 Standard Applicable

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.5.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.



4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	AC POWER	AFC-500W	F10407001 1	50Hz~60Hz	Mar. 21, 2018	May 08, 2018~ May 18, 2018	Mar. 20, 2019	Conducted (TH03-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101329	9kHz~30GHz	Jun. 26, 2017	May 08, 2018~ May 18, 2018	Jun. 25, 2018	Conducted (TH03-HY)
Temperature Chamber	ESPEC	SU-641	92013721	-30℃ ~70℃	Dec. 06, 2017	May 08, 2018~ May 18, 2018	Dec. 05, 2019	Conducted (TH03-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800 N1D01N-06	35419&03	30MHz to 1GHz	Dec. 18, 2017	May 10, 2018~ May 14, 2018	Dec. 17, 2018	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 23, 2017	May 10, 2018~ May 14, 2018	Aug. 22, 2018	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Nov. 10, 2017	May 10, 2018~ May 14, 2018	Nov. 09, 2018	Radiation (03CH07-HY)
Antenna Mast	Max-Full	MFA520BS	N/A	1m~4m	N/A	May 10, 2018~ May 14, 2018	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	N/A	May 10, 2018~ May 14, 2018	N/A	Radiation (03CH07-HY)
Amplifier	SONOMA	310N	187231	9kHz~1GHz	Jan. 08, 2018	May 10, 2018~ May 14, 2018	Jan. 07, 2019	Radiation (03CH07-HY)
EMI Test Receiver	Agilent	N9038A (MXE)	MY532900 53	20Hz to 26.5GHz	Jan. 16, 2018	May 10, 2018~ May 14, 2018	Jan. 15, 2019	Radiation (03CH07-HY)
Software	Audix	E3 6.2009-8-24	N/A	N/A	N/A	May 10, 2018~ May 14, 2018	N/A	Radiation (03CH07-HY)
Filter	Wainwright	WHK20/1000 C7/40SS	SN3	20M High Pass	Nov. 21, 2017	May 10, 2018~ May 14, 2018	Nov. 20, 2018	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24971/4 ,MY28655/ 4	9KHz~30MHz	Jan. 02, 2018	May 10, 2018~ May 14, 2018	Jan. 01, 2019	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY28655/4 , MY24971/4 , MY15682/4	30MHz~1GHz	Feb. 27, 2018	May 10, 2018~ May 14, 2018	Feb. 26, 2019	Radiation (03CH07-HY)



5. Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (9 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.40
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

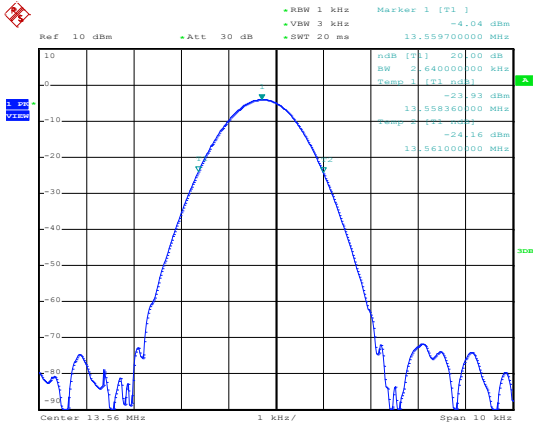
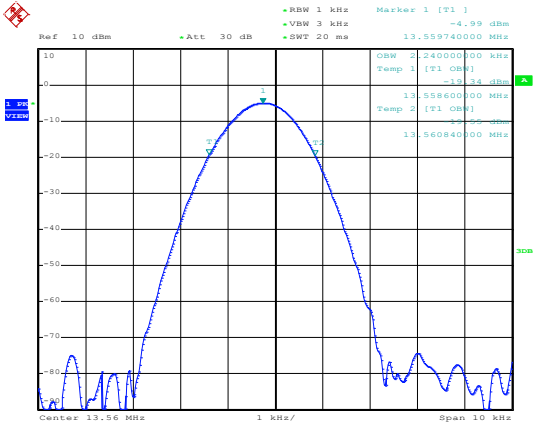
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.70
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Appendix A. Test Results of Conducted Test Items

A1. Test Result of 20dB Spectrum Bandwidth

<For 13.56MHz>

Test mode	NFC Tx	Test Frequency (MHz)	13.56
			
20dB Bandwidth (kHz)	2.640	99% OccupiedBW(kHz)	2.240
Frequency range (MHz)	$f_L > 13.553$	13.55836	Test Result
	$f_H < 13.567$	13.56100	Complies

Remark: Because the measured signal is CW adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

**A2. Test Result of Frequency Stability**

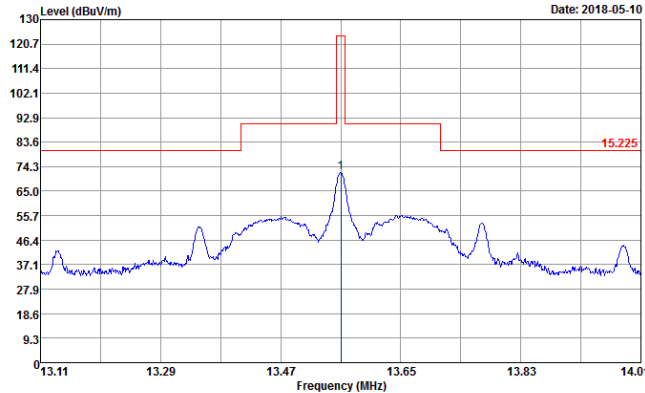
Voltage vs. Frequency Stability		Temperature vs. Frequency Stability		
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Time	Measurement Frequency (MHz)
120	13.559680	-20	0	13.559840
102	13.559680		2	13.559840
138	13.559680		5	13.559840
			10	13.559840
		-10	0	13.559920
			2	13.559920
			5	13.559920
			10	13.559920
		0	0	13.559920
			2	13.559920
			5	13.559920
			10	13.559920
		10	0	13.559900
			2	13.559900
			5	13.559900
			10	13.559900
		20	0	13.559830
			2	13.559820
			5	13.559820
			10	13.559840
		30	0	13.559840
			2	13.559820
			5	13.559830
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		40	0	13.559820
			2	13.559820
			5	13.559820
			10	13.559820

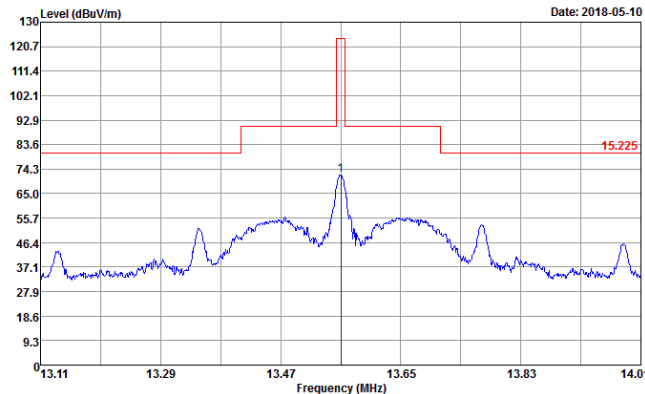


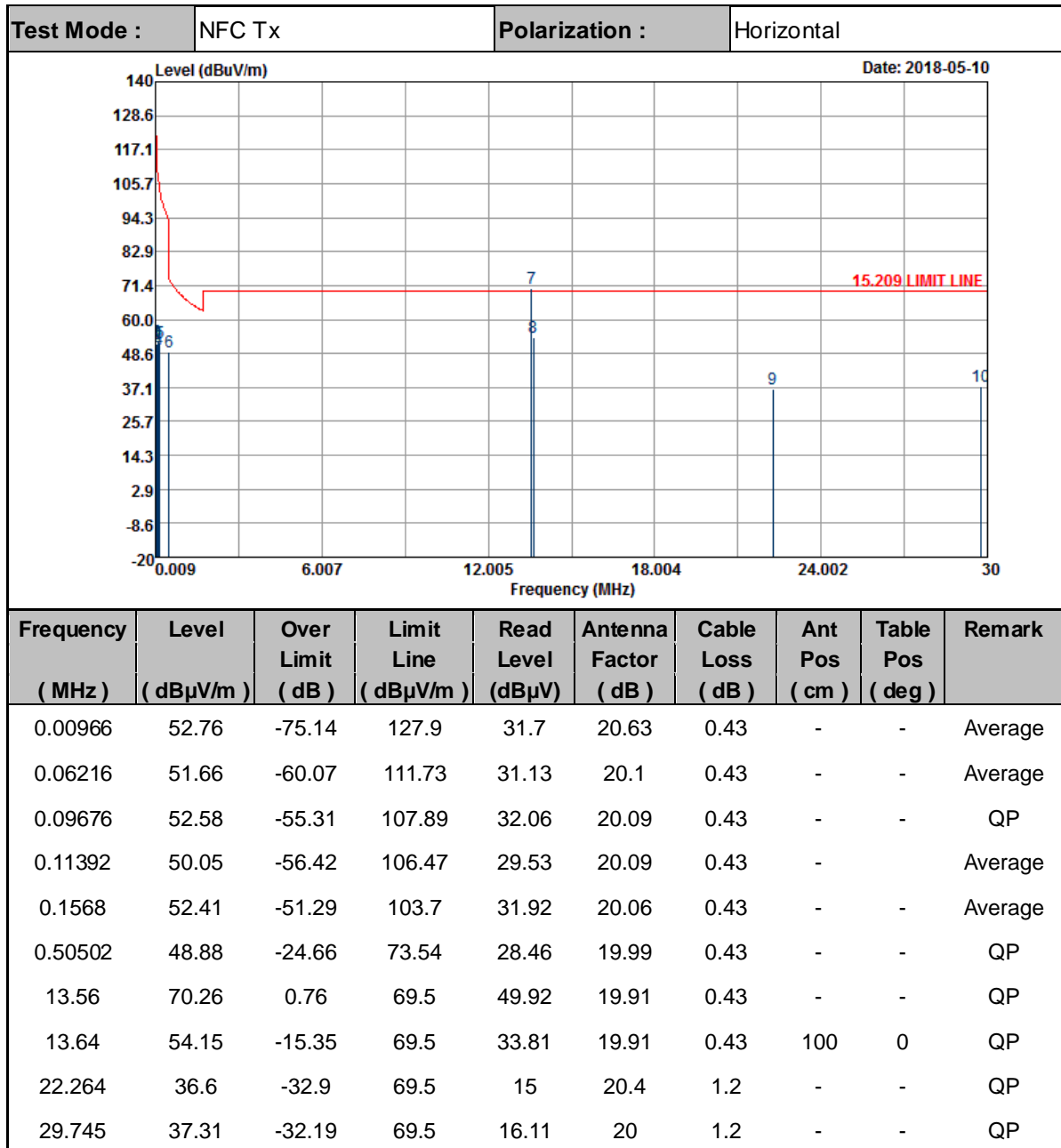
Voltage vs. Frequency Stability		Temperature vs. Frequency Stability		
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Time	Measurement Frequency (MHz)
		50	0	13.559660
			2	13.559660
			5	13.559660
			10	13.559670
Max.Deviation (MHz)	-0.000320	Max.Deviation (MHz)		-0.000340
Max.Deviation (ppm)	-23.5988	Max.Deviation (ppm)		-25.0737
Limit	FS < ±100 ppm	Limit		FS < ±100 ppm
Test Result	PASS	Test Result		PASS

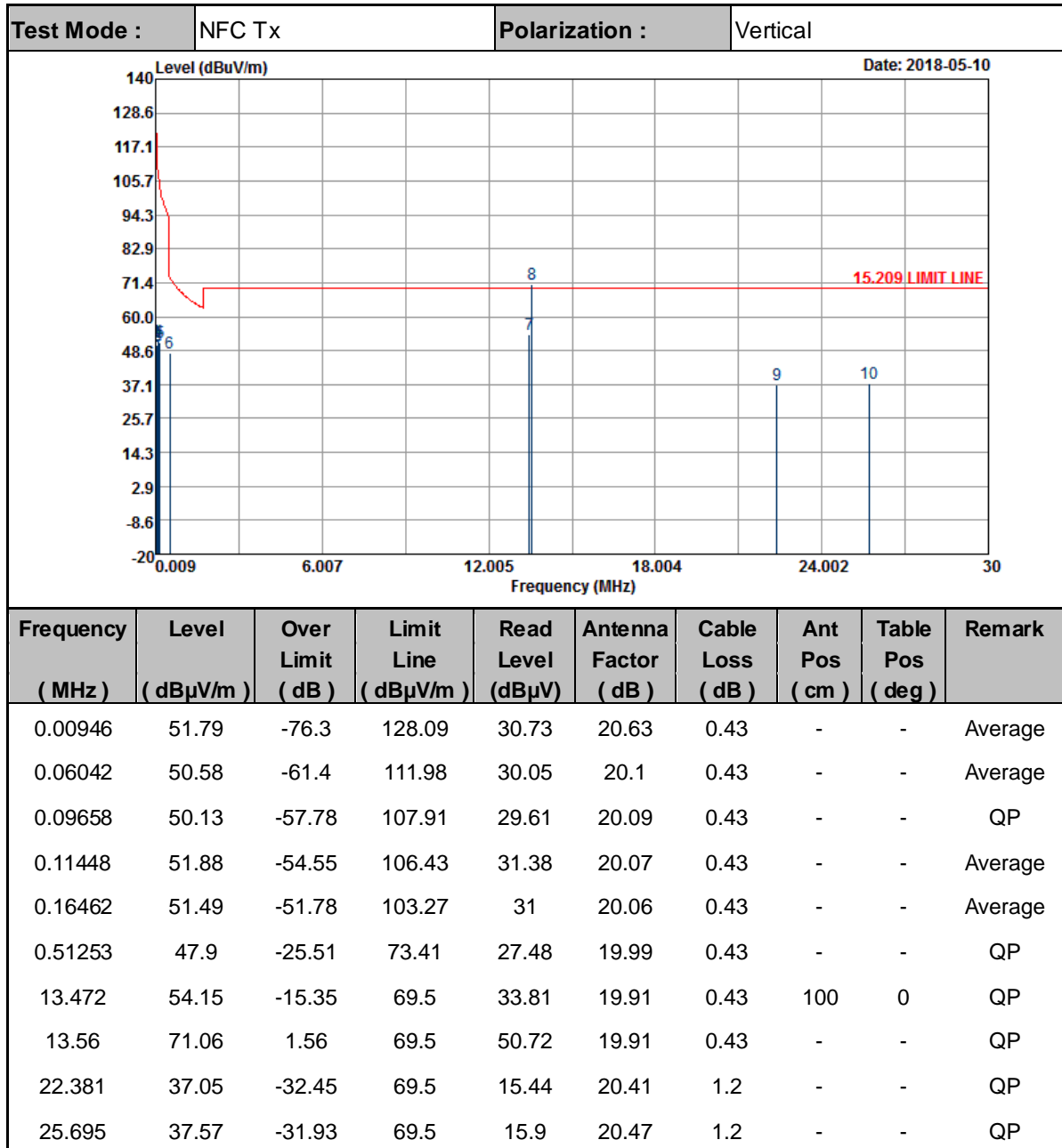
Appendix B. Test Results of Radiated Test Items

B1. Test Result of Field Strength of Fundamental Emissions

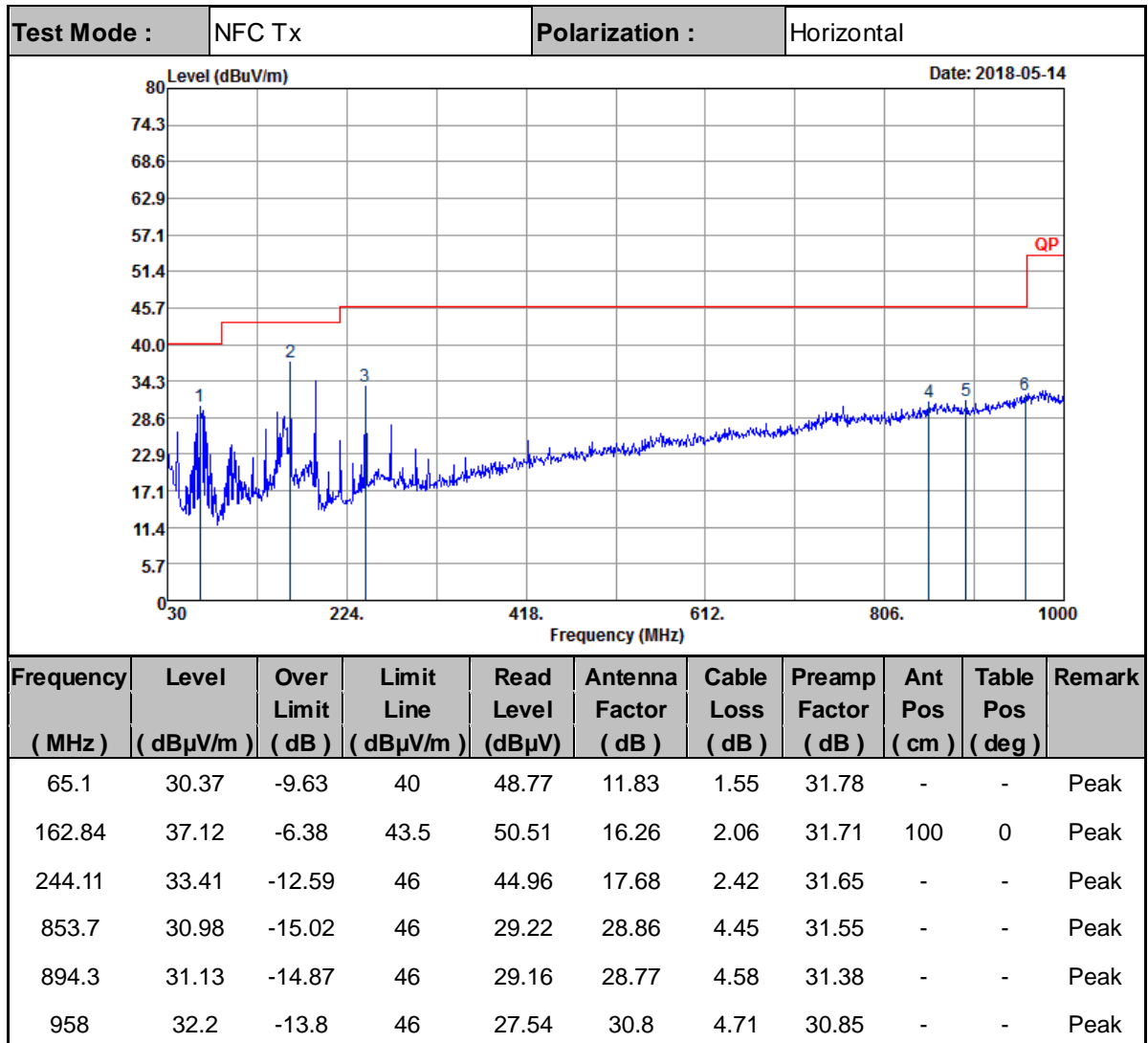
Test Mode :		NFC Tx		Test Frequency (MHz)		13.56																												
<div></div>				<div> Site : 03CH07-HY Condition : 15.225 3m LOOP_ANT(H)_100315 HORIZONTAL : RBW:9.000KHz VBW:9.000KHz SWT:Auto Project : 841912 Mode : 1 </div>																														
<table><tr><th>Freq</th><th>Level</th><th>Over</th><th>Limit</th><th>ReadAntenna</th><th>Cable</th><th>A/Pos</th><th>T/Pos</th><th>Remark</th></tr><tr><th>MHz</th><th>dBuV/m</th><th>dB</th><th>dBuV/m</th><th>dBuV</th><th>dB/m</th><th>dB</th><th>cm</th><th>deg</th></tr><tr><td>1</td><td>13.56</td><td>71.96</td><td>-52.04</td><td>124.00</td><td>51.62</td><td>19.91</td><td>0.43</td><td>100 336 QP</td></tr></table>				Freq	Level	Over	Limit	ReadAntenna	Cable	A/Pos	T/Pos	Remark	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	1	13.56	71.96	-52.04	124.00	51.62	19.91	0.43	100 336 QP				
Freq	Level	Over	Limit	ReadAntenna	Cable	A/Pos	T/Pos	Remark																										
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg																										
1	13.56	71.96	-52.04	124.00	51.62	19.91	0.43	100 336 QP																										

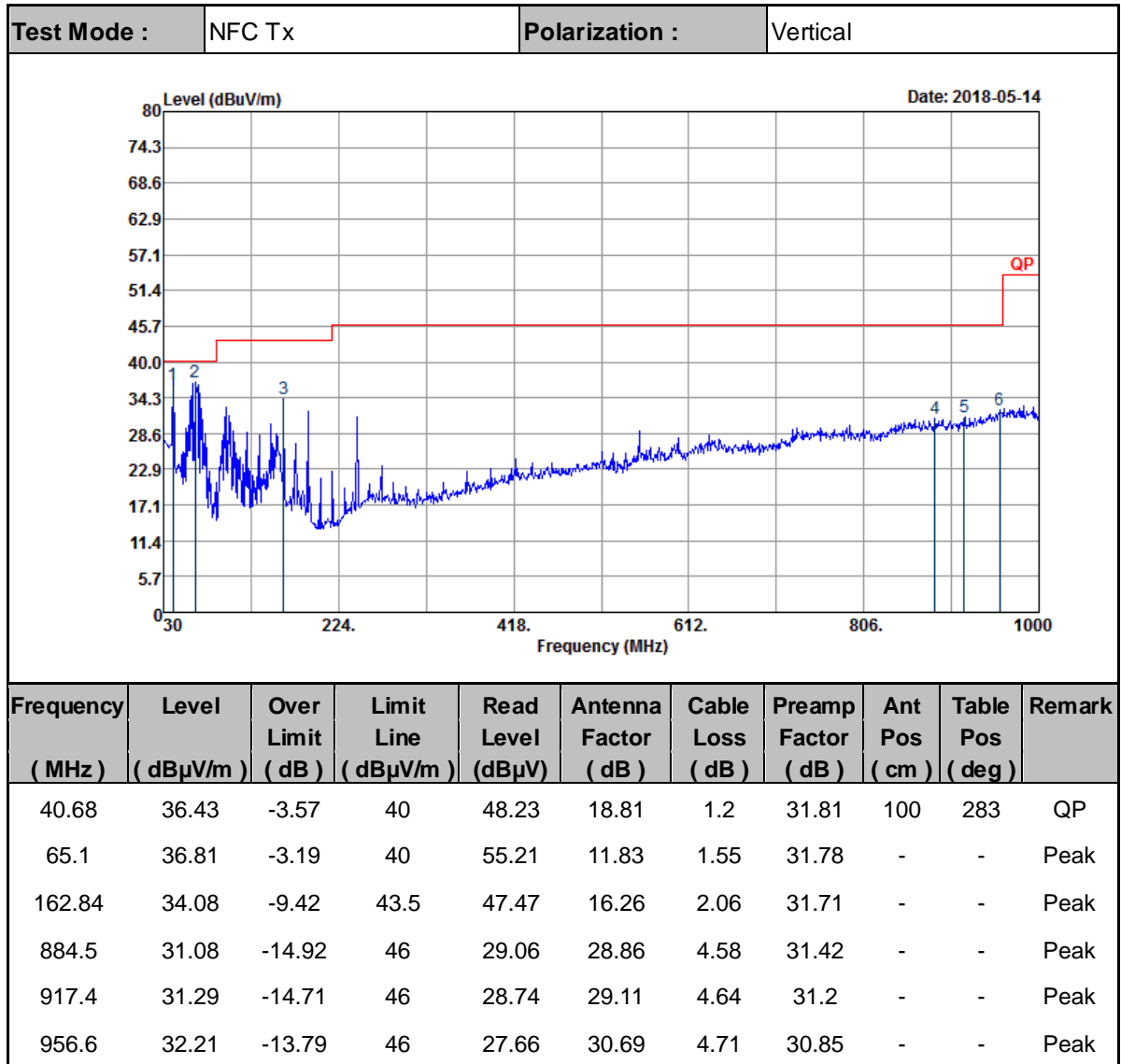
<div></div>				<div> Site : 03CH07-HY Condition : 15.225 3m LOOP_ANT(V)_100315 VERTICAL : RBW:9.000KHz VBW:9.000KHz SWT:Auto Project : 841912 Mode : 1 </div>																														
<table><tr><th>Freq</th><th>Level</th><th>Over</th><th>Limit</th><th>ReadAntenna</th><th>Cable</th><th>A/Pos</th><th>T/Pos</th><th>Remark</th></tr><tr><th>MHz</th><th>dBuV/m</th><th>dB</th><th>dBuV/m</th><th>dBuV</th><th>dB/m</th><th>dB</th><th>cm</th><th>deg</th></tr><tr><td>1</td><td>13.56</td><td>72.10</td><td>-51.90</td><td>124.00</td><td>51.76</td><td>19.91</td><td>0.43</td><td>100 84 QP</td></tr></table>				Freq	Level	Over	Limit	ReadAntenna	Cable	A/Pos	T/Pos	Remark	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	1	13.56	72.10	-51.90	124.00	51.76	19.91	0.43	100 84 QP				
Freq	Level	Over	Limit	ReadAntenna	Cable	A/Pos	T/Pos	Remark																										
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg																										
1	13.56	72.10	-51.90	124.00	51.76	19.91	0.43	100 84 QP																										

B2. Results of Radiated Spurious Emissions (9 kHz~30MHz)



Note:

1. 13.56 MHz is fundamental signal which can be ignored.
2. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
3. Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);
4. Limit line = specific limits (dBuV) + distance extrapolation factor.

B4. Results of Radiated Spurious Emissions (30MHz~1GHz)



Note:

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Emission level (dBμV/m) = 20 log Emission level (μV/m).
3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor= Level.