

FCC Test Report

Product Name	SMC NFC Reader/Writer
Model No.	EXW1-NT1
FCC ID	2AJE7SMC-WEX06

Applicant	SMC Corporation
Address	4-2-2, KINUNODAI, TSUKUBAMIRAI-SHI, IBARAKI-KEN 300-2493 JAPAN

Date of Receipt	Dec. 28, 2020
Issued Date	Mar. 02, 2021
Report No.	20C1012R-E3032110103
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF or any agency of the government.

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Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test Report

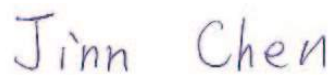
Issued Date: Mar. 02, 2021

Report No.: 20C1012R-E3032110103



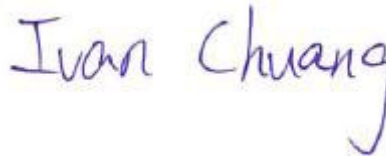
Product Name	SMC NFC Reader/Writer
Applicant	SMC Corporation
Address	4-2-2, KINUNODAI, TSUKUBAMIRAI-SHI, IBARAKI-KEN 300-2493 JAPAN
Manufacturer	SMC Corporation
Model No.	EXW1-NT1
FCC ID.	2AJE7SMC-WEX06
EUT Rated Voltage	DC 5V
EUT Test Voltage	DC 5V (Power by USB)
Trade Name	SMC
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By :



(Senior Adm. Specialist / Jinn Chen)

Tested By :



(Senior Engineer / Ivan Chuang)

Approved By :



(Director / Vincent Lin)

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Revision History

Report No.	Version	Description	Issued Date
20C1012R-E3032110103	V1.0	Initial issue of report.	Mar. 02, 2021

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	SMC NFC Reader/Writer
Trade Name	SMC
Model No.	EXW1-NT1
FCC ID	2AJE7SMC-WEX06
Frequency Range	13.56MHz
Modulation	ASK
Antenna Type	Loop coil Antenna
USB Cable	MFR: SMC, M/N: EXW1-NT1-C Shielded, 2.95m, with two ferrite cores bonded.

Frequency of Each Channel:

Channel	Frequency
Channel 1:	13.56 MHz

Note:

1. This device is a SMC NFC Reader/Writer with a built-in 13.56MHz transceiver.
2. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.225.
3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1: Transmit
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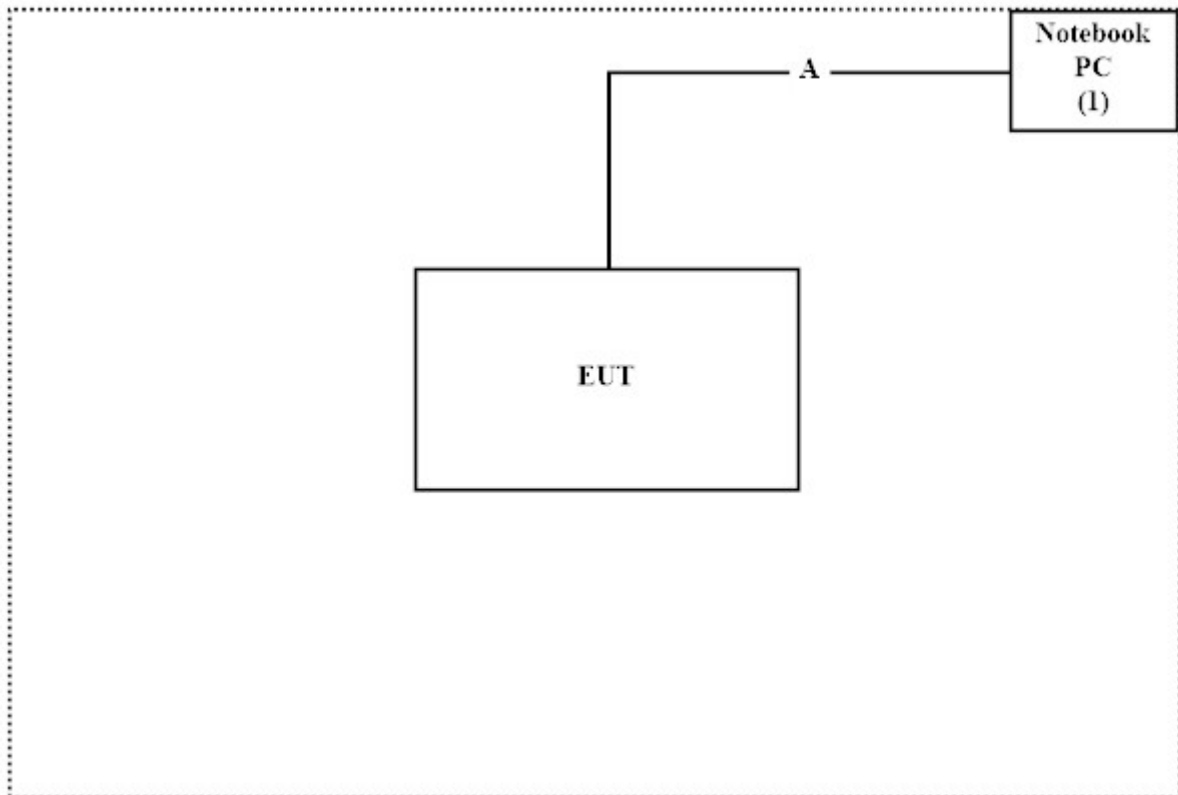
1.2. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	Power Cord
1 Notebook PC	DELL	Latitude E5440	HG26TZ1	Non-shielded, 0.8m

Signal Cable Type	Signal cable Description
A USB Cable	Shielded, 2.95m, with two ferrite cores bonded.

1.3. Configuration of tested System



1.4. EUT Exercise Software

1. Setup the EUT as shown in Section 1.3.
2. Execute software "Mic Test Tool v103" on the Notebook PC.
3. Configure the test mode, the test channel.
4. Press "OK" to start the continuous transmit.
5. Verify that the EUT works properly.

1.5. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Conducted Emission	Temperature (°C)	10~40 °C	21.1 °C
	Humidity (%RH)	10~90 %	45.2 %
Radiated Emission	Temperature (°C)	10~40 °C	15.8 °C
	Humidity (%RH)	10~90 %	67.5 %
Conductive	Temperature (°C)	10~40 °C	24.8 °C
	Humidity (%RH)	10~90 %	50 %

USA : FCC Registration Number: TW0023

Canada : IC Registration Number: 25880

Site Description : Accredited by TAF
Accredited Number: 3023

Test Laboratory : DEKRA Testing and Certification Co., Ltd
Address : No.159, Sec. 2, Wenhua 1st Rd., Linkou Dist.,
New Taipei City 24457, Taiwan, R.O.C.

Phone number : 886-2-2602-7968
Fax number : 866-2-2602-3286
Email address : info.tw@dekra.com
Website : <http://www.dekra.com.tw>

1.6. List of Test Equipment

For Conduction measurements /ASR1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	EMI Test Receiver	R&S	ESR7	101601	2020.05.28	2021.05.27
X	Two-Line V-Network	R&S	ENV216	101306	2020.03.25	2021.03.24
X	Two-Line V-Network	R&S	ENV216	101307	2020.04.17	2021.04.16
X	Coaxial Cable	DEKRA	RG400_BNC	RF001	2020.05.24	2021.05.23

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version : DEKRA Testing System V2.0

For Conducted measurements /ASR3

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Temperature Chamber	KSON	THS-D4T-100	A0606	2020.04.22	2021.04.21
X	Spectrum Analyzer	R&S	FSV30	103466	2020.12.28	2021.12.27
X	AC Power Source	EXTECH Electronics	6605	1570547	2020.12.23	2021.12.22

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version : DEKRA Conduction Test System V9.0.5

For Radiated measurements /ACB1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	AMETEK	HLA6121	49611	2020.03.16	2021.03.15
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-678	2020.09.04	2021.09.03
	Horn Antenna	ETS-Lindgren	3117	00203800	2020.12.22	2021.12.21
	Horn Antenna	Com-Power	AH-840	101087	2020.06.08	2021.06.07
X	Pre-Amplifier	EMCI	EMC001330	980316	2020.06.23	2021.06.22
	Pre-Amplifier	EMCI	EMC051835SE	980311	2020.06.23	2021.06.22
	Pre-Amplifier	EMCI	EMC05820SE	980310	2020.06.24	2021.06.23
	Pre-Amplifier	EMCI	EMC184045SE	980314	2020.06.10	2021.06.09
	Filter	MICRO TRONICS	BRM50702	G251	2020.09.17	2021.09.16
	Filter	MICRO TRONICS	BRM50716	G188	2020.09.17	2021.09.16
X	EMI Test Receiver	R&S	ESR7	101601	2020.05.28	2021.05.27
X	Spectrum Analyzer	R&S	FSV40	101148	2020.03.16	2021.03.15
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2020.07.03	2021.07.02
	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2020.06.10	2021.06.09

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version : DEKRA Testing System V2.0

1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document, and is described in each test chapter of this report.

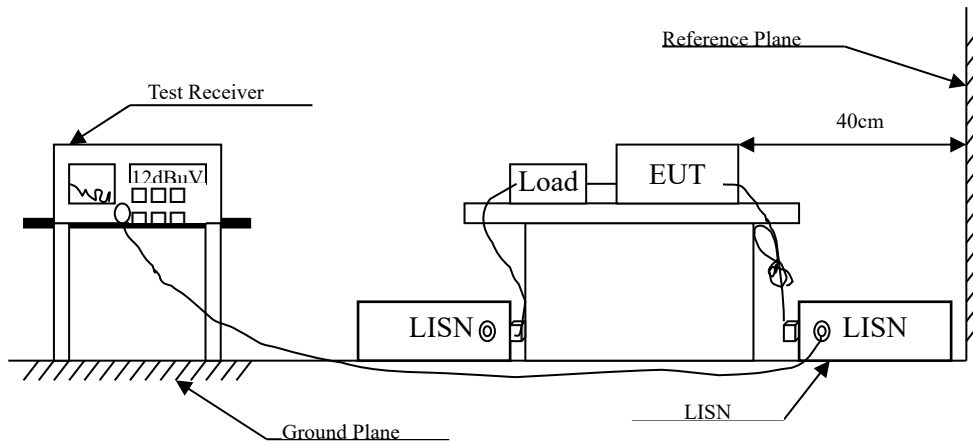
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test item	Uncertainty	
Conducted Emission	± 3.42 dB	
Radiated Emission	Under 1GHz ± 4.06 dB	Above 1GHz ± 3.73 dB
Band Edge	Under 1GHz ± 4.06 dB	Above 1GHz ± 3.73 dB
Frequency Tolerance	± 682.83 Hz	

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56 ^(§§)	56-46 ^(§§)
0.50-5.0	56	46
5.0 - 30	60	50

2.3. Test Procedure

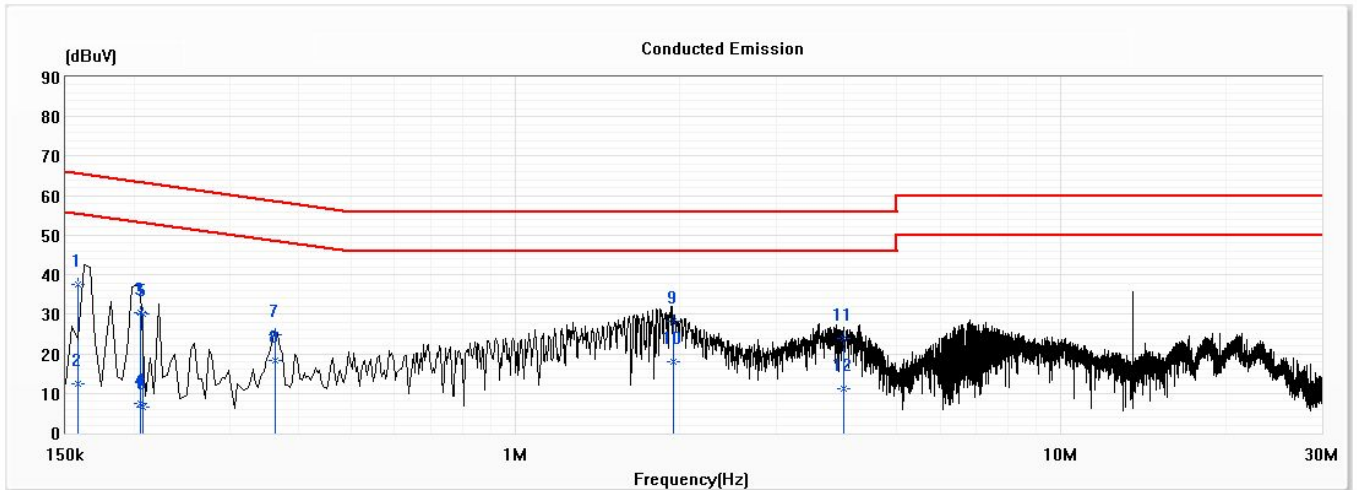
The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.4. Test Result of Conducted Emission

Product : SMC NFC Reader/Writer
 Test Item : Conducted Emission Test
 Power Line : L 1
 Test Mode : Mode 1: Transmit
 Test Date : 2021/01/20

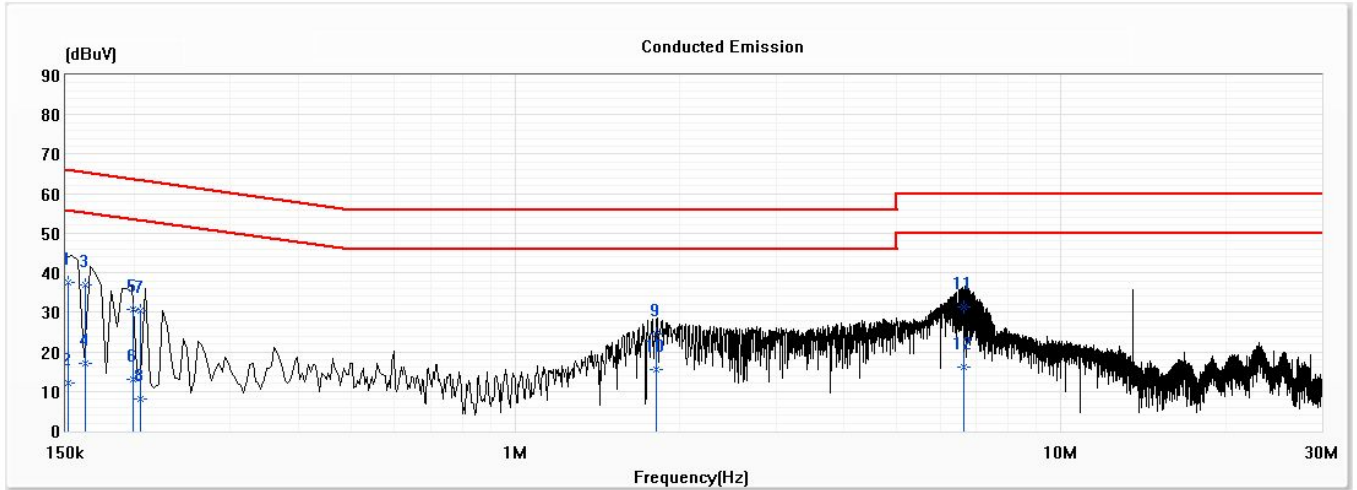


No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.158	37.42	65.55	-28.13	27.76	9.66	QP
2	0.158	12.36	55.55	-43.20	2.70	9.66	AV
3	0.205	30.42	63.39	-32.98	20.76	9.65	QP
4	0.205	7.42	53.39	-45.97	-2.23	9.65	AV
5	0.208	29.97	63.29	-33.32	20.32	9.65	QP
6	0.208	6.62	53.29	-46.68	-3.03	9.65	AV
7	0.363	24.88	58.66	-33.79	15.22	9.66	QP
8	0.363	18.27	48.66	-30.40	8.61	9.66	AV
9	1.943	28.33	56.00	-27.67	18.61	9.72	QP
*10	1.943	17.95	46.00	-28.05	8.23	9.72	AV
11	3.996	24.00	56.00	-32.00	14.23	9.77	QP
12	3.996	11.17	46.00	-34.83	1.40	9.77	AV

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ * “ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : SMC NFC Reader/Writer
 Test Item : Conducted Emission Test
 Power Line : N
 Test Mode : Mode 1: Transmit
 Test Date : 2021/01/20



No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.151	37.61	65.93	-28.32	27.94	9.67	QP
2	0.151	12.21	55.93	-43.72	2.54	9.67	AV
3	0.163	37.05	65.32	-28.28	27.38	9.67	QP
4	0.163	17.16	55.32	-38.16	7.49	9.67	AV
5	0.199	30.82	63.65	-32.83	21.15	9.67	QP
6	0.199	13.07	53.65	-40.58	3.40	9.67	AV
7	0.205	30.45	63.39	-32.93	20.78	9.67	QP
8	0.205	8.01	53.39	-45.38	-1.67	9.67	AV
9	1.815	24.52	56.00	-31.48	14.80	9.72	QP
*10	1.815	15.48	46.00	-30.52	5.75	9.72	AV
11	6.647	31.44	60.00	-28.56	21.60	9.85	QP
12	6.647	16.08	50.00	-33.92	6.23	9.85	AV

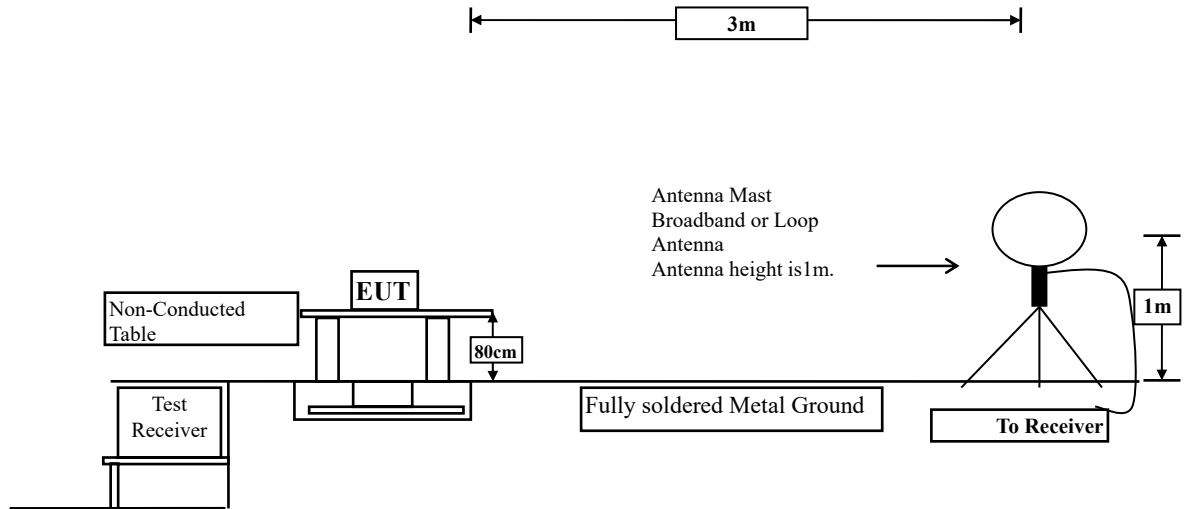
Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ * “ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

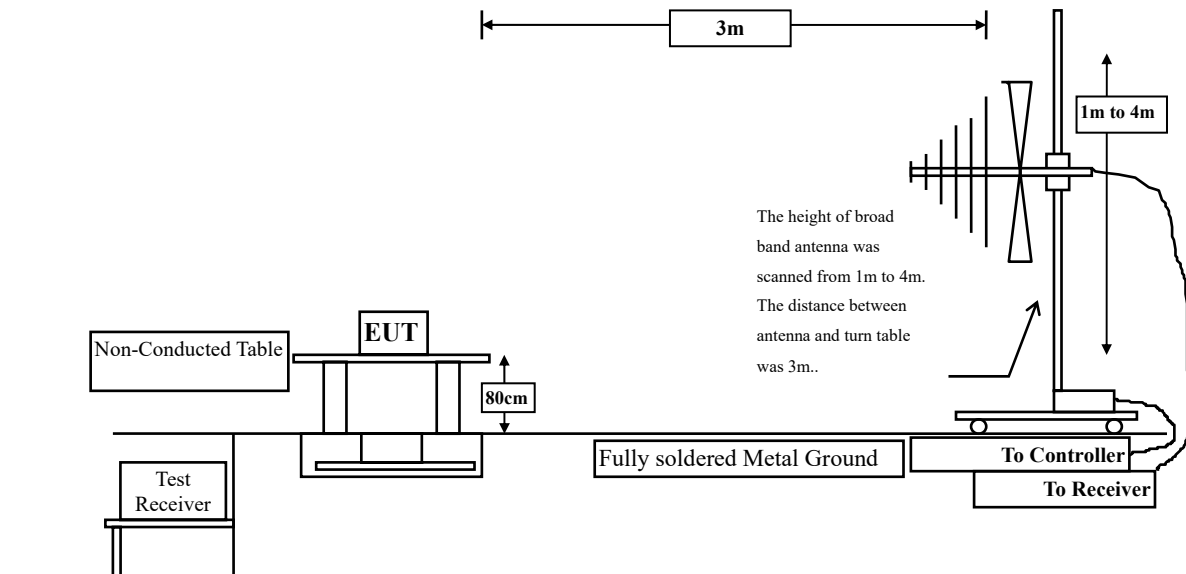
3. Radiated Emission

3.1. Test Setup

Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



3.2. Limits

➤ Fundamental electric field strength Limit

FCC Part 15 Subpart C Paragraph 15.225 Limits				
Fundamental Frequency MHz	Field strength of fundamental			
	uV/m	Distance (meter)	dBuV/m	Distance (meter)
13.553 – 13.567	15848	30	124	3
13.410 – 13.553 and 13.567 – 13.710	334	30	90.47	3
13.110 – 13.410 and 13.710 – 14.010	106	30	80.50	3
Outside of the 13.110 – 14.010	See 15.209 Limits			

Remarks :

1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
3. The emission limit in this paragraph is based on measurement instrumentation employing an quasi-peak detector.

➤ Spurious electric field strength Limit

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks :

1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3.3. Test Procedure

Fundamental electric field strength:

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum electric field strength.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna which is 1 meter above ground. All X-axis, Y-axis and Z-axis polarization of the antenna are set on measurement.

Spurious electric field strength:

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

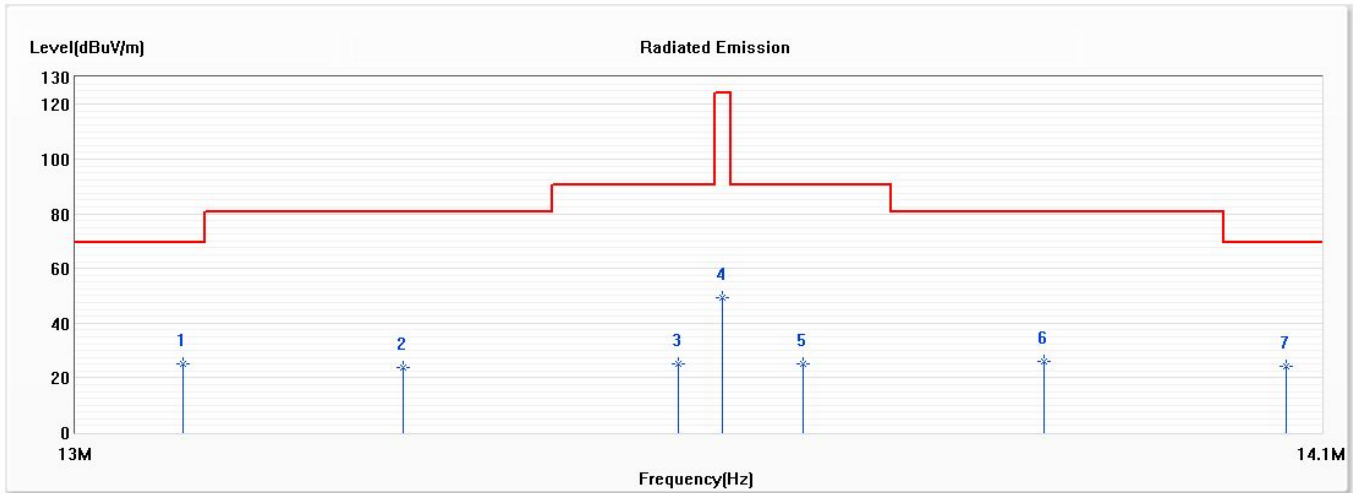
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

The bandwidth below 30MHz setting on the field strength meter is 9kHz and above 30MHz is 120kHz. The frequency range from 9kHz to 10th harmonics is checked.

3.4. Test Result of Radiated Emission

Product : SMC NFC Reader/Writer
 Test Item : Fundamental Radiated Emission
 Test Mode : Mode 1: Transmit
 Test date : 2021/02/25

Horizontal_X-axis



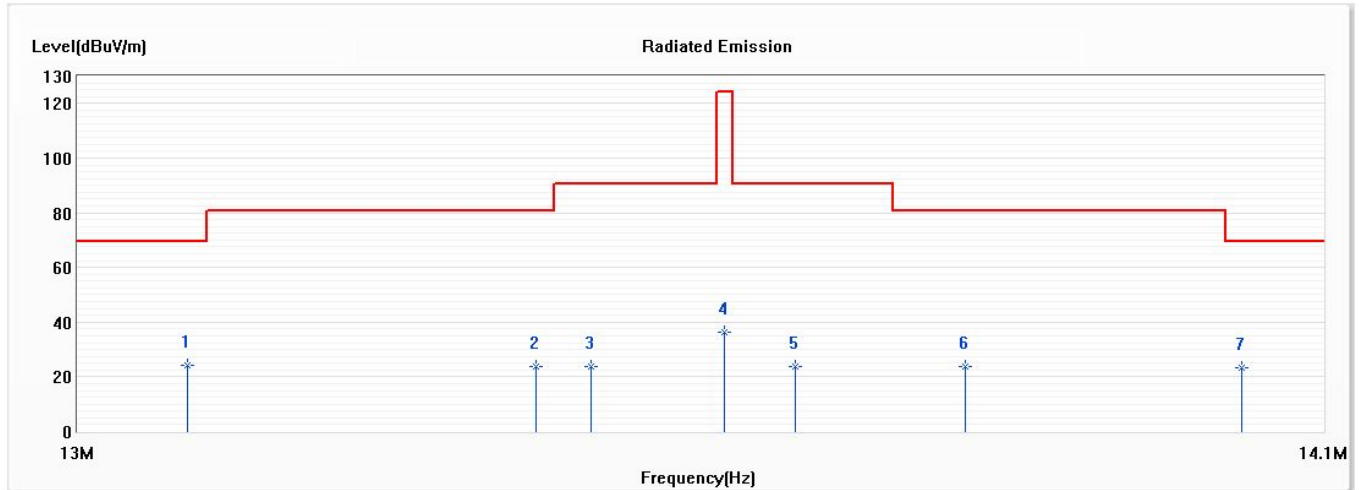
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	13.091	25.02	69.50	-44.48	4.70	20.32	QP
2	13.281	23.85	80.50	-56.65	3.60	20.25	QP
3	13.521	25.25	90.47	-65.22	5.10	20.15	QP
4	13.560	49.28	124.00	-74.72	29.14	20.14	QP
5	13.631	24.91	90.47	-65.56	4.80	20.11	QP
6	13.847	25.82	80.50	-54.68	5.80	20.02	QP
7	14.067	24.36	69.50	-45.14	4.40	19.96	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ * ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : SMC NFC Reader/Writer
 Test Item : Fundamental Radiated Emission
 Test Mode : Mode 1: Transmit
 Test date : 2021/02/25

Vertical_X-axis



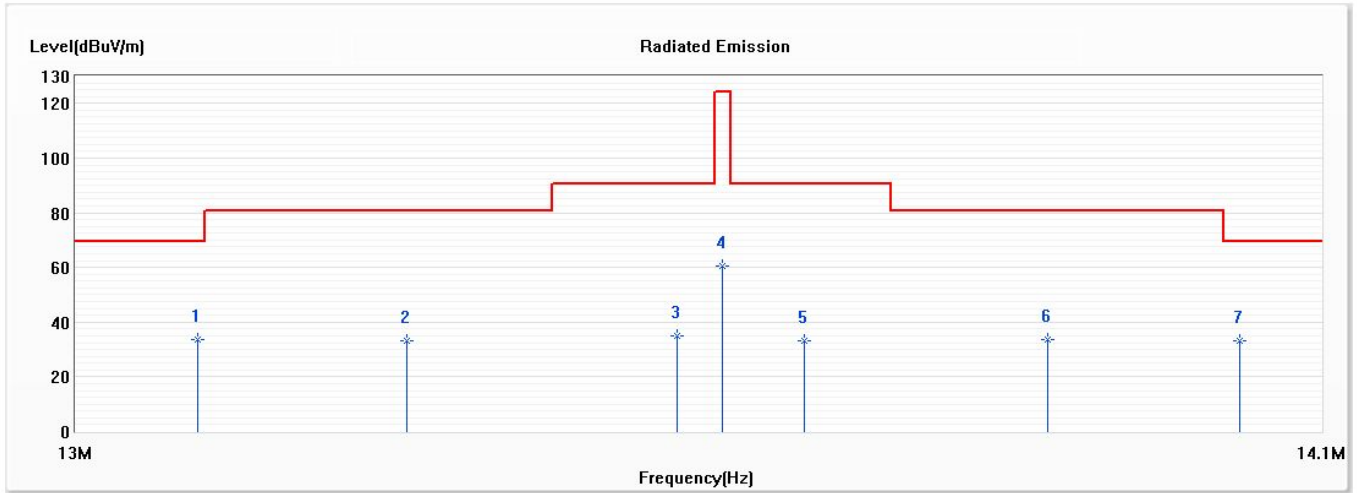
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	13.094	24.02	69.50	-45.48	3.70	20.32	QP
2	13.394	23.70	80.50	-56.80	3.50	20.20	QP
3	13.443	23.68	90.47	-66.79	3.50	20.18	QP
4	13.560	36.48	124.00	-87.52	16.34	20.14	QP
5	13.623	23.61	90.47	-66.86	3.50	20.11	QP
6	13.775	23.55	80.50	-56.95	3.50	20.05	QP
7	14.025	23.46	69.50	-46.04	3.50	19.96	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ * ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : SMC NFC Reader/Writer
 Test Item : Fundamental Radiated Emission
 Test Mode : Mode 1: Transmit
 Test date : 2021/02/25

Horizontal_Y-axis



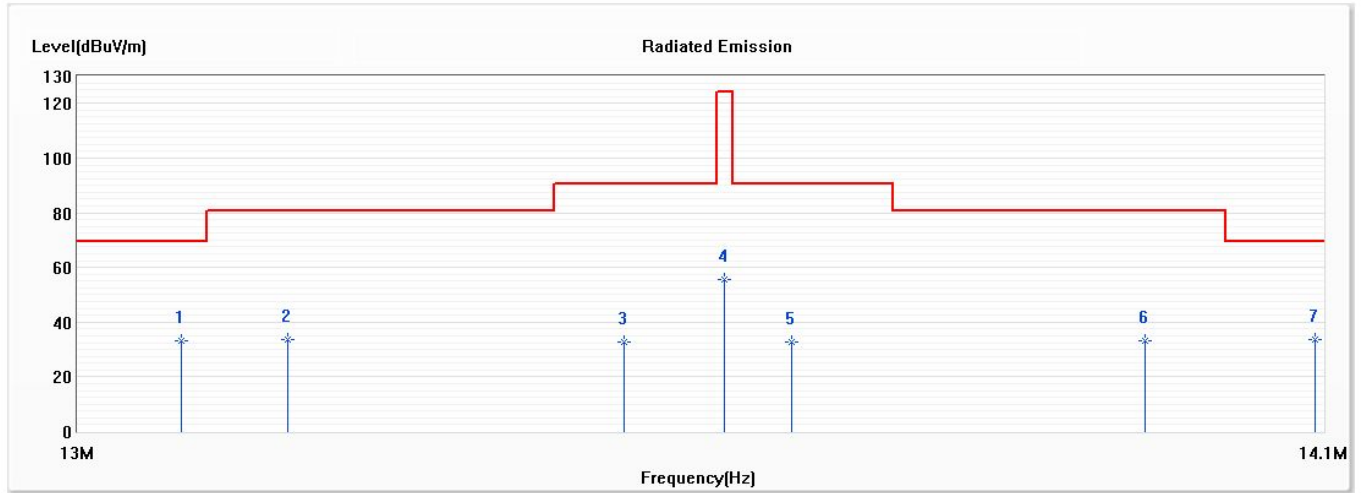
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	13.104	33.46	69.50	-36.04	13.14	20.32	QP
2	13.284	33.38	80.50	-47.12	13.13	20.25	QP
3	13.520	34.81	90.47	-55.66	14.66	20.15	QP
4	13.560	60.68	124.00	-63.32	40.54	20.14	QP
5	13.633	33.18	90.47	-57.29	13.07	20.11	QP
6	13.851	33.58	80.50	-46.92	13.56	20.02	QP
7	14.025	33.15	69.50	-36.35	13.19	19.96	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ * ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : SMC NFC Reader/Writer
 Test Item : Fundamental Radiated Emission
 Test Mode : Mode 1: Transmit
 Test date : 2021/02/25

Vertical_Y-axis



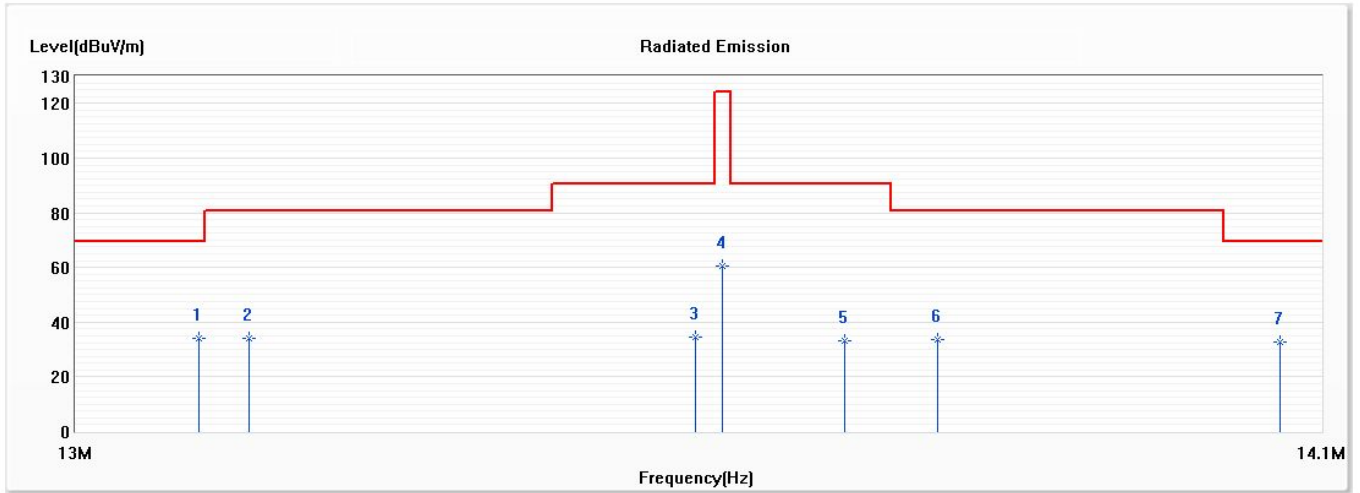
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	13.088	33.35	69.50	-36.15	13.03	20.32	QP
2	13.179	33.40	80.50	-47.10	13.11	20.29	QP
3	13.472	32.81	90.47	-57.66	12.64	20.17	QP
4	13.560	55.78	124.00	-68.22	35.64	20.14	QP
5	13.620	32.74	90.47	-57.73	12.63	20.11	QP
6	13.937	33.33	80.50	-47.17	13.34	19.99	QP
* 7	14.092	33.49	69.50	-36.01	13.53	19.96	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ * ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : SMC NFC Reader/Writer
 Test Item : Fundamental Radiated Emission
 Test Mode : Mode 1: Transmit
 Test date : 2021/02/25

Horizontal_Z-axis



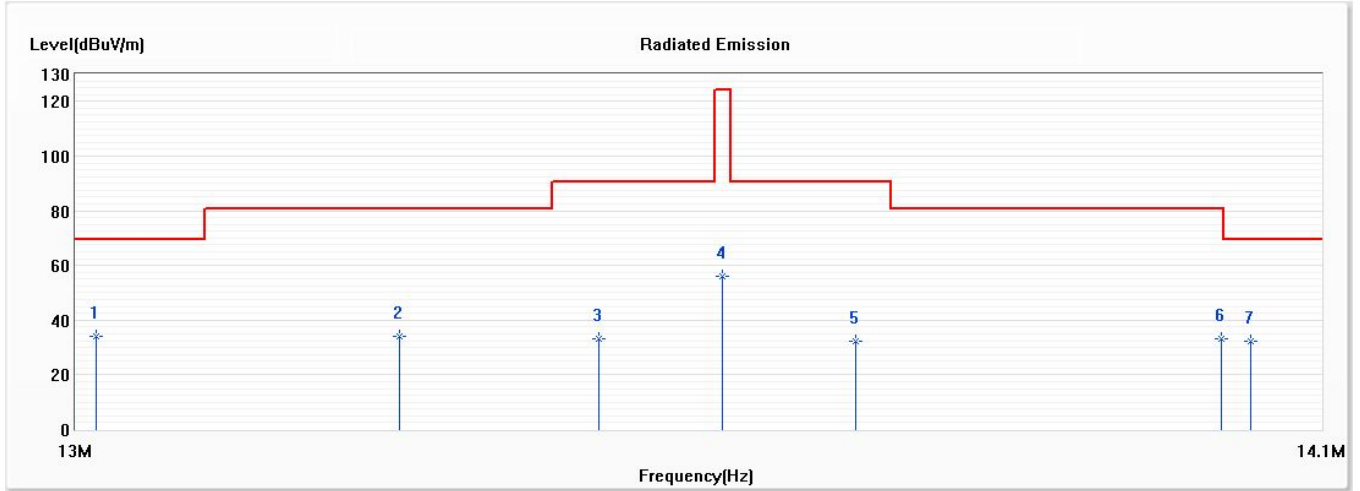
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	13.105	33.86	69.50	-35.64	13.54	20.32	QP
2	13.148	33.90	80.50	-46.60	13.60	20.30	QP
3	13.536	34.56	90.47	-55.91	14.41	20.15	QP
4	13.560	60.68	124.00	-63.32	40.54	20.14	QP
5	13.668	33.16	90.47	-57.31	13.07	20.09	QP
6	13.752	33.83	80.50	-46.67	13.77	20.06	QP
7	14.062	32.67	69.50	-36.83	12.71	19.96	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ * ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : SMC NFC Reader/Writer
 Test Item : Fundamental Radiated Emission
 Test Mode : Mode 1: Transmit
 Test date : 2021/02/25

Vertical_Z-axis



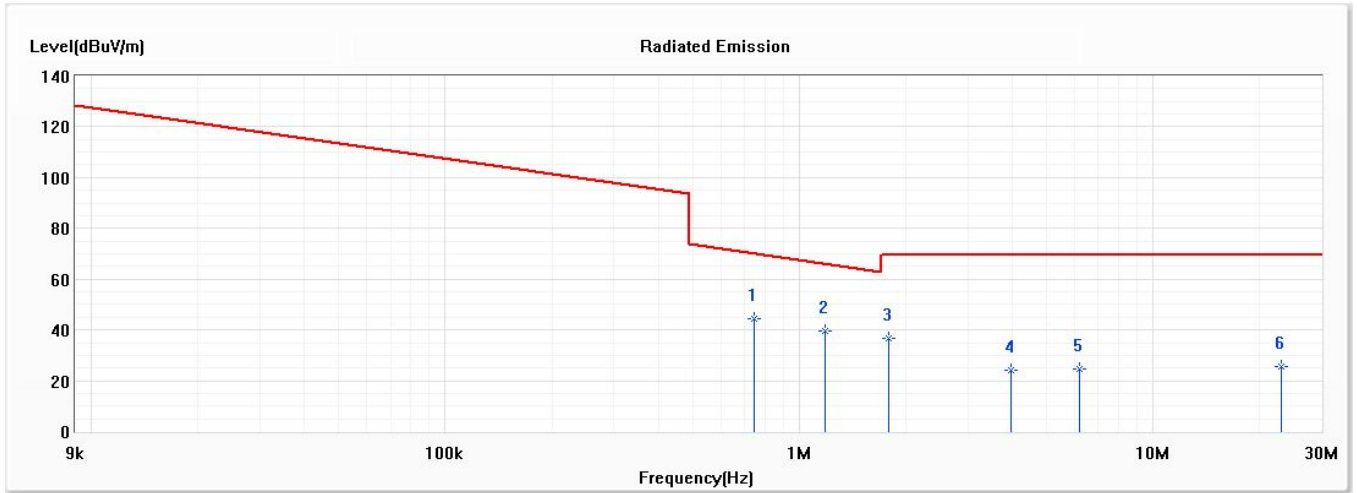
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	13.018	33.92	69.50	-35.58	13.57	20.35	QP
2	13.277	33.95	80.50	-46.55	13.70	20.25	QP
3	13.451	32.96	90.47	-57.51	12.78	20.18	QP
4	13.560	55.98	124.00	-68.02	35.84	20.14	QP
5	13.678	32.49	90.47	-57.98	12.40	20.09	QP
6	14.008	33.22	80.50	-47.28	13.26	19.96	QP
7	14.035	32.34	69.50	-37.16	12.38	19.96	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ * ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : SMC NFC Reader/Writer
 Test Item : General Radiated Emission Data (below 30MHz)
 Test Mode : Mode 1: Transmit
 Test date : 2021/01/11

Horizontal



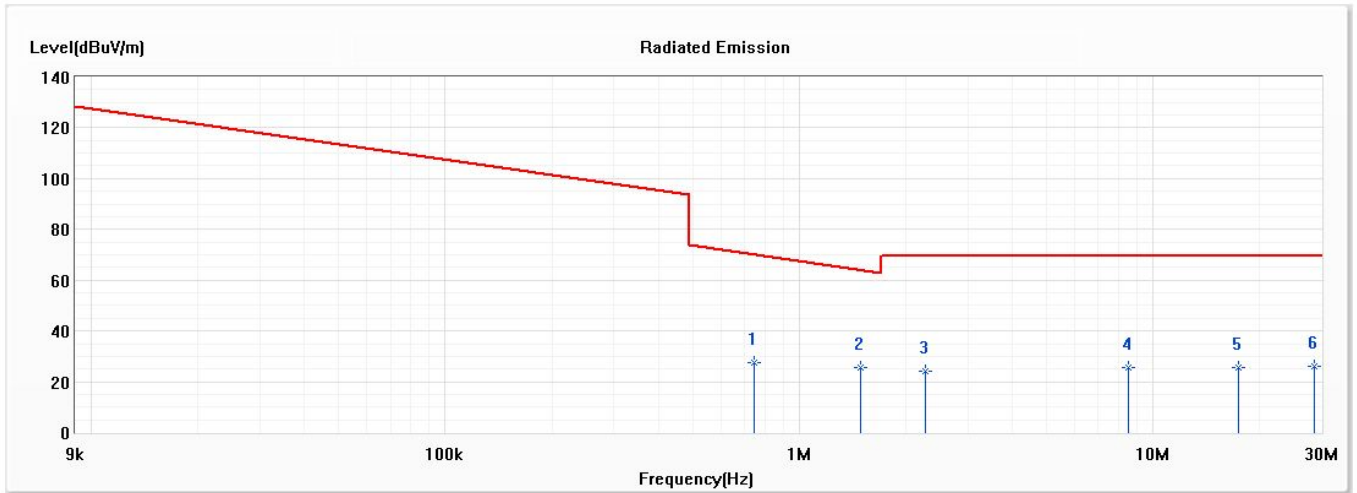
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	0.748	44.35	70.14	-25.79	23.90	20.45	QP
2	1.183	39.75	66.16	-26.41	19.40	20.35	QP
3	1.791	36.70	69.54	-32.84	16.50	20.20	QP
4	3.964	24.23	69.54	-45.31	3.90	20.33	QP
5	6.225	24.82	69.54	-44.72	3.70	21.12	QP
6	23.002	25.55	69.54	-43.99	2.80	22.75	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ * ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : SMC NFC Reader/Writer
 Test Item : General Radiated Emission Data (below 30MHz)
 Test Mode : Mode 1: Transmit
 Test date : 2021/01/11

Vertical



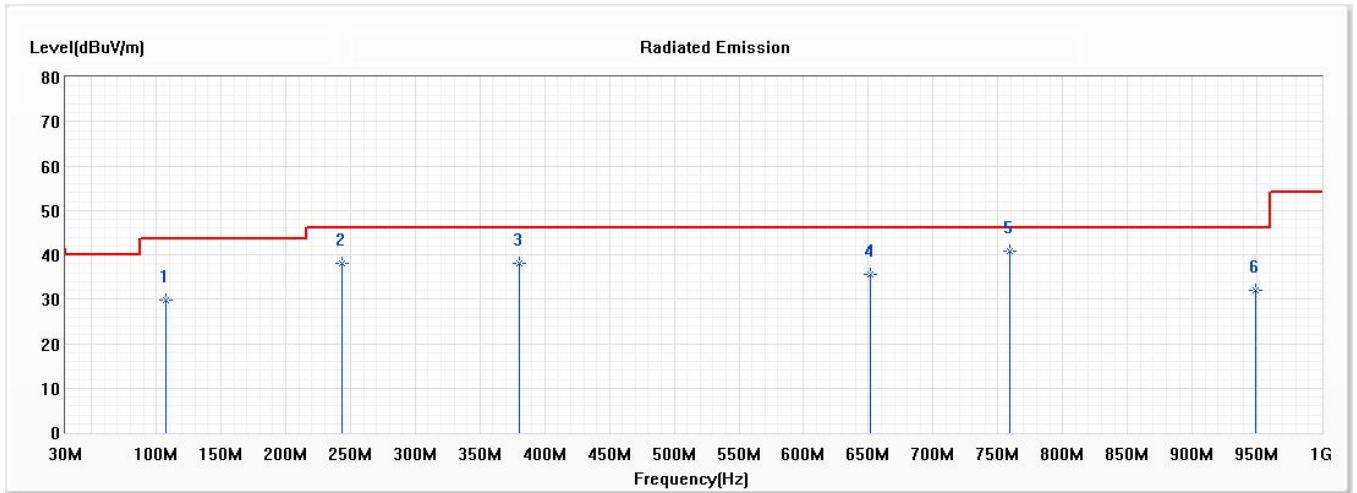
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.748	27.55	70.14	-42.59	7.10	20.45	QP
* 2	1.487	25.78	64.18	-38.40	5.50	20.28	QP
3	2.269	24.08	69.54	-45.46	4.00	20.08	QP
4	8.528	25.42	69.54	-44.12	3.70	21.72	QP
5	17.395	25.57	69.54	-43.97	3.10	22.47	QP
6	28.609	25.93	69.54	-43.61	2.90	23.03	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ * ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : SMC NFC Reader/Writer
 Test Item : General Radiated Emission Data (above 30MHz)
 Test Mode : Mode 1: Transmit
 Test date : 2021/01/11

Horizontal



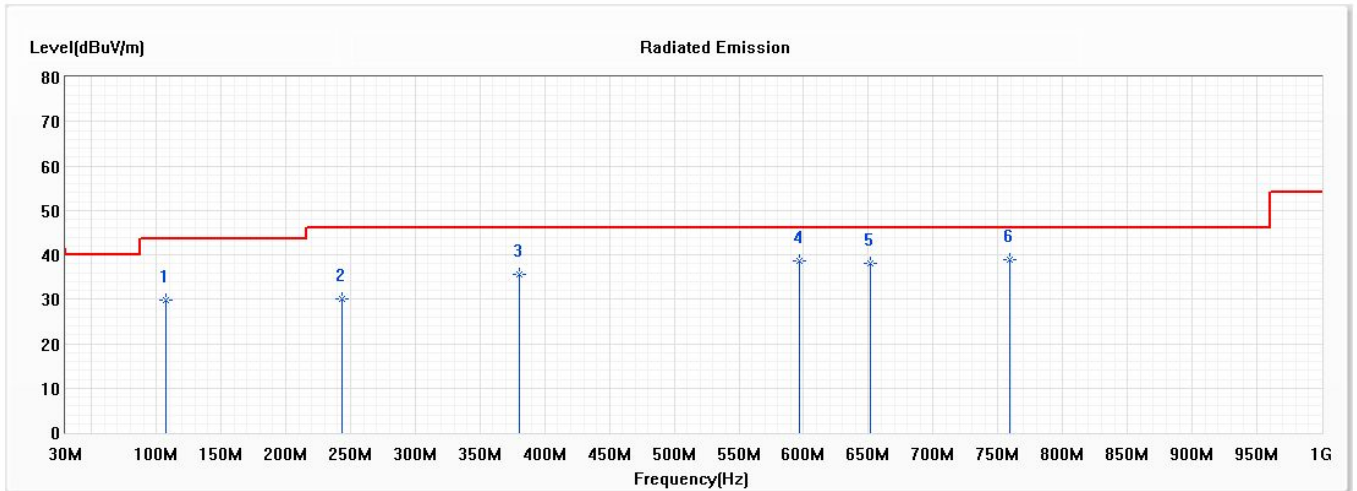
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	107.319	29.80	43.50	-13.70	44.03	-14.23	QP
2	243.681	38.01	46.00	-7.99	49.45	-11.44	QP
3	380.043	38.17	46.00	-7.83	45.61	-7.44	QP
4	651.362	35.62	46.00	-10.38	38.03	-2.41	QP
* 5	759.609	40.87	46.00	-5.13	41.53	-0.66	QP
6	949.391	31.99	46.00	-14.01	30.37	1.62	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ * ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : SMC NFC Reader/Writer
 Test Item : General Radiated Emission Data (above 30MHz)
 Test Mode : Mode 1: Transmit
 Test date : 2021/01/11

Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	107.319	29.87	43.50	-13.63	44.10	-14.23	QP
2	243.681	30.11	46.00	-15.89	41.55	-11.44	QP
3	380.043	35.47	46.00	-10.53	42.91	-7.44	QP
4	596.536	38.64	46.00	-7.36	41.61	-2.97	QP
5	651.362	38.05	46.00	-7.95	40.46	-2.41	QP
* 6	759.609	38.83	46.00	-7.17	39.49	-0.66	QP

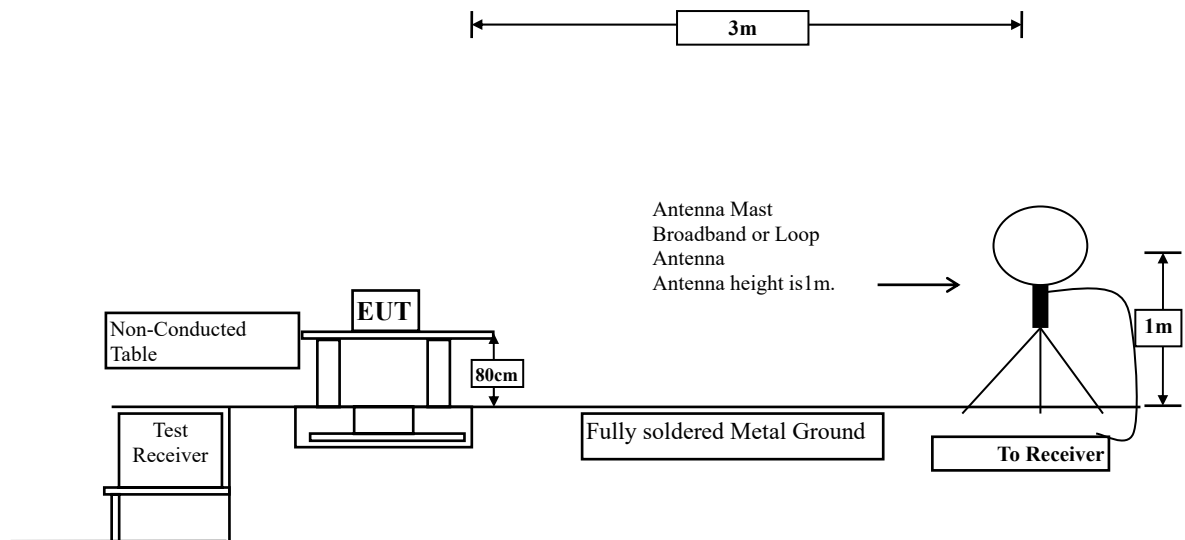
Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ * ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

4. Band Edge

4.1. Test Setup

Radiated Emission Under 30MHz



4.2. Limits

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 Section 15.209. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209

4.3. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

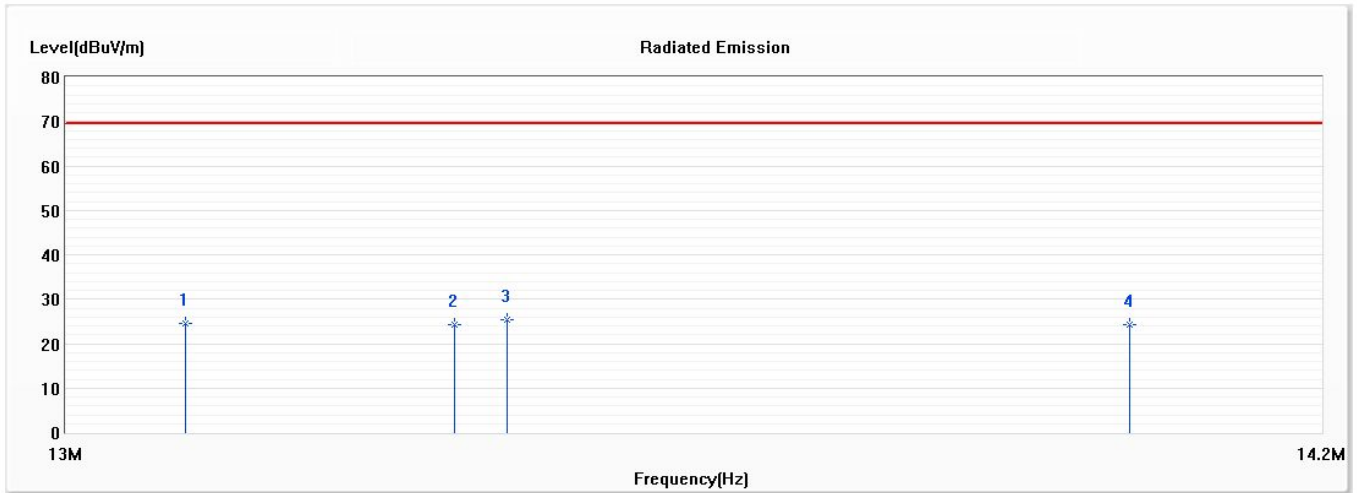
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

The bandwidth below 30MHz setting on the field strength meter is 9kHz and above 30MHz is 120kHz.

4.4. Test Result of Band Edge

Product : SMC NFC Reader/Writer
 Test Item : Band Edge Data
 Test Mode : Mode 1: Transmit
 Test date : 2021/02/25

Horizontal



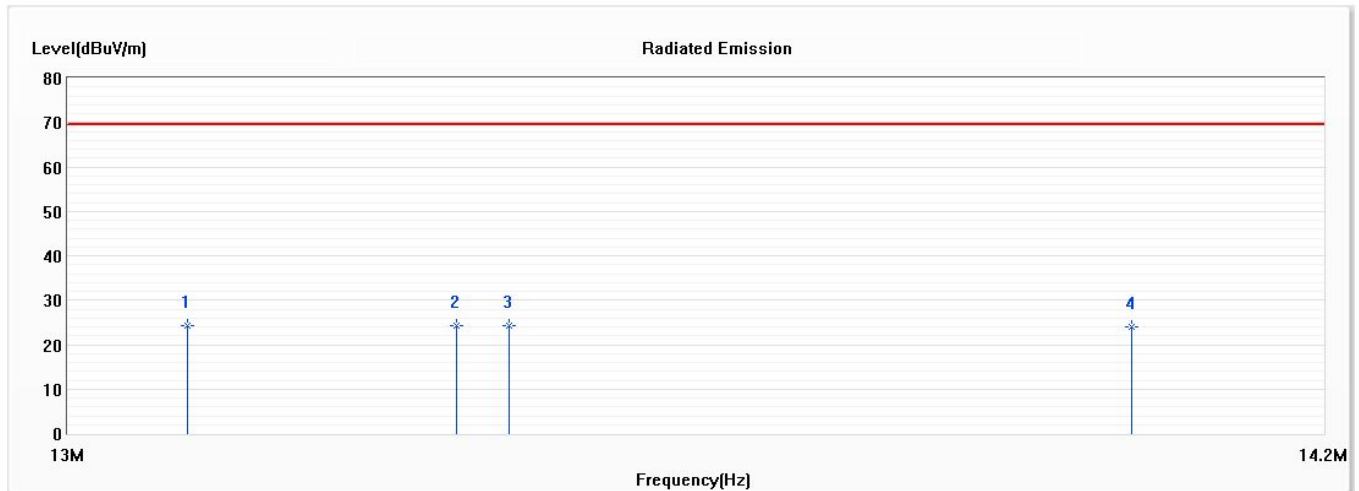
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	13.110	24.50	69.54	-45.04	4.18	20.32	QP
2	13.360	24.40	69.54	-45.14	4.18	20.22	QP
* 3	13.410	25.30	69.54	-44.24	5.10	20.20	QP
4	14.010	24.20	69.54	-45.34	4.24	19.96	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ * ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : SMC NFC Reader/Writer
 Test Item : Band Edge Data
 Test Mode : Mode 1: Transmit
 Test date : 2021/02/25

Vertical



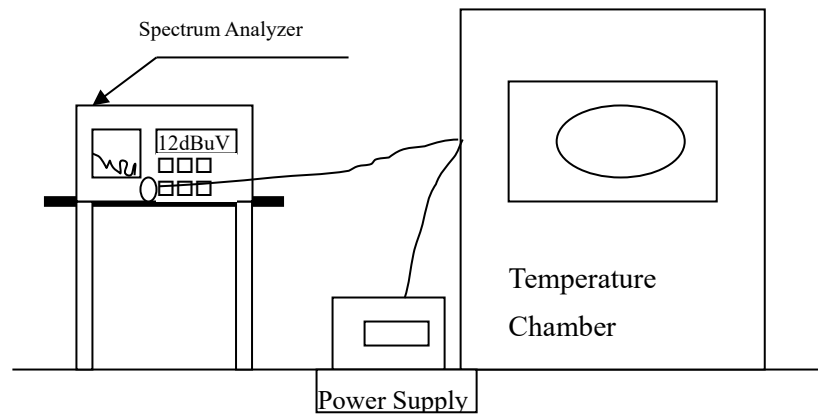
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	13.110	24.40	69.54	-45.14	4.08	20.32	QP
2	13.360	24.30	69.54	-45.24	4.08	20.22	QP
3	13.410	24.40	69.54	-45.14	4.20	20.20	QP
4	14.010	24.10	69.54	-45.44	4.14	19.96	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ * ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

5. Frequency Tolerance

5.1. Test Setup



5.2. Limits

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency.

5.3. Test Procedure

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ 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. For battery operated equipment, the equipment tests shall be performed using a new battery.

5.4. Test Result of Frequency Stability

Product : SMC NFC Reader/Writer
 Test Item : Frequency Tolerance
 Test Mode : Mode 1: Transmit
 Test date : 2021/02/27

Temperature (°C)	Voltage (V)	Observe Time	Declared Frequency (MHz)	Read Frequency (MHz)	Tolerance (%)	Limit (%)
20	5	start	13.56	13.56072	0.005310	±0.01 %
		2mins	13.56	13.56072	0.005310	
		5mins	13.56	13.56072	0.005310	
		10mins	13.56	13.56072	0.005310	
20	5.75	start	13.56	13.56072	0.005310	±0.01 %
		2mins	13.56	13.56072	0.005310	
		5mins	13.56	13.56072	0.005310	
		10mins	13.56	13.56072	0.005310	
20	4.25	start	13.56	13.56072	0.005310	±0.01 %
		2mins	13.56	13.56072	0.005310	
		5mins	13.56	13.56072	0.005310	
		10mins	13.56	13.56072	0.005310	
70	5	start	13.56	13.56072	0.005310	±0.01 %
		2mins	13.56	13.56072	0.005310	
		5mins	13.56	13.56072	0.005310	
		10mins	13.56	13.56072	0.005310	
60	5	start	13.56	13.56072	0.005310	±0.01 %
		2mins	13.56	13.56072	0.005310	
		5mins	13.56	13.56072	0.005310	
		10mins	13.56	13.56072	0.005310	
50	5	start	13.56	13.56072	0.005310	±0.01 %
		2mins	13.56	13.56072	0.005310	
		5mins	13.56	13.56072	0.005310	
		10mins	13.56	13.56072	0.005310	

40	5	start	13.56	13.56072	0.005310	±0.01 %
		2mins	13.56	13.56072	0.005310	
		5mins	13.56	13.56072	0.005310	
		10mins	13.56	13.56072	0.005310	
30	5	start	13.56	13.56072	0.005310	±0.01 %
		2mins	13.56	13.56072	0.005310	
		5mins	13.56	13.56072	0.005310	
		10mins	13.56	13.56072	0.005310	
20	5	start	13.56	13.56072	0.005310	±0.01 %
		2mins	13.56	13.56072	0.005310	
		5mins	13.56	13.56072	0.005310	
		10mins	13.56	13.56072	0.005310	
10	5	start	13.56	13.56072	0.005310	±0.01 %
		2mins	13.56	13.56072	0.005310	
		5mins	13.56	13.56072	0.005310	
		10mins	13.56	13.56072	0.005310	
0	5	start	13.56	13.56072	0.005310	±0.01 %
		2mins	13.56	13.56072	0.005310	
		5mins	13.56	13.56072	0.005310	
		10mins	13.56	13.56072	0.005310	
-10	5	start	13.56	13.56072	0.005310	±0.01 %
		2mins	13.56	13.56072	0.005310	
		5mins	13.56	13.56072	0.005310	
		10mins	13.56	13.56072	0.005310	
-20	5	start	13.56	13.56072	0.005310	±0.01 %
		2mins	13.56	13.56072	0.005310	
		5mins	13.56	13.56072	0.005310	
		10mins	13.56	13.56072	0.005310	

6. EMI Reduction Method During Compliance Testing

No modification was made during testing.