

FCC Test Report

Equipment : Personal Computer
Brand Name : SONY
Model No. : SVF15NB1YL
FCC ID : AK8SVF15NB1YL
Standard : 47 CFR FCC Part 15.225
Operating Band : 13.553 – 13.567 MHz (channel freq. 13.56 MHz)
Equipment Class : DXX
Applicant : Sony Corporation
Manufacturer : 1-7-1 Konan, Minato-ku, Tokyo 108-0075, Japan
NFC Module : SONY / RC-S640/IC

The product sample received on Aug. 16, 2013 and completely tested on Oct. 16, 2013. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2009 and shown compliance with the applicable technical standards.

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

Reviewed by:

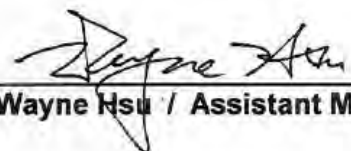

Wayne Hsu / Assistant Manager

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Summary of Test Result

Conformance Test Specifications					
Report Clause	Ref. Std. Clause	Description	Measured	Limit	Result
1.1.2	15.203	Antenna Requirement	Antenna connector mechanism complied	FCC 15.203	Complied
3.1	15.207	AC Power-line Conducted Emissions	[dBuV]: 0.1965370MHz 56.55 (Margin 7.21dB)- QP 38.22 (Margin 15.54dB)- AV	FCC 15.207	Complied
3.2	15.215(c)	Emission Bandwidth	20dB Bandwidth 2.84 [kHz] F_L : 13.55855 MHz F_H : 13.56139 MHz	Fall in band $F_L \geq 13.553$ MHz $F_H \leq 13.567$ MHz	Complied
3.3	15.225(a)~(d)	Field Strength of Fundamental Emissions and Spectrum Mask	Fundamental Emissions quasi peak:53.69 dBuV/m at 3m Device complies with spectrum mask – refer to test data	124 dBuV/m at 3	Complied
3.4	15.225(d)	Transmitter Radiated Unwanted Emissions	[dBuV/m at 3m]: 283.170MHz 44.34 (Margin 1.66dB) - QP	FCC 15.209	Complied
3.5	15.225(e)	Frequency Stability	22.12 ppm	$\pm 0.01\%$ (100ppm)	Complied



SPORTON INTERNATIONAL INC.
TEL : 886-3-327-3456
FAX : 886-3-327-0973

1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information				
Frequency Range	Modulation	Ch. Frequency (MHz)	Channel Number	Field Strength (dBuV/m)
13.553 – 13.567 MHz	ISO 14443-2 (ASK)	13.56	1	53.69
Note 1: Field strength performed quasi peak level at 3m.				

1.1.2 Antenna Information

Antenna Category	
☐	Equipment placed on the market without antennas
☒	Integral antenna (antenna permanently attached)
☐	External antenna (dedicated antennas)

1.1.3 Type of EUT

Identify EUT	
EUT Serial Number	N/A
Presentation of Equipment	☐ Production ; ☐ Pre-Production ; ☒ Prototype
Type of EUT	
☒	Stand-alone
☐	Combined (EUT where the radio part is fully integrated within another device) Combined Equipment - Brand Name / Model No.: ...
☐	Plug-in radio (EUT intended for a variety of host systems) Host System - Brand Name / Model No.: ...
☐	Other:

1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle	
☒	Operated test mode for worst duty cycle
Test Signal Duty Cycle (x)	Voltage Duty Factor [dB] – (20 log 1/x)
☒ 100%	0

1.1.5 EUT Operational Condition

Supply Voltage	☒ AC mains	☒ DC	
Type of DC Source	☐ Internal DC supply	☒ External DC adapter	☒ Li-on Battery

1.2 Accessories

Accessories Information				
AC Adapter	Brand Name	SONY	Model Name	VGP-AC19V75
	Power Rating	I/P: 100-240V ~ 1.2A 50/60Hz ; O/P: 19.5V $\overline{\overline{=}}$ 2.3A		
Li-ion Battery	Brand Name	SONY	Model Name	VGP-BPS40
	Power Rating	15.0V $\overline{\overline{=}}$ / 3 170 mAh / 48 Wh		

Reminder: Regarding to more detail and other information, please refer to user manual.

1.3 Support Equipment

Support Equipment- AC Line Conducted Emission Test				
No.	Equipment	Brand Name	Model Name	FCC ID
1	iPod Nano	Apple	A1199	DoC
2	(USB) Mouse	Microsoft	1004	DoC
3	NFC CARD	-	-	-
4	Wireless AP (Remote Workstation)	ASUS	RT-AC66U	MSQ-RTAC66U
5	Bluetooth Headset (Remote Workstation)	Sony Ericsson	Z354	PY7DDA-2006

Support Equipment- Radiated Emission Test				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Identity Badge	-	-	-

1.4 Testing Applied Standards

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

- ♦ 47 CFR FCC Part 15
- ♦ ANSI C63.10-2009
- ♦ FCC KDB 174176

1.5 Testing Location Information

Testing Location			
☒	HWA YA	ADD : No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.	
		TEL : 886-3-327-3456 FAX : 886-3-327-0973	
Test Condition	Test Site No.	Test Engineer	Test Environment
AC Conduction	CO04-HY	Zeus	22°C / 55%
RF Conducted	TH01-HY	Wei	25°C / 65%
Radiated Emission	03CH02-HY	Daniel	26°C / 55%

1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

Measurement Uncertainty			
Test Item		Uncertainty	Limit
AC power-line conducted emissions		±2.26 dB	N/A
Emission bandwidth		±1.42 %	N/A
Unwanted emissions, conducted	9 – 150 kHz	±0.38 dB	N/A
	0.15 – 30 MHz	±0.42 dB	N/A
	30 – 1000 MHz	±0.51 dB	N/A
All emissions, radiated	9 – 150 kHz	±2.49 dB	N/A
	0.15 – 30 MHz	±2.28 dB	N/A
	30 – 1000 MHz	±2.56 dB	N/A
Temperature		±0.8 °C	N/A
Humidity		±3 %	N/A
DC and low frequency voltages		±3 %	N/A
Time		±1.42 %	N/A
Duty Cycle		±1.42 %	N/A

2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

Modulation Used for Conformance Testing	
Modulation Mode	Field Strength (dBuV/m at 3 m)
NFC-Read/Write	53.69

2.2 Test Channel Frequencies Configuration

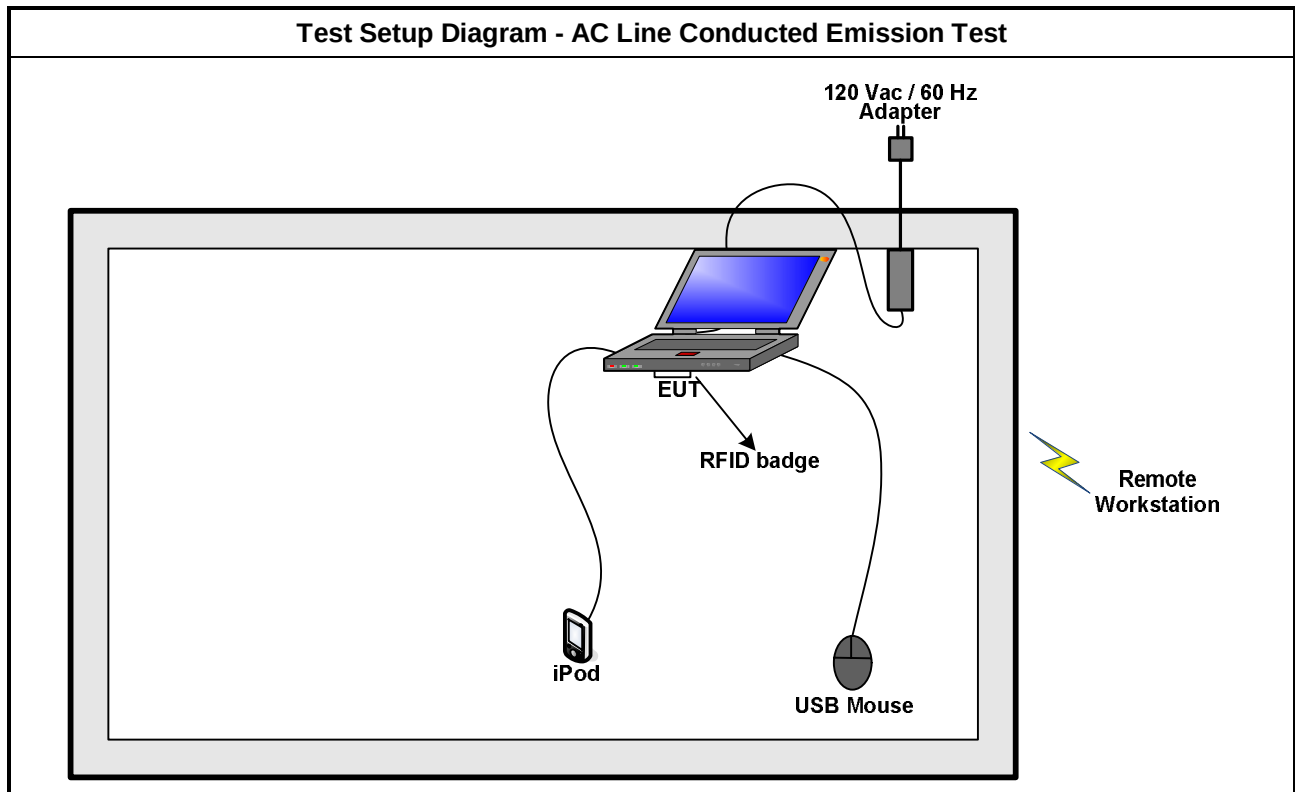
Test Channel Frequencies Configuration	
Modulation Mode	Test Channel Frequencies (MHz) – FX (Frequencies Abbreviations)
NFC-Read/Write	13.56-(F1)

2.3 The Worst Case Measurement Configuration

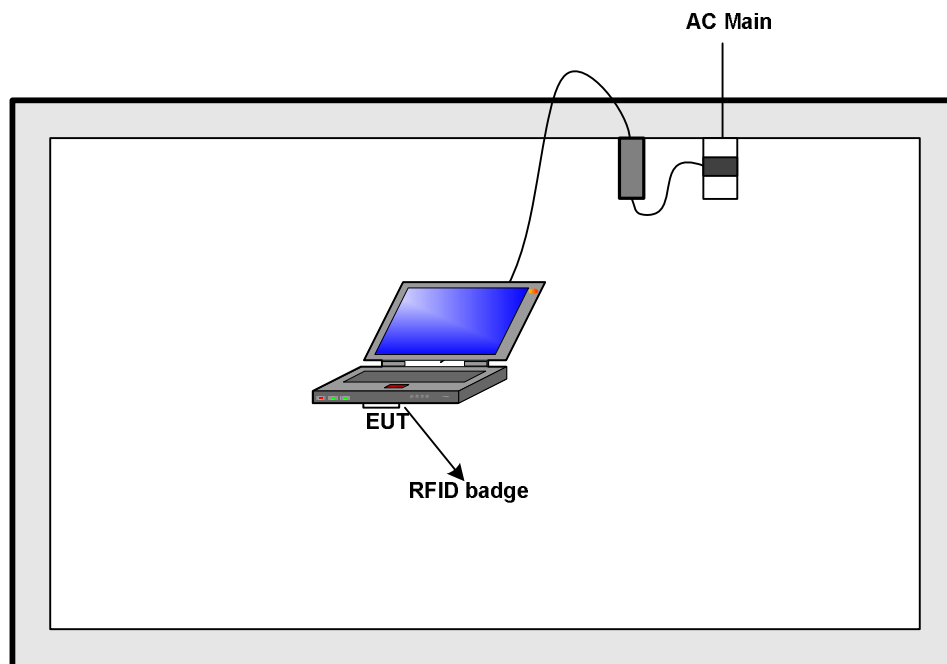
The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
Operating Mode	Operating Mode Description
1	AC Power & Radio link

The Worst Case Mode for Following Conformance Tests	
Tests Item	Emission Bandwidth, Field Strength of Fundamental Emissions Spectrum Mask, Transmitter Radiated Unwanted Emissions Frequency Stability
Test Condition	Radiated measurement
User Position	☒ EUT will be placed in fixed position.
	☐ EUT will be placed in mobile position and operating multiple positions. EUT shall be performed two orthogonal planes.
	☐ EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions. EUT shall be performed two or three orthogonal planes.
Operating Mode < 1GHz	☒ 1. AC Power & Radio link
Modulation Mode	NFC-Read/Write

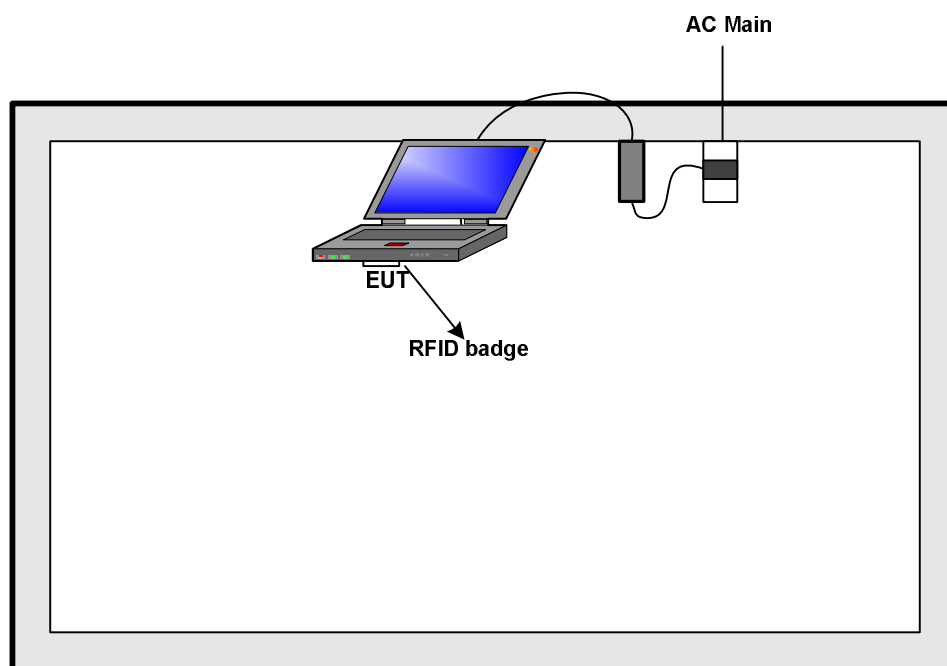
2.4 Test Setup Diagram



Test Setup Diagram - Radiated Below 30MHz Test



Test Setup Diagram - Radiated Above 30MHz Test



3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: * Decreases with the logarithm of the frequency.

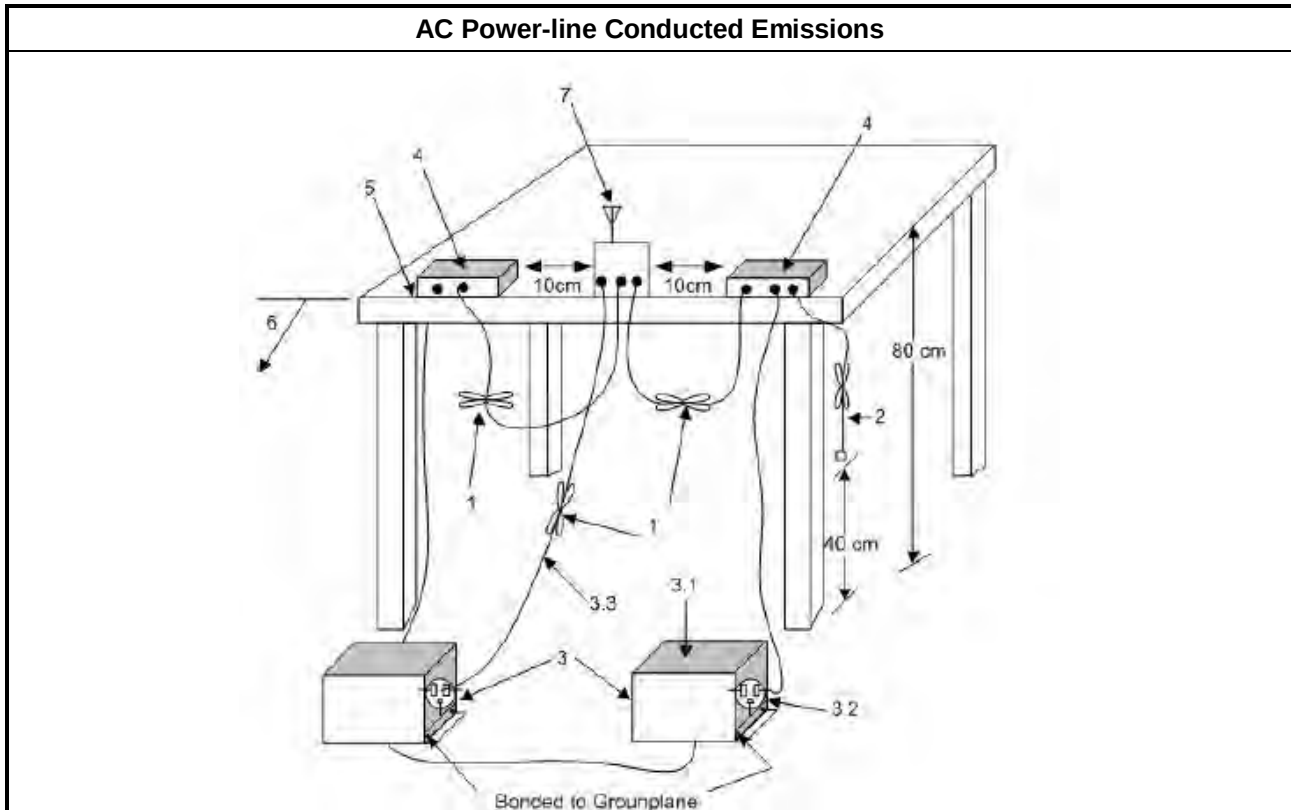
3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

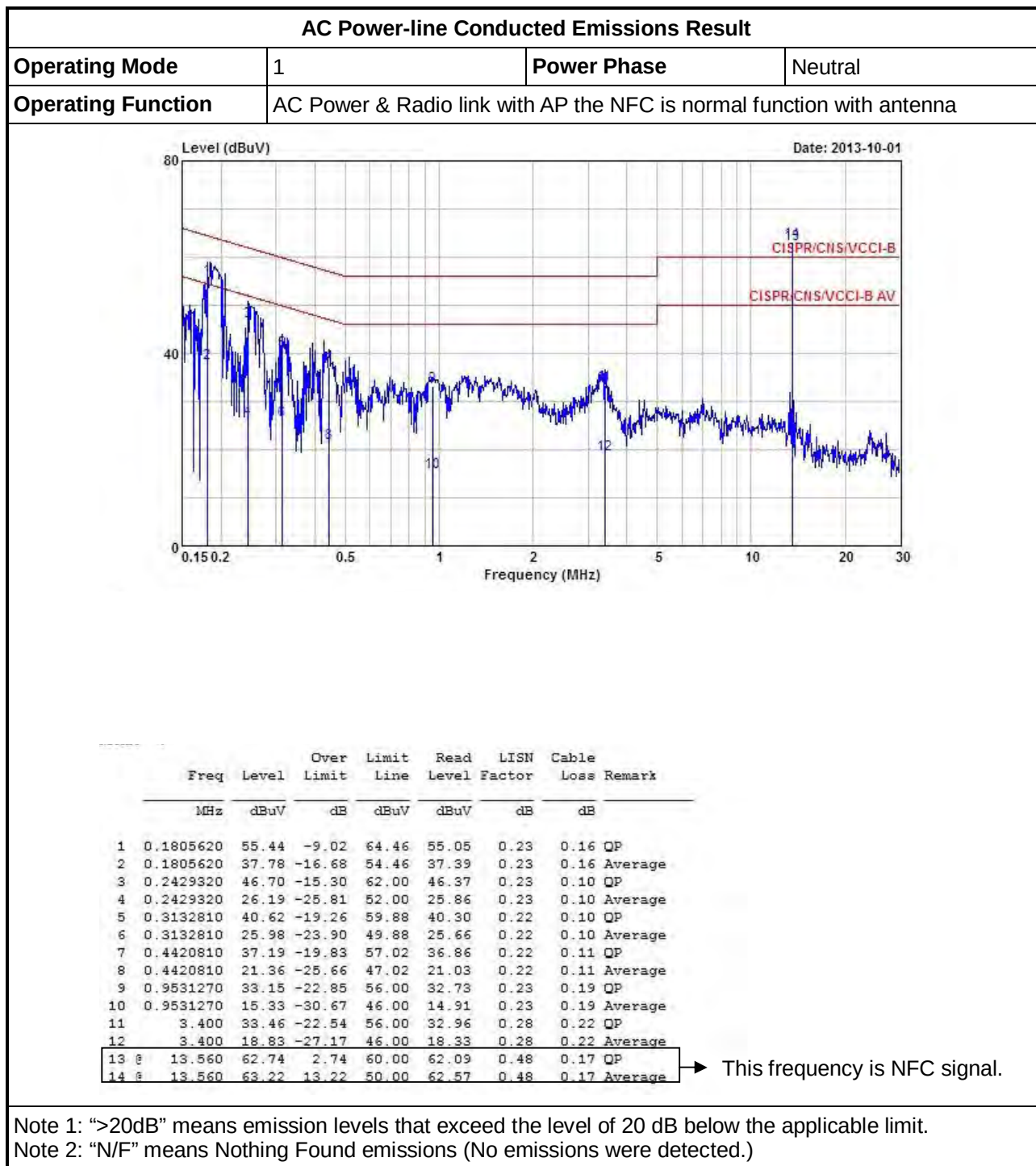
3.1.3 Test Procedures

Test Method	
☒	Refer as ANSI C63.10-2009, clause 6.2 for AC power-line conducted emissions.
☒	If AC conducted emissions fall in operating band, then following below test method confirm final result.
☐	Accept measurements done with a suitable dummy load replacing the antenna under the following conditions: (1) Perform the AC line conducted tests with the antenna connected to determine compliance with FCC 15.207 limits outside the transmitter's fundamental emission band; (2) Retest with a dummy load to determine compliance with FCC 15.207 limits within the transmitter's fundamental emission band.
☒	For a device with a permanent antenna operating at or below 30 MHz, accept measurements done with a suitable dummy load, in lieu of the permanent antenna under the following conditions: (1) Perform the AC line conducted tests with the permanent antenna to determine compliance with the FCC 15.207 limits outside the transmitter's fundamental emission band; (2) Retest with a dummy load in lieu of the permanent antenna to determine compliance with the FCC 15.207 limits within the transmitter's fundamental emission band.

3.1.4 Test Setup

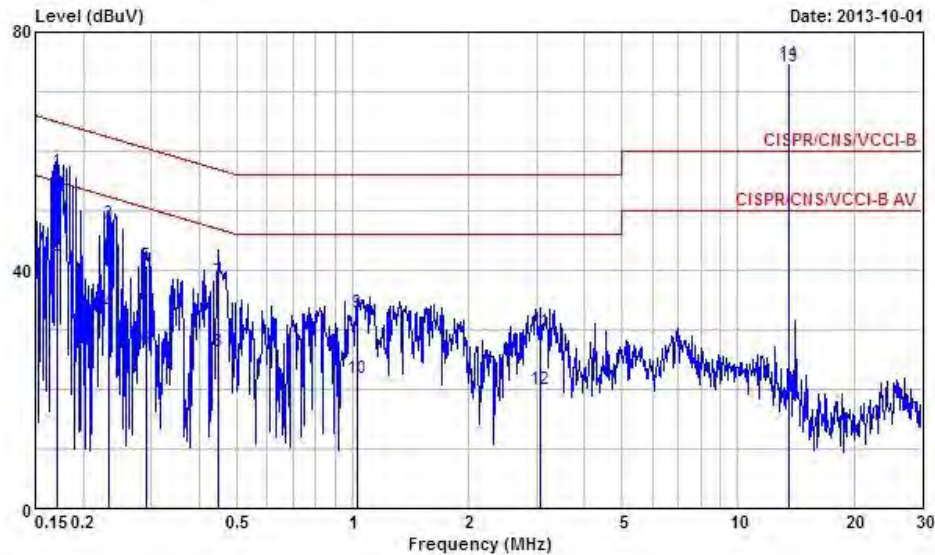


3.1.5 Test Result of AC Power-line Conducted Emissions



AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Line
Operating Function	AC Power & Radio link with AP the NFC is normal function with antenna		



	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.1712450	56.59	-8.31	64.90	56.29	0.11	0.19	QP
2	0.1712450	42.29	-12.61	54.90	41.99	0.11	0.19	Average
3	0.2328500	47.93	-14.42	62.35	47.72	0.11	0.10	QP
4	0.2328500	32.78	-19.57	52.35	32.57	0.11	0.10	Average
5	0.2908840	40.66	-19.84	60.50	40.46	0.10	0.10	QP
6	0.2908840	26.75	-23.75	50.50	26.55	0.10	0.10	Average
7	0.4491640	38.06	-18.83	56.89	37.85	0.10	0.11	QP
8	0.4491640	26.23	-20.66	46.89	26.02	0.10	0.11	Average
9	1.030	32.82	-23.18	56.00	32.51	0.11	0.20	QP
10	1.030	21.90	-24.10	46.00	21.59	0.11	0.20	Average
11	3.070	29.68	-26.32	56.00	29.30	0.14	0.24	QP
12	3.070	20.06	-25.94	46.00	19.68	0.14	0.24	Average
13	13.560	74.16	14.16	60.00	73.72	0.27	0.17	QP
14	13.560	74.64	24.64	50.00	74.20	0.27	0.17	Average

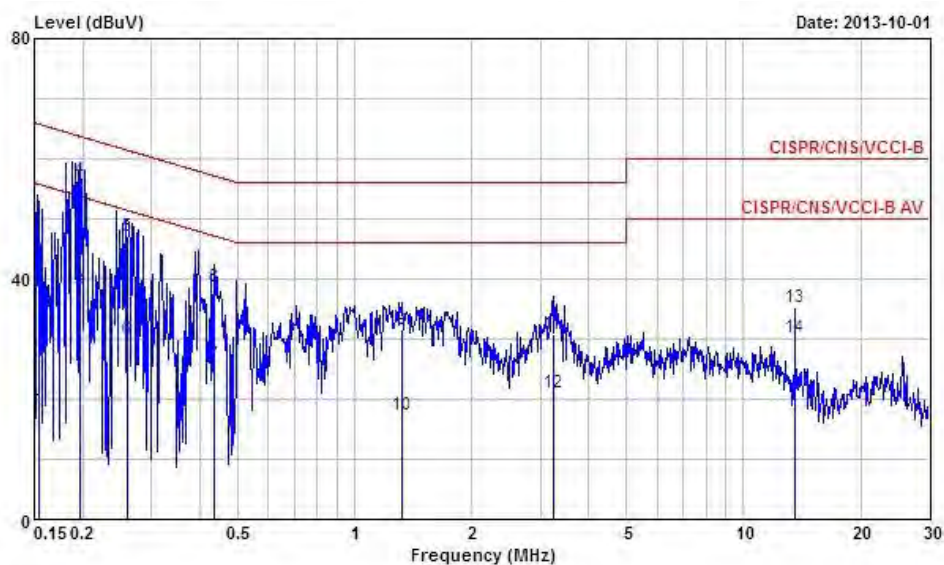
→ This frequency is NFC signal.

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Neutral
Operating Function	AC Power & Radio link with AP the NFC is normal function and antenna terminal		

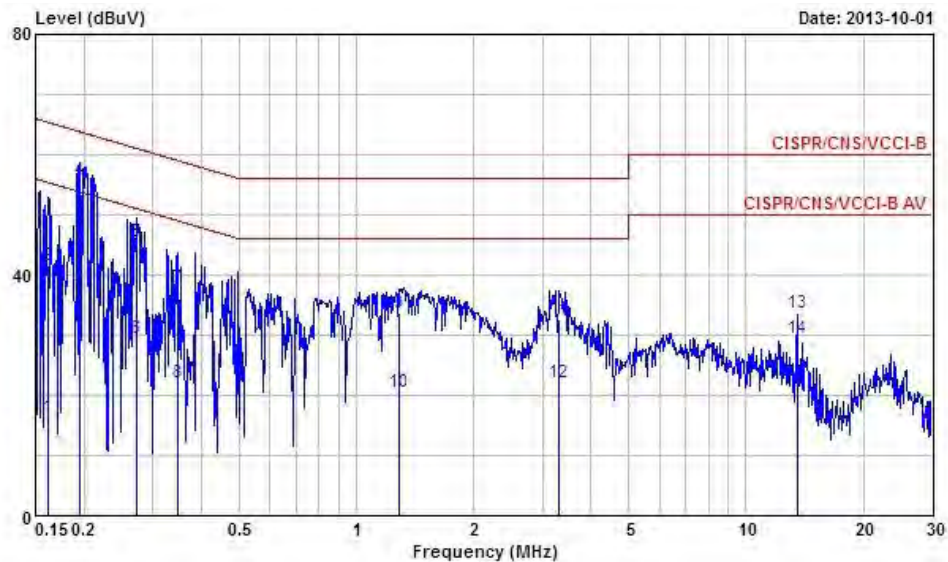


	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.1540270	18.26	-37.52	55.78	17.77	0.24	0.25	Average
2	0.1540270	42.38	-23.40	65.78	41.89	0.24	0.25	QP
3	0.1965370	38.22	-15.54	53.76	37.88	0.23	0.11	Average
4	0.1965370	56.55	-7.21	63.76	56.21	0.23	0.11	QP
5	0.2602550	47.15	-14.27	61.42	46.82	0.23	0.10	QP
6	0.2602550	29.93	-21.49	51.42	29.60	0.23	0.10	Average
7	0.4351090	25.79	-21.36	47.15	25.46	0.22	0.11	Average
8	0.4351090	38.60	-18.55	57.15	38.27	0.22	0.11	QP
9	1.320	31.50	-24.50	56.00	31.02	0.24	0.24	QP
10	1.320	17.42	-28.58	46.00	16.94	0.24	0.24	Average
11	3.240	30.73	-25.27	56.00	30.22	0.28	0.23	QP
12	3.240	21.14	-24.86	46.00	20.63	0.28	0.23	Average
13	13.560	35.33	-24.67	60.00	34.68	0.48	0.17	QP
14	13.560	30.18	-19.82	50.00	29.53	0.48	0.17	Average

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Neutral
Operating Function	AC Power & Radio link with AP the NFC is normal function and antenna terminal		



	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1615500	16.32	-39.06	55.38	15.99	0.11	0.22	Average
2	0.1615500	41.47	-23.91	65.38	41.14	0.11	0.22	QP
3	0.1944650	36.49	-17.35	53.84	36.27	0.11	0.11	Average
4	0.1944650	55.78	-8.06	63.84	55.56	0.11	0.11	QP
5	0.2729650	45.52	-15.51	61.03	45.31	0.11	0.10	QP
6	0.2729650	29.43	-21.60	51.03	29.22	0.11	0.10	Average
7	0.3464610	37.86	-21.19	59.05	37.66	0.10	0.10	QP
8	0.3464610	22.00	-27.05	49.05	21.80	0.10	0.10	Average
9	1.290	33.61	-22.39	56.00	33.25	0.12	0.24	QP
10	1.290	20.56	-25.44	46.00	20.20	0.12	0.24	Average
11	3.310	32.57	-23.43	56.00	32.20	0.14	0.23	QP
12	3.310	22.21	-23.79	46.00	21.84	0.14	0.23	Average
13	13.560	33.66	-26.34	60.00	33.22	0.27	0.17	QP
14	13.560	29.43	-20.57	50.00	28.99	0.27	0.17	Average

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

3.2 Emission Bandwidth

3.2.1 Emission Bandwidth Limit

20dB Bandwidth Limit	
☒	Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band (13.553 – 13.567 MHz).

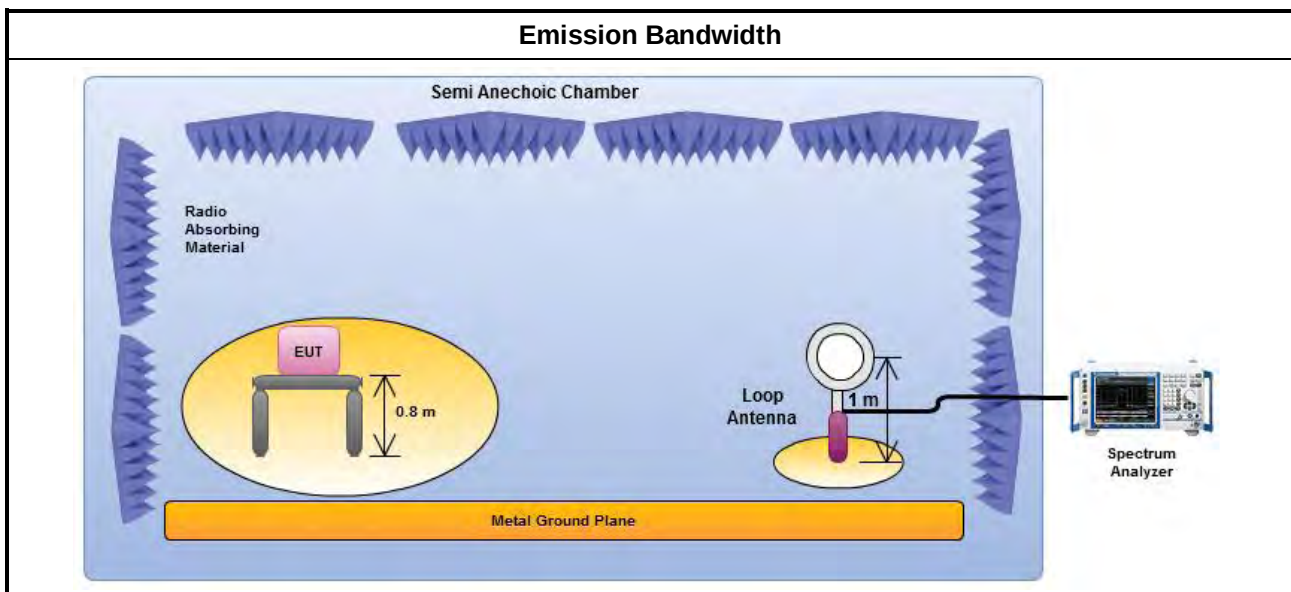
3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

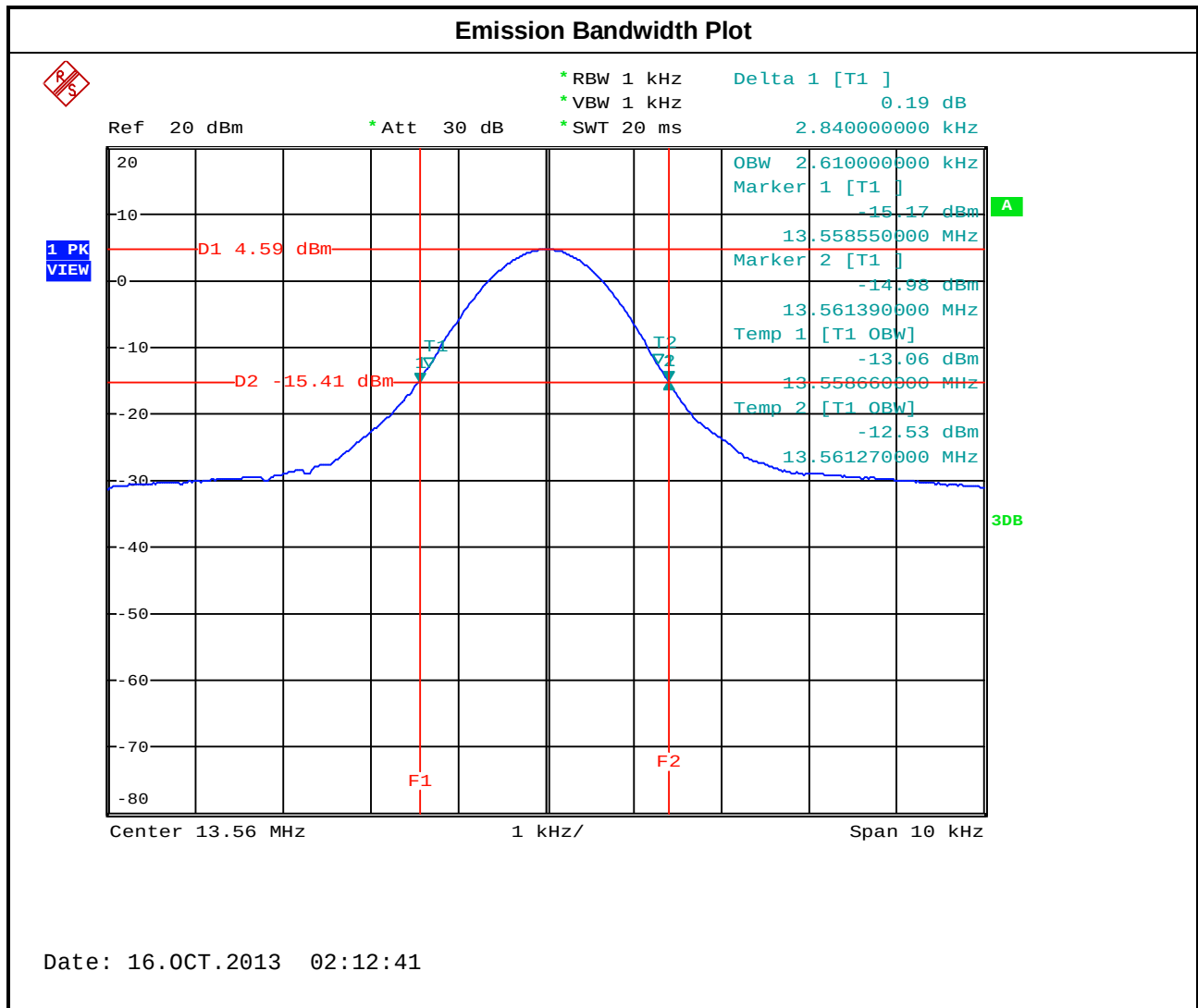
Test Method	
☒	For the emission bandwidth refer ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.
☒	For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field strength level.

3.2.4 Test Setup



3.2.5 Test Result of Emission Bandwidth

Occupied Channel Bandwidth Result					
Modulation Mode	Frequency (MHz)	20dB Bandwidth (kHz)	F _L at 20dB BW (kHz)	F _H at 20dB BW (MHz)	99% Bandwidth (kHz)
NFC-Read/Write	13.56	2.84	13.55855	13.56139	2.61
Limit		N/A	13.553	13.567	N/A
Result		Complied			



3.3 Field Strength of Fundamental Emissions and Spectrum Mask

3.3.1 Field Strength of Fundamental Emissions and Spectrum Mask Limit

Field Strength of Fundamental Emissions					
Emissions	(uV/m)@30m	(dBuV/m)@30m	(dBuV/m)@10m	(dBuV/m)@3m	(dBuV/m)@1m
Fundamental	15848	84.0	103.1	124.0	143.1
Quasi peak measurement of the fundamental.					

Spectrum Mask					
Freq. of Emission (MHz)	(uV/m)@30m	(dBuV/m)@30m	(dBuV/m)@10m	(dBuV/m)@3m	(dBuV/m)@1m
1.705~13.110	30	29.5	48.6	69.5	88.6
13.110~13.410	106	40.5	59.6	80.5	99.6
13.410~13.553	334	50.5	69.6	90.5	109.6
13.553~13.567	15848	84.0	103.1	124.0	143.1
13.567~13.710	334	50.5	69.6	90.5	109.6
13.710~14.010	106	40.5	59.6	80.5	99.6
14.010~30.000	30	29.5	48.6	69.5	88.6

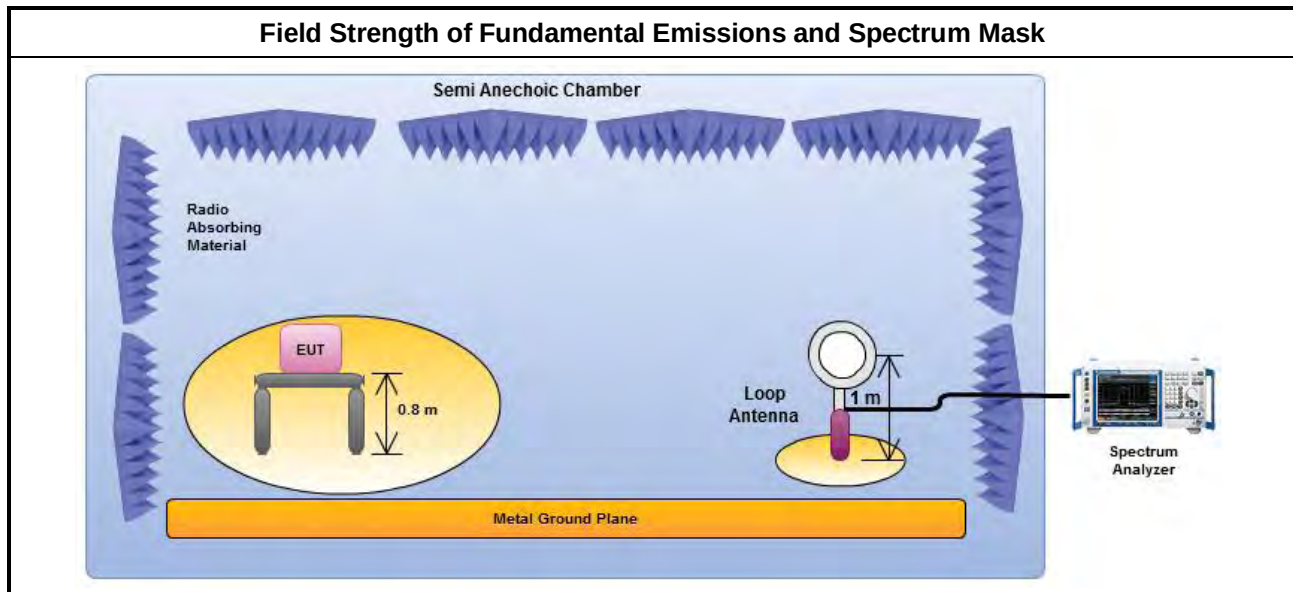
3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

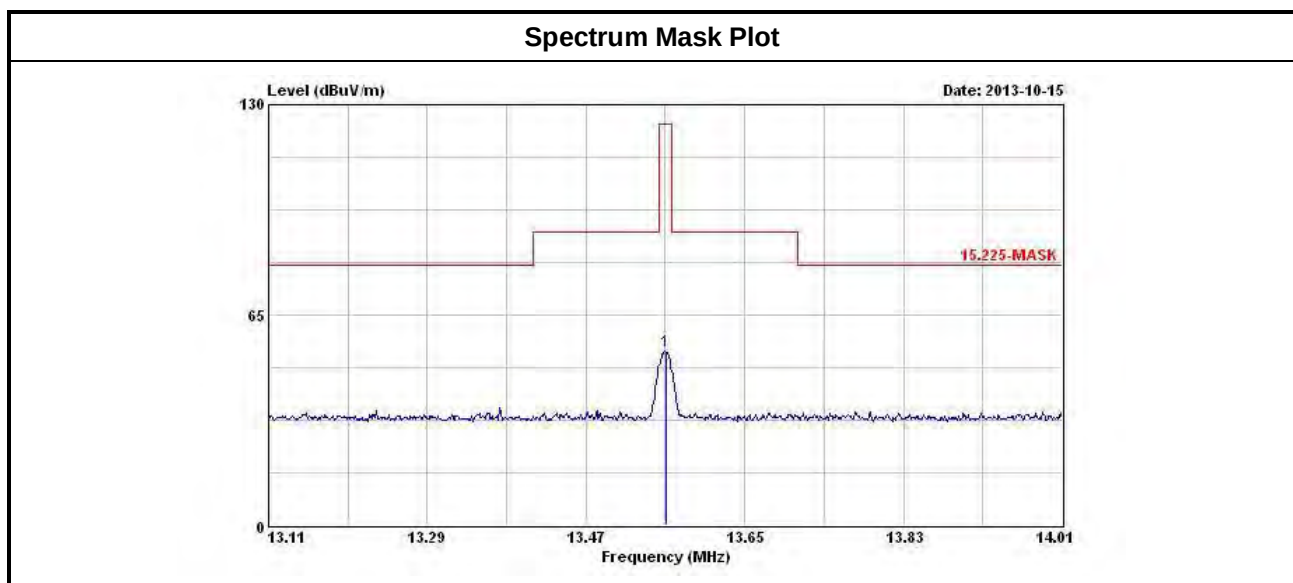
Test Method	
☒	Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz and test distance is 3m.
☒	At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the requirements; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be following below methods.
☐	The results shall be extrapolated to the specified distance by making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor.
☒	The results shall be by using the square of an inverse linear distance extrapolation factor (40 dB/decade).
☒	For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field strength level.

3.3.4 Test Setup



3.3.5 Test Result of Field Strength of Fundamental Emissions and Spectrum Mask

Field Strength of Fundamental Emissions Result					
Modulation Mode	Frequency (MHz)	Fundamental (dBuV/m)@3m	Polarization	Margin (dB)	Limit (dBuV/m)@3m
NFC-Read/Write	F1	53.69	H	70.31	124
Result		Complied			
Note 1: Measurement worst emissions of receive antenna polarization: V (Vertical).					



3.4 Transmitter Radiated Unwanted Emissions

3.4.1 Transmitter Radiated Unwanted Emissions Limit

Transmitter Radiated Unwanted Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

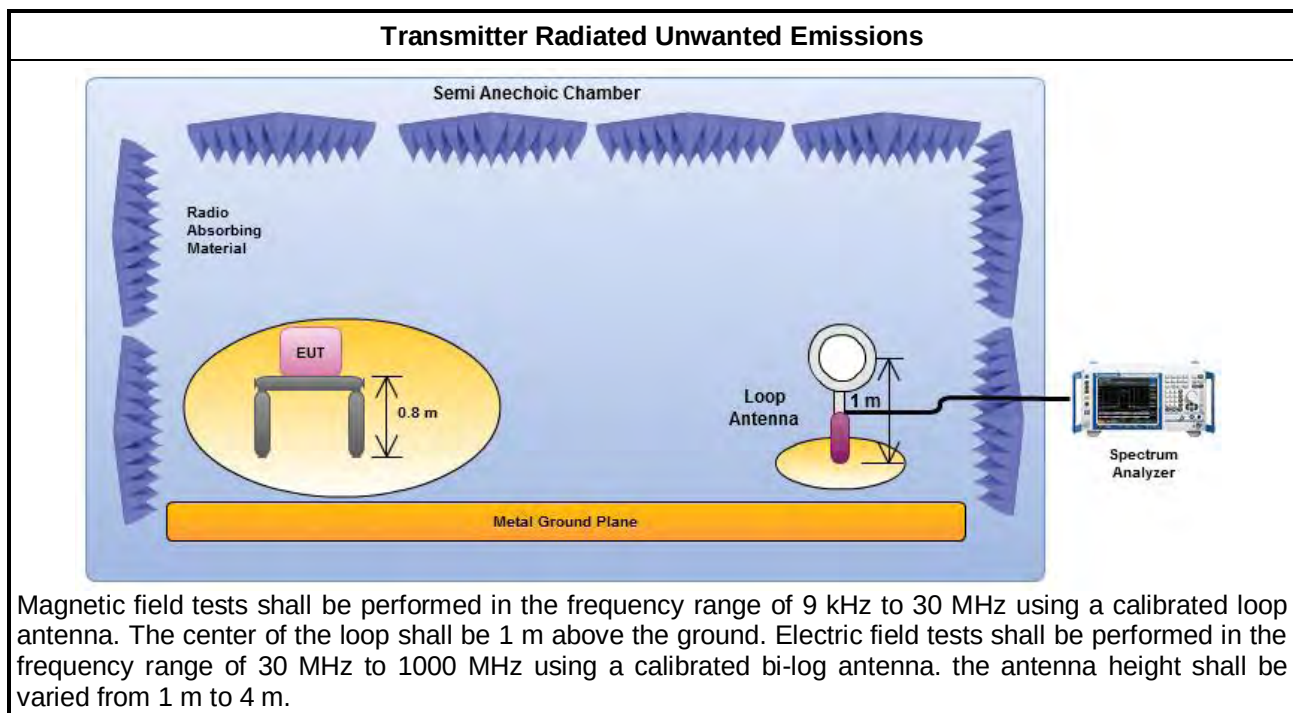
3.4.2 Measuring Instruments

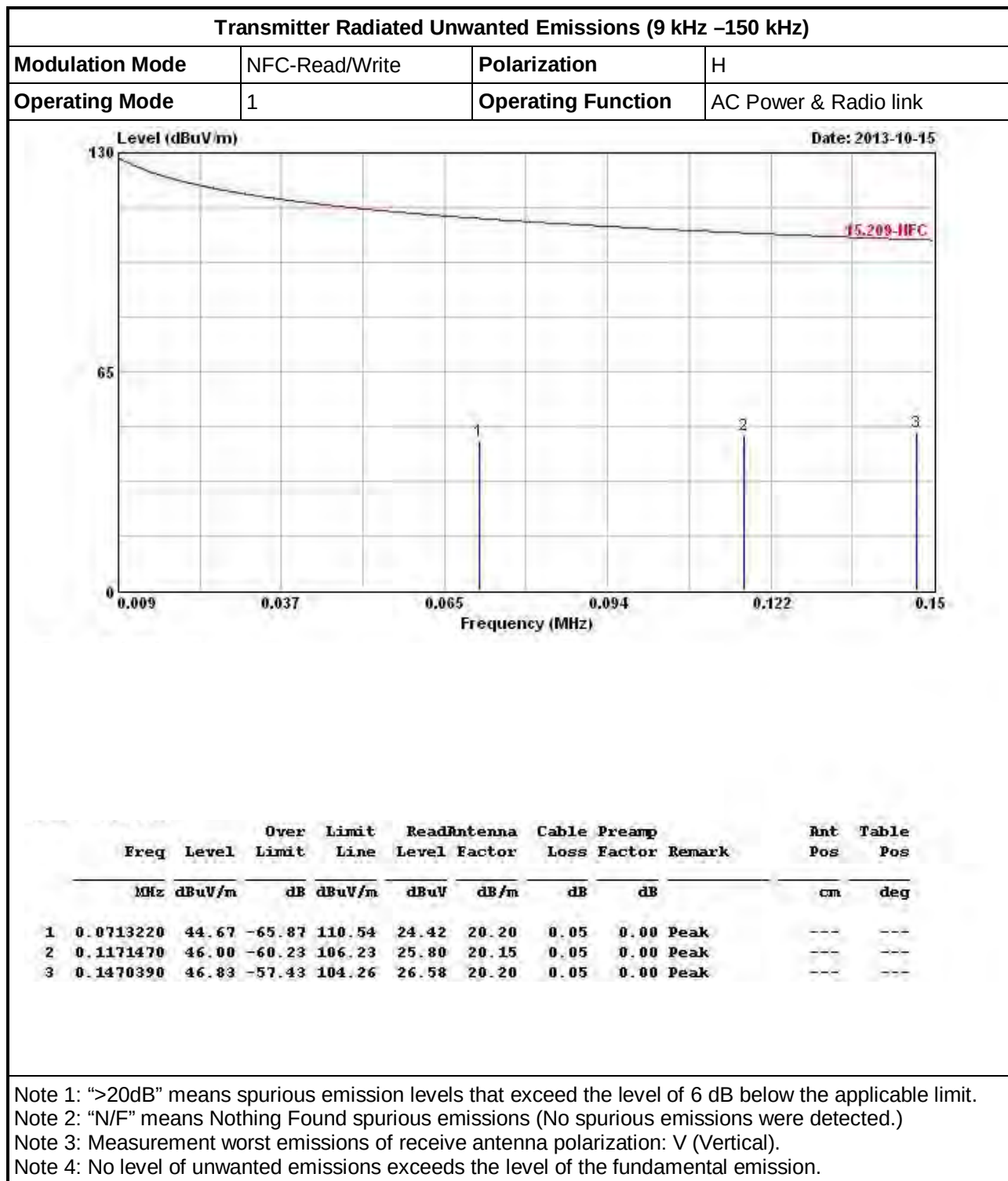
Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

Test Method	
☒	Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1 GHz and test distance is 3m.
☒	Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz and test distance is 3m.
☒	At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the requirements; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be following below methods.
☐	The results shall be extrapolated to the specified distance by making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor.
☒	The results shall be by using the square of an inverse linear distance extrapolation factor (40 dB/decade).
☒	For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field strength level.
☒	The any unwanted emissions level shall not exceed the fundamental emission level.
☒	All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

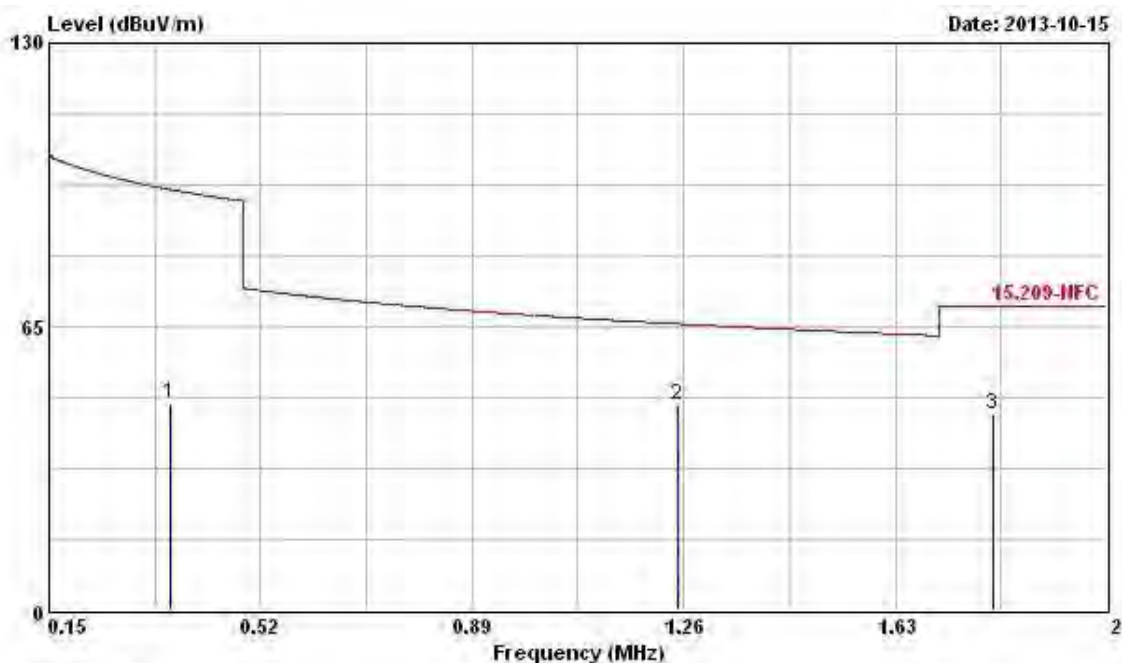
3.4.4 Test Setup



3.4.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)


Transmitter Radiated Unwanted Emissions (150 kHz – 2 MHz)

Modulation Mode	NFC-Read/Write	Polarization	H
Operating Mode	1	Operating Function	AC Power & Radio link



	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	0.3609000	47.47	-48.99	96.46	27.32	20.10	0.05	0.00	Peak	---
2	1.250	46.83	-18.84	65.67	26.78	19.95	0.10	0.00	Peak	---
3	1.800	44.79	-24.75	69.54	24.63	20.00	0.16	0.00	Peak	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

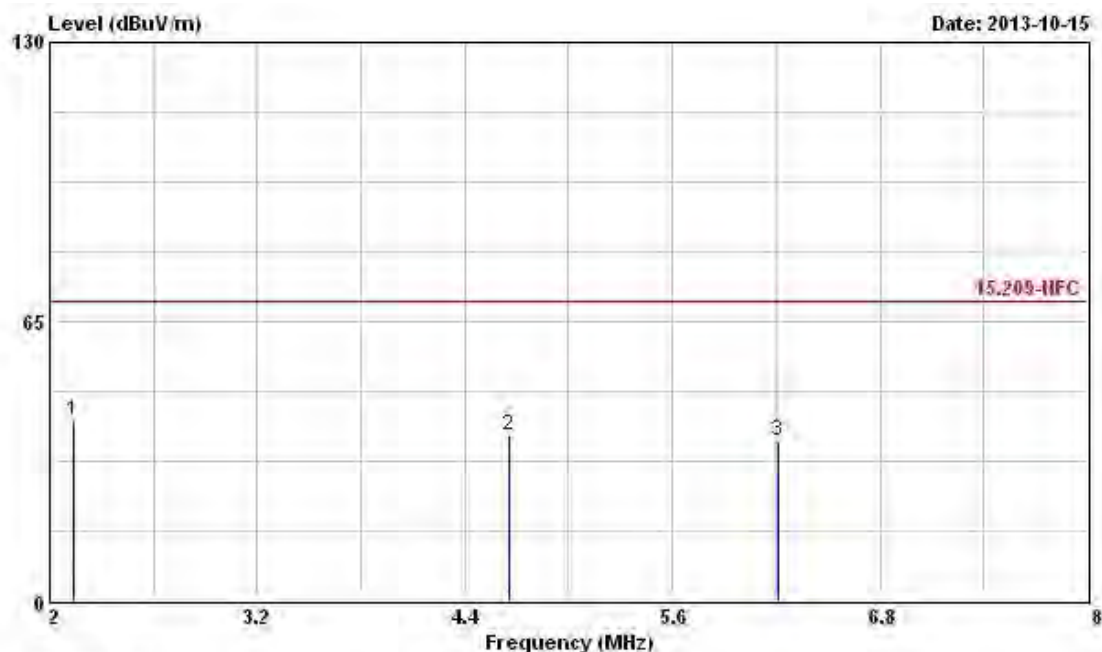
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

Note 3: Measurement worst emissions of receive antenna polarization: V (Vertical).

Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

Transmitter Radiated Unwanted Emissions (2 MHz – 8 MHz)

Modulation Mode	NFC-Read/Write	Polarization	H
Operating Mode	1	Operating Function	AC Power & Radio link



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	2.140	41.89	-27.65	69.54	21.73	20.00	0.16	0.00	Peak	---	---
2	4.660	38.55	-30.99	69.54	18.29	20.04	0.22	0.00	Peak	---	---
3	6.210	37.17	-32.37	69.54	16.81	20.08	0.28	0.00	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

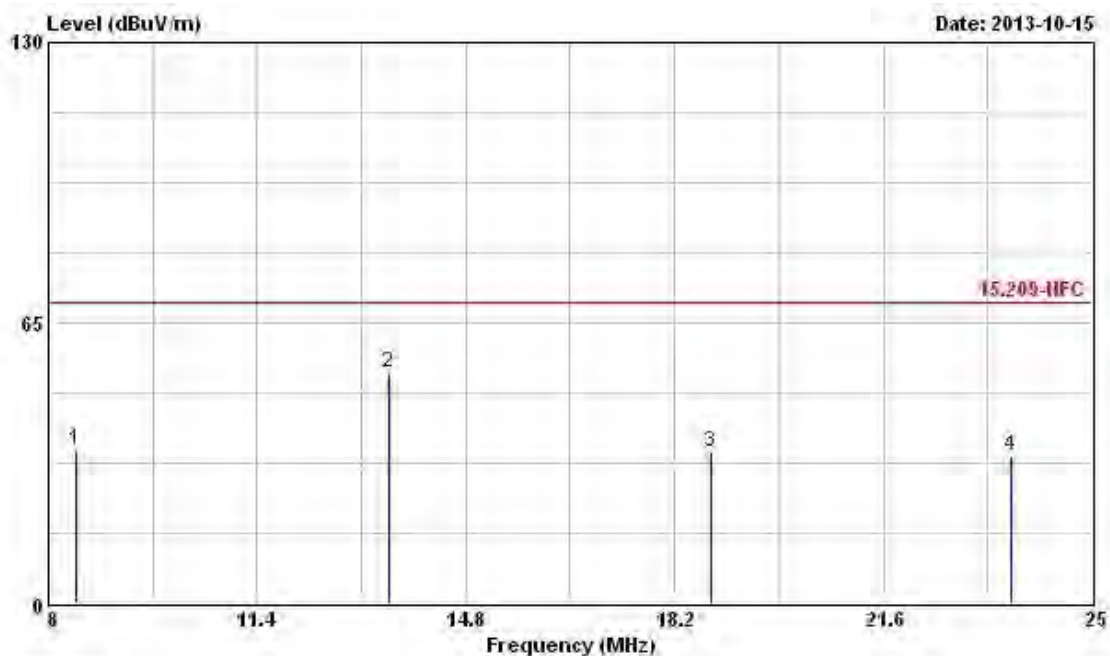
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

Note 3: Measurement worst emissions of receive antenna polarization: V (Vertical).

Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

Transmitter Radiated Unwanted Emissions (8 MHz – 25 MHz)

Modulation Mode	NFC-Read/Write	Polarization	H
Operating Mode	1	Operating Function	AC Power & Radio link



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8.460	35.66	-33.88	69.54	15.23	20.10	0.33	0.00	Peak	---	---
2	13.540	53.33	-16.21	69.54	32.75	20.10	0.48	0.00	Peak	---	---
3	18.780	34.92	-34.62	69.54	14.16	20.18	0.58	0.00	Peak	---	---
4	23.670	34.40	-35.14	69.54	13.61	20.13	0.66	0.00	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

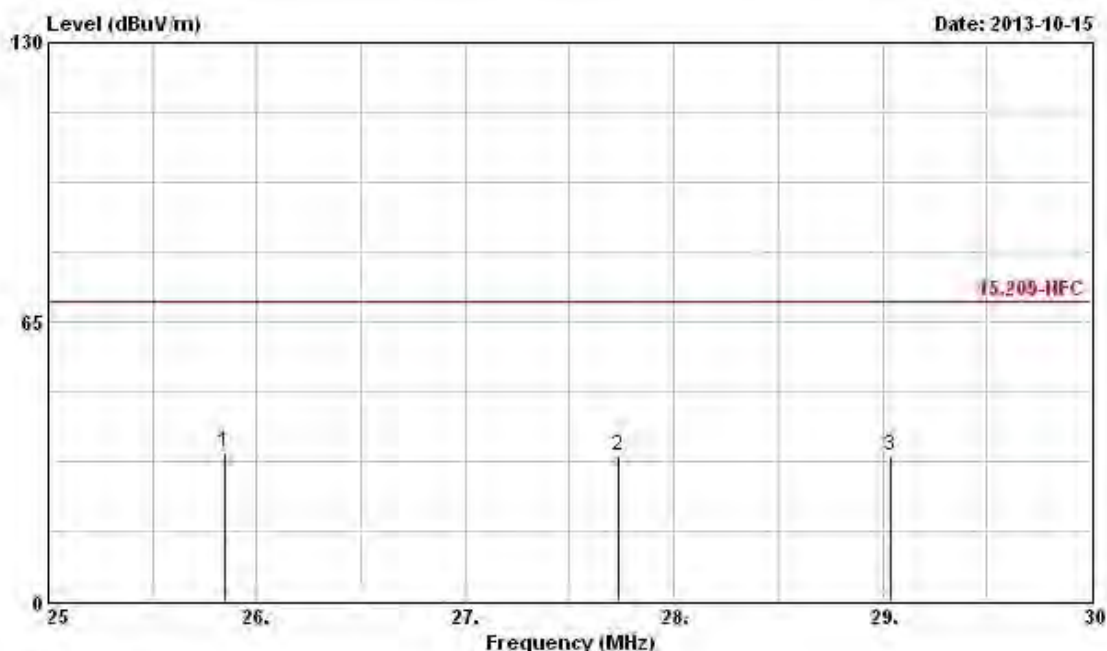
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

Note 3: Measurement worst emissions of receive antenna polarization: V (Vertical).

Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

Transmitter Radiated Unwanted Emissions (25 MHz – 30 MHz)

Modulation Mode	NFC-Read/Write	Polarization	H
Operating Mode	1	Operating Function	AC Power & Radio link



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	25.850	34.46	-35.08	69.54	13.66	20.10	0.70	0.00	Peak	---	---
2	27.730	33.66	-35.88	69.54	12.84	20.10	0.72	0.00	Peak	---	---
3	29.040	33.92	-35.62	69.54	13.06	20.10	0.76	0.00	Peak	---	---

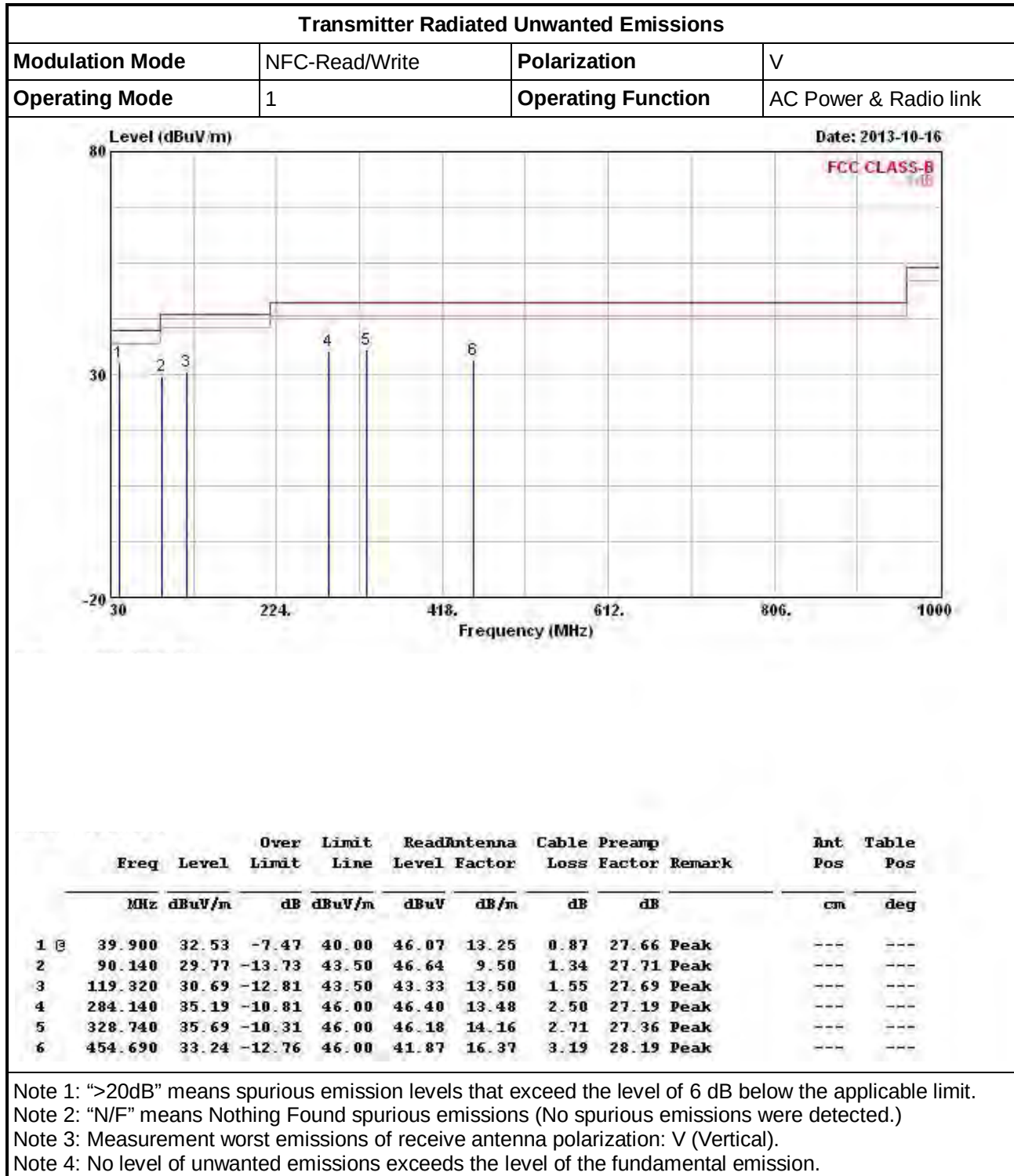
Note 1: ">20dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

Note 3: Measurement worst emissions of receive antenna polarization: V (Vertical).

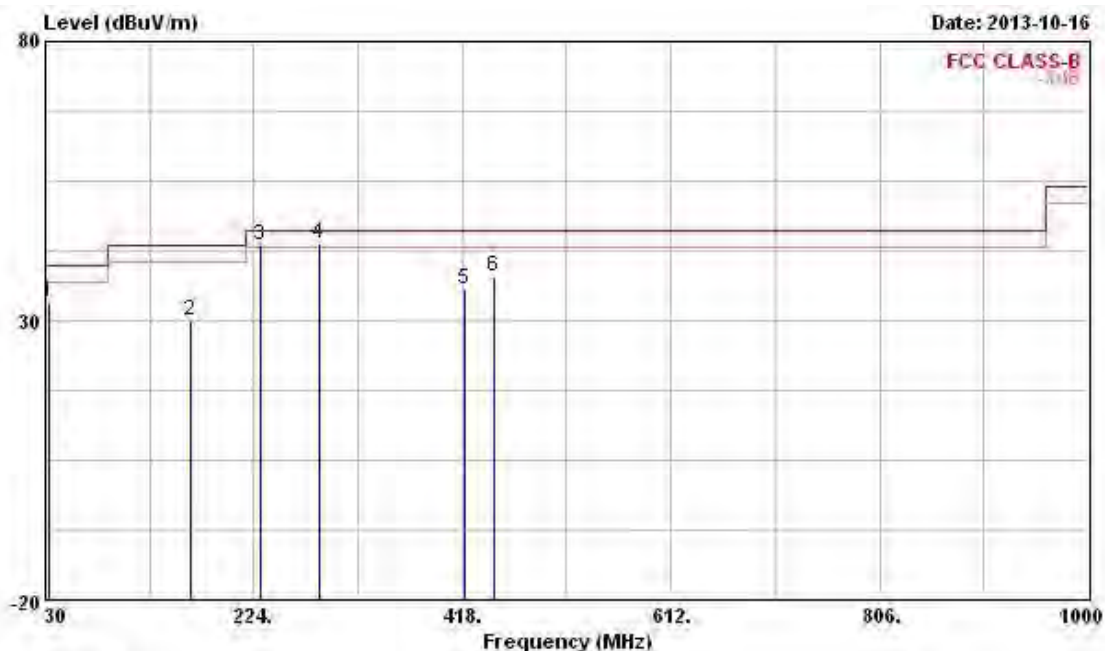
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

3.4.6 Transmitter Radiated Unwanted Emissions (Above 30MHz)



Transmitter Radiated Unwanted Emissions

Modulation Mode	NFC-Read/Write	Polarization	H
Operating Mode	1	Operating Function	AC Power & Radio link



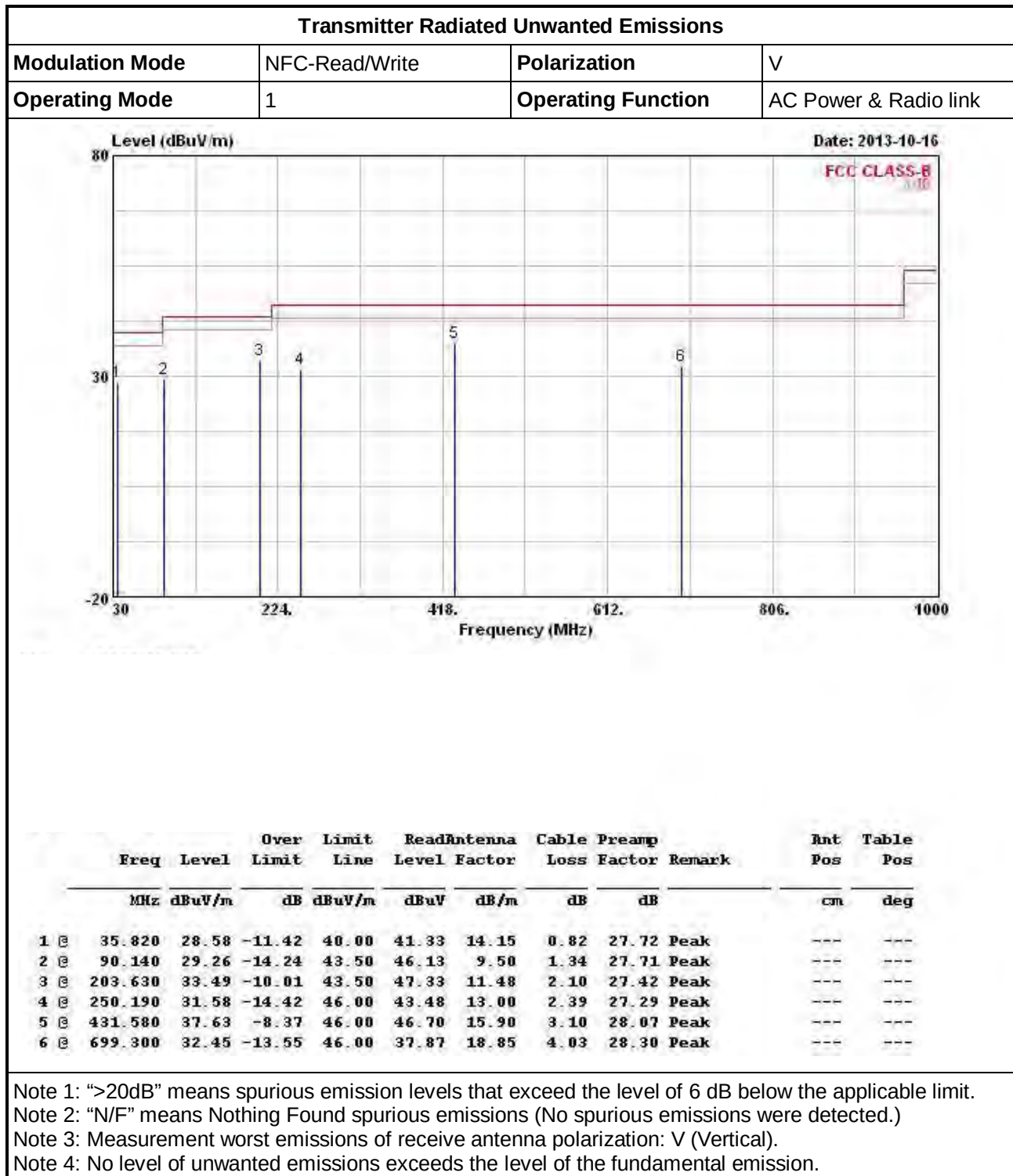
	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	32.910	33.36	-6.64	40.00	45.21	15.11	0.79	27.75	Peak	---
2	164.830	29.93	-13.57	43.50	45.31	10.34	1.82	27.54	Peak	---
3	229.820	43.55	-2.45	46.00	56.31	12.33	2.26	27.35	QP	---
4	284.140	43.97	-2.03	46.00	55.18	13.48	2.50	27.19	QP	---
5	420.030	35.74	-10.26	46.00	45.03	15.66	3.06	28.01	Peak	---
6	447.100	37.93	-8.07	46.00	46.70	16.22	3.16	28.15	Peak	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

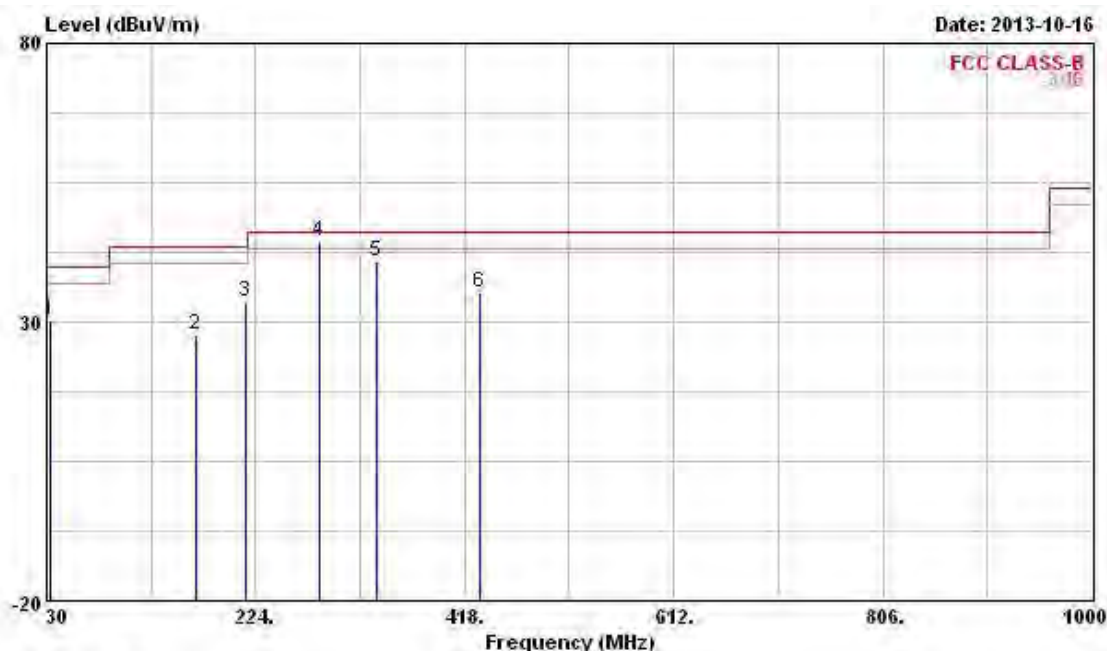
Note 3: Measurement worst emissions of receive antenna polarization: V (Vertical).

Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

3.4.7 Transmitter Radiated Unwanted Emissions (Above 30MHz)


Transmitter Radiated Unwanted Emissions

Modulation Mode	NFC-Read/Write	Polarization	H
Operating Mode	1	Operating Function	AC Power & Radio link



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	32.910	30.26	-9.74	40.00	42.11	15.11	0.79	27.75	Peak	---	---
2	167.740	27.68	-15.82	43.50	43.14	10.22	1.85	27.53	Peak	---	---
3	215.270	33.61	-9.89	43.50	46.97	11.86	2.17	27.39	Peak	---	---
4	283.170	44.34	-1.66	46.00	55.57	13.47	2.50	27.20	QP	---	---
5	335.550	40.79	-5.21	46.00	51.20	14.26	2.75	27.42	Peak	---	---
6	431.580	35.21	-10.79	46.00	44.28	15.90	3.10	28.07	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

Note 3: Measurement worst emissions of receive antenna polarization: V (Vertical).

Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

3.5 Frequency Stability

3.5.1 Frequency Stability Limit

Frequency Stability Limit	
☒	Carrier frequency stability shall be maintained to $\pm 0.01\%$ (± 100 ppm).

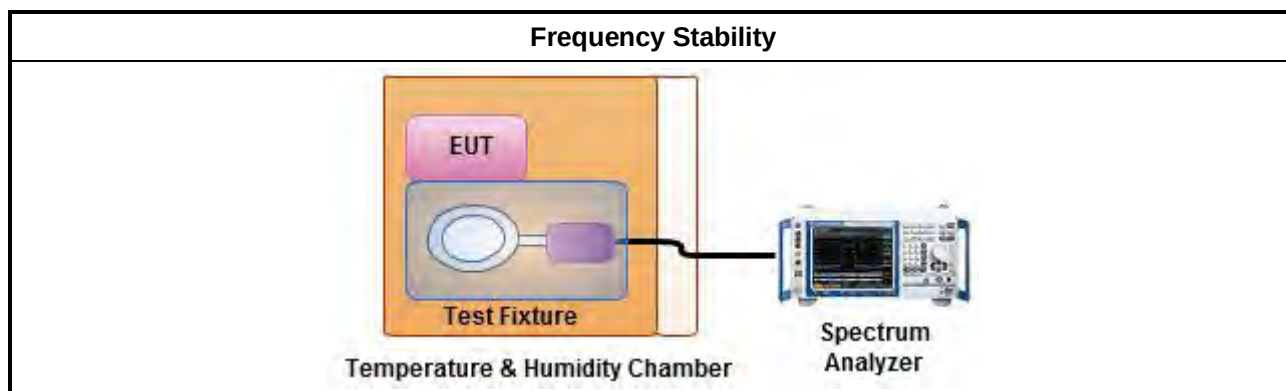
3.5.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

Test Method	
☒	Refer as ANSI C63.10, clause 6.8 for frequency stability tests
☒	Frequency stability with respect to ambient temperature
☒	Frequency stability when varying supply voltage
☐	For conducted measurement.
☒	For radiated measurement. The equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted power level.

3.5.4 Test Setup



3.5.5 Test Result of Frequency Stability

Frequency Stability Result		
Power Level	1	Frequency Stability Max. Deviation Limit < 100 ppm
Condition	Freq. (MHz)	10 min
T _{20°C} V _{max}	13.56	0.00
T _{20°C} V _{min}	13.56	0.00
T _{50°C} V _{nom}	13.56	-22.12
T _{40°C} V _{nom}	13.56	-22.12
T _{30°C} V _{nom}	13.56	0.00
T _{20°C} V _{nom}	13.56	0.00
T _{10°C} V _{nom}	13.56	0.00
T _{0°C} V _{nom}	13.56	22.12
T _{-10°C} V _{nom}	13.56	22.12
T _{-20°C} V _{nom}	13.56	22.12
Result		Complied
Note 1: Measure at 85 % [V _{min}] and 115 % [V _{max}] of the nominal voltage [V _{nom}]. The nominal voltage refer test report clause 1.1.5 for EUT operational condition.		

4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9kHz ~ 2.75GHz	Mar. 26, 2013	Conduction (CO04-HY)
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	8127-477	9kHz ~ 30MHz	Jan. 21, 2013	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9703-1839	9kHz ~ 30MHz	Apr. 18, 2013	Conduction (CO04-HY)
RF Cable-CON	HUBER+SUHNER	RG213/U	7.61183201e+012	9kHz ~ 30MHz	Nov. 09, 2012	Conduction (CO04-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSV 40	101013	9KHz ~ 40GHz	Jan. 29, 2013	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-SP-SD	MAA1112-007	-20 ~ 100℃	Nov. 21, 2012	Conducted (TH01-HY)
AC Power Source	G.W	APS-9102	EL920581	AC 0V ~ 300V	Jul. 16, 2013	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	May 11, 2013	Radiation (03CH02-HY)
Amplifier	Agilent	8447D	2944A11146	100kHz ~ 1.3GHz	Jul. 17, 2013	Radiation (03CH02-HY)
Spectrum Analyzer	R&S	FSP40	100593	9kHz ~ 40GHz	Oct. 03, 2013	Radiation (03CH02-HY)
Receiver	R&S	ESU26	1302.6005.26	20Hz ~ 26.5GHz	Apr. 02, 2013	Radiation (03CH02-HY)
Bilog Antenna	SCHAFFNER	CBL61128	2723	30MHz ~ 2GHz	Oct. 22, 2012	Radiation (03CH02-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	Nov. 10, 2012	Radiation (03CH02-HY)
Turn Table	Chaintek Instruments	3000	MF7802058	0~ 360 degree	N/A	Radiation (03CH02-HY)
Antenna Mast	MF	MF7802	MF780208205	1 ~ 4 m	N/A	Radiation (03CH02-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Loop Antenna	TESEQ	HLA 6120	31244	9 kHz ~ 30 MHz	Dec. 02, 2012	Radiation (03CH02-HY)

Note: Calibration Interval of instruments listed above is two year.