FCC Test Report

Equipment	:	**Tablet PC**
Brand Name	:	**hp**
Model Name	:	**HSTNN-C78C**
FCC ID	:	**B94HNC78CHWWR**
Standard	:	**47 CFR FCC Part 15.225**
Operating Band	:	**13.553 – 13.567 MHz (channel freq. 13.56 MHz)**
Equipment Class	:	**DXX**
Applicant	:	**Hewlett-Packard Company** 3000 Hanover Street, Palo Alto, California 94304, USA
Manufacturer	:	**COMPAL ELECTRONICS, INC.** No.581, Ruiguang Rd., Neihu District, Taipei City 11492, Taiwan (R.O.C.)

The product sample received on Oct. 15, 2013 and completely tested on Nov. 04, 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:

Testing Laboratory
1190

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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]: 0.5854040MHz 26.79 (Margin 19.21dB) - AV 45.15 (Margin 10.85dB) - QP	FCC 15.207	Complied
3.2	15.215(c)	Emission Bandwidth	20dB Bandwidth 2.48 [kHz] FL: 13.559219 MHz FH: 13.561693 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:33.25 dBuV/m at 10m Device complies with spectrum mask – refer to test data	103.08 dBuV/m at 10	Complied
3.4	15.225(d)	Transmitter Radiated Unwanted Emissions	[dBuV/m at 3m]: 31.940MHz 34.42 (Margin 5.58dB) - QP	FCC 15.209	Complied
3.5	15.225(e)	Frequency Stability	39.45 ppm	± 0.01% (100ppm)	Complied

Revision History

Report No.	Version	Description	Issued Date
FR392719-02	Rev. 01	Initial issue of report	Nov. 28, 2013
FR392719-04	Rev. 01	Add Wi-Fi and WWAN function and revised radiated emissions (above 30MHz) tested.	Nov. 29, 2013

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	33.25
Note 1: Field strength performed quasi peak level at 10m.				

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	HP	Model Name	HSTNN-DA34
	Power Rating	I/P: 100-240V ~ 0.5A 50-60Hz ; O/P: 9V⎓1.1A		
	Power Cord	1.7meter, non-shielded cable, with w/o ferrite core		
Li-ion Battery	Brand Name	HP	Model Name	HSTNN-IB5O
	Power Rating	7.4Vdc, 4200mAh		
NFC Chip	Part Number	PN65OPC		

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

1.3 Support Equipment

Support Equipment				
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 1st 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	24°C / 49%
RF Conducted	TH06-HY	Shiming	22.1°C / 61%
Radiated Emission	10CH02-HY	Teddy	23°C / 42%
Radiated Emission	03CH03-HY	Hsiao	23°C / 66%

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

2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

Modulation Used for Conformance Testing	
Modulation Mode	**Field Strength (dBuV/m at 10 m)**
NFC-Read/Write	33.25

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)

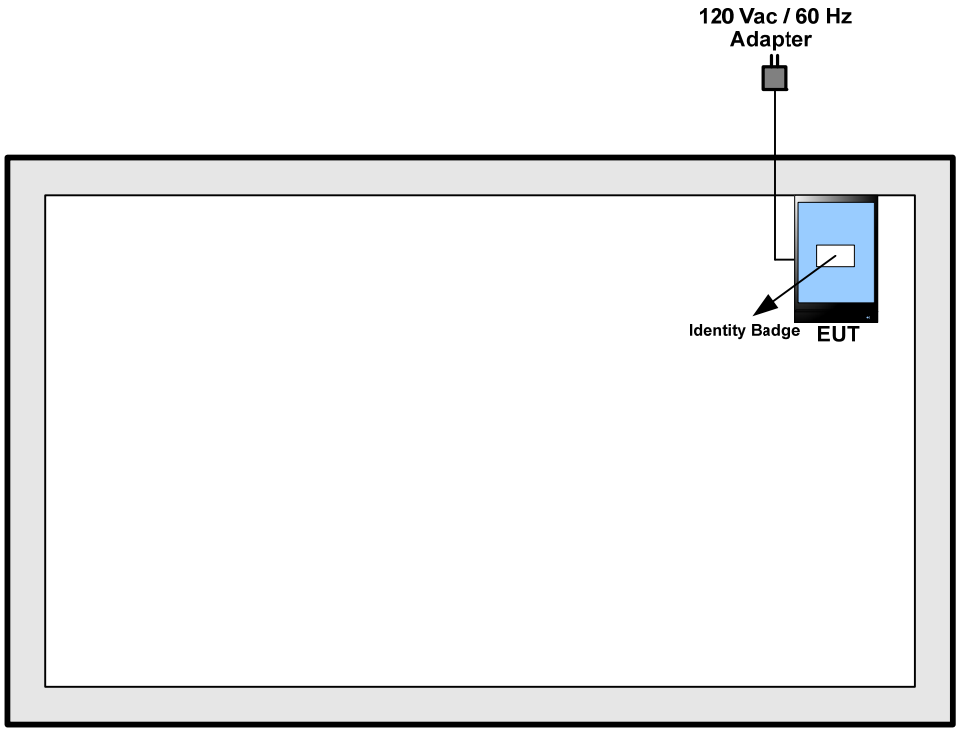
2.3 The Worst Case Measurement Configuration

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

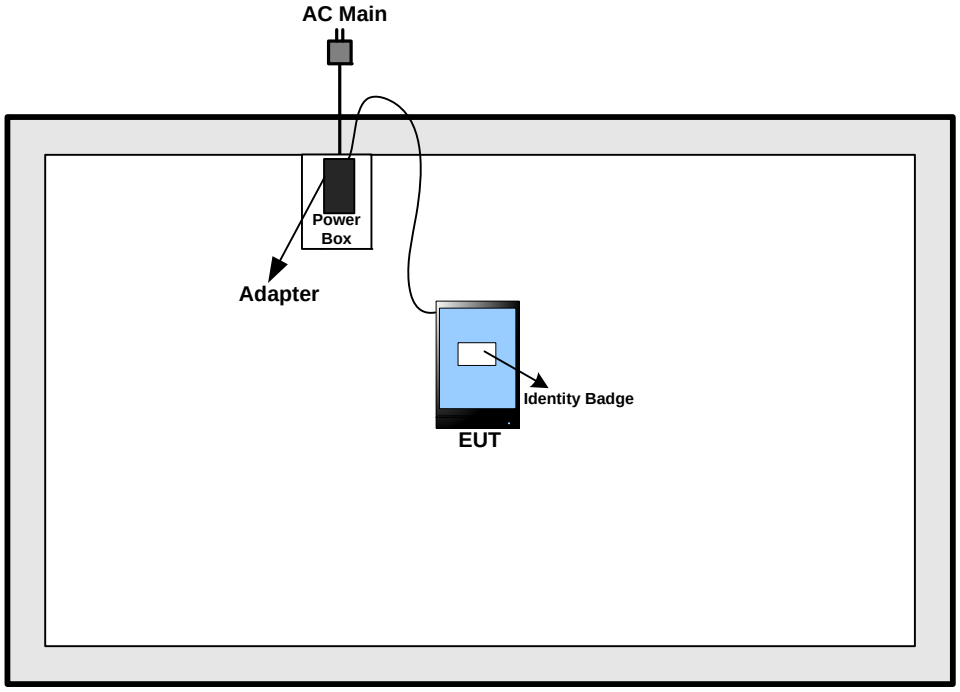
The Worst Case Mode for Following Conformance Tests			
Tests Item	Emission Bandwidth, Field Strength of Fundamental Emissions Spectrum Mask, Transmitter Radiated Unwanted Emissions Frequency Stability		
Test Condition	Radiated measurement		
User Position	☐ EUT will be placed in fixed position.		
	☐ EUT 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. The worst planes is Y.		
Operating Mode < 1GHz	☒ 1. AC Power & Radio link		
Modulation Mode	NFC-Read/Write		
Orthogonal Planes of EUT	**X Plane**	**Y Plane**	**Z Plane**
			

2.4 Test Setup Diagram

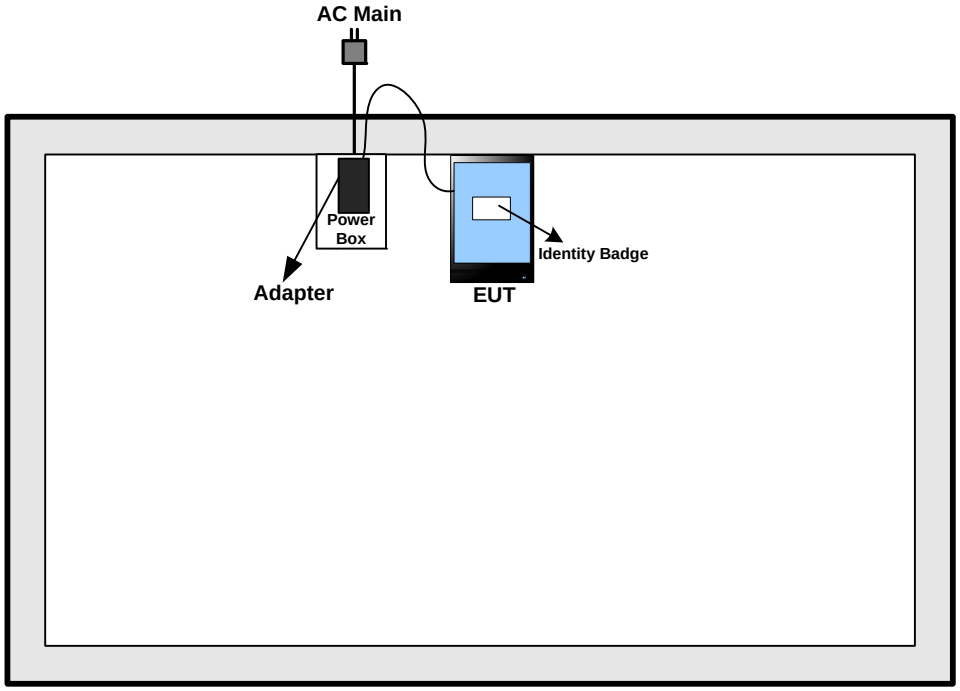
Test Setup Diagram - AC Line Conducted Emission Test



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

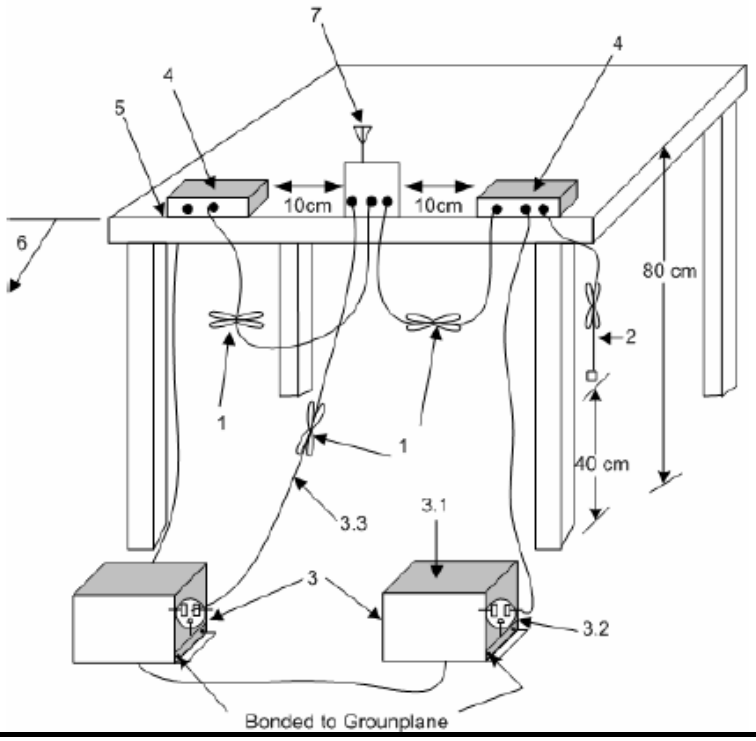
Refer a test equipment and calibration data table in this test report.

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.

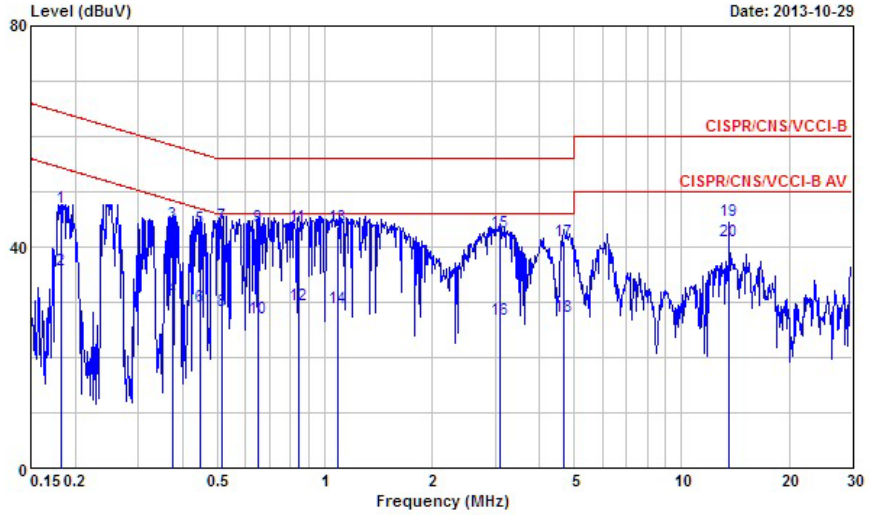
3.1.4 Test Setup

AC Power-line Conducted Emissions



3.1.5 Test Result of AC Power-line Conducted Emissions

AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Neutral
Operating Function	AC Power & Radio link link with AP the NFC is normal function with antenna		

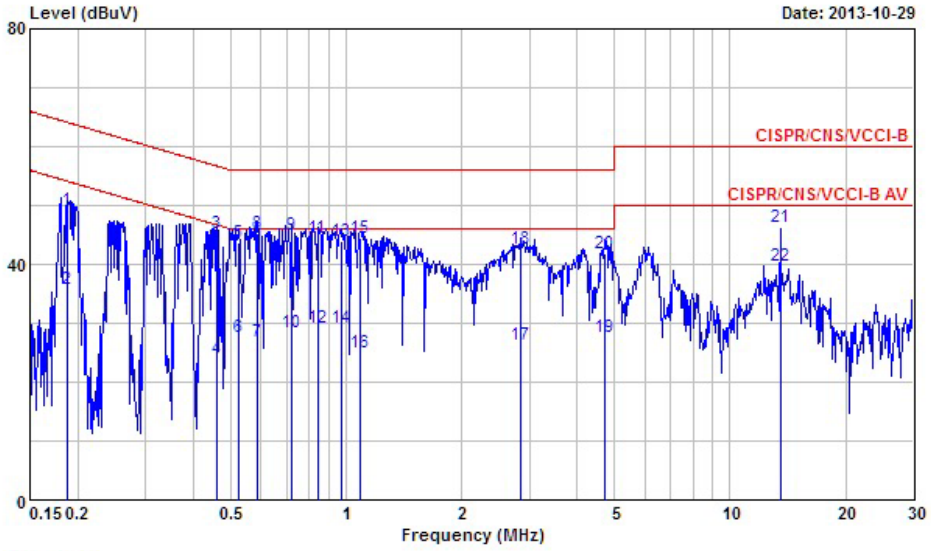


	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1824860	47.17	-17.20	64.37	46.79	0.23	0.15	QP
2	0.1824860	35.77	-18.60	54.37	35.39	0.23	0.15	Average
3	0.3751190	44.24	-14.15	58.39	43.92	0.22	0.10	QP
4	0.3751190	30.74	-17.65	48.39	30.42	0.22	0.10	Average
5	0.4467900	43.44	-13.49	56.93	43.11	0.22	0.11	QP
6	0.4467900	29.25	-17.68	46.93	28.92	0.22	0.11	Average
7	0.5155030	43.98	-12.02	56.00	43.63	0.22	0.13	QP
8	0.5155030	28.45	-17.55	46.00	28.10	0.22	0.13	Average
9	0.6508440	43.71	-12.29	56.00	43.33	0.23	0.15	QP
10	0.6508440	27.07	-18.93	46.00	26.69	0.23	0.15	Average
11	0.8437760	43.68	-12.32	56.00	43.27	0.23	0.18	QP
12	0.8437760	29.47	-16.53	46.00	29.06	0.23	0.18	Average
13	1.090	43.63	-12.37	56.00	43.19	0.23	0.21	QP
14	1.090	28.98	-17.02	46.00	28.54	0.23	0.21	Average
15	3.090	42.75	-13.25	56.00	42.23	0.28	0.24	QP
16	3.090	26.85	-19.15	46.00	26.33	0.28	0.24	Average
17	4.670	40.97	-15.03	56.00	40.48	0.31	0.18	QP
18	4.670	27.46	-18.54	46.00	26.97	0.31	0.18	Average
19	13.560	44.76	-15.24	60.00	44.11	0.48	0.17	QP
20	13.560	40.92	-9.08	50.00	40.27	0.48	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**	Line
Operating Function	AC Power & Radio link link with AP the NFC is normal function with antenna		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1883800	49.14	-14.97	64.11	48.90	0.11	0.13	QP
2	0.1883800	35.78	-18.33	54.11	35.54	0.11	0.13	Average
3	0.4587840	45.30	-11.41	56.71	45.08	0.10	0.12	QP
4	0.4587840	23.97	-22.74	46.71	23.75	0.10	0.12	Average
5	0.5265450	43.64	-12.36	56.00	43.41	0.10	0.13	QP
6	0.5265450	27.58	-18.42	46.00	27.35	0.10	0.13	Average
7	0.5854040	26.79	-19.21	46.00	26.55	0.10	0.14	Average
8	0.5854040	45.15	-10.85	56.00	44.91	0.10	0.14	QP
9	0.7235980	44.87	-11.13	56.00	44.60	0.11	0.16	QP
10	0.7235980	28.50	-17.50	46.00	28.23	0.11	0.16	Average
11	0.8437760	44.59	-11.41	56.00	44.30	0.11	0.18	QP
12	0.8437760	29.09	-16.91	46.00	28.80	0.11	0.18	Average
13	0.9683980	43.96	-12.04	56.00	43.65	0.11	0.20	QP
14	0.9683980	29.31	-16.69	46.00	29.00	0.11	0.20	Average
15	1.090	44.59	-11.41	56.00	44.27	0.11	0.21	QP
16	1.090	24.94	-21.06	46.00	24.62	0.11	0.21	Average
17	2.840	26.42	-19.58	46.00	26.03	0.14	0.25	Average
18	2.840	42.67	-13.33	56.00	42.28	0.14	0.25	QP
19	4.700	27.72	-18.28	46.00	27.37	0.17	0.18	Average
20	4.700	41.96	-14.04	56.00	41.61	0.17	0.18	QP
21	13.560	46.33	-13.67	60.00	45.89	0.27	0.17	QP
22	13.560	39.71	-10.29	50.00	39.27	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.)

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

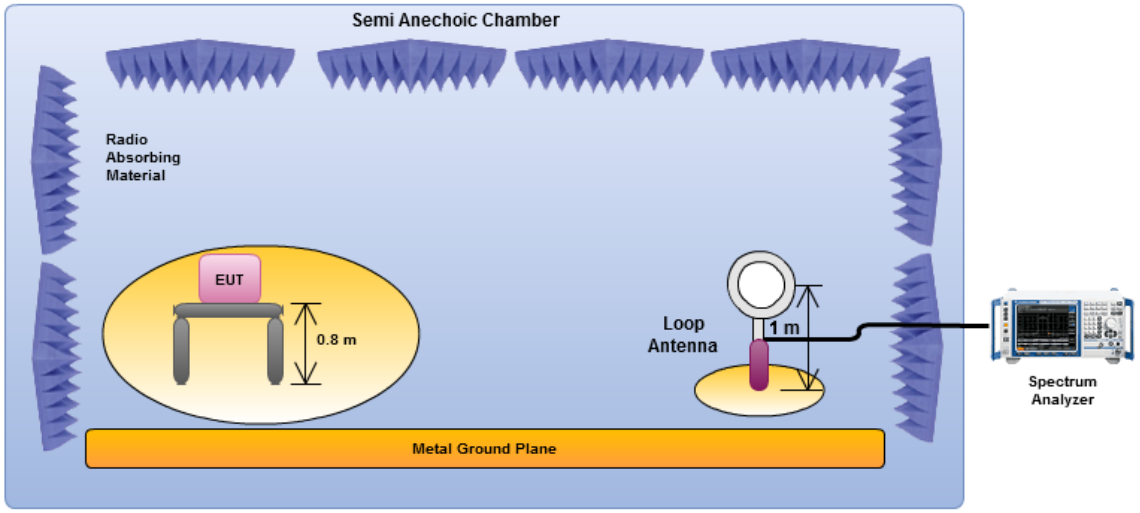
Refer a test equipment and calibration data table in this test report.

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

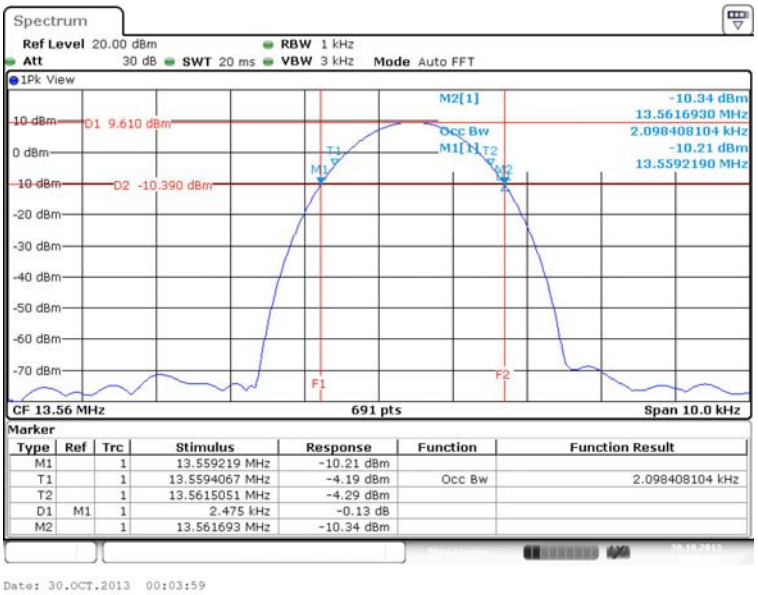
Emission Bandwidth



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	2.48	13.559219	13.561693	2.10
Limit		**N/A**	**13.553**	**13.567**	**N/A**
Result		**Complied**			

Emission Bandwidth Plot



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	103.08	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

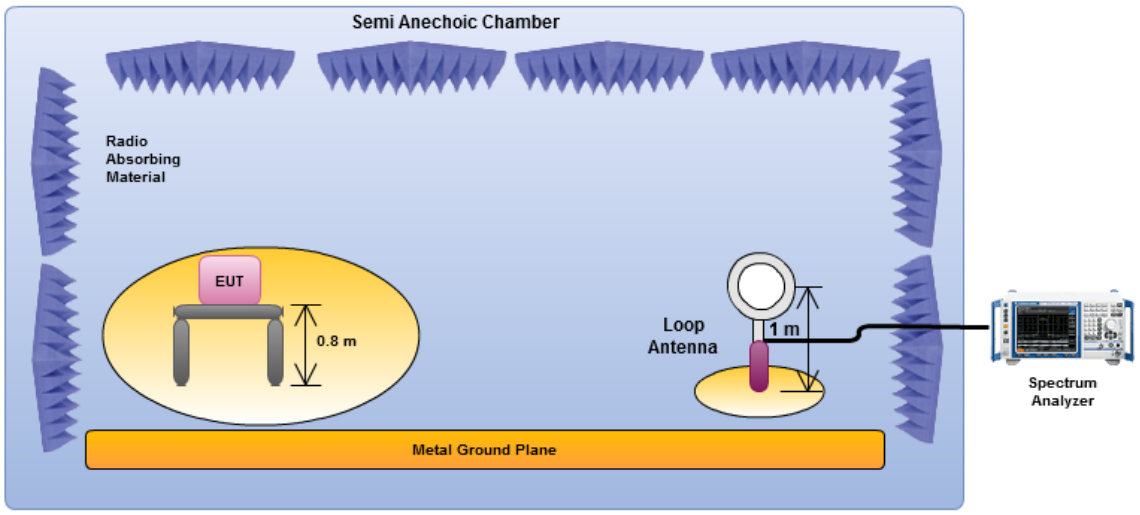
Refer a test equipment and calibration data table in this test report.

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 10m.
☒	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

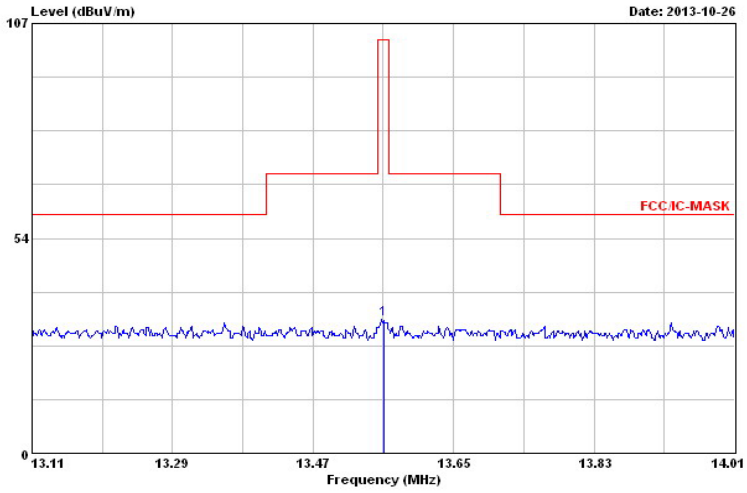
Field Strength of Fundamental Emissions and Spectrum Mask



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)@10m**	**Polarization**	**Margin (dB)**	**Limit (dBuV/m)@10m**
NFC-Read/Write	F1	33.25	H	69.83	103.08
Result		**Complied**			
Note 1: Measurement worst emissions of receive antenna polarization: V (Vertical).					

Spectrum Mask Plot



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

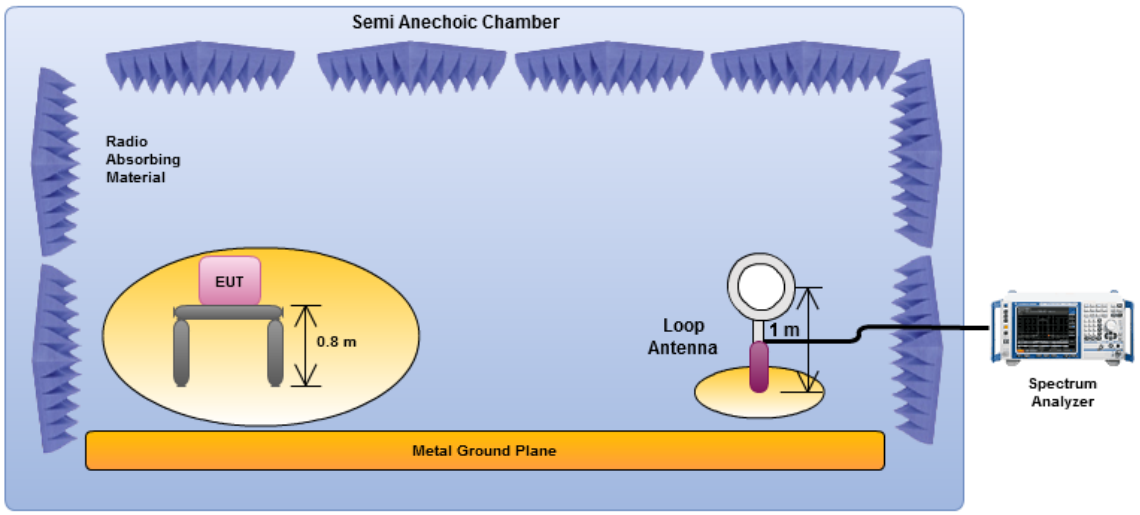
Refer a test equipment and calibration data table in this test report.

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 10m.
☒	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

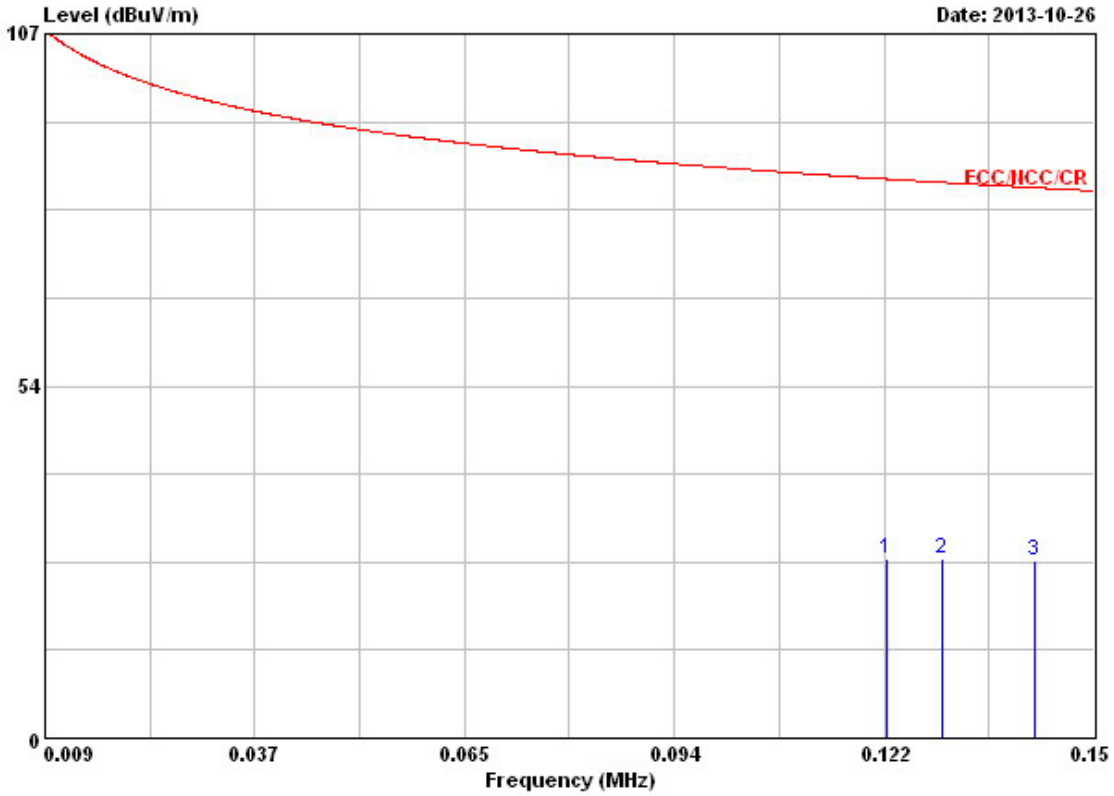
Transmitter Radiated Unwanted Emissions



Magnetic field tests shall be performed in the frequency range of 9 kHz to 30 MHz using a calibrated loop antenna. The center of the loop shall be 1 m above the ground. Electric field tests shall be performed in the frequency range of 30 MHz to 1000 MHz using a calibrated bi-log antenna. the antenna height shall be varied from 1 m to 4 m.

3.4.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

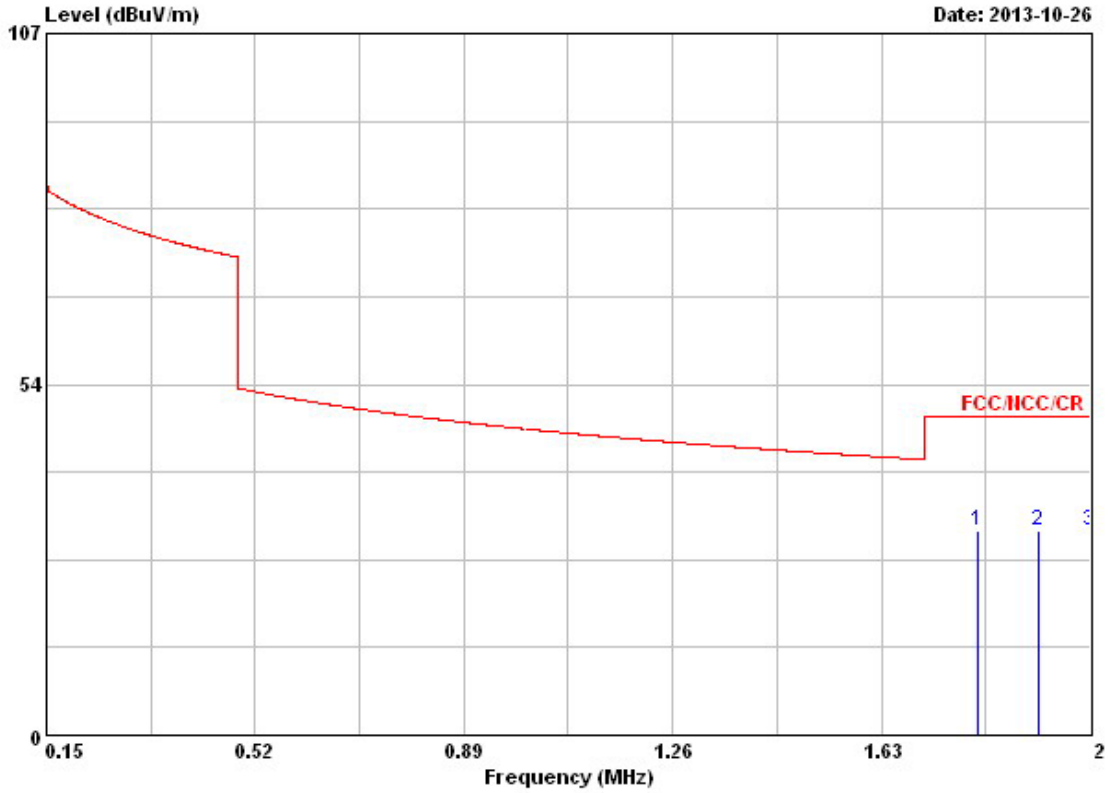
Transmitter Radiated Unwanted Emissions (9 kHz –150 kHz)			
Modulation Mode	NFC-Read/Write	**Polarization**	H
Operating Mode	1	**Operating Function**	AC Power & Radio link



	Freq	Level	Over Limit	Limit Line	Read Level	Preamp Factor	Cable Loss	Antenna Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		cm	deg
1	0.1222230	27.20	-57.75	84.95	6.91	0.00	0.14	20.15	Peak	---	---
2	0.1295550	27.14	-57.30	84.44	6.85	0.00	0.14	20.15	Peak	---	---
3	0.1419630	26.93	-56.72	83.65	6.65	0.00	0.13	20.15	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.

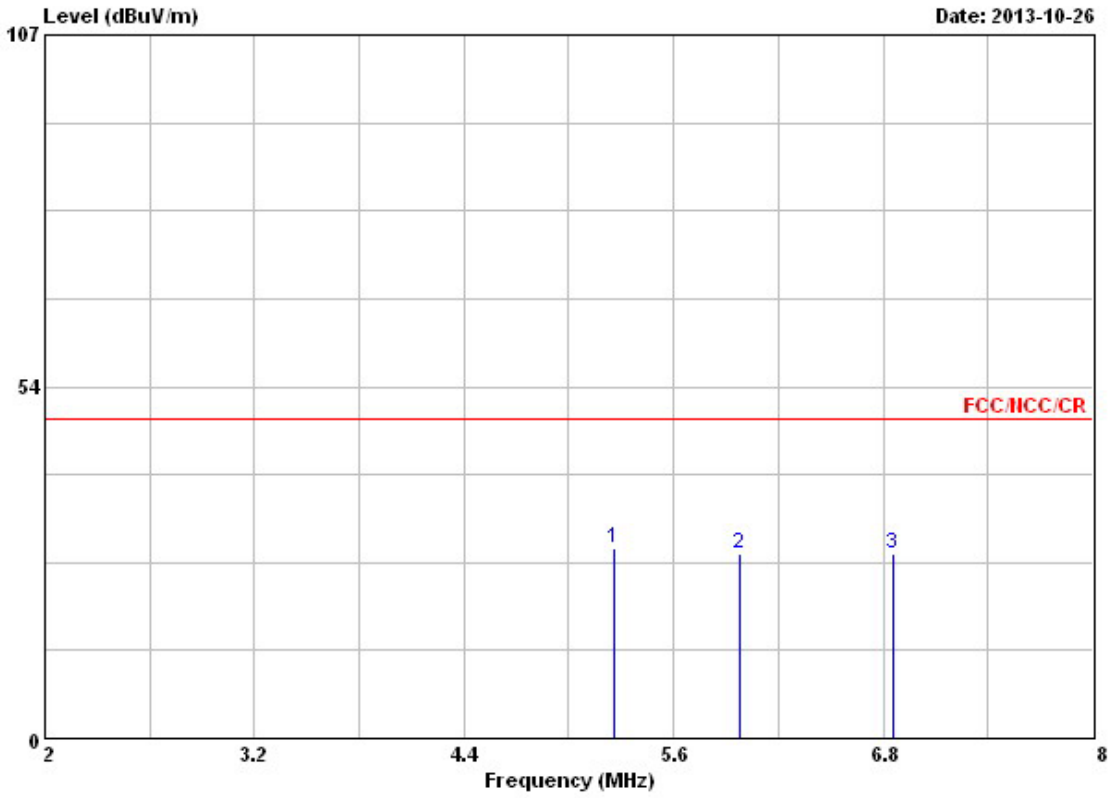
Transmitter Radiated Unwanted Emissions (150 kHz – 2 MHz)			
Modulation Mode	NFC-Read/Write	**Polarization**	H
Operating Mode	1	**Operating Function**	AC Power & Radio link



	Freq	Level	Over Limit	Limit Line	Read Level	Preamp Factor	Cable Loss	Antenna Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		cm	deg
1 @	1.800	31.12	-17.56	48.68	10.88	0.00	0.24	20.00	Peak	---	---
2 @	1.910	31.12	-17.56	48.68	10.88	0.00	0.24	20.00	Peak	---	---
3 @	2.000	31.13	-17.55	48.68	10.88	0.00	0.25	20.00	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.

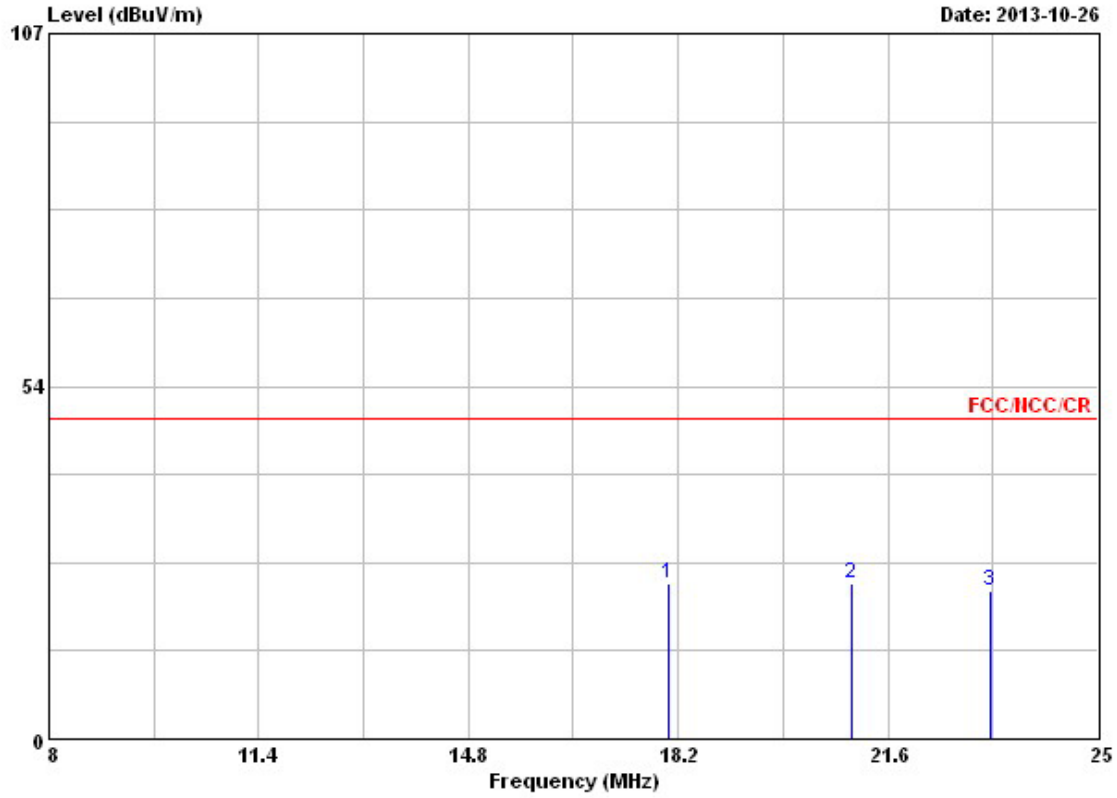
Transmitter Radiated Unwanted Emissions (2 MHz – 8 MHz)			
Modulation Mode	NFC-Read/Write	**Polarization**	H
Operating Mode	1	**Operating Function**	AC Power & Radio link



	Freq	Level	Over Limit	Limit Line	Read Level	Preamp Factor	Cable Loss	Antenna Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		cm	deg
1 @	5.260	29.05	-19.61	48.66	8.52	0.00	0.52	20.01	Peak	---	---
2 @	5.980	27.97	-20.69	48.66	7.35	0.00	0.57	20.05	Peak	---	---
3 @	6.860	28.07	-20.59	48.66	7.36	0.00	0.62	20.09	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.

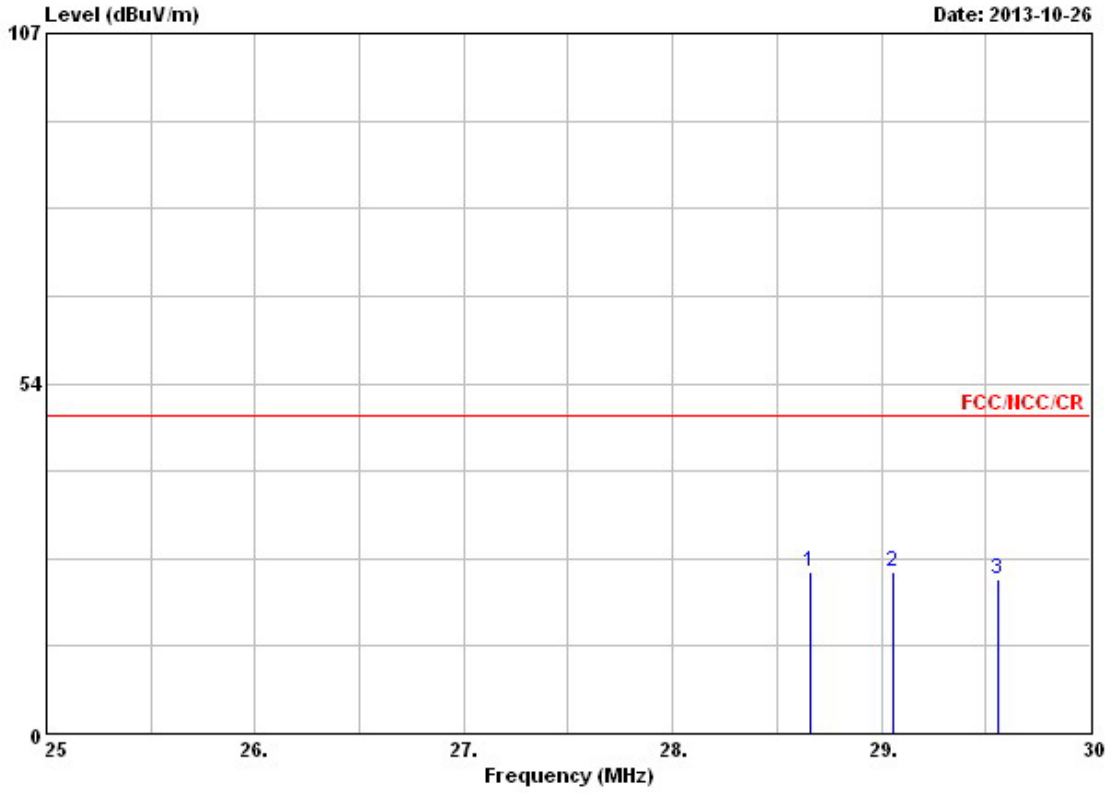
Transmitter Radiated Unwanted Emissions (8 MHz – 25 MHz)			
Modulation Mode	NFC-Read/Write	**Polarization**	H
Operating Mode	1	**Operating Function**	AC Power & Radio link



	Freq	Level	Over Limit	Limit Line	Read Level	Preamp Factor	Cable Loss	Antenna Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		cm	deg
1 @	18.030	23.54	-25.10	48.64	2.49	0.00	0.89	20.16	Peak	---	---
2 @	21.020	23.64	-25.00	48.64	2.50	0.00	0.96	20.18	Peak	---	---
3 @	23.270	22.48	-26.15	48.63	1.34	0.00	1.01	20.13	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

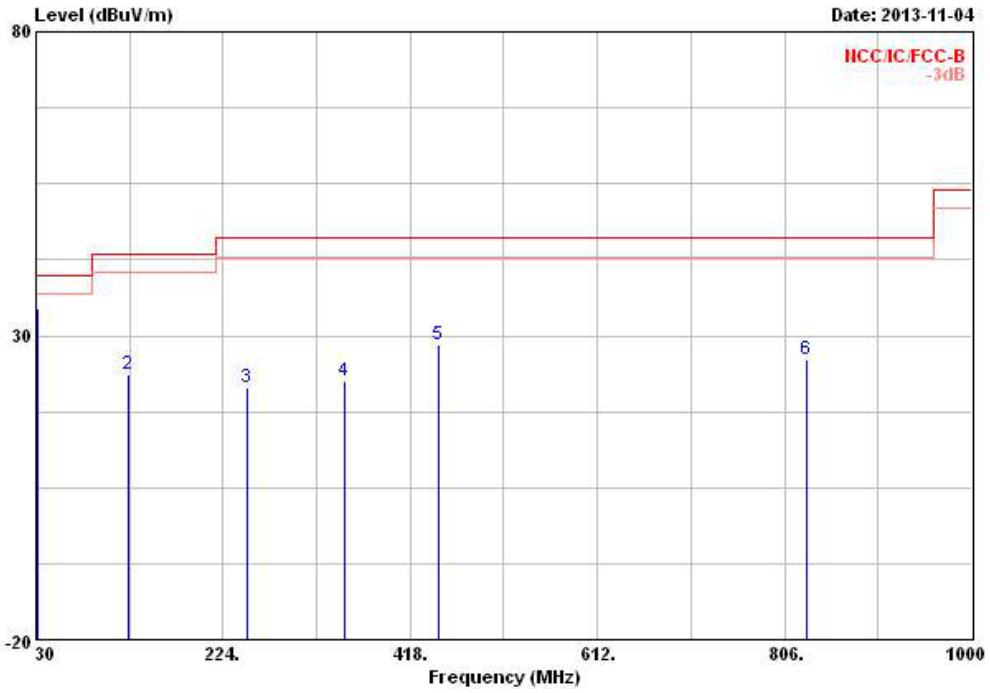


	Freq	Level	Over Limit	Limit Line	Read Level	Preamp Factor	Cable Loss	Antenna Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		cm	deg
1 @	28.660	24.73	-23.90	48.63	3.52	0.00	1.11	20.10	Peak	---	---
2 @	29.060	24.74	-23.89	48.63	3.52	0.00	1.12	20.10	Peak	---	---
3 @	29.560	23.73	-24.90	48.63	2.50	0.00	1.13	20.10	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)

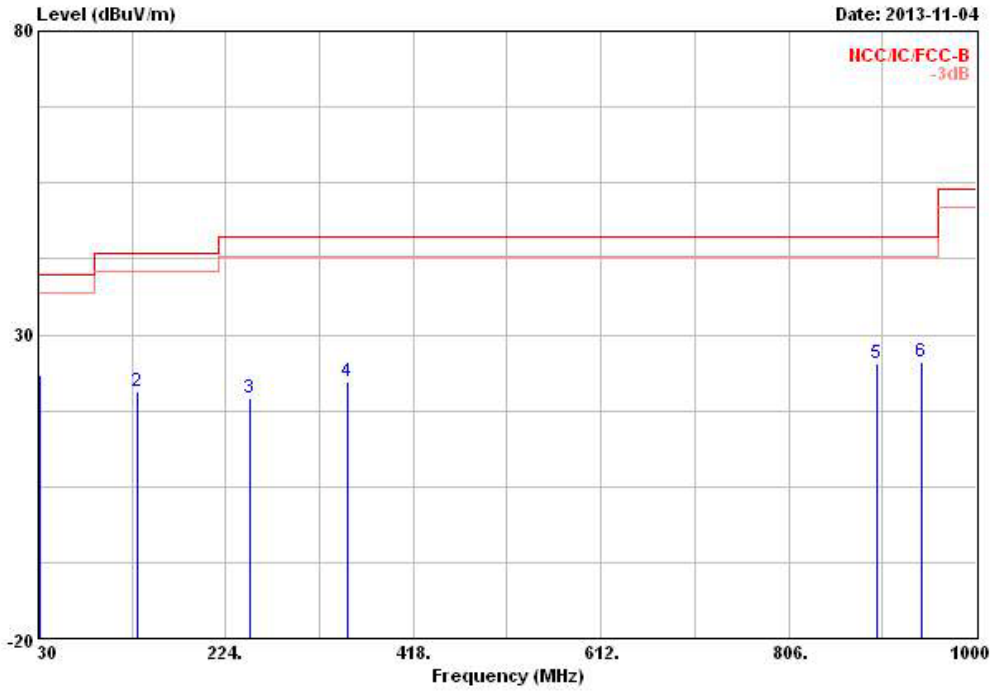
Transmitter Radiated Unwanted Emissions			
Modulation Mode	NFC-Read/Write	**Polarization**	V
Operating Mode	1	**Operating Function**	AC Power & Radio link



	Freq	Level	Over Limit	Limit Line	Read 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	31.940	34.42	-5.58	40.00	43.47	17.76	0.80	27.61	QP	---	---
2	126.030	23.73	-19.77	43.50	36.99	12.35	1.67	27.28	Peak	---	---
3	249.220	21.36	-24.64	46.00	33.24	12.64	2.31	26.83	Peak	---	---
4	350.100	22.67	-23.33	46.00	32.42	14.45	2.79	26.99	Peak	---	---
5	448.070	28.41	-17.59	46.00	36.41	16.43	3.17	27.60	Peak	---	---
6	828.310	26.09	-19.91	46.00	29.31	20.12	4.39	27.73	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			
Modulation Mode	NFC-Read/Write	**Polarization**	H
Operating Mode	1	**Operating Function**	AC Power & Radio link



	Freq	Level	Over Limit	Limit Line	Read 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	31.940	23.49	-16.51	40.00	32.54	17.76	0.80	27.61	Peak	---	---
2	132.820	20.64	-22.86	43.50	34.35	11.84	1.71	27.26	Peak	---	---
3	249.220	19.65	-26.35	46.00	31.53	12.64	2.31	26.83	Peak	---	---
4	350.100	22.16	-23.84	46.00	31.91	14.45	2.79	26.99	Peak	---	---
5	897.180	25.17	-20.83	46.00	27.70	20.49	4.54	27.56	Peak	---	---
6	943.740	25.48	-20.52	46.00	27.33	20.81	4.77	27.43	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 ±0.01% (±100 ppm).

3.5.2 Measuring Instruments

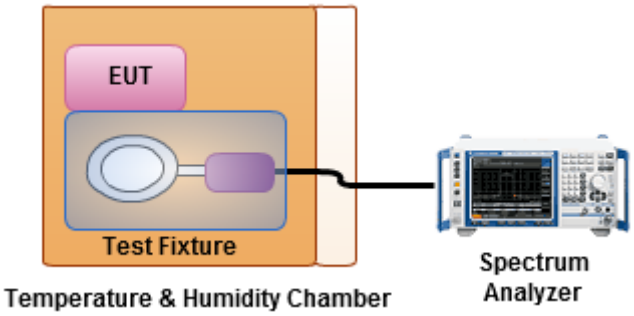
Refer a test equipment and calibration data table in this test report.

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

Frequency Stability



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**
$T_{20°C}$Vmax	13.56048	35.32
$T_{20°C}$Vmin	13.56048	35.25
$T_{50°C}$Vnom	13.56045	33.11
$T_{40°C}$Vnom	13.56045	33.11
$T_{30°C}$Vnom	13.56045	33.11
$T_{20°C}$Vnom	13.56048	35.25
$T_{10°C}$Vnom	13.56051	37.39
$T_{0°C}$Vnom	13.56052	38.42
$T_{-10°C}$Vnom	13.56054	39.45
$T_{-20°C}$Vnom	13.56054	39.45
Result		**Complied**
Note 1: Measure at 85 % [Vmin] and 115 % [Vmax] of the nominal voltage [Vnom]. 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)
RF Cable-CON	HUBER+SUHNER	RG213/U	7.61183201e+012	9kHz ~ 30MHz	Nov. 09, 2012	Conduction (CO04-HY)
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	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 (TH06-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Jun. 21, 2013	Conducted (TH06-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-S	MAB0103-001	-20 ~ 100℃	Nov. 21, 2012	Conducted (TH06-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
10m Semi Anechoic Chamber	TDK	SAC-10M	10CH02-HY	30 MHz ~ 1 GHz 10m,3m	Nov. 03, 2012	Radiation (10CH02-HY)
Receiver	R&S	ESI	838496/008	20 Hz ~ 7 GHz	May 14, 2013	Radiation (10CH02-HY)
Turn Table	EM Electronics	EM Electronics	060546	0 -360 degree	N/A	Radiation (10CH02-HY)
RF Cable-R10m	Suhner Switzerland + BELDEN	RG223/U + RG8/U	CB026-DOOR	30 MHz ~ 1 GHz	Feb. 09, 2013	Radiation (10CH02-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Loop Antenna	R&S	HFH2-Z2	860004/0001	9 kHz - 30 MHz	Jul. 03, 2012	Radiation (10CH02-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	Dec. 01, 2012	Radiation (03CH03-HY)
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	May. 03, 2013	Radiation (03CH03-HY)
Spectrum	R&S	FSP30	100023	9kHz ~ 30GHz	Jul. 20, 2013	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30MHz ~ 1GHz	Sep. 21, 2013	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	Jan. 17, 2013	Radiation (03CH03-HY)
Turn Table	EM Electronics	EM Electronics	060615	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	MF	MF-7802	MF780208179	1 ~ 4 m	N/A	Radiation (03CH03-HY)

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