

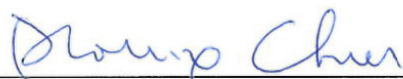
FCC Test Report

Equipment : Label/Sign Printer
Brand Name : DuraLabel
Model No. : DLBRONCO
FCC ID : ZKKDLB01
Standard : 47 CFR FCC Part 15.225
Operating Band : 13.553 – 13.567 MHz
Applicant : Graphic Products, Inc.
PO BOX 4030 Beaverton, OREGON 97076 USA
Manufacturer : Graphic Products, Inc.
9825 SW Sunshine Ct., Beaverton, OR 97005

The product sample received on Dec. 25, 2017 and completely tested on Mar. 05, 2018. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 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:



Phoenix Chen / Assistant Manager



Table of Contents

1	GENERAL DESCRIPTION	5
1.1	Information.....	5
1.2	Testing Applied Standards	7
1.3	Testing Location Information	7
1.4	Measurement Uncertainty	7
2	TEST CONFIGURATION OF EUT.....	8
2.1	The Worst Case Modulation Configuration	8
2.2	Test Channel Frequencies Configuration.....	8
2.3	The Worst Case Measurement Configuration.....	9
2.4	Accessories and Support Equipment	10
2.5	Test Setup Diagram	11
3	TRANSMITTER TEST RESULT	12
3.1	AC Power-line Conducted Emissions	12
3.2	Emission Bandwidth	16
3.3	Field Strength of Fundamental Emissions and Spectrum Mask	18
3.4	Transmitter Radiated Unwanted Emissions	20
3.5	Frequency Stability	29
4	TEST EQUIPMENT AND CALIBRATION DATA	31
APPENDIX A. TEST PHOTOS		
PHOTOGRAPHS OF EUT V01		

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]: 0.7047MHz 37.32(Margin 18.68dB) - QP 30.11(Margin 15.89dB) - AV	FCC 15.207	Complied
3.2	15.215(c)	Emission Bandwidth	20dB Bandwidth 4.978 [kHz] F_L : 13.558698 MHz F_H : 13.563676 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 peak: 87.27 dBuV/m at 3m Device complies with spectrum mask – refer to test data	124 dBuV/m at 3m	Complied
3.4	15.225(d)	Transmitter Radiated Unwanted Emissions	[dBuV/m at 3m]: 39.7MHz 39.87 (Margin 0.13dB) - QP	FCC 15.209	Complied
3.5	15.225(e)	Frequency Stability	65.63 ppm	$\pm 0.01\%$ (100ppm)	Complied

Revision History

[illegible]

1 General Description

1.1 Information

1.1.1 RF General Information

NFC Chip	Brand Name	Model Name
	SUNION	RF-331 -GX-1

RF General Information				
Frequency Range	Modulation	Ch. Frequency (MHz)	Channel Number	Field Strength (dBuV/m)
13.553 – 13.567 MHz	ISO 14443-3A (ASK)	13.56	1	87.27
Note 1: Field strength performed peak level at 3m.				

1.1.2 Antenna Information

Antenna Category	
☒	Integral antenna (antenna permanently attached)
☐	Temporary RF connector provided
☒	No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path.
☐	External antenna (dedicated antennas)

Antenna General Information		
No.	Ant. Cat.	Ant. Type
1	Integral	Loop

1.1.3 Type of EUT

Identify EUT	
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

Duty Cycle Operation Restriction			
The transmitter is used for		The transmitter is operated	
☒	Inductive applications	☒	Automatically triggered
☐	Duty cycle fixed mode	☒	Duty cycle random mode
Duty cycle mode - NFC-A (ISO 14443-3A)			
Declare transmitter duty cycle / 1 hour =		100%	
Duty cycle Limit			
☐	Class 1 - < 0.1 %	☐	Class 2 - < 1.0 %
☐	Class 3 - < 10 %	☐	Class 4 - Up to 100 %
Duty cycle mode - NFC-B (ISO 14443-3B)			
Declare transmitter duty cycle / 1 hour =		100%	
Duty cycle Limit			
☐	Class 1 - < 0.1 %	☐	Class 2 - < 1.0 %
☐	Class 3 - < 10 %	☐	Class 4 - Up to 100 %
Duty cycle mode - NFC-F (ISO 18092)			
Declare transmitter duty cycle / 1 hour =		100%	
Duty cycle Limit			
☐	Class 1 - < 0.1 %	☐	Class 2 - < 1.0 %
☐	Class 3 - < 10 %	☐	Class 4 - Up to 100 %
Duty cycle mode - NFC-V (ISO 15693)			
Declare transmitter duty cycle / 1 hour =		100%	
Duty cycle Limit			
☐	Class 1 - < 0.1 %	☐	Class 2 - < 1.0 %
☐	Class 3 - < 10 %	☒	Class 4 - Up to 100 %

1.1.5 EUT Operational Condition

Supply Voltage	☒ AC mains	☐ DC	
Type of DC Source	☐ Internal DC supply	☒ External AC adapter	☐ Battery
Test Voltage	☒ Vnom (120V)	☒ Vmax (138V)	☒ Vmin (102V)
Test Climatic	☒ Tnom (20°C)	☒ Tmax (55°C)	☒ Tmin (-20°C)

1.2 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 C63.10-2013
- ♦ KDB 174176 D01 v01r01

1.3 Testing Location Information

Testing Location				
☒	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.		
		TEL : 886-3-327-3456 FAX : 886-3-327-0973		
Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
AC Conduction	CO04-HY	Eric	24.2°C / 56%	17/Jan/2018
RF Conducted	TH01-HY	Tim	23.5°C / 65%	05/Mar/2018
Radiated	03CH03-HY	Jeff	24.2°C / 56%	12/Jan/2018

Test site Designation No. TW1190 with FCC.

1.4 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))

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	3.0 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	4.3 dB	Confidence levels of 95%
Conducted Emission	1.3 dB	Confidence levels of 95%
Temperature	0.7 °C	Confidence levels of 95%
Humidity	4 %	Confidence levels of 95%

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	87.27

2.2 Test Channel Frequencies Configuration

Modulation Mode	Test Channel Frequencies (MHz)
NFC	13.56

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	Adapter Mode

The Worst Case Mode for Following Conformance Tests	
Tests Item	Emission Bandwidth, Frequency Stability
Test Condition	Conducted measurement

The Worst Case Mode for Following Conformance Tests			
Tests Item	Field Strength of Fundamental Emissions Spectrum Mask, Transmitter Radiated Unwanted Emissions		
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 will be a hand-held or body-worn battery-powered devices and operating multiple positions.		
Pretest Mode	☐ 1. EUT Built in NFC A type		
	☐ 2. EUT Built in NFC B type		
	☐ 3. EUT Built in NFC F type		
	☒ 4. EUT Built in NFC V type		
	EUT only support mode 4 function.		
Operating Mode < 1GHz	☒ 1. Adapter Mode		
Modulation Mode	NFC		
Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane
			
Worst Planes of EUT		V	

2.4 Accessories and Support Equipment

Accessories Information				
AC Adapter	Brand Name	Wearnes	Model Name	WDS060240
	Power Rating	I/P: 100 - 240Vac, 1.6A, O/P: 24Vdc, 2.5A		
	Power Cord	DC output : 1.14meter, Shielded cable, with ferrite core AC input : 1.8meter, Non-Shielded cable, w/o ferrite core		

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

Support Equipment - AC Conduction				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Tag	-	-	-

Note: Support equipment No.1 was provided by customer.

Support Equipment - RF Conducted				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Tag	-	-	-
2	AC Source	GW	APS-9102	-

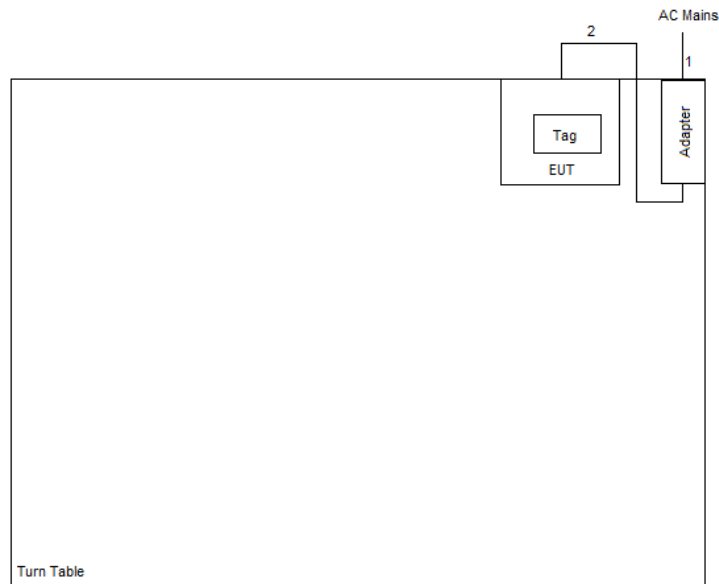
Note: Support equipment No.1 was provided by customer.

Support Equipment - RF Radiated Emission				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Tag	-	-	-

Note: Support equipment No.1 was provided by customer.

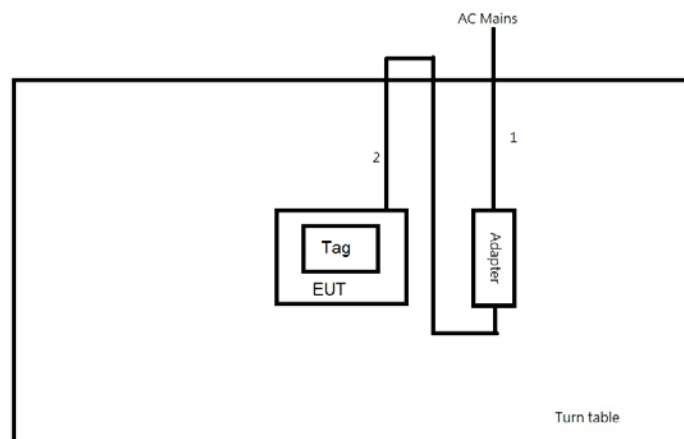
2.5 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



Item	Connection	Shielded	Length
1	AC Power Line	No	1.8m
2	DC Power Line	D	1.14m

Test Setup Diagram - Radiated Test



Item	Connection	Shielded	Length
1	AC Power Line	No	1.8m
2	DC Power Line	D	1.14m

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.

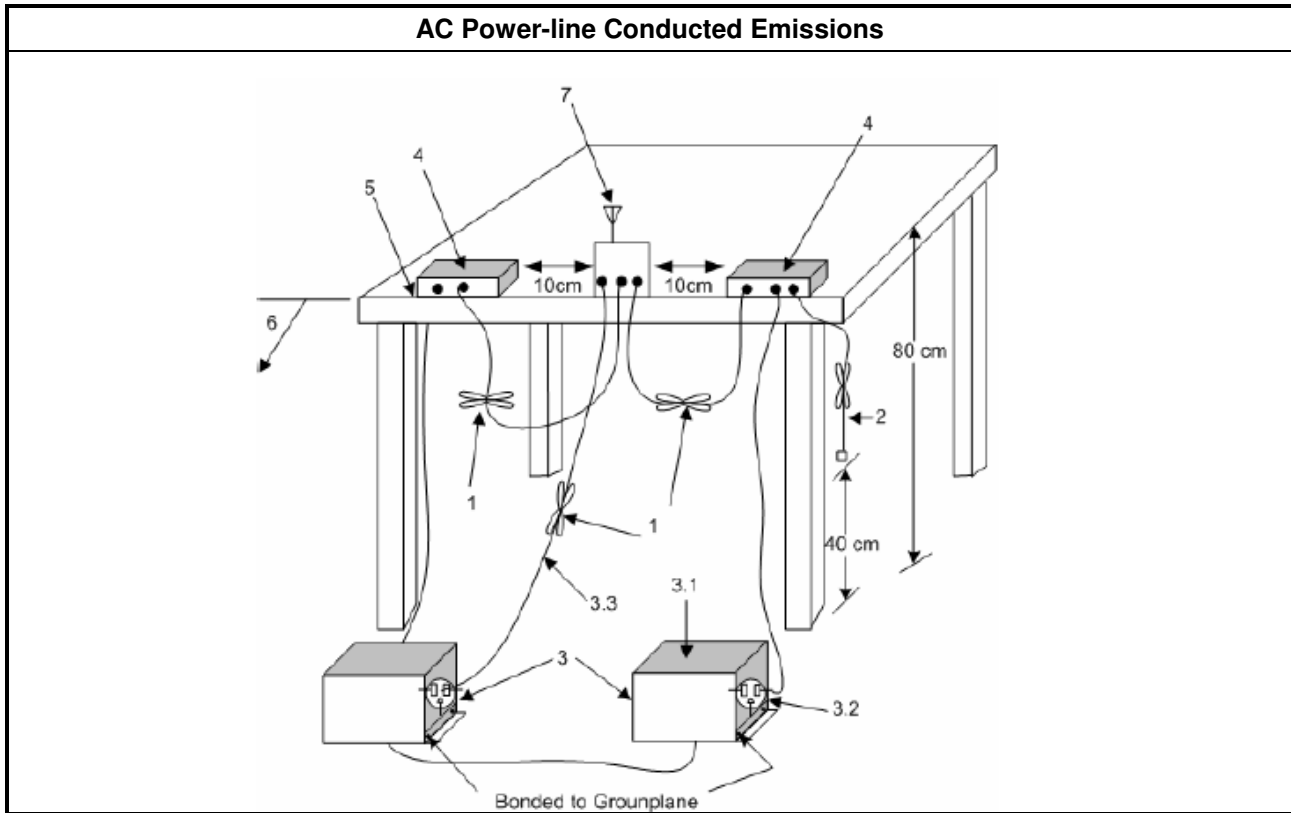
3.1.2 Measuring Instruments

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

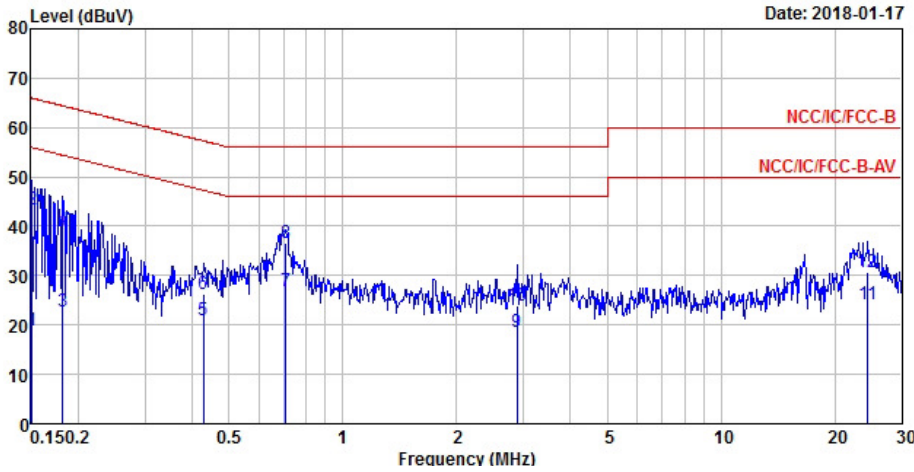
3.1.3 Test Procedures

Test Method	
☒	Refer as ANSI C63.10-2013, 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

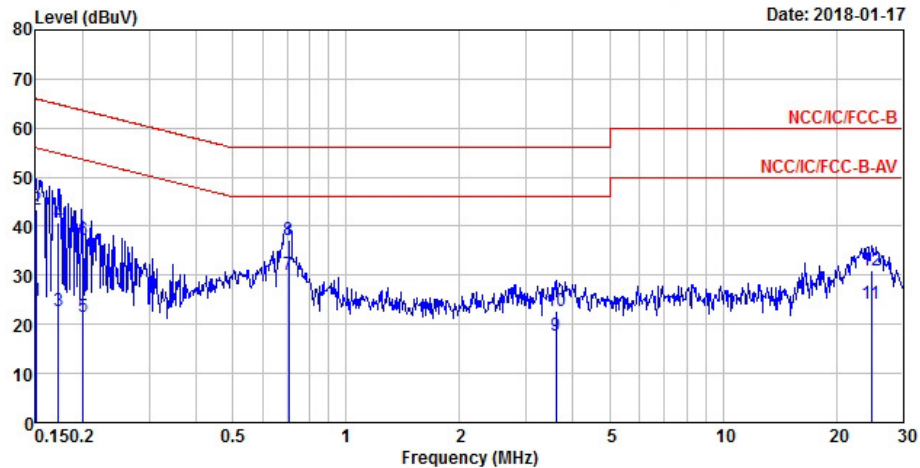


3.1.5 Test Result of AC Power-line Conducted Emissions

AC Power-line Conducted Emissions Result																																																																																																																																					
Operating Mode	1			Power Phase		Neutral																																																																																																																															
Operating Function	Adapter Mode																																																																																																																																				
Level (dBuV)  Date: 2018-01-17 Frequency (MHz) <table><thead><tr><th></th><th>Freq</th><th>Level</th><th>Over Limit</th><th>Limit Line</th><th>Read Level</th><th>LISN Factor</th><th>Cable Loss</th><th>Remark</th></tr><tr><th></th><th>MHz</th><th>dBuV</th><th>dB</th><th>dBuV</th><th>dBuV</th><th>dB</th><th>dB</th><th></th></tr></thead><tbody><tr><td>1</td><td>0.1508</td><td>18.96</td><td>-37.00</td><td>55.96</td><td>9.29</td><td>9.63</td><td>0.04</td><td>Average</td></tr><tr><td>2</td><td>0.1508</td><td>43.36</td><td>-22.60</td><td>65.96</td><td>33.69</td><td>9.63</td><td>0.04</td><td>QP</td></tr><tr><td>3</td><td>0.1815</td><td>22.74</td><td>-31.68</td><td>54.42</td><td>13.11</td><td>9.62</td><td>0.01</td><td>Average</td></tr><tr><td>4</td><td>0.1815</td><td>39.34</td><td>-25.08</td><td>64.42</td><td>29.71</td><td>9.62</td><td>0.01</td><td>QP</td></tr><tr><td>5</td><td>0.4282</td><td>20.98</td><td>-26.31</td><td>47.29</td><td>11.28</td><td>9.61</td><td>0.09</td><td>Average</td></tr><tr><td>6</td><td>0.4282</td><td>26.32</td><td>-30.97</td><td>57.29</td><td>16.62</td><td>9.61</td><td>0.09</td><td>QP</td></tr><tr><td>7 MAX</td><td>0.7084</td><td>26.99</td><td>-19.01</td><td>46.00</td><td>17.33</td><td>9.62</td><td>0.04</td><td>Average</td></tr><tr><td>8</td><td>0.7084</td><td>36.55</td><td>-19.45</td><td>56.00</td><td>26.89</td><td>9.62</td><td>0.04</td><td>QP</td></tr><tr><td>9</td><td>2.8845</td><td>18.47</td><td>-27.53</td><td>46.00</td><td>8.78</td><td>9.64</td><td>0.05</td><td>Average</td></tr><tr><td>10</td><td>2.8845</td><td>23.86</td><td>-32.14</td><td>56.00</td><td>14.17</td><td>9.64</td><td>0.05</td><td>QP</td></tr><tr><td>11</td><td>24.3995</td><td>24.24</td><td>-25.76</td><td>50.00</td><td>14.52</td><td>9.70</td><td>0.02</td><td>Average</td></tr><tr><td>12</td><td>24.3995</td><td>30.78</td><td>-29.22</td><td>60.00</td><td>21.06</td><td>9.70</td><td>0.02</td><td>QP</td></tr></tbody></table>									Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark		MHz	dBuV	dB	dBuV	dBuV	dB	dB		1	0.1508	18.96	-37.00	55.96	9.29	9.63	0.04	Average	2	0.1508	43.36	-22.60	65.96	33.69	9.63	0.04	QP	3	0.1815	22.74	-31.68	54.42	13.11	9.62	0.01	Average	4	0.1815	39.34	-25.08	64.42	29.71	9.62	0.01	QP	5	0.4282	20.98	-26.31	47.29	11.28	9.61	0.09	Average	6	0.4282	26.32	-30.97	57.29	16.62	9.61	0.09	QP	7 MAX	0.7084	26.99	-19.01	46.00	17.33	9.62	0.04	Average	8	0.7084	36.55	-19.45	56.00	26.89	9.62	0.04	QP	9	2.8845	18.47	-27.53	46.00	8.78	9.64	0.05	Average	10	2.8845	23.86	-32.14	56.00	14.17	9.64	0.05	QP	11	24.3995	24.24	-25.76	50.00	14.52	9.70	0.02	Average	12	24.3995	30.78	-29.22	60.00	21.06	9.70	0.02	QP
	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark																																																																																																																													
	MHz	dBuV	dB	dBuV	dBuV	dB	dB																																																																																																																														
1	0.1508	18.96	-37.00	55.96	9.29	9.63	0.04	Average																																																																																																																													
2	0.1508	43.36	-22.60	65.96	33.69	9.63	0.04	QP																																																																																																																													
3	0.1815	22.74	-31.68	54.42	13.11	9.62	0.01	Average																																																																																																																													
4	0.1815	39.34	-25.08	64.42	29.71	9.62	0.01	QP																																																																																																																													
5	0.4282	20.98	-26.31	47.29	11.28	9.61	0.09	Average																																																																																																																													
6	0.4282	26.32	-30.97	57.29	16.62	9.61	0.09	QP																																																																																																																													
7 MAX	0.7084	26.99	-19.01	46.00	17.33	9.62	0.04	Average																																																																																																																													
8	0.7084	36.55	-19.45	56.00	26.89	9.62	0.04	QP																																																																																																																													
9	2.8845	18.47	-27.53	46.00	8.78	9.64	0.05	Average																																																																																																																													
10	2.8845	23.86	-32.14	56.00	14.17	9.64	0.05	QP																																																																																																																													
11	24.3995	24.24	-25.76	50.00	14.52	9.70	0.02	Average																																																																																																																													
12	24.3995	30.78	-29.22	60.00	21.06	9.70	0.02	QP																																																																																																																													
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.)																																																																																																																																					
Note 3: When emissions are in operating band over limits, retest with a dummy load for final in-band results.																																																																																																																																					

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Line
Operating Function	Adapter Mode		



	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1508	24.71	-31.25	55.96	15.05	9.62	0.04	Average
2	0.1508	43.37	-22.59	65.96	33.71	9.62	0.04	QP
3	0.1722	22.76	-32.10	54.86	13.12	9.62	0.02	Average
4	0.1722	40.60	-24.26	64.86	30.96	9.62	0.02	QP
5	0.2007	21.49	-32.09	53.58	11.87	9.62	0.00	Average
6	0.2007	37.30	-26.28	63.58	27.68	9.62	0.00	QP
7 MAX	0.7047	30.11	-15.89	46.00	20.46	9.61	0.04	Average
8	0.7047	37.32	-18.68	56.00	27.67	9.61	0.04	QP
9	3.6034	17.65	-28.35	46.00	7.95	9.63	0.07	Average
10	3.6034	22.67	-33.33	56.00	12.97	9.63	0.07	QP
11	24.7904	24.26	-25.74	50.00	14.69	9.56	0.01	Average
12	24.7904	30.98	-29.02	60.00	21.41	9.56	0.01	QP

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.)

Note 3: When emissions are in operating band over limits, retest with a dummy load for final in-band results.

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).

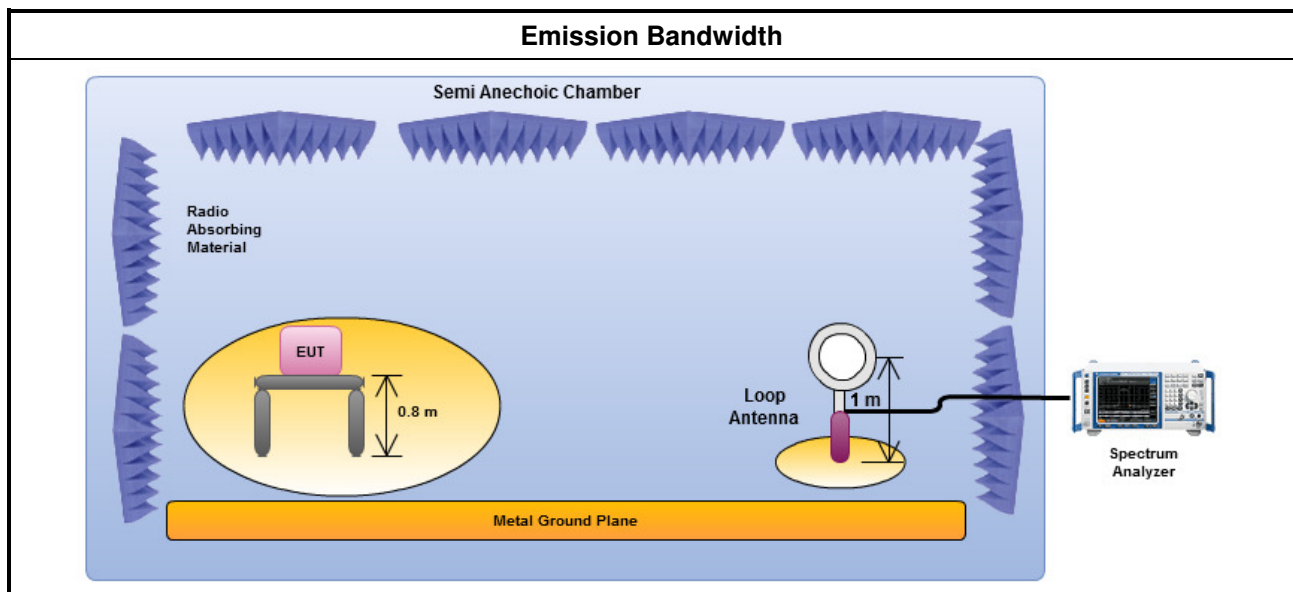
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

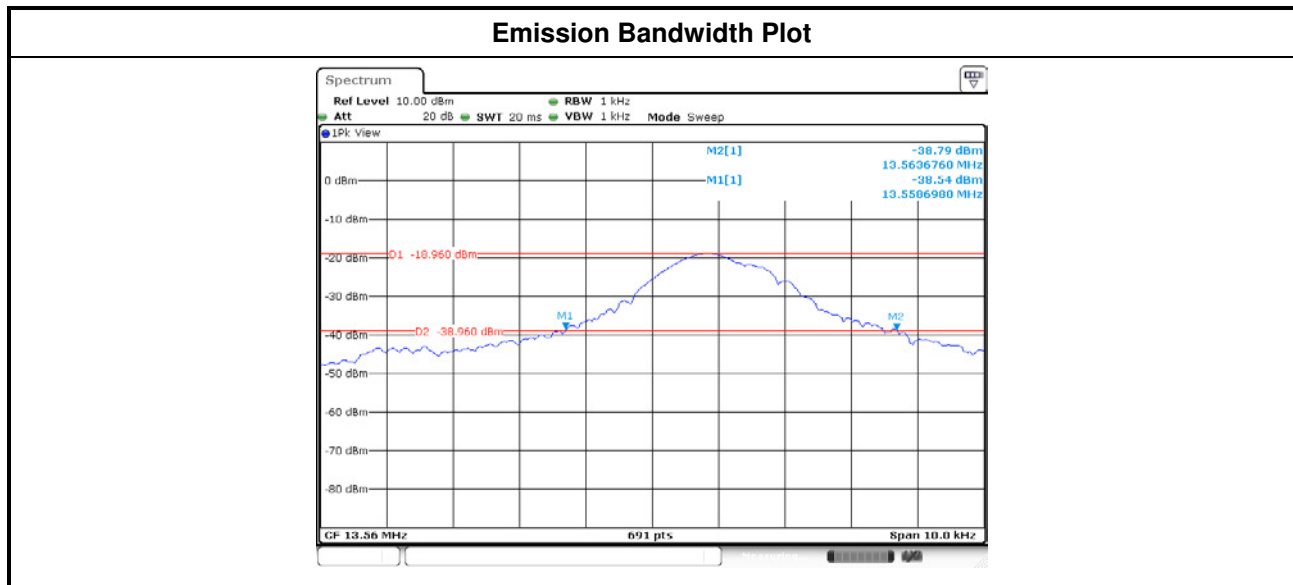
Test Method	
☒	For the emission bandwidth refer ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.
☒	For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field 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)	99% Bandwidth (kHz)	F _L at 20dB BW (MHz)	F _H at 20dB BW (MHz)
NFC	13.56	4.97800	6.164978	13.558698	13.563676
Limit		N/A	N/A	13.553	13.567
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 For FCC					
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 For FCC					
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

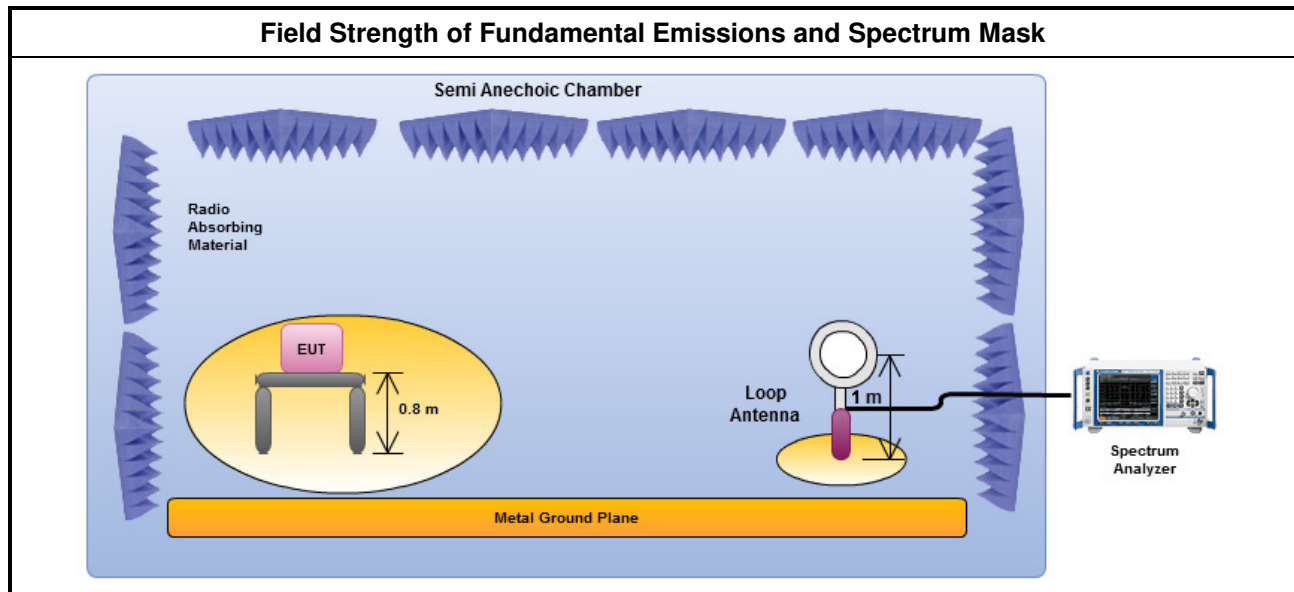
3.3.2 Measuring Instruments

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.

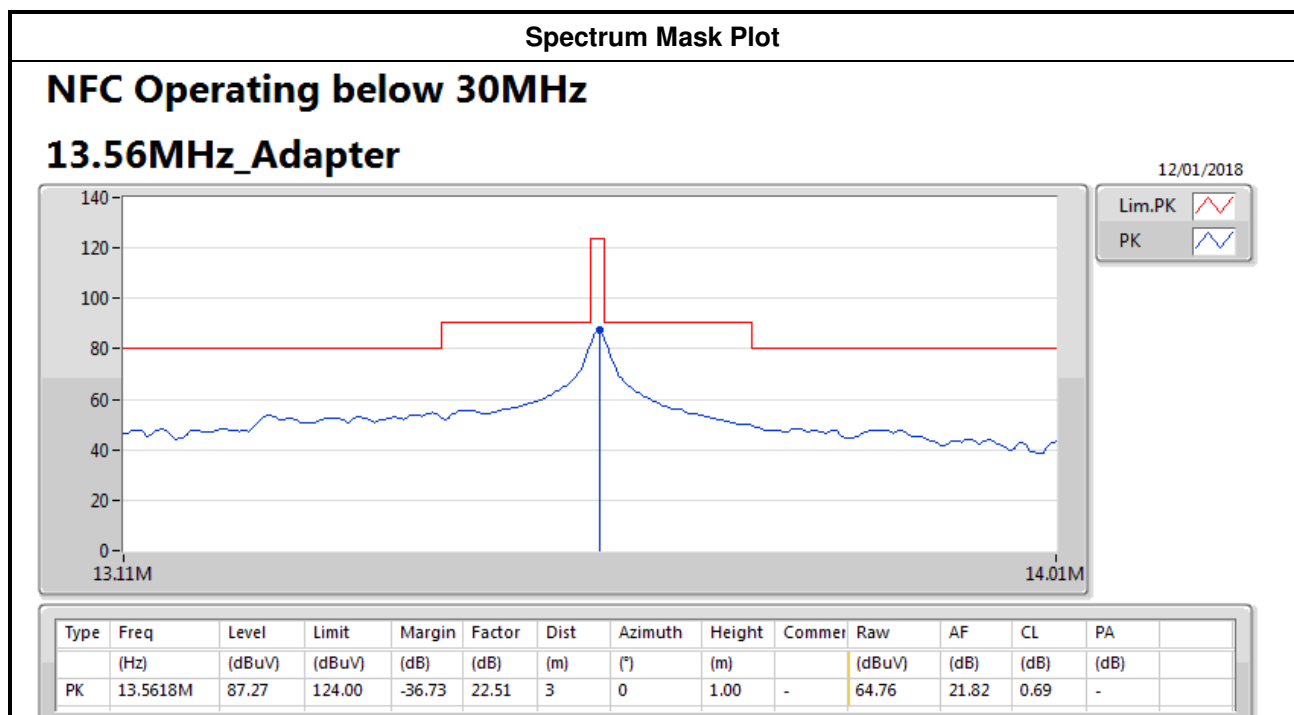
3.3.4 Test Setup



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	13.56	87.27	H	36.732	124.00
Result		Complied			

Note 1: Measurement worst emissions of receive antenna polarization: H(Horizontal).



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.

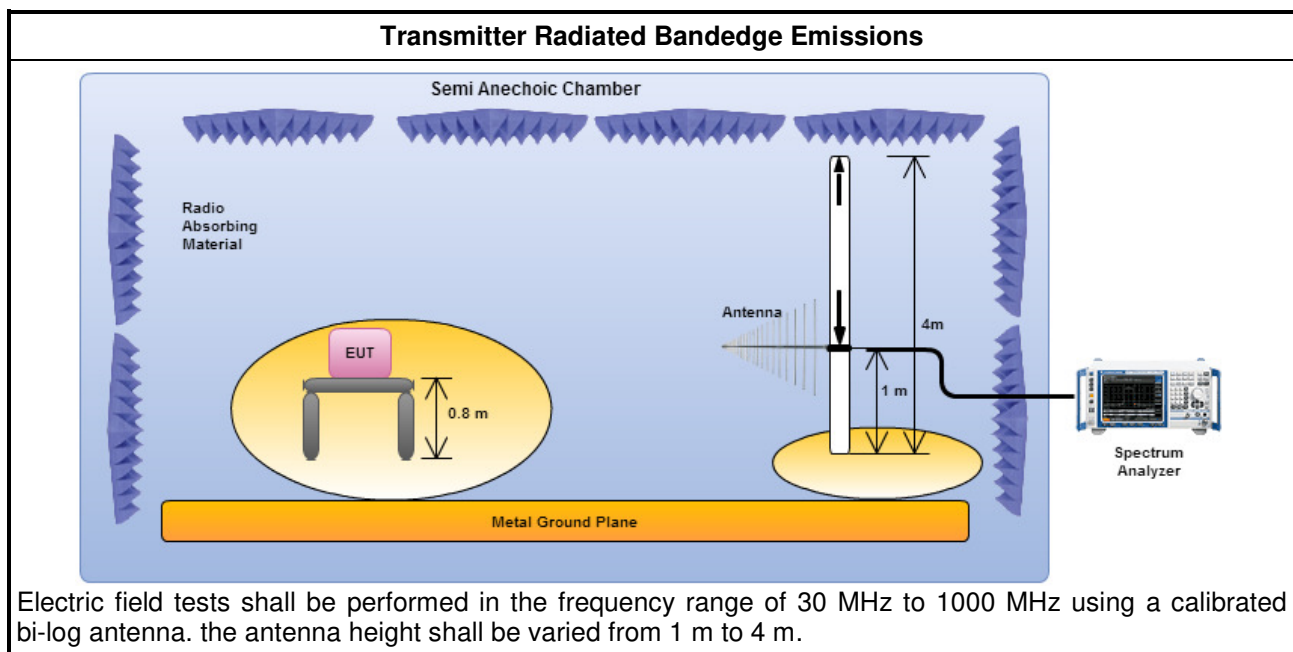
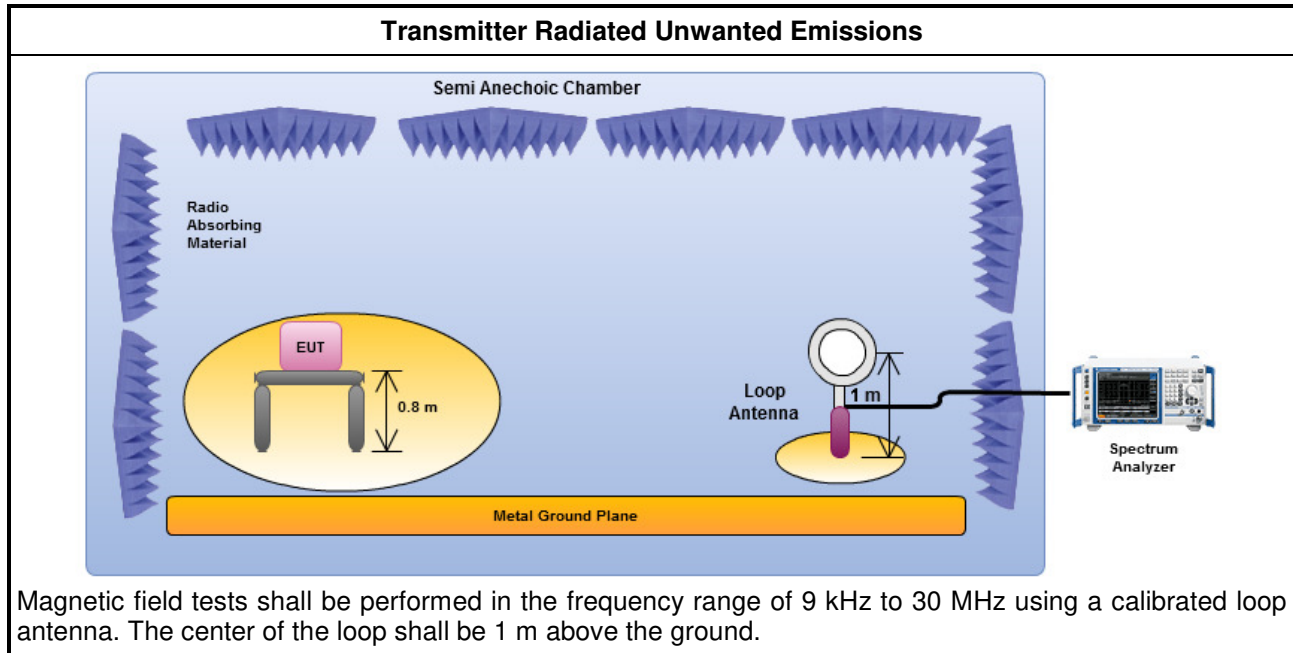
3.4.2 Measuring Instruments

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)

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Dist (m)	Azimuth (°)	Height (m)	Comments
13.553-13.567MHz	-	-	-	-	-	-	-	-	-	-	-
NFC	Pass	PK	3.3738M	46.03	69.50	-23.47	20.84	3	0	1.00	-

Result

Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Dist (m)	Azimuth (°)	Height (m)	Comments
NFC	-	-	-	-	-	-	-	-	-	-	-
13.56MHz_Adapter	Pass	PK	19.434k	70.17	121.80	-51.63	21.96	3	360	1.00	-
13.56MHz_Adapter	Pass	PK	24.228k	66.08	119.90	-53.82	22.01	3	360	1.00	-
13.56MHz_Adapter	Pass	PK	53.274k	62.91	113.05	-50.14	21.14	3	360	1.00	-
13.56MHz_Adapter	Pass	PK	2.3589M	44.92	69.50	-24.58	20.87	3	0	1.00	-
13.56MHz_Adapter	Pass	PK	3.3738M	46.03	69.50	-23.47	20.84	3	0	1.00	-
13.56MHz_Adapter	Pass	PK	4.3887M	39.61	69.50	-29.89	21.03	3	0	1.00	-
13.56MHz_Adapter	Pass	PK	13.5618M	87.27	124.00	-36.73	22.51	3	0	1.00	-

NFC Operating below 30MHz

13.56MHz_Adapter

12/01/2018

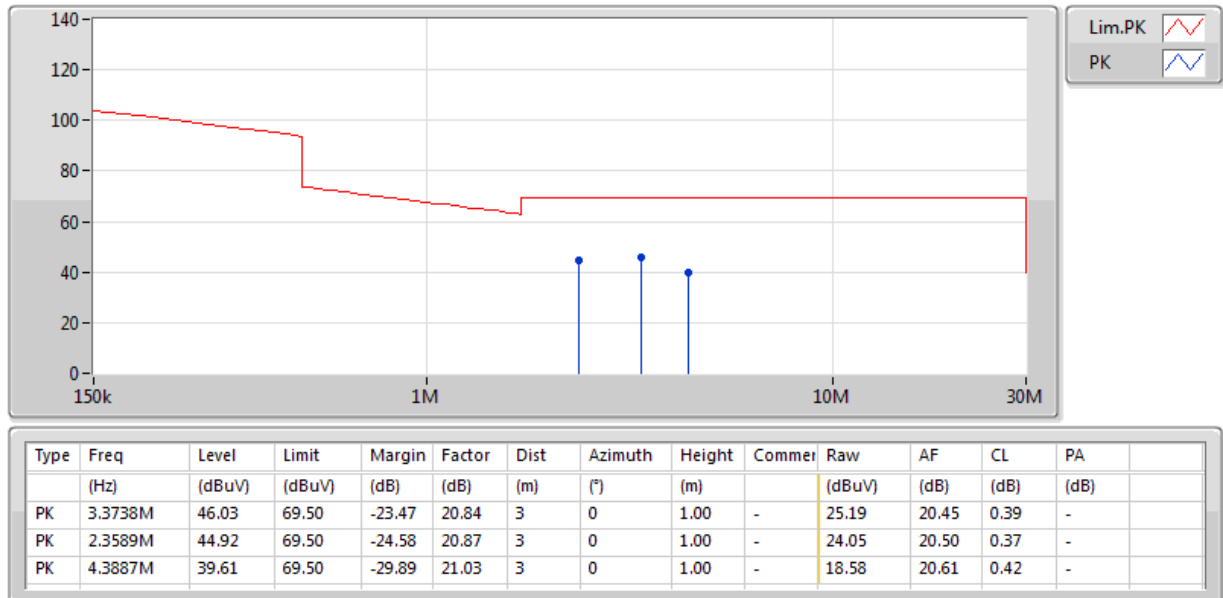


Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Dist (m)	Azimuth (°)	Height (m)	Commer	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	53.274k	62.91	113.05	-50.14	21.14	3	360	1.00	-	41.77	21.07	0.07	-
PK	19.434k	70.17	121.80	-51.63	21.96	3	360	1.00	-	48.21	21.90	0.06	-
PK	24.228k	66.08	119.90	-53.82	22.01	3	360	1.00	-	44.07	21.95	0.06	-

NFC Operating below 30MHz

13.56MHz_Adapter

12/01/2018



3.4.6 Transmitter Radiated Unwanted Emissions (Above 30MHz)

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
13.553-13.567MHz	-	-	-	-	-	-	-	-	-	-	-	-
NFC	Pass	QP	39.7M	39.87	40.00	-0.13	-7.84	3	Vertical	56	1.00	-

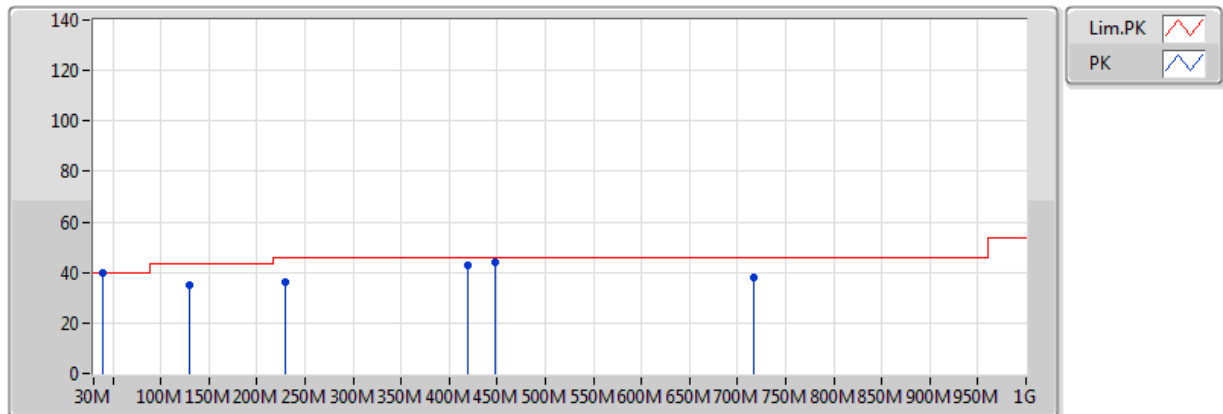
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
NFC	-	-	-	-	-	-	-	-	-	-	-	-
13.56MHz_Adapter	Pass	PK	130.88M	37.52	43.50	-5.98	-7.80	3	Horizontal	0	1.00	-
13.56MHz_Adapter	Pass	PK	229.82M	39.34	46.00	-6.66	-9.04	3	Horizontal	0	1.00	-
13.56MHz_Adapter	Pass	PK	406.36M	42.62	46.00	-3.38	-3.10	3	Horizontal	0	1.00	-
13.56MHz_Adapter	Pass	PK	447.1M	42.17	46.00	-3.83	-2.47	3	Horizontal	0	1.00	-
13.56MHz_Adapter	Pass	QP	175.5M	39.77	43.50	-3.73	-10.12	3	Horizontal	96	1.48	-
13.56MHz_Adapter	Pass	QP	720.64M	36.33	46.00	-9.67	0.77	3	Horizontal	124	1.30	-
13.56MHz_Adapter	Pass	PK	128.94M	35.24	43.50	-8.26	-7.73	3	Vertical	0	1.00	-
13.56MHz_Adapter	Pass	PK	229.82M	36.39	46.00	-9.61	-9.04	3	Vertical	0	1.00	-
13.56MHz_Adapter	Pass	PK	419.94M	42.79	46.00	-3.21	-2.77	3	Vertical	0	1.00	-
13.56MHz_Adapter	Pass	QP	39.7M	39.87	40.00	-0.13	-7.84	3	Vertical	56	1.00	-
13.56MHz_Adapter	Pass	QP	447.1M	44.00	46.00	-2.00	-2.47	3	Vertical	115	1.03	-
13.56MHz_Adapter	Pass	QP	716.76M	38.31	46.00	-7.69	0.64	3	Vertical	278	1.02	-

NFC Operating above 30MHz

13.56MHz_Adapter

12/01/2018

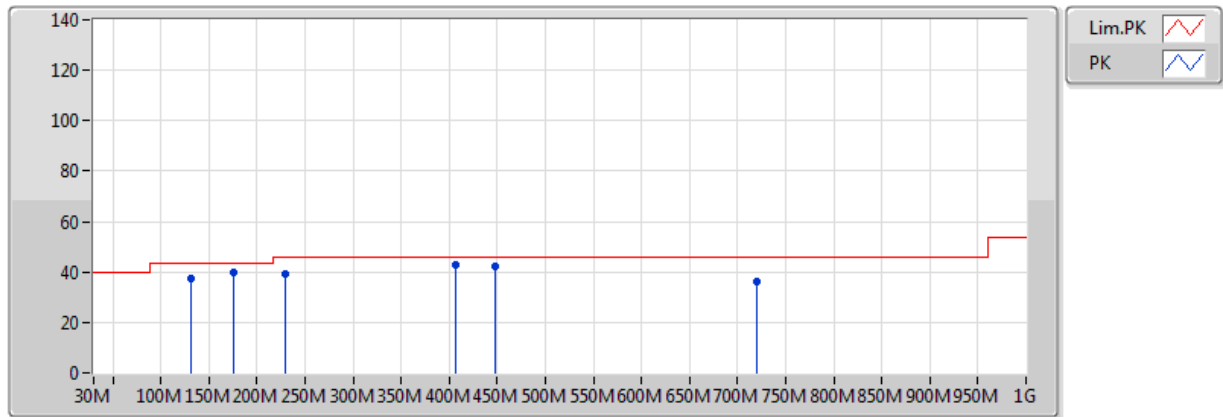


Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	128.94M	35.24	43.50	-8.26	-7.73	3	Vertical	0	1.00	-	42.97	17.14	2.37	27.24
PK	229.82M	36.39	46.00	-9.61	-9.04	3	Vertical	0	1.00	-	45.43	15.29	2.51	26.84
PK	419.94M	42.79	46.00	-3.21	-2.77	3	Vertical	0	1.00	-	45.56	21.42	3.21	27.40
QP	39.7M	39.87	40.00	-0.13	-7.84	3	Vertical	56	1.00	-	47.71	17.86	1.86	27.56
QP	447.1M	44.00	46.00	-2.00	-2.47	3	Vertical	115	1.03	-	46.47	21.67	3.41	27.55
QP	716.76M	38.31	46.00	-7.69	0.64	3	Vertical	278	1.02	-	37.67	24.35	4.20	27.92

NFC Operating above 30MHz

13.56MHz_Adapter

12/01/2018



Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	130.88M	37.52	43.50	-5.98	-7.80	3	Horizontal	0	1.00	-	45.32	17.04	2.38	27.23
PK	229.82M	39.34	46.00	-6.66	-9.04	3	Horizontal	0	1.00	-	48.38	15.29	2.51	26.84
PK	406.36M	42.62	46.00	-3.38	-3.10	3	Horizontal	0	1.00	-	45.72	21.11	3.10	27.32
PK	447.1M	42.17	46.00	-3.83	-2.47	3	Horizontal	0	1.00	-	44.64	21.67	3.41	27.55
QP	175.5M	39.77	43.50	-3.73	-10.12	3	Horizontal	96	1.48	-	49.89	14.52	2.38	27.02
QP	720.64M	36.33	46.00	-9.67	0.77	3	Horizontal	124	1.30	-	35.56	24.46	4.22	27.91

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).

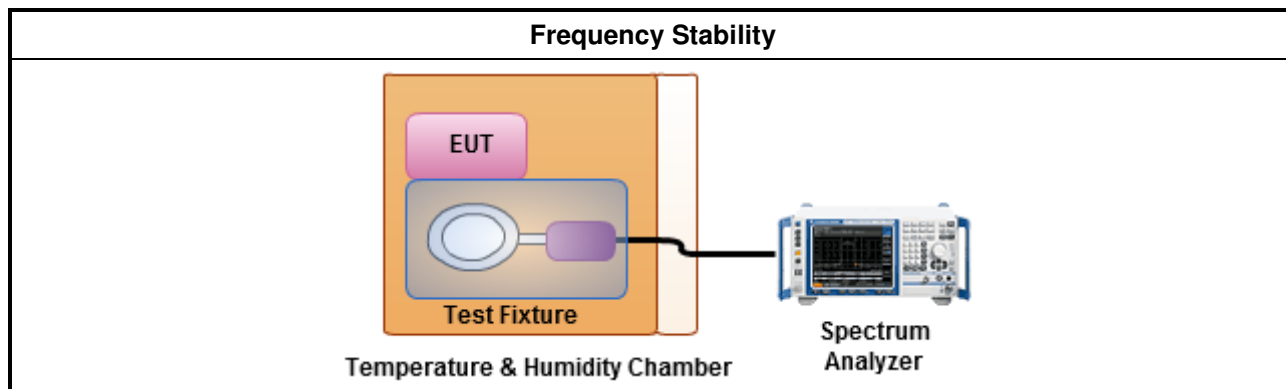
3.5.2 Measuring Instruments

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									
Condition	Ch. Freq. (MHz)	Frequency Stability (ppm)							
		Test Frequency (MHz)				Frequency Stability (ppm)			
		0 min	2 min	5 min	10 min	0 min	2 min	5 min	10 min
T _{20°C} Vmax	13.56	13.56085	13.56086	13.56088	13.56088	62.68	63.42	64.90	64.90
T _{20°C} Vmin	13.56	13.56081	13.56081	13.56082	13.56084	59.73	59.73	60.47	61.95
T _{55°C} Vnom	13.56	13.56086	13.56087	13.56087	13.56086	63.42	64.16	64.16	63.42
T _{50°C} Vnom	13.56	13.56087	13.56087	13.56087	13.56086	64.16	64.16	64.16	63.42
T _{40°C} Vnom	13.56	13.56086	13.56086	13.56087	13.56088	63.42	63.42	64.16	64.90
T _{30°C} Vnom	13.56	13.56085	13.56086	13.56088	13.56088	62.68	63.42	64.90	64.90
T _{20°C} Vnom	13.56	13.56083	13.56088	13.56086	13.56086	61.21	64.90	63.42	63.42
T _{10°C} Vnom	13.56	13.56086	13.56086	13.56088	13.56088	63.42	63.42	64.90	64.90
T _{0°C} Vnom	13.56	13.56088	13.56088	13.56088	13.56089	64.90	64.90	64.90	65.63
T _{-10°C} Vnom	13.56	13.56089	13.56089	13.56089	13.56090	65.63	65.63	65.63	66.37
T _{-20°C} Vnom	13.56	13.56088	13.56088	13.56086	13.56086	64.90	64.90	63.42	63.42
Limit (ppm)		100							
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.									
Note 2: Measure maximum deviation frequency at operating frequency at startup and two, five, and ten min.									

4 Test Equipment and Calibration Data

Instrument for AC Conduction

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
EMC Receiver	R&S	ESR3	102052	9KHz ~ 3.6GHz	29/Apr/2017	28/Apr/2018
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832020001	9kHz ~ 30MHz	06/Oct/2017	05/Oct/2018
AC POWER	APC	AFC-11005G	F310050055	47Hz~63Hz 5~300V	NCR	NCR
Impuls Begrenzer Pulse Limiter	SCHWARZBECK	VTSD 9561-F	9561-F041	9 kHz ~ 30 MHz	12/Oct/2017	11/Oct/2018
LISN	R&S	ENV216	101295	9kHz ~ 30MHz	17/Nov/2017	16/Nov/2018

NCR: No Calibration Require.

Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101515	9kHz~40GHz	08/Dec/2017	07/Dec/2018
Loop Antenna	TESEQ	HLA 6120	24155	9 kHz~30 MHz	16/Mar/2016	15/Mar/2018
Temp. and Humidity Chamber	Giant Force	GTH-225-40-CP-AR	MAA1611-005	-40 ~ 100℃	21/Nov/2016	20/Nov/2018

Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	31/Oct/2017	30/Oct/2018
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	19/Apr/2017	18/Apr/2018
Spectrum	R&S	FSV40	101500	9kHz ~ 40GHz	28/Jun/2017	27/Jun/2018
Receiver	R&S	ESR3	102052	9KHz ~ 3.6GHz	29/Apr/2017	28/Apr/2018
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	26/Jan/2017	25/Jan/2018
Bilog Antenna	SCHAFFNER	CBL 6112B	22237	30MHz ~ 1GHz	08/Jul/2017	07/Jul/2018
Loop Antenna	TESEQ	HLA 6120	31244	9 kHz~30 MHz	02/Mar/2017	01/Mar/2018