

# FCC Test Report

**FCC ID** : SWX-UALITE  
**Equipment** : UniFi Access  
**Brand Name** : UBIQUITI  
**Model Name** : UA-Lite  
**Applicant** : Ubiquiti Networks, Inc  
685 Third Avenue, 27th Floor New York,  
New York 10017 USA  
**Manufacturer** : Ubiquiti Networks, Inc  
685 Third Avenue, 27th Floor New York,  
New York 10017 USA  
**Standard** : 47 CFR FCC Part 15.225

The product was received on Feb. 14, 2019, and testing was started from Feb. 15, 2019 and completed on Feb. 19, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, 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 report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of United States government.

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



Approved by: Allen Lin

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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## Appendix A. Test Photos

### Photographs of EUT V01





### Summary of Test Result

Report Clause	Ref. Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	FCC 15.203
3.1	15.207	AC Power-line Conducted Emissions	PASS	FCC 15.207
3.2	15.215(c)	Emission Bandwidth	PASS	Fall in band $F_L \geq 13.553$ MHz $F_H \leq 13.567$ MHz
3.3	15.225(a)~(d)	Field Strength of Fundamental Emissions and Spectrum Mask	PASS	124 dBuV/m at 3m
3.4	15.225(d)	Transmitter Radiated Unwanted Emissions	PASS	FCC 15.209
3.5	15.225(e)	Frequency Stability	PASS	$\pm 0.01\%$ (100ppm)

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and explanations:**

None

Reviewed by: Ben Tseng

Report Producer: Ann Hou



# 1 General Description

## 1.1 Information

### 1.1.1 RF General Information

RF General Information				
Frequency Range	Modulation Mode	Ch. Frequency (MHz)	Channel Number	Field Strength (dBuV/m)
13.553 – 13.567 MHz	ISO 14443-3A (ASK)	13.56	1	58.11
Note 1: Field strength performed peak level at 3m.				

### 1.1.2 Antenna Information

Antenna Category	
<input type="checkbox"/>	Equipment placed on the market without antennas
<input checked="" type="checkbox"/>	Integral antenna (antenna permanently attached)
<input type="checkbox"/>	Temporary RF connector provided
<input checked="" type="checkbox"/>	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.
<input type="checkbox"/>	External antenna (dedicated antennas)

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

1.1.3 EUT Information

Identify EUT	
NFC Chip	Brand Name : NXP / Model Name : PN7150
Operational Condition	
EUT Power Type	From PoE
Type of EUT	
<input checked="" type="checkbox"/>	Stand-alone
<input type="checkbox"/>	Combined (EUT where the radio part is fully integrated within another device) Combined Equipment - Brand Name / Model No.:
<input type="checkbox"/>	Plug-in radio (EUT intended for a variety of host systems) Host System - Brand Name / Model No.:
<input type="checkbox"/>	Other:

1.1.4 Test Signal Duty Cycle

Duty Cycle Operation Restriction	
The transmitter is used for	The transmitter is operated
<input checked="" type="checkbox"/> Inductive applications	<input checked="" type="checkbox"/> Automatically triggered
<input type="checkbox"/> Duty cycle fixed mode	<input checked="" type="checkbox"/> Duty cycle random mode
<input checked="" type="checkbox"/> <b>Duty cycle mode - NFC-A (ISO 14443-3A)</b>	
Declare transmitter duty cycle / 1 hour =	100%
<input checked="" type="checkbox"/> <b>Duty cycle mode - NFC-B (ISO 14443-3B)</b>	
Declare transmitter duty cycle / 1 hour =	100%
<input checked="" type="checkbox"/> <b>Duty cycle mode - NFC-F (ISO 18092)</b>	
Declare transmitter duty cycle / 1 hour =	100%
<input type="checkbox"/> <b>Duty cycle mode - NFC-V (ISO 15693)</b>	
Declare transmitter duty cycle / 1 hour =	100%

## 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			
<input checked="" type="checkbox"/>	HWA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)	
		TEL : 886-3-327-3456	FAX : 886-3-327-0973
Test site Designation No. TW1190 with FCC.			

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
AC Conduction	CO04-HY	Daniel	22.9~23.8°C / 53.7~55.0%	15/Feb/2019
RF Conducted	TH01-HY	Gary	23.1~23.9°C / 63~65%	19/Feb/2019
Radiated Emission	03CH02-HY	Andy	22.5~23.2°C / 52.6~53.4%	15/Feb/2019

## 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)	3.54 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	1.6 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 Test Condition

Condition Item	Abbreviation/Remark	Remark
Frequency Stability	Tnom	20°C
-	Tmin	-20°C
-	Tmax	50°C
-	Vnom	48V
-	Vmin	43.2V
-	Vmax	52.8V

### 2.2 The Worst Case Modulation Configuration

Modulation Used for Conformance Testing	
Modulation Mode	Field Strength (dBuV/m at 3 m)
NFC	58.11

### 2.3 Test Channel Frequencies Configuration


Modulation Mode	Test Channel Frequencies (MHz)
NFC	13.56



## 2.4 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	<input checked="" type="checkbox"/> 1. PoE 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
Pretest Mode	<input checked="" type="checkbox"/> 1. NFC-A (ISO 14443-3A)
	<input checked="" type="checkbox"/> 2. NFC-B (ISO 14443-3B)
	<input checked="" type="checkbox"/> 3. NFC-F (ISO 18092)
	<input type="checkbox"/> 4. NFC-V (ISO 15693)
Mode 1 configuration was pretested and found to be the worst case and measured during the test.	
Operating Mode	<input checked="" type="checkbox"/> 1. PoE mode
Orthogonal Planes of EUT	<b>Y Plane</b>
	
Worst Planes of EUT	V

## 2.5 Support Equipment

Support Equipment - AC Conduction			
No.	Equipment	Brand Name	Model Name
1	PoE 1	UBNT	UA-Hub
2	PoE 2	UBNT	US-48-PRO

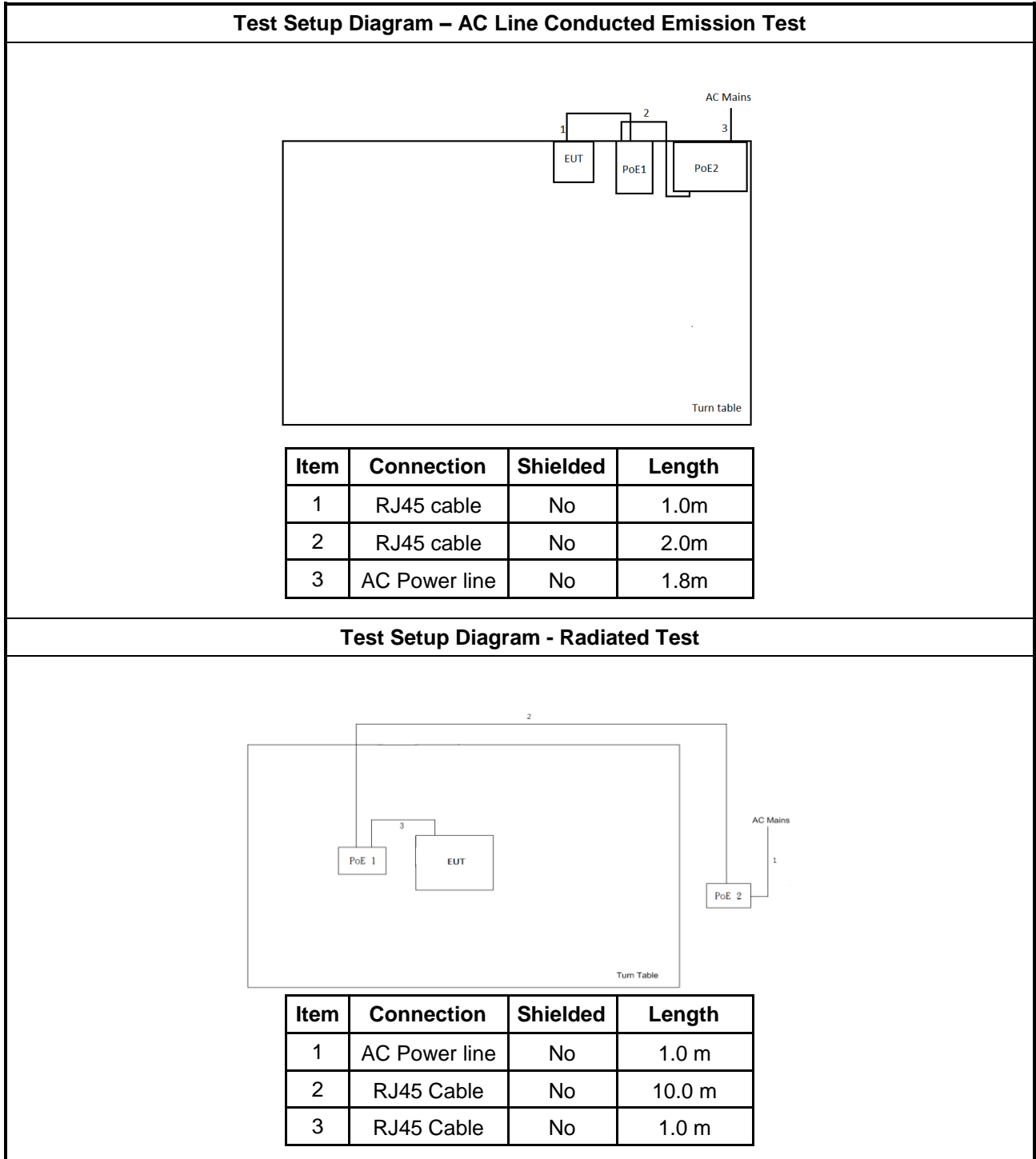
Note: Support equipment No.1, No.2 was provided by customer.

Support Equipment - RF Conducted			
No.	Equipment	Brand Name	Model Name
1	Notebook	DELL	E5410
2	Adapter for Notebook	DELL	HA65NM130
3	NFC Card	-	-

Support Equipment - Radiated			
No.	Equipment	Brand Name	Model Name
1	PoE 1	UBNT	UA-Hub
2	PoE 2	UBNT	US-48-PRO

Note: Support equipment No.1, No.2 was provided by customer.

## 2.6 Test Setup Diagram



### 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.

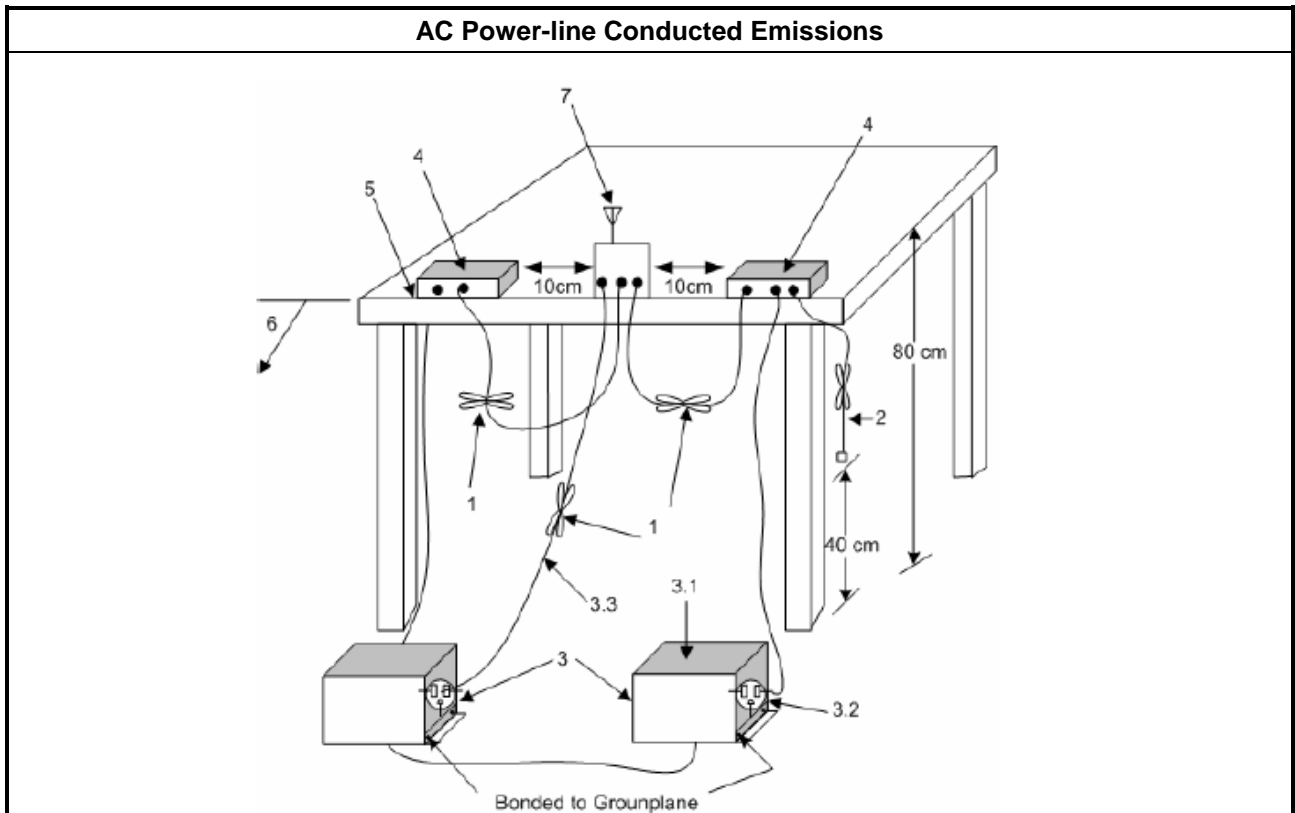
##### 3.1.2 Measuring Instruments

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

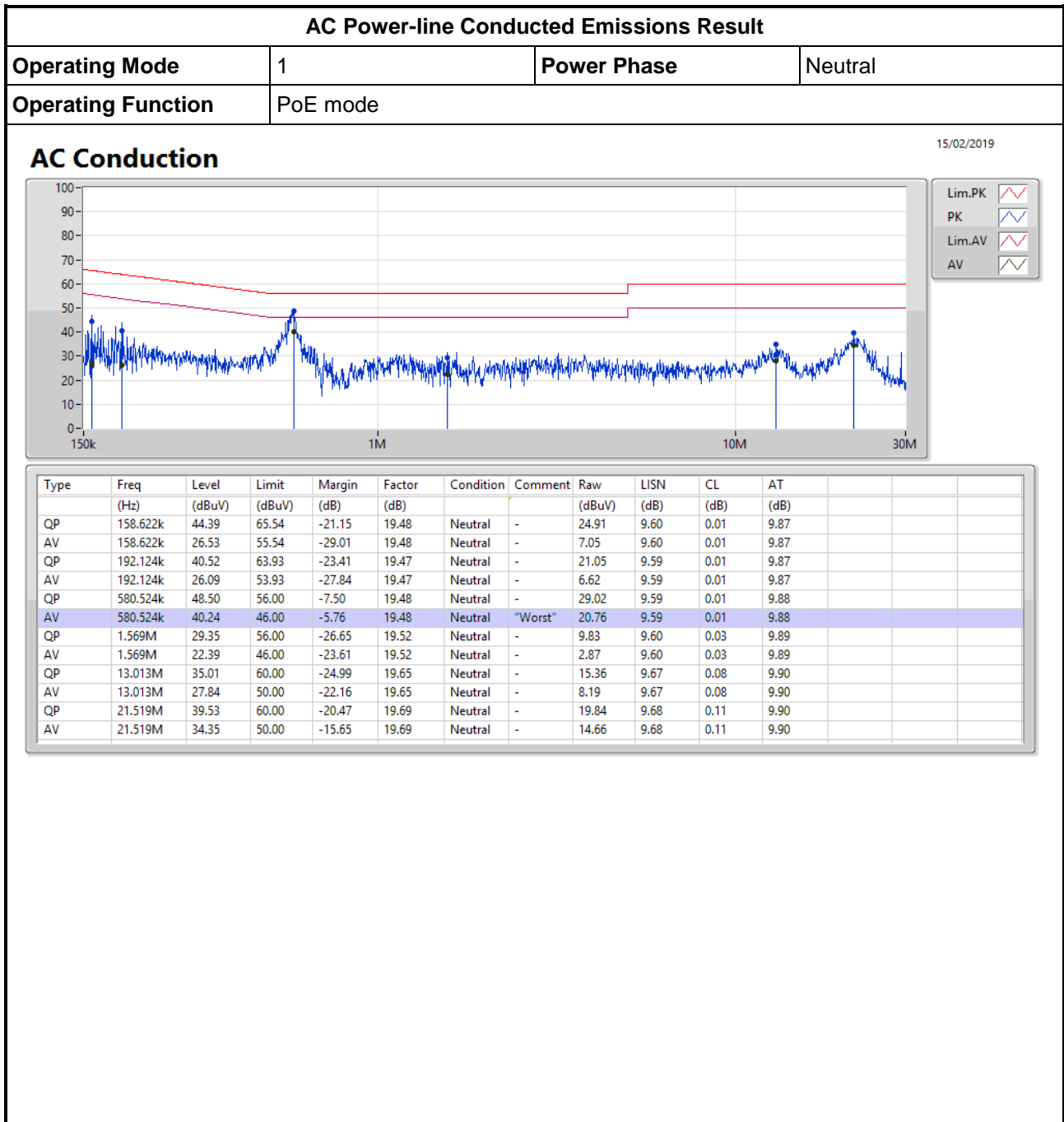
##### 3.1.3 Test Procedures

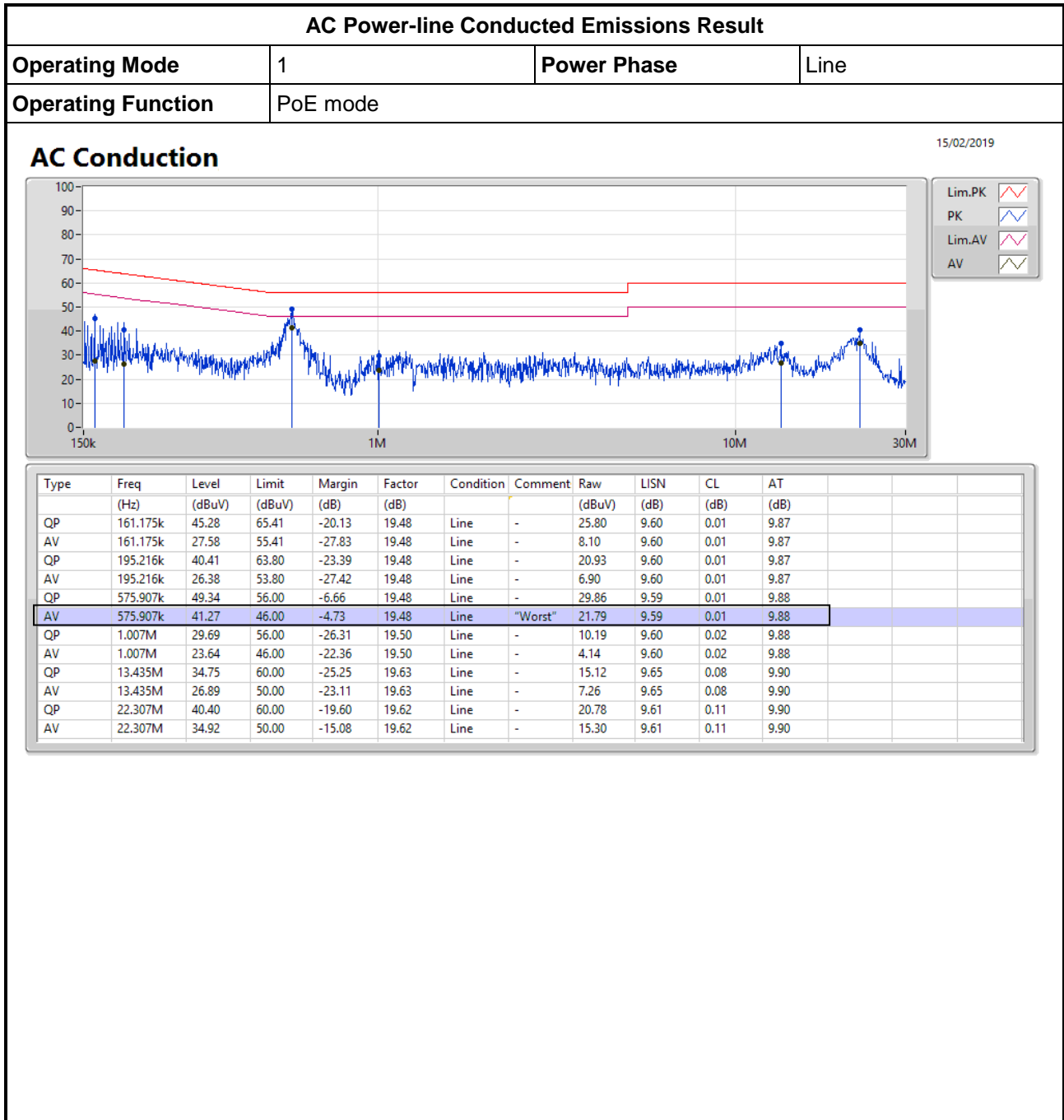
Test Method	
<input checked="" type="checkbox"/>	Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.
<input checked="" type="checkbox"/>	If AC conducted emissions fall in operating band, then following below test method confirm final result.
<input type="checkbox"/>	Accept measurements 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.
<input checked="" type="checkbox"/>	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





### 3.2 Emission Bandwidth

#### 3.2.1 Emission Bandwidth Limit

20dB Bandwidth Limit	
<input checked="" type="checkbox"/>	Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band (13.553 – 13.567 MHz).

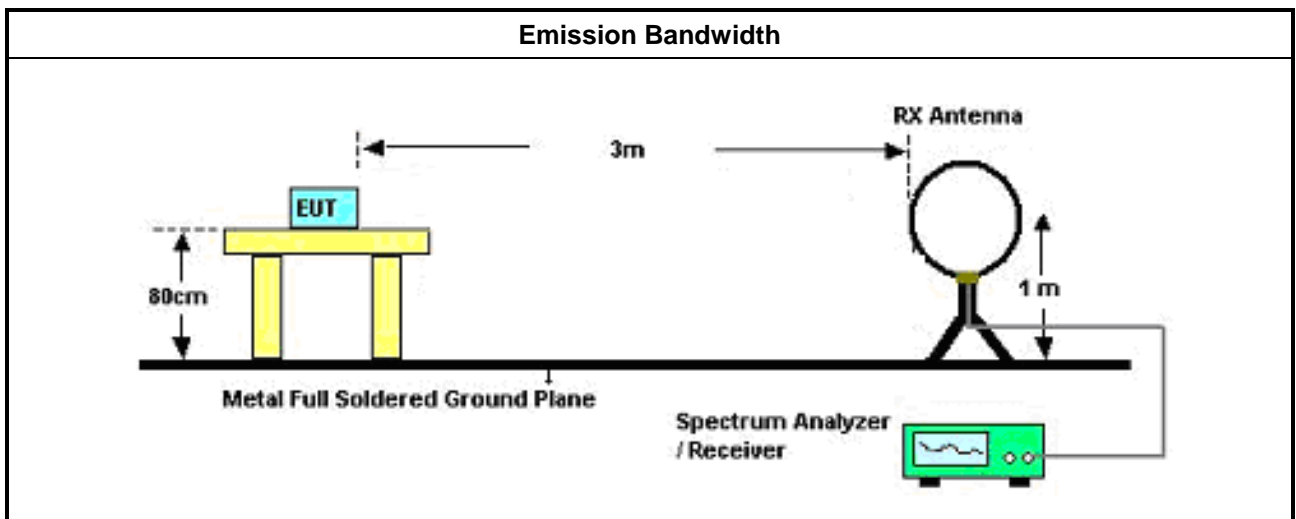
#### 3.2.2 Measuring Instruments

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

#### 3.2.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	For the emission bandwidth refer ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.
<input checked="" type="checkbox"/>	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.

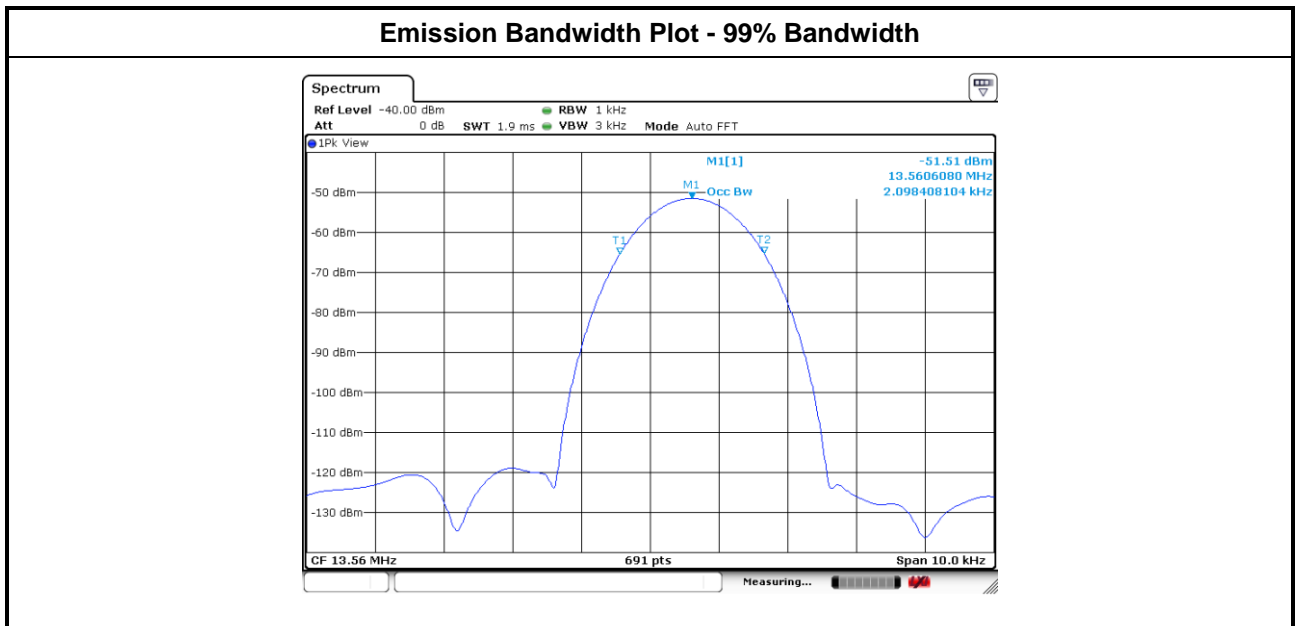
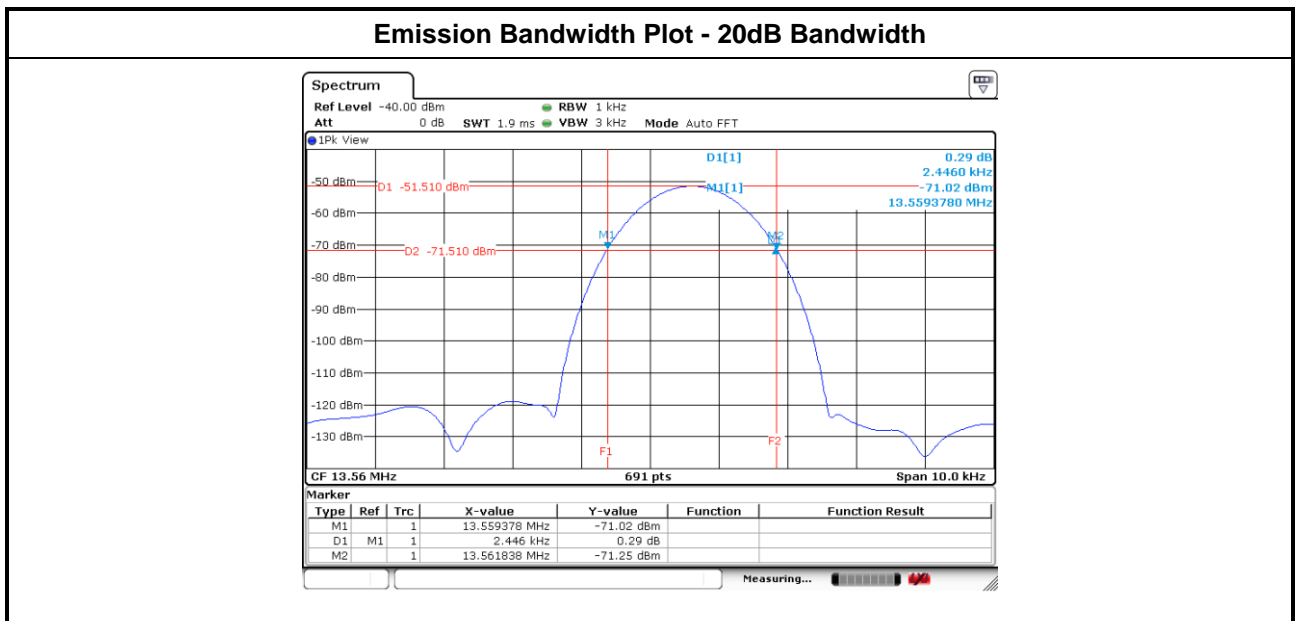
#### 3.2.4 Test Setup





### 3.2.5 Test Result of Emission Bandwidth

Occupied Channel Bandwidth Result					
Modulation Mode	Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)	F <sub>L</sub> at 20dB BW (MHz)	F <sub>H</sub> at 20dB BW (MHz)
NFC	13.56	2.44600	2.09841	13.55938	13.56184
<b>Limit</b>		<b>N/A</b>	<b>N/A</b>	<b>13.553</b>	<b>13.567</b>
<b>Result</b>		<b>Complied</b>			



### 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

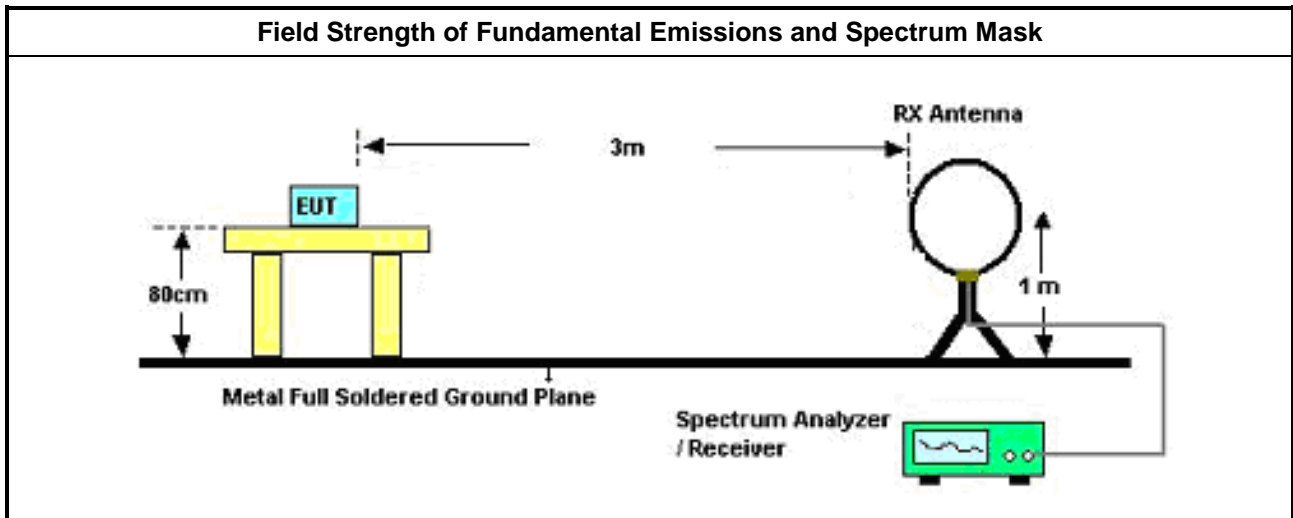
#### 3.3.2 Measuring Instruments

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

#### 3.3.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz and test distance is 3m.
<input checked="" type="checkbox"/>	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.
<input type="checkbox"/>	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.
<input checked="" type="checkbox"/>	The results shall be by using the square of an inverse linear distance extrapolation factor (40 dB/decade).
<input checked="" type="checkbox"/>	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.

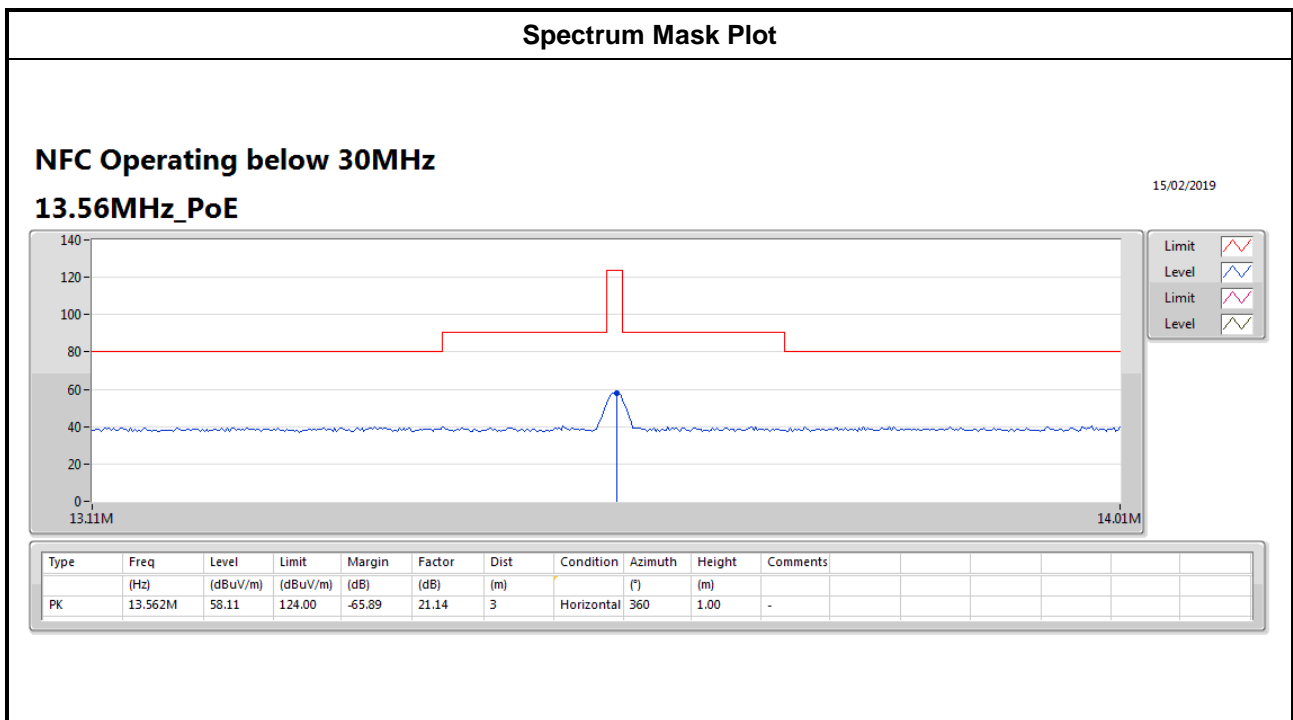
### 3.3.4 Test Setup



### 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	58.11	H	65.89	124.00
<b>Result</b>		<b>Complied</b>			

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.

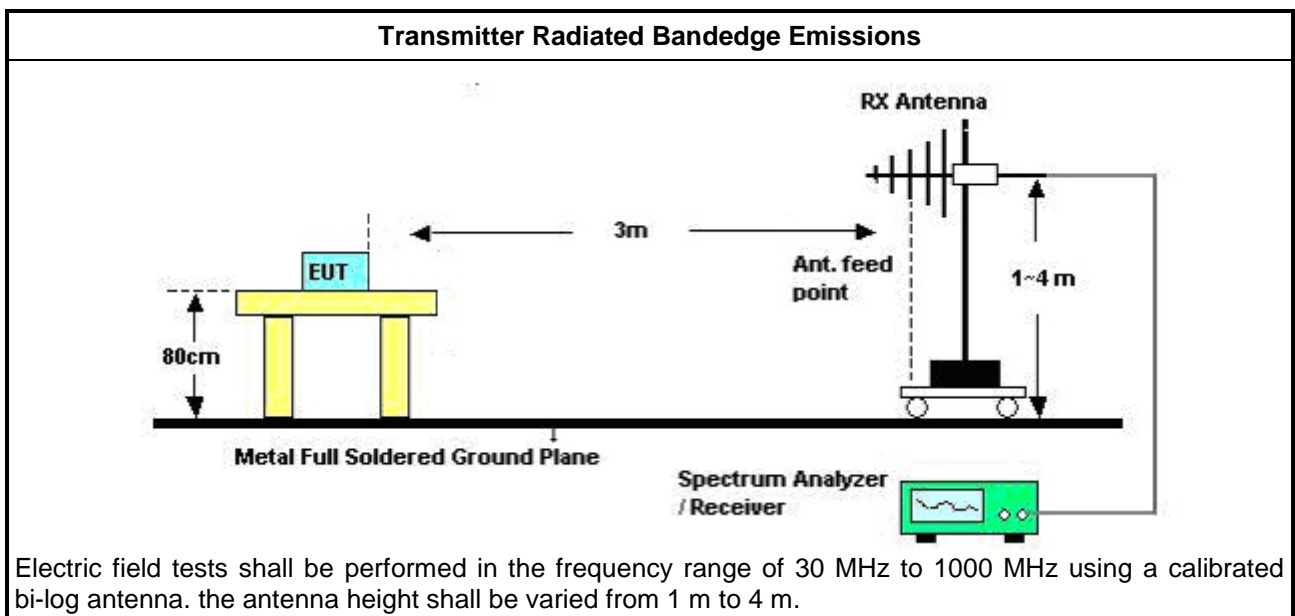
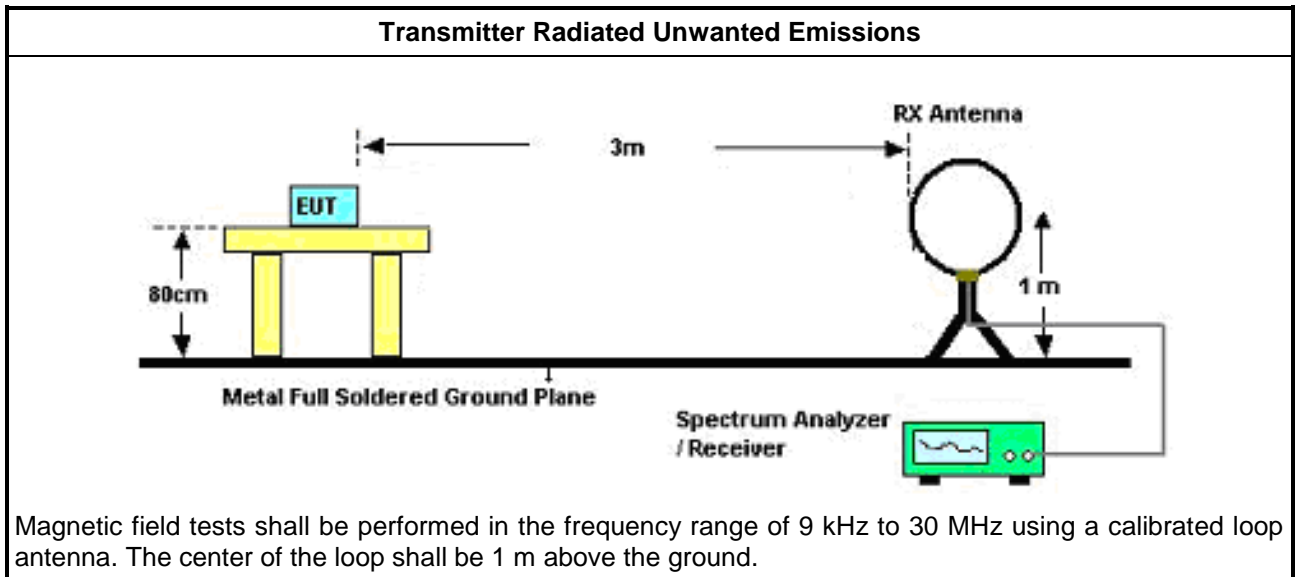
#### 3.4.2 Measuring Instruments

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

### 3.4.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1 GHz and test distance is 3m.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz and test distance is 3m.
<input checked="" type="checkbox"/>	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.
<input type="checkbox"/>	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.
<input checked="" type="checkbox"/>	The results shall be by using the square of an inverse linear distance extrapolation factor (40 dB/decade).
<input checked="" type="checkbox"/>	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.
<input checked="" type="checkbox"/>	The any unwanted emissions level shall not exceed the fundamental emission level.
<input checked="" type="checkbox"/>	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





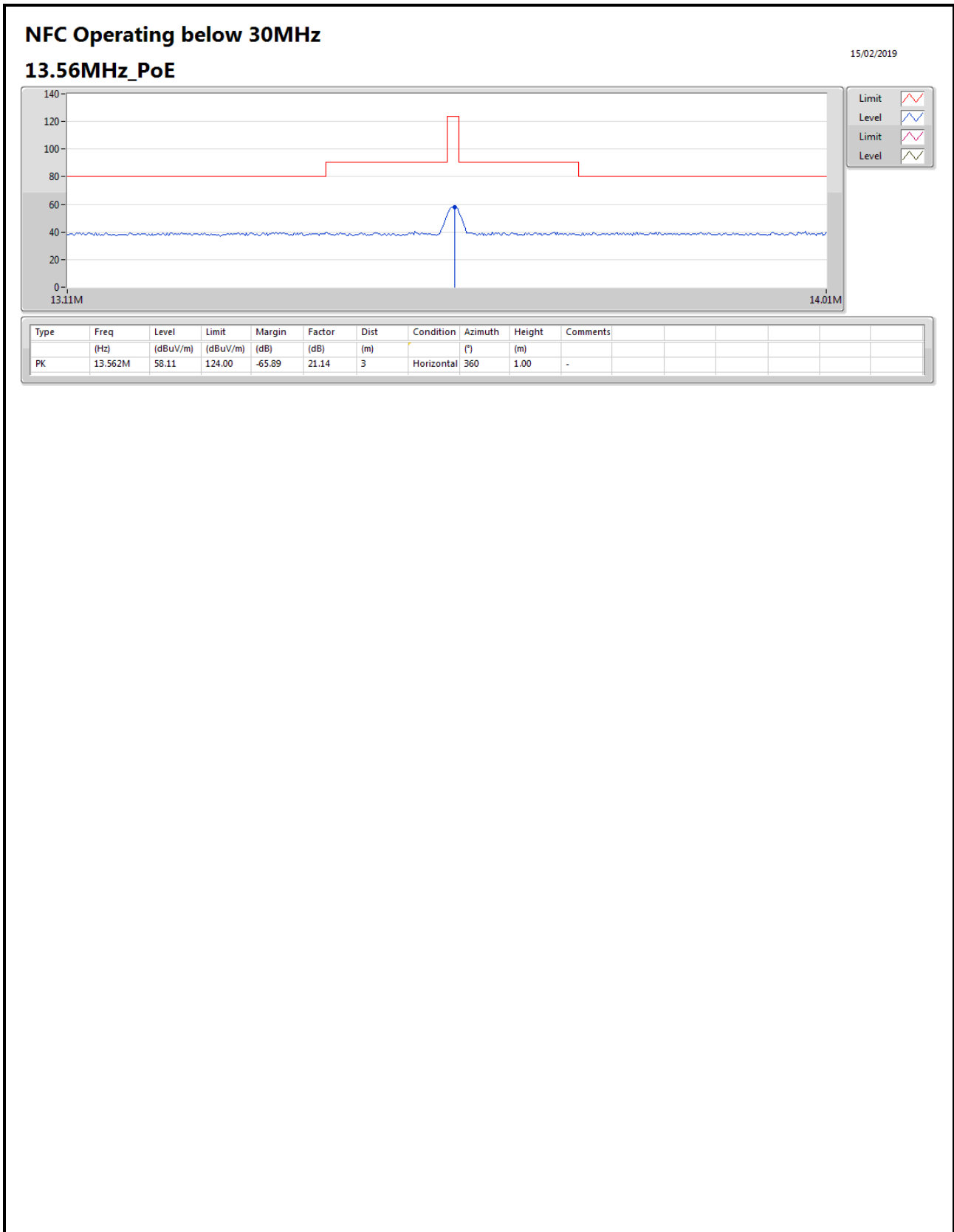
### 3.4.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

#### Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Azimuth (°)	Height (m)	Comments
13.553-13.567MHz	-	-	-	-	-	-	-	-	-	-	-
NFC	Pass	PK	1.643M	46.88	63.32	-16.44	17.36	3	360	1.00	-

#### Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Azimuth (°)	Height (m)	Comments
NFC	-	-	-	-	-	-	-	-	-	-	-
13.56MHz_PoE	Pass	PK	13.562M	58.11	124.00	-65.89	21.14	3	360	1.00	-
13.56MHz_PoE	Pass	PK	9.846k	60.94	127.72	-66.78	12.30	3	0	1.00	-
13.56MHz_PoE	Pass	PK	30.15k	55.26	118.01	-62.75	13.86	3	0	1.00	-
13.56MHz_PoE	Pass	PK	50.172k	44.24	113.59	-69.35	13.59	3	0	1.00	-
13.56MHz_PoE	Pass	PK	388.8k	54.86	95.80	-40.94	15.36	3	360	1.00	-
13.56MHz_PoE	Pass	PK	1.165M	46.81	66.31	-19.50	17.01	3	360	1.00	-
13.56MHz_PoE	Pass	PK	1.643M	46.88	63.32	-16.44	17.36	3	360	1.00	-



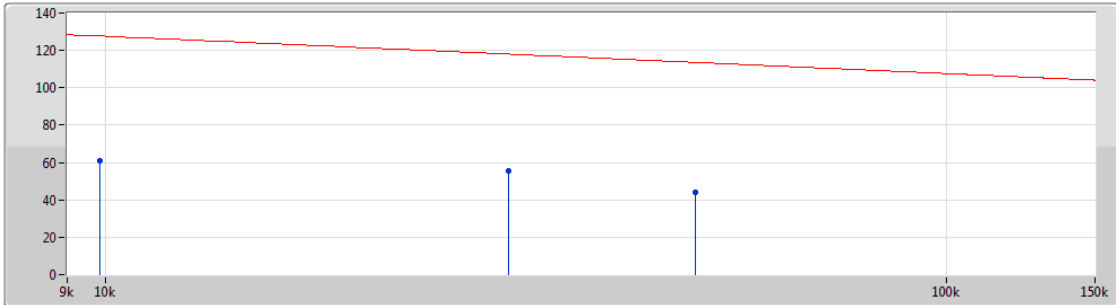




NFC Operating below 30MHz

15/02/2019

13.56MHz\_PoE



Legend for the graph:

- Limit (Red line)
- Level (Blue line)
- Limit (Red line)
- Level (Blue line)

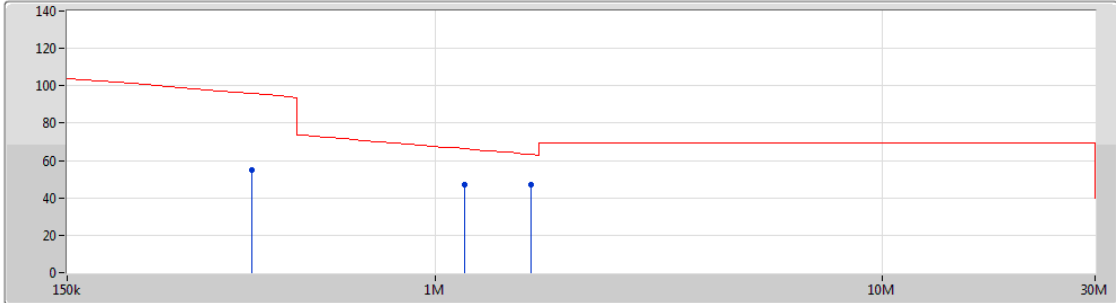
Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
PK	9.846k	60.94	127.72	-66.78	12.30	3	Horizontal	0	1.00	-
PK	30.15k	55.26	118.01	-62.75	13.86	3	Horizontal	0	1.00	-
PK	50.172k	44.24	113.59	-69.35	13.59	3	Horizontal	0	1.00	-



NFC Operating below 30MHz

15/02/2019

13.56MHz\_PoE



Limit

Level

Limit

Level

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
PK	388.8k	54.86	95.80	-40.94	15.36	3	Horizontal	360	1.00	-
PK	1.165M	46.81	66.31	-19.50	17.01	3	Horizontal	360	1.00	-
PK	1.643M	46.88	63.32	-16.44	17.36	3	Horizontal	360	1.00	-



### 3.4.6 Transmitter Radiated Unwanted Emissions (Above 30MHz)

#### Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Azimuth (°)	Height (m)	Comments
13.553-13.567MHz	-	-	-	-	-	-	-	-	-	-	-
NFC	Pass	PK	142.52M	39.24	43.50	-4.26	-9.80	3	360	1.00	-

#### Result

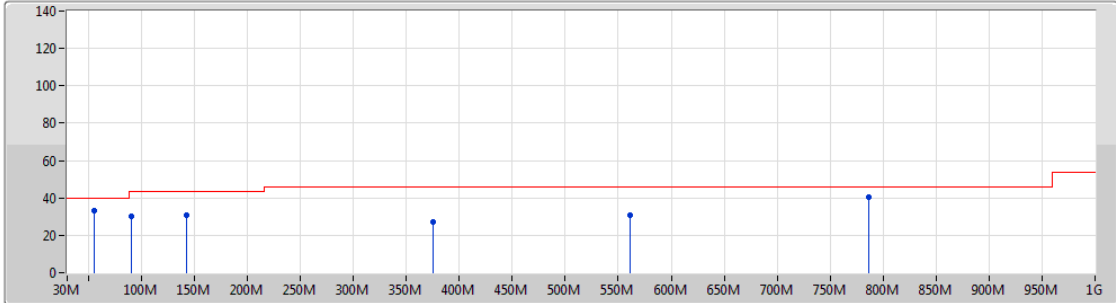
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Azimuth (°)	Height (m)	Comments
NFC	-	-	-	-	-	-	-	-	-	-	-
13.56MHz_PoE	Pass	PK	55.22M	33.11	40.00	-6.89	-15.09	3	0	1.00	-
13.56MHz_PoE	Pass	PK	90.14M	30.10	43.50	-13.40	-12.55	3	0	1.00	-
13.56MHz_PoE	Pass	PK	142.52M	30.68	43.50	-12.82	-9.80	3	0	1.00	-
13.56MHz_PoE	Pass	PK	375.32M	27.23	46.00	-18.77	-4.48	3	0	1.00	-
13.56MHz_PoE	Pass	PK	561.56M	30.72	46.00	-15.28	-0.94	3	0	1.00	-
13.56MHz_PoE	Pass	PK	786.6M	40.65	46.00	-5.35	1.20	3	0	1.00	-
13.56MHz_PoE	Pass	PK	39.7M	34.18	40.00	-5.82	-9.61	3	360	1.00	-
13.56MHz_PoE	Pass	PK	142.52M	39.24	43.50	-4.26	-9.80	3	360	1.00	-
13.56MHz_PoE	Pass	PK	264.74M	32.85	46.00	-13.15	-5.91	3	360	1.00	-
13.56MHz_PoE	Pass	PK	375.32M	35.26	46.00	-10.74	-4.48	3	360	1.00	-
13.56MHz_PoE	Pass	PK	829.28M	39.60	46.00	-6.40	1.57	3	360	1.00	-
13.56MHz_PoE	Pass	QP	784.66M	40.51	46.00	-5.49	1.19	3	123	1.02	-



NFC Operating above 30MHz

15/02/2019

13.56MHz\_PoE



Legend:

- Limit (Red line)
- Level (Blue line)
- Limit (Red line)
- Level (Blue line)

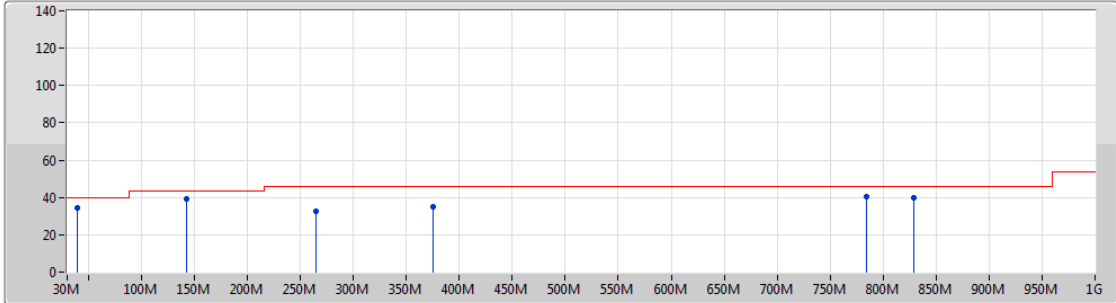
Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
PK	55.22M	33.11	40.00	-6.89	-15.09	3	Vertical	0	1.00	-
PK	90.14M	30.10	43.50	-13.40	-12.55	3	Vertical	0	1.00	-
PK	142.52M	30.68	43.50	-12.82	-9.80	3	Vertical	0	1.00	-
PK	375.32M	27.23	46.00	-18.77	-4.48	3	Vertical	0	1.00	-
PK	561.56M	30.72	46.00	-15.28	-0.94	3	Vertical	0	1.00	-
PK	786.6M	40.65	46.00	-5.35	1.20	3	Vertical	0	1.00	-



NFC Operating above 30MHz

15/02/2019

13.56MHz\_PoE



Legend for the spectrum plot:

- Limit: [Red line icon]
- Level: [Blue line icon]
- Limit: [Red line icon]
- Level: [Blue line icon]

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
PK	39.7M	34.18	40.00	-5.82	-9.61	3	Horizontal	360	1.00	-
PK	142.52M	39.24	43.50	-4.26	-9.80	3	Horizontal	360	1.00	-
PK	264.74M	32.85	46.00	-13.15	-5.91	3	Horizontal	360	1.00	-
PK	375.32M	35.26	46.00	-10.74	-4.48	3	Horizontal	360	1.00	-
PK	829.28M	39.60	46.00	-6.40	1.57	3	Horizontal	360	1.00	-
QP	784.66M	40.51	46.00	-5.49	1.19	3	Horizontal	123	1.02	-

### 3.5 Frequency Stability

#### 3.5.1 Frequency Stability Limit

Frequency Stability Limit	
<input checked="" type="checkbox"/>	Carrier frequency stability shall be maintained to $\pm 0.01\%$ ( $\pm 100$ ppm).

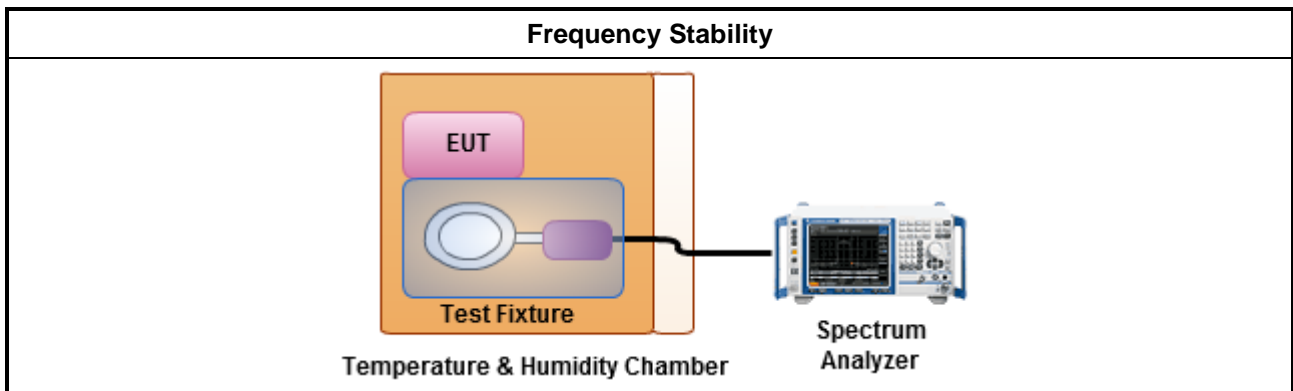
#### 3.5.2 Measuring Instruments

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

#### 3.5.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.8 for frequency stability tests
<input checked="" type="checkbox"/>	Frequency stability with respect to ambient temperature
<input checked="" type="checkbox"/>	Frequency stability when varying supply voltage
<input type="checkbox"/>	For conducted measurement.
<input checked="" type="checkbox"/>	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 <sub>20°C</sub> V <sub>max</sub>	13.56	13.56058	13.56058	13.56058	13.56058	42.85	42.77	42.77	42.77
T <sub>20°C</sub> V <sub>min</sub>	13.56	13.56058	13.56058	13.56058	13.56058	42.85	42.85	42.77	42.77
T <sub>50°C</sub> V <sub>nom</sub>	13.56	13.56057	13.56057	13.56057	13.56057	41.81	41.89	41.81	41.89
T <sub>40°C</sub> V <sub>nom</sub>	13.56	13.56058	13.56059	13.56058	13.56058	43.07	43.14	43.07	43.07
T <sub>30°C</sub> V <sub>nom</sub>	13.56	13.56061	13.56061	13.56060	13.56060	44.62	44.62	44.54	44.54
T <sub>20°C</sub> V <sub>nom</sub>	13.56	13.56062	13.56062	13.56062	13.56062	45.87	45.87	45.80	45.87
T <sub>10°C</sub> V <sub>nom</sub>	13.56	13.56058	13.56058	13.56058	13.56058	42.85	42.85	42.85	42.77
T <sub>0°C</sub> V <sub>nom</sub>	13.56	13.56065	13.56065	13.56065	13.56065	48.01	48.01	48.01	47.94
T <sub>-10°C</sub> V <sub>nom</sub>	13.56	13.56065	13.56065	13.56066	13.56065	48.23	48.23	48.30	48.23
T <sub>-20°C</sub> V <sub>nom</sub>	13.56	13.56065	13.56065	13.56065	13.56065	48.23	48.23	48.23	48.23
<b>Limit (ppm)</b>		-				100			
<b>Result</b>		Complied							
<p>Note 1: Measure at 85 % [V<sub>min</sub>] and 115 % [V<sub>max</sub>] of the nominal voltage [V<sub>nom</sub>]. The nominal voltage refer test report clause 2.1 for EUT operational condition.</p> <p>Note 2: Measure maximum deviation frequency at operating frequency at startup and two, five, and ten min.</p>									

## 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	ESR	102051	9KHz ~ 3.6GHz	03/May/2018	02/May/2019
LISN	R&S	ENV216	101295	9kHz ~ 30MHz	08/Nov/2018	07/Nov/2019
RF Cable-CON	MTJ	RG142	CB002-CO	9kHz ~ 200MHz	17/Sep/2018	16/Sep/2019
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/2018	11/Oct/2019

### Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101500	10Hz~40GHz	18/Jul/2018	17/Jul/2019
Temp. and Humidity Chamber	Giant Force	GTH-225-20-SP-SD	MAA1112-007	-20 ~ 100°C	22/May/2018	21/May/2019
Loop Antenna	TESEQ	HLA 6120	31244	9kHz ~ 30MHz	28/Mar/2018	27/Mar/2019

### Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	19/Oct/2018	18/Oct/2019
Amplifier	Agilent	8447D	2944A11149	100kHz ~ 1.3GHz	27Jul/2018	02/Jul/2019
Spectrum Analyzer	R&S	FSV40	101500	10Hz ~ 40GHz	18/Jul/2018	17/Jul/2019
RF Cable-R03m	Jye Bao	RG142	CB017	9kHz ~ 1GHz	18/Jan/2019	17/Jan/2020
Bilog Antenna & 5dB Attenuator	SCHAFFNER / MTJ	CBL 6112B / MTJ6102-05	2723 / 2	30MHz ~ 1GHz	08/Sep/2018	07/Sep/2019
EMI Test Receiver	R&S	ESR3	102052	9kHz ~ 3.6GHz	10/Apr/2018	09/Apr/2019
Loop Antenna	TESEQ	HLA 6120	31244	9k-30MHz	29/Mar/2018	28/Mar/2019