

FCC Test Report

FCC ID : XHM-MP82F22
Equipment : Mobile PC
Brand Name : TOUCH DYNAMIC
Model Name : Quest VIII
Applicant/
Manufacturer : FLYTECH TECHNOLOGY CO., Ltd.
No. 168, Sing-Ai Rd., Neihu District 11494, Taipei City,
Taiwan
Standard : 47 CFR FCC Part 15.225

The product was received on Jun. 01, 2020, and testing was started from Jun. 02, 2020 and completed on Jun. 02, 2020. 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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History of this test report

[illegible]

Summary of Test Result

Report Clause	Ref. Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.215(c)	Emission Bandwidth	PASS	-
3.3	15.225(a)~(d)	Field Strength of Fundamental Emissions and Spectrum Mask	PASS	-
3.4	15.225(d)	Transmitter Radiated Unwanted Emissions	PASS	-
3.5	15.225(e)	Frequency Stability	PASS	-

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: Sam Tsai

Report Producer: Yunha Liou

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	NFC-F (ISO 18092)	13.56	1	60.45
Note 1: Field strength performed peak level at 3m.				

1.1.2 Antenna Information

Antenna Category	
☐	Equipment placed on the market without antennas
☒	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.	Brand	Model	Ant. Cat.	Ant. Type
1	Smart Approach	SM-MSN35-C01	Integral	Loop

1.1.3 EUT Information

Operational Condition	
EUT Power Type	From AC Adapter
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 mode - NFC-B (ISO 14443-3B)	
Declare transmitter duty cycle / 1 hour =	100%
☒ Duty cycle mode - NFC-F (ISO 18092)	
Declare transmitter duty cycle / 1 hour =	100%
☒ Duty cycle mode - NFC-V (ISO 15693)	
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

The following reference test guidance is not within the scope of accreditation of TAF:

- ♦ KDB 414788 D01 v01r01

1.3 Testing Location Information

Testing Location			
☒	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	Edward	21.4~23.5°C / 59~65%	02/Jun/2020
RF Conducted	TH01-HY	Barry	23.5~24.8°C / 59~66%	02/Jun/2020
Radiated Emission	03CH02-HY	Daniel	20.9~26.1°C / 52~61%	02/Jun/2020

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)	0.9 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	2.4 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.7 dB	Confidence levels of 95%
Conducted Emission	1.0 dB	Confidence levels of 95%
Temperature	0.41 °C	Confidence levels of 95%
Humidity	3.4 %	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	110V
-	Vmin	93.5V
-	Vmax	126.5V

2.2 The Worst Case Configuration

Modulation Used for Conformance Testing		
Mode	Test Channel Frequencies (MHz)	Field Strength (dBuV/m at 3 m)
NFC	13.56	60.45

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
Operating Mode	CTX
	☒ 1. 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		
Pretest Mode	☒ 1. NFC-A (ISO 14443-3A)		
	☒ 2. NFC-B (ISO 14443-3B)		
	☒ 3. NFC-F (ISO 18092)		
	☒ 4. NFC-V (ISO 15693)		
Mode 3 configuration was pretested and found to be the worst case and measured during the test.			
Operating Mode	CTX		
	☒ 1. Adapter Mode		
Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane
			
Worst Planes of EUT		V	

2.4 Accessories

Accessories Information				
AC Adapter	Brand Name	Asian Power Devices	Model Name	WA-36A12R
	Power Rating	I/P: 100 - 240Vac, 0.9 A, O/P: 12 Vdc, 3 A		
	Power Cord	1.8 meter, Non-Shielded cable, w/o ferrite core		
Battery 1	Brand Name	SMP	Model Name	BA750000
	Power Rating	3.85Vdc, 7454 mAh, 28.69 Wh	Type	Li-ion
Battery 2	Brand Name	Formosa	Model Name	HL502430
	Power Rating	3.7 Vdc, 300mAh, 1.11 Wh	Type	Li-ion
LCD Panel	Brand Name	Interchangeable	Model Name	Interchangeable
MSR	Brand Name	Flytech	Model Name	P-2M301
Mini Smart Card2	Brand Name	Flytech	Model Name	P-2M302
VP3300	Brand Name	Flytech	Model Name	P-2M303
Augusta	Brand Name	Flytech	Model Name	P-2M305

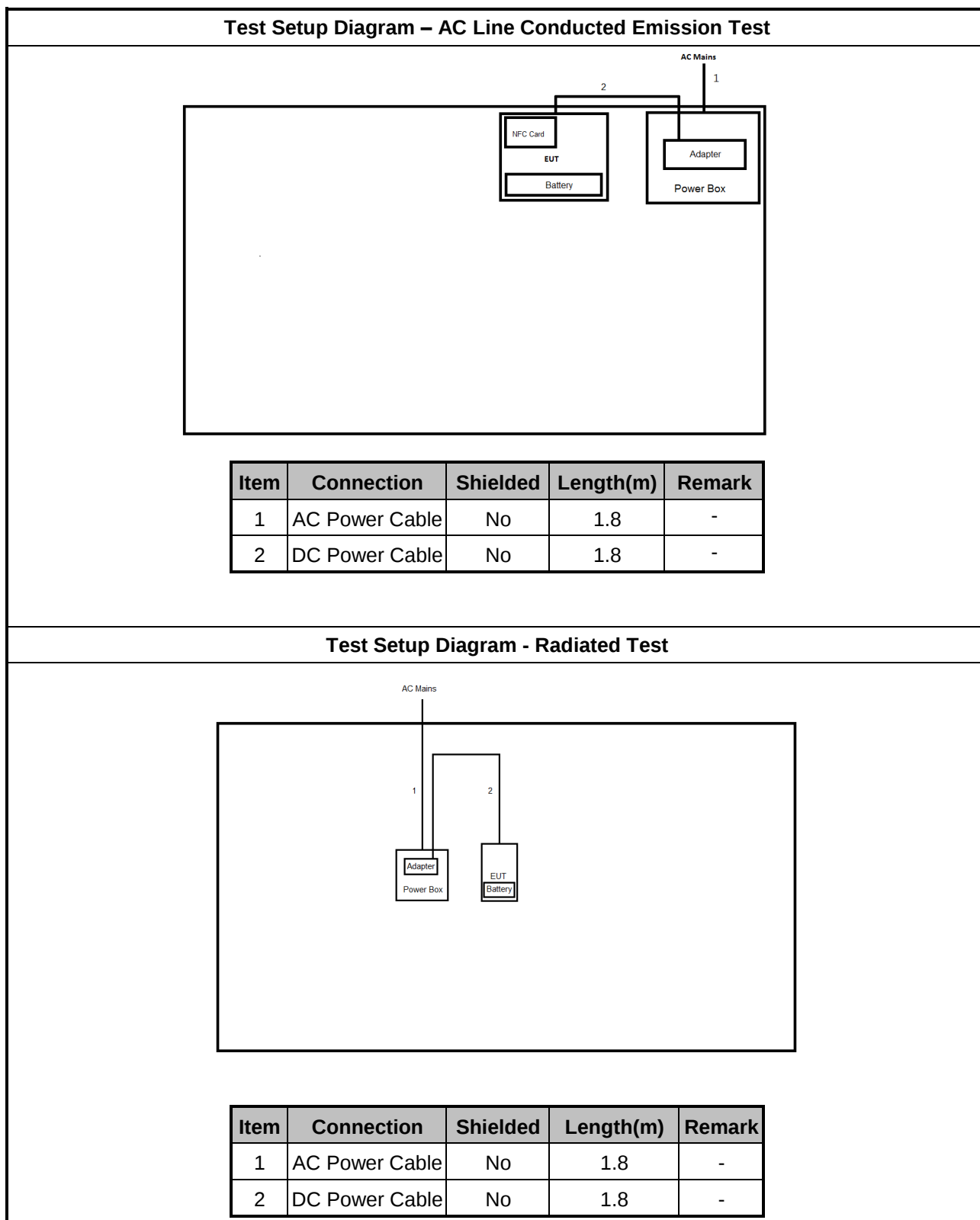
Reminder: Regarding to more detail and other information, please refer to user manual.

2.5 Support Equipment

Support Equipment - AC Conduction / Radiated			
No.	Equipment	Brand Name	Model Name
1	NFC Card	SPORTON	SPORTON

Support Equipment - RF Conducted			
No.	Equipment	Brand Name	Model Name
1	AC Power Source	GW	APS-9102
2	NFC Card	-	-

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.		

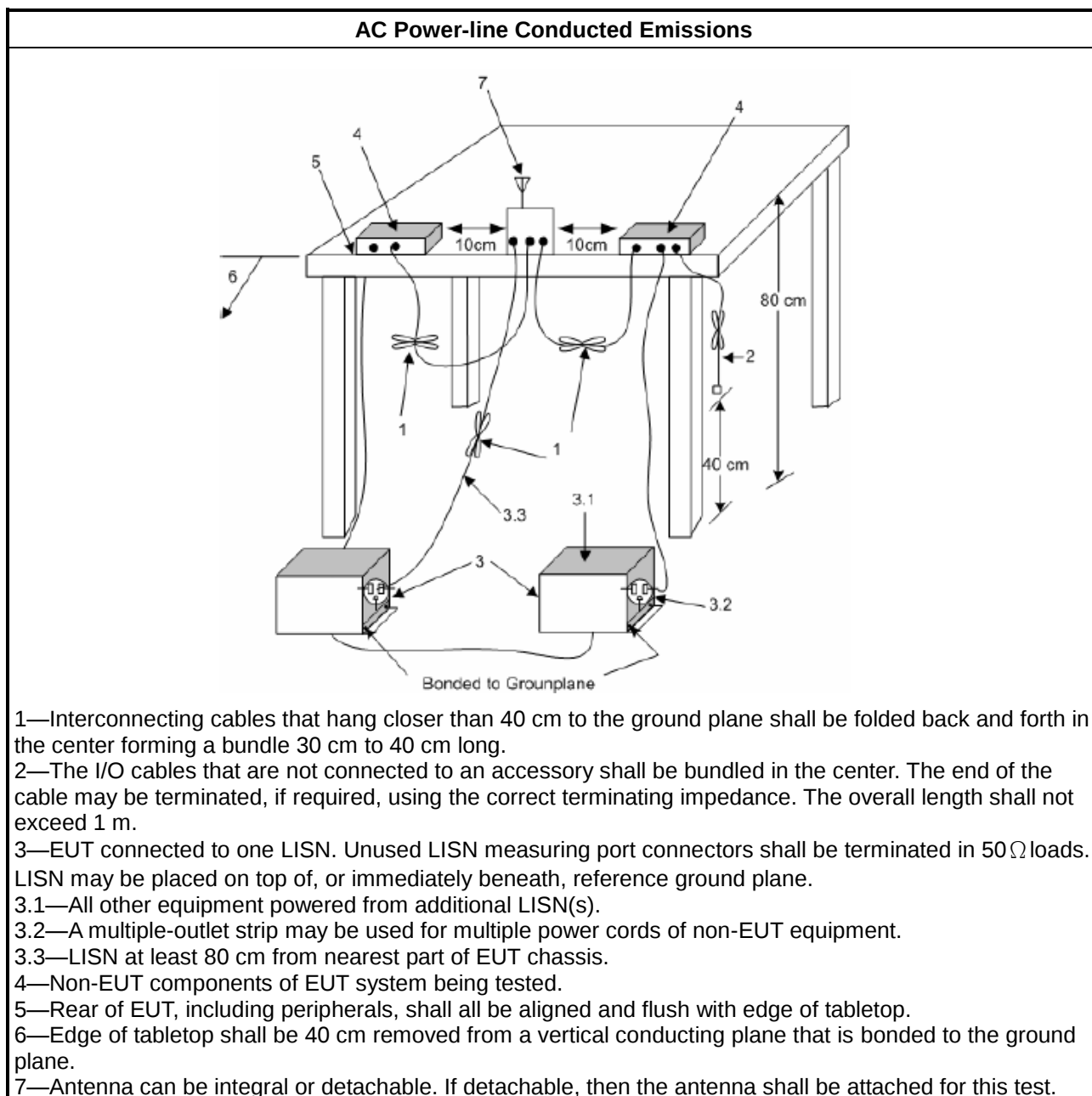
3.1.2 Measuring Instruments

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

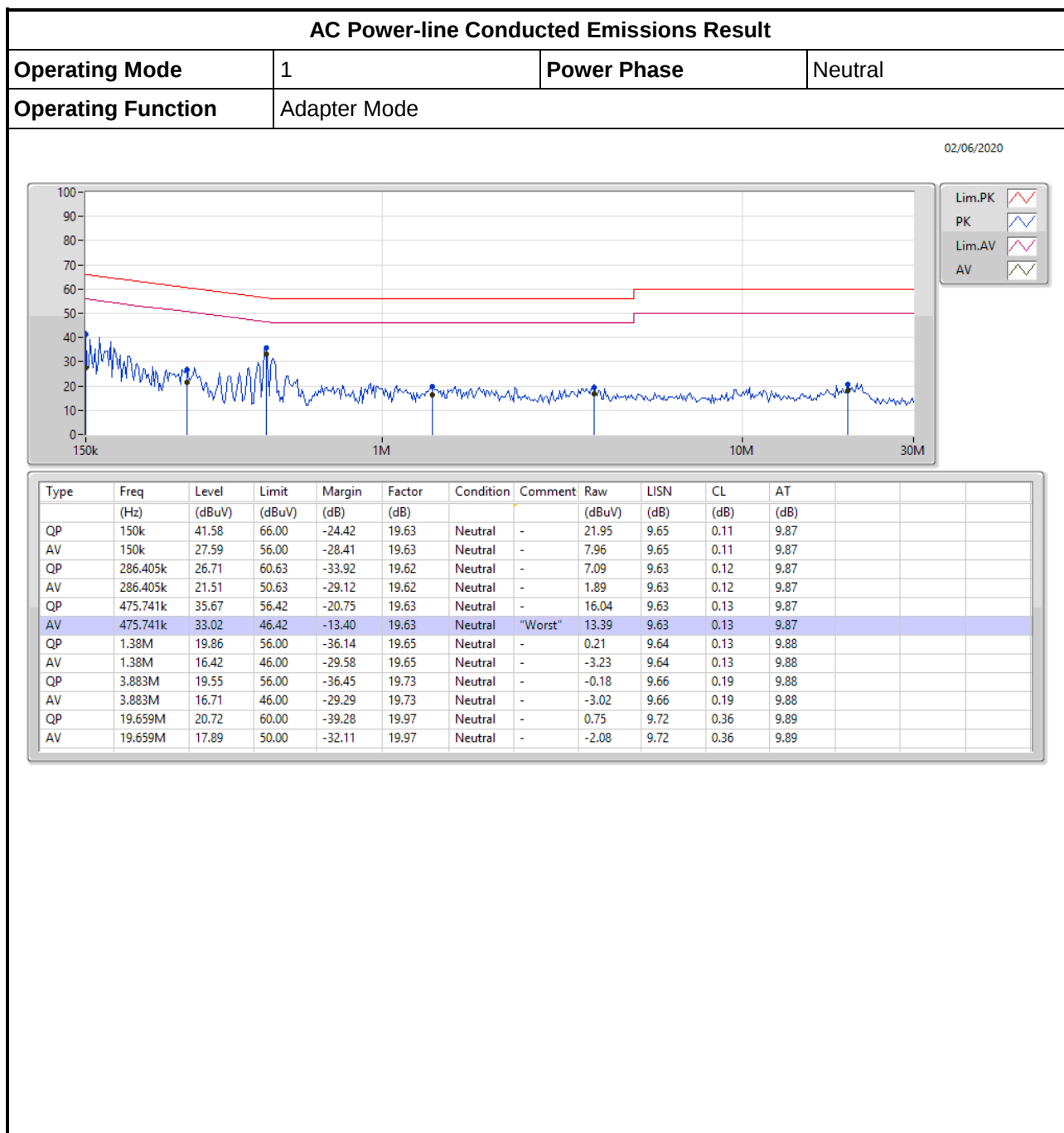
3.1.3 Test Procedures

Test Method	
☒	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



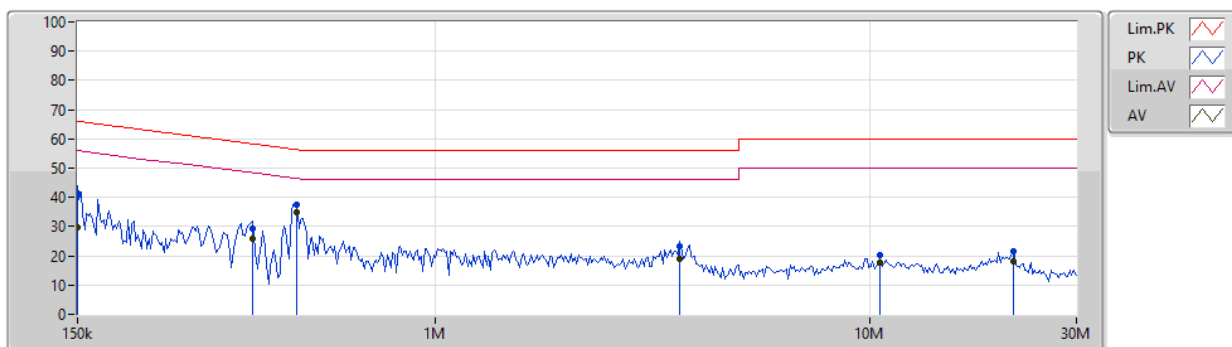
3.1.5 Test Result of AC Power-line Conducted Emissions



AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Line
Operating Function	Adapter Mode		

02/06/2020



Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition	Comment	Raw (dBuV)	LISN (dB)	CL (dB)	AT (dB)			
QP	150k	41.47	66.00	-24.53	19.64	Line	-	21.83	9.66	0.11	9.87			
AV	150k	29.76	56.00	-26.24	19.64	Line	-	10.12	9.66	0.11	9.87			
QP	378.424k	29.47	58.31	-28.84	19.63	Line	-	9.84	9.64	0.12	9.87			
AV	378.424k	25.99	48.31	-22.32	19.63	Line	-	6.36	9.64	0.12	9.87			
QP	480.498k	37.53	56.33	-18.80	19.64	Line	-	17.89	9.64	0.13	9.87			
AV	480.498k	35.00	46.33	-11.33	19.64	Line	"Worst"	15.36	9.64	0.13	9.87			
QP	3.658M	23.33	56.00	-32.67	19.72	Line	-	3.61	9.66	0.18	9.88			
AV	3.658M	19.06	46.00	-26.94	19.72	Line	-	-0.66	9.66	0.18	9.88			
QP	10.608M	20.36	60.00	-39.64	19.85	Line	-	0.51	9.69	0.28	9.88			
AV	10.608M	17.54	50.00	-32.46	19.85	Line	-	-2.31	9.69	0.28	9.88			
QP	21.501M	21.36	60.00	-38.64	19.89	Line	-	1.47	9.62	0.38	9.89			
AV	21.501M	18.29	50.00	-31.71	19.89	Line	-	-1.60	9.62	0.38	9.89			

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).

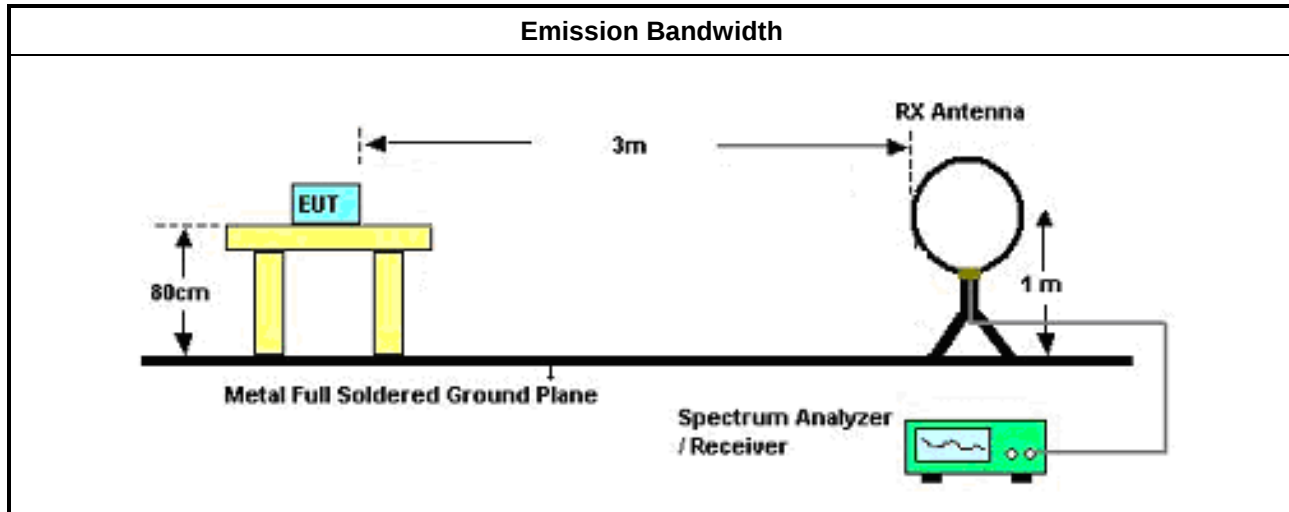
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

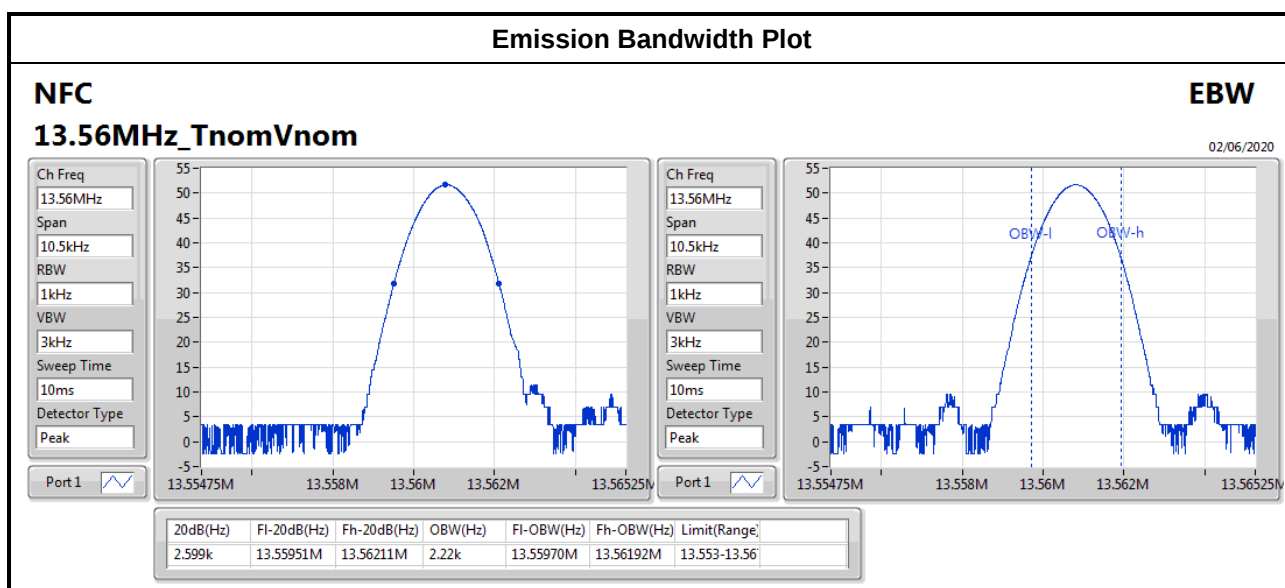
Test Method	
☒	Because the measured signal is CW or CW-like adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.
☒	For radiated measurement. Loop antenna was rotated about the horizontal and vertical 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-F (ISO 18092)	13.56	2.599	2.22	13.55970	13.56192
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

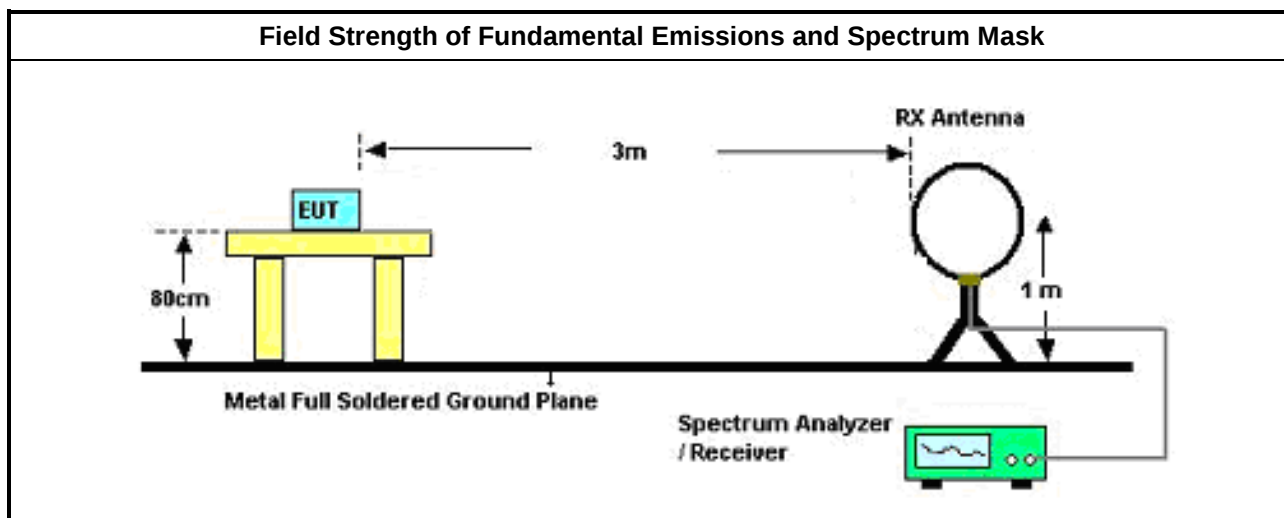
3.3.2 Measuring Instruments

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.

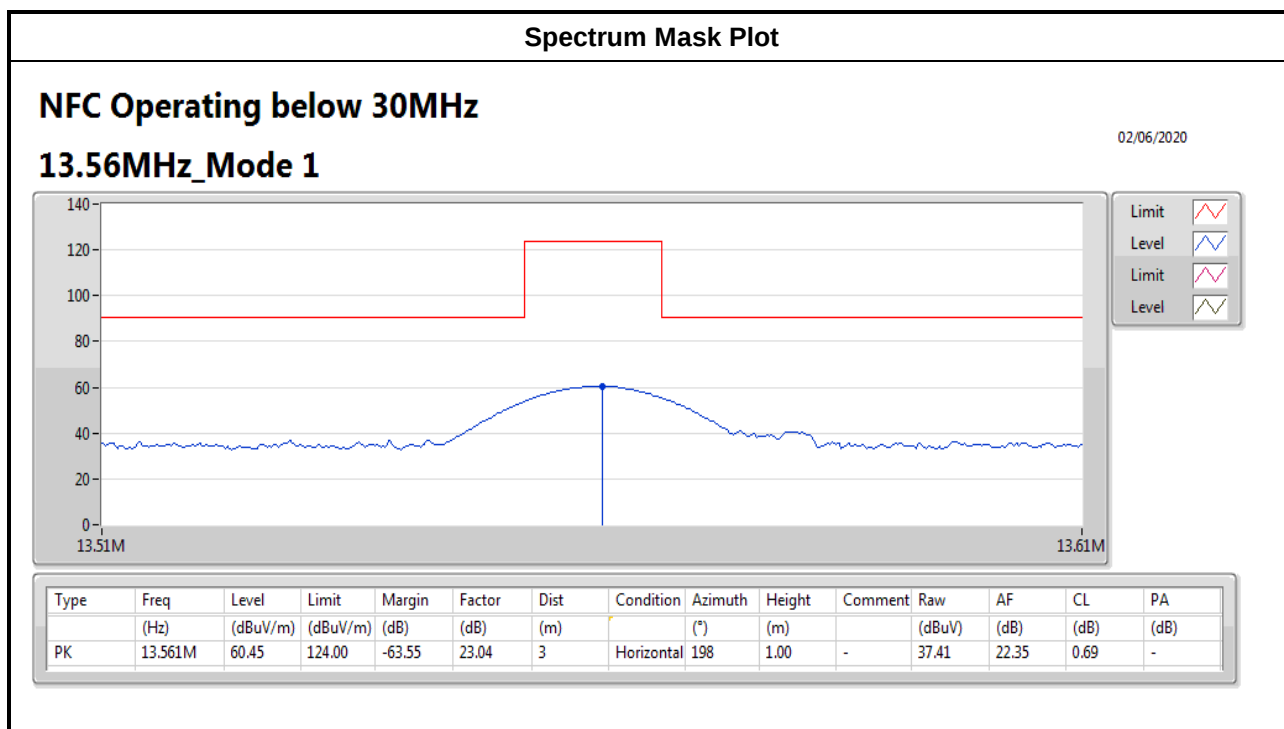
3.3.4 Test Setup



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-F (ISO 18092)	13.56	60.45	H	-63.55	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.

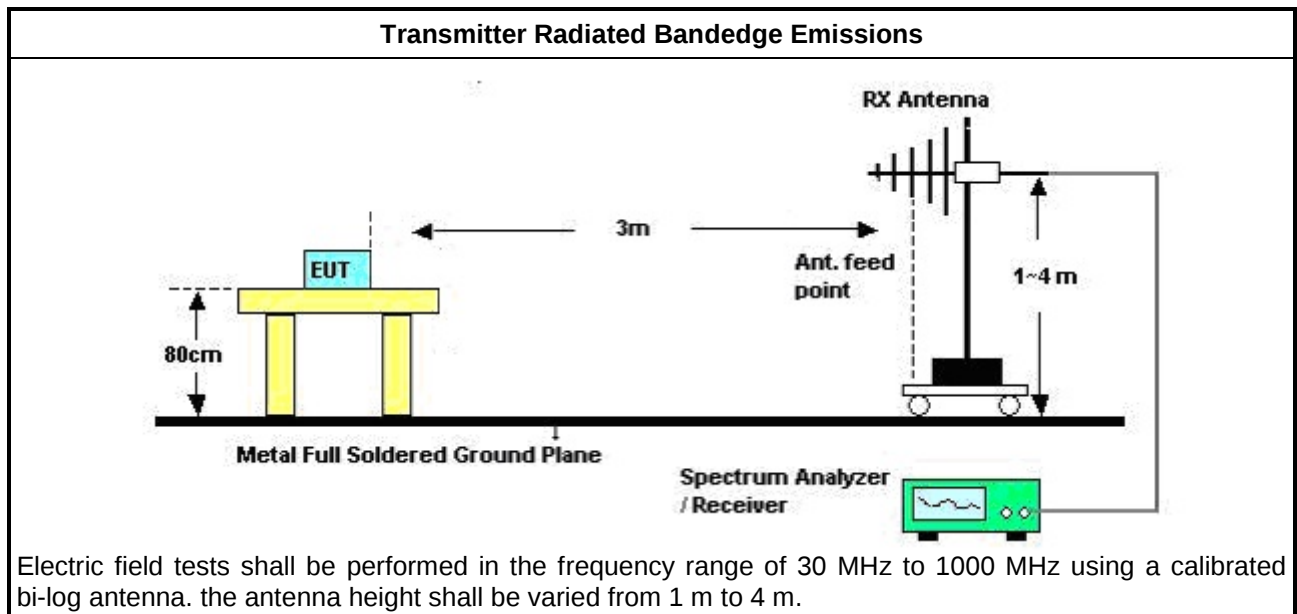
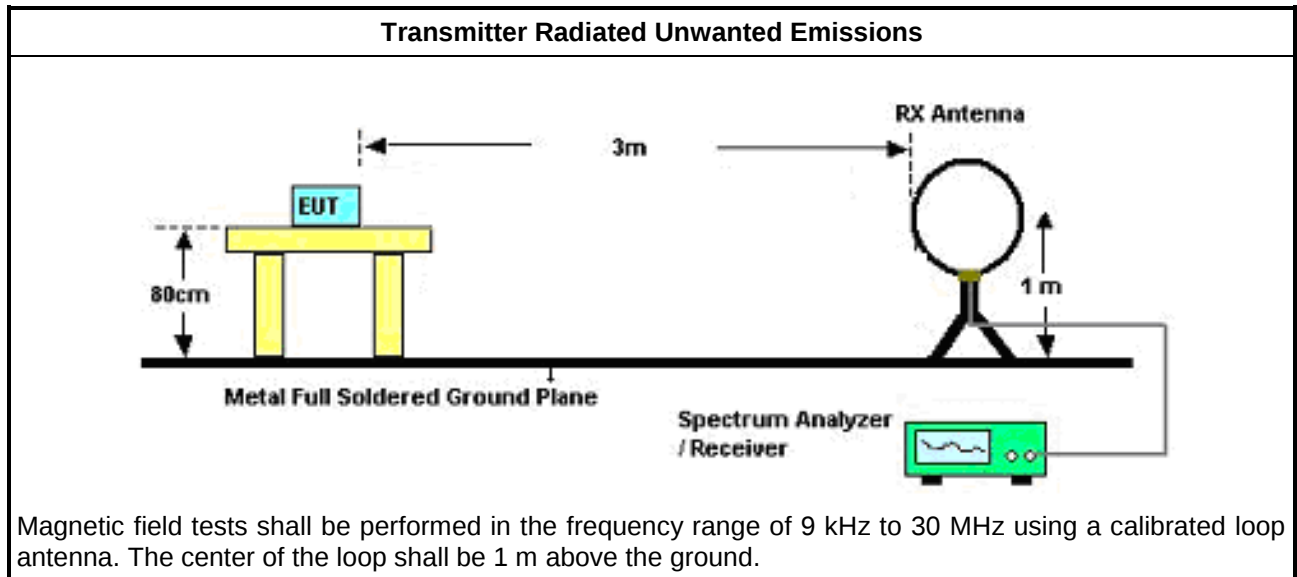
3.4.2 Measuring Instruments

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.
☒	KDB 414788 D01 v01r01 Open-Field Test Sites and Chamber Correlation Justification.
☐	Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in regulations; however, an attempt should be made to avoid making measurements in the near field.
☐	Open-field site and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

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	1.762M	47.93	69.50	-21.57	20.45	3	0	1.00	-

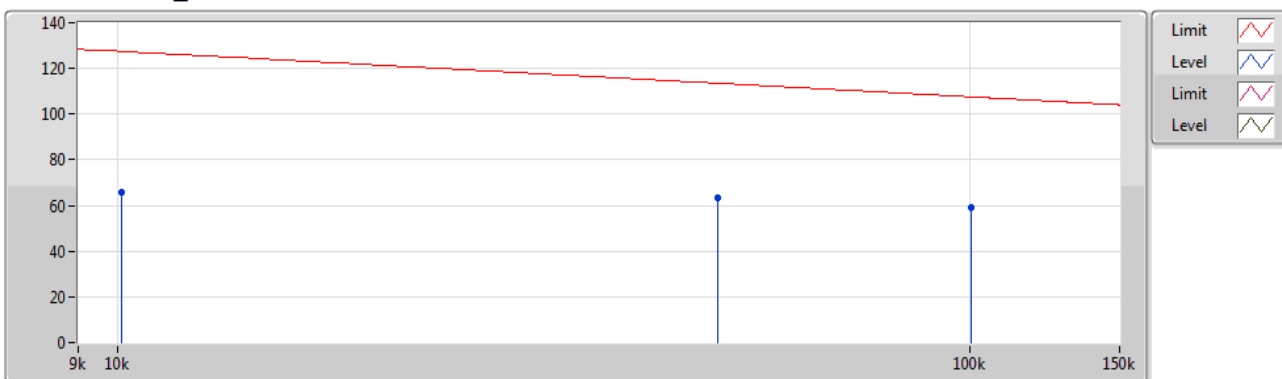
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Azimuth (°)	Height (m)	Comments
NFC	-	-	-	-	-	-	-	-	-	-	-
13.56MHz_Mode 1	Pass	PK	10.128k	65.55	127.46	-61.91	19.67	3	360	1.00	-
13.56MHz_Mode 1	Pass	PK	50.736k	63.55	113.49	-49.94	21.24	3	360	1.00	-
13.56MHz_Mode 1	Pass	PK	100.368k	58.86	107.55	-48.69	19.98	3	360	1.00	-
13.56MHz_Mode 1	Pass	PK	388.8k	57.81	95.80	-37.99	20.60	3	0	1.00	-
13.56MHz_Mode 1	Pass	PK	1.762M	47.93	69.50	-21.57	20.45	3	0	1.00	-
13.56MHz_Mode 1	Pass	PK	7.135M	41.48	69.50	-28.02	21.87	3	0	1.00	-

NFC Operating below 30MHz

02/06/2020

13.56MHz_Mode 1

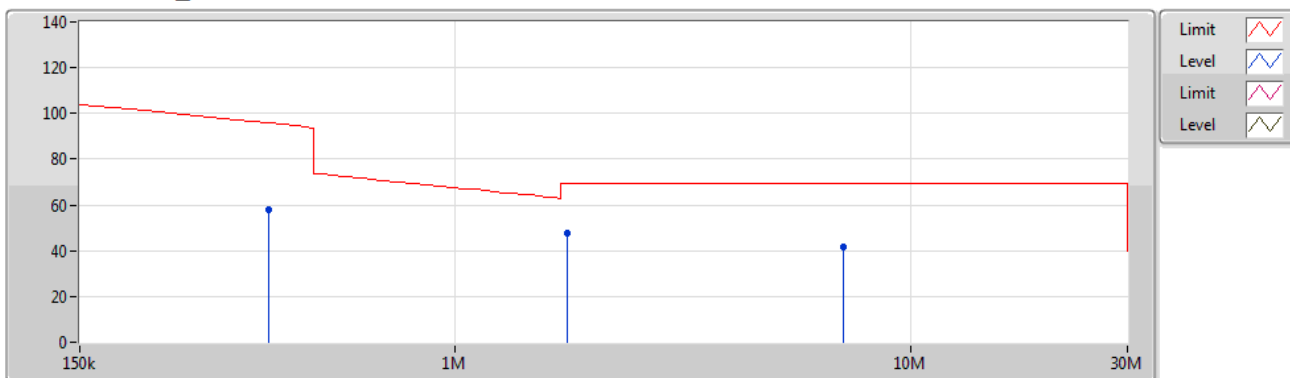


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	10.128k	65.55	127.46	-61.91	19.67	3	Horizontal	360	1.00	-	45.88	19.62	0.05	-
PK	50.736k	63.55	113.49	-49.94	21.24	3	Horizontal	360	1.00	-	42.31	21.17	0.07	-
PK	100.368k	58.86	107.55	-48.69	19.98	3	Horizontal	360	1.00	-	38.88	19.90	0.08	-

NFC Operating below 30MHz

02/06/2020

13.56MHz_Mode 1



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	388.8k	57.81	95.80	-37.99	20.60	3	Horizontal	0	1.00	-	37.21	20.45	0.15	-
PK	1.762M	47.93	69.50	-21.57	20.45	3	Horizontal	0	1.00	-	27.48	20.09	0.36	-
PK	7.135M	41.48	69.50	-28.02	21.87	3	Horizontal	0	1.00	-	19.61	21.37	0.50	-

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	476.2M	41.10	46.00	-4.90	-2.23	3	360	1.00	-

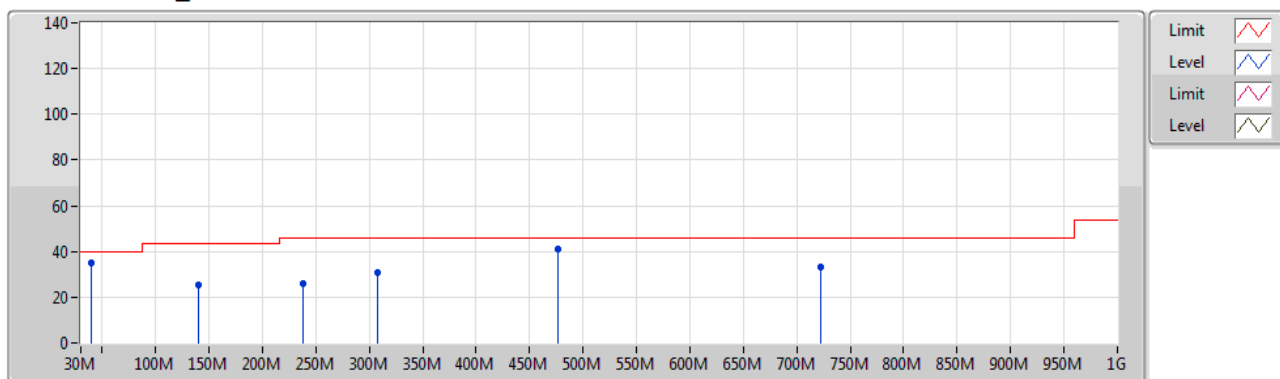
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Azimuth (°)	Height (m)	Comments
NFC	-	-	-	-	-	-	-	-	-	-	-
13.56MHz_Mode 1	Pass	PK	39.7M	34.72	40.00	-5.28	-8.75	3	360	1.00	-
13.56MHz_Mode 1	Pass	PK	140.58M	25.54	43.50	-17.96	-9.79	3	360	1.00	-
13.56MHz_Mode 1	Pass	PK	237.58M	25.76	46.00	-20.24	-8.70	3	360	1.00	-
13.56MHz_Mode 1	Pass	PK	307.42M	30.98	46.00	-15.02	-5.91	3	360	1.00	-
13.56MHz_Mode 1	Pass	PK	476.2M	41.10	46.00	-4.90	-2.23	3	360	1.00	-
13.56MHz_Mode 1	Pass	PK	722.58M	33.34	46.00	-12.66	0.31	3	360	1.00	-
13.56MHz_Mode 1	Pass	PK	47.46M	31.27	40.00	-8.73	-12.44	3	0	1.00	-
13.56MHz_Mode 1	Pass	PK	142.52M	35.04	43.50	-8.46	-9.97	3	0	1.00	-
13.56MHz_Mode 1	Pass	PK	239.52M	29.31	46.00	-16.69	-8.45	3	0	1.00	-
13.56MHz_Mode 1	Pass	PK	478.14M	35.00	46.00	-11.00	-2.19	3	0	1.00	-
13.56MHz_Mode 1	Pass	PK	625.58M	30.99	46.00	-15.01	-0.40	3	0	1.00	-
13.56MHz_Mode 1	Pass	PK	891.36M	33.50	46.00	-12.50	2.62	3	0	1.00	-

NFC Operating above 30MHz

02/06/2020

13.56MHz_Mode 1

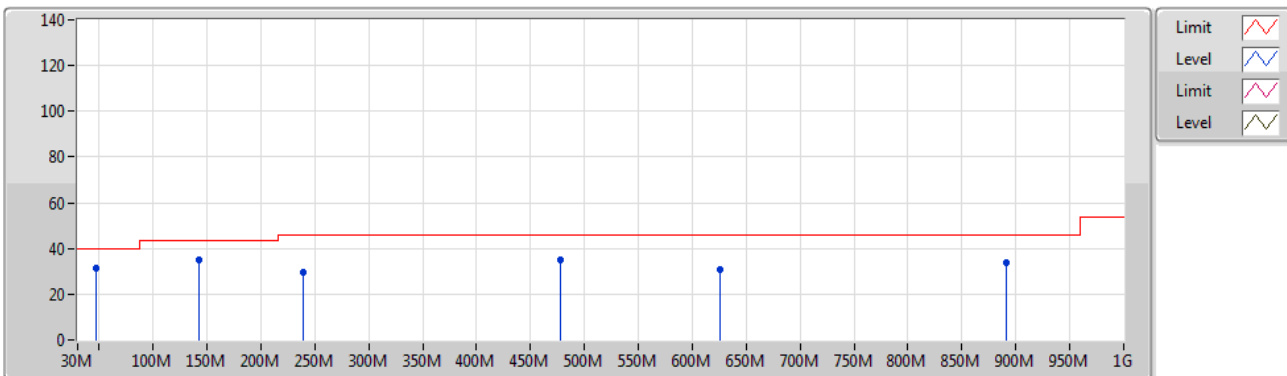


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	39.7M	34.72	40.00	-5.28	-8.75	3	Vertical	360	1.00	-	43.47	18.01	0.92	27.68
PK	140.58M	25.54	43.50	-17.96	-9.79	3	Vertical	360	1.00	-	35.33	16.14	1.74	27.67
PK	237.58M	25.76	46.00	-20.24	-8.70	3	Vertical	360	1.00	-	34.46	16.19	2.34	27.23
PK	307.42M	30.98	46.00	-15.02	-5.91	3	Vertical	360	1.00	-	36.89	18.61	2.69	27.21
PK	476.2M	41.10	46.00	-4.90	-2.23	3	Vertical	360	1.00	-	43.33	22.72	3.41	28.36
PK	722.58M	33.34	46.00	-12.66	0.31	3	Vertical	360	1.00	-	33.03	24.42	4.25	28.36

NFC Operating above 30MHz

02/06/2020

13.56MHz_Mode 1



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	47.46M	31.27	40.00	-8.73	-12.44	3	Horizontal	0	1.00	-	43.71	14.23	1.01	27.68
PK	142.52M	35.04	43.50	-8.46	-9.97	3	Horizontal	0	1.00	-	45.01	15.93	1.76	27.66
PK	239.52M	29.31	46.00	-16.69	-8.45	3	Horizontal	0	1.00	-	37.76	16.42	2.35	27.22
PK	478.14M	35.00	46.00	-11.00	-2.19	3	Horizontal	0	1.00	-	37.19	22.76	3.42	28.37
PK	625.58M	30.99	46.00	-15.01	-0.40	3	Horizontal	0	1.00	-	31.39	24.18	3.95	28.53
PK	891.36M	33.50	46.00	-12.50	2.62	3	Horizontal	0	1.00	-	30.88	25.59	4.78	27.75

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).

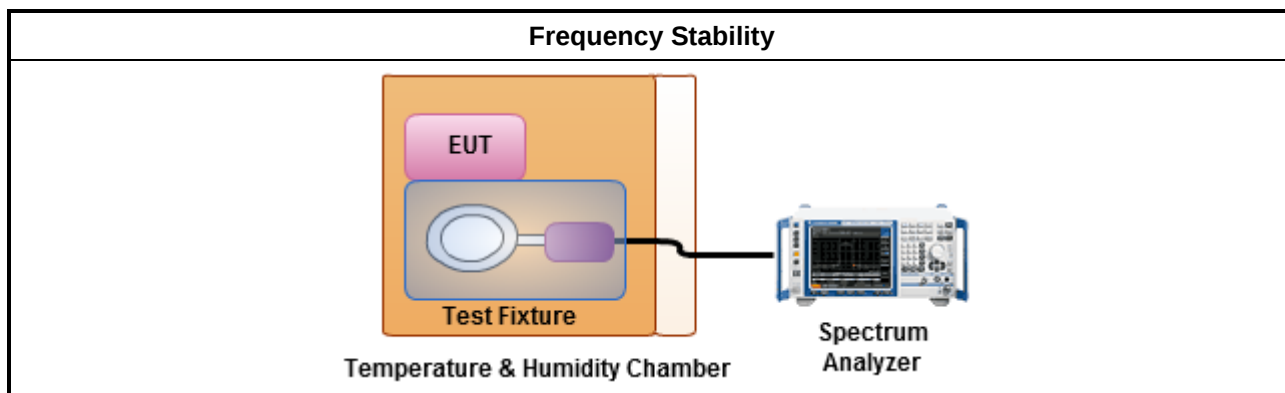
3.5.2 Measuring Instruments

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

Summary

Mode	Result	Ch (Hz)	Center (Hz)	ppm	Limit (ppm)	Port	Remark
13.553-13.567MHz	-	-	-	-	-	-	-
NFC	Pass	13.56M	13.560885M	65.2942	100	1	2 min

Result

Mode	Result	Ch (Hz)	Center (Hz)	ppm	Limit (ppm)	Port	Remark
NFC	-	-	-	-	-	-	-
13.56MHz_-30°C	Pass	13.56M	13.560879M	64.8426	100	1	0 min
13.56MHz_-30°C	Pass	13.56M	13.560879M	64.8426	100	1	2 min
13.56MHz_-30°C	Pass	13.56M	13.560878M	64.778	100	1	5 min
13.56MHz_-30°C	Pass	13.56M	13.560878M	64.7135	100	1	10 min
13.56MHz_-20°C	Pass	13.56M	13.560878M	64.7135	100	1	0 min
13.56MHz_-20°C	Pass	13.56M	13.560881M	64.9716	100	1	2 min
13.56MHz_-20°C	Pass	13.56M	13.56088M	64.9071	100	1	5 min
13.56MHz_-20°C	Pass	13.56M	13.560878M	64.7135	100	1	10 min
13.56MHz_-10°C	Pass	13.56M	13.560883M	65.1006	100	1	0 min
13.56MHz_-10°C	Pass	13.56M	13.560885M	65.2942	100	1	2 min
13.56MHz_-10°C	Pass	13.56M	13.560882M	65.0361	100	1	5 min
13.56MHz_-10°C	Pass	13.56M	13.560885M	65.2297	100	1	10 min
13.56MHz_0°C	Pass	13.56M	13.560879M	64.8426	100	1	0 min
13.56MHz_0°C	Pass	13.56M	13.560869M	64.0683	100	1	2 min
13.56MHz_0°C	Pass	13.56M	13.56088M	64.9071	100	1	5 min
13.56MHz_0°C	Pass	13.56M	13.560878M	64.778	100	1	10 min
13.56MHz_10°C	Pass	13.56M	13.560844M	62.2618	100	1	0 min
13.56MHz_10°C	Pass	13.56M	13.560839M	61.8746	100	1	2 min
13.56MHz_10°C	Pass	13.56M	13.560843M	62.1327	100	1	5 min
13.56MHz_10°C	Pass	13.56M	13.560843M	62.1327	100	1	10 min
13.56MHz_30°C	Pass	13.56M	13.560841M	62.0037	100	1	0 min
13.56MHz_30°C	Pass	13.56M	13.56084M	61.9392	100	1	2 min
13.56MHz_30°C	Pass	13.56M	13.560839M	61.8746	100	1	5 min
13.56MHz_30°C	Pass	13.56M	13.56084M	61.9392	100	1	10 min
13.56MHz_40°C	Pass	13.56M	13.560817M	60.2616	100	1	0 min
13.56MHz_40°C	Pass	13.56M	13.560816M	60.1971	100	1	2 min
13.56MHz_40°C	Pass	13.56M	13.560817M	60.2616	100	1	5 min
13.56MHz_40°C	Pass	13.56M	13.560817M	60.2616	100	1	10 min
13.56MHz_50°C	Pass	13.56M	13.5608M	58.9712	100	1	0 min
13.56MHz_50°C	Pass	13.56M	13.560796M	58.7132	100	1	2 min
13.56MHz_50°C	Pass	13.56M	13.5608M	58.9712	100	1	5 min
13.56MHz_50°C	Pass	13.56M	13.560799M	58.9067	100	1	10 min
13.56MHz_20°C-126.5V	Pass	13.56M	13.560799M	58.9067	100	1	0 min



Mode	Result	Ch (Hz)	Center (Hz)	ppm	Limit (ppm)	Port	Remark
13.56MHz_20°C-126.5V	Pass	13.56M	13.560801M	59.0358	100	1	2 min
13.56MHz_20°C-126.5V	Pass	13.56M	13.5608M	58.9712	100	1	5 min
13.56MHz_20°C-126.5V	Pass	13.56M	13.560787M	58.0034	100	1	10 min
13.56MHz_20°C-110V	Pass	13.56M	13.560801M	59.0358	100	1	0 min
13.56MHz_20°C-110V	Pass	13.56M	13.560795M	58.6486	100	1	2 min
13.56MHz_20°C-110V	Pass	13.56M	13.560799M	58.9067	100	1	5 min
13.56MHz_20°C-110V	Pass	13.56M	13.560801M	59.0358	100	1	10 min
13.56MHz_20°C-93.5V	Pass	13.56M	13.560799M	58.9067	100	1	0 min
13.56MHz_20°C-93.5V	Pass	13.56M	13.560799M	58.9067	100	1	2 min
13.56MHz_20°C-93.5V	Pass	13.56M	13.560799M	58.9067	100	1	5 min
13.56MHz_20°C-93.5V	Pass	13.56M	13.5608M	58.9712	100	1	10 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	ESR	102171	9kHz ~ 7GHz	26/Jun/2019	25/Jun/2020
LISN	R&S	ENV216	101295	9kHz ~ 30MHz	05/Nov/2019	04/Nov/2020
RF Cable-CON	MTJ	RG142	CB002-CO	9kHz ~ 200MHz	12/Sep/2019	11/Sep/2020
AC POWER	APC	AFC-11005G	F310050055	47Hz ~ 63Hz 5 ~ 300V	NCR	NCR
Impuls Begrenzer Pulse Limiter	SCHWARZBECK	VTSD 9561-F	9561-F041	9kHz ~ 30MHz	24/Sep/2019	23/Sep/2020

NCR:Non-Calibration required.

Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101029	10kHz ~ 40GHz	01/Oct/2019	30/Sep/2020
Loop Antenna	TESEQ	HLA 6120	31244	9kHz ~ 30MHz	16/Mar/2020	15/Mar/2021
*TEMP & humidity Chamber	Giant Force	GTH-225-40-CP-AR	MAA1611-005	-40 ~ 100℃ 10 ~ 98%RH	09/Dec/2019	08/Dec/2020

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	29/Aug/2019	28/Aug/2020
Amplifier	Agilent	8447D	2944A11149	100kHz ~ 1.3GHz	02/Jul/2019	01/Jul/2020
Spectrum Analyzer	Rohde & Schwarz	FSP40	100593	9kHz ~ 40GHz	27/Dec/2020	26/Dec/2021
EMC Receiver	R&S	ESR	102052	9kHz ~ 3.6GHz	29/Apr/2020	28/Apr/2021
RF Cable-R03m	Jye Bao	RG142	CB017	9kHz ~ 1GHz	25/Mar/2020	24/Mar/2021
Bilog Antenna & 5dB Attenuator	SCHAFFNER / MTJ	CBL 6112B / MTJ6102-05	2723 / 2	30MHz ~ 1GHz	28/Feb/2020	27/Feb/2021
Loop Antenna	TESEQ	HLA 6120	31244	9k ~ 30MHz	16/Mar/2020	15/Mar/2021