

FCC Radio Test Report

FCC ID : 2AOANTWSECOMOPC003C
Equipment : Independent Inductive Card Reader
Brand Name : TAIWAN SECOM CO., LTD
Model Name : OPC-003C
Applicant : TAIWAN SECOM CO., LTD.
6F, NO.139 CHENG CHOU ROAD, TAIPEI 103, Taiwan
Manufacturer : TITAN STAR INTERNATIONAL CO., LTD.
7 F., No. 139, Zhengzhou Rd., Datong Dist., Taipei City
10341, Taiwan (R.O.C.)
Standard : 47 CFR FCC Part 15.225

The product was received on Jul. 04, 2022, and testing was started from Sep. 28, 2022 and completed on Oct. 11, 2022. We, SPORTON INTERNATIONAL INC. Hsinhua 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 test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. Hsinhua Laboratory, the test report shall not be reproduced except in full.



Approved by: Jackson Tsai

SPORTON INTERNATIONAL INC. Hsinhua Laboratory
No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)



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PHOTOGRAPHS OF EUT V01



History of this test report

Report No.	Version	Description	Issued Date
FR262440AR	01	Initial issue of report	Jun. 14, 2023



Summary of Test Result

Report Clause	Ref. Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
-	15.207	AC Power-line Conducted Emissions	PASS	Only employ DC Power
3.1	15.215(c)	Emission Bandwidth	PASS	-
3.2	15.225(e)	Frequency Stability	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	-

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: Barry Hsiao

Report Producer: Michelle Tsai

1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information					
Frequency Range(MHz)	Type	Mode	Ch. Frequency (MHz)	Channel Number	Field Strength (dBuV/m)
13.553 – 13.567	NFC-A (ISO 14443-3A) NFC-B (ISO 14443-3B) NFC-F (ISO 18092) NFC-V (ISO 15693)	NFC	13.56	1	60.18

Note :
<ul style="list-style-type: none"> ◆ Field strength performed peak level at 3m. ◆ Uses a ASK modulation.

1.1.2 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector	Gain
1	TAIWAN SECOM CO., LTD	OPC-003C	Loop	N/A	0

1.1.3 EUT Information

Operational Condition	
EUT Power Type	From DC Power supply
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"/> Duty cycle mode - NFC-A (ISO 14443-3A)	
Declare transmitter duty cycle / 1 hour =	100%
<input checked="" type="checkbox"/> Duty cycle mode - NFC-B (ISO 14443-3B)	
Declare transmitter duty cycle / 1 hour =	100%
<input checked="" type="checkbox"/> Duty cycle mode - NFC-F (ISO 18092)	
Declare transmitter duty cycle / 1 hour =	100%
<input checked="" type="checkbox"/> 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

Test Lab. : Sporton International Inc. Hsinhua Laboratory				
<input checked="" type="checkbox"/> Hsinhua (TAF: 3785)	ADD: No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)			
	TEL: 886-3-327-3456		FAX: 886-3-327-0973	
Test site Designation No. TW3785 with FCC.				
Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH01-HY	Johnny Yu	22.1~24.2°C / 51~55%	11/Oct/2022
Radiated	03CH03-HY	Billy Wang	24.0~24.2°C / 59~60%	28/Sep/2022

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
AC Power-line Conducted Emissions	4.53 dB	Confidence levels of 95%
Emission Bandwidth	0.005 MHz	Confidence levels of 95%
Frequency Stability	5 ppm	Confidence levels of 95%
Field Strength of Fundamental Emissions and Spectrum Mask	2.5 dB	Confidence levels of 95%
Transmitter Radiated Unwanted Emissions	4.8 dB	Confidence levels of 95%
Receiver Radiated Unwanted Emissions	4.8 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
TnomVnom	Tnom	20°C
TminVmin	Vnom	12V
Freq. Stability	Abbreviation	Remark
-20°C	-	-
-10°C	-	-
0°C	-	-
10°C	-	-
20°C	-	-
30°C	-	-
40°C	-	-
50°C	-	-
20°C-13.8V	-	-
20°C-12V	-	-
20°C-10.2V	-	-

2.2 Test Channel Mode




Test Software Version	N/A
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Note: The EUT transmits RF signal continuously by itself.

Mode	PowerSetting
NFC_Nss1_1TX	-
13.56MHz	default

2.3 The Worst Case Measurement Configuration

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 and 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 checked="" type="checkbox"/> 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		
	DC Power Supply		
Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane
			
Worst Planes of EUT		V	

2.4 Accessories

Accessories Information				
Setting Cable	Brand Name	SECOM	Model Name	OPC-003C cable
	Signal Line	0.3 meter, non-shielded cable, w/o ferrite core		

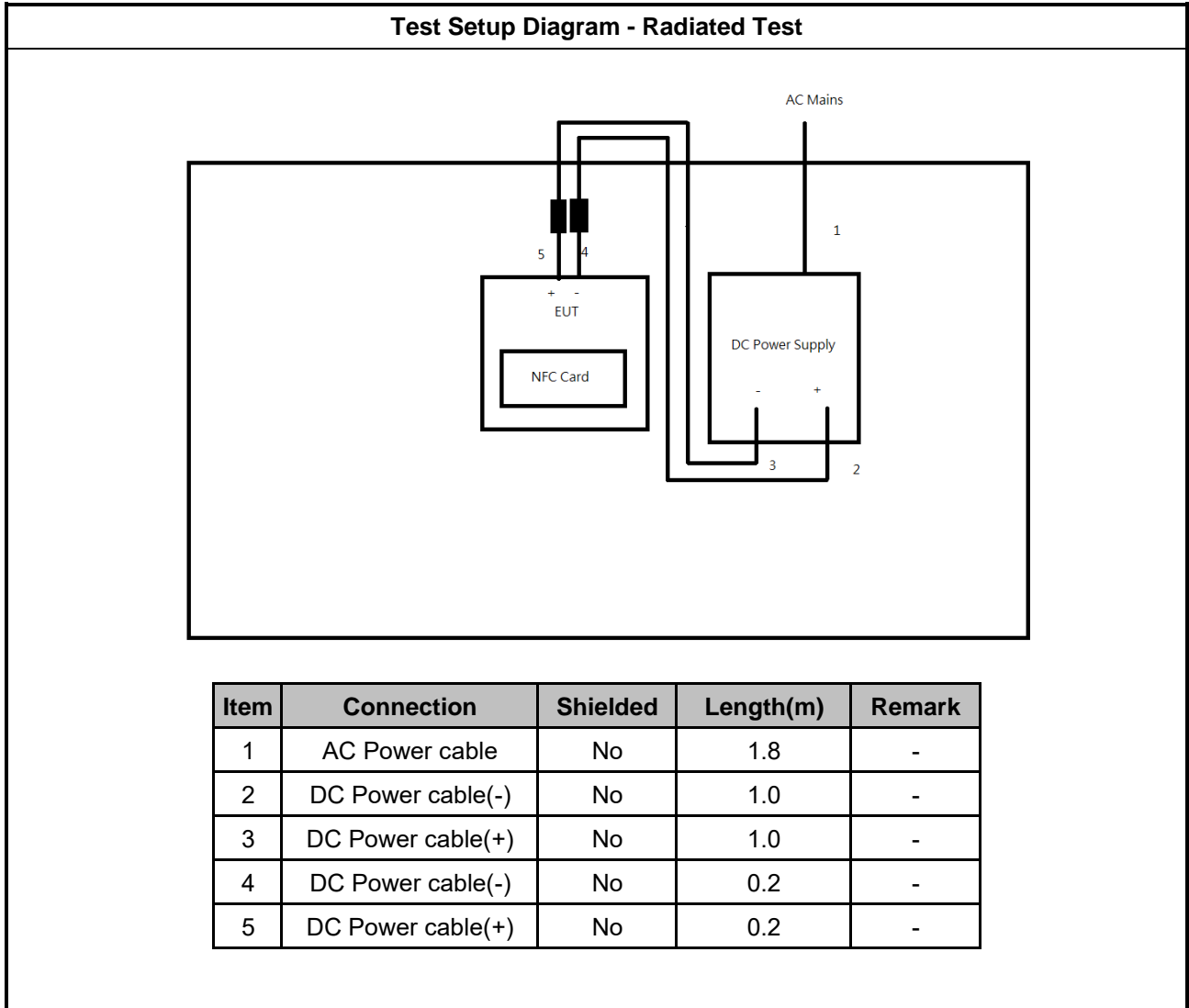
Reminder: Regarding to more detail and other information, please refer to user manual.

2.5 Support Equipment

Support Equipment – Conducted					
No.	Equipment	Brand Name	Model Name	FCC ID	Remark
1	NFC Card	SECOM	OPC-003C-A	-	Provided by Customer
2	NFC Card	SECOM	OPC-003C-B	-	Provided by Customer
3	NFC Card	SECOM	OPC-003C-F	-	Provided by Customer
4	NFC Card	SECOM	OPC-003C-V	-	Provided by Customer
5	DC Power Supply	GW	GPS-3030DD	-	-

Support Equipment – Radiated					
No.	Equipment	Brand Name	Model Name	FCC ID	Remark
1	DC Power Supply	GW	GPS-3030DD	-	-
2	DC Power cable(Rad)	MiSUMi	WTN1228-RED	-	-
3	DC Power cable(Black)	MiSUMi	WTN1228-BLACK	-	-
4	DC Power Supply	GW	GPS-3030DD	-	-
5	AC Power Cable	Power sync	PW-GPC180-3	-	-
6	NFC Card	SECOM	OPC-003C-A	-	Provided by Customer
7	NFC Card	SECOM	OPC-003C-B	-	Provided by Customer
8	NFC Card	SECOM	OPC-003C-F	-	Provided by Customer
9	NFC Card	SECOM	OPC-003C-V	-	Provided by Customer

2.6 Test Setup Diagram



3 Transmitter Test Result

3.1 Emission Bandwidth

3.1.1 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).

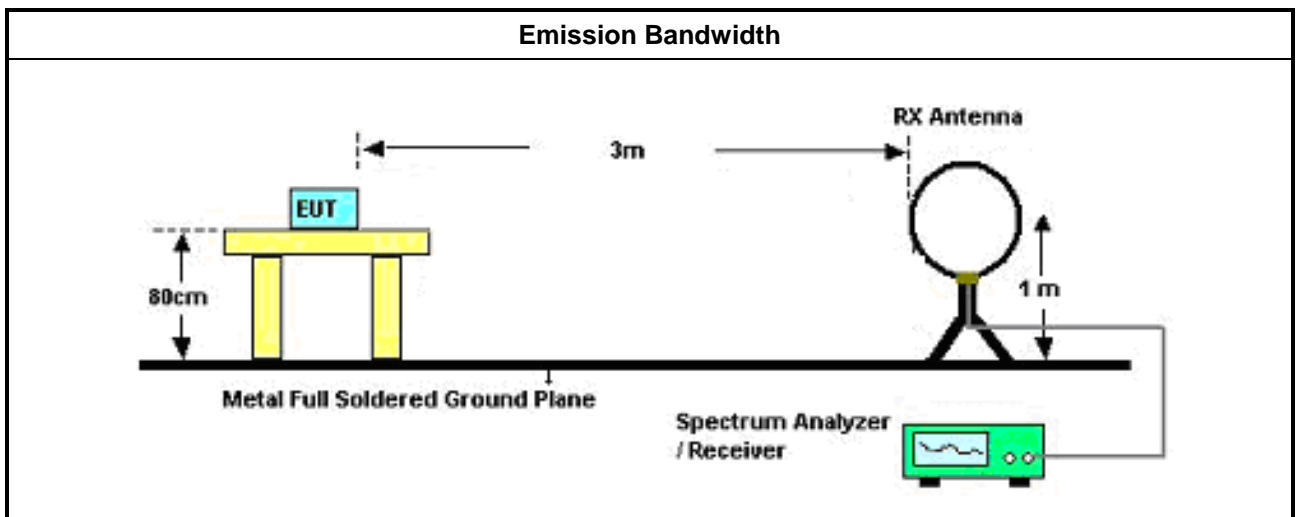
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	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.
<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.

3.1.4 Test Setup



3.1.5 Test Result of Emission Bandwidth

Refer as Appendix A

3.2 Frequency Stability

3.2.1 Frequency Stability Limit

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

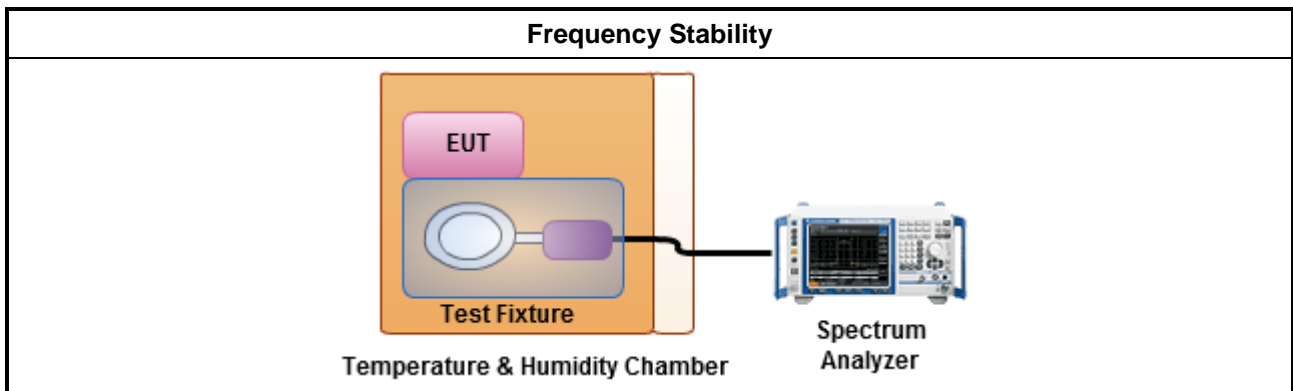
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	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.

3.2.4 Test Setup



3.2.5 Test Result of Frequency Stability

Refer as Appendix 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 and Spectrum Mask					
Emissions	(uV/m)@30m	(dBuV/m)@30m	(dBuV/m)@10m	(dBuV/m)@3m	(dBuV/m)@1m
fundamental	15848	84.0	103.1	124.0	143.1
Quasi peak measurement of the fundamental.					

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

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

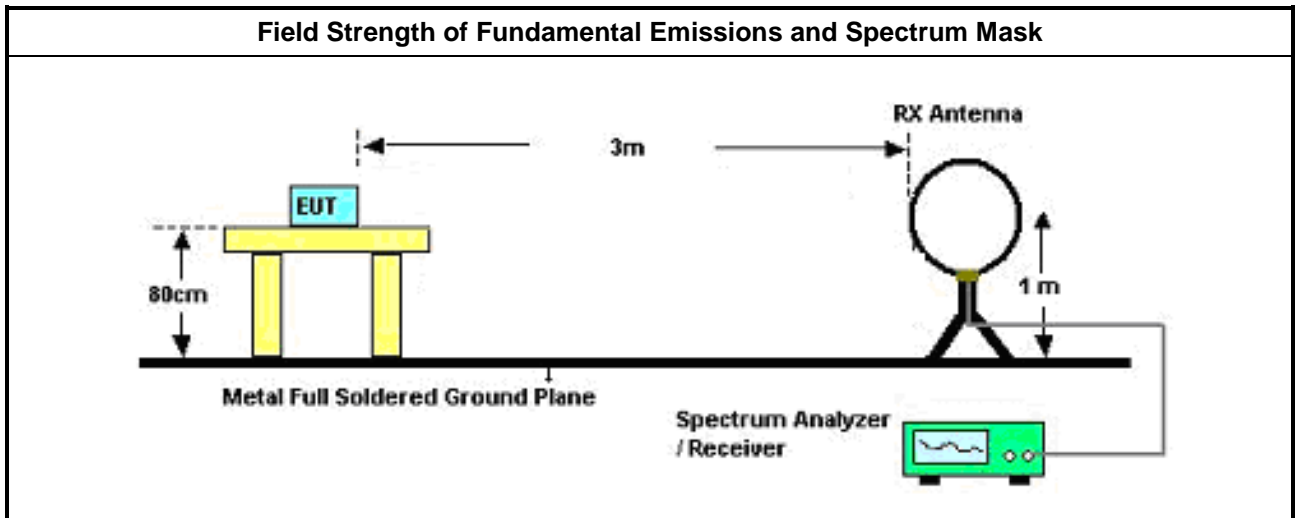
Test Method	
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz and test distance is 3m.
<input checked="" type="checkbox"/>	At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the requirements; 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 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Raw(Read Level) + AF(Antenna Factor) + CL(Cable Loss) - PA(Preamplifier Factor).

3.3.5 Test Setup



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

Refer as Appendix C

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

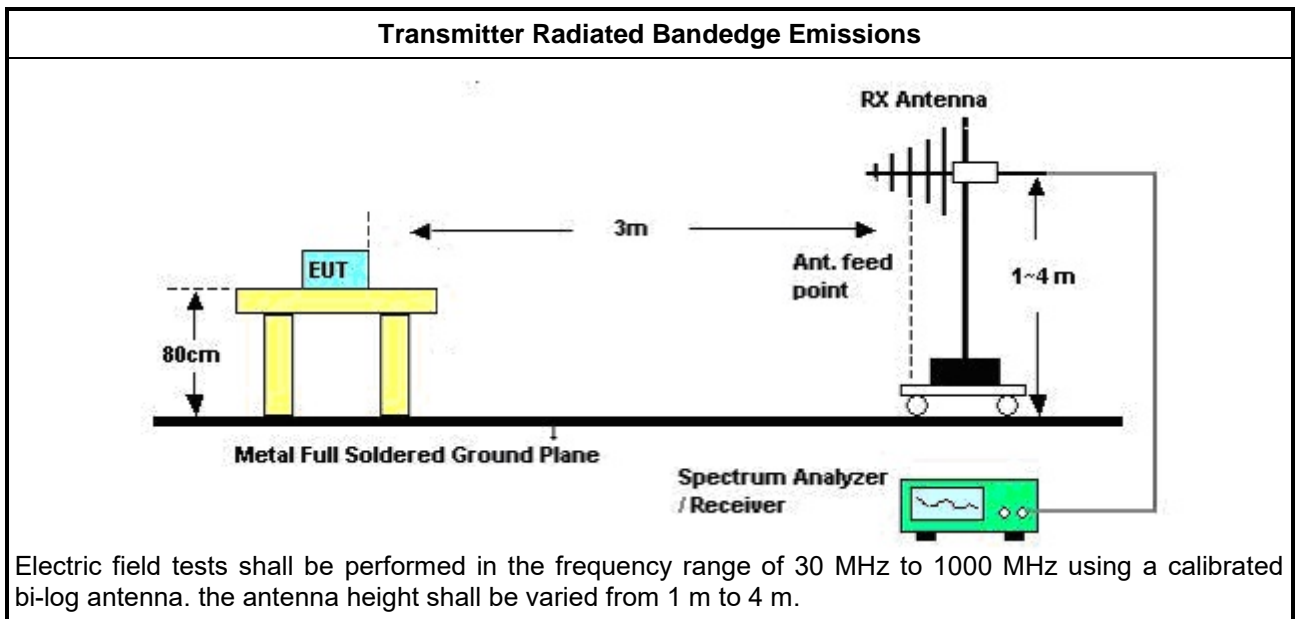
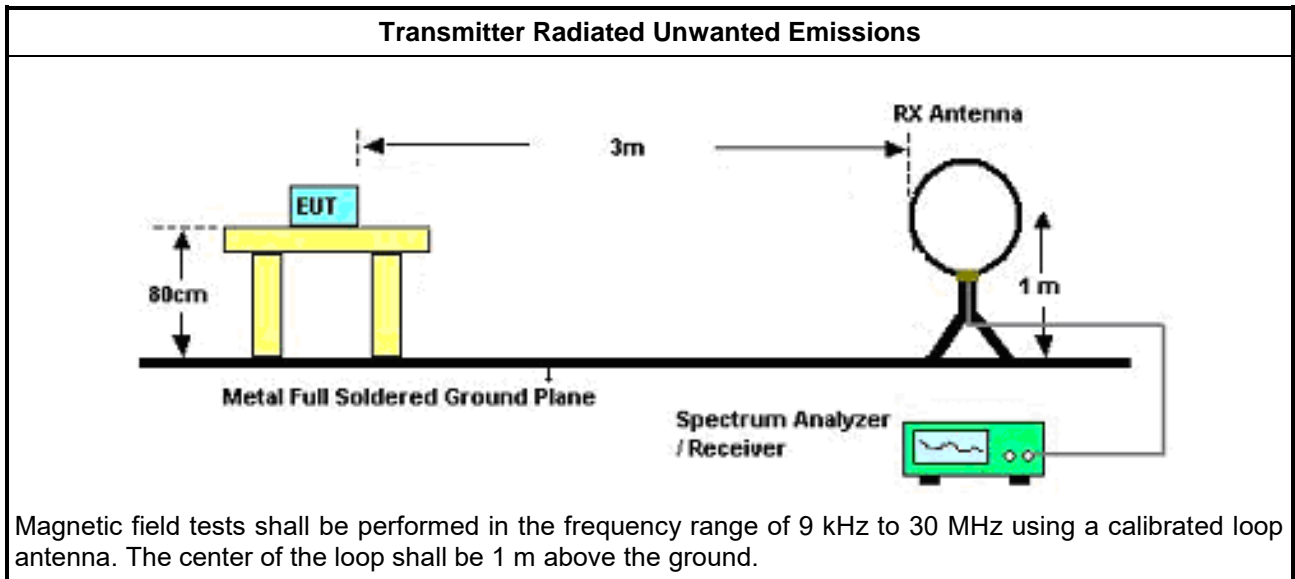
Test Method	
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1 GHz and test distance is 3m.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz and test distance is 3m.
<input checked="" 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.
<input checked="" type="checkbox"/>	KDB 414788 D01 v01r01 Open-Field Test Sites and Chamber Correlation Justification.
<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ 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.
<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ Open-field site and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

3.4.4 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Raw(Read Level) + AF(Antenna Factor) + CL(Cable Loss) - PA(Preamplifier Factor)

3.4.5 Test Setup



3.4.6 Transmitter Radiated Unwanted Emissions

Refer as Appendix C



4 Test Equipment and Calibration Data

Instrument for Conducted Test

Instrument	Manufacturer / Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV 40	101013	10Hz~40GHz	01/Apr/2022	31/Mar/2023
Programmable Temp. & Humi. Chamber	Giant Force	GTH-225-20-SP-SD	MAA1112-007	-20~100°C	19/May/2022	18/May/2023
SENSE-NFC	Sporton	V5.11.0	N/A	N/A	N/A	N/A

Instrument for Radiated Test

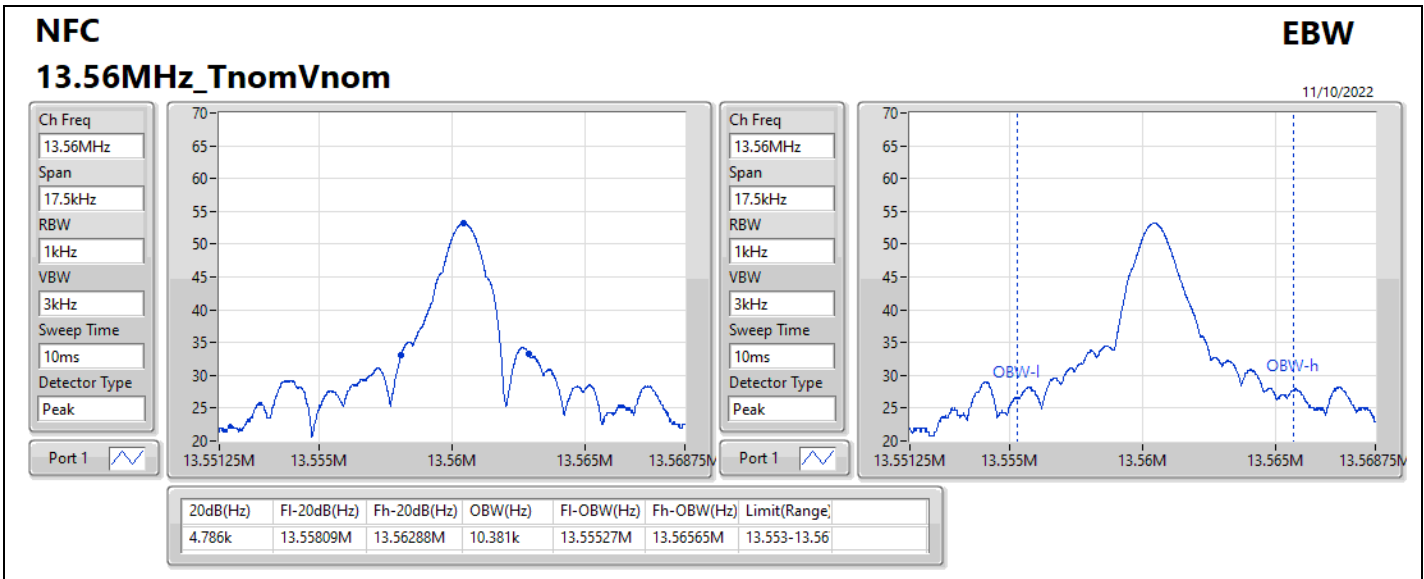
Instrument	Manufacturer / Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	01/Aug/2022	31/Jul/2023
Signal Analyzer	R&S	FSV40	101500	10Hz~40GHz	12/Oct/2021	11/Oct/2022
Amplifier	HP	8447D	2944A08033	10kHz~1.3GHz	08/Apr/2022	07/Apr/2023
Bilog Antenna & 6dB Attenuator	SCHAFFNER / EMC1	CBL6112B / N-6-05	22237 / AT-N-0603	30MHz~1GHz	17/Oct/2021	16/Oct/2022
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz~30MHz	13/Jun/2022	12/Jun/2023
RF Cable-R03m	Jye Bao	RG142	MY37335/4+CB0 21-1+CB021-2	30MHz~1GHz	22/Mar/2022	21/Mar/2023
Loop Antenna	TESEQ	HLA 6120	31244	9kHz~30MHz	18/Mar/2022	17/Mar/2023
EMI Test Receiver	R&S	ESR3	102052	9kHz~3.6GHz	13/May/2022	12/May/2023
SENSE-NFC	Sporton	V5.11.0	N/A	N/A	N/A	N/A

Summary

Mode	20dB (Hz)	FI-20dB (Hz)	Fh-20dB (Hz)	OBW (Hz)	Limit (Range)
13.553-13.567MHz	-	-	-	-	-
NFC	4.786k	13.55809M	13.56288M	10.381k	13.553-13.567

Result

Mode	Result	20dB (Hz)	FI-20dB (Hz)	Fh-20dB (Hz)	OBW (Hz)	FI-OBW (Hz)	Fh-OBW (Hz)	Limit (Range)
NFC	-	-	-	-	-	-	-	-
13.56MHz_TnomVnom	Pass	4.786k	13.55809M	13.56288M	10.381k	13.55527M	13.56565M	13.553-13.567





Summary

Mode	Result	Ch (Hz)	Center (Hz)	ppm	Limit (ppm)	Port	Remark
13.553-13.567MHz	-	-	-	-	-	-	-
NFC	Pass	13.56M	13.560882M	65.0361	100	1	10 min



Result

Mode	Result	Ch (Hz)	Center (Hz)	ppm	Limit (ppm)	Port	Remark
NFC	-	-	-	-	-	-	-
13.56MHz_-20°C	Pass	13.56M	13.55972M	20.6464	100	1	0 min
13.56MHz_-20°C	Pass	13.56M	13.560382M	28.1952	100	1	2 min
13.56MHz_-20°C	Pass	13.56M	13.560074M	5.4842	100	1	5 min
13.56MHz_-20°C	Pass	13.56M	13.560242M	17.872	100	1	10 min
13.56MHz_-10°C	Pass	13.56M	13.559975M	1.8711	100	1	0 min
13.56MHz_-10°C	Pass	13.56M	13.559663M	24.8402	100	1	2 min
13.56MHz_-10°C	Pass	13.56M	13.560339M	24.9692	100	1	5 min
13.56MHz_-10°C	Pass	13.56M	13.560375M	27.6791	100	1	10 min
13.56MHz_0°C	Pass	13.56M	13.560314M	23.1627	100	1	0 min
13.56MHz_0°C	Pass	13.56M	13.560031M	2.2582	100	1	2 min
13.56MHz_0°C	Pass	13.56M	13.560408M	30.0663	100	1	5 min
13.56MHz_0°C	Pass	13.56M	13.560882M	65.0361	100	1	10 min
13.56MHz_10°C	Pass	13.56M	13.560766M	56.455	100	1	0 min
13.56MHz_10°C	Pass	13.56M	13.560281M	20.7109	100	1	2 min
13.56MHz_10°C	Pass	13.56M	13.560291M	21.4851	100	1	5 min
13.56MHz_10°C	Pass	13.56M	13.560165M	12.1943	100	1	10 min
13.56MHz_20°C	Pass	13.56M	13.559625M	27.6791	100	1	0 min
13.56MHz_20°C	Pass	13.56M	13.560086M	6.323	100	1	2 min
13.56MHz_20°C	Pass	13.56M	13.560812M	59.8745	100	1	5 min
13.56MHz_20°C	Pass	13.56M	13.56012M	8.8392	100	1	10 min
13.56MHz_30°C	Pass	13.56M	13.560135M	9.9361	100	1	0 min
13.56MHz_30°C	Pass	13.56M	13.560505M	37.228	100	1	2 min
13.56MHz_30°C	Pass	13.56M	13.560439M	32.389	100	1	5 min
13.56MHz_30°C	Pass	13.56M	13.560074M	5.4842	100	1	10 min
13.56MHz_40°C	Pass	13.56M	13.560171M	12.6459	100	1	0 min
13.56MHz_40°C	Pass	13.56M	13.560279M	20.5819	100	1	2 min
13.56MHz_40°C	Pass	13.56M	13.559795M	15.0977	100	1	5 min
13.56MHz_40°C	Pass	13.56M	13.560432M	31.8729	100	1	10 min
13.56MHz_50°C	Pass	13.56M	13.5595M	36.8409	100	1	0 min
13.56MHz_50°C	Pass	13.56M	13.559948M	3.8712	100	1	2 min
13.56MHz_50°C	Pass	13.56M	13.560686M	50.5837	100	1	5 min
13.56MHz_50°C	Pass	13.56M	13.560275M	20.2593	100	1	10 min
13.56MHz_20°C-13.8V	Pass	13.56M	13.560019M	1.4194	100	1	0 min
13.56MHz_20°C-13.8V	Pass	13.56M	13.560181M	13.3556	100	1	2 min
13.56MHz_20°C-13.8V	Pass	13.56M	13.55953M	34.6472	100	1	5 min
13.56MHz_20°C-13.8V	Pass	13.56M	13.560646M	47.6157	100	1	10 min
13.56MHz_20°C-12V	Pass	13.56M	13.560242M	17.872	100	1	0 min
13.56MHz_20°C-12V	Pass	13.56M	13.559432M	41.8735	100	1	2 min
13.56MHz_20°C-12V	Pass	13.56M	13.55972M	20.6464	100	1	5 min
13.56MHz_20°C-12V	Pass	13.56M	13.559795M	15.0977	100	1	10 min
13.56MHz_20°C-10.2V	Pass	13.56M	13.560387M	28.5178	100	1	0 min
13.56MHz_20°C-10.2V	Pass	13.56M	13.560382M	28.1952	100	1	2 min
13.56MHz_20°C-10.2V	Pass	13.56M	13.560598M	44.0671	100	1	5 min



Frequency Stability

Appendix B

Mode	Result	Ch (Hz)	Center (Hz)	ppm	Limit (ppm)	Port	Remark
13.56MHz_20°C-10.2V	Pass	13.56M	13.559474M	38.7765	100	1	10 min



Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Azimuth (°)	Height (m)	Comments
13.56M	-	-	-	-	-	-	-	-	-	-
NFC	Pass	PK	1.643M	47.25	63.32	-16.07	3	0	1.00	-

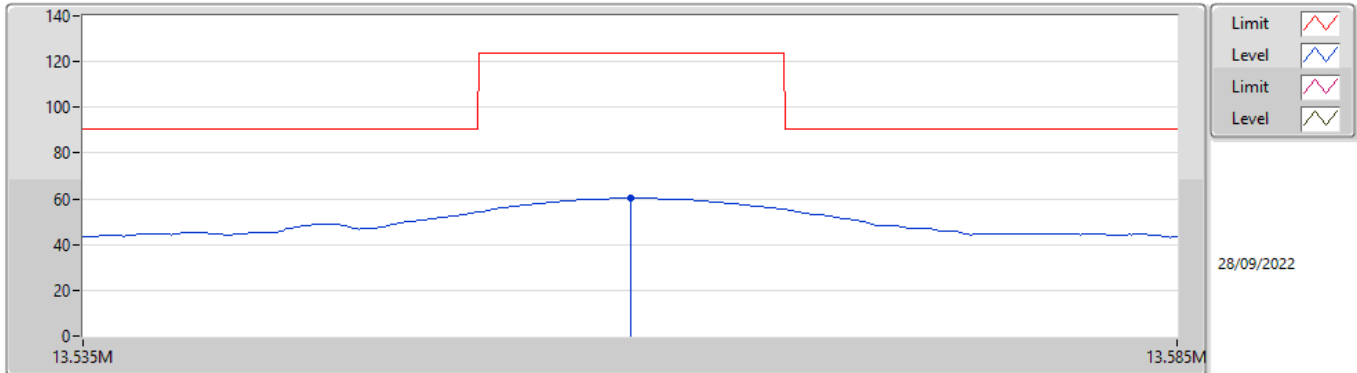


Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Azimuth (°)	Height (m)	Comments
NFC	-	-	-	-	-	-	-	-	-	-
13.56MHz_Mode 1	Pass	PK	13.56M	60.18	124.00	-63.82	3	0	1.00	-
13.56MHz_Mode 1	Pass	PK	18.87k	59.44	122.06	-62.62	3	360	1.00	-
13.56MHz_Mode 1	Pass	PK	29.022k	57.14	118.33	-61.19	3	360	1.00	-
13.56MHz_Mode 1	Pass	PK	40.866k	56.53	115.37	-58.84	3	360	1.00	-
13.56MHz_Mode 1	Pass	PK	490k	49.26	93.80	-44.54	3	0	1.00	-
13.56MHz_Mode 1	Pass	PK	1.046M	45.77	67.24	-21.47	3	0	1.00	-
13.56MHz_Mode 1	Pass	PK	1.643M	47.25	63.32	-16.07	3	0	1.00	-

NFC

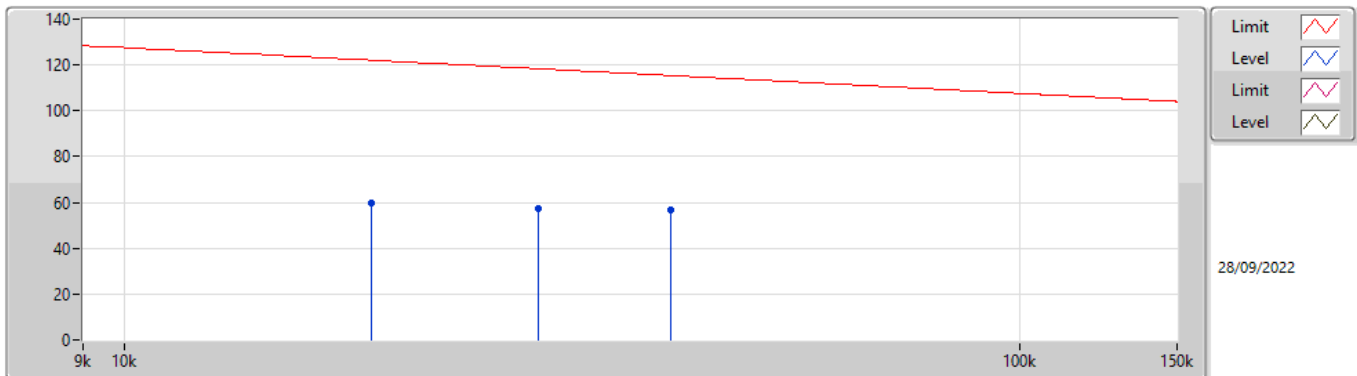
13.56MHz_Mode 1



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	13.56M	60.18	124.00	-63.82	23.02	3	Horizontal	0	1.00	-	37.16	22.54	0.48	-

NFC

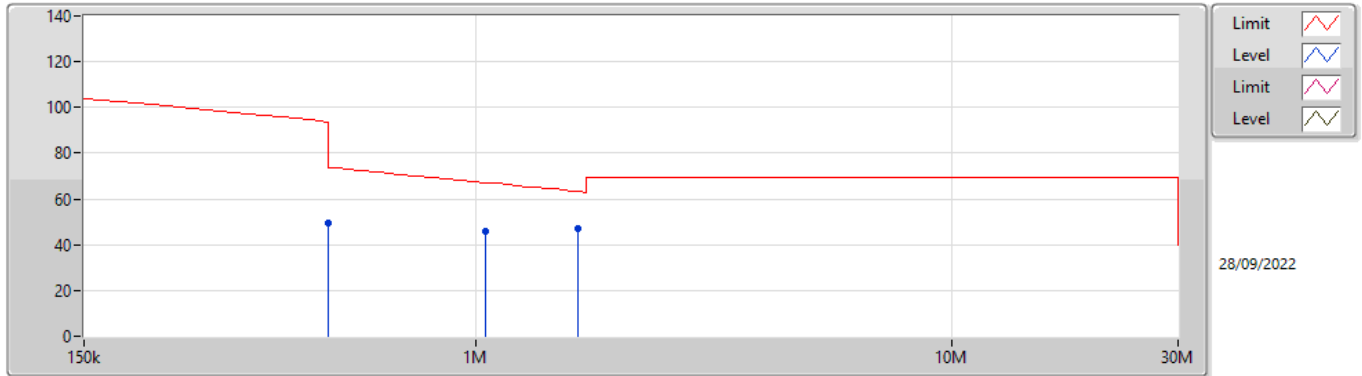
13.56MHz_Mode 1



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	18.87k	59.44	122.06	-62.62	20.48	3	Horizontal	360	1.00	-	38.96	20.46	0.02	-
PK	29.022k	57.14	118.33	-61.19	21.55	3	Horizontal	360	1.00	-	35.59	21.52	0.03	-
PK	40.866k	56.53	115.37	-58.84	21.16	3	Horizontal	360	1.00	-	35.37	21.12	0.04	-

NFC

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	490k	49.26	93.80	-44.54	20.28	3	Horizontal	0	1.00	-	28.98	20.20	0.08	-
PK	1.046M	45.77	67.24	-21.47	20.39	3	Horizontal	0	1.00	-	25.38	20.27	0.12	-
PK	1.643M	47.25	63.32	-16.07	20.13	3	Horizontal	0	1.00	-	27.12	19.98	0.15	-



Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Azimuth (°)	Height (m)	Comments
13.56M	-	-	-	-	-	-	-	-	-	-
NFC	Pass	PK	400.54M	42.89	46.00	-3.11	3	0	1.00	-

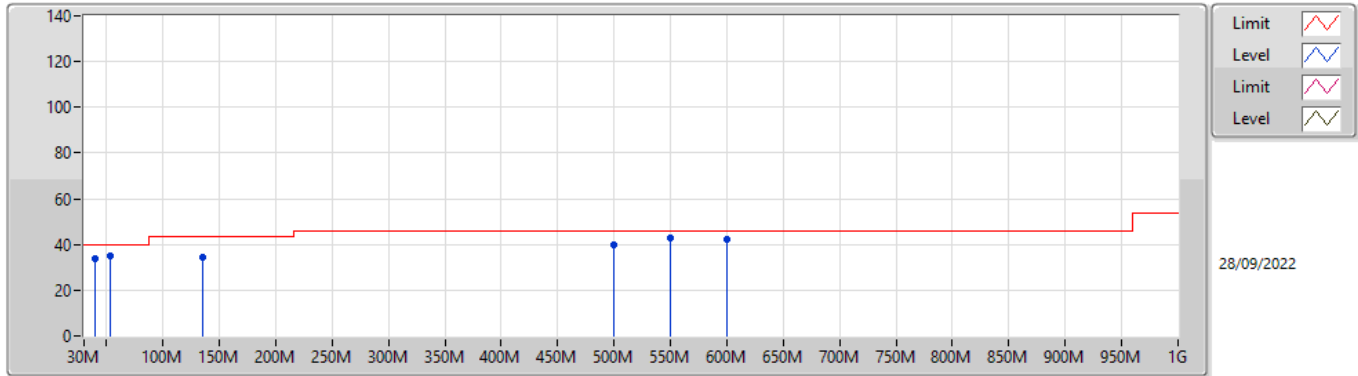


Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Azimuth (°)	Height (m)	Comments
NFC	-	-	-	-	-	-	-	-	-	-
13.56MHz_Mode 1	Pass	PK	39.7M	33.83	40.00	-6.17	3	360	1.00	-
13.56MHz_Mode 1	Pass	PK	53.28M	34.74	40.00	-5.26	3	360	1.00	-
13.56MHz_Mode 1	Pass	PK	134.76M	34.67	43.50	-8.83	3	360	1.00	-
13.56MHz_Mode 1	Pass	PK	499.48M	39.84	46.00	-6.16	3	360	1.00	-
13.56MHz_Mode 1	Pass	PK	600.36M	42.37	46.00	-3.63	3	360	1.00	-
13.56MHz_Mode 1	Pass	QP	549.92M	42.88	46.00	-3.12	3	98	1.00	-
13.56MHz_Mode 1	Pass	PK	134.76M	36.14	43.50	-7.36	3	0	1.00	-
13.56MHz_Mode 1	Pass	PK	198.78M	32.76	43.50	-10.74	3	0	1.00	-
13.56MHz_Mode 1	Pass	PK	256.98M	38.06	46.00	-7.94	3	0	1.00	-
13.56MHz_Mode 1	Pass	PK	299.66M	42.51	46.00	-3.49	3	0	1.00	-
13.56MHz_Mode 1	Pass	PK	400.54M	42.89	46.00	-3.11	3	0	1.00	-
13.56MHz_Mode 1	Pass	QP	549.92M	42.28	46.00	-3.72	3	63	1.49	-

NFC

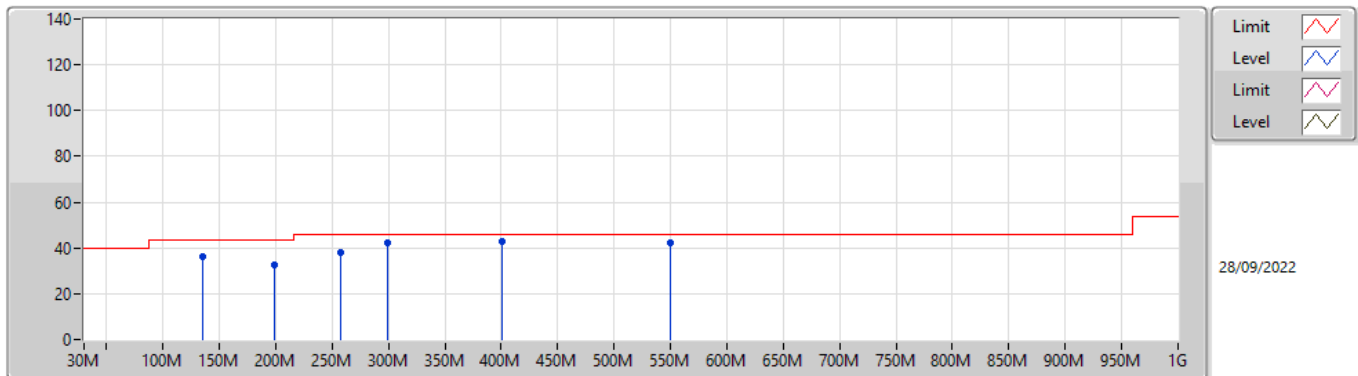
13.56MHz_Mode 1



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	39.7M	33.83	40.00	-6.17	-8.47	3	Vertical	360	1.00	-	42.30	18.05	1.02	27.54
PK	53.28M	34.74	40.00	-5.26	-14.18	3	Vertical	360	1.00	-	48.92	12.14	1.18	27.50
PK	134.76M	34.67	43.50	-8.83	-8.60	3	Vertical	360	1.00	-	43.27	16.71	1.90	27.21
PK	499.48M	39.84	46.00	-6.16	-1.28	3	Vertical	360	1.00	-	41.12	22.68	3.81	27.77
PK	600.36M	42.37	46.00	-3.63	0.02	3	Vertical	360	1.00	-	42.35	23.76	4.21	27.95
QP	549.92M	42.88	46.00	-3.12	0.26	3	Vertical	98	1.00	-	42.62	24.28	3.97	27.99

NFC

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	134.76M	36.14	43.50	-7.36	-8.60	3	Horizontal	0	1.00	-	44.74	16.71	1.90	27.21
PK	198.78M	32.76	43.50	-10.74	-10.22	3	Horizontal	0	1.00	-	42.98	14.34	2.34	26.90
PK	256.98M	38.06	46.00	-7.94	-5.65	3	Horizontal	0	1.00	-	43.71	18.35	2.67	26.67
PK	299.66M	42.51	46.00	-3.49	-5.40	3	Horizontal	0	1.00	-	47.91	18.29	2.92	26.61
PK	400.54M	42.89	46.00	-3.11	-2.79	3	Horizontal	0	1.00	-	45.68	21.02	3.38	27.19
QP	549.92M	42.28	46.00	-3.72	0.26	3	Horizontal	63	1.49	-	42.02	24.28	3.97	27.99