DEKRA Certification, Inc.
405 Glenn Dr. Suite 12,
Sterling, VA 20164
United States of America

#

ACCREDITED
Test Lab
Cert 2764.01

FCC LISTED, REGISTRATION NUMBER: 2764.01

ISED LISTED REGISTRATION NUMBER: 23595-1

Test report No:
2670ERM.005A1

Test report

USA FCC Part 15.225 and Part 15.209
CANADA RSS-210, RSS-Gen

(*) Identification of item tested	Qi Wireless Charger
(*) Trademark	Amphenol Tecvox
(*) Model and /or type reference	15W Wireless Charger
(*) Other identification of the product	FCC ID: 2AWLR-15WWC IC: 26295-15WWC
(*) Features	Qi 1.2.4, Basic & Extended Power Profiles (BPP, EPP)
Manufacturer	AMPHENOL TECVOX 4900 Bradford Drive Suite 1, Huntsville, Alabama 35805 USA.
Test method requested, standard	USA FCC Part 15.225 (10–1–19 Edition): Operation within the band 13.110 -14.010. USA FCC Part 15.209 (10–1–19 Edition).: Radiated emission limits, general requirements. CANADA RSS-210 Issue 10 (Dec 2019). CANADA RSS-Gen Issue 5 (March 2019). ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Domingo Galvez EMC&RF Lab Manager Digitally signed by Domingo Galvez DN: cn=Domingo Galvez, o=DEKRA Certification Inc., ou=Regulatory Lab, email=dgalvez@dekra.com, c=US Date: 2020.07.27 17:34:23 -04'00'
Date of issue	07-20-2020
Report template No	FDT08_22 (*) “Data provided by the client”

Index

Competences and guarantees

DEKRA Certification Inc. is a testing laboratory accredited by A2LA (The American Association for Laboratory Accreditation), to perform the tests indicated in the Certificate 2764.01

DEKRA Certification Inc. is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Certification Inc. has a calibration and maintenance program for its measurement equipment.

DEKRA Certification Inc. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Certification at the time of performance of the test.

DEKRA Certification Inc. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Certification Inc. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Certification internal document PODT000.

Frequency (MHz)	U(k=2)	Units
0,009 - 30	2.69	dB
30-180	3.82	dB
180-1000	2.61	dB
1000-18000	2.92	dB
18000-40000	2.15	dB

Data provided by the client

The test sample consist of 15W Qi Wireless Charger.

DEKRA declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
2670/1	Conducted Sample 1	20500W0	--	5/1/2020
2670/12	Harness Cable	--	--	5/1/2020

1. Sample S/01 has undergone following test(s)

   All conducted tests indicated in appendix A.

Sample S/02 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
2670/10	Commercial Sample 1	20500W0	--	5/1/2020
2670/12	Harness Cable	--	--	5/1/2020
2670/15	NFC Card Reader 1	A331R00	--	5/15/2020
2670/17	USB Cable	--	--	5/1/2020

1. Sample S/02 has undergone following test(s)

   All Radiated tests indicated in appendix A.

Sample S/01 & S/02 is composed of the following accessories:

Control Nº	Description	Model	Serial Nº	Date of reception
2670/11	Circuit Board	--	--	5/1/2020

#

Test sample description

<table>
<tr><td rowspan="4">Ports..... :</td><td colspan="2" rowspan="2">Port name and description</td><td colspan="3">Cable</td></tr>
<tr><td>Specified max length [m]</td><td>Attached during test</td><td>Shielded</td></tr>
<tr><td colspan="2">LIN</td><td>40m</td><td>☒</td><td>☐</td></tr>
<tr><td colspan="2"></td><td></td><td>☐</td><td>☐</td></tr>
<tr><td colspan="2"></td><td></td><td>☐</td><td>☐</td></tr>
<tr><td>Supplementary information to the ports..... :</td><td colspan="5"></td></tr>
<tr><td rowspan="6">Rated power supply .....:</td><td colspan="2" rowspan="2">Voltage and Frequency</td><td colspan="4">Reference poles</td></tr>
<tr><td>L1</td><td>L2</td><td>L3</td><td>N</td><td>PE</td></tr>
<tr><td>☐</td><td>AC:</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr>
<tr><td>☐</td><td>AC:</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr>
<tr><td>☒</td><td colspan="5">DC: Fuse limited (10A) 13.6V Battery</td></tr>
<tr><td>☐</td><td colspan="5">DC:</td></tr>
<tr><td>Rated Power .....:</td><td colspan="6"></td></tr>
<tr><td>Clock frequencies .....:</td><td colspan="6">127.778KHz, 20MHz, 27.12MHz, 100MHz</td></tr>
<tr><td>Other parameters.....:</td><td colspan="6"></td></tr>
<tr><td>Software version .....:</td><td colspan="6">3.0.0</td></tr>
<tr><td>Hardware version.....:</td><td colspan="6">13</td></tr>
<tr><td>Dimensions in cm (W x H x D)....:</td><td colspan="6">98 x 125.25 x 44.43mm</td></tr>
<tr><td rowspan="5">Mounting position.....:</td><td>☐</td><td colspan="5">Table top equipment</td></tr>
<tr><td>☐</td><td colspan="5">Wall/Ceiling mounted equipment</td></tr>
<tr><td>☐</td><td colspan="5">Floor standing equipment</td></tr>
<tr><td>☐</td><td colspan="5">Hand-held equipment</td></tr>
<tr><td>☒</td><td colspan="5">Other: Automotive</td></tr>
</table>

Modules/parts .....:	Module/parts of test item	Type	Manufacturer
Accessories (not part of the test item).....:	Description	Type	Manufacturer
Documents as provided by the applicant.....:	Description	File name	Issue date
	Product Sheet	20500W0 Wireless Charger Product Sheet-Internal.pdf	02-04-2020
	User Guide	20500W0 Wireless Charger Product User Guide-Internal.pdf	12-18-2019
	Block Diagram	20500W0 Wireless Charger Product Block Diagram-Internal.pdf	12-18-2019
Copy of marking plate:			
No Markup plate found.			

Identification of the client

AMPHENOL TECVOX

4900 BRADFORD DRIVE SUITE 1, HUNTSVILLE, ALABAMA 35805 USA.

Testing period and place

Test Location	DEKRA Certification Inc.
Date (start)	05-15-2020
Date (finish)	06-04-2020

Document history

Report number	Date	Description
2670ERM.005	07-20-2020	First release
2670ERM.005A1	07-24-2020	Second release

Modifications to the reference test report

It was introduced the following modification in respect to the test report number 2670ERM.005 related with the same samples:

Clauses/ Sub-Clauses	Modification	Justification
Page 16,18,20 /A3,A4,A5	Added tables with maximum values detected (Limit/Margin)	According to TCB comments

This modification test report cancels and replaces the test report 2670ERM.005.#

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Remarks and comments

The tests have been performed by the technical personnel: Divya Adusumilli, Bhagyashree Chaudhary, Koji Nishimoto and Lourdes María Valverde.

Testing verdicts

Not applicable :	N/A
Pass :	P
Fail :	F
Not measured :	N/M

Summary

FCC PART 15 PARAGRAPH / RSS-210					
Report Section	**15.225 Spec Clause**	**RSS Spec Clause**	**Test Description**	**Verdict**	**Remark**
A.1		RSS-Gen 6.7	99% Occupied Bandwidth	P	N/A
A.2	§ 15.225 (a)	RSS-210 Clause B.6 (a).	Field Strength of emissions within the band 13.553 MHz – 13.567 MHz	P	N/A
A.3	§ 15.225 (b)	RSS-210 Clause B.6 (b).	Field Strength of emissions within the band 13.410 MHz – 13.553 MHz and 13.567 – 13.710 MHz	P	N/A
A.4	§ 15.225 (c)	RSS-210 Clause B.6 (c).	Field Strength of emissions within the band 13.110 MHz – 13.410 MHz and 13.710 – 14.010 MHz	P	N/A
A.5	§ 15.225 (d)	RSS-210 Clause B.6 (d).	Field Strength of emissions outside of the band 13.110 MHz – 13.410 MHz	P	N/A
A.6	§ 15.225 (e)	RSS-210 Clause B.6	Frequency Tolerance of the carrier signal.	P	N/A

List of equipment used during the test

Conducted Measurements

CONTROL NUMBER	DESCRIPTION	MANUFACTURER	MODEL	LAST CALIBRATION	NEXT CALIBRATION
1039	Signal analyzer	Rohde & Schwarz	FSV40	2018/10	2020/10
0101	Climatic Chamber	Espec	ESL-2CA	2020/04	2021/04

Radiated Measurements

CONTROL NUMBER	DESCRIPTION	MANUFACTURER	MODEL	LAST CALIBRATION	NEXT CALIBRATION
1179	Semi anechoic Absorber Lined Chamber	Frankonia	SAC 3 plus “L”	N/A	N/A
1064	Biconical Log antenna	ETS LINDGREN	3142E	2018/01	2021/01
1058	Double-ridge Waveguide Horn antenna 1-18 GHz	ETS LINDGREN	3115	2020/05	2023/05
1012	EMI TEST RECEIVER	Rohde & Schwarz	ESR 26	2019/12	2021/12

Appendix A: Test results

Appendix A Content

PRODUCT INFORMATION

The following information is provided by the client:

Information	Description
Operating Frequency Band or Bands	13.56 MHz
Operating Frequency or Frequencies	13.56 MHz
Channel Bandwidth	--
Extreme operating conditions	
- Temperature range	-20 ºC to +55 ºC
Nominal Voltage	
- Supply Voltage	13.6 Vdc

Test modes available:

- Nominal Operating Frequency: 13.56 MHz

DESCRIPTION OF TEST CONDITIONS

TEST CONDITIONS	DESCRIPTION
TC#01	Power supply (V): $V_{nominal}$ = 13.56 V V_{min} = 9 V V_{max} = 16 V Temperature (ºC): Temperature range: -20ºC to +55 ºC The subscript nom indicates normal test conditions. The subscripts min and max indicate extreme test conditions (minimum and maximum respectively). N/A: Not Applicable. (*) Declared by applicant. Test Frequencies for Conducted and Radiated tests: 13.56 MHz

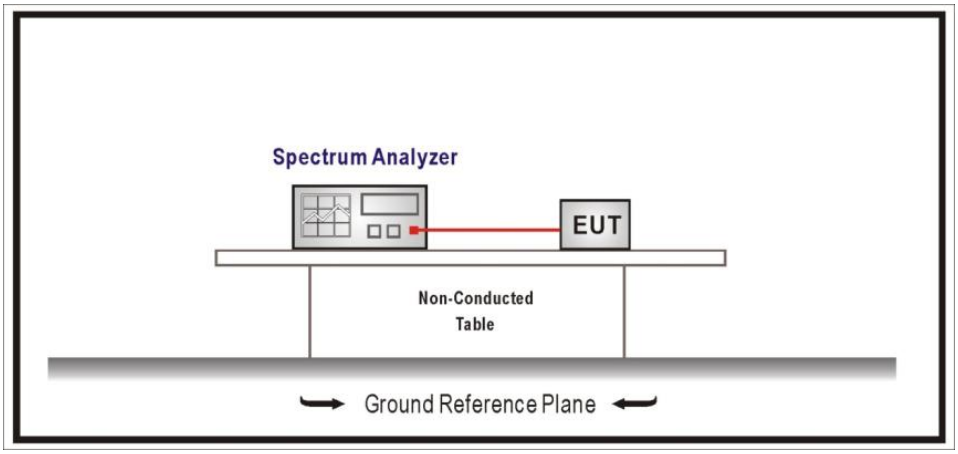
TEST A.1: 99% OCCUPIED BANDWIDTH

LIMITS:	Product standard:	RSS-Gen
	Test standard:	RSS-Gen 6.7

LIMITS

The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs

TEST SETUP	



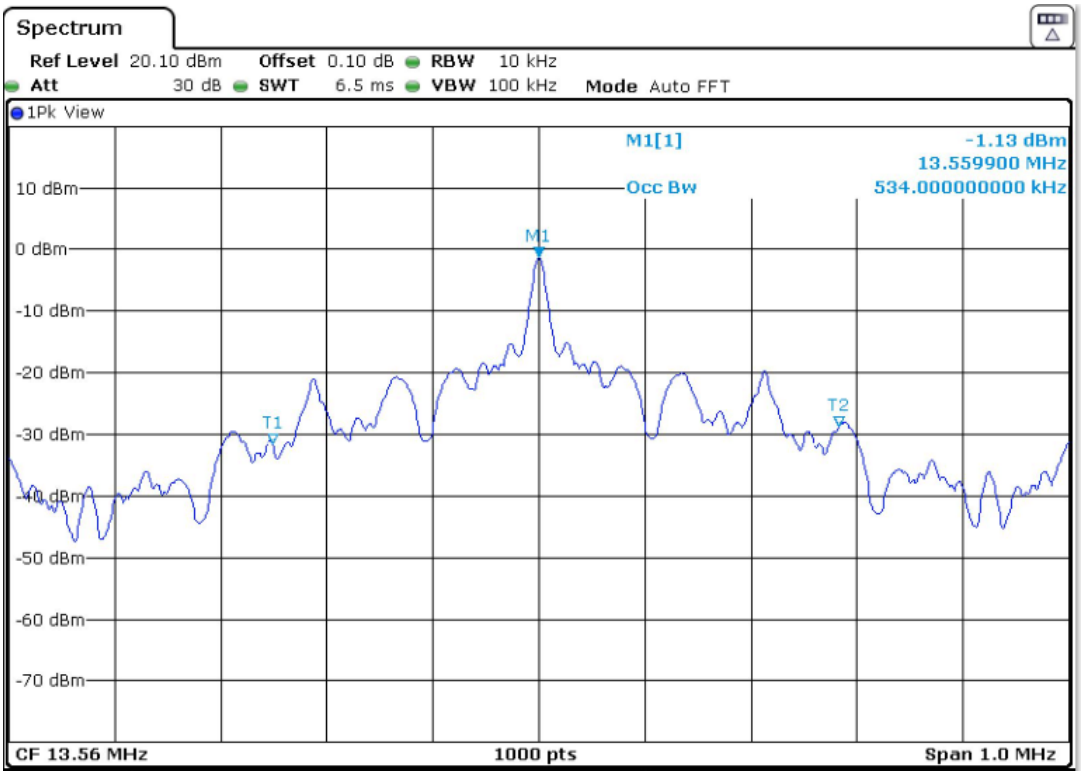
TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01
TEST RESULTS:	PASS

NFC Operating Frequency: 13.56MHz

Center Frequency (MHz)	13.559
99% bandwidth (KHz)	534
Measurement Uncertainty (KHz)	<±0.28

#

TEST RESULTS (Cont.):	



TEST A.2: FIELD STRENGTH OF EMISSIONS WITHIN THE BAND 13.553 MHZ – 13.567 MHZ

LIMITS:	Product standard:	Part 15 Subpart C §15.225 and RSS-210
	Test standard:	Part 15 Subpart C §15.225(a) and RSS-210 clause B.6 (a)

LIMITS

The field strength of any emissions within the band 13.553 – 13.567 MHz shall not exceed 15,848 microvolts/meter (84 dBµV/m) at 30 meters.

TEST SETUP	

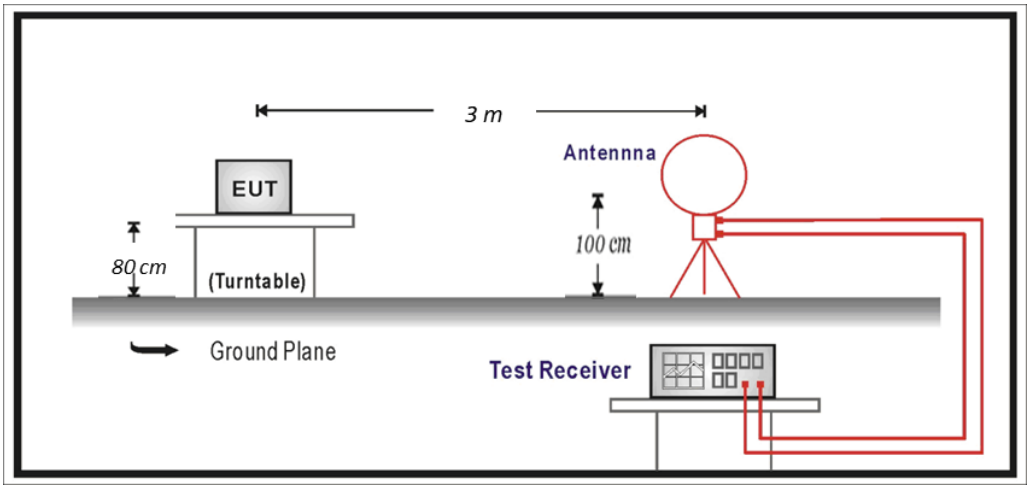
All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Loop antenna for the range between 9 kHz to 30 MHz) is situated at a distance of 3 m.

For radiated emissions in the range 9 kHz to 30 MHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 40 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º to find the maximum radiated emission.

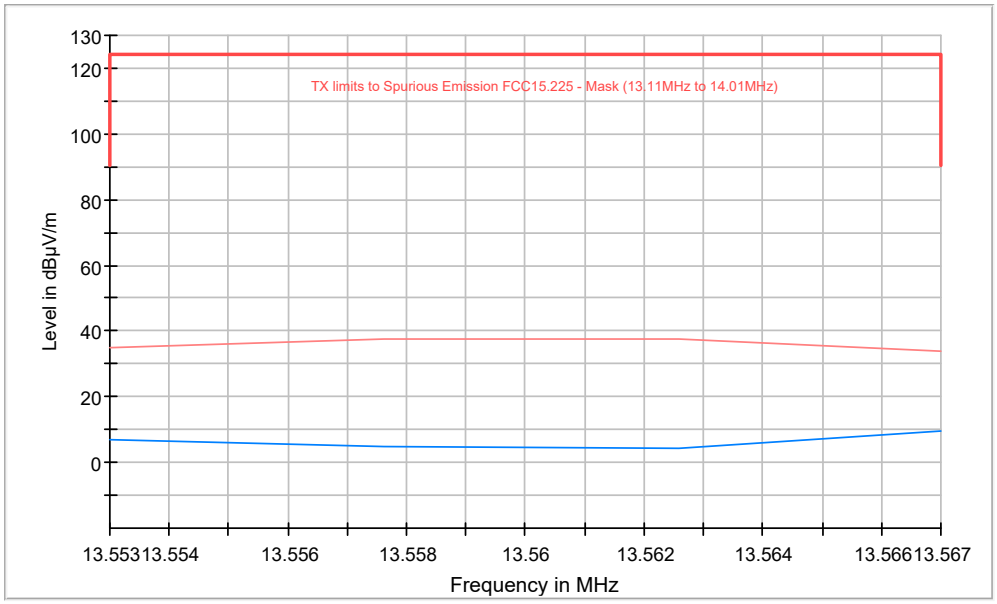
Three different orientations (X, Y, and Z) of receiving loop antenna orientation were tested to determine the worst case shown in the following test results.

Radiated measurements setup 9 kHz to 30 MHz.



TESTED SAMPLES:	S/02
TESTED CONDITIONS MODES:	TC#01
TEST RESULTS:	PASS

Band 13.553 MHz – 13.567 MHz



PK+_MAXH
PK+_CLRWR
TX limits to Spurious Emission FCC15.225 - Mask (13.11MHz to 14.01MHz)

Limit and Margin

Frequency (MHz)	PK+_CLRWR (dBµV/m)	PK+_MAXH (dBµV/m)	Pol	Azimuth (deg)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
13.5576251	**4.57**	**37.58**	**H**	**-80.0**	**86.42**	**124.0**

#

TEST A.3: FIELD STRENGTH OF EMISSIONS WITHIN THE BAND 13.410 MHZ – 13.553 MHZ AND 13.567 – 13.710 MHZ

LIMITS:	Product standard:	Part 15 Subpart C §15.225 and RSS-210
	Test standard:	Part 15 Subpart C §15.225(b) and RSS-210 clause B.6 (b)

LIMITS

The field strength of any emissions within the band 13.553 – 13.567 MHz shall not exceed 334 microvolts/meter (50.47 dBµV/m at 30 meters.

TEST SETUP	

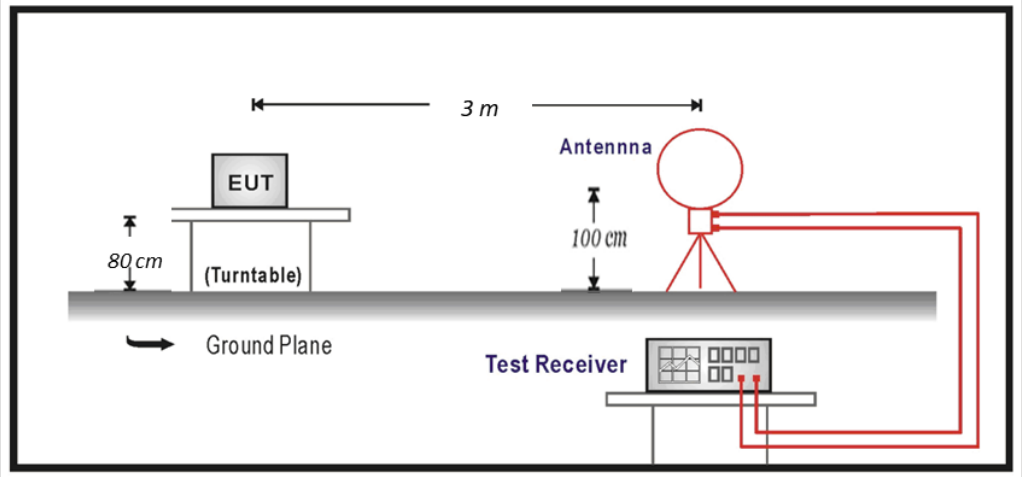
All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Loop antenna for the range between 9 kHz to 30 MHz) is situated at a distance of 3 m.

For radiated emissions in the range 9 kHz to 30 MHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 40 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º to find the maximum radiated emission.

Three different orientations (X, Y, and Z) of receiving loop antenna orientation were tested to determine the worst case shown in the following test results.

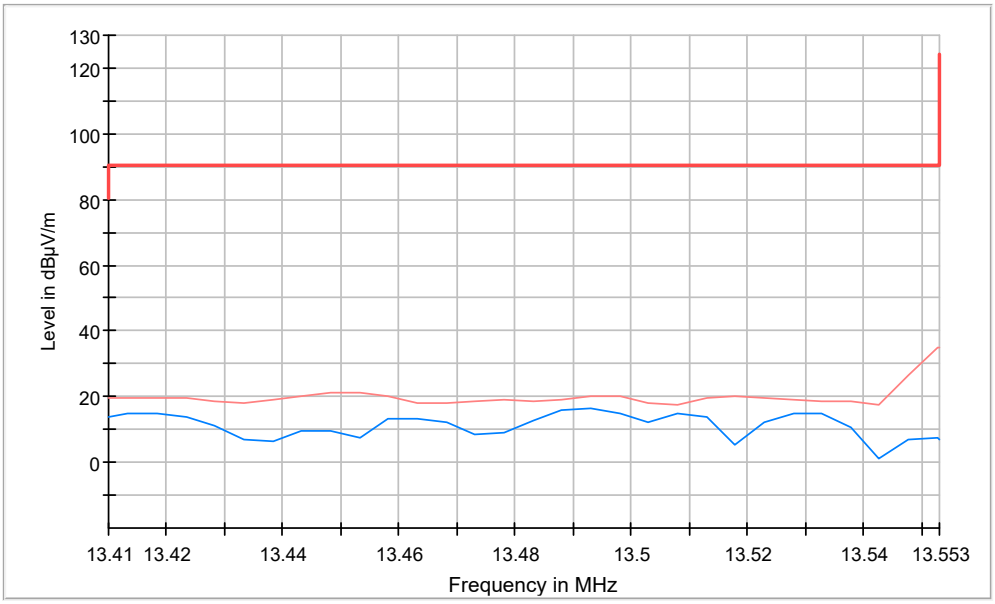
Radiated measurements setup 9 kHz to 30 MHz.



#

TESTED SAMPLES:	S/02
TESTED CONDITIONS MODES:	TC#01
TEST RESULTS:	PASS

Band 13.410 MHz – 13.553 MHz



PK+_MAXH
PK+_CLRWR
TX limits to Spurious Emission FCC15.225 - Mask (13.11MHz to 14.01MHz)

#

Limit and Margin

Frequency (MHz)	PK+_CLRWR (dBµV/m)	PK+_MAXH (dBµV/m)	Pol	Azimuth (deg)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
13.5526501	7.30	34.84	H	-80.0	55.63	90.47

TEST A.4: FIELD STRENGTH OF EMISSIONS WITHIN THE BAND 13.110 MHZ – 13.410 MHZ AND 13.710 – 14.010 MHZ

LIMITS:	Product standard:	Part 15 Subpart C §15.225 and RSS-210
	Test standard:	Part 15 Subpart C §15.225(c) and RSS-210 clause B.6 (c)

LIMITS

The field strength of any emissions within the band 13.553 – 13.567 MHz shall not exceed 106 microvolts/meter (40.51 dBµV/m) at 30 meters.

TEST SETUP	

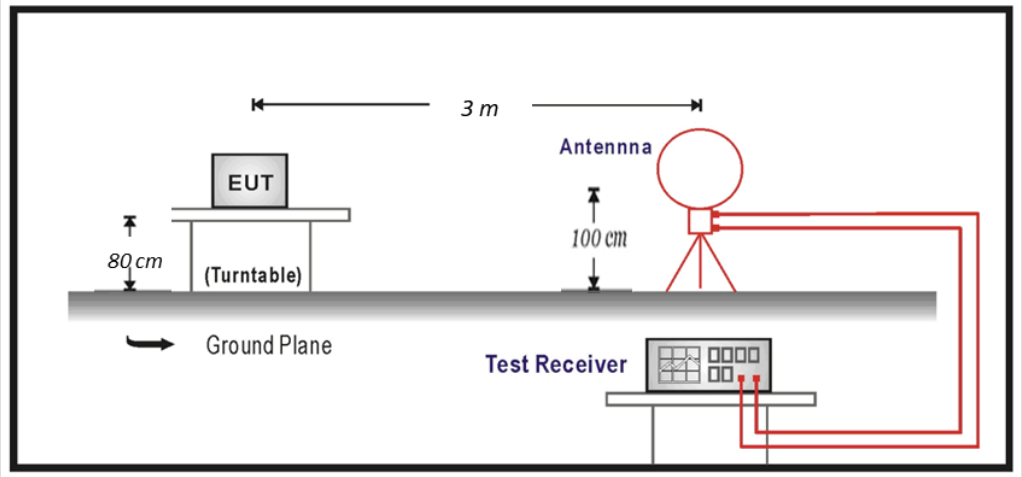
All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Loop antenna for the range between 9 kHz to 30 MHz) is situated at a distance of 3 m.

For radiated emissions in the range 9 kHz to 30 MHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 40 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º to find the maximum radiated emission.

Three different orientations (X, Y, and Z) of receiving loop antenna orientation were tested to determine the worst case shown in the following test results.

Radiated measurements setup 9 kHz to 30 MHz.



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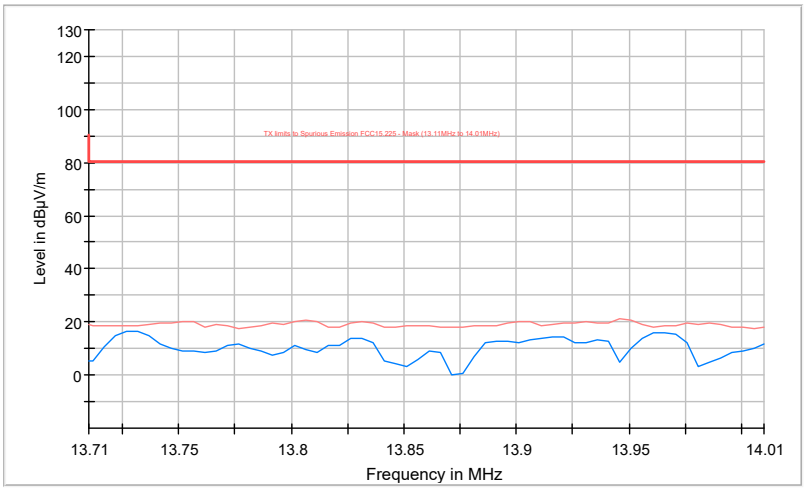
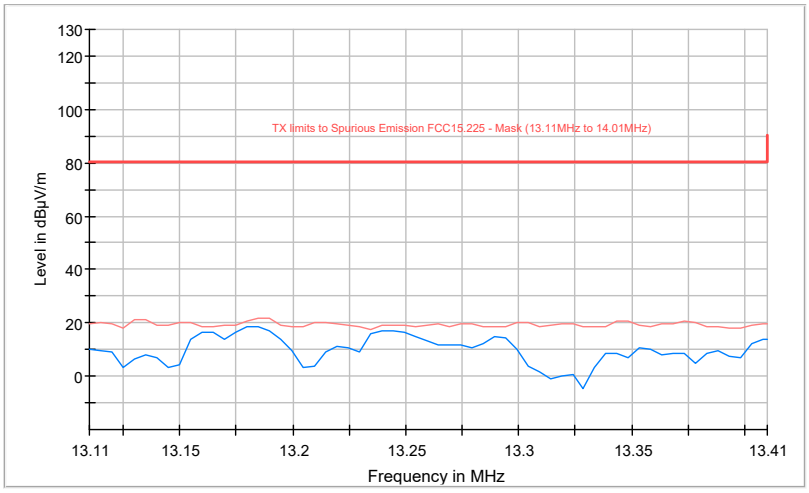
TESTED SAMPLES:	S/02
TESTED CONDITIONS MODES:	TC#01
TEST RESULTS:	PASS

Band 13.110 MHz – 13.410 MHz



Frequency (MHz)	PK+_CLRWR (dBµV/m)	PK+_MAXH (dBµV/m)	Pol	Azimuth (deg)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
13.9456751	4.71	21.07	H	-180.0	59.45	80.51

Band 13.710 MHz – 14.010 MHz



Frequency (MHz)	PK+_CLRWR (dBµV/m)	PK+_MAXH (dBµV/m)	Pol	Azimuth (deg)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
13.18948	17.17	21.57	H	-100.0	58.94	80.51

TEST A.5: FIELD STRENGTH OF EMISSIONS OUTSIDE OF THE BAND 13.110 MHZ – 13.410 MHZ

LIMITS:	Product standard:	Part 15 Subpart C §15.225 and RSS-210
	Test standard:	Part 15 Subpart C §15.225(d) and RSS-210 clause B.6 (d)

LIMITS

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	300
1.705 - 30.0	30	29.54	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

TEST SETUP

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Loop antenna for the range between 9 kHz to 30 MHz and Bilog antenna for the range between 30 MHz to 1 GHz) is situated at a distance of 3 m, and at a distance of 1m for the frequency range 1-26 GHz (1 GHz-18 GHz and 18 GHz-26 GHz Double ridge horn antennas).

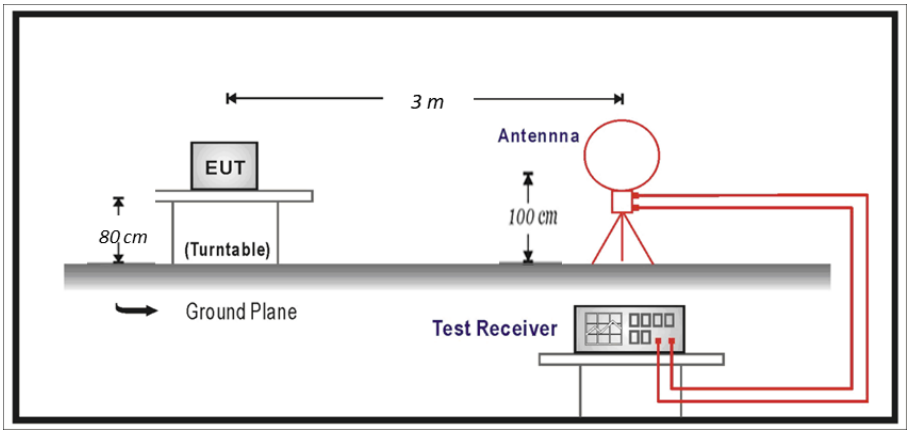
For radiated emissions in the range 9 kHz to 30 MHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 40 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and in the range between 30 MHz and 200 MHz the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

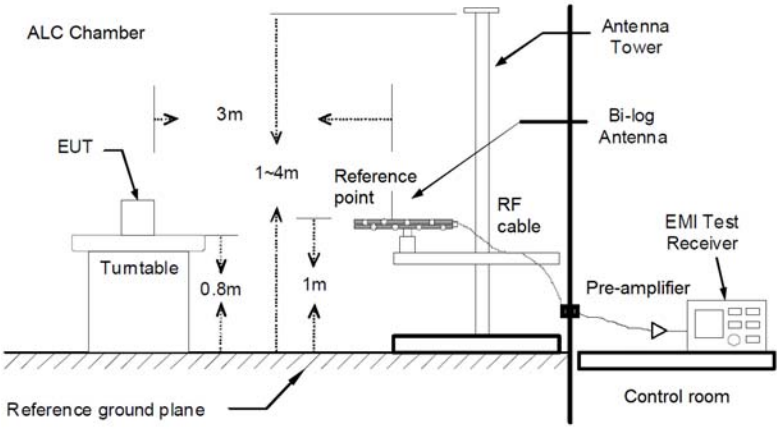
In the range between 9 kHz and 30 MHz three different orientations (X, Y, and Z) of receiving loop antenna were tested to determine the worst case shown in the following test results.

TEST SETUP (cont.):	

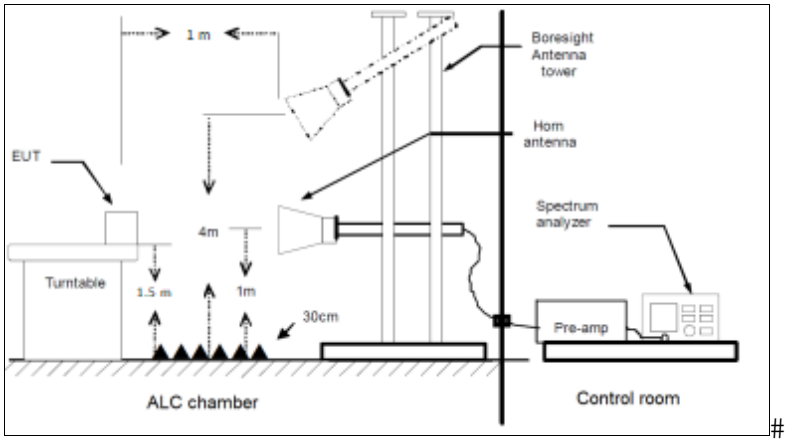
Radiated measurements setup 9 kHz to 30 MHz



Radiated measurements setup 30 MHz to 200 MHz



Radiated measurements setup above 1 GHz



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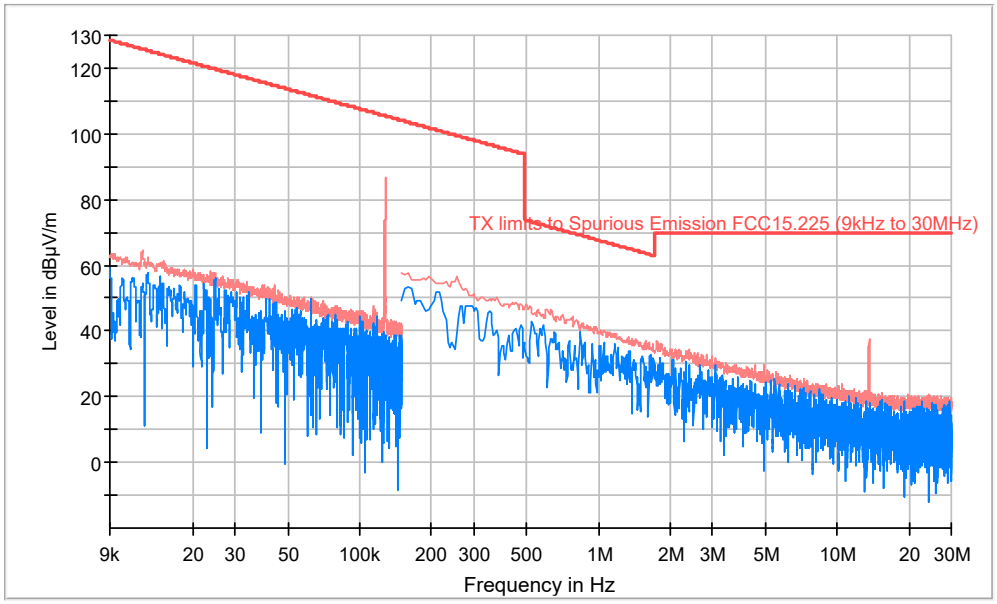
TESTED SAMPLES:	S/02
TESTED CONDITIONS MODES:	TC#01(NFC)
TEST RESULTS:	PASS

Frequency Range: 9 KHz – 30 MHz



PK+_MAXH
PK+_CLRWR
TX limits to Spurious Emission FCC15.225 (9kHz to 30MHz)

Maximizations

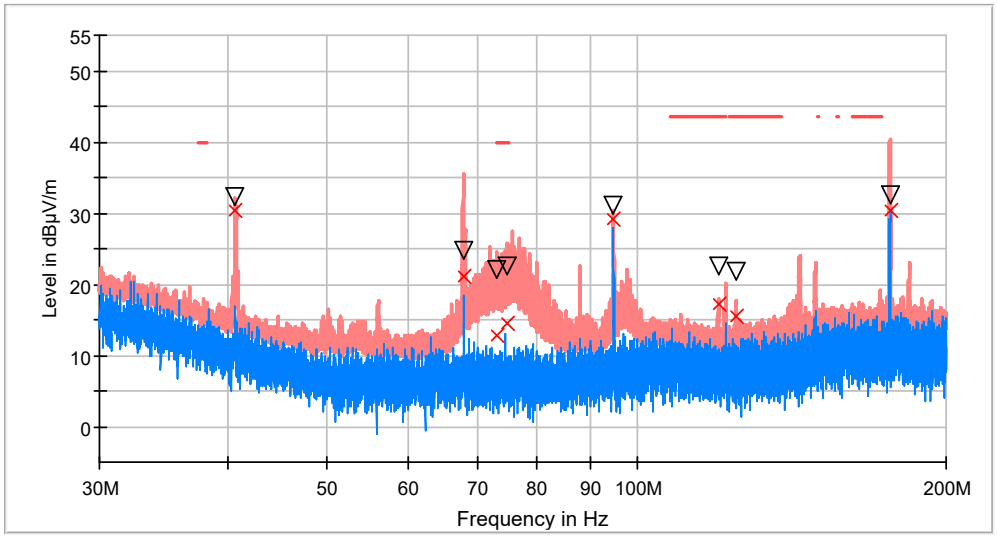
Frequency (MHz)	PK+_CLRWR (dBµV/m)	PK+_MAXH (dBµV/m)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)	Pol	Comment
0.012290	54.1	64.4	71.7	125.8	H	
0.114529	32.4	47.2	74.0	106.4	H	
0.127717	31.2	86.8	74.3	105.5	H	Fundamental WPT
0.254475	39.3	56.3	60.2	99.5	H	
4.901125	21.8	29.9	47.7	69.5	H	
13.562600	4.4	37.4	65.1	69.5	H	Fundamental NFC

#

TEST RESULTS:	PASS

Frequency Range: 30 MHz – 200 MHz

RF_FCC_15.225_E Field_30MHz_200MHz



PK+_MAXH
PK+_CLRWR
TX limits to Spurious Emission FCC15.225 (30MHz to 1GHz) Restricted Bands QPK Limit
MaxPeak-PK+ (Single)
QuasiPeak-QPK (Single)

Maximizations

Frequency (MHz)	PK+_CLRWR (dBµV/m)	PK+_MAXH (dBµV/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)	Pol
40.667500	32.3	30.3	---	---	V
67.808000	24.8	21.2	---	---	V
73.027000	22.0	12.8	27.2	40.0	V
74.939500	22.5	14.4	25.6	40.0	V
94.923000	31.0	29.2	---	---	H
120.015000	22.6	17.3	26.3	43.5	V
124.987500	21.8	15.6	28.0	43.5	V
176.302000	32.7	30.4	---	---	V

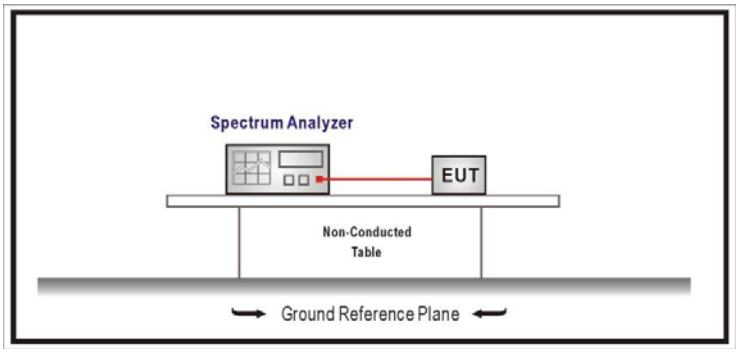
#

TEST A.6: FREQUENCY TOLERANCE OF THE CARRIER SIGNAL

LIMITS:	Product standard:	Part 15 Subpart C §15.225 and RSS-210
	Test standard:	Part 15 Subpart C §15.225(e) and RSS-210 clause B.6

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of –20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

TEST SETUP	



TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01
TEST RESULTS:	PASS

Nominal Operating Frequency: 13.56 MHz

Frequency stability over temperature variations.

Temperature (ºC)	Frequency Error (kHz)	Frequency Error (%)
+50	0.5	0.0369
+40	0.5	0.0369
+30	0.5	0.0369
+20	0.5	0.0369
+10	-0.5	-0.0369
0	-0.5	-0.0369
-10	-0.5	-0.0369
-20	-0.5	-0.0369
-30	0.5	0.0369

Frequency stability over voltage variations.

AC Supply voltage	Voltage (V)	Frequency Error (kHz)	Frequency Error (%)
Vmax	9	0.5	0.0369
Vmin	16	0.5	0.0369