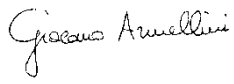
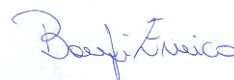


TEST REPORT

APPLICANT:	MUNDO READER, S.L. CALLE SOFIA, 10 P.I EUROPOLIS Las Rozas - Madrid, 28232 Spain	
APPLICANT REFEREE:	MR. IVAN GARCIA	
EUT DESCRIPTION	3D PRINTER	
EUT MODEL	WITBOX GO!	
FCC ID	2AKDW-WG	
EUT TRADEMARK	MUNDO READER	
MANUFACTURER	MUNDO READER, S.L.	
REFERENCE STANDARDS	47 CFR FCC part 15 subpart C Section 15.207 Section 15.209 Section 15.225	
TEST REPORT NUMBER	FCCTR_170244-4	
TEST REPORT ISSUE DATE	31/07/2017	
TESTING LABORATORY	Prima Ricerca & Sviluppo S.r.l. Via Campagna, 92 -22020 Faloppio (Co) – Italy FCC test registration number: 421808	
TESTING LOCATION	As Above	
DATE OF TEST SAMPLE RECEIPT	February 2017	
DATE OF TEST	June 2017	
TESTED BY	Giacomo ARMELLINI Responsabile Laboratorio EMC e RADIO/ EMC and RADIO Laboratory Manager	
APPROVED BY	Enrico Banfi Laboratory Manager	

*The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
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1. RELEASE CONTROL RECORD

TEST REPORT NUMBER	REASON OF CHANGE	DATE OF ISSUE
FCCTR_170244-0	Original release	31/07/2017
FCCTR_170244-1	Editorial Change	31/07/2017
FCCTR_170244-2	Added FCCID Number; Added Uncertainty table	31/07/2017
FCCTR_170244-3	Editorial Change	31/07/2017
FCCTR_170244-4	Editorial Change	31/07/2017

2. TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

2.1 Identification

Trademark:	MUNDO READER
Manufacturer:	MUNDO READER, S.L.
Type of Equipment :	3D PRINTER
Model name:	WITBOX GO!
Serial number :	prototype
FCC ID	2AKDW-WG
Country of manufacturer:	SPAIN

2.2 Technical data

Product type:	Radio Equipment
Radio type:	Intentional radiators
Product description / application	The EUT is 13,56MHz NFC Reader
Power supply requirements :	110Vac from the Printer
Operating Frequency range	13.553-13.567 MHz
Operating Frequency:	13.559MHz
Channel bandwidth	---
Channel spacing	---
Number of Channel	Single
Type of modulation :	AM
Antenna Type	Integral loop coil antenna
Power Control Setting	---

2.3 *Ports identification*

This section contains descriptions of all signal ports and AC/DC power input/output ports, the length and the type of the cable provided by manufacturer needed for the tests. Moreover it is specified if the ports are ever or optionally connected.

Port	Description	Connector	Max cable length
Enclosure	Plastic	Screw	-----
AC mains input/output ports	110 V 60 Hz	Plug	< 3m
DC mains input/output ports	Port not present	-----	-----
Signals / Control Ports	Serial port	uUSB	< 3m
Telecommunication port	Port not present	-----	-----
Note: During the tests all cables must be what provided the manufacturer or the same that used in the real employment of the EUT.			

2.4 *Auxiliary equipment*

- None

3. OPERATING TEST MODES AND CONDITIONS

In the following table there are the operating conditions adopted during tests identified by an indicator (#..) at which has been referred the item “Operating condition of the equipment under test”

<i>Operating condition</i>	<i>Description</i>
#1	<i>Continuous transmission</i>

Special Test Software: Special software and hardware by the Applicant to operate the EUT at each channel frequency continuously.

Special Hardware Used: The RF Module has been tested by an evaluation board supplied by BQ (See Photographic documentation).

Transmitter Test Antenna: The EUT has been tested with the antenna fitted in a manner typical of normal intended use as integral antenna equipment as described with the test results.

4. REFERENCE STANDARD / DOCUMENT FOR PERFORMED TESTS

Cfr 47 part 15 subpart C par. 15.225	§15.225 Operation within the band 13.110-14.010 MHz.
FCC Part 15 (Subpart C)	§15.207 Conducted limits
FCC Part 15 (Subpart C)	§15.209 Radiated emission limits; general requirements
ANSI C63.4:2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10:2013	American National Standard for Testing Unlicensed Wireless Devices

5. SUMMARY OF TEST RESULTS

Port	Phenomena	Basic standard	Operating condition ¹	Result
AC Mains	Conducted Limits	FCC Part 15 §15.207	#1	Within the limit
Enclosure	Radiated emission limits; general requirements.	FCC Part 15 §15.209	#1	Within the limit
	Field strength limits 13.553-13.567MHz	FCC Part 15 15.225(a)	#1	Within the limit
	Field strength limits Out of Bands Emissions	FCC Part 15 15.225(b)(c)(d)	#1	Within the limit
	Frequency Tolerance	FCC Part 15 § 15.225(e)	#1	Within the limit

6. MEASUREMENT UNCERTAINTY

Parameter	Uncertainty
Conducted Emission	±2,7 dBm
RF Output Power, conducted	±1,5 dB
Power spectral density, conducted	±3 dB
All Emissions Radiated	±4 dB
Temperature	±1°C
Humidity	±5%
DC Voltage	±3%
AC Voltage	±3%
Frequency	±0,00001%
Time	5%

7. TEST RESULTS

CONDUCTED LIMITS	10
FIELD STRENGTH	13
FREQUENCY TOLERANCE	20

TEST
1.

CONDUCTED LIMITS

**REFERENCE
DOCUMENT**

According to §15.207

- (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

- (b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

(1) For carrier current system containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 μ V within the frequency band 535-1705 kHz, as measured using a 50 μ H/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in §15.205, §15.209, §15.221, §15.223, or §15.227, as appropriate.

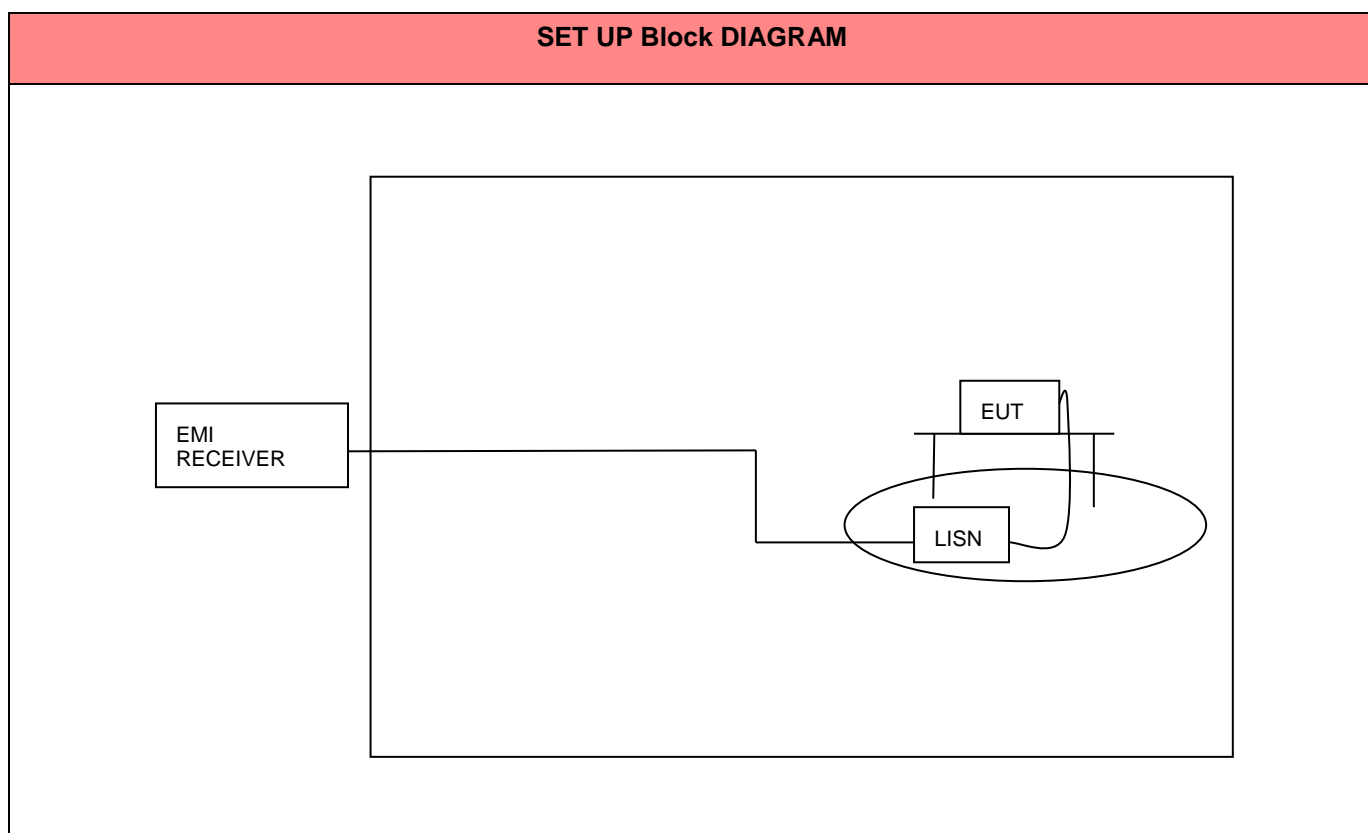
- (c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

TEST SETUP	In according to ref std
TEST LOCATION	Semi Anechoic Chamber / Radio test Area
TYPE OF MEASUREMENT	CONDUCTED
TEST EQUIPMENT	Emi Receiver / Spectrum Analyzer Rohde&Schwarz mod. ESU40 Artificial Network Rohde & Schwarz Mod. ESH3-Z5
TEST PERFORMED BY	Giacomo Armellini
TESTING DATE	June 2017

TEST CONDITIONS:	MEASURED
Ambient temperature : 23°C ± 5°C	24°C
Ambient humidity : 25 – 75 %rH	45%
Pressure : 85 – 106 kPa (860 mbar – 1060 mbar)	960mbar

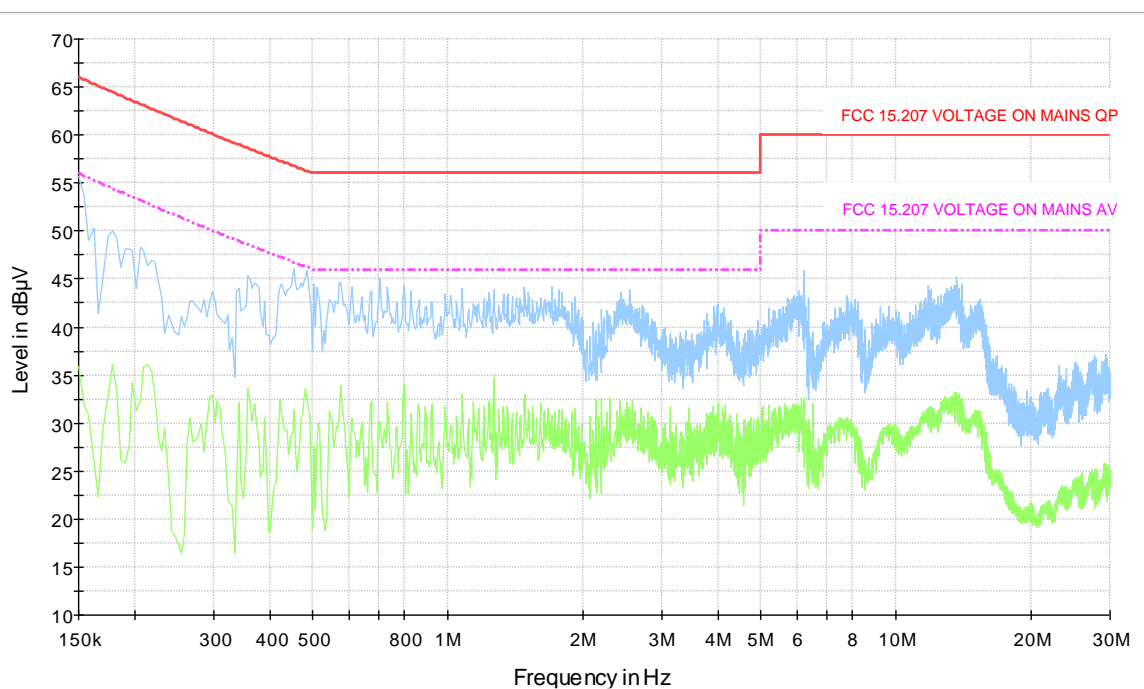
OPERATING CONDITION	#1, DUTY CYCLE 100%
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TEST RESULT	WITHIN THE LIMITS
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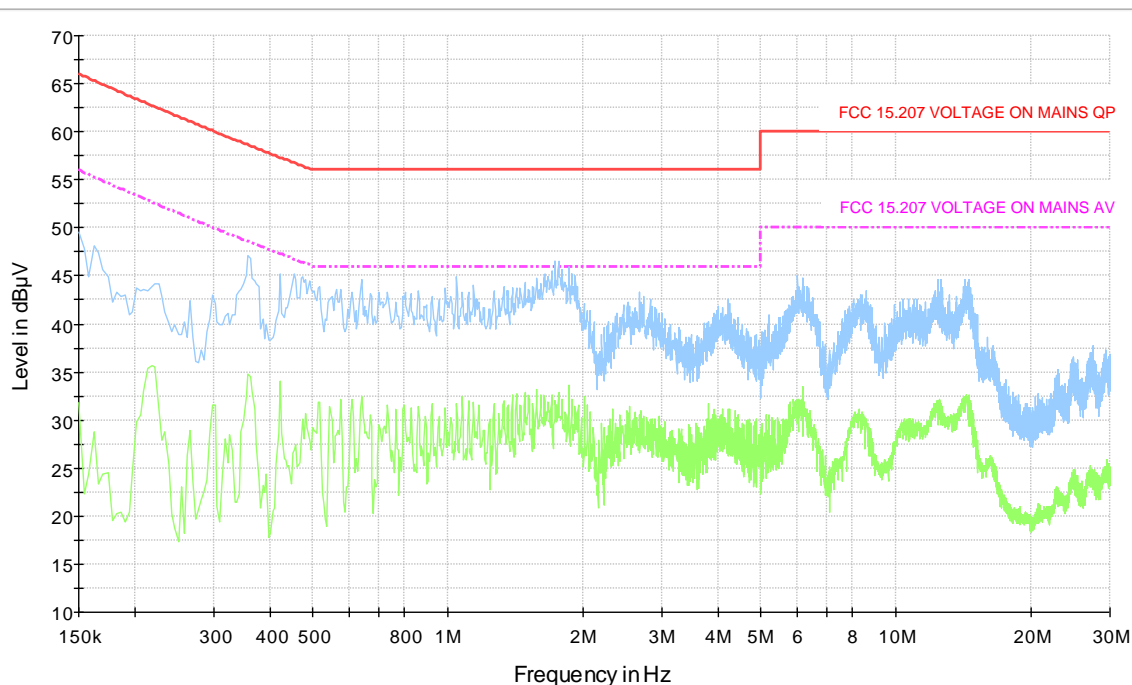




L1 LINE



NEUTRAL LINE



**TEST
2.**

FIELD STRENGTH

**REFERENCE
DOCUMENT**

According to §15.225 and §15.209:

- (a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- (b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- (c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209..

TEST SETUP	In according to ref std
TEST LOCATION	Semi Anechoic Chamber / Radio test Area
TYPE OF MEASUREMENT	RADIATED
TEST EQUIPMENT	Emi Receiver / Spectrum Analyzer Rohde&Schwarz mod. ESU40
TEST PERFORMED BY	Giacomo Armellini
TESTING DATE	June 2017

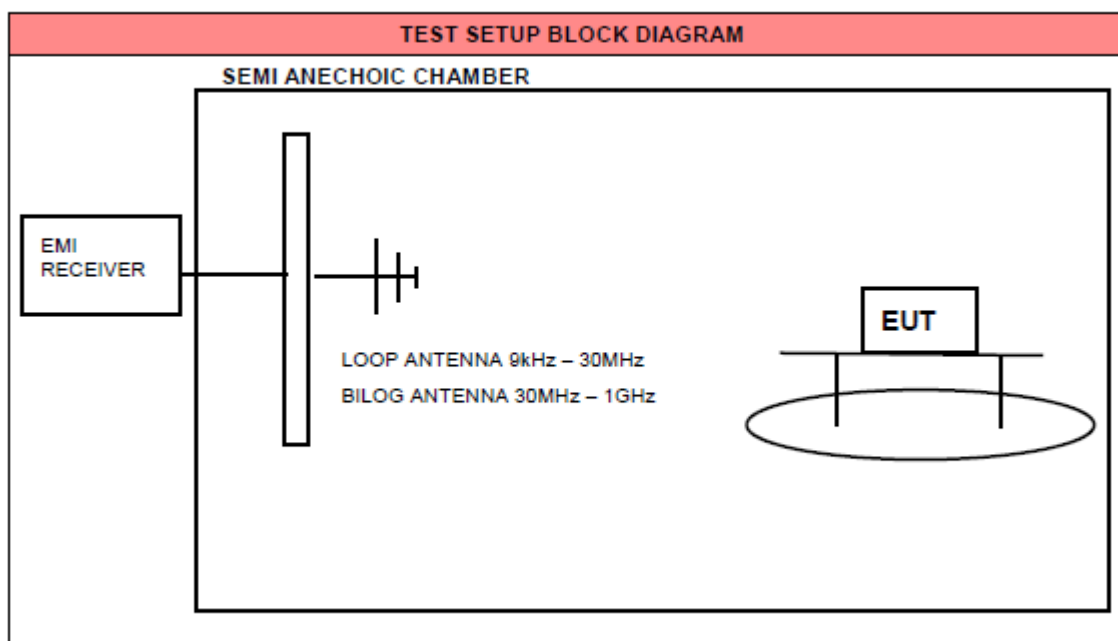
TEST CONDITIONS:	MEASURED
Ambient temperature : 23°C ± 5°C	24°C
Ambient humidity : 25 – 75 %rH	45%
Pressure : 85 – 106 kPa (860 mbar – 1060 mbar)	960mbar

OPERATING CONDITION	#1, DUTY CYCLE 100%
----------------------------	---------------------

TEST RESULT	WITHIN THE LIMITS
--------------------	--------------------------

MEASUREMENT PARAMETER	
Detector:	Peak / Quasi Peak / Average
Resolution bandwidth:	300Hz ($f < 150\text{kHz}$) 10kHz ($150\text{kHz} < f < 30\text{MHz}$) 100kHz ($30\text{MHz} < f < 1\text{GHz}$) 1MHz ($f > 1\text{GHz}$)
Video bandwidth:	1kHz ($f < 150\text{kHz}$) 30kHz ($150\text{kHz} < f < 30\text{MHz}$) 300kHz ($30\text{MHz} < f < 1\text{GHz}$) 3MHz ($f > 1\text{GHz}$)
Span:	see plots
Trace-Mode:	Max. hold

TEST DESCRIPTION
<p>Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously - rotating, remotely - control led turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency.</p> <p>The EUT is placed at test table.</p> <p>For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m</p> <p>Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m~4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3m.</p> <p>This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.</p>



FCC Cfr 47 15.31 (f) (2)

(2) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; 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 extrapolated to the specified distance by either making measurements at a minimum of two 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). This paragraph (f) shall not apply to Access BPL devices operating below 30 MHz.

Limit recalculation factor:

Limit @3m (dBuV/m) = Limit @300m (dBuV/m) - 40Log(3m/300m) dB = Limit @ 300m (dBuV/m) +80dB
Limit @3m (dBuV/m) = Limit @30m (dBuV/m) - 40Log(30m/300m) dB = Limit @ 30m (dBuV/m) +40dB

§15.225 Operation within the band 13.110-14.010 MHz.

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

(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

Frequency Range (MHz)	Limit @30m (dBuV/m)	Limit @3m (dBuV/m)
below 13.110	§ 15.209 limit	§ 15.209 limit + 40dB
13.110 – 13.410	40.5	80.5
13.410 – 13.553	50.47	90.47
13.553 – 13.567	84	124
13.567 – 13.710	50.47	90.47
13.710 – 14.010	40.5	80.5
Above 14.010	§ 15.209 limit	§ 15.209 limit + 40dB

§15.209 Radiated emission limits; general requirements.

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

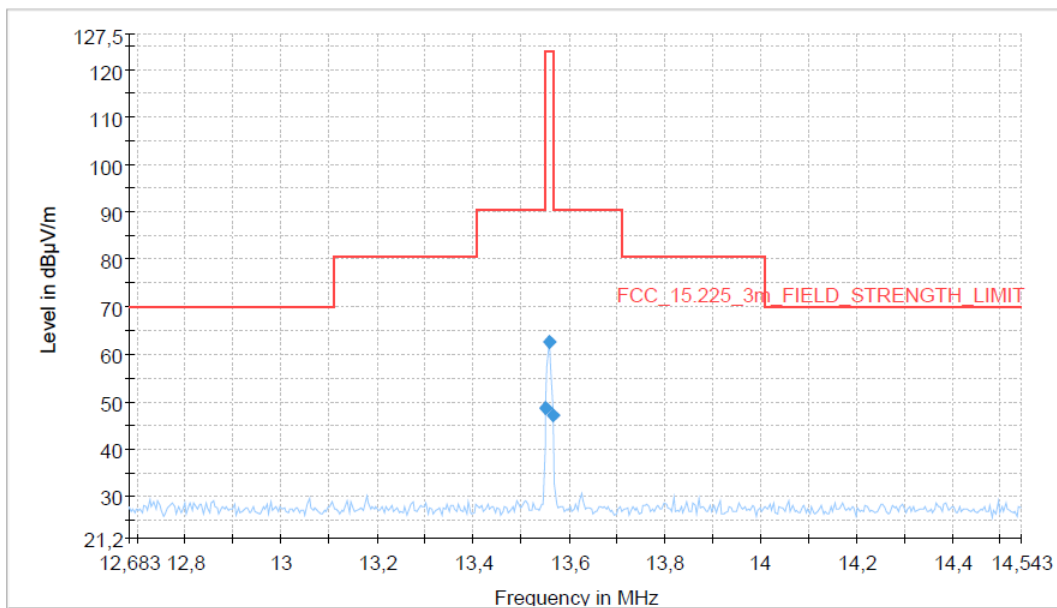
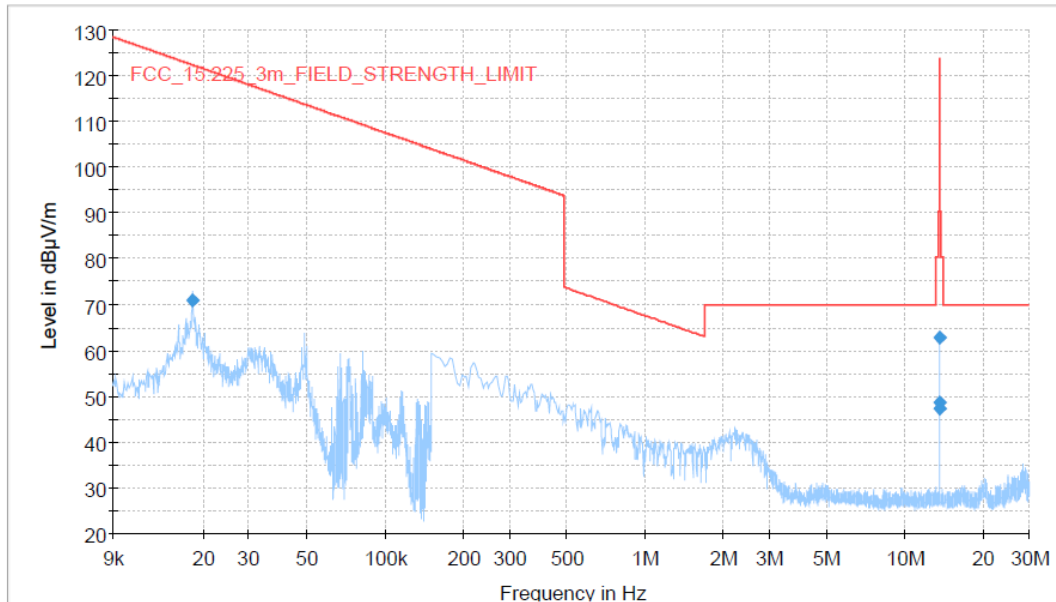
Frequency Range (MHz)	Limit @300m (dBuV/m)	Limit @3m (dBuV/m)
0.009 – 0.490	48.5 to 13.8	128.5 to 93.8

Frequency Range (MHz)	Limit @30m (dBuV/m)	Limit @3m (dBuV/m)
0.490 – 1.705	33.8 to 22.97	73.8 to 62.97
1.705 - 30	30	70

FCC 15.225 Radiated Emissions Limit @ 3m

Frequency Range (MHz)	Limit @3m (dBuV/m)
0.009 – 0.490	128.5 to 93.8
0.490 – 1.705	73.8 to 62.97
1.705 – 13.110	70
13.110 – 13.410	80.5
13.410 – 13.553	90.47
13.553 – 13.567	124
13.567 – 13.710	90.47
13.710 – 14.010	80.5
14.010 - 30	70
30 - 88	40
88 - 216	43.5
216 - 960	46
Above 960	54

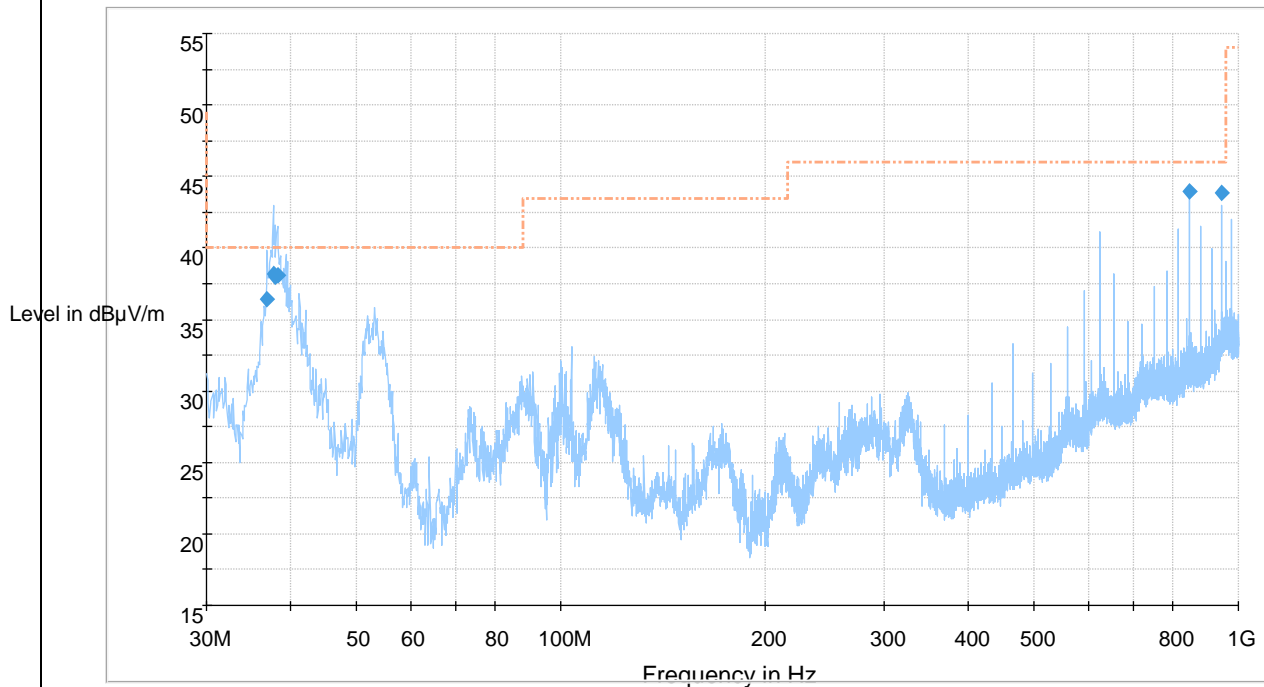
9kHz - 30MHz



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)
0.018200	70.80	122.39	51.59	0.200	122.0	89.0
13.553000	48.70	90.47	41.77	9.000	122.0	179.0
13.559880	62.70	120.00	61.30	9.000	122.0	179.0
13.567000	47.20	90.47	43.27	9.000	122.0	179.0

30MHz – 1GHz
VERTICAL Polarization

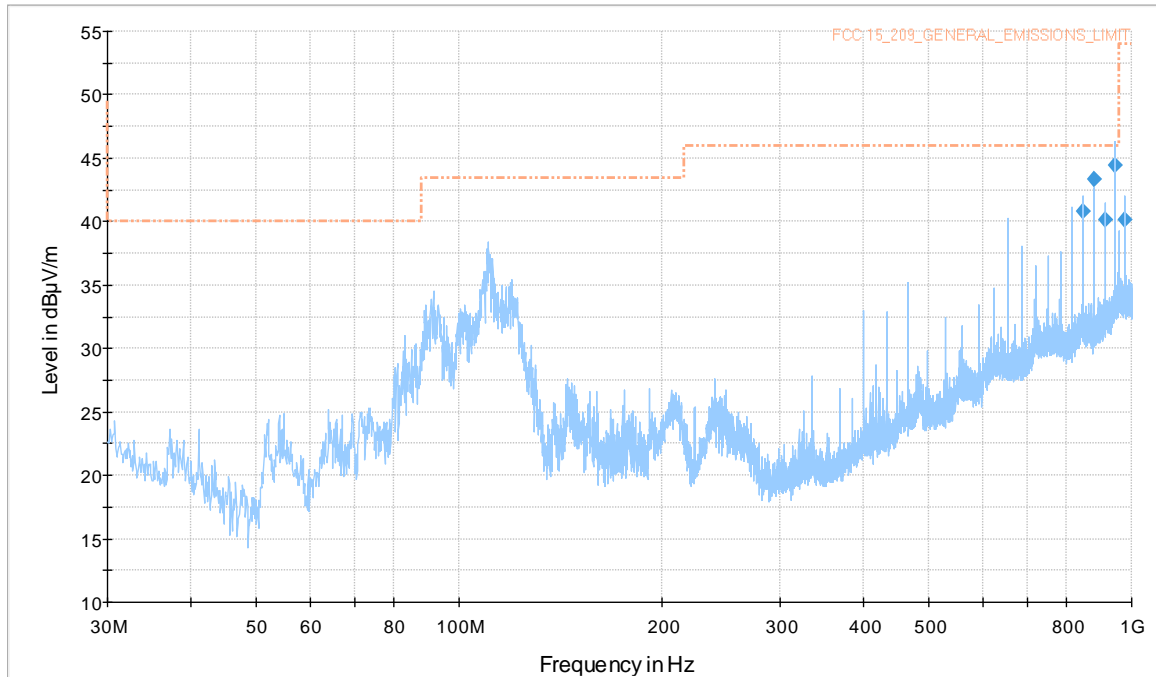
FCC_15_225_RADIATED_SPURIOUS_VERTICAL



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)
36.887000	36.4	40.00	3.60	100.000	103.0	V	1.0
37.663000	38.2	40.00	1.80	100.000	103.0	V	1.0
37.857000	38.0	40.00	2.00	100.000	103.0	V	1.0
38.148000	38.1	40.00	1.90	100.000	103.0	V	1.0
848.001000	44.0	46.00	2.00	100.000	259.0	V	179.0
944.031000	43.8	46.00	2.20	100.000	102.0	V	269.0

30MHz – 1GHz
HORIZONTAL Polarization



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Polarization	Azimuth (deg)
848.001000	40.8	46.00	5.20	103.0	H	88.0
880.011000	43.4	46.00	2.60	259.0	H	88.0
912.021000	40.1	46.00	5.90	103.0	H	88.0
944.031000	44.5	46.00	1.50	103.0	H	88.0
976.041000	40.1	46.00	5.90	103.0	H	0.0

**TEST
3.**

Frequency Tolerance

**REFERENCE
DOCUMENT**

According to §15.225,

(e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ 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 battery operated equipment, the equipment tests shall be performed using a new battery.

TEST SETUP	In according to ref std
TEST LOCATION	Radio test area
TYPE OF MEASUREMENT	RADIATED
TEST EQUIPMENT	Spectrum Analyzer Rohde&Schwarz mod. FSP40
TEST PERFORMED BY	Giacomo Armellini
TESTING DATE	June 2017

TEST CONDITIONS:	MEASURED
Ambient temperature : $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$	24°C
Ambient humidity : 25 - 75 %rH	45%
Pressure : 85 - 106 kPa (860 mbar - 1060 mbar)	960mbar

OPERATING CONDITION	#1, DUTY CYCLE 100%
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TEST RESULT	WITHIN THE LIMITS
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Temperature (°C)	Voltage (V)	Operating Frequency (MHz)	Measured Frequency (MHz)	Frequency Tolerance (% of the operating frequency)	Frequency Tolerance limit (% of the operating frequency)	Result
-20	110	13.56	13.559876	-0.0009144	±0.01	PASS
-10	110	13.56	13.559876	-0.0009144	±0.01	PASS
0	110	13.56	13.559878	-0.0008997	±0.01	PASS
10	110	13.56	13.559878	-0.0008997	±0.01	PASS
20	110	13.56	13.559880	-0.0008849	±0.01	PASS
30	110	13.56	13.559880	-0.0008849	±0.01	PASS
40	110	13.56	13.559880	-0.0008849	±0.01	PASS
50	110	13.56	13.559880	-0.0008849	±0.01	PASS
20	126.5 ¹	13.56	13.559832	-0.0012389	±0.01	PASS
20	110	13.56	13.559880	-0.0008849	±0.01	PASS
20	93.5 ²	13.56	13.559832	-0.0012389	±0.01	PASS

¹ 115% of the rated supply voltage

² 85% of the rated supply voltage

8. LIST OF EQUIPMENT USED

EQUIPMENT	MANUFACTURER	MODEL	SERIAL Nr.	CAL. DUE
EMI TEST RECEIVER 20Hz - 40GHz	Rohde & Schwarz	ESU40	100111	MAR. 2018
RF SEMI-ANECHOIC CHAMBER (CSSA)	Siemens	B83117-D6019- T232	003-005- 134/94C	Jan 2018
BILOG ANTENNA	Chase	CBL6111C	2717	May 2018
LOOP ANTENNA	Rohde & Schwarz	HFH2-Z2	841801/012	Aug 17
SPECTRUM ANALYZER	Rohde & Schwarz	FSP40	100038	Jun 2018
TUNABLE NOTCH FILTER	Wainwright	WRCT2200/2500- 5/40-10SK	5	Nov 2017
HIGH PASS FILTER	Wainwright	WHNX 2,8/18G- 10SS	1	Nov 2017
Programmable Step Attenuator, DC-26.5GHz, 1-11dB	HP/Agilent	84904K	2214832	Feb 2018