FCC RF TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

Wireless 900MHz Transmitter

ISSUED TO
Voxx Accessories Corp.

3502 Woodview Trace, Suite 220, Indianapolis, IN. 46268

Prepared by: Tu Lang
Tu Lang
(Reporting Specialist)
Date 2014.01.13

Approved by: Wei Yanquan
Wei Yanquan
(Lab Director)
Date 2014.01.13

Report No.:	BL-13C009-601
EUT Type:	Wireless 900MHz Transmitter
Model Name:	AWS43
Brand Name:	AR/808
FCC ID:	VIX-AWS43
Test Standard:	47 CFR Part 15, Subpart C
Test conclusion:	PASS
Test Date:	Dec 13, 2013 – Dec 24, 2013
Date of Issue:	Jan 13, 2014

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Revision History

Version	Issue Date	Revisions
Rev. 01	Jan 13, 2014	Initial Issue

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6683 3402
Fax Number	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen CTL Testing Technology Co., Ltd
Address	Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen, China
Accreditation Certificate	The laboratory has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are **970318** The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are **9618B**
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Test Environment Condition

Ambient Temperature	19 to 25 ℃
Ambient Relative Humidity	45 to 55 %
Ambient Pressure	N/A (Not applicable)

1.4 Announce

(1) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

(2) The test report is invalid if there is any evidence and/or falsification.

(3) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.

(4) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.

(5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

2 PRODUCT INFORMATION

2.1 Applicant

Applicant	Voxx Accessories Corp.
Address	3502 Woodview Trace, Suite 220, Indianapolis, IN. 46268

2.2 Manufacturer

Manufacturer	Smart Power Industrial Ltd
Address	Building Four, Huaguan Industrial Zone, Zhangqi Road, Qiping Village, Guanlan Town, Shenzhen City, Guangdong Province, China

2.3 General Description for Equipment under Test (EUT)

EUT Type	Wireless 900MHz Transmitter
Model Name	AWS43
Hardware Version	N/A
Software Version	N/A
Network/ Wireless connectivity	FM
Description	The EUT is a Wireless 900MHz Transmitter, it can working at the 914MHz, 914.5MHz and 915MHz.

2.4 Technical Information

The requirement for the following technical information of the EUT was tested in this report:

TX Operating Range	914~915MHz band f_c = 914 MHz + N*0.5 MHz, where - f_c = “Operating Frequency” in MHz, - N = “Channel Number” with the range from 0 to 2.
Modulation Type	FM
Antenna Type	Patch Antenna
Antenna Gain	0dBi

2.5 Ancillary Equipment

Ancillary Equipment 1	AC Adapter (Charger for Battery)	
	Brand Name	JFEC
	Model No	JF005WR-0900060UH
	Serial No	(n.a. marked #1 by test site)
	Rated Input	~ 100-240V, 180mA, 50/60Hz
	Rated Output	⎓9V 600 mA

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C(12-30-13 Edition)	Miscellaneous Wireless Communications Services
2	ANSI C63.4-2003/2009	American National Standard for 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
3	ANSI C63.10-2009	American National Standard for Testing Unlicensed Wireless Devices

3.2 Verdict

No.	Description	FCC Part No.	Test Result	Verdict
1	Conducted Emission	15.207	ANNEX A.1	Pass
2	Radiated Spurious Emission	15.249(a)	ANNEX A.2	Pass
3	Band Edge	15.249(e)	ANNEX A.3	Pass
4	20 dB Bandwidth	15.215(c)	ANNEX A.4	Pass

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

Environment Parameter	Selected Values During Tests		
	Temperature	Voltage	Relative Humidity
Normal Temperature, Normal Voltage (NTNV)	Ambient	DC 9V	Ambient

4.2 Test Equipment List

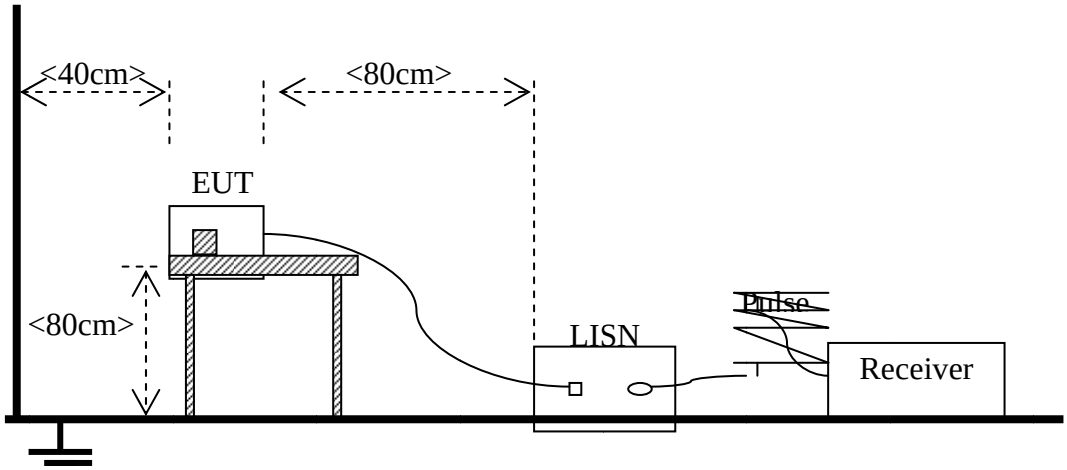
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	AGILENT	E4440A	MY45304434	2013.05.10	2014.05.09
Attenuator (20dB)	KMW	ZA-S1-201	110617091	--	--
Attenuator (6dB)	KMW	ZA-S1-61	1305003189	--	--
DC Power Supply	R&S	HMP2020	018141664	2013.07.06	2014.07.07
Test Antenna-Loop	SCHWARZBECK	FMZB 1519	1519-037	2013.07.03	2014.07.02
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-624	2013.07.03	2014.07.02
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	9120D-1148	2013.07.02	2014.07.01
Test Antenna-Horn	R&S	HL050S7	72681	2013.07.02	2014.07.01
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2013.10.07	2014.10.06
EMI Test Receiver	R&S	ESRP	101036	2013.06.04	2014.06.03
Artificial Mains Network	SCHWARZBECK	NSLK8127	8127-687	2013.06.04	2014.06.03

4.3 Test Configurations

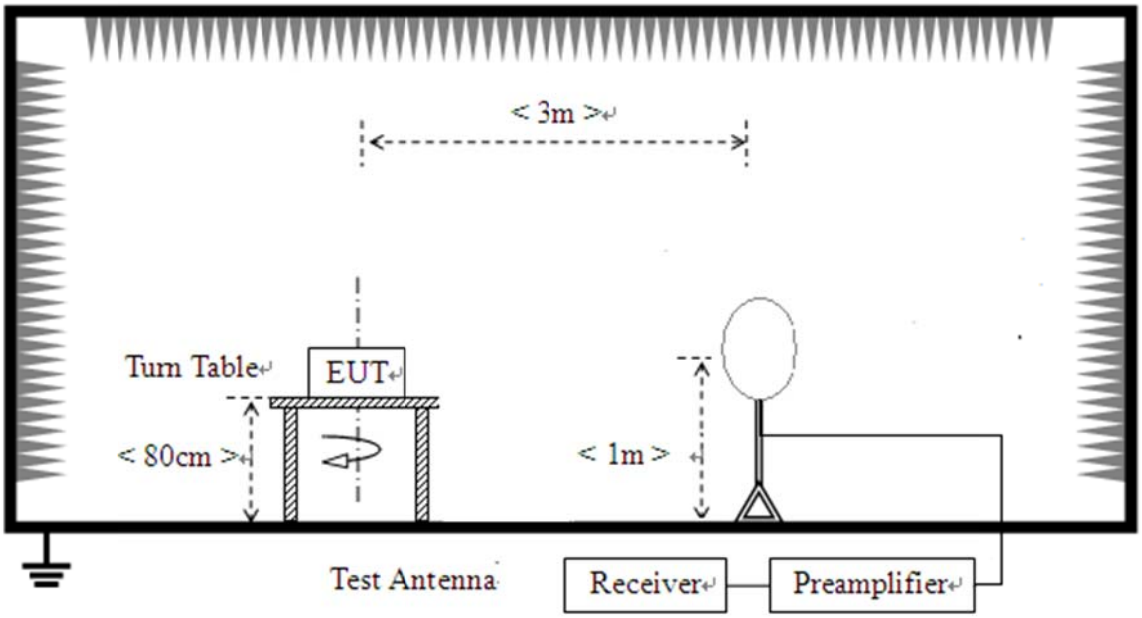
Test Configurations (TC) NO.	Description	
	Signal Description	Operating Frequency
Transmitter		
TC01	FM modulation	Ch No. 0/ 914 MHz
TC02	FM modulation	Ch No. 1/ 914.5 MHz
TC03	FM modulation	Ch No. 2/ 915 MHz

4.4 Test Setups

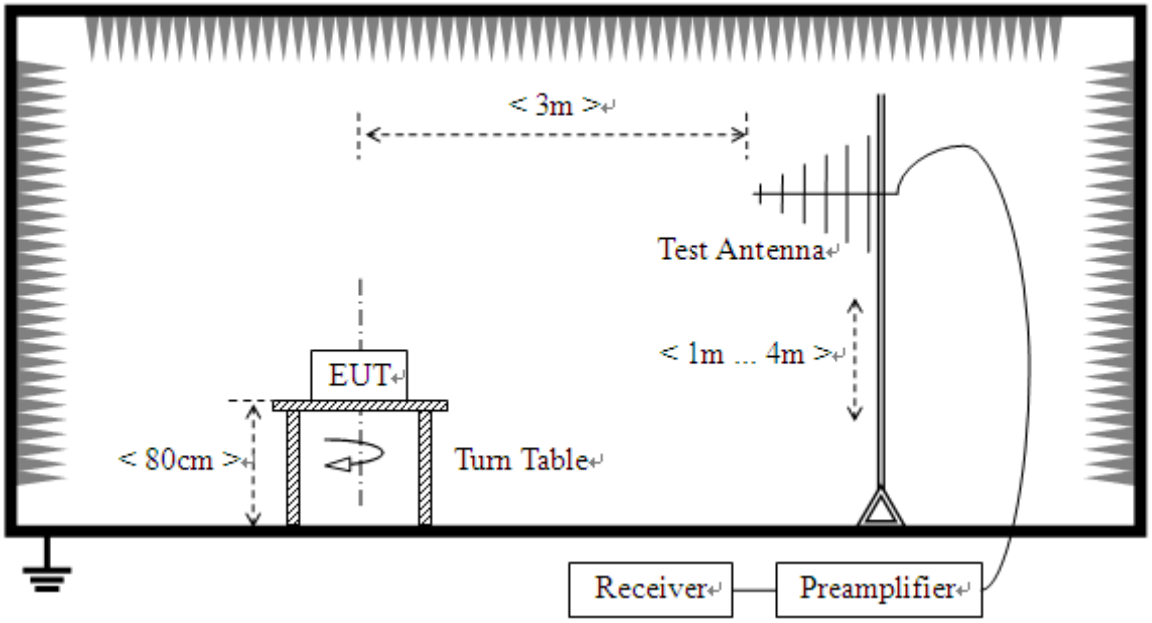
Setup 1- Conducted Emission Test Setup



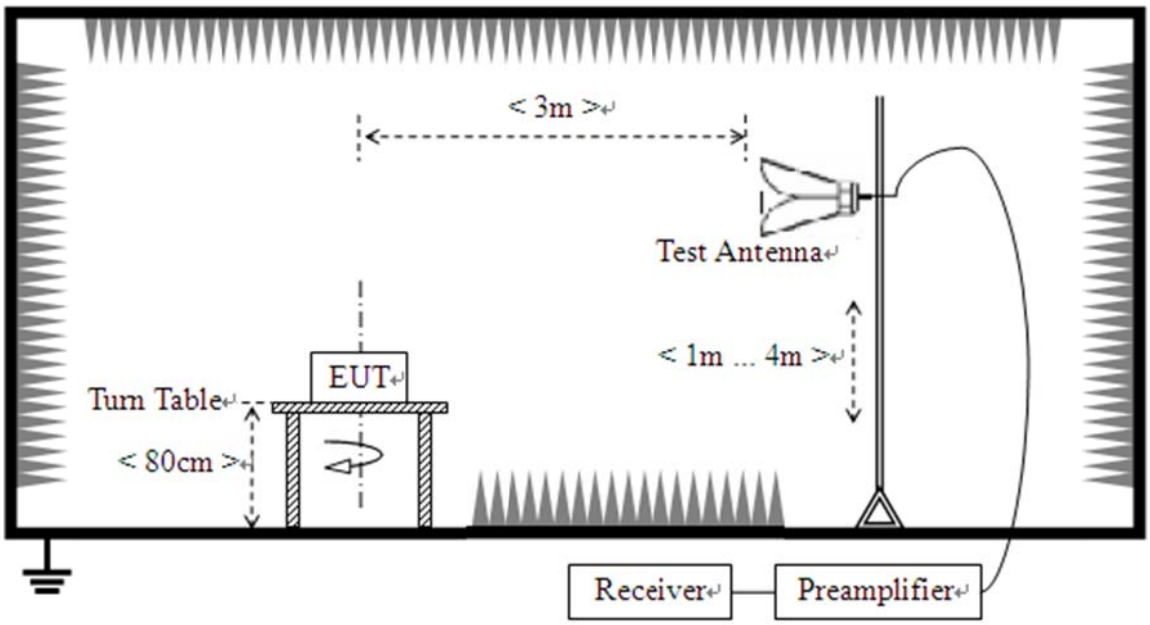
Test Setup 2–Radiated Spurious Emission Test Setup_1



Test Setup 3– Radiated Spurious Emission Test Setup_2



Test Setup 4– Radiated Spurious Emission Test Setup_3



4.5 Test Conditions

Test Case	Test Conditions		
	Test Env.	Test Setup Note 1	Test Configuration Note 2
Conducted Emission	NTNV	Test Setup 1	TC01, TC02, TC03
Radiated Emission	NTNV	Test Setup 2 Test Setup 3 Test Setup 4	TC01, TC02, TC03
Band Edge	NTNV	Test Setup 4	TC01, TC02, TC03

Note:
1. Please refer to section 4.4 for test setup details.
2. Please refer to section 4.3 for test setup details.

5 TEST ITEMS

5.1 Conducted Emission

5.1.1 Limit

FCC §15.207

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 within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

5.1.2 Test Procedure

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

5.2 Radiated Spurious Emission

5.2.1 Limit

FCC § 15.249(a):

Except as provided in paragraph (a) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (mV/m)	Field Strength of Harmonics (μV/m)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500

FCC §15.209

Radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (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 (μV/m)	Measurement Distance (m)
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

Note:

1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).

5.2.2 Test Procedure

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was

recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

5.3 Band Edge

5.3.1 Limit

FCC §15.209&15.249(e)

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.3.2 Test Procedure

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation

RBW ≥ 1% of the span

VBW ≥ RBW

Sweep = auto

Detector function = peak /AV

Trace = max hold

Allow the trace to stabilize.

E [dBμV/m] =UR + AT + AFactor [dB]; AT =LCable loss [dB]-Gpreamp [dB]

AT: Total correction Factor except Antenna

UR: Receiver Reading

Gpreamp: Preamplifier Gain

AFactor: Antenna Factor at 3m

5.4 20dB Bandwidth

5.4.1 Definition

FCC §15.215(c)

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensurethat the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in thespecific rule section under which the equipment operates, is contained within the frequency banddesignated in the rule section under which the equipment is operated.

ANNEX A TEST RESULTS

A.1 Conducted Emission

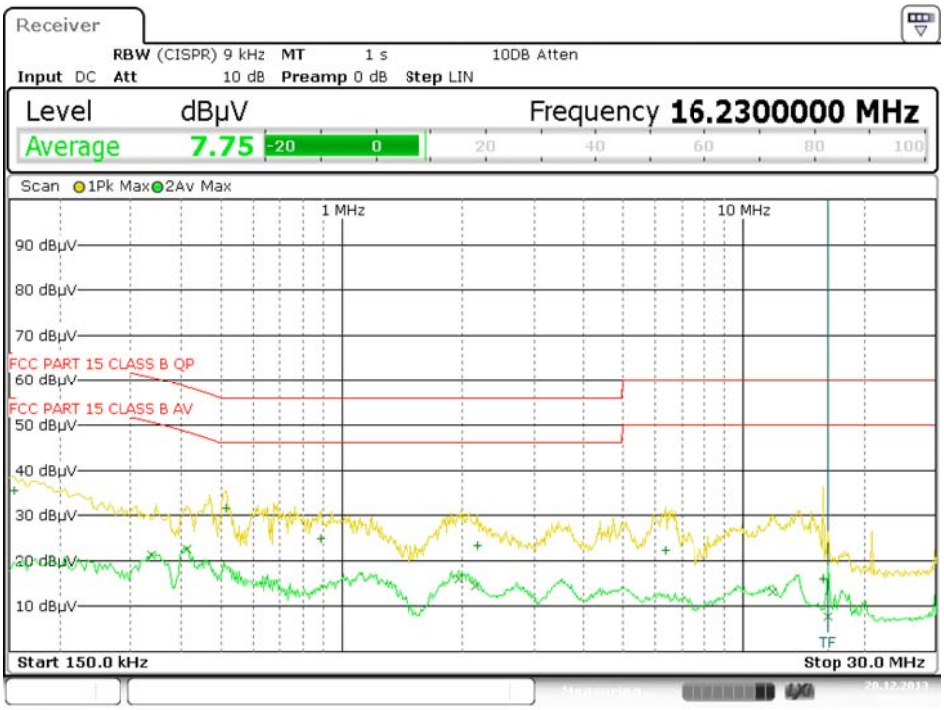
Note: Only the worst test results were recorded in this report.

Test Data

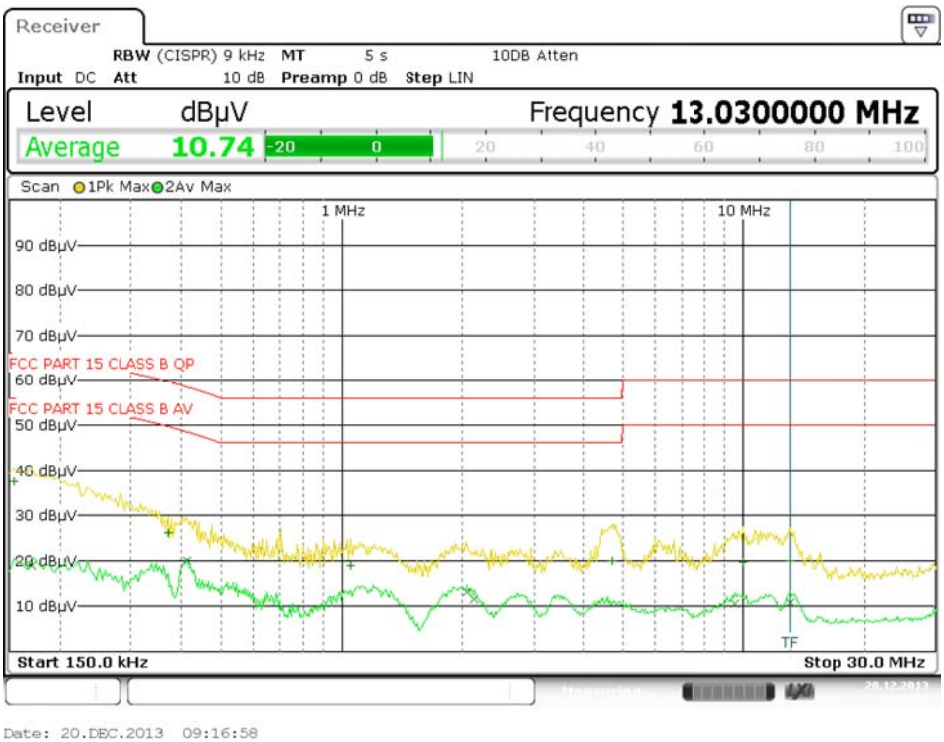
No.	Fre. (MHz)	Measurement Level (dBuV)	Limit (dBuV)	Margin (dB)	Phase	Detector	Verdict
1	0.154	35.47	65.89	-30.42	L	QP	PASS
2	0.338	21.21	50.63	-29.42	L	AV	PASS
3	0.414	22.47	48.46	-25.99	L	AV	PASS
4	0.514	31.54	56.00	-24.46	L	QP	PASS
5	0.890	24.92	56.00	-31.08	L	QP	PASS
6	1.962	15.99	46.00	-30.01	L	AV	PASS
7	2.154	14.38	46.00	-31.62	L	AV	PASS
8	2.182	23.31	56.00	-32.69	L	QP	PASS
9	6.362	22.26	60.00	-37.74	L	QP	PASS
10	11.830	13.11	50.00	-36.89	L	AV	PASS
11	15.738	16.09	60.00	-43.91	L	QP	PASS
12	16.230	7.77	50.00	-42.23	L	AV	PASS

No.	Fre. (MHz)	Measurement Level (dBuV)	Limit (dBuV)	Margin (dB)	Phase	Detector	Verdict
1	0.154	37.62	65.89	-28.27	N	QP	PASS
2	0.170	18.99	55.43	-36.44	N	AV	PASS
3	0.370	26.25	59.71	-33.46	N	QP	PASS
4	0.414	19.89	48.46	-28.57	N	AV	PASS
5	1.050	18.79	56.00	-37.21	N	QP	PASS
6	2.054	13.16	46.00	-32.84	N	AV	PASS
7	2.134	11.63	46.00	-34.37	N	AV	PASS
8	4.698	19.93	56.00	-36.07	N	QP	PASS
9	9.518	10.51	50.00	-39.49	N	AV	PASS
10	9.954	19.59	60.00	-40.41	N	QP	PASS
11	13.022	20.02	60.00	-39.98	N	QP	PASS
12	13.030	10.81	50.00	-39.19	N	AV	PASS

Test Plots



(Phase: L)



(Phase: N)

A.2 Radiated Spurious Emissions

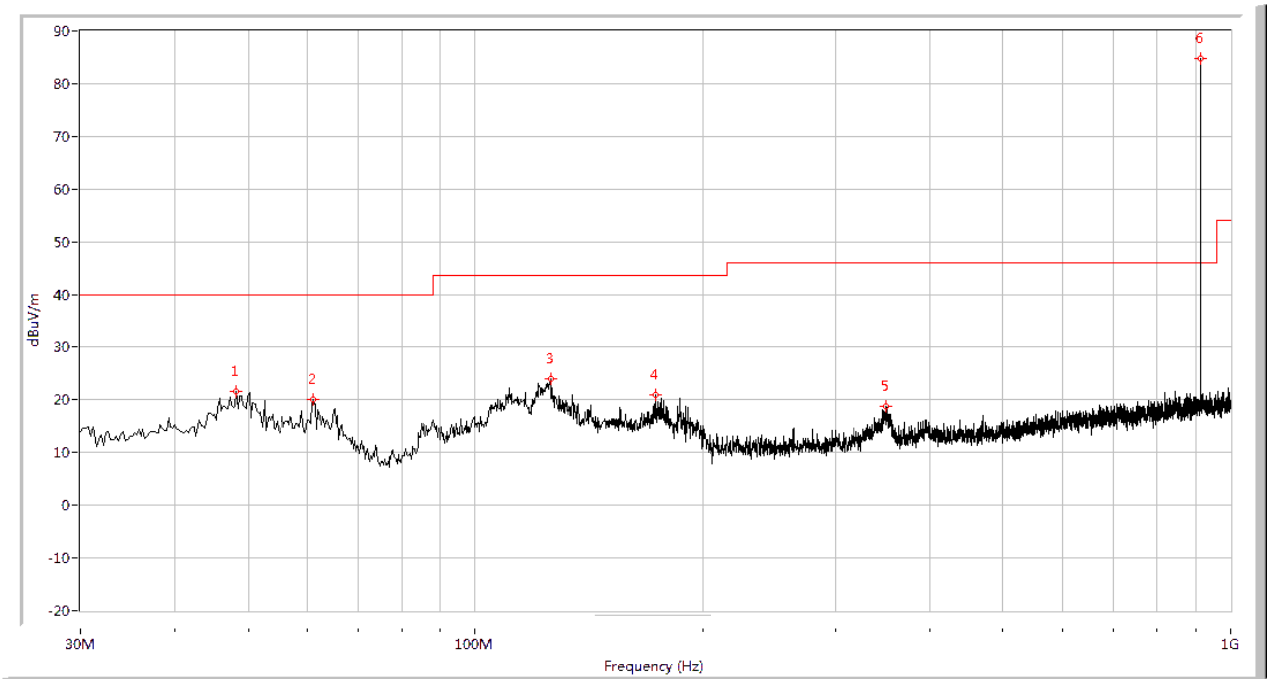
Note: No spurious emissions were detected below 30MHz, so only spurious emissions above 30MHz were recorded in the following test data and plots.

Test Data

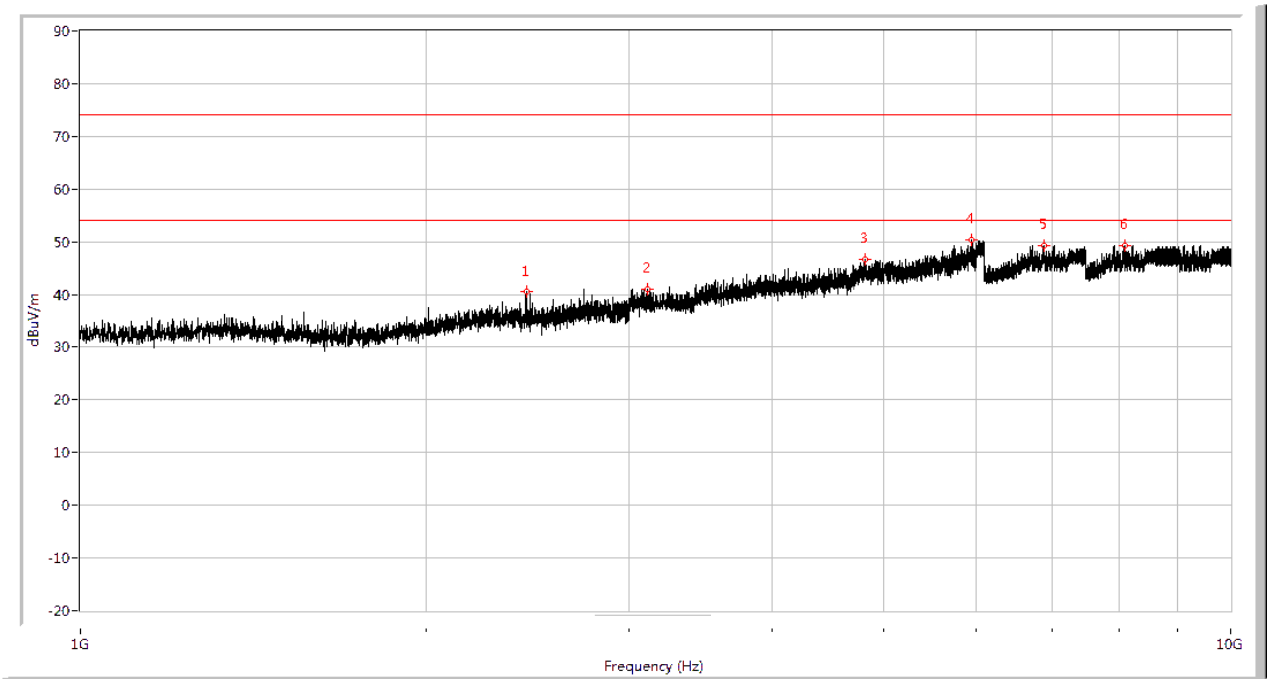
FM Mode-Low Channel								
Fre. (MHz)	Pk (dBuV)	QP (dBuV)	AV (dBuV)	Limit-PK(dBuV)	Limit-QP(dBuV)	Limit-AV(dBuV)	Antenna	Verdict
48.183	21.67	--	--	--	40.0	--	Vertical	PASS
61.032	20.17	--	--	--	40.0	--	Vertical	PASS
125.764	23.98	--	--	--	43.5	--	Vertical	PASS
173.039	20.89	--	--	--	43.5	--	Vertical	PASS
349.778	18.69	--	--	--	46.0	--	Vertical	PASS
913.934	84.74	--	--	--	94.0	--	Vertical	PASS Fundamental
2442.139	40.57	--	--	74.0	--	54.0	Vertical	PASS
3113.972	41.07	--	--	74.0	--	54.0	Vertical	PASS
4813.047	46.61	--	--	74.0	--	54.0	Vertical	PASS
5945.264	50.29	--	--	74.0	--	54.0	Vertical	PASS
6895.276	49.20	--	--	74.0	--	54.0	Vertical	PASS
8090.477	49.20	--	--	74.0	--	54.0	Vertical	PASS
43.577	16.27	--	--	--	40.0	--	Horizontal	PASS
62.002	17.86	--	--	--	40.0	--	Horizontal	PASS
148.553	19.01	--	--	--	43.5	--	Horizontal	PASS
179.828	23.75	--	--	--	43.5	--	Horizontal	PASS
396.326	17.37	--	--	--	46.0	--	Horizontal	PASS
913.934	69.95	--	--	--	94.0	--	Horizontal	PASS Fundamental
2298.675	38.19	--	--	74.0	--	54.0	Horizontal	PASS
2743.564	41.76	--	--	74.0	--	54.0	Horizontal	PASS
4847.538	47.40	--	--	74.0	--	54.0	Horizontal	PASS
6088.478	50.07	--	--	74.0	--	54.0	Horizontal	PASS
7033.992	49.20	--	--	74.0	--	54.0	Horizontal	PASS
7929.268	49.20	--	--	74.0	--	54.0	Horizontal	PASS
FM Mode-Mid Channel								
Fre. (MHz)	Pk (dBuV)	QP (dBuV)	AV (dBuV)	Limit-PK(dBuV)	Limit-QP(dBuV)	Limit-AV(dBuV)	Antenna	PASS
45.516	20.74	--	--	--	40.0	--	Vertical	PASS
62.002	18.96	--	--	--	40.0	--	Vertical	PASS
121.885	22.69	--	--	--	43.5	--	Vertical	PASS
189.040	20.10	--	--	--	43.5	--	Vertical	PASS
348.808	18.90	--	--	--	46.0	--	Vertical	PASS
914.176	82.72	--	--	--	94.0	--	Vertical	PASS Fundamental
2320.670	38.40	--	--	74.0	--	54.0	Vertical	PASS
2742.064	45.85	--	--	74.0	--	54.0	Vertical	PASS Harmonics
4853.537	47.42	--	--	74.0	--	54.0	Vertical	PASS
6039.740	50.03	--	--	74.0	--	54.0	Vertical	PASS

6895.276	49.20	--	--	74.0	--	54.0	Vertical	PASS
8090.477	49.20	--	--	74.0	--	54.0	Vertical	PASS
40.910	15.63	--	--	--	40.0	--	Horizontal	PASS
60.547	17.24	--	--	--	40.0	--	Horizontal	PASS
149.765	19.01	--	--	--	43.5	--	Horizontal	PASS
179.100	22.43	--	--	--	43.5	--	Horizontal	PASS
577.913	17.80	--	--	--	46.0	--	Horizontal	PASS
914.419	69.54	--	--	--	94.0	--	Horizontal	PASS Fundamental
2258.685	38.18	--	--	74.0	--	54.0	Horizontal	PASS
2743.564	45.49	--	--	74.0	--	54.0	Horizontal	PASS Harmonics
5100.225	48.52	--	--	74.0	--	54.0	Horizontal	PASS
6037.491	50.18	--	--	74.0	--	54.0	Horizontal	PASS
7033.992	49.20	--	--	74.0	--	54.0	Horizontal	PASS
7929.268	49.20	--	--	74.0	--	54.0	Horizontal	PASS
FM Mode-High Channel								
Fre. (MHz)	Pk (dBuV)	QP (dBuV)	AV (dBuV)	Limit-PK(dBuV)	Limit-QP(dBuV)	Limit-AV(dBuV)	Antenna	PASS
48.425	22.65	--	--	--	40.0	--	Vertical	PASS
65.154	18.73	--	--	--	40.0	--	Vertical	PASS
115.096	22.18	--	--	--	43.5	--	Vertical	PASS
174.979	20.79	--	--	--	43.5	--	Vertical	PASS
348.323	19.18	--	--	--	46.0	--	Vertical	PASS
914.904	84.68	--	--	--	94.0	--	Vertical	PASS Fundamental
1140.965	37.62	--	--	74.0	--	54.0	Vertical	PASS
2278.180	40.23	--	--	74.0	--	54.0	Vertical	PASS
3471.632	44.39	--	--	74.0	--	54.0	Vertical	PASS
5906.273	50.79	--	--	74.0	--	54.0	Vertical	PASS
7929.268	49.20	--	--	74.0	--	54.0	Vertical	PASS
9424.394	49.20	--	--	74.0	--	54.0	Vertical	PASS
45.516	18.90	--	--	--	40.0	--	Horizontal	PASS
60.305	16.60	--	--	--	40.0	--	Horizontal	PASS
147.583	19.19	--	--	--	43.5	--	Horizontal	PASS
176.918	22.44	--	--	--	43.5	--	Horizontal	PASS
393.659	16.52	--	--	--	46.0	--	Horizontal	PASS
914.904	69.30	--	--	--	94.0	--	Horizontal	PASS Fundamental
1232.942	37.02	--	--	74.0	--	54.0	Horizontal	PASS
2758.060	40.67	--	--	74.0	--	54.0	Horizontal	PASS
3869.783	46.18	--	--	74.0	--	54.0	Horizontal	PASS
5920.520	50.76	--	--	74.0	--	54.0	Horizontal	PASS
8090.477	49.20	--	--	74.0	--	54.0	Horizontal	PASS
9285.679	49.20	--	--	74.0	--	54.0	Horizontal	PASS

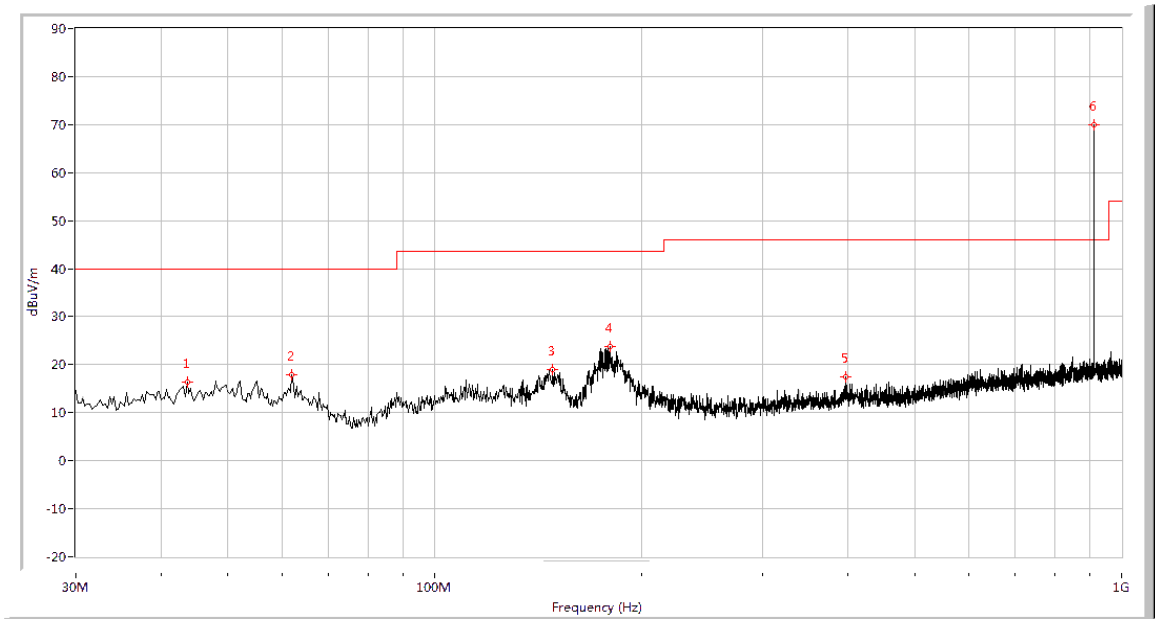
Test Plot



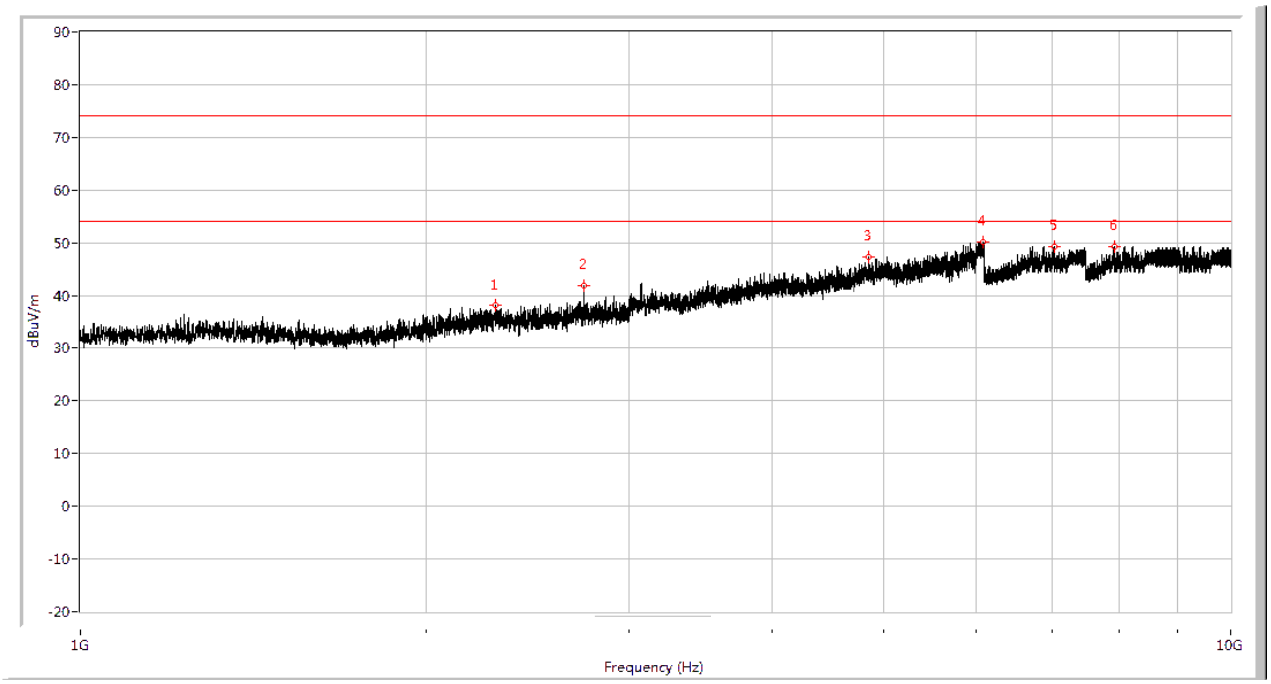
Plot A_FM Mode, Low Channel, ANT V (30MHz – 1GHz)



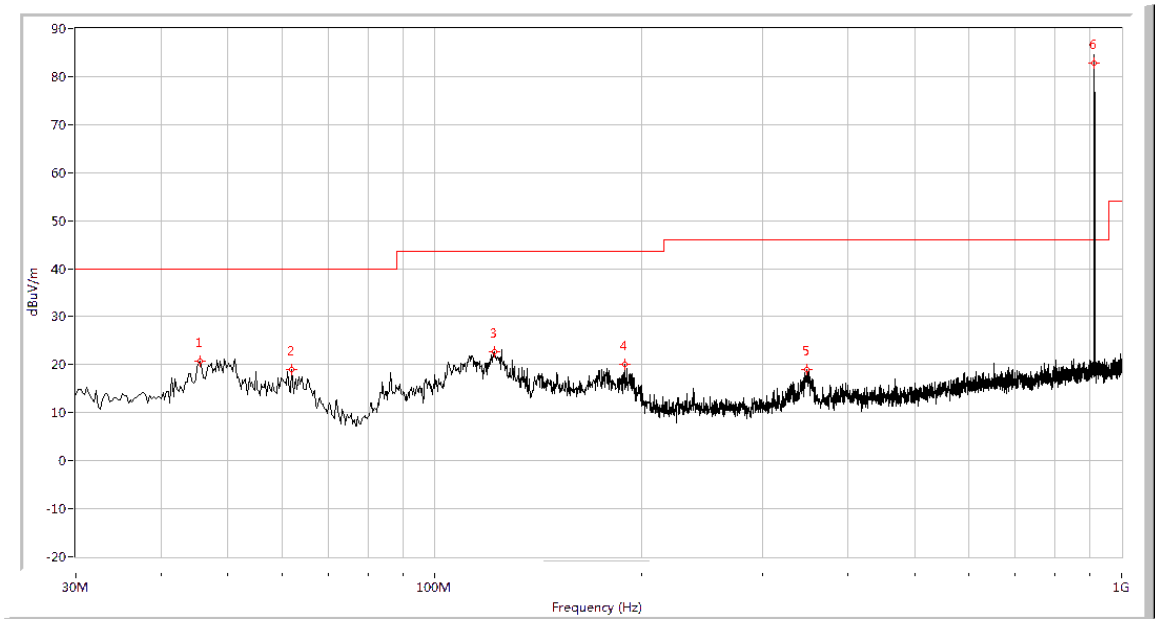
Plot B_FM Mode, Low Channel, ANT V (above 1GHz)



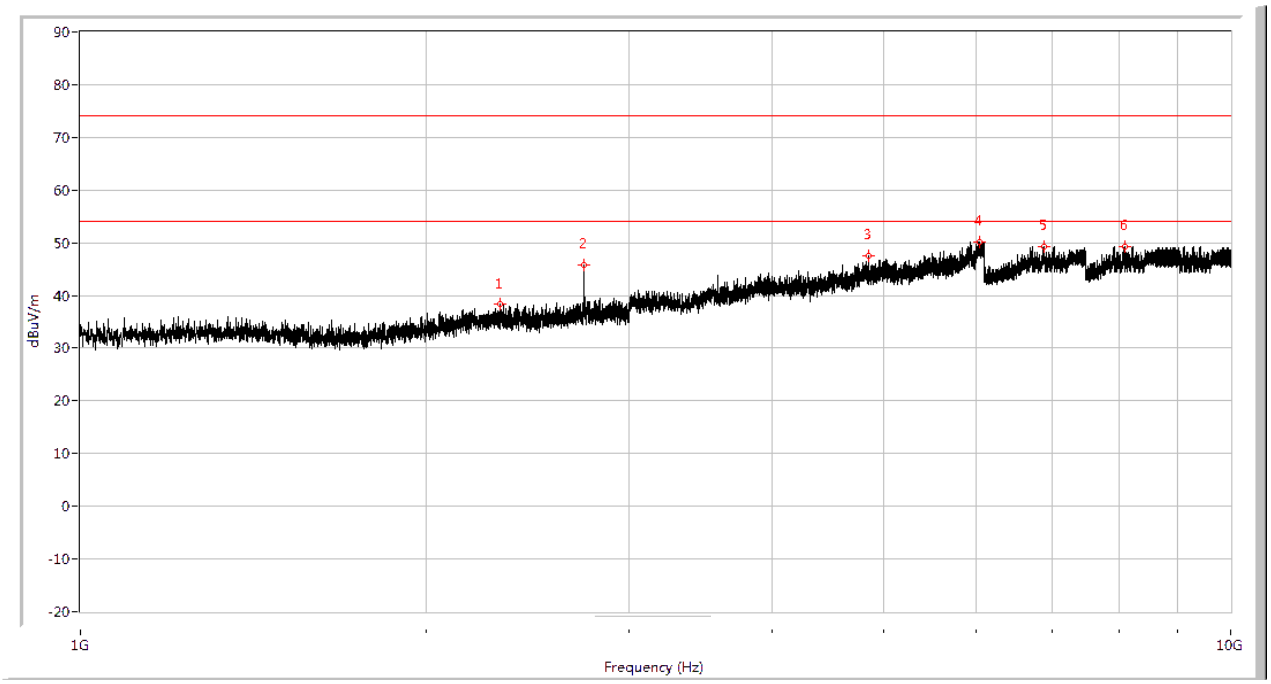
Plot C_FM Mode, Low Channel, ANT H (30MHz – 1GHz)



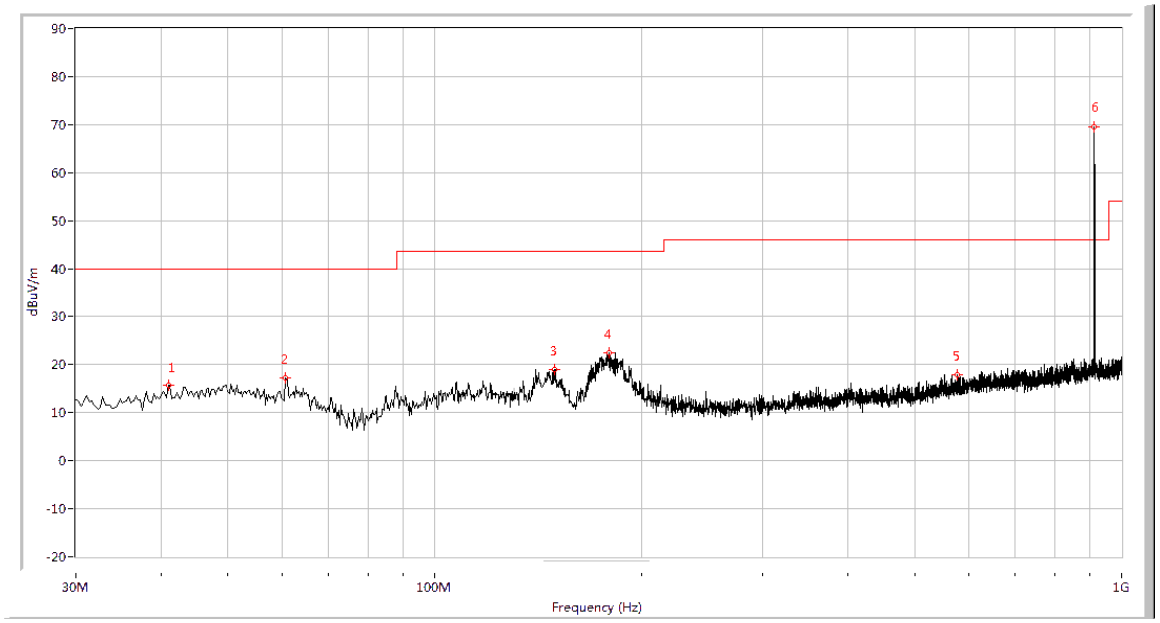
Plot D_FM Mode, Low Channel, ANT H(above 1GHz)



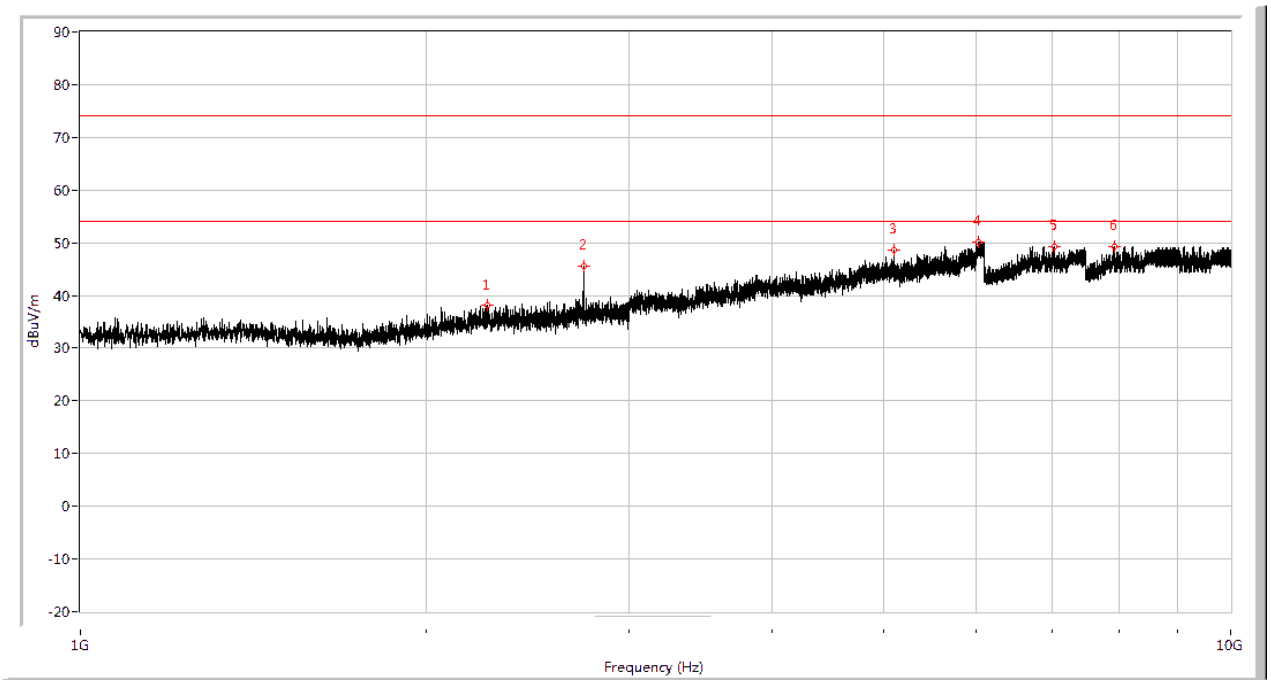
Plot E_FM Mode, Mid Channel, ANT V (30MHz – 1GHz)



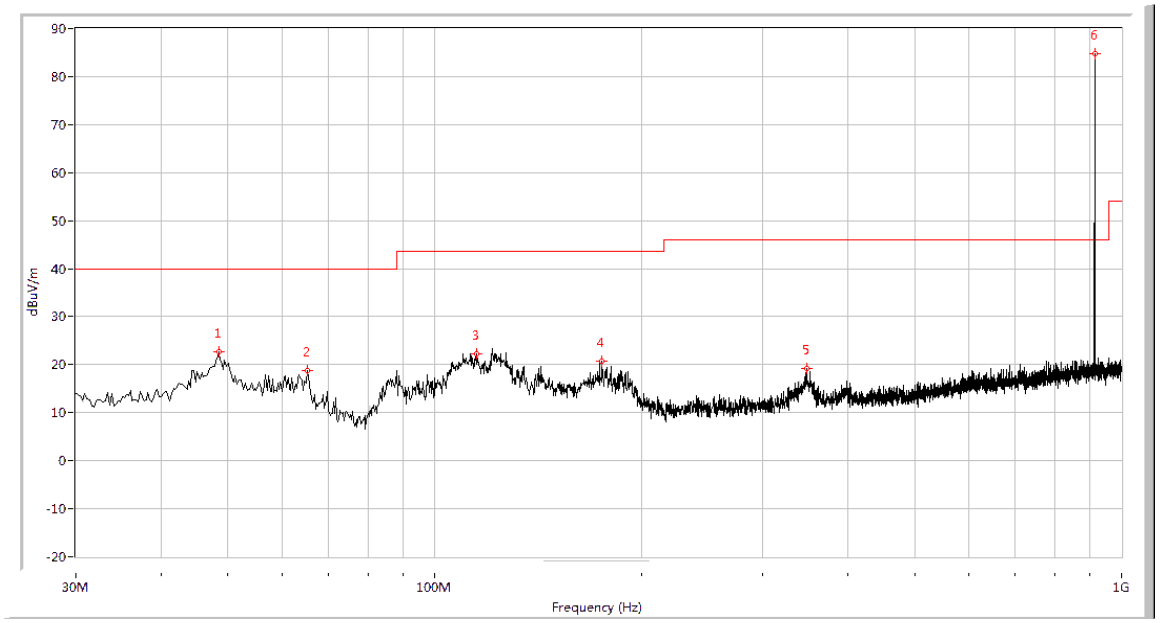
Plot F_FM Mode, Mid Channel, ANT V (above 1GHz)



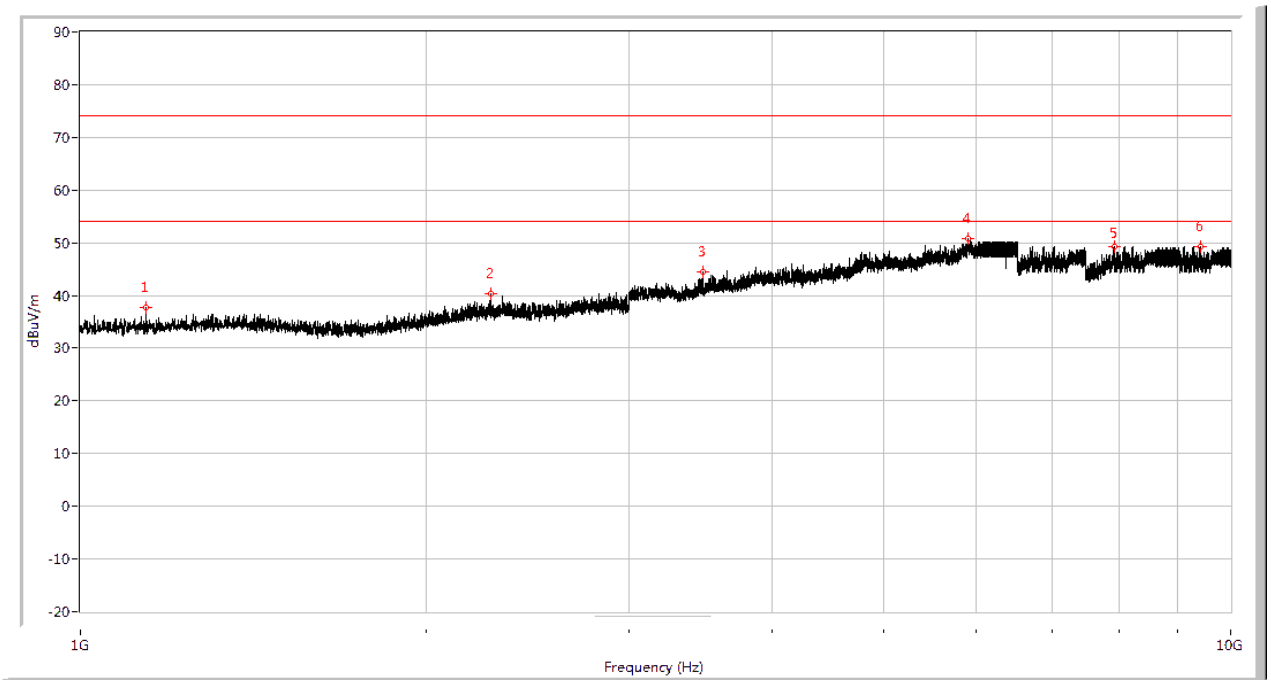
Plot G_FM Mode, Mid Channel, ANT H (30MHz – 1GHz)



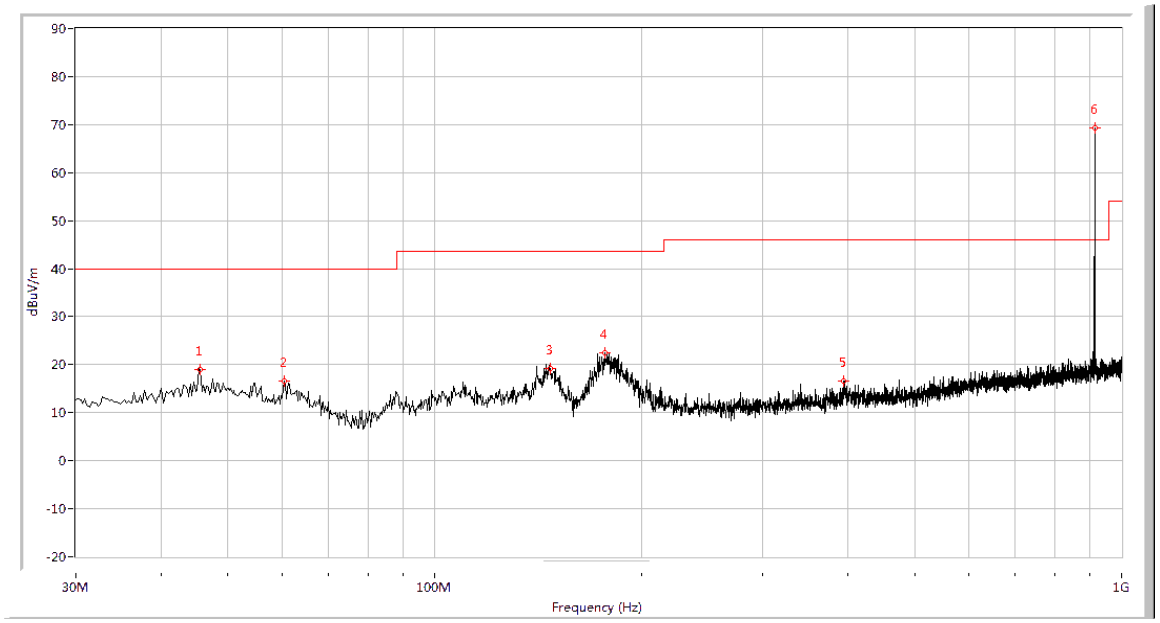
Plot H_FM Mode, Mid Channel, ANT H (above 1GHz)



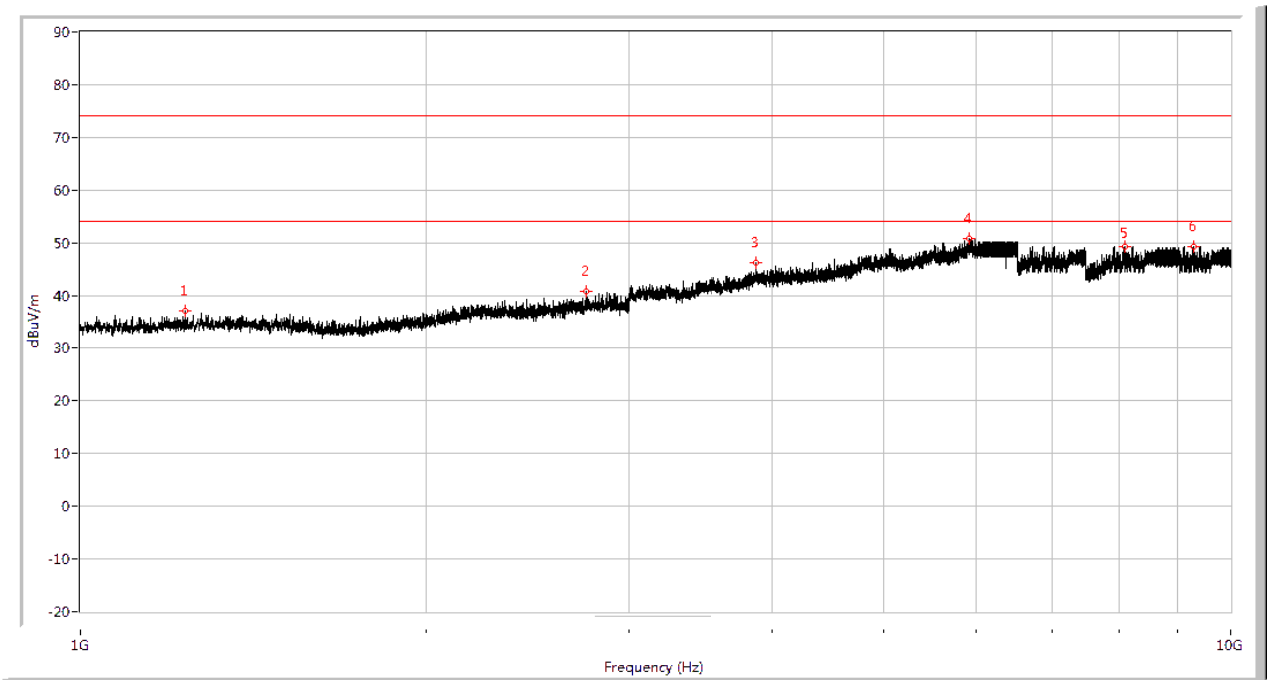
Plot I_FM Mode, High Channel, ANT V (30MHz – 1GHz)



Plot J_FM Mode, High Channel, ANT V (above 1GHz)



Plot K_FM Mode, High Channel, ANT H (30MHz – 1GHz)



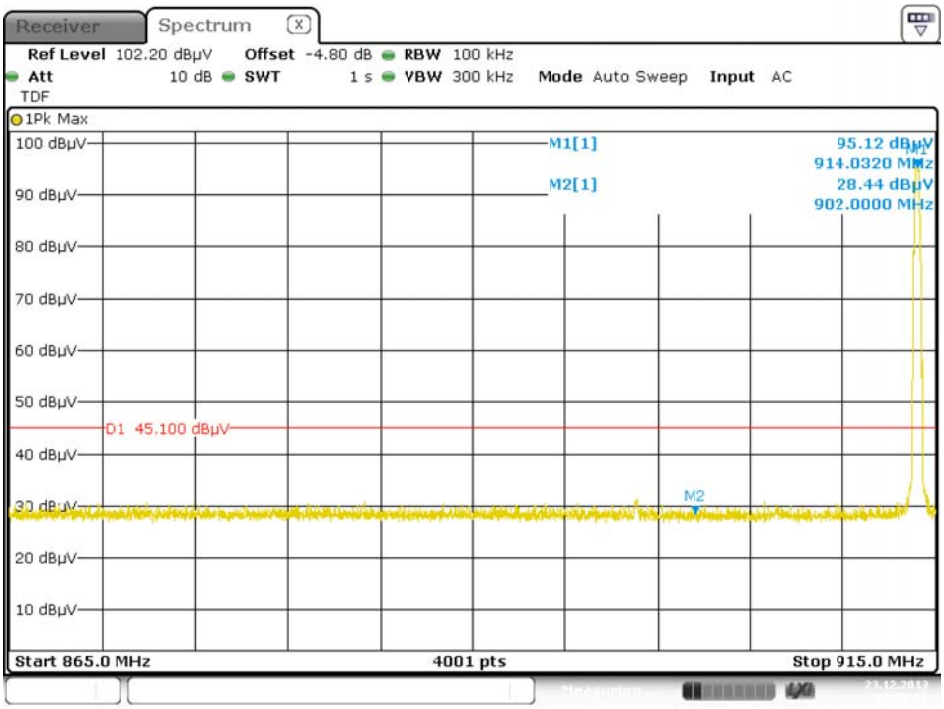
Plot L_FM Mode, High Channel, ANT H (above 1GHz)

A.3 Band Edge

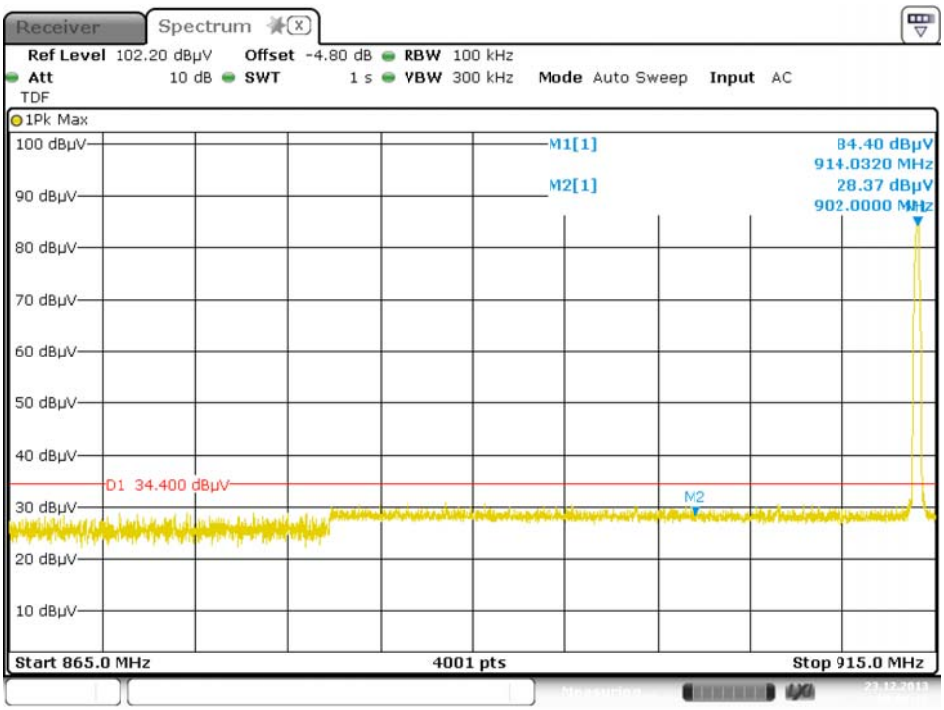
Test Data

The lowest and highest channels are tested to verify the band edge emissions. Please refer to the following the plots for emissions values.

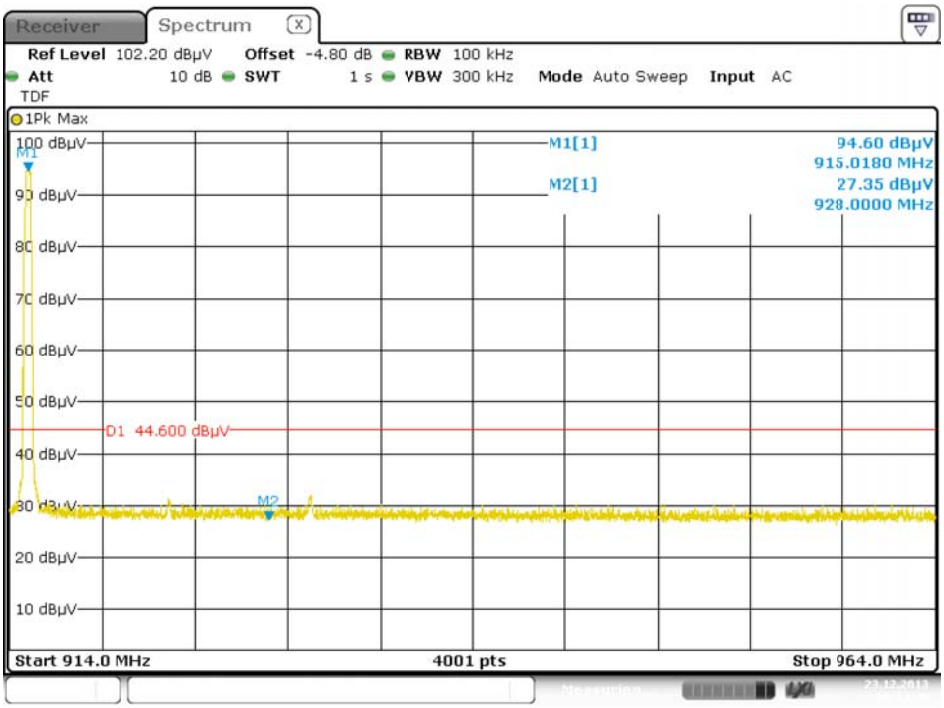
Test Plots



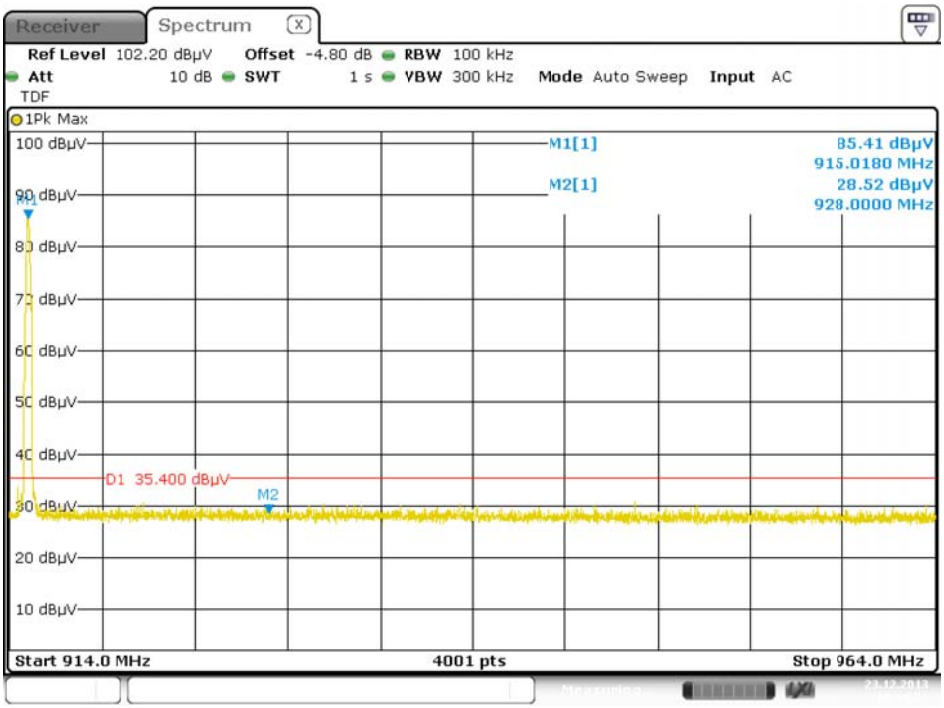
(FM CH Low, Vertical)



(FM CH Low, Horizontal)



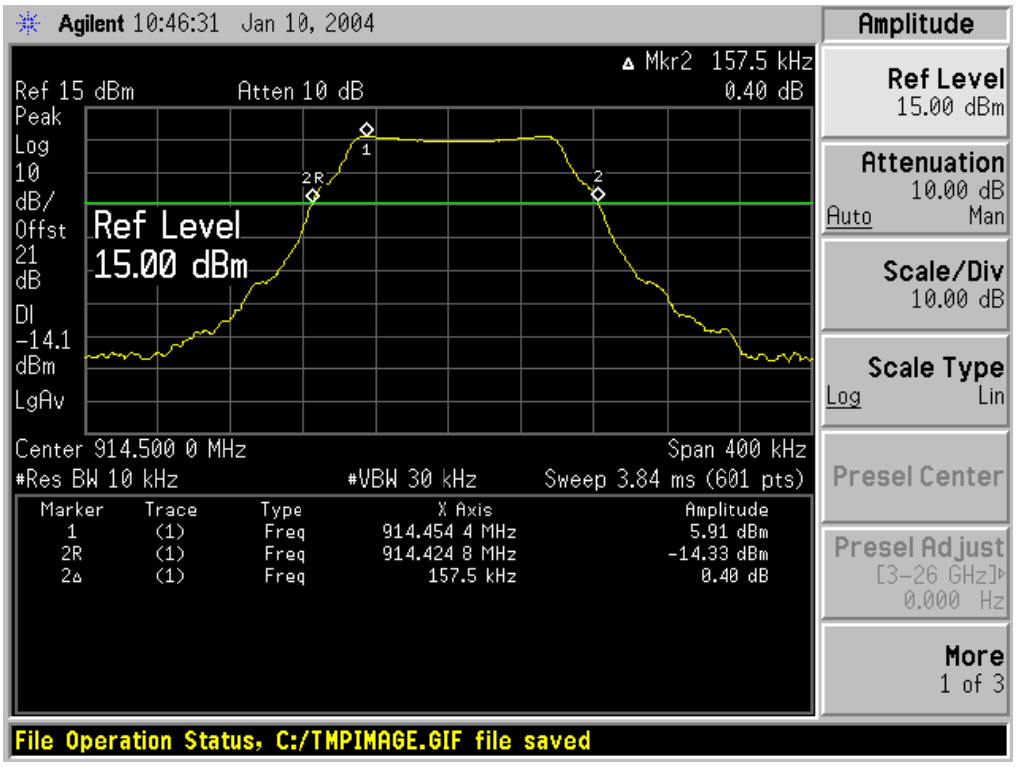
(FM CH High, Vertical)



(FM CH High, Horizontal)

A.4 20dBBandwidth

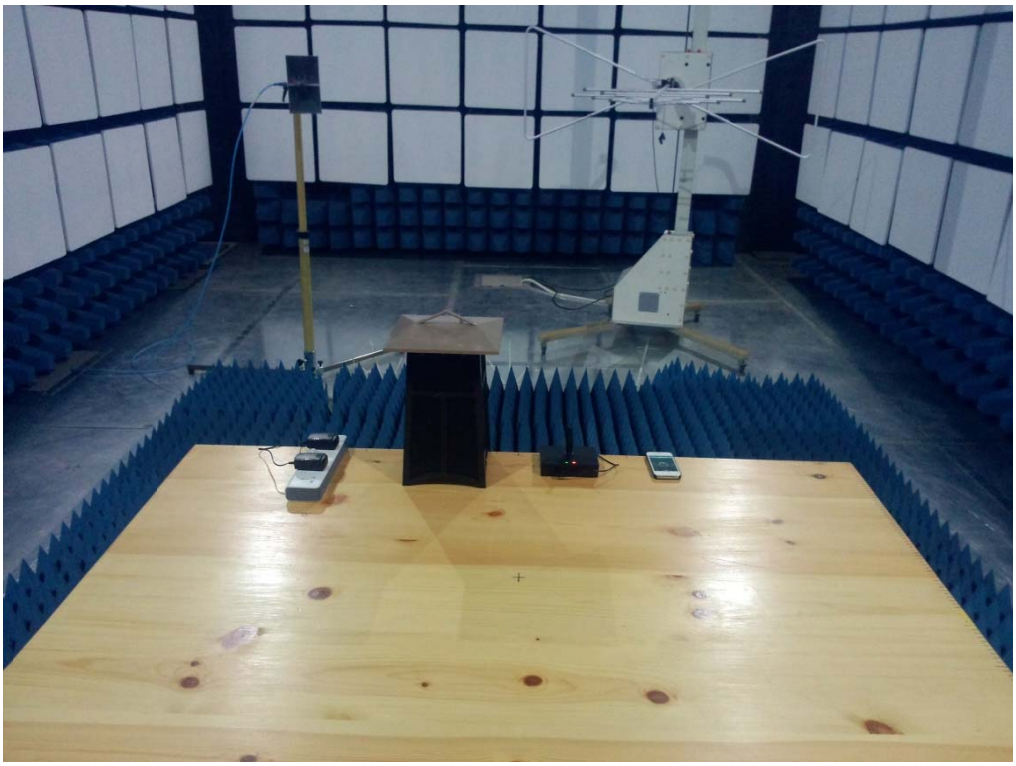
Test Data



ANNEX B TEST SETUP PHOTOS

B.1 Conducted Test Photo

B.2 Radiated Test Photo

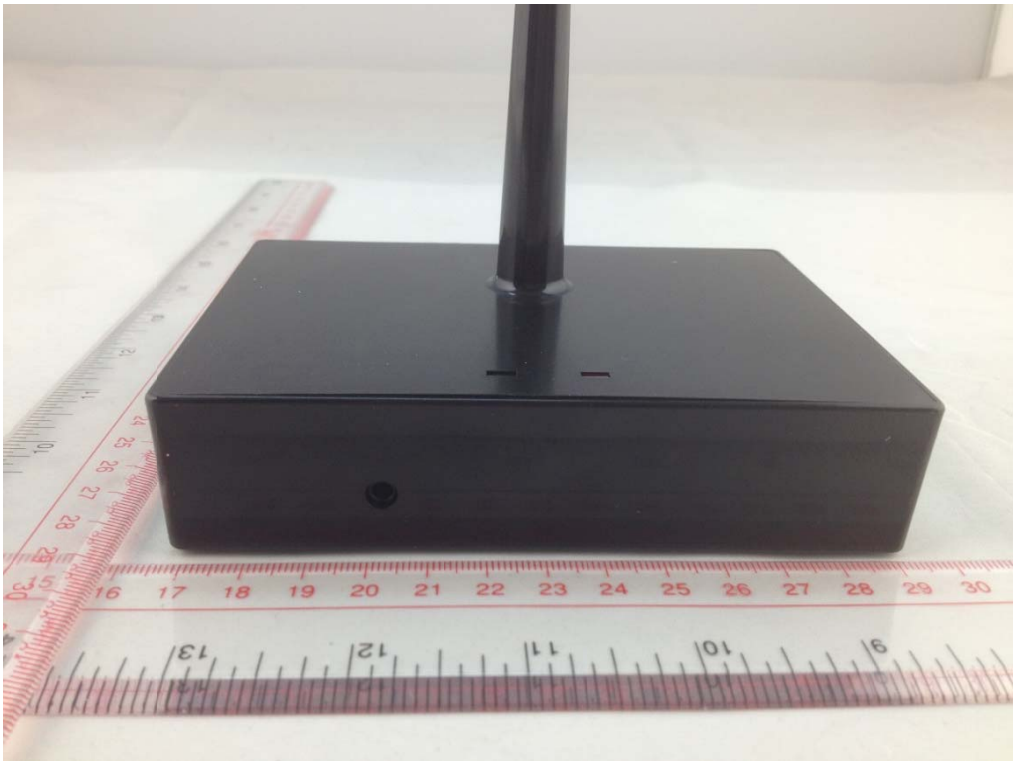


B.3 Conducted Emission Test Setup

ANNEX C EUT PHOTOS

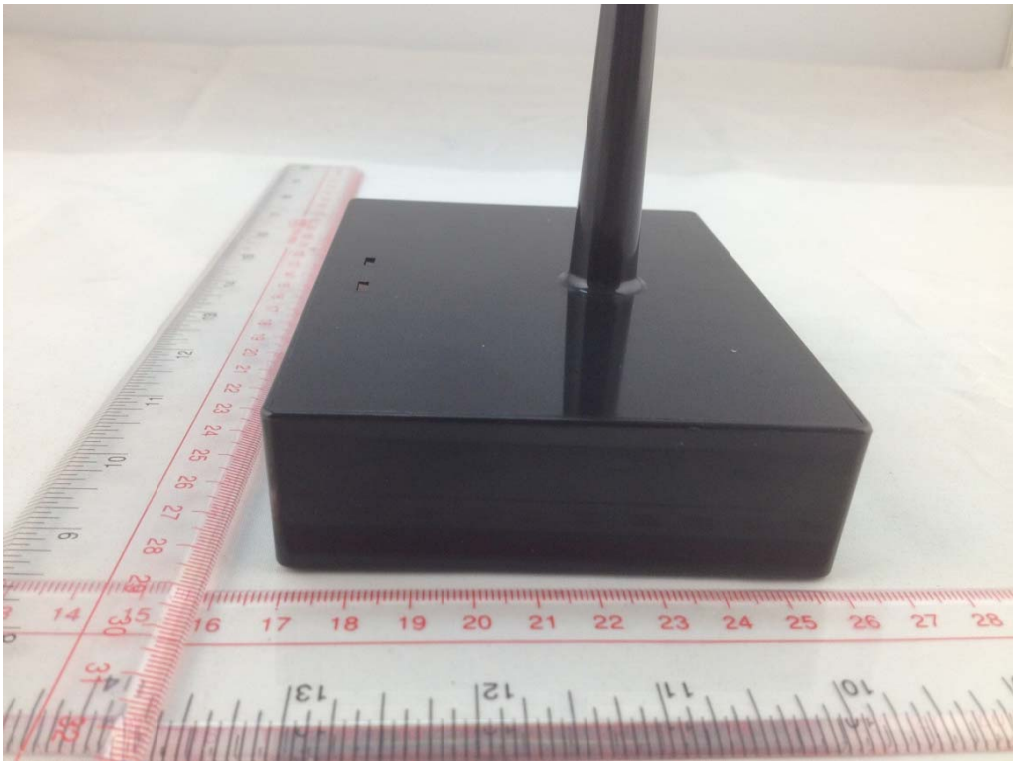
C.1 Appearance of the EUT

Front View of Sample

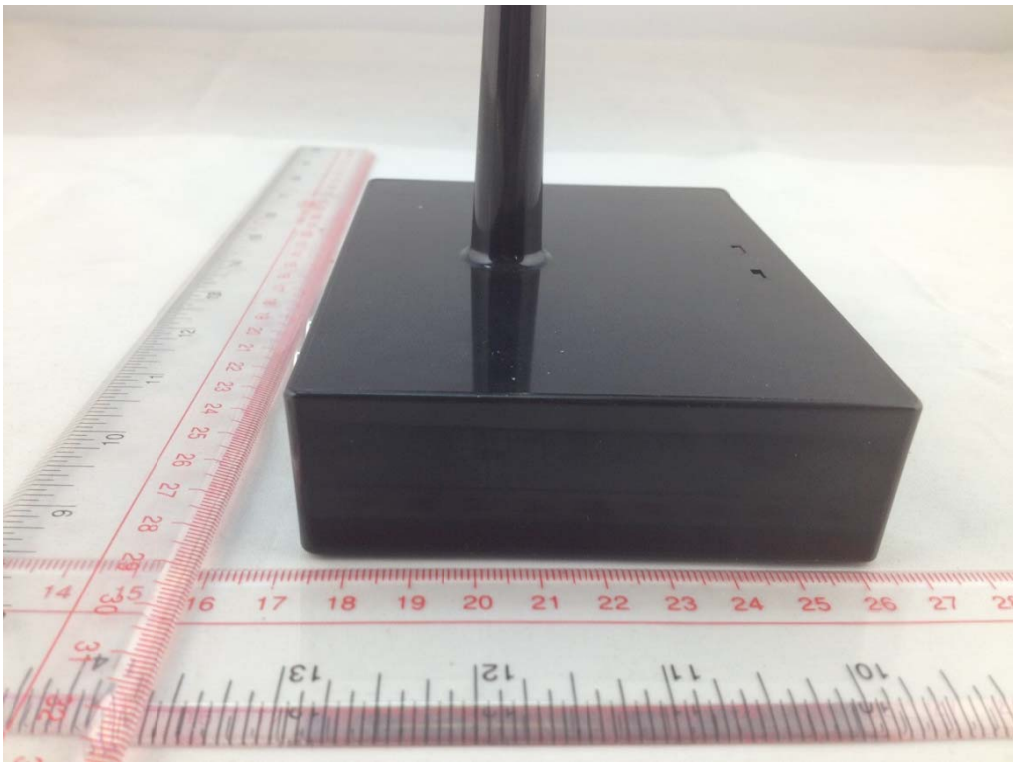


Back View of Sample

Left View of Sample



Right View of Sample



Up View of Sample

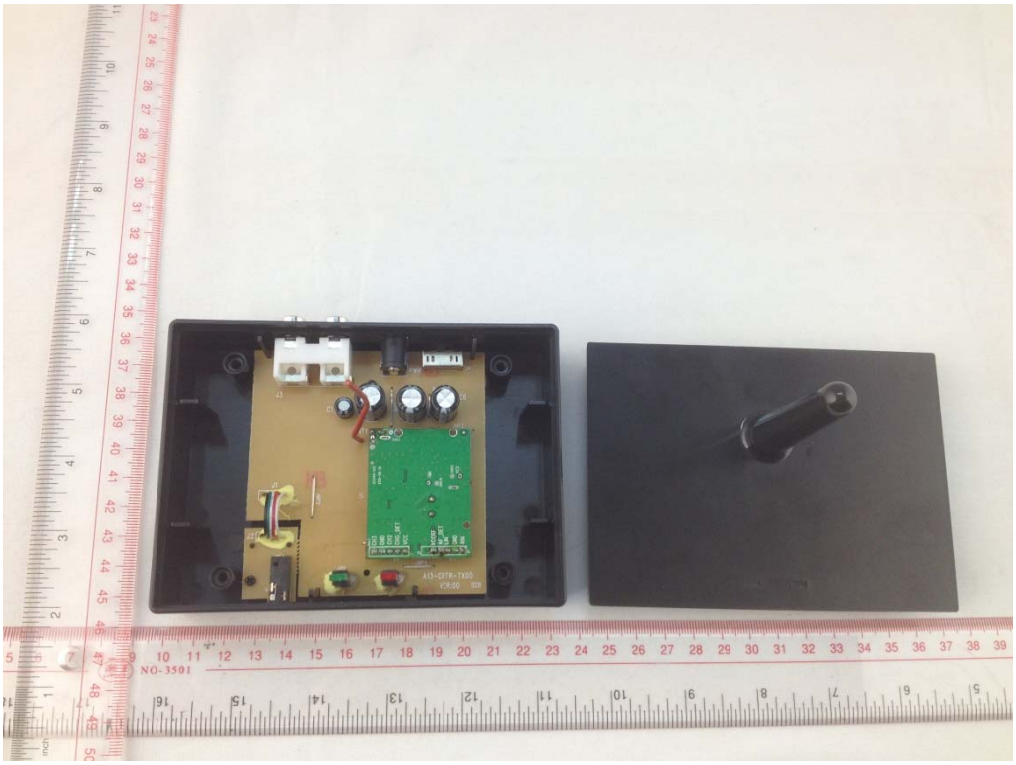
Down View of Sample

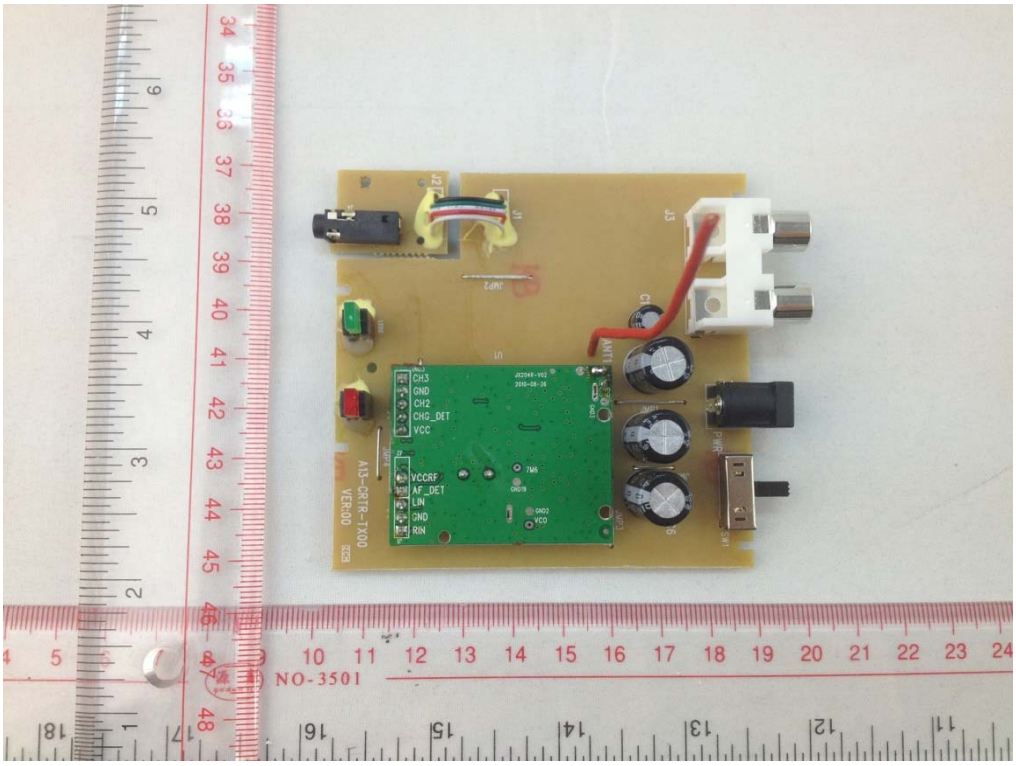
Photo of Charger

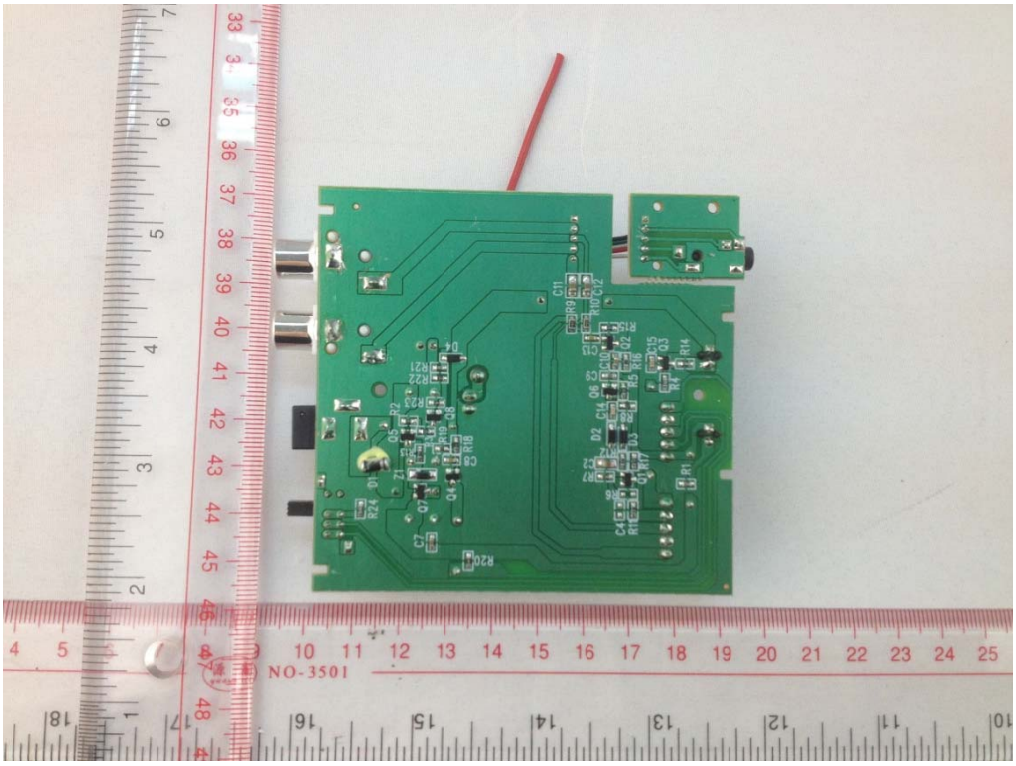
Photo of the charge label

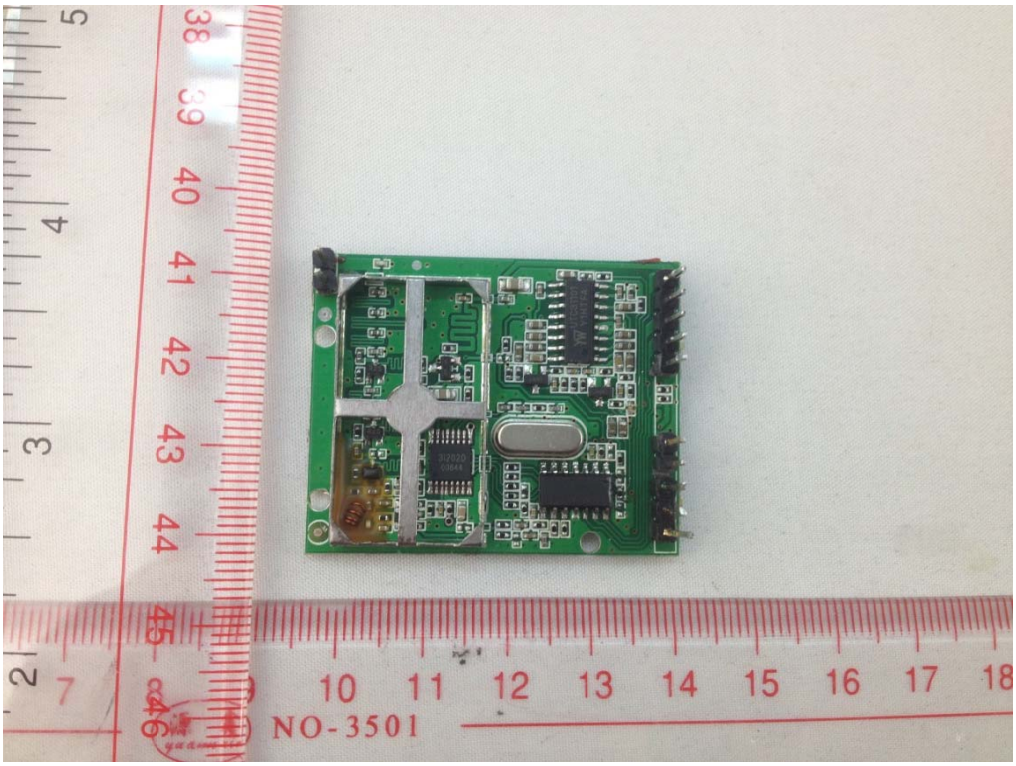
Photo of the audio cable

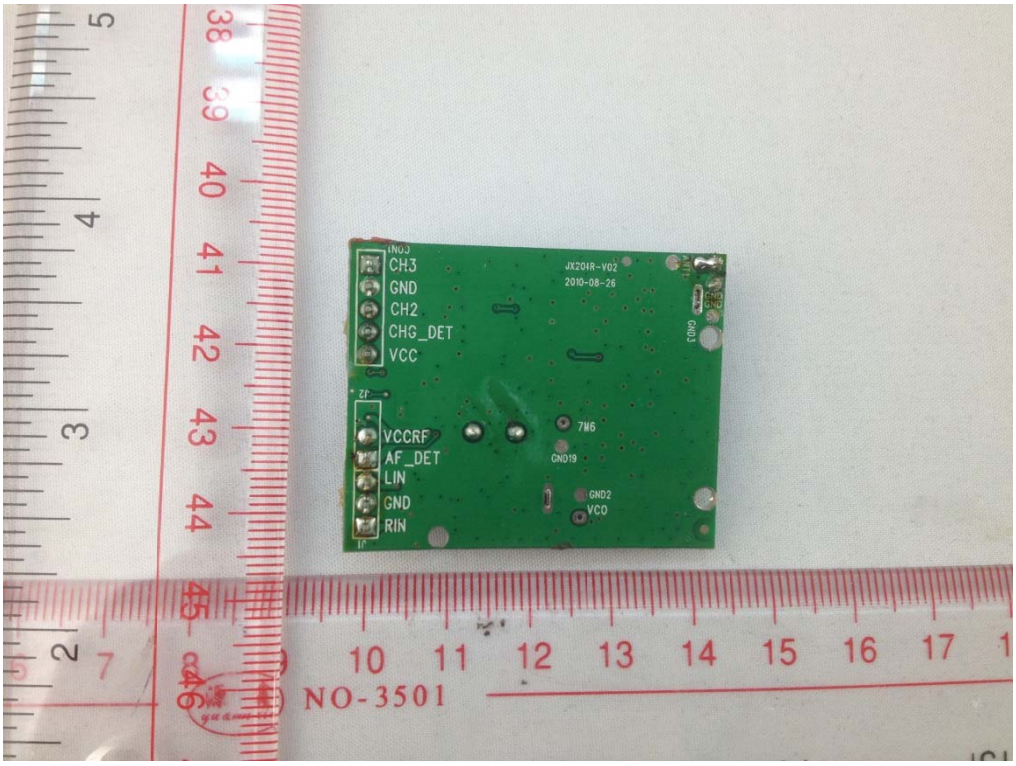
C.2 Inside of the EUT






NO-3501


NO-3501



--END OF REPORT--