

# FCC Part 15C Measurement and Test Report

For

**ATID Co., Ltd.**

(Gasandong, #1210 Byuksan/Kyungin Digitalvalley II),184,Gasandigital2-ro,

**Geumcheon-gu, Seoul, Korea**

**FCC ID: VUJAT911N**

<b>FCC Rule(s):</b>	<u>FCC Part 15.249</u>
<b>Product Description:</b>	<u>WCDMA wireless data terminal</u>
<b>Tested Model:</b>	<u>AT911N</u>
<b>Report No.:</b>	<u>STR16038164I-7</u>
<b>Tested Date:</b>	<u>2016-03-26 to 2016-04-05</u>
<b>Issued Date:</b>	<u>2016-04-06</u>
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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM.Test Technology Co., Ltd.

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## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment Under Test (EUT)

#### Client Information

Applicant: ATID Co., Ltd.  
 Address of applicant: (Gasan-dong, #1210 Byuksan/Kyungin Digitalvalley II), 184, Gasandigital2-ro, Geumcheon-gu, Seoul, Korea

Manufacturer: ATID Co., Ltd.  
 Address of manufacturer: (Gasan-dong, #1210 Byuksan/Kyungin Digitalvalley II), 184, Gasandigital2-ro, Geumcheon-gu, Seoul, Korea

General Description of EUT	
Product Name:	WCDMA wireless data terminal
Brand Name:	
Model No.:	AT911N
Adding Model:	/
Hardware Version:	AT911N MAIN PCB
Software Version:	STD0110P4MXGC
IMEI:	358625050875212
Rated Voltage:	DC 3.7V Li-ion Battery
Battery capacity:	Main Battery:2200mAh Gun Battery :5200mAh
Power Adaptor:	GT-46180-1505
	Input: 100-240V~50/60Hz 0.6A; Output: DC5V /3.0A
Device Category:	Portable Device
<i>Note: The test data is gathered from a production sample provided by the manufacturer.</i>	

Technical Characteristics of EUT	
Frequency Range:	920.625MHz-924.375MHz
Max. Field Strength:	90.72 dBuV/m
Modulation:	/
Quantity of Channels:	16
Channel Separation:	/
Antenna Type:	Integral
Antenna Gain:	1dBi
Lowest Internal Frequency of EUT:	32.768kHz

## 1.2 Test Standards

The following report is prepared on behalf of the ATID Co., Ltd. in accordance with FCC Part 15, Subpart B, Subpart C, and section 15.107, 15.203, 15.205, 15.207, 15.209 and 15.249 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.107,15.203, 15.205, 15.207, 15.209 and 15.249 of the Federal Communication Commissions rules.

**Maintenance of compliance** is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission, should be checked to ensure compliance has been maintained.

## 1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices, and 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.

## 1.4 Test Facility

### **FCC – Registration No.: 934118**

Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 934118.

### **Industry Canada (IC) Registration No.: 11464A**

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

### **CNAS Registration No.: L4062**

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2<sup>nd</sup> Road, Bao'an District, Shenzhen, P.R.C (518101).

## 1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	Low Channel	920.625MHz
TM2	Middle Channel	922.125MHz
TM3	High Channel	924.375MHz

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
Adapter Cable	1.5	shielded	With Core
USB Cable	1.0	shielded	Without Core

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
Earphone	1.2	shielded	Without Core

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	E10	LR-63C8R

## 1.6 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Agilent	E4407B	MY41440400	2015-06-17	2016-06-16
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2015-06-17	2016-06-16
Amplifier	Agilent	8447F	3113A06717	2015-06-17	2016-06-16
Amplifier	C&D	PAP-1G18	2002	2015-06-17	2016-06-16
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2015-06-17	2016-06-16
Horn Antenna	ETS	3117	00086197	2015-06-17	2016-06-16
Horn Antenna	ETS	3116B	00088203	2015-06-17	2016-06-16
Loop Antenna	Schwarz beck	FMZB 1516	9773	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2015-06-17	2016-06-16
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2015-06-17	2016-06-16
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2015-06-17	2016-06-16

## 2. SUMMARY OF TEST RESULTS

<b>FCC Rules</b>	<b>Description of Test Item</b>	<b>Result</b>
§15.203	Antenna Requirement	Compliant
§15.205	Restricted Band of Operation	Compliant
§15.207(a)	Conducted Emission	Compliant
§15.209(a)(f)	Radiated Spurious Emissions	Compliant
§15.249(a)	Field Strength of Emissions	Compliant
§15.249(d)	Out of Band Emission	Compliant
§15.215 (c)	Emission Bandwidth	Compliant

### **3. Antenna Requirements**

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#### **3.1 Standard Applicable**

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

#### **3.2 Test Result**

This product has an integral antenna, fulfill the requirement of this section.

## 4. Radiated Emissions

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### 4.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is  $\pm 5.10$  dB.

### 4.2 Standard Applicable

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of Harmonics (micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

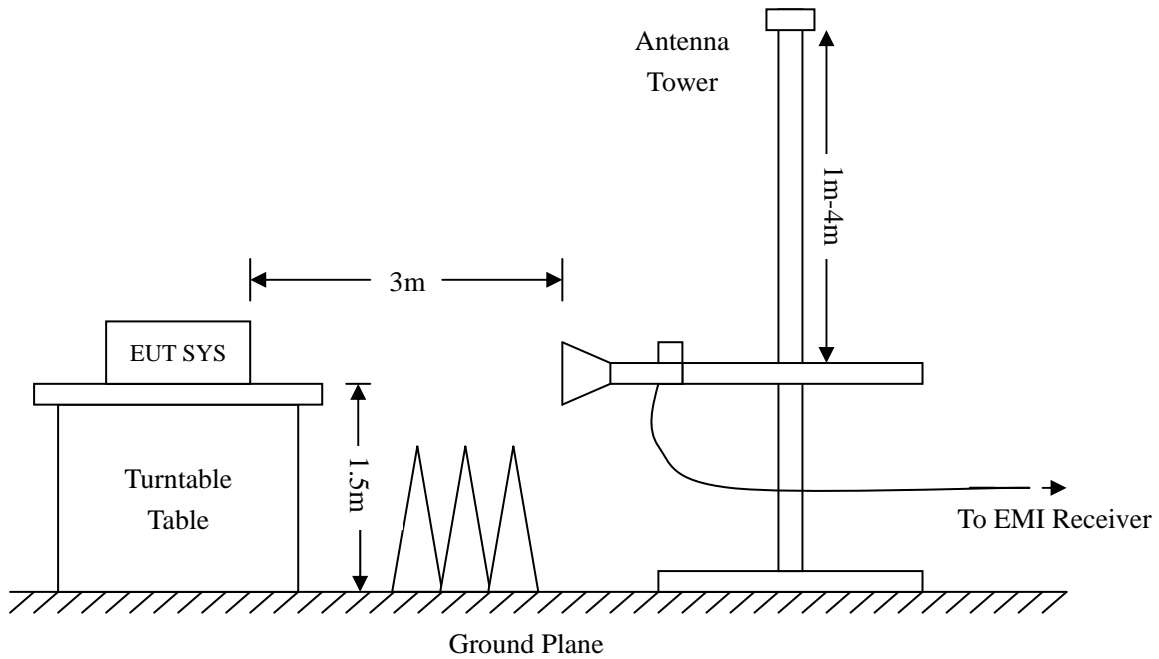
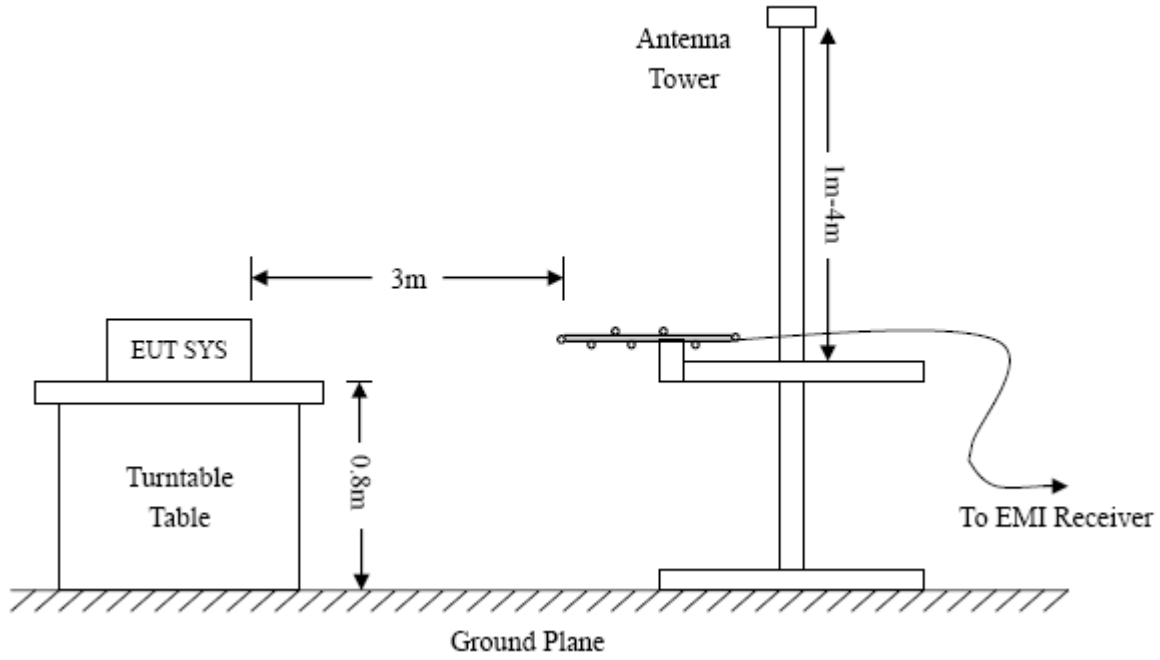
### 4.3 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.249(a) and FCC Part 15.209 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.





Frequency :9kHz-30MHz  
 RBW=10KHz,  
 VBW =30KHz  
 Sweep time= Auto  
 Trace = max hold  
 Detector function = peak

Frequency :30MHz-1GHz  
 RBW=120KHz,  
 VBW=300KHz  
 Sweep time= Auto  
 Trace = max hold  
 Detector function = peak, QP

Frequency :Above 1GHz  
 RBW=1MHz,  
 VBW=3MHz(Peak), 10Hz(AV)  
 Sweep time= Auto  
 Trace = max hold  
 Detector function = peak, AV

#### 4.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB $\mu$ V means the emission is 6dB $\mu$ V below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15C Limit}$$

#### 4.5 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	1012 mbar

#### 4.6 Summary of Test Results/Plots

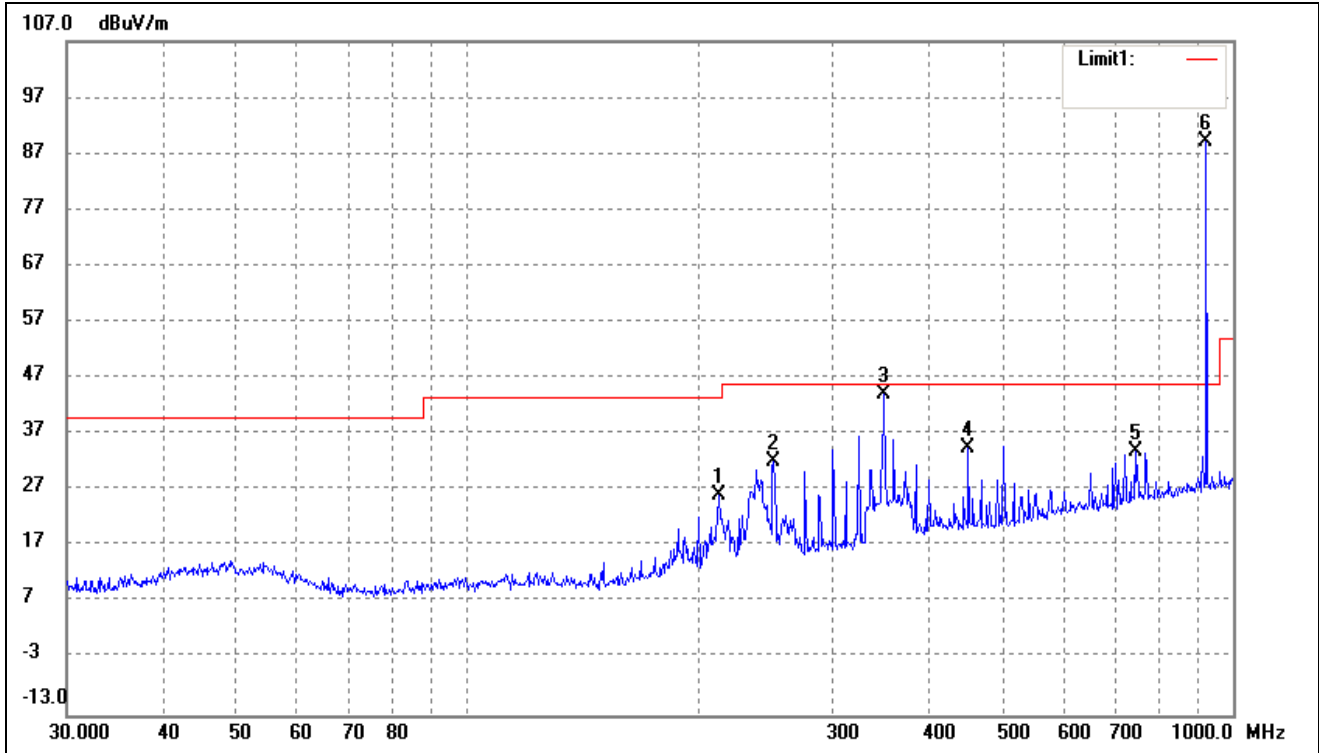
According to the data below, the [FCC Part 15.205](#), [15.209](#) and [15.249](#) standards, and had the worst margin of:

**-1.75 dB at 350.4768 in the Horizontal polarization, Low Channel, 9 kHz to 10 GHz, 3Meters**

*Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.*

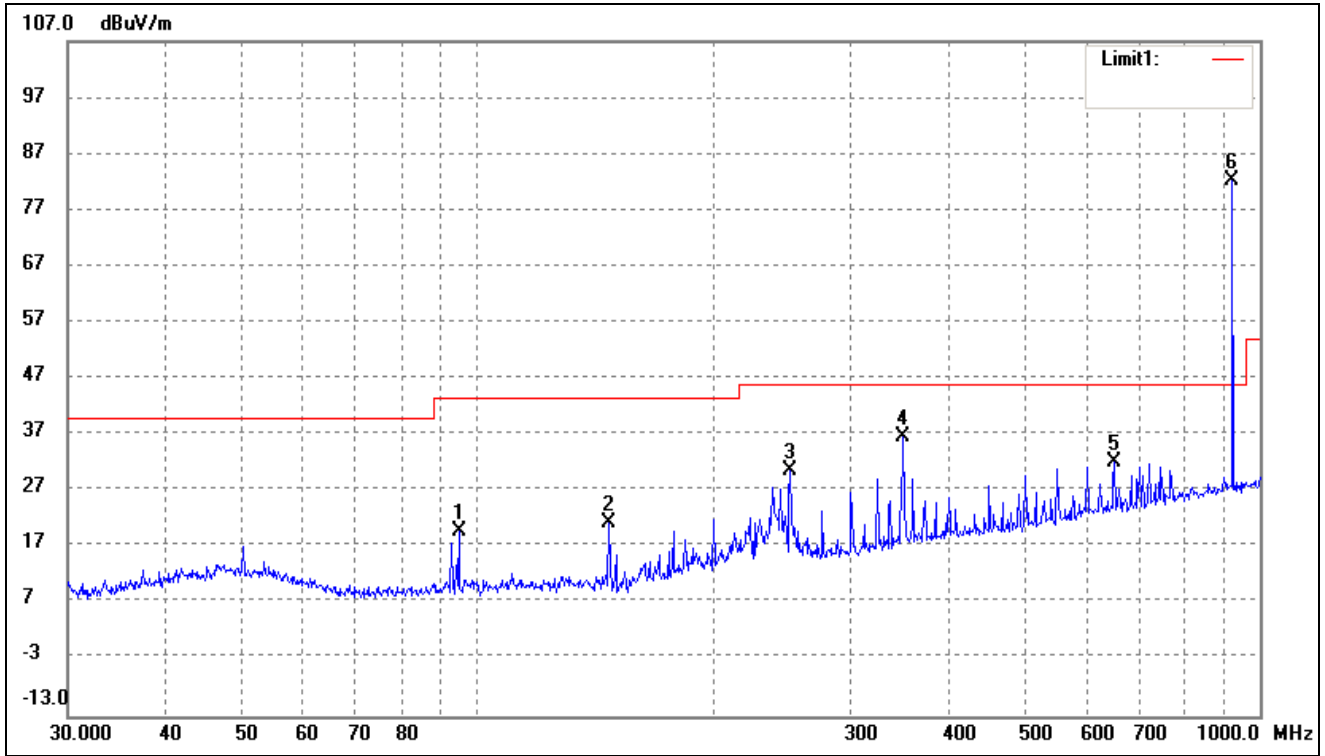
**Plot of Radiated Emissions Test Data (30MHz to 1GHz)**

EUT: WCDMA wireless data terminal  
 Tested Model: AT911N  
 Operating Condition: Transmitting Low Channel (920.625MHz)  
 Comment: DC 3.7V  
 Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	213.0151	33.87	-7.67	26.20	43.50	-17.30	264	100	peak
2	251.1804	38.41	-6.14	32.27	46.00	-13.73	113	100	peak
3	350.4768	47.36	-3.11	44.25	46.00	-1.75	287	100	peak
4	451.1350	36.21	-1.57	34.64	46.00	-11.36	185	100	peak
5	744.8661	30.09	3.75	33.84	46.00	-12.16	178	100	peak
6	920.6250	83.50	5.79	89.29	94.00	-4.71	168	100	Fundamental

Test Specification: Vertical

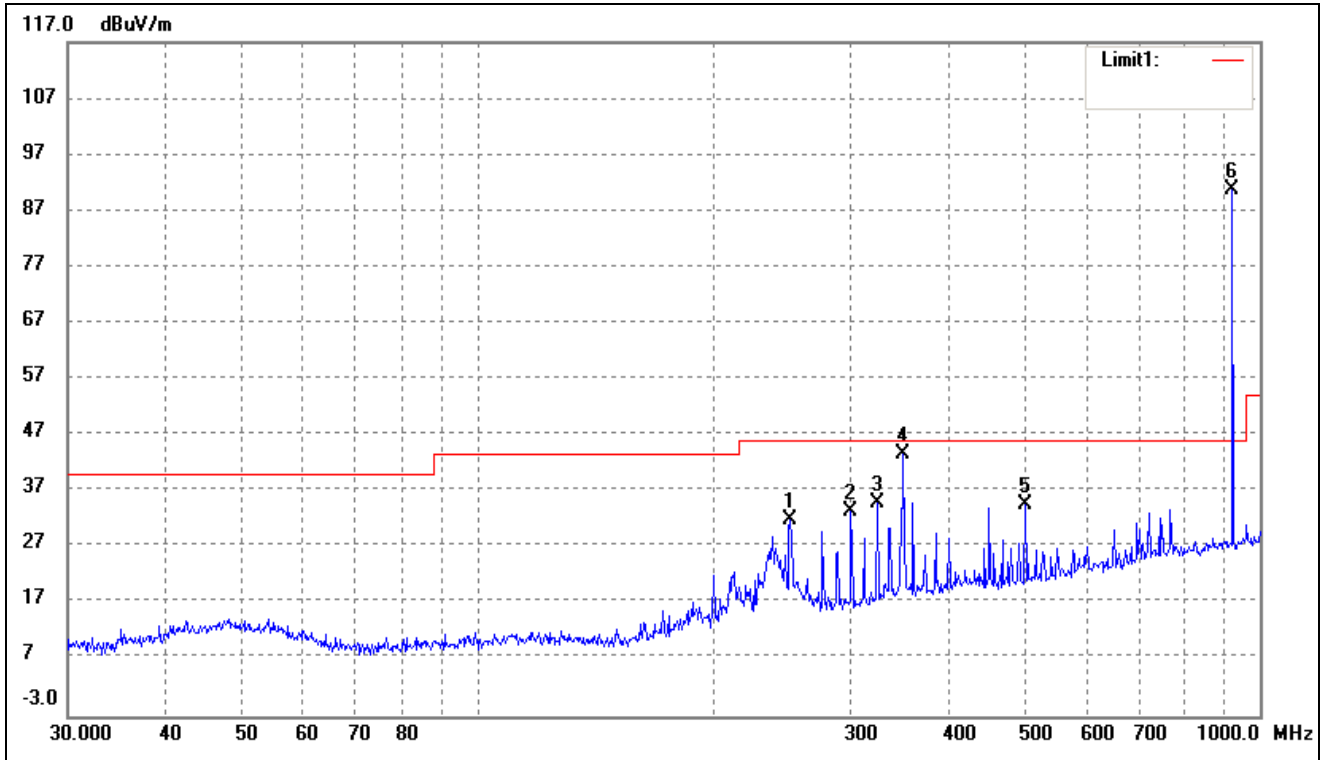


No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	94.7601	31.37	-11.63	19.74	43.50	-23.76	264	100	peak
2	147.4036	32.49	-11.00	21.49	43.50	-22.01	113	100	peak
3	251.1804	36.72	-6.14	30.58	46.00	-15.42	287	100	peak
4	350.4768	39.74	-3.11	36.63	46.00	-9.37	185	100	peak
5	651.9417	29.84	2.27	32.11	46.00	-13.89	178	100	peak
6	920.6250	76.53	5.79	82.32	94.00	-11.68	168	100	Fundamental

Operating Condition: Transmitting Middle Channel (922.125MHz)

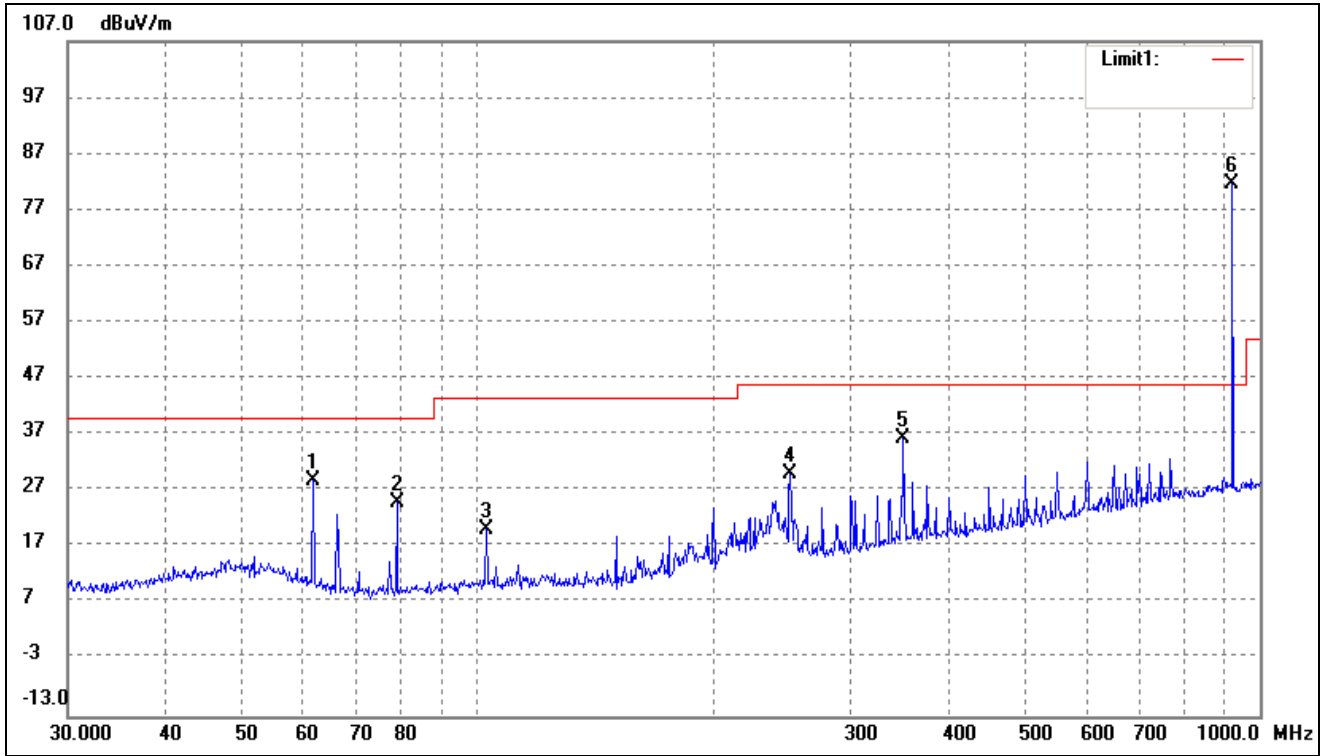
Comment: DC 3.7V

Test Specification: Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	251.1804	37.98	-6.14	31.84	46.00	-14.16	162	100	peak
2	300.3673	38.48	-4.98	33.50	46.00	-12.50	200	100	peak
3	324.4561	39.28	-4.24	35.04	46.00	-10.96	158	100	peak
4	350.4768	46.76	-3.11	43.65	46.00	-2.35	127	100	peak
5	501.1790	35.19	-0.60	34.59	46.00	-11.41	169	100	peak
6	922.1250	84.93	5.79	90.72	94.00	-3.28	85	100	Fundamental

Test Specification: Vertical

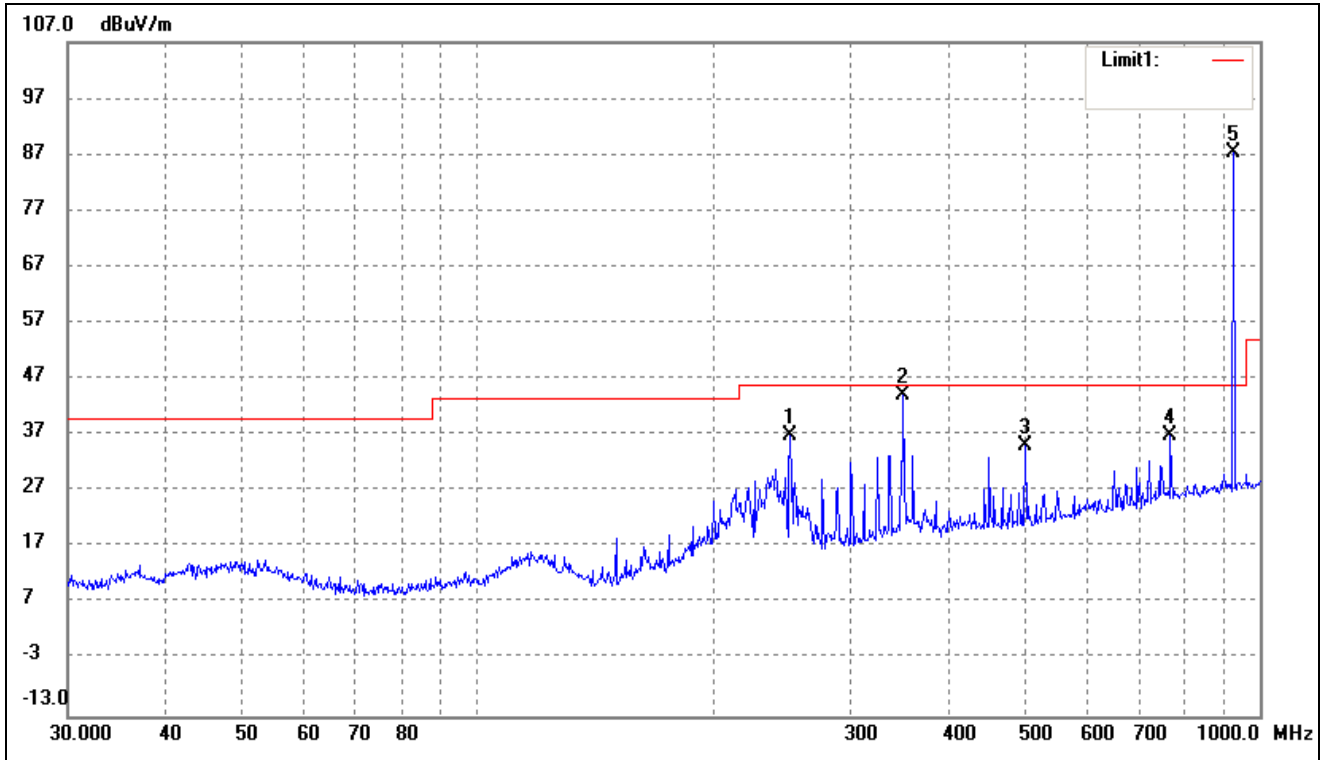


No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	61.7781	39.79	-10.82	28.97	40.00	-11.03	240	100	peak
2	78.9652	37.29	-12.30	24.99	40.00	-15.01	187	100	peak
3	102.7192	31.23	-11.01	20.22	43.50	-23.28	220	100	peak
4	251.1804	36.33	-6.14	30.19	46.00	-15.81	198	100	peak
5	350.4768	39.40	-3.11	36.29	46.00	-9.71	125	100	peak
6	922.1250	75.92	5.79	81.71	94.00	-12.29	145	100	Fundamental

Operating Condition: Transmitting High Channel (924.375MHz)

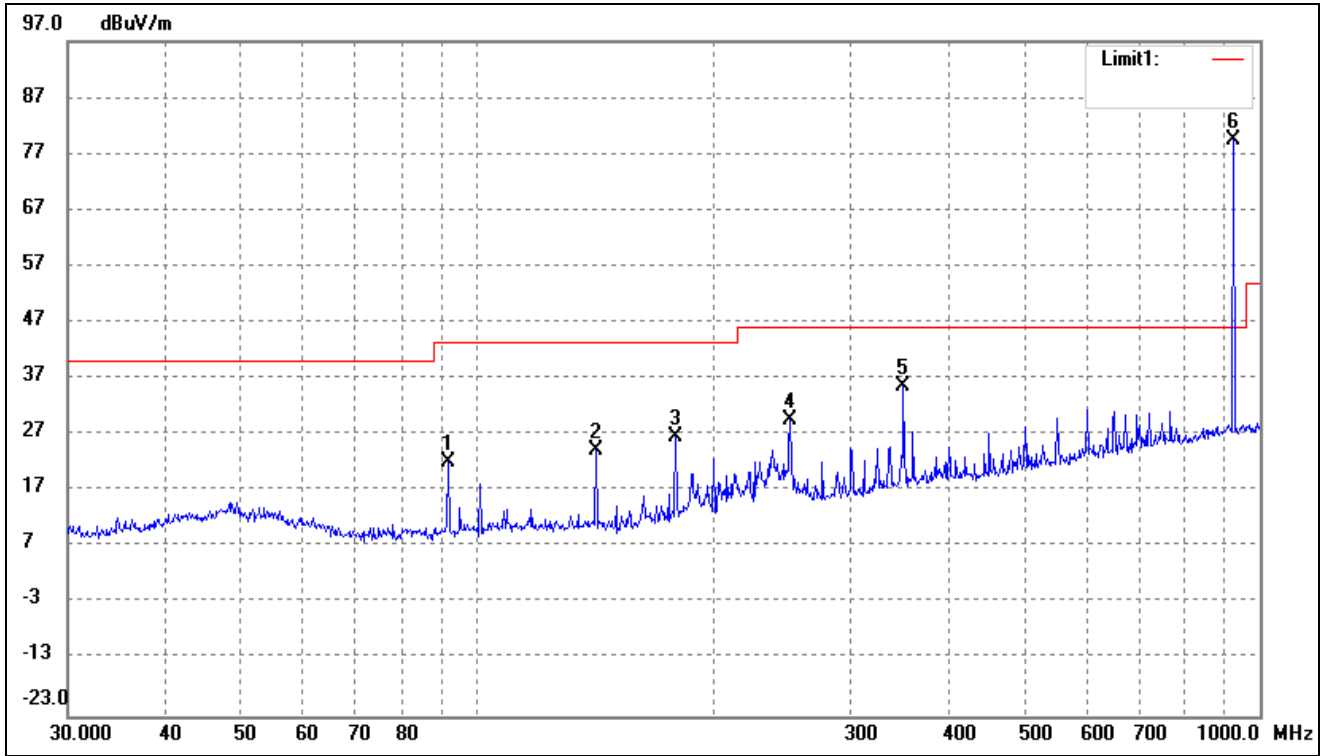
Comment: DC 3.7V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	251.1804	43.03	-6.14	36.89	46.00	-9.11	162	100	peak
2	350.4768	47.34	-3.11	44.23	46.00	-1.77	200	100	peak
3	501.1790	35.68	-0.60	35.08	46.00	-10.92	147	100	peak
4	768.7482	32.83	4.06	36.89	46.00	-9.11	158	100	peak
5	924.3750	81.62	5.80	87.42	94.00	-6.58	169	100	Fundamental

Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	91.8163	34.04	-11.86	22.18	43.50	-21.32	240	100	peak
2	141.8262	35.05	-10.91	24.14	43.50	-19.36	187	100	peak
3	179.3864	35.90	-9.31	26.59	43.50	-16.91	220	100	peak
4	251.1804	35.79	-6.14	29.65	46.00	-16.35	148	100	peak
5	350.4768	38.71	-3.11	35.60	46.00	-10.40	152	100	peak
6	924.3750	73.73	5.80	79.53	94.00	-14.47	168	100	Fundamental



*Spurious Emissions Above 1GHz*

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-920.625MHz							
1841.25	34.17	10.27	44.44	74.00	-29.56	H	PK
1841.25	20.77	10.27	31.04	54.00	-22.96	H	AV
1841.25	36.05	10.27	46.32	74.00	-27.68	V	PK
1841.25	25.33	10.27	35.60	54.00	-18.40	V	AV
Middle Channel-922.125MHz							
1644.25	34.85	10.28	45.13	74.00	-28.87	H	PK
1644.25	19.33	10.28	29.61	54.00	-24.39	H	AV
1644.25	34.85	10.28	45.13	74.00	-28.87	V	PK
1644.25	20.21	10.28	30.49	54.00	-23.51	V	AV
High Channel-924.375MHz							
1848.75	33.81	10.29	44.10	74.00	-29.90	H	PK
1848.75	20.90	10.29	31.19	54.00	-22.81	H	AV
1848.75	36.00	10.29	46.29	74.00	-27.71	V	PK
1848.75	22.38	10.29	32.67	54.00	-21.33	V	AV

*Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 3<sup>th</sup> Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*

*The measurements greater than 20dB below the limit from 9kHz to 30MHz.*

## 5. Out of Band Emissions

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### 5.1 Standard Applicable

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

### 5.2 Test Procedure

As the radiation test, set the Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2483.5MHz, than mark the higher-level emission for comparing with the FCC rules.

### 5.3 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	1012 mbar

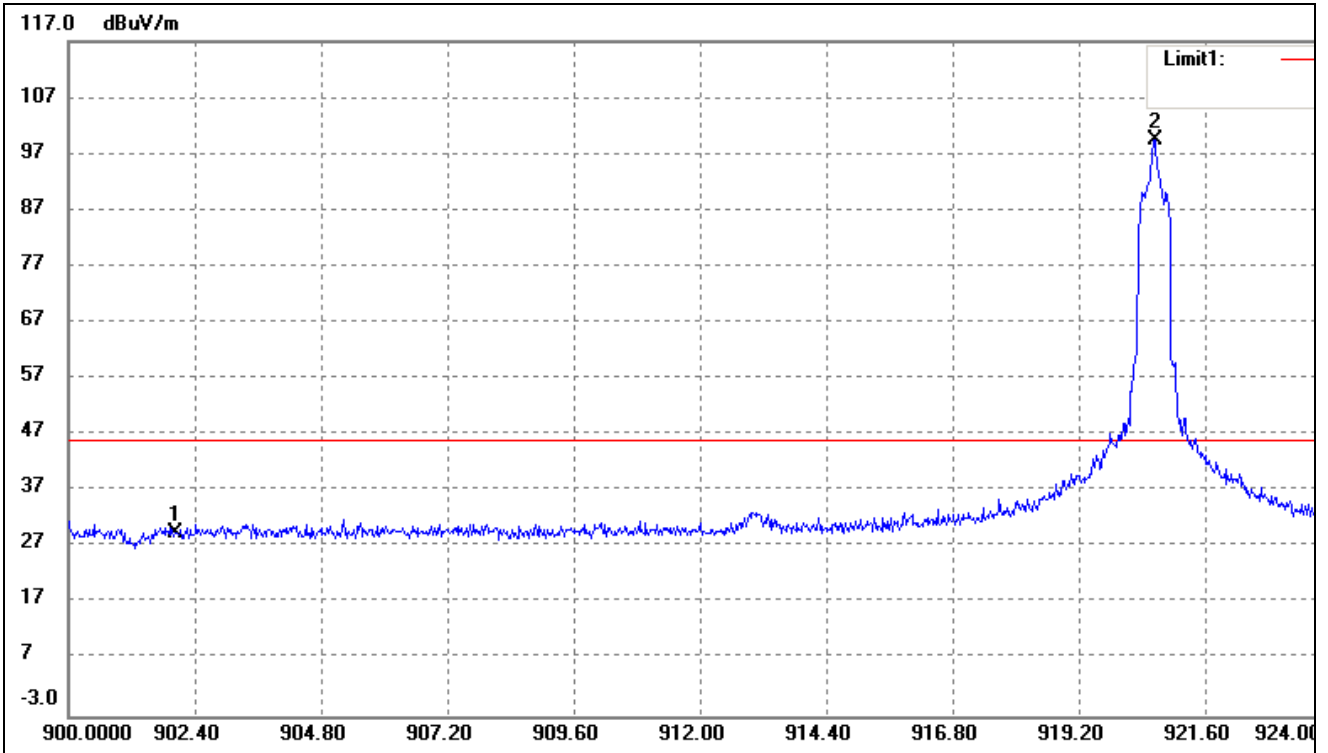
### 5.4 Summary of Test Results/Plots

Test mode	Frequency	Limit	Result
	MHz	dBuV / dBc	
Lowest	902.00	<46 dBuV	Pass
	928.00	<46 dBuV	Pass

The edge emissions are below the FCC 15.209 Limits or complies with the 15.249 requirements.

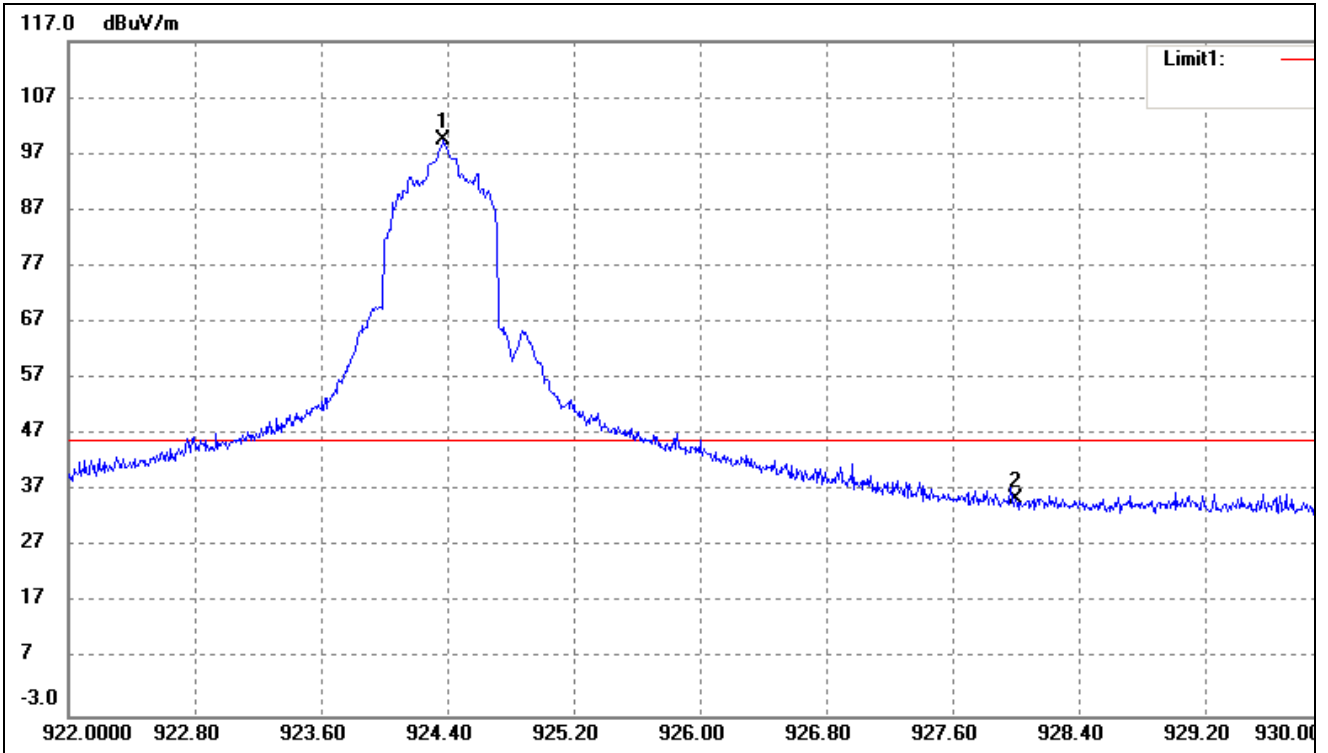
Please refer to the test plots as below.

Lowest Bandedge  
Vertical (Worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	902.0000	23.84	5.66	29.50	46.00	-16.50	Peak Detector
2	920.6400	93.77	5.77	99.54	/	/	Fundamental

Highest Bandedge  
Vertical (Worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	924.3760	93.73	5.79	99.52	/	/	Fundamental
2	928.0000	29.74	5.81	35.55	46.00	-10.45	Peak Detector

## 6. Emission Bandwidth

### 6.1 Standard Applicable

According to 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 ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

### 6.2 Test Procedure

According to the ANSI 63.4-2014, the emission bandwidth test method as follows.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Set span = 1MHz, centered on a transmitting channel

RBW  $\geq$ 1% 20dB Bandwidth, VBW  $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, use the marker-delta function to measure and record the 20dB down and 99% bandwidth of the emission.

### 6.3 Environmental Conditions

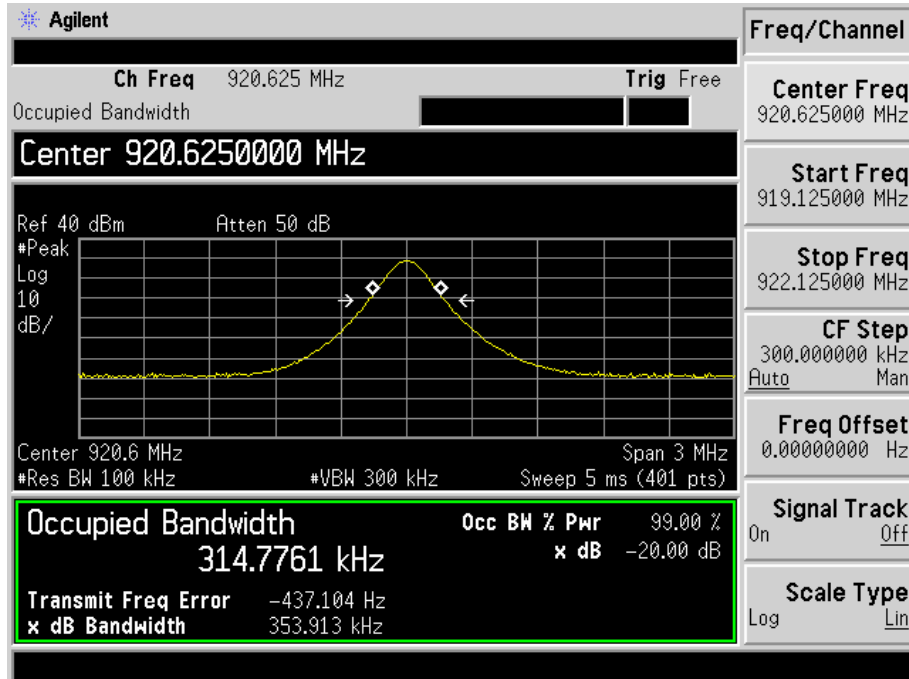
Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

### 6.4 Summary of Test Results/Plots

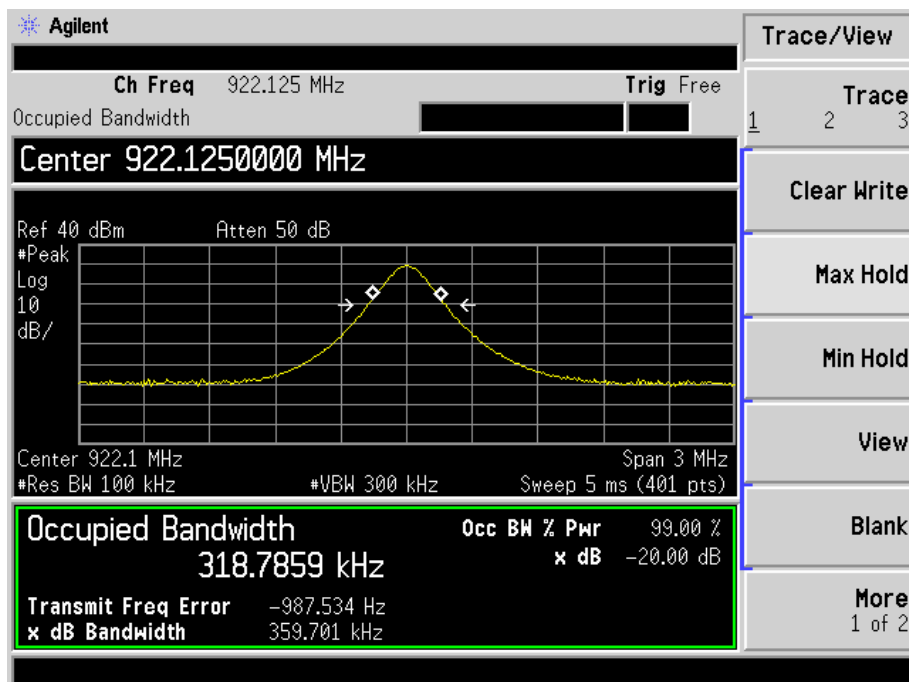
Channel	Frequency MHz	20dB Bandwidth kHz	99% Bandwidth kHz
Low Channel	920.625	353.913	314.7761
Middle Channel	922.125	359.701	318.7859
High Channel	924.375	359.395	318.9337

Please refer to the following test plots

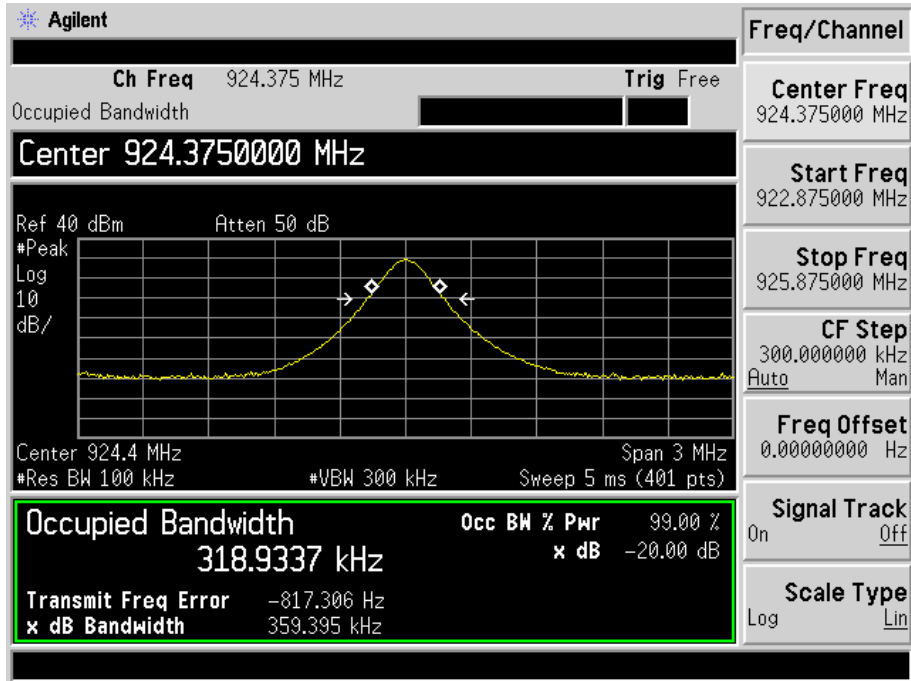
Low Channel:



Middle Channel:



High Channel:



## 7. Conducted Emissions

### 7.1 Measurement Uncertainty

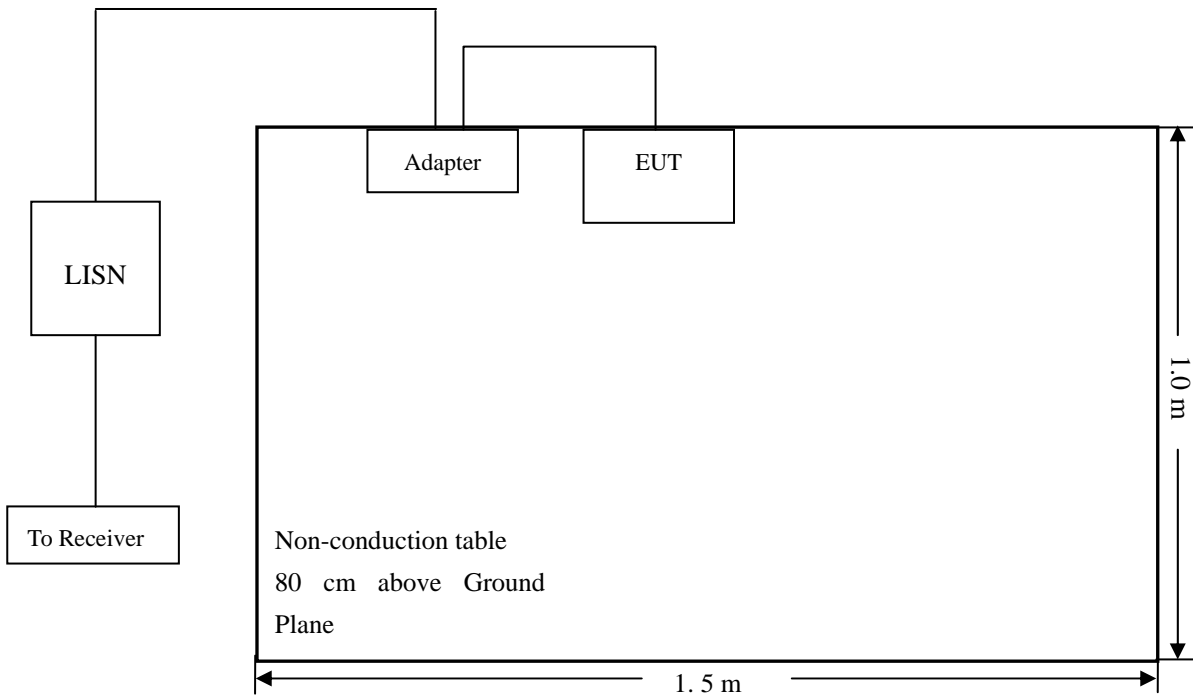
Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is  $\pm 2.88$  dB.

### 7.2 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.207 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle. The spacing between the peripherals was 10 cm.

### 7.3 Basic Test Setup Block Diagram



### 7.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar



## 7.5 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency ..... 150 kHz  
Stop Frequency..... 30 MHz  
Sweep Speed ..... Auto  
IF Bandwidth..... 10 kHz  
Quasi-Peak Adapter Bandwidth ..... 9 kHz  
Quasi-Peak Adapter Mode ..... Normal

## 7.6 Summary of Test Results/Plots

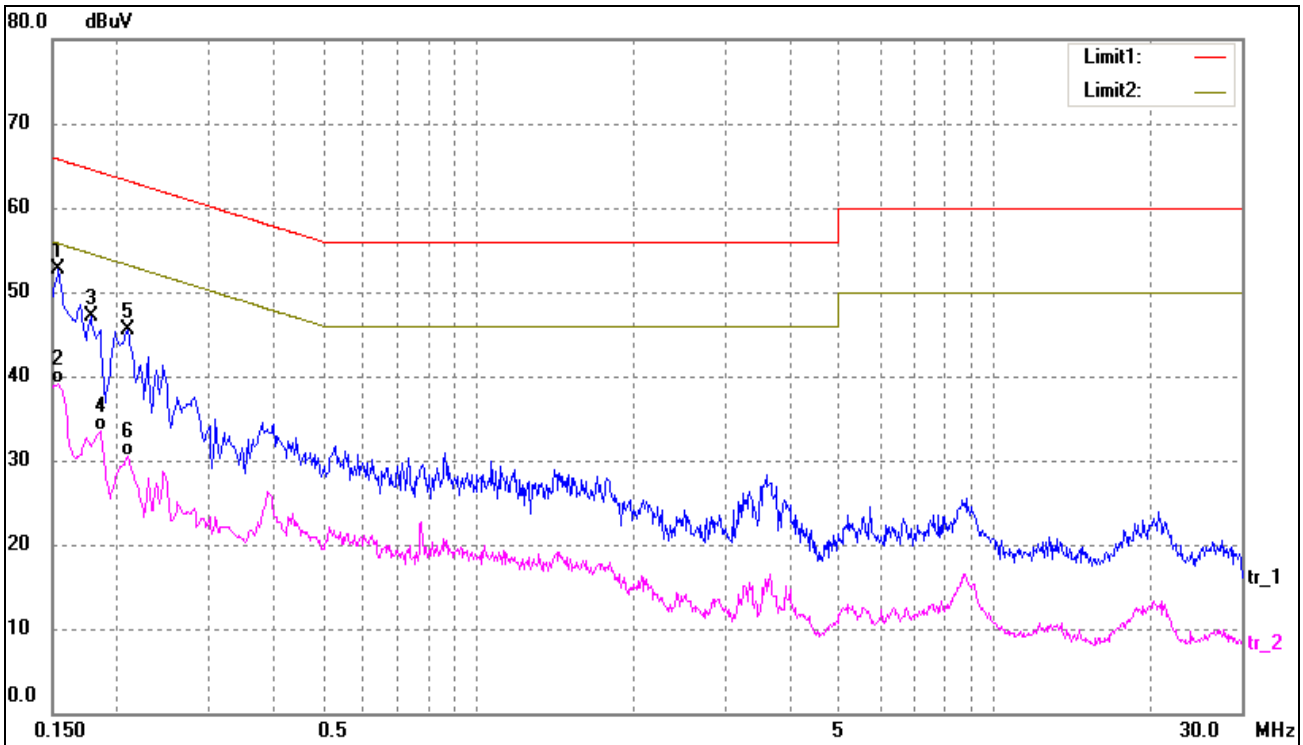
According to the data in section 7.7, the EUT complied with the FCC Part 15.207 Conducted margin for this device, with the *worst* margin reading of:

**-11.93 dB at 0.1700 MHz in the Line mode, Peak detector, 0.15-30MHz**

## 7.7 Conducted Emissions Test Data

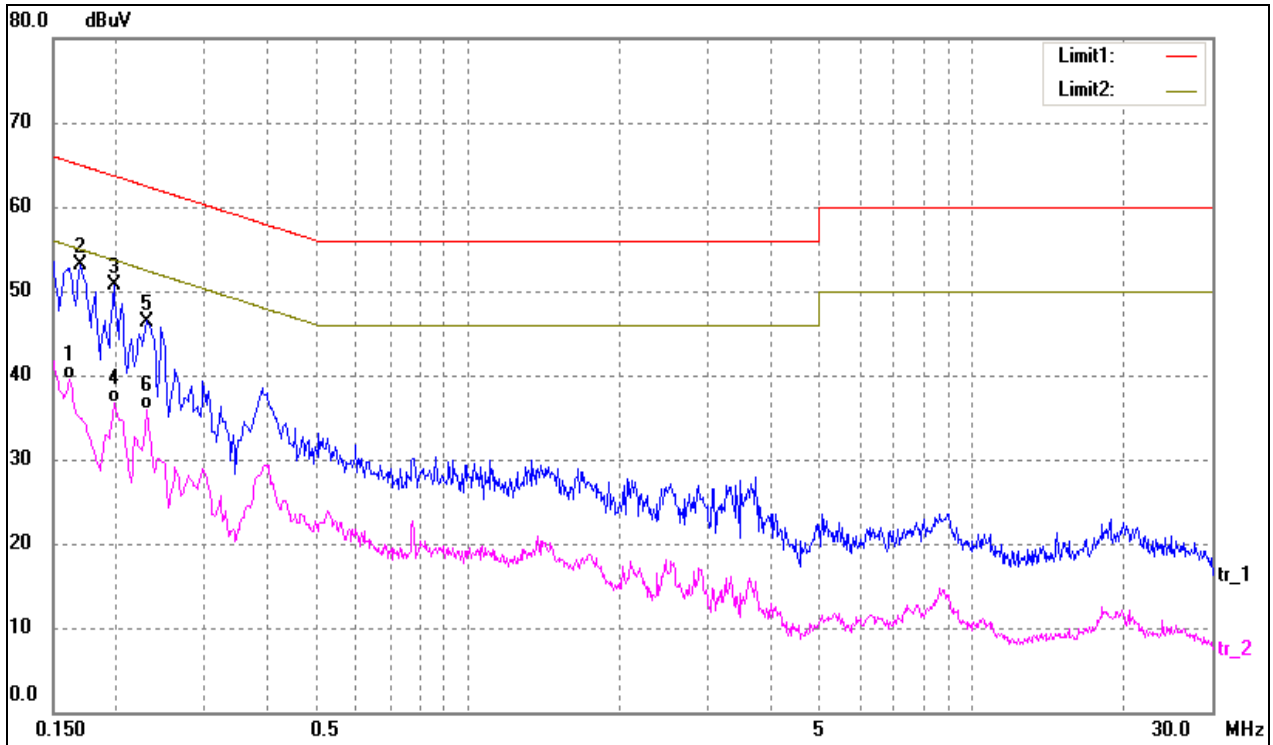
**Plot of Conducted Emissions Test Data**

EUT: WCDMA wireless data terminal  
 Tested Model: AT911N  
 Operating Condition: Transmitting  
 Comment: AC 120V/60Hz; Adapter DC 5V  
 Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.1540	43.23	9.50	52.73	65.78	-13.05	peak
2	0.1540	29.58	9.50	39.08	55.78	-16.70	AVG
3	0.1780	37.60	9.50	47.10	64.58	-17.48	peak
4	0.1860	24.08	9.50	33.58	54.21	-20.63	AVG
5	0.2100	35.96	9.50	45.46	63.21	-17.75	peak
6	0.2100	20.96	9.50	30.46	53.21	-22.75	AVG

Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1620	30.03	9.50	39.53	55.36	-15.83	AVG
2*	0.1700	43.53	9.50	53.03	64.96	-11.93	peak
3	0.1980	41.13	9.50	50.63	63.69	-13.06	peak
4	0.1980	27.27	9.50	36.77	53.69	-16.92	AVG
5	0.2300	36.90	9.50	46.40	62.45	-16.05	peak
6	0.2300	26.42	9.50	35.92	52.45	-16.53	AVG

\*\*\*\*\* END OF REPORT \*\*\*\*\*