



# FCC RF Test Report

**Product Name: Smart Phone**

**Model Number: HUAWEI RIO-L01, RIO-L01**

**Report No: SYBH(Z-RF)025042015-2005**

**FCC ID: QISRIO-L01**

**Reliability Laboratory of Huawei Technologies Co., Ltd.**

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District,  
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## Notice

1. The laboratory has Passed the accreditation by China National Accreditation Service for Conformity Assessment (CNAS). The accreditation number is L0310.
2. The laboratory has Passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 2174.01.
3. The laboratory has been listed by the US Federal Communications Commission to perform electromagnetic emission measurements. The site recognition number is 97456.
4. The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 6369A-2.
5. The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
6. The test report is invalid if there is any evidence of erasure and/or falsification.
7. The test report is only valid for the test samples.
8. 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.



**Applicant:** Huawei Technologies Co., Ltd.  
**Address:** Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

**Date of Receipt Sample:** 2015-06-15  
**Start Date of Test:** 2015-06-15  
**End Date of Test:** 2015-06-30

**Test Result:** Pass

<b>Approved by Senior Engineer:</b>	2014-06-30	Liu Chunlin	
	Date	Name	Signature

<b>Prepared by:</b>	2015-06-30	maowenli	
	Date	Name	Signature

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# 1 General Information

<b>1.1 Applied Standard</b>	
Applied Rules: 47 CFR FCC Part 02: 2013 FCC Part 15 Subpart C (15.225): 2013	
<b>1.2 Test Location</b>	
Test Location 1:	Reliability Laboratory of Huawei Technologies Co., Ltd.
Address:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Test Location 2:	BTL Laboratory
Address :	No.3,Jinshagang 1st Road,ShiXia,Dalang Town,DongGuan,China.
<b>1.3 Test Environmental Condition</b>	
Ambient Temperature:	20 – 25 °C
Ambient Relative Humidity:	45 – 55 %
Atmospheric Pressure:	101 kPa



## 2 Summary

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result	Reference
15.225 (a)	In-Band Emissions	15.848 $\mu$ V/m @ 30m 13.553 – 13.567 MHz	RADIATED	Pass	Section 5.2
2.1049	20 dB Bandwidth	N/A		Pass	Section 5.1
15.225(b)	In-Band Emissions	334 $\mu$ V/m @ 30m 13.410 – 13.553 MHz 13.567 – 13.710 MHz		Pass	Section 5.2
15.225(c)	In-Band Emissions	106 $\mu$ V/m @ 30m 13.110 – 13.410 MHz 13.710 – 14.010 MHz		Pass	Section 5.2
15.225(d) 15.209	Out-of-Band Emissions	Emissions outside of the specified band (13.110 – 14.010 MHz) must meet the radiated limits detailed in 15.209		Pass	Section 5.3
15.225(e)	Frequency Stability Tolerance	$\pm$ 0.01% of Operating Frequency	Temperature Chamber	Pass	Section 5.4
15.207	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits	LINE CONDUCTED	Pass	Part 15B report



### 3 Product Description

#### 3.1 Product Information

##### 3.1.1 General Description

HUAWEI RIO-L01, RIO-L01 is subscriber equipment in the LTE/WCDMA/GSM system. The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900. The HSPA+/UMTS frequency band is Band I and Band VIII. The LTE frequency band is B1 and B3 and B7 and B8 and B20. The Mobile Phone implements such functions as RF signal receiving/transmitting, LTE/HSPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video MMS service, GPS, AGPS, NFC and WIFI etc. Externally it provides SIM card interface (it can also used as micro SD card interface), earphone port (to provide voice service) and USIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

#### 3.2 EUT Identity

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

##### 3.2.1 Board

Board		
Description	Hardware Version	Software Version
Main Board	HL1RIOL01M	RIO-L01 C00B035

##### 1.3.1 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
Adapter	HW-050100U01	Huawei Technologies Co., Ltd.	Input Voltage: ~100-240V 50/60Hz 0.2A 0.5A Output Voltage: 5V  1A Rated Power: 5W
Adapter	HW-050100E01	Huawei Technologies Co., Ltd.	Input Voltage: ~100-240V 50/60Hz 0.2A 0.5A Output Voltage: 5V  1A Rated Power: 5W
Adapter	HW-050100B01	Huawei	Input Voltage: ~100-240V 50/60Hz



Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
		Technologies Co., Ltd.	0.2A 0.5A Output Voltage: 5V  1A Rated Power: 5W
Adapter	HW-050100A01	Huawei Technologies Co., Ltd.	Input Voltage: ~100-240V 50/60Hz 0.2A 0.5A Output Voltage: 5V  1A Rated Power: 5W
Battery	HB396481EBC	Huawei Technologies Co., Ltd.	Rated capacity: 3000 mAh Nominal Voltage:  +3.8V Charging Voltage:  +4.35V



## 4 Main Test Instruments

Test Location 1:

Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal- Due
Power supply	KEITHLEY	2303	A120714713	2014-08-07	2016-08-06
Wireless Communication Test set	Agilent	N4010A	MY49081592	2014-11-04	2015-11-03
Universal Radio Communication Tester	R&S	CMU200	123299	2014-11-04	2015-11-03
Spectrum Analyzer	Agilent	N9020A	MY52090652	2014-07-11	2015-07-10
Universal Radio Communication Tester	R & S	CMW500	126854	2015-02-13	2016-02-12
Spectrum Analyzer	Agilent	E4440A	MY48250119	2014-07-11	2015-07-10
Signal Analyzer	R&S	FSQ31	200021	2014-11-04	2015-11-03
Spectrum Analyzer	Agilent	N9030A	MY49431698	2014-11-04	2015-11-03
Temperature Chamber	WEISS	WKL64	56246002940010	2015-02-13	2016-02-12
Signal generator	Agilent	E8257D	MY49281095	2014-11-04	2015-11-03
Vector Signal Generator	R&S	SMU200A	104162	2014-11-04	2015-11-03
Power Detecting & Sampling Unit	R&S	OSP-B157	100881	2014-09-08	2015-09-07
Signal Generator	Agilent	E4438C	MY47271904	2014-10-28	2015-10-27

Test Location 2:

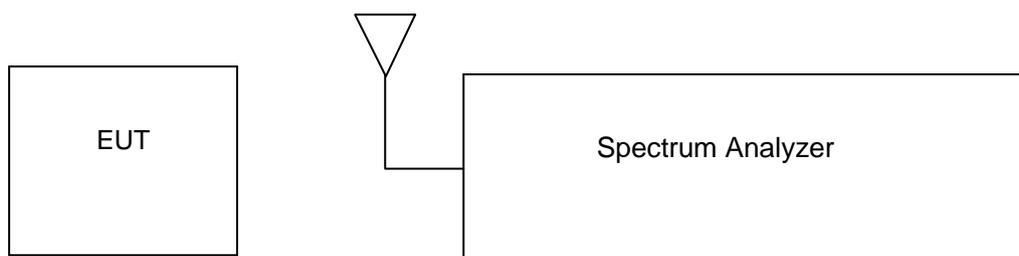
Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE
EXA Spectrum Analyzer	N9010A	MY5052044	Agilent	Mar.28,2016
Microwave Preamplifier With Adaptor	EMC012645B	980221	EMC INSTRUMENT	Oct.22,2015
Amplifier	8449B	3008A02274	Agilent	Mar.28,2016
Double Ridged Guide Antenna (1 GHz ~18GHz)	3115	00075846	ETS.LINDGREN	Mar.28,2016
Antenna (1 GHz ~18GHz)	3115	00075789	ETS	Mar.28,2016
Antenna(30M~1GHz)	VULB9160	9160-3231	SCHWARZBECK	Mar.28,2016
Antenna(30M~1GHz)	VULB9160	9160-3232	SCHWARZBECK	Mar.28,2016
Triple Loop Antenna(9K~30M)	HXYZ9170	9170-110	SCHWARZBECK	Mar.28,2016
Horn Antenna(18GHz~26.5GHz)	3116C	00152324	ETS	Mar.28,2016
controller	SC100	9163-235	CT	N/A
Amplifier	8447D	1937A02847	HP	Mar. 17, 2016
Receiver	N9038A	MY52130039	AGILENT	Sep. 30, 2015

## 5 Test Results

### 5.1 20dB Bandwidth Measurement

The 20dB bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode.

#### 5.1.1 Test Setup



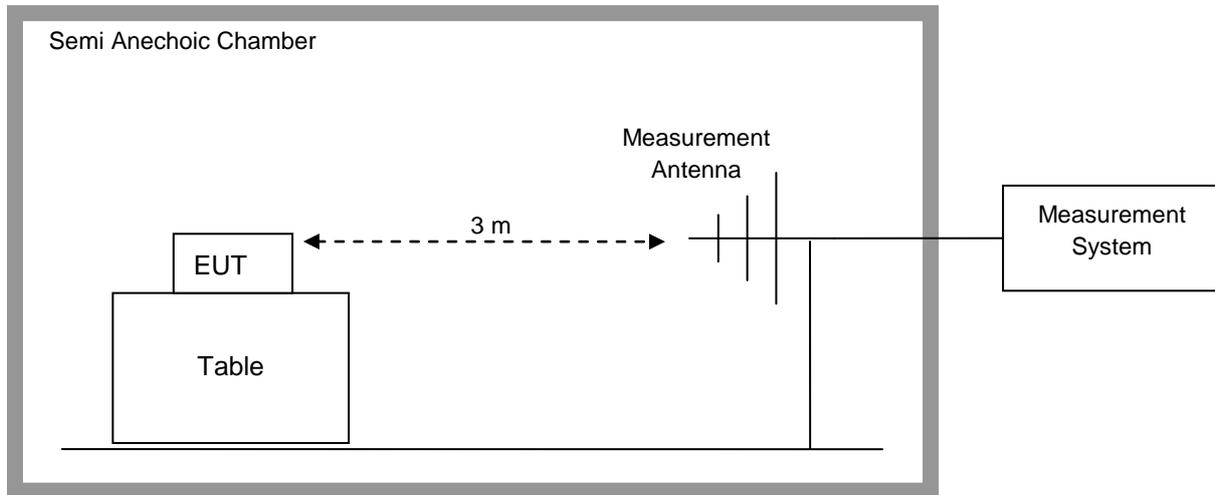
#### 5.1.2 Test Result

Frequency	Occupied Bandwidth
13.56MHz	200KHz

**The result of the measurement is passed.**

## 5.2 In-Band Radiated Spurious Emission Measurements

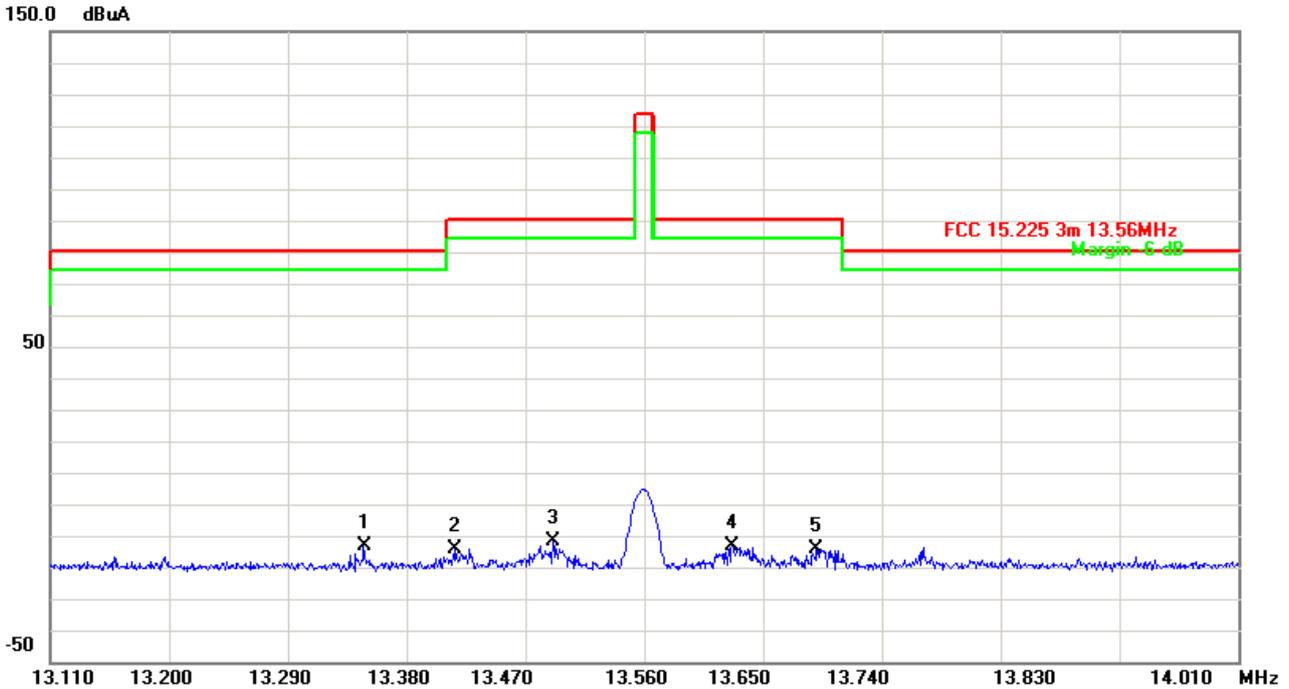
### 5.2.1 Test Setup



Measurement parameters	
Detector:	Quasi Peak
Sweep time:	-/-
Resolution bandwidth:	10 kHz
Video bandwidth:	10 kHz
Span:	-/-
Trace-Mode:	Max Hold



### 5.2.2 Test Result



Final Result 1

No.	Mk.	Freq. MHz	Reading Level dBuA	Correct Factor dB	Measure- ment dBuA	Limit dBuA	Margin dB
1	*	13.3476	-13.46	0.00	-13.46	80.50	-93.96
2		13.4170	-14.46	0.00	-14.46	90.50	-104.96
3		13.4907	-11.75	0.00	-11.75	90.50	-102.25
4		13.6266	-13.21	0.00	-13.21	90.50	-103.71
5		13.6905	-14.13	0.00	-14.13	90.50	-104.63

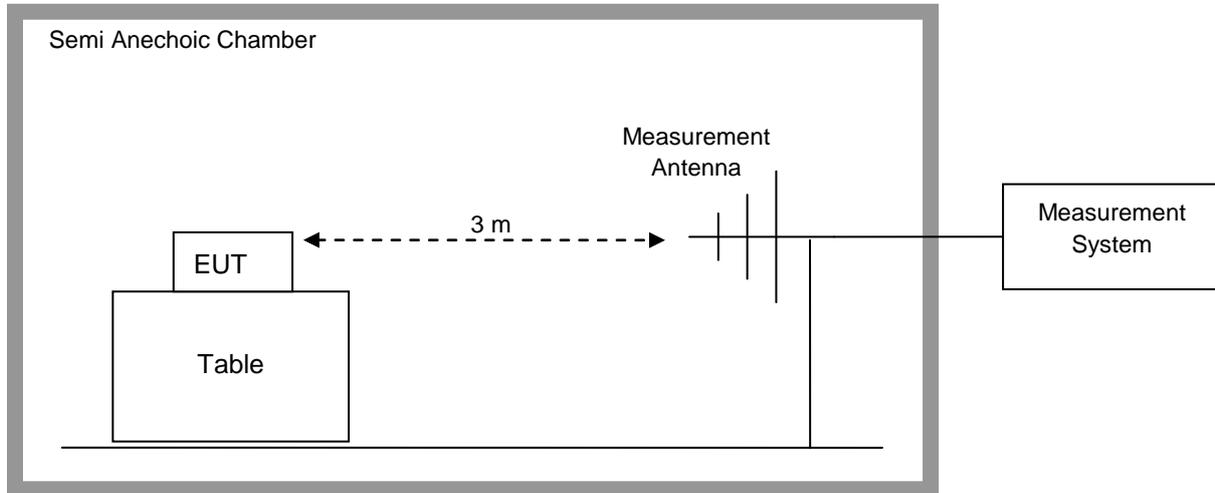
**NOTES:**

1. All measurements were performed using a loop antenna. The antenna was positioned in three orthogonal positions (X front, Y side, Z top) and the position with the highest emission level was recorded.
2. Measurements were performed at 3m and the data was extrapolated to the specified measurement distance of 30m using the square of an inverse linear distance extrapolation factor (40 dB/decade) as specified in §15.31(f)(2). Extrapolation Factor =  $20 \log_{10}(30/3)^2 = 40\text{dB}$
3. All measurements were recorded using a spectrum analyzer employing a quasi-peak detector.

The result of the measurement is passed.

### 5.3 Radiated Spurious Emission Measurements, Out-of-Band

#### 5.3.1 Test Setup

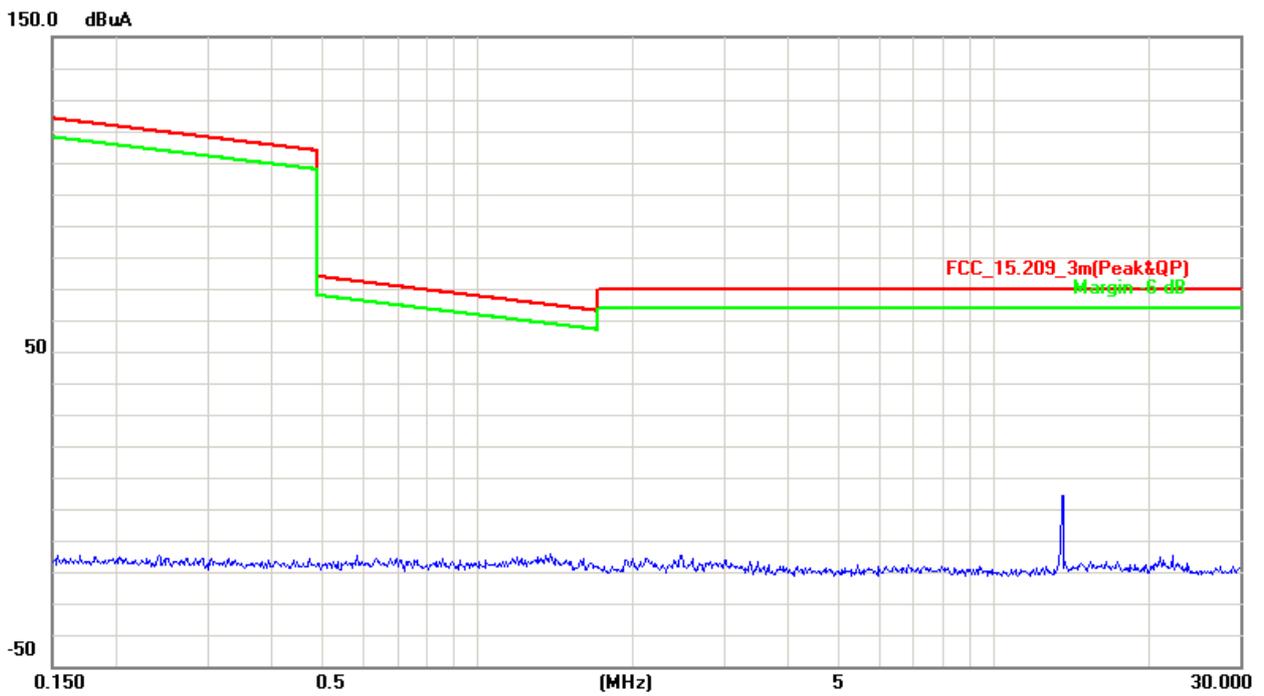
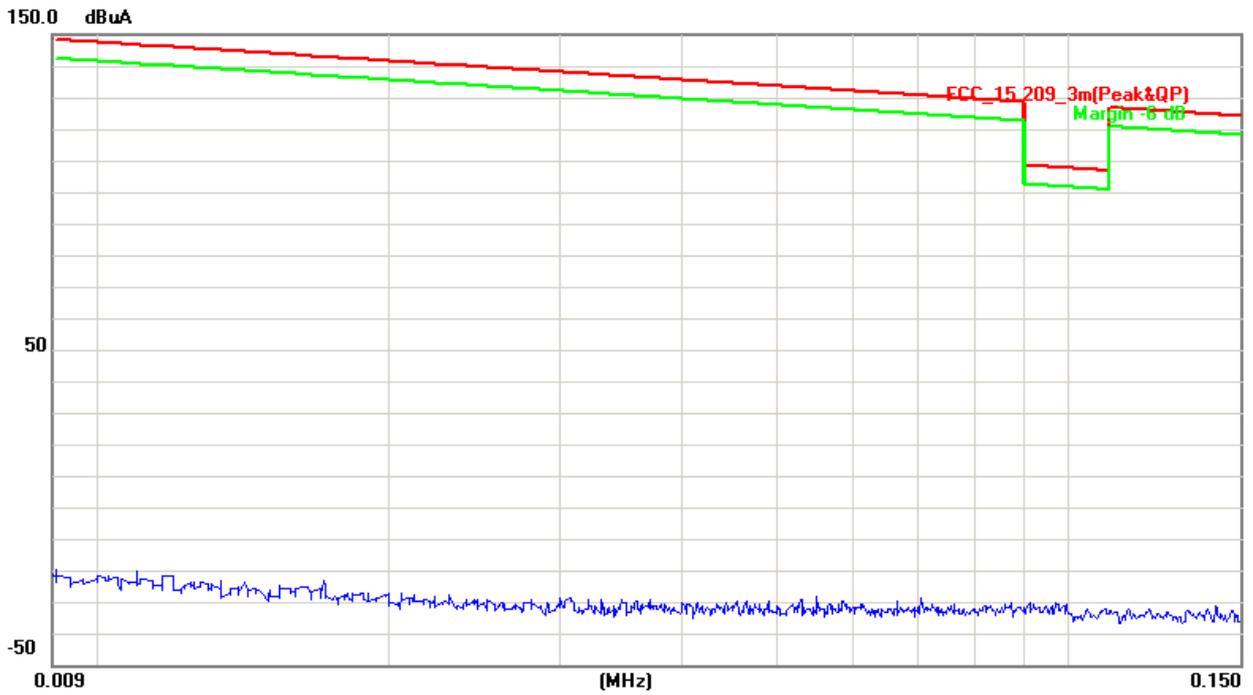


Measurement parameters	
Detector:	Quasi Peak
Sweep time:	Auto
Resolution bandwidth:	9 kHz – 150 kHz: 200 Hz 150 kHz – 30 MHz: 9 kHz 30 MHz – 1000 MHz: 100 kHz
Video bandwidth:	9 kHz – 150 kHz: 200 Hz 150 kHz – 30 MHz: 9 kHz 30 MHz – 1000 MHz: 100 kHz
Span:	See Plots
Trace-Mode:	Max Hold



### 5.3.2 Test Result

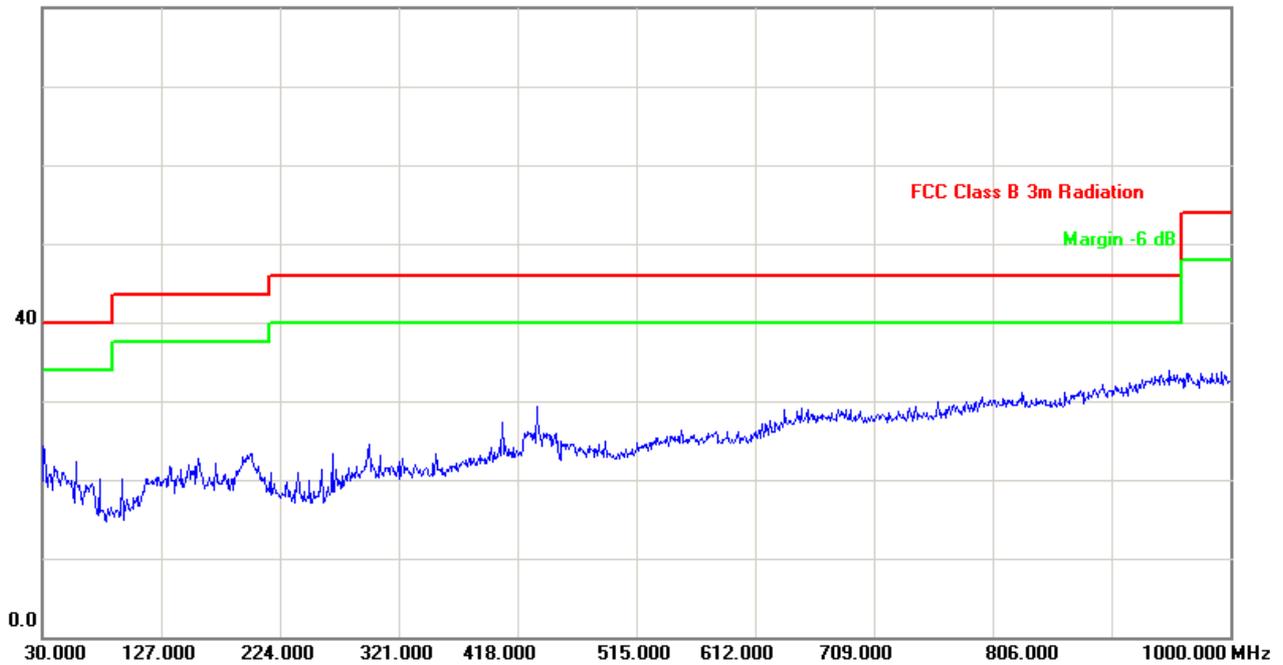
9k~30MHz





30M~1GHz

80.0 dBuV/m



**NOTES:**

1. All measurements were recorded using a spectrum analyzer employing a quasi-peak detector for emissions below 960MHz.
2. Both Vertical and Horizontal polarities of the receive antenna were evaluated with the worst case emissions being reported. Below 30MHz the Loop antenna was positioned in 3 separate radials.
3. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
4. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

**The result of the measurement is passed.**



## 5.4 Frequency Stability

### 5.4.1 Test Setup

The EUT was placed in a Climatic Chamber. A small whip antenna was placed close to the EUT, and connected to the measuring Spectrum Analyzer. Measurement performed without modulation on TX.

### 5.4.2 Test Result

VOLTAGE (%)	POWER Battery	TEMP (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100%		-20	13559980	13	0.0000009587035
100%		-10	13559983	-9	-0.0000006637176
100%		0	13560016	17	0.0000012536858
100%		10	13560011	21	0.0000015486713
100%		20	13560007	-15	-0.0000011061941
100%		30	13560012	8	0.0000005899700
100%		40	13560015	15	0.0000011061935
100%		50	13559987	-13	-0.0000009587030
Battery End Point		3.6	20	13560010	12
115%	4.35	20	13559987	14	0.0000010324494

The result of the measurement is passed.

-----The END-----