



FCC RF Test Report

Product Name: Smart Phone

Model Number: HUAWEI GRA-L09

Report No: SYBH(Z-RF)013022015-2005

FCC ID: QISGRA-L09

Reliability Laboratory of Huawei Technologies Co., Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District,
Shenzhen, 518129, P.R.C
Tel: +86 755 28780808 Fax: +86 755 89652518



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: 2015-03-09
Start Date of Test: 2015-03-10
End Date of Test: 2015-03-24

Test Result: Pass

Approved by Senior Engineer: 2015-03-24 Liu Chunlin *Liu Chunlin*

Date Name
Signature

Prepared by: 2015-03-24 maowenli *Maowenli*

Date Name
Signature



Contents

1	<u>General Information</u>	5
1.1	APPLIED STANDARD	5
1.2	TEST LOCATION	5
1.3	TEST ENVIRONMENTAL CONDITION	5
2	<u>Summary</u>	6
3	<u>Product Description</u>	7
3.1	PRODUCT INFORMATION	7
3.2	EUT IDENTITY	7
4	<u>Main Test Instruments</u>	9
5	<u>Test Results</u>	10
5.1	20DB BANDWIDTH MEASUREMENT	10
5.2	IN-BAND RADIATED SPURIOUS EMISSION MEASUREMENTS.....	11
5.3	RADIATED SPURIOUS EMISSION MEASUREMENTS, OUT-OF-BAND	13
5.4	FREQUENCY STABILITY	16



1 General Information

1.1 Applied Standard	
Applied Rules:	47 CFR FCC Part 02: 2013 FCC Part 15 Subpart C (15.225): 2013
1.2 Test Location	
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
1.3 Test Environmental Condition	
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 μ 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 μ V/m @ 30m 13.410 – 13.553 MHz 13.567 – 13.710 MHz		Pass	Section 5.2
15.225(c)	In-Band Emissions	106 μ 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 GRA-L09 is subscriber equipment in the LTE/UMTS/GSM system. The LTE frequency band is Band I,Band II,Band III,Band IV,Band V,Band VII,Band VIII,Band XII,BandXVII,BandXVIII,BandXIX,Band XX,Band XXV,Band XXVI,Band XXVIII and Band XL. The HSUPA/HSDPA/UMTS frequency band is Band I, Band II, Band IV,Band V and Band VIII, The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900, The Mobile Phone implements such functions as RF signal receiving/transmitting, LTE/UMTS/GSM protocol processing, voice, video, MMS service, GPS, AGPS WIFI and NFC etc. Externally it provides 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	HL2UGRACEM	GRA-L09V100R1001C900B022

1.3.1 Sub-Assembly

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



Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
Adapter	HW-050100A01	Huawei Technologies Co., Ltd.	Input Voltage: ~100-240V 50/60Hz 0.2A Output Voltage: 5V $\overline{\overline{=}}$ 1A Rated Power: 5W
Adapter	HW-050100B2W	Huawei Technologies Co., Ltd.	Input Voltage: ~100-240V 50/60Hz 0.2A Output Voltage: 5V $\overline{\overline{=}}$ 1A Rated Power: 5W
Adapter	HW-050100E2W	Huawei Technologies Co., Ltd.	Input Voltage: ~100-240V 50/60Hz 0.2A Output Voltage: 5V $\overline{\overline{=}}$ 1A Rated Power: 5W
Adapter	HW-050100U2W	Huawei Technologies Co., Ltd.	Input Voltage: ~100-240V 50/60Hz 0.2A Output Voltage: 5V $\overline{\overline{=}}$ 1A Rated Power: 5W
Adapter	HW-050100A2W	Huawei Technologies Co., Ltd.	Input Voltage: ~100-240V 50/60Hz 0.2A Output Voltage: 5V $\overline{\overline{=}}$ 1A Rated Power: 5W
Battery	HB3447A9EBW	Huawei Technologies Co., Ltd.	Rated capacity: 2600mAh Nominal Voltage: $\overline{\overline{=}}$ +3.8V Charging Voltage: $\overline{\overline{=}}$ +4.35V



4 Main Test Instruments

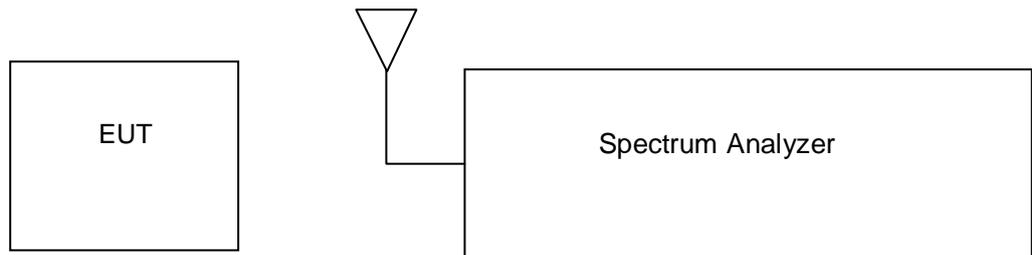
Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal- Due
Power supply	KEITHLEY	2303	A120714713	2014-08-07	2016-08-06
Wireless Communication Test set	Agilent	N4010A	MY49081592	2014-11-04	2015-11-03
Universal Radio Communication Tester	R&S	CMU200	123299	2014-11-04	2015-11-03
Spectrum Analyzer	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
Temperature Chamber	ESPEC	MW3030	06114003	2014-05-09	2015-05-08
Signal generator	Agilent	E8257D	MY51500314	2014-05-09	2015-05-08
Vector Signal Generator	R&S	SMU200A	104162	2014-11-04	2015-11-03
Test receiver	R&S	ESU26	100150	2014-05-09	2015-05-08
Spectrum analyzer	R&S	FSU3	200474	2014-11-04	2015-11-03
Spectrum analyzer	R&S	FSU43	100144	2014-11-04	2015-11-03
Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF907	100391	2013-12-21	2015-12-20
Trilog Broadband Antenna (30M~3GHz)	SCHWARZ BECK	VULB 9163	9163-521	2013-12-21	2015-12-20
LOOP Antennas(9kHz-30MHz)	R&S	HFH2-Z2	100263	2013-05-11	2015-05-10
Pyramidal Horn Antenna(18GHz-26-5GHz)	ETS-LINDGREN	3160-09	5140299	2015-01-05	2017-01-04
Artificial Mains Network	R&S	ENV4200	100134	2014-11-04	2015-11-03
Artificial Mains Network	R&S	ENV216	100382	2014-11-04	2015-11-03
Power Detecting & Sampling Unit	R&S	OSP-B157	19709DD	2014-09-08	2015-09-07
Signal Generator	Agilent	E4438C	MY47271904	2014-10-28	2015-10-27

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



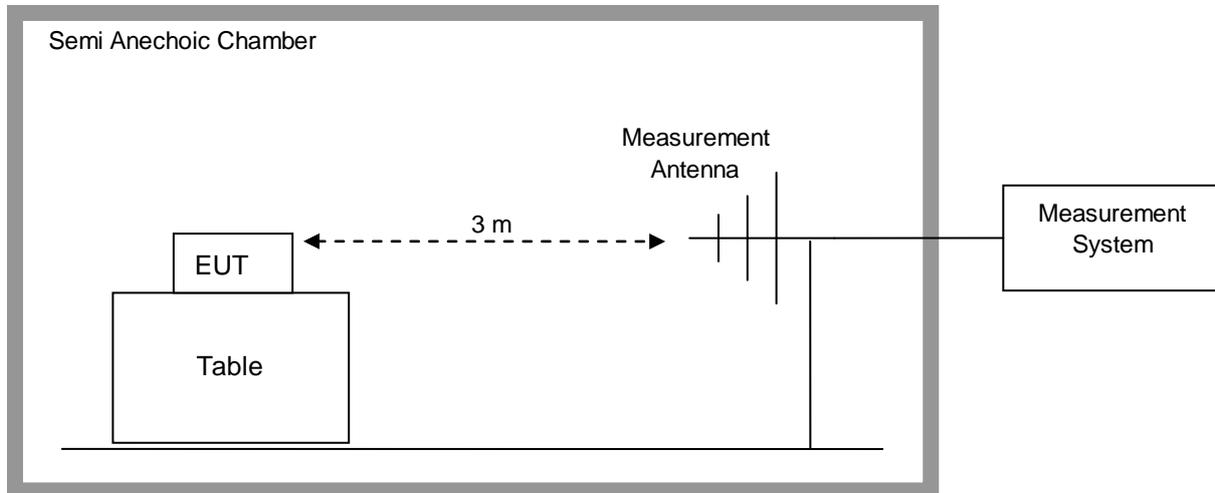
5.1.2 Test Result

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

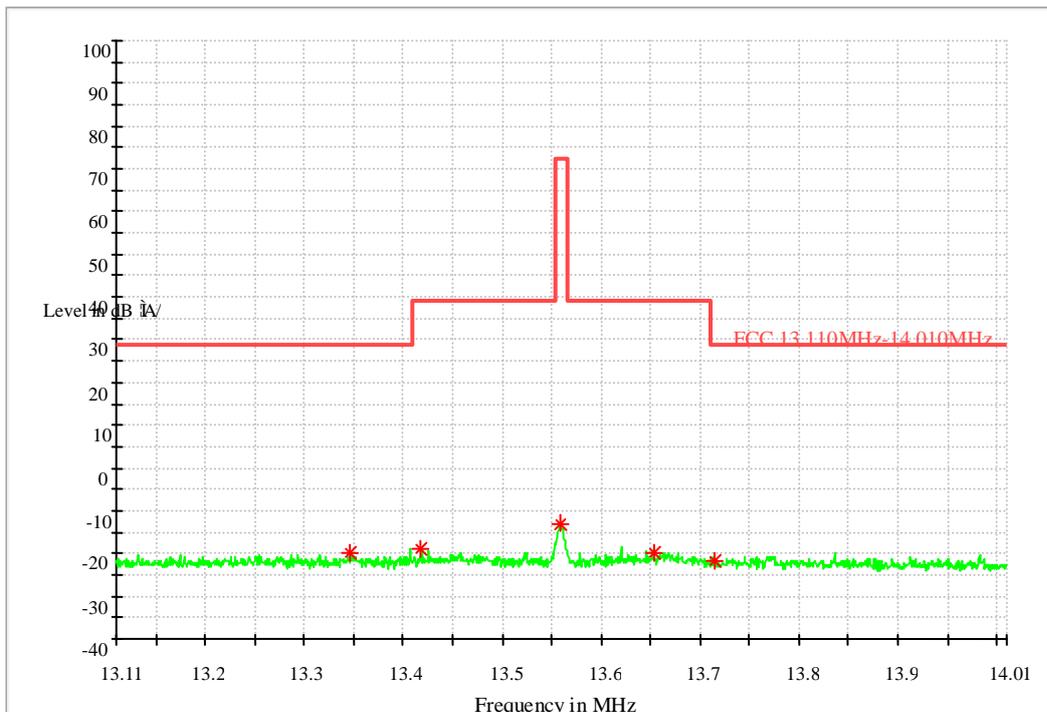


Measurement parameters	
Detector:	Quasi Peak
Sweep time:	-/-
Resolution bandwidth:	10 kHz
Video bandwidth:	10 kHz
Span:	-/-
Trace-Mode:	Max Hold

5.2.2 Test Result



FCC Loop Antenna 13.110MHz-14.010MHz



Final Result 1

Frequency (MHz)	QuasiPeak (dBμ A/m)	Bandwidth (kHz)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμ A/m)
13.347168	-20.0	9.000	V	166.0	-31.2	49.0	29.0
13.418280	-18.7	9.000	V	45.0	-31.2	57.7	39.0
13.561254	-13.2	9.000	V	168.0	-31.2	52.2	39.0
13.653752	-19.8	9.000	V	264.0	-31.2	58.8	39.0
13.714896	-21.7	9.000	V	13.0	-31.2	50.7	29.0

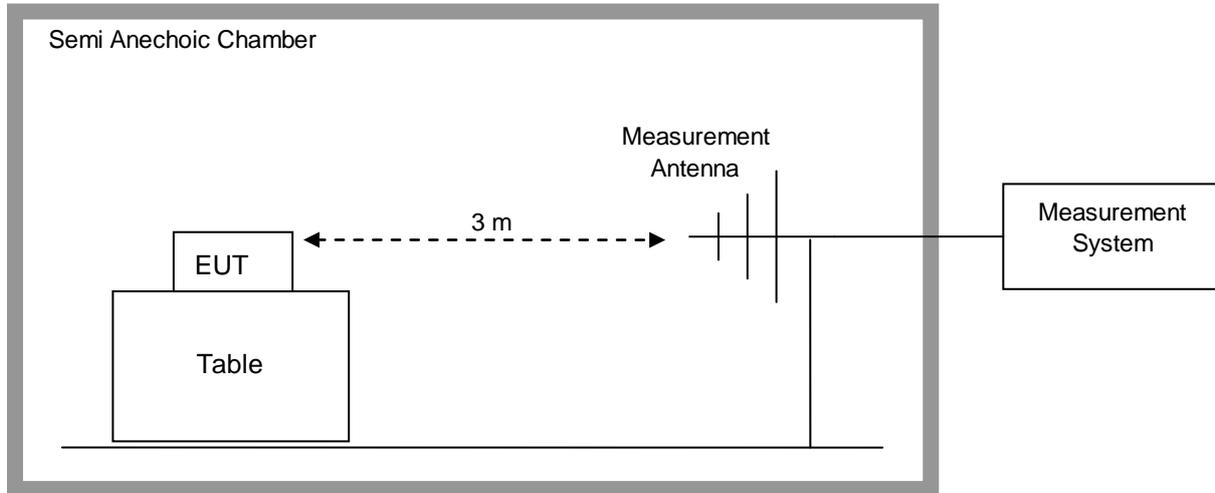
NOTES:

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

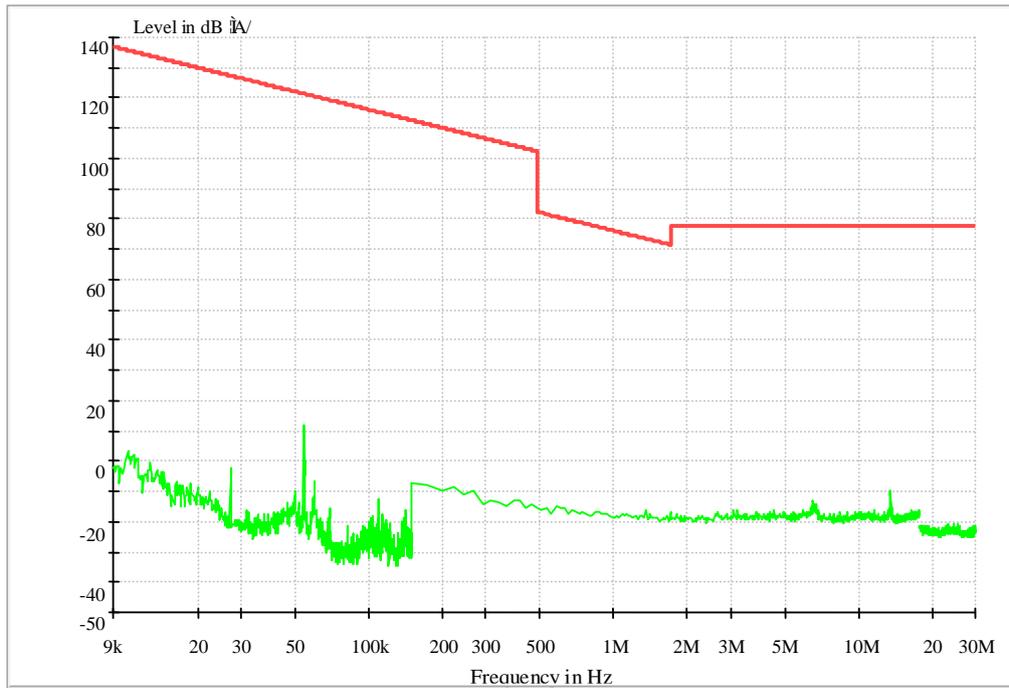


Measurement parameters	
Detector:	Quasi Peak
Sweep time:	Auto
Resolution bandwidth:	9 kHz – 150 kHz: 200 Hz 150 kHz – 30 MHz: 9 kHz 30 MHz – 1000 MHz: 100 kHz
Video bandwidth:	9 kHz – 150 kHz: 200 Hz 150 kHz – 30 MHz: 9 kHz 30 MHz – 1000 MHz: 100 kHz
Span:	See Plots
Trace-Mode:	Max Hold

5.3.2 Test Result

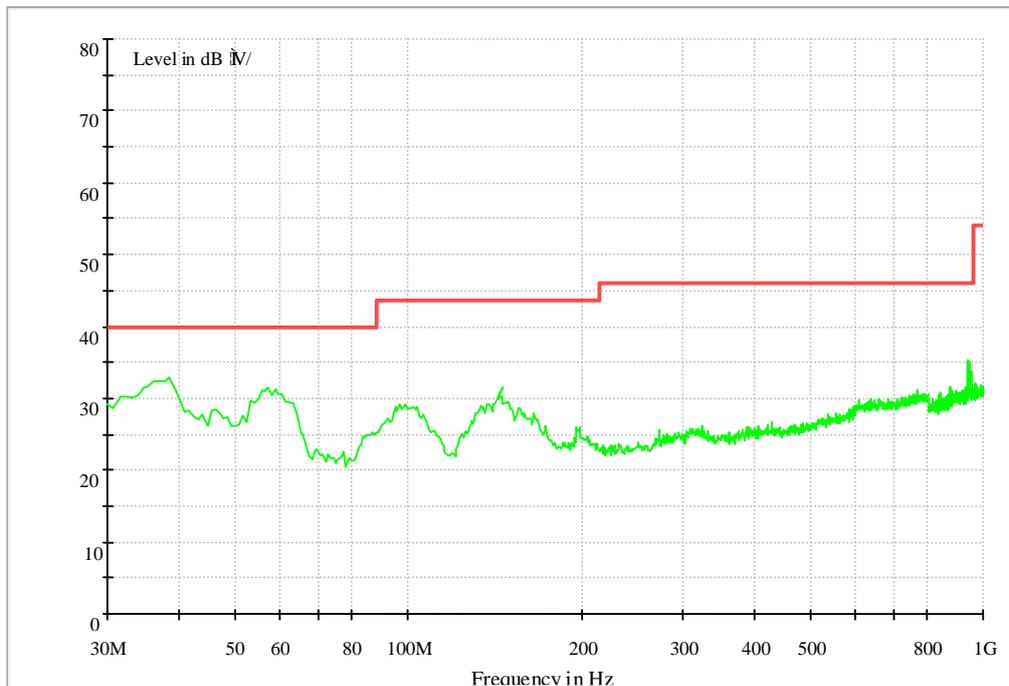


9k~30MHz





30M~1GHz



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-----