



# FCC&ISED RF Test Report

Product Name: Smart Phone

Model Number: VOG-L04

Report No.: SYBH(Z-RF)20181218028001-2006

FCC ID : QISVOG-L04

IC: 6369A-VOGL04

Authorized	APPROVED (Lab Manager)	PREPARED (Test Engineer)
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DATE	2019-01-28	2019-01-28

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2. The laboratory has been recognized by the US Federal Communications Commission (FCC) to perform compliance testing subject to the Commission's Certification rules. The Designation Number is CN1173, and the Test Firm Registration Number is 294140.
3. The laboratory has been recognized by the Innovation, Science and Economic Development Canada (ISED) to test to Canadian radio equipment requirements. The CAB identifier is CN0003, and the ISED# is 21741.
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**MODIFICATION RECORD**

No.	Report No	Modification Description
1	SYBH(Z-RF)20181218028001-2006	First release.

**DECLARATION**

Type	Description
Multiple Models Applications	<input checked="" type="checkbox"/> The present report applies to single model.
	<input type="checkbox"/> The present report applies to several models. The practical measurements are performed with the model.
	The present report only presents the worst test case of all modes, see relevant test results for detailed.

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## 2 General Information

### 1.1 Test standard/s

Applied Rules :	47 CFR FCC Part 02 47 CFR FCC Part 15 Subpart C (15.225) ISED RSS-Gen (Issue 5, April 2018) ISED RSS-210 (Issue 9, August 2016)
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### 1.2 Test Environment

Temperature :	TN	15 to 30	°C during room temperature tests
Ambient Relative Humidity:	20 to 85 %		
Atmospheric Pressure:	Not applicable		
Power supply :	VL	3.6	V
	VN	3.82	V DC by Battery
	VH	4.35	V

NOTE 1: 1) VN= nominal voltage, VL= low extreme test voltage, VH= High extreme test voltage;

TN= normal temperature, TL= low extreme test temperature, TH= High extreme test temperature.

NOTE 2: The values used in the test report may be stringent than the declared.

### 1.3 Test Laboratories

Test Location 1 :	RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD.
Address of Test Location 1 :	No.2, New City Avenue, Songshan Lake Sci. & Tech. Industry Park, Dongguan, 523808, P.R.C

### 1.4 Applicant and Manufacturer

Company Name :	HUAWEI TECHNOLOGIES CO., LTD
Address :	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

### 1.5 Application details

Date of Receipt Sample:	2019-01-02
Start of test:	2019-01-03
End of test:	2019-01-28

### 3 Summary

FCC Rule No.	ISED Rule No.	Test Description	Test Limit	Test Condition	Test Result	Reference
<b>TRANSMITTER MODE</b>						
15.225 (a)	RSS-210, B6(a)	In-Band Emissions	15,848 $\mu$ V/m @ 30m 13.553 – 13.567 MHz	RADIATED	Pass	Section 5.2
2.1049 15.215	RSS-Gen, 6.7	Bandwidth	N/A		Pass	Section 5.1
15.225(b)	RSS-210, B6(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)	RSS-210, B6(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	RSS-210, B6(d)	Out-of-Band Emissions	FCC: Emissions outside of the specified band (13.110 – 14.010 MHz) must meet the radiated limits detailed in 15.209  ISED: Emissions outside of the specified band (13.110 – 14.010 MHz) must meet the radiated limits detailed in RSS-Gen 8.9		Pass	Section 5.3
15.225(e)	RSS-210, B6(d)	Frequency Stability Tolerance	$\pm$ 0.01% of Operating Frequency	Temperature Chamber	Pass	Section 5.4
15.207	RSS-Gen, 8.8	AC Conducted Emissions 150kHz – 30MHz	FCC: < FCC 15.207 limits  ISED: < RSS-Gen, 8.8 limits.	LINE CONDUCTED	Pass	Section 5.5
NOTE: The transmitter has an integral PCB loop antenna that is enclosed within the housing of the EUT and meets the requirements of FCC 15.203						

## 4 Product Description

### 4.1 Product Information

#### 4.1.1 General Description

VOG-L04 is a subscriber equipment in the GSM/WCDMA/LTE system. The GSM frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900. The UMTS frequency band is B1 and B2 and B4 and B5 and B6 and B8 and B19. The LTE frequency band is B1 and B2 and B3 and B4 and B5 and B6 and B7 and B8 and B9 and B12 and B17 and B18 and B19 and B20 and B26 and B28 and B34 and B38 and B39 and B40 and B41 and B66. 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, Bluetooth, NFC, Wi-Fi and Wirelessly Charging etc. VOG-L04 provides one USIM card interface and one HUAWEI Nano memory card interface. Externally it provides type C USB charging port, and the port could be used as the earphone port or data-transfer port.

Note: Only NFC test data included in this report.















### 4.2 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.

#### 4.2.1 Board

Board		
Description	Software Version	Hardware Version
Main Board	9.1.0.42(C792E10R1P4)	HL2VOGUEM

### 4.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
Adapter	HW-100400A00	Huawei Technologies Co., Ltd.	Input voltage: 100-240V ~50/60Hz 1.2A Output voltage: 5V  2A OR 9V  2A OR 10V  4A
Adapter	HW-100400U00	Huawei Technologies Co., Ltd.	Input voltage: 100-240V ~50/60Hz 1.2A Output voltage: 5V  2A OR 9V  2A OR 10V  4A
Adapter	HW-100400E00	Huawei Technologies Co., Ltd.	Input voltage: 100-240V ~50/60Hz 1.2A Output voltage: 5V  2A OR 9V  2A OR 10V  4A
Adapter	HW-100400B00	Huawei Technologies Co., Ltd.	Input voltage: 100-240V ~50/60Hz 1.2A Output voltage: 5V  2A OR 9V  2A OR 10V  4A
Battery	HB486486ECW	Huawei Technologies Co., Ltd.	Rated capacity: 4100mAh Nominal Voltage:  +3.82V Charging Voltage:  +4.4V

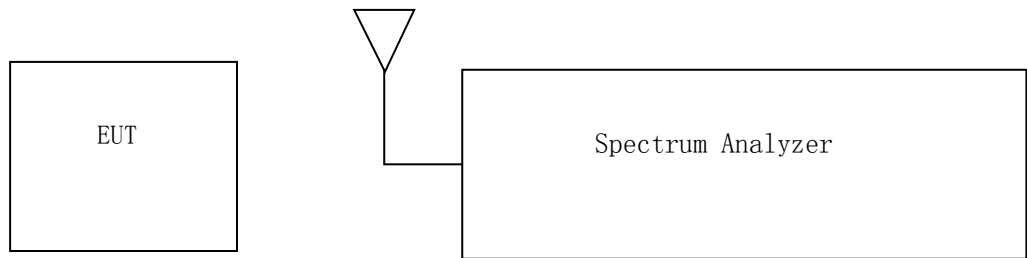


## 5 Test Results

### 5.1 Bandwidth Measurement

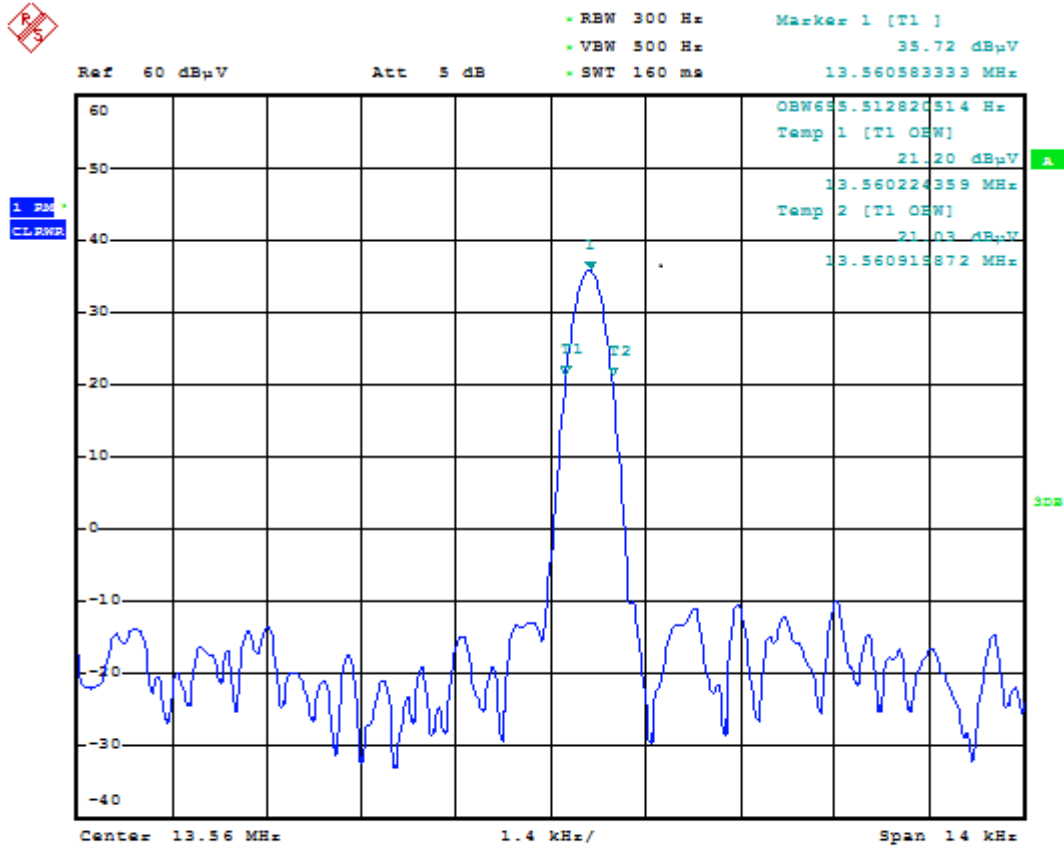
The 99% emission bandwidth and 20dB bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode.

#### 5.1.1 Test Setup



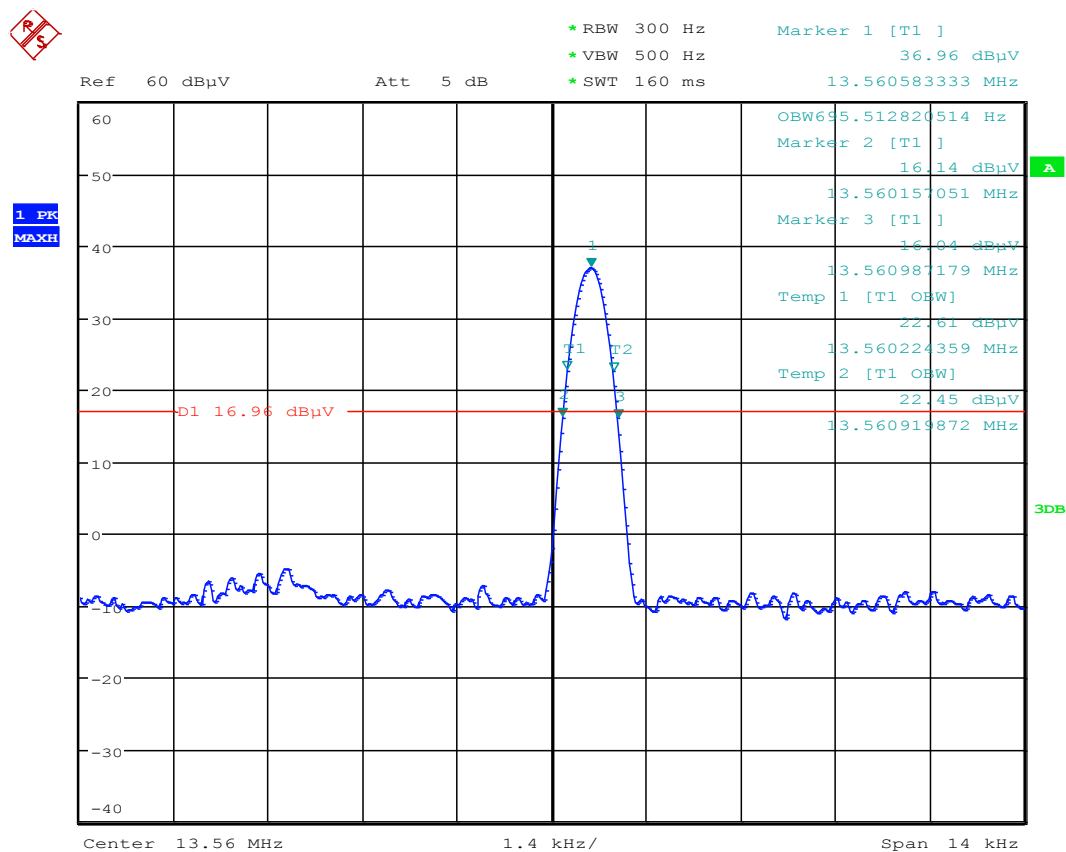
## 5.1.2 Test Result

### 99% emission bandwidth



Date: 14.JAN.2019 17:44:04

20dB bandwidth



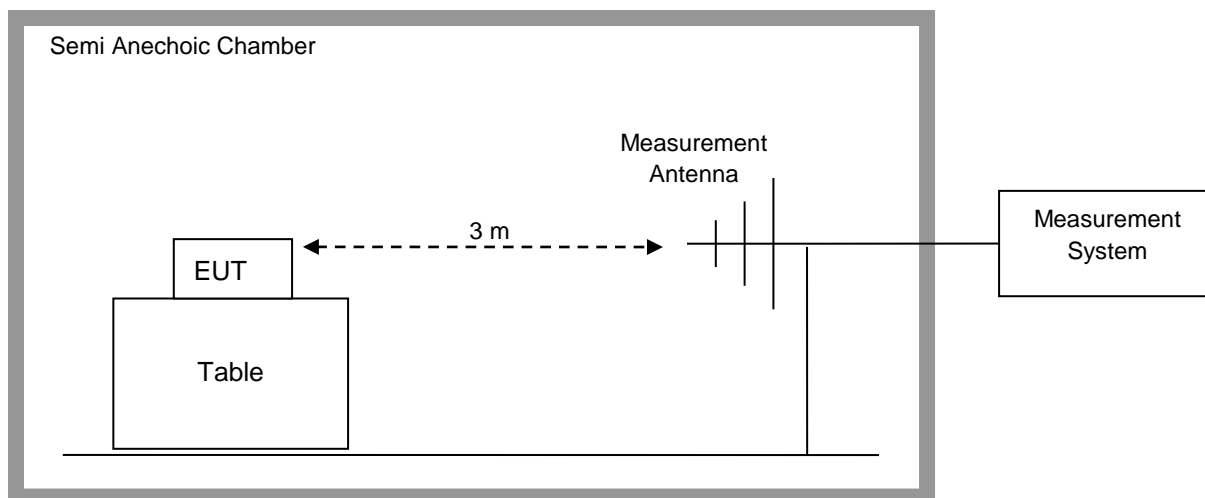
Date: 14.JAN.2019 17:41:13

Emission bandwidth	Result (Hz)	FL@OBW (MHz)	FH@OBW (MHz)	Verdict
99% emission bandwidth	695.513	13.560224359	13.560919872	PASS
20dB bandwidth	695.513	13.560157051	13.560987179	PASS

The result of the measurement is passed.

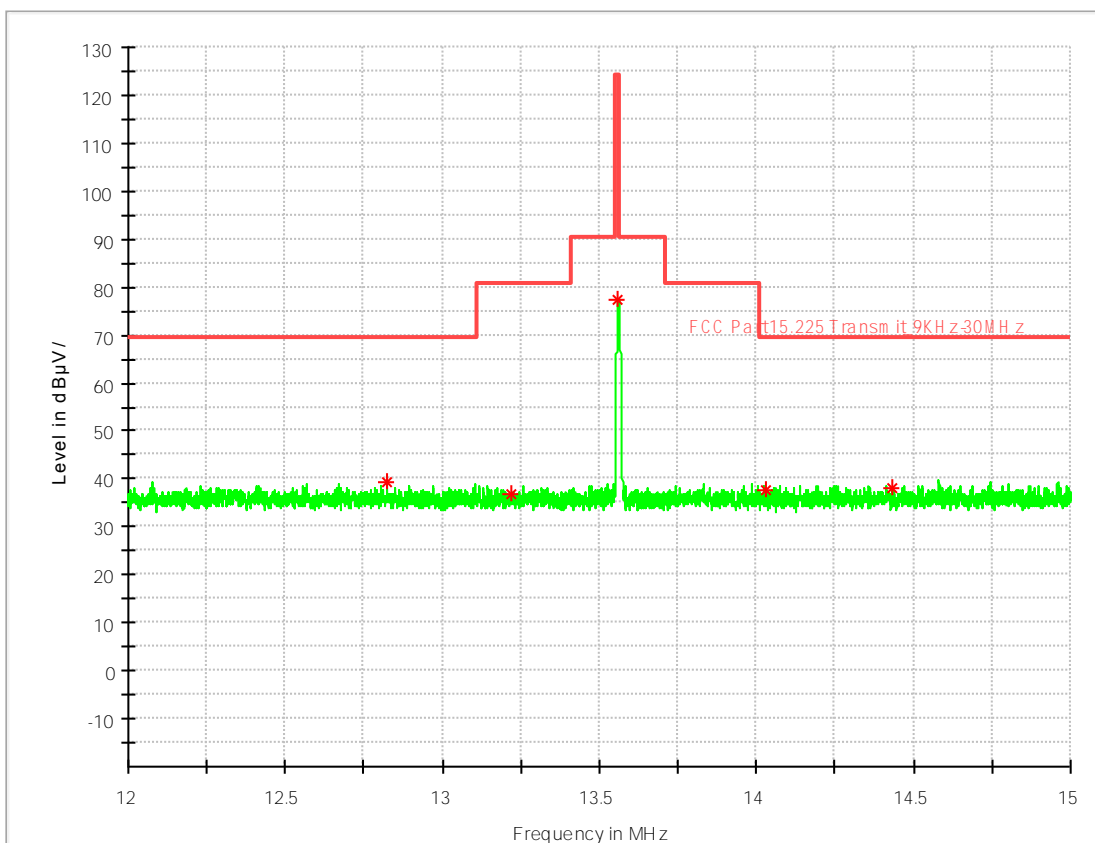
## 5.2 In-Band Radiated Spurious Emission Measurements

### 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



MEASUREMENT RESULT: QP Detector

Frequency (MHz)	Quasi Peak (dB µ A/m)	Limit (dB µ A/m)	Margin (dB)	Azimuth (deg)
12.824625	-46.29	-20.00	26.29	292.0
13.216125	-43.90	-20.00	23.90	63.0
13.560188	-17.66	42.00	59.66	0.0
14.032500	-42.02	-20.00	22.02	212.0
14.434688	-40.75	-20.00	20.75	45.0

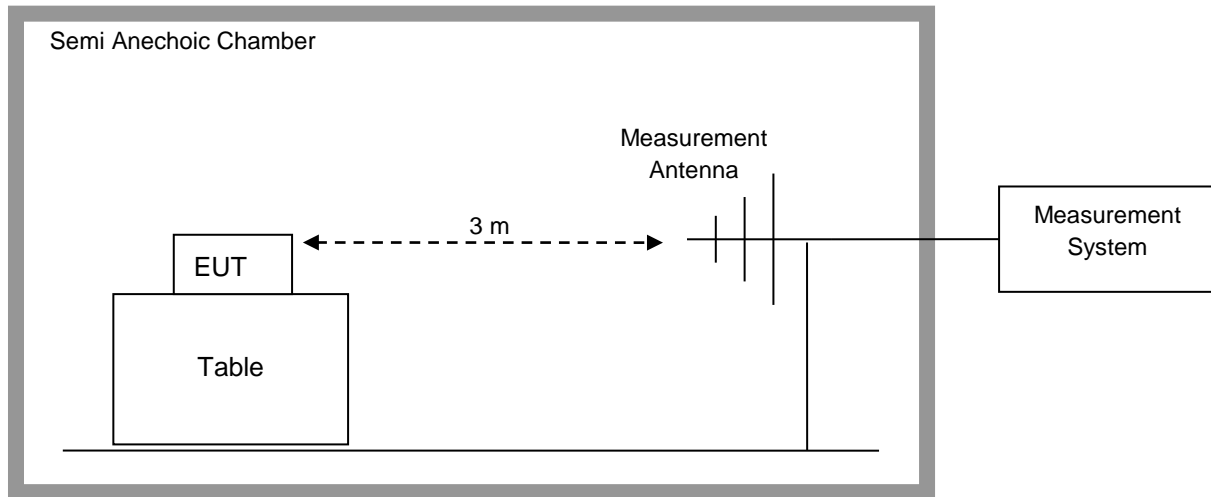
NOTES:

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.
4. Level = Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain). The reading level is calculated by software which is not shown in the sheet.

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

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

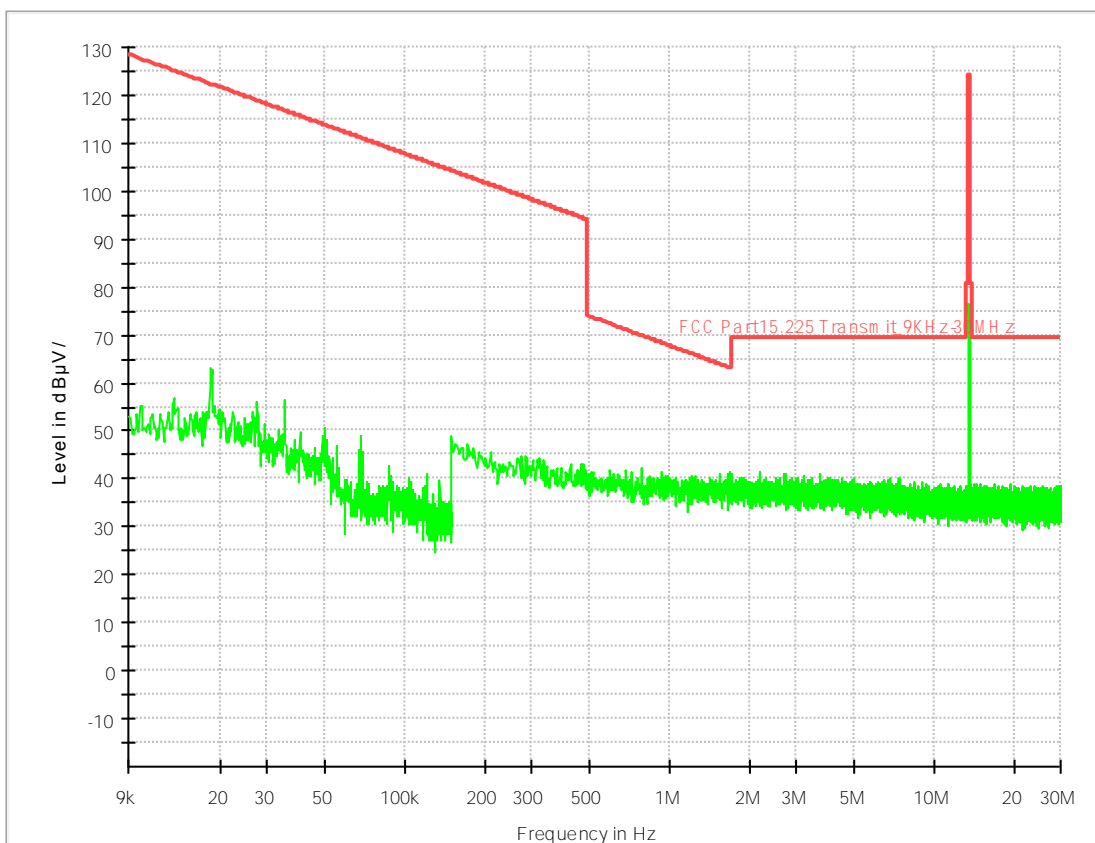
#### 5.3.1 Test Setup



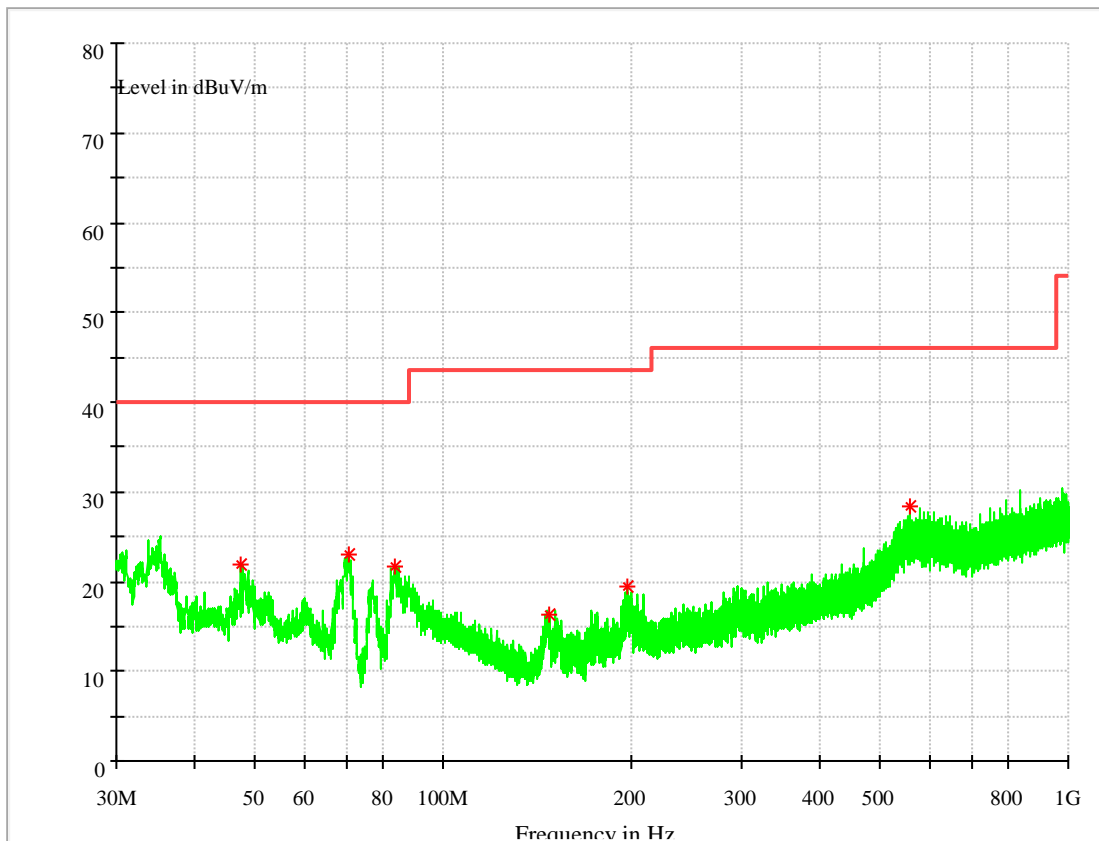
Measurement parameters	
Detector:	Quasi Peak
Sweep time:	Auto
Resolution bandwidth:	9 kHz – 150 kHz: 200 Hz 150 kHz – 30 MHz: 9 kHz 30 MHz – 1000 MHz: 100 kHz
Video bandwidth:	9 kHz – 150 kHz: 200 Hz 150 kHz – 30 MHz: 9 kHz 30 MHz – 1000 MHz: 100 kHz
Span:	See Plots
Trace-Mode:	Max Hold

#### 5.3.2 Test Result

9k~30MHz



30M~1GHz



**MEASUREMENT RESULT: QP Detector**

Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Transd. (dB)
62.972880	21.90	40.00	18.10	101.0	V	219.0	14.2
95.869420	22.96	40.00	17.04	101.0	V	236.0	9.6
175.923900	21.57	40.00	18.43	100.0	V	278.0	10.8
280.679960	16.40	43.50	27.11	100.0	H	105.0	9.6
423.940180	19.33	43.50	24.17	100.0	H	1.0	12.1
596.338660	28.30	46.00	17.70	101.0	V	13.0	20.0

**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.
5. Level =Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain). The reading level is calculated by software which is not shown in the sheet.

**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	13559977	-23	-0.0001696165192
100%		-10	13559985	-15	-0.0001106194690
100%		0	13560014	14	0.0001032448378
100%		10	13560008	8	0.0000589970501
100%		20	13560001	1	0.0000073746313
100%		30	13560017	17	0.0001253687316
100%		40	13560015	15	0.0001106194690
100%		50	13559979	-21	-0.0001548672566
Battery End Point		3.6	20	13560007	7
115%	4.35	20	13559993	-7	-0.0000516224189

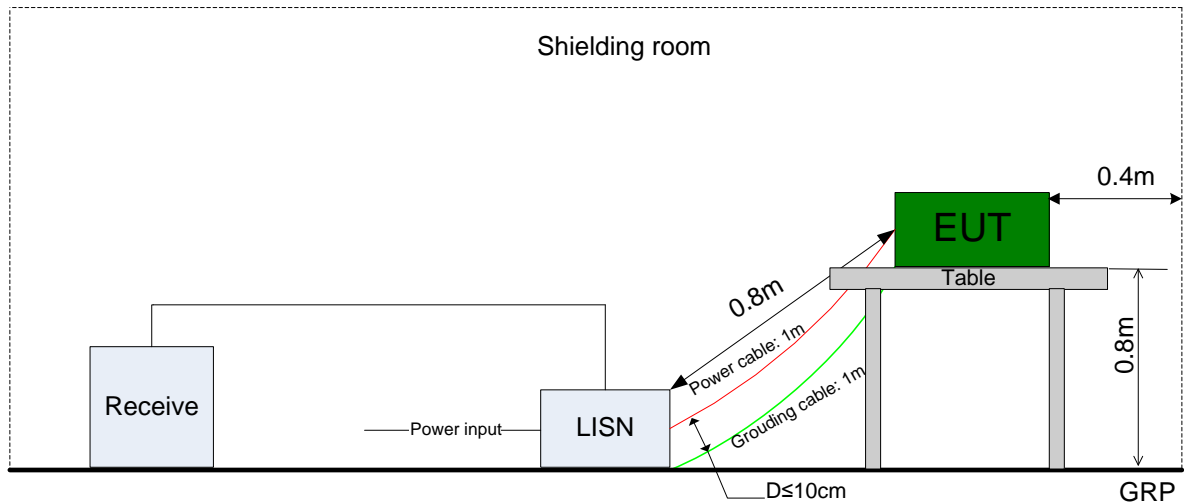
The result of the measurement is passed.

## 5.5 AC Power Line Conducted Emissions

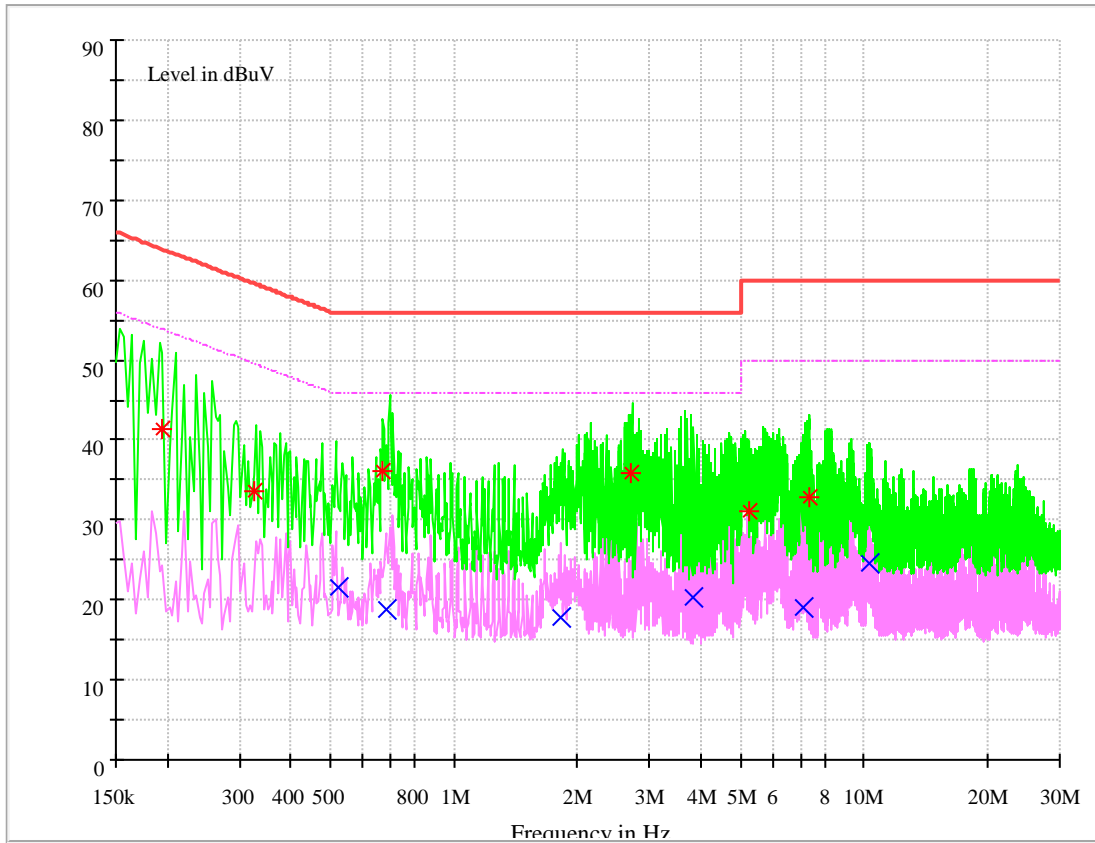
### 5.5.1 Test Setup

The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.



### 5.5.2 Test Result



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dB $\mu$ V	Limit dB $\mu$ V	Transd dB	Margin dB	Line	PE
0.194216	41.37	N	9.7	22.48	63.85	FLO
0.327075	33.64	L1	9.7	25.89	59.53	FLO
0.672284	36.08	L1	9.7	19.92	56.00	FLO
2.710526	35.73	L1	9.7	20.27	56.00	FLO
5.227791	31.10	L1	9.7	28.90	60.00	FLO
7.378218	32.85	L1	9.7	27.15	60.00	FLO

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dB $\mu$ V	Limit dB $\mu$ V	Transd dB	Margin dB	Line dB $\mu$ V	PE
0.521241	21.55	L1	9.7	24.45	46.00	FLO
0.682542	18.74	L1	9.7	27.26	46.00	FLO
1.825179	17.92	L1	9.7	28.08	46.00	FLO
3.826555	20.41	L1	9.7	25.59	46.00	FLO
7.116606	19.13	L1	9.7	30.87	50.00	FLO
10.253380	24.55	L1	9.7	25.45	50.00	FLO

Note:

1, Level = Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain)

The reading level is calculated by software which is not shown in the sheet.

2, Margin=Limit - Level

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

## 6 MAIN TEST INSTRUMENTS

This table gives a complete overview of the RF measurement equipment.

Devices used during the test described are marked

<input checked="" type="checkbox"/> Main Test Equipment( RE test system)						
Marked	Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal-Due
<input checked="" type="checkbox"/>	Test receiver	R&S	ESU26	100387	2019/01/15	2020/01/14
<input checked="" type="checkbox"/>	LOOP Antennas(9kHz-30MHz)	R&S	HFH2-Z2	100262	2017/04/25	2019/04/25
<input type="checkbox"/>	LOOP Antennas(9kHz-30MHz)	R&S	HFH2-Z2	100263	2017/04/25	2019/04/25
<input checked="" type="checkbox"/>	Trilog Broadband Antenna (30M~3GHz)	SCHWARZB ECK	VULB 9163	9163-357	2017/04/21	2019/04/20
<input type="checkbox"/>	Trilog Broadband Antenna (30M~3GHz)	SCHWARZB ECK	VULB 9163	9163-520	2017/3/29	2019/3/28
<input type="checkbox"/>	Trilog Broadband Antenna (30M~3GHz)	SCHWARZB ECK	VULB 9163	9163-491	2017/3/29	2019/3/28
<input type="checkbox"/>	Trilog Broadband Antenna (30M~3GHz)	SCHWARZB ECK	VULB 9163	9163-356	2018/4/9	2020/4/8
<input checked="" type="checkbox"/>	Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF907	100305	2017/4/21	2019/4/20
<input type="checkbox"/>	Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF906	100684	2017/5/27	2019/5/26
<input type="checkbox"/>	Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF906	100683	2017/3/29	2019/3/28
<input checked="" type="checkbox"/>	Pyramidal Horn Antenna(18GHz-26.5GHz)	ETS-Lindgren	3160-09	5140299	2017/07/20	2019/07/19
<input type="checkbox"/>	Pyramidal Horn Antenna(18GHz-26.5GHz)	ETS-Lindgren	3160-09	00206665	2018/4/21	2020/4/20
<input checked="" type="checkbox"/>	Pyramidal Horn Antenna(26.5GHz-40GHz)	ETS-Lindgren	3160-10	00205695	2018/04/20	2020/04/19
<input type="checkbox"/>	Pyramidal Horn Antenna(26.5GHz-40GHz)	ETS-Lindgren	3160-10	LM5947	2017/07/20	2019/07/19
<input checked="" type="checkbox"/>	Measurement Software	R&S	EMC32 V9.25.0	/	/	/

<input checked="" type="checkbox"/> Main Test Equipment( CE test system)						
Marked	Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal-Due
<input type="checkbox"/>	Test receiver	R&S	ESU26	100387	2019/01/15	2020/01/14

<input checked="" type="checkbox"/>	Test receiver	R&S	ESCI	101163	2019/01/15	2020/01/14
<input type="checkbox"/>	Artificial Main Network	R&S	ENV4200	100134	2018/05/08	2019/05/07
<input checked="" type="checkbox"/>	Line Impedance Stabilization Network	R&S	ENV216	100382	2018/05/08	2019/05/07
<input checked="" type="checkbox"/>	Measurement Software	R&S	EMC32 V9.25.0	/	/	/

## 7 System Measurement Uncertainty

For a 95% confidence level (k = 2), the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

Test Item		Extended Uncertainty
All Emissions, Radiated	Field Strength [dBμV/m]	For 3 m Chamber: U = 5.90 dB (30 MHz-1 GHz) U = 4.94 dB (1 GHz-18 GHz) U = 4.24 dB (18 GHz-26.5 GHz)
AC Power Line Conducted Emissions	Disturbance Voltage[dBμV]	U=2.3 dB

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