



TEST REPORT

APPLICANT : Bullitt Group
PRODUCT NAME : 4G Mobile Phone
MODEL NAME : S62
BRAND NAME : Yogi
FCC ID : ZL5S62
STANDARD(S) : 47 CFR Part 15 Subpart C
RECEIPT DATE : 2020-10-10
TEST DATE : 2020-10-30 to 2021-01-26
ISSUE DATE : 2021-02-19

Edited by :

Handwritten signature of Qijie Xiao in black ink.

Qijie Xiao

Approved by:

Handwritten signature of Fuming Hu in black ink.

Fuming Hu

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Change History		
Version	Date	Reason for change
1.0	2021-02-19	First edition



1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Bullitt Group
Applicant Address:	One Valpy, Valpy Street, Reading, Berkshire, RG1 1AR, United Kingdom
Manufacturer:	Bullitt Group
ManufacturerAddress:	One Valpy, Valpy Street, Reading, Berkshire, RG1 1AR, United Kingdom

1.2. Equipment Under Test (EUT) Description

Product Name:	4G Mobile Phone	
Serial No:	(N/A, marked #1 by test site)	
Hardware Version:	Q190_V1	
Software Version:	LTE_S02111.10_N_S62_0	
Frequency Range:	13.553MHz-13.567MHz	
Operating Frequency:	13.56MHz	
Data Rate:	106kBd	
Modulation Type:	ASK	
Antenna Type:	Loop Antenna	
Accessory Information	Battery	
	Brand Name:	
	Model No:	XQ6602G
	Capacity:	4000mAh
	Rated Voltage:	3.8V
Ancillary Equipment:	Adapter	
	Manufacturer:	Jiangxi Jian Aohai Technology Co.,Ltd.
	Brand Name:	AOHAI
	Model No.:	A138-120150C-US1

Note 1: We set the maximum data rate(the worst case) of EUT during the test.

Note 2: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.



1.3. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 15 Subpart C	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Test Date	Test Engineer	Result
1	15.203	Antenna Requirement	N/A	N/A	PASS
2	15.207	Conducted Emission	Jan 26,2021	Qijie Xiao	PASS
3	15.209 15.225(a)(b)(c)(d)	Radiated Emission	Oct 12,2020 Oct 15,2020	Qijie Xiao	PASS
4	15.225(e)	Frequency Tolerance	Oct 30,2020	Elvis Wang	PASS
5	15.215(c)	20dB Bandwidth	Oct 30,2020	Elvis Wang	PASS

Note: The tests were performed according to the method of measurements prescribed in ANSI C63.10-2013. The EUT has been tested under continuous operating condition.

1.4. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106



2.47 CFR Part 15C Requirements

2.1. Antenna requirement

2.1.1. Applicable Standard

According to FCC 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.

2.1.2. Result:

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

Result: Compliant

2.2. Conducted Emission

2.2.1. Test Requirement

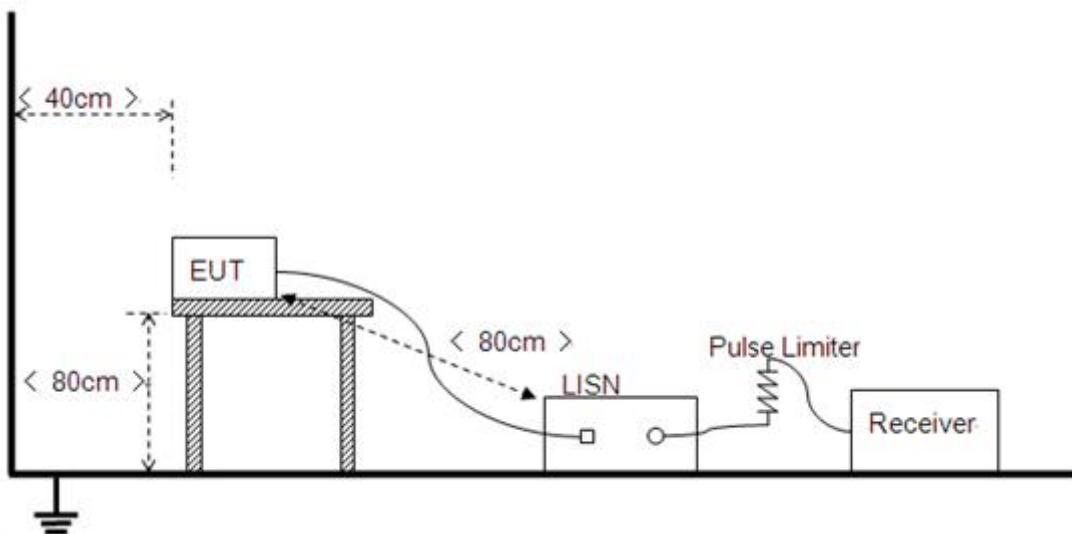
According to FCC section 15.207, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN).

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

NOTE:

- (a) The lower limit shall apply at the band edges.
- (b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.2.2. Test Setup



The EUT is placed on a 0.8m high insulating table, which stands on the grounded conducting floor, and keeps 0.4m away from the grounded conducting wall. The EUT is connected to the power mains through a LISN which provides $50\Omega/50\mu\text{H}$ of coupling impedance for the measuring instrument. A Pulse Limiter is used to protect the measuring instrument. The factors of the whole test system are calibrated to correct the reading.

2.2.3. Test Result

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.

A. Test setup:

Test Mode:ADAPTER + EUT(NFC on)

Test Voltage:AC 120V/60Hz

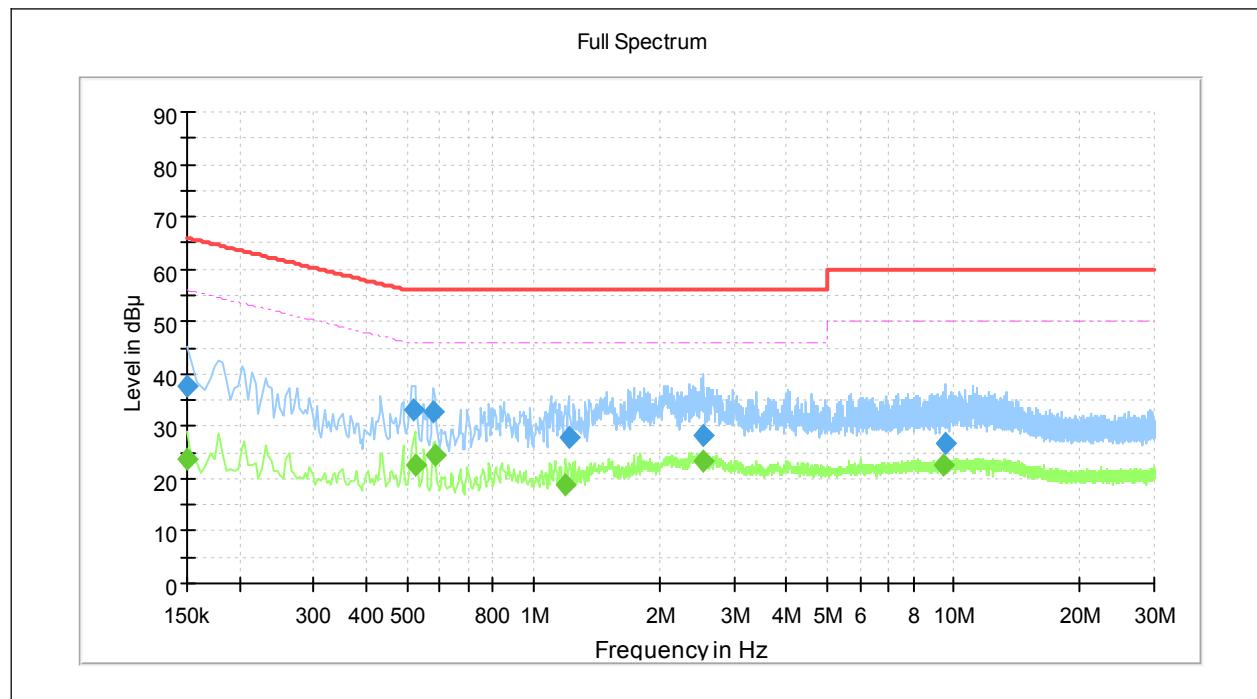
The measurement results are obtained as below:

$$E [\text{dB}\mu\text{V}] = U_R + L_{\text{Cable loss}} [\text{dB}] + \text{Corr.}$$

U_R : Receiver Reading

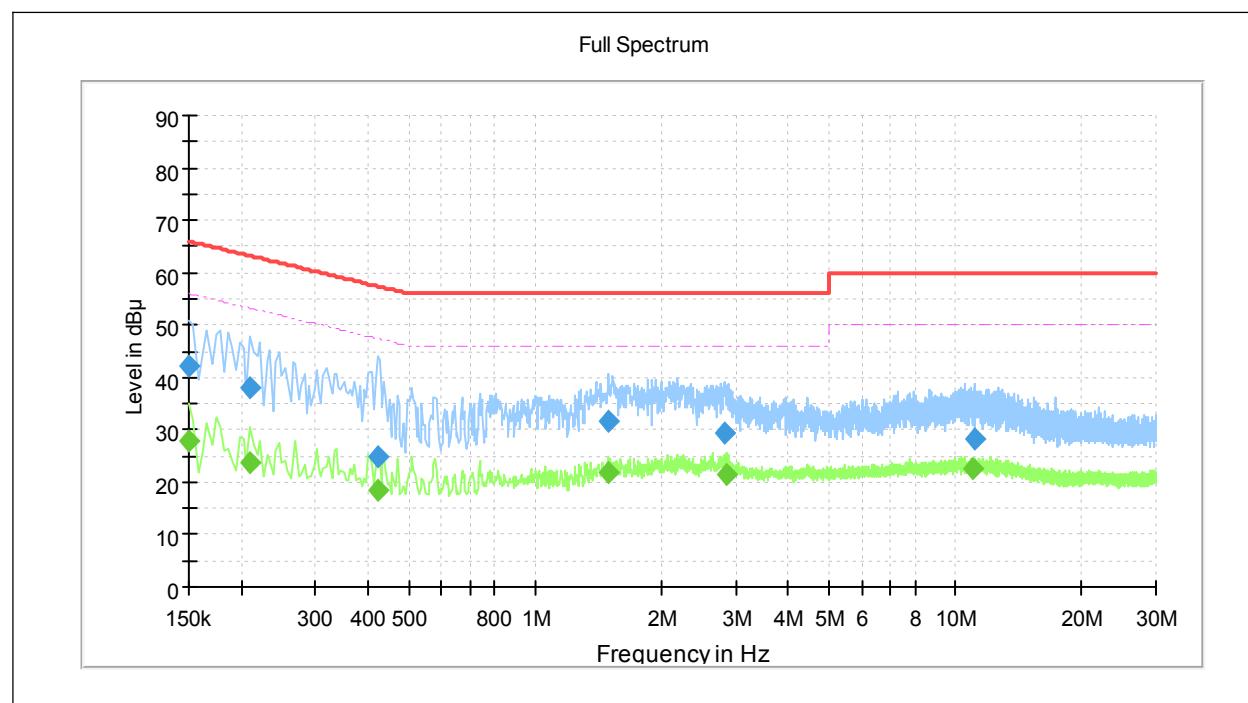
Corr.: Voltage division factor of LISN

Test Plots:



(L Phase)

Frequency (MHz)	MaxPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Corr. (dB)
0.150000	---	23.63	56.00	32.37	L1	10.2
0.150000	37.68	---	66.00	28.32	L1	10.2
0.518000	33.29	---	56.00	22.71	L1	10.2
0.522000	---	22.45	46.00	23.55	L1	10.2
0.578000	32.73	---	56.00	23.27	L1	10.2
0.582000	---	24.51	46.00	21.49	L1	10.2
1.190000	---	18.88	46.00	27.12	L1	10.3
1.214000	27.76	---	56.00	28.24	L1	10.3
2.538000	28.29	---	56.00	27.71	L1	10.3
2.542000	---	23.39	46.00	22.61	L1	10.3
9.494000	---	22.41	50.00	27.59	L1	10.6
9.558000	26.75	---	60.00	33.25	L1	10.6





2.3. Radiated Emission

2.3.1. Test Requirement

Radiated Emission <30MHz (9 kHz-30MHz, E-field)

According to FCC section 15.225, for <30MHz, Radiated emissions were measured according to ANSIC63.4. The EUT was set to transmit at the highest output power. The EUT was set 30 meter away from the measuring antenna. The loop antenna was positioned 1 meter above the ground from the center of the loop. The measuring bandwidth was set to 10KHz. (Note: During testing the receive antenna was rotated about its axis to maximize the emission from the EUT)

There was no detected Restricted bands and Radiated Spurious emission below 30MHz. The 30m limit was converted to 3m Limit using square factor(x) as it was found by measurements as follows;
3 m Limit(dBuV/m) = $20\log(X) + 40\log(30/3) = 20\log(15848) + 40\log(30/3) = 124\text{dBuV}$

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 range (MHz)	Field Strength(μV/m)	Distance(m)
0.009 ~ 0.490	2400/F(KHz)	300
0.490 ~ 1.705	24000/F(KHz)	30
1.705 ~ 30	30	30

Frequency range (MHz)	Field Strength@30m		Field Strength@3m
	μV/m	dBμV/m	dBμV/m
Below 13.110	30	29.5	69.5
13.110 ~ 13.410	106	40.5	80.5
13.410 ~ 13.553	334	50.5	90.5
13.553 ~13.567	15.848	84	124
13.567 ~ 13.710	334	50.5	90.5
13.710 ~14.010	106	40.5	80.5
Above 14.010	30	29.5	69.5

NOTE: a) Field Strength (dBμV/m) = $20\log[\text{Field Strength } (\mu\text{V/m})]$.

b) In the emission tables above, the tighter limit applies at the band edges.

Radiated Emission >30MHz (30MHz-1GHz, E-field)

According to FCC section 15.205, the field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the following values:

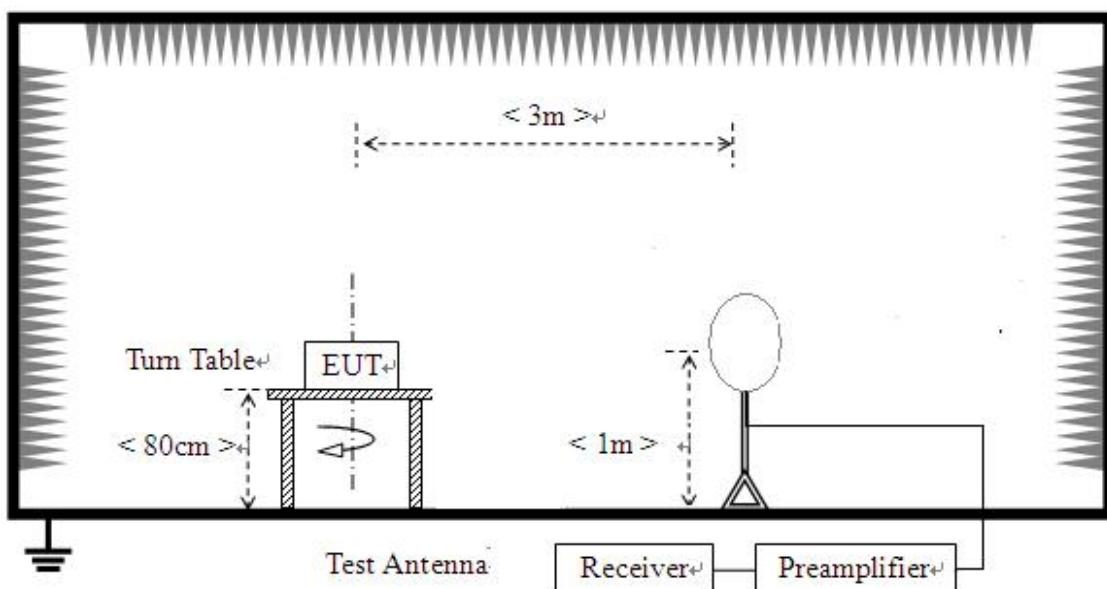
Frequency range (MHz)	Field Strength	
	$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

NOTE: a) Field Strength ($\text{dB}\mu\text{V/m}$) = $20 \times \log[\text{Field Strength } (\mu\text{V/m})]$.

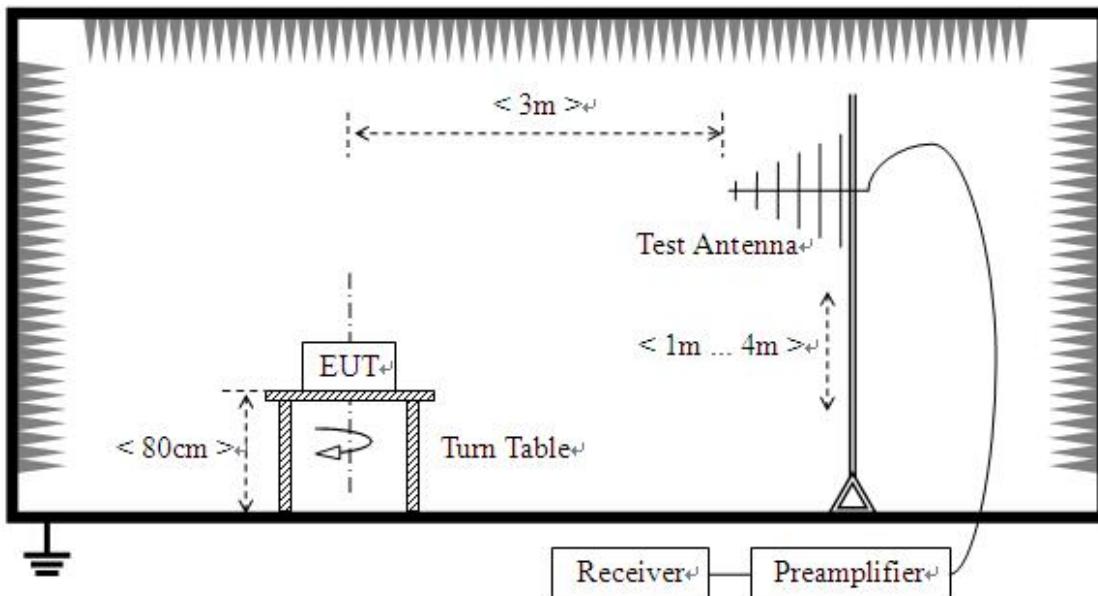
b) In the emission tables above, the tighter limit applies at the band edges.

2.3.2. Test Setup

1) For radiated emissions below 30MHz



2) For radiated emissions from 30MHz to 1GHz



The test is performed in a 3m Semi-Anechoic Chamber; the antenna factor, cable loss and so on of the site (factors) is calculated to correct the reading. The EUT is placed on a 0.8m high insulating Turn Table, and keeps 3m away from the Test Antenna, which is mounted on a variable-height antenna master tower.

For the test Antenna:

In the frequency range of 9 kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.

In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) was used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

2.3.3. Test Result

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak limit, it is unnecessary to perform an quasi-peak measurement.

The measurement results are obtained as below:

Test Mode1:ADAPTER + EUT(Face recognition mode+NFC Card mode)

Test Mode2:ADAPTER + EUT(NFC Card mode)

Test Mode3: EUT(Face recognition mode+NFC Card mode)

Test Mode4: EUT(NFC Card mode)

Test Voltage:AC 120V/60Hz

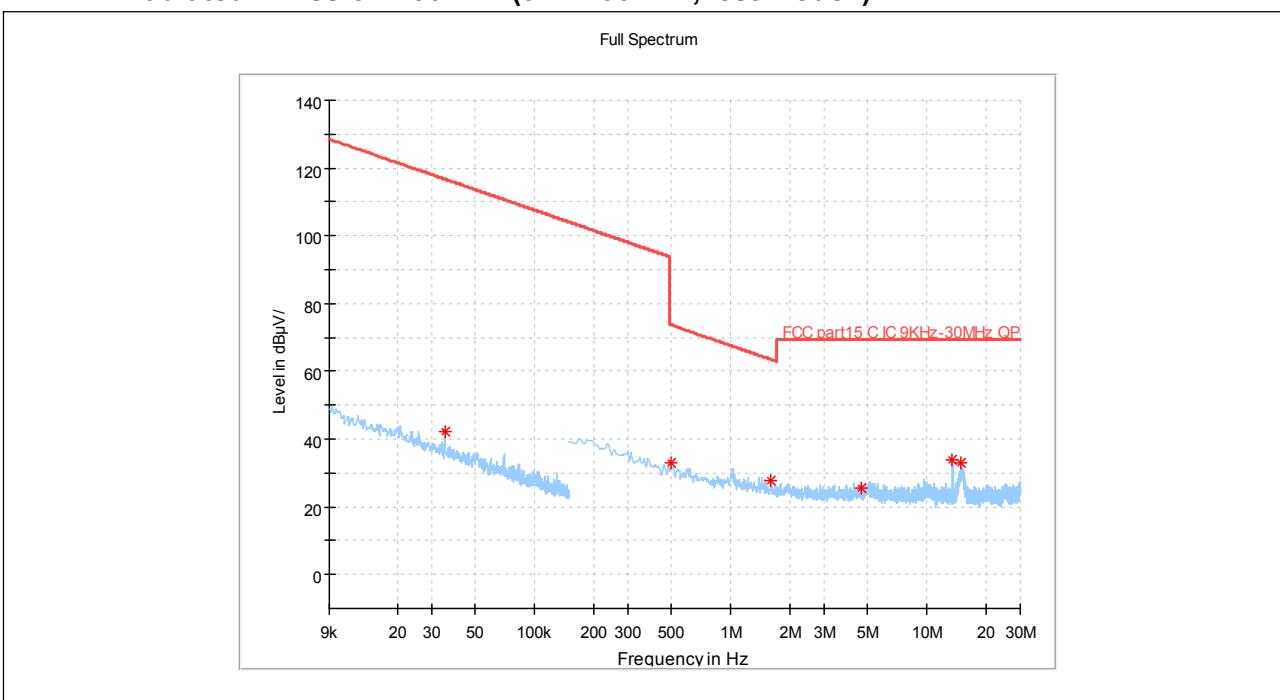
The measurement results are obtained as below:

$E [\text{dB } \mu \text{V}] = \text{UR} + \text{LCable loss } [\text{dB}] + \text{Corr.}$

UR: Receiver Reading

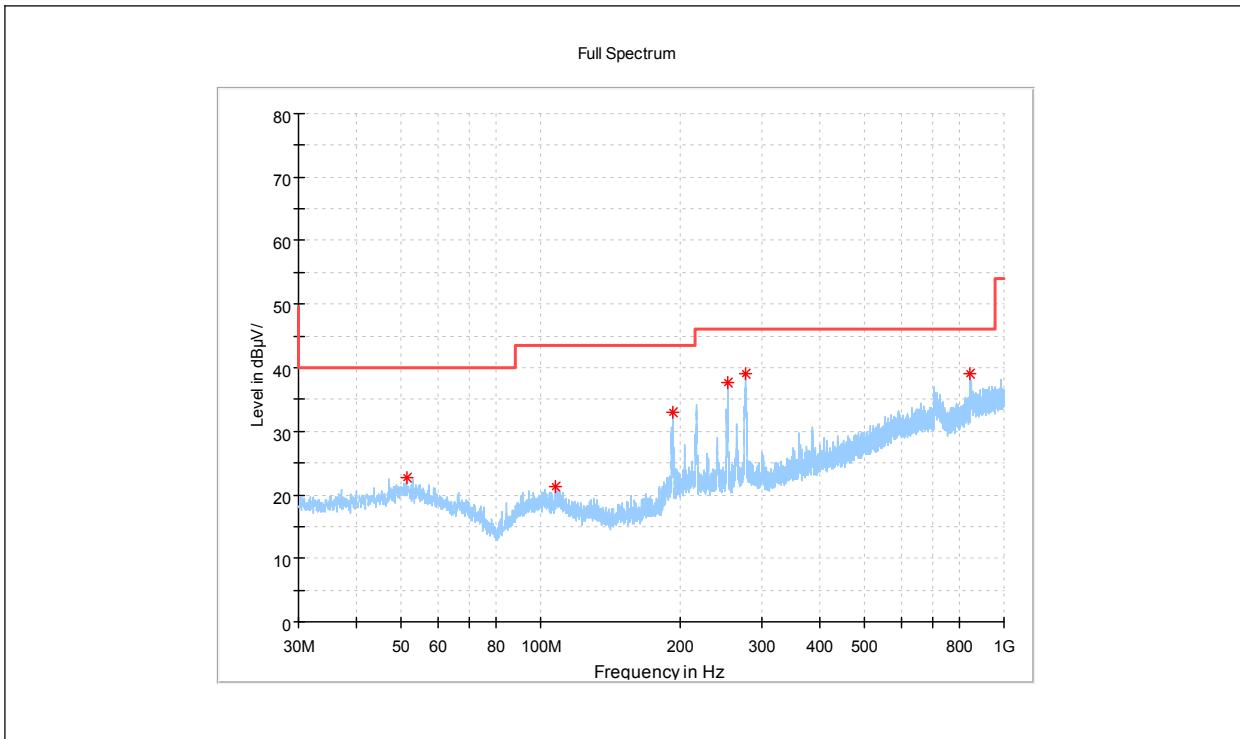
Corr.: Voltage division factor of LISN

A. Radiated Emission <30MHz (9kHz-30MHz,Test mode1)



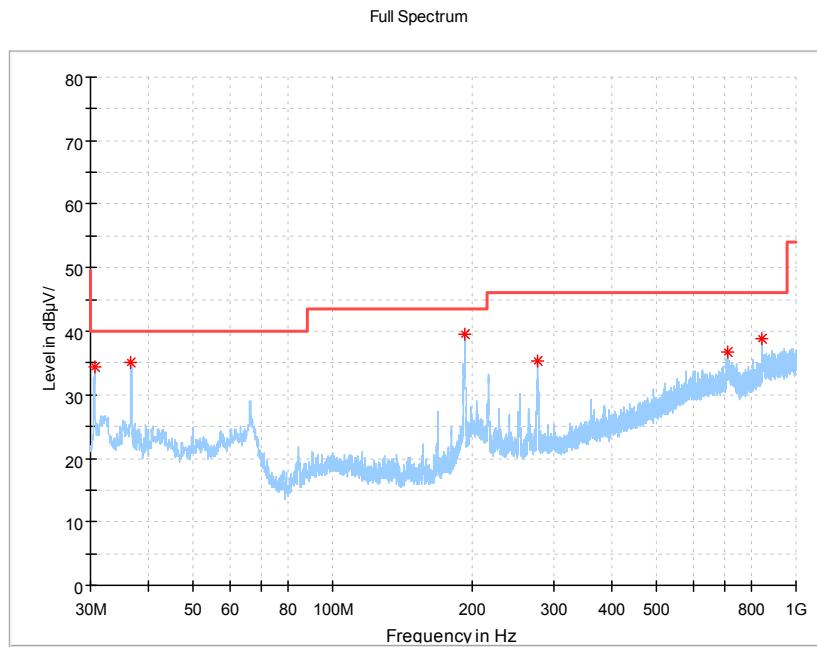
Frequency (MHz)	MaxPeak (dB μ V/m)	Quasi Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
0.034909	42.36	---	116.73	74.37	V	20.4	PASS
0.501177	32.89	---	73.61	40.72	V	21.7	PASS
1.602993	27.85	---	63.53	35.69	V	20.4	PASS
4.667007	25.68	---	69.53	43.85	V	20.6	PASS
13.560552	34.00	---	69.51	35.51	V	20.8	PASS
15.057441	32.85	---	69.51	36.66	V	28.3	PASS

Radiated Emission >30MHz (30MHz-1GHz, Test mode1)



(30MHz – 1GHz, Test Antenna Horizontal)

Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
51.299583	22.57	40.00	17.43	H	15.1	PASS
107.923333	21.25	43.50	22.25	H	12.6	PASS
192.717500	32.94	43.50	10.56	H	12.7	PASS
253.019167	37.70	46.00	8.30	H	15.1	PASS
277.107500	39.16	46.00	6.84	H	15.5	PASS
845.527500	38.98	46.00	7.02	H	26.8	PASS



(30MHz – 1GHz, Test Antenna Vertical)

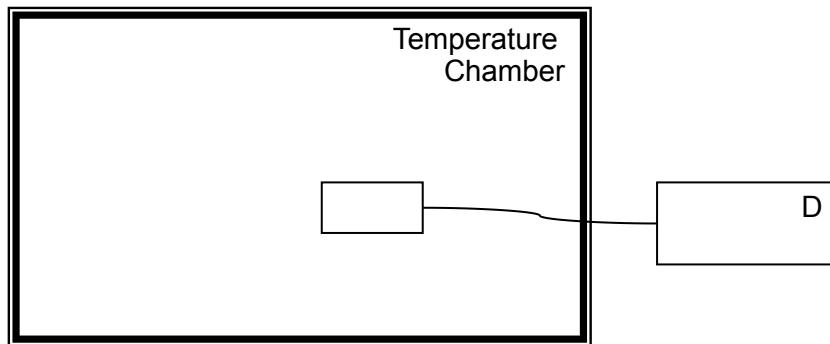
Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
30.687083	34.35	40.00	5.65	V	11.3	PASS
36.749583	35.00	40.00	5.00	V	12.9	PASS
192.798333	39.56	43.50	3.94	V	12.7	PASS
277.147917	35.38	46.00	10.62	V	15.5	PASS
709.646667	36.71	46.00	9.29	V	24.5	PASS
845.365833	38.82	46.00	7.18	V	26.8	PASS

2.4. Frequency Tolerance

2.4.1. Test Requirement

According to FCC section 15.225, the devices operating in the 13.553~13.567 MHz shall maintain the carrier frequency within 0.01% of the operating frequency over the temperature variation of -20°C to +50°C using an environmental chamber. The primary supply voltage is varied from 85% to 115% of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

2.4.2. Test Setup



The EUT, which is powered by the DC Power Supply directly, is located in the Temperature Chamber. The EUT was measured by transmitter mode continuously.



2.4.3. Test Result

Operating Frequency: 13,560,000 Hz

Deference Voltage: 6.0V

Deviant Limit: $\pm 0.01\%$

Test result:

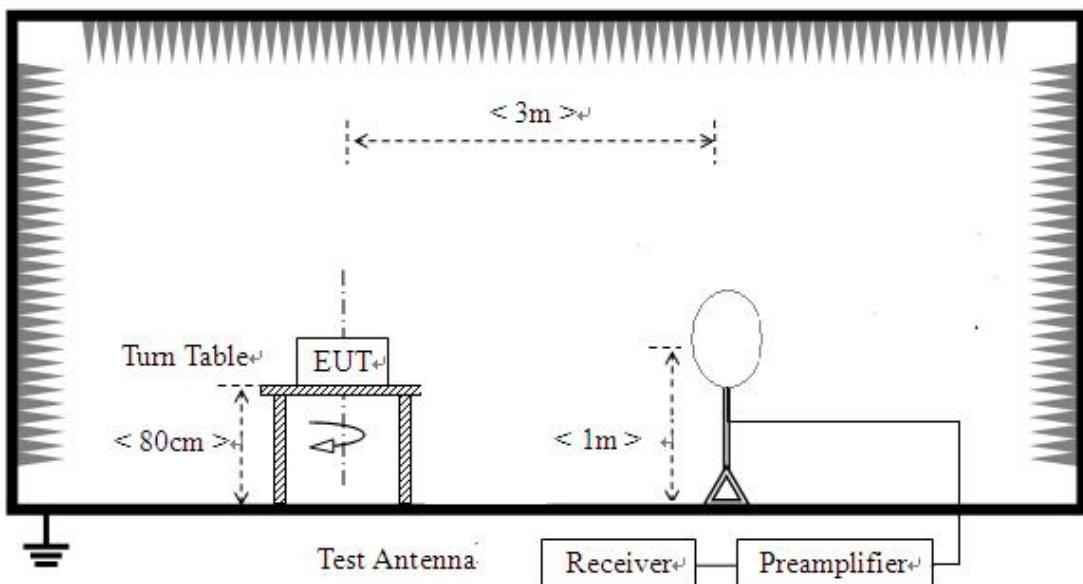
VOLTAGE (%)	Test Conditions		Fre. Dev. (Hz)	Deviation (%)	Verdict
	Power (VDC)	Temperature (°C)			
100	6	-20	237	0.00175	PASS
100		-10	246	0.00181	
100		0	281	0.00207	
100		10	302	0.00223	
100		20	284	0.00209	
100		25	310	0.00229	
100		30	277	0.00204	
100		40	290	0.00214	
100		50	303	0.00223	
85	5.1	20	288	0.00212	
115	6.9	20	272	0.00201	

2.5. 20dB Bandwidth

2.5.1. Standard Applicable

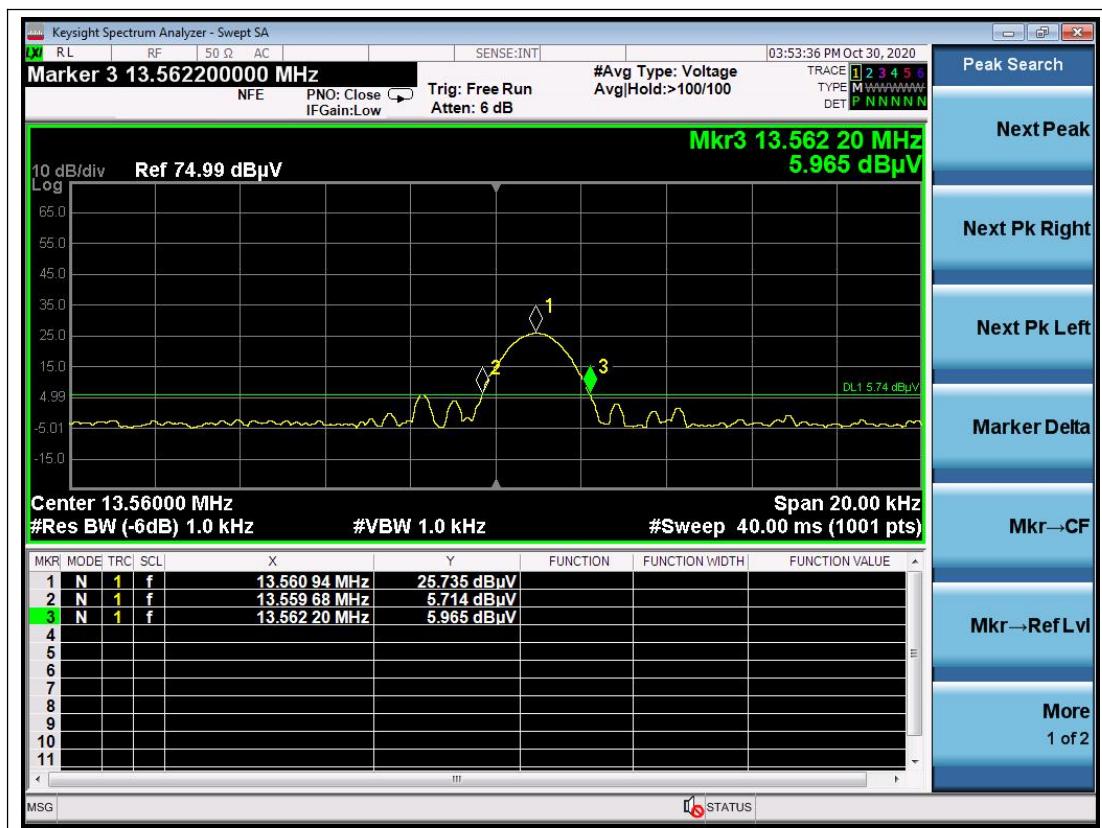
According to FCC section 15.215(c), the 20dB bandwidth should be contained within the frequency band designated in the rule section under which the EUT is operated, it was measured with a spectrum analyzer connected the EUT while the EUT is operating in transmission mode.

2.5.2. Test Setup



2.5.3. Test Result

Centre Frequency	Measurement		Limit		Verdict
	20dB Bandwidth (kHz)	Frequency Range (MHz)	20dB Bandwidth (kHz)	Frequency Range(MHz)	
13.56MHz	2.52	13.559 to 13.561	14	13.553 to 13.567	PASS





Annex A Test Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

Uncertainty of Conducted Emission Measurement

Measuring Uncertainty for a Level of Confidence of 95%(U=2Uc(y))	9kHz-150kHz	±3.10 dB
	150kHz-30MHz	±2.61dB

Uncertainty of Radiated Emission Measurement

Measuring Uncertainty for a Level of Confidence of 95%(U=2Uc(y))	30MHz-200MHz	±3.87dB
	200MHz-1000MHz	±4.07dB



Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Department:	Kehu-Morlab Test Laboratory
Address:	Unit 101, No.1732 Gangzhong Road, Xiamen Area, Pilot Free Trade Zone (Fujian) China
Responsible Test Lab Manager:	Mr. Di Dehai
Telephone:	+86 592 5612050
Facsimile:	+86 592 5612095

2. Identification of the Responsible Testing Location

Name:	Kehu-Morlab Test Laboratory
Address:	Unit 101, No.1732 Gangzhong Road, Xiamen Area, Pilot Free Trade Zone (Fujian) China

3. Accreditation Certificate

Accredited Testing Laboratory:	The FCC designation number is CN1249. (Kehu-Morlab Test Laboratory)
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4. Test Equipment Utilized

Conducted Emission Test Equipments

No.	Equipment Name	Serial No.	Model No.	Manufacturer	Cal.Due Date
1	EMI Receiver	102174	ESR3	ESR3	2021.03.15
2	LISN	101338	ENV432	ENV432	2021.03.09
3	Pulse Limiter (10dB)	317	VTSD 9561 F	VTSD 9561 F	2021.03.13
4	Coaxial cable(BNC) (30MHz-3GHz)	EMC01	N/A	Morlab	2021.03.13

Radiated Test Equipments

No.	Equipment Name	Serial No.	Model No.	Manufacturer	Cal.Due Date
1	Anechoic Chamber	N/A	9m*6m*6m	ETS-Lindgren	2022.07.20



REPORT No. : XM20070009W08

2	Active Ring Antenna	FMZB 1513 #269	FMZB 1513	Schwarzbeck	2022.01.11
3	Linear Log Periodic Broad Band Antenna	949	VULB 9163	Schwarzbeck	2021.09.24
4	Receiver	R&S	ESR7	101799	2021.03.15

List of Software Used

No.	Model	Version Number	Producer	Test Item
1	EMC 32	V10.00.00	R&S	RE
2	EMC 32	V10.20.01	R&S	CE

———— END OF REPORT ————