



Certificate #5376.01



**EUROFINS ELECTRICAL TESTING SERVICE (SHENZHEN) CO., LTD.**

# **RADIO TEST - REPORT**

**FCC Compliance Test Report for**

**Product name: High Precision GNSS Receiver**

**Model name: M68G**

**FCC ID: 2BB82-M68G**

**Test Report Number: EFGX23070007-IE-03-E01**



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## 1 General Information

### 1.1 Notes

The results of this test report relate exclusively to the item tested as specified in chapter "Description of test item" and are not transferable to any other test items.

Eurofins Electrical Testing Service (Shenzhen) Co., Ltd. is not responsible for any generalisations and conclusions drawn from this report. Any modification of the test item can lead to invalidity of test results and this test report may therefore be not applicable to the modified test item.

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#### Operator

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2023-09-14

Bruce Zheng / Project Engineer



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Date

Eurofins-Lab.

Name / Title

Signature

#### Technical responsibility for area of testing:

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2023-09-14

Albert Xu / Lab Manager



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Date

Eurofins-Lab.

Name / Title

Signature



## 1.2 Testing laboratory

Eurofins Electrical Testing Service (Shenzhen) Co., Ltd.

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The Laboratory has passed the Accreditation by the American Association for Laboratory Accreditation (A2LA). The Accreditation number is 5376.01

The Laboratory has been listed by industry Canada to perform electromagnetic emission measurements, The CAB identifier is CN0088

## 1.3 Details of applicant

Name	:	Guangzhou Devecent Information Technology Co.,Ltd.
Address	:	Rm 402,Building A, No.11, CaiPin Road, Science City, HuangPu District, GuangZhou, GuangDong, China
Telephone	:	./.
Fax	:	./.

## 1.4 Details of manufacturer

Name	:	Guangzhou Devecent Information Technology Co.,Ltd.
Address	:	Rm 402, Building A, No.11, CaiPin Road, Science City, HuangPu District, GuangZhou, GuangDong, China
Telephone	:	./.
Fax	:	./.

## 1.5 Application details

Date of receipt of application	:	2023-07-03
Date of receipt of test item	:	2023-07-03
Date of test	:	2023-07-03 to 2023-09-01
Date of issue	:	2023-09-14

## 1.6 Test item

Product type	:	High Precision GNSS Receiver
Test Model	:	M68G
Sample ID	:	230703-14-003
Model name	:	M68G
Brand name	:	ZX
Serial number	:	./.
Hardware Version	:	M68G-PCBA.1.2.230106
Software / Firmware Version	:	m68.2.438.2307.1755
Ratings	:	Input:5V--- 3A, 9V--- 2A 3.7Vdc, 9600mAh supplied by internal rechargeable battery pack.
Test voltage	:	3.7Vdc
FCC ID	:	2BB82-M68G
PMN	:	High Precision GNSS Receiver

### RadioTechnical data

Radio Tech.	:	WLAN 2.4G
Modulation	:	802.11b(DSSS):CCK,DQPSK,DBPSK 802.11g(OFDM):BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM):BPSK,QPSK,16-QAM,64-QAM
Antenna type	:	Internal antenna
Maximum antenna gain	:	1.20dBi
Additional information	:	

1. The RF module(FCC ID: XMR201703FC20) had been certificated and the final product replaces the antenna, so we only test radiated spurious emission for compliance

The above sample(s) and sample information was/were submitted and identified on behalf of the applicant. Eurofins assures objectivity and impartiality of the test, and fulfills the obligation of confidentiality for applicant's commercial information and technical documents.

## 1.7 Test standards

Test Standards	
FCC Part 15 Subpart C	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

### Test Method

- 1: 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.
- 2: ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices.
- 3: KDB558074 D01 15.247 Meas Guidance v05r02

## 2 Technical test

### 2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

or

The deviations as specified were ascertained in the course of the tests performed.

### 2.2 Test environment

Ac line conducted

Enviroment Parameter	Temperature °C	Relative Humidity
101.4 kPa	23.7	51.9%

RF Conducted

Enviroment Parameter	Temperature °C	Relative Humidity
101.4 kPa	24.6	62.9%

Radiated

Enviroment Parameter	Temperature °C	Relative Humidity
101.4 kPa	24.7	53.7%

### 2.3 Measurement uncertainty

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

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty in conducted measurements	1.96dB
Uncertainty for Conducted RF test	RF Power Conducted: 1.16dB Frequency test involved: 1.05×10-7 or 1%
Uncertainty for Radiated Emission 9KHz-30MHz	4.56dB
Uncertainty for Radiated Spurious Emission 30MHz-3000MHz	Horizontal: 4.46dB; Vertical: 4.54dB;
Uncertainty for Radiated Spurious Emission 3000MHz-18000MHz	Horizontal: 4.42dB; Vertical: 4.41dB;
Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz	Horizontal: 4.63dB; Vertical: 4.62dB;

## 2.4 Test mode

Operation Frequency each of channel(802.11b/g/n HT 20)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

Operation Frequency each of channel(802.11n HT 40)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
--	--	4	2427MHz	7	2442MHz	--	--
--	--	5	2432MHz	8	2447MHz	--	--
3	2422MHz	6	2437MHz	9	2452MHz	--	--

For 802.11b/g n(HT20) (2.4GHz band), the lowest, middle, highest channel numbers of the EUT used and tested in this report are separately 1 (2412MHz), 6 (2437MHz) and 11 (2462MHz).

For 802.11n(HT40)(2.4GHz band), the lowest, middle, highest channel numbers of the EUT used and tested in this report are separately 3 (2412MHz), 6 (2437MHz) and 9 (2452MHz).

## 2.5 Test equipment utilized

EQUIPMENT ID	EQUIPMENT NAME	MODEL NO.	CAL. DUE DATE
23-2-13-05	EMI Test Receiver	ESR3	2024-03-21
23-2-13-06	LISN	NNLK 8127 RC	2024-03-21
23-2-10-16	Attenuator	VTSD 9561-F	2024-03-21
23-2-10-63	Temperature & Humidity Meter	COS-03	2024-03-21
23-2-10-65	Barometer	Baro	2024-03-21
23-2-13-12	Signal Analyzer	N9010B-544	2024-03-21
23-2-13-13	BT/WLAN Tester	CMW270	2024-03-21
23-2-13-14	Signal Generator	N5183B-520	2024-03-21
23-2-13-15	Vector Signal Generator	N5182B-506	2024-03-21
23-2-10-43	Switch and Control Unit	ERIT-E-JS0806-2	2024-03-21
23-2-10-44	DC power supply	E3642A	2024-03-21
23-2-10-45	Temperature test chamber	SG-80-CC-2	2024-03-21
23-2-10-50	Temperature & Humidity Meter	COS-03	2024-03-21
23-2-10-66	Barometer	Baro	2024-03-21
23-2-13-01	EMI Test Receiver	ESR7	2024-03-21
23-2-13-02	Signal Analyzer	N9020B-544	2024-03-21
23-2-12-01	Active Loop Antenna	FMZB 1519B	2024-05-29
23-2-12-02	TRILOG Broadband Antenna	VULB9168	2024-05-29
23-2-12-03	Horn Antenna	3117	2024-05-29
23-2-12-04	Horn Antenna	BBHA 9170	2024-05-29
23-2-10-01	Preamplifier	BBV9745	2024-03-21
23-2-10-02	Preamplifier	TAP01018048	2024-03-21
23-2-10-03	Preamplifier	TAP18040048	2024-03-21
23-2-10-62	Temperature & Humidity Meter	COS-03	2024-03-21
23-2-10-64	Barometer	Baro	2024-03-21
23-2-10-14	Switch and Control Unit	ERIT-E-JS0806-SF1	N/A
23-2-13-03	EMI Test Receiver	ESR7	2024-03-21
23-2-13-04	Signal Analyzer	N9020B-526	2024-03-21
23-2-12-06	Active Loop Antenna	FMZB 1519B	2024-05-05
23-2-12-07	TRILOG Broadband Antenna	VULB9168	2024-05-05
23-2-12-08	Horn Antenna	3117	2024-05-05
23-2-10-46	Preamplifier	BBV9745	2024-03-21
23-2-10-47	Preamplifier	TAP01018048	2024-03-21
23-2-10-61	Temperature & Humidity Meter	COS-03	2024-03-21
23-2-10-52	Barometer	Baro	2024-03-21
23-2-10-15	Switch and Control Unit	ERIT-E-JS0806-SF1	N/A



## 2.6 Auxiliary equipment used during test

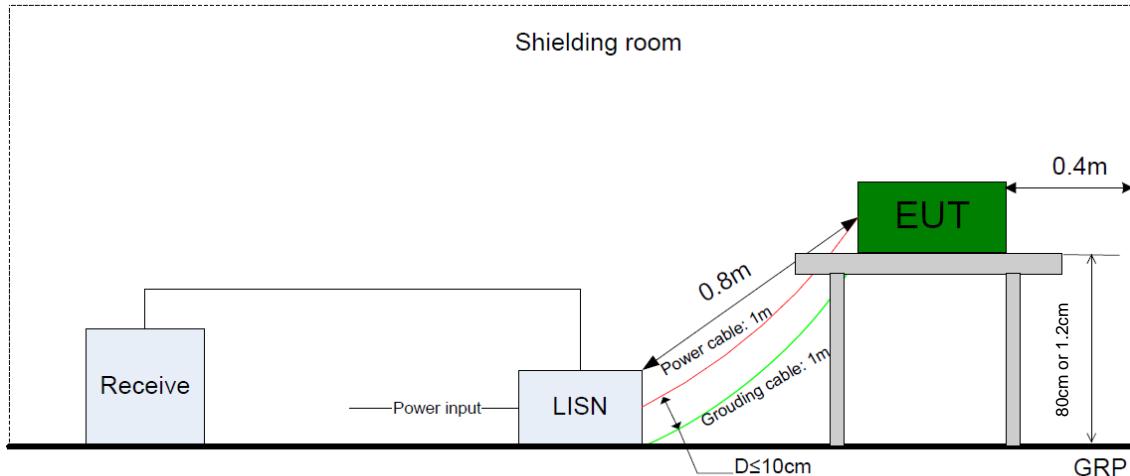
DESCRIPTION	MANUFACTURER	MODEL NO.	S/N
Laptop	LENOVO	TP00096A	PF-1QH0LV

## 2.7 Test software information

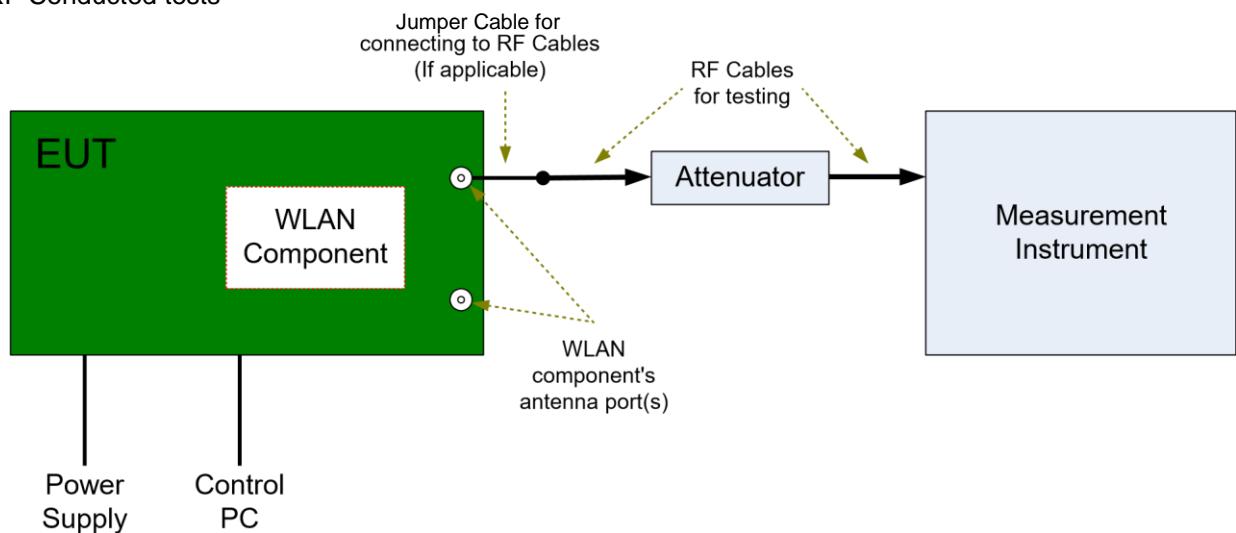
Test Software&Version	CMD		
Mode	Power setting		Rate
802.11b	CH1	CH6	CH11
	DEF	DEF	DEF
802.11g	CH1	CH6	CH11
	DEF	DEF	DEF
802.11n HT20	CH3	CH6	CH9
	DEF	DEF	DEF
802.11n HT40	CH3	CH6	CH9
	DEF	DEF	DEF

## 2.8 Test setup

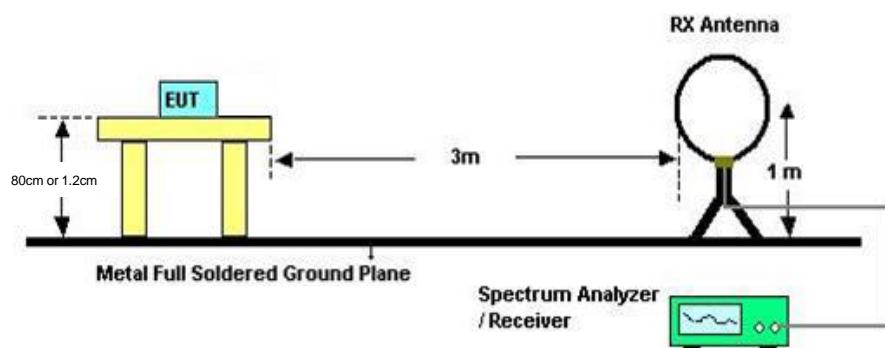
Ac line conducted



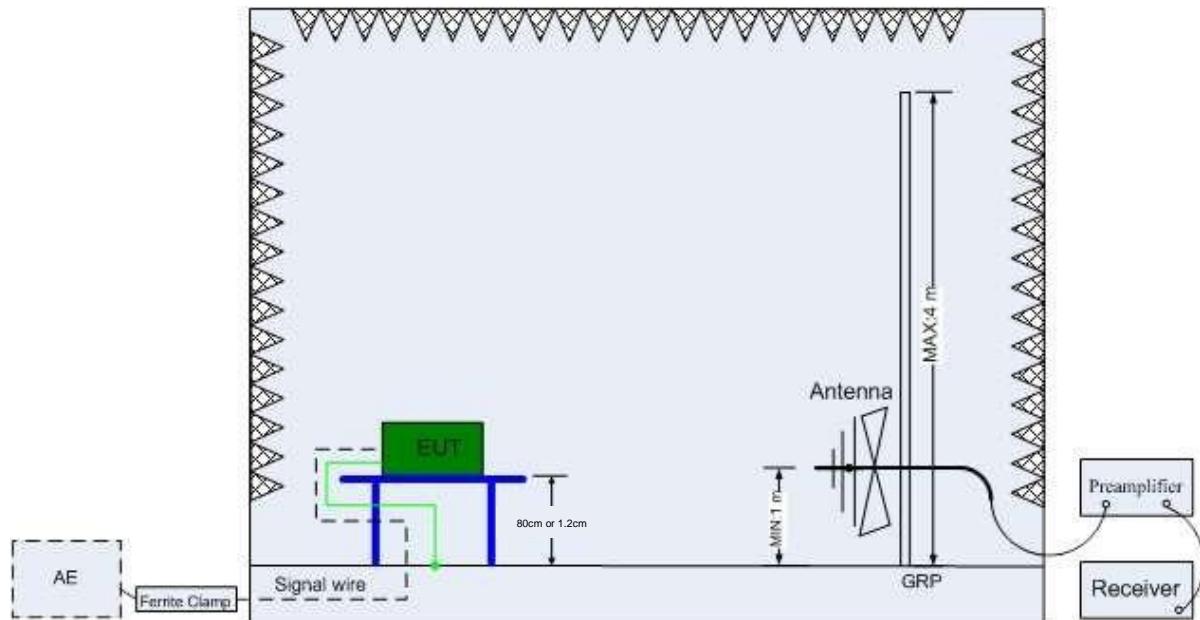
RF Conducted tests



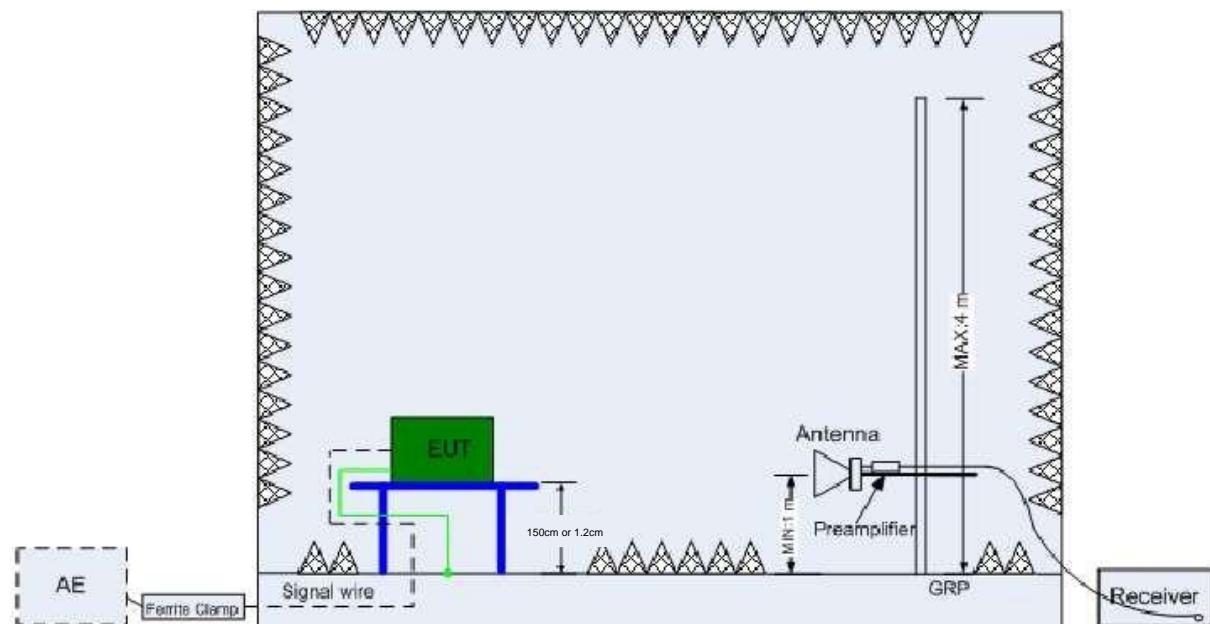
Radiated tests below 30MHz



## Radiated tests below 1GHz



## Radiated tests above 1GHz





## 2.9 Test results

1<sup>st</sup> test

test after modification

production test

Technical Requirements				
FCC Part 15 Subpart C				
Test Condition		Test Result	Verdict	Test Site
§15.207	Conducted emission AC power port	Appendix A	Pass	Site 1
§15.209 & §15.205	Spurious emissions , Band edge & Restricted Band	Appendix B Appendix C	Pass	Site 1
§15.203	Antenna requirement	See note 1	Pass	--

Remark 1: N/A – Not Applicable.

Note 1: The EUT uses a internal antenna. According to §15.203, it is considered sufficiently to comply with the provisions of this section.

### 3 Technical Requirement

#### 3.1 Conducted emission AC power port

**Test Method:**

The test method was referred to the subclause 6.2 of ANSI C63.10-2013.

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both Neutral and Live lines.

**Limit:**

FCC §15.207 (a)

Frequency	QP Limit	AV Limit
MHz	dB $\mu$ V	dB $\mu$ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linear.

### 3.2 Spurious emissions & Restricted Band

#### Test Method:

The test method was referred to the subclause 11.12 of ANSI C63.10-2013.

Radiated emission measurements setup:

- 1: The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
- 3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

Antenna-port conducted measurements:

Antenna-port conducted measurements may also be used as an alternative to radiated measurements for determining compliance in the restricted frequency bands requirements. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case emissions is required.

Use the following spectrum analyzer settings According to C63.10:

For Above 1GHz

Span = wide enough to capture the peak level of the in-band emission and all spurious  
RBW = 1MHz, VBW $\geq$ RBW for peak measurement, Sweep = auto, Detector function = peak,  
Trace = max hold.

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious  
RBW = 100 KHz, VBW $\geq$ RBW for peak measurement, Sweep = auto, Detector function = peak,  
Trace = max hold.

For Below 30MHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious  
RBW = 200 Hz, VBW $\geq$ RBW from 9KHz to 0.15MHz, RBW 9KHz VBW $\geq$ RBW from 0.15MHz to 30MHz for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

#### Note:

- 1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video band-width is 3MHz for peak detection (PK) at frequency above 1GHz.
- 3: If the EUT can be configured or modified to transmit continuously ( $D \geq 98\%$ ), The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average detection (AV) at frequency above 1GHz.
- 4: If continuous transmission of the EUT ( $D \geq 98\%$ ) cannot be achieved and the duty cycle is constant (duty cycle variations are less than  $\pm 2\%$ ), The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ( $10\log(1/\text{duty cycle})$ ).
- 5: If continuous transmission of the EUT ( $D \geq 98\%$ ) cannot be achieved and the duty cycle is not constant (duty cycle variations exceed  $\pm 2\%$ ), The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\text{VBW} \geq 1 / T$ , the  $T$  is transmission duration (T).



**Limit:**

FCC §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

§15.205 Restricted bands of operation

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	
13.36-13.41			



## 4 Test Setup Photos

Ref "EFGX23070007-IE-03-E01\_Setup\_Photos.pdf"

## 5 External Photos

Ref "EFGX23070007-IE-03-E01\_External\_Photos.pdf"

## 6 Internal Photos

Ref "EFGX23070007-IE-03-E01\_Internal\_Photos.pdf"

## 7 Appendix

Ref "EFGX23070007-IE-03-E01\_appendix.pdf"

**-End of report-**