



REPORT No. : SZ16070096W08

FCC PART 15C TEST REPORT

APPLICANT : Bragi GMBH
PRODUCT NAME : The Dash Left
MODEL NAME : B1001-01L
TRADE NAME : Bragi
BRAND NAME : Bragi
FCC ID : 2AF5TB1001L
STANDARD(S) : 47 CFR Part 15 Subpart C
TEST DATE : 2016-10-24 to 2016-11-30
ISSUE DATE : 2016-12-06



SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.

NOTE: This document is issued by MORLAB, the test report shall not be reproduced except in full without prior written permission of the company. The test results apply only to the particular sample(s) tested and to the specific tests carried out which is available on request for validation and information confirmed at our website.

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road,
Block67, BaoAn District, ShenZhen , Guangdong Province, P. R. China

Tel: 86-755-36698555

Fax: 86-755-36698525

[Http://www.morlab.cn](http://www.morlab.cn)

E-mail: service@morlab.cn



DIRECTORY

1. TECHNICAL INFORMATION.....	4
1.1. APPLICANT INFORMATION.....	4
1.2. EQUIPMENT UNDER TEST (EUT) DESCRIPTION.....	4
2. TEST RESULTS	5
2.1. APPLIED REFERENCE DOCUMENTS	5
3. 47 CFR PART 15C REQUIREMENTS	6
3.1. RADIATED EMISSION.....	6
3.1.1. TEST REQUIREMENT.....	6
3.1.2. TEST EQUIPMENT	7
3.1.3. TEST SETUP.....	7
3.1.4. TEST RESULT	8
3.2. BANDWIDTH OF THE MODULATED CARRIER.....	12
3.2.1. STANDARD APPLICABLE.....	12
3.2.2. TEST EQUIPMENT	12
3.2.3. TEST SETUP.....	13
3.2.4. TEST RESULT	13
ANNEX A TEST UNCERTAINTY.....	14
ANNEX B TESTING LABORATORY INFORMATION	15
1. IDENTIFICATION OF THE RESPONSIBLE TESTING LABORATORY	15
2. IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION.....	15
3. ACCREDITATION CERTIFICATE	15
4. TEST ENVIRONMENT CONDITIONS	15



REPORT No. : SZ16070096W08

Test Report Declaration

Applicant	Bragi GMBH
Applicant Address	Sendlinger Str. 7/ Angerblock 2.OG, 80331 München, Germany
Manufacturer	Bragi GMBH
Manufacturer Address	Sendlinger Str. 7/ Angerblock 2.OG, 80331 München, Germany
Product Name	The Dash Left
Model Name	B1001-01L
Brand Name	Bragi
HW Version	B1.2 for Beta3
SW Version	B3_RC2
Test Standards	47 CFR Part 15 Subpart C
Test Result	PASS

Tested by : Wang Dalong
Wang Dalong (Test Engineer)

Reviewed by : Xiao Xiong
Xiao Xiong (EMC Manager)

Approved by : Andy Yeh
Andy Yeh (Technology Manager)



1. Technical Information

Note: Provided by applicant.

1.1. Applicant Information

Company: Bragi GMBH

Address: Sendlinger Str. 7/ Angerblock 2.OG, 80331 München, Germany

1.2. Equipment under Test (EUT) Description

EUT Type:	The Dash Left
Serial No:	(N/A, marked #1 by test site)
Hardware Version:	B1.2 for Beta3
Software Version:	B3_RC2
Operating Frequency:	10.6MHz
Transmit Strength:	<69.54 dBμV/m at 3m
Modulation Type:	CPFSK
Antenna Type:	Coil Antenna

Power supply:	Battery1	
	Brand Name:	VARTA
	Model No.:	CP 1654 A2
	Serial No.:	(N/A ,marked #1 by test site)
	Capacity:	100mAh
	Rated Voltage:	3.7V
	Charge Limit:	4.2V
Power supply:	Battery 2	
	Brand Name:	ZeniPower
	Model No.:	Z105
	Serial No.:	(N/A, marked #1 by test site)
	Capacity:	105mAh
	Rated Voltage:	3.7V
	Charge Limit:	4.2V

NOTE:

1. The EUT is a Dash Right which supports NFMI (10.6MHz) band.
2. For a more detailed description, please refer to specification or user's manual supplied by the applicant and/or manufacturer.



2. Test Results

2.1. Applied Reference Documents

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C:

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

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

No.	Section	Description	Result
1	15.207	Conducted Emission	N/A ^{note1}
2	15.209(a)	Radiated Emission	PASS
3	15.215	Bandwidth of the Modulated Carrier	PASS

Note: The tests were performed according to the method of measurements prescribed in ANSI C63.4-2014. The EUT has been tested under continuous operating condition. The frequency 10.6MHz was chosen for testing.

Note1: The 10.6MHz band was not active during the charge mode.

3. 47 CFR Part 15c Requirements

3.1. Radiated Emission

3.1.1. Test Requirement

- 1) 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.
- 2) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other Sections within this Part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emissions and not the fundamental frequency. However, the level of any unwanted emission shall not exceed the level of the fundamental frequency.

The emission limits shown in the following table are based on measurements employing a CISPR quasi-peak detector except for the frequency 9-90kHz, 110-490kHz and above 1000MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Frequency range (MHz)	Field Strength($\mu\text{V/m}$)	Distance(m)
0.009 ~ 0.490	2400/F(KHz)	300
0.490 ~ 1.705	24000/F(KHz)	30
1.705 ~ 30	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

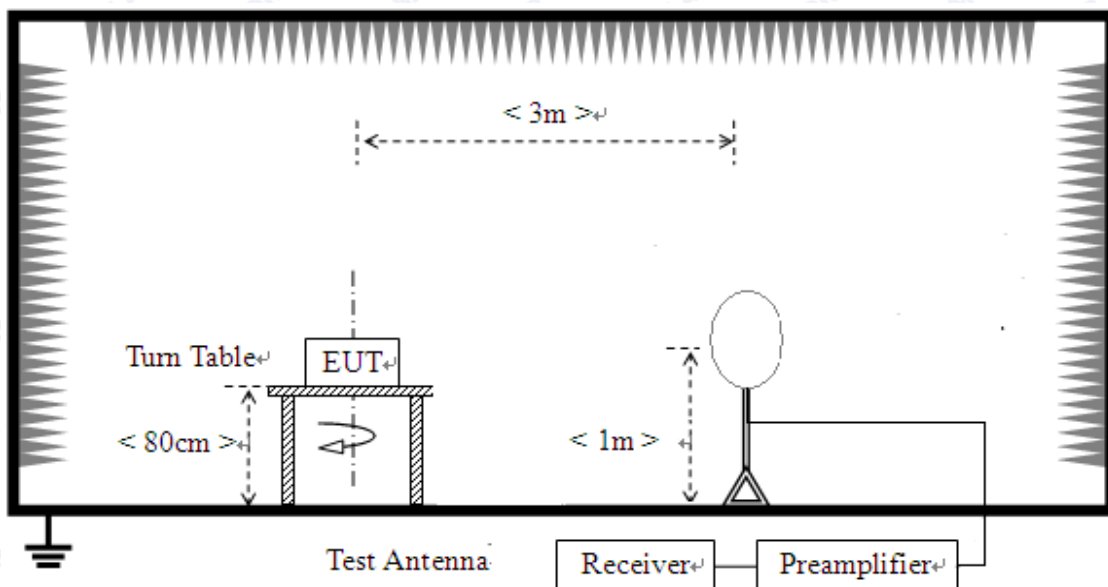
- a) Field Strength ($\text{dB}\mu\text{V/m}$) = $20 \cdot \log[\text{Field Strength } (\mu\text{V/m})]$.
- b) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of $L_{d1} = L_{d2} \cdot (d_2/d_1)^2$.
Example:
F.S Limit at 30m distance is $30\mu\text{V/m}$, then F.S Limitation at 3m distance is adjusted as
 $L_{d1} = 30\mu\text{V/m} \cdot (10)^2 = 100 \cdot 30\mu\text{V/m}$
- c) In the emission tables above, the tighter limit applies at the band edges.

3.1.2. Test Equipment

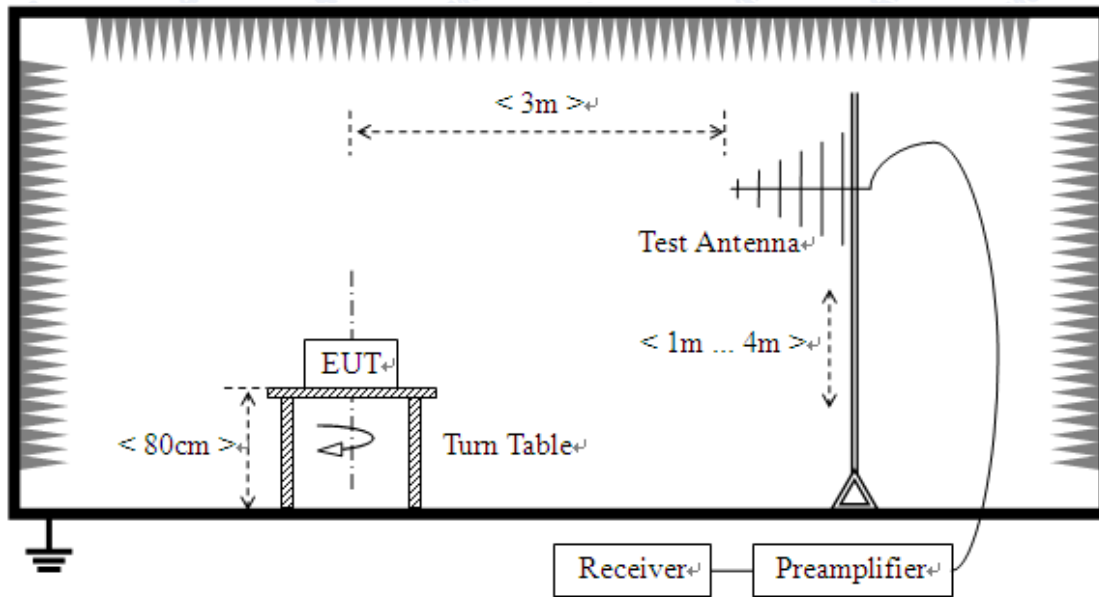
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
MXE EMI Receiver	Agilent	N9038A	MY54130016	2016.01.13	2017.01.12
Semi-Anechoic Chamber	Changning	9m*6m*6m	N/A	2016.01.13	2017.01.12
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2016.01.13	2017.01.12
Test Antenna -Loop	Schwarzbeck	FMZB 1519	1519-022	2016.01.13	2017.01.12
Coaxial Cable	Morlab	EMC02	CB06	N/A	N/A

3.1.3. 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.

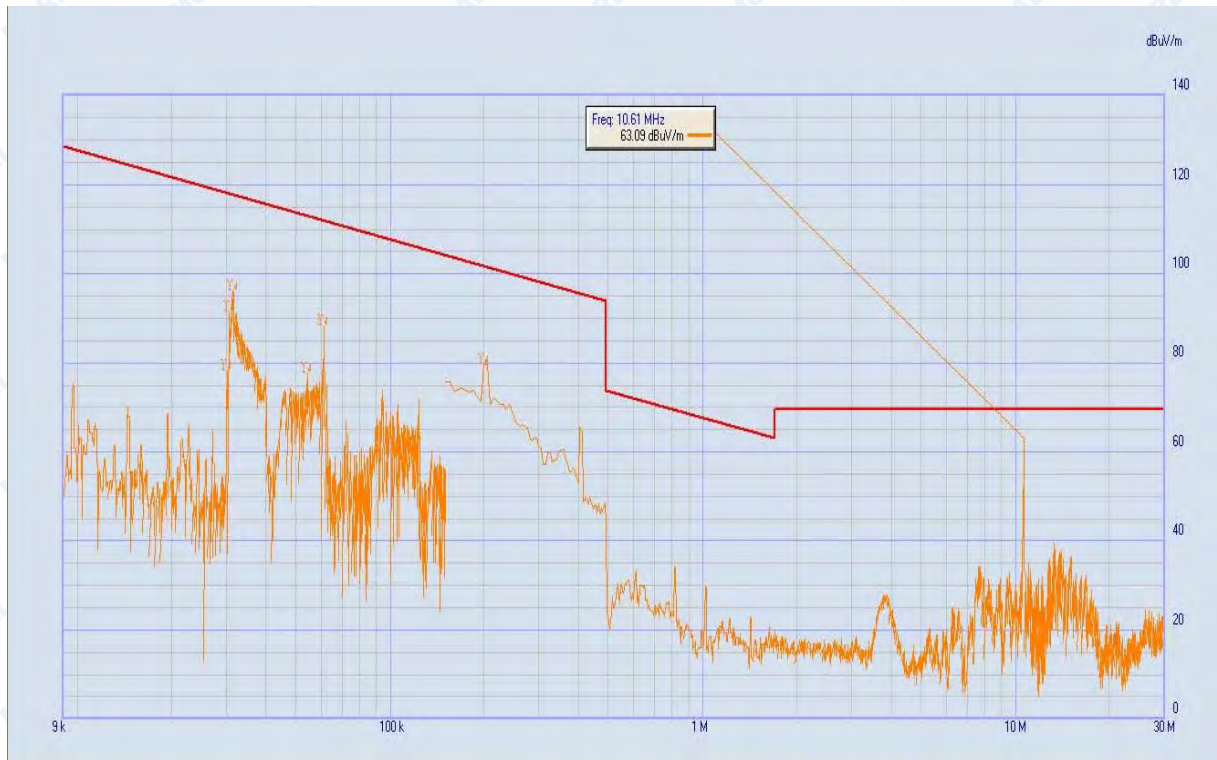
For the test Antenna:

- 1) In the frequency range of 9KHz 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.
- 2) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) are 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.

3.1.4. Test Result

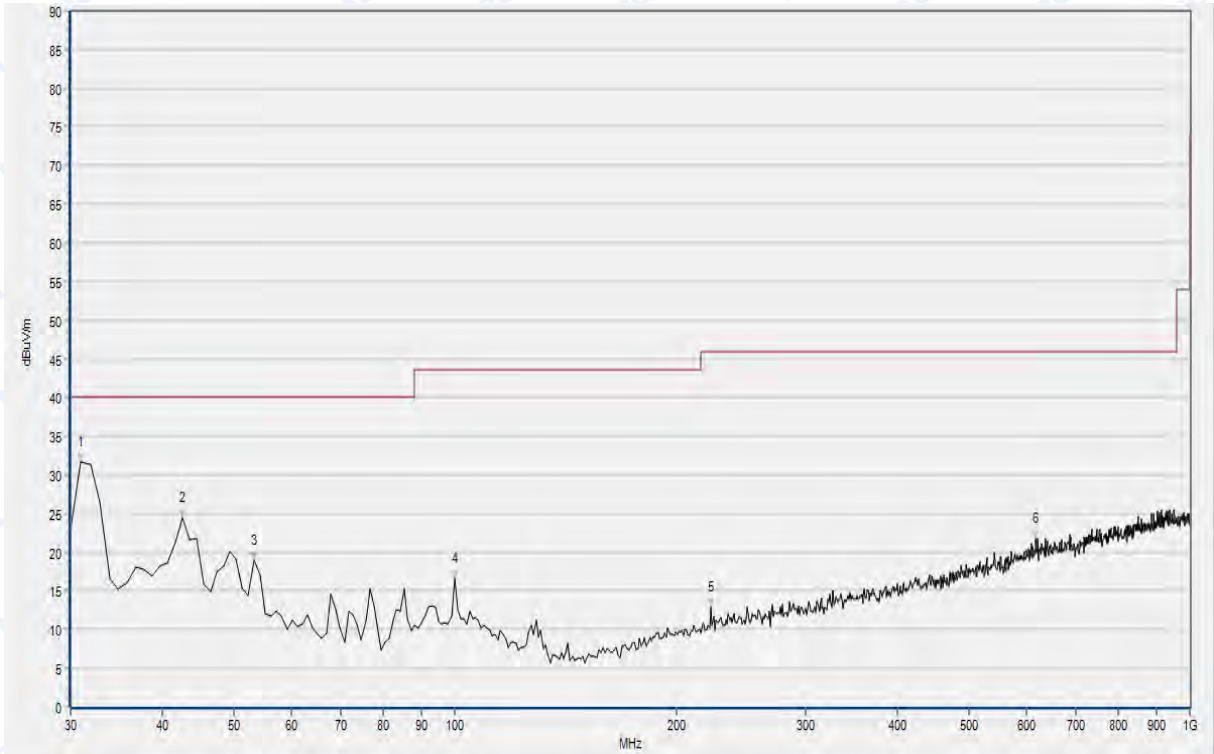
A. Radiated Emission <30MHz (9KHz-30MHz)

NOTE: The emissions are too small to be measured and are at least 6 dB below the limit, so all the data of marked are pass.



(Plot A: 9KHz – 30MHz)

No.	Fre. MHz	Pk dBμV/m	QP dBμV/m	AV dBμV/m	Limit-PK dBμV/m	Limit-QP dBμV/m	Limit-AV dBμV/m	Verdict
1	0.03	N.A.	N.A.	78.24	N.A.	N.A.	118.06	PASS
2	0.0306	N.A.	N.A.	91.45	N.A.	N.A.	117.89	PASS
3	0.0313	N.A.	N.A.	96.15	N.A.	N.A.	117.69	PASS
4	0.054	N.A.	N.A.	77.56	N.A.	N.A.	112.96	PASS
5	0.0612	N.A.	N.A.	88.31	N.A.	N.A.	111.87	PASS
6	0.2	N.A.	N.A.	79.67	N.A.	N.A.	101.58	PASS
7	10.6	N.A.	63.09	N.A.	N.A.	69.54	N.A.	PASS

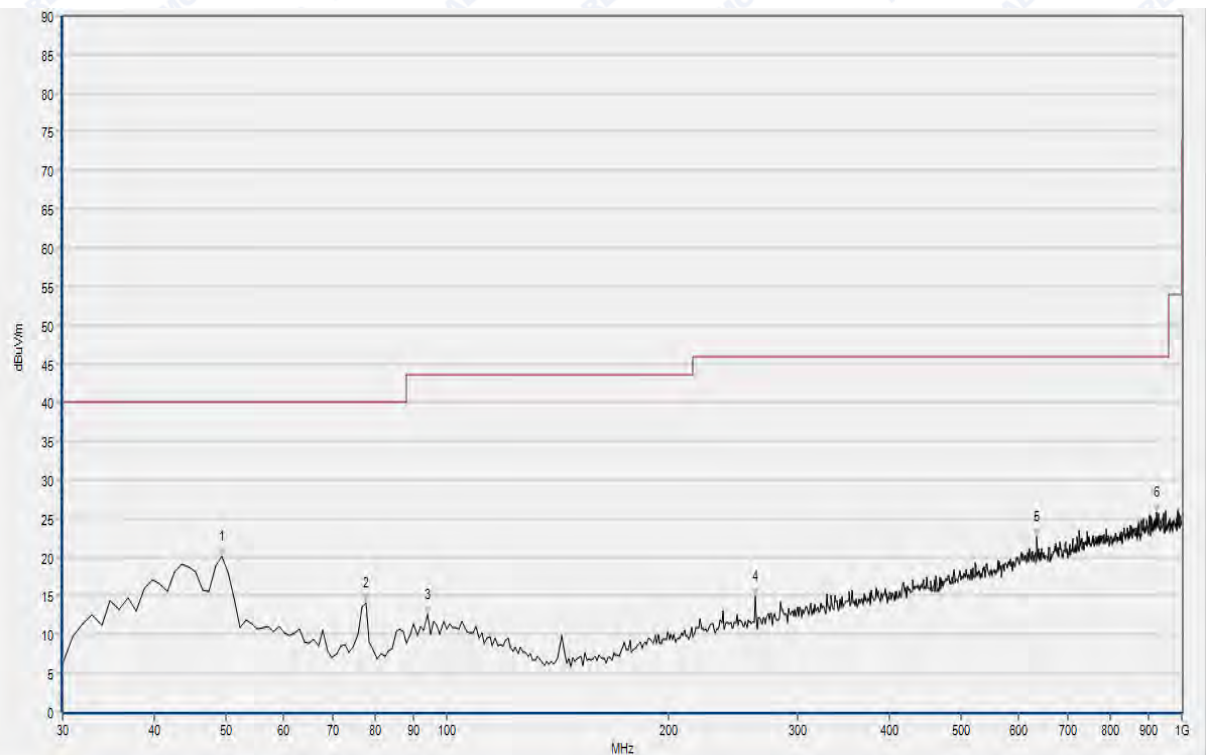
**B. Radiated Emission >30MHz (30MHz-1GHz)**

(Plot B: 30MHz – 1GHz, Test Antenna Vertical)

No.	Fre. MHz	Pk dBμV/m	QP dBμV/m	AV dBμV/m	Limit-PK dBμV/m	Limit-QP dBμV/m	Limit-AV dBμV/m	ANT	Verdict
1	30.970	N.A.	31.69	N.A.	N.A.	40.00	N.A.	V	PASS
2	42.610	N.A.	24.49	N.A.	N.A.	40.00	N.A.	V	PASS
3	53.280	N.A.	18.96	N.A.	N.A.	40.00	N.A.	V	PASS
4	99.840	N.A.	16.62	N.A.	N.A.	43.50	N.A.	V	PASS
5	223.030	N.A.	12.99	N.A.	N.A.	46.00	N.A.	V	PASS
6	616.850	N.A.	21.73	N.A.	N.A.	46.00	N.A.	V	PASS



REPORT No. : SZ16070096W08



(Plot C: 30MHz – 1GHz, Test Antenna Horizontal)

No.	Fre. MHz	Pk dBμV/m	QP dBμV/m	AV dBμV/m	Limit-PK dBμV/m	Limit-QP dBμV/m	Limit-AV dBμV/m	ANT	Verdict
1	49.400	N.A.	20.04	N.A.	N.A.	40.00	N.A.	H	PASS
2	77.530	N.A.	14.09	N.A.	N.A.	40.00	N.A.	H	PASS
3	94.020	N.A.	12.56	N.A.	N.A.	43.50	N.A.	H	PASS
4	262.800	N.A.	14.85	N.A.	N.A.	46.00	N.A.	H	PASS
5	635.280	N.A.	22.64	N.A.	N.A.	46.00	N.A.	H	PASS
6	924.340	N.A.	25.86	N.A.	N.A.	46.00	N.A.	H	PASS

Result: PASS



3.2. Bandwidth of the Modulated Carrier

3.2.1. Standard Applicable

For 99% Bandwidth

The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.

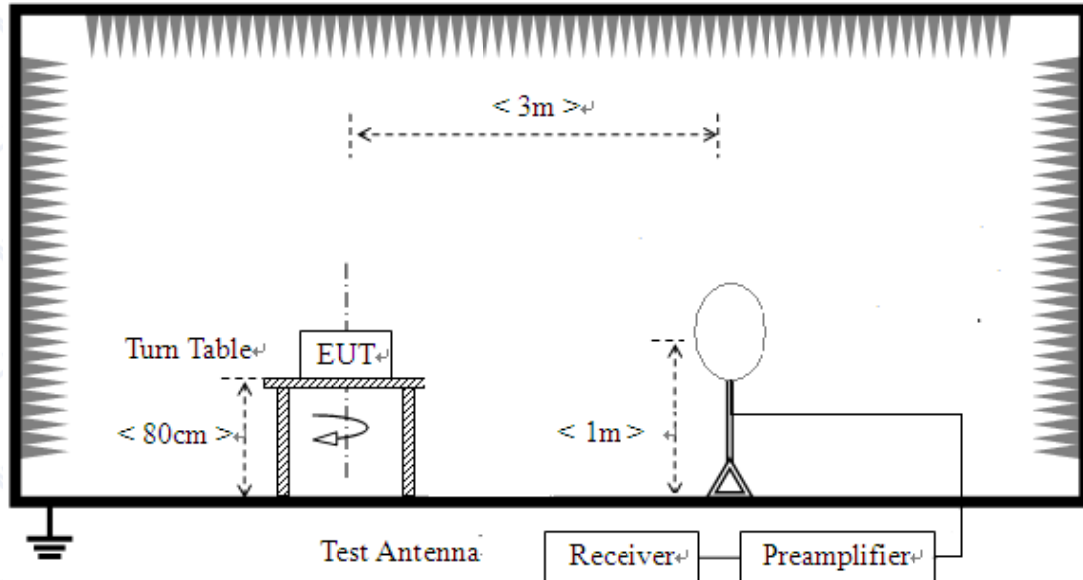
The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are places in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded.

The span between the two recorded frequencies is the occupied bandwidth.

3.2.2. Test Equipment

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
MXE EMI Receiver	Agilent	N9038A	MY54130016	2016.01.13	2017.01.12
Semi-Anechoic Chamber	Changning	9m*6m*6m	N/A	2016.01.13	2017.01.12
Test Antenna -Loop	Schwarzbeck	FMZB 1519	1519-022	2016.01.13	2017.01.12
Coaxial Cable	Morlab	EMC02	CB06	N/A	N/A

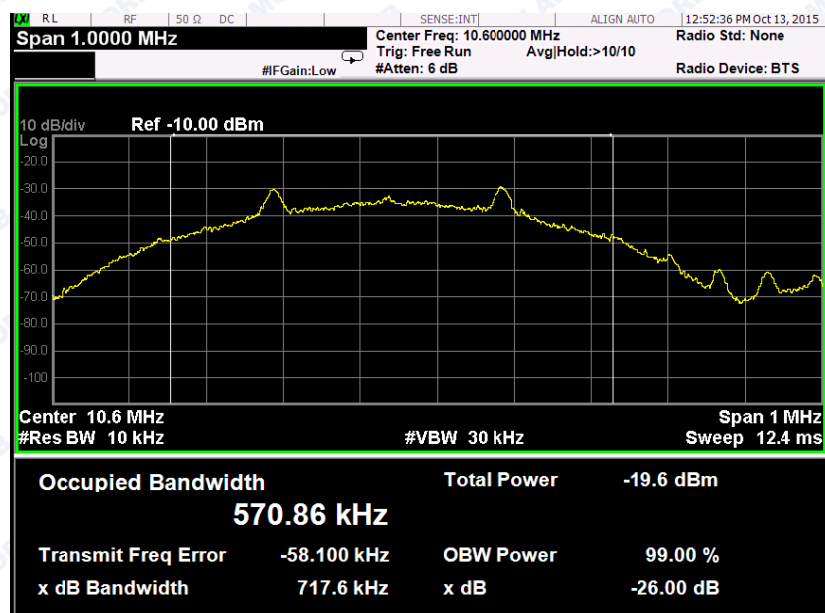
3.2.3. Test Setup



3.2.4. Test Result

Frequency(MHz)	99% Bandwidth (MHz)
10.6	0.570

Please refer to the following plot:





REPORT No. : SZ16070096W08

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 Radiated Emission:	$\pm 3.1\text{dB}$
-----------------------------------	--------------------



Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Company Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Department:	Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Responsible Test Lab Manager:	Mr. Su Feng
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

3. Accreditation Certificate

Accredited Testing Laboratory: The FCC registration number is 695796.
(Shenzhen Morlab Communications Technology Co., Ltd.)

4. Test Environment Conditions

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

Temperature (°C):	15 - 35
Relative Humidity (%):	20 - 75
Atmospheric Pressure (kPa):	86 - 106

***** END OF REPORT *****