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Report No.: SZEM161100971905

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FCC REPORT

Application No. : SZEM1611009719CR

Applicant: BRAGI GMBH

Manufacturer: BRAGI GMBH

Factory: VTech (Dongguan) Communications Ltd.

Product Name: The Headphone

Model No.(EUT): H1001-01

Trade Mark: Bragi

FCC ID: 2AF5TH1001R

Standards: 47 CFR Part 15, Subpart C (2015)

Date of Receipt: 2016-11-17

Date of Test: 2016-11-21

Date of Issue: 2016-12-08

Test Result:	PASS *
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* In the configuration tested, the EUT complied with the standards specified above.



Authorized Signature:

Jack Zhang
EMC Laboratory Manager

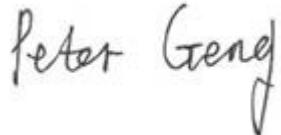
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1 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2016-12-08		Original

Authorized for issue by:			
Tested By		 (Peter Geng) /Project Engineer	2016-11-21
Checked By		 (Eric Fu) /Reviewer	2016-12-08

2 Test Summary

Test Item	Test Requirement	Test method	Result
Radiated Spurious emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 (2013)	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 (2013)	PASS
20dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section	ANSI C63.10 (2013)	PASS

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4 General Information

4.1 Client Information

Applicant:	BRAGI GMBH
Address of Applicant:	Sendlinger Strasse 7 / Angerblock 2. OG, 80331 München, Germany
Manufacturer:	BRAGI GMBH
Address of Manufacturer:	Sendlinger Strasse 7 / Angerblock 2. OG, 80331 München, Germany
Factory:	VTech (Dongguan) Communications Ltd.
Address of Factory:	Xia Ling Bei Management Zone, Liaobu Town, Dongguan City, Guangdong Province, China

4.2 General Description of EUT

Name:	The Headphone
Model No.:	H1001-01
Trade Mark:	Bragi
Operation Frequency:	10.579MHz
Antenna Type:	Loop Antenna
Power Supply:	Left headphone: DC 3.7V, 50mAh rechargeable battery; Right headphone: DC 3.7V, 100mAh rechargeable battery Which both charged by the docking(Charged from Adapter via USB cable)
Test Voltage:	AC 120V/50Hz
Cable:	USB charging line: 18.5cm, shielded
Product details:	H1001-01 consists of a left earplug, a right earplug, a USB charging line and a charging case.

4.3 Test Environment and Mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	55 % RH
Atmospheric Pressure:	1010 mbar
Test mode:	
TX mode	Keep the EUT in transmitting mode

4.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.
Adapter	Apple	A1357 W010A051

4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch,
No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China.
518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• VCCI

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

• FCC – Registration No.: 556682

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 556682.

• Industry Canada (IC)

The 3m Semi-anechoic chambers and the 10m Semi-anechoic chambers of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-2, 4620C-3.

4.7 Deviation from Standards

None.

4.8 Abnormalities from Standard Conditions

None.

4.9 Other Information Requested by the Customer

None.

4.10 Equipment List

RE in Chamber						
Item	Test Equipment	Manufacturer	Model No.	Inventory No	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
1	10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2016-05-13	2017-05-13
2	EMI Test Receiver (9k-7GHz)	Rohde & Schwarz	ESR	SEM004-03	2016-04-25	2017-04-25
3	Trilog-Broadband Antenna(30M-1GHz)	Schwarzbeck	VULB9168	SEM003-18	2016-06-29	2019-06-29
4	Pre-amplifier	Sonoma Instrument Co	310N	SEM005-03	2016-07-06	2017-07-06
5	Loop Antenna	ETS-Lindgren	6502	SEM003-08	2015-08-14	2018-08-14

Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
1	Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2016-05-13	2017-05-13
2	LISN	Rohde & Schwarz	ENV216	SEM007-01	2016-10-09	2017-10-09
3	LISN	ETS-LINDGREN	3816/2	SEM007-02	2016-04-25	2017-04-25
4	8 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T8-02	EMC0120	2016-09-28	2017-09-28
5	4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T4-02	EMC0121	2016-09-28	2017-09-28
6	2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	EMC0122	2016-09-28	2017-09-28
7	EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2016-04-25	2017-04-25
8	DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2016-10-09	2017-10-09

5 Test results and Measurement Data

5.1 Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2013		
Test Frequency Range:	150kHz to 30MHz		
Limit:	Frequency range (MHz)		Limit (dBuV)
			Quasi-peak
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test Procedure:	<ol style="list-style-type: none">1) The mains terminal disturbance voltage test was conducted in a shielded room.2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2009 on conducted measurement.		

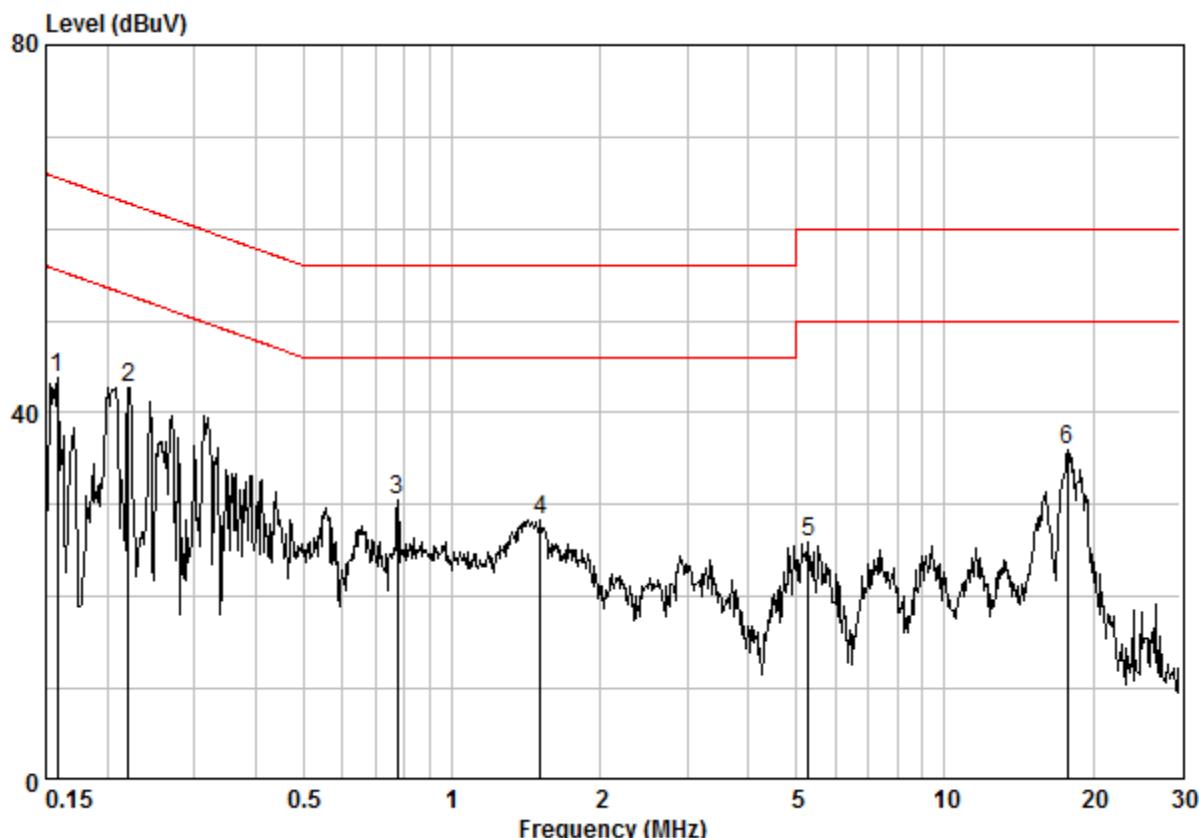
Test setup:	
Instruments Used:	Refer to section 4.10 for details
Test Mode:	NFMI mode
Test Results:	Pass

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live Line:



Site : Shielding Room

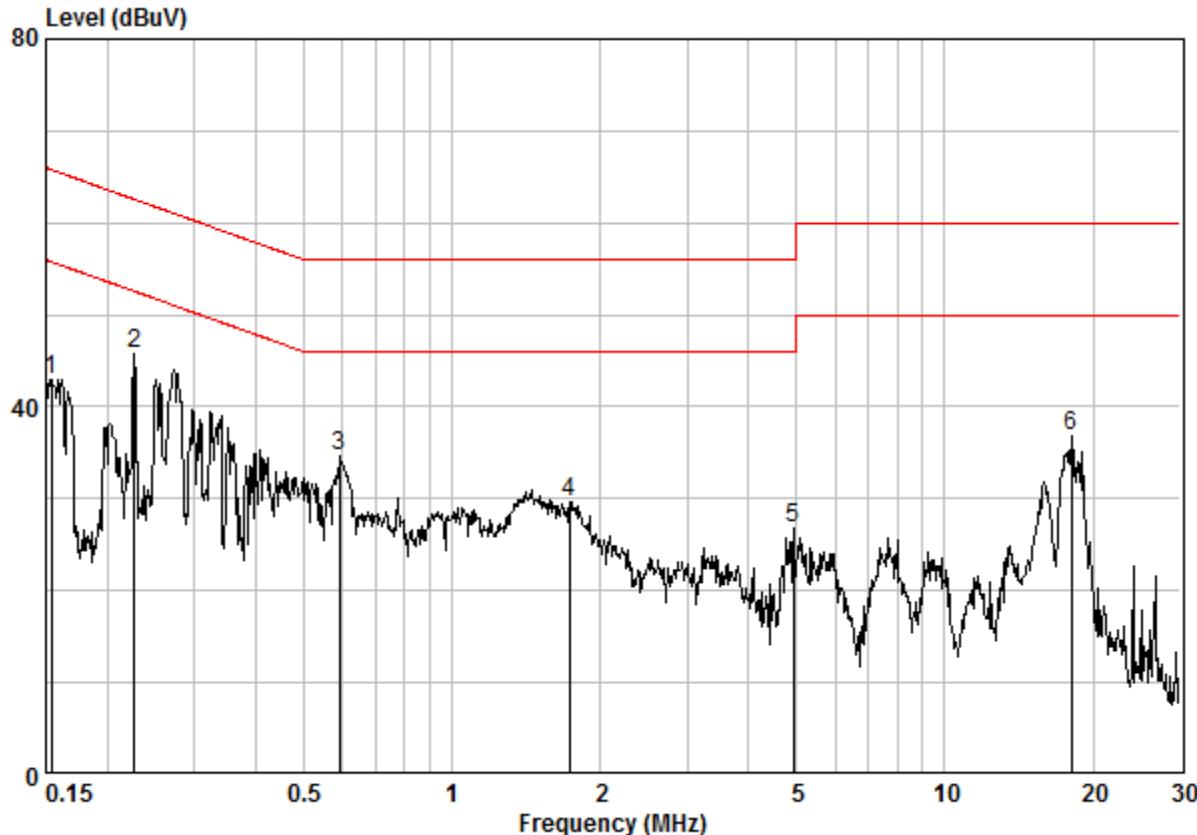
Condition : CE LINE

Job No. : 9719CR

Mode : TX(NFMI)

	Freq	Cable	LISN	Read	Limit	Over	Remark
		Loss	Factor	Level	Level	Line	
	MHz	dB	dB	dBuV	dBuV	dB	
1	0.15816	0.02	9.59	34.19	43.80	55.56	-11.76 Peak
2	0.22083	0.02	9.60	33.03	42.65	52.79	-10.14 Peak
3	0.77519	0.03	9.60	20.87	30.50	46.00	-15.50 Peak
4	1.511	0.03	9.58	18.65	28.26	46.00	-17.74 Peak
5	5.277	0.03	9.66	16.32	26.00	50.00	-24.00 Peak
6	17.755	0.16	9.77	26.06	36.00	50.00	-14.00 Peak

Neutral Line:



Site : Shielding Room
 Condition : CE NEUTRAL
 Job No. : 9719CR
 Mode : TX(NFMI)

	Freq	Cable	LISN	Read	Limit		Over	Remark
		Loss	Factor	Level	Level	Line	Limit	
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.15403	0.02	9.62	33.37	43.00	55.78	-12.78	Peak
2 @	0.22676	0.02	9.61	36.09	45.72	52.57	-6.84	Peak
3	0.59164	0.02	9.63	25.05	34.70	46.00	-11.30	Peak
4	1.734	0.03	9.65	20.07	29.75	46.00	-16.25	Peak
5	4.926	0.02	9.72	17.00	26.74	46.00	-19.26	Peak
6	18.039	0.17	9.96	26.82	36.94	50.00	-13.06	Peak

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

5.2 Radiated Emission

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205				
Test Method:	ANSI C63.10: 2013				
Test Site:	Measurement Distance: 10m (Semi-Anechoic Chamber)				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	100kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
Test Procedure:	<ol style="list-style-type: none"> For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 and 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter full-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. The antenna height 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. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. The radiation measurements are performed in X, Y, Z axis positioning for 				

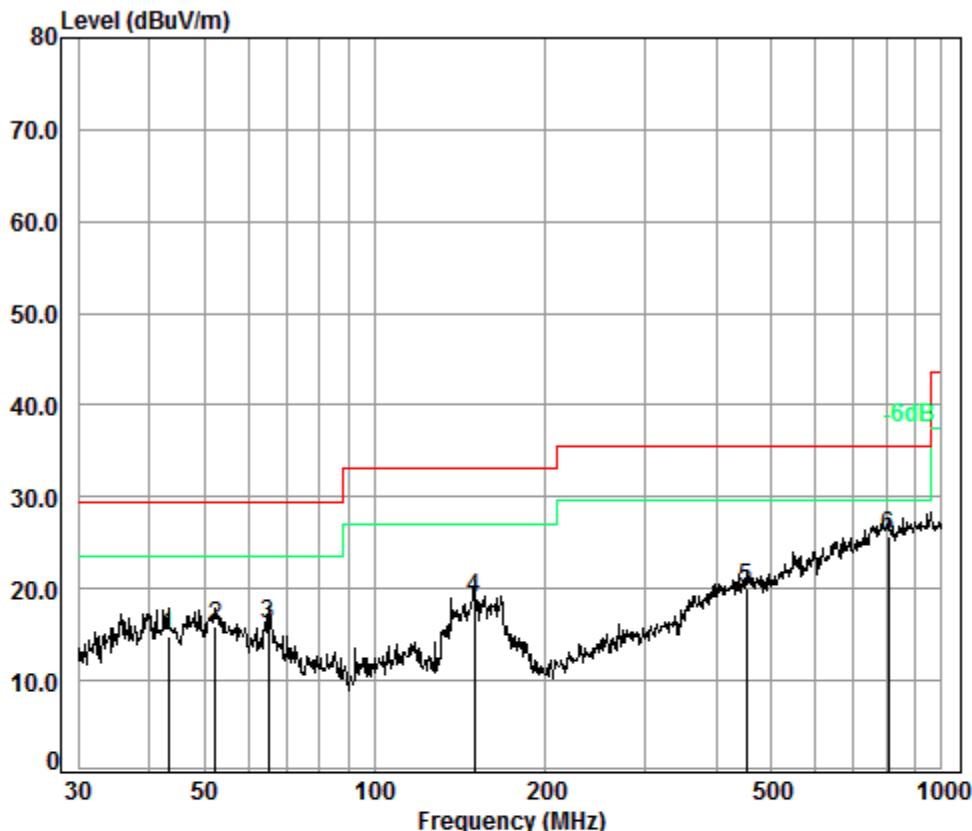
	Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete.
Test Setup:	
Figure 1. 30MHz to 1GHz	

Field Strength Of The Fundamental Signal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level @10m (dBuV/m)	Level @ 30m (dBuV/m)	Limit Line @ 30m (dBuV/m)	Over Limit (dB)	Polarization
10.579	0.50	10.66	32.90	60.05	38.31	19.23	29.5	10.27	H
10.579	0.50	10.66	32.90	58.84	37.10	18.02	29.5	11.48	V

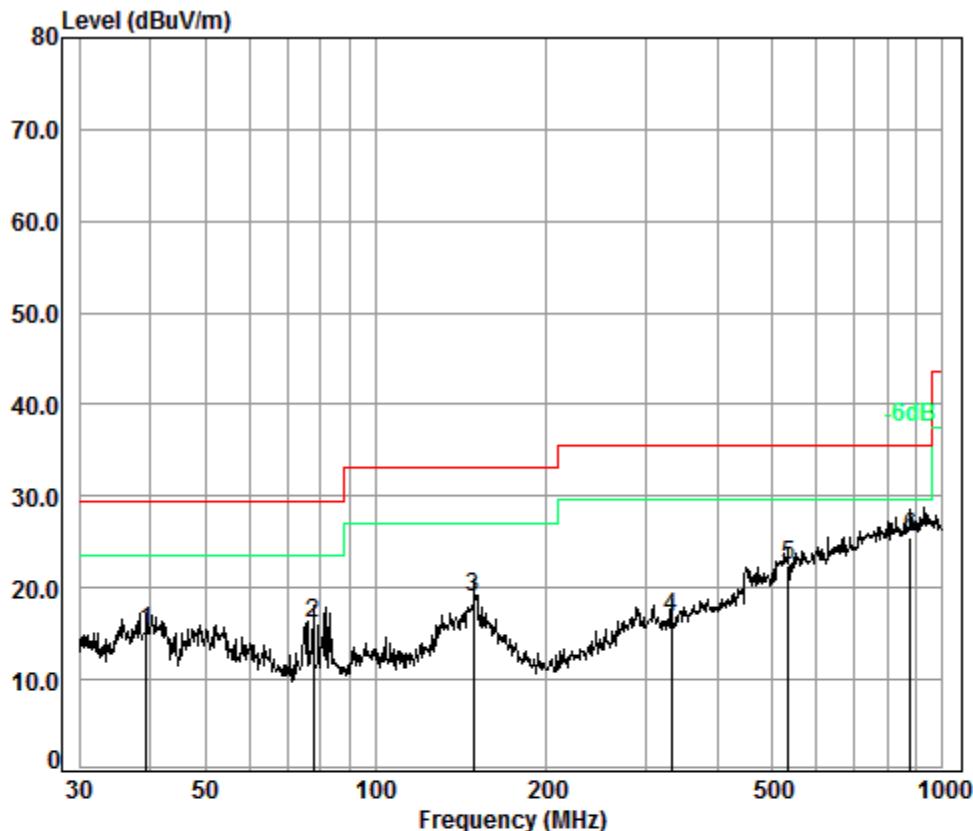
QP value: 30MHz~1GHz

Horizontal


Condition: 10m HORIZONTAL
Job No. : 9719CR
Test Mode: NFMI Mode

Freq	Cable	Ant	Preamp	Read	Limit	Over		
	Loss	Factor	Factor	Level	Level	Line	Limit	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	43.20	6.80	13.05	32.99	27.98	14.84	29.50	-14.66
2	52.39	6.95	12.58	32.99	29.34	15.88	29.50	-13.62
3	64.89	7.00	11.02	32.92	31.03	16.13	29.50	-13.37
4	150.01	7.45	13.41	32.74	30.90	19.02	33.10	-14.08
5	452.72	8.43	16.21	32.60	28.07	20.11	35.60	-15.49
6 pp	804.60	9.30	21.26	32.60	27.79	25.75	35.60	-9.85

Vertical



Condition: 10m VERTICAL

Job No. : 9719CR

Test Mode: NFMI Mode

	Cable Freq	Ant Loss	Preamp Factor	Read Level	Limit Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1	39.44	6.79	13.25	32.99	28.24	15.29	29.50 -14.21
2	77.59	7.05	8.89	32.87	33.10	16.17	29.50 -13.33
3	148.96	7.45	13.34	32.74	30.86	18.91	33.10 -14.19
4	332.52	8.17	13.52	32.60	27.60	16.69	35.60 -18.91
5	533.83	8.74	17.43	32.60	28.89	22.46	35.60 -13.14
6 pp	878.32	9.49	21.93	32.52	26.61	25.51	35.60 -10.09

Below 1GHz

The test was performed at a 10m test site. According to below formulate and the test data at 10m test distance,

$$L_3 / L_{10} = D_{10} / D_3$$

Note:

L_3 : Level @ 3m distance. Unit: uV/m;

L_{10} : Level @ 10m distance. Unit: uV/m;

D_3 : 3m distance. Unit: m

D_{10} : 10m distance. Unit: m

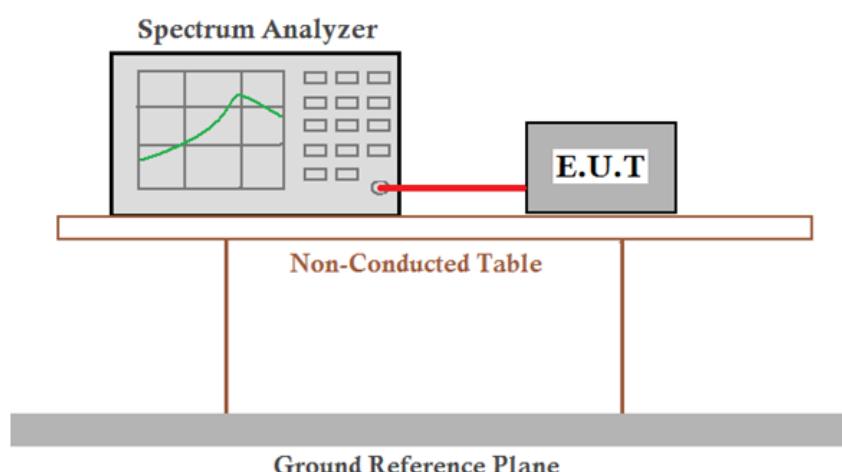
The level at 3m test distance is below:

Frequency (MHz)	Level @ 10m (dBuV/m)	Level @ 10m (uV/m)	Level @ 3m (uV/m)	Level @ 3m (dBuV/m)	Limit @ 3m (dBuV/m)	Margin (dB)	Ant. Polarization
39.44	15.29	5.81	19.38	25.75	40.00	-14.25	V
77.59	16.17	6.43	21.45	26.63	40.00	-13.37	V
148.96	18.91	8.82	29.40	29.37	43.50	-14.13	V
332.52	16.69	6.83	22.77	27.15	46.00	-18.85	V
533.83	22.46	13.27	44.25	32.92	46.00	-13.08	V
878.32	25.51	18.86	62.86	35.97	46.00	-10.03	V
43.20	14.84	5.52	18.40	25.30	40.00	-14.70	H
52.39	15.88	6.22	20.74	26.34	40.00	-13.66	H
64.89	16.13	6.40	21.35	26.59	40.00	-13.41	H
150.01	19.02	8.93	29.78	29.48	43.50	-14.02	H
452.72	20.11	10.13	33.76	30.57	46.00	-15.43	H
804.60	25.75	19.39	64.62	36.21	46.00	-9.79	H

Remark:

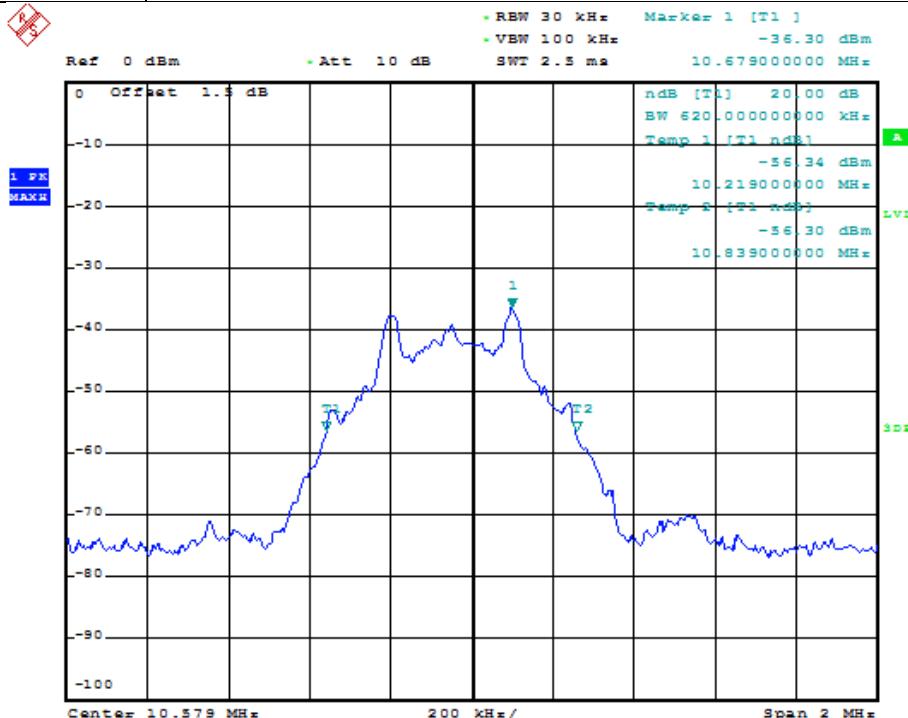
- 1)The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
- 2)Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- 3)Emissions from 9kHz to 30 MHz is too low to be find, so it is not reported.

5.3 20dB Occupy Bandwidth

Test Requirement:	47 CFR Part 15C
Test Method:	ANSI C63.10:2013 Section 7.8.7
Test Setup:	
Limit:	NA
Final Test Mode:	Transmitting mode
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

Measurement Data

Test channel	20dB Occupy Bandwidth (kHz)
10.579MHz	620



6 Photographs - EUT Test Setup

6.1 Conducted Emission



6.2 Radiated Emission





7 Photographs - EUT Constructional Details

Refer to Appendix A - Photographs of EUT Constructional Details for SZEM1611009719CR.