



FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

Applicant: Netvox Technology Co., Ltd.

Address: No. 21-1, Sec. 1 Chung Hua West Road, Tainan, Taiwan, R.O.C.

Product Name: Combined Interface

Model Name: Z108A

Brand Name: Netvox

FCC ID: NRH – ZB – Z108

Report No.: MTE/DYY/S16010072

Date of Issue: Jan. 14, 2016

Issued by: Most Technology Service Co., Ltd.

**Address : No.5, Langshan 2nd Road, North District, Hi-tech Industrial Park,
Nanshan, Shenzhen, Guangdong, China**

Tel : 86-755-8617 0306

Fax : 86-755-8617 0310

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1. VERIFICATION OF CONFORMITY

Equipment Under Test: Combined Interface
Brand Name: Netvox
Model Number: Z108A
Series Number: N/A
Description of Differences: N/A
FCC ID: NRH – ZB – Z108
Applicant: Netvox Technology Co., Ltd.
No. 21-1, Sec. 1 Chung Hua West Road, Tainan, Taiwan, R.O.C.
Manufacturer: Netvox Technology Co., Ltd. (Xiamen)
No.2, Xin Feng 2 Road, Xiamen Torch Hi-Tech Industrial Development Zone,
Xiamen City, China
Technical Standards: 47 CFR Part 15 Subpart C
File Number: MTE/DYY/S16010072
Date of test: Jan. 08-12, 2016
Deviation: None
Condition of Test Sample: Normal
Test Result: PASS

The above equipment was tested by MOST for compliance with the requirements set forth in FCC rules and the Technical Standards mentioned above. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment and the level of the immunity endurance of the equipment are within the compliance requirements.

The test results of this report relate only to the tested sample identified in this report.

Tested by (+ signature):

Daisy

Daisy Yu

Jan. 08-12, 2016

Review by (+ signature):

Henry

Henry Chen

Jan. 14, 2016



Approved by (+ signature):

Yvette Zhou

Yvette Zhou(Manager)

Jan. 14, 2016

2. GENERAL INFORMATION

2.1 Product Information

Product:	Combined Interface
Trade Name:	Netvox
Model Number:	Z108A
Series Number:	N/A
Description of Differences:	N/A
Power Supply:	DC 5 V by USB Port
Frequency Range:	2405MHz-2480MHz
Modulation Type:	O-QPSK
Antenna Type:	PCB antenna
Antenna Gain:	0dBi
Channel Number:	16
Temperature Range:	-10°C ~ 50°C

NOTE:

1. For a more detailed features description about the EUT, please refer to User's Manual.

2.2 Objective

Perform FCC Part 15 Subpart C tests for FCC Marking.

2.3 Test Standards and Results

Test items and the results are as bellow:

No.	Section	Description	Result	Date of Test
1	15.207	Power Line Conducted Emission	PASS	2016-1-08
2	15.249(a) (d)	Radiated Emission	PASS	2016-1-08
3	15.249	Occupied bandwidth	PASS	2016-1-11
4	15.203	Antenna Requirement	PASS	2016-1-08
5	15.249(d)	Band Edge	PASS	2016-1-08

Note: 1. The test result judgment is decided by the limit of measurement standard
2. The information of measurement uncertainty is available upon the customer's request.

2.4 Environmental Conditions

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

- Temperature: 15-35°C
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

2.5 MEASUREMENT UNCERTAINTY

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

The report uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, Providing a level of confidence of approximately 95%

- Uncertainty of Conducted Emission, $U_c = \pm 1.8\text{dB}$
- Uncertainty of Radiated Emission, $U_c = \pm 3.2\text{dB}$

3. TEST METHODOLOGY

3.1 TEST FACILITY

Test Site:	Most Technology Service Co., Ltd.
Location:	No.5, Langshan 2nd Rd., North Hi-Tech Industrial park, Nanshan, Shenzhen, Guangdong ,China
Description:	<p>There is one 3m semi-anechoic an area test sites and two line conducted labs for final test. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2014 and CISPR 16 requirements.</p> <p>The FCC Registration Number is 490827.</p> <p>The IC Registration Number is 7103A-1.</p> <p>The CNAS Registration Number is CNAS L3573.</p>
Site Filing:	The site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046.
Instrument Tolerance:	All measuring equipment is in accord with ANSI C63.4:2014 and CISPR 16 requirements that meet industry regulatory agency and accreditation agency requirement.
Ground Plane:	Two conductive reference ground planes were used during the Line Conducted Emission, one in vertical and the other in horizontal. The dimensions of these ground planes are as below. The vertical ground plane was placed distancing 40 cm to the rear of the wooden test table on where the EUT and the support equipment were placed during test. The horizontal ground plane projected 50 cm beyond the footprint of the EUT system and distanced 80 cm to the wooden test table. For Radiated Emission Test, one horizontal conductive ground plane extended at least 1m beyond the periphery of the EUT and the largest measuring antenna, and covered the entire area between the EUT and the antenna.

3.2 Test Conditions

The EUT has been tested under normal operating (TX) .

The field strength of radiation emission was measured in the following position: EUT lie-down position (X axis).

The following data show X axis setup.

Based on client request, all normal using modes of the normal function were tested but only the worst test data of the worst mode is reported by this report.

3.3 Channel List

Channel List for O-QPSK Mode					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
11	2405MHz	17	2435MHz	23	2465MHz
12	2410MHz	18	2440MHz	24	2470MHz
13	2415MHz	19	2445MHz	25	2475MHz
14	2420MHz	20	2450MHz	26	2480MHz
15	2425MHz	21	2455MHz		
16	2430MHz	22	2460MHz		

3.4 Description of Test Modes

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pre-test Mode	Description
Mode 1	O-QPSK CH11/CH18/CH26

Note:

The measurements are performed at the highest, middle, lowest available channels.

3.5 Table of Parameters of Text Software Setting

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level, the RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of Zigbee.

Test software Version	Test channels		
O-QPSK Mode	2405MHz	2440MHz	2480MHz

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 8.3.1 of ANSI C63.4:2009.

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 7.3 of ANSI C63.4:2009, Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

3.6 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 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	2655 - 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	(²)
13.36 - 13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

4. SETUP OF EQUIPMENT UNDER TEST

4.1 TEST EQUIPMENT LIST

Instrumentation: The following list contains equipment used at Most for testing. The equipment conforms to the CISPR 16-1 / ANSI C63.2 Specifications for Electromagnetic Interference and Field Strength Instrumentation from 10 kHz to 1.0 GHz or above.

No.	Equipment	Manufacturer	Model No.	S/N	Calibration date	Calibration Interval
1	Test Receiver	Rohde & Schwarz	ESCI	100492	2015/03/10	1 Year
2	Spectrum Analyzer	Agilent	E7405A	US44210471	2015/03/14	1 Year
3	L.I.S.N.	Rohde & Schwarz	ENV216	100093	2015/03/10	1 Year
4	Coaxial Switch	Anritsu Corp	MP59B	6200283933	2015/03/07	1 Year
5	Terminator	Hubersuhner	50Ω	No.1	2015/03/07	1 Year
6	RF Cable	SchwarzBeck	N/A	No.1	2015/03/07	1 Year
7	Test Receiver	Rohde & Schwarz	ESPI	101202	2015/03/10	1 Year
8	Bilog Antenna	Sunol	JB3	A121206	2015/03/14	1 Year
9	Horn Antenna	SCHWARZBECK	BBHA9120D	756	2015/03/14	1 Year
10	Horn Antenna	Penn Engineering	9034	8376	2015/03/14	1 Year
11	Cable	Resenberger	N/A	NO.1	2015/03/07	1 Year
12	Cable	SchwarzBeck	N/A	NO.2	2015/03/07	1 Year
13	Cable	SchwarzBeck	N/A	NO.3	2015/03/07	1 Year
14	Single Phase Power Line Filter	DuoJi	FNF 202B30	N/A	2015/03/07	1 Year
15	Test Receiver	Rohde & Schwarz	ESCI	100492	2015/03/10	1 Year
16	Loop antenna	ARA	PLA-1030/B	1039	2015/03/14	1 Year

NOTE: Equipments listed above have been calibrated and are in the period of validation.

5. 47 CFR Part 15C 15.249 Requirements

5.1 AC Power Line Conducted Emission

5.1.1 Requirement

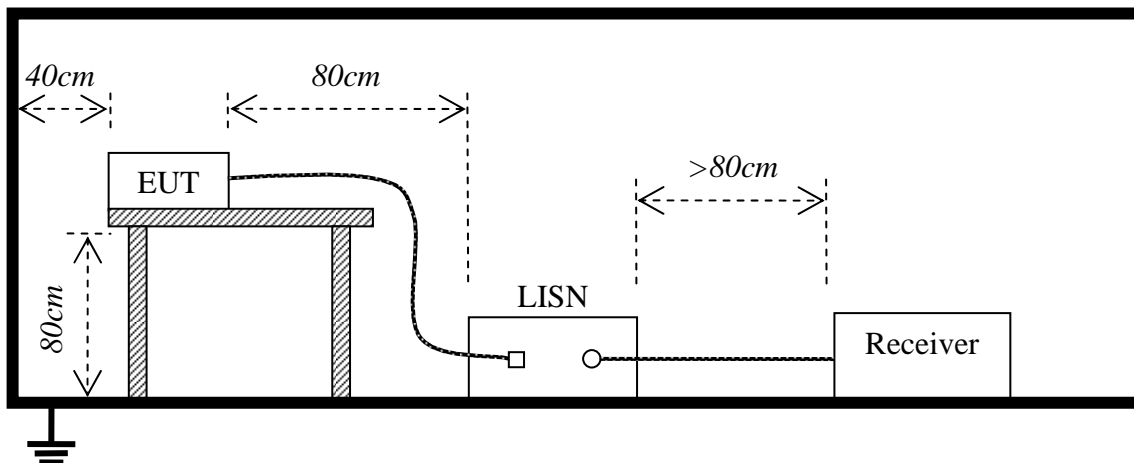
A radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that the radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies within the and 150 kHz-30 MHz, shall not exceed the limits in the following table:

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz-500kHz	66-56	56-46
500kHz-5MHz	56	46
5MHz-30MHz	60	50

****Note:** 1. the lower limit shall apply at the band edges.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz

5.1.2 Block Diagram of Test Setup



5.1.3 Test procedure

1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.
2. Exploratory measurements were made to identify the frequency of the emission that has the highest amplitude relative to the limit;
3. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).
4. Both sides of A.C. line are checked for maximum conducted interference. 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.
5. The bandwidth of test receiver (ESCI) set at 9 KHz.

6. All data was recorded in the Quasi-peak and average detection mode.

5.1.4 Test Result

Pass

Note: All test modes are performed, only the worst case is recorded in this report.

Please refer the following pages.



Address: No.5, Langshan 2nd Rd., North Hi-Tech Industrial park
Guangdong, China
Tel: 0755-86026850 Fax: 0755-26013350

Conducted Emission Measurement

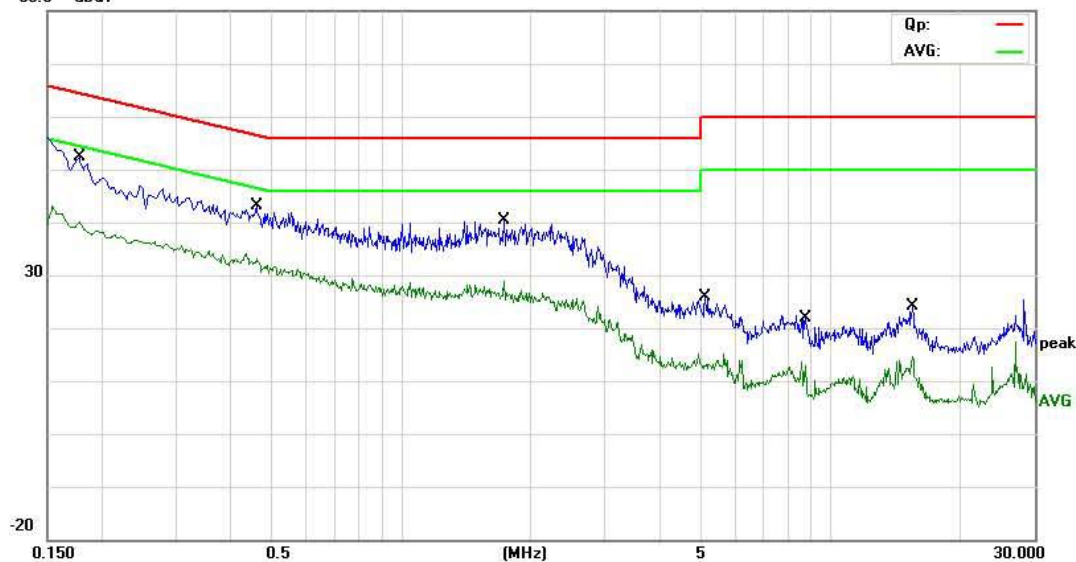
File: Z108A

Data: #3

Date: 16/01/08/

Time: 11/00/52

80.0 dBuV



Site: MOST #1

Phase: **L1**

Temperature: 23.4

Limit: FCC Part15 B Class B QP

Power: DC 5V by USB Port

Humidity: 52.7 %

EUT: Combined Interface

M/N: Z108A

Mode: O-QPSK-CH11

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1787	42.13	9.61	51.74	64.55	-12.81	QP	
2		0.1787	30.34	9.61	39.95	54.55	-14.60	AVG	
3		0.4660	32.47	9.59	42.06	56.58	-14.52	QP	
4		0.4660	23.07	9.59	32.66	46.58	-13.92	AVG	
5		1.7420	30.81	9.60	40.41	56.00	-15.59	QP	
6		1.7420	19.19	9.60	28.79	46.00	-17.21	AVG	
7		5.1180	16.23	9.63	25.86	60.00	-34.14	QP	
8		5.1180	3.28	9.63	12.91	50.00	-37.09	AVG	
9		8.7660	12.18	9.67	21.85	60.00	-38.15	QP	
10		8.7660	3.17	9.67	12.84	50.00	-37.16	AVG	
11		15.5500	14.51	9.70	24.21	60.00	-35.79	QP	
12		15.5500	4.98	9.70	14.68	50.00	-35.32	AVG	

*:Maximum data x:Over limit l:over margin

Engineer Signature: hzy



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park
Guangdong, China
Tel: 0755-86026850 Fax: 0755-26013350

Conducted Emission Measurement

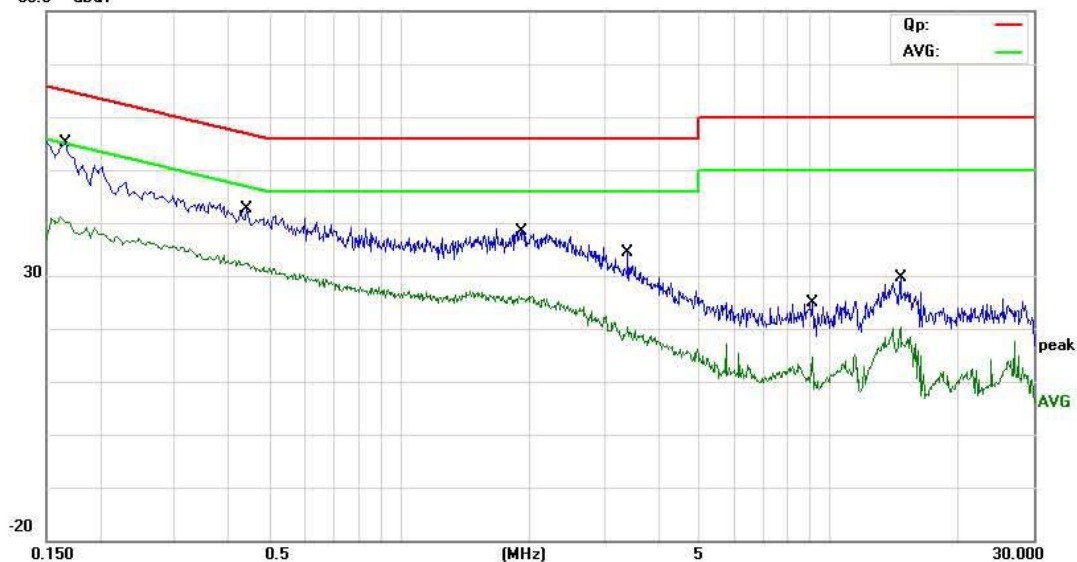
File: Z108A

Data: #4

Date: 16/01/08/

Time: 11/03/18

80.0 dBuV



Site: MOST #1

Phase: **N**

Temperature: 23.4

Limit: FCC Part15 B Class B QP

Power: DC 5V by USB Port

Humidity: 52.7 %

EUT: Combined Interface

M/N: Z108A

Mode: O-QPSK-CH11

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1641	45.08	9.61	54.69	65.25	-10.56	QP	
2		0.1641	30.91	9.61	40.52	55.25	-14.73	AVG	
3		0.4420	32.96	9.59	42.55	57.02	-14.47	QP	
4		0.4420	22.83	9.59	32.42	47.02	-14.60	AVG	
5		1.8980	28.38	9.60	37.98	56.00	-18.02	QP	
6		1.8980	16.10	9.60	25.70	46.00	-20.30	AVG	
7		3.4140	24.64	9.61	34.25	56.00	-21.75	QP	
8		3.4140	10.78	9.61	20.39	46.00	-25.61	AVG	
9		9.1380	15.19	9.68	24.87	60.00	-35.13	QP	
10		9.1380	4.93	9.68	14.61	50.00	-35.39	AVG	
11		14.6380	19.99	9.70	29.69	60.00	-30.31	QP	
12		14.6380	10.66	9.70	20.36	50.00	-29.64	AVG	

*:Maximum data x:Over limit l:over margin

Engineer Signature: hzy

5.2 Radiated Emission Test

5.2.1 Requirement

According to FCC section 15.249(a):

Except as provided in paragraph (a) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (mV/m)	Field Strength of Harmonics (μV/m)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500

According to FCC section 15.249(d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

According to FCC section 15.209 (a), 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 (MHz)	Field Strength (μV/m)	Measurement Distance (m)
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

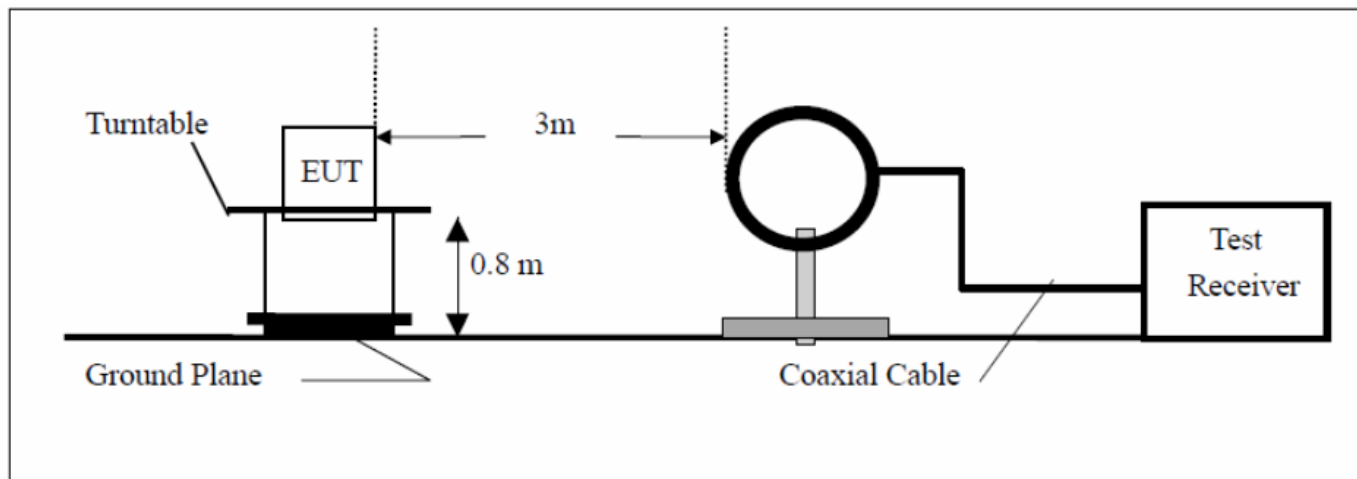
In the above emission table, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

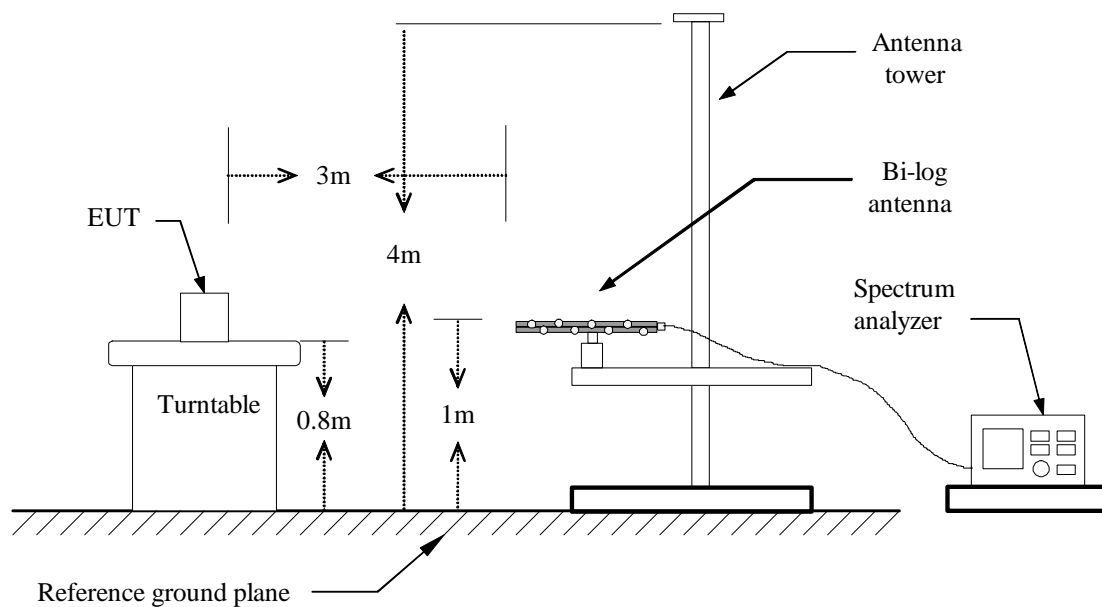
5.2.2 Test Description

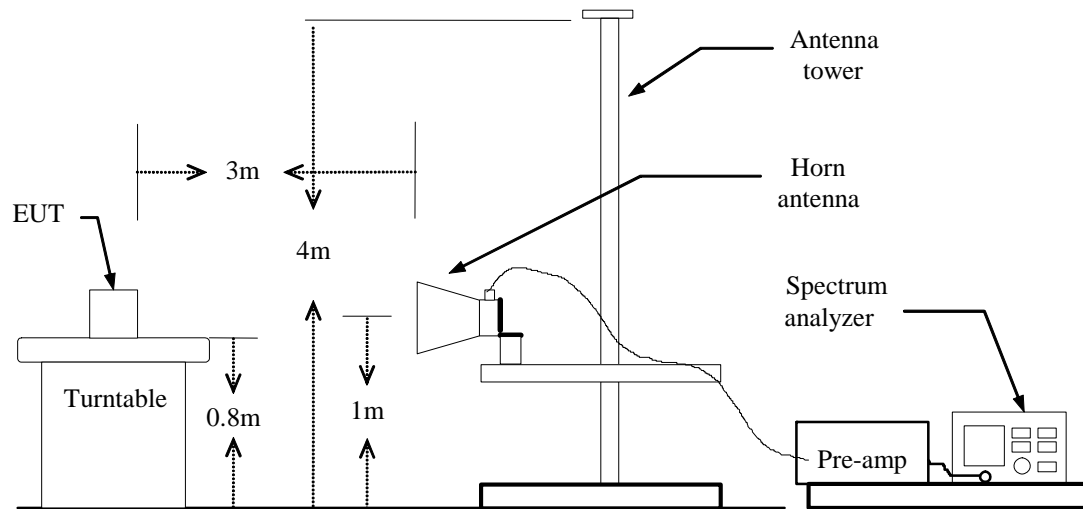
Test Setup:

From 9KHz to 30MHz:



From 30MHz to 1GHz:



Above 1GHz:**5.2.3 Test Description**

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:
Below 1GHz: RBW=100 kHz / VBW=300 kHz / Sweep=AUTO
Above 1GHz PEAK: RBW=VBW=1MHz / Sweep=AUTO
AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

5.2.4 Test Result

From 9 KHz to 30MHz:

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
N/A	H								
N/A	V								

Remark: After pre-testing, the level of testing data was too low, no data recorded.

From 30MHz to 25GHz:

The following test mode(s) were scanned during the preliminary test:

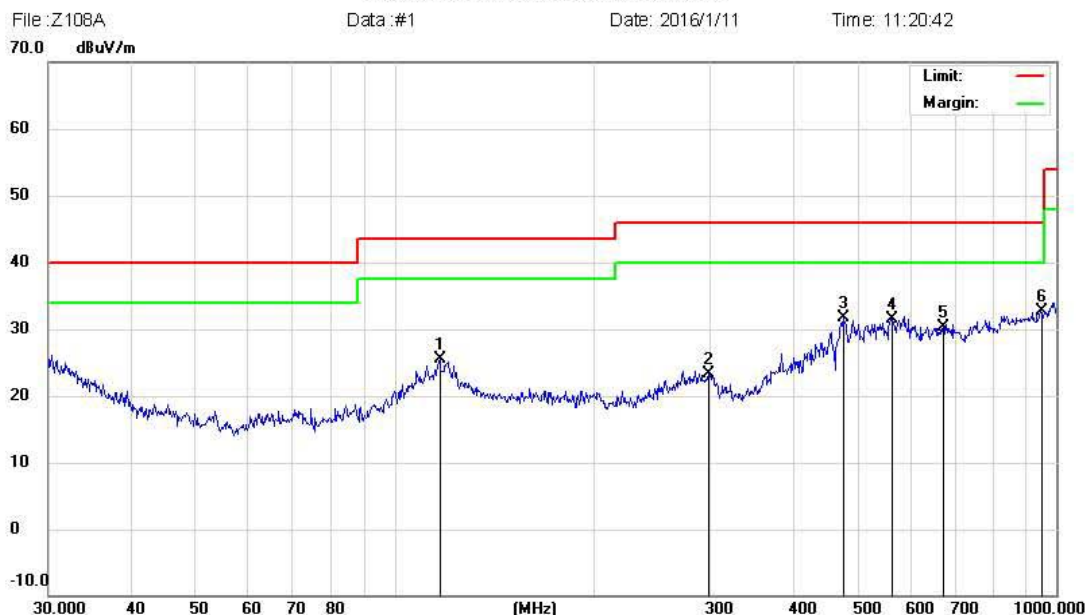
Preliminary Radiated Emission Test				
Frequency Range Investigated		30MHz TO 25 GHz		
Mode of operation	Date	Report No.	Data#	Worst Mode
O-QPSK	2016-1-08	MTE/DYY/S16010072	Z108A	<input checked="" type="checkbox"/>

Below 1 GHz:



Address: No.5, Langshan 2nd Rd., North Hi-Tech Industrial park
Guangdong, China
Tel: 0755-86026850 Fax: 0755-26013350

Radiated Emission Measurement



Site: site #1

Polarization: **Horizontal**

Temperature: 24

Limit: FCC Part 15 B 3M Radiation

Power: DC 5V by USB Port

Humidity: 50.5 %

EUT: Combined Interface

Distance: 3M

M/N: Z108A

Mode: O-QPSK-CH11

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		116.9494	8.48	17.07	25.55	43.50	-17.95	QP		
2		298.2681	3.96	19.32	23.28	46.00	-22.72	QP		
3		475.4991	10.19	21.47	31.66	46.00	-14.34	QP		
4		562.6623	8.73	22.76	31.49	46.00	-14.51	QP		
5		672.8444	5.88	24.50	30.38	46.00	-15.62	QP		
6	*	948.7609	4.89	27.86	32.75	46.00	-13.25	QP		

*:Maximum data x:Over limit l:over margin

Engineer Signature: FLY



Address: No.5, Langshan 2nd Rd., North Hi-Tech Industrial park
Guangdong, China
Tel: 0755-86026850 Fax: 0755-26013350

Radiated Emission Measurement

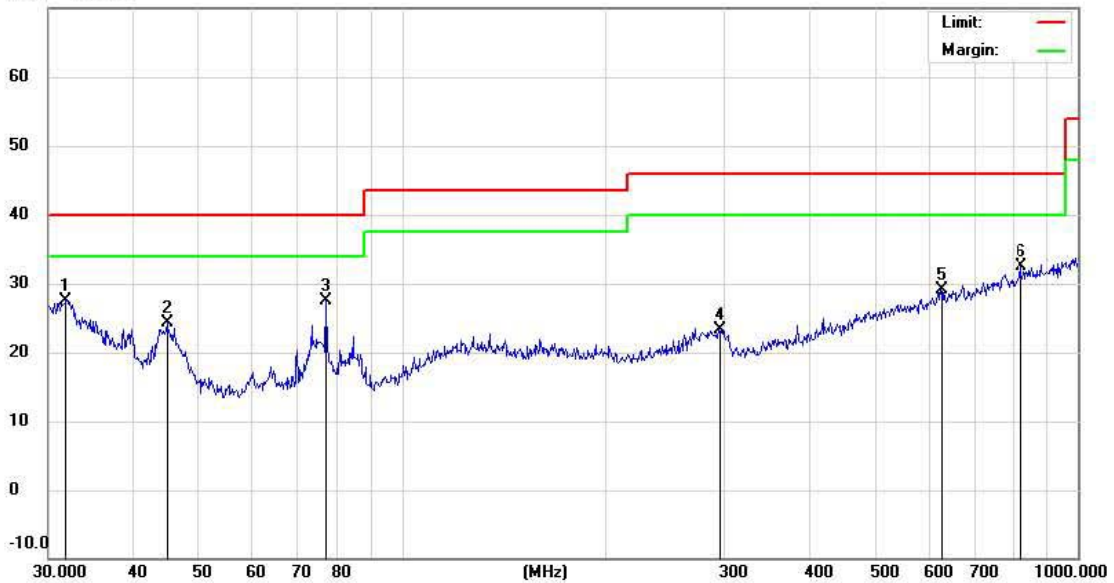
File: Z108A

Data: #2

Date: 2016/1/11

Time: 11:29:13

70.0 dBuV/m



Site site #1

Polarization: **Vertical**

Temperature: 24

Limit: FCC Part15 B 3M Radiation

Power: DC 5V by USB Port

Humidity: 50.5 %

EUT: Combined Interface

Distance: 3M

M/N: Z108A

Mode: O-QPSK-CH11

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		31.8427	5.70	21.87	27.57	40.00	-12.43	QP			
2		45.0583	11.23	13.12	24.35	40.00	-15.65	QP			
3	*	77.3210	16.10	11.48	27.58	40.00	-12.42	QP			
4		294.1137	3.97	19.36	23.33	46.00	-22.67	QP			
5		625.0780	5.46	23.65	29.11	46.00	-16.89	QP			
6		821.7103	5.94	26.59	32.53	46.00	-13.47	QP			

*:Maximum data x:Over limit l:over margin

Engineer Signature:

FLY

About 1GHz:**Fundamental frequency measurement :**

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Peak Margin (dB)	AV Margin (dB)
				Peak (dBuV/m)	AV (dBuV/m)				
Horizontal									
2405.00	90.75	80.50	-8.42	82.33	72.08	114.00	94.00	-22.91	-21.92
2440.00	90.24	80.05	-8.35	81.89	71.70	114.00	94.00	-23.11	-22.30
2480.00	89.74	79.83	-8.30	81.44	71.53	114.00	94.00	-32.56	-22.47
Vertical									
2405.00	91.35	80.21	-8.42	82.93	71.79	114.00	94.00	-31.07	-22.21
2440.00	90.95	79.24	-8.35	82.60	70.89	114.00	94.00	-31.40	-23.11
2480.00	90.62	78.96	-8.30	82.32	70.66	114.00	94.00	-31.68	-23.34

Note:

The O-QPSK Low channel modulation type was the worst case condition, The worse test data was shown on the summary data page.



Address: No.5, Langshan 2nd Rd., North Hi-Tech Industrial park
Guangdong, China
Tel: 0755-86026850 Fax: 0755-26013350

Radiated Emission Measurement

File: Z108A

Data: #5

Date: 2016-1-8

Time: 9:27:46

96.9 dBuV/m



Site site #1

Polarization: **Horizontal**

Temperature: 24.2

Limit: FCC 1-12G PEAK

Power: DC 5V by USB Port

Humidity: 51.3 %

EUT: Combined Interface

Distance: 3m

M/N: Z108A

Mode: O-QPSK-CH11

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1	X	2405.000	90.75	-8.42	82.33	74.00	8.33	peak		
2	*	2405.000	80.50	-8.42	72.08	54.00	18.08	AVG		
3		4810.000	47.22	-6.08	41.14	74.00	-32.86	peak		
4		4810.000	34.90	-6.08	28.82	54.00	-25.18	AVG		

*:Maximum data x:Over limit !:over margin

Engineer Signature: sunny



Address: No.5, Langshan 2nd Rd., North Hi-Tech Industrial park
Guangdong, China
Tel: 0755-86026850 Fax: 0755-26013350

Radiated Emission Measurement

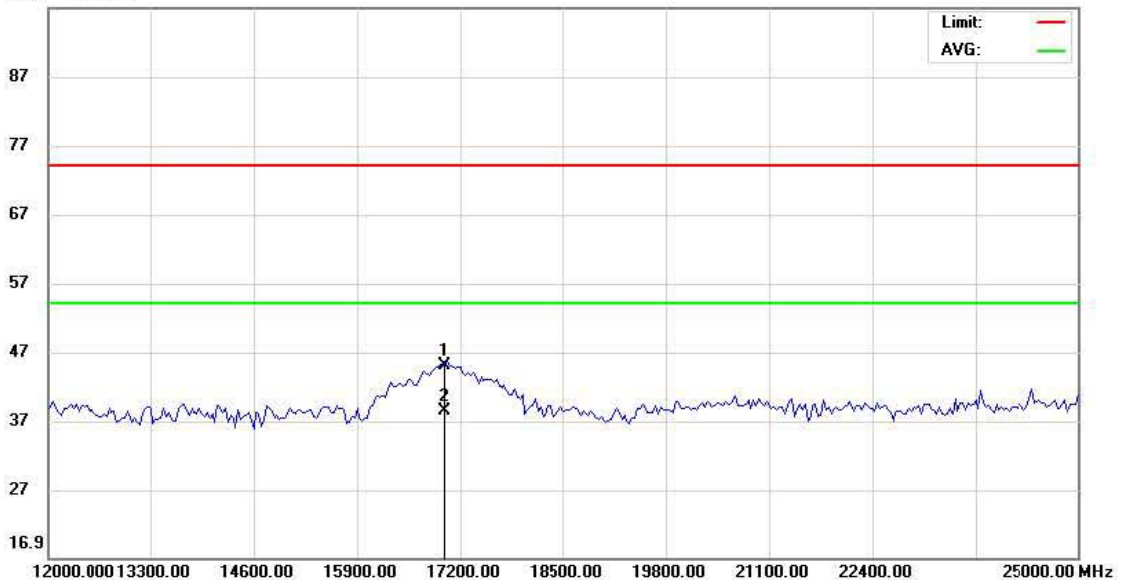
File: Z108A

Data: #7

Date: 2016-1-8

Time: 9:46:07

96.9 dBuV/m



Site: site #1

Polarization: **Horizontal**

Temperature: 24.2

Limit: FCC 12-25G PEAK

Power: DC 5V by USB Port

Humidity: 51.3 %

EUT: Combined Interface

Distance: 3m

M/N: Z108A

Mode: O-QPSK-CH11

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		17005.00	38.14	6.90	45.04	74.00	-28.96	peak		
2	*	17005.00	31.43	6.90	38.33	54.00	-15.67	AVG		

*:Maximum data x:Over limit !:over margin

Engineer Signature: sunny



Address: No.5, Langshan 2nd Rd., North Hi-Tech Industrial park
Guangdong, China
Tel: 0755-86026850 Fax: 0755-26013350

Radiated Emission Measurement

File: Z108A

Data: #6

Date: 2016-1-8

Time: 9:35:40

96.9 dBuV/m



Site site #1

Polarization: **Vertical**

Temperature: 24.2

Limit: FCC 1-12G PEAK

Power: DC 5V by USB Port

Humidity: 51.3 %

EUT: Combined Interface

Distance: 3m

M/N: Z108A

Mode: O-QPSK-CH11

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1	X	2405.000	91.35	-8.42	82.93	74.00	8.93	peak			
2	*	2405.000	80.21	-8.42	71.79	54.00	17.79	AVG			
3		4810.000	51.79	-6.08	45.71	74.00	-28.29	peak			
4		4810.000	40.35	-6.08	34.27	54.00	-19.73	AVG			

*:Maximum data x:Over limit !:over margin

Engineer Signature: sunny



Address: No.5, Langshan 2nd Rd., North Hi-Tech Industrial park
Guangdong, China
Tel: 0755-86026850 Fax: 0755-26013350

Radiated Emission Measurement

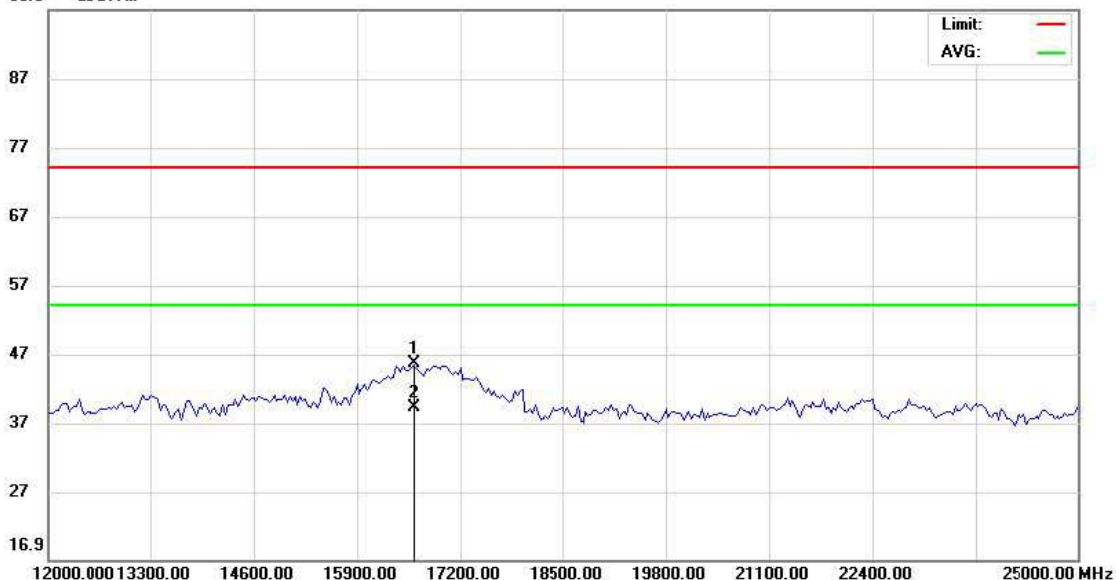
File: Z108A

Data: #8

Date: 2016-1-8

Time: 9:58:27

96.9 dBuV/m



Site site #1

Polarization: **Vertical**

Temperature: 24.2

Limit: FCC 12-25G PEAK

Power: DC 5V by USB Port

Humidity: 51.3 %

EUT: Combined Interface

Distance: 3m

M/N: Z108A

Mode: O-QPSK-CH11

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		16615.00	39.98	5.65	45.63	74.00	-28.37	peak		
2	*	16615.00	33.54	5.65	39.19	54.00	-14.81	AVG		

*:Maximum data x:Over limit !:over margin

Engineer Signature: sunny

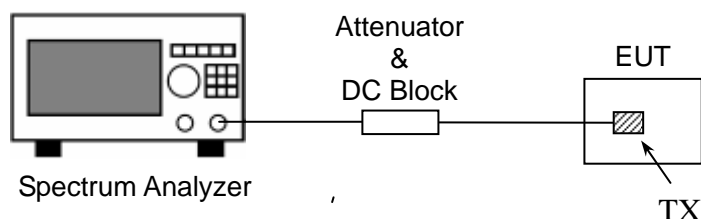
5.3 Occupied Bandwidth

5.3.1 Definition

Intentional radiators operating under the alternative provisions to the general emission limits, as Contained in §§15.217 through 15.257 and in sub-part E of this part, must be designed to ensure that the 20 dB Bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific Rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

5.3.2 Block Diagram Of Test Setup

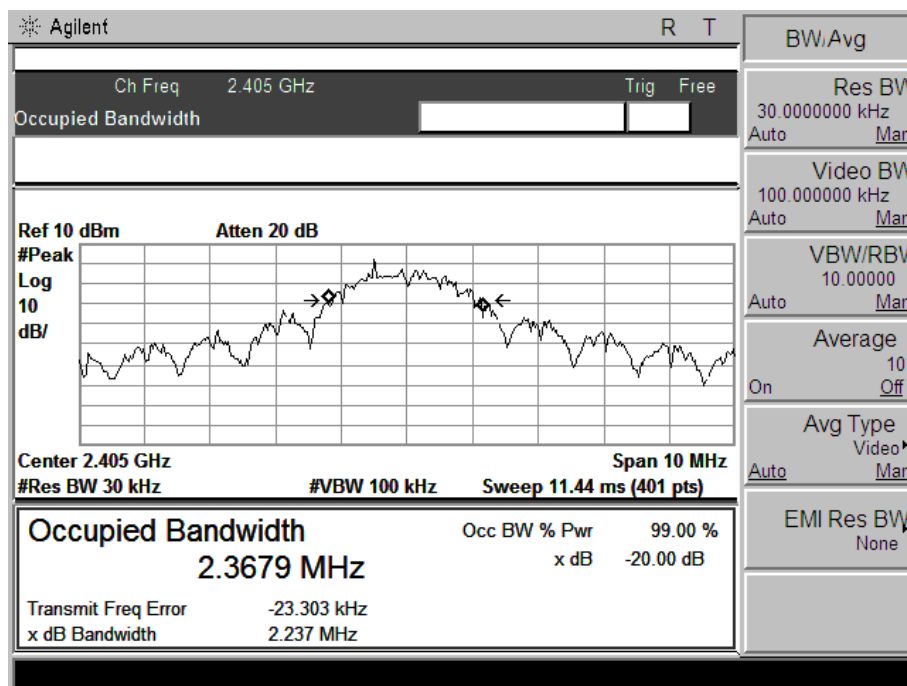
The EUT is powered by the Battery, is coupled to the Spectrum Analyzer (SA) through the Attenuator/DC Block. The path loss as the factor is calibrated to correct the reading. During the measurement, the EUT is activated and is set to operate at maximum power. The RF load attached to the EUT antenna terminal is 50Ohm.



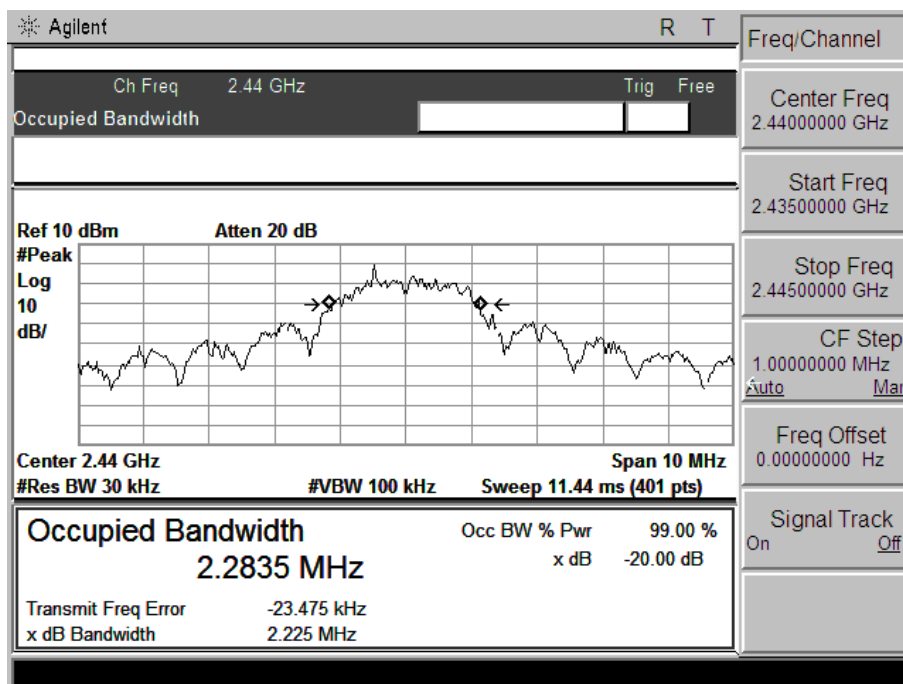
5.3.3 Test Result

GFSK Modulation test result:

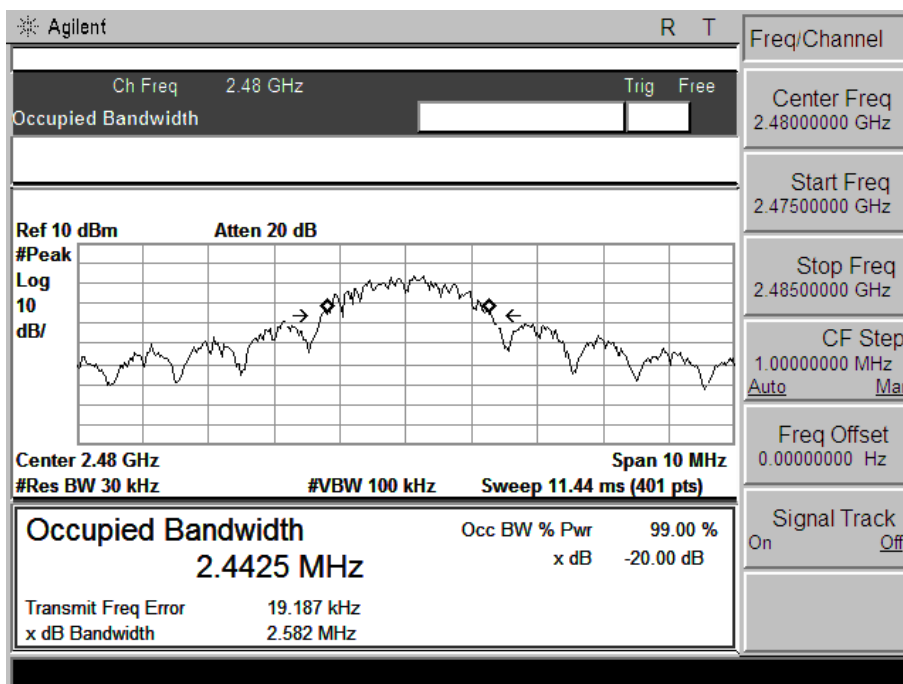
Channel	Frequency (MHz)	Test Result(MHz)
1	2405	2.237
8	2440	2.225
16	2480	2.582



CH Low



CH MID



CH High

5.4 Antenna Requirement

5.4.1 Definition

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, An analysis of the EUT was performed to determine compliance with FCC Section 15.203. This section requires specific handling and control of antennas used for devices subject to regulations.

5.4.2 Evaluation Criteria

Section 15.203 of the rules states that the subject device must meet at least one of the following criteria:

- (a) Antenna must be permanently attached to the unit.
- (b) Antenna must use a unique type of connector to attach to the EUT.
- (c) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

5.4.3 Evaluation Results

The antenna used in this product is external antenna. The antenna connector is designed with unique type RF connector and no consideration of replacement.

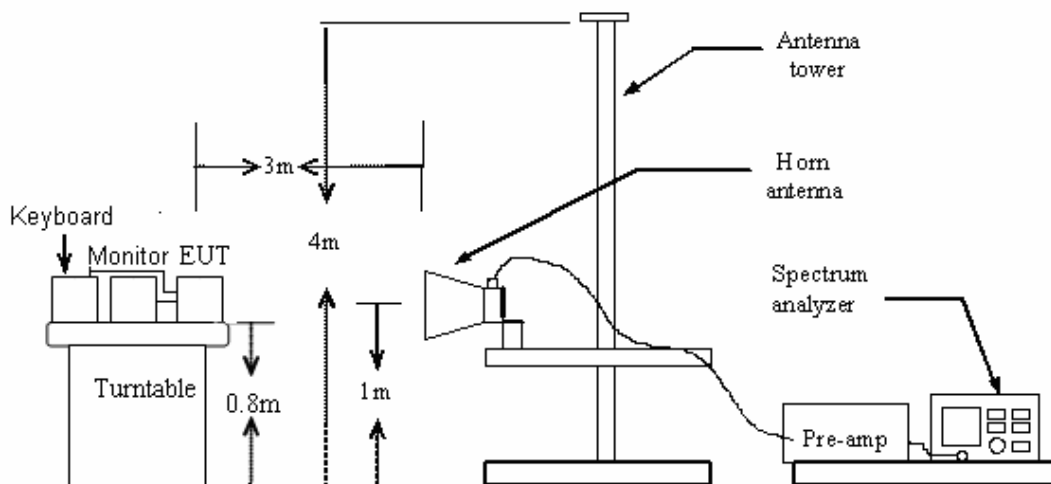
5.5 Restricted Frequency Bands

5.5.1 Test Requirement

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

5.5.2 Test Configuration

Test Setup:



5.5.3 Test Procedure:

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber. 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 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.
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 table was turned from 0 degrees to 360 degrees to find the maximum reading.

5.5.4 Test Result

Pass

Note: All test modes are performed, only the worst case is recorded in this report.

Please refer the following plots.



Address: No.5, Langshan 2nd Rd., North Hi-Tech Industrial park
Guangdong, China
Tel: 0755-86026850 Fax: 0755-26013350

Radiated Emission Measurement

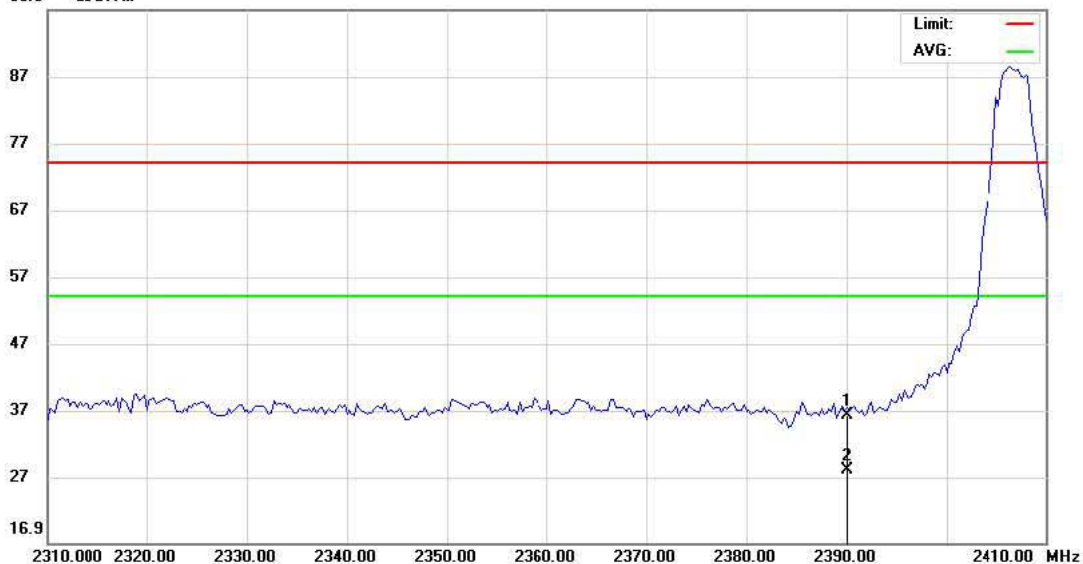
File: Z108A

Data: #11

Date: 2016-1-8

Time: 8:45:21

96.9 dBuV/m



Site: site #1

Polarization: **Vertical**

Temperature: 24

Limit: FCC RF LIMIT PEAK

Power: DC 5V by USB port

Humidity: 50.5 %

EUT: Combined Interface

Distance: 3m

M/N: Z108A

Mode: O-QPSK-CH11

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		2390.000	44.73	-8.43	36.30	74.00	-37.70	peak			
2	*	2390.000	36.51	-8.43	28.08	54.00	-25.92	AVG			

*:Maximum data x:Over limit l:over margin

Engineer Signature: Sunny



Address: No.5, Langshan 2nd Rd., North Hi-Tech Industrial park
Guangdong, China
Tel: 0755-86026850 Fax: 0755-26013350

Radiated Emission Measurement

File: Z108A

Data: #12

Date: 2016-1-8

Time: 8:51:43

96.9 dBuV/m



Site: site #1

Polarization: **Horizontal**

Temperature: 24

Limit: FCC RF LIMIT PEAK

Power: DC 5V by USB port

Humidity: 50.5 %

EUT: Combined Interface

Distance: 3m

M/N: Z108A

Mode: O-QPSK-CH11

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		2390.000	44.71	-8.43	36.28	74.00	-37.72	peak			
2	*	2390.000	35.23	-8.43	26.80	54.00	-27.20	AVG			

*:Maximum data x:Over limit l:over margin

Engineer Signature: Sunny



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park
Guangdong, China
Tel: 0755-86026850 Fax: 0755-26013350

Radiated Emission Measurement

File: Z108A

Data: #13

Date: 2016-1-8

Time: 9:07:03

96.9 dBuV/m



Site: site #1

Polarization: **Vertical**

Temperature: 24

Limit: FCC RF LIMIT PEAK

Power: DC 5V by USB port

Humidity: 50.5 %

EUT: Combined Interface

Distance: 3m

M/N: Z108A

Mode: O-QPSK-CH26

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		2483.500	60.80	-8.29	52.51	74.00	-21.49	peak			
2	*	2483.500	54.79	-8.29	46.50	54.00	-7.50	AVG			

*:Maximum data x:Over limit l:over margin

Engineer Signature: Sunny



Address: No. 5, Langshan 2nd Rd., North Hi-Tech Industrial park
Guangdong, China
Tel: 0755-86026850 Fax: 0755-26013350

Radiated Emission Measurement

File: Z108A

Data: #14

Date: 2016-1-8

Time: 9:19:35

96.9 dBuV/m



Site: site #1

Polarization: **Horizontal**

Temperature: 24

Limit: FCC RF LIMIT PEAK

Power: DC 5V by USB port

Humidity: 50.5 %

EUT: Combined Interface

Distance: 3m

M/N: Z108A

Mode: O-QPSK-CH26

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		2483.500	59.99	-8.29	51.70	74.00	-22.30	peak			
2	*	2483.500	53.90	-8.29	45.61	54.00	-8.39	AVG			

*:Maximum data x:Over limit l:over margin

Engineer Signature: Sunny

-----END OF REPORT-----