TECHNICAL REPORT

卓時檢測 TIMEWAY TESTING LABORATORY

ilac-MRA CNAS TESTING CNAS L2292

ISO/IEC17025 Accredited Lab.

Report No: FCC0811032
File reference No: 2008-11-21

Applicant: SOYO TECHNOLOGY DEVELOPMENT CO., LTD

Product: 2.4G Wireless Audio Module

Model No: SOYO-WM24G02

Brand Name: GUANBIAO

Test Standards: FCC Part 15 Subpart C, Paragraph 15.249

Test result: It is herewith confirmed and found to comply with the requirements set up by ANSI C63.4&FCC Part 15 Subpart C, Paragraph 15.249 regulations for the evaluation of electromagnetic compatibility

Approved By

Jack Chung

Jack Chung

Manager

Dated: November 21, 2008

Results appearing herein relate only to the sample tested
The technical reports is issued errors and omissions exempt and is subject to withdrawal at

SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO LTD

East 5/Block 4, Anhua Industrial Zone, No.8,Tairan Rd. CheGongMiao, FuTian District, Shenzhen, CHINA.
Tel (755) 83448688 Fax (755) 83442996

Special Statement:

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meet with ISO/IEC-17025 requirements, which is approved by CNAL. This approval result is accepted by MRA of APLAC.

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

CNAL-LAB Code: L2292

The EMC Laboratory has been assessed and in compliance with CNAL/AC01:2002 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:1999 General Requirements) for the Competence of testing Laboratories.

FCC-Registration No.: 899988

The 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.: 899988.

IC- Registration No.: IC5205A-01

The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration IC No.: 5205A-01.

Test Report Conclusion

Content

1.0 **General Details**

1.1 Test Lab Details

Name : SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO LTD

Address: 5/F,Block 4, Anhua Industrial Zone.,No.8 TaiRan Rd.CheGongMiao,FuTian District, Shenzhen,CHINA.

Telephone: (755) 83448688

Fax: (755) 83442996

Site on File with the Federal Communications Commission – United Sates

Registration Number: 899988

For 3m & 10 m OATS

Site Listed with Industry Canada of Ottawa, Canada

Registration Number: IC: 5205A-01

For 3m & 10 m OATS

1.2 Applicant Details

Applicant: SOYO TECHNOLOGY DEVELOPMENT CO.,LTD

Address: Suit 1010, Minning Building, 6009 North Caitian Rd.,Futian District, Shenzhen, Guangdong Province, China

Telephone: +86 0755 83185563

Fax: +86 0755 83185950

1.3 Description of EUT

Product:	2.4G Wireless Audio Module
Manufacturer:	SOYO TECHNOLOGY DEVELOPMENT CO.,LTD
Brand Name:	GUANBIAO
Model Number:	SOYO-WM24G02
Additional Model Name	N/A
Additional Trade Name	N/A
Rating:	DC3.6-6V
Modulation Type:	GFSK
Operation Frequency	2402-2478MHz
Number of Channel	20
Antenna Designation	The antenna type used in this product is Dipole antenna with reverse polarity SMA connector. The maximum Gain of this antenna is 2.15dBi.

1.4 Submitted Sample

2 Sample

1.5 Test Duration

2008-11-15 to 2008-11-25

1.6 Test Uncertainty

Conducted Emissions Uncertainty =3.6dB

Radiated Emissions Uncertainty =4.7dB

1.7 Test Engineer

The sample tested by Terry Tang

Print Name: Terry Tang

2.0	**Test Equipments**				
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	2007-12-05	2008-12-04
Absorbing Clamp	ROHDE&SCHWARZ	MDS-21	100126	2007-12-05	2008-12-04
TWO Line-V-NETW	ROHDE&SCHWARZ	EZH3-Z5	100294	2007-12-05	2008-12-04
TWO Line-V-NETW	ROHDE&SCHWARZ	EZH3-Z5	100253	2007-12-05	2008-12-04
Ultra Broadband ANT	ROHDE&SCHWARZ	HL562	100157	2007-12-05	2008-12-04
ESDV Test Receiver	ROHDE&SCHWARZ	ESDV	100008	2008-04-26	2009-04-25
4-WIRE ISN	ROHDE&SCHWARZ	ENY 41	830663/044	2008-02-18	2009-02-17
GG ENY22 Double 2-Wire ISN	ROHDE&SCHWARZ	ENY22	83066/016	2008-02-18	2009-02-17
Impuls-Begrenzer	ROHDE&SCHWARZ	ESH3-Z2	100281	2008-02-18	2009-02-17
System Controller	CT	SC100	-	2008-02-18	2009-02-17
Printer	EPSON	PHOTO EX3	CFNH234850	2008-02-18	2009-02-17
FM-AM Signal Generator	JUNGJIN	SG-150M	389911177	2008-02-18	2009-02-17
Color TV Pattern Generator	PHILIPS	PM5418	LO621747	2008-02-18	2009-02-17
Computer	IBM	8434	1S8434KCE99BLX LO*	-	-
Oscillator	KENWOOD	AG-203D	3070002	2008-02-18	2009-02-17

Spectrum Analyzer	HAMEG	HM5012	-	-	-
Power Supply	LW	APS1502	-	-	-
5K VA AC Power Source	California Instruments	5001iX	56060	2008-02-18	2009-02-17
CDN	EM TEST	CDN M2/M3	-	2008-02-18	2009-02-17
Attenuation	EM TEST	ATT6/75	-	2008-02-18	2009-02-17
Resistance	EM TEST	R100	-	2008-02-18	2009-02-17
Electromagnetic Injection Clamp	LITTHI	EM101	35708	2008-02-18	2009-02-17
Signal Generator	ROHDE&SCHWARZ	SMT03	100029	2008-02-18	2009-02-17
Power Amplifier	AR	150W1000	300999	2008-02-18	2009-02-17
Field probe	Holaday	HI-6005	105152	2008-02-18	2009-02-17
Bilog Antenna	Chase	CBL6111C	2576	2008-02-18	2009-02-17
ESPI Test Receiver	ROHDE&SCHWARZ	ESI26	838786/013	2008-02-18	2009-02-17
3m OATS	--	--	N/A	2008-02-18	2009-02-17
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170265	2008-08-16	2009-08-15
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-631	2008-04-26	2009-04-25

3.0 Technical Details

3.1 Summary of test results

The EUT has been tested according to the following specifications:

Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.207	Conducted Emission Test	PASS	Complies
FCC Part 15 Subpart C Paragraph 15.249(a) & 15.249(b) Limit	Field Strength of Fundamental	PASS	Complies
FCC Part 15, Paragraph 15.209	Radiated Emission Test	PASS	Complies
FCC Part 15 Subpart C Paragraph 15.249(d) Limit	Band Edge Test	PASS	Complies

3.2 Test Standards

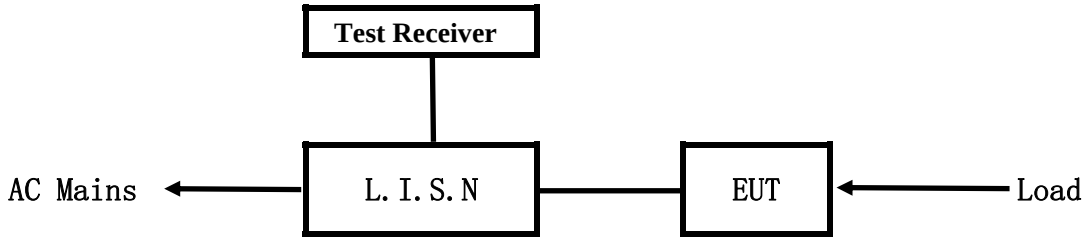
FCC Part 15 Subpart C, Paragraph 15.249

4.0 EUT Modification

No modification by Shenzhen Timeway Technology Consulting Co.,Ltd

5. Power Line Conducted Emission Test

5.1 Schematics of the test

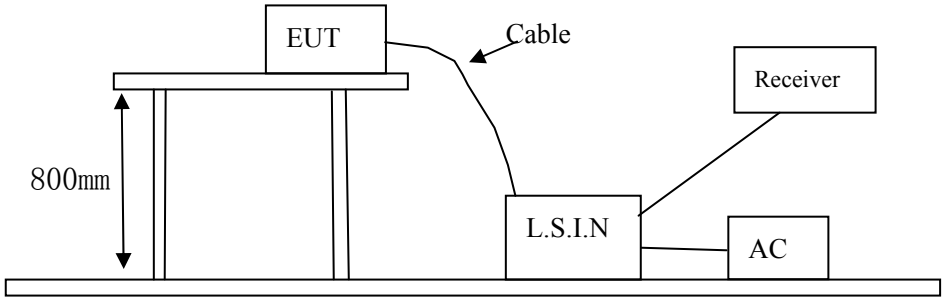


EUT: Equipment Under Test

5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.4-2003.The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.4 –2003.

Block diagram of Test setup



5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.4-2003. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

One channels are provided to the EUT

A. EUT

Device	Manufacturer	Model	FCC ID
2.4G Digital Wireless Audio Module	SOYO TECHNOLOGY DEVELOPMENT CO., LTD.	SOYO-WM24G02	WFUSOYO-WM24G02

B. Internal Device

Device	Manufacturer	Model	FCC ID/DOC

N/A			

C. Peripherals

Device	Manufacturer	Model	FCC ID/DOC	Cable
N/A				

5.4 EUT Operating Condition

Operating condition is according to ANSI C63.4 -2003.

A Setup the EUT and simulators as shown on follow

B Enable AF signal and confirm EUT active to normal condition

5.5 Power line conducted Emission Limit according to Paragraph 15.207

Frequency(MHz)	Class A Limits (dB μ V)		Class B Limits (dB μ V)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ～ 0.50	79.0	66.0	66.0～56.0*	56.0～46.0*
0.50 ～ 5.00	73.0	60.0	56.0	46.0
5.00 ～ 30.00	73.0	60.0	60.0	50.0

Notes: 1. *Decreasing linearly with logarithm of frequency.

2. The tighter limit shall apply at the transition frequencies

5.6 Test Results

The frequency spectrum from 0.15MHz to 30MHz was investigated. All reading are quasi-peak values with a resolution bandwidth of 9kHz.

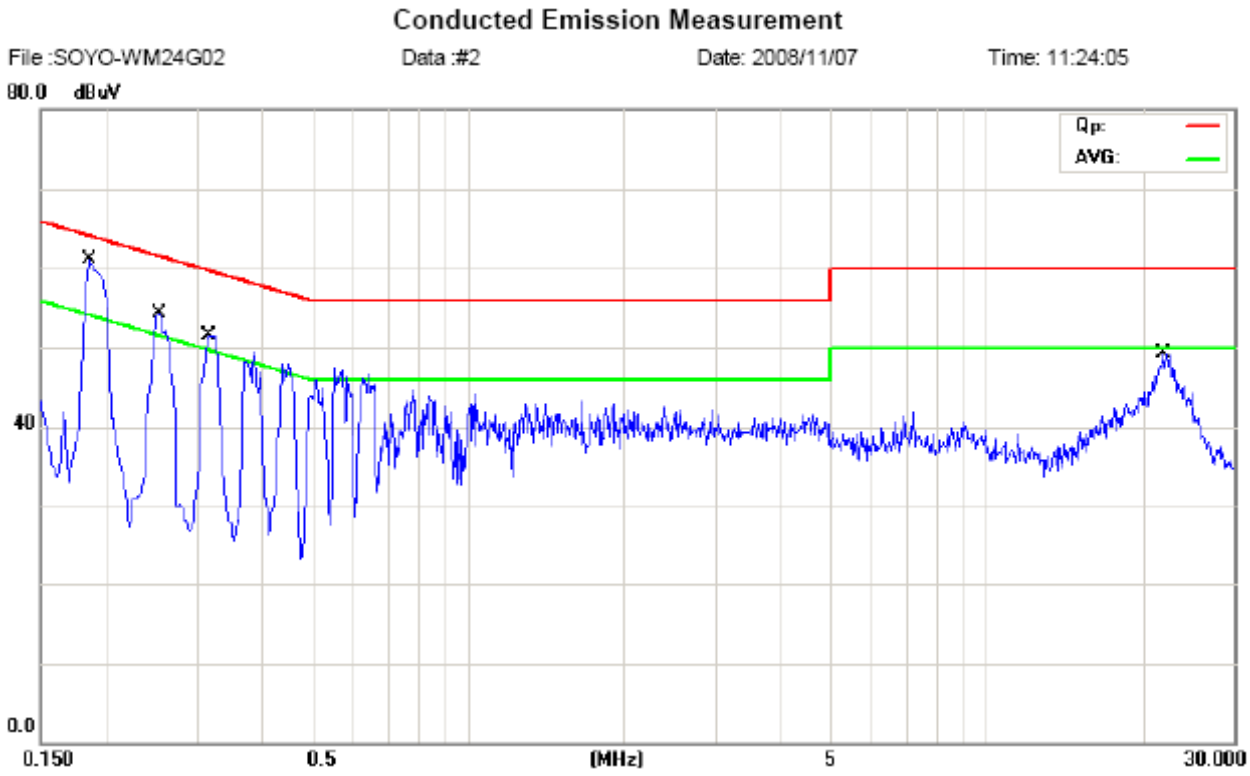
A: Conducted Emission on Live Terminal of the power line (150kHz to 30MHz)

EUT set Condition: Normal operation mode

Level **Class B**

Results: **Pass**

Please refer to following diagram for individual



Frequency (MHz)	Reading(dBμV)				Limit	
	Live		Neutral		(dBμV)	
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
0.1852	53.14	33.24	--	--	64.25	54.25
0.2534	48.21	31.41	--	--	61.64	51.64
0.3192	46.88	32.98	--	--	59.73	49.73
21.8621	43.01	36.81	--	-	60.00	50.00

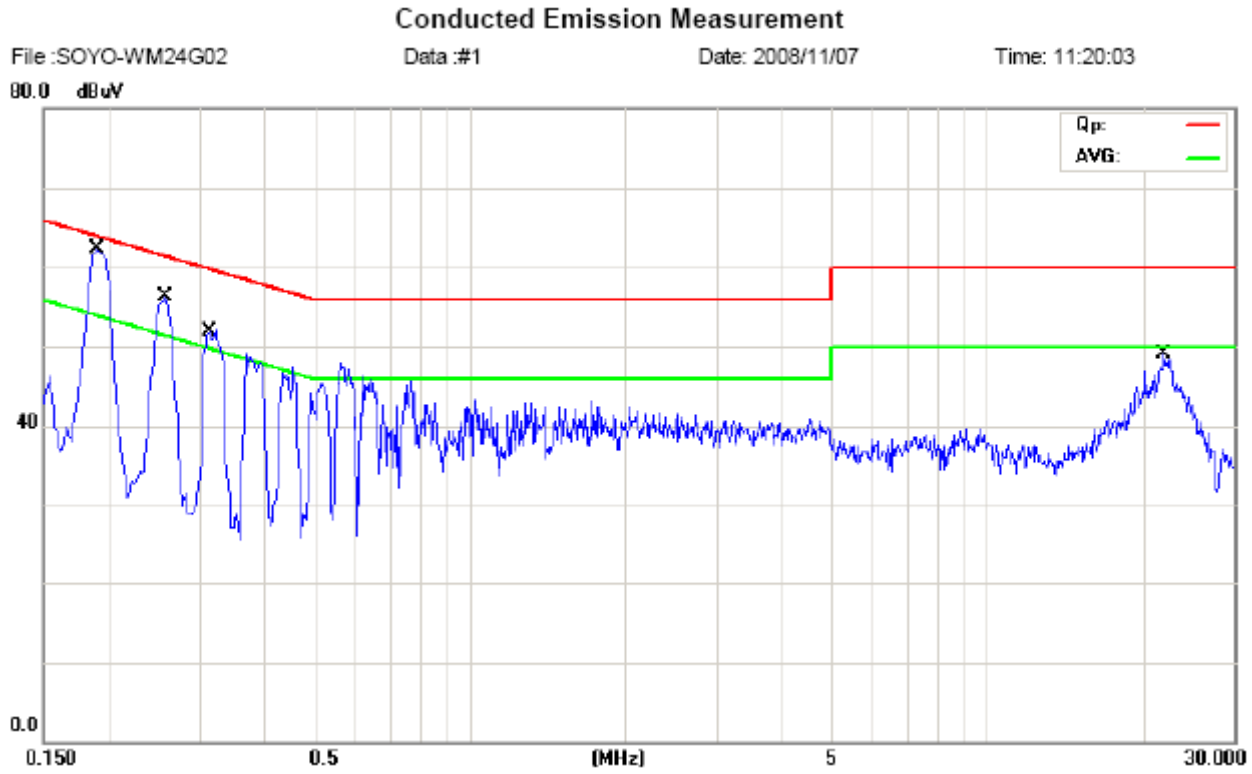
B: Conducted Emission on Neutral Terminal of the power line (150kHz to 30MHz)

EUT set Condition: Normal operation mode

Level **Class B**

Results: **Pass**

Please refer to following diagram for individual



Frequency (MHz)	Reading(dBμV)				Limit	
	Live		Neutral		(dBμV)	
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
0.1896	--	--	56.94	28.54	64.05	54.05
0.2576	--	--	49.71	23.81	61.51	51.51
0.3141	--	--	47.67	32.07	59.86	49.86
22.0031	--	--	43.32	36.82	60.00	50.00

6 Radiated Emission Test

6.1 Test Method and test Procedure:

(1) The EUT was tested according to ANSI C63.4 –2003. The radiated test was performed at Timeway Laboratory. This site is on file with the FCC laboratory division, Registration No.899988

(2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.4-2001.

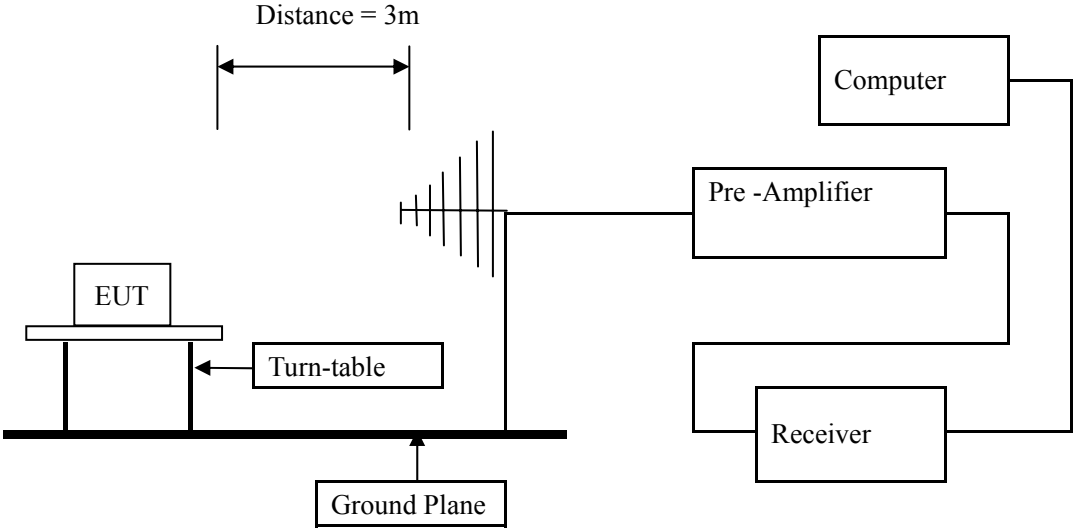
(3) The frequency spectrum from 30 MHz to 1 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.

(4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.

(5) Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "**QP**" in the data table.

(6) The antenna polarization : Vertical polarization and Horizontal polarization.

Block diagram of Test setup



6.2 Configuration of The EUT

Same as section 5.3 of this report

6.3 EUT Operating Condition

Same as section 5.4 of this report.

6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

A FCC Part 15 Subpart C Paragraph 15.249(a) Limit

Fundamental Frequency (MHz)	Field Strength of Fundamental (3m)			Field Strength of Harmonics (3m)		
	mV/m	**dBuV/m**		**uV/m**	**dBuV/m**	
2400-2483.5	50	94 (Average)	114 (Peak)	500	54 (Average)	74 (Peak)

Note: 1. RF Field Strength (dBuV) = 20 log RF Voltage (uV)

2.Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

B. Frequencies in restricted band are complied to limit on Paragraph 15.209.

Frequency Range (MHz)	Distance (m)	Field strength (dB μ V/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note: 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)

2. In the Above Table, the tighter limit applies at the band edges.

3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT

6.5 Test result

A Fundamental & Harmonics Radiated Emission Data

Product:	Digital Wireless Audio Module	Test Mode:	Low Channel
Test Item:	Fundamental Radiated Emission Data	Temperature:	25℃
Test Voltage:	6VDC	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horiz / Vert	Limits PK/AV (dBuV/m)	Margin (dB)
2402.001	83.5/74.0	H	114/94	-30.59/-20.0
2402.001	95.1/86.3	V	114/94	-18.9/-7.7
4804	54.6/37.2	V	74/54	-19.4/-16.8
4804	--	H	74/54	--
--	--	H/V	74/54	--
--	--	H/V	74/54	--
--	--	H/V	74/54	--
--	--	H/V	74/54	--
--	--	H/V	74/54	--
--	--	H/V	74/54	--
--	--	H/V	74/54	--
--	--	H/V	74/54	--

Product:	Digital Wireless Audio Module	Test Mode:	Middle Channel
Test Item:	Fundamental Radiated Emission Data	Temperature:	25℃
Test Voltage:	6VDC	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	**Emission PK/AV (dBuV/m)**	**Horiz / Vert**	**Limits PK/AV (dBuV/m)**	**Margin (dB)**
2442.026	84.8/75.8	H	114/94	-29.2/-18.2
2442.026	97.2/89.9	V	114/94	-16.8/-4.1
4884	47.7/34.3	V	74/54	-26.3/-19.7
4884	--	H	74/54	--
	--	H/V	74/54	--
	--	H/V	74/54	--
	--	H/V	74/54	--
	--	H/V	74/54	--
	--	H/V	74/54	--
	--	H/V	74/54	--
	--	H/V	74/54	--
	--	H/V	74/54	--

TEST REPORT

Product:	Digital Wireless Audio Module	Test Mode:	High Channel
Test Item:	Fundamental Radiated Emission Data	Temperature:	25℃
Test Voltage:	6VDC	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horiz / Vert	Limits PK/AV (dBuV/m)	Margin (dB)
2477.964	85.2/76.9	H	114/94	-28.8/-17.1
2477.9645	94.6/83.3	V	114/94	-19.4/-10.7
4956	48.9/34.8	H	74/54	-25.1/-19.2
4956	--	V	74/54	--
	--	H/V	74/54	--
	--	H/V	74/54	--
	--	H/V	74/54	--
	--	H/V	74/54	--
	--	H/V	74/54	--
	--	H/V	74/54	--
	--	H/V	74/54	--
	--	H/V	74/54	--

Note: (1) PK= Peak, AV= Average

(2) Emission Level = Reading Level + Probe Factor + Cable Loss-AMP.

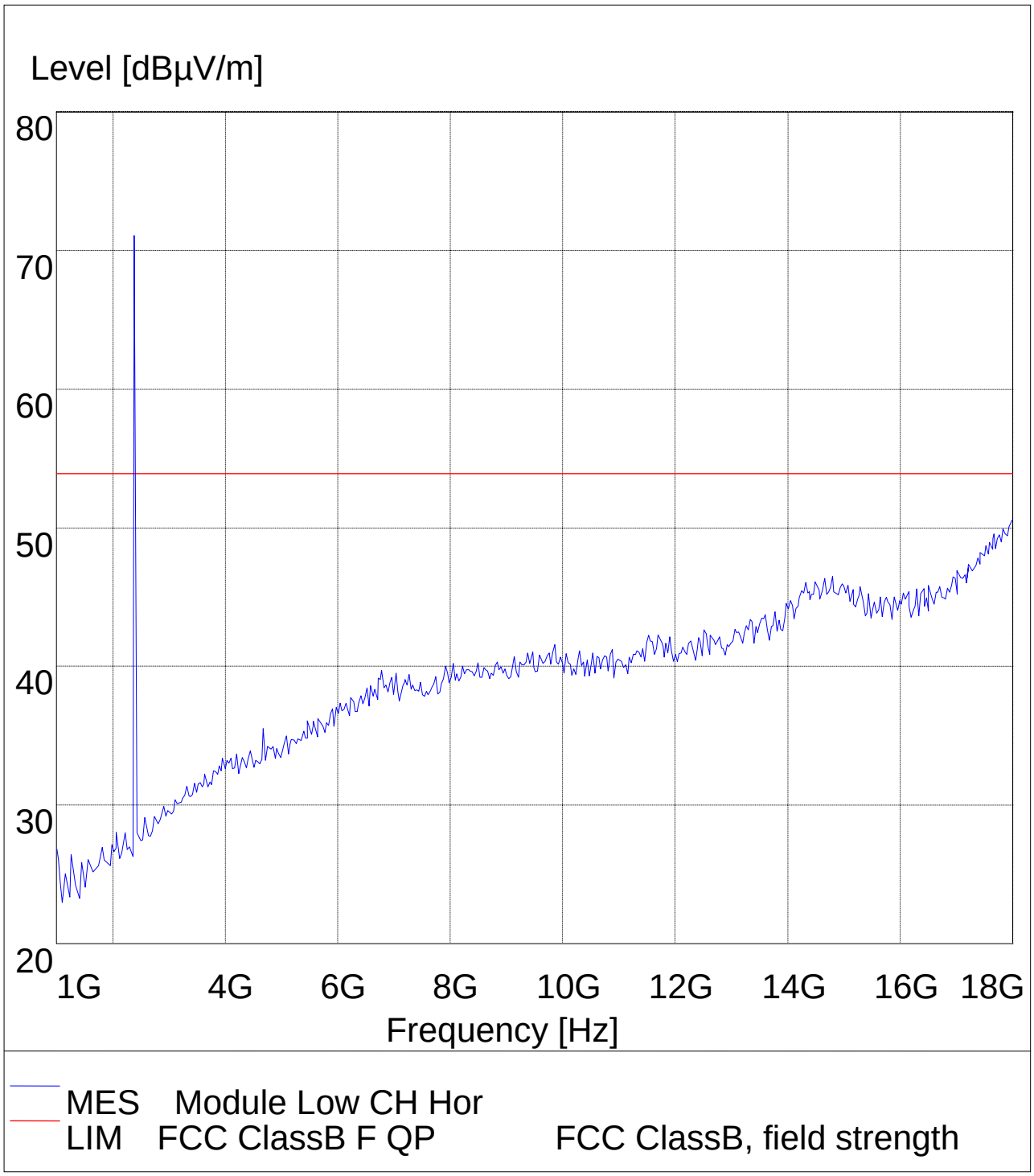
(3)Margin=Emission-Limits

(4)According to section 15.35(b), the peak limit is 20dB higher than the average limit

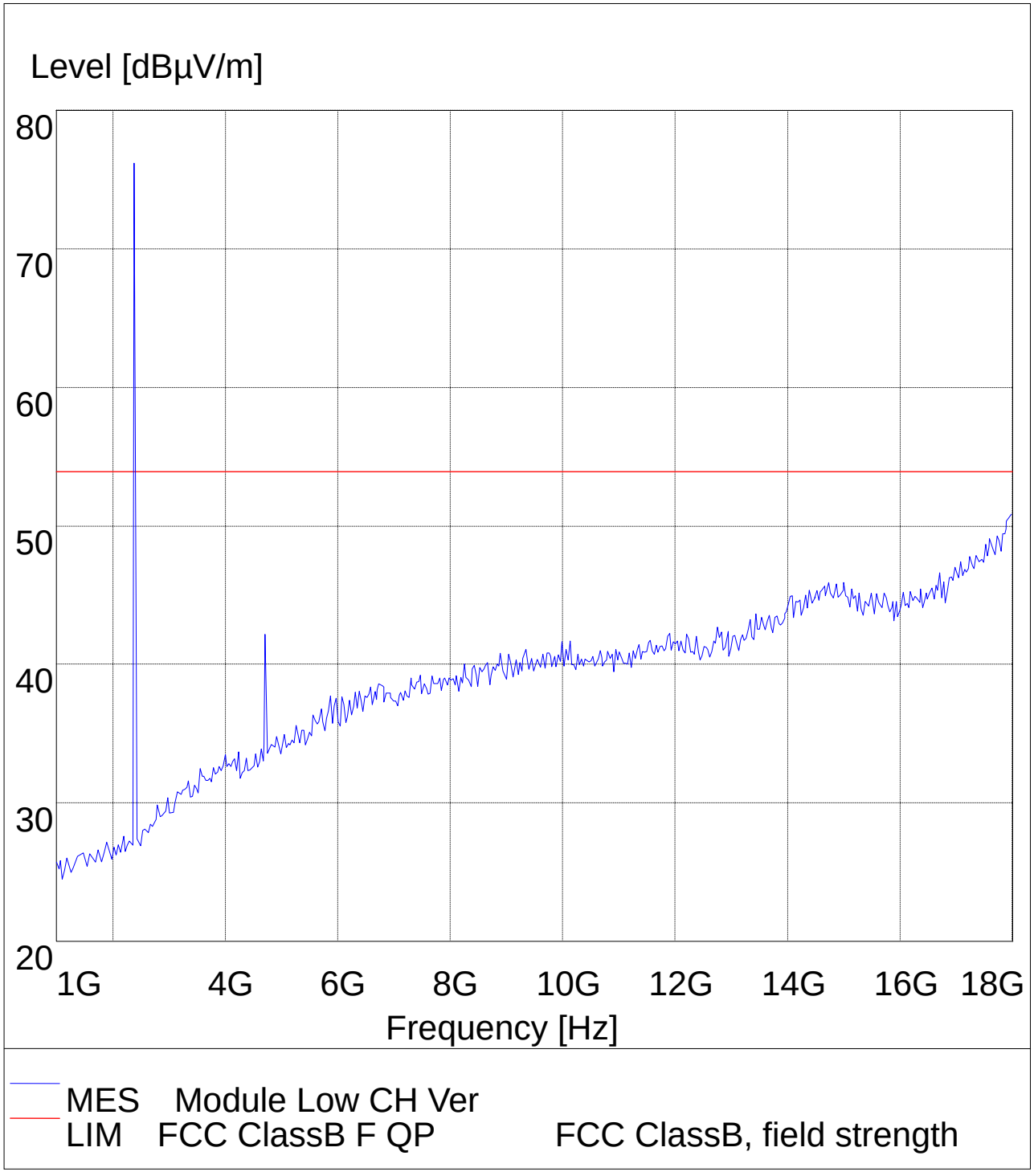
(5) Due to measured PK value less than the AV limit, the measured AV value must be less than AV limit

Test Figure above 1G

Low Channel: **Horizontal**

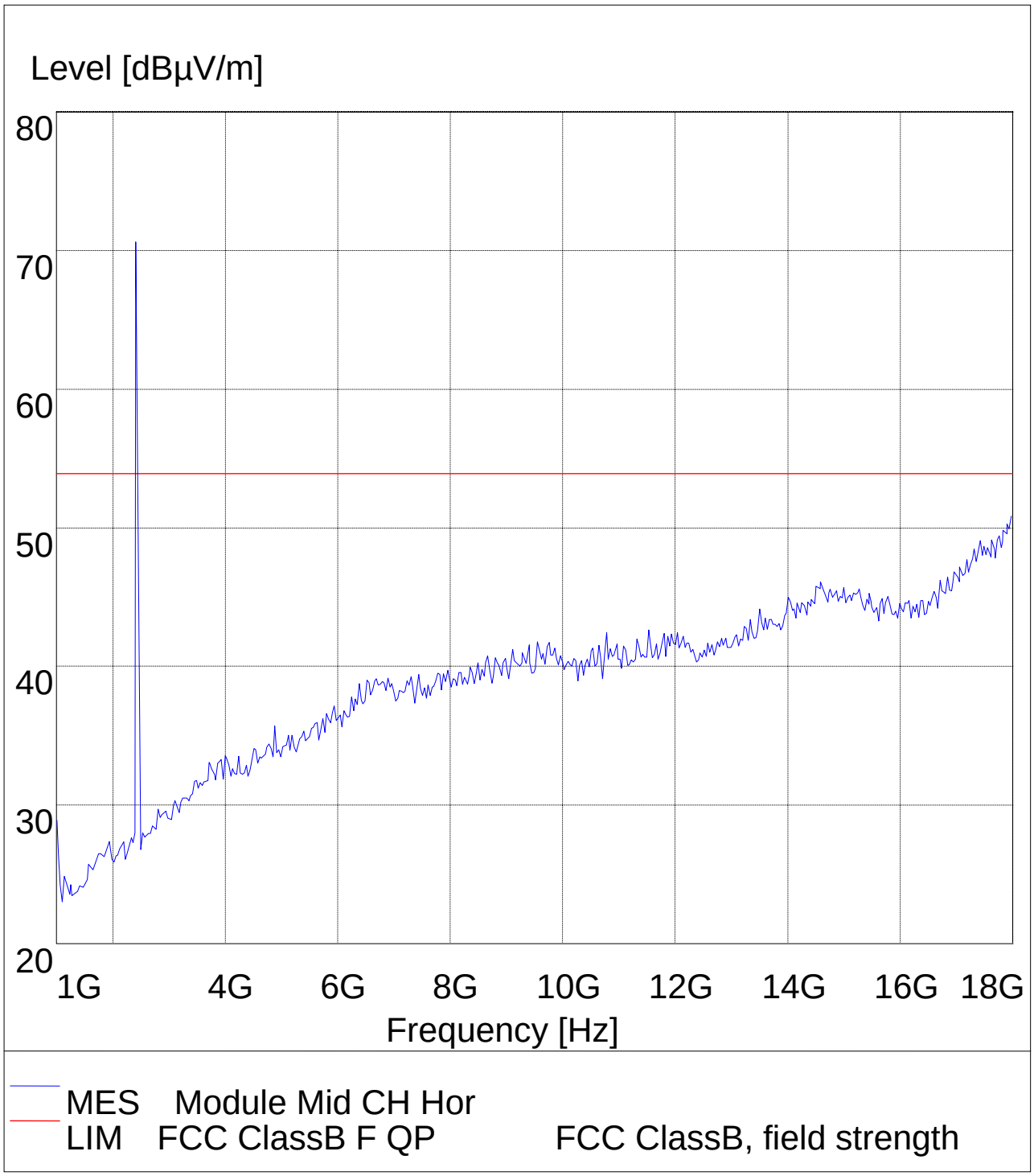


Low Channel: **Vertical**



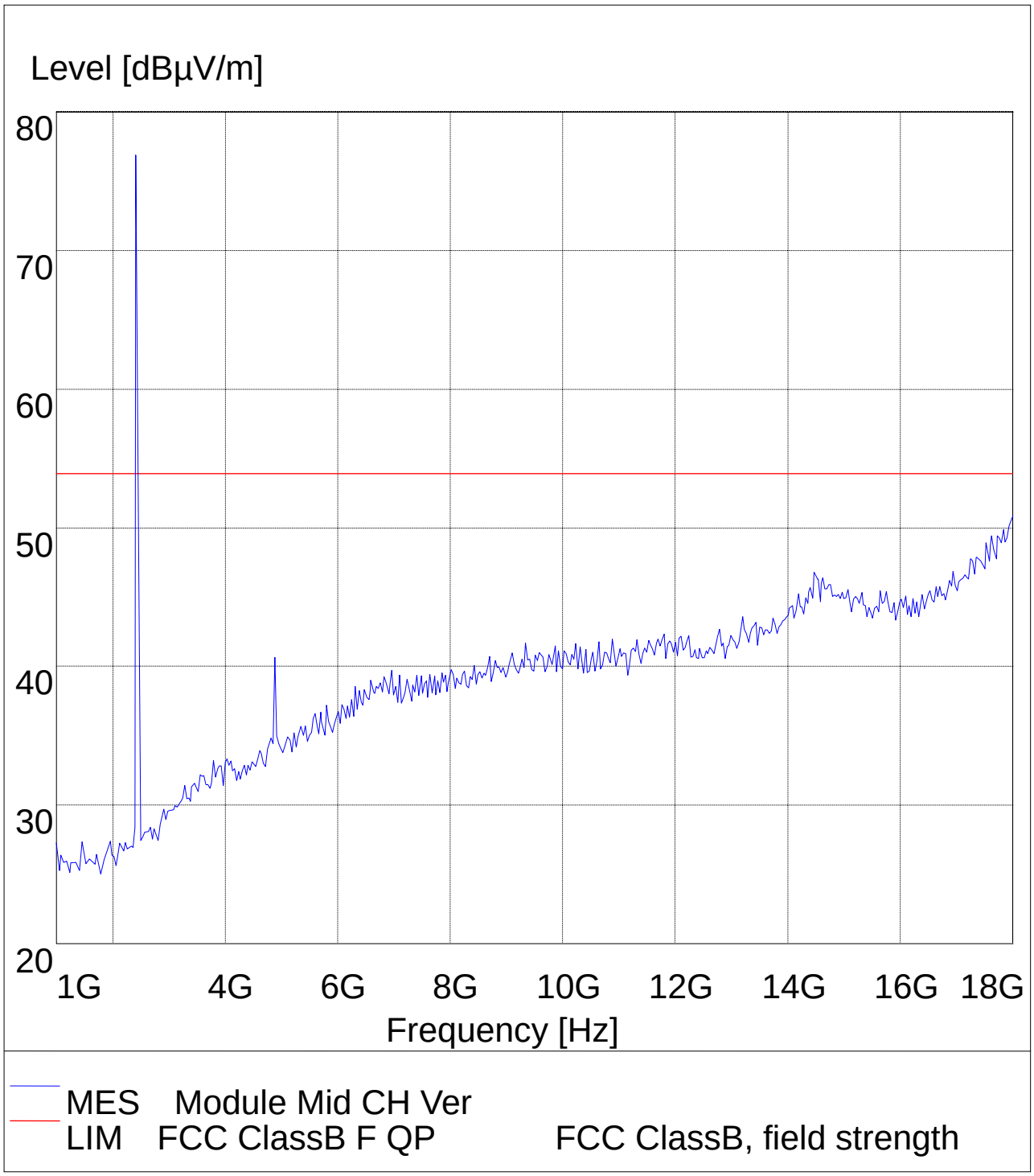
Middle Channel

Horizontal



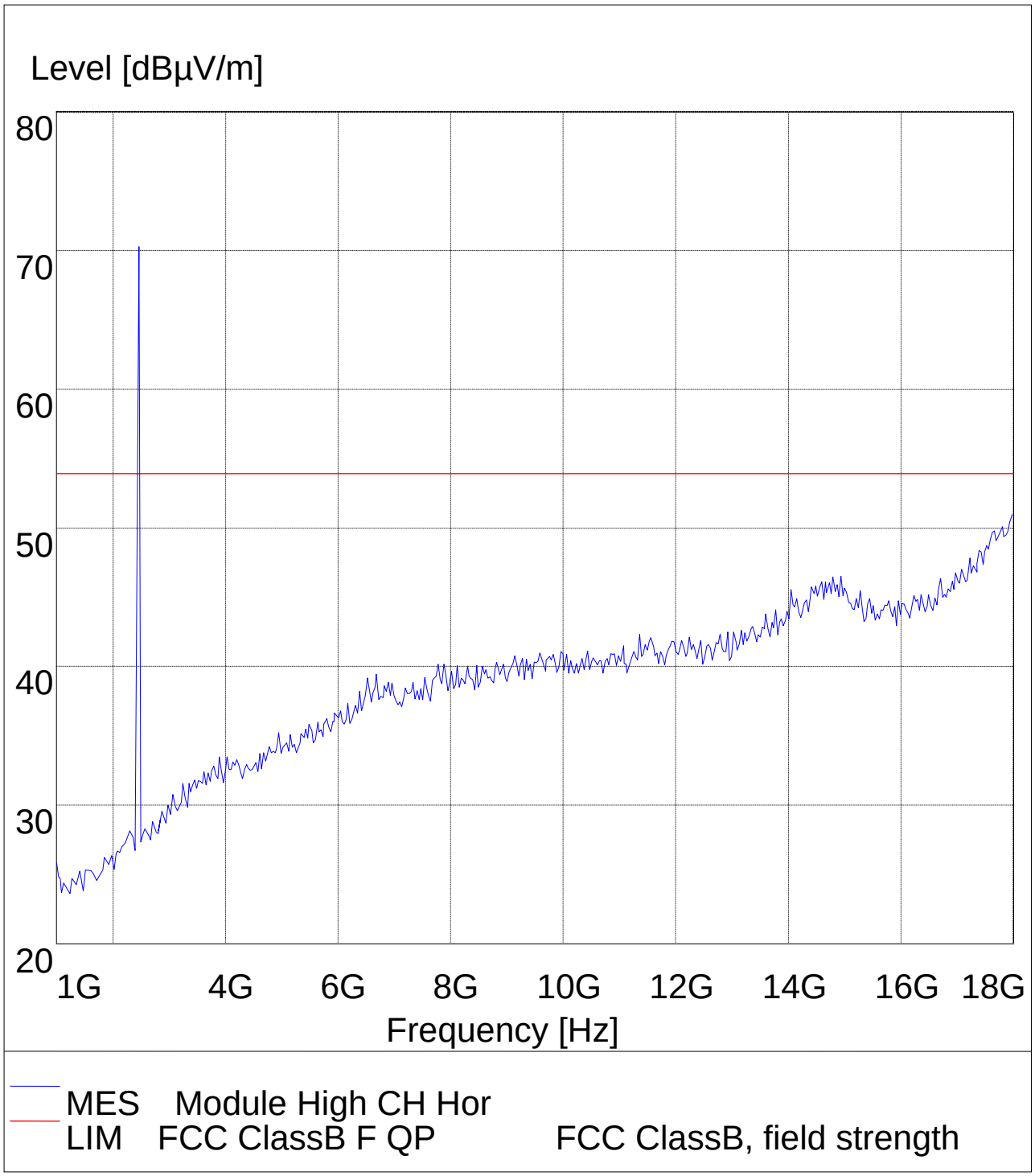
Middle Channel

Vertical



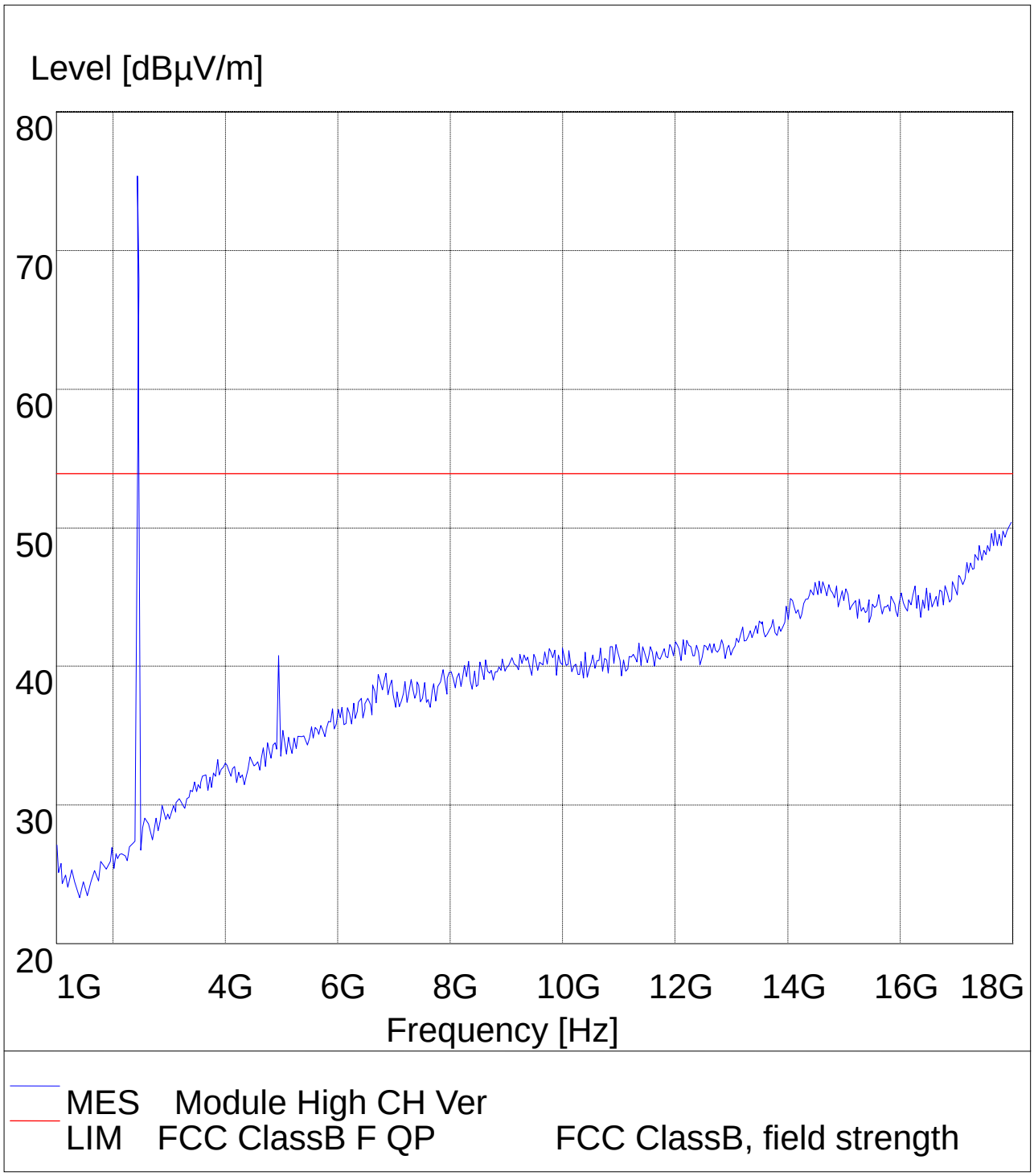
High Channel

Horizontal



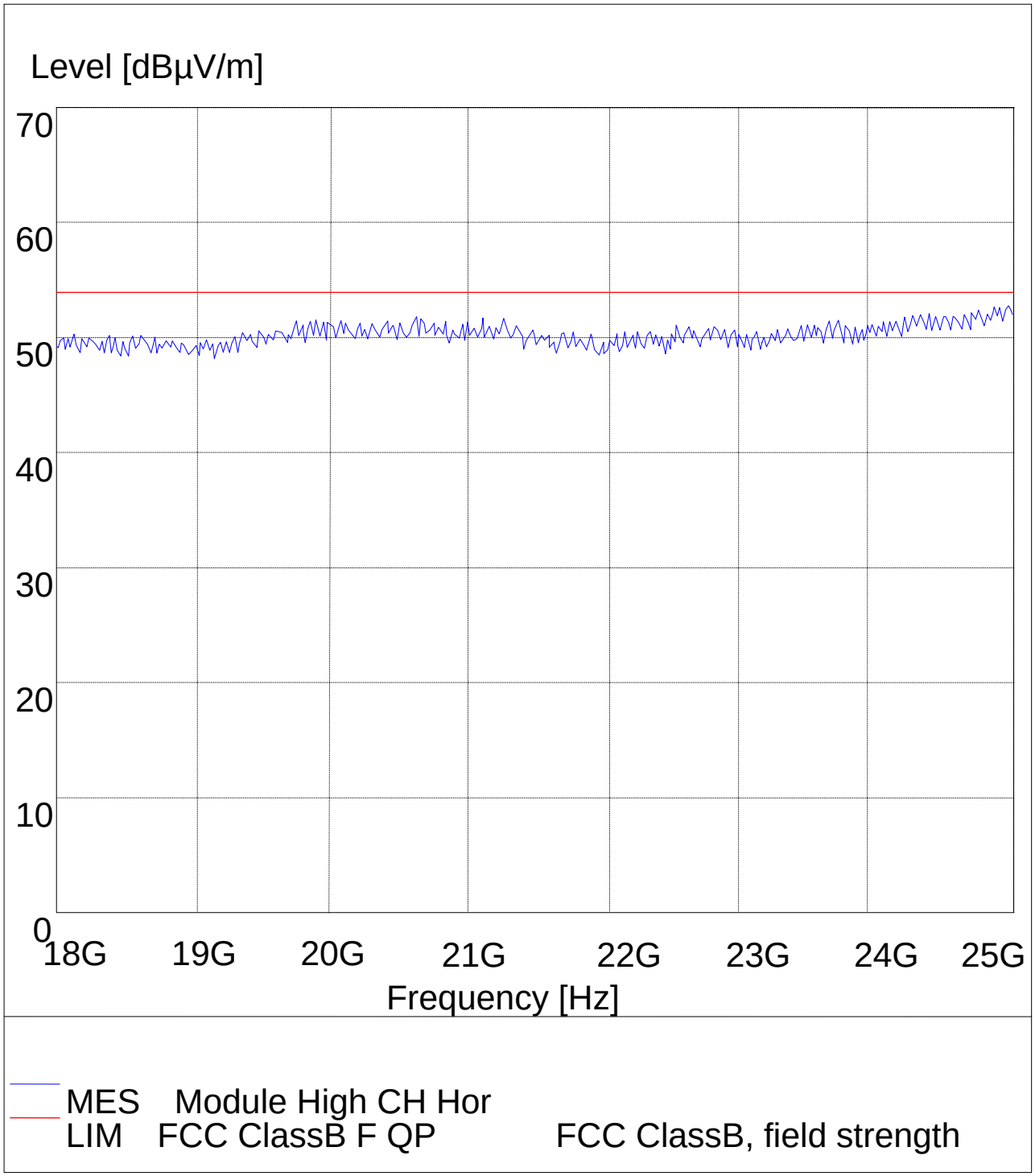
High Channel

Vertical



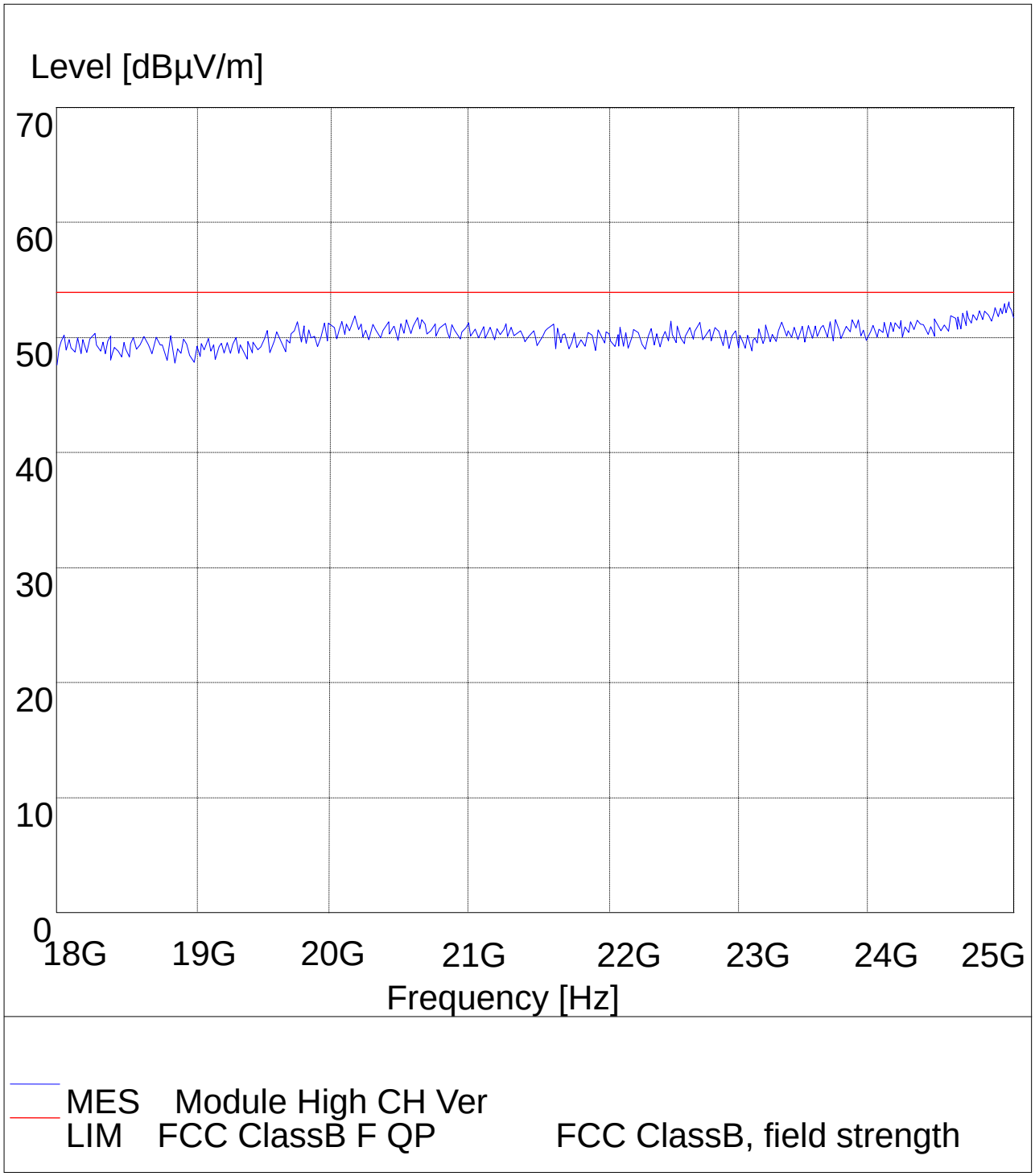
18-25G

High Channel



18-25G

High Channel



B. **General Radiated Emission Data**

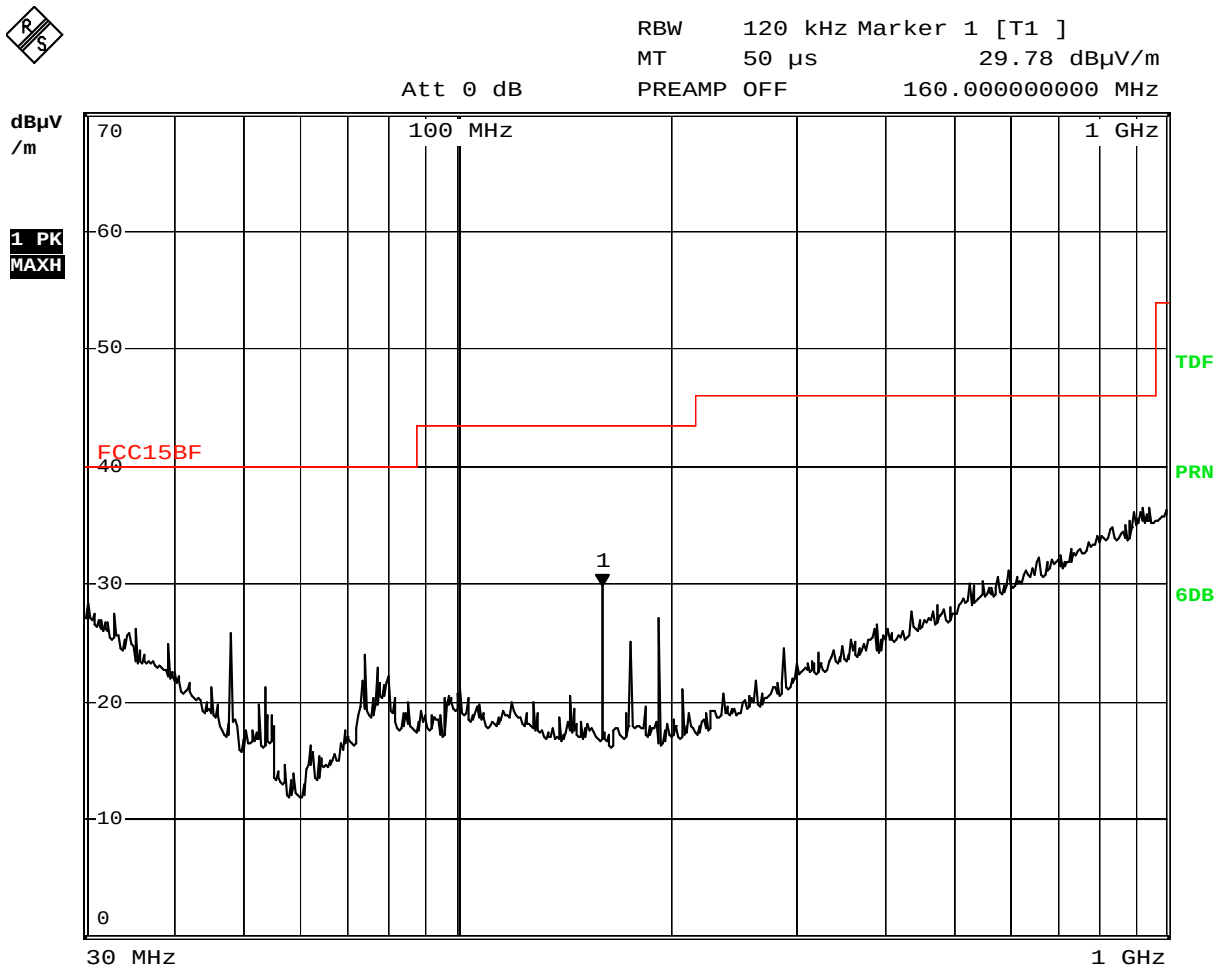
Radiated Emission In Vertical (30MHz----1000MHz)

EUT set Condition: Keep Tx transmitting

Mode: Low Channel

Results: Pass

Please refer to following diagram for individual



Date: 24.NOV.2008 17:39:38

Frequency (MHz)	Level@3m (dB µ V/m)	Antenna Polarity	Limit@3m (dB µ V/m)
160.00	29.56	V	43.50

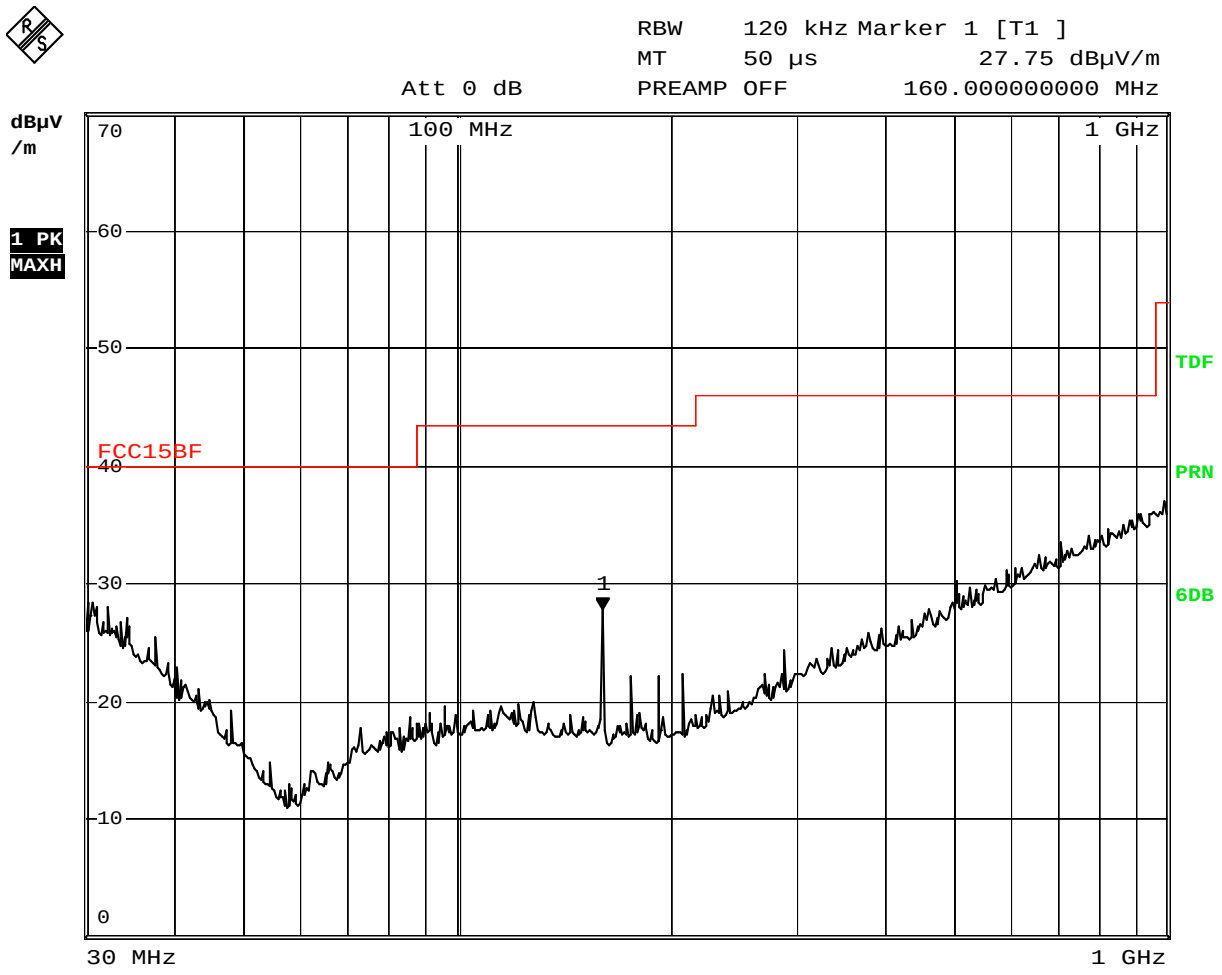
Radiated Emission In Horizontal (30MHz----1000MHz)

EUT set Condition: Keep Tx transmitting

Mode: Low Channel

Results: Pass

Please refer to following diagram for individual



Date: 24.NOV.2008 17:40:44

Frequency (MHz)	Level@3m (dB µ V/m)	Antenna Polarity	Limit@3m (dB µ V/m)
160.00	28.12	H	43.50

7. Band Edge

Band Edge Limit

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 50dB below that in the 100kHz, bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Test Result

Product:	2.4G Digital Wireless Audio Module		Test Mode:	Low Channel
Mode	Keeping Transmitting		Input Voltage	DC6V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2390MHz	PK (dBμV/m)	53.28(V)/42.38(H)	Limit	74(dBμV/m)
	AV(dBμV/m)	36.14(V)/33.72(H)		54(dBμV/m)

Product:	2.4G Wireless Stereo Speaker		Test Mode:	High Channel
Mode	Keeping Transmitting		Input Voltage	DC6V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2483.5MHz	PK (dBμV/m)	55.18(V)/44.37(H)	Limit	74(dBμV/m)
	AV(dBμV/m)	34.69(V)/33.61(H)		54(dBμV/m)

Note: Field Strength in restrict band measured in conventional manner

8.0 Antenna Requirement

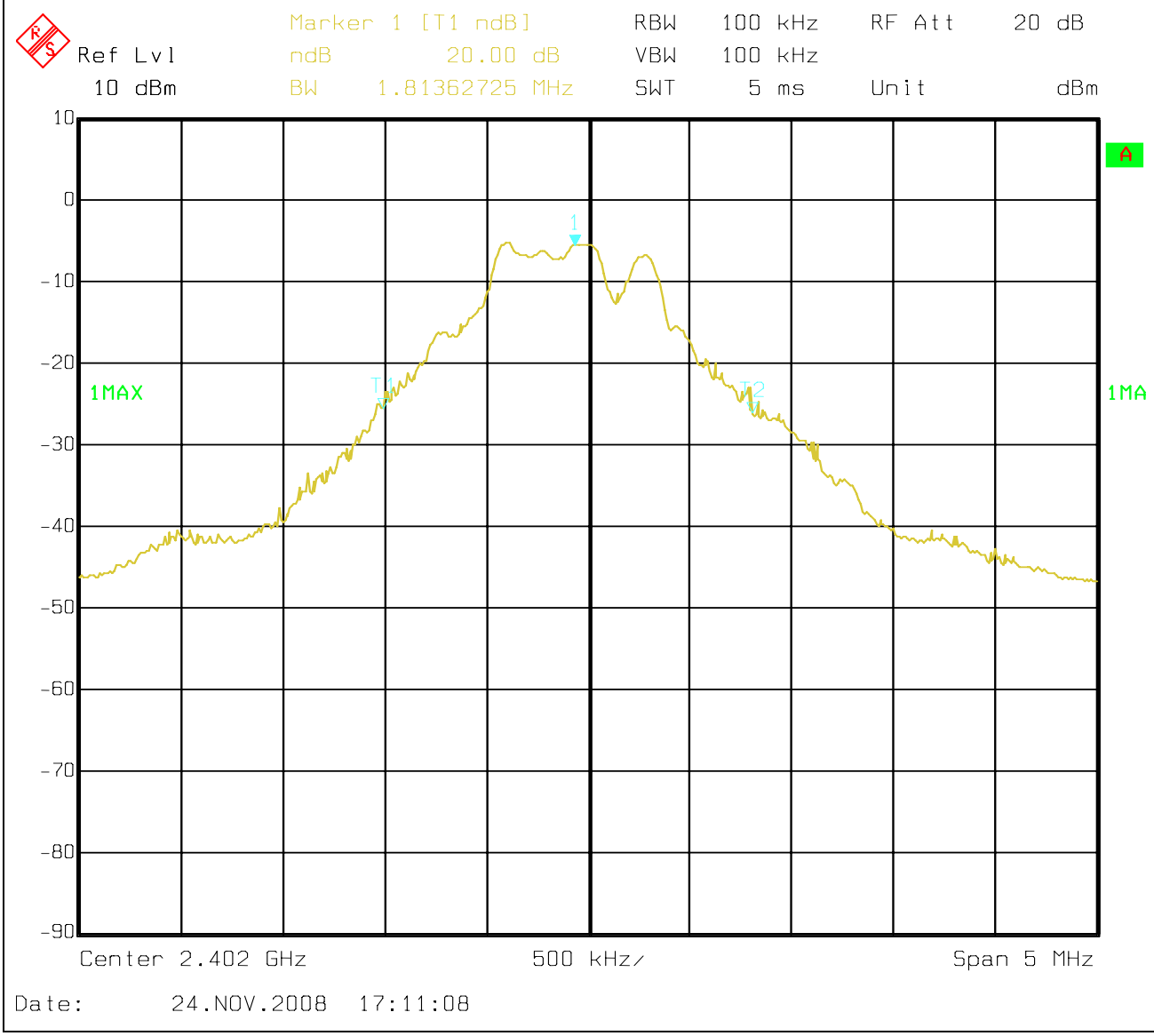
Applicable Standard

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.

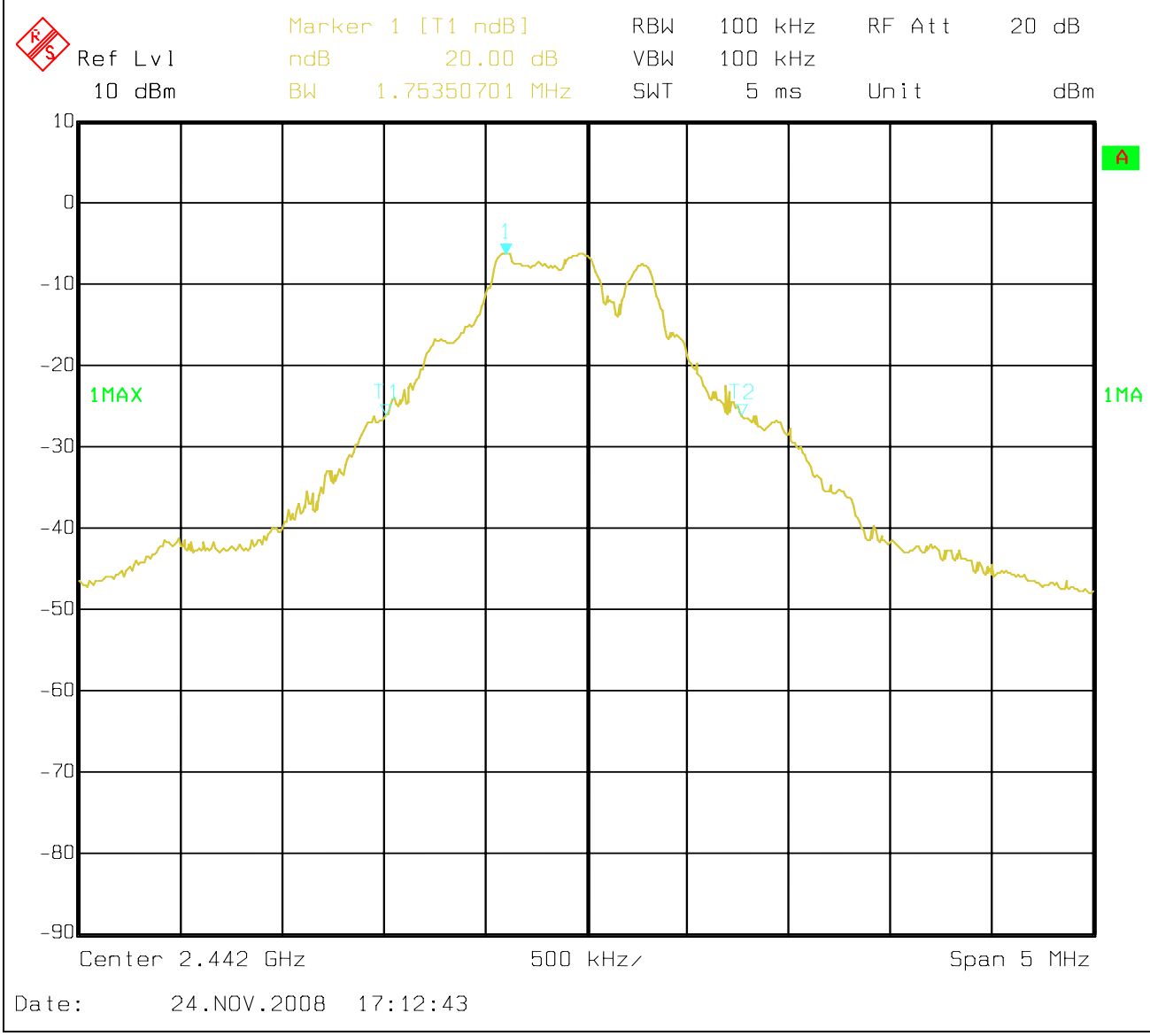
The antenna type used in this product is Dipole antenna with reverse polarity SMA connector. The maximum Gain of this antenna is 2.15dBi.

Test Result: Pass

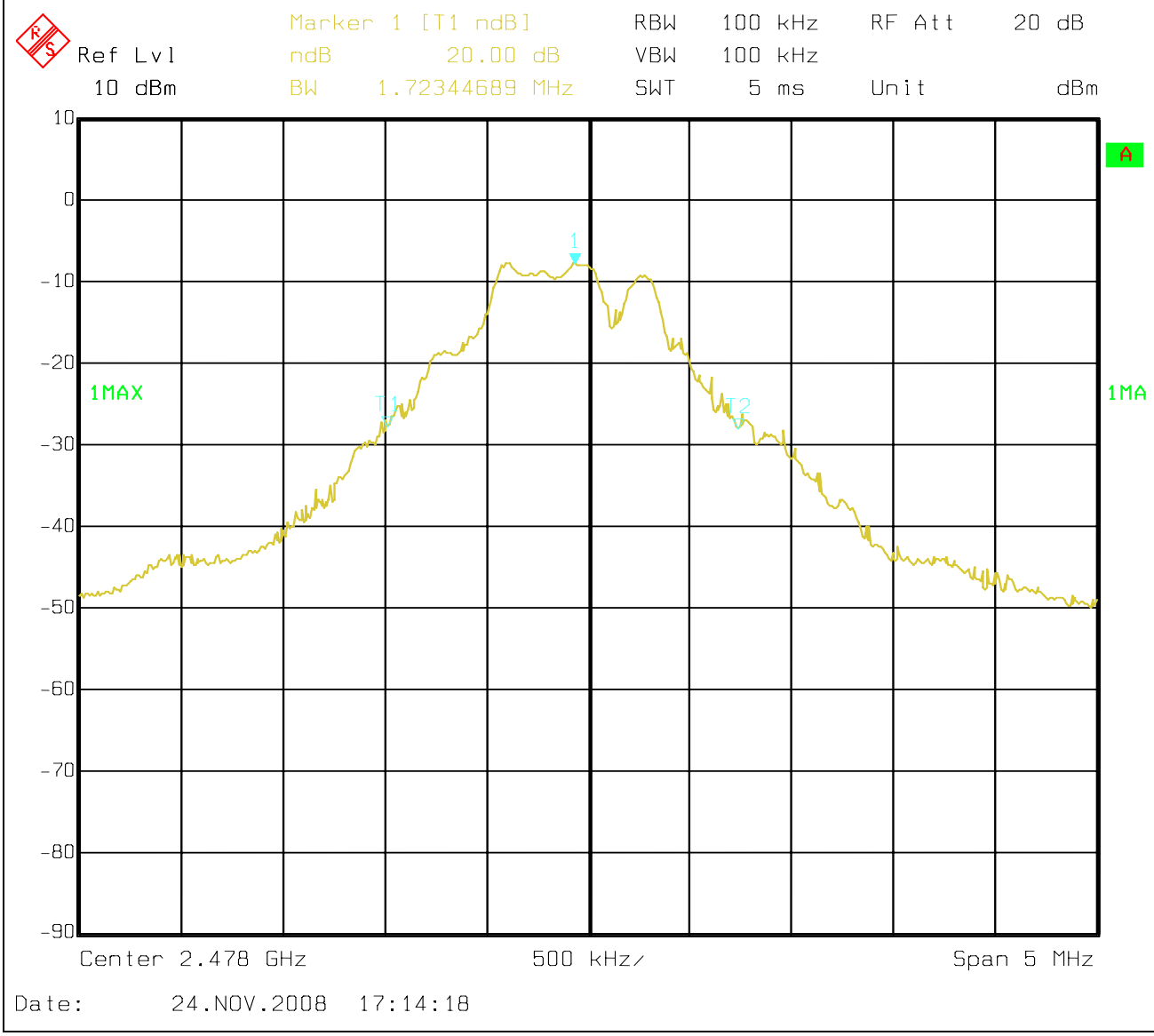
9.0 20dB Bandwidth Measurement			
Product:	2.4G Digital Wireless Audio Module	Test Mode:	Low Channel
Mode	Keeping Transmitting	Test Voltage	DC6V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK
20dB Bandwidth	1.814MHz	--	--



9.0 20dB Bandwidth Measurement			
Product:	2.4G Digital Wireless Audio Module	Test Mode:	Middle Channel
Mode	Keeping Transmitting	Test Voltage	DC6V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK
20dB Bandwidth	1.753MHz	--	--



9.0 20dB Bandwidth Measurement			
Product:	2.4G Digital Wireless Audio Module	Test Mode:	High Channel
Mode	Keeping Transmitting	Test Voltage	DC6V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK
20dB Bandwidth	1.723MHz	--	--



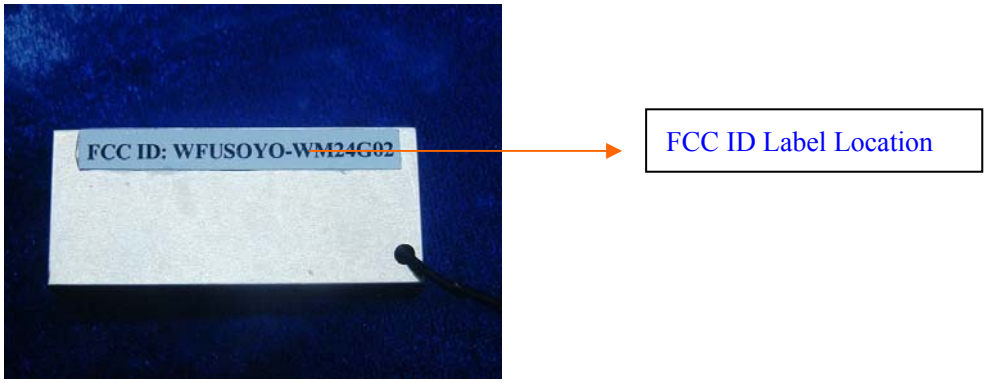
10.0 FCC ID Label

FCC ID: WFUSOYO-WM24G02

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Mark Location:



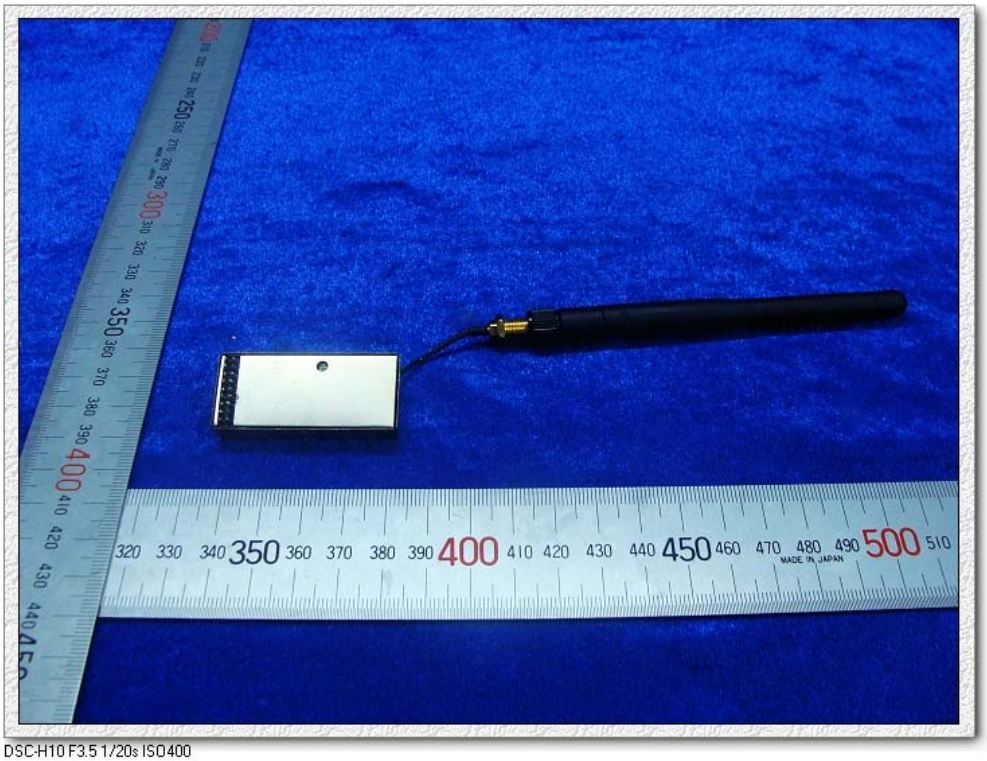
11.0 Photo of testing

11.1 Conducted test View

11.2 Radiated emission test view

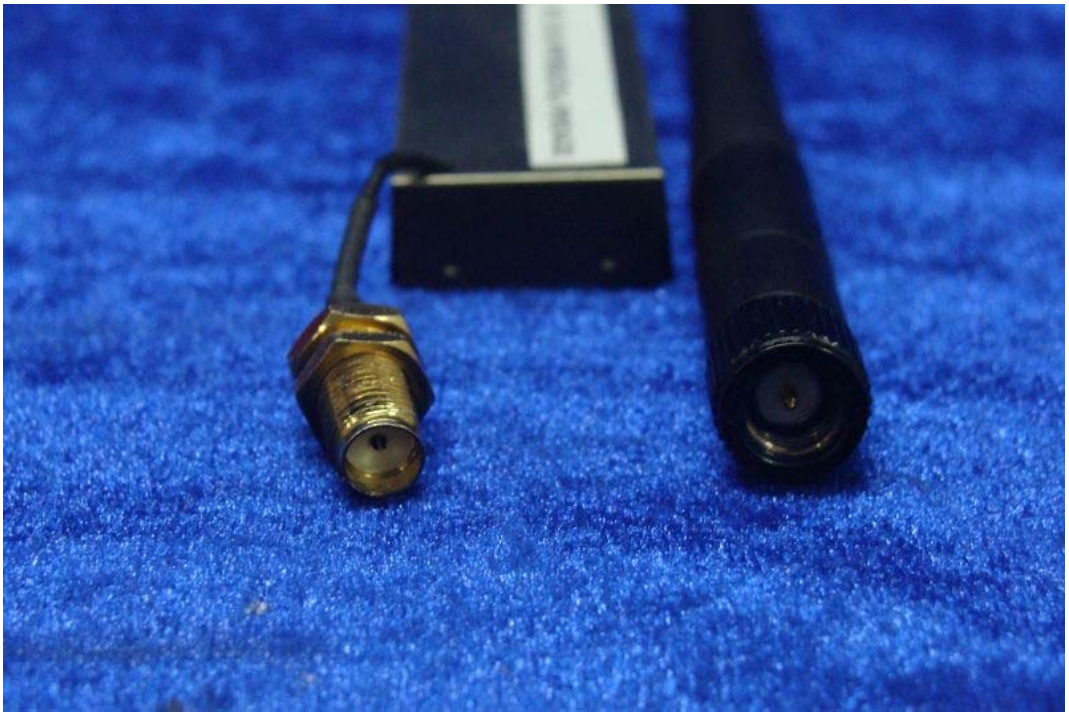
11.3 Photo for the EUT

Outside View

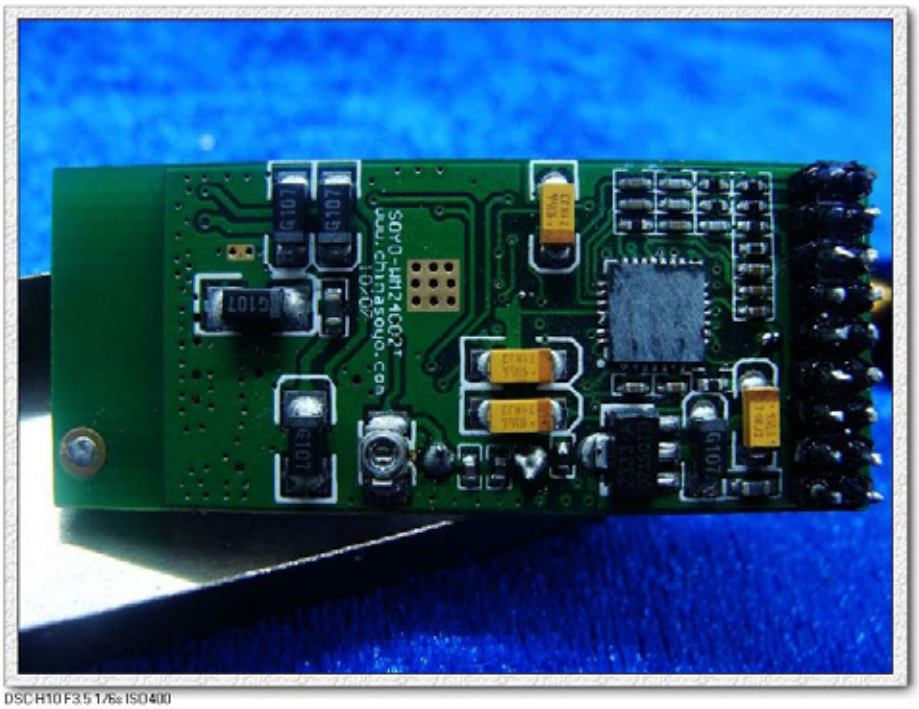


11.3 Photo for the EUT

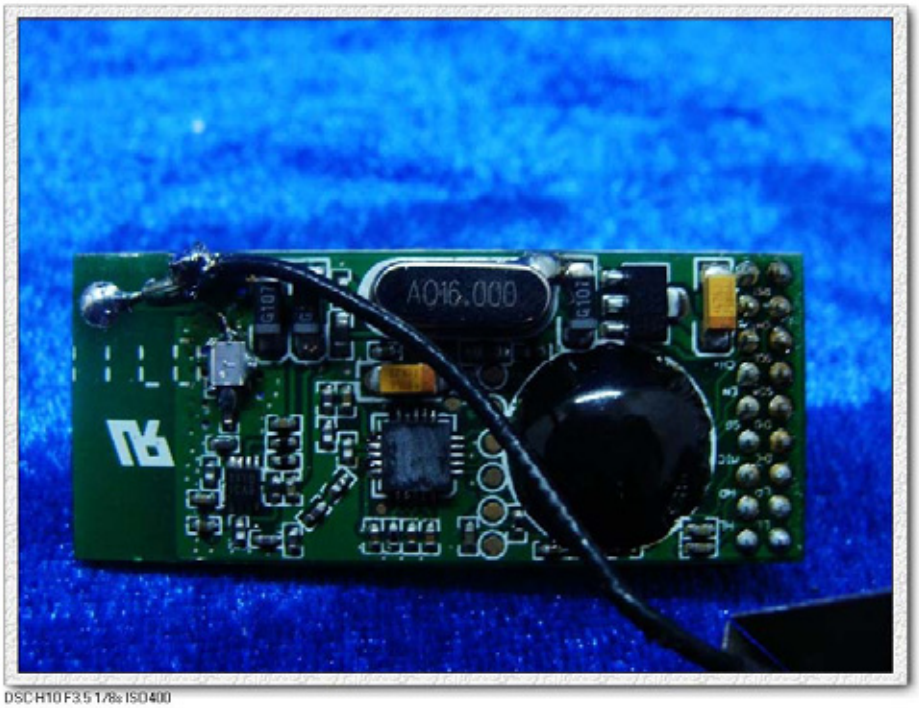
Outside View



Interior View



DSC H10 F3.5 1/6s ISO400



DSC H10 F3.5 1/8s ISO400

--End of the report--