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# APPLICATION CERTIFICATION FCC Part 15C On Behalf of HONG KONG NATURAL SOUND ELECTRONICS LIMITED

#### MID

Model No.: PC788BXC, Trio HD Elite 7.85 Tablet, CDN-Trio Stealth G4X 7.85, MST-785X41

FCC ID: PWK-PC788BXC

Prepared for : HONG KONG NATURAL SOUND ELECTRONICS

LIMITED

Address : FLAT/RM M 4/F CONTINENTAL MANSION 300

KING'S ROAD HONG KONG

Prepared by : ACCURATE TECHNOLOGY CO., LTD

Address : F1, Bldg. A, Chan Yuan New Material Port, Keyuan

Rd. Science & Industry Park, Nan Shan, Shenzhen,

Guangdong P.R. China

Tel: (0755) 26503290 Fax: (0755) 26503396

Report Number : ATE20140716
Date of Test : May 07-19, 2014
Date of Report : May 19, 2014

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# **Test Report Certification**

Applicant : HONG KONG NATURAL SOUND ELECTRONICS LIMITED

Manufacturer : Natural Sound Electronics (Shenzhen) Co., Ltd.

**EUT Description** : MID

(A) MODEL NO.: PC788BXC, Trio HD Elite 7.85 Tablet,

CDN-Trio Stealth G4X 7.85, MST-785X41

(B) Trade Name.: N/A

(C) POWER SUPPLY: DC 3.7V (Powered by battery) or DC 5V (Powered by

adapter)

Measurement Procedure Used:

### FCC Rules and Regulations Part 15 Subpart C Section 15.247 ANSI C63.4: 2009

The EUT was tested according to DTS test procedure of April 09, 2013 KDB558074 D01 DTS Meas Guidance v03 for compliance to FCC 47CFR 15.247 requirements

The device described above is tested by ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.247 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO. LTD.

Date of Test :	May 07, 2014- May 19, 2014
Prepared by :	7 in 2harg (Tim.zhang, Engineer)
Approved & Authorized Signer : _	Lemil
	( Sean Liu, Manager)



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# 1. GENERAL INFORMATION

# 1.1.Description of Device (EUT)

EUT : MID

Model Number : PC788BXC, Trio HD Elite 7.85 Tablet,

CDN-Trio Stealth G4X 7.85, MST-785X41

Note: These samples are same except for the model number is difference. So we prepare the PC788BXC for

test

Bluetooth version : Bluetooth V4.0 LE Frequency Range : 2402MHz-2480MHz

Number of Channels : 40

Type of Antenna : Integral Antenna

Antenna gain : 1.0dBi

Power Supply : DC 5V (Power by adapter)&DC 3.7V(Battery)

Adapter : Model number: FY0502000

Input: AC 100-240V; 50/60Hz 0.6A

Output: DC 5V/2.0A

USB line: Non-shielded, Non-detachable, 0.8m

Modulation mode : GFSK

Applicant : HONG KONG NATURAL SOUND ELECTRONICS

**LIMITED** 

Address : FLAT/RM M 4/F CONTINENTAL MANSION 300

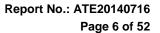
KING'S ROAD HONG KONG

Manufacturer : Natural Sound Electronics (Shenzhen) Co., Ltd.

Address : 4th Building, Xinyuan Industrial Zone, Gushu Village,

Bao'an District, Shenzhen, China

Date of sample received: May 07, 2014
Date of Test: May 07-19, 2014





# 1.2. Carrier Frequency of Channels

Channel	Frequeeny (MHz)	Channel	Frequeeny (MHz)	Channel	Frequeeny (MHz)	Channe 1	Frequeeny (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

# 1.3. Special Accessory and Auxiliary Equipment N/A



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# 1.4.Description of Test Facility

EMC Lab : Accredited by TUV Rheinland Shenzhen

Listed by FCC

The Registration Number is 752051

Listed by Industry Canada

The Registration Number is 5077A-2

Accredited by China National Accreditation Committee

for Laboratories

The Certificate Registration Number is L3193

Name of Firm : ACCURATE TECHNOLOGY CO. LTD

Site Location : F1, Bldg. A, Changyuan New Material Port, Keyuan Rd.

Science & Industry Park, Nanshan, Shenzhen, Guangdong

P.R. China

# 1.5.Measurement Uncertainty

Conducted Emission Expanded Uncertainty = 2.23dB, k=2

Radiated emission expanded uncertainty = 3.08dB, k=2

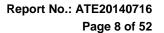
(9kHz-30MHz)

Radiated emission expanded uncertainty = 4.42dB, k=2

(30MHz-1000MHz)

Radiated emission expanded uncertainty = 4.06dB, k=2

(Above 1GHz)

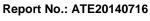




# 2. MEASURING DEVICE AND TEST EQUIPMENT

**Table 1: List of Test and Measurement Equipment** 

Kind of equipment	Manufacturer	Туре	S/N	Calibrated dates	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 11, 2014	Jan. 10, 2015
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 11, 2014	Jan. 10, 2015
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 11, 2014	Jan. 10, 2015
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	Jan. 11, 2014	Jan. 10, 2015
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 15, 2014	Jan. 14, 2015
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 15, 2014	Jan. 14, 2015
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 15, 2014	Jan. 14, 2015
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 15, 2014	Jan. 14, 2015
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 11, 2014	Jan. 10, 2015
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 11, 2014	Jan. 10, 2015
Highpass Filter	Wainwright Instruments	WHKX3.6/18 G-10SS	N/A	Jan. 11, 2014	Jan. 10, 2015
Band Reject Filter	Wainwright Instruments	WRCG2400/2 485-2375/2510 -60/11SS	N/A	Jan. 11, 2014	Jan. 10, 2015





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# 3. OPERATION OF EUT DURING TESTING

# 3.1. Operating Mode

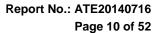
The mode is used: **BLE Transmitting mode** 

Low Channel: 2402MHz Middle Channel: 2440MHz High Channel: 2480MHz

# 3.2.Configuration and peripherals

EUT

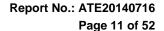
Figure 1 Setup: Transmitting mode





# 4. TEST PROCEDURES AND RESULTS

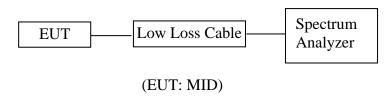
FCC Rules	<b>Description of Test</b>	Result		
Section 15.207	Power Line Conducted Emission	Compliant		
Section 15.247(a)(2)	6dB Bandwidth Test	Compliant		
Section 15.247(e)	Power Spectral Density Test	Compliant		
Section 15.247(b)(3)	Maximum Peak Output Power Test	Compliant		
Section 15.247(d)	Band Edge Compliance Test	Compliant		
Section 15.247(d) Section 15.209	Radiated Spurious Emission Test	Compliant		
Section 15.247(d)	Conducted Spurious Emission Test	Compliant		
Section 15.203	Antenna Requirement	Compliant		





5. 6DB BANDWIDTH MEASUREMENT

# 5.1.Block Diagram of Test Setup



## 5.2. The Requirement For Section 15.247(a)(2)

Section 15.247(a)(2): Systems using digital modulation techniques may operate in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

# 5.3.EUT Configuration on Measurement

The equipment is installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

# 5.4. Operating Condition of EUT

- 5.4.1. Setup the EUT and simulator as shown as Section 5.1.
- 5.4.2. Turn on the power of all equipment.
- 5.4.3.Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480 MHz. We select 2402MHz, 2440MHz, and 2480MHz TX frequency to transmit.

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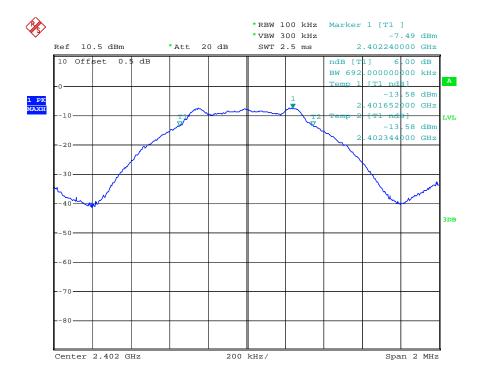
### 5.5.Test Procedure

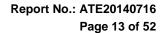
- 5.5.1.The transmitter output was connected to the spectrum analyzer through a low loss cable.
- 5.5.2.Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz.
- 5.5.3.The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

### 5.6.Test Result

Channel	Frequency (MHz)	6 dB Bandwith (MHz)	Minimum Limit(MHz)	PASS/FAIL
0	2402	0.692	0.5	PASS
19	2440	0.676	0.5	PASS
39	2480	0.672	0.5	PASS

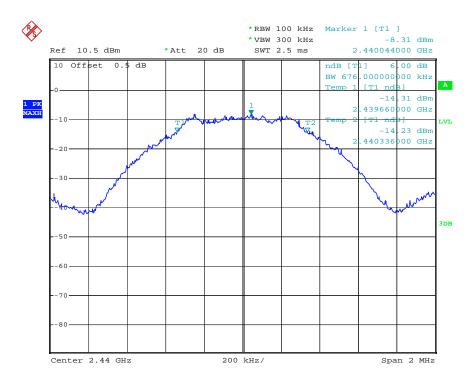
The spectrum analyzer plots are attached as below.

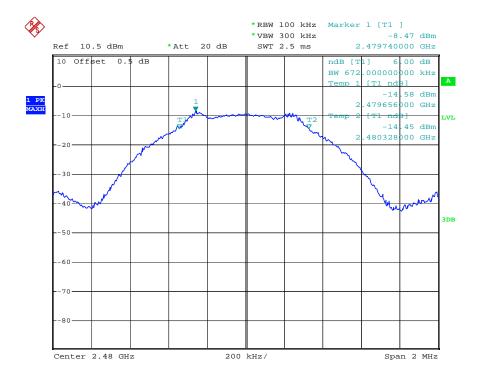


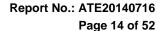




### channel 19



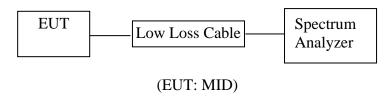






# 6. MAXIMUM PEAK OUTPUT POWER

# 6.1.Block Diagram of Test Setup



## 6.2. The Requirement For Section 15.247(b)(3)

Section 15.247(b)(3): For systems using digital modulation in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands: 1 Watt.

# 6.3.EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

# 6.4. Operating Condition of EUT

- 6.4.1. Setup the EUT and simulator as shown as Section 6.1.
- 6.4.2. Turn on the power of all equipment.
- 6.4.3.Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480 MHz. We select 2402MHz, 2440MHz, and 2480MHz TX frequency to transmit.

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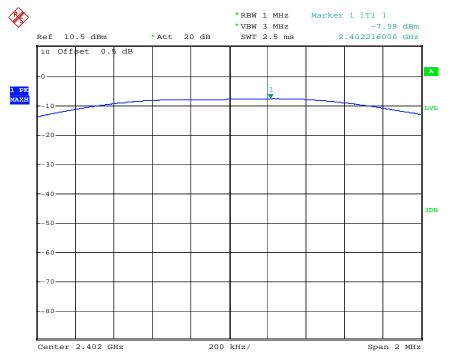
### 6.5. Test Procedure

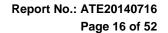
- 6.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.
- 6.5.2.Test method is options 1 from KDB558074 D01 DTS Meas Guidance v03
- 6.5.3.Set RBW of spectrum analyzer to 1 MHz and VBW to 3 MHz.
- 6.5.4. Measurement the maximum peak output power.

# 6.6.Test Result

Channel	Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass / Fail	
0	2402	-7.59	30	PASS	
19	2440	-7.58	30	PASS	
39	2480	-7.63	30	PASS	

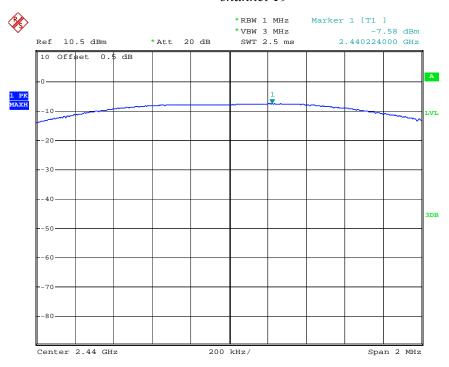
The spectrum analyzer plots are attached as below.

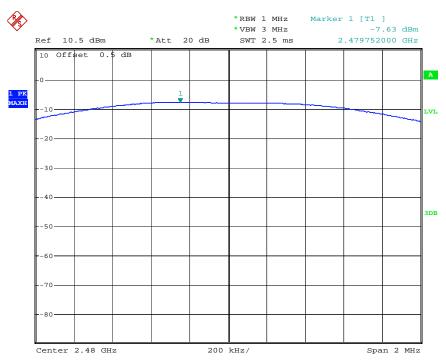






# channel 19



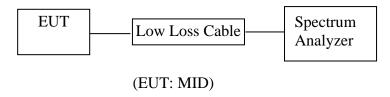


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# 7. POWER SPECTRAL DENSITY MEASUREMENT

# 7.1.Block Diagram of Test Setup



# 7.2. The Requirement For Section 15.247(e)

Section 15.247(e): For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

# 7.3.EUT Configuration on Measurement

The equipment is installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

# 7.4. Operating Condition of EUT

- 7.4.1. Setup the EUT and simulator as shown as Section 8.1.
- 7.4.2. Turn on the power of all equipment.
- 7.4.3.Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480. We select 2402MHz, 2440MHz, and 2480MHz TX frequency to transmit.



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#### 7.5.Test Procedure

- 7.5.1.The EUT was tested according to DTS test procedure of April 09, 2013 KDB558074 D01 DTS Meas Guidance v03 for compliance to FCC 47CFR 15.247 requirements.
- 7.5.2. The transmitter output was connected to the spectrum analyzer through a low loss cable.

#### 7.5.3. Measurement Procedure PKPSD:

This procedure must be used if maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit, and is optional if the maximum (average) conducted output power was used to demonstrate compliance.

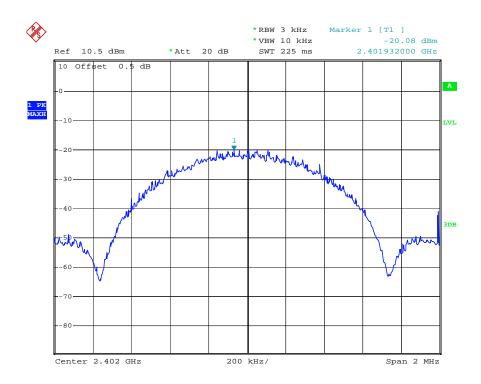
- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. Set the span to 1.5 times the DTS channel bandwidth.
- 3. Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- 4. Set the VBW  $\geq$  3 x RBW.
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.
- 9. Use the peak marker function to determine the maximum amplitude level.
- 10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
- 7.5.4.Measurement the maximum power spectral density.

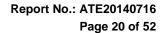


# 7.6.Test Result

CHANNEL NUMBER	FREQUENCY (MHz)	PSD (dBm/3KHz)	LIMIT (dBm/3KHz)	PASS/FAIL
0	2402	-20.08	8	PASS
19	2440	-20.10	8	PASS
39	2480	-20.37	8	PASS

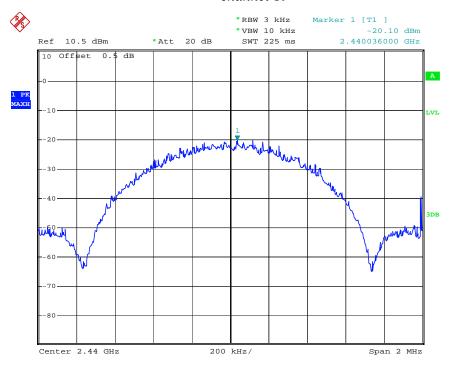
The spectrum analyzer plots are attached as below.

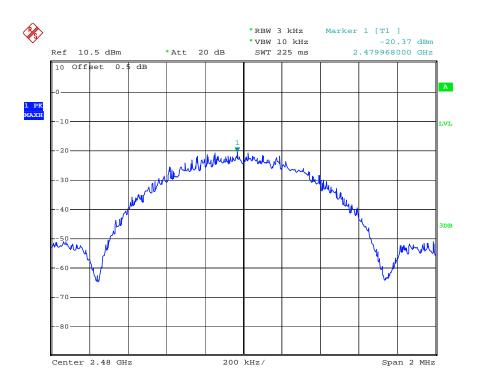


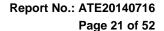




### channel 19



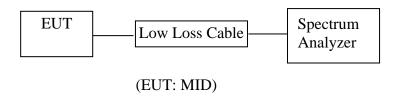






8. BAND EDGE COMPLIANCE TEST

# 8.1.Block Diagram of Test Setup



## 8.2. The Requirement For Section 15.247(d)

Section 15.247(d): 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, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. 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).

# 8.3.EUT Configuration on Measurement

The equipment is installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.



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# 8.4. Operating Condition of EUT

- 8.4.1. Setup the EUT and simulator as shown as Section 9.1.
- 8.4.2. Turn on the power of all equipment.
- 8.4.3.Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480 MHz. We select 2402MHz, 2480MHz TX frequency to transmit.

#### 8.5.Test Procedure

#### Conducted Band Edge:

- 8.5.1. The transmitter output was connected to the spectrum analyzer via a low loss
- 8.5.2.Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz.

#### Radiate Band Edge:

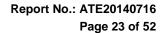
- 8.5.3. The EUT is placed on a turntable, which is 0.8m above the ground plane and worked at highest radiated power.
- 8.5.4. The turntable was rotated for 360 degrees to determine the position of maximum emission level.
- 8.5.5. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
- 8.5.6. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

8.5.7. The band edges was measured and recorded.

#### 8.6.Test Result

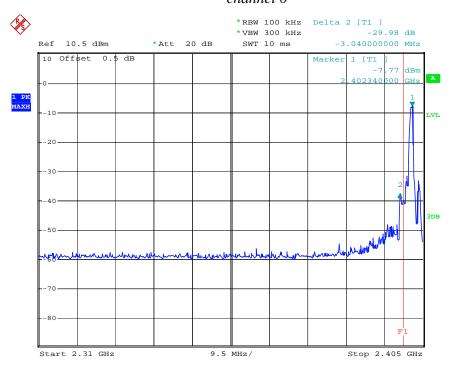
#### **Pass**

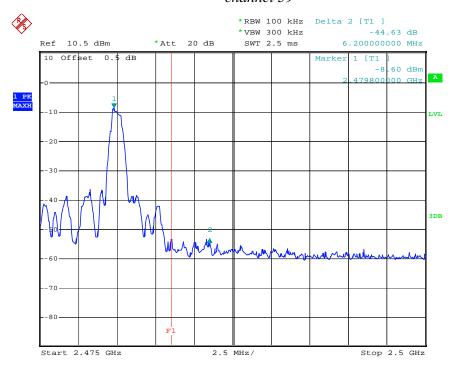
Channel	Frequency	Delta peak to band emission	Limit(dBc)		
0	2399.3MHz	29.98	20		
39	2486.0MHz	44.63	20		





channel 0







## **Radiated Band Edge Result**

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Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.

- 2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

  Result = Reading + Corrected Factor
- 3. Display the measurement of peak values.



# ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg,A,Changyuan New Material Port Keyuan Rd, Science & Industry Park,Nanshan Shenzhen,P.R.China

Polarization: Horizontal

Power Source: AC 120V/60Hz

Date: 14/05/12/ Time: 9/05/12 Engineer Signature:

Distance: 3m

Job No.: alen #3626 Standard: FCC PK

Test item: Radiation Test
Temp.( C)/Hum.(%) 25 C / 55 %

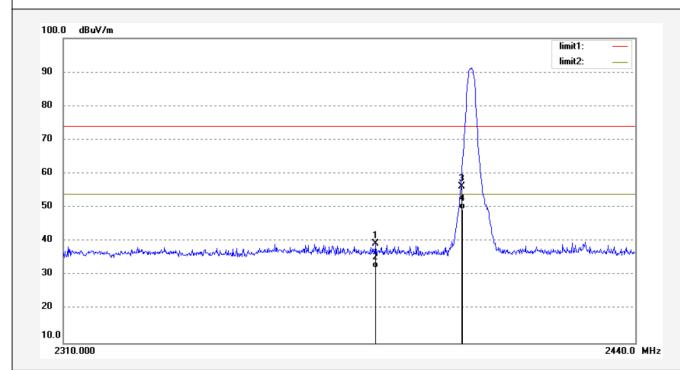
EUT: MID

Mode: TX 2402MHz

Model: PC788BXC

Manufacturer: Natural Sound

Note: Report No:ATE20140716



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2380.200	46.19	-6.81	39.38	74.00	-34.62	peak			
2	2380.200	38.95	-6.81	32.14	54.00	-21.86	AVG			
3	2399.700	63.01	-6.76	56.25	74.00	-17.75	peak			
4	2399.700	56.35	-6.76	49.59	54.00	-4.41	AVG			



Job No.: alen #3625

Standard: FCC PK

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Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Report No.: ATE20140716

Polarization: Vertical

Power Source: AC 120V/60Hz

Date: 14/05/12/
Time: 9/04/05
Engineer Signature:
Distance: 3m

Temp.( C)/Hum.(%) 25 C / 55 % EUT: MID

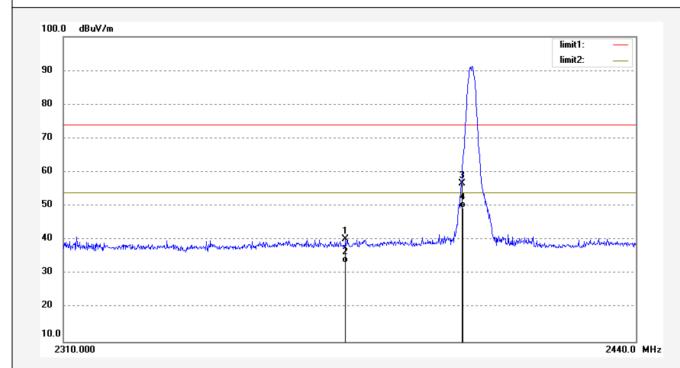
Mode: TX 2402MHz

Test item: Radiation Test

Model: PC788BXC

Manufacturer: Natural Sound

Note: Report No:ATE20140716



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2373.310	46.98	-6.82	40.16	74.00	-33.84	peak			
2	2373.310	40.15	-6.82	33.33	54.00	-20.67	AVG			
3	2399.700	63.47	-6.76	56.71	74.00	-17.29	peak			
4	2399.700	56.31	-6.76	49.55	54.00	-4.45	AVG			



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Report No.: ATE20140716

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Job No.: alen #3627 Standard: FCC PK

Test item: Radiation Test

Temp.( C)/Hum.(%) 25 C / 55 %

EUT: MID

Mode: TX 2480MHz

Model: PC788BXC

Manufacturer: Natural Sound Note: Report No:ATE20140716

Power Source: AC 120V/60Hz Date: 14/05/12/ Time: 9/06/39 **Engineer Signature:** 

Horizontal

Distance: 3m

Polarization:

100.0 dBuV/m limit1: limit2: 90 80 70 60 50 40 30 20 10.0 2460.000 2500.0 MHz

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.680	49.08	-6.54	42.54	74.00	-31.46	peak			
2	2483.680	41.41	-6.54	34.87	54.00	-19.13	AVG			
3	2484.200	49.89	-6.54	43.35	74.00	-30.65	peak			
4	2484.200	42.23	-6.54	35.69	54.00	-18.31	AVG			



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Report No.: ATE20140716

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Job No.: alen #3628 Standard: FCC PK

Test item: Radiation Test

Temp.( C)/Hum.(%) 25 C / 55 %

EUT: MID

Mode: TX 2480MHz

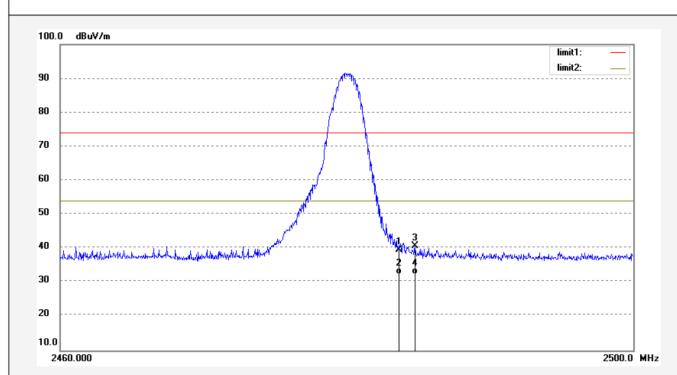
Model: PC788BXC

Manufacturer: Natural Sound

Note: Report No:ATE20140716 Polarization: Vertical

Power Source: AC 120V/60Hz

Date: 14/05/12/ Time: 9/08/06 Engineer Signature: Distance: 3m



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.560	46.15	-6.54	39.61	74.00	-34.39	peak			
2	2483.560	38.86	-6.54	32.32	54.00	-21.68	AVG			
3	2484.720	47.16	-6.54	40.62	74.00	-33.38	peak			
4	2484.720	39.04	-6.54	32.50	54.00	-21.50	AVG			

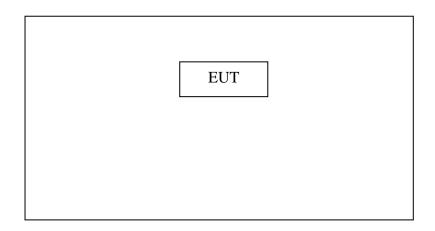


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# 9. RADIATED SPURIOUS EMISSION TEST

# 9.1.Block Diagram of Test Setup

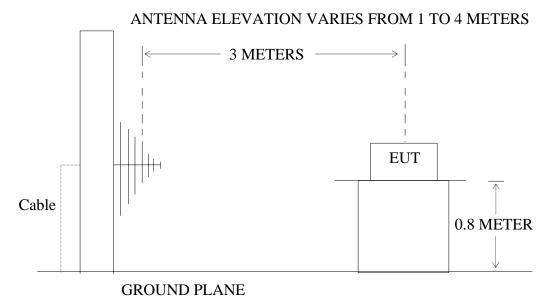
9.1.1.Block diagram of connection between the EUT and peripherals



Setup: Transmitting mode

(EUT: MID)

9.1.2.Semi-Anechoic Chamber Test Setup Diagram





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## 9.2. The Limit For Section 15.247(d)

Section 15.247(d): 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, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. 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).

# 9.3. Restricted bands of operation

#### 9.3.1.FCC Part 15.205 Restricted bands of operation

(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
<sup>1</sup> 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	$(^2)$
13.36-13.41			

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

(b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

<sup>&</sup>lt;sup>2</sup>Above 38.6



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# 9.4. Configuration of EUT on Measurement

The equipment is installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

# 9.5. Operating Condition of EUT

- 9.5.1. Setup the EUT and simulator as shown as Section 10.1.
- 9.5.2. Turn on the power of all equipment.
- 9.5.3.Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480 MHz. We select 2402MHz, 2440MHz, and 2480MHz TX frequency to transmit.

#### 9.6.Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4: 2009 on radiated emission measurement. The EUT was tested in 3 orthogonal planes.

The bandwidth of test receiver is set at 9 kHz in below 30MHz. and set at 120 kHz in 30-1000MHz, and 1MHz in above 1000MHz.

The frequency range from 9 kHz to 25GHz is checked.

The final measurement in band 9-90 kHz, 110-490 kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

The field strength is calculated by adding the antenna factor, and cable loss, and subtracting the amplifier gain from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

# 9.7. The Field Strength of Radiation Emission Measurement Results

Note: 1. Emissions attenuated more than 20 dB below the permissible value are not reported.

- 2. The EUT is tested radiation emission at Low, Middle, High channel in three axes. The worst emissions are reported in all channels. The fundamental radiated emissions were reduced by Band Reject Filter in the attached plots.
- 3. The radiation emissions from 18-25GHz are not reported, because the test values lower than the limits of 20dB.
- 4. The average measurement was not performed when peak measured data under the limit of average detection.



# Below 1GHz

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Job No.: alen #4072

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.( C)/Hum.(%) 25 C / 55 %

EUT: MID

Mode: TX 2402MHz Model: PC788BXC

Manufacturer: Natural Sound

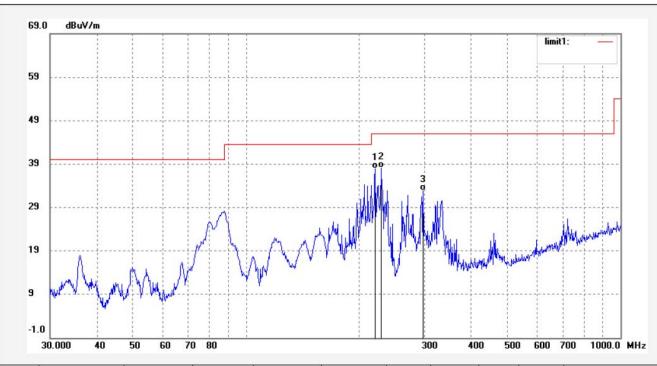
Note: Report No:ATE20140716

Polarization: Horizontal

Power Source: AC 120V/60Hz

Date: 14/05/12/ Time: 11/16/35 Engineer Signature:

Distance: 3m





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Report No.: ATE20140716

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Job No.: alen #4073

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.( C)/Hum.(%) 25 C / 55 %

EUT: MID

Mode: TX 2402MHz

Model: PC788BXC

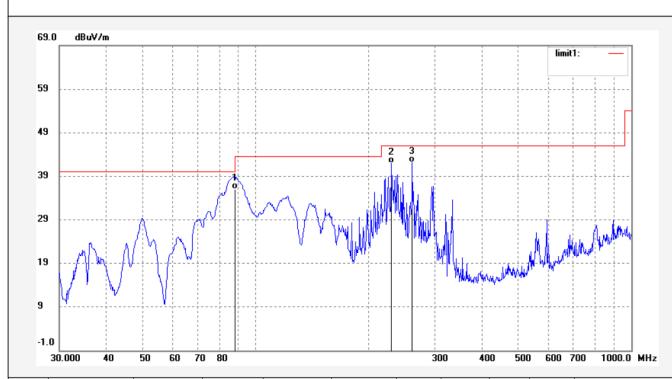
Manufacturer: Natural Sound

Note: Report No:ATE20140716

Polarization: Vertical

Power Source: AC 120V/60Hz

Date: 14/05/12/ Time: 11/17/21 Engineer Signature: Distance: 3m



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)		Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	88.0328	57.59	-21.64	35.95	43.50	-7.55	QP			
2	229.2931	61.82	-19.86	41.96	46.00	-4.04	QP			
3	261.0582	61.29	-19.08	42.21	46.00	-3.79	QP			



Report No.: ATE20140716

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> Polarization: Horizontal

Power Source: AC 120V/60Hz

Date: 2014/05/12 Time: 11:19:00 Engineer Signature: Distance: 3m

Job No.: alen #4075

Standard: FCC Class B 3M Radiated

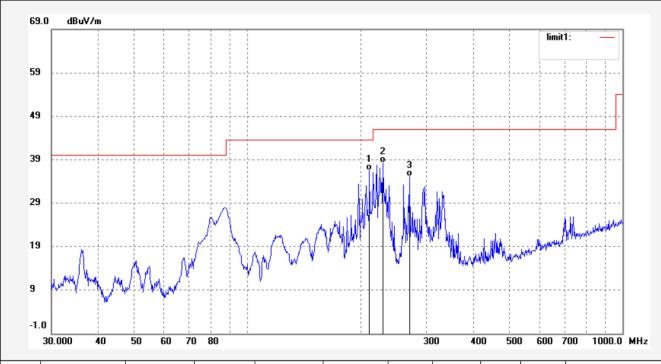
Test item: Radiation Test

Temp.( C)/Hum.(%) 25 C / 55 %

EUT: Mode: TX 2440MHz Model: PC788BXC

Manufacturer: Natural Sound

Report No:ATE20140716 Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	211.5264	56.48	-20.00	36.48	43.50	-7.02	QP			
2	229.2931	58.18	-19.86	38.32	46.00	-7.68	QP			
3	270.3747	53.85	-18.68	35.17	46.00	-10.83	QP			



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Report No.: ATE20140716

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Job No.: alen #4074

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.( C)/Hum.(%) 25 C / 55 %

EUT: MID

Mode: TX 2440MHz

Model: PC788BXC

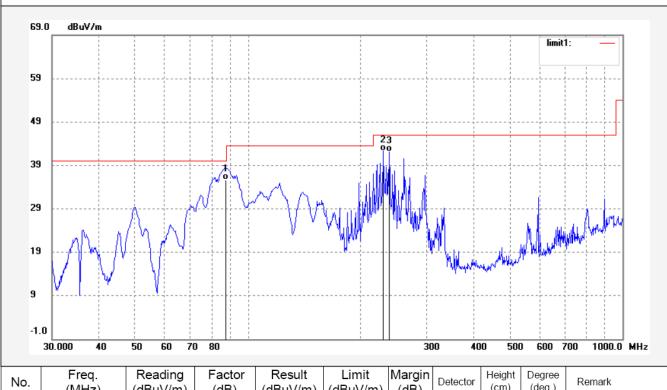
Manufacturer: Natural Sound

Note: Report No:ATE20140716

Polarization: Vertical

Power Source: AC 120V/60Hz

Date: 2014/05/12 Time: 11:18:07 Engineer Signature: Distance: 3m



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	87.4176	57.28	-21.61	35.67	40.00	-4.33	QP			
2	229.2931	62.10	-19.86	42.24	46.00	-3.76	QP			
3	238.3102	61.95	-19.82	42.13	46.00	-3.87	QP			



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Report No.: ATE20140716

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Job No.: alen #4076 Polarization: Horizontal

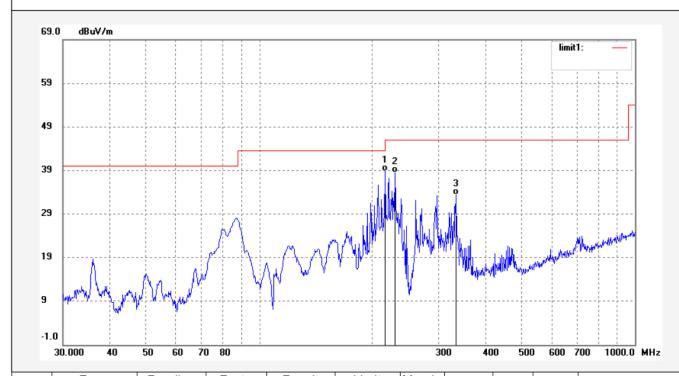
Standard: FCC Class B 3M Radiated Power Source: AC 120V/60Hz

Test item: Radiation Test Date: 2014/05/12 Temp.( C)/Hum.(%) 25 C / 55 % Time: 11:19:34 EUT: MID Engineer Signature: Distance: 3m

Mode: TX 2480MHz Model: PC788BXC

Note: Report No:ATE20140716

Manufacturer: Natural Sound



١	No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1		216.0240	58.79	-19.96	38.83	46.00	-7.17	QP			
2		229.2931	58.39	-19.86	38.53	46.00	-7.47	QP			
3		333.6865	50.12	-16.80	33.32	46.00	-12.68	QP			



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Polarization: Vertical

Power Source: AC 120V/60Hz

Date: 2014/05/12 Time: 11:20:17 Engineer Signature: Distance: 3m

Job No.: alen #4077

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.( C)/Hum.(%) 25 C / 55 %

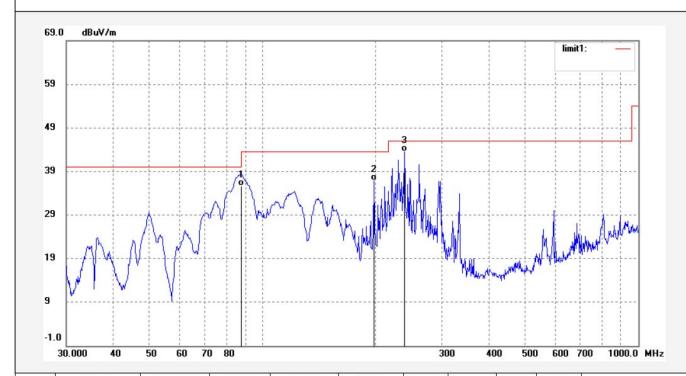
EUT: MID

Mode: TX 2480MHz

Model: PC788BXC

Manufacturer: Natural Sound

Note: Report No:ATE20140716



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)		Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	87.7248	57.35	-21.62	35.73	40.00	-4.27	QP			
2	197.8928	57.31	-20.35	36.96	43.50	-6.54	QP			
3	238.3102	63.43	-19.82	43.61	46.00	-2.39	QP			



# Above 1GHz

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Tel:+86-0755-26503290 Fax:+86-0755-26503396

Site: 1# Chamber

Job No.: alen #3722

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.( C)/Hum.(%) 25 C / 55 %

EUT: MID

Mode: TX 2402MHz

Model: PC788BXC

Manufacturer: Natural Sound

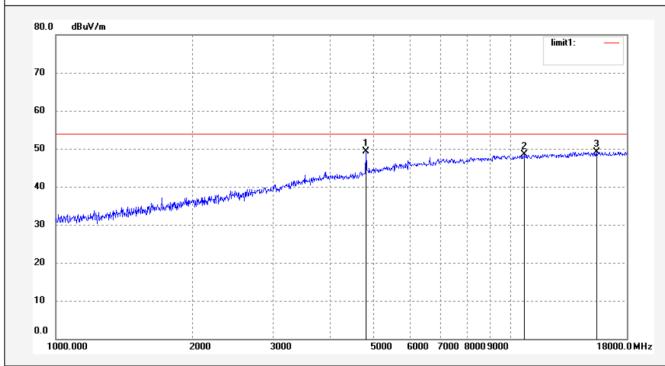
Note: Report No:ATE20140716

Polarization: Horizontal

Power Source: AC 120V/60Hz

Date: 14/05/11/ Time: 9/28/00 Engineer Signature:

Distance: 3m



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	4804.110	50.96	-1.59	49.37	54.00	-4.63	peak			
2	10698.514	43.10	5.32	48.42	54.00	-5.58	peak			
3	15443.405	37.77	11.33	49.10	54.00	-4.90	peak			



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Site: 1# Chamber

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Report No.: ATE20140716

Polarization: Vertical

Power Source: AC 120V/60Hz

Date: 14/05/11/ Time: 9/29/29 Engineer Signature:

Distance: 3m

Job No.: alen #3723

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.( C)/Hum.(%) 25 C / 55 %

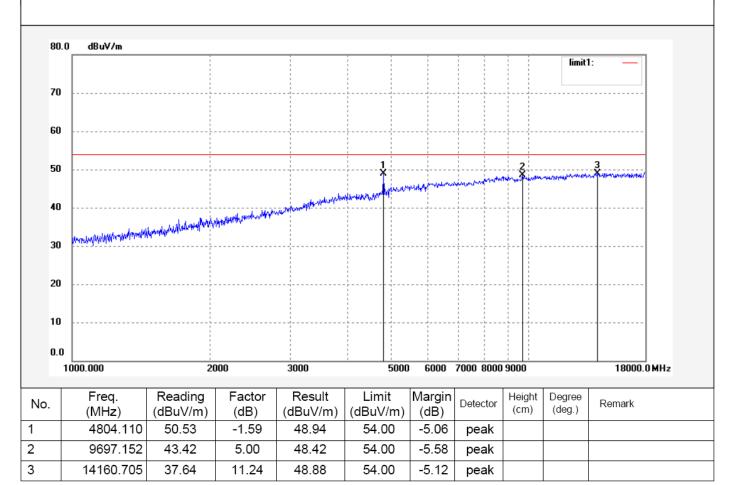
EUT: MID

Mode: TX 2402MHz

Model: PC788BXC

Manufacturer: Natural Sound

Note: Report No:ATE20140716





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Job No.: alen #3725

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.( C)/Hum.(%) 25 C / 55 %

EUT: MID

Mode: TX 2440MHz

Model: PC788BXC

Manufacturer: Natural Sound

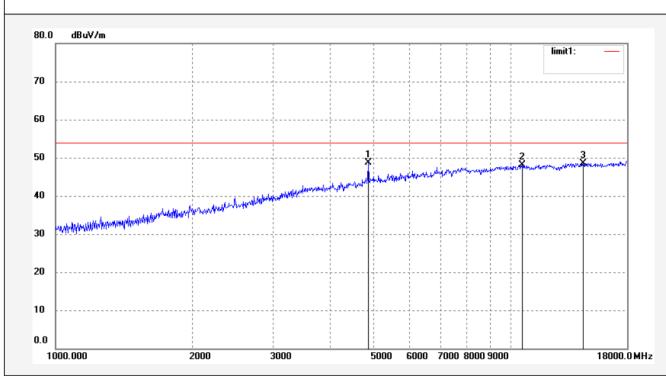
Note: Report No:ATE20140716

Polarization: Horizontal

Power Source: AC 120V/60Hz

Date: 14/05/11/ Time: 9/31/20

Engineer Signature: Distance: 3m





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Report No.: ATE20140716

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Job No.: alen #3724

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.( C)/Hum.(%) 25 C / 55 %

EUT: MID

Mode: TX 2440MHz

Model: PC788BXC

Manufacturer: Natural Sound

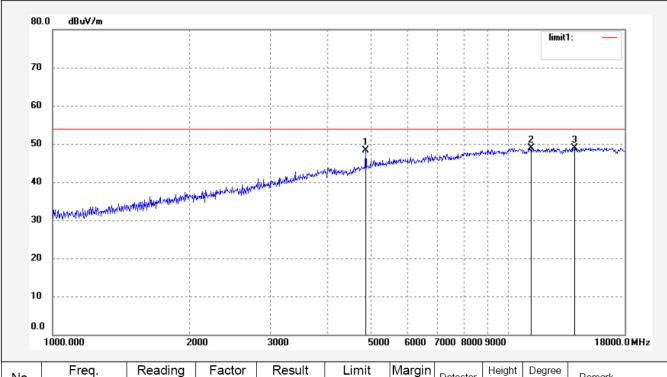
Note: Report No:ATE20140716

Polarization: Vertical

Power Source: AC 120V/60Hz

Date: 14/05/11/ Time: 9/30/27 Engineer Signature:

Distance: 3m





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Job No.: alen #3726

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.( C)/Hum.(%) 25 C / 55 %

EUT: MID

30

20

10

0.0

1000.000

Mode: TX 2480MHz

Model: PC788BXC

Manufacturer: Natural Sound

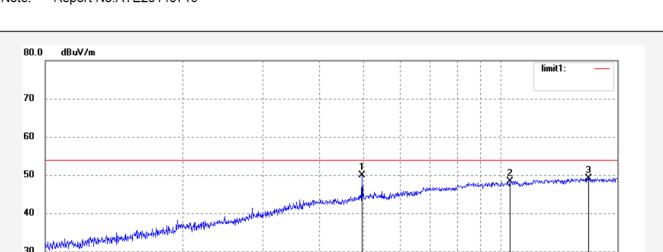
Note: Report No:ATE20140716 Polarization: Horizontal

Power Source: AC 120V/60Hz

Date: 14/05/11/ Time: 9/32/37 Engineer Signature:

Distance: 3m

6000 7000 8000 9000



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	4959.307	51.09	-1.12	49.97	54.00	-4.03	peak			
2	10484.230	43.20	5.20	48.40	54.00	-5.60	peak			
3	15577.899	37.80	11.30	49.10	54.00	-4.90	peak			

3000

2000

18000.0 MHz



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Site: 1# Chamber

Report No.: ATE20140716

Tel:+86-0755-26503290 Fax:+86-0755-26503396

Job No.: alen #3727

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.( C)/Hum.(%) 25 C / 55 %

EUT: MID

Mode: TX 2480MHz

Model: PC788BXC

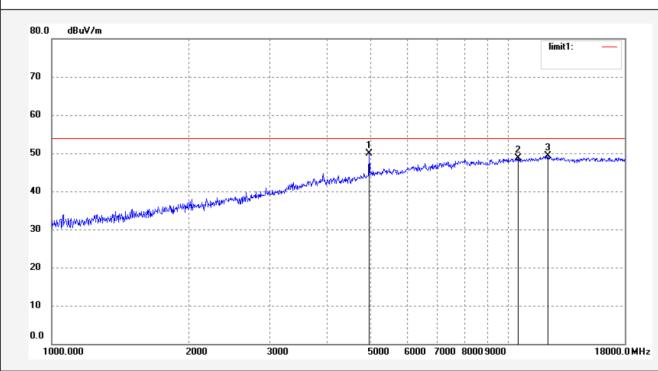
Manufacturer: Natural Sound

Note: Report No:ATE20140716

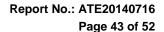
Polarization: Vertical

Power Source: AC 120V/60Hz

Date: 14/05/11/
Time: 9/33/48
Engineer Signature:
Distance: 3m



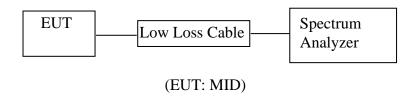
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	4959.307	51.05	-1.12	49.93	54.00	-4.07	peak			
2	10514.577	43.47	5.20	48.67	54.00	-5.33	peak			
3	12219.853	42.61	6.79	49.40	54.00	-4.60	peak			





# 10. CONDUCTED SPURIOUS EMISSION COMPLIANCE TEST

# 10.1.Block Diagram of Test Setup



# 10.2. The Requirement of Section 15.247(d)

Section 15.247(d): 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, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. 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).

# 10.3.EUT Configuration on Measurement

The equipment is installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.



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10.4. Operating Condition of EUT

- 10.4.1. Setup the EUT and simulator as shown as Section 11.1.
- 10.4.2. Turn on the power of all equipment.
- 10.4.3.Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480 MHz. We select 2402MHz, 2440MHz, and 2480MHz TX frequency to transmit.

# 10.5.Test Procedure

- 10.5.1. The transmitter output was connected to the spectrum analyzer via a low loss cable.
- 10.5.2.Set RBW of spectrum analyzer to 100kHz and VBW to 300kHz
- 10.5.3. The Conducted Spurious Emission was measured and recorded.

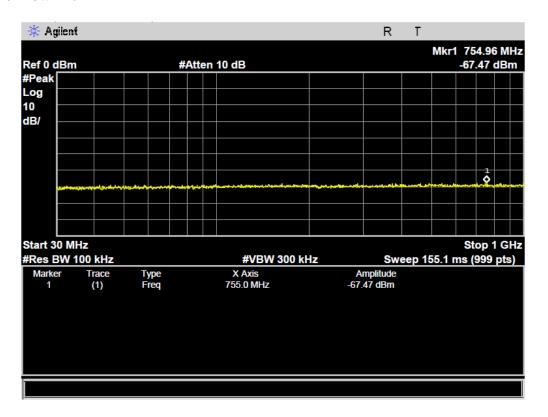
### 10.6.Test Result

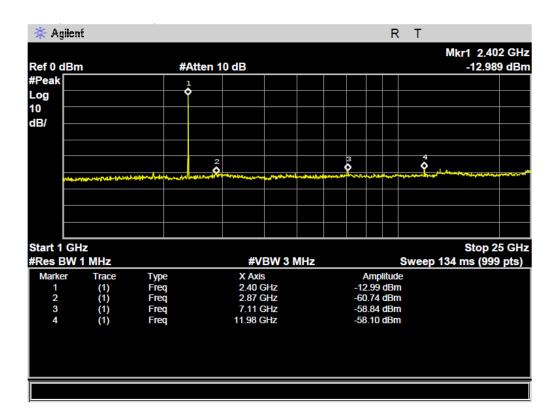
Pass.

The spectrum analyzer plots are attached as below.



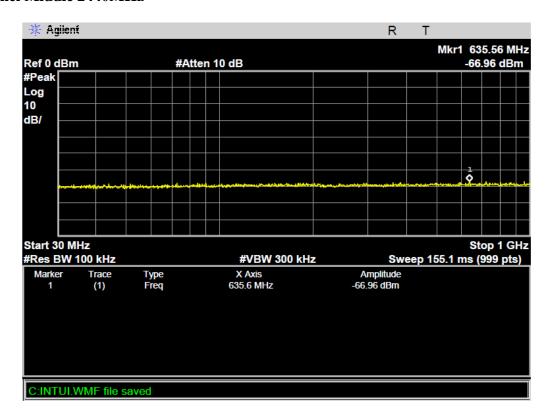
#### **BLE Channel Low 2402MHz**

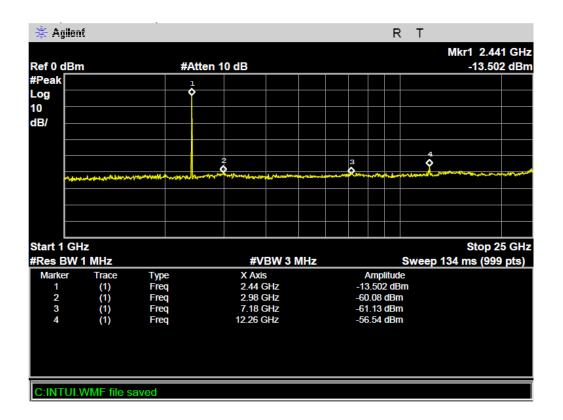




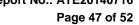


#### **BLE Channel Middle 2440MHz**



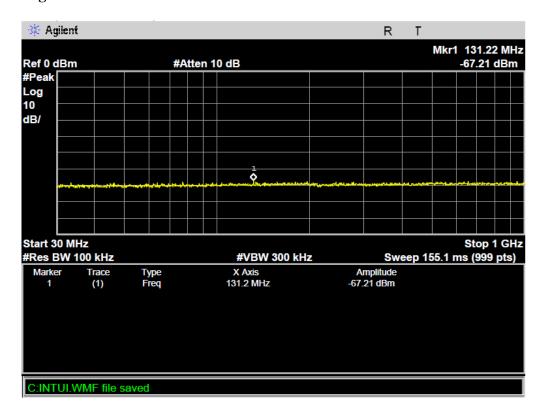


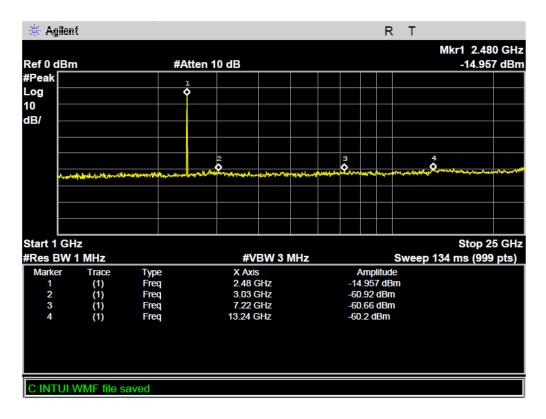






# **BLE Channel High 2480MHz**

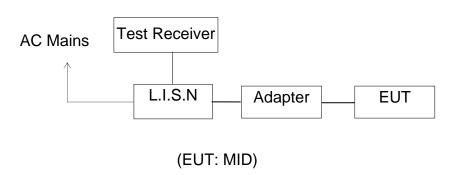






11.POWER LINE CONDUCTED MEASUREMENT

# 11.1.Block Diagram of Test Setup



### 11.2. Power Line Conducted Emission Measurement Limits

Frequency	Limit dB(μV)					
(MHz)	Quasi-peak Level	Average Level				
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *				
0.50 - 5.00	56.0	46.0				
5.00 - 30.00	60.0	50.0				

NOTE1: The lower limit shall apply at the transition frequencies.

NOTE2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

# 11.3.Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

# 11.4. Operating Condition of EUT

- 11.4.1. Setup the EUT and simulator as shown as Section 5.1.
- 11.4.2. Turn on the power of all equipment.
- 11.4.3.Let the EUT work in test mode and measure it.



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### 11.5.Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 500hm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.4: 2009 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCS30) is set at 9kHz.

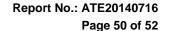
The frequency range from 150kHz to 30MHz is checked.

# 11.6.Power Line Conducted Emission Measurement Results

#### PASS.

Emissions attenuated more than 20 dB below the permissible value are not reported.

The spectral diagrams are attached as below.





#### CONDUCTED EMISSION STANDARD FCC PART 15 B

MID M/N:PC788BXC EUT: Manufacturer: Natural Sound Operating Condition: BT/Charging Test Site: 1#Shielding Room

Operator: Alen

Test Specification: N 120V/60Hz

Comment: Report No.:ATE20140716 Start of Test: 5/9/2014 / 8:44:25AM

SCAN TABLE: "V 150K-30MHz fin"

Short Description: \_SUB\_STD\_VTERM2 1.70

Stop Step Detector Meas. ΙF Transducer

Bandw. Width Time

Frequency Frequency 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008

Average



# MEASUREMENT RESULT: "NS-F01 fin"

5/9/2014 8:46AM Frequency Level Transd Limit Margin Detector Line PΕ dΒμV MHz dΒμV dΒ dΒ 0.187577 54.00 10.5 64 10.1 GND QΡ 1.060744 QΡ GND 36.50 10.9 56 19.5 Ν

11.2

60

31.6

OP

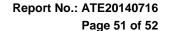
#### MEASUREMENT RESULT: "NS-F01 fin2"

28.40

5/9/2014	8:46A	M						
Freque	ency				Margin	Detector	Line	PΕ
	MHz	dΒμV	dB	dΒμV	dB			
0.62	1288	35.50	10.8	46	10.5	VA	N	GND
1.24		26.30	10.9		19.7		N	GND
6.04	6573	13.10	11.2	50	36.9	AV	N	GND

6.095043

GND





#### CONDUCTED EMISSION STANDARD FCC PART 15 B

MID M/N:PC788BXC EUT: Manufacturer: Natural Sound Operating Condition: BT/Charging Test Site: 1#Shielding Room

Operator: Alen

Test Specification: L 120V/60Hz

Comment: Report No.: ATE20140716 Start of Test: 5/9/2014 / 8:47:25AM

# SCAN TABLE: "V 150K-30MHz fin" Short Description: \_SUB\_S

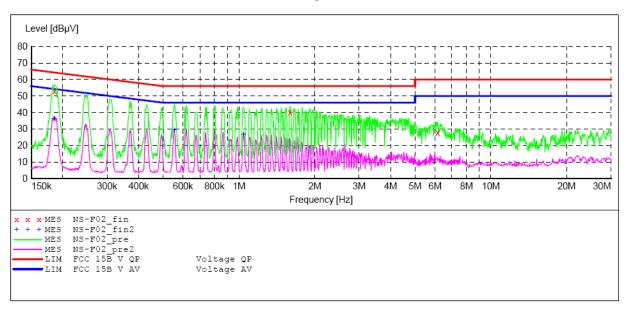
\_SUB\_STD\_VTERM2 1.70

Stop Start Step Detector Meas. ΙF Transducer

Width Time Bandw.

Frequency Frequency 150.0 kHz 30.0 MHz 4.5 kHz 9 kHz NSLK8126 2008 QuasiPeak 1.0 s

Average



#### MEASUREMENT RESULT: "NS-F02 fin"

5,	/9/2014	3:49AM						
	Frequen	cy Level	l Transd	Limit	Margin	Detector	Line	PΕ
	Mi	Hz dBµV	/ dB	dΒμV	dB			
	0.1853	44 52.90	10.5	64	11.3	QP	L1	GND
	1.5938	57 40.30	10.9	56	15.7	QP	L1	GND
	6.14390	00 27.70	11.2	60	32.3	OP	T.1	GND

#### MEASUREMENT RESULT: "NS-F02 fin2"

8:49AM							
ncy	Level	Transd	Limit	Margin	Detector	Line	PΕ
MHz	dΒμV	dB	dΒμV	dB			
605	36.20	10.5	54	18.1	AV	L1	GND
370	29.40	10.7	46	16.6	AV	L1	GND
940	26.80	10.9	46	19.2	AV	L1	GND
	ncy MHz 605 370	MHz dBμV 605 36.20 370 29.40	ncy Level Transd MHz dBμV dB 605 36.20 10.5 370 29.40 10.7	ncy Level Transd Limit MHz dBμV dB dBμV 605 36.20 10.5 54 370 29.40 10.7 46	ncy         Level Transd Limit Margin dB dBμV         MHz         dBμV         dB dBμV         dB           605         36.20         10.5         54         18.1           370         29.40         10.7         46         16.6	ncy Level Transd Limit Margin Detector MHz dBμV dB dBμV dB 605 36.20 10.5 54 18.1 AV 370 29.40 10.7 46 16.6 AV	ncy         Level         Transd         Limit         Margin         Detector         Line           MHz         dBμV         dB         dB         dB         dB         L1         AV         L1         AV         L1         AV         L1         <



# 12.ANTENNA REQUIREMENT

# 12.1.The Requirement

According to Section 15.203, 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.

# 12.2.Antenna Construction

Anténna

Device is equipped with unique antenna, which isn't displaced by other antenna. Therefore, the equipment complies with the antenna requirement of Section 15.203.

